

# Environment Act Proposal Municipality of Russell-Binscarth Russell to Rossburn and Russell to Inglis Treated Water Pipelines



The Manitoba Water Services Board

## **EXECUTIVE SUMMARY**

The Municipality of Russell Binscarth requested the Manitoba Water Services Board (MWSB) to prepare an Environment Act Proposal (EAP) for a Class 2 Development License under the Manitoba Environment Act for an upgrade of the Water Treatment Plant (WTP) and water supply pipeline. The expansion and upgrade involves the following:

1. Construction of a treated water supply pipeline from the new Russell WTP to existing reservoir in Rossburn.
2. Construction of a treated water supply pipeline from the new Russell WTP to existing reservoir in Inglis.

The remainder of the project has been licensed under an earlier EAP including the new Russell WTP, concentrate discharge to Spear Lake, and treated water pipeline from Russell to Binscarth.

The proposed upgrades will allow the Municipality to overcome inadequate water supply with aged ineffective infrastructure, with the Rossburn WTP in violation of the operating license conditions. This EAP is submitted for this proposed infrastructure.

The Town of Rossburn has an approximate population of 552, and the Community of Inglis has an approximate population of 200 people.

The expansion includes the construction of a new 32 L/s WTP in Russell using groundwater wells as a water supply. The proposed treatment process will consist of an integrated membrane system including Reverse Osmosis (RO). Concentrate from the RO will be discharged to Spear Lake north-west of Russell. The proposed expansion to the Russell WTP will increase the operating capacity from 10 L/s to 32 L/s.

The distribution system will be expanded with the installation of approximately 40 kms of pressure pipeline to supply the existing Rossburn reservoir, and a 22 km pipeline to Inglis. Existing or upgraded infrastructure from the Rossburn reservoir and Inglis reservoir will be utilized for re-chlorination purposes as necessary.

---

## Table of Contents

EXECUTIVE SUMMARY .....	i
List of Acronyms .....	1
<b>1.0 Introduction and Background .....</b>	<b>2</b>
<b>1.1 Introduction .....</b>	<b>2</b>
<b>1.2 Background Information.....</b>	<b>2</b>
<b>1.2.1 Previous Studies .....</b>	<b>3</b>
<b>1.2.2 Population.....</b>	<b>4</b>
<b>1.2.3 Current and Projected Water Use.....</b>	<b>4</b>
<b>1.2.4 Raw Water Source .....</b>	<b>5</b>
<b>1.2.5 Water Rights Act.....</b>	<b>5</b>
<b>1.2.6 Water Quality .....</b>	<b>6</b>
<b>1.2.7 Compliance Plan .....</b>	<b>8</b>
<b>2.0 Description of Proposed Development .....</b>	<b>9</b>
<b>2.1 Project Description .....</b>	<b>9</b>
<b>2.1.1 Water Source .....</b>	<b>9</b>
<b>2.1.1.1 Well Installations .....</b>	<b>9</b>
<b>2.1.1.2 Raw Water Quality.....</b>	<b>10</b>
<b>2.1.1.3 Raw Water Pipeline .....</b>	<b>10</b>
<b>2.1.2 Water Treatment Plant .....</b>	<b>10</b>
<b>2.1.3 Backwash and Concentrate Disposal.....</b>	<b>11</b>
<b>2.1.4 Operation and Maintenance.....</b>	<b>12</b>
<b>2.1.5 Treated Water Pipeline .....</b>	<b>12</b>
<b>2.2 Certificate of Title .....</b>	<b>13</b>
<b>2.3 Mineral Rights .....</b>	<b>13</b>
<b>2.4 Existing and Adjacent Land Use.....</b>	<b>13</b>
<b>2.5 Land Use Designation and Zoning.....</b>	<b>13</b>
<b>2.6 Agricultural and Livestock Water Use.....</b>	<b>13</b>
<b>2.7 Water Conservation Report.....</b>	<b>14</b>
<b>2.8 Project Schedule .....</b>	<b>14</b>

2.9	Project Funding .....	14
2.10	Regulatory Approvals .....	14
2.11	Public Consultation .....	14
3.0	Description of Existing Environment in the Project Area .....	15
3.1	Physiography .....	15
3.2	Climate .....	15
3.3	Hydrogeology .....	15
3.4	Hydrology .....	16
3.5	Fish and Fish Habitat .....	16
3.6	Habitat, Vegetation and Wildlife .....	17
3.7	Socioeconomic .....	18
3.8	Parks .....	18
3.9	Heritage Resources .....	19
3.10	Aboriginal Communities .....	19
4.0	Description of Environmental and Human Health Effects of the Proposed Development 20	
4.1	Air Quality .....	20
4.2	Soils .....	20
4.3	Surface Water, Fish Habitat and Fisheries .....	20
4.4	Groundwater Quality .....	21
4.5	Groundwater Levels .....	21
4.6	Vegetation .....	21
4.7	Wildlife Habitat .....	21
4.8	Noise and Vibration .....	22
4.9	Heritage Resources .....	22
4.10	Employment/Economy .....	22
4.11	Human Health and Well-being .....	22
4.12	Climate Change .....	23
5.0	Mitigation Measures and Residual Environment Effects .....	24
5.1	Air Quality .....	24
5.2	Soils .....	24

---

5.3	Surface Water, Fish Habitat and Fisheries .....	25
5.4	Groundwater Quality .....	25
5.5	Groundwater Levels .....	25
5.6	Vegetation .....	26
5.7	Wildlife Habitat .....	26
5.8	Noise and Vibration .....	26
5.9	Heritage Resources .....	26
5.10	Employment/Economy .....	26
5.11	Human Health and Well-being .....	26
5.12	Climate Change .....	26
6.0	Follow-up Plans including Monitoring and Reporting .....	27
7.0	Conclusions .....	27
8.0	References .....	28
Appendices .....		29
Appendix A - Pipeline Route Drawings .....		30
Appendix B - Existing Water Rights License (#2007-022) .....		1
Appendix C - Nearby Parks Map .....		4
Appendix D - Russell Water Chemistry .....		6
Appendix E - MWSB Watercourse Crossing Guidelines .....		15

---

**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 Municipality of Russell Binscarth requested the Manitoba Water Services Board (MWSB) to prepare an Environment Act Proposal (EAP) for a Class 2 Development License under the Manitoba Environment Act for a treated water pipeline from Russell to Rossburn and Inglis. This document provides the compiled information required for Manitoba Sustainable Development's 'Environment Act Proposal Report Guidelines' and 'Supplementary Guidelines for Municipal Water Supply Systems'.

An additional EAP was submitted for the WTP Upgrade, concentrate discharge, and pipeline from Russell to Binscarth. Since these have been previously covered, this EAP will focus only on the additional components to be licensed under this new application.

### 1.2 Background Information

The Town of Russell and the Village of Binscarth amalgamated in 2015. The Municipality of Russell Binscarth supplies potable water to residents in the former Town of Russell (population of 1,611 from the 2011 census) and the former Village of Binscarth (population of 425 from the 2011 census), from two separate aging WTPs.

The Municipality of Russell Binscarth is located in western Manitoba, adjacent to the Saskatchewan border with a population of approximately 2500. The Russell WTP receives raw water from a sand-and-gravel aquifer located approximately 8 km east of the Town. Two 200 mm diameter wells supply water to the WTP. A 200 mm PVC and 250 mm HDPE raw water pipeline deliver water from the wells to the WTP. Raw water is currently treated by the Town's lime soda ash WTP renovated in 1964 with a current treatment capacity of 7.8 to 10.3 L/s. The maximum day demand from the Town was recorded at 302.8 cubic meters in 2010.

The Russell water treatment process involves mixing of lime, soda ash, and alum with the raw water to facilitate flocculation, clarification, and precipitation prior to gravity filtration. The water is then re-carbonated, filtered through a dual media gravity filter, and chlorinated prior to storage in the reservoir. Treated water is stored in a 1000 cubic meter single-cell concrete reservoir with a 113 cubic meter pump well. A water tower (1956) with a capacity of 272,800 L maintains distribution pressure for a total treated water storage capacity of 1386 cubic meters, though the tower is nearing the end of its life cycle. The existing water tower and WTP will be replaced with a new 32 L/s reverse osmosis treatment system and in-ground concrete reservoir.

The Russell WTP supplies the Town with treated water via 805 service connections with an additional 125 connections anticipated in the future.

The Town of Rossburn currently has a population of 552 people. The existing water treatment system consists of a greensand filter with ion exchange softener system and UV disinfection, and 307 m<sup>3</sup> partially submerged concrete reservoir. The treated water has high ammonia, hardness, total dissolved solids (TDS), and sodium.

The Rossburn WTP receives raw water from two wells located just north of the WTP building in NW30-19-24W. The wells were installed in 1985 and 1999, and the Town recently replaced the pitless units on both wells. The 200mm and 150mm wells are installed in a shale aquifer with screen from depth 14.3 to 20.7m and are under artesian conditions. The wells are not considered to be GUDI. These existing wells will be decommissioned as part of the works.

The average day demand on the Rossburn WTP is 2.5 L/s with a peak day of approximately 4.9 L/s. The Rossburn WTP supplies the 552 people of the Town with treated water with an additional population of 25 new residents anticipated in the future. The Town also supplies the Waywayseecappo First Nation with approximately 2,250 m<sup>3</sup> of potable water per year through a truck fill station.

The Community of Inglis public water system supplies 215 service connections and a population of approximately 200 people, including the ski resort and 40 chalets. Inglis consumes 48,500 L (0.67 L/s) on an average day, with peak day demand near 118,000 L (1.64 L/s), supplied from two production wells located near (125mm), and in the WTP (250mm). The Inglis WTP utilizes a membrane treatment process prior to be chlorinated in a 182 m<sup>3</sup> reservoir.

### 1.2.1 Previous Studies

Previous reports have been reviewed in preparation of this Environment Act Proposal.

In November 2014, the MWSB prepared a short upgrading study, *Rossburn Water Treatment Plant Upgrading Study*, which identified the costs associated with upgrading the existing water treatment plant to provide a softened water supply.

W.L. Gibbons & Associates Inc. (WLG) prepared a report dated October 2015,<sup>7</sup> which provides a summary of the pumping well installations at Russell. Two new 300 mm diameter wells with a design capacity in excess of 32 Lps each were installed and tested. The well capacities were approximately 68 Lps (900 lpm) and 100 Lps (1300 lpm).



---

### 1.2.2 Population

Based on 2011 Census data, the Village of Rossburn has an estimated population of 552 residents, an increase from 546 in 2006, representing a growth rate of 1.1%. A projected growth over 20 years results in a future population of 577 residents in 2034. A contributing population of 100 has been assumed for the surrounding First Nations' consumption.

A per capita water consumption of 258 L/c/d was calculated in 2012. A peak day factor of 2.0 was assumed resulting in a peak day demand of 349.4 m<sup>3</sup> or 4.9 L/s based on a 20-hour operating day with four hours dedicated to maintenance activities.

Census data is not available for the community of Inglis. It is estimated that Inglis has a population of 200 people, and a 0.5% growth rate, or a total 20-year population of 221.

### 1.2.3 Current and Projected Water Use

A WTP is designed based on peak day demand. When calculating water consumption, typical average daily water usage ranges from 250 L/person/day to 300 L/person/day and peak day usage (peak day factor) is typically 1.5 to 2.0 times greater. Consumptions of 300 L/person/day and a peak day factor of 1.8 was used for this study. The project treated water demands are summarized in Table 1.1.

The current peak treated water demand for Russell is 14.2 L/s and the peak day for Binscarth is 5.3 L/s, or a total of 19.5 L/s. The 20-year peak-day demand for Rossburn is 4.9 L/s. Inglis is projected to consume 0.8 L/s on an average day, with 20-year peak day demand near 1.8 L/s. A total system peak-day demand is projected to be 25.5 L/s (See Table 1.1 below). The 20-year average day demand for the system is projected to be 1,021,500 L/day (14.2 L/s).

The WTP will provide a 32 L/s capacity with additional capacity available for expansion in the future. The new WTP will provide a reservoir which satisfies the required the water consumption, chlorine contact disinfection time, and emergency fire storage for a Class 5 reservoir (240 L/s), Basic Fire Protection for Medium Sized Towns with 2000 to 4000 Population.

**Table 1.1 - Projected Treated Water Demand for the Municipality of Russell Binscarth and Town of Rosburn**

Projected Treated Water Demand for the Russell Regional Water System		
	Quantity	Units
Russell & Binscarth Current Connections	1030	
Russell & Binscarth Future Connections	1195	
Rosburn Current Connections	278	
Rosburn Future Connections	339	
<i>Total Future Connections</i>	<i>1534</i>	<i>Connections</i>
Russell & Binscarth Current Population	2094	
Russell & Binscarth 20 Year Future Population	2607	
Rosburn Current Population	546	
Rosburn Future Population (@ 1.1%)	577	
Inglis Current Population	200	
Inglis Future Population	221	
<i>Total Future System Population</i>	<i>3405</i>	<i>People</i>
Consumption/capita/day	300	L/capita/day
Average Day Consumption	1,021,500	L/day
<i>Average Day Demand</i>	<i>14.2</i>	<i>L/s</i>
Peak Day Factor	1.8	
Peak Day Consumption	1,838,700	L/day
<i>Peak Day Demand (20 hour operating day)</i>	<i>25.5</i>	<i>L/s</i>

#### 1.2.4 Raw Water Source

The raw water sources for both the Town of Russell and the Village of Binscarth are wells. This EAP proposes a regional water source of non-GUDI wells five miles east of the Town of Russell.

#### 1.2.5 Water Rights Act

The Town of Russell utilizes Water Rights License No. 2007-022 (previous License No. 85-16). The original license was implemented in 1984/85 for wells on SE-17-21-27W. The License allows the maximum instantaneous rate of withdrawal to be 11 L/s and a maximum annual usage of 250 cubic decameters.

W.L. Gibbons & Associates Inc. (WLG), applied for a groundwater exploration permit in April 2015 for the regional system. The new wells are located approximately 1.5 miles east of the old wells on SE-17-21-27W. The maximum instantaneous rate of withdrawal is 32 L/s and a maximum annual usage of 421 cubic decameters. The 0.042 cubic meters per second (42 L/s) pumping rate is the rate required for this proposed system to supply the estimated demand.

The estimated 20-year raw water demand is 18.9 L/s on an average day and 34.0 L/s on a peak day.

**Table 1.2 - Projected Total Water Demand for the Russell Regional WTP**

Demand	Unit
18.9	L/s
496,692,000	L/yr
496,692	cubic meters/yr
496.7	cubic decameters/yr

Based on Table 1.2, the proposed WTP is capable of supplying the average day demands and an amendment to the WRL will need to be applied for to service the 20-year demand. A new Water Rights License will be applied for the new raw water supply system.

### 1.2.6 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 water quality parameters exceeding the GCDWQ include arsenic, hardness, iron, manganese, and Total Dissolved Solids (TDS). Treated water quality parameters at the existing Town of Russell WTP exceeding the GCDWQ include hardness. The existing treatment system does not reduce all parameters below the maximum acceptable concentration or the aesthetic objective including hardness. A treatment system upgrade to address all the parameters that exceed the GCDWQ and the high hardness, sulfate, and TDS in the treated water will be completed prior to the pipeline to Rossburn being placed into service.

Considering the issues with the water quality, the Town requested MWSB assistance to develop a ground water source located at SE 16-21-27W and necessary infrastructure to supply the raw water for present and future demands in the region.

Table 1.3 - Water Quality Results

Parameter	Unit	GCDWQ		Sampled: August 7, 2013	Sampled: August 7, 2013	Sampled: June 4, 2015
		AO/OG	MAC	Russell Existing Well Raw	Russell Existing WTP Treated	Russell New Well Raw
Alkalinity (Total) CaCO <sub>3</sub>	mg/L			481	95	439
Ammonia (Total) Nitrogen	mg/L			1.20	<0.010	0.72
Arsenic	mg/L		0.01	<b>0.0341</b>	0.00703	<b>0.0383</b>
Boron	mg/L			0.174	0.150	0.119
Calcium	mg/L			151	19.4	124
Chloride (Dissolved)	mg/L	250		4.26	12.9	1.44
Colour (True)	CU	15		<5.0	<5.0	<5.0
Conductivity	umhos/cm			1120	679	974
Fluoride (Dissolved)	mg/L		1.5	0.22	0.67	0.205
Hardness (Total) CaCO <sub>3</sub>	mg/L			601	159	507
Iron	mg/L	0.3		<b>3.50</b>	<0.10	<b>2.97</b>
Langelier Saturation Index (4 C)	NA			0.47	-0.35	0.70
Langelier Saturation Index (60 C)	NA			1.2	0.41	1.5
Lead	mg/L		0.01	0.000331	0.000171	<0.00090
Magnesium	mg/L			54.1	26.8	47.8
Manganese	mg/L	0.05		<b>0.463</b>	0.00298	<b>0.300</b>
Nitrate and Nitrite as N	mg/L		10	~~~	~~~	<0.070
Nitrate as N	mg/L		10	<0.0050	0.280	<0.020
Nitrite as N	mg/L		1	<0.0010	<0.0010	<0.010
pH	pH	6.5 to 8.5		7.39	8.09	7.72
Potassium	mg/L			6.72	7.49	5.85
Sodium	mg/L	200		39.1	83.0	19.7
Sulphate/ Sulfate (Dissolved)	mg/L	500		219	225	142
Total Dissolved Solids	mg/L	500		<b>813</b>	468	<b>688</b>
Total Organic Carbon	mg/L			3.1	3.0	3.8
Turbidity	NTU			38.3	0.39	42
Uranium	mg/L		0.02	0.00415	<0.00010	0.00267
Zinc	mg/L	5		0.0071	<0.0020	<0.0020

<sup>a</sup> Hardness levels greater than 200 are considered poor but tolerable. Hardness levels greater than 500 are generally considered unacceptable.

<sup>b</sup> THM based on average of quarterly samples.

<sup>c</sup> 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.

<sup>DLA</sup> Detected Limit Adjusted for required dilution.

---

### 1.2.7 Compliance Plan

A compliance plan has not been completed for the existing WTP.

## 2.0 Description of Proposed Development

### 2.1 Project Description

The proposed development includes:

1. Construction of a treated water supply pipeline from the new Russell WTP to the existing Rossburn reservoir.
2. Construction of a treated water supply pipeline from the new Russell WTP to the existing Inglis reservoir.

The WTP, concentrate discharge, and pipeline to Binscarth have all been applied for under a previous EAP.

Refer to the drawing in the Appendix, which show the proposed location of the rural water pipeline to Rossburn and Inglis.

#### 2.1.1 Water Source

The groundwater will be pumped from an aquifer located beneath SE-16-21-27W approximately 10 km east of Russell. This source was selected following a groundwater study of potential options and field testing to confirm the availability of suitable groundwater resources. This aquifer has also been the source of water for Russell for the past three decades; it is a reliable and sustainable aquifer.

##### 2.1.1.1 Well Installations

W.L. Gibbons & Associates Inc. (WLG) report dated October 2015,<sup>5</sup> provides a summary of the pumping well installations.

"The two new pumping wells were installed in the summer of 2015 (June through September) by Watkins & Argue Drilling of Clearwater, MB under the direct supervision of WLG personnel."<sup>5</sup>

The installation of the first new supply well (designated as PW 15-01) began on July 27 and was completed on July 30, 2015."<sup>5</sup>

"The well was installed approximately 350 meters south of Mile Road 122N, and on the west side of PR 478. The well is located within private property to be acquired by the municipality."<sup>5</sup>

"A pumping test was conducted on Well PW 15-01 on September 15 to 16, 2015. Assuming the pump is set at a depth of 34.4 meters (113 feet), and a maximum safe pumping level of 18.45

---

meters (60 feet), the total well capacity is approximately 68 Lps (900 lgpm), well in excess of the current design requirement of 32 Lps."<sup>5</sup>

"The installation of the second supply well (designated as PW 15-02) began on September 14 and was completed on September 17, 2015."<sup>5</sup>

"A well capacity test was conducted on Well PW 15-02 on September 16, 2015. Assuming the pump is set at a depth of 34.4 meters(113 feet), and a maximum safe pumping level of 18.45 meters (60 feet), the total well capacity is in excess of 100 Lps (1300 lgpm)."<sup>5</sup>

#### **2.1.1.2 Raw Water Quality**

During the long term pump test, water samples were collected and submitted for laboratory analysis to characterize the raw water quality of the aquifer. The chemistry results indicated that the aquifer has a good water quality for membrane treatment. The chemistry results from the existing Town of Russell wells indicate that good water quality is consistent across the aquifer. The wells are considered to be installed in a confined aquifer and are not in an artesian condition as the previous production wells. The complete chemistry can be found in the Appendix or refer to Table 1.3 - Water Quality Results.

#### **2.1.1.3 Raw Water Pipeline**

The raw water pipeline was sized using 20-year projected water demand. The raw water pipeline has been constructed on highway and roadway Right-of-Ways (ROWs) as required. The pipeline route can be found in the Appendix.

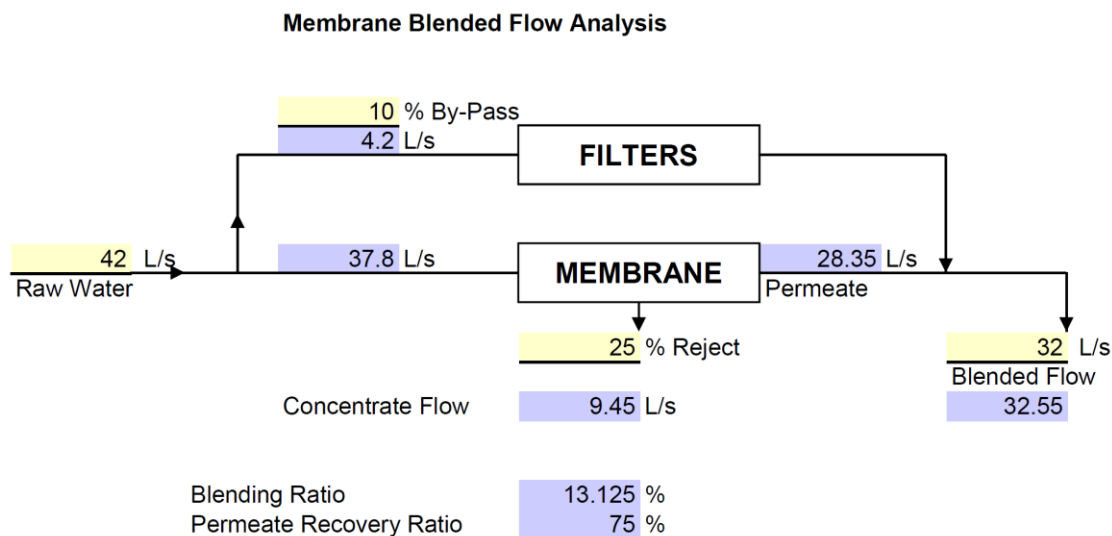
The pipeline is 250 mm HDPE.

### **2.1.2 Water Treatment Plant**

The Municipality of Russell Binscarth WTP is classified as a Class 3 Water Treatment Facility. The existing lime soda ash treatment system will be replaced with a 32.0 L/s Reverse Osmosis (RO) membrane unit with possible greensand bypass. The proposed membrane filtration is effective in protecting against viruses and cysts such as *Cryptosporidium* oocysts and *Giardia lamblia* cysts as well as removing nitrates, TDS, iron, manganese, and softening the water to acceptable concentrations. The upgraded treatment system will supply the projected 20-year population demand of the Municipality while treating water that meets the DWSA and GCDWQ.

The detailed design of the proposed WTP is slated to begin in September 2016 and commence construction in Spring 2017.

The existing treatment system will be decommissioned once the new treatment system is fully operational and commissioned. The existing raw water line will be utilized to supply the new WTP. The old treatment equipment will be removed from the existing WTP building. Membrane concentrate accounts for 20-30% of the total raw water flow through the WTP. Using a 25% concentrate rate and a 10% by-pass rate through a pressure filter will result in an instantaneous raw water demand of 42 L/s. Figure 2.1 illustrates a schematic of the treatment process producing 32 L/s of treated water to satisfy the 20-year projected water demand.



**Figure 2.1 - Blended Membrane Flow Analysis**

The membrane system will be designed to reduce hardness to a level acceptable to the community (generally less than 150 mg/L). Membrane systems remove a significant portion of the dissolved minerals. In order to achieve an aesthetically acceptable level of hardness, approximately 10% percent of the raw water flow will by-pass the membrane unit and receive treatment in a filter to be blended with membrane permeate. Membrane permeate is generally chemically unstable and benefits from the addition of filtered by-pass water or caustic soda to adjust the pH to a suitable level within the distribution system.

The existing Water Rights License (WRL) which is 250 cubic decameters is inadequate, thus the proposed WRL amendment.

### 2.1.3 Backwash and Concentrate Disposal

The membrane concentrate disposal has been applied for under a previous EAP. 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 an 80%



recovery rate with a 20% concentrate rate of the flow through the membrane unit. It is proposed that membrane concentrate be discharged to Spear Lake through a 200 mm diameter pipeline. Spear Lake is fed by Conjuring Creek.

#### **2.1.4 Operation and Maintenance**

The Municipality is responsible for operation and maintenance of the raw water pipeline, well site, and 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 residential 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 during the commissioning phase by the selected equipment supplier.

Typical operating costs include: chemicals, maintenance personnel salary, electricity costs, general repairs, water and 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.

#### **2.1.5 Treated Water Pipeline**

A 200 mm or 250 mm HDPE diameter pipeline of High Density Polyethylene (HDPE) or Poly Vinyl Chloride (PVC) will be installed to Rosburn, and a 100 mm or 150 mm pipeline to Inglis will be installed in accordance with MWSB Standard Construction Specifications 2016. Installation will involve open cut trenches with horizontal drilling where required. The pipeline will be buried a minimum depth of 2.4 meters through roadway crossings. Excavated soil will be stock piled, adjacent to the work area, and then used as backfill. Ditches will be restored to original grades and seeded where required to prevent erosion.

Horizontal directional drilling will be in accordance with MWSB guidelines for watercourse crossings (refer to Appendix), MWSB Standard Construction Specifications 2016, and Department of Fisheries and Oceans (DFO) Operational Statements (OS). Pipeline crossings at drains will be directionally drilled, starting and ending outside of the riparian zone. Although stream crossings are usually directionally drilled, specifications permit dry intermittent drains to be crossed by open cut trenching according to MWSB Specifications and DFO OS - Isolated or Dry Open Cut Stream Crossings. All highway and roadway (PTH & PR) crossings will be

directionally drilled and encased in accordance with Manitoba Infrastructure and Transportation (MIT) regulations.

Upon the completion of construction, the pipeline will be swabbed with multiple swabs until the pipeline is clean, pressure tested, and disinfected prior to commissioning the system in accordance with MWSB Specifications.

## **2.2 Certificate of Title**

The wells will be located on municipal owned land in SE-16-21-27W. The Municipality of Russell Binscarth is in the process of acquiring title for the new well site.

The Russell WTP is on property owned by the Municipality of Russell Binscarth. The most likely location for the proposed new Russell WTP is on property adjacent to the existing WTP. The Municipality is in negotiations with the Canadian Pacific Railway (CPR) to obtain the property or access to the property for the WTP construction.

It is proposed to locate the treated water pipeline to Rossburn within highway and roadway Right-of-Ways (ROWs) which are owned by the Crown. If necessary, private easements will be obtained to accommodate the pipeline installation.

## **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 municipality, adjacent land is agricultural use. 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 Municipality of Russell Binscarth was designed to include the former Town of Russell and the former Village of Binscarth. The assumption is that

country residents of the municipality are serviced by individual wells. Therefore, for this specific project and scope of work, the agricultural and livestock water use can be assumed to be negligible. Total water demands for "agricultural and livestock water use" can be estimated to be less than 5% of the gross water use.

## **2.7 Water Conservation Report**

Water conservation measures include metering and pricing of water. 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 commence in Fall 2016 and be completed in the March 2018, depending on the receipt of all approvals.

## **2.9 Project Funding**

This project has received Clean Water and Wastewater Funding from the Federal and Provincial Governments.

## **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:

- Manitoba Conservation and Water Stewardship
- Office of Drinking Water (ODW)
- Manitoba Infrastructure and Transportation (MIT)

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

## **2.11 Public Consultation**

A public consultation will be held in the future to discuss the proposed pipeline with the residents of Rossburn as part of the Borrowing Bylaw. It is not expected that there will be major concerns forwarded to the Town regarding the upgrades, other than the cost of the proposed infrastructure.

---

## 3.0 Description of Existing Environment in the Project Area

### 3.1 Physiography

The Municipality of Russell Binscarth is located in western Manitoba, near the southwest corner of Riding Mountain National Park (RMNP).

W.L. Gibbons & Associates Inc. (WLG) report dated November 2014:

"Regional Setting:"

"Physiography:"

"The study area is located generally in T20 to 21, R27 to 28W which 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 and the Conjuring Creek Valley. The ground elevation in the uplands near Russell is on the order of 560 m. The base of the Assiniboine River Valley is at an elevation on the order of 410 m. Surface water drainage is towards the Assiniboine River Valley."<sup>5</sup>

### 3.2 Climate

There is a Government of Canada weather station located at Russell. Information available after October 1990. The climate ID/ station ID/ station number: 5012520. Latitude: 50-46'00.000" N. Longitude: 101-17'00.000" W. Elevation: 567.00 m.

There is a Government of Canada weather station located at Binscarth. Information available after October 2005. The climate ID/ station ID/ station number: 5010216. Latitude: 50-35'00.000" N. Longitude: 101-16'00.000" W. Elevation: 525.80 m.

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 in the month of January. Approximately 500 mm of precipitation are received each year on average in this region.

### 3.3 Hydrogeology

W.L. Gibbons & Associates Inc. (WLG) report dated November 2014:

"Bedrock Geology/Hydrogeology: Bedrock in the study area occurs at depths ranging from 3 meters in the immediate area of the Town of Russell to in excess of 100 meters to the east and

north east. The bedrock in the upland areas consists primarily of shales of the Odanah Member of the Riding Mountain Formation, underlain by the shales of the Millwood Member. Locally, the Odanah Member shales are fractured and domestic scale volumes of groundwater can be obtained from the bedrock. The Millwood Member shales are rarely fractured and are considered to be an aquitard."<sup>5</sup>

"To the east of the Town of Russell, the available evidence indicates that a deep buried valley has been eroded into the bedrock surface that generally follows the current orientation of Silver Creek. This buried valley has been subsequently infilled with sediments that include the sands and gravels which form the aquifer for the Towns current water supply."<sup>6</sup>

"Surficial Geology/Hydrogeology: The surficial geology of the region consists predominantly of a veneer of clay till with colluvium and alluvium in the river and creek valleys. The information from the past drilling of water wells in the study area has found that the stratigraphy at depth consists primarily of till with small layers of sands and gravels. Within the buried bedrock valley to the east of Russell, there is a thick sequence of sand and gravel deposits underlying the till and overlying the shale bedrock. This sand and gravel deposit is approximately 1 to 2 miles wide. Within the study area, the sand and gravel forms a continuous deposit from the north side of (T21-R27W) to the south side of (T20-R28W). The deposit extends to the north and south of the indicated limits. The existing Town of Russell supply wells withdraw water from this aquifer, and there have been two loading stations developed in it, one at SE21-21-27W and another at NE36-19-28W."<sup>6</sup>

### 3.4 Hydrology

There are numerous smaller "pothole" lakes surrounding Russell. Rossburn is located 40 km south-east of Russell. In this region, the Assiniboine River runs north-south, approximately 10 km west of Russell; the Manitoba-Saskatchewan border is 16 km west. The Shellmouth Reservoir along the Assiniboine River is approximately 20 km north-west of Russell just west of Inglis.

The proposed pipeline will cross one major waterway: Birdtail Creek. No major obstacles are anticipated in crossing the creek, and the crossing will be completed in accordance with MWSB Waterway crossing guidelines.

### 3.5 Fish and Fish Habitat

Potential fish habitat in the project area includes Silver Creek, Birdtail Creek, Conjuring Creek, and Thunder Creek which are all in the Assiniboine River basin. Fish species information has been requested from Manitoba Sustainable Development, but has not yet been provided. In discussion with B. Bruederlin on August 16, 2016 it was presented that all crossings will be by

directional drilling which was identified as the preferred method of crossing, and least disruptive to the environment.

### 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 Municipality of Russell Binscarth as "Aspen Parkland".

From the website for the "World Wildlife Federation" (.org), the following is available about this ecozone:

"Canadian Aspen Forests and Parklands:

Status: Critical/ Endangered

This ecoregion is classified primarily as having a subhumid low boreal ecoclimate, which distinguishes this ecoregion from the warmer, drier areas to the south and the cooler boreal forests to the north. It also has a transitional grassland ecoclimate. Summers are short and warm, and winters are cold and long. The Peace River Lowland area of the region generally represents the coolest temperatures for each range, while the Southwest Manitoba Uplands region represents the warmest temperatures.

Much of the region is underlain by Cretaceous shale, and covered by undulating to kettled, calcareous, glacial till with significant areas of level lacustrine, and hummocky to ridged fluvioglacial deposits. Associated with the rougher hummocky glacial till are a large number of small lakes, ponds and sloughs occupying shallow depressions.

Description:

Biological Distinctiveness:

Vegetation in this ecoregion is characterized by a cover of quaking aspen (*Populus tremuloides*) with secondary quantities of balsam poplar (*P. balsamifera*), together with an understory of mixed herbs and tall shrubs. White spruce (*Picea glauca*) and balsam fir (*Abies balsamea*) are the climax species, but are not well represented because of fires. Jack pine (*Pinus banksiana*) stands may be present on drier, sandy sites. Poorly drained sites are usually covered with sedges (*Carex spp.*), willow (*Salix spp.*), some black spruce (*P. mariana*), and tamarack (*Larix laricina*). In the Turtle Mountain and Spruce Woods areas (TEC 163, 164), quaking aspen dominates with secondary quantities of balsam poplar, although white spruce and balsam fir are the climax species if fires do not occur frequently (ESWG 1995).

Characteristic wildlife include moose (*Alces alces*), white-tailed deer (*Odocoileus virginianus*), black bear (*Ursus americanus*), wolf (*Canis lupus*), beaver (*Castor*

*canadensis*), coyote (*Canis latrans*), marten (*Martes americana*), mink (*Mustela vison*), red fox (*Vulpes vulpes*), snowshoe hare (*Lepus americanus*), northern pocket gopher (*Thomomys talpoides*), Franklin's ground squirrel (*Citellus franklinii*), sharp-tailed grouse (*Tympahuchus phasianellus*), ruffed grouse (*Bonasa umbellus*), black-billed magpie (*Pica pica*), cormorant (*Phalacrocorax spp.*), gull (*Larus spp.*), tern (*Sterna spp.*), American white pelican (*Pelecanus erythrorhynchos*) and many neotropical migrant bird species (ESWG 1995).

Of ecological significance, the Aspen Parkland and Forests ecoregion represents the most extensive boreal-grassland transition in the world. This ecoregion contains the northernmost breeding distribution for many warbler species (*Parulinae*) and has some of the most productive and extensive waterfowl breeding habitat on the continent. White-tailed and black-tailed deer (*Odocoileus virginianus* and *O. hemionus*) reach their northern continental limit here."<sup>6</sup>

The Government of Manitoba has information and detailed records on Manitoba's animals and plant communities at risk (Species-At-Risk (SAR)), together with their known location, maintained by the Manitoba Conservation Data Centre. There is an "ecoregion search" within this database. For this ecoregion, there is a long list of recognized plants and animals. However, without an in-situ (field) biological survey of the target area, there is no scientific and quantifiable method of determining what species are actually in the target area for this project, though all pipelines will be installed in previously disturbed road ROW's.

### 3.7 Socioeconomic

The Municipality of Russell Binscarth 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 expand and upgrade the Public Water System (PWS). This work will ensure the long-term supply of potable water for the community of Rossburn. This is necessary to ensure the continued socio-economic sustainability and growth of these 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. It is anticipated that there will be socioeconomic benefit due to the increased lifespan of hot water tanks and fixtures connected to the system in Rossburn.

### 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 north-east. The nearest provincial park is Asessippi Provincial Park located by the Shellmouth

Reservoir of the Assiniboine River, described earlier in Section 3.4. The second nearest Provincial Park is Duck Mountain Provincial Park which is north of RMNP. Please refer to the maps in the Appendix.

### **3.9 Heritage Resources**

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

### **3.10 Aboriginal Communities**

One First Nation (FN) communities is located along the proposed pipeline alignment. Waywayseecappo First Nation is located approximately 3 km west of Rossburn on Treaty # 2 land. The proposed pipeline will follow Provincial Highway 45 right-of-way which runs adjacent to the northern boundary of Waywayseecappo First Nation for approximately 7 km, and then follow the municipal roads along the boundary to connect to Rossburn.



## **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.

#### **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**

A new Water Rights License (WRL) will be applied for the new production wells (raw water source) for the Municipality of Russell Binscarth. 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.

Groundwater will be extracted through the Water Rights License for the wells supplying the regional system for the Municipality of Russell Binscarth. This groundwater has been studied in several reports most notably through W.L. Gibbons & Associates Inc. (WLG) reports from Steve Wiecek. This groundwater pumping rate is sustainable. The increased rate beyond 32 L/s may require mitigating the impact to the nearest well but installing a new submersible pump and pitless unit. Other groundwater will not be affected.

#### **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, 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. There will be some local economic benefit during construction. The proposed project will address limited treatment capacity at Russell and water quality at Rossburn. 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 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 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 pipeline 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 in accordance with 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, Manitoba Conservation and Water Stewardship will be notified through the emergency response line and appropriate measures will be taken according to Manitoba Conservation and Water Stewardship requirements.

Backfilling with soil stockpiles as soon as possible and minimizing the amount of soil disturbance 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.

### **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 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 or yearly) and input into a suitable database capable of generating charts of water level trends over time.

### **5.6 Vegetation**

Backfilling with soil stockpiles as soon as possible and minimizing the amount of soil disturbance 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 undesirable 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

Prior to construction a "Permit to Construct or Alter a Public Water System" will be submitted to the Office of Drinking Water (ODW) under the Drinking Water Safety Act (DWSA) for approval. An amended Operating License and WRL for the new regional system will be required for the new WTP in Russell.

## 7.0 Conclusions

In conclusion, this Environment Act Proposal for a Class 2 Development License under the Manitoba Environment Act for a rural water pipeline to service the Rossburn and Inglis Public Water Systems has demonstrated that the proposed Work meets or exceeds regulatory requirements and is environmentally responsible.

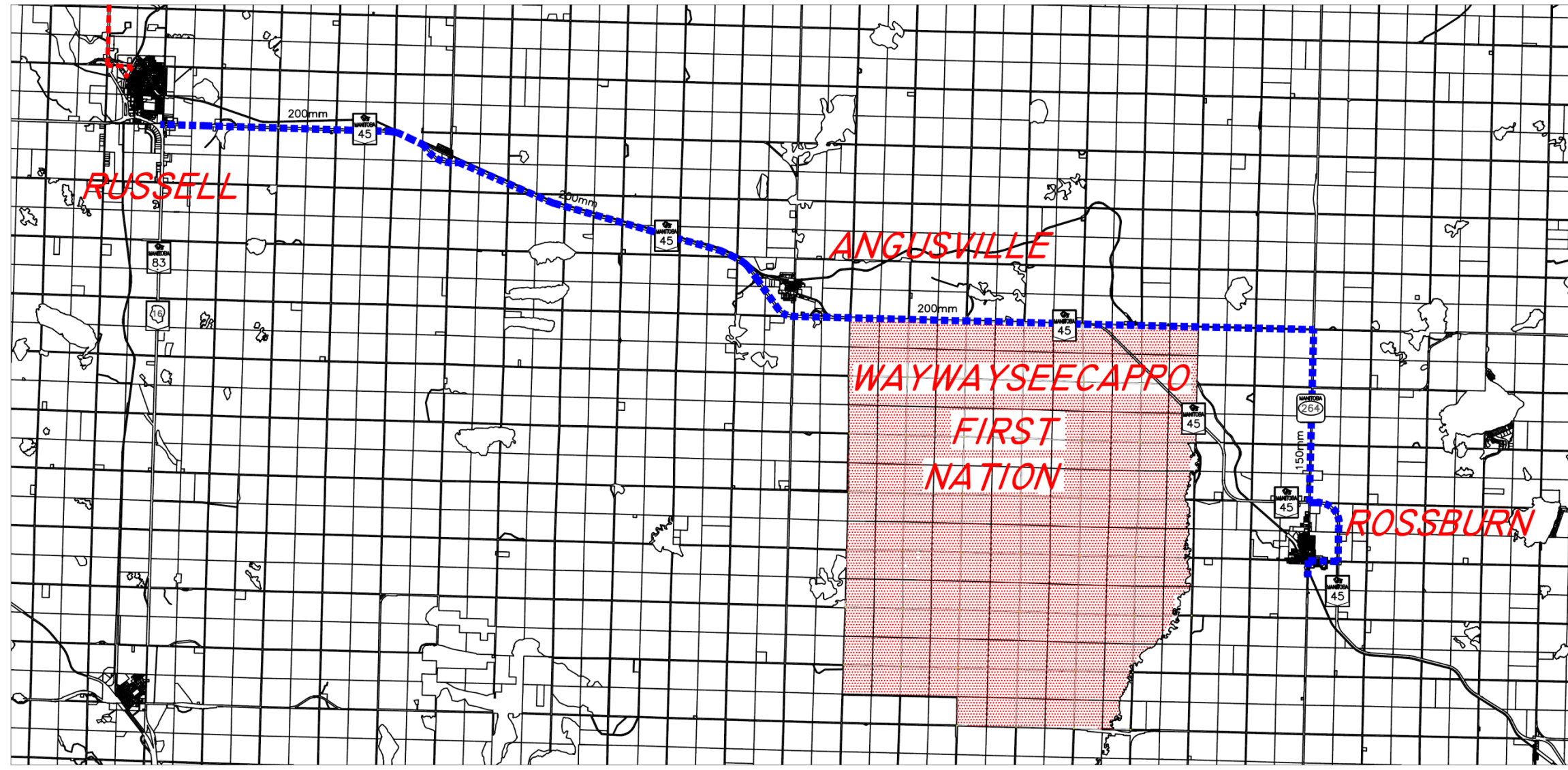


## 8.0 References

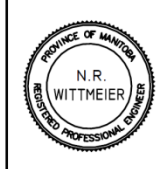
1. MWSB, Nathan Wittmeier, November 2014, Rossburn *Water Treatment Plant Upgrading Study*.
2. MWSB, Nathan Wittmeier, February 2015, *Municipality of Russell-Binscarth Treated Water Supply Study*.
3. W.L. Gibbons & Associates, Steve Wiecek, August 2014, Town of Russell, *Water Supply Assessment Report on Investigation Results*, File: 08-197.
4. W.L. Gibbons & Associates, Steve Wiecek, November 2014, *Town of Russell Groundwater Supply Assessment Study*.
5. W.L. Gibbons & Associates, Steve Wiecek, October 2015, Municipality of Russell-Binscarth, *Water Supply Upgrades, Summary Report of Pumping Well Installations*, File: 08-197.
6. WWF (org), 30/11/2015, World Wildlife Fund or World Wide Fund for Nature (WWF), Ecoregion: Canadian Aspen Forests and Parklands:  
<http://www.worldwildlife.org/ecoregions/na0802>

## Appendices

**Appendix A - Pipeline Route Drawings**



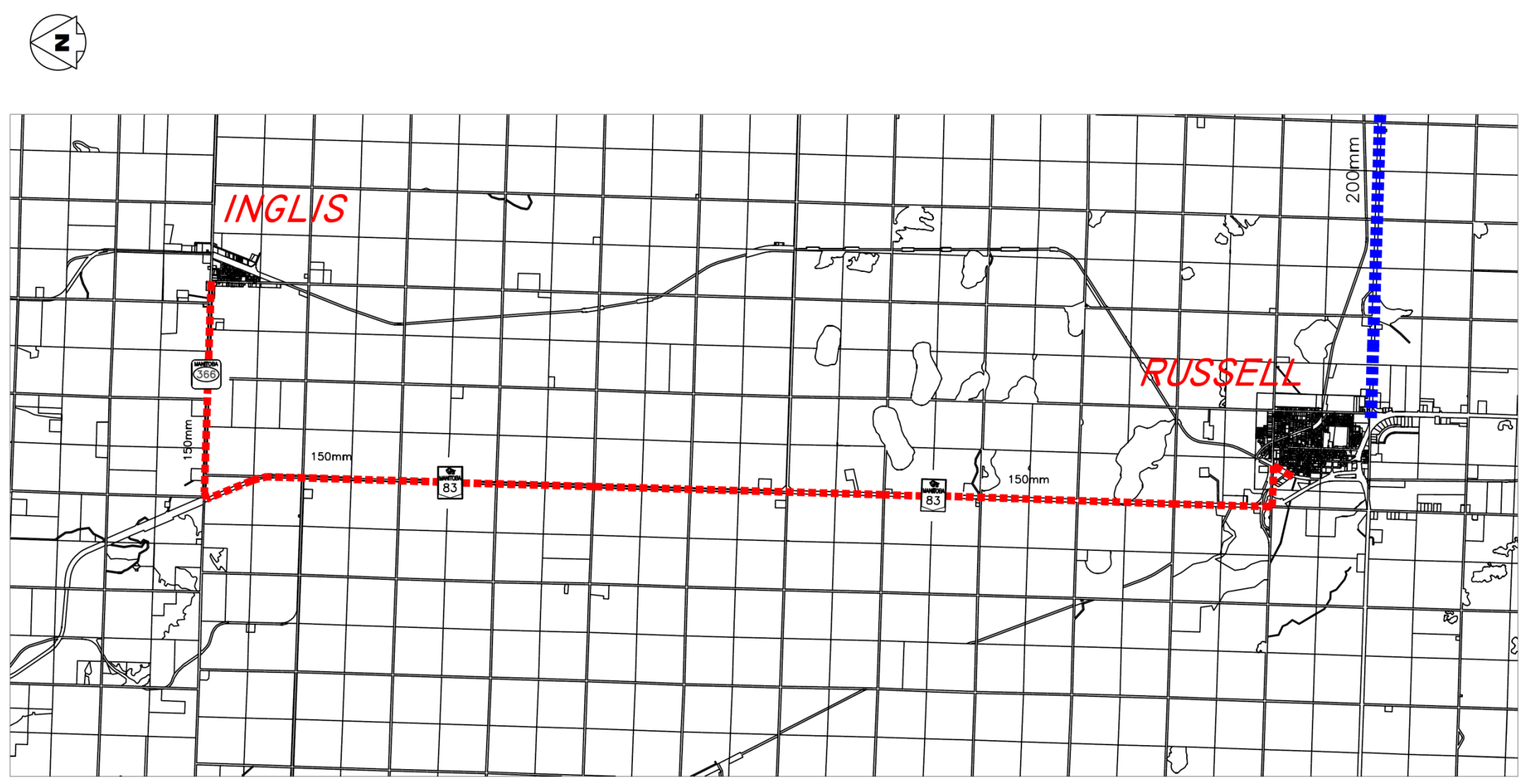
NO.	DESCRIPTION	BY	DATE
A	ISSUED FOR APPROVAL	NW	2016-08-10



PROVINCE OF MANITOBA THE MANITOBA WATER SERVICES BOARD INDIGENOUS AND MUNICIPAL RELATIONS	
SURVEYED	BOOK NUMBER
DRAWN N. LUCIER	
DESIGNED N. WITTEMEIER	
CHECKED N. WITTEMEIER	
REVIEWED	
CHIEF ENGINEER	DATE
GENERAL MANAGER	DATE

MUNICIPALITY OF RUSSELL-BINSKARTH R.M. OF RIDING MOUNTAIN WEST MUNICIPALITY OF ROSSBURN			
RUSSELL TO ROSSBURN PROPOSED TREATED WATER PIPELINE (2016)			
SCALE	DATE	PROJECT NUMBER	REVISION
N.T.S.	16-08-10		
			SHEET
			1 of 2

ISSUED FOR APPROVAL



					PROVINCE OF MANITOBA THE MANITOBA WATER SERVICES BOARD INDIGENOUS AND MUNICIPAL RELATIONS		MUNICIPALITY OF RUSSELL-BINSARTH R.M. OF RIDING MOUNTAIN WEST		
					DRAWN: N. LUCIER DESIGNED: N. WITTMER CHECKED: N. WITTMER REVIEWED:	SUBMITTED: _____ DATE: _____	APPROVED: _____ DATE: _____	RUSSELL TO INGLIS PROPOSED TREATED WATER PIPELINE (2016)	
A	ISSUED FOR APPROVAL	NW	2016-08-10		SCALE: N.T.S.	DATE: 16-08-12	PROJECT NUMBER:	REVISION:	SHEET: 2 of 2

ISSUED FOR APPROVAL

**Appendix B - Existing Water Rights License (#2007-022)**

MG-14854 (English)

**Licence to Use Water for  
Municipal-Distribution System  
Purposes**



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

Licence No.: **2007-022**  
(Previous Lic. No.: 85-16)  
U.T.M.: Zone 14 345754 E  
5630429 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 Russell** 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 Southeast Quarter of Section 17, in Township 21 and Range 27, West of the Principal Meridian in Manitoba, more particularly described on Certificate of Title No. 1650415 NLTO,**

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

**Section 3, in Township 21 and Range 28, 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-distribution system** 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 **0.011 cubic metres per second (0.4 cubic feet per second)** .  
b) The total quantity of water diverted in any one year shall not exceed **250 cubic decametres (202.68 acre feet)** .
4. The LICENSEE does hereby remise, release and forever discharge Her Majesty the Queen in Right of the Province of Manitoba, of and from all manner of action, causes of action, claims and demands whatsoever which against Her Majesty the LICENSEE ever had, now has or may hereafter have, resulting from the use of water for **municipal-distribution system** purposes.
5. In the event that the rights of others are infringed upon and/or damage to the property of others is sustained as a result of the operation or maintenance of the WORKS and the rights herein granted, the LICENSEE shall be solely responsible and shall save harmless and fully indemnify Her Majesty the Queen in Right of the Province of Manitoba, from and against any liability to which Her Majesty may become liable by virtue of the issue of this Licence and anything done pursuant hereto.
6. This Licence is not assignable or transferable by the LICENSEE and when no longer required by the LICENSEE this Licence shall be returned to the Executive Director, Infrastructure and Operations Division, for cancellation on behalf of the Minister.
7. Upon the execution of this Licence the LICENSEE hereby grants the Minister or the Minister's agents the right of ingress and egress to and from the lands on which the WORKS are located for the purpose of inspection of the WORKS and the LICENSEE shall at all times comply with such directions and/or orders that may be given by the Minister or the Minister's agents in writing from time to time with regard to the operation and maintenance of the WORKS.
8. This Licence may be amended, suspended or cancelled by the Minister in accordance with The Water Rights Act by letter addressed to the LICENSEE at **Box 10, Russell, MB, R0J 1W0, Canada** and thereafter this Licence shall be determined to be at an end.
9. Notwithstanding anything preceding in this Licence, the LICENSEE must have legal control, by ownership or by rental, lease, or other agreement, of the lands on which the WORKS shall be placed and the water shall be used.
10. The term of this Licence shall be **five (5) years** and this Licence shall become effective only on the date of execution hereof by a person so authorized in 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.
11. This Licence expires automatically upon the loss of the legal control of any of the lands on which the WORKS are located or on which water is used, unless the Licence is transferred or amended by the Minister upon application for Licence transfer or amendment.
12. The LICENSEE shall keep records of daily and annual water use and shall provide a copy of such records to the Executive Director, Infrastructure and Operations Division, not later than February 1st of the following year.

Page 1 of 2

13. A flow meter must be installed, positioned to accurately measure instantaneous pumping rate and accumulative withdrawals from the water source.
14. The LICENSEE does hereby agree to correct, to the satisfaction of the Minister, any water supply problems to wells or other forms of supply, which were constructed and operating prior to the date of issuance of the original Licence (No. 85-16), and which are partly or wholly attributable, in the opinion of the Minister, to the diversion of water as authorized by this Licence.
15. The LICENSEE shall hold and maintain all other regulatory approvals that may be required and shall comply with all other regulatory requirements for the construction, operation, or maintenance of the WORKS or to divert or use water as provided by this Licence.

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

SIGNED, SEALED AND DELIVERED  
in the presence of

\_\_\_\_\_) \_\_\_\_\_ (Seal)  
Witness Licensee

Canada, PROVINCE OF MANITOBA To Wit:

I, \_\_\_\_\_ of the \_\_\_\_\_

of \_\_\_\_\_ in the Province of Manitoba, MAKE OATH AND SAY:

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

SWORN BEFORE me at the \_\_\_\_\_

in the Province of Manitoba this \_\_\_\_\_ day of \_\_\_\_\_ A.D. 20\_\_\_\_\_.

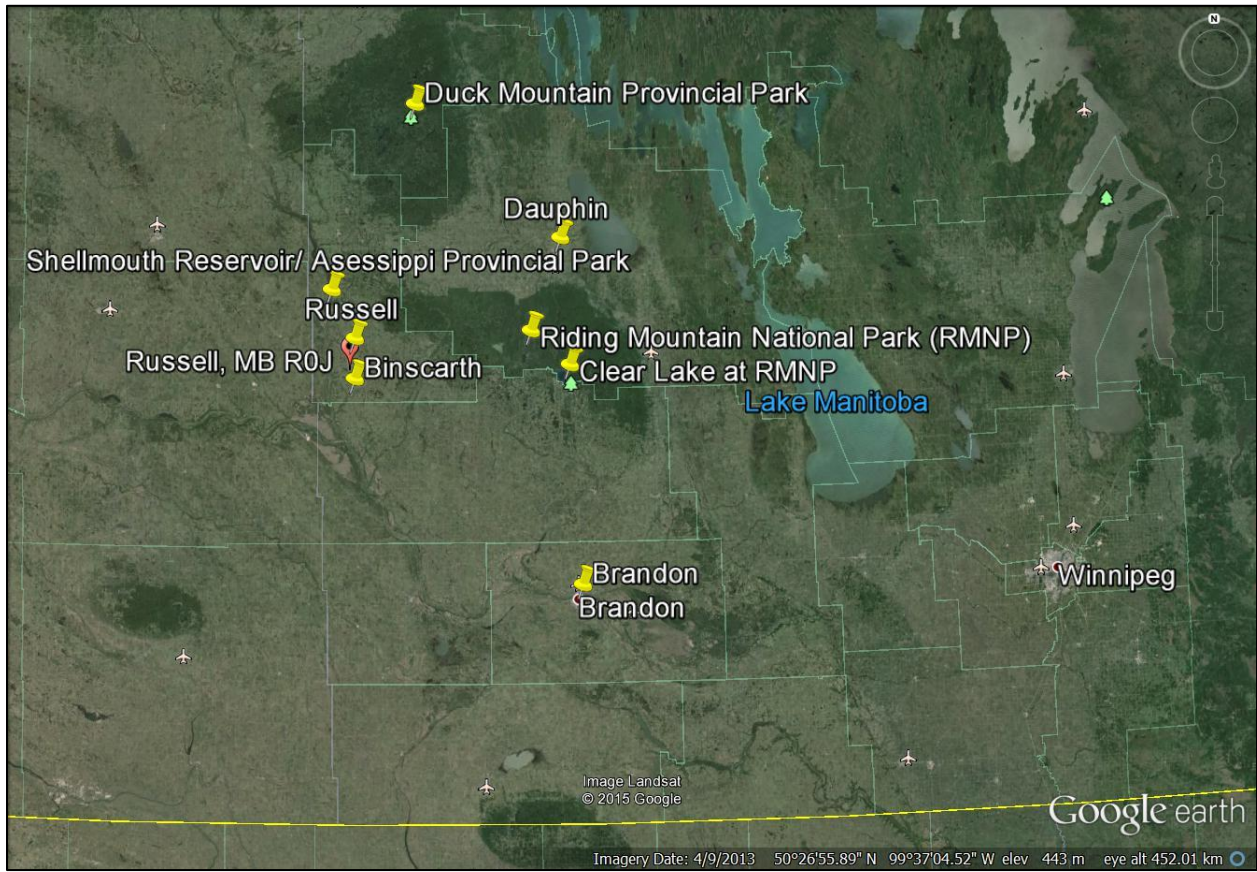
\_\_\_\_\_) \_\_\_\_\_  
A COMMISSIONER FOR OATHS Witness  
in and for the Province of Manitoba

My Commission expires \_\_\_\_\_

**FOR OFFICE USE ONLY**  
Issued at the City of Winnipeg, in the Province of Manitoba, this \_\_\_\_\_ day of \_\_\_\_\_ A.D. 20\_\_\_\_\_.  
  
\_\_\_\_\_  
The Honourable the Minister of Conservation and Water Stewardship (or her/his designate)



**Appendix C - Nearby Parks Map**



## Appendix D - Russell Water Chemistry



Town of Russell - Water Treatment Plant  
ATTN: STEVEN SMITH  
Russel Water Plant  
Box 10  
Russell MB R0J 1W0

Date Received: 08-AUG-13  
Report Date: 13-AUG-13 15:27 (MT)  
Version: FINAL

Client Phone: 204-773-2253

## Certificate of Analysis

**Lab Work Order #:** L1344556  
**Project P.O. #:** NOT SUBMITTED  
**Job Reference:** RUSSELL - PWS 189.00  
**C of C Numbers:**  
**Legal Site Desc:** 17511

A handwritten signature in cursive script that reads "Lisa Page".

Lisa Page  
Account Manager

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

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

Environmental The logo icon for Environmental, featuring a stylized green leaf or water drop shape.

[www.alsglobal.com](http://www.alsglobal.com)

RIGHT SOLUTIONS RIGHT PARTNER

ALS Environmental		ANALYTICAL REPORT				L1344556 CONTD.... PAGE 2 of 7 13-AUG-13 15:27 (MT)	
<b>Physical Tests (WATER)</b>							
		ALS ID		L1344556-1	L1344556-2		
		Sampled Date		07-AUG-13	07-AUG-13		
		Sampled Time		14:00	14:00		
		Sample ID		RUSSELL 1-RAW	RUSSELL 2-TREATED		
Analyte	Unit	Guide Limit #1	Guide Limit #2				
Colour, True	CU	15	-	<5.0	<5.0		
Conductivity	umhos/cm	-	-	1120	679		
Hardness (as CaCO3)	mg/L	-	-	601	159		
Langelier Index (4 C)	No Unit	-	-	0.47	-0.35		
Langelier Index (60 C)	No Unit	-	-	1.2	0.41		
pH	pH units	6.5-8.5	-	7.39	8.09		
Total Dissolved Solids	mg/L	500	-	813	468		
Transmittance, UV (254 nm)	% T	-	-	88.3	94.9		
Turbidity	NTU	-	-	38.3	0.39		
<b>Federal Guidelines for Canadian Drinking Water Quality (AUG, 2012)</b>							
#1: GCDWQ - Aesthetic Objective							
#2: GCDWQ - Maximum Acceptable Concentrations (MACs)							
<b>Anions and Nutrients (WATER)</b>							
		ALS ID		L1344556-1	L1344556-2		
		Sampled Date		07-AUG-13	07-AUG-13		
		Sampled Time		14:00	14:00		
		Sample ID		RUSSELL 1-RAW	RUSSELL 2-TREATED		
Analyte	Unit	Guide Limit #1	Guide Limit #2				
Alkalinity, Total (as CaCO3)	mg/L	-	-	481	95		
Ammonia, Total (as N)	mg/L	-	-	1.20 <sup>DLA</sup>	<0.010		
Bicarbonate (HCO3)	mg/L	-	-	587	116		
Bromide (Br)	mg/L	-	-	<0.10	<0.10		
Carbonate (CO3)	mg/L	-	-	<12	<12		
Chloride	mg/L	250	-	4.26	12.9		
Fluoride	mg/L	-	1.5	0.22	0.67		
Hydroxide (OH)	mg/L	-	-	<6.8	<6.8		
Nitrate-N	mg/L	-	10	<0.0050	0.280		
Nitrite-N	mg/L	-	1	<0.0010	<0.0010		
Sulfate	mg/L	500	-	219	225		
<b>Federal Guidelines for Canadian Drinking Water Quality (AUG, 2012)</b>							
#1: GCDWQ - Aesthetic Objective							
#2: GCDWQ - Maximum Acceptable Concentrations (MACs)							
<b>Organic / Inorganic Carbon (WATER)</b>							
		ALS ID		L1344556-1	L1344556-2		
		Sampled Date		07-AUG-13	07-AUG-13		
		Sampled Time		14:00	14:00		
		Sample ID		RUSSELL 1-RAW	RUSSELL 2-TREATED		
Analyte	Unit	Guide Limit #1	Guide Limit #2				
Dissolved Organic Carbon	mg/L	-	-	2.4	3.0		
Total Organic Carbon	mg/L	-	-	3.1	3.0		
<b>Federal Guidelines for Canadian Drinking Water Quality (AUG, 2012)</b>							
#1: GCDWQ - Aesthetic Objective							
#2: GCDWQ - Maximum Acceptable Concentrations (MACs)							
<p><span style="background-color: yellow;">   </span> Detection Limit for result exceeds Guide Limit. Assessment against Guide Limit cannot be made.</p> <p><span style="background-color: pink;">   </span> Analytical result for this parameter exceeds Guide Limit listed on this report.</p> <p>* Please refer to the Reference Information section for an explanation of any qualifiers noted.</p>							



ANALYTICAL REPORT

L1344556 CONTD....  
 PAGE 3 of 7  
 13-AUG-13 15:27 (MT)

Total Metals (WATER)

Analyte	Unit	ALS ID		L1344556-1	L1344556-2
		Guide Limit #1	Guide Limit #2	07-AUG-13 14:00 RUSSELL 1- RAW	07-AUG-13 14:00 RUSSELL 2- TREATED
Aluminum (Al)-Total	mg/L	0.1	-	<0.0050	<0.0050
Antimony (Sb)-Total	mg/L	-	0.006	<0.00020	<0.00020
Arsenic (As)-Total	mg/L	-	0.01	0.0341	0.00703
Barium (Ba)-Total	mg/L	-	1	0.0131	0.00132
Beryllium (Be)-Total	mg/L	-	-	<0.00020	<0.00020
Bismuth (Bi)-Total	mg/L	-	-	<0.00020	<0.00020
Boron (B)-Total	mg/L	-	5	0.174	0.150
Cadmium (Cd)-Total	mg/L	-	0.005	0.000027	0.000026
Calcium (Ca)-Total	mg/L	-	-	151 <sup>DLA</sup>	19.4
Cesium (Cs)-Total	mg/L	-	-	<0.00010	<0.00010
Chromium (Cr)-Total	mg/L	-	0.05	<0.0010	<0.0010
Cobalt (Co)-Total	mg/L	-	-	0.00075	<0.00020
Copper (Cu)-Total	mg/L	1	-	0.00838	0.00888
Iron (Fe)-Total	mg/L	0.3	-	3.50	<0.10
Lead (Pb)-Total	mg/L	-	0.01	0.000331	0.000171
Lithium (Li)-Total	mg/L	-	-	0.115	0.109
Magnesium (Mg)-Total	mg/L	-	-	54.1	26.8
Manganese (Mn)-Total	mg/L	0.05	-	0.463	0.00298
Molybdenum (Mo)-Total	mg/L	-	-	0.00817	0.00800
Nickel (Ni)-Total	mg/L	-	-	<0.0020	<0.0020
Phosphorus (P)-Total	mg/L	-	-	0.14	<0.10
Potassium (K)-Total	mg/L	-	-	6.72	7.49
Rubidium (Rb)-Total	mg/L	-	-	0.00148	0.00248
Selenium (Se)-Total	mg/L	-	0.01	<0.0010	<0.0010
Silicon (Si)-Total	mg/L	-	-	14.3	7.23
Silver (Ag)-Total	mg/L	-	-	<0.00010	<0.00010
Sodium (Na)-Total	mg/L	200	-	39.1	83.0 <sup>DLA</sup>
Strontium (Sr)-Total	mg/L	-	-	0.607	0.108
Tellurium (Te)-Total	mg/L	-	-	<0.00020	<0.00020
Thallium (Tl)-Total	mg/L	-	-	<0.00010	<0.00010
Thorium (Th)-Total	mg/L	-	-	<0.00010	<0.00010
Tin (Sn)-Total	mg/L	-	-	<0.00020	<0.00020
Titanium (Ti)-Total	mg/L	-	-	0.00310	0.00325

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

#1: GCDWQ - Aesthetic Objective

#2: GCDWQ - Maximum Acceptable Concentrations (MACs)

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

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

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



ANALYTICAL REPORT

L1344556 CONTD....  
 PAGE 4 of 7  
 13-AUG-13 15:27 (MT)

**Total Metals (WATER)**

Analyte	Unit	ALS ID		L1344556-1	L1344556-2
		Guide Limit #1	Guide Limit #2	RUSSELL 1-RAW	RUSSELL 2-TREATED
Tungsten (W)-Total	mg/L	-	-	<0.00010	<0.00010
Uranium (U)-Total	mg/L	-	0.02	0.00415	<0.00010
Vanadium (V)-Total	mg/L	-	-	<0.00020	<0.00020
Zinc (Zn)-Total	mg/L	5	-	0.0071	<0.0020
Zirconium (Zr)-Total	mg/L	-	-	<0.00040	<0.00040

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

#1: GCDWQ - Aesthetic Objective

#2: GCDWQ - Maximum Acceptable Concentrations (MACs)

**Volatile Organic Compounds (WATER)**

Analyte	Unit	ALS ID		L1344556-1
		Guide Limit #1	Guide Limit #2	RUSSELL 1-RAW
Benzene	ug/L	-	5	<0.50
1,1-Dichloroethylene	ug/L	-	14	<0.50
Dichloromethane	ug/L	-	50	1.63
Ethyl Benzene	ug/L	2.4	-	<0.50
MTBE	ug/L	15	-	<0.50
Tetrachloroethylene	ug/L	-	30	<0.50
Toluene	ug/L	24	-	<0.50
Trichloroethylene	ug/L	-	5	<0.50
Xylenes (Total)	ug/L	300	-	<1.1
Surrogate: 4-Bromofluorobenzene	%	-	-	111.6
Surrogate: 1,2-Dichloroethane d4	%	-	-	108.7
Surrogate: Toluene-d8	%	-	-	101.1

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

#1: GCDWQ - Aesthetic Objective

#2: GCDWQ - Maximum Acceptable Concentrations (MACs)

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

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

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

Reference Information

**Qualifiers for Individual Parameters Listed:**

Qualifier	Description
DLA	Detection Limit Adjusted For required dilution

**Methods Listed (if applicable):**

ALS Test Code	Matrix	Test Description	Method Reference**
---------------	--------	------------------	--------------------

<b>ALK-TOT-WP</b>	Water	Alkalinity	APHA 2320B
-------------------	-------	------------	------------

Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. It is determined by titration with a standard solution of strong mineral acid to the successive HCO<sub>3</sub><sup>-</sup> and H<sub>2</sub>CO<sub>3</sub> endpoints indicated electrometrically.

<b>BR-IC-WP</b>	Water	Bromide by Ion Chromatography	EPA 300.1 (modified)
-----------------	-------	-------------------------------	----------------------

Anions in aqueous matrices are analyzed using ion chromatography with conductivity and/or UV absorbance detectors.

<b>C-TC, TIC, TOC-WP</b>	Water	Carbons	APHA 5310 B-INSTRUMENTAL
--------------------------	-------	---------	--------------------------

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.

TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

<b>C-TDC, DIC, DOC-WP</b>	Water	Carbons Dissolved	APHA 5310 B-INSTRUMENTAL
---------------------------	-------	-------------------	--------------------------

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.

TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

<b>CL-L-IC-WP</b>	Water	Chloride by Ion Chromatography	EPA 300.1 (modified)
-------------------	-------	--------------------------------	----------------------

Anions in aqueous matrices are analyzed using ion chromatography with conductivity and/or UV absorbance detectors.

<b>COLOUR-TRUE-WP</b>	Water	Colour, True	APHA 2120C
-----------------------	-------	--------------	------------

True colour in water is analyzed by discrete analyzer using the platinum-cobalt colourimetric method. Colour is pH dependant; unless otherwise indicated, reported colour results pertain to the pH of the sample as received to within +/- 1 pH unit.

<b>EC-WP</b>	Water	Conductivity	APHA 2510B
--------------	-------	--------------	------------

Conductivity of an aqueous solution refers to its ability to carry an electric current. Conductance of a solution is measured between two spatially fixed and chemically inert electrodes.

<b>ETL-HARDNESS-TOT-WP</b>	Water	Hardness Calculated	HARDNESS CALCULATED
----------------------------	-------	---------------------	---------------------

<b>ETL-LANGELIER-4-WP</b>	Water	Langelier Index 4C	Calculated
---------------------------	-------	--------------------	------------

<b>ETL-LANGELIER-60-WP</b>	Water	Langelier Index 60C	Calculated
----------------------------	-------	---------------------	------------

<b>F-IC-WP</b>	Water	Fluoride by Ion Chromatography	EPA 300.1 (modified)
----------------	-------	--------------------------------	----------------------

Anions in aqueous matrices are analyzed using ion chromatography with conductivity and/or UV absorbance detectors.

<b>IONBALANCE-CALC-WP</b>	Water	Ion Balance Calculation	APHA 1030E
---------------------------	-------	-------------------------	------------

<b>MET-T-L-MS-WP</b>	Water	Total Metals by ICP-MS	U.S. EPA 200.8-TL
----------------------	-------	------------------------	-------------------

Total Metals by ICP-MS: This analysis is carried out using sample preparation procedures adapted from Standard Methods for the examination of Water and Wastewater Method 3030E and analytical procedures adapted from U.S. EPA Method 200.8 for analysis of metals by inductively coupled-




Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
mass spectrometry.			
<b>NH3-COL-WP</b>	Water	Ammonia by colour	APHA 4500 NH3 F
Ammonia in water samples forms indophenol when reacted with hypochlorite and phenol. The intensity is amplified by the addition of sodium nitroprusside and measured colourmetrically.			
<b>NO2-L-IC-WP</b>	Water	Nitrite as N by Ion Chromatography	EPA 300.1 (modified)
Anions in aqueous matrices are analyzed using ion chromatography with conductivity and/or UV absorbance detectors.			
<b>NO3-L-IC-WP</b>	Water	Nitrate as N by Ion Chromatography	EPA 300.1 (modified)
Anions in aqueous matrices are analyzed using ion chromatography with conductivity and/or UV absorbance detectors.			
<b>PH-WP</b>	Water	pH	APHA 4500H
The pH of a sample is the determination of the activity of the hydrogen ions by potentiometric measurement using a standard hydrogen electrode and a reference electrode.			
<b>SO4-IC-WP</b>	Water	Sulfate by Ion Chromatography	EPA 300.1 (modified)
Anions in aqueous matrices are analyzed using ion chromatography with conductivity and/or UV absorbance detectors.			
<b>SOLIDS-TDS-WP</b>	Water	Total Dissolved Solids	APHA 2540 C (modified)
Total dissolved solids in aqueous matrices is determined gravimetrically after evaporation of the filtrate at 180 °C.			
<b>TRANSM-UV-WT</b>	Water	Transmittance, UV (254 nm)	APHA 5910 B-Spectrophotometer
<b>TURBIDITY-WP</b>	Water	Turbidity	APHA 2130B (modified)
Turbidity in aqueous matrices is determined by the nephelometric method.			
<b>VOC-ROU-WT</b>	Water	Volatile Organic Compounds	SW846 8260
The purge and trap method purges Volatile Organic Compounds (VOC) from aqueous samples by bubbling an inert gas through the sample. Once in the gaseous phase, the analytes are swept from the purging device and trapped in a short column. The compounds are that are trapped on the column are thermally desorbed and transferred to the analytical column of the GC/MS.			
<b>XYLENES-SUM-CALC-WT</b>	Water	Sum of Xylene Isomer Concentrations	CALCULATION
Total xylenes represents the sum of o-xylene and m&p-xylene.			
**ALS test methods may incorporate modifications from specified reference methods to improve performance.			
Chain of Custody Numbers:			
<i>The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:</i>			
Laboratory Definition Code	Laboratory Location		
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA		
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA		

Weight 15:27 (MT)	L1344556 CONTD... PAGE 7 of 7 13-AUG-1
lory	<p><b>GLOSSARY OF REPORT TERMS</b></p> <p>Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.</p> <p>mg/kg - milligrams per kilogram based on dry weight of sample mg/kg wwt - milligrams per kilogram based on wet weight of sample mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight mg/L - unit of concentration based on volume, parts per million. &lt; - Less than. D.L. - The reporting limit. N/A - Result not available. Refer to qualifier code and definition for explanation.</p> <p>Test results reported relate only to the samples as received by the laboratory. UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION. Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.</p> <p>Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to fitness for purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information.</p>
or a particular	

Manitoba Conservation Water Stewardship Office of Drinking Water 1007 Century Street, Winnipeg, Manitoba, Canada R3H 0W4		Chain of Custody (COC) Manitoba Drinking Water Systems ONLY FOR: Regulatory General Chemistry 8		 L1344556-COFC	
<b>Report to Operator (email pdf):</b> Contact: Steve Smith Address: Box 10 Russell MB R0J 1W0 Phone: 204-773-3185 Email: russellwaterplant@hotmail.com			<b>Owner billing (Email):</b> Contact: Wally Melnyk Address: Box 10 Russell MB R0J 1W0 Phone: 204-773-2253 Email: wally@russellmb.com		
<b>Operator contact update (if different then above):</b> Contact: Address: Phone: Email:			<b>Owner contact update (if different then above):</b> Contact: Address: Phone: Email:		
Account: <u>W7260</u> ODW Report type: <u>EMS (Lab-MWS)</u>			Client / Project Information: Operation Name: RUSSELL - PWS Operation Code (com code): 189.00 Operation Id: 17511 Sampled by: <u>Steven Smith</u>		
Agency Code: <u>382</u> Project: <u>DWQ-C</u>			Analysis Request MB-CH-PWS-V2013 MB-VOC-PWS-V2013 Number of Containers		
Lab: <u>ALS</u> Lab Work Order # / Job # (lab use only)			Sample Matrix: 6-Raw Water, 10-Treated Water Sample Type: 1-Grab Sample		
Lab Sample # (lab use only) Sample Number Station Number Sample Identification			Date Time Sample Matrix Sample Type		
1308GR0022 MB05MED051 Russell 1 - Raw			07-08-13 2 PM 6 1 X X 5		
1308GR0023 MB05MED052 Russell 2 - Treated			07-08-13 2 PM 10 1 X X 5		
Failure to complete all portions of this form may delay analysis. Please fill in this form <b>LEGIBLY</b> . By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified by the Laboratory. For ALL other testing, please use Laboratory specific forms. <b>DO NOT COPY or RE-USE this form. Sample Numbers are unique to the Office of Drinking Water and provided by DWO.</b>					
Relinquished By: <u>Steven Smith</u> Date & Time: <u>2 PM Aug 7/13</u>		Received By: <u>G.H.</u> (lab use only) Date & Time: <u>Aug 8/13 12:00</u>		Sample Condition (lab use only)	
Relinquished By:		Received By:		Temperature: <u>13.9°C</u> Samples Received in Good Condition? <u>Y/N</u> (if no provide details)	
Operator mandatory		Operator optional		Operator to fill, if information above has changed	
				Opr to fill, Lab specific pre-filled by DWO	
Note: Cyanide and Mercury are <b>not</b> required and have been removed from the list. Please use the Rev. July 29, 2013 Water System Chemistry List.					

**Appendix E - 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.