Environment Act Proposal Municipality of Prairie View Water Supply Upgrades

July 2017

Prepared by: Paul Macaraeg, EIT
Reviewed by: Tyler Foxton, P.Eng.
Approved by: Nathan Wittmeier, P.Eng.
The Manitoba Water Services Board
Unit 1A – 2010 Currie Blvd.
Brandon, MB R7B 4E7

Table of Contents

Executive Summary

The Municipality of Prairie View has requested The Manitoba Water Services Board (MWSB) to submit an Environment Act Proposal for a Class 2 Development License under the Manitoba Environment Act to upgrade the public water system in the community of Birtle. The proposed development includes installation of two pumping wells capable of withdrawing at a rate of 12 L/s or 240 dam^3/yr at the Wattsview truck haul loading station (NW ¼ 17-16-27WPM) and installation of 16 km 150 mm to 200 mm diameter raw water pipeline from the Wattsview station to the community of Birtle's public water system.

Population in Birtle was 642 in 2016 with a 20-yr projected population of 670. The municipality is a full-service region with accommodations, agricultural services, auto, construction, financial, health, food, retail, and recreation. The community's current water demand is high at 500 L/c/d but newer residential water meters only tally 45% of the treated water usage or 225 L/c/d. Significant distribution system losses are suspected from breaks, leaks, and abandoned water services. The future treated water demand for the system is projected to be an average day consumption of 201,000 L/d and a peak day consumption of 402,000 L/d or 5.6 L/s.

Birtle's existing treatment system is not in compliance with Drinking Water Safety Act (DWSA) requirements, producing treated water that has aesthetic and health concerns, and lacking primary disinfection. The raw water quality at the Wattsview Station site improves the raw water quality of Birtle's existing water source located within the community. The raw water quality at Wattsview Station is considered slightly hard, and iron and manganese will have to be removed by the existing water treatment system and future new water treatment plant to bring the Birtle public water system in compliance.

The water distribution system in Birtle is challenged by terrain with reliefs of 40 to 60 m, and also substantial water losses. It is expected that the network will need to operate in multiple pressure zones. The current water treatment plant facility is in poor condition, and a new water treatment plant is required. Given these circumstances, a 12 L/s withdrawal rate would be able to meet current and future demands.

The Wattsview loading station aquifer was investigated. A test well was installed and found to have a very high specific capacity of 22.6 L/s per metre of drawdown. The result confirms that the lower sands and gravels are suitable for the installation of high capacity pumping well.

The Municipality will be responsible for the operation and maintenance of the raw water pipeline and the mechanized wells, in addition to the community's existing public water system, including the distribution network, and any treatment infrastructure.

The proposed development is assessed to have minor to negligible impacts to the natural environment, and corresponding environmental management measures are proposed to mitigate or avoid altogether the impacts. An environmental scan found species that are threatened or of special concern in the project area, and the stakeholders will work with the Heritage branch and follow their recommendations to minimize the impacts to the status of these species (plains rough fescue, baird's sparrow, and bobolink).

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
NF	Nano filtration
ODW	Office of Drinking Water
OS	Operational Statements
PR	Public Road
PWS	Public Water System
RM	Rural Municipality
RO	Reverse Osmosis
TDS	Total Dissolved Solids
THM	Trihalomethane
TOC	Total Organic Carbon
UF	Ultra-filtration
UV	Ultraviolet
WTP	Water Treatment Plant
WRL	Water Rights License

1.0 Introduction

The Municipality of Prairie View requested the Manitoba Water Services Board (MWSB) to prepare an Environment Act Proposal for a Class 2 Development License under the Manitoba Environment Act for a 16 km pipeline and water withdrawal at a rate of 12 L/s or 240 dam^3/yr from a new groundwater source to be developed at the existing Wattsview truck haul loading station, approximately 13 km southwest of Birtle adjacent to PR 568 in NW 17-16-27W for the community of Birtle. This document provides the compiled information required on Manitoba Conservation's Environment Act Proposal (EAP) Report Guidelines and Supplementary Guidelines for Municipal Water Supply Systems. This EAP includes components of the proposed pipelines installation and the new groundwater source (Wattsview).

1.1 Background Information

The Municipality of Prairie View has requested MWSB for assistance to develop a new raw water supply and upgrade to the water treatment system in the community of Birtle to meet Drinking Water Safety Act (DWSA) requirements.

The Birtle water distribution system consists of a combination of original cast iron pipe constructed in the 1960s and PVC pipe constructed in the 1980s. The community's current water demand is high at 500 L/c/d but newer residential water meters only tally 45% of the treated water usage or 225 L/c/d. Significant distribution system losses are suspected from breaks, leaks, and abandoned water services. Birtle's topography, being located along the Birdtail River, has over 60 metres of elevation change in the Town making it difficult to regulate distribution pressure and identify potential sources of leaks.

The Municipality has also decided to pursue an alternate water supply for Birtle from the Wattsview loading station in NW¼ 17-16-27W. Comparison of the existing and Wattsview raw water qualities are discussed in Section 2.0.

The community of Birtle is located near the intersection of PTH 83 and PTH 42 in the Municipality of Prairie View, about 140 km NW of Brandon.

1.1.1 Previous Studies

A public water system assessment (Bullée Consulting Ltd., 2010) recommended that a major upgrade to the facility, addressing aged and undersized components, should be initiated in the near future, including all of the major components of the system (water supply, treatment, storage and distribution pumping).

MWSB entered into an agreement with the Municipality to undertake a water supply feasibility study, and W.L. Gibbons & Assoc. Inc. was retained to conduct a hydrogeological assessment of potential locations to develop alternative groundwater sources and identifying potential sources. A number of locations were identified and explored including water quality sampling. Further discussion can be found in section 2.0. The

study, currently near completion, strongly indicates that the Wattsview loading station general area is a suitable alternative source of raw water for the community of Birtle. More information can be found in Section 2.1.1.

1.1.2 Population

Population in the community was 664 in 2011 (Statistics Canada, 2011) and 642 in 2016 (Statistics Canada, 2016), representing a decrease of 22 people, or an annualized decline of 0.5%. A recent wastewater study on the community projected a 20-year population of 670 (Stantec Consulting Ltd., 2017).

1.1.3 Current and Projected Water Use

A WTP is designed to supply 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 2.0 were assumed for this EAP. The projected treated water demands are summarized in Table 1.1.

TABLE 1.1 - PROJECTED TREATED WATER DEMAND FOR THE COMMUNITY OF BIRTLE

Parameter	Units	Quantity
Community of Birtle Current Connections	ea.	340
(all are municipal connections)		
2016 Population	people	642
Projected 2036 population		670
Average consumption/person/day	L/c/day	300
Average Day Consumption	L/day	201,000
Peak Hour Factor (Harmon Peaking Factor)		3.91
Peak Hour Demand	L/s	9.1
Peak Day Factor		2.0
Peak Day Demand (20 hr operating day)	L/s	5.58*
Peak Day Consumption	L/day	402,000

*Peak day demand includes 20% increase to factor in the 20-hr. operating day criterion, i.e. (201,000 * 2.0)/20 hr/3600 s/hr = **5.58 L/s**.

The community's current water demand is high at 500 L/c/d but newer residential water meters only tally 45% of the treated water usage or 225 L/c/d. Significant distribution system losses are suspected from breaks, leaks, and abandoned water services. With improved water quality it is anticipated that 225 L/c/d consumption will increase and

therefore a future demand was calculated based on an average day consumption of 300 L/c/d.

The future peak treated water demand for the community is projected at 5.6 L/s based on Table 1.1. An environmental approval is being requested for the withdrawal of water at a rate of 12 L/s or 240 dam^3/yr from the Wattsview station. The water system in Birtle is challenged by terrain with reliefs of 40 to 60 m, and also substantial water losses. It is expected that the network will need to operate in multiple pressure zones. The current water treatment plant facility is in poor condition, and a new water treatment plant is required. Given these circumstances and anticipating for process water reject and additional capacity for growth of the PWS, a 12 L/s withdrawal rate would be able to meet current and future demands. The community should implement a watermain renewal program to resolve the considerable water loss. However, implementing such a program typically requires in the order of about 10 years to complete.

1.1.4 Raw Water Source

Raw water is proposed to be drawn from two wells located in the general area of the Wattsview truck loading station (proposed location shown in Appendix A - General Site Plan of Proposed Works). The raw water pumping system would consist of 2 pumps, with one duty and one stand-by. A detailed water quality analysis is presented in Section 1.1.6. More information on well installations see Section 2.1.1.1.

1.1.5 Water Rights Act

The water rights licence for the withdrawal of groundwater application will be submitted upon completion of groundwater investigation. Preliminary findings strongly indicate the proposed wells will sustainable supply the requirements of the municipality.

The availability of groundwater usage for potential future users will be assessed through the Water Rights Act Licensing process.

1.1.6 Water Quality

Table 1.2 outlines the water quality parameters of concern. Full chemistry analysis can be found in Appendix E - Raw Water Quality Analysis. In addition, the operator tests chlorine residuals daily on the treated water.

The raw water quality at the Wattsview station is greatly improved over the raw water quality of Birtle's existing water source located in the community. The raw water quality at Wattsview Station is considered slightly hard, and iron and manganese will have to be removed by the existing water treatment system and future new water treatment plant to bring the Birtle public water system in compliance. In the interim, the new water supply will be transported to the pumping station where sodium hypochlorite will be injected for disinfection which will then be transported to the water treatment plant (more details in

section 2.0). This would bring the PWS into compliance with DWSA requirements, and iron and manganese removed, but will not remove hardness as most homes have their own water softening systems.

TABLE 1.2 - TYPICAL RESULTS OF BIRTLE WATER QUALITY ANALYSIS

Parameter	Raw – Existing (mg/L)	Existing – Treated (mg/L)	Raw – Wattsview Station (mg/L)	GCDWQ Limit (mg/L)
Hardness	**865 - 925**	**893**	**325**	200/500[a]
Ammonia	**2.47 - 2.55**	**2.40**[d]	0.068	-
Arsenic	**0.026 - 0.024**	0.00094 - 0.00126	0.00154	0.010 (ALARA)
Iron	**4.23 - 3.91**	0.018 - 0.159	**0.669**	≤ 0.3
Manganese	**0.475 - 0.493**	0.0139 - **0.145**	**0.414**	≤ 0.05
Sodium	**436 - 465**	**446 - 468**	2.57	≤ 200[DLA]
Sulphate	**1200 - 1260**	**1220**	63.5	≤ 500
TDS	**2450**	**2460 - 2570**	376	≤ 500

[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

[d] Ammonia is a concern for chlorine disinfection as ammonia consumes the free chlorine.

[DLA] Detected Limit Adjusted for required dilution

For reference, the current Operating Licence for the existing Birtle Public Water System, Licence Number: PWS-09-403-01 A, can be found in Appendix C - PWS Operating Licence. A separate submission will be made to the Office of the Drinking Water once the existing PWS is ready to construct the new water source and the current treatment be upgraded.

1.1.7 Compliance Plan

The Office of Drinking Water (ODW) has indicated that the Birtle public water system (PWS) does not meet minimum chlorine disinfection contact time under peak demand conditions and hence lacks primary disinfection. The ODW required a re-assessment of the water system infrastructure and water supply sources to be completed and submitted by a qualified professional engineer. In addition, the Licensee was also asked to update and re-submit an update to their 2015 compliance plan (Office of Drinking Water, 2017). The engineering consultant hired by MWSB (Associated Engineering) is in the process of a PWS re-assessment and updating the 2015 compliance plan.

2.0 Description of Proposed Development

2.1 Project Description

Prairie View Municipality requested the Manitoba Water Services Board (MWSB) to develop a new raw water supply and upgrade the water treatment system in the community of Birtle to meet Drinking Water Safety Act (DWSA) requirements. The Municipality has also previously entered into an agreement with MWSB to undertake a water supply feasibility study, and MWSB retained W.L. Gibbons & Assoc. Inc. to conduct a hydrogeological assessment to identify potential alternative groundwater sources and locations. From that study it was determined that the most suitable alternative raw water source is at the Wattsview loading station (conceptual Location Map is shown in Appendix A - General Site Plan of Proposed Works). This proposal requests for the environmental approval of the installation of 16 km of raw water pipeline and the withdrawal of water from the Wattsview truck haul loading station at a rate of 240 dam^3/yr to the Birtle PWS.

The proposed development includes mechanization of two wells capable of withdrawing water at a rate of 12 L/s at the proposed Wattsview Station, installation of 16 km raw water pipeline from Wattsview Station to Birtle, and upgrading the existing water treatment system to bring it into compliance with the DWSA requirements.

This EAP submission is for a Class 2 Development License under the Manitoba Environment Act for the withdrawal of water at a rate of 12 L/s or 240 dam^3/yr at Wattsview station and the installation of 16 km raw water pipeline from the Wattsview station to the community of Birtle.

2.1.1 Water Source

MWSB retained W.L. Gibbons & Assoc. Inc. to conduct a hydrogeological assessment to identify potential alternative groundwater sources and locations. Numerous locations were identified and assessed through water quality sampling: (1) within town limits showing similar water quality to the existing supply, (2) existing reservoir area showing no potential at all, (3) west area of Birtle showing good potential but close to existing lagoon, (4) at Hoopers Lake area south of Birtle showing limited supply and poor water quality, (5) at Beulah loading station, and (6) at Wattsview loading station. The two existing loading stations were ultimately considered for a more thorough comparison, and while Beulah loading station water quality was slightly better, the Wattsview loading station location was considered due to proximity to the community.

2.1.1.1 Well Installations

The Wattsview loading station aquifer was investigated and a test well was drilled and installed to perform pumping capacity testing. Based upon test hole installations, the stratigraphy is determined to consist of 4.5 m to 6.1 m of clay followed by a layer of sand and gravel up to depths of 44.5 m to 51.8 m. A test well was installed and found to have a very high specific capacity of 22.6 L/s per

metre of drawdown. The result confirms that the lower sands and gravels are suitable for the installation of high capacity pumping well (W.L. Gibbons & Assoc. Inc., 2017).

The Wattsview loading station site is located on top of about 7 m clay overburden underlain by a sand and gravel layer further underlain by the Odanah Shale Aquifer. The proposed wells will be installed in the sand and gravel layer aquifer.

The hydrogeologist recommends two 200 mm diameter wells with a design capacity of 22.7 L/s be established at the site, as there is opportunity to design wells for the normal maximum capacity of 200 mm wells for future growth in the system demand (W.L. Gibbons & Assoc. Inc., 2017).

2.1.1.2 Raw Water Quality

This project proposes to draw raw water from the Wattsview truck haul loading station. Raw water quality analysis results showed that this source has a much improved quality compared to the existing source. Further discussions on raw water quality were presented in Section 1.1.6.

2.1.1.3 Raw Water Pipeline

A number of potential pipeline routes were considered. Through desktop analyses and multiple site visits, the preferred pipeline route has been identified, as shown in Appendix A - General Site Plan of Proposed Works. The general area is challenged by valleys, waterway crossings, and some geotechnical challenge like the presence of stones and cobbles. These challenges will be addressed in the detailed design and tender phase.

A new raw water pipeline will have to be installed to transport water from the Wattsview station to the Birtle PWS. The raw water pipeline is currently being proposed to be 150 mm to 200 mm diameter to address water pressure challenges due to the area's valley and river crossings, and in general rolling topography, with reliefs up to 60 m. The proposed pipeline will have the capacity to service the 20-year projected population with additional capacity for additional connections.

The pipeline will be high density polyethylene (HDPE) or poly vinyl chloride (PVC) installed in accordance with MWSB Standard Construction Specifications.

2.1.1.4 Water Treatment Plant

Birtle's existing treatment system is not in compliance with DWSA requirements, producing treated water that has aesthetic and health parameter exceedances, and lacks adequate primary disinfection. The building has surpassed its intended

lifespan and has corrosion due to poor ventilation, and inadequate floor storage. The treatment system consists of oxidation, filtration, and chlorine disinfection.

Once the alternative water source is established and is connected to the Birtle PWS, two phases are necessary to bring the PWS into compliance with DWSA requirements: bring in the new water supply to the pumping station first (located at the reservoir site) and inject sodium hypochlorite for chlorine disinfection and then transport that water to the existing water treatment plant. This approach is expected to achieve required chlorine contact time, and remove iron and manganese, but will not remove hardness as most homes have their own water softening systems.

2.1.1.5 Operation and Maintenance

The Municipality will be responsible for the operation and maintenance of the raw water pipeline and the mechanized wells, in addition to the community's existing public water system, including the distribution network, and any treatment infrastructure upgrade. An operator is required to periodically inspect flush outs, air releases, etc. to ensure system performance is maintained. In addition, the operator will be required to submit bi-weekly water samples for bacteriological testing in accordance with the Manitoba *Drinking Water Quality Standards Regulation*. Operators will read water meters on a minimum quarterly basis and respond to maintenance issues related to the system.

The operator(s) will be required to operate the facility in a safe and efficient manner in accordance with relevant operations manuals and Drinking Water Safety Act regulations. Operation requirements will include measurements, monitoring, sampling, testing, record-keeping and reporting. In addition, the operator(s) must ensure the equipment is inspected and properly maintained. The operator(s) will receive instructions and/or training during the commissioning phase when a retrofit or a temporary treatment system is installed.

Other typical operating costs include chemicals, maintenance personnel, electricity costs, general repairs, water and bacteriological testing, and a reserve fund for future replacement or expansion and staff certification and training. Operating and maintenance costs are recovered through the sale of water in the distribution system.

2.2 Certificate of Title

The Municipality of Prairie View is currently in negotiations with the land owners at the proposed Wattsview Loading station. Although the loading station is operated by the municipality the transfer of land ownership was never formalized. The pipeline will be installed along road right-

of-ways. To accommodate the works, the Municipality, Province, and other stakeholders that may be involved is expected to work cooperatively on this matter.

2.3 Mineral Rights

No change is proposed to any and/or all mineral rights associated with lands for the existing and proposed works.

2.4 Existing and Adjacent Land Use

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

2.5 Land Use Designation and Zoning

Outside of the community of Birtle the location of proposed works will be on designated agricultural/rural area and inside the community of Birtle either a designated Agricultural/Urban Reserve Area or Non-Residential Area according to the Carlton Trail Planning District Development Plan By-Law No. 2-2008 (Manitoba Intergovernmental Affairs Community Planning Services, 2008). The maps are shown in Appendix H – Development Plan and Zoning By-Law Maps. The existing Birtle WTP and reservoir are located within the community of Birtle in designated Residential Areas. Map is shown in Appendix A - General Site Plan of Proposed Works.

2.6 Project Schedule

The project is scheduled to be tendered in late Summer or early Fall 2017 with construction depending on the availability of funding and the receipt of all approvals.

2.7 Project Funding

This project is eligible for cost sharing between the MWSB and the Municipality subject to all approvals and the availability of funding. The municipality was successful in obtaining funding for a $4.0M water supply project from the Clean Water and Wastewater Fund (CWWF) for works including the establishment of two new wells, a new raw water pipeline (16 km), and providing water treatment upgrades to the existing public water system to comply with DWSA. Engineering design services for a new water treatment plant and expanded reservoir are also included in this budget. The proposed works has been approved for a Clean Water and Waste Fund which have to be expended by March 31, 2018.

2.8 Regulatory Approvals

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

Manitoba Sustainable Development
Office of Drinking Water
Manitoba Infrastructure

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

2.9 Public Consultation

A number of public consultations has been conducted in the past, and as a result the Municipality of Prairie View came to request The Manitoba Water Services Board for assistance to develop a new raw water supply and upgrade to the water treatment system in the community of Birtle to meet Drinking Water Safety Act requirements.

The Manitoba Water Services Board, W.L. Gibbons & Assoc. Inc., and Municipality of Prairie View also presented to the public on March 31st, 2017 to provide context and needed work for the community's public water system. An article on the proposed development was featured in the local newspaper as well.

2.10 Storage of Petroleum Products and Other Chemicals

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

There will be no storage of petroleum products or other chemicals at the existing WTP or at the construction site. Chemicals associated with the operation of the new plant will be stored in designated areas within the plant complete with spill containment. General household cleaning products will also be stored on-site.

3.0 Physical Environment

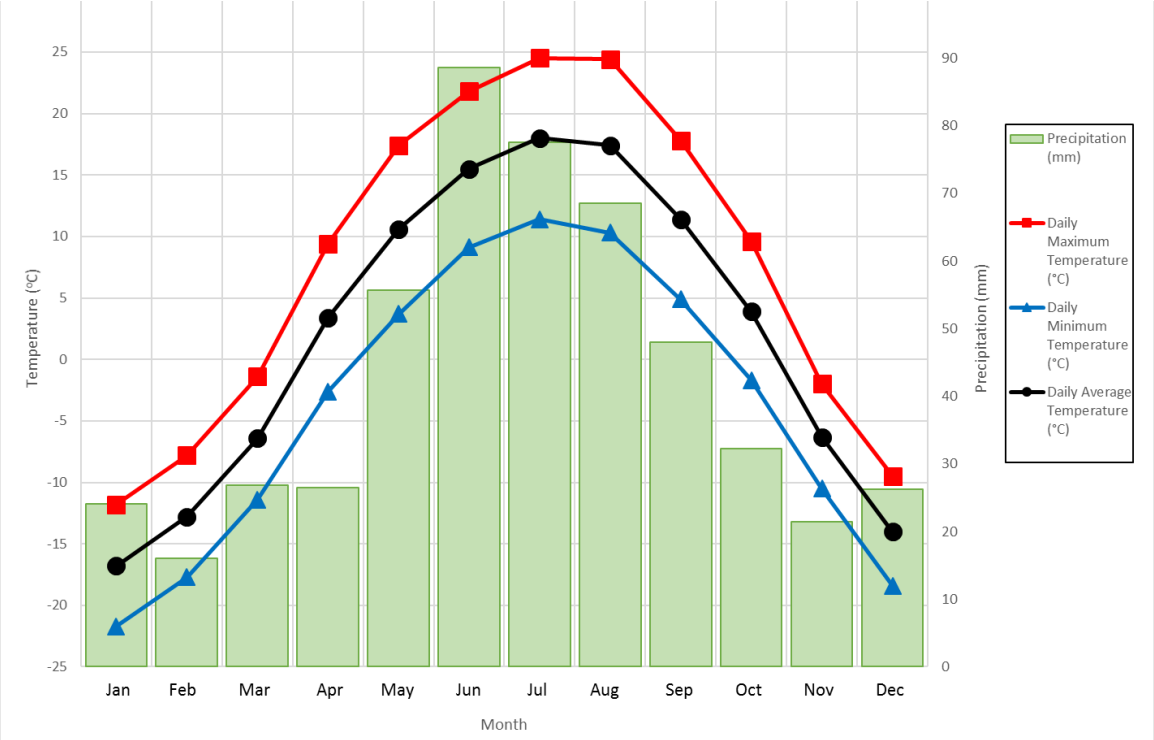
3.1 Physiography

The community of Birtle is located near the intersection of PTH 83 and PTH 42 in the Municipality of Prairie View, about 140 km NW of Brandon. The general area, including at the community of Birtle, is characterized by valley and river crossings, and in general flat to rolling topography with reliefs up to 60 m. It is located in the Aspen Parkland ecoregion of Canada. This broad plains region, underlain by Cretaceous shale, is covered by undulating to kettled, calcareous, glacial till with significant areas of level lacustrine and hummocky to ridged fluvioglacial deposits (Environment Canada, 2017).

3.2 Weather and Climate

The closest weather station to Birtle which is less than 30 km away is located in Binscarth, Manitoba. Based on climate data available (Environment Canada, 2017), the daily average annual temperature in the area is 2 °C. Average annual total precipitation is 511.8 mm. The climate normal precipitation and temperature values for Binscarth from 1981 to 2010 is shown in Figure 3.1.

FIGURE 3.1 - CANADIAN CLIMATE NORMALS 1981-2010 TEMPERATURE AND PRECIPITATION FOR BINSCARTH, MANITOBA



Climate normals are three-decade averages of climatological variables including temperature and precipitation.

3.3 Hydrogeology

MWSB hired hydrogeologist W.L. Gibbons & Assoc. Inc. to conduct groundwater investigations for a new water supply. For discussions on site selection see section 2.0. The Wattsview loading station site is located on top of mostly sand and gravel layer underlain by the Odanah Shale Aquifer. The proposed wells will be installed in the sand and gravel layer aquifer. Based upon test hole installations, the stratigraphy is determined to consist of 4.5 m to 6.1 m of clay followed by a layer of sand and gravel up to depths of 44.5 m to 51.8 m. A test well was installed and found to have a very high specific capacity of 22.6 L/s per metre of drawdown. The result confirms that the lower sands and gravels are suitable for the installation of high capacity pumping well (W.L. Gibbons & Assoc. Inc., 2017). Preliminary update from the study indicates that the Wattsview Station is capable of supporting a withdrawal rate of 12 L/s or 240 dam^3/yr.

3.4 Hydrology

The area is part of the Assiniboine River basin which eventually drains to the Hudson Bay watershed. Birdtail creek is the closest waterway within the vicinity of the proposed works.

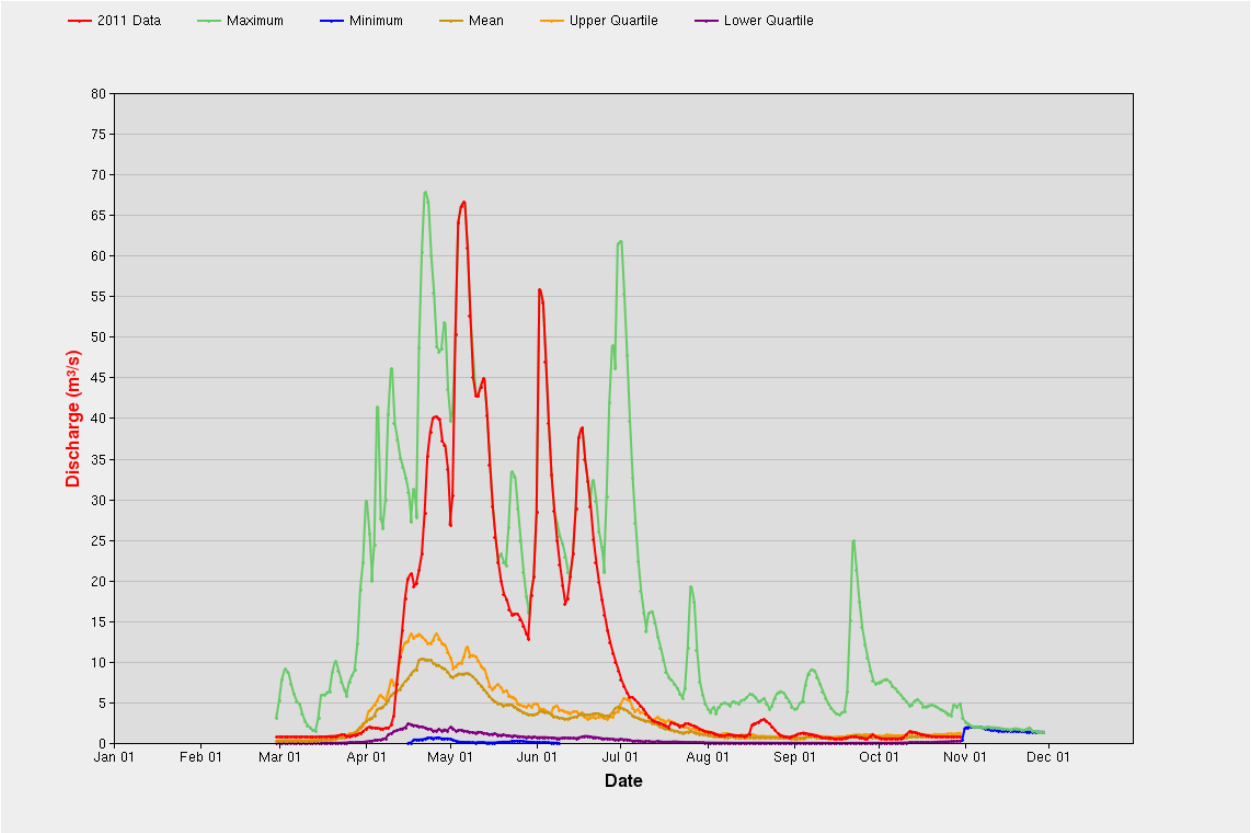
The hydrology of the area is not expected to be altered and is therefore not expected to be impacted by the proposed works.

General drainage in this area is towards the Birdtail Creek. The gross drainage area for the Birdtail Creek near Birtle Station (05ME003) is 1,100 km^2. Based on available data (Water Office of Canada), the year 2011 was a significantly wet year and it is used for reference. A table of flows is shown in Table 3.1 and corresponding hydrograph is shown in Figure 3.2.

TABLE 3.1 – BIRDTAIL CREEK NEAR BIRTLE MEAN DISCHARGE

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean flow (L/s) (000)	-	-	0.841	16.5	32.8	26.7	3.55	1.44	0.806	0.822	-	-

FIGURE 3.2 - DAILY DISCHARGE GRAPH FOR BIRDTAIL CREEK NEAR BIRTLE (05ME003) CORRESPONDING TO DATA RECORDED FROM 1953 TO 2015



3.5 Fish and Fish Habitat

Potential fish habitat in the project area includes the Birdtail Creek and a number of unnamed small waterways. Existing and/or planned fish habitat is not expected to be impacted by the proposed works. A guideline on pipeline waterway crossing is included in Appendix I – MWSB Guidelines for Watercourse Crossing and will be used for the project. A map showing Sampling sites, fish captures and habitat classification of streams and constructed drains throughout agricultural areas of Manitoba (2002 – 2006) (Department of Fisheries and Oceans, 2012) focusing on the project area is shown in Appendix G – Fish Habitat Classification.

3.6 Wildlife Habitat and Vegetation

The project area is located within the Aspen Parkland Ecoregion (a sub-division of) within the Prairies Ecozone. The ecoregion is classified as having a transitional grassland ecoclimate. Most of the ecoregion is now farmland but in its native state, the landscape was characterized by trembling aspen, oak groves, mixed tall shrubs, and intermittent fescue grasslands. Open stands of trembling aspen and shrubs occur on most sites, and bur oak and grassland communities occupy increasingly drier sites on loamy Black Chernozemic soils. The ecoregion also provides a

major breeding habitat for waterfowl and includes habitat for white-tailed deer, coyote, snowshoe hare, cottontail, red fox, northern pocket gopher, Franklin's ground squirrel, and bird species like sharp-tailed grouse and black-billed magpie. (Environment Canada, 2017).

A search of the Manitoba Conservation Data Centre's rare species database found occurrences of Plains Rough Fescue (S3), Baird's Sparrow (S1B), and Bobolink (S4B) for this area (Manitoba Sustainable Development, 2017). Search result is detailed in Appendix F - Manitoba Conservation Data Centre Information Request. Associated environmental management measure can be found in section 5.5.

3.7 Socioeconomic Overview

The community of Birtle is part of the Municipality of Prairie View. The municipality along with the RM of Hamiota, Town of Hamiota, RM of Blanshard, RM of Woodsworth, and RM of Saskatchewan forms the Mid-West Planning District.

The project area is located within the Municipality of Prairie View and the community of Birtle. Population in the community is about 642 in 2016 (Statistics Canada, 2016). The municipality is a full-service region ranging from accommodations, agricultural services, auto, construction, financial, health, food, petroleum industry, retail, to recreation, to list a few (Municipality of Prairie View, 2017).

There is also a proposed Birtle Transmission Project by Manitoba Hydro that originates in the Birtle South Station to the province of Saskatchewan.

3.8 Heritage Resources

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

4.0 Potential Environmental Effects

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

4.1 Air Quality

During construction, dust will be raised by construction equipment and there will be gaseous and particulate emissions from the construction equipment. Water spraying is an important, common and practical procedure that would be applied as required to alleviate potential dust problems. Emissions of gases and particulates would be minimized by advising contractor to keep machinery in good working order. Any effects would be localized and temporary. During construction there will be no releases of pollutants to the air. In the event of an emergency pollution incident, in addition to following emergency response plans, the Manitoba Ministry of Sustainable Development will also be notified as necessary.

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 well construction site will not be allowed. Therefore, the potential spills will be very small in size and standard construction spill clean-up procedures, including the removal of any impacted soil, will be applied to prevent or mitigate impact. In the event of an emergency pollution incident, in addition to following emergency response plans, the Manitoba Ministry of Sustainable Development will also be notified as necessary.

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 and the use of established routes to access the wells and WTP. 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 and Fish Habitat

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

and minimize impacts. There is potential for some loss of drilling mud to surface water. Impacts to fisheries and fish habitat are considered minor.

4.4 Groundwater Quality

Groundwater quality can be impacted by surface activities and surface water quality. The available information indicates that the proposed withdrawal of groundwater is unlikely to result in adverse changes 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 system operation to be made.

4.5 Groundwater Levels

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 of the groundwater levels will be required to identify any such adverse effects and allow the appropriate adjustments in the system operation to be made.

4.6 Vegetation

Construction will occur primarily within municipal right-of-way or easement that are previously disturbed, regularly managed, and comprised primarily of grasses. The construction work is expected to take place in or near a built environment, 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.

4.7 Wildlife Habitat and Vegetation

A search of the Manitoba Conservation Data Centre's rare species database found occurrences of Plains Rough Fescue (S3), Baird's Sparrow (S1B), and Bobolink (S4B) for this area (Manitoba Sustainable Development, 2017). Search result is detailed in Appendix F - Manitoba Conservation Data Centre Information Request. Associated environmental management measure can be found in section 5.5.

The construction and operation activities associated with this project will be limited to areas already developed for urban, agricultural, or road right-of-ways. The potential to wildlife habitat loss still exists, however, is assessed to be negligible to minor.

4.8 Noise and Vibration

During the construction phase of the project, there will be several sources of sound emissions including equipment used for construction. The types of noises heard due to construction are dominated by equipment engines. However, miscellaneous short term impact noises (e.g. dump

truck gates, back hoe buckets) are often heard. The noise will be in addition to regular community and highway activities, and the effects are considered minor.

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

Before construction begins, the contractor will be required to coordinate with the Municipality to notify residents of the upcoming construction activity and any other arrangements appertaining to the construction.

4.9 Employment/Economy

Socio-economic implications are not expected as a result of environmental impacts as these impacts are considered minor and short-term. Some economic implications may exist for the Municipality due to the cost of upgrading their water system, however, the Municipality will have a sustainable potable water supply to meet future demands. There may be some local economic benefits as well during construction. The proposed project will address various issues of the existing water system and will bring the community in compliance with the Office of Drinking Water. The potential effects of the project on employment and the economy are assessed to be positive.

4.10 Human Health and Well Being

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

The project will result in the construction of an improved raw water supply source and a water treatment upgrade designed and operated to produce a treated water supply that meets current water quality standards. This will produce a higher quality of living in Birtle. The effects of this on human health and well-being are considered positive.

4.11 Climate Change

There are no predicted impacts to climate as a result of the proposed works.

5.0 Environmental Management Measures

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

5.1 Air Quality

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

The impact of dust may be mitigated by the use of an approved dust suppressant, limiting construction during high wind periods, and re-establishment of vegetation as soon as possible. In the event of an emergency pollution incident, in addition to following emergency response plans, the Manitoba Ministry of Sustainable Development will also be notified as necessary.

5.2 Soils

Mitigation to potential impacts to soil by contamination from petroleum products include preparation of an emergency response plan for potential spills, use of spill clean-up equipment and materials, using properly maintained equipment, and using appropriate fuelling equipment. In the event of an emergency pollution incident, in addition to following emergency response plans, the Manitoba Ministry of Sustainable Development will also be notified as necessary.

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

5.3 Surface Water

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

Petroleum leaks or spills will be mitigated by use of properly maintained equipment, use of spill clean-up equipment and materials, and use of appropriate fuelling equipment. A prepared emergency response plan can be implemented in the event of a significant spill. In the event of an emergency pollution incident, in addition to following emergency response plans, the Manitoba Ministry of Sustainable Development will also be notified as necessary.

A 100 m setback to watercourses will be maintained for fuelling activities. Vehicles will avoid entering the riparian zones. Re-establishment of vegetation will occur as soon as possible on areas of disturbed soil.

Horizontal directional drilling will be implemented at watercourse crossings, a guide to be used is included in Appendix I – MWSB Guidelines for Watercourse Crossing.

5.4 Groundwater

Groundwater is primarily protected by the natural hydrogeology in the area. The aquifer at the supply well is protected by confining clay till overburden. Mitigation of potential groundwater impacts from petroleum products can be mitigated as described in Section 5.3. To address potential issues associated with water quality and water level changes, the following monitoring programs will be implemented.

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 a minimum of annually. The laboratory analyses should include electrical conductivity, hardness, alkalinity, total dissolved solids, major cations and anions (Ca, Na, Mg, HCO_3, SO_4, CL), dissolved metals (including As), and total Fe and Mn. 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. Note that this sampling program is separate from any routine sampling program required as part of the operation of the water treatment plant.

The recommended groundwater level monitoring program would include the use of groundwater monitoring stations maintained by the province. The 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. It is assumed at this stage that the Province will continue to maintain groundwater monitoring stations and will make the information available on an annual basis.

The availability of groundwater usage for potential future users will be assessed through the Water Rights Act Licensing process.

5.5 Vegetation and Wildlife

A search of the Manitoba Conservation Data Centre's rare species database found occurrences of Plains Rough Fescue (S3), Baird's Sparrow (S1B), and Bobolink (S4B) for this area (Manitoba Sustainable Development, 2017). Search result is detailed in Appendix F - Manitoba Conservation Data Centre Information Request. Associated environmental management measure can be found in section 5.5. The proponent will work with Heritage Resources Branch to protect or mitigate any concerns to the identified species as required. In addition, as attached in Appendix J – Recommended Development Setback Distances from Birds guideline will be followed.

Disturbance on other plant species will be minimized and re-establishment of vegetation will occur as soon as possible on disturbed areas. Impacts to wildlife habitat can be limited by minimizing the area of construction and controlling access to the designated construction area. Other impacts resulting from dust or smoke will be minimized as previously indicated. Noise

disturbance will be limited by use of muffling vehicles and equipment, limiting idling and limiting the construction area.

Any potential loss and disturbance to vegetation and wildlife during operation may be mitigated by restricting vehicular traffic to designated and previously disturbed areas, and by limiting monitoring and maintenance activities to previously disturbed areas.

5.6 Fisheries

Fisheries impacts will be minimized by implementing practices to reduce soil and contaminate run-off as previously mentioned in Section 5.3.

5.7 Noise and Vibration

Limiting any noise-creating activities, including regular maintenance and monitoring activities to normal working hours, and limiting unnecessary long-term idling can mitigate any potential increased noise and vibration effects. Residents, businesses, and other stakeholders in the area will be notified of when the construction will happen.

5.8 Water Conservation

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

5.9 Socio-Economic Implications

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

6.0 References

Bullée Consulting Ltd. (2010). *Town of Birtle Waterworks System Assessment.* Saskatoon.

Department of Fisheries and Oceans. (2012). Map of Sampling sites, fish captures and habitat classification of streams and constructed drains throughout agricultural areas of Manitoba (2002 – 2006) 062K06. Manitoba, Canada.

Environment Canada. (2017, 07). Canadian Climate Normals 1981-2010 Station Data. Birdtail Creek near Birtle. Retrieved June 1, 2017, from http://climate.weather.gc.ca/climate_normals/index_e.html

Environment Canada. (2017, June 8). *Ecological Framework of Canada*. Retrieved from www.ecozones.ca

Manitoba Intergovernmental Affairs Community Planning Services. (2008, October). Cartlon Trail Planning District Development Plan By-Law 2-2008 MAP 2, MAP 3.

Manitoba Sustainable Development. (2017, June 8). Data developed by the Manitoba Conservation Data Centre; Wildlife & Fisheries Branch, Manitoba Sustainable Development.

Municipality of Prairie View. (2017, July 12). *Business Directory*. Retrieved from My Prairie View: myprairieview.ca

Office of Drinking Water. (2017). *Letter regarding the February 8, 2017 Inspection.* Birtle.

Stantec Consulting Ltd. (2017). *Birtle Wastewater System Study - Final Submission.* Winipeg.

Statistics Canada. (2011). *Census Program.* Retrieved from http://www12.statcan.gc.ca/census-recensement/2011/index-eng.cfm

Statistics Canada. (2016). *Census Program.* Retrieved from http://www12.statcan.gc.ca/census-recensement/index-eng.cfm

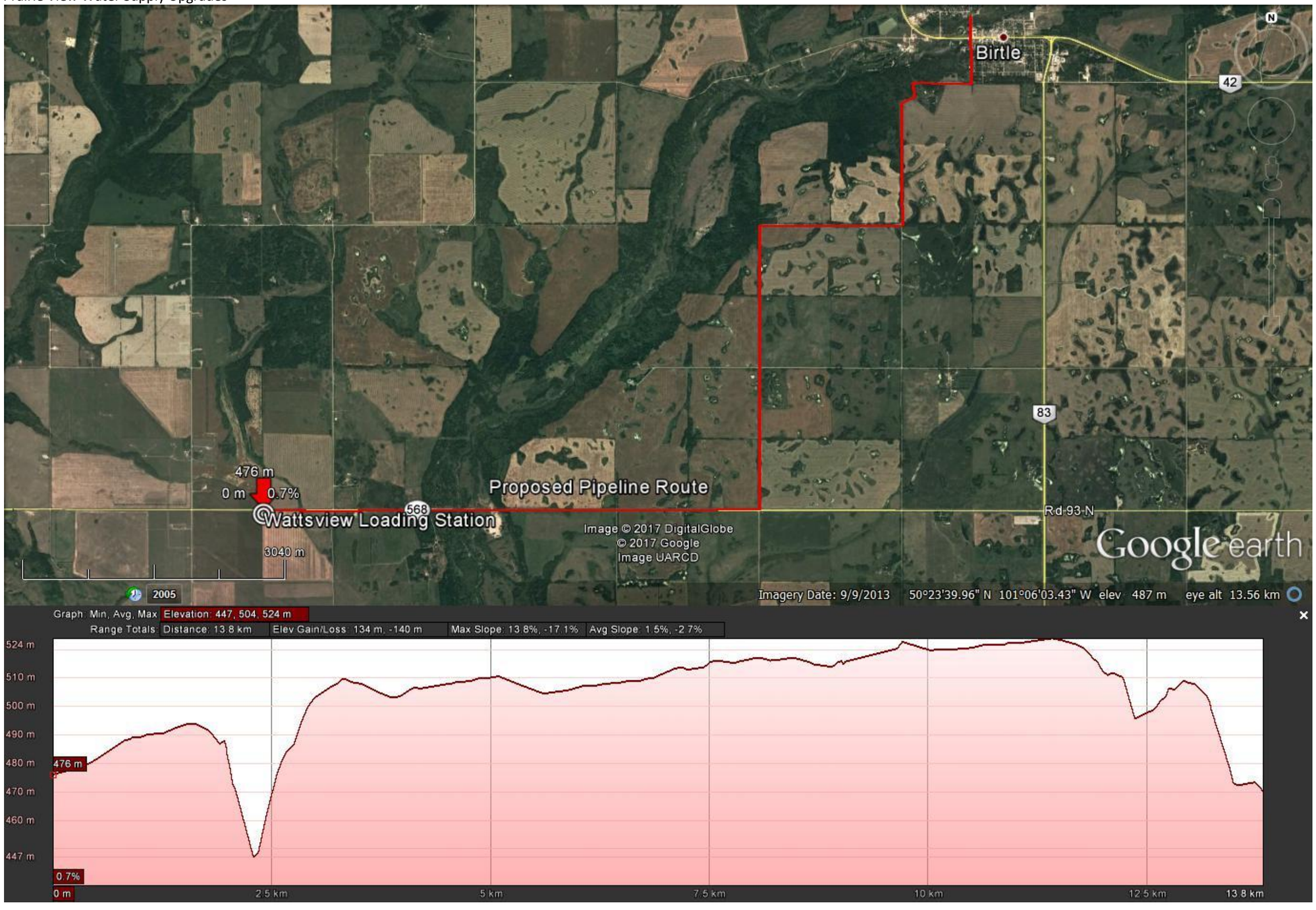
W.L. Gibbons & Assoc. Inc. (2017). *RE: RM of Prairie View - Birtle Water Supply Upgrade - Wattsview Loading Station Preliminary Update.* Brandon.

Water Office of Canada. (n.d.). Archived Hydrometric Data Online. Retrieved June 8, 2017, from https://www.ec.gc.ca/rhc-wsc/

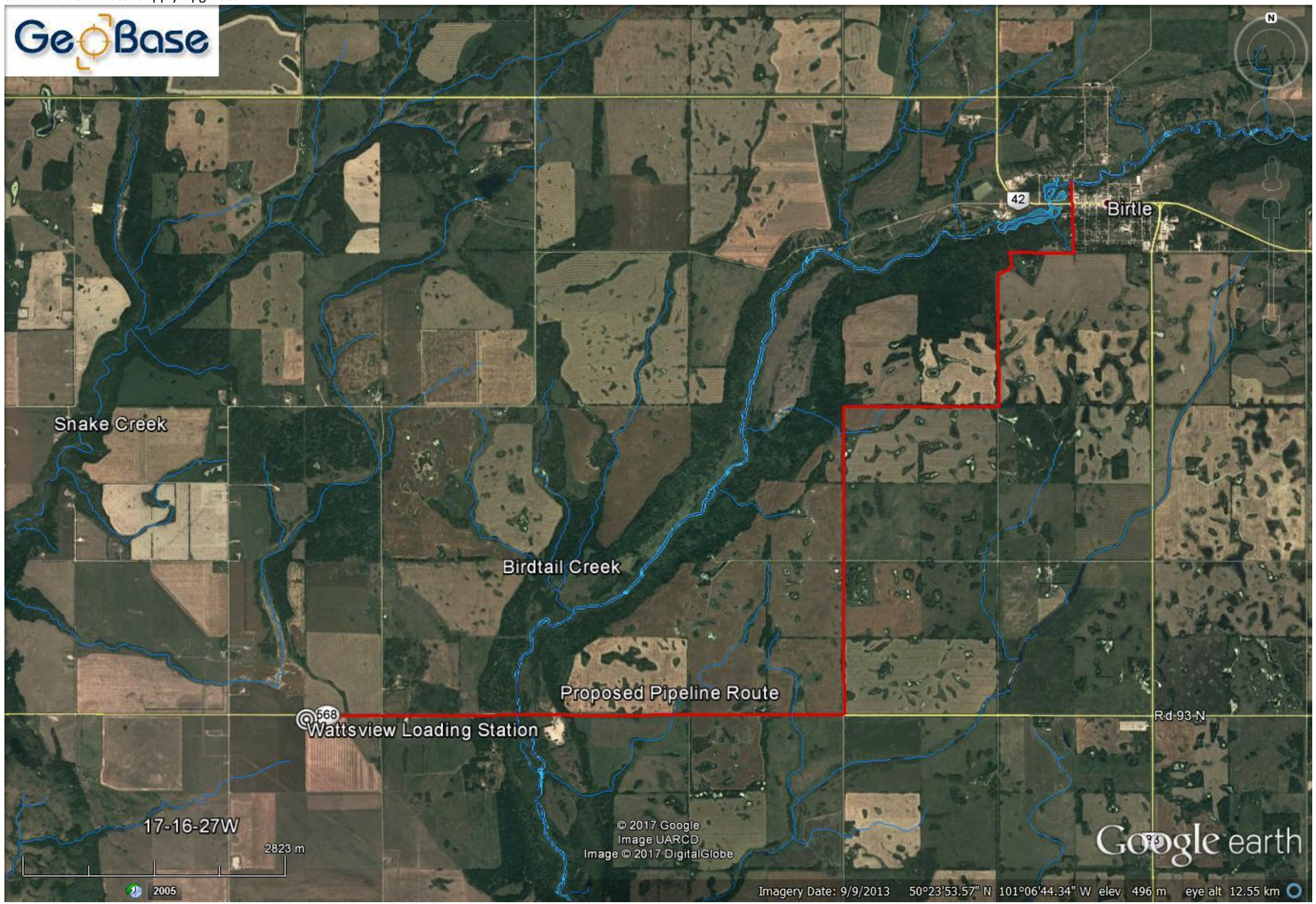
Appendix A - General Site Plan of Proposed Works

Including Pipeline Route Elevation Estimates


Water Treatment Plant
Reservoir
Flower St
Kent St
6 St
2 St
4 St
Main St
Birtle
Pearl St
St Clare St
Vine St
Hill St
Morton Dr
Centre St
7 St
8 St
9 St
10 St
11 St
12 St
Beaconsfield Ave
Lundy St
Britle
Queen Ave
Queen St
42
83
Google Earth
2005
Imagery Date: 9/9/2013 50°25'17.89" N 101°02'41.84" W elev 1593 ft eye alt 7298 ft


Birtle
42
83
476 m
0 m
0.7%
Proposed Pipeline Route
568
Wattsview Loading Station
3040 m
Rd 93 N
Image © 2017 DigitalGlobe
© 2017 Google
Image UARGD
Google earth
2005
Imagery Date: 9/9/2013 50°23'39.96" N 101°06'03.43" W elev 487 m eye alt 13.56 km
Graph: Min, Avg, Max Elevation: 447, 504, 524 m
Range Totals: Distance: 13.8 km Elev Gain/Loss: 134 m, -140 m Max Slope: 13.8%, -17.1% Avg Slope: 1.5%, -2.7%
524 m
510 m
500 m
490 m
480 m
470 m
460 m
447 m
476 m
0.7%
0 m
2.5 km
5 km
7.5 km
10 km
12.5 km
13.8 km

Appendix B - Hydrology of Location of Proposed Works


GeoBase
N
42
Birtle
Snake Creek
Birdtail Creek
Proposed Pipeline Route
568
Wattsview Loading Station
Rd 93 N
17-16-27W
2823 m
© 2017 Google
Image UARCD
Image © 2017 DigitalGlobe
Google earth
2005
Imagery Date: 9/9/2013 50°23'53.57" N 101°06'44.34" W elev 496 m eye alt 12.55 km

Appendix C - PWS Operating Licence

Manitoba
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-09-403-01 A

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

WATER SYSTEM CODE:	**23.00**
OPERATION ID:	**16538**
EFFECTIVE DATE:	**JANUARY 1, 2015**
EXPIRY DATE:	**NOVEMBER 30, 2019**

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

PRAIRIE VIEW MUNICIPALITY: "THE LICENSEE"

FOR THE OPERATION OF THE **BIRTLE PUBLIC WATER SYSTEM**, WHICH INCLUDES SECURE WELL, 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.

PWS-09-403-01 A *Page 2 of 6*

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 submit a compliance plan in a form satisfactory to the Director by April 1, 2011 addressing the following standards:
   a) 99.99% (4-log) reduction or inactivation of viruses
   b) 20 minute chlorine contact time, or a method or combination of methods approved by the Director

2.6. 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) 99.99% (4-log) reduction or inactivation of viruses
   b) 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.

PWS-09-403-01 A *Page 3 of 6*

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
E. coli	Less than one *E. coli* bacteria detectable per 100 mL in all treated and distributed water
Monochloramine	A monochloramine residual of at least 1.0 mg/L in water entering the distribution system 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 *E. coli*)	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
Monochloramine (treated water)	One sample per day of water entering the distribution system
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 of water entering the distribution system
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 of water entering the distribution system
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) nitrite and nitrate
c) general chemistry

PWS-09-403-01 A *Page 5 of 6*

d) 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 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.

5.5. 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.

PWS-09-403-01 A *Page 6 of 6*

Appendix D - Water Rights Licence

(pending)

Appendix E - Raw Water Quality Analysis

Summary adopted from W.L. Gibbons & Assoc. Inc. RM of Prairie View – Birtle Water Supply Upgrade – Wattsview Loading Station Preliminary Update to the Manitoba Water Services Board dated July 10, 2017.

Full water quality analysis results follows.

Table 1
Municipality of Prairie View - Birtle
Water Quality Data
Sheet 1 of 2

Parameters	Existing Supply SE6-17-26W 14/02/13 Deep Intertill	Wattsview LS NE17-16-27W 24/11/16 Shallow S&G	MW 17-01 NE17-16-27W 15/7/17 Deep S&G	TW 17-01 NE17-16-27W 16/7/17 Deep S&G	Canadian Drinking Water Quality Guidelines
Total Alkalinity (as CaCO3)	393	280	257	262	
Bicarbonate (as HCO3)	457	342	314	320	
Carbonate (as CO3)	<12	<0.6	<0.6	<0.6	
Hydroxide (OH)	<6.8	<0.34	<0.34	<0.34	
Ammonia, Total (as N)	2.47	0.068	0.142	0.177	
Total Carbon	115.3	50.7	49.6	54.5	
Total Inorganic Carbon	110	49.6	48.1	53.4	
Total Organic Carbon	5.3	1.08	1.49	1.08	
Chloride (Cl)	144	1.61	3.87	3.66	250
True Colour (CU)	35.4	<5	<5	<5	15
Conductivity (umhos/cm)	3440	568	551	555	
Fluoride (F)	0.18	0.178	0.138	0.137	1.5
Hardness (as CaCO3)	865	325	279	283	
Cation - Anion Balance	36.5	-2.4	-3.7	-3.3	
Anion Sum	36.8	7.01	6.6	6.67	
Cation Sum	0.3	6.67	6.13	6.24	
Langelier Index (4°C)	1.3	0.35	0.71	0.3	
Langelier Index (60°C)	2.0	1.1	1.5	1.1	
Nitrate-N	<0.025	0.352	<0.02	<0.02	10
Nitrate and Nitrite as N	<0.025	0.352	<0.07	<0.07	10
Nitrite-N	<0.0050	<0.01	<0.01	<0.01	1
Sulphate (SO4)	1200	63.5	64.4	63.1	500
Total Dissolved Solids	2450	376	381	360	500
Total Kjedahl Nitrogen	3.08	<0.2	0.2	36.5	
UV Transmittance (245nm)	82.7	96.2	94.4	94.8	
Turbidity (NTU)	43.1	6.05	2.83	1.15	
pH	8.43	7.67	8.14	7.72	

Note: All units in mg/l except as noted.
- denotes exceedance of guideline

Table 1
Municipality of Prairie View - Birtle
Water Quality Data
Sheet 2 of 2

Parameters	Existing Supply SE6-17-26W 14/02/13 Deep Intertill	Wattsview LS NE17-16-27W 24/11/16 Shallow S&G	MW 17-01 NE17-16-27W 15/7/17 Deep S&G	TW 17-01 NE17-16-27W 16/7/17 Deep S&G	Canadian Drinking Water Quality Guidelines
Total Metals					
Aluminum (Al)	<0.0050	<0.005	0.0181	0.0126	0.1
Antimony (Sb)	<0.00020	<0.0002	<0.0002	<0.0002	0.006
Arsenic (As)	0.0262	0.00154	0.00311	0.00324	0.0100
Barium (Ba)	0.00622	0.0939	0.685	0.0668	1
Beryllium (Be)	<0.00020	<0.0002	<0.0002	<0.0002	
Bismuth (Bi)	<0.00020	<0.0002	<0.0002	<0.0002	
Boron (B)	0.578	0.033	0.034	0.034	5
Cadmium (Cd)	0.000045	<0.00001	<0.00001	<0.00001	0.005
Calcium (Ca)	213	85.4	71.9	72.3	
Cesium (Cs)	<0.00010	<0.0001	<0.0001	<0.0001	
Chromium (Cr)	<0.0010	<0.001	<0.0001	<0.001	0.05
Cobalt (Co)	0.00121	<0.0002	0.00053	0.00023	
Copper (Cu)	<0.00020	0.00049	0.00041	0.00467	1
Iron (Fe)	4.23	0.669	0.759	1.06	0.3
Lead (Pb)	<0.000090	<0.00009	<0.00009	0.000688	0.01
Lithium (Li)	0.233	0.0164	0.0189	0.0193	
Magnesium (Mg)	80.8	27.2	24.1	24.8	
Manganese (Mn)	0.475	0.414	0.435	0.421	0.050
Molybdenum (Mo)	0.00654	0.0009	0.00124	0.00098	
Nickel (Ni)	<0.0020	0.0025	<0.002	<0.002	
Phosphorous (P)	0.12	<0.1	<0.1	<0.1	
Potassium (K)	13.2	2.23	3.08	3.11	
Rubidium (Rb)	0.00348	0.00048	0.00095	0.00085	
Selenium (Se)	<0.0010	<0.001	<0.001	<0.001	0.01
Silicon (Si)	16.4	12.8	12.8	12.8	
Silver (Ag)	<0.00010	<0.0001	<0.0001	<0.0001	
Sodium (Na)	436	2.57	10.9	11.4	200
Strontium (Sr)	1.39	0.171	0.145	0.149	
Tellurium (Te)	<0.00020	<0.0002	<0.0002	<0.0002	
Thallium (Tl)	<0.00010	<0.0001	<0.0001	<0.0001	
Thorium (Th)	<0.00010	<0.0001	<0.0001	<0.0001	
Tin (Sn)	<0.00020	<0.0002	<0.0002	<0.0002	
Titanium (Ti)	0.0171	<0.0005	0.00059	<0.0005	
Tungsten (W)	<0.00010	<0.0001	<0.0001	0.00011	
Uranium (U)	0.00136	0.00354	0.00255	0.0026	
Vanadium (V)	<0.00020	<0.0002	0.00025	<0.0002	
Zinc (Zn)	<0.0020	0.0025	0.0036	<0.002	
Zirconium (Zr)	<0.00040	<0.0004	<0.0004	<0.0004	

Note: All units in mg/l except as noted.
- denotes exceedance of guideline

WL Gibbons & Associates Inc.
ATTN: STEVE WIECEK
64 St. Andrew Road
Winnipeg MB R2M 3H6

Date Received: 25-NOV-16
Report Date: 02-DEC-16 10:23 (MT)
Version: FINAL

Client Phone: 204-771-4389

Certificate of Analysis

Lab Work Order #: L1862648
Project P.O. #: NOT SUBMITTED
Job Reference: BIRTLE
C of C Numbers:
Legal Site Desc:

Craig Riddell, B.Sc.Ag
Account Manager

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

BIRTLE

L1862648 CONTD....
PAGE 2 of 6
Version: FINAL

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1862648-1 WATTSVIEW Sampled By: SJW on 24-NOV-16 @ 16:00 Matrix: WATER							
MB Conservation test 72D							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	342		1.2	mg/L		30-NOV-16	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		30-NOV-16	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		30-NOV-16	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	280		1.0	mg/L		29-NOV-16	R3606736
Ammonia by colour							
Ammonia, Total (as N)	0.068		0.010	mg/L		29-NOV-16	R3606814
Chloride in Water by IC							
Chloride (Cl)	1.61		0.50	mg/L		26-NOV-16	R3606789
Colour, True							
Colour, True	<5.0		5.0	CU		26-NOV-16	R3606147
Conductivity							
Conductivity	568		1.0	umhos/cm		29-NOV-16	R3606736
Fluoride in Water by IC							
Fluoride (F)	0.178		0.020	mg/L		26-NOV-16	R3606789
Hardness Calculated							
Hardness (as CaCO3)	325	HTC	0.25	mg/L		01-DEC-16	
Ion Balance Calculation							
Cation - Anion Balance	-2.4			%		01-DEC-16	
Anion Sum	7.01			me/L		01-DEC-16	
Cation Sum	6.67			me/L		01-DEC-16	
Langelier Index 4C							
Langelier Index (4 C)	0.35					01-DEC-16	
Langelier Index 60C							
Langelier Index (60 C)	1.1					01-DEC-16	
Nitrate in Water by IC							
Nitrate (as N)	0.352		0.020	mg/L		26-NOV-16	R3606789
Nitrate+Nitrite							
Nitrate and Nitrite as N	0.352		0.070	mg/L		30-NOV-16	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		26-NOV-16	R3606789
Sulfate in Water by IC							
Sulfate (SO4)	63.5		0.30	mg/L		26-NOV-16	R3606789
Total Carbon by Calculation							
Total Carbon	50.7		1.0	mg/L		02-DEC-16	
Total Dissolved Solids (TDS)							
Total Dissolved Solids	376		20	mg/L		29-NOV-16	R3606950
Total Inorganic Carbon by Combustion							
Total Inorganic Carbon	49.6		0.50	mg/L		28-NOV-16	R3605892
Total Kjeldahl Nitrogen							
Total Kjeldahl Nitrogen	<0.20		0.20	mg/L	29-NOV-16	30-NOV-16	R3607742
Total Metals by ICP-MS							
Aluminum (Al)-Total	<0.0050		0.0050	mg/L	30-NOV-16	30-NOV-16	R3607476
Antimony (Sb)-Total	<0.00020		0.00020	mg/L	30-NOV-16	30-NOV-16	R3607476
Arsenic (As)-Total	0.00154		0.00020	mg/L	30-NOV-16	30-NOV-16	R3607476
Barium (Ba)-Total	0.0939		0.00020	mg/L	30-NOV-16	30-NOV-16	R3607476
Beryllium (Be)-Total	<0.00020		0.00020	mg/L	30-NOV-16	30-NOV-16	R3607476
Bismuth (Bi)-Total	<0.00020		0.00020	mg/L	30-NOV-16	30-NOV-16	R3607476
Boron (B)-Total	0.033		0.010	mg/L	30-NOV-16	30-NOV-16	R3607476

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

BIRTLE

L1862648 CONTD....
PAGE 3 of 6
Version: FINAL

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1862648-1 WATTSVIEW							
Sampled By: SJW on 24-NOV-16 @ 16:00							
Matrix: WATER							
Total Metals by ICP-MS							
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	30-NOV-16	30-NOV-16	R3607476
Calcium (Ca)-Total	85.4		0.10	mg/L	30-NOV-16	30-NOV-16	R3607476
Cesium (Cs)-Total	<0.00010		0.00010	mg/L	30-NOV-16	30-NOV-16	R3607476
Chromium (Cr)-Total	<0.0010		0.0010	mg/L	30-NOV-16	30-NOV-16	R3607476
Cobalt (Co)-Total	<0.00020		0.00020	mg/L	30-NOV-16	30-NOV-16	R3607476
Copper (Cu)-Total	0.00049		0.00020	mg/L	30-NOV-16	30-NOV-16	R3607476
Iron (Fe)-Total	0.669		0.010	mg/L	30-NOV-16	30-NOV-16	R3607476
Lead (Pb)-Total	<0.000090		0.000090	mg/L	30-NOV-16	30-NOV-16	R3607476
Lithium (Li)-Total	0.0164		0.0020	mg/L	30-NOV-16	30-NOV-16	R3607476
Magnesium (Mg)-Total	27.2		0.010	mg/L	30-NOV-16	30-NOV-16	R3607476
Manganese (Mn)-Total	0.414		0.00030	mg/L	30-NOV-16	30-NOV-16	R3607476
Molybdenum (Mo)-Total	0.00090		0.00020	mg/L	30-NOV-16	30-NOV-16	R3607476
Nickel (Ni)-Total	0.0025		0.0020	mg/L	30-NOV-16	30-NOV-16	R3607476
Phosphorus (P)-Total	<0.10		0.10	mg/L	30-NOV-16	30-NOV-16	R3607476
Potassium (K)-Total	2.23		0.020	mg/L	30-NOV-16	30-NOV-16	R3607476
Rubidium (Rb)-Total	0.00048		0.00020	mg/L	30-NOV-16	30-NOV-16	R3607476
Selenium (Se)-Total	<0.0010		0.0010	mg/L	30-NOV-16	30-NOV-16	R3607476
Silicon (Si)-Total	12.8		0.10	mg/L	30-NOV-16	30-NOV-16	R3607476
Silver (Ag)-Total	<0.00010		0.00010	mg/L	30-NOV-16	30-NOV-16	R3607476
Sodium (Na)-Total	2.57		0.030	mg/L	30-NOV-16	30-NOV-16	R3607476
Strontium (Sr)-Total	0.171		0.00010	mg/L	30-NOV-16	30-NOV-16	R3607476
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	30-NOV-16	30-NOV-16	R3607476
Thallium (Tl)-Total	<0.00010		0.00010	mg/L	30-NOV-16	30-NOV-16	R3607476
Thorium (Th)-Total	<0.00010		0.00010	mg/L	30-NOV-16	30-NOV-16	R3607476
Tin (Sn)-Total	<0.00020		0.00020	mg/L	30-NOV-16	30-NOV-16	R3607476
Titanium (Ti)-Total	<0.00050		0.00050	mg/L	30-NOV-16	30-NOV-16	R3607476
Tungsten (W)-Total	<0.00010		0.00010	mg/L	30-NOV-16	30-NOV-16	R3607476
Uranium (U)-Total	0.00354		0.00010	mg/L	30-NOV-16	30-NOV-16	R3607476
Vanadium (V)-Total	<0.00020		0.00020	mg/L	30-NOV-16	30-NOV-16	R3607476
Zinc (Zn)-Total	0.0025		0.0020	mg/L	30-NOV-16	30-NOV-16	R3607476
Zirconium (Zr)-Total	<0.00040		0.00040	mg/L	30-NOV-16	30-NOV-16	R3607476
Total Organic Carbon by Combustion							
Total Organic Carbon	1.08		0.50	mg/L		29-NOV-16	R3608561
Turbidity							
Turbidity	6.05		0.10	NTU		28-NOV-16	R3605985
UV Transmittance (Calculated)							
Transmittance, UV (254 nm)	96.2		1.0	%T/cm		25-NOV-16	R3603332
pH							
pH	7.67		0.10	pH units		29-NOV-16	R3606736

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

BIRTLE L1862648 CONTD....
PAGE 4 of 6
Version: FINAL

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-CO3CO3-CALC-WP	Water	Alkalinity, Carbonate	CALCULATION
The Alkalinity of water is a measure of its acid neutralizing capacity.Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by carbonate is calculated and reported as mg CO3 2-/L.			
ALK-HCO3HCO3-CALC-WP	Water	Alkalinity, Bicarbonate	CALCULATION
The Alkalinity of water is a measure of its acid neutralizing capacity.Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by bicarbonate is calculated and reported as mg HCO3-/L			
ALK-OHOH-CALC-WP	Water	Alkalinity, Hydroxide	CALCULATION
The Alkalinity of water is a measure of its acid neutralizing capacity.Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by hydroxide is calculated and reported as mg OH-/L.			
ALK-TITR-WP	Water	Alkalinity, Total (as CaCO3)	APHA 2320B
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. Total alkalinity is determined by titration with a strong standard mineral acid to the successive HCO3- and H2CO3 endpoints indicated electrometrically.			
C-TC-CALC-WP	Water	Total Carbon by Calculation	CALCULATED
Total carbon represents the sum of total inorganic carbon and total organic carbon. For the purpose of calculation, results less than the detection limit (DL) are treated as zero.			
C-TIC-HTC-WP	Water	Total Inorganic Carbon by Combustion	APHA 5310 B-WP
Sample is injected into a heated reaction chamber where it is acidified converting all inorganic carbon to CO2, which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.			
C-TOC-HTC-WP	Water	Total Organic Carbon by Combustion	APHA 5310 B-WP
Sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO2 which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.			
CL-IC-N-WP	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
COLOUR-TRUE-WP	Water	Colour, True	APHA 2120C
True Colour is measured spectrophotometrically by comparison to platinum-cobalt standards using the single wavelength method (450 - 465 nm) after filtration of sample through a 0.45 um filter. Colour measurements can be highly pH dependent, and apply to the pH of the sample as received (at time of testing), without pH adjustment. Concurrent measurement of sample pH is recommended.			
EC-WP	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.			
ETL-LANGELIER-4-WP	Water	Langelier Index 4C	Calculated
ETL-LANGELIER-60-WP	Water	Langelier Index 60C	Calculated
F-IC-N-WP	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
HARDNESS-CALC-WP	Water	Hardness Calculated	APHA 2340B
Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.			
IONBALANCE-CALC-WP	Water	Ion Balance Calculation	APHA 1030E
Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions)			

BIRTLE L1862648 CONTD....
PAGE 5 of 6
Version: FINAL

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance (as % difference) cannot be calculated accurately for waters with very low electrical conductivity (EC), and is reported as "Low EC" where EC < 100 uS/cm (umhos/cm). Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-T-L-MS-WP	Water	Total Metals by ICP-MS	APHA 3030E/EPA 6020A-TL

This analysis involves preliminary sample treatment by hotblock acid digestion (APHA 3030E). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

N-TOTKJ-WP	Water	Total Kjeldahl Nitrogen	APHA 4500 NorgD (modified)

Aqueous samples are digested in a block digester with sulfuric acid and copper sulfate as a catalyst. Total Kjeldahl Nitrogen is then analyzed using a discrete analyzer with colorimetric detection.

NH3-COL-WP	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.

NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-WP	Water	Nitrite in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-N-WP	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

PH-WP	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.

SO4-IC-N-WP	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

TDS-WP	Water	Total Dissolved Solids (TDS)	APHA 2540 SOLIDS C,E

A well-mixed sample is filtered through a glass fiber filter paper. The filtrate is then evaportaed to dryness in a pre-weighed vial and dried at 180 – 2C. The increase in vial weight represents the total dissolved solids.

TURBIDITY-WP	Water	Turbidity	APHA 2130B (modified)

Turbidity in aqueous matrices is determined by the nephelometric method.

UV-%TRANS-WP	Water	UV Transmittance (Calculated)	APHA 5910B

Test method is adapted from APHA Method 5910B. A sample is filtered through a 0.45 um polyethersulfone (PES) filter and its UV Absorbance is measured in a quartz cell at 254 nm. UV Transmittance is calculated from the UV Absorbance result and reported as UV Transmittance per cm. The analysis is carried out without pH adjustment.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

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:

Laboratory Definition Code	Laboratory Location
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA

Chain of Custody Numbers:

BIRTLE

L1862648 CONTD....
PAGE 6 of 6
Version: FINAL

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

GLOSSARY OF REPORT TERMS

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.
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.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

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.

Appendix F - Manitoba Conservation Data Centre Information Request

Macaraeg, Paul (IMR)

From: Friesen, Chris (SD)
Sent: July-17-17 9:39 AM
To: Macaraeg, Paul (IMR)
Subject: Birtle Water Supply System
Attachments: Birtle.xlsx

Paul

Thank you for your information request. I completed a search of the Manitoba Conservation Data Centre's rare species database for your area of interest.

I am attaching an excel table summarizing these occurrences. The table includes scientific and common names, the provincial (SRank) rank for each species as well as MB Endangered Species and Ecosystem Act, COSEWIC and SARA designations. Further information on this ranking system can be found on our website at http://www.gov.mb.ca/conservation/cdc/consranks.html and these designations can be found at http://web2.gov.mb.ca/laws/statutes/ccsm/e111e.php, http://www.cosewic.gc.ca/ and http://www.sararegistry.gc.ca/default_e.cfm.

Manitoba's recommended setback distances can be found at http://www.gov.mb.ca/conservation/cdc/pubs.html

The information provided in this letter is based on existing data known to the Manitoba Conservation Data Centre of the Wildlife and Fisheries Branch at the time of the request. These data are dependent on the research and observations of our scientists and reflects our current state of knowledge. An absence of data does not confirm the absence of any rare or endangered species. Many areas of the province have never been thoroughly surveyed, therefore, the absence of data in any particular geographic area does not necessarily mean that species or ecological communities of concern are not present. The information should not be regarded as a final statement on the occurrence of any species of concern, nor should it substitute for on-site surveys for species or environmental assessments. Also, because our 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 passes before it is utilized.

Third party requests for products wholly or partially derived from our Biotics database 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 data from our database, as 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 contact me directly at (204) 945-7747.

Chris Friesen
Coordinator
Manitoba Conservation Data Centre
204-945-7747

1

chris.friesen@gov.mb.ca
http://www.manitoba.ca/conservation/cdc/

-----Original Message-----
From:
Sent: July-04-17 3:32 PM
To: Friesen, Chris (SD)
Subject: WWW Form Submission

Below is the result of your feedback form. It was submitted by WWW Information Request () on Tuesday, July 4, 2017 at 15:32:06

DocumentID: Manitoba_Conservation

Project Title: Birtle Water Supply System

Date Needed: 2017/07/21

Name: Paul Macaraeg

Company/Organization: Manitoba Water Services Board

Address: Unit 1A - 2010 Currie Blvd.

City: Brandon

Province/State: MB

Phone: 2047266766

Email: Paul.Macaraeg@gov.mb.ca

Project Description: Prairie View Municipality ("Municipality") requested The Manitoba Water Services Board ("MWSB") for assistance to develop a new raw water supply and upgrade to the water treatment system in the community of Birtle to meet Drinking Water Safety Act requirements.

The Wattsview loading station groundwater source shows good water quality, and so it is proposed to draw water from that location. Two pipeline routes are being investigated to convey water.

An Environmental Act Proposal (EAP) is currently being drafted for submission.

Information Requested: As part of the EAP, potential environmental effects have to be addressed. We are collecting information about the project area with regard to the environment.

Please submit an inclusive set of information available from you so we may identify environmental effects that our project may cause to the environment and come up with mitigation measures and follow-up activities. So we can include this in our proposal.

This would include, but not be limited to, fish habitat, species at risk, wildlife habitat, vegetation, traditional, ecological and archaeological sites, and any other sensitive environmental parameters.

2

Format Requested: As applicable. If shapefile or KML also available, please include.

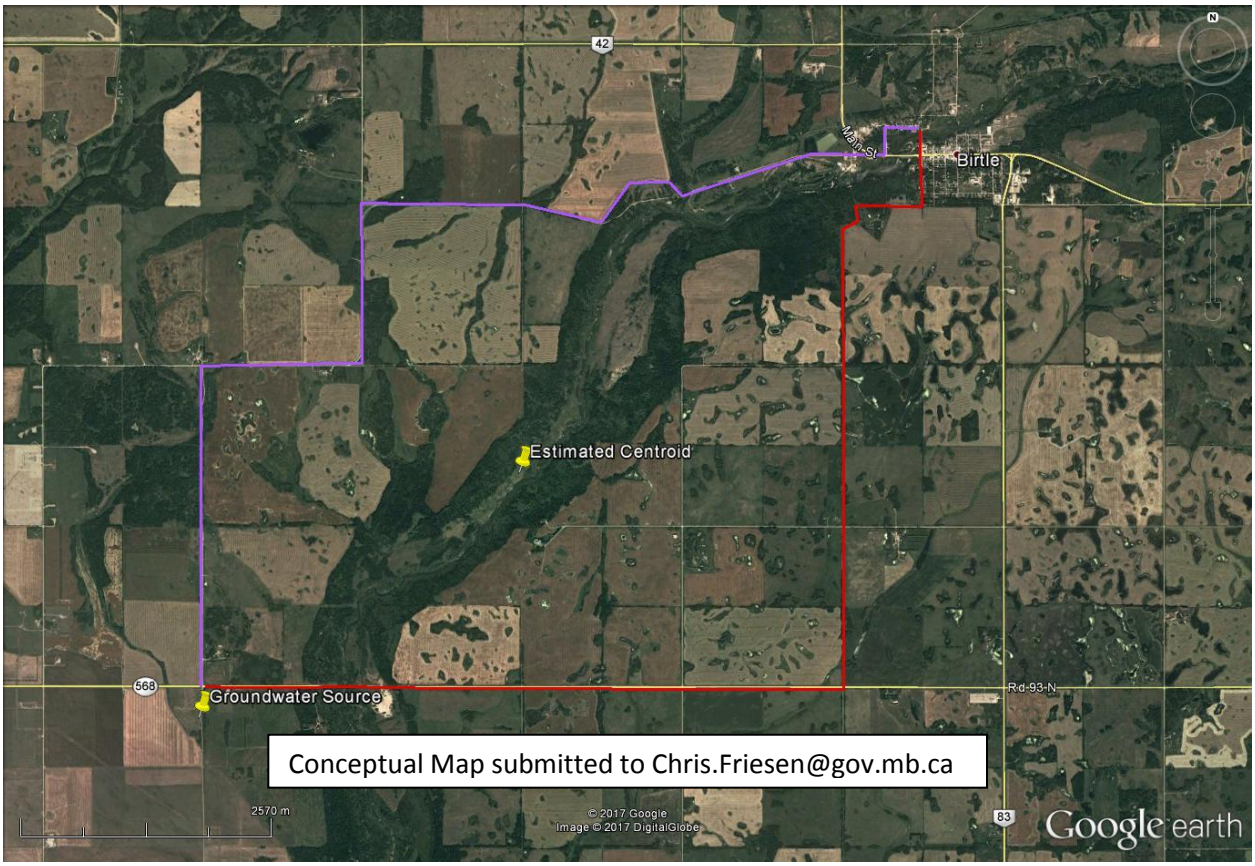
Location: Please conduct a 5-km radius search from 50°23'34.20"N, 101° 6'29.61"W (2 Pipeline Routes' centroid), and a 2-km radius search from 50°25'16.08"N, 101° 2'41.30"W (Birtle's centroid)

Conceptual Map to be sent as a supplementary data to chris.friesen@gov.mb.ca .

Please feel free to call or email for any clarifications. Thanks.

action: Submit

3

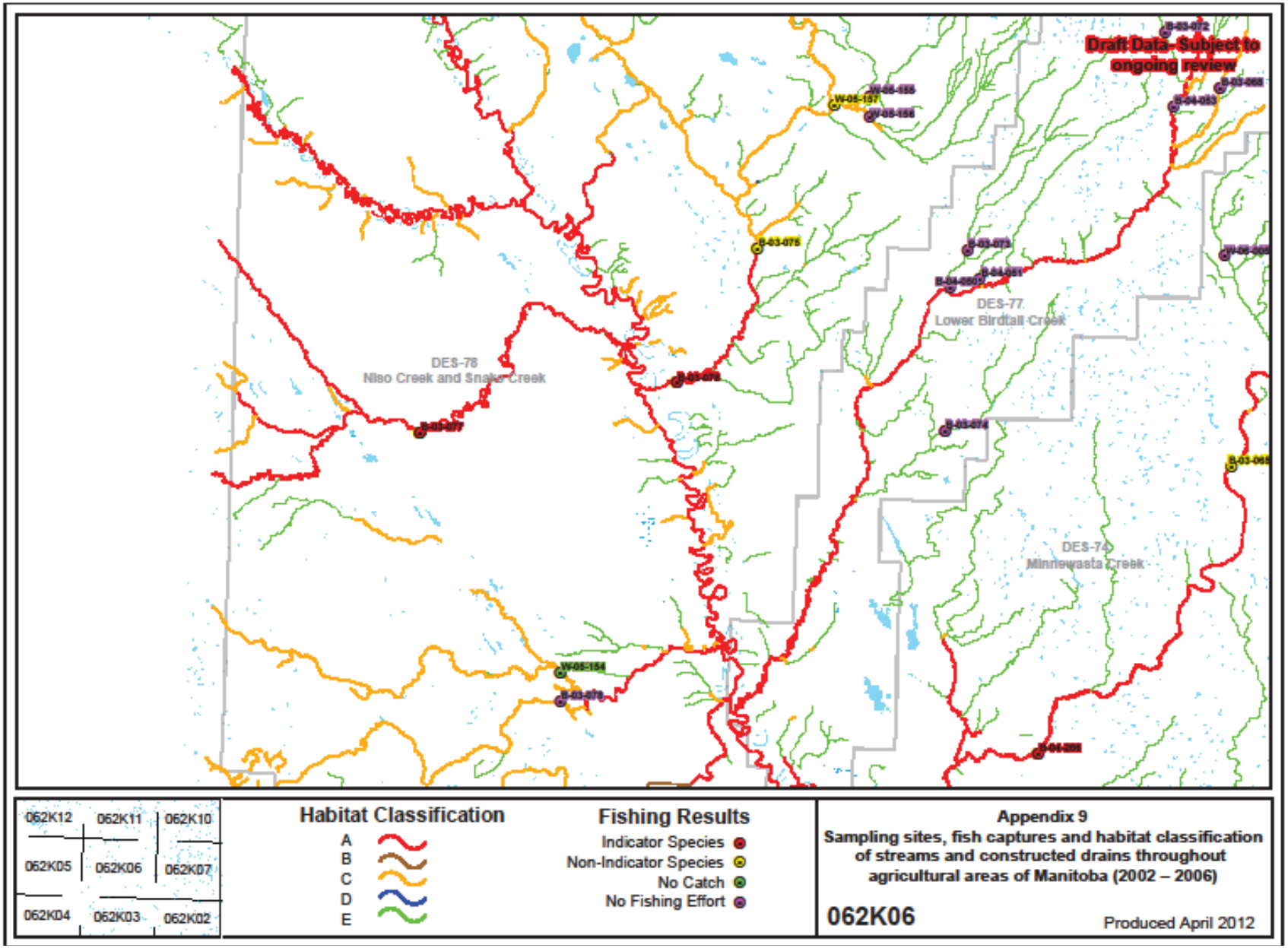


Conceptual Map submitted to Chris.Friesen@gov.mb.ca

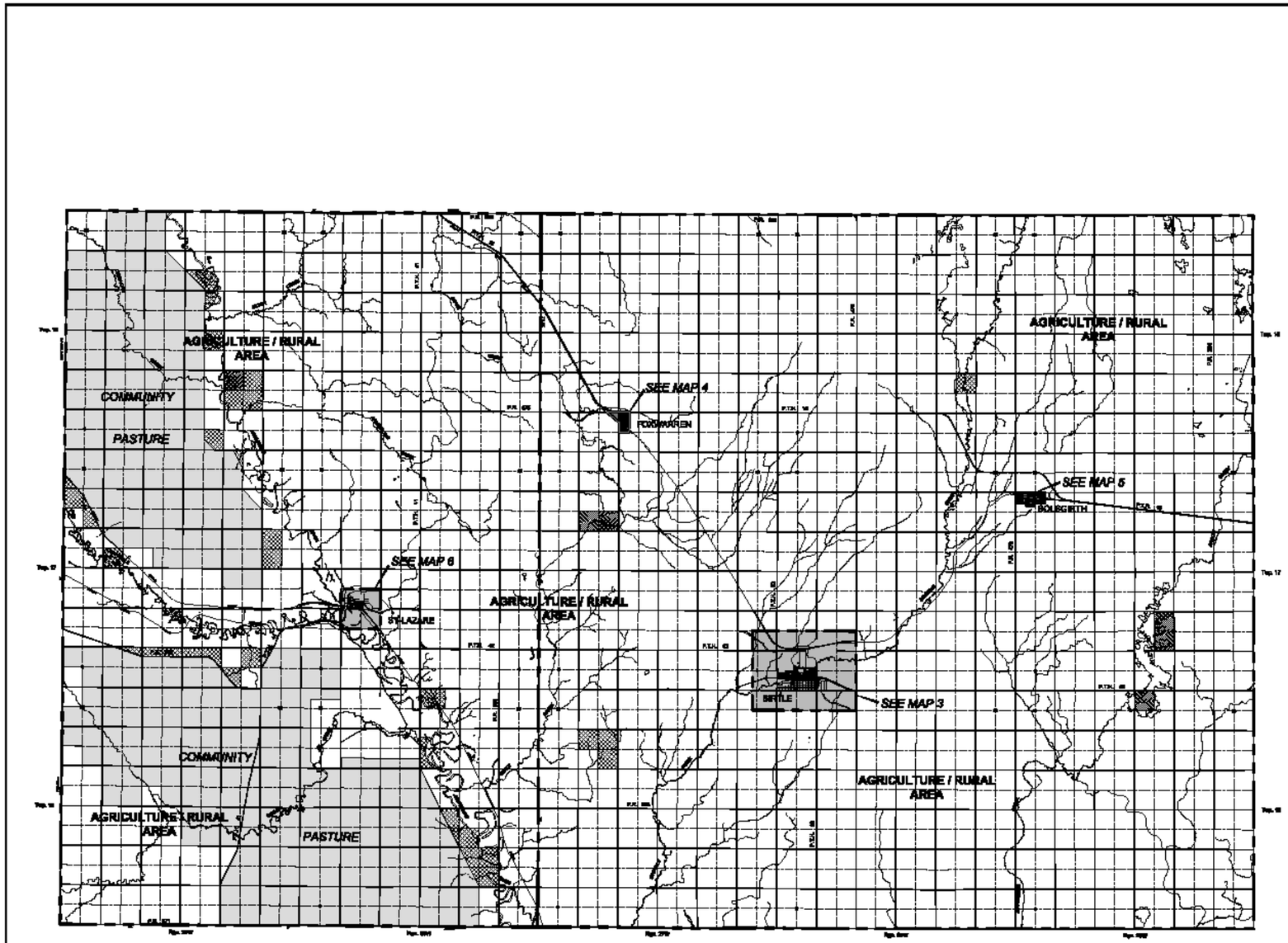
Manitoba Conservation Data Centre Search Results

CATEGORY	SCIENTIFIC_NAME	COMMON_NAME	S_RANK	ESEA	SARA	COSEWIC	5KM	2KM
Vascular Plant	Festuca hallii	Plains Rough Fescue	S3				X	X
Vertebrate Animal	Ammodramus bairdii	Baird's Sparrow	S1B	Endangered	Special Concern	Special Concern	X	
Vertebrate Animal	Dolichonyx oryzivorus	Bobolink	S4B			Threatened	X	

Appendix G – Fish Habitat Classification


Draft Data- Subject to ongoing review
DES-78
Niso Creek and Snake Creek
DES-77
Lower Birdtail Creek
DES-74
Minnewasta Creek
062K12
062K11
062K10
062K05
062K06
062K07
062K04
062K03
062K02
Habitat Classification
A
B
C
D
E
Fishing Results
Indicator Species
Non-Indicator Species
No Catch
No Fishing Effort
Appendix 9
Sampling sites, fish captures and habitat classification of streams and constructed drains throughout agricultural areas of Manitoba (2002 – 2006)
062K06
Produced April 2012

Appendix H – Development Plan and Zoning By-Law Maps



CARLTON TRAIL PLANNING DISTRICT

R.M OF BIRTLE
R.M. OF ELLICE

DEVELOPMENT PLAN

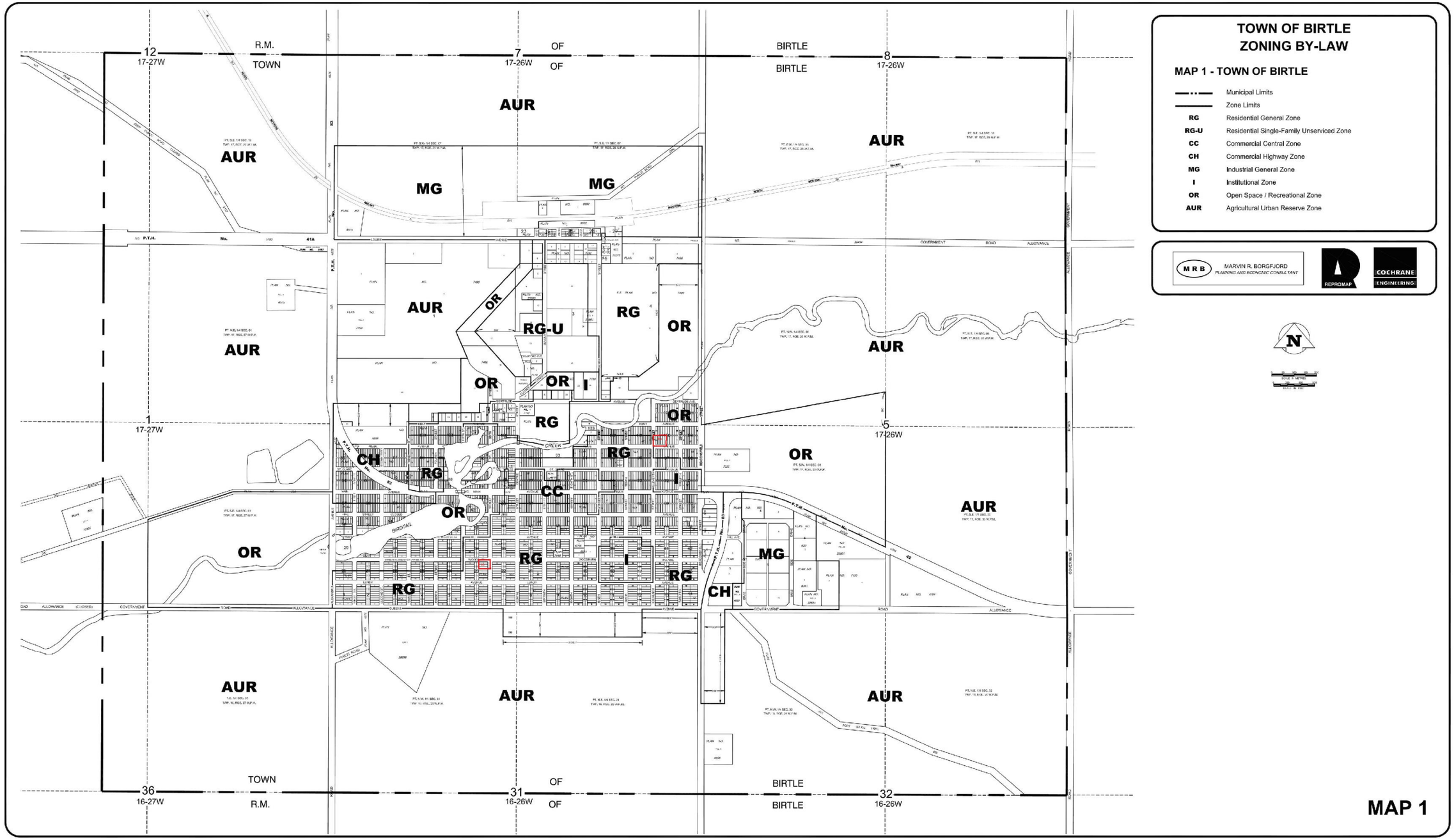
MAP 2

RURAL POLICY AREAS

LEGEND:

- Municipal Boundary
- Incorporated Community
- Unincorporated Community
- Crown Land
- Wildlife Management Area
- Community Pasture

Manitoba
Intergovernmental Affairs
Community Planning Services


TOWN OF BIRTLE
ZONING BY-LAW
MAP 1 - TOWN OF BIRTLE
Municipal Limits
Zone Limits
RG Residential General Zone
RG-U Residential Single-Family Unserviced Zone
CC Commercial Central Zone
CH Commercial Highway Zone
MG Industrial General Zone
I Institutional Zone
OR Open Space / Recreational Zone
AUR Agricultural Urban Reserve Zone
MRB MARVIN R. BORGFJORD PLANNING AND ECONOMIC CONSULTANT
REPROMAP
COCHRANE ENGINEERING
N
R.M. OF TOWN
BIRTLE
12 17-27W
7 17-26W
8 17-26W
1 17-27W
5 17-26W
36 16-27W
31 16-26W
32 16-26W
P.T.H. No. 41A
COUNTRY ROAD ALLOWANCE
MAP 1

Appendix I – MWSB Guidelines for Watercourse Crossing

WATERCOURSE CROSSINGS

Mitigation Measure

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

Reclamation

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

Pressure Loss/Fluid Loss Response

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

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

Loss of Fluid and Frac-out Response Plan

1. If an abnormal loss of fluid, drop in pressure or visible plume is observed indicating a frac-out or possible frac-out, drilling is to stop immediately.
2. The contractor will notify the MWSB construction field supervisor of the frac-out condition or potential condition and decide on the appropriate action as follows:
   a) Assign a person to visually monitor for the presence of muddy plume.

b) Make adjustments to the mud mixture; add lost circulation material (LCM) to the drilling fluid in an attempt to prevent further loss of fluid to the ground formation and/or watercourse.

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

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

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.

Appendix J – Recommended Development Setback Distances from Birds

Recommended Development Setback Distances from Birds
Manitoba Conservation Data Centre
June 24, 2015

Introduction

The Manitoba Conservation Data Centre (MBCDC) developed these recommendations and setback distances in order to provide industry proponents with consistent, readily available guidelines that can be applied in situations where sensitive species may be present in or near the project area. The setback distances were established by reviewing relevant literature and guidelines from other jurisdictions, and consulting local ornithologists.

General Recommendations

In most cases, disturbance or potentially deleterious activity outside of the breeding season is preferential to activity during the breeding season. The breeding season begins with territory establishment and ends when the young are fledged and the nesting territory is abandoned.

Where the activity will occur in suitable habitat for these species (eg: native grassland for the grassland birds), minimal clearing/disturbance techniques should be employed during or even outside of the breeding season. Any suitable habitat unavoidably disturbed should be reclaimed/rehabilitated as soon as possible.

If these species have been recorded in or near the project area, it is recommended that the proponent develop an environmental protection plan to submit to the MBCDC for review. At minimum the plan should:

a) describe the project, including a timeline of activities, a description of the location and current land use, and a description of the wildlife values in the area, including any species of concern identified by the MBCDC;
b) identify potential impacts of the project to wildlife values, especially to any species of concern identified by the MBCDC; and
c) propose impact management and mitigation measures to avoid or manage the identified impacts, including reclamation/rehabilitation efforts.

In some cases, MBCDC may also recommend the development of a monitoring program designed to assess species of concern that may occur in the area, impacts on wildlife values and/or the effectiveness of mitigation measures.

Disturbance Categories

Low
e.g.: foot traffic; occasional/infrequent/short-term small vehicle (<1 ton) or ATV use; operating oil or gas wells without flaring; operating pipelines

Foot-traffic only (FTO) is indicated for certain taxa, in which case all activities normally considered low disturbance (other than foot traffic) are considered medium disturbance.

Medium
e.g.: trucks>1 ton (gravel, oil, grain), regular/frequent/long-term small vehicle (<1 ton) or ATV use, pipeline construction (diameters <1 foot), operating compressor station or battery without flaring

High
e.g., road construction, roads, drilling rigs, mines and quarries, construction of compressor station or battery, forest harvest, large diameter pipeline construction, seismic exploration, blasting, rock crushing, asphalt batching, gravel pit, operating compressor station or battery or oil/gas well with flaring

Nest Site
In many cases it will be difficult to identify the exact location of a nest, and intensive efforts to do so may disturb breeding birds and/or their nests. In such cases, determining the main home range, territory and/or song perches through auditory song/call surveys and low-intensity visual observation, are recommended to determine the approximate location of nest sites. The set-back distance should then be applied to this approximate location.

Species	Key Wildlife Feature	Restricted Activity Period	Recommended Set-back Distance by Disturbance Category (metres)		
			Low	Medium	High
Baird's Sparrow	Nest Site	May 15 - August 15	100	250	500
Bald Eagle	Active or Traditional Nest Site	March 15 - July 15	250	500	1000
Bank Swallow	Nesting Colony	May 15 - July 31	50	150	300
Barn Swallow	Nest Site	May 15 - September 30	50	100	100
Barred Owl	Active or Traditional Nest Site	March 15 - July 15	250	500	1000
Bobolink	Nest Site	May 15 - August 15	100	250	400
Boreal Owl	Nest Site	March 1 - July 15	250	500	1000
Buff-breasted Sandpiper	Migratory Stop-over Site	May 20 - June 5, July 20 - Oct 10	100	200	400
Burrowing Owl	Active or Traditional Nest Site	April 1 - August 15	200	300	500
		August 16 - March 31	50	250	500
Canada Warbler	Nest Site	May 1 - July 31	200	300	450
Chesnut-collared Longspur	Nest Site	May 1 - August 15	100	250	650
Chimney Swift	Nest or Roost Site	May 1 - July 31	50	150	300
Common Nighthawk	Nest Site	May 1 - August 31	100	200	300
Eastern Screech Owl	Nest Site	March 15 - July 15	200	300	500
Eastern Wood-Pewee	Nest Site	May 15 - Aug 15	50	150	300
Ferruginous Hawk	Active or Traditional Nest Site	March 15 - July 31	500	750	1000
Golden-winged Warbler	Nest Site	May 15 - August 6	200	300	450
Golden Eagle	Active or Traditional Nest Site	March 15 - July 15	500	750	1000
Grasshopper Sparrow	Nest Site	May 16 - August 21	100	250	650
Great Gray Owl	Active or Traditional Nest Site	Feb 15 - July 15	250	500	1000
Horned Grebe	Nest Site	May 1 - Sep 15	100	200	400
Least Bittern	Nest Site	May 1 - July 31	100	200	400
Loggerhead Shrike	Nest Site	May 1 - August 15	100	250	500
Northern Hawk Owl	Nest Site	Feb 15 - July 15	250	500	1000
Olive-sided Flycatcher	Nest Site	May 1 - August 31	50	150	300
Peregrine Falcon[1]	Nest Site	April 1 - August 15	250	500	1000
Piping Plover	Active or Traditional Nest Site	April 15 - August 15	200	400	600
Red-headed Woodpecker	Nest Site	April 15 - August 15	50	100	200
Red Knot	Migratory Stop-over Site	May 20 - June 5, July 20 - Oct 10	100	200	400
Ross's Gull	Nest Site	May 15 - August 15	500	1000	1500
Rusty Blackbird	Nest Site	May 1 - July 31	50	150	300
Sharp-tailed Grouse[2]	Lek	Mar 15 - May 15	200	500	1000
Short-eared Owl	Nest Site	April 15 - September 15	200	300	500
Sprague's Pipit	Nest Site	May 1 - August 15	100	250	650
Trumpeter Swan	Nest Site	April 1 - July 31	500	750	1000
Eastern Whip-poor-will	Nest Site	May 15 - July 16	100	200	300
Whooping Crane	Staging Area	May 1 - November 1	500	750	1000
Yellow Rail	Nest Site	May 1 - July 15	100	150	350
American White Pelican	Nesting Colony	April 1 - August 31	500	750	1000
Double-crested Cormorant	Nesting Colony	April 1 - August 31	400	500	750
Herons	Nesting Colony	April 1 - August 31	400	500	750
Colonial Nesting grebes	Nesting Colony	May 15 - July 15	100	200	400
Colonial Nesting gulls/terns	Nesting Colony	May 1 - July 15	400	500	750

[1]Non-urban occurrences only

June 24, 2015

[2]Low disturbance is foot traffic only.