Environment Act Proposal (EAP) for the Village of Wawanesa Lagoon

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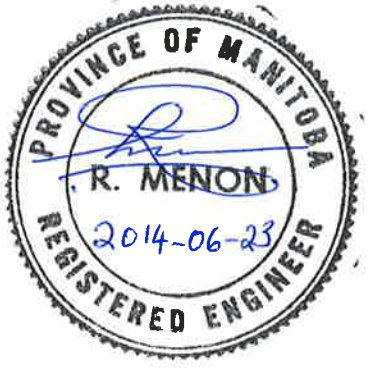

Environment Act Proposal (EAP) for the Village of Wawanesa Lagoon

Manitoba Conservation and Water Stewardship

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Submitted by

Dillon Consulting Limited

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1 INTRODUCTION AND BACKGROUND

The Village of Wawanesa (Wawanesa) uses a Rotating Biological Contactor (RBC) wastewater treatment plant (WWTP) to treat its residents' wastewater. The RBC was constructed in 1976 and requires significant upgrades to prolong its useful life. Septage is pumped to the existing WWTP via a gravity collection system, including a lift station, and is discharged to the Souris River. A condition assessment completed in 2011 indicated that the WWTP required approximately $1M of capital upgrades to extend the useful life to 2021. The condition assessment also indicated that the effluent did not meet standards required by Manitoba Environment Act for suspended solids, fecal coliforms, and total coliforms. In addition, the plant is not equipped to meet the new (2011) Manitoba Water Quality Standards, Objectives, and Guidelines Regulation for phosphorus and ammonia removal.

In March of 2013, there was a mechanical failure at the plant; a shaft sheared off of the RBC. The location of the break was such that a repair could not be conducted with any guarantee of success. Wawanesa considered three options for wastewater treatment going forward: (i) upgrading the existing RBC, (ii) constructing a new lagoon, and (iii) installing a new packaged treatment plant. After weighing environmental sustainability and life cycle costs, Wawanesa opted to proceed with constructing a new wastewater treatment lagoon to replace the existing RBC WWTP.

In February 2014, Dillon completed the functional design for a new lagoon system to be located southwest of Wawanesa in the Rural Municipality (RM) of Oakland. However, the RM of Oakland did not support the chosen location, and in April 2014 Dillon was contracted to revise the functional design and licence application for a new site located southeast of Wawanesa.

1.1 Population and Service Area

Currently all residences in the Village of Wawanesa are serviced by the central wastewater collection and treatment system. It is assumed that all future residences will also be centrally serviced. There are no wet industries or major institutional/commercial sources of wastewater in Wawanesa.

The 2011 Statistics Canada Census reported the population of Wawanesa at 562. An annual growth rate of 1% was used to estimate the 25-year population, which resulted in a projected serviced population of 735 people by 2038. The lagoon is also designed to provide trucked septage dumping service to a maximum of 516 rural residents (172 homes) from the surrounding Rural Municipalities (RMs) of Oakland, South Cypress and Riverside.

1.2 Lagoon Loading Criteria

Using an organic loading rate of 0.085 kg BOD_5/p/d for piped wastewater and 2.0 kg BOD_5/residence/yr for trucked septage, the total projected 25-year loading to the lagoon is 68 kg BOD_5/ha/day (see **Attachment 1**). Based upon the maximum organic treatment rate of 56 kg BOD_5/ha/day allowed by Manitoba Conservation and Water Stewardship (CWS), the primary cell is required to have a liquid surface area of 12,100 m^2.

Using an estimated wastewater generation rate of 262 L/p/d for piped wastewater, the projected 25-year hydraulic load to the lagoon is 194 m^3/d (see **Attachment 1**). The required hydraulic storage capacity of the lagoon is based upon a 230-day storage period from November 1 to June 15 of each year. Therefore, the required storage capacity of the lagoon is projected to be 44,500 m^3.

1.3 Public Consultation

A public consultation session was hosted by the Village of Wawanesa on April 22, 2014 at the Wawanesa New Horizons Centre. The session included a Public Hearing for Lagoon Borrowing By-Law No. 529 and Local Improvement Plan. According to Wawanesa, the general consensus from those attending was that the lagoon project was necessary for the community and the proposed site east of Wawanesa was preferred over the original site west of the Village. One written objection to the Local Improvement Plan was received.

1.4 Previous Studies and Activities

The following studies and reports were referenced or produced in the preparation of the lagoon design and this Environment Act Proposal:

- Village of Wawanesa - Public Water System Water Assessment Report Section 9, Manitoba DWSA (January 2011), by Genivar;
- Village of Wawanesa - Water and Wastewater Treatment Assessment (September 2011), by Dillon;
- Village of Wawanesa - Wastewater Treatment Plant Upgrade Options (May 2013), by Dillon;
- Village of Wawanesa – Technical Memo #1: Lagoon Sizing Options (November 2013), by Dillon;
- Village of Wawanesa – Technical Memo #2: Cost Estimate for Wastewater Conveyance to/from Lagoon (December 2013), by Dillon;
- Village of Wawanesa – Nutrient Reduction Strategy Options Letter Report (February 2014), by Dillon;
- Village of Wawanesa – Lagoon Functional Design Report for Site #1 (February 2014), by Dillon; and,
- Village of Wawanesa – Lagoon Functional Design Report for Site #2 (June 2014), by Dillon. An abbreviated version of this report (excluding capital cost estimates) has been included as Attachment 1 to this Environment Act Proposal.

2 DESCRIPTION OF THE PROPOSED DEVELOPMENT

2.1 Site

Wawanesa identified an agricultural field located approximately 3 km southeast of the Village centre as the preferred location for the proposed lagoon. The following factors were considered in the selection of the site:

- Land availability for purchase;
- Input from the RM of Oakland;
- A balance of distance and proximity to the Village centre, to respect CWS guidelines requiring a minimum of 450 m between the lagoon and a population centre, and also to reduce heightened life-cycle costs associated with longer pipelines;
- A minimum buffer of 300 m to the nearest individual residence;
- Location south of the Village centre (prevailing winds are from the northwest);
- Compatible land uses of adjacent properties (non-residential);
- Accessibility to an all-weather road (Commercial Street); and,
- Proximity to a surface water body appropriate for accepting treated effluent (Souris River).

The selected site is located in the RM of Oakland on the SE ¼ 25-7-17 WPM. The key plan of the proposed site and surrounding features are shown on Sheet M-0 in **Attachment 1**.

2.1.1 Certificate of Title

The preferred site for the proposed lagoon is currently privately owned land (Title No. 1742895/2). Wawanesa has reached an agreement in principle with the property owner to subdivide and purchase part of the parcel for use as a lagoon. Telus, which currently leases part of the area of interest, has also agreed to move their lease location. The subdivided parcel will be 279 m east-west by 372 m north-south, or a total of 10.4 ha (25.6 acres). As shown on Sheet M-1 in **Attachment 1**, the parcel of land that Wawanesa is purchasing is large enough to accommodate the lagoon footprint and a typical 30 m buffer distance between the toe of slope and the new property line. Copies of the current Status of Title and the signed Offer to Purchase are presented in **Appendix A**.

2.1.2 Mineral Rights

The mines and mineral rights are not part of the surface title; according to the title search they were split from the site by Transfer No. 110403 and are owned by others. Wawanesa does not propose a change to the existing mines and mineral rights ownership.

2.1.3 Current Land Use

The land for the proposed wastewater treatment lagoon is currently cultivated agricultural land that is privately owned. Properties surrounding the site are used mainly for agricultural and residential (farm homesteads) purposes. The nearest residential dwelling is 1.4 km east of the proposed lagoon, as shown on Sheet M-4 in **Attachment 1**. The proposed lagoon parcel is bordered by Commercial Street to the south and agricultural fields/livestock pastures to the east, north, and west. The Souris River, flows east past Wawanesa to the Assiniboine River and passes approximately 300 m north of the lagoon.

The proposed site for the wastewater treatment lagoon is in the RM of Oakland and is zoned as an Agricultural General Area. According to the RM of Oakland Zoning By-Law, utility services, including wastewater treatment lagoons, are a conditional use within Agricultural General Areas. According to the RM of Oakland Development Plan, new sewage lagoons are considered conditional uses. As such, approval for using the proposed site as a lagoon will be obtained from the RM of Oakland prior to construction.

The land south of the lagoon is zoned as Agricultural General, while the land west of the site is zoned as Agricultural Limited. The proposed site is adjacent to the municipal border; the property immediately east of the site is part of the RM of South Cypress. It is zoned as Agricultural General Rural.

Construction and operation of the proposed wastewater treatment lagoon will not change the land use designation on the property. Adjacent properties are also cultivated and land use will not be altered by the construction and operation of the wastewater treatment lagoon.

2.2 Design

2.2.1 Lagoon and Associated Works

The proposed development consists of a greenfield construction of a two-cell facultative lagoon with a constructed soil liner. The proposed lagoon location is adjacent to the municipal roadway known as Commercial Street or "Dump Road", in the southeast corner of SE ¼ 25-7-17 WPM. The primary cell and truck dump will be closest to the road, with the secondary cell following to the north, as pictured on Sheet M-1 of **Attachment 1**.

As described in **Section 1.2**, the proposed Wawanesa lagoon must provide a minimum hydraulic storage capacity of 44,500 m^3 with a minimum primary cell surface area of 12,100 m^2. The dimensions for the proposed lagoon are as follows in **Table 1** and provide a total of 48,500 m^3 of storage with a 12,250 m^2 primary cell surface area. The proposed lagoon has tiered cells, with the secondary cell floor at an elevation approximately 0.4 m below the primary cell floor.

Table 1: Proposed Lagoon Configuration

Cell	Approximate Bottom of Cell Dimensions (m)		Approximate Storage Volume (m^3)	Approximate Treatment Surface Area (m^2)
Primary	62	174	7,530	12,247
Secondary	180	175	41,006	n/a
Total			**48,536**	**12,247**

The capacity and surface area measurements were determined based on the following design parameters, in keeping with CWS guidelines:

- Storage capacity in the primary cell calculated as half the total liquid storage above 0.3 m depth;
- Storage capacity in the secondary cell calculated omitting the liquid storage volume below 0.3 m depth;
- Minimum berm height of 2.5 m, corresponding to a maximum liquid depth of 1.5 m with 1.0 m freeboard;
- Berm side slopes and drainage ditch slopes at 4:1; and,
- Berm top width of 3 m.

Based on the soils investigation conducted by Dillon and Paddock Drilling Ltd. on April 22, 2014 and the subsequent laboratory analysis by Stantec Consulting Ltd (previously National Testing Limited), the mix of silt and clay observed in test boreholes at the proposed site is not suitable for use as a natural (in situ) soil liner, but would likely be suitable for use if compacted. As such, a 1 m thick compacted soil liner has been specified (see Sheet M-2 of **Attachment 1**).

Other components of the proposed Wawanesa lagoon system include an access gate, an approach road, a truck dump and spillway, fencing around the perimeter of the site, and rip rap around the lagoon interior berms to protect them from wave action erosion. The approach road is necessary to provide access to the site from Commercial Street, and will be aligned along an existing unused Government Road Allowance. Access to the lagoon (esp. truck dump) will be controlled with the access gate and fencing. The truck dump will include a concrete splash pad installed in front of the sewage spillway.

In addition to truck-hauling, wastewater will be conveyed to the lagoon via a new forcemain that will connect Wawanesa's existing lift station to the lagoon primary cell. Based on the 25-year peak hourly flow rates (9 L/s), an optimal scouring velocity of 0.9 – 1.4 m/s, and estimates for dynamic head loss, the forcemain will be a 200 mm DR 11 HDPE pipe. The existing lift station is in good condition and will be retrofitted with two new 30 hp submersible pumps to provide flows of 23 L/s against total dynamic head of 17 m at the duty point.

Drawings showing bottom of cell dimensions, elevations, site access details, and the proposed forcemain route are included in Appendix A of the Village of Wawanesa - Lagoon Functional Design Report for Site #2 (**Attachment 1**).

2.2.2 Discharge Route

The nearest major surface water body is the Souris River, north of the proposed lagoon site. According to provincial drain maps from the Manitoba Land Initiative, there is a first order natural drain crossing the field directly east of the lagoon site. It is fed via culvert from the municipal road ditch and the fields south of the municipal road. The natural drain (seasonal creek) flows northeast approximately 1 km then joins with other natural drains and flows northwest approximately 800 m to meet the Souris River, as shown on Sheet M-4 in **Attachment 1**.

On April 24, 2014, Dillon staff performed a detailed survey of the proposed lagoon site and a preliminary survey of the proposed forcemain route. As part of the survey, Dillon measured the culvert and select municipal road ditch elevations. Based on the survey results and the existence of a natural drain in the lagoon area, Dillon proposes the following 2.2 km effluent discharge route:

1. Discharge the secondary cell into the eastern perimeter ditch of the lagoon, which will flow south approximately 300 m on the lagoon property;
2. Connect to the municipal road ditch on the north side, flowing east approximately 100 m; and,
3. Drain through the existing natural drain to the Souris River for approximately 1.8 km.

This proposed discharge route maximizes the use of existing terrain where possible. However, an existing municipal culvert and approximately 100 m of the existing municipal ditch between the lagoon access road and the natural drain entrance needs to be regraded to a lower elevation to make gravity drainage from the lagoon possible.

It is Dillon's understanding that as this is an existing natural drain, no easements or permission are required to discharge treated effluent into it. The RM of South Cypress will be contacted prior to construction to secure agreement to regrade the municipal ditch as described above.

2.2.3 Nutrient Reduction Strategies

Under Manitoba Water Protection Act regulations introduced in 2011, all new wastewater treatment facilities are required to consider and mitigate nutrient (nitrogen and phosphorus) impacts from treated effluent on receiving streams or lakes. As the Wawanesa lagoon is designed to treat less than 2,000 person equivalents, it is considered a "small wastewater treatment facility" and therefore has the option of implementing a demonstrated nutrient reduction strategy instead of being required to comply with a 1 mg/L phosphorus effluent discharge limit.

Wawanesa considered three main phosphorus reduction strategies for the proposed lagoon:

1. Chemical addition - metal salts are added to the secondary cell prior to effluent discharge. The metal salts react with soluble phosphorus, forming insoluble metal phosphates that precipitate out of solution. The metal phosphates are removed and landfilled when the lagoon is desludged;
2. Trickle discharge - effluent is released from the secondary cell slowly over an extended period of time (three to five week period). The slowed flow rate allows nutrients to adsorb to the soil. Plant growth is then regularly harvested along the discharge route, capturing and removing nutrients from the soil; and,
3. Passive filtration – effluent is discharged through a subsurface flow wetland with a packed filter bed configuration, known as a "passive filter." Native plants with high phosphorus uptake rates grow on the surface of the passive filter and are regularly harvested to remove phosphorus from the system.

Effluent irrigation and traditional constructed wetlands were also considered briefly but eliminated from further deliberation due to their large footprint requirements: effluent irrigation would require additional secondary cell storage area in case of a wet year when adding water onto cropland is undesirable. Constructed wetlands also typically require substantial area due to their shallow depth and horizontal flow configuration.

Land requirements, environmental impacts, maintenance needs, cost estimates, and efficacy of the above nutrient reduction strategies were considered when comparing phosphorus reduction strategies. Wawanesa selected chemical addition (alum) as the phosphorus reduction strategy for the proposed lagoon. This was chosen primarily due to Wawanesa's limited financial capacity to construct a passive filter or the additional storage capacity necessary to facilitate a trickle discharge strategy.

2.3 Construction

2.3.1 Methods of Note

Where applicable, silt fences and sediment traps such as rock check dams and straw bales will be implemented and utilized as sediment and erosion control measures during the construction of related lagoon works. Other soils at the site exposed as a result of construction activities will be seeded with a mixture of native grasses to minimize soil erosion. As construction is anticipated to commence in fall of 2014 and conclude in the spring of 2015, temporary works such as erosion control blankets, silt fences, and straw bales will be used until vegetation can establish itself in the spring. If spot erosion on unseeded soil; such as along the lagoon berms, occurs over the winter, corrections will be made by the contractor in the spring where necessary.

The construction specification document will state that all fuel handling and storage facilities located on-site during the construction works must comply with The Dangerous Goods and Transportation Act, the Storage and Handling of Petroleum Products Regulation, and the Manitoba Fire Code (e.g., no handling or refueling of equipment within 100 m of any drainage path, spill kit on-site, etc.).

2.3.2 Schedule

Given the current condition of the existing wastewater treatment system at Wawanesa (see Section 1), an accelerated construction schedule is proposed. As such, the goal is to tender the project and begin construction as soon as possible (likely late summer or early fall 2014). It is expected that construction may break for the winter and conclude in spring 2015.

2.3.3 Funding

Matching funds for the construction of the proposed lagoon and associated works have been committed by the Manitoba Water Services Board and is not contingent on work being completed in the 2014 construction season. Wawanesa has also submitted a statement of interest to seek matching federal funding under the Build Canada initiative. Wawanesa's share of funding is expected to be provided by a Borrowing By-Law, which has already been initiated (see **Section 1.3**). A decision from the Municipal Board is expected within a week.

2.3.4 Other Required Approvals

Permission will be obtained from the RM of Oakland for the following activities:

- Use of the proposed site in the RM of Oakland as a lagoon;
- Installation of the forcemain along a municipal road in theRM of Oakland; and,
- Construction of the lagoon access road along the shared (and currently undeveloped) N-S government road allowance between the RM of South Cypress and the RM of Oakland.

Permission has already been obtained from the RM of South Cypress for the access road construction (as described above) and for regrading portions of an RM of South Cypress municipal ditch and an existing culvert to accommodate the lagoon discharge.

2.4 Operation

The lagoon is designed to be discharged twice per year; once in the spring and once in the fall (based on discharge occurring between June 15 and October 31 each year). After a discharge event, the primary cell will be allowed to fill to its maximum capacity. An intercell valve to the primary and secondary cells will subsequently be opened to allow for hydraulic equalization between the cells. Three weeks prior to a scheduled discharge event, the secondary cell will be isolated from the primary cell. If necessary, the operator will add alum to the secondary cell at this time. The necessity for alum dosing and the dosage added is typically refined by the operator year over year based on their past experience and local conditions. One week prior to a scheduled discharge event, effluent samples will be collected and analysed by an accredited laboratory to determine if the effluent meets the following limits for BOD_5, total suspended solids (TSS), fecal coliforms, and total coliforms:

- $BOD_5 \leq 25$ mg/L;
- TSS $\leq$ 25 mg/L;
- Fecal Coliforms $\leq$ 200 MPN/ 100 mL sample;
- Total Coliforms $\leq$ 1,500 MPN/ 100 mL sample; and,
- Total Phosphorus $\leq$ 1 mg/L.

The storage/secondary cell will be discharged only if these criteria are met. If the phosphorus criterion is not met, more alum would be added and the lagoon would be retested.

Under Schedule A of M.R. 77/2003, the proposed lagoon is considered a Class 1 facility, which requires the operator to hold a Class 1 operator's certificate. Dillon understands that Wawanesa's wastewater operator has obtained and will maintain a valid operator's certificate issued under Manitoba Regulation 77/2003 of The Environment Act (C.C.S.M. c. E125).

The lagoon will be operated under the current system of one operator on contract. Access will be controlled by a lockable access gate. Sewage haulers will be required to provide detailed records to Wawanesa with respect to the volume and origin of the loads that they discharge into the lagoon, which will enable Wawanesa to maintain detailed records regarding the usage of the lagoon by specific septage haulers.

2.5 Maintenance

The lagoon will be routinely inspected. This includes a physical inspection of the site to note concerns with berm erosion or the flow of wastewater from the lift station to the primary lagoon cell and into the secondary lagoon cell, particularly during the transfer and discharge of the primary and secondary cells. Records of operation and maintenance activities completed for the facility will be maintained at the Village office.

2.6 Decommissioning

A decommissioning plan will be prepared for the existing RBC plant as the financial capacity of Wawanesa allows. Decommissioning will not occur until after construction and commissioning of the proposed new lagoon. A decommissioning plan has not been prepared for the proposed lagoon. If decommissioning should be required in the future, site decommissioning will be undertaken in a manner consistent with current best practices and environmental standards and legislation, as well as a consideration of the intended future use(s) at the site.

3 DESCRIPTION OF THE ENVIRONMENT

3.1 Terrestrial Environment

According to Environment Canada, the proposed lagoon site is located in the Aspen Parkland Ecoregion of Canada. The Ecoregion is transitional between areas of boreal forest to the north and the grasslands to the south. Physiographically, Wawanesa is considered to be within the Brandon Lakes Plain subsection of the Assiniboine River Plain. Soils are primarily lacustrine materials, consisting of loam to silty clay with underlying glacial till (Canada-Manitoba Soil Survey, 1985). Soils in the region are categorized as Class 1 or 2 agricultural capability by the Canada Land Inventory system, the two highest ratings possible.

The climate is considered to be sub-humid, cool continental (Canada-Manitoba Soil Survey, 1985). According to climate data from the nearest long-term Environment Canada station (Souris), the average temperature is 2.3°C, the average annual precipitation is 456 mm, and the frost-free period is 105 days (Manitoba Land Initiative, 1996).

Due to these fertile soils and favourable climate, most of the Aspen Parkland Ecoregion (including the area surrounding Wawanesa and the project site) is cultivated. Vegetation is a mix of farmland and forest, characterized by treed landscapes with a mix of herbaceous plants and grasses. Common species include trembling aspen, bur oak, elm, green ash, Manitoba maple, cottonwood, and white birch (Canada-Manitoba Soil Survey, 1985). Crops include spring wheat, oil seeds, forages and several specialty crops.

Wildlife includes waterfowl, white-tailed deer, snowshoe hare, cottontail, red fox, northern pocket gopher, ground squirrel and bird species. The Province of Manitoba's Wildlife and Ecosystem Protection Branch was contacted regarding species at risk, endangered, or rare species that exist at the proposed lagoon expansion site. According to their records, there were no occurrences of such species found in their database at this time (see email correspondence in **Appendix B**)

Topography in the project area is primarily level and well above the nearby Souris River water level. The terrain is dominated by the Souris River Valley, which is characterized by dissected valley sides, with ground elevation near the river dropping rapidly towards the river floor. Bank slumping is not uncommon. Long-term bank erosion at the project site is considered by the Manitoba Land Resource Unit to be a moderate mean risk value. Specifically at the proposed site, approximately 80 m south of the lagoon's northwest corner lies a ridgeline representing the start of a 25 m elevation drop. There is a relatively level agricultural field at this elevation, which then drops off a further 5 m to the Souris River. Flooding is not considered to be of concern at the project site: the closest portion of the lagoon to the river bank (northeast corner) is set back by approximately 300 m and the top of berm elevation is 26 m higher than the peak water level measured at a nearby Environment Canada hydrometric station (see **Appendix C**). Wawanesa itself is more vulnerable to bank erosion and flooding, as it is approximately 20 m lower than the lagoon site (see results of preliminary survey of the project site in Section 5.2 of **Attachment 1**) and categorized as a severe mean risk value for water erosion.

The primary groundwater resource in the area is the sand and gravel aquifer from which Wawanesa currently draws its municipal water. According to a report on groundwater resources in the Souris Basin by the province, the sand and gravel aquifers near Wawanesa are typically local lens-shaped pockets of water-bearing sand and gravel surrounded by glacial till. The local lenses typically provide poor to fair quality water, but have a limited yield. They are refreshed by snowmelt and precipitation in the spring. Beneath the glacial till lies hard shale bedrock that is highly fractured and may also be water-bearing in some areas (Manitoba Water Resources Division, 1976).

3.2 Aquatic Environment

Wawanesa is surrounded on three sides by the Souris River, the major water feature in the area. The proposed Wawanesa wastewater treatment lagoon is located south of the Souris River in the Central Assiniboine Watershed. According to the Central Assiniboine Watershed Integrated Watershed Management Plan - Water Quality Report, there are six long term water quality monitoring stations and ten other water quality monitoring stations within the watershed. The Souris River water quality monitoring station at Wawanesa is one of the 'other' stations and therefore, information is not available over the long term. This station was monitored for phosphorus between 1978 and 1986. Total phosphorus was above the river objective for each year that this station was monitored. Total nitrogen concentrations also increased over time in the Souris River. Water quality information gathered from monitoring stations is compiled and used to rank water quality of specific sites from 'poor' to 'excellent'. In general, the Water Quality Index ranks the Souris River as 'Fair' to 'Good'. However, total phosphorus concentrations had a negative impact on water quality.

Environment Canada has a hydrometric water station measuring flow in the Souris River at Wawanesa (Station ID 05NG001). Environment Canada data, included in **Appendix C**, indicate that in the months of June and October the mean 50-year flow rates were 40.5 m^3/s and 4.81 m^3/s respectively. The monthly flow rates for June over the last 50 years range between 0.122 m^3/s and 572 m^3/s, while flow in October has a narrower range (between 0.392 m^3/s and 41.1 m^3/s).

Other municipal wastewater treatment facilities discharging into the Souris River include the Treesbank Colony lagoon, located downstream and approximately 3.3 km northeast of Wawanesa's proposed lagoon site. Reviewing the Water Use Planning Document prepared by the Central Assiniboine and Lower Souris River Integrated Watershed Management Plan, there does not appear to be a Water Rights Licence granted for the use of the Souris River as a drinking water source downstream of the proposed lagoon location.

The Fisheries Branch of Manitoba CWS was contacted regarding the type of fish that may be present near the proposed lagoon site (see **Appendix B**). Because the site that is proposed for the lagoon is downstream of the dam and fish barrier in the Souris River, the fish species present in this part of the Souris River are considered to be the same as those found in the Assiniboine River. According to the Fisheries Branch information, there are approximately 45 extant native species of fish present in the Assiniboine River, including lake sturgeon and maple leaf mussels. An extensive list was provided by the Fisheries Branch (see **Appendix B**).

4 POTENTIAL IMPACTS AND MITIGATION MEASURES

One potential impact from the proposed lagoon is the release of nuisance odours, which may occur for approximately two weeks every spring when the ice cover on the lagoon melts. As the lagoon is situated approximately 1.4 km from the nearest residence (to the east) and approximately 3 km from the Village centre (to the west), and given that prevailing winds are typically from the northwest, it is unlikely that residents would be disturbed in their homes by the odours.

4.1 Potential Terrestrial Impacts and Mitigation Measures

During construction, there is potential for petroleum hydrocarbons (e.g., gasoline, diesel, oil, etc.) to leak or spill from construction equipment or machinery onto the soil and seep into the ground. This is mitigated by proper handling of petroleum products, as specified earlier in **Section 2.3.1**.

According to Manitoba Conservation Data Centre, there have been no recorded occurrences of species at risk at this location, as discussed earlier. There is the potential for wildlife (e.g., deer) or the public to be impacted by the lagoon as a result of the natural water hazard (i.e., drowning) posed by any open body of water (in this case, the lagoon cells). The proposed lagoon will be enclosed by a barbed wire fence around the perimeter of the lagoon and signage posted warning the public against unauthorized entry. The proposed lagoon parcel is currently used for agriculture and therefore, potential adverse impacts to wildlife, vegetation, or forestry as a result of the construction and operation of the expanded lagoon are not expected.

Surface drainage on the agricultural land to the west of the proposed lagoon may be impacted, as the location of the improvements may interrupt the passage of surface run-off from the field to its prior natural drainage route. To mitigate this potential impact, a perimeter drainage ditch will be constructed around the lagoon to direct surface run-off towards the proposed effluent discharge ditch to the Souris River. The proposed effluent drainage route takes advantage of natural swales and pre-existing drains where possible.

There is potential to impact groundwater via seepage of untreated sewage through the bottom of the lagoon or the lagoon berms. Sewage containment within the lagoon will be provided via a soil liner. The constructed soil liner will be inspected as per Manitoba CWS requirements; the soil liner will be 1 m thick with a maximum hydraulic conductivity of 10^{-7} cm/s, thus mitigating the risk of groundwater impacts from lagoon seepage. The proposed lagoon floor is also more than 1 m above the highest groundwater elevation observed during the April 2014 soils investigation.

4.2 Potential Aquatic Impacts and Mitigation Measures

Potential exists to impact surface water via sedimentation during construction activities and via spillage of raw septage outside of the lagoon from truck dumps during the operation of the lagoon. To reduce the possibility of sedimentation occurring, the contractor will utilize sediment and erosion control methods such as erosion control blankets or sediment traps, where applicable, as described in **Section 2.3.1**. To mitigate the potential release of raw sewage to surface water, the proposed truck dump spillway design includes a concrete pad and bollards to facilitate septage trucks backing up to the appropriate discharge location on the spillway.

As effluent will not be discharged from the Wawanesa lagoon unless the Tier I Water Quality Standards identified by Manitoba Water Quality Standards, Objectives, and Guidelines for municipal wastewater effluents are met, the potential to impact fisheries in the Souris River is low. The potential to impact fisheries will also be minimized by limiting discharge events to occur between June 15 (end of the typical fish spawning period) and November 1.

Further, effluent discharge flows will be small relative to flows in the Souris River. At the maximum possible discharge volume from the Wawanesa lagoon (entire secondary cell storage volume) and assuming a discharge period of 4 days, the effluent discharge flow rate would be 0.12 m^3/s (= 41,000 m^3 / 4 days). This is less than three percent of the mean October flow in the Souris River, and less than a tenth of a percent of the mean June flow in the Souris River. The minimum recorded monthly flow in the Souris River at Wawanesa over the last fifty years was 0.122 m^3/s in June 1988. At this minimum flow, the maximum discharge from Wawanesa would be received in the Souris River at a 1:1 ratio (see **Appendix C**).

4.3 Potential Heritage and Socioeconomic Impacts

Negative impacts to social and economic aspects of the area within the vicinity of the lagoon are not anticipated. The current landowner will realize a small decrease in agricultural land area available for crop production; however, the landowner will be compensated and has agreed to sell the land voluntarily. Therefore, any negative socio-economic implications as a result of the sale of this land were available for consideration by the current landowner prior to agreeing to the sale.

Dr. Myra Sitchon, an Impact Assessment Archaeologist with the Province of Manitoba Historic Resources Branch, was contacted for information on heritage resources that may be located within the vicinity of the proposed construction site. Dr. Sitchon indicated that due to the project's location within 1 km of the Souris River, a heritage resources impact assessment will be required (see **Appendix B**). Manitoba Water Services Board has committed to performing this assessment prior to the project start and to sharing the results with the appropriate regulatory agencies.

5 CLOSURE

The Village of Wawanesa is proposing to construct a new two-cell facultative wastewater treatment lagoon in the Rural Municipality of Oakland, Manitoba to replace its existing wastewater treatment plant. The lagoon is designed to accept piped wastewater from 735 people and trucked septage from an additional 516 people. It will discharge to the Souris River through a 2.2 km network of existing municipal ditches and natural drains. A 200 mm DR 11 HDPE forcemain, approximately 4 km in length, will be constructed to transport wastewater from the existing lift station to the proposed lagoon location. The existing lift station will be retrofitted to accommodate more powerful pumps. As Wawanesa's current wastewater treatment plant is not fully operational, this is a high priority project for both the Village of Wawanesa and the Manitoba Water Services Board. Due to the urgency of this project, the Proponent requests expedition of the licence application where possible so that construction can begin in fall 2014.

APPENDIX A

PROPERTY DETAILS

OFFER TO PURCHASE

THE PURCHASER, **VILLAGE OF WAWANESA**, (hereinafter called the "Purchaser") having inspected the property described below HEREBY OFFERS TO PURCASE from **CLARK ALBERT LEACHMAN** (hereinafter called the "Vendor") a 25.6 acre parcel in the following legally described land:

TITLE NO. 1742895/2

A 279 meter by 272 meter (25.6 acre) parcel out of:

Parcel One: FRACTIONAL SE ¼ 25-7-17 WPM, ESC ALL MINES AND MINERALS AS SET FORTH IN TRANSFER NO.110403

to be subdivided from the quarter section, as seen on the attached Schedule "A" to this Offer to Purchase

collectively referred to as "the Property" for the total price of **Two Hundred Fifty Six Thousand ($256,000.00) Dollars** (hereinafter called the "Purchase Price").

1. THE PURCHASE PRICE shall be payable as follows:

(i)	A deposit of	$1,000.00
(ii)	By cash, certified cheque, bank draft or lawyer's trust cheque on or before the date of possession	$255,000.00
	TOTAL PURCHASE PRICE	**$256,000.00**

The Village of Wawanesa hereby makes a deposit of $1,000.00 on account of this purchase by cheque made payable to MEIGHEN HADDAD LLP IN TRUST. The said deposit shall be held in trust for the Purchaser until the Vendor accepts this Offer and is to be returned to the Purchaser if the Vendor does not accept this Offer.

After this Offer has been accepted by the Vendor, the deposit shall be paid over to the Vendor as part of the purchase price when they have carried out their entire obligation under this contract, but to be returned to the Purchaser should they fail to do so. Should the Purchaser fail to carry out their obligation under this contract, the Vendor may (at their option) cancel the contract whereon the deposit shall be forfeited to the Vendor, or the Vendor may take what other remedies they may have at law.

If part of the purchase price is to be paid from the proceeds of a new mortgage, payment of that amount may be delayed by the time necessarily required for registration of the mortgage to be completed by the Land Titles Office and reported to the Mortgagee and, if so, that amount shall bear interest payable to the Vendors at the same rate as the new mortgage, until paid.

The property, until the date of possession shall remain at the risk and responsibility of the Vendor.

2. THE CLOSING DATE of this transaction of purchase and sale shall be Thirty (30) after the Village of Wawanesa has obtained Final Certificate of Approval for the subdivision (hereinafter referred to as the "Closing Date") on which date the Vendor shall provide a registerable transfer of title to the Property to the Purchaser and the Purchaser shall have vacant possession of the Property.

3. THE PURCHASER shall be responsible for payment of the property taxes from and after January 1, 2015. The Vendors are responsible for all property taxes to December 31, 2014.

4. THE PURCHASER shall receive clear title to the said property at the Closing Date subject only to any encumbrances registered by, on behalf of, the Purchaser.

5. THE PURCHASER shall be responsible to pay any Goods and Services Tax payable on the purchase price or alternatively shall file all appropriate reports, elections, and returns pertaining to this purchase transaction and shall confirm the filing. The Purchaser represents to the Vendor that it is registered under the goods and services provisions of The Excise Tax Act and the Purchaser's GST No. is 108180902 RT0001.

6. THE PURCHASER will not be obligated to complete the purchase provided for in this Offer unless each of the following conditions have been satisfied, it being understood that these conditions are included for the exclusive benefit of the Purchaser and may be waived in whole or in part by the Purchaser at any time in writing:

(a) The Vendor consents to the Purchaser or its designated assigns having access to the property to commence construction of the lagoon project prior to the Subdivision being completed, subject to the Purchaser obtaining the necessary permit approvals at the Purchaser's cost and the Vendor agreeing to cooperate and sign all necessary documentation to obtain those approvals and permits;

(b) The Purchaser agrees to indemnify and save harmless the Vendor from any claim which may be made against the Vendor as a result of the Purchaser's construction of the Lagoon;

(c) Successful completion of the subdivision;

(d) The Purchaser shall, at the Purchaser's own expense, control noxious weeds on the subdivided property on an annual basis.

7. THE VENDORS and the Purchaser agree to execute promptly, when prepared, any documents required to complete this transaction.

8. This Offer to Purchase is open for acceptance by the Vendors up to 6:00 p.m. on the 22nd day of June, 2014.

9. NO ASSIGNMENT of this Agreement may be made by the Purchaser unless it is approved in writing signed by the Vendor.

10. UPON ACCEPTANCE of this Offer to Purchase within the time prescribed herein, this agreement shall constitute a binding contract of purchase and sale and shall be binding upon the parties hereto, and their respected successors and permitted assigns.

IN WITNESS WHEREOF the Purchaser has executed this Offer by the hand of its proper Officer in that behalf this 9th day of JUNE 2014.

Witness

Per: _____
Mayor

Witness

Per: _____
CAO

Purchaser's Solicitor: Meighen Haddad LLP
110 – 11th Street
Brandon, MB R7A 4J4
Attention: Ashley T. Joyce

FOR VALUABLE CONSIDERATION, **CLARK ALBERT LEACHMAN**, the registered owner of the Property, HEREBY AGREES to sell the Property to the Purchaser and accept all of the terms and conditions set out above. Should it fail to do so, the Purchaser may, at its option, cancel this Agreement or take what other remedies the Purchaser may have at law.

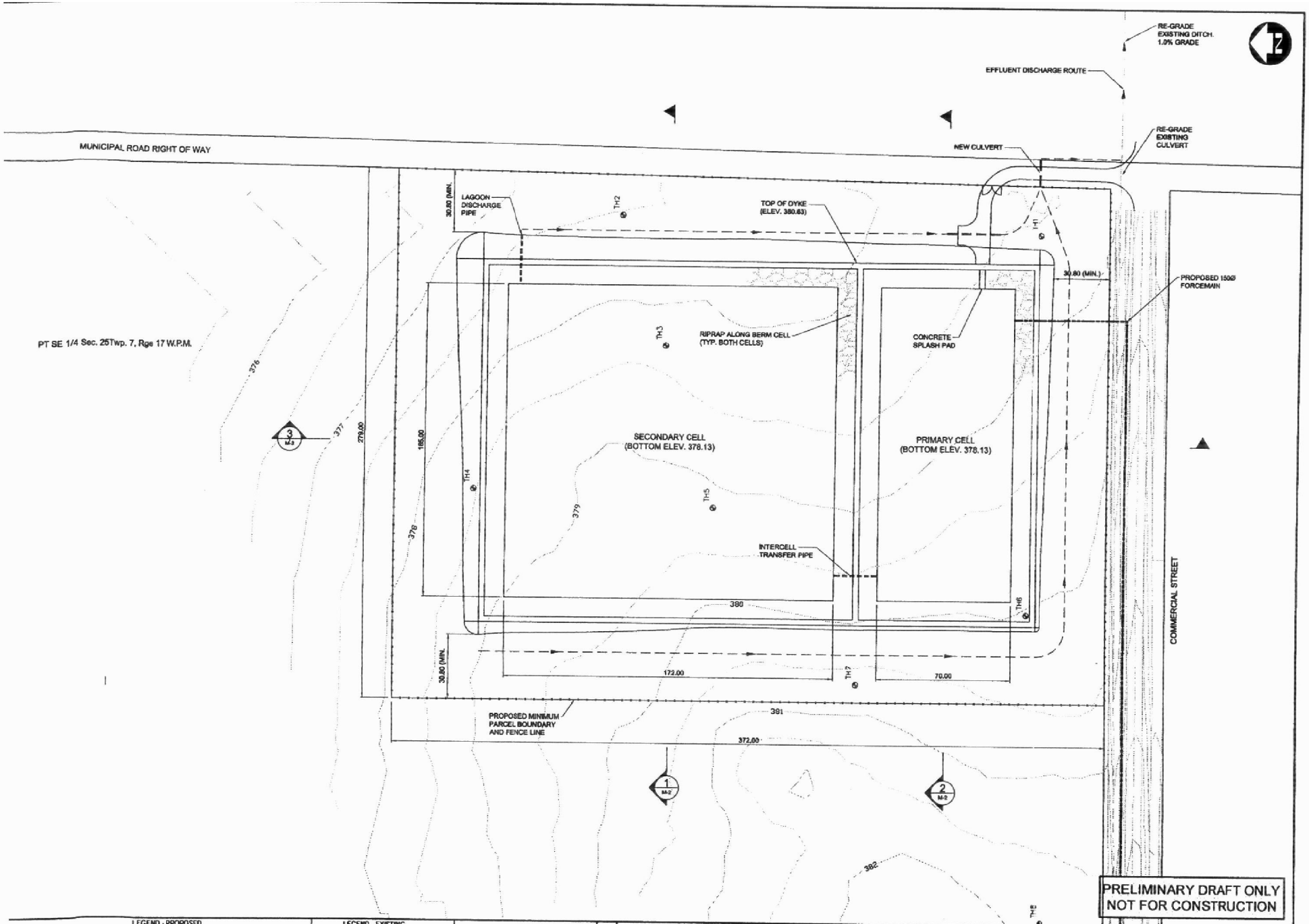
IN WITNESS WHEREOF the Vendor has accepted this Offer this 9th day of JUNE, 2014.

Witness

CLARK ALBERT LEACHMAN

Vendor's Solicitor:

Warren Barber, Meighen Haddad


RE-GRADE EXISTING DITCH. 1.0% GRADE
EFFLUENT DISCHARGE ROUTE
RE-GRADE EXISTING CULVERT
MUNICIPAL ROAD RIGHT OF WAY
NEW CULVERT
LAGOON DISCHARGE PIPE
30.80 (MIN.)
TH2
TOP OF DYKE (ELEV. 380.63)
TH1
30.80 (MIN.)
PROPOSED 150Ø FORCEMAIN
PT SE 1/4 Sec. 25Twp. 7, Rge 17 W.P.M.
TH3
RIPRAP ALONG BERM CELL (TYP. BOTH CELLS)
CONCRETE SPLASH PAD
376
377
279.00
185.00
SECONDARY CELL (BOTTOM ELEV. 378.13)
PRIMARY CELL (BOTTOM ELEV. 378.13)
TH4
TH5
379
378
INTERCELL TRANSFER PIPE
380
TH6
COMMERCIAL STREET
30.80 (MIN.)
172.00
TH7
70.00
391
PROPOSED MINIMUM PARCEL BOUNDARY AND FENCE LINE
372.00
382
TH8
PRELIMINARY DRAFT ONLY
NOT FOR CONSTRUCTION
LEGEND - PROPOSED
FORCEMAIN (FM)
DRAINAGE DITCH
BARBED WIRE FENCE
LEGEND - EXISTING
BOREHOLE LOCATION
DILLON CONSULTING
ISSUED FOR CLIENT REVIEW
ISSUED FOR CLIENT REVIEW
DESIGN W.J.S.
REVIEWED K.L.W
DRAWN A.R.D.
CHECKED W.J.S.
DATE FEBRUARY 2014
SCALE 1:1000
VILLAGE OF WAWANESA
LAGOON FUNCTIONAL DESIGN
PROJECT NO 13-8212
PROPOSED LAGOON GENERAL PLAN
SHEET NO M-1

DATE: 2014/06/02
TIME: 09:24

MANITOBA

STATUS OF TITLE

TITLE NO: 1742895/2

PAGE: 1

STATUS OF TITLE..... ACCEPTED
ORIGINATING OFFICE... BRANDON
REGISTERING OFFICE... BRANDON
REGISTRATION DATE.... 2000/08/22
COMPLETION DATE..... 2000/08/29

PRODUCED FOR.. MEIGHEN HADDAD & CO. (BRANDON)
ADDRESS..... 110 11TH STREET
BRANDON MB R7A 4J4

CLIENT FILE... VILLAGE OF WAWANESA 143010
PRODUCED BY... G.GISLASON

LEGAL DESCRIPTION:

CLARK ALBERT LEACHMAN
OF WAWANESA IN MANITOBA

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

PARCEL ONE: FRACTIONAL SE 1/4 25-7-17 WPM
EXC ALL MINES AND MINERALS AS SET FORTH IN TRANSFER NO. 110403.

PARCEL TWO: ALL THAT PORTION OF SW 1/4 25-7-17 WPM
LYING SOUTH OF THE SOURIS RIVER
EXC ALL MINES AND MINERALS AS SET FORTH IN TRANSFER NO. 110403.

ACTIVE TITLE CHARGE(S):

NO ACTIVE TITLE CHARGES EXIST ON THIS TITLE

ADDRESS(ES) FOR SERVICE:

EFFECT	NAME AND ADDRESS	POSTAL CODE
ACTIVE	CLARK LEACHMAN WAWANESA MB	ROK 2GO

ORIGINATING INSTRUMENT(S):

REGISTRATION NUMBER	TYPE	REG. DATE	CONSIDERATION	SWORN VALUE
1084268/2	ITREQ	2000/08/22	$0.00	$0.00
PRESENTED BY:	BLTO			
FROM:	BLTO			
TO:				

FROM TITLE NUMBER(S):

163477/2 ALL

LAND INDEX:

LOT	QUARTER SECTION	SECTION	TOWNSHIP	RANGE
	SE	25	7	17W
NOTE:	FRAC; EX ALL M&M			
	SW	25	7	17W
NOTE:	PT S OF SOURIS RIVER EXC ALL M&M			

CERTIFIED TRUE EXTRACT PRODUCED FROM THE LAND TITLES DATA
STORAGE SYSTEM ON 2014/06/02 OF TITLE NUMBER 1742895/2

********** STATUS OF TITLE 1742895/2 CONTINUED ON NEXT PAGE **********

STATUS OF TITLE.....	ACCEPTED	PRODUCED FOR..	MEIGHEN HADDAD & CO. (BRANDON)
ORIGINATING OFFICE...	BRANDON	ADDRESS.....	110 11TH STREET
REGISTERING OFFICE...	BRANDON		BRANDON MB R7A 4J4
REGISTRATION DATE....	2000/08/22		
COMPLETION DATE.....	2000/08/29	CLIENT FILE...	VILLAGE OF WAWANESA 143010
		PRODUCED BY...	G.GISLASON

**ACCEPTED THIS 22ND DAY OF AUGUST, 2000
BY H.PIERCE FOR THE DISTRICT REGISTRAR OF
THE LAND TITLES DISTRICT OF BRANDON.**

CERTIFIED TRUE EXTRACT PRODUCED FROM THE LAND TITLES DATA
STORAGE SYSTEM ON 2014/06/02 OF TITLE NUMBER 1742895/2.

********** END OF STATUS OF TITLE 1742895/2 **********

APPENDIX B

CORRESPONDENCE

Stoffel, Lucas <lstoffel@dillon.ca>

Wawanesa Wastewater Treat

2 messages

Stoffel, Lucas <lstoffel@dillon.ca> Thu, May 22, 2014 at 3:28 PM
To: Chris.Friesen@gov.mb.ca

Chris,

The location of the lagoon to be constructed in the Village of Wawanesa has been changed. The updated location is as follows.

The selected site is located in the Rural Municipality (RM) of Oakland on the southeast ¼ of Section 25, Township 7, Range 17, and west of the prime meridian.

Would we be able to receive updated information for this change in site. I have attached the previous email that we received from you.

Thanks

--

Lucas Stoffel
Dillon Consulting Limited
1558 Wilson Place
Winnipeg, Manitoba, R3T 0Y4
T - 204.453.2301 ext. PAGE
LStoffel@dillon.ca
www.dillon.ca

Wawanesa - Rare species letter.pdf
75K

Friesen, Chris (CWS) <Chris.Friesen@gov.mb.ca> Mon, May 26, 2014 at 2:37 PM
To: "Stoffel, Lucas" <lstoffel@dillon.ca>

Lucas

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

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

site surveys for species as part of environmental assessments.

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

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

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

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

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

Chris Friesen

Biodiversity Information Manager

Manitoba Conservation Data Centre

204-945-7747

chris.friesen@gov.mb.ca

http://www.gov.mb.ca/conservation/cdc/

From: Stoffel, Lucas [mailto:lstoffel@dillon.ca]
Sent: May-22-14 3:28 PM
To: Friesen, Chris (CWS)
Subject: Wawanesa Wastewater Treat

[Quoted text hidden]

Sunstrum, Mary <msunstrum@dillon.ca>

Wawanesa Treatment Lagoon

Bruederlin, Bruno (CWS) <Bruno.Bruederlin@gov.mb.ca> Thu, Feb 20, 2014 at 5:02 PM
To: "Sunstrum, Mary" <msunstrum@dillon.ca>

Good Afternoon Mary,

Our scanner was acting up so I faxed you the list and cover page from the report it is from.

Don't forget to include lake sturgeon and maple leaf mussels.

Bruno Bruederlin

Regional Fisheries Biologist

Conservation and Water Stewardship

Fisheries Branch

Room 128 Box 13

1129 Queens Avenue

Brandon MB R7A 1L9

cellular 724-4116, fax 726-6301

email Bruno.Bruederlin@gov.mb.ca

From: Sunstrum, Mary [mailto:msunstrum@dillon.ca]
Sent: February-18-14 10:35 AM
To: Bruederlin, Bruno (CWS)
Subject: Re: Wawanesa Treatment Lagoon

[Quoted text hidden]

Fishes Collected from the Canadian Portion of the Assiniboine River Drainage

B. R. McCulloch and W. G. Franzin

Central and Arctic Region
Department of Fisheries and Oceans
Winnipeg, Manitoba R3T 2N6

1996

Canadian Technical Report of Fisheries and Aquatic Sciences 2087

Fisheries and Oceans Pêches et Océans

Canada

Table 1: Scientific and common names for the abbreviations used in the appendices.

Family Petromyzontidae		
I. cast	*Ichthyomyzon castaneus*	Chestnut lamprey
Family Hiodontidae		
H. alos	*Hiodon alosoides*	Goldeye
H. terg	*Hiodon tergisus*	Mooneye
Family Esocidae		
E. luci	*Esox lucius*	Northern pike
Family Salmonidae		
C.clup	*Coregonus clupeaformis*	Lake whitefish
C.arte	*Coregonus artedi*	Cisco
Family Umbridae		
U. limi	*Umbra limi*	Central mudminnow
Family Cyprinidae		
C. spil	*Cyprinella spiloptera*	Spotfin shiner
C. carp	*Cyprinus carpio*	Common carp
L. corn	*Luxilus cornutus*	Common shiner
M. stor	*Macrhybopsis storeriana*	Silver chub
M. marg	*Margariscus margarita*	Pearl dace
N. crys	*Notemigonus crysoleucas*	Golden shiner
N. athe	*Notropis atherinoides*	Emerald shiner
N. blen	*Notropis blennius*	River shiner
N. dors	*Notropis dorsalis*	Bigmouth shiner
N. hdon	*Notropis heterodon*	Blackchin shiner
N. hlep	*Notropis heterolepis*	Blacknose shiner
N. huds	*Notropis hudsonius*	Spottail shiner
N. stra	*Notropis stramineus*	Sand shiner
P. eos	*Phoxinus eos*	Northern redbelly dace
P. neog	*Phoxinus neogaeus*	Finescale dace
P. prom	*Pimephales promelas*	Fathead minnow
P. grac	*Platygobio gracilis*	Flathead chub
R. atra	*Rhinichthys atratulus*	Blacknose dace
R. cata	*Rhinichthys cataractae*	Longnose dace
S. atro	*Semotilus atromaculatus*	Creek chub

Lake Sturgeon

Table 1. continued.

Family Catostomidae		
C. cypr	*Carpiodes cyprinus*	Quillback
C. comm	*Catostomus commersoni*	White sucker
I. cyp	*Ictiobus cyprinellus*	Bigmouth buffalo
M. anis	*Moxostoma anisurum*	Silver redhorse
M. eryt	*Moxostoma erythrurum*	Golden redhorse
M. macr	*Moxostoma macrolepidotum*	Shorthead redhorse
Family Ictaluridae		
A. mel	*Ameiurus melas*	Black bullhead
A. nebu	*Ameiurus nebulosus*	Channel catfish
N. flav	*Noturus flavus*	Stonecat
N. gyr	*Noturus gyrinus*	Tadpole madtom
Family Percopsidae		
P. omis	*Percopsis omiscomaycus*	Trout-perch
Family Gadidae		
L. lota	*Lota lota*	Burbot
Family Gasterosteidae		
C. inco	*Culaea inconstans*	Brook stickleback
P. pung	*Pungitius pungitius*	Ninespine stickleback
Family Cottidae		
C.rice	*Cottus ricei*	Spoonhead sculpin
Family Centrarchidae		
A. rupe	*Ambloplites rupestris*	Rock bass
Family Percidae		
E. exil	*Etheostoma exile*	Iowa darter
E. nigr	*Etheostoma nigrum*	Johnny darter
P. flav	*Perca fluviatilis flavescens*	Yellow perch
P. macu	*Percina maculata*	Blackside darter
P. shum	*Percina shumardi*	River darter
S. cana	*Stizostedion canadense*	Sauger
S. vitr	*Stizostedion vitreum*	Walleye
Family Sciaenidae		
A. grun	*Aplodinotus grunniens*	Freshwater drum

Table 2. Continued.

Pungitius pungitius	*	*				
Cottus ricei		lakes				
Ambloplites rupestris	*	*	*	*	*	
Etheostoma exile	oxbow	*	*			*
Etheostoma nigrum	*	*	*	*	*	*
Perca flavescens	*	*	*	*		
Percina maculata	*	*	*	*	*	*
Percina shumardi	*				*	
Stizostedion vitreum	*	*	*	*		
Stizostedion canadense	*	*				
Aplodinotus grunniens	*					
Total (extant native species)	45	35	33	20	18	17

46 — 50

Table 2. Fish species collected from the Assiniboine River and its major tributaries.

Species	Assiniboine River	Qu'Appelle River	Souris River	Little Saskatchewan River	Cypress River	Shell River
Ichthyomyzon castaneus	*	*				*
Acipenser fulvescens	historic					
Hiodon alosoides	*	*	*			
Hiodon tergisus	*	*				
Esox lucius	*	*	*	*	*	
Umbra limi	*		*		*	
Salvelinus fontinalis			stocked			stocked
Oncorhynchus mykiss						stocked
Coregonus artedii		lakes				
Coregonus clupeaformis		lakes				
Cyprinella spiloptera	*					
Cyprinus carpio	*	*	*	*		
Luxilus cornutus	*	*	*	*	*	
Macrhybopsis storeriana	*					
Margariscus margarita			*	*		
Notemigonus crysoleucus	*		*			
Notropis atherinoides	*	*				*
Notropis blennius	*	*	*		*	
Notropis dorsalis	*		*	*	*	*
Notropis heterodon	*		*			
Notropis heterolepis	*	*	*			*
Notropis hudsonius	*	*	*	*		
Notropis stramineus	*	*	*		*	
Phoxinus eos			*			
Phoxinus neogaeus	*					
Pimephales promelas	*	*	*	*	*	*
Platygobio gracilis	*		*			
Rhinichthys atratulus	*	*	*	*	*	*
Rhinichthys cataractae	*	*	*	*	*	*
Semotilus atromaculatus	*	*	*	*	*	*
Carpiodes cyprinus	*	*				
Catostomus commersoni	*	*	*	*	*	*
Ictiobus cyprinellus		lakes				
Moxostoma anisurum	*				*	*
Moxostoma erythrurum	*					
Moxostoma macrolepidotum	*	*	*	*		*
Ameiurus melas	*	*	*			
Ameiurus nebulosus	*		*			
Ictalurus punctatus	*	*				
Noturus flavus	*		*	*	*	
Noturus gyrinus	*		*			
Percopsis omiscomaycus	*	*	*			*
Lota lota	*	*		*		*
Culaea inconstans	*	*	*	*	*	*

Manitoba

Memorandum

DATE: April 11, 2014

TO: Lin Watt
Dillon Consulting Limited
1558 Wilson Place
Winnipeg, MB R3T 0Y4

FROM: Myra Sitchon
Impact Assessment Archaeologist
Historic Resources Branch
Main Floor 213 Notre Dame Avenue
Winnipeg MB
R3B 1N3
PHONE NO.: (204) 945-6539

SUBJECT: Heritage Resources

HRB FILE: AAS-13-7322

Village of Wawanesa
SE-25-7-17-WPM
RM Oakland

Further to your memo regarding the above-noted project, I have examined the locations in conjunction with Branch records for areas of potential concern. The location of the project is within 1km radius of a major waterway which is a factor that suggests the development has the potential to impact heritage resources. Therefore, the Historic Resources Branch has concerns with the project.

Under Section 12(2) of The Heritage Resources Act, if the Minister of Tourism, Culture, Heritage, Sport and Consumer Protection has reason to believe that heritage resources or human remains are known, or thought likely to be present, on lands that are to be developed, then the owner/developer may be required to conduct at his/her own expense, a heritage resource impact assessment and mitigation, if necessary, prior to the project's start.

It is recommended that the developer contract an archaeological consultant to conduct a survey of the proposed locations, in order to identify and assess any heritage resources that may be negatively impacted by development. If desirable, the Branch will work with the developer/land owners and its consultant to draw up terms of reference for this project.

If you have any questions or comments, please feel free to contact me at (204) 945-6539 or Brian Smith, Manager, Archaeological Assessment Services at (204) 945-1830.

Myra Sitchon

APPENDIX C

SOURIS RIVER HYDROMETRIC DATA

SOURIS RIVER AT WAWANESA (05NG001)

Station: 05NG001 ▼ Report Type: Monthly ▼ Flow ▼ for 2012 ▼

Refresh Graph View

Monthly Mean Discharge (m^3/s)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
1912	-	-	-	-	-	-	-	-	-	2.27	-	-	-
1913	0.283	-	-	27.4	28.0	4.71	1.42	1.18	1.23	1.05	0.706	0.425	-
1914	0.142	0	0	14.2	19.3	6.70	4.62	2.76	1.56	0.803	0.567	0.142	4.25
1915	0	0	0.057	3.41	1.91	1.41	1.13	0.124	0.846	0.949	0.429	0.057	0.860
1916	0.028	0	0.057	56.0	74.5	46.6	13.7	6.16	2.38	2.24	1.69	0.566	17.0
1917	0	0	0.418	23.9	29.8	14.6	3.78	1.08	0.397	0.363	0.688	0.085	6.27
1918	0	0	2.08	13.0	5.90	3.01	0.766	0.589	0.350	1.04	0.923	0.514	2.35
1919	0.177	0	0.271	37.5	33.2	5.34	1.80	0.523	0.297	0.311	0.227	0.028	6.64
1920	0	0	0	19.6	51.6	28.0	5.27	2.02	1.29	1.14	0.566	-	-
1921	-	-	-	7.07	5.54	3.50	2.88	5.36	2.12	1.38	0.731	-	-
1922	-	-	0.663	36.2	30.7	13.1	3.83	2.21	1.14	0.972	1.16	-	-
1923	-	-	-	46.6	57.4	40.2	16.7	13.0	3.89	2.52	2.21	-	-
1924	-	-	-	-	14.0	5.81	7.95	2.08	0.935	1.37	-	-	-
1925	-	-	-	48.1	39.8	28.7	8.30	2.32	1.28	1.42	-	-	-
1926	-	-	-	3.21	3.11	2.22	2.82	1.41	1.21	1.26	-	-	-
1927	-	-	-	42.7	57.5	79.4	52.8	17.1	10.4	8.22	7.99	-	-
1928	-	-	-	43.3	42.1	24.4	32.2	28.3	13.8	5.85	3.24	-	-
1929	-	-	-	12.2	6.73	8.35	2.92	0.563	1.02	0.666	0.321	-	-
1930	-	-	-	35.9	16.8	5.54	2.28	0.400	0.068	0.217	-	-	-
1931	-	-	-	1.14	0.337	0.144	0.088	0.002	0.001	0.001	0.001	0	-
1932	0	0	0	3.56	2.56	1.17	0.698	0.092	0.009	0.104	-	-	-
1933	-	-	2.80	29.8	10.4	2.57	4.26	1.48	0.774	0.112	-	-	-
1934	-	-	-	14.0	2.51	0.498	0.042	0	0	0	0	0	-
1935	0	0	-	4.81	2.66	2.06	20.6	4.76	0.935	0.238	0.142	0	-
1936	0	0	0	24.4	2.55	0.712	0.049	0	0	0	0	0	2.28
1937	0	0	0	0.714	0.301	0.421	0.057	0.123	0.001	0	0	0	0.134
1938	0	0	5.64	1.07	0.347	0.107	0.024	0.002	0	0	0	0	0.608
1939	0	0	3.53	8.62	0.295	0.218	0.027	0	0	-	-	-	-
1940	-	-	-	-	0.378	0.058	0.016	0.033	0.020	-	-	-	-
1941	-	-	-	11.7	0.980	0.354	0.090	0.045	0.415	0.674	-	-	-
1942	-	-	-	-	14.1	3.47	0.915	0.580	0.895	-	-	-	-
1943	-	-	-	40.6	52.0	43.3	22.3	8.27	1.59	1.91	-	-	-

1944	-	-	-	5.16	9.03	9.31	35.6	8.52	8.94	4.79	-	-	-
1945	-	-	-	24.1	9.83	1.95	2.11	2.51	0.566	0.500	-	-	-
1946	-	-	-	24.6	2.49	0.912	0.766	0.260	1.01	1.62	-	-	-
1947	-	-	-	41.4	29.2	12.2	22.4	10.6	5.01	1.52	-	-	-
1948	-	-	-	-	97.0	59.7	27.1	17.2	4.74	3.25	-	-	-
1949	-	-	-	116	94.0	30.4	8.23	4.03	2.35	1.83	-	-	-
1950	-	-	-	35.2	77.3	71.2	26.4	19.6	10.0	6.64	-	-	-
1951	-	-	-	73.7	104	60.7	17.8	3.21	4.80	4.24	-	-	-
1952	-	-	-	28.4	22.3	4.22	2.57	1.93	1.10	0.140	-	-	-
1953	-	-	-	10.8	16.0	23.7	30.4	30.4	6.35	3.11	6.75	1.70	-
1954	3.82	3.55	4.96	10.7	9.90	28.8	48.8	22.3	8.23	16.8	11.2	6.65	14.7
1955	5.25	4.47	3.29	97.4	105	78.6	44.3	16.2	9.27	9.13	4.32	1.56	31.6
1956	0.619	0.642	0.518	74.9	83.9	66.8	21.7	10.1	7.45	6.47	7.51	2.88	23.6
1957	1.05	0.640	5.39	9.25	10.4	9.10	5.70	5.20	3.94	2.66	3.07	2.19	4.90
1958	0.396	0.932	4.16	15.0	4.58	3.20	1.44	0.504	0.481	0.653	0.280	0.023	2.63
1959	0.003	0.003	2.79	3.38	0.678	0.609	0.554	0.174	0.527	1.63	3.46	1.07	1.24
1960	0.853	0.757	0.590	85.4	41.7	17.2	2.35	0.800	0.954	1.10	0.728	0.353	12.7
1961	0.169	0.164	0.796	3.01	1.13	0.336	0.344	0.017	0.041	0.219	0.298	0.083	0.550
1962	0.039	0.046	0.062	10.7	1.37	1.55	0.563	0.726	0.820	1.27	0.284	0.217	1.47
1963	0.072	0	0.928	3.27	1.26	5.93	3.56	0.572	0.664	0.610	0.575	0.161	1.47
1964	0.028	0.063	0.147	13.6	13.5	2.04	4.67	0.948	2.14	3.62	0.805	0.147	3.48
1965	0.135	0.081	0.098	17.0	12.9	17.0	14.6	6.09	8.37	7.57	2.84	1.65	7.38
1966	1.56	1.17	20.9	23.0	30.0	13.0	4.73	2.02	0.757	0.786	0.575	0.281	8.28
1967	0.252	0.192	0.720	15.3	16.9	5.31	0.682	0.220	0.084	0.662	0.639	0.201	3.43
1968	0.112	0.129	3.73	1.99	0.698	0.496	0.747	1.36	5.97	5.66	1.96	0.601	1.96
1969	0.470	0.608	0.490	159	168	79.9	24.6	18.7	4.03	2.14	1.94	1.80	38.6
1970	1.97	1.89	1.41	32.0	85.9	84.7	50.9	15.8	3.02	2.65	2.22	0.706	23.7
1971	0.434	0.892	1.57	23.0	39.5	20.0	13.2	11.1	2.22	3.27	6.19	3.24	10.4
1972	2.47	2.07	19.6	74.5	75.8	25.6	20.3	7.24	4.11	4.16	6.76	0.721	20.3
1973	0.451	0.898	3.24	1.73	5.25	3.80	3.54	2.06	2.14	4.39	1.04	0.631	2.45
1974	0.564	0.976	1.95	121	174	119	38.8	5.77	3.27	2.43	3.94	1.98	39.5
1975	1.03	0.869	1.06	48.2	212	175	86.5	22.4	10.4	26.8	24.9	12.2	52.1
1976	9.01	7.47	7.50	488	286	107	38.3	20.1	11.1	3.71	2.40	1.83	81.6
1977	1.50	1.08	1.74	2.18	1.96	1.06	1.13	0.498	1.04	0.828	0.610	0.616	1.19
1978	0.770	0.769	0.928	25.8	13.0	2.65	4.44	6.13	4.23	0.523	0.722	0.442	5.03
1979	0.485	0.822	1.58	28.5	137	118	37.1	6.23	1.62	1.03	0.861	0.251	28.0
1980	0.188	0.254	0.941	6.18	4.97	1.18	0.773	1.29	1.34	3.36	3.36	1.96	2.15
1981	1.24	3.64	7.59	6.78	4.52	4.11	2.22	1.98	1.84	1.56	1.65	0.591	3.13
1982	0.142	0.133	1.04	40.8	57.7	26.6	3.04	3.41	4.39	6.38	8.78	1.95	12.9
1983	1.81	2.41	13.7	95.9	67.1	11.7	6.07	4.92	11.7	6.44	6.22	1.26	19.1
1984	0.604	1.34	4.54	7.03	20.5	17.6	3.53	2.14	1.75	2.51	2.26	1.44	5.44
1985	0.490	0.237	25.2	20.3	15.8	10.8	1.73	2.65	4.61	5.05	2.16	1.65	7.59
1986	1.66	1.54	13.4	18.1	30.2	8.22	2.63	2.50	0.931	5.39	2.84	1.04	7.42
1987	1.19	1.19	10.1	63.2	24.3	5.49	3.91	6.58	4.68	2.29	2.27	1.62	10.6
1988	0.094	0.372	1.30	2.20	0.546	0.122	0.533	0.022	0.200	0.576	0.494	0.153	0.550
1989	0.110	0.058	0.029	38.6	2.73	0.510	0.333	0.312	0.294	0.554	0.581	0.122	3.64
1990	0.011	0	0.900	3.36	0.505	0.569	0.742	0.215	0.226	0.392	0.585	0.267	0.647
1991	0.095	0.078	0.573	0.985	0.529	3.39	5.21	1.29	0.471	0.906	0.802	0.339	1.23

1992	0.348	0.315	15.0	18.7	4.01	0.900	0.758	0.223	0.527	0.685	0.612	0.206	3.52
1993	0.122	0.141	1.57	1.36	0.274	0.164	0.615	0.717	3.13	1.37	0.863	0.559	0.908
1994	0.683	0.638	4.68	10.4	8.89	6.85	5.96	1.56	2.18	1.67	9.43	6.39	4.96
1995	2.63	1.66	20.4	155	80.5	21.8	12.5	9.54	6.06	4.87	4.12	1.57	26.7
1996	0.971	0.944	1.14	112	147	51.9	13.2	10.6	3.88	2.46	1.87	1.57	29.0
1997	0.733	0.545	3.69	94.6	106	42.7	11.9	9.78	3.17	2.20	1.56	1.20	23.3
1998	0.794	0.952	0.781	59.1	23.9	14.4	15.6	13.1	4.13	5.61	5.78	4.66	12.4
1999	4.11	2.63	20.9	161	217	195	83.1	39.1	27.3	17.4	7.53	4.06	65.1
2000	2.71	2.72	4.79	3.79	11.8	15.2	16.0	12.7	5.39	2.69	2.95	2.83	6.99
2001	3.30	1.03	2.53	108	103	45.3	16.3	14.8	8.10	4.00	3.93	3.36	26.2
2002	1.60	0.622	0.541	1.94	1.19	3.36	5.65	1.74	1.88	1.15	0.717	0.520	1.75
2003	0.200	0.155	7.43	20.1	14.0	11.2	2.81	0.466	0.494	0.523	0.409	0.143	4.83
2004	0.132	0.181	1.00	7.44	4.22	31.5	29.1	9.91	5.95	4.92	3.09	4.13	8.48
2005	0.747	0.579	0.584	71.7	29.8	80.7	141	76.4	11.5	11.8	6.75	2.74	36.4
2006	1.87	2.42	5.53	69.3	29.3	7.33	2.19	1.42	0.883	1.08	0.619	0.318	10.2
2007	0.101	0.074	9.38	6.88	3.95	9.96	7.40	2.83	1.34	1.88	1.47	0.609	3.84
2008	0.282	0.099	0.236	2.01	0.719	2.87	2.09	0.809	0.785	1.13	0.817	0.243	1.01
2009	0.210	0.229	19.6	85.5	126	25.3	8.96	6.84	6.15	7.27	3.44	0.869	24.3
2010	1.01	1.08	9.89	31.7	21.8	36.9	56.6	27.1	21.1	22.2	17.0	11.2	21.6
2011	10.8	12.8	16.2	284	409	572	520	168	87.0	41.1	15.1	11.8	180
2012	9.51	3.96	6.86	21.5	21.1	19.6	13.1	3.16	1.63	1.82	1.26	0.594	8.67
Mean	1.16	1.06	4.63	41.5	42.0	29.2	18.6	8.22	4.25	3.56	3.00	1.62	15.2
Max	10.8	12.8	25.2	488	409	572	520	168	87.0	41.1	24.9	12.2	180
Min	0.000*	0.000*	0.000*	0.714	0.274	0.058	0.016	0.000*	0.000*	0.000*	0.000*	0.000*	0.134

* Asterisk - occurs more than once.

* THE SOURIS RIVER BASIN STUDY ESTIMATED DISCHARGES OF HISTORICAL FLOODS - 1882 AND 1904 WERE 1130 AND 566 M3/S RESPECTIVELY

Date Modified: 2010-04-30

SOURIS RIVER AT WAWANESA (05NG001)

Station: 05NG001 ▼ Report Type: Monthly ▼ Level ▼ for 2012 ▼ Refresh Graph View

Monthly Mean Water Level (m)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
2002	348.314	348.216	348.223	348.188	348.137	348.234	348.330	348.169	-	-	348.184	348.163	-
2003	348.216	348.143	-	348.768	348.601	348.515	348.209	348.083	348.092	348.104	348.088	348.057	-
2004	348.118	348.088	348.138	348.416	348.265	348.988	348.927	348.495	348.375	348.327	348.277	348.388	348.401
2005	348.257	348.203	348.187	349.559	348.969	349.679	350.288	349.624	348.519	348.546	348.381	348.325	348.882
2006	348.331	348.393	348.539	349.580	348.907	348.385	348.177	348.119	348.079	348.112	348.081	348.075	348.397
2007	348.113	348.103	348.568	348.392	348.259	348.502	348.439	348.207	348.140	348.173	348.163	348.166	348.270
2008	348.135	348.148	348.136	348.188	348.077	348.216	348.174	348.083	348.083	348.114	348.103	348.089	348.129
2009	348.127	348.116	348.870	349.995	350.122	348.810	348.441	348.376	348.364	348.432	348.288	348.236	348.684
2010	348.271	348.314	348.524	348.962	348.767	349.061	349.388	348.870	348.760	348.802	348.731	348.820	348.775
2011	348.873	349.001	-	351.382	352.319	353.069	352.724	350.472	349.672	349.102	348.661	348.626	-
2012	348.777	348.576	348.442	348.655	348.680	348.648	348.474	348.124	348.036	348.045	348.029	348.014	348.374
Mean	348.321	348.300	348.403	349.099	349.009	349.101	349.052	348.602	348.412	348.376	348.271	348.269	348.489
Max	348.873	349.001	348.870	351.382	352.319	353.069	352.724	350.472	349.672	349.102	348.731	348.820	348.882
Min	348.113	348.088	348.136	348.188*	348.077	348.216	348.174	348.083*	348.036	348.045	348.029	348.014	348.129

* Asterisk - occurs more than once.

Water Levels Referred To GEODETIC SURVEY OF CANADA DATUM (LOCAL 1954 ADJ.)

Date Modified: 2010-04-30

SOURIS RIVER AT WAWANESA (05NG001)

Station: 05NG001 ▼ Report Type: Peak ▼ Level ▼ for 2012 ▼ Refresh Graph View

Peak Water Level (m)

Year	Maximum Instantaneous Water Level (m)	Minimum Instantaneous Water Level (m)	Maximum Daily Water Level (m)	Minimum Daily Water Level (m)
2002	348.439 at 13:55 CST on Jul 09	348.076 at 09:20 CST on Oct 31	348.433 on Jul 10	348.110 on May 30
2003	----	348.025 at 07:00 CST on Sep 05	----	348.029 on Sep 05
2004	349.582 at 10:45 CST on Jul 14	348.049 at 03:40 CST on Mar 19	349.536 on Jul 14	348.052 on Mar 09
2005	351.951 at 00:30 CST on Apr 03	348.161 at 02:00 CST on Mar 31	350.671 on Apr 03	348.171 on Mar 29
2006	351.873 at 01:50 CST on Apr 04	347.999 at 11:00 CST on Nov 23	350.183 on Apr 04	348.038 on Nov 23
2007	352.167 at 06:50 CST on Mar 26	348.026 at 06:40 CST on Nov 17	350.624 on Mar 26	348.041 on Feb 20
2008	348.346 at 02:00 CST on Jun 13	348.012 at 12:00 CST on Nov 18	348.323 on Jun 13	348.038 on Aug 29
2009	352.262 at 04:00 CST on Mar 26	348.054 at 11:00 CST on Nov 24	351.978 on Mar 26	348.084 on Jan 02
2010	349.559 at 00:00 CST on Mar 31	348.229 at 03:00 CST on Mar 17	349.523 on Jul 03	348.239 on Mar 16
2011	354.159 at 09:50 CST on Jul 06	348.395 at 00:40 CST on Nov 19	354.118 on Jul 06	348.432 on Nov 19
2012	348.877 at 09:15 CST on Jan 24	347.935 at 11:40 CST on Nov 10	348.876 on Jan 23	347.943 on Nov 10

Date Modified: 2010-04-30

ATTACHMENT 1

FUNCTIONAL DESIGN REPORT
(ABBREVIATED)