



DILLON
CONSULTING

Environment Act Proposal for the Town of Winnipeg Beach Lagoon

Final Report

December 23, 2014

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

Attention: Tracy Braun, M.Sc.
Director

Environment Act Proposal on behalf of The Town of Winnipeg Beach

Dear Ms. Braun,

Please find enclosed a copy of the Environment Act Proposal (EAP) for The Town of Winnipeg Beach municipal wastewater lagoon upgrades. This EAP is being submitted with the intention of obtaining a licence as a Class 2 Development under the Environment Act. The EAP describes the site, the operations, environmental conditions, potential effects of the proposed upgrades, and the measures that have been or will be taken to prevent or mitigate adverse environmental effects. The upgraded lagoon facility is expected to improve the quality of treated effluent that is discharged to Lake Winnipeg.

As required, a \$7,500 application fee is included with this EAP.

If you have any questions regarding this proposal, please contact me at (204) 453-2301.

Yours sincerely,

DILLON CONSULTING LIMITED

For: Ash Raichura, P.Eng.
Project Manager

FMZ/knp

Attachments: Environment Act Proposal,
EAP filing fee cheque for \$7,500.00

cc: Manitoba Water Services Board, Town of Winnipeg Beach

Our file: 13-8858

O:\PROJECTS\FINAL\141078\Reports\Final\Environment Act Proposal_Final_2014.11.10.docx



1558 Willson Place
Winnipeg
Manitoba
Canada
R3T 0Y4
Telephone
(204) 453-2301
Fax
(204) 452-4412

**Dillon Consulting
Limited**

Table of Contents

1.0	Introduction and Background	1
1.1	Population and Service Area.....	2
1.2	Lagoon Loading Criteria	2
1.3	Public Consultation	3
1.4	Previous Studies	3
2.0	Existing Facilities	4
2.1	Wastewater Collection and Treatment Facilities	4
2.2	Existing Lagoon Structure	4
2.3	Lagoon Discharge and Discharge Rate.....	5
3.0	Description of Development	7
3.1	Site	7
3.1.1	Certificate of Title	7
3.1.2	Mineral Rights	7
3.1.3	Current Land Use	7
3.2	Design.....	8
3.2.1	Description of Proposed Upgrades	8
3.3	Construction	9
3.3.1	Funding	9
3.3.2	Schedule	9
3.4	Operation	10
3.5	Maintenance	11
3.6	Sludge Management and Disposal	11
3.7	Decommissioning	11
4.0	Description of Environment	12
4.1	Terrestrial Environment	12
4.2	Aquatic Environment	13
5.0	Potential Impacts and Mitigation Measures	14
5.1	Potential Terrestrial Impacts and Mitigation Measures	14
5.2	Potential Aquatic Impacts and Mitigation Measures.....	14
5.3	Potential Heritage and Socioeconomic Impacts.....	15

6.0	Monitoring	16
6.1	Current Practices	16
6.2	Proposed Monitoring Regime	16
6.2.1	Surface Water Monitoring.....	16
6.2.2	Groundwater	16
7.0	Closure	17
8.0	References	18

Figures

Figure 1: Existing Lagoon System	2
Figure 2: Existing Lagoon Discharge Route.....	6

Appendices

A	Property Details
B	Correspondence
C	Clean Environment Commission Order No. 314VC00

Attachments

1	Functional Design Report (Abbreviated for EAP)
---	--



1.0

Introduction and Background

The Town of Winnipeg Beach (the Town) is a community of approximately 1,000 permanent residents located on the southwest shore of Lake Winnipeg. The Town is a popular resort community because of its close proximity to Winnipeg and well known recreational beaches. The Province of Manitoba operates Winnipeg Beach Provincial Park (the Park), which is located on the southeast side of the Town and recently received Blue Flag status for excellence in water quality and environmental management.

Wastewater treatment for the Town is presently provided by two lagoon systems made up of the original two cell facultative lagoon located north of Kernstead Road and the newer three cell facultative lagoon located south of Kernstead Road. During normal flow conditions, spring and summer wastewater treatment is provided by the three cell lagoon located south of Kernstead Road. The two cell lagoon located north of Kernstead Road provides additional hydraulic storage capacity, and is utilized mainly for winter flow storage and as additional storage during wet weather conditions.

The two cell lagoon was the original wastewater treatment facility at Winnipeg Beach. It was constructed in the early 1960's and by 1963, was receiving municipal wastewater from the newly constructed lift station. Over the next 20 years, the Town grew rapidly and a lagoon expansion was required. M.M. Dillon performed the initial site investigation and subsequent lagoon design. The three cell lagoon was constructed in 1987 with a recompacted clay liner. The Town lift station was modified to allow wastewater pumping to either the original two cell, or new three cell lagoon.

The two lagoon system operates under Clean Environment Commission Order No. 314VC00, most recently amended on July 29, 1987 (**Appendix C**). The facility was not updated to meet the more stringent design standards required by the Environment Act of 1989. In recent years, there have been multiple requests for emergency discharges of the lagoon(s) due to hydraulic overloading of the lagoons in the summer months. In response to the most recent request for emergency discharge, Manitoba Conservation and Water Stewardship (CWS) issued a letter (Nov. 19, 2010, **Appendix B**) recommending immediate action by the Town to address the hydraulic capacity issues at the lagoon and informed the Town that future requests for emergency discharge will not be considered.

As a result of the request from CWS to address the hydraulic capacity issues at the lagoon, the Town of Winnipeg Beach retained Dillon to perform a study that outlined and compared options for upgrading the lagoon to meet the current hydraulic loading. The conclusion of the study indicated that in addition to making upgrades to meet hydraulic capacity, the lagoon requires upgrades to the organic treatment and nutrient removal capacity to meet current municipal wastewater effluent quality guidelines.

Following the initial study, the Manitoba Water Services Board (MWSB) retained Dillon to provide a functional design for the Winnipeg Beach wastewater treatment lagoon upgrades. This report was completed in fall, 2014. Since wastewater treatment lagoon systems are considered Class 2 developments under the Manitoba Environment Act, approval for major alterations must be granted by CWS. This report is prepared and submitted on behalf of the Town of Winnipeg Beach for approval to construct and operate the lagoon as proposed in the functional design (**Attachment 1**).

1.1 Population and Service Area

Dwellings in the Town of Winnipeg Beach are serviced by a wastewater collection system that consists of gravity and low pressure sewers. According to Statistics Canada, the Town had 547 permanent dwellings and a population of 1,011 in 2011. There are an additional 1,210 dwellings in the Town that are occupied seasonally. Hauled septage is accepted at the lagoon, but only from residents of the Town. This septage is from the on-site septic tanks of dwellings connected to the low-pressure sewer system.



FIGURE 1: EXISTING LAGOON SYSTEM

The Winnipeg Beach Provincial Park is expected to connect into the wastewater collection system once the lagoon upgrades are complete. Extending the service area of the lagoons beyond servicing the Town and Park are not expected in the future and capacity for such an increase is not contemplated in the functional design of the upgrades.

The lagoon upgrades are designed to accommodate a peak summer population of 5,306 people which include both seasonal and permanent residents and an allocation for the Park. It is assumed that the seasonal population will produce approximately half the volume of wastewater as the permanent population due to intermittent occupation of the seasonal dwellings during the summer. Details of the design population breakdown and expected wastewater generation rates for the design population are included in **Attachment 1**.

1.2 Lagoon Loading Criteria

The Town of Winnipeg Beach is a popular resort destination therefore the summer wastewater loading rates are significantly higher than the annual average rates. Thus the summer loading rates will govern the design of the lagoon upgrades. Using a typical organic loading rate of 0.085 kg BOD₅/cap/d, the expected annual average daily organic loading is 178 kg BOD₅/d while during peak summer period the expected organic loading is 369 kg BOD₅/d. The primary cell of the three cell lagoon has a total area of approximately 3.0 hectares (ha). Based on the maximum organic treatment rate of 56 kg BOD₅/ha/d allowed by CWS, the primary cell has capacity to treat 168 kg BOD₅/d.

Annual average day hydraulic loading is expected to be 1,064 m³/d, while the summer hydraulic loading is expected to be 1,217 m³/d based on the estimated wastewater generation rates for the population as outlined in **Attachment 1**.

Using a typical total phosphorus loading rate of 3.3g TP/cap./d, the total projected loading to the lagoon at the design year is expected to be and 12 kg TP/d, or 4380 kg TP sent to the lagoon annually. Under Manitoba Water Protection Act regulations introduced in 2011, all new and altered wastewater treatment facilities are required to consider and mitigate nutrient impacts from treated effluent on receiving streams or lakes. Under these regulations the Winnipeg Beach lagoon system will be required to meet the effluent quality standard of 1 mg/L or less of total phosphorus. Peak summer phosphorus loading is expected to be 14.3 kg TP/d.

Organic Nitrogen loading to the lagoon is estimated at 47 kg TKN/d based on a typical value of 13 g TKN/cap/d. At summer peak flow, daily organic nitrogen loading to the lagoon is expected to be 56 kg TKN/d. Approximately 95% of the organic nitrogen load can be expected to be converted to ammonia in the lagoon. The expected total ammonia nitrogen (TAN) "loading" can therefore be estimated at approximately 45 kg TAN/d annually. New federal regulations require an annual maximum unionized ammonia nitrogen (NH₃-N) concentration of less than or equal to 1.25 mg NH₃-N/L at 15°C in the treated effluent. The Province of Manitoba standards regulate total ammonia nitrogen based on pH and temperature of the receiving water body. Effluent from the Winnipeg Beach lagoon will be required to meet the more stringent ammonia effluent quality standard which is expected to be the provincial standard.

1.3 Public Consultation

A public consultation session is tentatively scheduled for mid-January 2015. Results of the consultation will be forwarded to CWS for consideration and inclusion in their files.

1.4 Previous Studies

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

- Winnipeg Beach Sewage Lagoon Expansion Preliminary Geotechnical Report by K.A. Buhr (1973).
- Town of Winnipeg Beach Wastewater Lagoon Upgrades Population and Wastewater Loading Projections – Technical Memo (December 10, 2013), by Dillon
- Winnipeg Beach Lagoon Upgrade Feasibility Study (February 2014), by Dillon
- Town of Winnipeg Beach Lagoon Upgrades Functional Design (September 2014), by Dillon.

An abbreviated version of the functional design report (excluding capital cost estimates) has been included as Attachment 1 to this Environment Act Proposal

2.0

Existing Facilities

2.1

Wastewater Collection and Treatment Facilities

Wastewater treatment in the Town is currently provided by two lagoon systems. The original, two cell facultative lagoon located north of Kernstead Road was constructed in 1963. A newer, three cell facultative lagoon located south of Kernstead Road was constructed in 1987 and is currently used for treating the wastewater generated at Winnipeg Beach.

Wastewater collected by both gravity and low pressure sewer systems flows to a lift station located southeast of the Town. Duplex pumps move wastewater southeast, via forcemain, to the lagoons. The lift station and forcemain system has been designed to pump wastewater to the primary cell of the three cell lagoon system south of Kernstead Road, or to the primary cell of the two cell lagoon system north of Kernstead Road by manual actuation of control valves on the forcemain.

During normal operation, the primary cell of the south lagoon (Cell 1-S) receives wastewater flows from the municipal collection system and trucked septage. The three-cell facultative lagoon treatment system has a total hydraulic capacity of 154,196 m³. Wastewater flows through the cells in the following order:

- Cell 1-S : primary cell, 3.0 ha area;
- Cell 2-S: secondary cell, 3.0 ha area; and
- Cell 3-S: secondary cell, 2.2 ha area.

The two cell lagoon located north of Kernstead Road has a total area of 3.3 ha and provides additional hydraulic storage capacity estimated at 62,000 m³. It is utilized mainly for flow equalization and storage.

The existing lagoons are operating under Order No. 314C00 from the Clean Environment Commission issued in 1987, included in **Appendix C**.

2.2

Existing Lagoon Structure

The three cell lagoon that is currently utilized for the treatment of Winnipeg Beach wastewater was constructed with an engineered soil liner. A provincial geotechnical report by K. Buhr (1973) indicates the soils are suitable for use as a recompacted soil liner which could provide a hydraulic conductivity of 5×10^{-9} cm/s. Design drawings indicate that a 1 m thick recompacted soil liner was constructed using local high-plasticity soils.

Operational evidence suggests the constructed soil liner within the lagoon cells is providing adequate containment as there is no evidence of seepage around the lagoon berms. There is some evidence of erosion on the interior side of the berms due to wind and wave action. This erosion does not appear to have compromised liner performance. Regardless, the Town intends to repair the eroded sections to reduce further erosion of the liner.

No complaints have been received from nearby residents or beachgoers regarding seepage, or the quality of the lake water around the lagoon. In fact, in spring 2014, Winnipeg Beach Provincial Park received Blue Flag status for water quality which signifies exceptional quality of the beach and excellence in environmental management within the park and surrounding areas. The numerous emergency discharge requests in recent years indicate the continuing performance of the liner. However, to further monitor the lagoon containment system performance, monitoring well installation is proposed (**Section 6**).

The proposed upgrades will not require modifications to the actual lagoon berms and liner. Some berm repairs will be completed to restore the interior berm profile as necessary. Access to the site is made possible by the roads located on top of the lagoon berms. Restoration of the road along the east berm will be included with the lagoon upgrades to maintain access to the blower building, phosphorus filter, and UV unit. Further details of the proposed lagoon upgrades can be found in **Attachment 1**.

Following the fall discharge period in 2014 sludge levels in the primary cell were measured when the water levels in the lagoon were at their lowest point. The average sludge depth in the lagoon was measured to be approximately 425 mm by the lagoon operator. This sludge volume is not yet significant enough to warrant de-sludging of the primary cell. However, future considerations for lagoon de-sludging are addressed in **Section 3.6**.

2.3 Lagoon Discharge and Discharge Rate

The existing lagoon discharges through a low lying swamp to the south of the lagoon system which drains east into Lake Winnipeg. The total discharge route length is approximately 950 m. Clean Environment Commission Order No. 314VC00, allows for two discharges per year: once between 15 May and the 15 June, and once after September 15. No discharge is currently permitted between June 15 and September 15.

FIGURE 2: EXISTING LAGOON DISCHARGE ROUTE



3.0

Description of Development

3.1

Site

3.1.1

Certificate of Title

The existing lagoon lands border the Winnipeg Beach Provincial Park and privately owned land. The legal addresses for the properties are: the Northeast quarter of Section 27 in the 17th Township and 4th Range, East of the Principle Meridian in Manitoba (NE 27-17-04E) and the Southeast quarter of Section 34 in the 17th Township and 4th Range, East of the Principle Meridan (SE 34-17-04E). Both properties are owned by the Town of Winnipeg Beach. Copies of the Certificate of Title for these properties are provided in Appendix A. No additional property purchases are proposed.

3.1.2

Mineral Rights

The mining and mineral rights beneath the site of the existing lagoons are owned by Canpar Holdings Ltd.; sand and gravel rights are held by the Town. A copy of the Certificate of Title for Mines and Minerals is included in **Appendix A**.

3.1.3

Current Land Use

The existing wastewater treatment lagoon sites straddle the boundary between the Town and the Rural Municipality (RM) of St. Andrew's.

The site of the two cell facultative lagoon north of Kernstead Road is zoned as 'Restricted Development Area' in the *Town of Winnipeg Beach Zoning Bylaw, 8-2012* and designated as 'Restricted Development' in the *Eastern Interlake Planning District Development Plan, 02-2010*. The Restricted Development Area requires that any change in the use of land or buildings will be compatible with the sewage lagoons. The Development Plan also stipulates that if the lagoons are changed or modified in a manner that reduces the separation distance between new land uses and the lagoons, the area designation for adjacent lands (also zoned and designated as Restricted Development) will be reviewed and adjusted. The proposed upgrade is not expected to change the separation distances required around the site.

The site of the three cell facultative lagoon located on the south side of Kernstead Road is zoned as 'A80 – Agricultural General' but is further identified as a waste disposal facility in Schedule A of the *Rural Municipality of St. Andrews Zoning By-law, 4066*. In this zoning by-law 'Waste Disposal Facility' can be both a solid waste or in the case of the lagoon, liquid waste disposal/treatment facility. The site is designated as 'Resource and Agricultural' under the *Selkirk and District Development Plan*. This land use is for areas predominantly reserved for agricultural but other conditional uses such as wastewater treatment can be permitted.

The existing sites have been used for treatment of municipal wastewater and sewage since the lagoons were built. No land use changes are anticipated.

3.2 Design

3.2.1 Description of Proposed Upgrades

The existing lagoon system is hydraulically and organically overloaded during the summer months due to the seasonal population peak that occurs at the Town. Annual phosphorus loading to the lagoon at the design year will exceed the 875 kg/year threshold set by CWS and will therefore require phosphorus reduction in the lagoon effluent down to 1 mg/L or less. To manage these loadings the proposed upgrades to the lagoon include the following:

1. Continuous Seasonal Discharge

The lagoon will discharge continuously between April 1 and October 31. The annual (12 month) inflow will be discharged over the seven month discharge period. The expected seven month discharge rate at the design year is approximately 1815 m³/d. This flow corresponds to a total hydraulic capacity of the lagoon of 390,225 m³/year. This continuous discharge will be facilitated by a 5 hp end suction pump installed on the berm near the existing discharge pipe to provide a controlled flow from the tertiary lagoon cell through the proposed phosphorus filter and UV disinfection units before discharging to the existing discharge route.

2. Primary Cell Aeration

Continuous aeration in the primary cell will treat the elevated organic loading to the primary cell. The aeration system (See drawing **M1** in **Attachment 1** for details) will operate continuously throughout the year to maintain aerobic conditions in the primary cell. Two duty, and one standby blower (3 total) will provide 2450 sm³/hr through 120 fine bubble membrane diffusers to maintain a dissolved oxygen concentration in the lagoon of approximately 2.0 mg/L. The active aeration provided by the aeration system is designed to reduce BOD₅ and total ammonia levels to below discharge limits within the primary cell.

3. Tertiary Phosphorus Removal with Chemical Precipitation

Chemical addition, trickle discharge, and passive filtration were considered as phosphorus reduction strategies at the feasibility study stage. However based on land requirements, cost, and the reliability of achieving the desired effluent phosphorus concentration, chemical addition and filtration was the technology selected for the lagoon upgrades.

A continuous flow, tertiary phosphorus filter is proposed for the Winnipeg Beach lagoon upgrades. The system will be enclosed in a single tank which will be separated into rapid mix and slow mix zones (See drawing **M2** in **Attachment 1** for details). Chemical addition to the incoming lagoon effluent will cause precipitation of the phosphorus and the precipitated phosphorus will be removed from the effluent by a cloth disc filter. Filtrate will be discharged from the phosphorus filter with phosphorus concentration below 1 mg TP/L. Filter backwash and sludge from the filter will be discharged into the secondary cell of the lagoon. Total backwash and sludge volume is expected to be approximately 1% of the filtrate volume. An approximately 70 m³ tank volume will be required to treat the design discharge flow of 1815 m³/d. If a steel tank is selected in the detailed design, an active corrosion inhibiting system such as sacrificial anodes will be installed to protect the tank structure.

By applying the phosphorus reduction system as tertiary treatment after the aerated lagoon system, chemical addition is minimized as is chemical sludge production. In addition, the filtrate will have a low suspended solids concentration which will increase the efficiency of the subsequent UV disinfection system.

4. UV Disinfection

Filtrate from the phosphorus removal filter will flow through an in-channel UV disinfection system prior to discharge. For the 1,815 m³/d design flow, a 32 lamp flow-through system is designed to provide sufficient radiation to achieve the 200 fecal coliform/100 ml sample disinfection limit on a the proposed monthly sampling basis.

5. Ancillary Features

Other components of the proposed Winnipeg Beach lagoon upgrades include a blower building (approximately 6m x 15m) to house the blowers and provide sound attenuation, a pump and chemical storage building (approximately 3m x 5m), and concrete pad foundations for the buildings and phosphorus filter tank. A 50 m long, 250 mm HDPE effluent pipe will connect the UV disinfection unit to the existing discharge route. No modifications to the existing discharge route are proposed beyond installation of the new 250 mm discharge pipe. A smaller (100 mm) HDPE pipe will convey phosphorus filter backwash to the secondary cell.

3.3 Construction

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 upgrades. 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 spring of 2015 and conclude in the summer of 2015, temporary works such as erosion control blankets, silt fences, and straw bales will be used until vegetation is established.

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.).

3.3.1 Funding

The Winnipeg Beach lagoon upgrades have been approved for funding through the Small Communities Fund, which is a part of the larger Provincial-Territorial Infrastructure Component of the New Building Canada Fund. A total of \$3.5 M has been approved for the project with costs shared evenly between the national, provincial, and municipal levels. Winnipeg Beach's share of funding is expected to be provided by a Borrowing By-Law, which has yet to be completed.

3.3.2 Schedule

Although details of the funding schedule have not been finalized, the lagoon upgrades need to be completed in 2015. Given the high hydraulic and organic loading of the existing wastewater treatment system and that CWS approval of future emergency discharge events is unlikely, it is in the best interest of the Town to complete the upgrades in 2015. As such, the goal is to tender the project and begin construction as soon as possible (likely early summer 2015). It is expected that construction will be completed within 60 working days. This schedule is contingent on receiving regulatory approval from Manitoba Conservation in early 2015 so that the detailed design and tender package can be completed.

3.4

Operation

Operation of the Winnipeg Beach lagoon system will be changed as a result of the proposed upgrades. Wastewater will be pumped into the primary cell of the three cell lagoon (Cell 1-S) from the Town's lift station. The primary cell will be continuously aerated throughout summer and winter, providing the required BOD₅ and ammonia reduction for continuous discharge. The secondary and tertiary cells will be used for storage and polishing.

The upgraded lagoon system will continuously discharge treated effluent from April 1 to October 31. The total annual flow will be discharged over this seven month period resulting in an average day flow of 1,815 m³/d at the design year (2024). During the discharge period, effluent from the tertiary cell will be pumped through the phosphorus reduction filter. The phosphorus reduction system includes chemical addition and mixing followed by filtration which will reduce total phosphorus in the effluent to below 1 mg/L and is expected to further reduce total suspended solids (TSS) to below 10 mg/L.

Filtrate from the phosphorus filter will flow by gravity through a UV disinfection system located in the blower building and then discharged through the existing drainage route. Filter backwash water (expected to be less than 1% of the flow) will be pumped back through a 100 mm HDPE backwash return pipe, to the secondary cell.

Once the annual discharge period has been completed (i.e., after October 31), the phosphorus filter, UV disinfection system, and pumping systems will be drained, cleaned, and winterized as part of the annual maintenance program for the system. The three cell lagoon system will store the wastewater generated between November 1 and March 31 of the following year, with the aeration system in the primary cell operating throughout the winter. Each spring, the operator will start up the filter, UV, and discharge systems by reconnecting the discharge pumps, and chemical feed systems and powering on the UV and phosphorus filter systems.

The proposed lagoon upgrades will increase classification of the facility from its current Class 1 designation to a Class 2 designated facility. Dillon understands that Winnipeg Beach's wastewater operator will obtain and will maintain a valid Class 2 wastewater treatment facility 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 to the lagoon is controlled by a lockable access gate. Sewage haulers will be required to provide detailed records to Winnipeg Beach with respect to the volume and origin of the loads that they discharge into the lagoon, which will enable the Town to maintain detailed records regarding the usage of the lagoon by specific septage haulers.

3.5 Maintenance

The current maintenance program at the lagoon will be continued with the following additions:

- The UV disinfection unit will be cleaned and bulbs replaced as needed based on maintaining a minimum UV transmittance in the channel as measured by an online monitor;
- Pumps will be inspected and serviced annually;
- Phosphorus filter disc will be inspected and replaced as needed (expected annual replacement);
- Blowers will be inspected and maintained quarterly;
- Diffusers will be inspected and replaced on an as needed basis;
- Chemical dosing system will be inspected monthly and chemical reservoirs replenished as necessary
- Annual winterization process and spring start-up processes will be performed

The majority of maintenance operations on the mechanical parts of the treatment system can be carried out during the lagoon storage phase when the mechanical systems are not operating. Spares and replacement parts for commonly replaced system components (bulbs, cloth filter, tubing, etc.) will be kept on hand in the event that replacement is required during system operation.

3.6 Sludge Management and Disposal

Sludge levels in the primary cell of the lagoon were measured in the fall of 2014. Sludge on the base of the primary cell is approximately 425 mm deep. It is expected that with the installation of the aeration system, this sludge will degrade further (stabilize) and reduce in volume. However, sludge will continue to accumulate in the lagoon system such that de-sludging the lagoon will be required.

Winnipeg Beach is committed to sustainably managing the wastewater sludge produced in the lagoons. Land application of sludge is a sustainable way to manage bio-solids as it will benefit the receiving area in terms of soil structure and crop production. Since there is no chemical addition to the primary cell, and the primary cell will be continuously aerated, the sludge produced is expected to be highly stabilized and suitable for agricultural use.

When de-sludging of the lagoon is warranted, Winnipeg Beach will identify suitable agricultural land within a reasonable hauling distance to use as bio-solids application sites. The Town will submit a request to CWS for a license to land apply biosolids in accordance with the Environment Act and will submit a Nutrient Management Plan as required by the provincial Nutrient Management Regulations.

3.7 Decommissioning

Decommissioning of the existing Winnipeg Beach wastewater treatment lagoon system is not planned. If decommissioning should be required in the future, site decommissioning would be undertaken in a manner consistent with up-to-date environmental standards and legislation, as well as a consideration of the intended future use(s) at the site.

4.0

Description of Environment

4.1

Terrestrial Environment

The project site is situated in the Gimli Ecodistrict, within the eastern portion of the Interlake Plain Ecoregion of the Boreal Plains Ecozone (Agriculture and Agri-Food Canada, 1998). Soil materials in the Gimli Ecodistrict and the Lake Winnipeg Terrace were deposited during the time of glacial Lake Agassiz. They consist primarily of thin, clayey lacustrine and till materials underlain by loam, textured, stony glacial till. According to the Land Resource Unit Information Bulletins for the RM of St. Andrews and the RM of Gimli, the soils at Winnipeg Beach are primarily clayey lacustrine (luvisols and dark gray chernozems), with some gleysols (1999). Further, Winnipeg Beach is primarily a well- to imperfectly-draining area. The soils at Winnipeg Beach are thus considered well suited for agriculture (Class 2). However, in terms of land use Winnipeg Beach is considered a developed (urban) area. Vegetation generally consists of some forested areas that contain mostly trembling aspen with some white spruce, balsam poplar, and bur oak. Green ash and white birch are also common in the well-drained areas close to the lake, such as Winnipeg Beach. Topography is primarily flat, with some gentle undulations (less than 2% slope). The land generally slopes downwards east towards Lake Winnipeg.

Characteristic mammals include white-tailed deer, black bear, moose, coyote, beaver, and snowshoe hare. The white-tailed deer is especially well established in the Interlake Plain Ecoregion, thriving in the mixture of cultivated fields, pastures and aspen forests. Bird species characteristic to this area of Manitoba include hawks, owls, woodpeckers, sparrows, blackbirds and waterfowl. Colonial birds frequent the area including Franklin's Gulls, Black-crowned Night-Herons, cormorants, Sandhill Cranes, Canada Geese, Pelicans, and Western Grebes. A number of amphibians and reptiles occur within the Gimli Ecodistrict including the common and widespread red-sided and plains garter snakes (Agriculture and Agri-Food Canada, 1998). The project site has been disturbed already as a result of the lagoon construction and operation. The existing lagoon provides poor wildlife habitat. Areas west and east of the subject site are wooded, where wildlife may be present. The Manitoba Conservation Data Centre was contacted to conduct a search for occurrences of rare species at the project site. When a response is received from MCDC, it will be forwarded.

The project site is part of the extensive Subhumid Low Boreal Ecoclimate Region that extends from south-eastern Manitoba to the Peace River in north-central Alberta. The climate is characterized by short, warm summers and long, cold winters. The Ecodistrict has a humid, moderately cold, Cryoboreal to subhumid, cool, Boreal soil climate. The region experiences variable winds, an abundance of sunshine, and occurrences of severe weather incidences in all seasons (Agriculture and Agri-Food Canada, 1998). According to climate data from the nearest long-term Environment Canada weather reporting station (Gimli), the average temperature is 1.8°C and the average growing season is 176 days. The mean annual precipitation is about 532.5 mm, of which about three-quarters falls as rain and one-quarter falls as snow. The average annual moisture deficit is nearly 100 mm (Environment Canada, 2012).

The Town of Winnipeg Beach Public Water System draws its water from groundwater wells approximately 550 m northwest of the project site. The wells are Artesian and considered secure by the Office of Drinking Water; as such the aquifer in this area is considered to be relatively well protected by overlying clayey materials. The Province of Manitoba has identified the Town of Winnipeg Beach as a "flowing well area," where groundwater generally originates from an upper carbonate aquifer and is of good quality. Winnipeg Beach has not been identified as a groundwater pollution hazard area.

The Manitoba Historic Resources Branch was also contacted for information on heritage resources that may be impacted by the proposed development. When a response is received, it will be forwarded. The nearest protected area is the Winnipeg Beach Provincial Park and Campground, along the northwest border of the project site.

4.2 Aquatic Environment

Lake Winnipeg, to the east of Winnipeg Beach, is the major water feature in the area and the receiving water body for treated effluent discharge from the Winnipeg Beach lagoon system. Water quality in Lake Winnipeg is routinely monitored, due to its use for recreation and its importance for fisheries (domestic, recreational, and commercial). The nearest sampling point is the recreational beach north of the lagoon site in Winnipeg Beach Provincial Park, which is tested weekly from June to September for *E. coli*. In 2014, only two out of sixteen samples taken at Winnipeg Beach exceeded the recreational water quality objective of 200 CFU / 100 mL (see **Appendix B**). Some communities, particularly along the eastern shore of Lake Winnipeg, do utilize water from Lake Winnipeg as a source for drinking water (Environment Canada, 2011). Dillon is not aware of any public water systems in the vicinity of Winnipeg Beach that utilize lake water; the Town system draws from secure groundwater wells as mentioned previously.

Other nearby municipal wastewater treatment facilities discharging into Lake Winnipeg include the Dunnottar lagoon, south of Winnipeg Beach, and the Gimli wastewater treatment plant, north of Winnipeg Beach.

Manitoba Conservation and Water Stewardship identified 54 species of fish found in Lake Winnipeg in 2005 (see **Appendix B**). Out of the 54 species, four fish species were designated “at risk” by the Committee on the Status of Endangered Species (COSEWIC). They include silver cub (*Macrhybopsis storeriana*) (SARA – Special Concern), bigmouth buffalo (*Ictiobus cyprinellus*) (SARA – Special Concern), shortjaw cisco (*Coregonus zenithicus*) (SARA - Threatened) and chestnut lamprey (*Ichthyomyzon castaneus*) (SARA – Special Concern). Although the silver chub is thought to be abundant within Lake Winnipeg, it has been identified as a concern because of low dissolved oxygen levels and water temperature fluctuations in the lake within the past few years, which can potentially have negative effects on the species.

5.0

Potential Impacts and Mitigation Measures

The proposed upgrades to the Winnipeg Beach lagoon system will improve the treatment process at the existing lagoon by including tertiary treatment, which will result in improved effluent quality.

5.1

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 3.3**.

The existing lagoon site has been heavily disturbed as a result of past lagoon construction and operation activities. As the proposed lagoon upgrades are confined to the existing lagoon parcel, potential adverse impacts to wildlife, vegetation, forestry, or agricultural capability as a result of the construction and operation of the upgraded lagoon are not expected.

No impacts to groundwater are anticipated as a result of the expansion of the Winnipeg Beach lagoon system; no additional cells are being built and discharge from the tertiary treatment system will be piped directly to the existing discharge route.

5.2

Potential Aquatic Impacts and Mitigation Measures

Construction activity will be limited to areas along the east lagoon berm between the berm and the existing drainage ditch. Surface area disturbance will be limited and surface drainage is not expected to be impacted. Sediment and erosion control measures will be used as required to control runoff at the site and will incorporate a variety of standard measures to avoid the potential adverse effects of construction-related activities (e.g., clearing, topsoil handling, and grading at the site), such as silt curtains and straw bales. Regular monitoring and maintenance of sediment and erosion control measures will occur throughout the construction phase. Following the construction phase, exposed soils created by construction activities will be seeded, where necessary, to stabilize the soils.

The potential to impact fisheries in Lake Winnipeg is low because the treated effluent will not be discharged from the lagoon system unless the Tier I Water Quality Standards identified by Manitoba Water Quality Standards, Objectives, and Guidelines for municipal wastewater effluent are met. Regular monitoring of the effluent is proposed during the discharge period (**see Section 6**) to confirm compliance with the effluent quality regulations. The proposed upgrades include nutrient reduction which will result in a reduction of discharged nutrients to Lake Winnipeg that may otherwise contribute to eutrophication and cyanobacteria proliferation.

Moving to continuous discharge during the summer months could pose a risk to public health and safety for the recreational users of Lake Winnipeg. However, the implementation of a UV disinfection to inactivate harmful pathogens such as fecal coliforms and regular effluent quality monitoring is expected to effectively mitigate this risk. Additionally, the phosphorus cloth filter disk is a positive barrier to gross solids that may pass through the lagoon treatment system.

5.3 Potential Heritage and Socioeconomic Impacts

During construction of the lagoon upgrades the lagoon and surrounding area may be impacted by temporary elevations of noise, dust, and traffic. These potential impacts will be mitigated by limiting working hours and by watering of Kernstead Rd. as necessary. Long term noise impact from continuous blower operation will be mitigated by enclosing the blowers in a sound attenuating building. Permanent negative impacts to social and economic aspects of the area within the vicinity of the lagoon are not anticipated. Further, as the project site has already been disturbed with the construction of the existing lagoon system, no negative impacts to heritage resources are anticipated

6.0

Monitoring

6.1

Current Practices

The environmental management practices that are currently in place at the Winnipeg Beach sewage lagoon involve pre-discharge monitoring of the effluent for biochemical oxygen demand (BOD₅), fecal coliform bacteria, and total coliform bacteria. The results are forwarded to Manitoba Conservation and Water Stewardship prior to discharge in the fall. The lagoon operator conducts the sampling up to a month prior to discharge in order to allow sufficient time for resampling and/or chlorination procedures to be enacted in the event that sampling results do not meet current criteria for municipal wastewater effluent discharge.

6.2

Proposed Monitoring Regime

The following monitoring program is proposed for environmental stewardship and compliance purposes. Other testing may be undertaken at the Town's discretion for operational or research purposes. Results of the sampling related to compliance with the operating licence will be forwarded on to CWS on an annual basis.

6.2.1

Surface Water Monitoring

Effluent discharge from the UV disinfection system will be monitored. Surface water quality monitoring for compliance with the operating licence will be conducted at the outlet from the UV system as follows:

Surface water parameters analyzed:

1. Total coliforms;
2. Fecal coliforms;
3. Total suspended solids (TSS);
4. Five-day biochemical oxygen demand (BOD₅); and
5. Total phosphorus (TP).
6. Total Ammonia-N (TAN)

Surface water sampling will be carried out on a bi-weekly (twice per month) basis during the discharge period, from the outlet of the UV system. The large retention time in the lagoon system will buffer changes in wastewater quality and therefore significant changes in effluent quality are not expected to occur on a daily basis. The third cell alone provides over one month of storage at summer peak design flows. Therefore a bi-weekly sampling program is sufficiently conservative to monitor the system effluent quality.

6.2.2

Groundwater

There are no groundwater wells installed at the lagoon site. As part of the lagoon upgrades, a number of groundwater wells will be installed at strategic locations around the lagoon site. Annual groundwater monitoring will be conducted and results will be forwarded to CWS. Groundwater monitoring parameters will include total dissolved solids (TDS), conductivity, pH, dissolved oxygen (DO), dissolved metals, nitrates/nitrites, phosphate, sulphate, chloride, and alkalinity

7.0

Closure

The Town of Winnipeg Beach is proposing to upgrade the existing lagoon treatment system to provide a higher level of treatment to the wastewater, consistent with current regulations, and to increase hydraulic capacity of the system. The upgraded system will continuously discharge between April 1 and October 31 of each year. Aeration provided in the primary cell will reduce organics and ammonia to levels acceptable for discharge. Treated lagoon effluent will flow through a tertiary phosphorus filter which will reduce total phosphorus levels in the filtrate to below 1 mg/L. Following filtration, the filtrate will be disinfected with UV radiation prior to discharge to the existing discharge route. The filtered and disinfected lagoon effluent will flow through nearly 1000 m of low lying swamp before discharging into Lake Winnipeg. These upgrades are expected to improve the quality of the Winnipeg Beach lagoon effluent compared to current treatment levels.

8.0

References

- AAFC-PFRA 2005. Summary of Resources and Land Use Issues Related to Riparian. Areas in the Lower Red River Watershed Study Area. Agriculture and Agri-Food Canada-Prairie Farm Rehabilitation, Winnipeg, MB. 2005. 67pp.
- Buhr, K.A. 1973. Winnipeg Beach Sewage Lagoon Expansion Preliminary Geotechnical Report. Province of Manitoba, Department of Mines, Resources, and Environmental Management – Water Resources Branch. Winnipeg, Manitoba.
- Canada Land Inventory. 1965. Soil Capability for Agriculture. Map 62-H Winnipeg. National Soil Database. Agriculture and Agri-Food Canada.
- Canada Land Inventory. 1969. Land Capability for Wildlife-Waterfowl. Map 62-H Winnipeg. Department of Agriculture. Department of Forestry and Rural Development and Development of Energy. Mines and Resources. Ottawa, Ontario.
- Canada Land Inventory. 1971. Land Capability for Wildlife-Ungulates. Map 62-H Winnipeg. Department of Agriculture. Department of Regional Economic Development and Development of Energy. Mines and Resources. Ottawa, Ontario.
- Dillon Consulting Limited. 2014. Town of Winnipeg Beach Lagoon Upgrades Functional Design.
- Dillon Consulting Limited. 2014. Winnipeg Beach Lagoon Upgrade Feasibility Study.
- Environment Canada. 2013. Canadian Climate Normals for Gimli, Manitoba 1971 to 2001. Website available at: http://climate.weatheroffice.gc.ca/climate_normals/index_e.html. Accessed September 2014.
- Eastern Interlake Planning District. 2011. Development Plan By-Law 02-2010.
- Government of Canada (GC). 2013. Species at Risk Public Registry. Website available at http://sararegistry.gc.ca/sar/index/default_e.cfm. Accessed September 2014.
- Land Resource Unit. 1999. Soils and Terrain. An Introduction to the Land Resource. Rural Municipality of St. Andrews. Information Bulletin 99-2, Brandon Research Centre, Research Branch, Agriculture and Agri-Food Canada.
- Manitoba Conservation. 2013. Species Listed Under *the Manitoba Endangered Species Act*. Wildlife and Ecosystem Protection Branch. Winnipeg. Website available at: <http://www.gov.mb.ca/conservation/wildlife/sar/sarlist.html>. Accessed September 2014.
- Manitoba Conservation Data Centre (MBCDC). Email communication. September 2014.

- Manitoba Conservation Data Centre (MBCDC). 2012. Occurrence of Species by Ecoregion. Interlake Plain. Wildlife and Ecosystem Protection Branch. Winnipeg. Website available at: <http://www.gov.mb.ca/conservation/cdc/ecoreg/lakembplain.html>. Accessed February 2013.
- Nelson Environmental. 2014. OPTAER Wastewater Treatment System: Preliminary Proposal for Design, Supply and Installation of OPTAER Wastewater Treatment System.
- Preston, W.B. 1982. The Amphibians and Reptiles of Manitoba. Manitoba Museum of Man and Nature. 128p.
- Selkirk and District Planning Area Board. 2011. Selkirk and District Planning Area Development Board, By-Law No, 190/08.
- Smith, R.E., H. Veldhuis, G.F. Mills, R.G. Eilers, W.R. Fraser, and G.W. Lelyk. 1998. Terrestrial Ecozones, Ecoregions and Ecodistricts of Manitoba, An Ecological Stratification of Manitoba's Natural Landscapes. Land Resource Unit. Brandon Research Centre, Research Branch. Agriculture and Agri-Food Canada. Report and 1:1.5 M scale map.
- Statistics Canada. 2012. Winnipeg Beach, Manitoba (Code 4618034) and Manitoba (Code 46) (table). Census Profile. 2011 Census. Statistics Canada Catalogue no. 98-316-XWE. Ottawa. Released October 24, 2012. <http://www12.statcan.gc.ca/census-recensement/2011/dp-pd/prof/index.cfm?Lang=E> (accessed September 24, 2014).

Appendix A

Property Details

DATE: 2014/12/18
TIME: 14:40**MANITOBA**

TITLE NO: 1783294/1

STATUS OF TITLE

PAGE: 1

STATUS OF TITLE.....	ACCEPTED	PRODUCED FOR..	NA
ORIGINATING OFFICE...	WINNIPEG	ADDRESS.....	
REGISTERING OFFICE...	WINNIPEG		
REGISTRATION DATE....	2001/02/08		
COMPLETION DATE.....	2001/02/27		
		CLIENT FILE...	NA
		PRODUCED BY...	R.NERBAS

LEGAL DESCRIPTION:

THE TOWN OF WINNIPEG BEACH

IS REGISTERED OWNER SUBJECT TO SUCH ENTRIES
RECORDED HEREON, IN THE FOLLOWING DESCRIBED LAND:LOT 6 BLOCK 4 PLAN 16624 WLTO
IN FRAC N 1/2 SECTION 27 AND
IN FRAC NW 1/4 SECTION 26-17-4 EPM**ACTIVE TITLE CHARGE(S):****NO ACTIVE TITLE CHARGES EXIST ON THIS TITLE****ADDRESS(ES) FOR SERVICE:**

EFFECT NAME AND ADDRESS POSTAL CODE

ACTIVE THE TOWN OF WINNIPEG BEACH
X**ORIGINATING INSTRUMENT(S):**

REGISTRATION NUMBER	TYPE	REG. DATE	CONSIDERATION	SWORN VALUE
2570780/1	EREQ	2001/02/08	\$0.00	\$0.00
PRESENTED BY:	WLTO CONVERSION			
FROM:	WINNIPEG LAND TITLES OFFICE - CONVERSIONS			
TO:				

FROM TITLE NUMBER(S):

H20328/1 ALL

LAND INDEX:

LOT	BLOCK	SURVEY PLAN
6	4	16624

NOTE:

DUPLICATE PRODUCED FOR.. HOLD FOR PROD OF DUPL CT NO(S) 2001/02/28
ADDRESS..... E74940

POSTAL CODE.....

CERTIFIED TRUE EXTRACT PRODUCED FROM THE LAND TITLES DATA
STORAGE SYSTEM ON 2014/12/18 OF TITLE NUMBER 1783294/1

***** STATUS OF TITLE 1783294/1 CONTINUED ON NEXT PAGE *****

DATE: 2014/12/18
TIME: 14:40

MANITOBA

TITLE NO: 1783294/1

STATUS OF TITLE

PAGE: 2

STATUS OF TITLE.....	ACCEPTED	PRODUCED FOR..	NA
ORIGINATING OFFICE...	WINNIPEG	ADDRESS.....	
REGISTERING OFFICE...	WINNIPEG		
REGISTRATION DATE....	2001/02/08		
COMPLETION DATE.....	2001/02/27		
		CLIENT FILE...	NA
		PRODUCED BY...	R.NERBAS

ACCEPTED THIS 8TH DAY OF FEBRUARY, 2001
BY W.KNIGHT FOR THE DISTRICT REGISTRAR OF
THE LAND TITLES DISTRICT OF WINNIPEG.

CERTIFIED TRUE EXTRACT PRODUCED FROM THE LAND TITLES DATA
STORAGE SYSTEM ON 2014/12/18 OF TITLE NUMBER 1783294/1.

***** END OF STATUS OF TITLE 1783294/1 *****

DATE: 2014/12/18
TIME: 14:40

MANITOBA

TITLE NO: 1798735/1

STATUS OF TITLE

PAGE: 1

STATUS OF TITLE.....	ACCEPTED	PRODUCED FOR..	NA
ORIGINATING OFFICE...	WINNIPEG	ADDRESS.....	
REGISTERING OFFICE...	WINNIPEG		
REGISTRATION DATE....	2001/04/18		
COMPLETION DATE.....	2001/05/17		
		CLIENT FILE...	NA
		PRODUCED BY...	R.NERBAS

LEGAL DESCRIPTION:

THE TOWN OF WINNIPEG BEACH

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

SP LOT 21 PLAN 15516 WLTO
SUBJECT TO THE RESERVATIONS AND PROVISIOES
CONTAINED IN THE GRANT FROM THE CROWN
IN FRACTIONAL S 1/2 OF SECTION 34-17-4 EPM

ACTIVE TITLE CHARGE(S):

NO ACTIVE TITLE CHARGES EXIST ON THIS TITLE

ADDRESS(ES) FOR SERVICE:

EFFECT	NAME AND ADDRESS	POSTAL CODE
--------	------------------	-------------

ACTIVE	THE TOWN OF WINNIPEG BEACH	
	X	

ORIGINATING INSTRUMENT(S):

REGISTRATION NUMBER	TYPE	REG. DATE	CONSIDERATION	SWORN VALUE
2588203/1	EREQ	2001/04/18	\$0.00	\$0.00
PRESENTED BY:	WLTO CONVERSION			
FROM:	WINNIPEG LAND TITLES OFFICE - CONVERSIONS			
TO:				

FROM TITLE NUMBER(S):

G73855/1 ALL

LAND INDEX:

LOT	BLOCK	SURVEY PLAN
-----	-------	-------------

21 15516

NOTE: EXC RES

DUPLICATE PRODUCED FOR..	HOLD FOR PROD OF DUPL CT NO(S)ON	2001/05/18
ADDRESS.....	G73855	

POSTAL CODE.....

CERTIFIED TRUE EXTRACT PRODUCED FROM THE LAND TITLES DATA
STORAGE SYSTEM ON 2014/12/18 OF TITLE NUMBER 1798735/1

DATE: 2014/12/18
TIME: 14:40

MANITOBA

TITLE NO: 1798735/1

STATUS OF TITLE

PAGE: 2

STATUS OF TITLE.....	ACCEPTED	PRODUCED FOR..	NA
ORIGINATING OFFICE...	WINNIPEG	ADDRESS.....	
REGISTERING OFFICE...	WINNIPEG		
REGISTRATION DATE....	2001/04/18		
COMPLETION DATE.....	2001/05/17		
		CLIENT FILE...	NA
		PRODUCED BY...	R.NERBAS

ACCEPTED THIS 18TH DAY OF APRIL, 2001
BY W.KNIGHT FOR THE DISTRICT REGISTRAR OF
THE LAND TITLES DISTRICT OF WINNIPEG.

CERTIFIED TRUE EXTRACT PRODUCED FROM THE LAND TITLES DATA
STORAGE SYSTEM ON 2014/12/18 OF TITLE NUMBER 1798735/1.

***** END OF STATUS OF TITLE 1798735/1 *****

Appendix B

Correspondence



Conservation and Water Stewardship

Manitoba.ca > CWS > Beach Monitoring Information

Beach Monitoring Information

[Main Beach Page](#)

Beach monitoring is now complete for the 2014 season.

Please select a beach from the drop down list below in order to view *E. coli* and Algae data.

Results for Winnipeg Beach

E. coli Data

Sample Date	Average <i>E. coli</i> Density (CFU/ 100 mL)	Recreational Water Quality Objective (200 CFU/100 mL)
2 Sep 2014	10	Beach Acceptable
26 Aug 2014	27	Beach Acceptable
19 Aug 2014	34	Beach Acceptable
12 Aug 2014	17	Beach Acceptable
5 Aug 2014	16	Beach Acceptable
31 Jul 2014	12	Beach Acceptable
29 Jul 2014	574	Exceeds Objective Lake Winnipeg Advisory Posted
22 Jul 2014	81	Beach Acceptable
15 Jul 2014	11	Beach Acceptable
8 Jul 2014	30	Beach Acceptable
2 Jul 2014	41	Beach Acceptable
26 Jun 2014	19	Beach Acceptable
24 Jun 2014	1447	Exceeds Objective Lake Winnipeg Advisory Posted
17 Jun 2014	17	Beach Acceptable
9 Jun 2014	10	Beach Acceptable
3 Jun 2014	10	Beach Acceptable

Algae Data

This season, no algal blooms have been reported at this beach.

This information is available in map form; to access this information in map form please follow the [link](#).

Kevin Trapp - Lake Winnipeg Fish Species List

From: "Cann, Rob (WSD)" <RoCann@gov.mb.ca>
To: "'ktrapp@dillon.ca'" <ktrapp@dillon.ca>
Date: 5/25/2005 3:51 PM
Subject: Lake Winnipeg Fish Species List
CC: "Biggin, Wade (WSD)" <WaBiggin@gov.mb.ca>

Hi Kevin, here is the list of Lake Winnipeg species you requested. If you require further species inventories, please contact Wade Biggin at wabiggin@gov.mb.ca.

Thanks.

Species

BLACK BULLHEAD
BLACK CRAPPIE
BLACKNOSE DACE
BLACKNOSE SHINER
BLACKSIDED DARTER
BROOK STICKLEBACK
BROWN BULLHEAD
BURBOT
CARP
CENTRAL MUDMINNOW
CHANNEL CATFISH
CHESTNUT LAMPREY
CISCO
CREEK CHUB
EMERALD SHINER
FATHEAD MINNOW
FLATHEAD CHUB
FRESHWATER DRUM
GOLDEN SHINER
GOLDEYE
IOWA DARTER
JOHNNY DARTER
LAKE CHUB
LAKE STURGEON
LAKE WHITEFISH
LOGPERCH
LONGNOSE DACE
LONGNOSE SUCKER
MIMIC SHINER
MOONEYE
MOTTLED SCULPIN
NINESPINE
STICKLEBACK
NORTHERN PIKE

PEARL DACE
QUILLBACK
RAINBOW SMELT
RIVER DARTER
RIVER SHINER
ROCK BASS
SAND SHINER
SAUGER
SHORTJAW CISCO
SILVER CHUB
SILVER LAMPREY
SILVER REDHORSE
SLIMY SCULPIN
SPOONHEAD SCULPIN
SPOTTAIL SHINER
TADPOLE MADTOM
TROUT PERCH
WALLEYE
WHITE BASS
WHITE SUCKER
YELLOW PERCH

Rob Cann
Provincial Angling Manager
Water Stewardship - Fisheries Branch
200 Saulteaux Crescent, Winnipeg, MB R3J 3W3
Ph: 204.945.7816 Fax: 204.948.2308

><(((°> ><(((°> ><(((°>

This communication may contain confidential information and is intended only for the person(s) to whom it is addressed. If you have received this message in error, please notify us immediately and delete this message without reading, copying or forwarding it to anyone. Thank you.



Conservation

Environmental Operations
123 Main Street, Suite 160
Winnipeg, Manitoba R3C 1A5
T 945-7100 F 948-2338

RECEIVED

NOV 26 2010

November 19, 2010

Rob Boitson, Public Works Foreman
Town of Winnipeg Beach
Box 160
Winnipeg Beach MB R0C 3G0

Dear Mr. Boitson:

**Re: Request for Suspension of Clause 5(a) of Clean Environment Commission
Order No. 314VCOO, Town of Winnipeg Beach Wastewater Treatment Lagoon**

In response to the written request of Mr. Rob Boitson, Public Works Foreman, Town of Winnipeg Beach on November 17, 2010, please be informed that I am granting a suspension of Clause 5(a) of Clean Environment Commission Order No. 314VCOO, pursuant to Section 18(1) of *The Environment Act*.

The suspension is for the period from November 19, 2010, through to and including December 3, 2010, and subject to the following conditions:

1. Sewage shall only be discharged from the Cell 3.
2. Sampling of the discharge route for total coliforms, fecal coliforms, and BOD must occur once every 24 hours for the duration of the discharge event. Sample results must be submitted to the Selkirk District Office.
3. An Environmental Assessment of the facility must be undertaken and completed by June 31, 2011, by a qualified Engineer. A copy of the report must be submitted to the Director by July 15th, 2011.

All other Clauses of Clean Environment Commission Order No. 314VCOO remain in force

Based on the number of emergency discharge requests in the past, it would appear that hydraulic capacity is an issue and expansion to the sewage lagoon may be necessary. Actions to address the hydraulic capacity should be initiated as soon as possible. Please be advised that any future request for discharge beyond the limits and conditions of the current Order will not be considered by this department. Failure to meet the above conditions is considered a non compliance of *The Environment Act*.

If you have any questions regarding this matter, please contact Paige Allison, Environment Officer at (204) 785-5022.

Yours sincerely


Don Labossiere
Director, Environmental Operations

c: Paige Allison
c: Public Registry

Appendix C

Clean Environment Commission Order No. 314VC00

COPY

AN ORDER OF THE CLEAN ENVIRONMENT COMMISSION
UNDER THE CLEAN ENVIRONMENT ACT

RE: THE CLEAN ENVIRONMENT COMMISSION and the TOWN OF WINNIPEG BEACH,
Applicant,

- WHEREAS pursuant to the provisions of The Clean Environment Act, the Town of Winnipeg Beach submitted an application to The Clean Environment Commission in connection with the operation of a five cell sewage lagoon system located in the SE 1/4 of Section 34, Township 17, Range 4 EPM in the Town of Winnipeg Beach and the NE 1/4 of Section 27, Township 17, Range 4 EPM in the Rural Municipality of St. Andrews, with discharge of effluent through a low lying swamp to the south of the lagoon system to Lake Winnipeg;
- AND WHEREAS after giving notice of the application and after not receiving representations from any persons likely to be affected by the issuance of an order, the Commission issued Order No. 314 prescribing limits on the said application on the 9th day of October, 1973;
- AND WHEREAS on the 14th day of January, 1983, the Minister requested the Commission to hold a hearing pursuant to Section 14(6) of the said Act because of concerns expressed by residents of properties adjacent to the said sewage lagoon system;
- AND WHEREAS the Commission held a hearing on the 15th day of March, 1983, which reconvened on the 21st day of June, 1983, to receive evidence and representations concerning the said operation;
- AND WHEREAS the Commission considered the evidence and representations received on the 25th day of July, the 22nd day of August, and the 19th day of September, 1983, and, on the 27th day of September, 1983, issued Order No. 1003 prescribing additional terms and conditions in connection with the operation of trucks delivering sewage to the said sewage lagoon system;
- AND WHEREAS on the 20th day of October, 1983, the Applicant submitted to the Commission a request for the variation of the provisions of Order No. 1003 and, on the 28th day of October, 1983, the Commission denied the variation request;
- AND WHEREAS on the 24th day of January and the 15th day of February, 1984, the Applicant submitted to the Commission a request for the variation of the provisions of Order No. 1003 and, on the 20th day of February, 1984, the Commission denied the variation request;

- AND WHEREAS on the 7th day of May, 1984, the Applicant requested the Commission to suspend the provisions of Order No. 1003 in view of new evidence;
- AND WHEREAS on the 13th day of June, 1984, the Commission held a hearing pursuant to the provisions of Section 14(7) of the said Act to receive evidence and representations concerning the possible variation of all or part of its Orders No. 314 and 1003;
- AND WHEREAS on the 4th day of July, 1984, the Commission issued varied Order No. 314VC prescribing limits, terms and conditions on the said operation and rescinding Order No. 1003;
- AND WHEREAS after making a verbal appeal the Town of Winnipeg Beach filed a written appeal to Order No. 314VC with the Minister on the 22nd day of October, 1984 on the ground that financing was not available to implement the order;
- AND WHEREAS on the 5th day of March, 1987, after review of the appeal, he, the Minister, directed the Commission to vary the terms of the order and, on the 18th day of March, 1987, the Commission issued order no. 314VCO to comply with the provisions of Order-in-Council No. 230 issued on the 27th day of February, 1987;
- AND WHEREAS on the 13th day of April, 1987, he, the Minister, requested the Commission, under Section 17(3.1) of the Act, to hold a hearing and submit a report and recommendations to him in connection with a request for variation of the Order submitted by the Mayor and Council of the said Town on the 27th day of March, 1987;
- AND WHEREAS the Commission held a hearing in Winnipeg Beach on the 9th day of June, 1987 and submitted its report and recommendations to the Minister on the 10th day of June, 1987;
- AND WHEREAS on the 17th day of June, 1987, he, the Minister, directed the Commission to vary Order No. 314VCO to comply with the provisions of Order-in-Council No. 888/87 issued on the 15th day of July, 1987;

IT IS HEREBY ORDERED THAT ORDER NO. 314VCO BE VARIED TO READ AS FOLLOWS

1. The Applicant shall ensure that all the facilities for the treatment of sewage and the holding of effluent are constructed of impervious materials and said facilities are maintained and operated in such a manner as to prevent the contamination of groundwater.
2. The Applicant shall operate and maintain the said sewage lagoon system in such a manner as to minimize the release of offensive odours.
3. The Applicant shall ensure that the five day biochemical oxygen demand loading on the primary cell of the said sewage lagoon system is not in excess of 112 kilograms per hectare per day.
4. The Applicant shall not discharge effluent from the said sewage lagoon system where:
 - (a) the organic content of the effluent, in terms of the five day biochemical oxygen demand, is in excess of 30 milligrams per litre;
 - (b) the total coliform content of the effluent, as indicated by the MPN index, is in excess of 1500 per 100 millilitres of sample;
 - (c) the faecal coliform content of the effluent, as indicated by the MPN index, is in excess of 200 per 100 millilitres of sample.

5. The Applicant shall not discharge effluent from the said sewage lagoon system:
 - (a) between the 1st day of November of any year and the 15th day of May of the following year;
 - (b) between the 15th day of June and the 15th day of September of any year.
6. On and after the 31st day of December, 1986, the Applicant shall not cause or permit the dumping or discharge of sewage from any sewage trucks to any site or discharge point located on the West side of the said Cell No. 1 (as designated on the sketch attached as Appendix "A" to this Order.)
7. On or after the 31st day of August, 1987, the Applicant shall not cause or permit the use of Kernstead Road by sewage trucks approaching the said sewage lagoon system for the purpose of dumping or discharging sewage into the said sewage lagoon system, except:
 - (a) between the hours of 8:00 a.m. to 8:00 p.m. local time for a period not exceeding three weeks during the months of April or May and September to allow for annual septic tank cleanout; and
 - (b) between the hours of 12:00 midnight and 8:00 a.m., local time, Monday to Thursday for outhouse service; this use is to be terminated by December 31, 1988, unless otherwise approved by the Environmental Management Division.
8. The Applicant shall notify the Environmental Management Division of the commencement date in April or May and September of the annual septic tank cleanout.
9. At all times when there is traffic of sewage trucks on Kernstead Road, the Applicant shall carry out an effective dust abatement program on those portions of the said Road being used for such traffic.

10. In this order:

- (a) "sewage truck" means a truck used for the conveyance of sewage from private or public sewage treatment or storage facilities to the said sewage lagoon system;
- (b) "Kernstead Road" means the road designated by that name on the drawing attached as Appendix "A" to this order.

11. Order No. 1003 shall be and the same is hereby rescinded.

12. Order No. 314VCO, as varied to comply with Order-in-Council No. 888/87 is hereby designated as Order No. 314VCOO.

Order No. 314VCOO

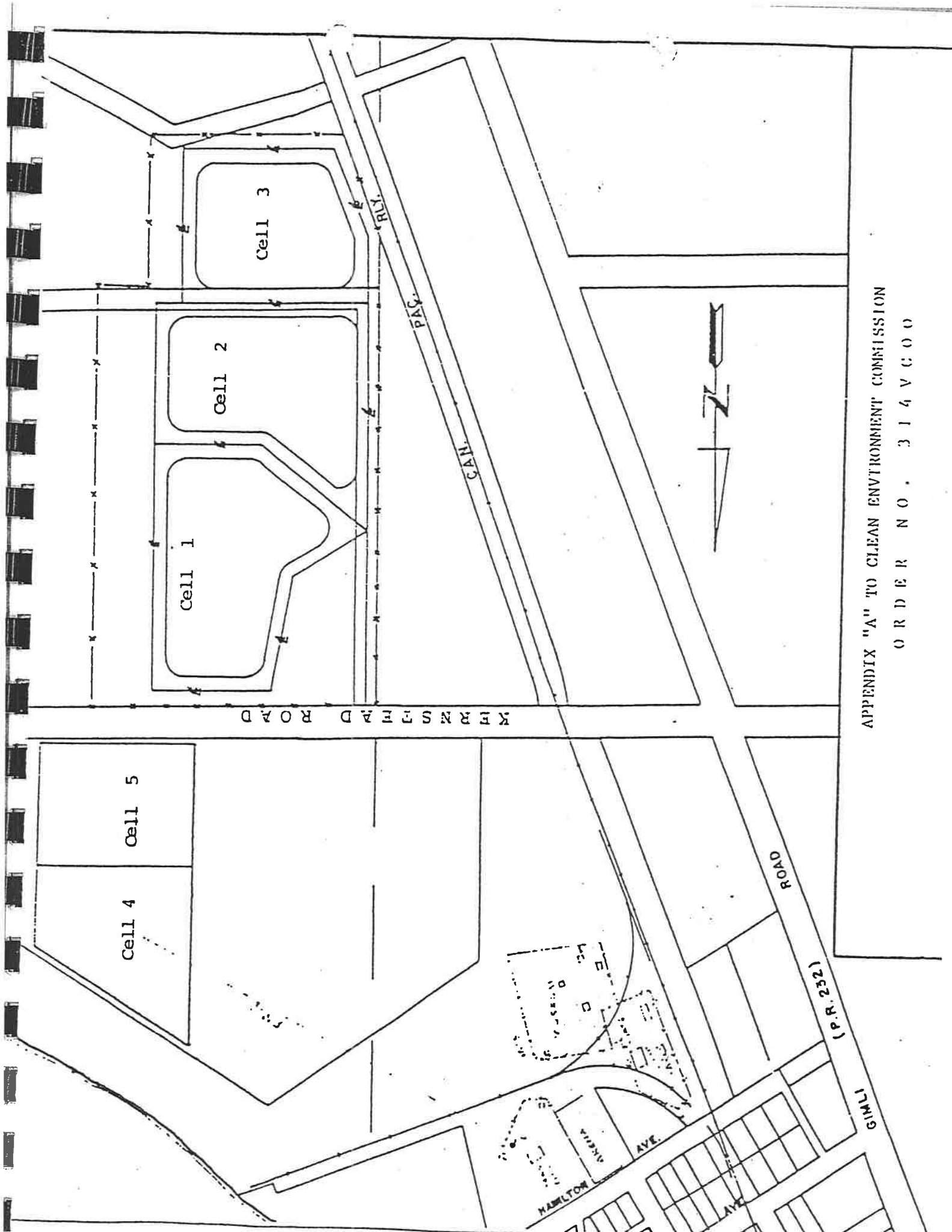
Dated at the City of Winnipeg

this 29th day of July, 1987.



Chairman,
The Clean Environment Commission.

File: 74.1



APPENDIX "A" TO CLEAN ENVIRONMENT COMMISSION
 ORDER NO. 314VCOO

Attachment

Abbreviated Functional Design Report



DILLON
CONSULTING

Town of Winnipeg Beach

**Lagoon Upgrades Functional Design
(Abbreviated for EAP)**

Table of Contents

1.0	INTRODUCTION	1
2.0	EXISTING SYSTEMS	2
2.1	Collection System	2
2.2	Current Wastewater Treatment System	2
3.0	WASTEWATER GENERATION	3
3.1	Population	3
3.2	Wastewater Generation (Hydraulic Loading)	3
3.2.1	Septage Loads	4
3.3	Winnipeg Beach Provincial Park	4
4.0	DESIGN PARAMETERS	5
4.1	Organic Loading	5
4.2	Hydraulic Loading	5
4.3	Phosphorus Reduction	6
4.4	Total/Fecal Coliform Reduction	6
4.5	North Lagoon Cells	6
5.0	FUNCTIONAL DESIGN	7
5.1	System Operation	7
5.2	System Components	7
5.2.1	Aeration System	7
5.2.2	Blower Building and Chemical Storage and Pumping Building	8
5.2.3	Pumps	8
5.2.4	Phosphorus Reduction Filter	8
5.2.5	UV Disinfection System	9
5.2.6	Discharge and Sampling	9

5.2.7 Electrical 9

Appendices

A Functional Design Drawings

Figures

Figure 1: Existing Lagoon System (from Google Maps 2014).....2

Tables

Table 1: Current and Future Wastewater Generation Rates to Winnipeg Beach Lagoon..... 4

Table 2: Lagoon Upgrade Design Parameters5

Table 3: Aeration System Blower Details7

1.0

INTRODUCTION

The Town of Winnipeg Beach (the Town) is a community of approximately 1,000 permanent residents located on the southwest shore of Lake Winnipeg. Wastewater treatment for the Town is presently provided by a two lagoon system made up of the original two cell facultative lagoon located north of Kernstead Road and the newer three cell facultative lagoon located south of Kernstead Road. During normal flow conditions, spring and summer wastewater treatment is provided by the three cell lagoon located south of Kernstead Road. The two cell lagoon located north of Kernstead Road provides additional hydraulic storage capacity, and is utilized mainly for winter flow storage and as additional storage for summer flows during wet weather conditions.

The whole system operates under Clean Environment Commission Order No. 314VC00 issued on July 29, 1987. The facility was not updated to meet more stringent design standards that came into force with the Environment Act of 1989. At present, it is believed that wastewater loadings to the system exceed current regulatory standards. In particular:

- Overall organic capacity may be less than half of current regulatory requirements; and,
- Summer hydraulic holding capacity may be one quarter of current regulatory requirements.

The Province of Manitoba has recently announced new regulations aimed at reducing nutrient release from wastewater treatment facilities. These regulations will require phosphorus reduction plans to be implemented at Winnipeg Beach by January 1, 2016.

In 2013 Dillon Consulting Limited (Dillon) was retained by the Manitoba Water Services Board (MWSB) to undertake a feasibility study of the existing system and to provide options for meeting current and future regulatory requirements and servicing needs. The feasibility study presented four options for the Town to consider for bringing the wastewater treatment system up to current standards in terms of wastewater treatment and nutrient reduction. The option of modifying the existing lagoons was recommended as the preferred option. The proposed lagoon modifications included:

- Cell 1-S: Aerated lagoon cell for 5-day Biological Oxygen Demand (BOD₅) removal equipped with fine-bubble aerators;
- Cell 2-S: Storage cell containing spray aeration systems for treatment and volume reduction;
- Cell 3-S: Storage cell discharging to newly constructed phosphorus reduction system;
- Cell 1-N and 2-N: Original lagoon cells north of Kernstead Road used for additional storage; and,
- Ultraviolet disinfection system and lift station to outfall.

The following report provides the functional design for the lagoon modifications.

2.0

EXISTING SYSTEMS

2.1

Collection System

Homes in Winnipeg Beach, with the exception of the downtown area, are connected to the central low pressure sewer (LPS) wastewater collection system, which flows to a duplex lift station. The downtown area is serviced by a gravity sewer that flows to the same lift station. The lift station pumps wastewater to the wastewater lagoons located southeast of the Town. The lift station has the capability to pump wastewater to the primary cell of the three cell lagoon system south of Kernstead Road, or to the primary cell of the two cell lagoon system north of Kernstead Road. Dillon did not undertake an assessment of the wastewater collection system at Winnipeg Beach as part of this project. Any maintenance or upgrades required to the existing sewers are considered outside the scope of this assignment.

2.2

Current Wastewater Treatment System

The Winnipeg Beach wastewater treatment lagoon is a three-cell facultative lagoon treatment system with a total hydraulic capacity of 154,196 m³. The system consists of the following components:

- Cell 1-S (primary facultative cell): 3.0 ha area;
- Cell 2-S (secondary facultative cell): 3.0 ha area;
- Cell 3-S (polishing cell): 2.2 ha area; and,
- Cells 1-N and 2-N north of Kernstead Road (used for flow equalization and winter storage): 3.3 ha total area.

A schematic of the existing lagoon system is presented in **Figure 1**.



FIGURE 1: EXISTING LAGOON SYSTEM
(from Google Maps 2014)

3.0

WASTEWATER GENERATION

Current and future wastewater generation (flow and strength) were estimated to determine the sizing of the aeration system, pumping requirements, and phosphorus filter size for the lagoon upgrades at the Town.

3.1

Population

The population of the Town has remained relatively constant for the past 20 years. Reported population growth over this period has primarily resulted from the conversion of seasonal dwellings to permanent residences. Population data available from Statistics Canada for 2011 indicates that the Town presently contains 547 permanent dwellings, with a permanent population of 1,011. Previously reported servicing estimates have indicated 1,757 dwellings are connected to sewer servicing within the Town. We have assumed, and confirmed with Council, that these additional 1,210 dwellings are occupied seasonally.

In consultation with the Town and MWSB representatives, it was determined likely that 50% of current seasonal dwellings will be converted to permanent residences by 2024. Conversion of seasonal dwellings to permanent dwellings will increase the permanent town population by 3,630 residents, assuming an average of three persons per converted seasonal dwelling. Additional population increases are anticipated through residential developments at the True Country Golf Course and a new proposed hotel. **Table 1** (next page) summarizes the current and proposed population for the Town.

3.2

Wastewater Generation (Hydraulic Loading)

Per-capita wastewater generation rates have been reviewed and adjusted based on our experience with similar communities operating LPS systems. Wastewater generation from seasonal dwellings has been set at 50% of the total generation from permanent dwellings and is limited to the summer months to reflect typical occupancy of two to three days per week during summer months.

Approximately 120 students are currently bussed to Winnipeg Beach School from surrounding areas. These bussed students are not reflected in the current town permanent population. Use of the sewer system by students is limited to the school day, approximately eight hours per day so the wastewater generation rate from these students is assumed to be approximately one third of typical flows from permanent residents.

Assumed per-capita wastewater generation rates are summarized below:

- Permanent Dwellings 280 litres/(capita*day)
- Seasonal Dwellings 140 litres/(capita*day)
- Future Developments 280 litres/(capita*day)
- Bussed Students 90 litres/(capita*day)

3.2.1 Septage Loads

Currently the lagoon only accepts hauled septage from residents of the Town. Since septage is primarily the solid fraction of the wastewater that is retained in the septic tank, the total organic loading to the lagoon will be the same as if the sewage collection system was a typical gravity sewer. However, since the septage is typically hauled in spring and fall, due to summer road use restrictions around the lagoon, the proposed aeration system will be designed to handle the high organic loading from septage in the spring and fall.

3.3 Winnipeg Beach Provincial Park

Winnipeg Beach Provincial Park (Provincial Park) is located south of the Town and north of the existing wastewater treatment lagoons. Presently, wastewater generated within the park is collected at the provincial park sewage station and hauled to the wastewater treatment lagoon in Dunnottar. Future treatment of wastewater from the Provincial Park at the Winnipeg Beach wastewater treatment lagoon will require a servicing agreement to be established between the Town and the Provincial Park, including capital contributions and ongoing service charges. For the sake of a conservative design of lagoon upgrades, an allocation for the Park of 8 m³/d, is included in the summer loading rates to the lagoon.

Wastewater Source	Wastewater Generation (l/cap/day)	2014		2024	
		Population	Flows [m ³ /d]	Population	Flows [m ³ /d]
Permanent Residents	280	1,011	283	2,826	791
Bussed Students	90	120	11	120	11
Golf Course	280		-	525	147
Hotel	280		-	20	6
Summer Only Population and Flows					
Seasonal Residents	140	3,630	508	1,815	254
Provincial Park	-	-	-	-	8
Summer Peak Total			802	-	1,217
Winter Total			294	-	955

TABLE 1: CURRENT AND FUTURE WASTEWATER GENERATION RATES TO WINNIPEG BEACH LAGOON

4.0

DESIGN PARAMETERS

Based on the population projections and flows developed in Section 3, the design criteria for the lagoon upgrades have been established. Typical organic and nutrient loads were applied to the projected wastewater flows to develop the nutrient and organic loading for the design flows. For municipal wastewater collection systems, daily BOD₅ production is typically 0.085 kg/cap and daily total phosphorus production is typically 3.3 g/cap¹. **Table 2** shows the design parameters for the lagoon design.

Parameter, [unit]	Summer	Winter
Hydraulic Loading, [m ³ /d]	1,217	955
BOD ₅ Loading, [kg/d]	369	274
Total P Loading, [kg/d]	14.3	10.6
Other Design Parameters		
Total Lagoon Volume, [m ³]	154,196	
Average Day Flow [m ³ /d]	1,064	
Primary Cell Area, [ha]	3.0	

TABLE 2: LAGOON UPGRADE DESIGN PARAMETERS

4.1

Organic Loading

Organic loading to lagoons is typically limited to 56 kgBOD₅/ha/d by Manitoba Conservation under the most recent licensing requirements for similar lagoon treatment systems. This organic loading requirement is expected to be written into the new lagoon license for Winnipeg Beach. As a result, the primary cell area would need to be 6.6 ha to handle the summer organic loading rates. The 6.6 ha area requirement is equivalent to about 80% of the existing lagoon area and is, therefore, not feasible to be met with the existing lagoon cells.

In the feasibility study, primary cell aeration was identified as a preferred alternative to building additional lagoon cells to provide sufficient treatment for the organic loading in the lagoon. The Optaer™ system (by Nelson Environmental) has been selected for the purpose of functional design and cost estimation. The Optaer™ system is a lagoon aeration system that has been implemented around Canada with great success. This system is designed to provide sufficient aeration to produce an effluent from the primary cell with a BOD₅ of 25 mg/L or less.

4.2

Hydraulic Loading

Implementation of primary cell aeration will allow for an application to Manitoba Conservation for continuous discharge of the lagoon during the spring and summer. Year round continuous discharge is not likely because the lagoon effluent is discharged to a low-lying wetland that freezes over the winter. A reasonable period for continuous discharge for the Winnipeg Beach lagoon system is April 1 to Oct 31. Therefore winter storage requirements are limited to 150 days, or approximately 144,000 m³, which is within the storage capacity of the existing three cell lagoon.

¹ *Wastewater Engineering Treatment and Reuse 4th Edition*, Metcalf and Eddy, McGraw Hill, New York, 2003.

Beginning on April 1, continuous lagoon discharge will be controlled at a minimum rate sufficient to discharge the stored wastewater and the actual and anticipated incoming flow over the discharge period. This type of discharge flow is referred to as 12/7 discharge because 12 months of wastewater is being discharged over only seven months. At the design year (2024), the estimated discharge flow from the lagoon will be approximately 1,815 m³/d (21 L/s).

Implementation of a spray aeration system in the first storage cell (second cell in the lagoon) was identified in the feasibility study as a component of the preferred option. It was estimated at that time that the spray aerators could reduce the daily discharge rate by about 10%. Through the functional design process, it was identified that this 10% reduction in flow would not decrease the size of the aeration system in the primary cell, the phosphorus filter, or the UV disinfection system. The cost of implementing and maintaining the sprayer aeration system is therefore not justified for the Winnipeg Beach lagoon system and is not included in the functional design.

4.3 Phosphorus Reduction

In the feasibility study, the preferred option recommended use of a passive filter system to reduce phosphorus in the lagoon effluent. Based on updated information from Manitoba Conservation, it is evident that a more intensive phosphorus reduction strategy will be required to meet the 1 mg/L phosphorus limitation, which cannot be achieved with a passive filter system. Therefore the proposed phosphorus reduction system is a chemical coagulation and filtration system which will actively precipitate dissolved phosphorus in the lagoon effluent, and filter the effluent to achieve concentrations below 1 mg/L in the effluent. This system is described in detail in Section 5.2.4.

4.4 Total/Fecal Coliform Reduction

Continuous discharge into waters considered “recreational” will require UV disinfection to reduce total and fecal coliform counts to the acceptable levels as outlined in the guidance document². The UV system will provide pathogen reduction to meet or exceed treatment requirements; less than 200 MPN total coliform and *E.coli*. per 100 ml sample.

4.5 North Lagoon Cells

There are no changes planned for the operation of the lagoon with regard to the two cells north of Kernstead Road. These cells will provide wet weather (emergency) storage, with discharge from the cells on a bulk discharge basis using the normal protocol for discharging from facultative lagoons.

² *Manitoba Water Quality Standards, Objectives, and Guidelines*, Manitoba Water Stewardship, November 28, 2011

5.0

FUNCTIONAL DESIGN

5.1

System Operation

The upgraded lagoon system will continuously discharge treated effluent from April 1 to October 31. The total annual flow will be discharged over this seven month period resulting in an average day flow of 1,815 m³/d at the design year (2024). The primary cell will be continuously aerated throughout summer and winter, providing the required BOD₅ reduction for continuous discharge. The secondary and tertiary cells will be used for storage and polishing. During the discharge period, duplex self-priming pumps located in the chemical storage and pumping building will pump lagoon effluent to the phosphorus reduction filter on a continuous flow basis. The phosphorus reduction step involves chemical addition and mixing followed by filtration which will reduce total phosphorus in the effluent to below 1 mg/L and is expected to further reduce total suspended solids (TSS) to below 10 mg/L. Filtrate from the phosphorus filter will flow by gravity through a UV disinfection system located beside the phosphorus filter tank and then discharged through the existing (improved) drainage route.

Once the annual discharge period has been completed (i.e., after October 31), the phosphorus filter, and UV disinfection system will be drained, cleaned, and winterized as part of the annual maintenance program for the system. The three-cell lagoon system will store the wastewater generated between November 1 and March 31 of the following year, with the aeration system in the primary cell operating throughout the winter.

5.2

System Components

5.2.1

Aeration System

The aeration system provides oxygen to the wastewater to facilitate the rapid breakdown of organics in the wastewater and to promote the conversion of ammonia to nitrate. Air is provided by three positive displacement blowers operating in a two duty, one standby configuration. Blower characteristics are summarized in the table below:

	Units	Value
Number of Blowers		3
Duty Blowers		2
Standby Blowers		1
Nominal Horsepower	hp	30
Design Airflow per Blower	SCFM	1,440
Normal Operating Pressure	psi	3.4
Max Operating Pressure (purge)	psi	5.8
Actual Power Consumption	bhp	20.3
Sound Level	dB(A)	71

*Information from Nelson Environmental Optaer system literature

TABLE 3: AERATION SYSTEM BLOWER DETAILS

Air from the blowers is transported via a galvanized metal manifold pipe to the HDPE headers. The galvanized pipe allows for heat dissipation which improves aeration efficiency. The HDPE header has flanged connections to each lateral aeration pipe which floats on the lagoon surface. Hanging from the lateral pipes are the individual fine bubble membrane diffusers which produce fine, non-coalescing bubbles that improve oxygen transfer to the wastewater. A schematic diagram of the Optaer system by Nelson Environmental can be found in Appendix A. The Optaer aeration system can be installed in the primary cell while the lagoon is still operating.

The aeration system will provide BOD₅ reduction of the wastewater in the primary cell to below 25 mg/L which meets discharge requirements. Total Ammonia-N levels are expected to be reduced to below 30 mg/L in the aerated primary cell. Thus, the major part of the wastewater treatment will occur in the primary cell. Additional ammonia and TSS reduction will occur in the secondary and tertiary cells.

5.2.2 Blower Building and Chemical Storage and Pumping Building

Blowers will be housed in a prefabricated insulated steel panel building. Panels will be insulated with polyurethane foam and finished with painted metal cladding on the exterior and 28 gauge galvanized steel skin on the interior. A lightweight frame will be provided by extruded aluminum channels. The building will be constructed on a cast-in-place thickened edge concrete pad.

A separate building located at the south end of the lagoon will house the lagoon effluent lift pumps (as described in Section 5.2.3) and the chemical storage and dosing equipment for the phosphorus reduction filter (Section 5.2.4).

5.2.3 Pumps

Two high efficiency suction end pumps located in the chemical storage and pumping building will pump lagoon effluent from the lagoon to the phosphorus filter. The pumps will be approximately 5 hp self-priming pumps which are easier to service and maintain than submersible pumps. Each pump is capable of providing full pumping requirements at the design year; therefore, if one pump is out of service, the system can remain in operation. The suction line will be installed along the interior surface of the lagoon berm near the existing discharge pipe and will be protected from ice lift with a rip rap or granular cover.

5.2.4 Phosphorus Reduction Filter

The phosphorus reduction filter will be housed in an epoxy coated steel tank located on a cast-in-place concrete pad next to the chemical storage and pumping building. The tank is approximately 8 m long x 3 m wide x 2.5 m deep. The steel tank will be installed partially above grade to allow for gravity flow from the filter through the UV disinfection system, to the existing discharge route. Within the tank, there will be three zones; a flash mix zone blends the alum with the lagoon effluent; a slow mix zone allows for flocculation and settling of much of the precipitated phosphorus; and finally, the filter zone contains cloth filter modules that filter out remaining insoluble phosphorus. The cloth filters operate as an outside-in flow filter meaning filtered water is collected from within the filter disc and flows out into the discharge channel. From the discharge channel, filtrate flows by gravity to the UV disinfection system located adjacent to the phosphorus filter tank.

The phosphorus reduction filter will be equipped with an automatic backwashing system that cleans the surface of the cloth filters once head loss through the filter modules causes the water

levels in the filter tank to rise above a specified set-point. Sludge and backwash water will be discharged back to the lagoon through a small diameter (50 mm) HDPE pipe.

Typically, maintenance on the phosphorus filtration system is minimal and can be scheduled during the non-discharge season. However, in the event that emergency maintenance work is required during the discharge season, the influent pumps can be shut off to allow work to occur on the system.

5.2.5 UV Disinfection System

The final stage of the upgraded lagoon system will be a UV disinfection unit. The UV disinfection system will be located immediately downstream of the phosphorus filter and will be controlled to match the effluent flow rate with the option of turning off some banks of UV bulbs during periods of lower flow when they are not required. The bulb modules can be removed separately for manual cleaning or bulb replacement without disconnecting the whole UV disinfection system. Manual cleaning of the bulbs is not expected to be a significant maintenance issue because the phosphorus removal step immediately prior will remove most of the TSS in the lagoon effluent, resulting in a very clean flow to the UV system. The low solids content in the effluent will maximize efficiency of the UV disinfection system. To achieve the required level of disinfection, a channel type UV system will be installed in the blower building and will provide a UV dose of 40mJ/cm².

5.2.6 Discharge and Sampling

Following UV disinfection, the filtered and disinfected lagoon effluent will flow by gravity to the existing discharge route. Effluent sampling for license compliance will occur at the outlet of the UV disinfection system and at one or two points along the discharge route depending on licensing requirements by Manitoba Conservation. The long vegetated discharge route will improve phosphorus reduction in the effluent, and may allow for lower chemical dosing in the phosphorus filter. However, for the purpose of ensuring compliance, the potential nutrient reduction along the discharge route is not considered in the design of the chemical dosing system.

5.2.7 Electrical

The blowers, pumps, UV system, and phosphorus filter will require a 600 V, three-phase power supply. Currently there is only single phase power along Kernstead Road. Therefore, an upgraded service will be required. Power will be provided to the blower building which will house the main breaker panel and the control panels for the various equipment.

Appendix A

Functional Design Drawings

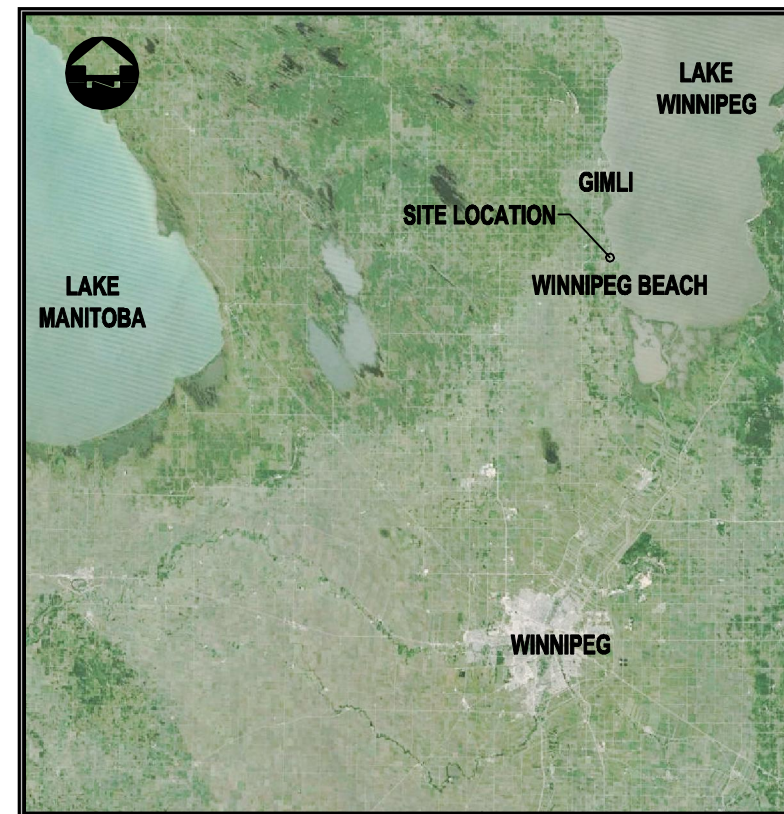
TOWN OF WINNIPEG BEACH

WINNIPEG BEACH LAGOON UPGRADES

DRAWING LIST:

TITLE	DRAWING NO.
DRAWING LIST AND SITE LOCATION	C-0
SITE PLAN	C-1
AERATION SYSTEM	P-1
P REMOVAL AND UV SYSTEM PLAN	P-2
P REMOVAL AND UV SYSTEM DETAILS	P-3

NOT FOR CONSTRUCTION

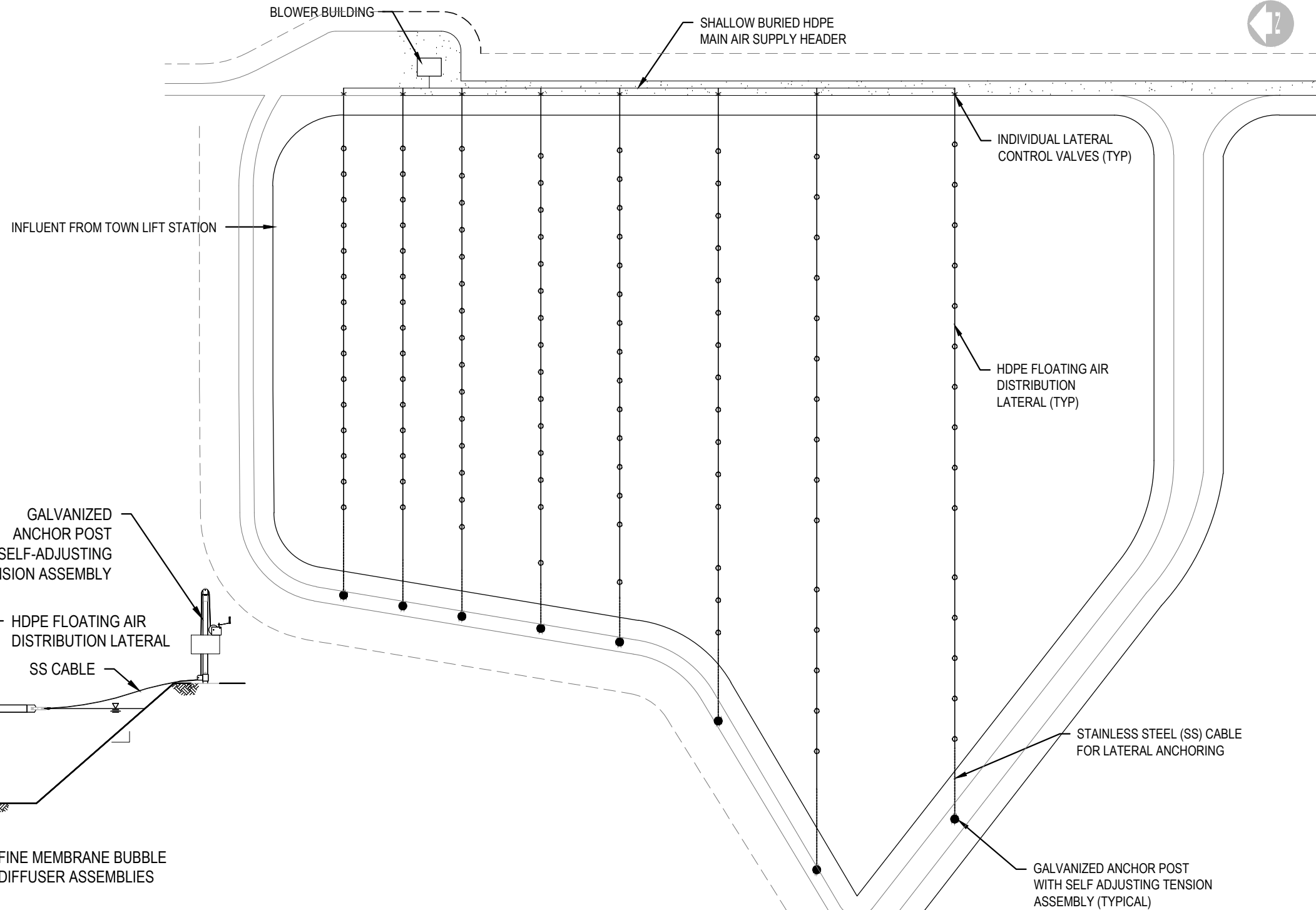
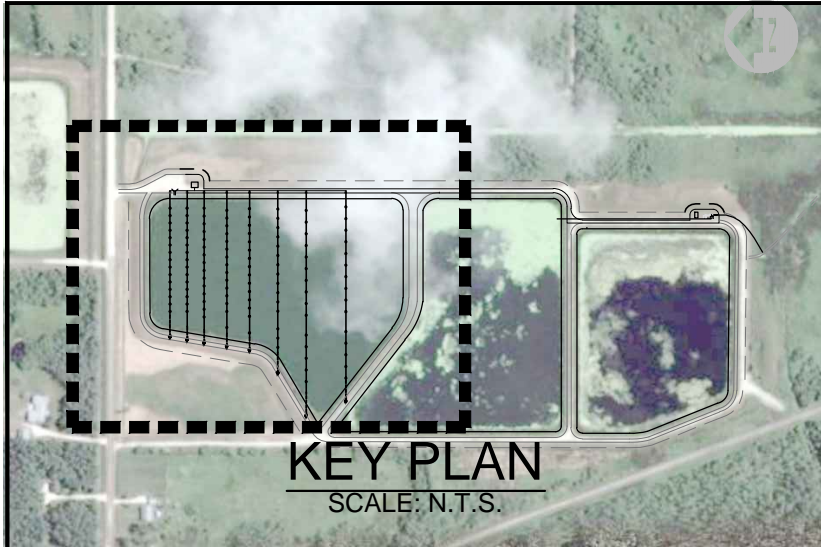


File Location:
g:\cad\138588\10-water_waste\01-contract\138588-10-cov-con-c-0.dwg
Thursday, December 18, 2014 12:28:13 PM

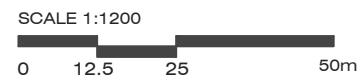
TABLOID/ANSI B

DECEMBER 2014

ANSI EXPAND B (11.00 X 17.00 INCHES)



AERATED LAGOON SECTION
N.T.S.



NOT FOR CONSTRUCTION

Thursday, December 18, 2014 12:28:13 PM

File Location: g:\cadd\138588\10-water_waste\10-contract\138588-10-shit-con-p-1.dwg

Conditions of Use

Verify elevations and/or dimensions on drawing prior to use. Report any discrepancies to Dillon Consulting Limited.

Do not scale dimensions from drawing.

Do not modify drawing, re-use it, or use it for purposes other than those intended at the time of its preparation without prior written permission from Dillon Consulting Limited.



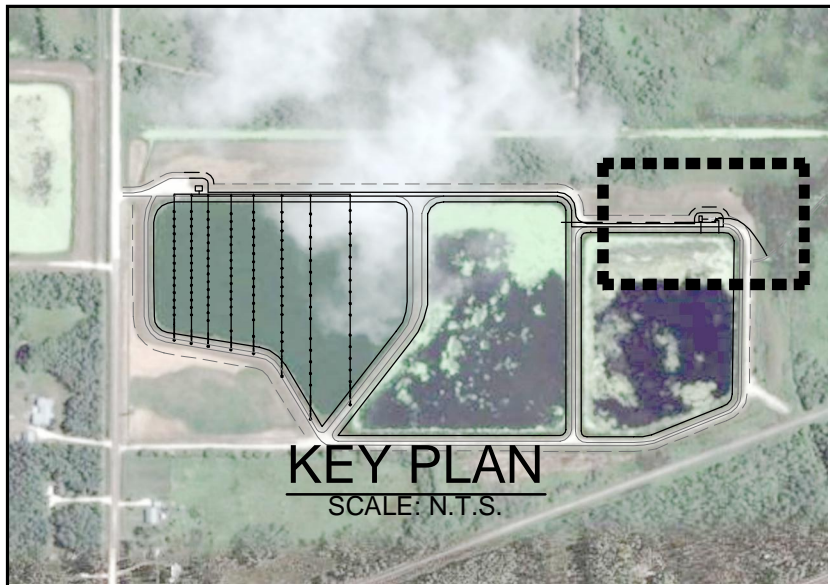
DESIGN	FMZ	REVIEWED BY	ARR
DRAWN	GLG	CHECKED BY	
DATE			
SCALE			
A	ISSUED FOR EAP SUBMISSION	12/23/2014	
No.	ISSUED FOR	DATE	BY

WINNIPEG BEACH LAGOON UPGRADES

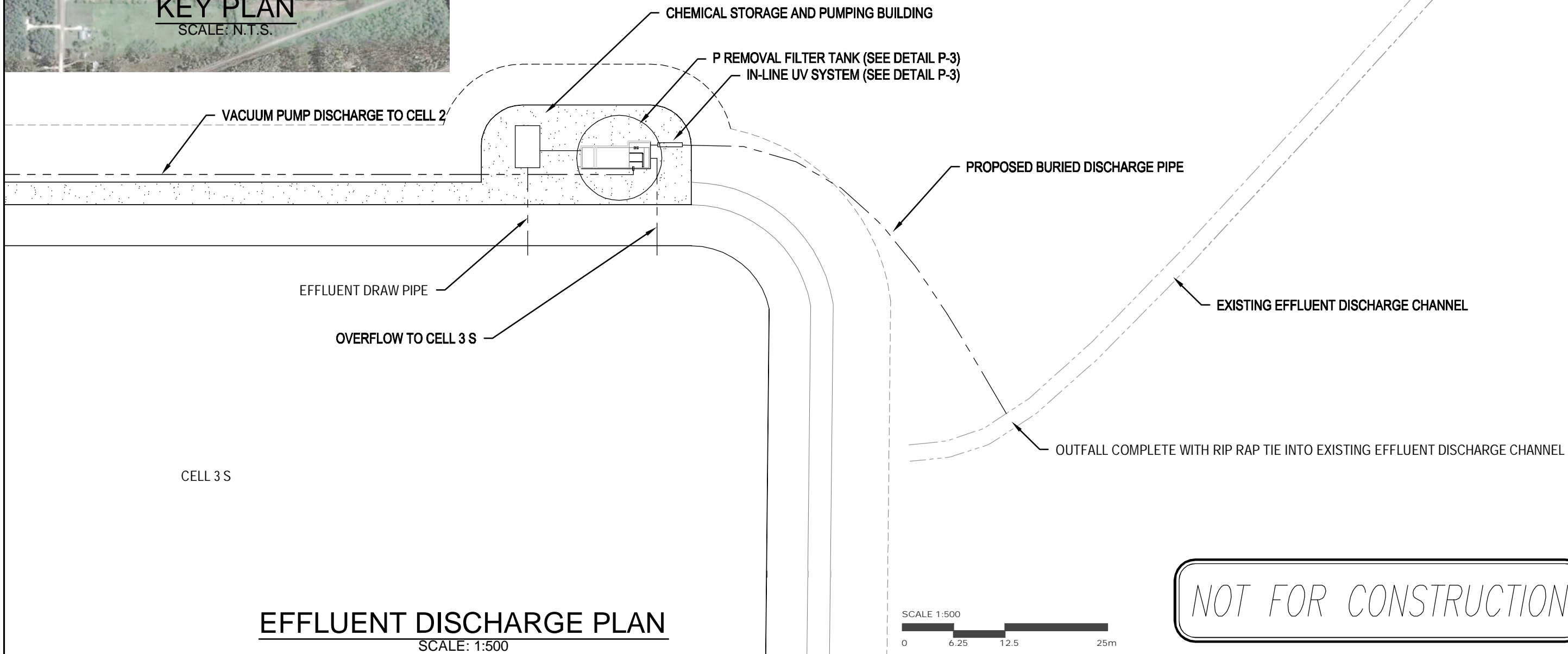
PROJECT NO. 138588

AERATION SYSTEM

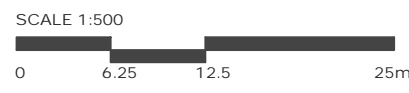
SHEET NO. P-1



KEY PLAN
SCALE: N.T.S.



EFFLUENT DISCHARGE PLAN
SCALE: 1:500



NOT FOR CONSTRUCTION

Conditions of Use
Verify elevations and/or dimensions on drawing prior to use. Report any discrepancies to Dillon Consulting Limited.
Do not scale dimensions from drawing.
Do not modify drawing, re-use it, or use it for purposes other than those intended at the time of its preparation without prior written permission from Dillon Consulting Limited.



DESIGN	FMZ	REVIEWED BY	ARR
DRAWN	GLG	CHECKED BY	
DATE			
SCALE			
A	ISSUED FOR EAP SUBMISSION	12/23/2014	
No.	ISSUED FOR	DATE	BY

WINNIPEG BEACH LAGOON UPGRADES

P REMOVAL AND UV SYSTEM PLAN

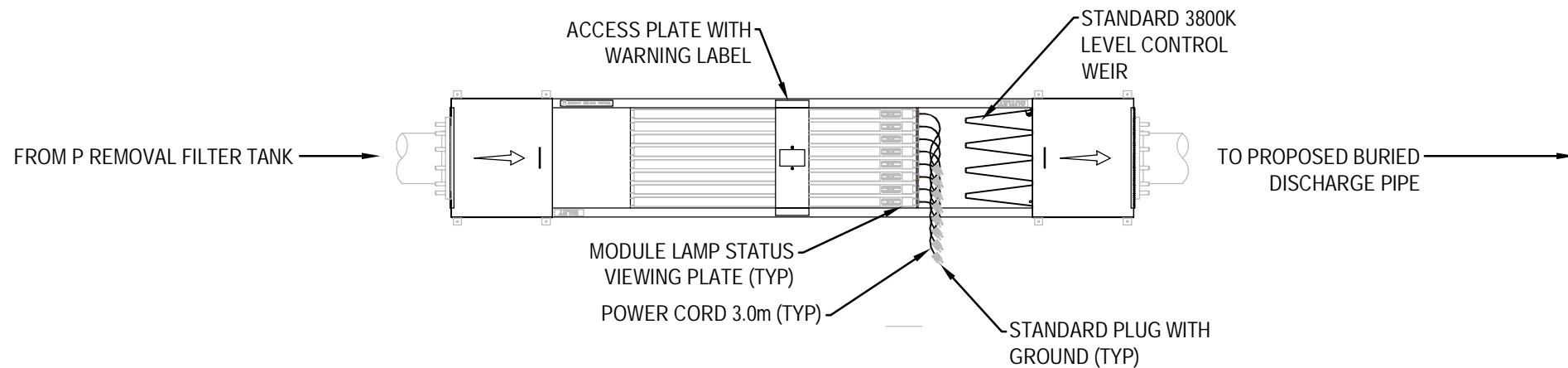
PROJECT NO. 138588

SHEET NO. P-2

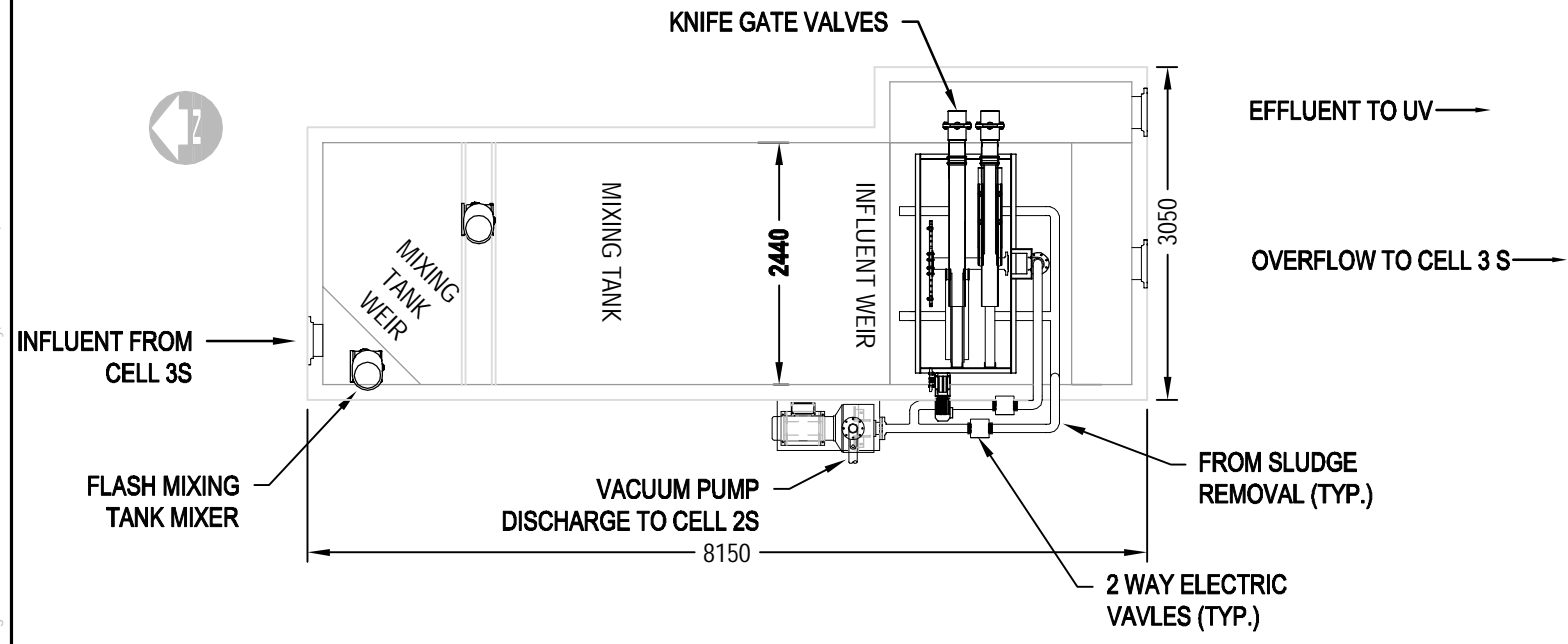
TABLOID/ANSI B

Monday, December 22, 2014 12:18:45 PM

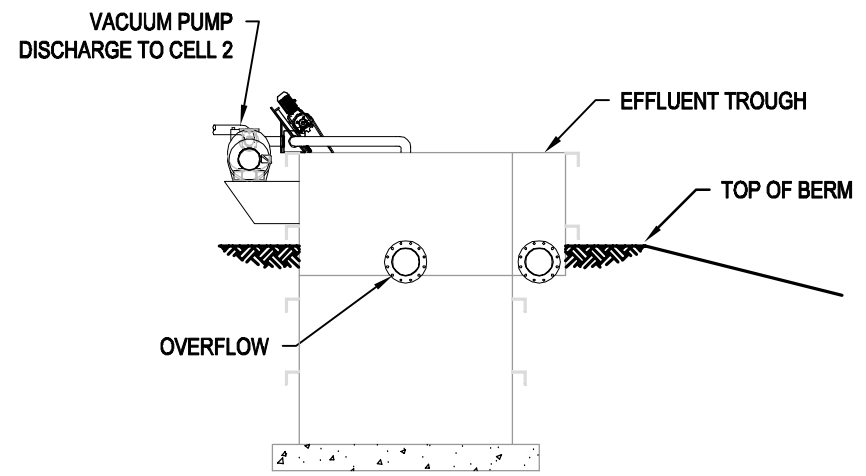
File Location: g:\cad\138588\10-water_waste\101-contract\138588-10-sht-con-p-3.dwg



IN-LINE UV SYSTEM PLAN
SCALE: N.T.S.



P REMOVAL FILTER TANK
SCALE: N.T.S.



P REMOVAL TANK SECTION
SCALE: N.T.S.

NOT FOR CONSTRUCTION

Conditions of Use
Verify elevations and/or dimensions on drawing prior to use. Report any discrepancies to Dillon Consulting Limited.
Do not scale dimensions from drawing.
Do not modify drawing, re-use it, or use it for purposes other than those intended at the time of its preparation without prior written permission from Dillon Consulting Limited.



DESIGN	FMZ	REVIEWED BY	ARR
DRAWN	GLG	CHECKED BY	
DATE			
SCALE			
A	ISSUED FOR EAP SUBMISSION	12/23/2014	
No.	ISSUED FOR	DATE	BY

PROJECT NO. 138588
WINNIPEG BEACH LAGOON UPGRADES
P REMOVAL AND UV SYSTEM DETAILS

SHEET NO. P-3



NOT FOR CONSTRUCTION

SCALE 1:2500

Conditions of Use
 Verify elevations and/or dimensions on drawing prior to use. Report any discrepancies to Dillon Consulting Limited.
 Do not scale dimensions from drawing.
 Do not modify drawing, re-use it, or use it for purposes other than those intended at the time of its preparation without prior written permission from Dillon Consulting Limited.



DESIGN	FMZ	REVIEWED BY	ARR
DRAWN	GLG	CHECKED BY	
DATE			
SCALE			
A	ISSUED FOR EAP SUBMISSION	12/23/2014	
No.	ISSUED FOR	DATE	BY

WINNIPEG BEACH LAGOON UPGRADES

PROJECT NO. 138588

SITE PLAN

SHEET NO. C-1