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Schedule ‘B’ Class Environmental Assessment Addendum Report

Municipality of Brighton Wastewater Treatment System

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

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- 2022 Schedule 'B' Class Environmental Assessment Addendum for Brighton Wastewater Treatment System by J.L. Richards & Associates Limited

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1.0 Introduction

1.1 Background

J.L. Richards & Associates Limited (JLR) was retained by the Municipality of Brighton (Municipality) to complete and addendum to the recently completed 2022 Schedule 'B' Class Environmental Assessment (EA) Addendum to the 2017 Schedule 'B' Class Environmental Assessment for Brighton Wastewater Treatment System. Since potential changes to the preferred wastewater treatment alternative are being contemplated by the Municipality, the conclusions and recommendations must be validated considering an updated understanding of the contributory information and other changes due to the lapse in time from the previous study.

The Municipality includes the former Town and Township of Brighton and is the most eastern municipality within the County of Northumberland. The Municipality is bounded by the City of Quinte West to the east and the Township of Cramahe to the west, with the shoreline of Lake Ontario to the south. Highway 401 provides the main east-west corridor through the Municipality, which tends to be a regional focus for hamlets in the surrounding areas. Refer to Figure 1 for an overview of the Municipality and the urban area of Brighton (study location).

The communal sewage system generally consists of the Brighton Wastewater Treatment Lagoon system (currently rated for 4,600 m^3/day), the Harbour Street Sewage Pumping Station (SPS) and forcemain, a small sub-area sewage pumping station and forcemain servicing Presqu'ile Provincial Park, and several kilometers of gravity collection sewer. Approximately half of the sewage generated in the collection system is directed to the Harbour Street SPS and pumped via a 0.82 km long, 300mm forcemain to the Lagoon and the other half flows by gravity to the Lagoon. Refer to Figure 2 for an overview of the Brighton urban settlement area serviced by the communal sewage system.

The Harbour Street SPS receives sewage from a significant portion of the collection system, including pumped flow from Presqu'ile Provincial Park. The Harbour Street SPS is currently being upgraded and expanded. The SPS generally consists of a wet well/dry well configuration and is equipped with three dry pit centrifugal type raw sewage pumps (lead/lag/standby operation) complete with inlet and outlet piping, a standby diesel generator, a wet well emergency overflow to Butter Creek, and related instrumentation and controls for the station.

The wastewater treatment system (WWTS) consists of a 0.68 ha single cell aerated lagoon, a single cell 5.44 ha waste stabilization pond with baffle partition curtains, and a 2-cell constructed wetland with a total surface area of 6.2 ha. There is also a chemical storage/feed system used to facilitate continuous phosphorus removal. Chemical is introduced after the aerated lagoon and upstream of the waste stabilization pond. Treated effluent from the waste stabilization pond is discharged continuously to the constructed wetland and from the constructed wetland it continuously discharges to a natural wetland and ultimately to Presqu'ile Bay, which is located off the northeast shore of Lake Ontario.

The following is a summary of the previous studies and activities at the Brighton Wastewater Treatment System. Refer to Appendix A for a copy of the previous study reports.

1.1.1 2017 Schedule ‘B’ Class Environmental Assessment for Brighton Wastewater Treatment System by J.L. Richards & Associates Limited

The Municipality of Brighton (the Municipality) initiated a Class Environmental Assessment (Class EA) of their wastewater treatment system in August 2016 to address various problems experienced with treatment at their treatment lagoon (e.g., elevated ammonia concentrations in the treated effluent), and also to ensure that increased influent flows from future growth can be effectively accommodated. JLR was retained by the Municipality to define the problems and identify a preferred solution to address these issues. The Class EA was completed in 2017. The preferred solution included the following:

- Installation of a specialized treatment system (such as a complete mix activated sludge process or a fixed film biological process)
- Upgrading baffles in the stabilization pond
- Optimizing alum dosing
- Refurbishing the constructed wetland
- Diverting high waste streams
- Desludging program

1.1.2 2020 Brighton Wastewater Treatment System Design by GHD

Additional efforts have been undertaken by the Municipality since the completion of the 2017 Schedule ‘B’ Class EA to address treatment deficiencies. A moving bed biofilm reactor (MBBR) system was selected as the preferred treatment technology. The Brighton Wastewater Treatment System upgrades were then designed and tendered in 2020. However, due to budgetary constraints, the project was cancelled.

1.1.3 2021 Brighton Wastewater Treatment System Aeration Conceptual Design by GSS

With an effort to address the effluent quality issues, in June 2021, the Municipality retained GSS Engineering Consultants Ltd. (GSS), who acted as the Municipality’s Engineer, to develop conceptual level design for aeration upgrades in the aerated lagoon cell. In addition, GSS recommended implementing a secondary clarifier after the aerated cell and adding screening and grit removal processes. For sludge management, GSS suggested the alternatives to either discharge waste sludge to a drying bed or Geotubes®, or discharge waste sludge to the stabilization lagoon and remove annually.

The proposed conceptual design was presented to Council in August 2021. The proposed upgrades were approved by Council, and a motion was passed to proceed with a working group and retain a consultant for a technical review of the conceptual design.

1.1.4 2022 Brighton Wastewater Treatment System Technical Review by R.V. Anderson Associates Limited

The Municipality retained R.V. Anderson Associates Limited (RVA) to undertake a technical feasibility review of GSS’s design. RVA proposed the following changes to the GSS’s design which include the following:

- Implementing a new headworks facility upstream of the aerated lagoon cell
- Confirming proposed aeration rate to provide adequate mixing
- Upsizing proposed clarifier

- Removing accumulated sludge from aerated cell and stabilization pond
- Evaluating options for sludge storage and dewatering in a later study

The technical review was presented to Council in April 2022. The review and proposed upgrades were approved, and a motion was passed to proceed with the next steps to update the existing Class EA with an Addendum.

1.1.5 2022 Brighton Wastewater Treatment System Schedule ‘B’ Class EA Addendum

In 2022, the Municipality retained JLR to complete a Class EA Addendum to capture the changes that have occurred since the completion of the previous Schedule ‘B’ Class EA for the Brighton Wastewater Treatment System in 2017. These changes include updated growth projections and design basis, the proposed liquid and solids treatment by GSS and RVA, and sludge management options. Specifically, the EA Addendum detailed the proposed future upgrades:

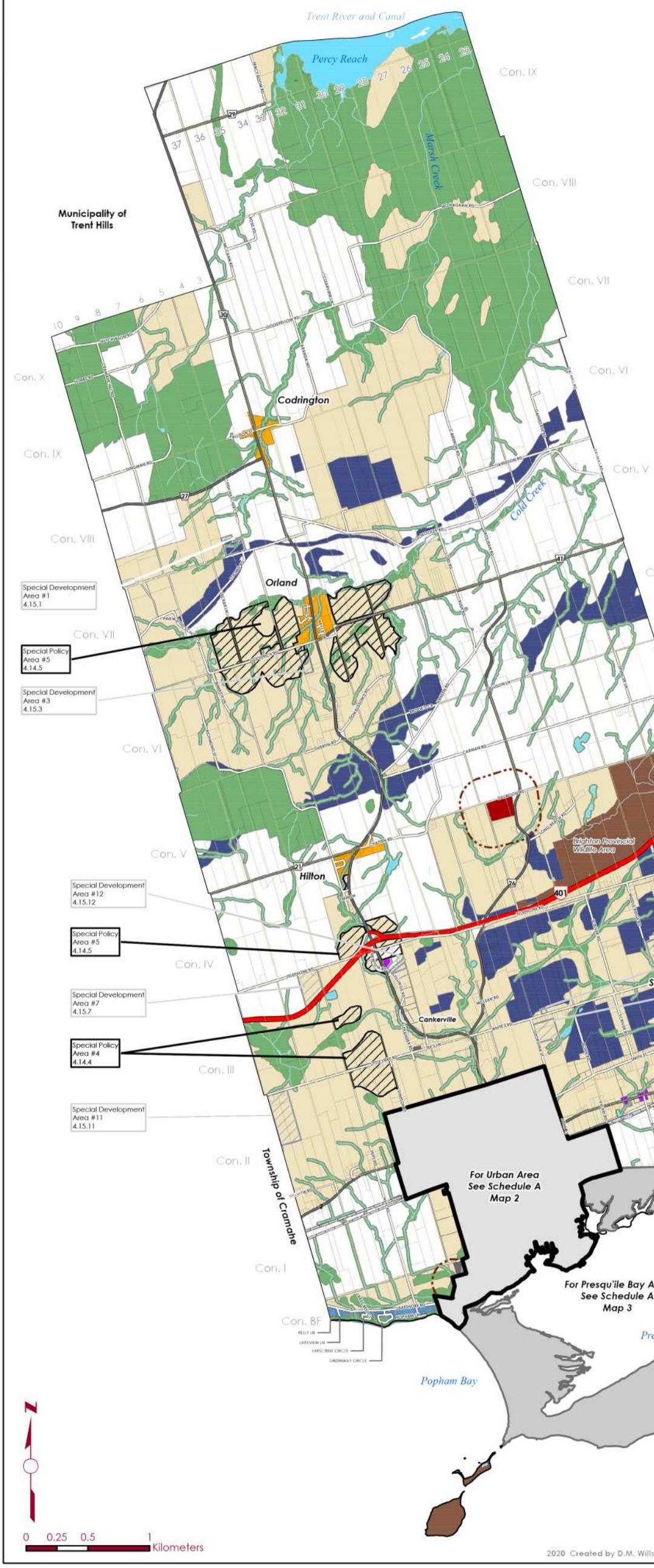
- New influent pumping
- New headworks building complete with odour control to house inclined auger screen
- Two horizontal grit channels
- Upgrade aeration system in existing aeration lagoons
- New secondary clarifier with sludge collection
- New effluent disinfection and outfall piping
- Modify existing facultative lagoon into WAS stabilization / storage pond with new shoreline chamber for supernatant collection and return of liquid treatment process, installation of supplemental aeration to mitigate freezing risks and odour impacts
- Arena Creek relocation

Refer to Figure 3 for the proposed layout.

1.1.6 2023 Brighton Wastewater Treatment System Lagoon Cleanout

In August/September 2023, the Municipality retained GFL Environmental (GFL) to survey, collect and remove sludge from the existing stabilization lagoon. The intention of the cleanout is to improve the performance of the lagoon and mitigate impacts to the quality of the treated effluent. GFL started at the inlet pipe on the north side of the lagoon, where a high volume of sludge had settled. Approximately one third of the north side of the stabilization lagoon was cleaned out before exceeding the contract budget limits.

Municipality of Brighton, Ontario
Official Plan
Land Use
Brighton Rural Area
Schedule "A"
Map 1



Land Use Designations

- Environmental Protection
- Aggregate Resource
- Industrial
- Highway Commercial
- Hamlet
- Shoreline Residential
- Waste Disposal Area
- Rural
- Agriculture
- Crownland

Features

- Provincial Highway
- County Road
- Municipal Road
- Property Boundary
- Special Policy Area
- Special Development Area
- Gas Lines
- Oil Line
- Transmission Lines
- Rail Lines
- Waste Disposal Assessment Area
- Watercourse Intermittent
- Watercourse Permanent
- Waterbodies

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PROJECT:
BRIGHTON WASTEWATER TREATMENT SYSTEM CLASS EA ADDENDUM
MUNICIPALITY OF BRIGHTON, ONTARIO

DRAWING:
Urban Area Location Plan

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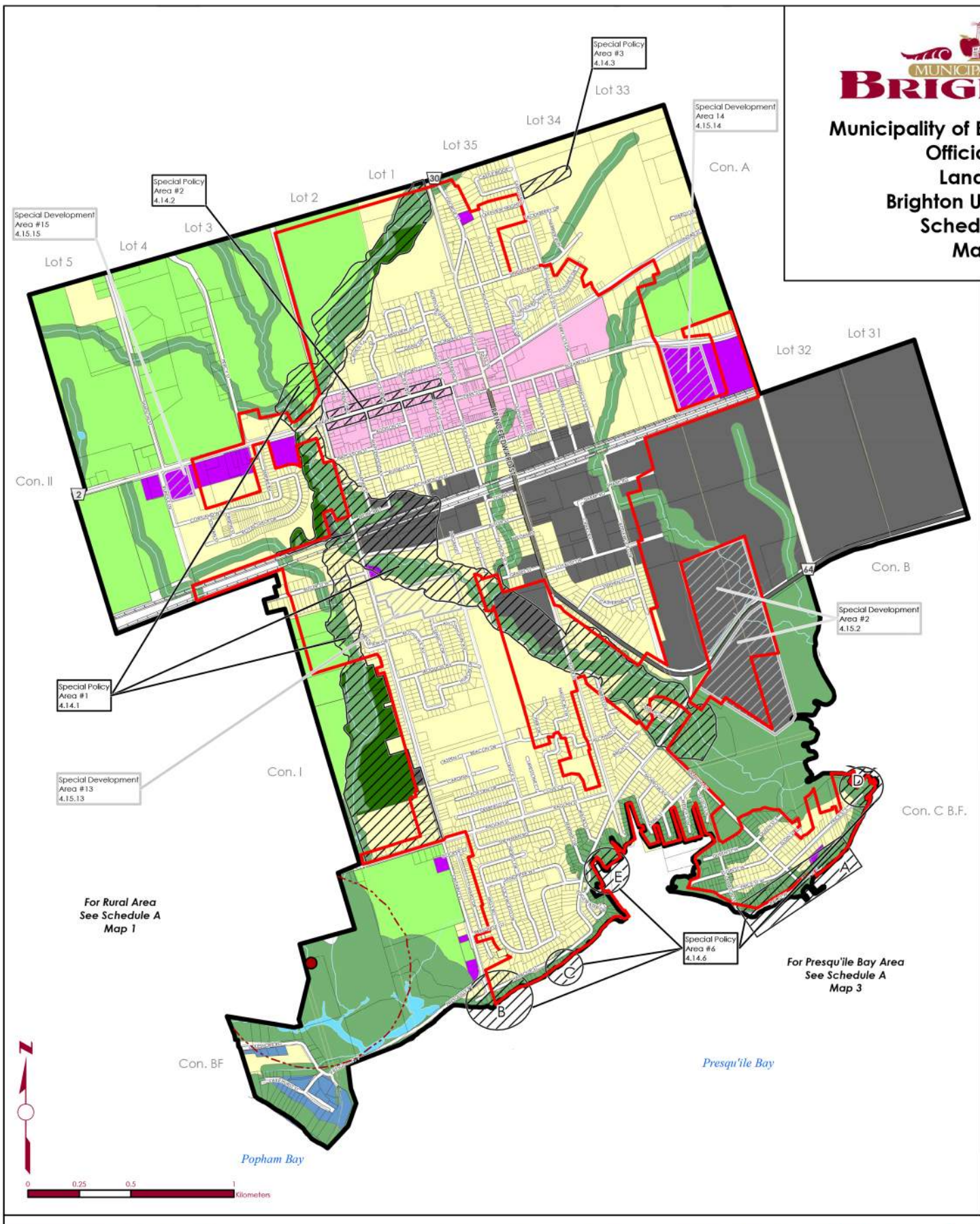
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DESIGN:	MM	JLR NO:	31795
DRAWN:	KTK	DRAWING NO.:	FIGURE 1
CHECKED:	SJS		

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Municipality of Brighton, Ontario
Official Plan
Land Use
Brighton Urban Area
Schedule "A"
Map 2



Land Use Designations

- Environmental Protection
- Core Commercial
- Highway Commercial
- Residential
- Shoreline Residential
- Industrial
- Greenfield

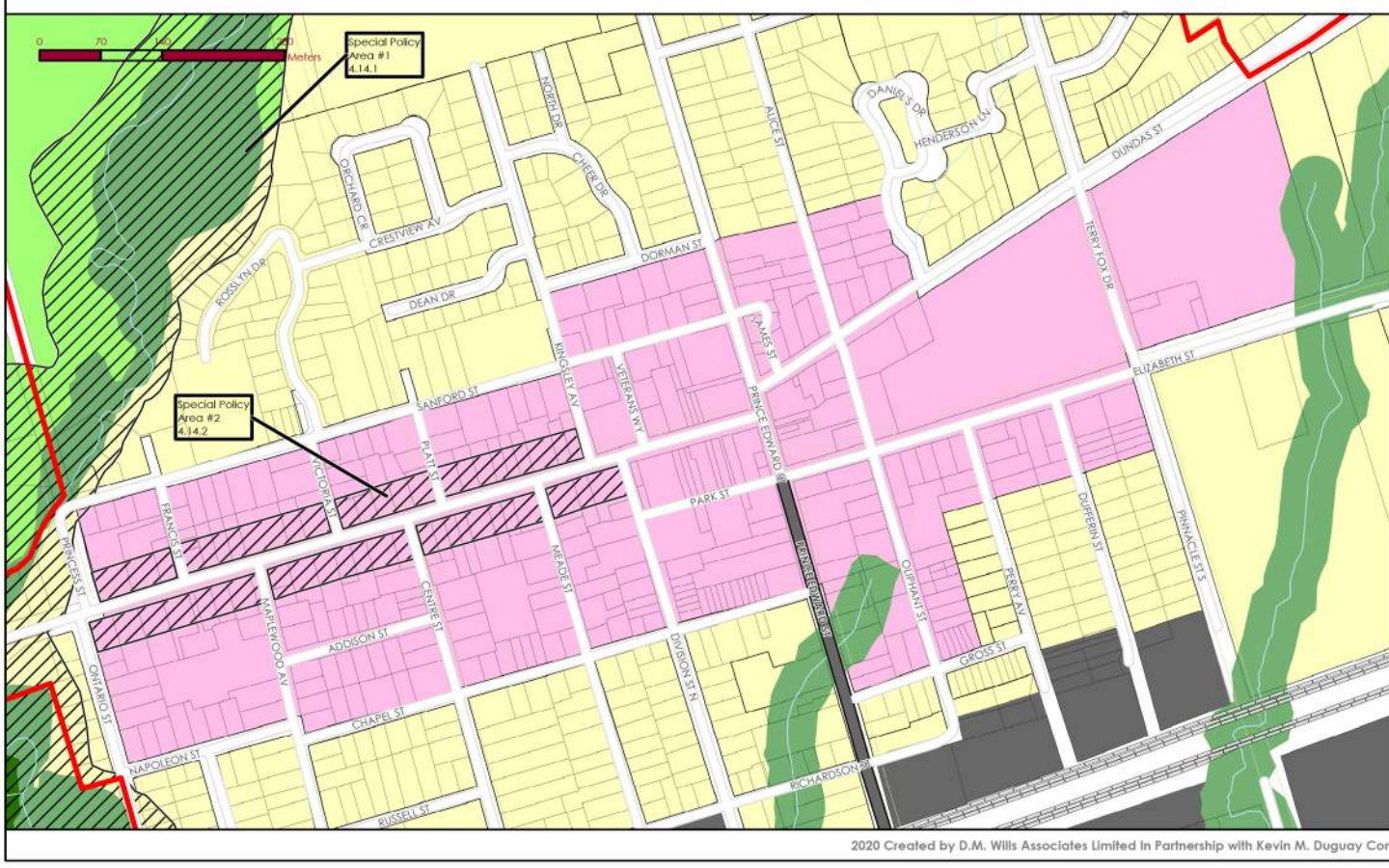
Special Policy Area #1 Land Use

- Community Facilities and Open Space

Features

- Special Policy Area
- Special Development Area
- Intensification Boundary
- Urban Settlement Boundary
- Property Boundary
- County Road
- Municipal Road
- Rail Lines
- Watercourse Permanent
- Waterbodies
- Waste Disposal Assessment Area
- Landfill

Schedule A Map 2 i



Schedule A Map 2 ii

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WILLS

Kevin M. Duguay Community Planning and Consulting Inc.

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PROJECT:
BRIGHTON WASTEWATER TREATMENT SYSTEM CLASS EA ADDENDUM
MUNICIPALITY OF BRIGHTON, ONTARIO

DRAWING:
Urban Settlement Area

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DESIGN: MM	JLR NO: 31795
DRAWN: KTK	DRAWING NO.: FIGURE 2
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Figure 3: 2022 Class EA Addendum Proposed Site Layout

1.3 Class Environmental Assessment Process

The Ontario Environmental Assessment Act (the Act) sets out a planning and decision-making process so that potential environmental effects are considered before a project begins. The purpose of the Act is to provide for the protection and conservation of the natural environment (R.S.O. 1990, c.E.18, s.2).

The Municipal Class EA process is followed for common types of projects to streamline the review process while ensuring that the project meets the requirements of the Act. It involves detailed site-specific information gathering and studies, as well as consultation with the public and stakeholder agencies. In 1987 the first Class EA prepared by the Municipal Engineers Association (MEA) on behalf of Ontario Municipalities was approved under the Act. Updates and amendments were subsequently made in 1993, 2000, 2007, 2011, 2015, and 2023.

This Class EA was initiated as a Schedule B project under the Class EA process. Projects categorized as Schedule B undertakings have the potential for significant environmental effects, and are required to follow Phase 1 and Phase 2 specified under the Municipal Class EA. This includes consultation with all parties that may potentially be affected by the project, and the preparation of a Class EA project file that documents the Class EA process for the project. At the end of Phase 2, the project Schedule is reviewed to determine if the project is complete under a Schedule B Schedule or if the project needs to proceed as a Schedule C undertaking, in which case Phases 3 and 4 of the Class EA process are completed.

The Class EA framework defines the process for each type of project. For Schedule B projects, the completion of the following Phases of the Class EA process are required:

- Phase 1 – Identify the Problem and/or Opportunity
- Phase 2 – Identify Alternative Solutions to the Problem and/or Opportunity

The Project File shall be made available for public and agency review at the completion of Phase 2 of the Class EA process for a mandatory 30-day period. If there are no requests to the Minister of the Environment and Climate Change (MOECC) for a 'Part II Order' within this 30-day review period, then the project may proceed to implementation (Phase 5).

A Class EA Addendum is prepared when there is any significant modification to the project or change in the environmental conditions of the project. For this project, a Notice of Filing of Addendum will be issued. The Notice will be sent to those who were notified during the preparation of the original Class EA, and the 2022 Class EA Addendum with the addition of any new members of the public or review agencies that are potentially affected with the proposed changes. Like the original Class EA process, the Addendum will be made available for public review for a mandatory 30-day period. During this review period, only the Addendum (the changes to the project) shall be open for review or considered in a request for a Part II Order.

1.4 Objectives of the Class EA Addendum

The purpose of the Class EA Addendum is to describe the proposed modification to 2022 EA Addendum, describing the circumstances necessitating the change, including any potential environmental impacts and proposed mitigation measures.

Technical memoranda have been prepared to summarize various elements of the overall project through the ongoing preliminary and detailed design. Technical Memoranda will form part of the Class EA Addendum Project File, which is anticipated to be the key deliverable for this project. The completion of this Class EA Addendum is proceeding alongside the detailed design for the Brighton WWTS Upgrades. Refer to Appendix B for the Technical Memorandum.

The following documents and reports and have been prepared and cover the following topics:

- Conceptual design by GSS
- Treatment System Technical Review by R.V. Anderson
- Technical Memorandum 1 – Design Basis by JLR (2024)
- Technical Memorandum 2 – Liquid Train by JLR (2024)
- Technical Memorandum 3 – Solids Train by JLR (2024)
- Technical Memorandum 5 – Energy Requirements by JLR (2024)
- Memorandum – WAS Stabilization Lagoon Design Considerations by JLR (2024)

The Class EA Addendum is proceeding in accordance with the Schedule B requirements of the Ontario Municipal Class EA, October 2000, as amended in 2023.

1.5 Project Team

The following Project Team was involved in carrying out this Class EA Addendum:

Proponent:
The Municipality of Brighton
35 Alice Street
Brighton, ON K0K 1H0

Consultant:
J.L. Richards & Associates Limited
203-863 Princess Street
Kingston, ON K7L 5N4

Sub-Consultant (Environmental Impact Assessment):
Cambium Inc.
625 Fortune Crescent, Unit 1
Kingston, ON K7P 0L5

Both the Municipality and JLR were responsible for issuing the Notice of Filing EA Addendum to the public and review agencies and communicating with key review agencies such as the Ministry of the Environment, Conservation and Parks (MECP).

2.0 Changes Since Completion of 2022 Schedule 'B' Class EA Addendum

The following section provides an overview of the key changes to the 2022 Schedule 'B' Class EA Addendum.

2.1 Proposed Unit Processes

2.1.1 Headworks and Influent Pumping Station

No changes have been identified from the proposed headworks and influent pumping station presented in the 2022 EA Addendum.

2.1.2 Liquid Train Treatment

For liquid treatment, the 2022 EA Addendum proposed replacing the aeration system in the existing aerated lagoon to increase the aeration capacity and adding a new secondary clarifier to the liquid treatment train south of the aerated lagoon. It is now being proposed that dedicated concrete aeration basins, clarifiers, and UV channels be constructed to the northwest of the existing lagoons in a greenfield mechanical treatment plant. The aeration basins will provide biological treatment via extended aeration, the clarifiers will provide secondary sedimentation, and the UV channels will provide disinfection to meet the future compliance requirements. The existing aerated lagoon on site will be reused for WAS stabilization and storage (as described further in Section 2.1.4), and the facultative lagoon will be used for peak flow attenuation and WAS lagoon supernatant storage.

BioWin ™ modeling was completed to determine the new recommended treatment train. The model was used to analyze the treatment level and aeration requirements of the following three liquid train options:

- Option 1: Retrofit the aerated lagoon to one aeration basin (per 2022 EA Addendum)
- Option 2: Retrofit and divide the aerated lagoon into two aeration basins
- Option 3: Construct two new purpose-built concrete aeration basins

The BioWin ™ model concluded that the solids retention time for the two lagoon retrofit options would be greater than the values recommended in the MECP Design Guidelines for Sewage Works (2008). Purpose-built basins can be designed to meet all of the recommended parameters in the MECP Design Guidelines for Sewage Works (2008) and can also be built with minimal disruption to the existing treatment system. To retrofit the existing lagoons, as recommended in the 2022 EA Addendum, the lagoons must be taken offline and de-sludged prior to construction. Temporary treatment would be required to treat all the influent sewage and maintain treated effluent quality as specified in ECA during construction.

A high-level cost comparison was completed. It was found that a mechanical plant with purpose-built aeration basins would offer significant cost savings compared to the lagoon retrofit options. Cost saving factors of this option include:

- Shorter construction schedule
- Reduced level of effort for lagoon sludge cleaning
- Significantly less requirements for temporary treatment (i.e., bypass pumping and temporary aeration)

- Lower aeration and overall power requirements for the purpose-built basins

Along with cost, another driver for this change in the proposed liquid treatment design were the challenges associated with meeting the ECA compliance limits during construction. Several packaged temporary treatment systems were investigated which could be brought to site to treat influent during construction and be removed following construction. It was found that the Brighton WWTS daily capacity exceeded the capacity of the packaged treatment systems. Hauling sewage from the WWTS to another treatment site was also considered, but it was found to be cost prohibitive given the daily influent flowrate.

Retrofitting facultative lagoon into the aerated lagoon by installing aerators in the facultative pond was another option considered for temporary treatment during construction. This would provide biological treatment in the facultative lagoon during construction when the aerated lagoon would be taken offline. Given this treatment measure had not been proven in the region, there were concerns that it would not provide sufficient treatment to meet the sites compliance limits. This was especially a concern for cold weather months when nitrification levels decrease, posing an increased risk for exceedances in total ammonia nitrogen (TAN) concentrations in the effluent. Through consultation with the MECP (see the minutes from December 11, 2023, meeting between MECP, the Municipality and JLR in Appendix C) it was confirmed that the Municipality would remain responsible for meeting the existing compliance limits throughout the duration of construction. The MECP's primary concern was ammonia toxicity due the lagoons historical performance issues with respect to TAN exceedances. Given compliance limits would not be relaxed during construction, it was determined that retrofitting the facultative lagoon with aerators was an insufficient temporary treatment measure.

The above conclusions led the project team to recommend that a purpose-built extended aeration plant be constructed in place of the previously recommended lagoon retrofit solution. This solution was found to be the most financially viable, would meet the ECA effluent compliance limits, and mitigates the risk of increased compliance limit exceedances during construction. The updated block flow diagram for the new liquid treatment train can be seen in Appendix D.

2.1.3 Location

The proposed location of the processes has also changed from the 2022 EA Addendum. It is now proposed that a new process building be built northwest of the existing facultative lagoon to house the new recommended treatment processes including septage receiving, raw sewage pumping, headworks building, the extended aeration basins, clarifiers, UV channels, process building, and associated mechanical and electrical equipment. This location was selected as the space was not being utilized, and it is at a higher elevation than the remainder of the site which benefits the process hydraulically. Geotechnical, hydrogeological, and ecological assessment completed have confirmed the suitability of the proposed location.

A desktop Natural Environment Review for the new process location has been completed (see Section 4.5) to identify risks and constraints. The new proposed site layout can be seen in Appendix E.

2.1.4 Solids Treatment Train

As it is now being proposed that the facility be converted to a mechanical extended aeration treatment system, sludge will be separated from the liquid stream in the secondary clarifiers and

either returned to the head of the aeration basin(s) or removed as Waste Activated Sludge (WAS). Therefore, upgrades are required to manage the WAS stream. Storing WAS in the existing facultative lagoon with supplemental aeration was recommended in the 2022 EA Addendum. Given the revised recommendation of building a new mechanical plant with purpose-built aeration basins, it is now proposed that the current aerated lagoon can be used for WAS storage, with the addition of supplemental aeration. Retrofitting the aeration lagoon is considered a better option as the aerated lagoon is deeper comparing to the facultative lagoon (2.8 m depth vs. 1.5 m depth) which is better suited to aerated mixing and periodic desludging, and it has a smaller surface area to manage. This newly proposed option will provide a low capital cost, low maintenance and efficient land use solution for biosolids management. Periodic sludge removal will occur in the aerated lagoon. Decanting will be used to minimize the frequency in which desludging is required. The proposed block flow diagram for the solids train can be seen in Appendix D.

2.1.5 Equalization Storage

It is proposed to use the entire existing facultative lagoon to provide equalization storage to the incoming peak flows. In addition, the WAS lagoon supernatant will also be stored in this lagoon, prior to being returned to the headworks.

2.1.6 Arena Creek Relocation

Arena Creek, which runs along the eastern berm of the lagoon, will need to be relocated. The creek is increasing the erosion rate of the berm and presents a structural risk. The desktop Natural Environment Review completed (Section 4.5) addresses the creek relocation feasibility and requirements.

2.1.7 Septage Receiving Station

A septage receiving station (SRS) is now being proposed to be implemented at the Brighton WWTS, which was not included in the 2022 EA Addendum. The SRS will be located west of the proposed process building location as shown in Appendix E. The SRS will accept hauled waste from the Municipality of Brighton and the surrounding areas to be treated by the WWTS. Septage flows to the plant will be minimal relative to the overall plant flows as such the SRS will not impact average daily flow or peak flows to the plant. Septage is highly concentrated in comparison to sewage, hence there is an impact to plant loadings, see Section 2.2 for the updated design basis accounting for septage.

Septage receiving volume forecasts can be highly variable due to economic or charge rate influences, new septage receiving facilities and other related items. The Municipality has a relatively high rural population currently being serviced by private septic systems and/or holding tanks, and local septage haulers have indicated that there is demand for an SRS within the Municipality of Brighton. A local SRS would offer increased convenience to residents and haulers currently hauling outside of the Municipality boundaries. Negative social impacts are possible through the introduction of increased odours to the WWTS. This negative impact would be mitigated through the selection of SRS equipment which incorporates odour control or installing odour control in the headworks area of the building. Local truck traffic would also increase.

A packaged SRS would be placed on site as shown in the site layout in Appendix E and would discharge upstream of the headworks facilities. The SRS is recommended to include the following

at a minimum; note that the Municipality may also wish to consider equalization tankage and pumping in order to mitigate potential impacts of shock loading to the liquid treatment train.

- User automated access/control/billing system
- Upgraded access road
- Truck connection/unloading area
- Piping and interconnections
- Pre-treatment unit(s) to prevent clogging of downstream pumps, complete with building to enclose pre-treatment
- Autosampler

2.1.8 New Administration Building

It has been determined that a new administration building will be constructed, that is separate from the previously proposed process building. This decision was made to optimize various site functions and allow the Municipality the opportunities to postpone the construction of the new administration building (in the event that the tender comes in over budget) to alleviate budgetary constraints.

2.2 Updated Design Basis

The following section is a summary of the updated design basis for the proposed upgrades.

2.2.1 Influent Characteristics

Table 1 below displays the updated influent loading projections to be used in detailed design. The loadings have changed from the previous EA Addendum to account for the additional loadings from the proposed SRS. Note that influent flows remain consistent with the previous EA Addendum as SRS will not increase the average or the peak flows to the plant, and flow pacing will be used to control septage flow during peak events. While septage flow to the plant is low in comparison to raw sewage flows, the strength of septage is much greater than sewage. Increased pollutant loadings from septage must be accounted for in sizing of treatment systems.

Projected influent loadings and concentrations were calculated using the previous influent loading averages received at the Brighton WWTS, as described in the 2022 EA Addendum, and incorporating the additional loadings expected from septage. Septage pollutant loadings and concentrations were estimated using a combination of septage concentrations received at neighboring facilities, and the average septage values presented in the MECP's Design Guidelines for Sewage Works (2008).

Table 1: Wastewater Treatment System Influent Characteristics

Parameter		Concentration (mg/L) (1)	Loading (kg/d)
BOD_5 (2)(3)	Average	207	950
	Max. Month		*1,354*
TSS (4)	Average	253	1,163
	Max. Month		*1,653*
TKN (5)	Average	48	222
	Max. Month		*284*
TAN (6)	Average	38	174
	Max. Month		*228*
TP (7)	Average	6.0	27
	Max. Month		*37*

Notes:
(1) Future municipal sewage concentrations assumed to be equal to historical 3-year average concentrations, with the exception of BOD_5, where 2022 annual average concentration was used instead.
(2) Projected average concentrations and loading values were based on estimated average septage volume of 31 m^3/d and municipal sewage volume of 4,569 m^3/d. Projected maximum monthly loading values were calculated using an estimated maximum septage volume of 40 m^3/d (max month factor of 1.3), municipal sewage volume of 4,560 m^3/d, and the historical max month loading factors for each parameter.
(3) Where BOD_5 refers to Biochemical Oxygen Demand.
(4) Where TSS refers to Total Suspended Solids.
(5) Where TKN refers to Total Kjeldahl Nitrogen.
(6) Where TAN refers to Total Ammonia Nitrogen.
(7) Where TP refers to Total Phosphorous.

2.2.2 Design Flows

There have been no changes to the design flows as presented in the 2022 EA Addendum.

2.2.3 Final Effluent Requirements

Based on pre-consultation meetings with MECP during detailed design, the following effluent criteria have been agreed upon for the future Brighton WWTS.

Table 2: Wastewater Treatment System Effluent Characteristics

Final Effluent Parameter	Design Objectives (1)	Compliance Limits (1)
$cBOD_5$	15.0 mg/L	25.0 mg/L
TSS	15.0 mg/L	25.0 mg/L
TP	0.8 mg/L	1.0 mg/L
TAN (2)		
from May 01 to October 31	2.0 mg/L	14.0 mg/L
from November 01 to April 30	4.0 mg/L	17.0 mg/L
E. Coli	150 CFU/100mL	200 CFU/100mL
pH	6.5 – 8.5 inclusive	6.0 – 9.5 inclusive

Notes:
(1) Refer to attached meeting minutes with MECP.
(2) MECP indicated that the future amended ECA will include a condition to review and update all effluent limits in 3 years based on observed plant performance, on an as-needed basis. Once MECP has 3 years of annual report data, MECP will re-define effluent TAN limits, along with other parameters if required.

2.3 Proposed Plant Block Flow Diagram

Refer to Appendix D for the block flow diagram of the wastewater treatment system following the proposed upgrades.

3.0 Project Description

3.1 Overview

Table 3 shows a summary of the updated proposed upgrades for the Brighton WWTS based on the past and recent studies as described in the Section 2.

Table 3: Summary of Updated Proposed Upgrades

Process Description	Updated Proposed Upgrades Summary
Liquid Treatment Train	
Septage receiving station	New packaged septage receiving station
Headworks	No change
Secondary Treatment	Construct two purpose built extended aeration basins. Construct three new secondary clarifiers c/w sludge collection.
Disinfection	No change
Effluent Piping	No change
Equalization Storage	Utilize existing facultative lagoon to store peak flows and to receive supernatant from sludge stabilization lagoon
Solids Treatment Train	
Sludge pumping	No change
Sludge Stabilization and Thickening / Biosolids Storage	Modify existing aerated lagoon into the WAS stabilization/storage pond
Site-Wide Upgrades	
New administration building	New administration building on the northwest corner of the existing facultative lagoon
Civil	New location north of the existing lagoons requiring excavation and clearing. Yard piping, grading, access/driveway upgrades, etc. Arena Creek relocation.
Electrical	No change
Instrumentation and Controls	No change

3.2 General Site Layout

As discussed in previous sections, the site layout has been changed from the 2022 EA Addendum for the Brighton WWTS upgrades. Refer to Appendix E for the updated site layout of the WWTS following the proposed upgrades.

3.3 Opinion of Probable Costs

It shall be noted that the Opinion of Probable Costs (OPC) were completed using 2024 dollars value. An OPC with a Class 'D' (Indicative Estimate) level of accuracy was developed for each alternative solution and includes allowances for design elements that have not fully been developed. Class 'D' OPCs developed for this assignment are expected to be within +/- 30%. The OPCs were developed based on past experience on similar projects, professional judgment, and equipment costs provided by suppliers. Design completed as part of this Class EA is conceptual in nature for the purpose of obtaining Class 'D' cost estimates. All design parameters should be confirmed during detailed design. Any provided estimate of costs or budget is an OPC that is based on historic construction data and does not include labour, material, equipment, manufacturing, supply, transportation or any other cost impacts in relation to outstanding market conditions. JLR shall not be responsible for any variation in the estimate caused by the foregoing factors but will notify the Municipality of any conditions which JLR believes may cause such variation upon delivery of the estimate.

It is estimated that the construction capital costs of the proposed Brighton WWTS upgrades will be $36.8 million (excl. HST).

3.4 Design Considerations

The following are considerations to be explored during the detailed design of the proposed upgrades. Additional considerations are noted in the GSS Conceptual Design and RVA's technical review (refer to Appendix A), and the Technical Memorandum 1 to 5 prepared by JLR (refer to Appendix B).

- The proposed upgrades design will need to consider the future expansion of the wastewater treatment system beyond the 20-year growth forecasts. Some considerations may include sizing new structures and buildings (such as the headworks, clarifier, and disinfection) to accommodate a flow rate beyond the rated capacity, including provisions for the construction of additional treatment trains, etc.
- The existing treatment system will need to maintain operation during the construction of the new upgrades. The location and sequencing of the new infrastructure will need to be considered.
- The relocation of Arena Creek is necessary to prevent erosion of the aerated lagoon berm. The final location of the creek relocation should be confirmed following the confirmation of the proposed site plan.
- The power supply and other electrical considerations will need to be reviewed based on the selection of new equipment for the proposed upgrades.

3.5 Project Implementation Schedule

It shall be noted that the Brighton WWTS detailed design is ongoing. Once the EA Addendum is approved, the Municipality intends to start the tendering and construction phase of the project. Table 4 shows the estimated timelines for the design and construction of the upgrades.

Table 4: Project Implementation Schedule

Milestone	Schedule
Tender	Spring 2025
Permits and Approvals Applications	Spring 2025
Construction Period	2025-2027

3.6 Additional Field Studies, Permits and Approvals

Since the previous EA Addendum, a Geotechnical and Hydrogeological investigation has been initiated and is underway. Additional field studies are recommended prior to implementing the proposed works including, but not limited to, a Field Environmental Impact Assessment for Arena Creek relocation.

A number of approvals are required prior to implementing the proposed works. These may include:

- Amendments to the Environmental Compliance Approval
- Environmental Activity Sector Registry (EASR) or Permit to Take Water (PTTW) for Construction dewatering from the MECP, if required
- Site Plan approval from the Municipality
- Building Permit from the Municipality
- Ministry of Natural Resources/ Conservation Authority Consultation
- Fisheries and Oceans Canada (DFO) Request for Review consultation
- Electrical Safety Authority (ESA) Permit
- Screening of the project in accordance with the requirements of the Canadian Environmental Assessment Act, should any Federal approvals be required or should funding be provided by the Federal Government for this project.

4.0 Potential Effects and Mitigation Measures

4.1 Geotechnical Conditions

No change from the previous EA Addendum. Geotechnical information for the site is limited, hence a geotechnical investigation with additional fieldwork is required to be completed during conceptual design to identify and address any geotechnical challenges for the construction of the new infrastructure at the proposed process location.

4.2 Source Water Protection

No change from the previous EA Addendum. The site is not within the source water protection area.

4.3 Climate Change

As described in the 2022 EA Addendum, the Brighton region is at risk for increased total annual precipitation, and increased precipitation intensity due to climate change. To adapt to these changing climate conditions, consideration must be made for how to handle increased flow to the

WWTS during peak storm events due to increased infiltration. To this end, the design team is proposing to use the existing facultative lagoon on the site for equalization storage. Influent can be directed here when flows exceed the treatment capacity of the plant. Sewage from the equalization storage can then be fed back to the headworks over several hours once influent flow has returned to a treatable capacity following a storm event.

With respect to climate change mitigation, the primary change from the previous EA Addendum is that the new proposed design will use purposely sized tanks for the influent flows and characteristics. This is in contrast with the previous proposed design that proposed retrofitting the lagoons, which are oversized for extended aeration treatment and hence would require oversized blowers and electrical equipment. By sizing the equipment for the flow and characteristics of the Brighton WWTS, smaller blowers can be used to minimize energy usage and greenhouse gas (GHG) emissions. All pumps and blowers within the plant will also be equipped with variable frequency drives (VFDs). VFDs reduce energy demands, and hence GHG emissions, by enabling electric motors to operate at less than full speed. During the design stage, consideration for the material choice and installation method for the new structures and its associated carbon footprint will also be given. The sizing of the upgrades will be optimized to require fewer building materials, which would generally lead to reduced GHG emissions during material manufacturing and construction phase.

4.4 Air Quality, Dust and Noise

With the new septage receiving station, there will be additional noise and odour being generated. Design considerations shall be given to mitigate these risks. Mitigation measures may include odour control system, frequent pump-out of the tanks, truck washdowns, etc.

4.5 Natural Environment, Ecology and Species at Risk

Cambium Inc. was retained to conduct an updated desktop Natural Environment Review for the site. This includes a review of the natural heritage existing conditions and an impact assessment for the proposed WWTS upgrades. The study area included the WWTS site and within 120m adjacent to the site, including Arena Creek. The complete memorandum can be found in Appendix F.

Table 5 summarizes the natural heritage features identified in the desktop review.

Table 5: Natural Heritage Features

Natural Heritage Feature	Identified Potential Site Concerns (On site or in Adjacent Lands Within 120 m of Site Location)
Significant habitat of Endangered and Threatened Species (SAR)	Bard Swallow (Threatened) Black Ask (Endangered) Black Tern (Special Concern) Blanding's Turtle (Threatened) Butternut (Endangered) Bobolink (Threatened) Eastern meadowlark (Threatened) Eastern Small-footed Myotis (Endangered) Eastern Wood-pewee (Special Concern) Grass Pickerel (Special Concern)

Natural Heritage Feature	Identified Potential Site Concerns (On site or in Adjacent Lands Within 120 m of Site Location)
	King Rail (Endangered) Least Bittern (Threatened) Little Brown Bat (Endangered) Pale-bellied Frost Lichen (Endangered) Red-headed Woodpecker (Endangered) Tri-colored Bat (Endangered) Wood Thrush (Special Concern)
Significant wetlands	None
Significant coastal wetlands or coastal wetlands	Presqu'ile Bay Marsh (on adjacent land)
Significant valley lands	None
Significant woodlands	None
Significant wildlife habitat	None
Significant Areas of Natural and Scientific Interest	None
Fish Habitat	Arena Creek (on Site and adjacent lands): • Cold water fish habitat • No SAR documented to be present Presqu'ile Bay Marsh and Adjacent Lands South of County Road 64: • Bridle Shiner (Special Concern) • Eastern Pondmussel (Special Concern) • Grass Pickerel (Special Concern) • Pugnose Shine (Threatened) • Shortnose Cisco (Endangered)
Other Natural Heritage Features	Woodlands (on Site and adjacent lands), not identified as Significant. Unevaluated wetlands (on Site and adjacent lands).

An environmental consultant knowledgeable in fish and fish habitat regulations, mitigation, and design strategies should be retained as a part of the team designing the relocation of Arena Creek. A field investigation should be performed to determine if fish can pass from south of County Road 64 northward into Arena Creek. In addition, it is recommended that fish community sampling and habitat mapping be completed within Arena Creek and within the proposed channel relocation area. Potential constraints and opportunities for the construction of a new channel should be identified during the field investigation. Confirmation of existing conditions and fish species present, including aquatic SAR, will contribute to the channel relocation detail design.

The DFO does not typically participate in the pre-construction design or planning of projects. DFO should be engaged to complete a Request for Project Review after the channel relocation detail design is 100% complete. The design team should provide DFO with an explanation of the proposed works, design drawings and a statement demonstrating how the design meets the requirements of the Fisheries Act and regulations. The design must quantify the area impact within direct fish habitat. A geomorphologist may be required to review the location and design of

the relocated channel to prevent impacts to the embankment of the aeration pond and minimize future maintenance work on the new channel from erosion.

The creek relocation should be designed to comply with fish and fish habitat protection provisions in the Fisheries Act. In particular, measures should be implemented to avoid:

- causing the death of fish
- the harmful alteration, disruption or destruction of fish habitat in your work, undertaking or activity

Measures to protect fish should consider:

- **In-water Work Window:** Based on the documented fish assemblage in Arena Creek, the restricted activity timing window to protect fish and fish habitat prohibits all in-water work from April 1 to July 15 when fish are potentially spawning. In-water work is permitted from July 16 to March 31.
- **Habitat Elements:** if possible, the new channel design should include substrates or habitat structures to support fish spawning. Where possible, riparian vegetation should be maintained, and re-vegetation areas should include planting and/or seeding of native species. If tree removal is planned, consider utilizing coarse woody debris or root wads for the new channel.
- **Channel Stability:** The new channel should be created in a 'fish-friendly' manner with natural channel design to ensure long term stability of the channel. Live willow stakes, a soil bio-engineering technique, can be incorporated into the banks of the new channel to provide biophysical stability, shading of the watercourse and allochthonous materials for fish. Soil bio-engineering will actively prevent erosion of the new watercourse channel.
- **Erosion and Sediment Control:** An erosion and sediment control plan should be developed to prevent sediment from entering the watercourse and harming fish or fish habitat during construction.
- **Permits and Approvals:** It is recommended that the DFO Request for Review process should be undertaken through consultation with DFO. If a Fisheries Act Authorization is required, the tender and drawings for construction work should include all conditions of the authorization or letter of advice. A Conservation Authority permit is likely required to work within their regulated area (i.e., in-water work, work adjacent to the watercourse and wetlands).

Vegetation clearing (including low-lying vegetation and shrubs) should occur outside of the migratory bird breeding season (April 15 and August 15). If any vegetation clearing is required within this time, a qualified biologist should be contacted prior to any work commencing to inspect if any active nests are present.

As the Site is located adjacent to potential habitat for turtles, workers should be aware that turtles nest in terrestrial habitats from May 15 to July 15. Turtle nests typically incubate and hatch in August to the end of October. As a mitigative strategy, it is recommended that silt fence can be

installed around the construction area to exclude turtles from the work area by May 15 and maintained to October 15. Any turtles or nests found on site should be documented and left undisturbed until the turtle has moved away, or the eggs have hatched (late August-October). If a nest needs to be moved, a qualified biologist should be contacted.

Species at risk (SAR) bats may utilize portions of the property for their lifecycle. A field investigation should be undertaken to determine if the Site has suitable habitat features for SAR bats.

Black Ash and Butternut may be present on the Site. A field investigation should be undertaken to document the presence or absence of these SAR trees on the site. Breeding birds will be documented during this survey to see which common and SAR birds are utilizing the Site.

4.6 Surface Water

No change from previous EA Addendum.

4.7 Groundwater

No change from the previous EA Addendum.

4.8 Archaeological Conditions

The Ministry of Tourism, Culture and Sport provided the "Criteria for Evaluating Archeological Potential" checklist that was used to confirm that there are no known archaeological conditions associated with this site. Refer to the form in Appendix G. Question 8 of the form asks the following:

- *Has the entire property (or project area) been subjected to recent, extensive and intensive disturbance?*

The Brighton WWTS, including the aerated lagoon, process building, facultative lagoon, sewer lines and roads, was built after 1970. Arena Creek was also relocated during these works to its current location on the eastern edge of the site. As such, most of the property has been subjected to recent (after 1960), extensive and intensive disturbances, as described on the checklist instructions. The project team contacted archaeologicalsites@ontario.ca and has confirmed that there are no reported archaeological sites on or in the immediate vicinity of the Brighton WWTS. Refer to the correspondence in Appendix G.

The proposed works will not exceed the site boundaries. As there are no known archaeological conditions associated with this site and the site has been previously disturbed within the proposed works footprint, there is low potential for built heritage or culture heritage landscape on the property. Per the Criteria for Evaluating Archaeological Potential checklist, an Archeological Assessment is not required.

4.9 Built Heritage

The Ministry of Tourism and Culture and Sport (MTCS) provided "Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes"; which is a checklist to help determine whether an EA project may impact built heritage resources and/or cultural heritage landscapes. This completed checklist can be found in Appendix H.

See an excerpt from the checklist copied below:

- *4. Does the property (or project area) contain a parcel of land that:*
  d. contains buildings or structures that are 40 or more years old?

The Brighton WWTS has a building on the site that is more than 40 years old; being the control building on the site situated between the two lagoons. This building was constructed in in 1977, it houses electrical equipment and chemical dosing/storage. The building is constructed with concrete block walls and a standard flat roof. In consulting with the MTCS, during the 2022 EA Addendum it was determined there is a very low potential for built heritage or cultural heritage landscape for the existing structures on site and therefore no further investigations are required. Refer to Appendix H for the correspondence. No additional built heritage resources or cultural heritage landscapes were identified in the revised proposed treatment location.

5.0 Public and Stakeholder Consultation Activities

5.1 Ministry of Environment, Conservation and Parks (MECP) Consultation

Since the previous EA Addendum, the Municipality, JLR and the MECP have been engaged in a series of Project Progress Meetings to provide the MECP with design and schedule updates on the Brighton WWTS Upgrades project monthly. From this ongoing discussion the need for an additional EA Addendum to follow-up the 2022 EA Addendum was identified due to the process and location changes.

Refer to Appendix C for the meeting minutes from the ongoing meeting series which began in November 2023.

5.2 Stakeholder comments

There are no additional stakeholder comments at this time.

5.3 First Nation Consultation

MECP has instructed the Project team to consult with the following First Nation communities who have been identified as potentially affected by the proposed project:

- Alderville First Nation
- Curve Lake First Nation
- Hiawatha First Nation
- Mississaugas of Scugog Island
- Kawartha Nishnawbe

These communities were engaged in the previous EA and EA Addendum. The Notice of Filing of Addendum will be sent to First Nations communities identified above.

6.0 References

- Metcalf & Eddy Inc., Wastewater Engineering Treatment and Reuse, Fourth Edition, 2003.
- Ministry of the Environment, Conservation and Parks, MOE Design Guidelines for Sewage Works, 2008.
- GSS Engineering Consultants Ltd., Brighton WWTP Aeration System Upgrades with Option to Expand Capacity, 2021.
- R.V. Anderson Associates Ltd., Brighton WPCP Proposed Upgrade Technical Review, 2022.

7.0 Limitations

This report has been prepared by J.L. Richards & Associates Limited for the Municipality of Brighton's exclusive use. Its discussions and conclusions are summary in nature and cannot properly be used, interpreted or extended to other purposes without a detailed understanding and discussions with the client as to its mandated purpose, scope and limitations. This report is based on information, drawings, data, or reports provided by the named client, its agents, and certain other suppliers or third parties, as applicable, and relies upon the accuracy and completeness of such information. Any inaccuracy or omissions in information provided, or changes to applications, designs, or materials may have a significant impact on the accuracy, reliability, findings, or conclusions of this report.

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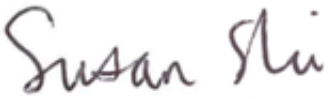
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Appendix A

Previous Studies

MUNICIPALITY OF BRIGHTON

BRIGHTON WASTEWATER TREATMENT SYSTEM

MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT

PHASE 2 REPORT - FINAL

August 2018

Submitted by:

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JLR 27271

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APPENDICES

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1.0 INTRODUCTION

1.1 Background

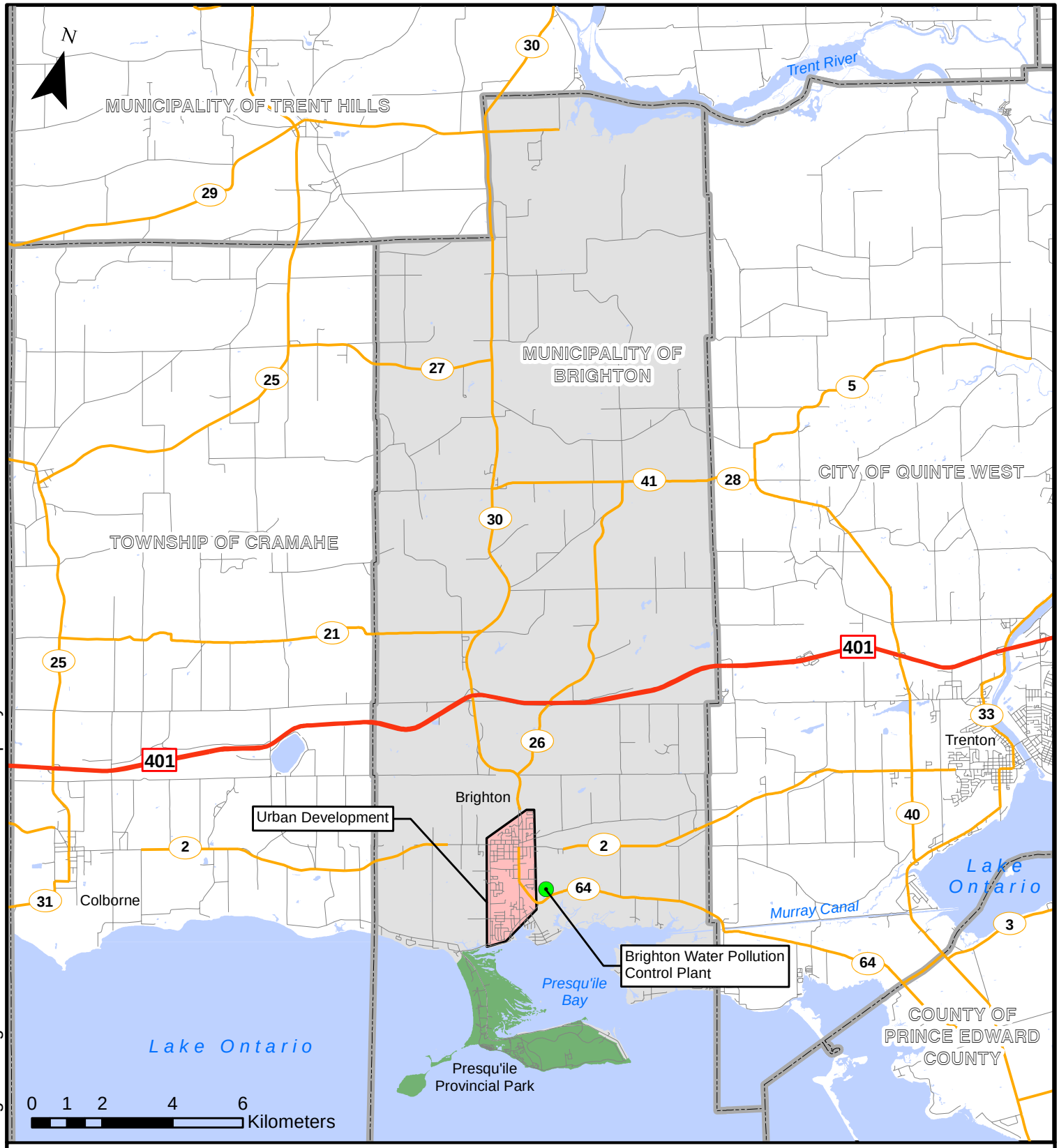
The Municipality of Brighton (the Municipality) initiated a Class Environmental Assessment (Class EA) of their wastewater treatment system in August 2016 to address various problems experienced with treatment (e.g. elevated ammonia concentrations in the treated effluent) and also to ensure that increased influent flows from future growth can be effectively accommodated. In order to fully define the problems and identify a preferred solution to address these issues, J.L. Richards & Associates Limited (JLR) was retained by the Municipality to assist in the completion of the Class EA.

The Municipality includes the former Town and Township of Brighton and is the most eastern Municipality within the County of Northumberland. The Municipality is bounded by the City of Quinte West to the east and the Town of Cramahe to the west, with the shoreline of Lake Ontario to the south. Highway 401 provides the main east-west corridor through the Municipality, which tends to be a regional focus for hamlets in the surrounding areas. Refer to Figure 1-1 for an overview of the Municipality and study location.

The communal sewage system generally consists of the Brighton Wastewater Treatment Lagoon system (currently rated for 4,600 m^3/day), the Harbour Street Sewage Pumping Station (SPS) and forcemain, a small sub-area sewage pumping station and forcemain servicing Presqu'ile Provincial Park, and several kilometers of gravity collection sewer. Approximately half of the sewage generated in the collection system is directed to the Harbour Street SPS and pumped via a 8.2 km long, 300 mm forcemain to the Lagoon treatment system and the other half flows by gravity to the Lagoon treatment system. Refer to Figure 1-2 for an overview of the Brighton communal sewage system.

As noted above, the Harbour Street SPS receives sewage from approximately half of the existing collection system. The SPS generally consists of a wet well/dry well configuration and is equipped with three dry pit centrifugal type raw sewage pumps (lead/lag/standby operation) complete with inlet and outlet piping, a standby diesel generator, a wet well emergency overflow to Butter Creek, and related instrumentation and controls for the station.

The wastewater treatment system consists of a 0.68 ha single cell aerated lagoon followed by a single cell 5.44 ha waste stabilization pond with baffle partition curtains followed by a 2-cell constructed wetland with a total surface area of 6.2 ha. There is also a chemical storage/feed system used to facilitate continuous phosphorus removal. Chemical is introduced after the aerated lagoon and upstream of the waste stabilization pond. Treated effluent from the waste stabilization pond is discharged continuously to the constructed wetland and from the constructed wetland it continuously discharges to a natural wetland and ultimately to Presqu'ile Bay, which is located off the northeast shore of Lake Ontario.



PROJECT:

BRIGHTON WASTEWATER TREATMENT SYSTEM CLASS EA

MUNICIPALITY OF BRIGHTON, ONTARIO

DRAWING:

LOCATION PLAN

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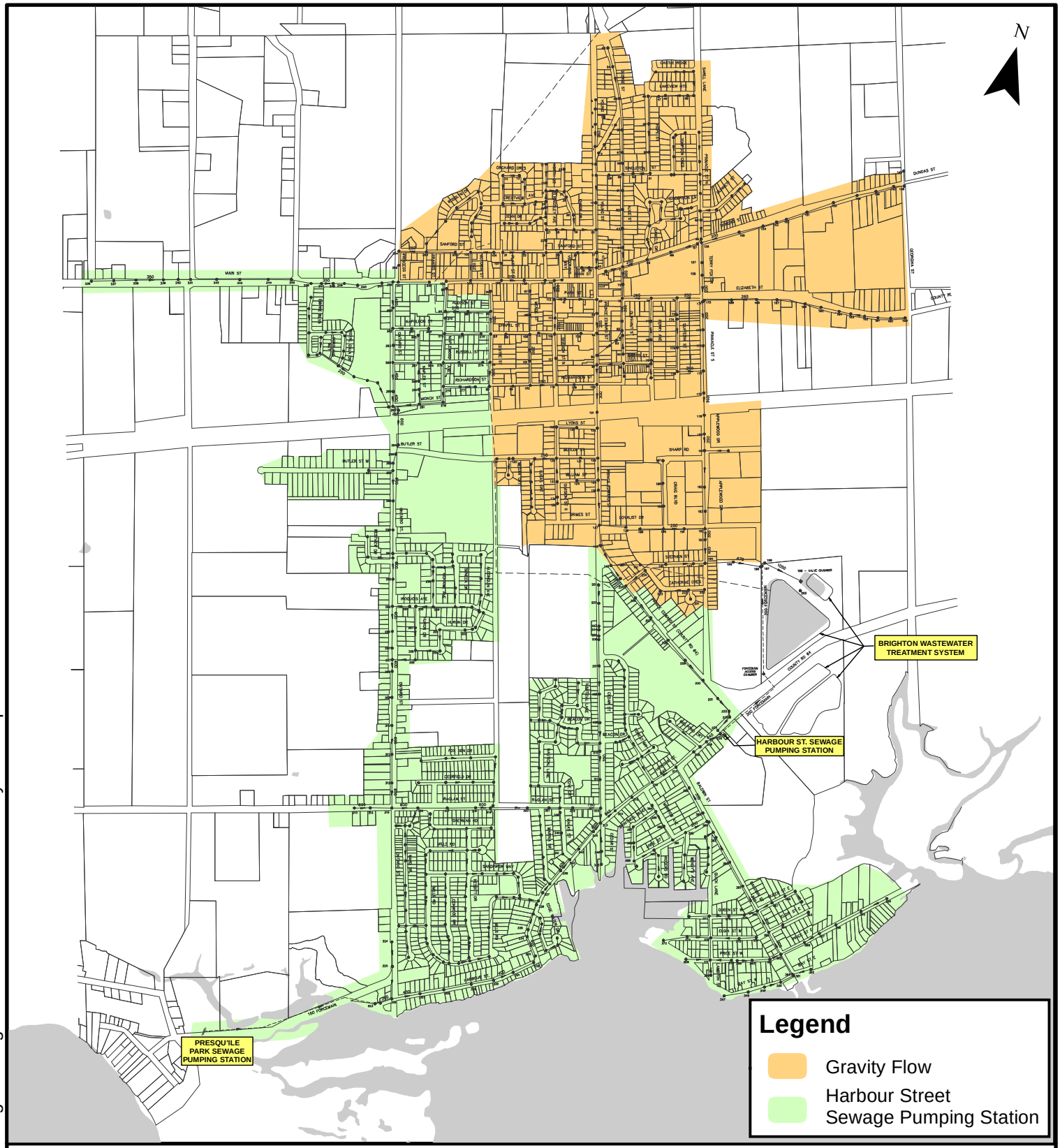
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PROJECT:

BRIGHTON WASTEWATER TREATMENT SYSTEM CLASS EA

MUNICIPALITY OF BRIGHTON, ONTARIO

DRAWING:

SYSTEM MAP (PUMPING STATION(S), FORCEMAIN, LAGOON SITE)

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1.2 Class Environmental Assessment Process

The Ontario Environmental Assessment Act (the Act) sets out a planning and decision-making process so that potential environmental effects are considered before a project begins. The purpose of the Act is to provide for the protection and conservation of the natural environment (R.S.O. 1990, c.E.18, s.2).

The Municipal Class EA process is followed for common types of projects to streamline the review process while ensuring that the project meets the requirements of the Act. It involves detailed site-specific information gathering and studies, as well as consultation with the public and stakeholder agencies. In 1987 the first Class EA guidance document prepared by the Municipal Engineers Association (MEA) on behalf of Ontario Municipalities was approved under the Act. Updates and amendments were subsequently made in 1993, 2000, 2007, 2011, and 2015.

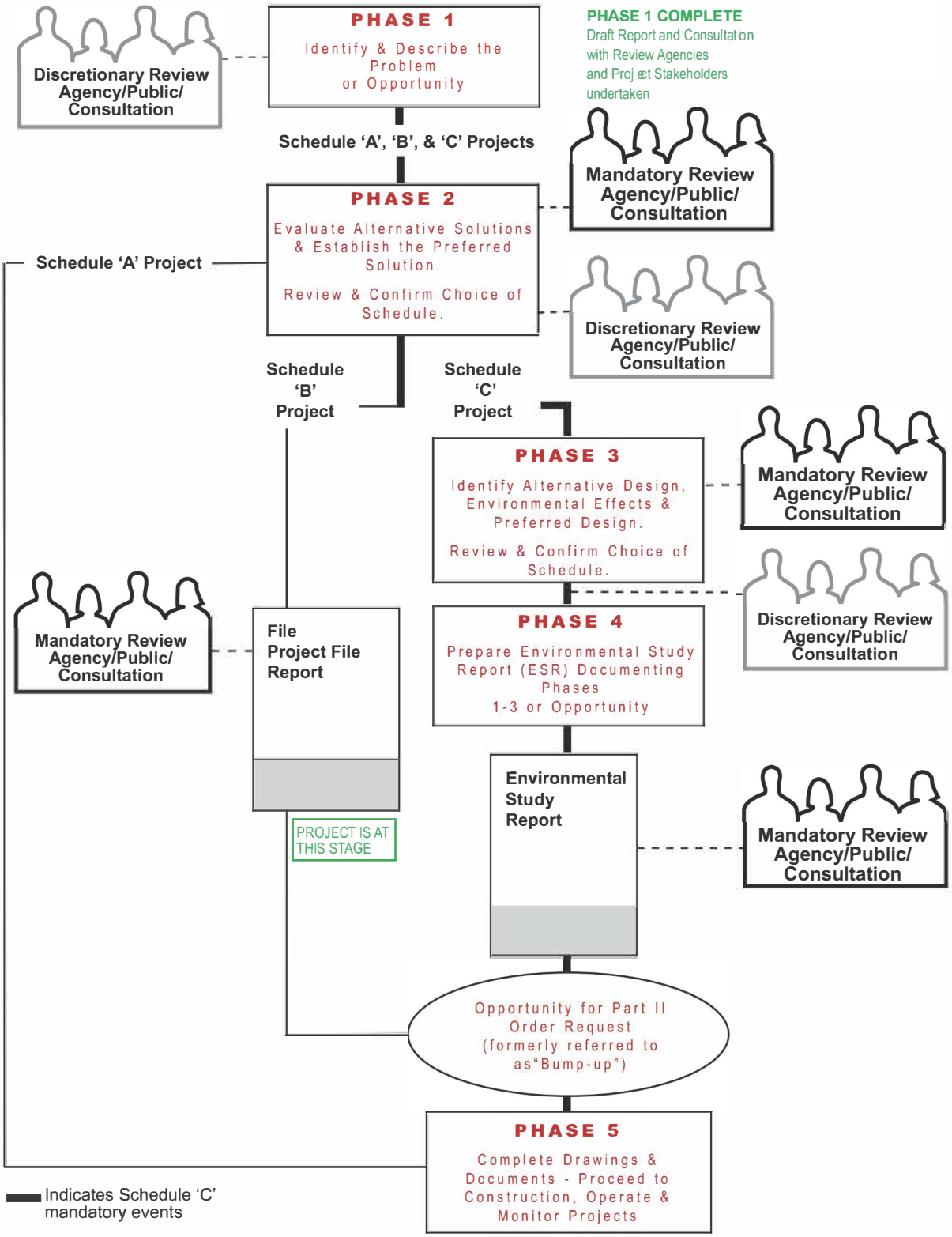
This Class EA has been initiated as a Schedule 'B' project. Projects categorized as Schedule 'B' undertakings have the potential for significant environmental effects, and are required to follow Phase 1 and Phase 2 specified under the Municipal Class EA. This includes consultation with all parties that may potentially be affected by the project, and the preparation of a Class EA Project File that documents the Class EA process for the project. At the end of Phase 2, the project Schedule is reviewed to determine if the project is complete under a Schedule 'B' Schedule or if the project needs to proceed as a Schedule C undertaking in which case Phases 3 and 4 of the Class EA process are completed.

The Class EA framework defines the process for each type of project (refer to Figure 1-3). For Schedule B projects, the completion of the following Phases of the Class EA process are required:

Phase 1 – Identify the Problem and/or Opportunity

Phase 2 – Identify Alternative Solutions to the Problem and/or Opportunity

The Project File shall be made available for public and agency review at the completion of Phase 2 of the Class EA process for a mandatory 30-day period. If there are no requests to the Ministry of the Environment and Climate Change (MOECC) for a 'Part II Order' within this 30-day review period, then the project may proceed to implementation (Phase 5).



PROJECT:

BRIGHTON WASTEWATER TREATMENT SYSTEM CLASS EA

MUNICIPALITY OF BRIGHTON, ONTARIO

DRAWING:

CLASS EA PROCESS

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1.3 Objectives of the Class EA

The objective of this Class EA is to identify the preferred strategies for wastewater treatment and for the main sewage pumping station and associated forcemain for the Brighton communal sewage system over a 20-year planning period.

The purpose of this Report is to summarize the results of Phase 2 of the Class EA process, including providing a review of the various options that have been considered to address the Problem Statement determined during Phase 1 and to recommend a preferred alternative. This Report also summarizes Phase 1 findings (based on a separate report completed for that Phase) and summarizes agency and public consultation activities;

2.0 SUMMARY OF PHASE 1 FINDINGS

2.1 Key Findings

The following are some of the key Phase 1 findings:

- The raw sewage is relatively “high strength” for a domestic sewage, with monthly samples each year falling in the range of literature values for medium to high strength raw municipal wastewater. Some maximum values are reported to be even higher. This suggests that non-residential contributions to the waste stream (e.g. industrial wastes or other sources) may be significant and may be loading the lagoon at a higher rate than it was originally designed for treating.

- The main concern over the past several years is related to treated effluent quality. In particular, ammonia concentration has exceeded the ECA limits (stabilization pond effluent) and objectives (wetland effluent) on several occasions. Additionally, in four of the six years reviewed, the ECA limits for total phosphorous were not met in the stabilization pond. There are no limits specified in the ECA for E. Coli, but the objective (wetland) was not met in five of the six years reviewed.

- A detailed review of the wastewater treatment system performance indicates that the existing system experiences a number of challenges including: regular organic overloading, potential short circuiting, and limited hydraulic detention time, issues with inefficient aeration, rapid sludge accumulation, and poor ammonia effluent quality throughout the year.

- The wetland portion of the treatment system does not appear to be providing significant treatment with the exception of some marginal decreases in Total Phosphorus.

- Due to the age and condition of the existing infrastructure, it is estimated that approximately $500,000 in infrastructure rehabilitation and maintenance at the Harbour Street SPS and Lagoon is required over approximately the next 7 years.

- Updated population and flow projections show that the currently approved ECA rated capacity of the existing treatment system is not anticipated to be exceeded in the 20-year planning period for this study.

2.2 Phase 1 Problem and Opportunity Statement

Based on the information developed and analyzed during Phase 1 of this Class EA, the following problem/opportunity statement was developed for the project:

The Brighton communal sewage system generally consists of several kilometers of gravity collection sewers, a main pumping station, a smaller sub-area pumping station and a continuously discharged lagoon based treatment system that includes an aeration cell, a waste stabilization pond, a constructed wetland and a continuous chemical feed system for phosphorus removal. The treatment system is currently licensed under Environmental Compliance Approval (ECA) No. 3081-9XQNZK which stipulates certain operational and performance requirements. The system currently services an estimated population of 6462 and some population growth is projected to occur within the 20 year planning period that will generate additional flows and increase hydraulic loading to the treatment system. The system is currently only operating at approximately 60% to 70% of its ECA rated "hydraulic" capacity.

Based on an evaluation of the available operational historical treated effluent data, it has been determined that the treatment system has regular difficulties in achieving the effluent quality required by ECA No. 3081-9XQNZK, particularly for ammonia and in some cases Total Phosphorus. A review of historical raw sewage quality, hydraulic input and the overall physical configuration of the Lagoon based treatment system, indicates that the relatively high strength raw sewage combined with physical limitations of the treatment system is the primary cause for the treated effluent exceedances. The system, as currently configured, is not capable of treating the organic loadings received from the collection system. Further the constructed wetland portion of the treatment system is not providing any significant treatment with respect to the parameters of concern.

In addition, the Harbour Street SPS and the Lagoon based treatment system were evaluated as part of Phase 1 of the Class EA. Due to the age and condition of the existing infrastructure, within the next 7 years approximately $500,000 in infrastructure rehabilitation and maintenance is required.

3.0 PHASE 2 PUBLIC AND AGENCY CONSULTATION

3.1 Consultation Summary

The Class EA process requires consultation with parties that may potentially be affected by the project. As part of Phase 2, the consultation plan developed in Phase 1 was followed in order to facilitate communication with the public and various agencies and other interested parties. Refer to Appendix A for the Phase 2 Public Consultation Summary and supporting documentation.

Key components of Phase 2 Stakeholder consultation include:

- Reviewing the Public Consultation Plan (developed in Phase 1)
- Project Team/Committee Meetings
- Responding to Public Stakeholder Comments
- Responding to Review Agency Comments
- Maintaining Project Mailing List and Contacts
- Public Information Centre
- Notice of Completion

Key consultation correspondence from Phase 2 is included in Appendix A. A brief summary of some of the key results of this consultation is presented below:

- Public – Comments were received from members of the public and Councilors. Concerns varied but included comments about the design and operation of the current wastewater treatment system, maintenance and protection of the engineered and natural wetland, the planning horizon of the Class EA, water quality in Presqu'ile Bay, the capital on ongoing costs associated with the proposed infrastructure upgrades, and comments on the preliminary preferred alternative.

- MOECC - The MOECC reviewed the Phase 1 and draft Phase 2 Report and other available information on the project and determined that the existing effluent limits may remain in place. The Ministry noted that the Class EA evaluation should consider that some add-on treatment options could provide incidental improvements in overall effluent quality. Improvements in BOD and TSS in addition to ammonia were of particular interest to the MOECC. The MOECC indicated that they do not anticipate giving credit to the effluent quality improvements that the constructed wetland may provide.

4.0 ADDITIONAL CONDITIONS AND CONSTRAINTS

Phase 1 of the Class EA involved problem/opportunity definition, which included identifying all relevant existing conditions and constraints to ensure that feasible alternative solutions could be properly identified and evaluated in consideration of all of the project specific circumstances. Some additional key conditions and constraints were also confirmed early on in Phase 2 and are outlined below.

4.1 Treated Effluent Requirements

The wastewater treatment system is rated for an Average Day Flow (ADF) of 4,600 m^3/day. An evaluation of projected growth within the service area was undertaken as part of Phase 1 of this Class EA and based on this evaluation, the 20-year design average day raw sewage flow to the lagoon is anticipated to be less than the current rated capacity and there is no need for an increase to the ECA rated capacity during this time period.

The existing ECA compliance requirements for the treatment system are outlined in Table 4-1. The MOECC was consulted near the end of Phase 1 and early on into Phase 2 of the Class EA. During this consultation, it was confirmed that the current ECA requirements are to remain in effect as part of this undertaking. It was noted by the MOECC that enhanced treatment should focus on addressing the issues associated with ammonia removal and to a lesser extent total phosphorous. The MOECC indicated that during the evaluation of options in Phase 2 and moving forward into preliminary design, consideration should be given to alternatives that can provide some incidental improvements in the treatment of TSS and $cBOD_5$. Documentation of this correspondence with the MOECC is provided in the Consultation Summary (Appendix A).

Table 4-1 Existing Effluent Compliance Limits – Waste Stabilization Pond

Parameter	Concentration in Effluent	Loading in Effluent	Non-compliance
$CBOD_5$	30.0 mg/L	138.0 kg/day	Annual Average
Total Suspended Solids	40.0 mg/L	184.0 kg/day	Annual Average
Ammonia + Ammonium Nitrogen	14.0 mg/L * 17.0 mg/L **	64.4 kg/day * 78.2 kg/day **	Monthly Average
Total Phosphorus	1.0 mg/L	4.6 kg/day	Monthly Average
Notes: * from May 01 to October 30 ** from November 01 to April 30			

4.2 Receiving Water Assessment

Based on the above-noted consultation with the MOECC and given the fact that an increase in the rated capacity is not required for this particular undertaking, a receiving water assessment was deemed not to be required.

5.0 IDENTIFICATION OF WASTEWATER TREATMENT ALTERNATIVES

5.1 Evaluation and Selection Methodology

The main objective of Phase 2 of a Class EA is to identify and evaluate possible alternative solutions to the problem(s) (and/or opportunities) identified in Phase 1. All reasonable potential solutions to the problem(s), including the 'Do Nothing' option, are considered. Class EAs for wastewater projects generally result in the identification and review of a broad range of solutions. It is also important to note that the objective of Phase 2 is to focus on a determining an overall "generalized solution" to the problem and not necessarily all of the intricate details which are typically further explored as part of Phase 3 of a Schedule C Class EA and then further developed during a preliminary and detailed design stage (i.e. included as part of Phase 5 of the Class EA process and referred to as Implementation).

In order to facilitate the evaluation and selection of the preferred solutions during Phase 2, a transparent and logical three part assessment process was established. This process included:

- Initial screening of alternatives;
- Detailed evaluation of screened alternatives; and
- Selection of a preferred alternative.

The first evaluation stage considers the overall feasibility of the potential solutions and identifies those alternatives that fully address the problem statement. This step ensures that unrealistic alternatives are not carried forward to a more detailed evaluation stage.

Based on the initial screening, a detailed assessment of the short list of alternatives is conducted. Evaluation criteria were developed based on a review of the background information, experience on similar assessments and in consultation with Municipal staff. The evaluation was conducted using criterion in the following four major criteria categories:

- Natural Environment and Archeology
- Engineering and Technical Considerations
- Social and Community Well Being
- Financial Impacts

Once the detailed evaluation was completed, a recommended preferred alternative or alternative(s) was identified for presentation to stakeholders and to solicit input prior to finalizing a preferred alternative.

5.2 Initial Screening of Alternatives

Several alternatives are presented in Table 5-1 along with a summary of the review carried out to support a recommendation to either carry the alternative forward for further evaluation or not.

Table 5-1 Description and Preliminary Evaluation of Wastewater Treatment Alternatives

Alternative	Review/Recommendation
Option 1: Do nothing	
1) Do nothing	**Review:** This option would have a negative effect on the environment as effluent would likely continue to exceed the ECA limits and could also result in fines to the Municipality. This option has not been carried forward as it does not address the problem. **Recommendation: Do not carry forward**
Option 2: Optimize/Modify Current Lagoon Operations	
2A) Remove sludge from lagoon cells	**Review:** Sludge removal has proven in the past to not address the identified issues on its own. This alternative should only be considered in combination with other options. **Recommendation: Carry forward but only as an option to be considered in combination with other alternatives**
2B) Optimize baffle design and upgrade/refurbish existing baffles	**Review:** Optimizing baffle design in the stabilization pond (Cell No. 2) will not address all the identified problems on its own but it should provide some additional treatment by improving lagoon retention time and reduce overall risks in not meeting ECA requirements. This alternative should be only considered in combination with other options. **Recommendation: Carry forward but only as an option to be considered in combination with other alternatives**
2C) Modify lagoon operating volume and/or aeration	**Review:** Previous upgrades to the existing lagoon aeration system have proven not to be effective in addressing the identified problems. A new aeration system is part of some of the other options being carried forward (see below). Adding additional lagoon volume will not address the issues associated with ammonia treatment. **Recommendation: Do not carry forward**

2D) Optimize alum dosage for phosphorous removal	**Review:** Optimizing alum dosage will not address all of the identified problems on its own but should help to resolve the issues with periodic phosphorous exceedances from the lagoon. **Recommendation: Carry forward but only as an option to be considered in <u>combination</u> with other alternatives**
2E) Upgrade/refurbish the constructed wetland	**Review:** Refurbishing the wetland is not anticipated to address all of the identified issues on its own. Initial conversations with the MOECC suggest that the effluent objects on the wetland are for data collection purposes only. Refurbishing the wetland, however, may provide some additional treatment and reduce overall risks in not meeting ECA requirements. **Recommendation: Carry forward but only as an option to be considered in <u>combination</u> with other alternatives**
1F) Investigate and divert any identified high strength waste streams away from the lagoon system	**Review:** As part of the preferred alternative, the Municipality should continue to work with its ICI customers in the community to assess options for reducing high strength sewage discharges to the collection system. Reducing the strength of the influent loading to the lagoon system will assist in mitigating risks of impacts to the existing treatment system (and any new systems) and the resulting treated effluent concentrations. **Recommendation: Carry forward but only as an option to be considered in <u>combination</u> with other alternatives**
Option 3: Install Specialized Treatment System to Complement the Existing Lagoon System	
3A) Install complete mix activated sludge process upstream of existing lagoons (e.g. Biolac Treatment System)	**Review:** These options (Option 3) have all been reviewed based on information received from technology providers and all have the potential to meet the current effluent criteria and address the key issues in the problem statement. **Recommendation: Carry forward**
3B) Upgrade aeration in the existing aeration cell and install submerged aerated bio-film reactors in the existing stabilization pond (e.g. WCS Bio-Shell)	
3C) Upgrade/expand aeration in the existing cells and install an attached growth reactor following the existing stabilization pond (e.g. SAGR)	
3D) Add pre-screening and install a fixed film biological treatment process upstream of the existing lagoons (e.g. SMBR, MBBR)	

3E) Upgrade aeration in the existing aeration cell and install a fixed film biological treatment process downstream of the existing lagoons (e.g. SMBR, MBBR)	
3F) Add pre-screening and install a bioreactor with activated sludge process and membrane technology upstream of the existing lagoons (e.g. MBR)	
Option 4: New Mechanical Treatment Plant	
4) Replace lagoon completely with a new mechanical treatment plant	**Review:** This option has the proven ability to meet the current effluent criteria and address the key issues in the problem statement; however, the costs are anticipated to be much higher than the other options and significant changes to the site and operations would be required making it unaffordable to the Municipality. Costs are estimated to be $15M to $25M with annual operating costs in the $750,000 range. **Recommendation: Do not carry forward**

5.3 Detailed Evaluation of Wastewater Treatment Alternatives

5.3.1 Probable Costs - Capital Costs

An Opinion of Probable Construction Costs (OPCC) with a Class 'D' (Indicative Estimate) level of accuracy was developed for each of the alternates and includes allowances for design elements that have not fully been developed. The OPCC's were developed based on past experience on similar projects, professional judgment, and equipment costs provided by suppliers.

Table 5-2 Total Estimated Cost of Treatment Alternatives (2017 $)

Option	Estimated Capital Cost (2017 $)
Option 2: Optimize/Modify Current Lagoon Operations	
2a. Remove sludge from lagoon cells [1.]	$ 1,000,000
2b. Upgrade/refurbish existing baffles [2.]	$ 300,000
2d. Optimize alum dosage (study component only)	$ 30,000
2e. Refurbish the constructed wetland	$150,000
2f. Divert high strength waste streams	No on-site cost
Option 3: Install Specialized Treatment System to the Existing Lagoon System	
3a. Complete Mix Activated Sludge Process	$4.5M
3b. Submersible Aerated Bio-Film Reactors [3.]	$4.5M
3c. Submerged Attached Growth Reactor [3.]	$4.5M
3d. Fixed Film Biological Process – upstream	$6.0M
3e. Fixed Film Biological Process – downstream [3.]	$4.5M
3f. Activated Sludge with Membrane Technology	$10.0M

Notes:
1. Estimated cost of full desludging of aeration and stabilization pond.
2. Includes computational fluid dynamics (CFD) modelling to optimize design and new, as well as modified baffles in the stabilization pond.
3. Includes aeration upgrades in existing aeration cell.

5.3.2 Probable Costs – Lifecycle Costs

Based on the cost of existing operations and information from suppliers and similarly sized facilities, the annual operating costs of each particular treatment alternative have been summarized in Table 5-3. For the purposes of establishing operational costs it has been assumed that the treatment system is operating at its ECA rated capacity. Costs include operations staff and electricity costs for blowers and pumps. Chemical costs associated with the phosphorous removal system and equipment replacement costs have not been included.

Table 5-3 Estimated Annual Operational Costs of Treatment Alternatives (2017 $)

Option	Estimated Operations Cost ($/year)
3a. Complete Mix Activated Sludge Process	$200,000
3b. Submersible Aerated Bio-Film Reactors	$200,000
3c. Submerged Attached Growth Reactor	$300,000
3d. Fixed Film Biological Process - upstream	$200,000
3e. Fixed Film Biological Process - downstream	$200,000
3f. Activated Sludge with Membrane Technology	Info not provided by supplier

5.3.3 Evaluation Overview

Table 5-4 summarizes the detailed evaluation of the screened alternatives for the treatment system. Each option was assigned an evaluation impact level (refer to Table 5-4) for each evaluation criteria. This method provides an overall assessment of the positive and negative impacts of each alternative. This method was used as it is recognized that there could be more than one option or technology that can address the problem and that additional consideration of these technologies could be undertaken either as part of a Phase 3 (i.e. Schedule C continuation of this Class EA) or as part of a pre-design stage. For the detailed evaluation refer to Appendix B.

Table 5-4 Evaluation Impact Level

Evaluation Impact Level	Indicator
Potential for Positive Impact	+1
No Anticipated Impact	0
Potential for Negative Impact	-1

Appendix C contains conceptual layouts of each of the technologies and how they could be integrated into the existing site.

Table 5-5 Summary Evaluation Matrix

MAJOR CRITERIA	MINOR CRITERIA	OPT 3A COMPLETE MIX ACTIVATED SLUDGE PROCESS	OPT 3B SUBMERSIBLE AERATED BIO-FILM REACTORS	OPT 3C SUBMERGED ATTACHED GROWTH REACTOR	OPT 3D FIXED FILM BIOLOGICAL PROCESS (UPSTREAM)	OPT 3E FIXED FILM BIOLOGICAL PROCESS (DOWNSTREAM)	OPT 3F ACTIVATED SLUDGE WITH MEMBRANE TECHNOLOGY
NATURAL ENVIRONMENT AND ARCHAEOLOGY	Effect on Fish and Aquatic Habitat	+1	+1	+1	+1	+1	+1
	Effect on Wetlands, Woodlands, Wildlife Habitat	0	0	-1	0	0	0
	Effect on Archeological Potential Impacts	0	0	0	0	0	0
ENGINEERING AND TECHNICAL CONSIDERATIONS	Proven Cold Weather Installations	+1	-1	+1	+1	+1	-1
	Ability to Meet Effluent Criteria	+1	0	+1	+1	+1	+1
	Degree of Process Control	+1	-1	-1	+1	+1	+1
	Ease of Operation	-1	+1	+1	0	0	-1
	Capability with existing site	+1	+1	-1	+1	0	+1
	Opportunities for Future Expansion	+1	-1	-1	+1	+1	+1
SOCIAL/ COMMUNITY WELL BEING	Impacts During Construction	0	0	-1	0	0	0
	Compatibility with Surrounding Land Use and Visual Impact	0	0	-1	0	0	0
	Noise and Odour Effects during Operation	+1	+1	+1	+1	+1	+1
Maintenance (Short Term and Long Term Requirements)		-1	-1	0	-1	+1	-1
Capital Cost		0	0	0	-1	0	-1
TOTAL		**5**	**0**	**-1**	**5**	**7**	**2**

6.0 PREFERRED SOLUTION

6.1 Description of the Preferred Alternative

Based on the evaluation methodology utilized, it was determined that Option 3 - Install a Specialized Treatment System to Complement the Existing Lagoon System provided the highest overall net benefit to the Municipality. In order to mitigate risk and ensure appropriate treatment redundancy and to take advantage of existing facilities/infrastructure (i.e. the existing lagoon and constructed wetland), this option should be completed in combination with some of the items identified in Option 2 – Optimizing and Modifying Current Lagoon Operations as being part of the overall preferred solutions. This includes a very thorough de-sludging program prior to any new technology implementation, upgrading baffles in the stabilization pond, optimizing alum dosage, refurbishing the constructed wetland, and diverting high waste streams. With regards to the particular specialized treatment system to be selected, the complete mix activated sludge process (3A) and the fixed film biological process (3D or 3E) appear to provide the highest overall benefit to the Municipality based on information available at this time.

The main benefits of each of the preferred solutions in Option 3 are the following:

- Proven full scale Canadian and cold weather installations;
- Ability to meet current effluent criteria, with quality that is better than current ECA limits;
- Controlled process that can be adjusted to achieve consistent effluent quality;
- Easily expandable process with minimal capital cost to increase treatment capacity; and
- Moderate upfront capital costs and ongoing operational costs.

In addition, the fixed film biological process located downstream of the stabilization pond (3E) has several added benefits for consideration by the municipality:

- Comparatively lower capital cost investment
- Potential for reduced necessity to upgrade aeration equipment in Cell 1
- Manufacturer’s warrantee on effluent quality (with effluent at ECA compliance measurement point)

6.2 Opinion of Probable Cost for Preferred Solution (including lifecycle upgrades)

An Opinion of Probable Construction Costs (OPCC) with a Class ‘D’ (Indicative Estimate) level of accuracy was developed for full implementation of all elements of the preferred solution. Allowances for design elements that have not fully been developed are included. The OPCC’s were developed based on past experience on similar projects, professional judgment, and equipment costs provided by suppliers.

Table 6-1 Opinion of Probable Cost for Preferred Solution

Component	Estimated Capital Cost (2017 $) (Option 3E)
Install Specialized Treatment System	$4,500,000
Remove sludge from lagoon cells	$1,000,000
Upgrade/refurbish existing baffles	$ 300,000
Optimize alum dosage (study component only)	$ 30,000
Refurbish the constructed wetland	$ 150,000
Complete Lifecycle Upgrades at SPS and Lagoon	$ 500,000
Sub-Total	**$6,480,000**
Engineering and Contingency (30%)	$ 1,940,000
Grand Total (rounded)	**$ 8,424,000**

7.0 CONCLUSIONS AND NEXT STEPS

The Municipality is now in a position to post the Class EA Project File that documents the Class EA process. After the 30-day period for comment closes the Municipality will be in a position to implement the preferred option and proceed directly into preliminary design. The design would be based on the analysis presented within this Schedule B and the conceptual layouts for the preferred alternatives identified in Phase 2 that take the environmental factors into consideration (e.g. potential impacts to the constructed wetland, etc.).

Appendix A

Public Consultation Summary

MUNICIPALITY OF BRIGHTON

BRIGHTON WASTEWATER TREATMENT SYSTEM

MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT

PHASE 2

PUBLIC CONSULTATION SUMMARY

August 2018

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APPENDICES

Appendix A – Notice of Study Commencement

Appendix B – Public Correspondence

Appendix C – Agency Mailing List and Correspondence

Appendix D – Aboriginal Communities Mailing List and Correspondence

Appendix E – Public Information Centre Materials (Notice, Boards, and Comment Sheet)

1.0 OVERVIEW

The Municipality of Brighton (the Municipality) initiated a Class Environmental Assessment (Class EA) of their wastewater treatment system in August 2016 to address various problems experienced with treatment at their treatment lagoon (e.g. elevated ammonia concentrations in the treated effluent) and also to ensure that increased influent flows from future growth can be effectively accommodated. In order to fully define the problems and identify a preferred solution to address these issues, J.L. Richards & Associates Limited (JLR) was retained by the Municipality to assist in the completion of the Class EA.

Public consultation activities have been undertaken to ensure that the public and other stakeholders would have numerous opportunities to be involved in and to provide comments throughout the Class EA. This Consultation Summary will be updated on an ongoing basis throughout the Class EA.

2.0 NOTICE OF STUDY COMMENCEMENT

In accordance with Phase 1 of this Class EA, a Notice of Study Commencement (provided in Appendix A) was prepared by the consulting team. The Notice was issued in English and also included a survey for stakeholders to return by mail or email.

The Notice of Study Commencement was:

1. Placed on the Municipality's website home page from October 14, 2016 to date.
2. In the Brighton Independent newspaper on December 8, 2016 and December 15, 2016.
3. Mailed to the mandatory review agencies on October 27, 2016.

3.0 STAKEHOLDER COMMENTS

3.1 Public Stakeholders

Written correspondence from the public and project team responses is summarized in Appendix B. In addition, approximately 20 members of the public requested to join the project mailing list. These names were added to the stakeholder list.

3.2 Review Agencies

A project mailing list was developed identifying review agency stakeholders. Refer to Appendix C for a copy of the project agency mailing list and written correspondence from the review agencies. Table 3.1 provides a summary of agency comments received to date regarding this Class EA. In addition to written correspondence, meetings were held with the Ministry of Environment and Climate Change, these are documented in Section 6.0.

Table 3.1 Summary of Agency Stakeholder Comments

Stakeholder	Comment	Action
Lower Trent Region Conservation Authority (LTC)	November 23, 2016 - The LTC expressed interest in being included on the mailings for this project as portions of the treatment system are in an area regulated by the LTC.	Added to the mailing list.
Ministry of Environment and Climate Change (MOECC)	November 30, 2016 - The MOECC provided comments on the Class EA Process, MOECC Technical Review, and consultation with Aboriginal Communities.	A pre-consultation meeting with the MOECC was scheduled.
	March 28, 2017 – The MOECC reviewed the Phase 1 Report and other available information on the project and determined that the existing effluent limits can remain in place. The Ministry noted that the Class EA evaluation should consider that some add-on treatment options could provide incidental improvements in overall effluent quality. Improvements in BOD and TSS in additional to ammonia were of particular interest in to the MOECC. The MOECC indicated that they do not anticipate giving credit to the effluent quality improvements that the constructed wetland may provide.	Incidental improvements in overall effluent quality were considered in the evaluation alternatives.
	July 13, 2017 – The MOECC reviewed the Phase 2 Report (dated April 10, 2017) the MOECC indicated that they are prepared to accept the proposal that as no physical expansion of the sewage works is proposed, the existing effluent compliance limits, objectives and loadings be maintained in the amended ECA and that the compliance point or the Brighton sewage system be imposed upstream of the constructed wetland. Overall, the MOECC indicated that they are satisfied with the proposed effluent criteria for the upgrades to the Brighton sewage system.	The proposed effluent criteria have been incorporated into the final Phase 2 Report.
Ministry of Natural Resources and Forestry (MNRF)	December 13, 2016 – The MNRF provided general information on the databases available. It was also noted that any expansions of the existing infrastructure should not be placed within the Provincially Significant Wetland (adjacent to the engineered wetland). A site assessment was also recommended to identify the presence of any Species at Risk and/or their habitat.	The placement of new infrastructure was considered as part of the evaluation and consideration will be given to completing a site assessment in subsequent phases of the proposed work.

3.3 Aboriginal Communities

Based on the Crown's preliminary assessment seven Aboriginal communities were identified as potentially affected. Refer to Appendix D for a copy of the Aboriginal communities' mailing list and written correspondence received. Table 3.2 provides a summary of Aboriginal comments received to date regarding this Class EA.

Table 3.2 Summary of Aboriginal Community Stakeholder Comments

Stakeholder	Comment	Action
Mississaugas of Scubob Island	August 2, 2017 – The Missassaugas of Scugog Island expressed concern for the fishing and wetland related species and environments.	The evaluation considered the potential impact of each alternative on several natural environment criteria including: fish and aquatic habitat; wetlands, woodlands, wildlife habitat; and archeological potential impacts. Study updates will be sent to the representative.

4.0 PROJECT MEETINGS

4.1 Project Committee Team Meetings

To facilitate the consultation process the Project Management Team, including JLR team members and City staff, have met at regular intervals during the Class EA. Table 4.1 provides a summary of the meetings.

Table 4.1 Summary of Project Team Meetings

Meeting/Date	Comments
Progress Meeting No. 1 September 28, 2016	Meetings held to discuss Phase 1 activities to date, including review and collection of background information.
Progress Meeting No. 2 Friday May 3, 2017	Review draft Phase 1 and Phase 2 reports, including discussion of the MOECC feedback, evaluation methodology, and selection of the preferred alternative.

4.2 MOECC Meetings

To facilitate the consultation process the Project Management Team, including JLR team members and City staff, met at regular intervals during the Class EA with representatives from the MOECC. Table 4.2 provides a summary of the meetings.

Table 4.2 Summary of MOECC Consultation Meetings

Meeting/Date	Comments
MOECC Meeting No. 1 December 20, 2016	Meeting held to provide MOECC with project background information and obtain preliminary feedback from the MOECC on the project.
MOECC Meeting No. 2 January 31, 2018	Meeting to provide the MOECC with a project update, discuss the Class EA status, and solicit input into next steps.
MOECC Meeting No. 3 July 16, 2018	Meeting to review the Council decisions to move forward with completion of Schedule B Class EA for the Brighton WPCP based on the preferred design alternative and discuss the detailed plans and timelines for the project.

4.3 Presentations to Council

To facilitate the consultation process the JLR team members presented to Council at regular intervals during the Class EA. Table 4.3 provides a summary of the meetings.

Table 4.3 Summary of JLR Presentations to Council

Meeting/Date	Comments
Special Council Meeting May 29, 2017	Presentation from Steve Saxton, JLR regarding the Brighton Wastewater Treatment System Schedule B Class Environmental Assessment. Meeting was held in conjunction with the Public Information Centre.
Council Meeting July 17, 2017	Follow-up from Steve Saxton, JLR regarding the Brighton Wastewater Treatment System Schedule B Class EA.
Council Meeting December 11, 2017	That Council received delegation from Steve Saxton, JLR in response to a Motion passed December 4, 2017 to resume the Schedule 'B' Class EA and investigate the construction of a mechanical, conventional activated sludge plant.
Council Meeting June 4, 2018	Steve Saxton, JLR attended in response Council direction regarding next steps at the Brighton Wastewater Treatment System. A motion was passed that JLR provide a report to Council describing various ammonia treatment technologies and associated costs.
Special Council Meeting June 25, 2018	Steve Saxton, P.Eng., JLR provided a report regarding Resolution 2018-443 directing J.L. Richards to describe different technologies and associated costs that will address the ammonia issue at the Brighton Lagoon. Technologies discussed included: the complete mix activated sludge process, submersible aerated bio-film reactors, submerged attached growth reactor, fixed film biological process (MBBR), activated sludge with membrane, secondary clarifier with activated sludge recirculation. Resolution No. 2018-520 was passed that Council select MBBR supplemental treatment and complete the Schedule 'B' Class EA. Further to that, Resolution 2018-521 was passed that Council provide funding for a Schedule 'C' Class EA for future planning. To conclude Resolution No. 2018-522 was passed that Council direct staff though GSS Engineering to develop an RFP for the preliminary detailed design of an MBBR system.

5.0 PUBLIC INFORMATION CENTRE

The Phase 2 Public Information Centre (PIC) for the Class EA took place on Monday, May 29, 2017 at the Brighton Community Centre from 6:00 pm to 8:00 pm. The Notice was sent to the project mailing list and posted on the Municipality's website. Representatives from the project team and staff from the Municipality were available to answer questions during the PIC. The PIC was attended by some Councillors and approximately 20 members of the public. Comments received from the public at the PIC are summarized in Appendix B. Refer to Appendix E for a copy of the Notice, display boards and comment sheet.

Appendix A

Notice of Study Commencement

Notice of Study Commencement

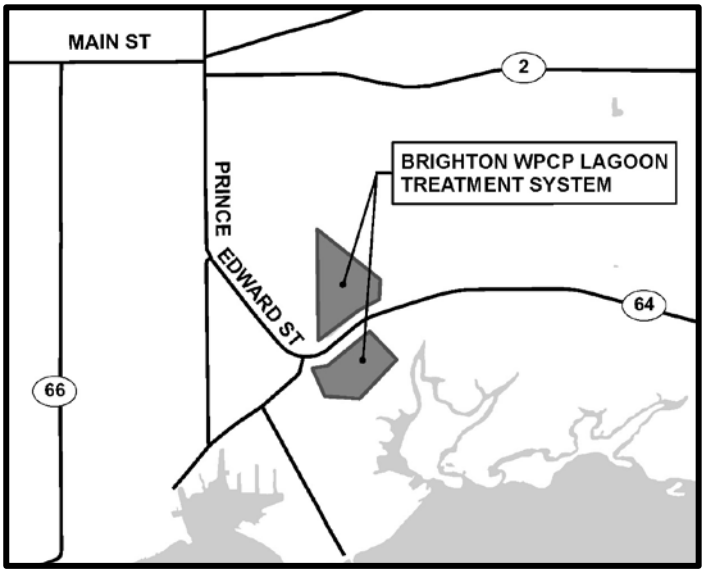
Municipality of Brighton
Brighton Wastewater Treatment System
Schedule B Class Environmental Assessment

The Municipality of Brighton has initiated a Class Environmental Assessment (Class EA) to determine the most suitable process for wastewater treatment in Brighton over the next 20 years.

How Will This Affect Me?

The study will assess current and future requirements of the Brighton wastewater treatment system, including the lagoon, main sewage pumping station, and forcemain and make recomemdations for the wastewater treatment system.

Public and agency consultation is a key element of the process. Based on your input, alternative strategies will be evaluated to identify optimal community, environmental and economic opportunities.



How Do I Get More Information?

A Public Information Centre (PIC) will be conducted in early 2017 prior to finalzing the preferred solution. In the meantime, the study team is reviewing background data and determining alternative solutions. You are also invited to contact a member of the study team at anytime with questions or to provide input into the study.

Updates will be provided thoghout the study on the Municipality website, and if you have any questions regarding the study, please visit our website at www.brighton.ca or contact one of the people listed below.

TO FIND OUT MORE VISIT
www.brighton.ca

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This study is being conducted according to the requirements of a Schedule B project under the Municipal Class Environmental Assessment process (October 2000, as amended in 2015).

This Notice issued October 14, 2016

Appendix B

Public Correspondence

Brighton Wastewater Treatment System Municipal Class EA
Record of Public Feedback
(Comments received to June 27, 2017)

Comment 1 – [redacted] – Resident – Received October 25 & 27, 2016

The Aecom report states in section 3, ammonia control options, the retention time has to be increased from the present to 48 and 54 days of retention in order to meet the ammonia limits, in order to do this the top water has to be raised 0.9 m.
Q) Is this sound advice, can this be done, and will it help?

> *Response: It is not uncommon for facultative lagoons to have difficulties in treating for ammonia. An expanded lagoon volume could improve some aspects of the treated effluent quality but would not be effective in additional ammonia removal which has been identified as a key concern for this project. There are, however, several available specialized treatment technology lagoon "add-ons" that could be implemented on site which are designed to specifically target ammonia removal and are best suited to be located downstream of the lagoon after it has removed significant contaminants. Many of these specialized processes also provide additional treatment for other parameters which will be a benefit in providing additional redundancy to the lagoon system.*

In the Aecom report it clearly states in section 3 that in order to maintain this retention time for a daily average flow rate for the future (4600 m^3/day) the berm would have to be raised 0.6 m.
Q) Is this sound advice, can this be done, and will it help?

> *Response: The existing wastewater stabilization pond can be considered a valuable asset at its current capacity. An expanded lagoon volume, by raising the berm could improve some aspects of the treated effluent quality but would not be effective in additional ammonia removal which has been identified as a key concern for this project. One related recommendation from the current EA work is to undertake Computational Fluid Dynamic (CFD) modeling of the lagoon system to determine if enhancing the overall baffling will significantly improve retention time. The decision to improve baffling or not will be made based on the CFD modeling and also in consideration of all factors including the specific type of specialized add on treatment.*

Q) What is the max daily flow rate with a retention time of 48 and 54 day can our system handle with outraising the berm?

> *Response: The site is limited by its current Environmental Compliance Approval which limits flow to 4600m^3/day.*

In the Aecom report it is clear in section 2 with a retention time of 48 and 54 day that we have a reserve capacity equivalent to 2127 persons a day if we extended the height of the berm 0.6 m.
Q) Is this correct?

> *Response: As shown in the Draft Phase 1 Report, an updated uncommitted reserve capacity calculation indicates that 967 units (above the 345 units already committed) can be accommodated by the current Lagoon ECA hydraulic capacity. . At 2.2 persons per unit, this equates to 2886 persons. However, effective ammonia removal is a key consideration of this Class EA and it has been determined that the existing lagoon as currently configured requires an*

additional treatment process to consistently and reliably achieve ammonia effluent requirements now and in the future.

Q) Presqu'ile Park has about 120,000 overnight guests ever year for 5 months that the park is open. We can't divide this number over a 12 month period because our system has to take that flow of sewage when it occurs. About 400 persons in new development to be conservative, 50 new commercial lots, and our first Tim Horton's.Is our system sized for the population it serves by the size of our population (not by flow)?

Response: We acknowledge that the Park draws a large number of visitors that do contribute flow to the Brighton wastewater treatment facility. The MOECC has a published procedure in order to identify available capacity at water and wastewater facilities. It is based on historical flow and Presqu'ile Park is included in these historical values. Based on the MOECC Procedure D-5-1 (Uncommitted Reserve Capacity Calculation) and reported approved development information, the Municipality has MOECC approved hydraulic capacity within the current configuration for growth over the next 20 years. This is based on the understanding that the wastewater treatment system effluent quality remains acceptable and in accordance with the current ECA. Installation of specialized treatment systems, as described in the Class EA reporting, will be used to improve effluent quality and ensure all compliance requirements are med. It should be noted that flow from commercial/industrial growth can vary depending on the nature of the activity on those lots and wastewater volume and quality impacts from significant commercial/industrial development needs to be considered should that type of development be contemplated.

Q) Would adding raw water to the system at the plant help with the dilution of the raw sewage, and would this be helpful with ammonia control?

Response: The amount of raw water required would be enormous and not practical. It is also generally recognized that "dilution is not the solution to pollution". There are, however, several available specialized treatment technology lagoon "add-ons" that could be implemented on site which are designed to specifically target ammonia removal and are best suited to be located downstream after it has removed significant contaminants.

Q) The smell of sewage is a problem, can a treatment system be installed to prevent the odor?

Response: Ongoing maintenance, including routine desludging of the lagoon and constructed wetland renewal, is expected to improve odours. The Municipality is not aware of a persistent odour issue, however, we will note your comment for future reference.

Q) Can the discharge of the constructed wetland be redirected to discharge to the east side away from the north west wind and away from the shore line of Gosport?

Response: The constructed wetland outfall (discharge location) is on the south side of the constructed wetland due to the hydraulic grade of the process (water flowing from high point to low point). From here, water flows into the natural wetland area. All flow from the natural wetland area then passes the east point of Gosport near the Presqu'ile Yacht Club.

Q) The constructed wetland is not part of our system or C of A why is this, the final discharge from our treatment system is from the wetland?

> *Response: The constructed wetland is recognized within the facility's Environmental Compliance Approval. However, MOECC does not anticipate giving credit to the effluent quality improvements that the constructed wetland provides. It is acknowledged that the wetland may offer varying levels of additional treatment for some parameters (e.g. Total Phosphorus), but it also may have little or detrimental treatment for other parameters.*

Q) Wildlife is a problem in the constructed wetland, would it help if we had a more aggressive wildlife removal program?

> *Response: The Class EA focus is to determine improvements to the facility effluent. Your comment is noted for future reference by the Municipality. They may choose to control wildlife that is shown to cause damage to the wetland (e.g. burrowing animals) in the future .*

Q) Why are we allowing the public to walk around this site, with no safety or staff on site?

> *Response: The Class EA focus is to determine improvements to the facility effluent. Your comment is noted for future reference by the Municipality. The municipality has chosen to allow limited access to the site. Public access to the site is reviewed on a regular basis.*

Comment 2 – Roger McMurray – Municipal Councillor – Received April 27, 2017

After reading the report, I have two concerns. The first relates to the date the system was established. The report states "the 1970s" I believe that the 1960s would be more accurate. I have contacted staff who were present and hopefully more accurate info is available as to christening date. The second point is more critical to this EA and accurate numbers are essential to establish true loading of the plant. Section 4 table, page 3 states, "Presquile Park has about 120,000 overnight guests every year for 5 months that the park is open" I am including an Ontario Parks printout of parks in the southeast zone which includes Presqu'ile which list the 2010 visitor number at 212,614 and Day-use visitors as 79,341. I have stat sheets for 2008 and 2009 which show respectively 191,804 and 201,983 visitors which show the 120,000 visitors listed in the EA to be very low in comparison and would introduce an error in loading calculations. I recommend that the Consultant contact Ontario Parks and get a more accurate visitor statistics to better reflect actual spring/summer/fall loading of the lagoon. I am including a copy of the 2010 SOUTHEAST ZONE statistics which includes Presqu'ile Park on digital page 46 (actual page 43). For your info/action as required. Best regards.

> *Response: Thank you for the information on the date that the facility was first established. We have updated the Phase 1 report to reflect that the lagoon was established between the 1960s to early 1970s.*
>
> *Thank you also for highlighting the number of annual visitors to Presqu'ile Park. We acknowledge that the Park draws a large number of visitors that do contribute flow to the*

Brighton wastewater treatment facility. The MOECC has a published procedure in order to identify available capacity at water and wastewater facilities. It is based on historical flow and Presqu'ile Park is included in these historical values. Based on the MOECC Procedure D-5-1 (Uncommitted Reserve Capacity Calculation) and reported approved development information, the Municipality has capacity within the current configuration for growth over the next 20 years. This is based on the understanding that the wastewater treatment system effluent quality remains acceptable. Installation of specialized treatment systems, as described in the Class EA reporting, will improve effluent water quality. It should be noted that flow from commercial/industrial growth can vary depending on the nature of the activity on those lots and wastewater volume and quality impacts from significant commercial/industrial development needs to be considered should that type of development be contemplated.

Comment 3 – Anonymous Resident – Comment Sheet Response from PIC Meeting – Received May 29, 2017

[Comment Sheet Question 3 – The recommended preferred solution is shown in the poster. Do you have any comments or questions on the recommended solution?] **"Like the small footprint. Concerned about high operating costs. If the wetland is ineffective – why retain?"**

Response: The constructed wetland has shown to provide improvements for some chemical parameters and nutrients such as total phosphorus. It also provides other social and environmental benefits to the community (e.g. bird watching). Also, one of the components of the overall recommended solution is to refurbish/clean the constructed wetland with the goal of improving its treatment performance effectiveness. Reportedly it has not been cleaned out since it was originally constructed.

[Comment Sheet Question 5 – Do you have any additional comments?] **"Regrettable that the Mayor and Council not present to receive comments."**

Response: Thank you for the comment. Please also note that all comments received will be included in the final project file and in a dedicated Appendix to the Phase 2 report and available for review by the Municipality, including Council.

Comment 4 – [redacted] – Resident – Received May 30, 2017

Item 1: I thought the explanations given at the May 29 meeting were quite clear

Response: Thank you for the comment.

Item 2:

- The current system does need upgrading based on ammonia and phosphorous removal problems.
- There could be a need to rebuild the whole system based on poor settling pond performance and rapid rate of sludge build up.
- I also question how it can be said that the system is only being used at 60% of capacity yet does not meet MOE effluent requirements and sludge build up appears to be excessive.
- I also favour a 20 year planning window used by the consultant as opposed to the 50 year window batted about at the meeting. One can't predict population growth or technology changes 50 years into the future.

Response: *The recommended preferred solution includes a thorough cleaning of the lagoon. Although it has been reported that some sludge has been removed in the past, the thoroughness of that previous sludge removal is in question. The existing sewage treatment system is in some respects, performing well by providing a significant level of treatment for key wastewater parameters. For example, CBOD5 removal is reported to be in the 90% range on average, TSS removal is in the 85% range on average and total phosphorus removal is in the 85% range on average. However, it does require assistance to provide treatment for ammonia as ammonia removal is only reported to be in the 40% range. It is not uncommon for facultative lagoons to have difficulties in treating for ammonia. Planning sewage treatment improvements on a 20 year interval is industry standard practice. Constructing a system today to accommodate a flow that may or may not occur in 50 years would be economically unwise. In addition, treatment components such as mechanical equipment, instrumentation and controls, electrical, etc. typically have a service life in the 20 year range. Depending on the option ultimately implemented, planning provisions can be made for future capacity expansion (e.g. if flows increase faster than expected or if the preferred technology option is still relevant and can be upgraded/renewed after the 20 year time period has elapsed).*

Item 3:

- It is clear to me that the current treatment system does not work and that some sort of special treatment is required.
- We need a proven system that will meet MOE effluent limits all year around regardless of temperature extremes.
- The information presented at the meeting was, in my mind, insufficient to say that the stated preferred system is the best system.
- It makes sense to put any biological treatment after the settling pond to minimize shock loading that could harm the bacteria. Such a system must be sized properly to handle the outflow.

Response: *Thank you for the comments. The goal of a Schedule B Class EA is to identify the problem and the opportunity along with the major constraints and then identify a preferred solution through a consultative process. It is not intended to necessarily define all of the details and nuances of the preferred solution which can be further reviewed as part of a Schedule C Class EA (if the Municipality so chooses to follow that course) or as part of a preliminary design phase and detailed design phase. The solution presented for this Class EA has been purposely presented in a somewhat "general" nature to allow for further optimization during subsequent work and to achieve an optimum (i.e. "best") solution.*

Item 4: At the meeting there seemed to be confusion as to what role council would play in this decision. Whatever the next steps that will be taken they should be made clear to the public.

> *<u>Response:</u> Thank you for the comment. Council has recognized this Class EA as a strategic priority and have budgeted for and recommended that this Class EA be undertaken. A Class EA is intended to be an open and transparent process that needs to account for many project specific factors throughout its course. The "expected" outcomes of a Class EA are sometimes preconceived ahead of time; however, the "final" outcome can sometimes be different than expected since environmental and other factors that come to light during the study can have an impact on the recommended preferred solution. Council generally has a role in endorsing the recommended preferred solution in the Class EA before it moves to the implementation phase.*

Item 5: I am concerned that the current study is too focused on adding onto the current treatment system. For example the proposals all used the current settling pond because that is what exists. Perhaps more land could be bought and the pond enlarged and reengineered, thereby increasing retention times and sewage uniformity. This would make whatever the next treatment step more effective.

> *<u>Response:</u> The recommended preferred solution includes utilizing the existing wastewater stabilization pond since this readily available and valuable asset is, in some respects, performing well by providing a significant level of treatment for many key wastewater parameters. For example, CBOD5 removal is reported to be in the 90% range on average, TSS removal is in the 85% range on average and total phosphorus removal is in the 85% range on average. However, it does require assistance to provide treatment for ammonia as ammonia removal is only reported to be in the 40% range. It is not uncommon for facultative lagoons to have difficulties in treating for ammonia. An expanded lagoon volume could improve some aspects of the treated effluent quality but would not be effective in additional ammonia removal which has been identified as a key concern for this project. There are, however, a number of available specialized treatment technology lagoon "add-ons" that could be implemented on site which are designed to specifically target ammonia removal and are best suited after the lagoon treatment component of the system has removed significant contaminants (as noted above). Many of these processes also provide additional treatment for other parameters as well which will be a benefit in providing additional redundancy to the lagoon system.*

<u>Comment 5 – Tom Willison –Commodore Presqu'ile Yacht Club – Received May 30, 2017</u>

Speaking on behalf of the Presqu'ile Yacht Club

- We are very interested in water quality since the membership is focused on using the bay for our activities. In addition we are directly located near the outlet of the current treatment wetlands and so our water front is directly affected by the effluent. Excessive nutrients, bacteria, and suspended solids causes problems that impede our boating activities and cause

undo expense in dredging and aquatic weed control. It is imperative that the new treatment system produce effluent that meets or is better than the MOE requirements.

- We also request that any system chosen will be able to, without question, handle sewage from boat holding tanks. Every other community with docking facilities has waste treatment facilities that can handle this type of sewage and Brighton should too. Not being able to use the sewer system for boat holding tank sewage could lead to unhealthy sewage handling and possible improper disposal.

Response: *Thank you for your comments. One of the intents of the recommended preferred solution is to substantially improve the quality of effluent discharged to the environment by the current system as well as the consistency of this quality. The Municipality may elect to resume accepting wastewater from the Presqu'ile Yacht Club when they are satisfied that the wastewater treatment process can accommodate these additional flows without risking non-compliance of the overall treatment system.*

Comment 6 – [redacted] – Resident – Received June 5, 2017

I attended the information session and reviewed the presentation. I am concerned that the recommended solution of $6.5 million expenditure to upgrade the present system and water polishing ponds is inadequate and wasteful. The lagoon system in place has failed. To simply try a new method of resuscitation as planned is a gamble that may result in improvement but it will still leave the town with an inadequate system. Brighton is growing quickly. As new subdivisions are added and more retirement-aged Torontonians flee the city, demand for new services will far outstrip the projected volumes. The industrial park is capable of accommodating a number of new industries. However, any sizeable operation will overwhelm the working sewage plant envisioned here. The twenty year threshold given as the operational range may well be overcome in ten years! I believe that the population growth algorithm applied to Brighton is way off base.

I believe that Brighton will require a new mechanized treatment plant within 10 years. Indeed, it needs it now. $6.5 million spent fixing the present system is wasteful. Better to apply $6.5 million towards a $25 million plant and seek Federal and Provincial funds to assist. The new Federal municipal infrastructure programs and infrastructure bank may well provide funds. Long term debt at government backed low rates should be acceptable to Brighton taxpayers. The provincial environment officials will be demanding that we get on with it. Let's get on with a proper solution and not another band-aid.

Response: *Population projections that have been completed for the Class EA use data from the Municipality's own growth documents as well as including committed/reserved capacity for subdivisions and other developments that have yet to be constructed or are in the process of being constructed. It has been determined that an appropriately upgraded facility would be capable of handling the flow projections within a 20 year planning horizon and possibly beyond.*

The recommended preferred solution includes utilizing the existing wastewater stabilization pond since this readily available and valuable asset is in some respects, performing well by

providing a significant level of treatment for many key wastewater parameters. For example, CBOD5 removal is reported to be in the 90% range on average, TSS removal is in the 85% range on average and total phosphorus removal is in the 85% range on average. However, it does require assistance to provide treatment for ammonia as ammonia removal is only reported to be in the 40% range. In this respect the lagoon system has not "failed" as it is not uncommon for facultative lagoons to have difficulties in treating for ammonia and require an appropriate upgrade just like many other sewage treatment systems require at some point. Treatment for ammonias can be accomplished through specialized treatment technologies which are often scalable. There are hundreds of lagoon treatment systems throughout Ontario and Canada that have been operating successfully for many decades. Ammonia has become more of a concern to regulators in recent years and many municipalities that own and operate lagoons are doing similar successful treatment "add-ons" so what is being proposed as the recommended preferred solution should not in any way be considered to be a "band-aid". Should wastewater treatment improvements become necessary again in the future, the Municipality will be able to assess what is the most appropriate option (from a physical, cultural, fiscal, environmental perspective) at that time. It is should also be noted that while a mechanical treatment plant is another option that will address the ammonia problem and was considered as part of the evaluation of solutions, it was determined that this would not only entail a significant "capital" cost but would also entail a significant increase to ongoing annual "operational" costs for which funding programs are not applicable. Projects that are not financially viable are at risk of never being implemented in which case the current problem would persist.

Comment 7 – Roger McMurray – Municipal Councillor – Received June 6, 2017

1. RFP 2015-10 Section 3, Task 1 - Review all Existing Information

Bullet 1 of para 1. Above states: "**Meet with Municipal Council, staff and others to identify available background information." Is it SOP to wait until the first public meeting to meet Council?** Particularly after meeting with staff, collecting and reviewing reports, dwgs, ops and maint data. Collecting and reviewing gov't docs, OP and inspecting existing facilities?

Response: Typically, Councils are aware of the project and receive periodic updates on the progress of the project by staff. Council members are invited to public meetings as well. If Council as a group wishes to discuss the project with the consultant, attendance at meetings of Council can be arranged by staff. Public meetings run through a Class Environmental Assessment process and cannot take place at a meeting of Council. Two key reports (Phase 1 and Phase 2) were also made available to the Municipality in "draft" form well prior to the public meeting in order to apprise staff and Council of progress. There is little point in formally meeting with Council until some tangible results of the Class EA are developed which in this case was during Phase 2 of the Class EA. In some respects it is beneficial for the Consultant to work partially through a Class EA in order to scientifically evaluate the problems and solutions in a transparent and unbiased manner.

Note: Paras 12.- 16 Inclusive, Below, refer to information from both the RFP 2015-10 and the J.L Richards Phase II report.

Under item 1.3 – <u>General Description of Preliminary Upgrade Alternatives for the Wastewater Treatment System</u>. RFP 22015-10 states at Item 1.3, paragraph 4: "To upgrade and/or expand the wastewater treatment system, all reasonable alternatives are to be considered which could include upgrading the existing lagoon system or construction of a new mechanical plant, likely at the existing site." .Why was the construction of a small mechanical plant given short shrift in the EA. They work and they last a long time.

> <u>Response:</u> *This Class EA process involved reviewing a long list of alternatives (including a Mechanical Treatment Plant option) and then narrowing this list down to undertake a more thorough review of the short list of alternatives. Once the required treated effluent quality requirements were determined in consultation with the Provincial regulators (i.e. the MOECC), the mechanical treatment plant alternative did not make the short list of alternatives primarily because the capital and operating costs involved are anticipated to be much higher than other viable options and significant changes to the site and operations would be required, likely making it unaffordable to the Municipality. Capital costs are estimated at $15M to $25M with annual operating costs in the $750K range. Given that the existing lagoon facility is generally performing well with respect to CBOD5 (90% removal efficiency on average), TSS (85% removal efficiency on average) and Total Phosphorus (85% removal efficiency on average) it should be considered a readily available and valuable asset and not a "throw away". However, it is recognized that the existing lagoon does require assistance to provide improved treatment for ammonia which has been one of the focuses of this Class EA and a key factor in the development of a proposed solution. There is a risk in specifying a project that is unaffordable to a municipality in that it is possible that it will never be implemented in which case the problem will persist. A balance of factors was used in the determination of a recommended preferred solution.*

1. Benthal Feedback. GSS Engineering some time ago complained to me informally of high ammonia readings where they should not have been. Processing ammonia has been a problem since at least 2008. I am aware that anaerobically digesting sludge can release ammonia into the water column. In your opinion does our sewage treatment lagoon, specifically the facultative lagoon exhibit symptoms of **benthal feedback**. How can this condition be positively identified? Can it be eliminated by sludge removal? To what degree must sludge be removed? I have read where this condition can lead to **the effluent** concentration testing higher than **the influent** for ammonia concentration and could account for the plant's apparent inability to process ammonia. ENVIROSIM testing proved that the plant was capable of processing existing influent streams.

> <u>Response:</u> *It is suspected that one of the causes of elevated ammonia concentrations in the lagoon effluent, compared to what would normally be expected, is the influence of sludge (potentially through a benthal feedback action) particularly since ammonia removal is also poor in the warmer months when it is typically easier to treat. We understand that desludging activities have been completed in the past but there are questions in regards to the thoroughness of those cleaning activities. It is suspected that existing sludge may be part of the problem although regardless of this issue, lagoons typically are not extremely effective on their*

own at ammonia removal throughout an entire year of operation. One of the recommendations of the Class EA is to complete a thorough desludging of the lagoon which is part of the normal operation and maintenance of any lagoon over the course of its life anyway (i.e. is should not be viewed as a capital cost for the project but rather a maintenance activity that may have been deferred for too long). In our opinion, effective removal of sludge would be a first step that could be undertaken in order to remove impacts from the sludge on the ammonia concentrations in the treated effluent.

2. Sludge Removal. Excess sludge buildup could be blamed for many of the plant's shortcomings for a number of years, however approx. 20,000 M3 were removed in 2012/2013 with no short or long term improvement in ammonia processing. If sludge accumulation is a problem already it is painfully obvious that a lagoon system is not the best approach for processing ammonia. Will the system you recommend deal with the heavy sludge accumulation problem? The size of the lagoon has not changed since the late 1950s/early 1960s despite a population growth from 2500 in 1959/60 until today's population of 6462 plus Presqu'ile Park. Should the municipality have a regular schedule for sludge removal rather than an ad hoc process?

<u>Response:</u> Effective lagoon desludging involves accurately measuring the existing sludge volume and water content by mapping the sludge contours throughout the lagoon. A desludging contract is then centred on the effective removal of solids (instead of water) as solids content is continuously measured throughout the removal process. An experienced contractor is paid only on removal of solids. At the end of the contract, the sludge contours are again mapped to determine the overall effectiveness of the desludging operations. It is our understanding that earlier desludging activities were not based on solids removal and therefore much of the original sludge may still remain in place. Buildup of sludge in lagoons varies from case to case. Some municipalities go many years (even decades) without having to desludge any significant volume. A good practice is to undertake a mapping exercise on regular intervals (such as every 2-5 years after the most recent desludging activity). At that time, the Municipality can assess the pros and cons of whether there is significant volume of sludge that is affecting the quality of effluent as well as a significant enough volume in order to make a contract feasible through economies of scale.

3. **Screening.** During 2015 Council tried to meet the requirements of a MOECC Order and passed motions which were provided to MOECC by GSS Engineering who was contracted by the Municipality act as the municipal signing authority and liaise with the MOECC. A Motion was passed by Council to provide screening to prevent fouling of the aerators. Screening was never purchased for whatever reason. Do your alternate and preferred optionsinclude the provision of screening for raw sewage?

<u>Response:</u> Several specialized treatment technologies have been identified in the Phase 2 Report and are available for consideration by the Municipality. Some of these technologies would benefit from upstream screening of the raw sewage. Others are not necessarily affected as much (or at all) since the technology is preferentially located downstream of the lagoon allowing sufficient settlement of these materials in the lagoons. In short, screening is dependent on the technology selected and should not necessarily be implemented if not needed as it entails

significant capital cost and also requires additional operation and maintenance costs to ensure its effectiveness.

4. **Bio-Cord.** During 2015 Council tried to meet the requirements of a MOECC Order and passed motions which were provided to MOECC by GSS Engineering who was contracted by the Municipality to act as the municipal signing authority and liaise with the MOECC. A Motion was passed by Council to provide a, "BIO-CORD system which would provide a foundation for nitrifying bacteria to grow as at present there is nowhere for the bacteria to attach. A Council resolution was passed to acquire one, however, it did not happen. If you select a lagoon based system does it include a bio-cord system or equivalent?

Response: Several of the technologies presented in the Phase 2 report are based on a similar philosophy of providing a media for the attached growth of nitrifying organisms. The nitrification process is a key to removal of ammonia.

5. **Chemical Sludge Removal.** Has your company considered a chemical based method of sludge removal other than physical removal by dredging?

Response: No we have not considered a chemical based method of sludge removal as part of this Class EA. In our experience, physical removal of sludge is the most effective way of ensuring that sludge has been removed from the facility. Chemical based methods that offer to either solubilize the sludge and transport out of the facility over a period of time or consolidate it in a thicker mat of sludge do not have the immediate impact that physical sludge removal does.

6. In 2012, Council approved the proposal for consulting services for the Brighton WWTP upgrade and odour study submitted by AECOM. The AECOM report stated that 6 Aerators are ultimately required. June 2012 – Oct 2012 Bio-solids removal as per AECOM proposal. In Jul 2012 AECOM proposed a tender for floating aerators with estimated cost for purchase that was more than two and one half times the estimated cost in their proposal dated Sept 2011. For comparison staff reviewed cost and ammonia removal efficiencies of other aeration technologies. A technology was discovered (BIO-DOMES) with proven ammonia removal capabilities in wastewater treatment systems that are similar to Brighton's system. Following removal of bio-solids the municipality will engage a contractor conduct a pilot study for an aeration system. The pilot study will require a temporary amendment of the ECA with an application to be submitted early in 2013. The bio-dome pilot project was ultimately unsuccessful. The municipality purchased and installed two used aerators. Will the preferred solution address the aeration issue?

Response: Several specialized treatment technologies are available for consideration by the Municipality and are presented in the Phase 2 report. Some of these technologies would benefit from optimizing aeration of the raw sewage. Others are not necessarily affected as much. In addition, aeration design is site specific and requires careful consideration of the depth and dimensions of the aerated cell compared with the size of the aeration equipment. As has been demonstrated at the Brighton facility, installing aeration equipment of incompatible size/type does not provide beneficial results and can, in fact, worsen the situation. A detailed assessment of the system requirements and design is required as part of the final selection of the technology.

It is also possible that upfront aeration could ultimately be eliminated. In either case, the size and operating parameters of the technology will be optimized for the site.

7. What is the annual operational bill for the proposed new system? More staff required?

Response: The Phase 2 report has conservatively suggested that approximate annual operating costs of $200K can be expected. An additional 0.5 to 1.0 FTE (full time equivalent) of additional staff may be expected, the cost of which is included in the annual operating cost mentioned above. In comparison to a mechanical treatment plant, annual operating costs of approximately $750,000 may be expected including the addition of several FTE staff and the requirement of staff to undergo additional training and hold additional levels of licensing.

8. What will the capital costs (up-front and continuing) for the MBBR system? Is purchase of proprietary material required?

Response: The MBBR system is one of several technologies available to the Municipality. This technology does use a floating media. Several suppliers of this particular technology are in the marketplace, each with their own type of proprietary media and system configuration. Replacement of media is very infrequent with some suppliers indicating that many facilities have never had to replace media but purchase of more media would be available if needed in the future (note that additional media can also be added in the future to improve treatment further). Up-front capital cost for the technology is estimated to be approximately $4M including on-site capital works. Annual operating costs of $200K are forecasted for the treatment system. In addition, in the future MBBRs can be added upstream of the existing lagoon to improve other parameters and potentially defer the need to add more lagoon volume (this has been done successfully in several installations in Quebec).

9. What is the MTBF for the proposed new system? What is the MTTR for the system? Can the system be taken off line and Isolated for maintenance/repair?

Response: All parts of sewage treatment facilities require ongoing preventative maintenance. Generally more passive equipment with less moving parts requires less maintenance. Several of the specialized treatment technologies have passive equipment and should be expected to have less maintenance, less time between maintenance activities and less downtime during maintenance. Installations can be designed with parallel systems to ensure one side can be taken off line while maintenance or repairs are being made. An additional benefit of the flow buffering capacity of lagoons is to create short term capacity in the lagoon by temporarily lowering the lagoon cell slightly and stopping flow to downstream processes. This example could allow for short term interruptions of flow and allow maintenance on technologies that are placed downstream of the lagoon.

10. The municipality expends significant resources on sludge removal due to it being regularly identified and the primary culprit for ammonia exceedances. In What area (of overall plant) will savings (if any) be

realized with inclusion of an MBBR system and more importantly, how much will the inclusion of a MBBR impact overall operational costs?

> *Response: Refer to the answer for question 7 above regarding approximate anticipated operation and maintenance costs of the specialized treatment technologies available to the Municipality. The MBBR system will not treat sludge and sludge buildup will continue in the lagoon. The MBBR system would be used to improve treated effluent quality and in particular effluent ammonia levels. The savings are realized by continuing to use the lagoon facility as a significant asset for the treatment of CBOD5, TSS, TP and a portion of the ammonia and avoiding the need to construct and operate a mechanical treatment plant as well as avoiding impacts to the environment caused by poor effluent quality that could result in fines from the regulator.*

11. Will the proposed MBBR system process the entire flow of the WWTP or will it process a defined percentage and then add this treated effluent to the primary stream to lower its overall strength to a point where it complies with the ECR? How much will the nitrifying media cost for the proposed MBBR annually?

> *Response: Each of the specialized treatment technologies available, including the MBBR system, is intended to accommodate the entire flow sent through the system. As described in the answer to Question 8 above, media replacement is infrequent and an annual cost for media replacement is not anticipated.*

12. In the "Summary of Problem/Opportunity Statement" bullet five states," It has been determined that the current Environmental Compliance Approval (ECA) rated hydraulic capacity does not need to increase for the next 20 years.
13. I thought that this (the 20 year time horizon) was an inordinately short time for such a large, complex and costly Environmental assessment considering that the collection system and lagoon were installed in the late 1950s and early 1960s and have remained virtually unchanged until the present (approximately 57 years) Twenty years is a relatively short period of time compared to the length of time the system has been in existence. Question, Who or what organization determined this 20 year number?

> *Response: Twenty years is a common planning time frame for sewage treatment facility projects since accurately forecasting population growth (translated into flow) is not precise and/or always dependable. Ttechnologies and regulations can also change over time and predicting this 50 years into the future is unreliable. The longer the planning period (e.g. 50 years) the less accurate the predicted population (and resulting flows) becomes. In addition, sewage treatment equipment such as mechanical equipment, instrumentation and controls and electrical systems tend to have a service life of 20 years and therefore the solutions are often limited to this type of time frame. It is not to say that the systems cannot be refurbished or replaced in the future to extend the systems life but designing for a system that is 25, 30 or 50 years is not prudent in this case. Interestingly, lagoons can be an exception to this as they tend to be relatively passive type systems constructed of earthworks which can last significantly longer provided they are properly maintained which includes periodic removal of sludge. In fact, Municipalities such as Brighton*

are often seen by other municipalities as fortunate to have a low-cost communal sewage treatment process. Annual operating and maintenance costs of lagoons are relatively low compared to mechanical treatment plants.

14. Concerned about the short time frame (20 years) being considered, I consulted the Municipality of Brighton Request for Proposal (RFP) 2015-10. I note at page 14, item 1.3 which states, In part "prior to starting Phase 2 of the EA, produce a Summary Growth Evaluation Document that would project estimates of the projected serviced population sewer flows for a i) 20 year period and ii) a 50 year planning period."

Response: Recommending a sewage treatment facility that can accommodate a projected flow 50 years into the future is not common for the reasons outlined previously (population growth projection uncertainty, service life of typical components, the potential for more economical advanced technologies in the future and not overdesigning and overpaying for future flows that may not come to fruition). The economies of sizing a facility for a 50 year flow is generally thought of as an untimely investment in infrastructure since the facility would largely sit underutilized for much of its lifetime while deterioration is ongoing and much of it (if not all) would need replacement well before the 50 year time period elapsed.

A 20 year projection was developed prior to the start of Phase 2 and presented in the Phase 1 Report for this project. For sake of interest, we have extrapolated that calculation and have determined that the 50 year serviced population projection is 9,867 and the 50 year flow is 4,970 m^3/day. It is recommended, however, that these figures not be used as any basis for determination of a preferred solution within the context of this Class EA and that they simply be noted for interest sake.

15. Additionally, RFP 2015-10 Page 14, bullet 4 states in part: "That once the above Growth Evaluation Document is prepared and accepted by the Municipality of Brighton, that the evaluation of alternatives would be completed in accordance to population and sewage flow increases projected by the document." To my knowledge, this document remains outstanding and has not been seen by Council.

Response: The Growth Evaluation Document is presented in Appendix C to the Phase 1 Report. As previously indicated, there is little point in updating this document to include the 50 year projections if they are not going to be utilized in any meaningful way.

GROWTH IN POPULATION

16. Page 14, section 1.3 of the RFP 2015-10 states, "Preliminary growth data reviewed for Brighton and the County of Northumberland suggests that growth rates will be approximately 1% per year over a 20 year planning period. If a 1960 population of 2500 is assumed, the increase is in the neighbourhood of 155 percent and incrementing the 2500 number at 1 percent per year comes nowhere close to the 6462 population being presently used.

Population projections that have been completed for the Class EA use data from the municipality's own growth documents as well as including committed/reserved capacity for subdivisions and other developments that have yet to be constructed or are in the process of being constructed. It has been determined that an appropriately upgraded facility would be capable of handling the flow projections within a 20 year planning horizon and possibly beyond.

17. The sheet titled: "Phase 1 Problem and Opportunity Statement of the J.L. Richards report states in part: "that the system is currently operating at approximately 60 to 70 percent of its ECA rated "hydraulic" capacity. Question. What does the word, "currently" include? That is to say, how many months/years of flow data were included to arrive at these percentages? I can remember flows being in excess of 80 percent (See R.V. Anderson Report. How are fixed percentages to be seen as credible when infiltration is so variable?

Response: Five years of data have been used to perform the MOECC Procedure D-5-1 "Uncommitted Reserve Capacity" calculation (please refer to the Phase 1 report). The average of these years indicates approximately 60-70% of ECA rated capacity. Reduced flow in the last two years can be, at least, partially attributed to ongoing efforts to reduce inflow and infiltration. These activities could result in slightly decreasing flows (per capita) as time progresses.

18. In the J.L. Richards Opinion of Probable Costs for the Recommended Preferred Solution: $6,500,000 (including engineering and contingency, excluding HST) one can assume that due to the many manufacturers of MBBRs that this potential acquisition by the Municipality of Brighton will be sent out for competitive bid as per the Municipal purchasing by-law. Who will prepare the RFP for the MBBR and send it out to interested bidders?

Response: That is correct. There are several suppliers of the MBBR technology as well as several others suppliers of the other specialized treatment technologies identified in the Phase 2 Report. It is anticipated that the designer retained by the Municipality as part of the implementation phase would prepare documents to facilitate competitive bidding by suppliers and contractors. It should be noted that further preliminary and detail design exercises are required prior to implementation.

After reading "future tasks" which appear to relate to preliminary and detailed design and project implementation my thoughts were that J.L. Richards assumes that by completing an EA that they won a contract for engineering and installing a new facility if Council should agree. Am I hallucinating? I was under the impression that the Municipality hired J.L. Richards to do an Environmental Assessment.

Response: You are correct. J.L. Richards & Associates Limited was only retained to undertake the Class EA. There is no assumption on anyone's part that J.L. Richards & Associates Limited would be automatically be involved in subsequent design tasks. The reference to "future tasks" was simply to provide the Municipality with some guidance as to the next steps that are typically taken towards implementation and were in fact requested to be included by staff.

CONCLUSION

I am disappointed that this EA has focused on the ammonia problem particularly when the proposed cost for solving this one problem is so high. I consider MBBR to be just bio-domes on steroids. The pilot project using bio-domes failed and no one is really sure why. How long will the MBBR last? Will it suffer the same fate as the bio-domes? I can see the Municipality shelling out another 6.5 million in a few years to go off on another tangent. In your description of the recommended preferred solution (J.L. Richards) para 3 list other upgrades which are not really upgrades but maintenance actions. 1. The lagoon has been de-slugged in 2012/2013 to no avail. 2. A contract for $189,000 for baffles replacement was awarded to Fitzgibbon Construction in 2013. 3. Flocculent was changed from alum to ferric chloride. Why? 4. Refurbish the constructed wetland. Why? It may or may not be part of the system depending on who you ask and according to the J.L. Richards report it is not working. 5. In my humble opinion, High strength wastewater is a red herring. All influent streams were tested by Envirosim and no problems were highlighted. Rather than chasing rainbows and fixing a single problem area, the Municipality should be investing in tried and true technology that will last a lifetime as is the case in our neighbouring municipalities such as Picton, Cobourg, Colbourne, and Quinte West – The Conventional Activated Sludge (CAS) Plant. Yes, CAS plants are expensive but they work.

> *<u>Response:</u> Many of the above comments have been responded to in previous responses. Please also reference the Phase 1 and Phase 2 technical reports for a full understanding of the work completed as part of this Class EA including a concise identification of the existing problems with the lagoon which to a large extent revolve around effluent ammonia – not an uncommon situation for similar types of systems and partly due to enhanced scrutiny by regulators. The MBBR process is a system that has been installed on previous lagoons and is working successfully in full scale applications – as is some of the other processes presented in the Phase 2 report. The science of an attached growth media to promote nitrification (and hence ammonia removal) is proven in many different applications including some mechanical treatment plants. MBBR is in fact considered a mechanical treatment system.*

<u>Comment 8 – Roger McMurray – Municipal Councillor – Received June 6, 2017</u>

J.L. Richards makes the statement in their Phase one report in the problem and opportunity statement ion page 28 that, “the overall physical configuration of the lagoon-based treatment system indicates that the relatively high strength sewage combined with the physical limitations of the treatment system is the primary cause for the treated effluent exceedances. **The system, as currently configured, is not capable of treating the organic loadings received from the collection system**. Further, the Constructed Wetland portion of the treatment system is not providing any significant treatment with respect to the parameters of concern.

Concerns about the efficacy of the sewage lagoon are not new. In July 2011 AECOM consultants were retained to complete an independent review of the operation of the Brighton WPCP. They conclude that the lagoon volume would have to be significantly increased to achieve nitrification even with additional aeration. They indicated a total hydraulic retention time of 48 days would be required versus the current

detention time of 31 days at existing flows and only 23 days at the rated capacity flow of 4600 m3/day. It is not a ringing endorsement of our lagoon-based sewage treatment system when two unrelated engineering firms have reservation on its efficacy. It begs the question: why is the Municipality reluctant to consider tried and true solutions? **The only thing our wastewater system seems to process effectively are consulting firms**.

Projects such as wastewater plants are both costly and risky and it is Council's role to consider funding. *In 2009 CH2MHill proposed a hybrid plant using an MBR at a cost of 6.4 million. In 2011 AECOM provided a number of options in its ammonia removal study including SAGR, Gravel Bed, Bio-Reef, U Tech Volute System and a mechanical Plant at a cost of 17 million. AECOM suggested raising the Bern by .6 Meters. Brighton staff were concerned. The purchase of three aerators was considered and dropped and in 2012 the bio-dome trial was initiated as a replacement for aeration. The bio-dome trial ultimately failed and as it was only a trial, cost to the municipality were minimal. Had it been a full scale installation of bio-domes that failed financial loss would have been extreme. AECOM recommended the installation of three and possibly 6 aerators, however none were installed. Baffles were replaced in 2013 by Fitzgibbon Construction. There was no movement by AECOM on the Ammonia issue in 2013. RV Anderson was hired by the CAO in 2014 and their proposal was not endorsed by Council who subsequently submitted an RFP which resulted in the hiring of GSS Engineering Consultants. This firm managed to provide 2 used aerators from Norwood and did their best to bring the lagoon into compliance. GSS Engineering was subsequently hired to draft an RFP for this EA and here we are.*

Considering the bad experiences with the Bio-domes with their suspended nitrifying bacteria and the lack of success by GSS Engineering with their Aqua-n magic potion ***, I and reluctant to endorse J.L. Richard's preferred solution using Moving Bed Bio-film Reactors (MBBR) with their film based nitrifying bacteria at a cost to the Municipality of 6.5 million dollars.*** *The money could be better used to initiate purchase of a mechanical plant. As money seems to be the biggest impediment to fixing this problem, perhaps the purchase of a mechanical plant could be considered over a ten year window in manageable phases starting with screening, sludge handling, etc.* The firm of J.L. Richards won the bid to perform an EA for the Municipality. Briefly the following are my concerns in that regard.

1. Did not meet with Council as per RFP 2015, Section 3, Task 1.
2. Who or what organization specified a 20 year planning period?
3. Did not provide a 50 year planning period as required by RFP 2015-10. Page 14 Item 1.3
4. Did not provide Growth Evaluation document as required by RFP 2015-10, page 14, bullet 4.
5. The firm of J.L. Richards seems to have assumed that they were awarded a design/build contract along with winning the bid for the EA. Is my assumption valid or not?
6. A Conventional Activated sludge Plant was not given and serious consideration even though it appears to be the gold standard.

   <u>Response:</u> The lagoon has been doing a relatively good job at CBOD5, TSS and Total Phosphorus (TP) removal but requires "assistance" in the removal of ammonia which has been a focus of this Class EA. While the constructed wetland has shown limited effectiveness it does in fact show some indications of nutrient removal (particularly TP). The overall recommended preferred solution includes cleaning the constructed wetland which has reportedly not been done since it was originally constructed. It is envisioned that this will improve overall treatment for this component. The recommended preferred solution also recommends conducting a Computational Fluid Dynamic (CFD) assessment of the existing lagoon including the baffling to more definitively determine the hydraulic residence time and then determine if adding additional baffling could

improve the residence time in the lagoon. Some additional costs for more baffling have been included in the estimated cost for the recommended preferred solution.

Phasing in a mechanical treatment plant over a ten year period in order to address the actual problem (i.e. ammonia removal improvement) is not possible (e.g. adding screening will not impact ammonia removal). Essentially the entire mechanical treatment plant would need to be constructed to address the ammonia issue as ammonia removal would be through secondary treatment which requires all components of a plant to be in place.

In response to specific questions 1 to 6 please note the following:

1. *JLR met with Municipal staff as part of a project kickoff meeting and site visit and had previously met with two members of Council prior to the project award and discussed project scope. Based on these consultations it was not felt it was required to have a formal meeting with Council as it would not provide any additional required information at that time.*
2. *The Municipality's RFP references a 20 year planning period which was also proposed as part of the JLR work plan.*
3. *Acknowledged. A 20 year planning period (which was more the focus noted in the RFP) is more appropriate for this type of project and is standard for a Class EA of this type. This was used as the basis for problem identification and solution evaluation. The 50 year population projection is 9,867 with a resulting average day flow of 50 year flow is 4,970 m^3/day.*
4. *Please refer to Appendix C of Phase 1 report for Technical Memorandum: Growth Evaluation Document*
5. *Your assumption is not valid. It is unclear why this would be assumed by anyone. JLR does not have a contract for anything beyond completion of the Class EA.*
6. *A mechanical treatment plant was given consideration as an option during Phase 2. The mechanical treatment plant option would be significantly more in capital and ongoing annual operating cost and would entail significantly more energy to operate versus the lagoon based system which relies partly on natural treatment processes. In addition there are other options available that are viable and less costly for addressing the ammonia treatment issue.*

Comment 9 – Roger McMurray – Municipal Councillor – Received June 6, 2017

MBBR/IFAS

Hi Steve,
I understand that Lakeview WWTP in Peel Region initiated a study in 2005/2006 to assess the relative merits of a Conventional Activated Sludge plant and an MBBR by running both system in parallel. Apparently the pilot is still running, however, Lakeview WWTP does not plan to permanently implement Integrated Fixed Film Activated Sludge (IFAS) for secondary treatment. I understand that a decision was made that conventional treatment is the preferred treatment method at Lakeview. I have two papers

authored by William Fernandes, Manager of Capital Works for the Region of Peel. Reasons for Mr. Fernandes choosing conventional treatment versus IFAS include:

- The plant (Peel Lakeview) is a very large one. We have 14 aeration tanks for 448 ML per day;
- Concern about how to keep the media in the tank at all times;
- How to transfer media from one tank to the next;
- Our tanks are very long and we would have to put many screens and increase head loss in plant 5;
- Concern over foaming

In going through general information available on the Internet I note that a number of MBBRs/IFAS operations have suffered hydraulic failures after media causing screen failure and media loss due to blocked screes. I also have a concern over the ongoing cost of media which I assume is not generic. The municipality would be locked in to a single supplier of increasing costly proprietary media.
*

QUESTION: **What were the primary reasons for choosing the MBBR over conventional treatment considering the multitude of other concerns associated with the Brighton WWTP, i.e. lack of screening, rapid sludge accumulation, etc.?**

> *<u>Response:</u> Comparison of Brighton to Peel (Lakeview) is not possible since the facilities are extremely different. Peel (Lakeview) is a mechanical treatment plant that requires screening as such. It is also "orders of magnitude" larger than Brighton. Without intimate knowledge of the retrofit considered at that facility, it also appears that a retrofit of IFAS was not ideal due to existing tankage geometry and flow routing through the facility. Brighton's facility would be built specifically for the treatment technology that is selected. It should also be noted that although it has been noted that the MBBR technology appears to be an attractive option for the Brighton system based on site specific factors, other technologies can still be considered as an "add-on" to the existing lagoon system.*

QUESTION**: How many MBBRs are presently in operation at Ontario Municipal WWTPs under an MOECC C of A**? How many (if any) are operating in conjunction with sewage lagoons?

> *<u>Response:</u> We do not have these numbers and would need to undertake some additional research to obtain this information.*

<u>Comment 10 – Anonymous Resident – Comment Sheet Response from PIC Meeting – Received June 9, 2017 by Municipality, Received June 14 by JLR</u>

[Comment Sheet Question 1 – This study is following the requirement of the Municipal Class Environmental Assessment process for a Schedule B project. Do you have any questions, comments, or concerns about the decision-making and public consultation process that are being followed to-date?]
"**How do we know that the constructed wetland is not providing significant additional treatment (as stated in Summary of Problem)?"**

Response: Laboratory testing of effluent water quality done both before and after the constructed wetland has been completed for many years and has indicated as such (information is presented in the Class EA Phase 1 report). It is noted that cleaning of the wetland is recommended as part of the overall recommended solution with the intent of improving its performance.

[Comments Sheet Question 2 – The need to upgrade the Brighton Wastewater Treatment System is based on the current condition and future servicing requirements within the Municipality. Do you have any questions, comments, or concerns about the need to upgrade the wastewater treatment system?] **"'Services are estimated to be serving 6,462 people and upgrades are intended to add 20 years to current system.' Brighton grew 8.4% since 2011 (2016 Census) Have we done projections for the next 20 years?"**

Response: Population projections have been completed for the next 20 years at rates published by the Municipality's own growth documents (refer to the Phase 1 report).

[Comment Sheet Question 3 – The recommended preferred solution is shown in the poster. Do you have any comments or questions on the recommended solution?] **"(1) What would the capacity be once upgraded? (2) Do we have space for expansion in the future when needed?"**

Response: The current licensed 'rated capacity' would be unchanged from present as there is additional capacity presently available in the facility's licence in order to accommodate the projected growth (this was also noted in the Municipality's RFP). Depending on the final technology selected it is anticipated that there would be space for expansion if and when needed in the future.

[Comment Sheet Question 4 – There are several final steps to be undertaken to finalize the Environmental Assessment. Do you have any comments or questions regarding how this study will be completed?] **"(1) Will the discretionary public meeting be held? (3 mandatory, 2 discretionary) (2) What happens to public input?"**

Response: The points of contact for consultation in this project were identified as (1) Project commencement (mandatory), (2) MOE consultation (agency – discretionary), (3) Notice of Public Meeting and Public Meeting (Mandatory), (4) Notice of Project Completion (Mandatory – yet to be completed). Public input becomes part of the public record and will be documented in the Class EA reports (specifically Appendix A of the Phase 2 Report) and in the project file.

Comment 11 – [redacted] - Resident – Comment Sheet Response from PIC Meeting – Received June 9, 2017 by Municipality, Received June 14 by JLR

[Comment Sheet Question 1 – This study is following the requirement of the Municipal Class Environmental Assessment process for a Schedule B project. Do you have any questions, comments, or

concerns about the decision-making and public consultation proce3ss that are being followed to-date?] "**I believe the correct procedure is being followed in this regard."**

Response: *Thank you for the feedback.*

[Comments Sheet Question 2 – The need to upgrade the Brighton Wastewater Treatment System is based on the current condition and future servicing requirements within the Municipality. Do you have any questions, comments, or concerns about the need to upgrade the wastewater treatment system?] **"Upgrades to the current system are definitely required."**

Response: *Thank you for the feedback.*

[Comment Sheet Question 3 – The recommended preferred solution is shown in the poster. Do you have any comments or questions on the recommended solution?] **"I thought that the 'preferred solution' was the very minimum that needs to be done but was rather surprised to see that this will cost $6,500,000!"**

Response: *Note that the $6.5M includes substantial existing operation and maintenance costs that are not related to construction of the actual specialized treatment technology itself.*

[Comment Sheet Question 4 – There are several final steps to be undertaken to finalize the Environmental Assessment. Do you have any comments or questions regarding how this study will be completed?] **"I do not know what these steps are."**

Response: *Upon receipt of all stakeholder feedback it will be summarized and integrated into the Class EA reporting. The recommendations will be revisited to determine whether changes to the original evaluation and recommended preferred alternative are necessary. Once reporting is finalized, a 'Notice of Completion' will be issued to notify interested public, stakeholders and agencies of this milestone and provide a further 30 days to comment. Should concerns remain, the Municipality can address them or they can be referred to the Minister of Environment through a process called a "Part II Order" request. Should no concerns remain; the municipality can proceed with implementation beginning with preliminary and detail design tasks, procurement and amendments to the ECA as appropriate, and finally construction and commissioning.*

[Comment Sheet Question 5 – Do you have any additional comments?] "**After reading the J.L. Richards report on-line, I thought that the Town should have a larger aeration pond, but at the Open House Mr. Saxton said that in reality what is required is a larger stabilization lagoon. I was surprised to read that the previous recommendations made over the past few years have not been acted upon. I realize that the Town is in a bit of a bind re: enlarging the settlement pond owing to the fact that no additional land is available except for the engineered wetland. In spite of complaints from the bird watchers, I believe this is where an additional settling pond should be located. This is necessary in order to protect Lake Ontario. Because this is handwritten, I hope that you will take the time to read my comments.**
Thank you.

Response: *What may have been relayed is that the hydraulic retention time in the Brighton lagoon is lower in comparison to other similar facilities in eastern Ontario. Part of the overall*

solution is to improve retention time with improving the baffling of the existing lagoon. With a longer retention time, treatment of wastewater may be enhanced. Increasing the size of the retention pond by converting the constructed wetland is not advisable since other social and environmental factors influence this decision. In addition, the larger retention time will not be the only necessity in order to meet effluent criteria limits. In other words, the need to introduce a specialized treatment technology is still required since increasing retention time alone will not be enough to enhance effluent water quality with respect to effluent ammonia

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Comment 12 – [redacted]- Resident – Telephone Call – Date unrecorded by JLR

Resident indicated that Brighton should look into use of ozonators with a fine bubble diffuser to deal with ammonia issues.

Response: Thank you for the suggestion. The addition of a treatment technology should have multiple treatment aspects to it. This could allow for improvement of ammonia levels as well as other parameters in the effluent. Further work into the potential of ozone as a part of the addition of an overall treatment train could be completed during detail design stages.

Appendix C

Agency Mailing List and Correspondence

Date Created: August 8, 2016
Last Modified: August 23, 2016
JLR File No. 27271

Brighton Lagoon
Notice of Commencment Agency and Organization Mailing List - MASTER

Jurisdiction	Agency	Address 1	Address 2	Salutation
Aboriginal	Ontario Ministry of Aboriginal Affairs	4th floor, 160 Bloor Street East	Toronto ON M7A 2E6	To Whom It May Concern
Aboriginal	Metis Consultation Unit – Metis Nation of Ontario Head Office	500 Old St. Patrick Street, Unit D	Ottawa ON, K1N 9G4	To Whom It May Concern
Aboriginal	Metis Nation of Ontario – Land, Resources & Consultation	355 Cranston Cres	Midland ON L4R 4K6	To Whom It May Concern
Federal	Environment Canada	P.O. Box 5050 867 Lakeshore Road	Burlington ON L7R 4A6	Mr. Dobos
Federal	Fisheries and Oceans Canada – Communication Branch	200 Kent Street, 13th Floor, Station 13E228	Ottawa ON K1A 0E6	To Whom It May Concern
Federal	Health Canada	200 Eglantine Driveway, Tunney's Pasture	Ottawa ON K1A 0K9	To Whom It May Concern
Provincial	Ministry of the Environment and Climate Change (MOECC) – Peterborough District MOECC Office	300 Water Street Robinson Place	Peterborough ON K9J 8M5	Mr. Muloin
Provincial	Ministry of Natural Resources and Forestry (MNRF) - Southern Regional Office	4th Floor South Tower, 300 Water Street	Peterborough ON K9J 3C7	To Whom It May Concern
Provincial	Ministry of Natural Resources and Forestry (MNRF) - Peterborough District Office	1st Floor South Tower, 300 Water Street	Peterborough, ON K9J 3C7	To Whom It May Concern
Provincial	Ministry of Agriculture and Food & Rural Affairs	R R #3, 95 Dundas Street	Brighton, ON K0K 1H0	Mr. Valaitis
Provincial	Ministry of Culture, Tourism & Recreation	5th Floor, 180 Dundas Street	Toronto ON M7A 2R9	To Whom It May Concern
Provincial	Ministry of Transportation	1201 Wilson Ave., 7th Floor, Atrium Tower	Downsview ON M3M 1J8	Mr. DeVos
Provincial	Ministry of Municipal Affairs & Housing – Planners, Community P & D	777 Bay St., 13th Floor	Toronto ON M5G 2E5	Ms. Gonzalez
Provincial	Infrastructure Ontario	1 Dundas St. West, Suite 2000	Toronto ON M5G 2L5	To Whom It May Concern
Regional	Brighton Health Unit	35 Alice St.	Brighton, ON K0K 1H0	Dr. Noseworthy
Regional	Hydro One Networks Inc	12th Floor, North Tower, 483 Bay Street	Toronto ON M5G 2P5	To Whom It May Concern
Regional	Enbridge Consumers Gas	500 Consumers Road	North York ON M2J 1P8	To Whom It May Concern
Regional	Bell Canada	Floor 5, Blue, 100 Borough Drive	Toronto ON M1P 4W2	Mr. Lachapelle
Regional	Lower Trent Conservation Authority	714 Murray Street, R.R. 1	Trenton, Ontario, K8V 5P4	Ms. Noyes
Provincial	Ministry of the Environment and Climate Change (MOECC) – Peterborough District MOECC Office	300 Water Street Robinson Place	Peterborough ON K9J 8M5	Ms. Light
Provincial	Ministry of the Environment and Climate Change (MOECC) – Eastern Region - Kingston MOECC Office	PO Box 22032	Kingston, ON K7M 8S5	Ms. Mitchell

Jane Wilson

From: Steve Saxton
Sent: November 23, 2016 3:24 PM
To: Janet Noyes
Cc: Bill Watson; Jane Wilson
Subject: RE: Schedule B Class EA Brighton WWTP

Hi Janet,
Thanks for letting us know. We'll be sure to include you in the communications and will seek LTC comments as the project progresses.
Kind regards,
Steve

Steve Saxton, P.Eng.
Civil Engineer

J.L. Richards & Associates Limited
203 - 863 Princess Street, Kingston, ON K7L 5N4
Tel: 613-544-1424 Fax: 613-544-5679



From: Janet Noyes [mailto:janet.noyes@ltc.on.ca]
Sent: November 22, 2016 3:15 PM
To: Steve Saxton
Cc: Bill Watson
Subject: Schedule B Class EA Brighton WWTP

Hello Steve;

Lower Trent Region Conservation Authority (LTC) received the Notice of Commencement for the above noted Class EA project in Brighton.

Since portions of the WWTP are located within the Presqu'ile Bay Marsh Provincially Significant Wetland and along the Lake Ontario shoreline, and therefore within an area regulated by LTC, we are interested in being including on the communications mailings for this project.

We look forward to reviewing the submissions and providing comments to aid in the protection of this coastal wetland and the Lake Ontario shoreline.

Regards,

Janet Noyes

Janet Noyes, P.Eng.

Manager, Development Services & Water Resources

Lower Trent Conservation

Phone: 613-394-3915 x 211

Fax: 613-394-5226

714 Murray Street

R.R. #1 Trenton, ON

K8V 5P4

Buying or building near wetlands or waterways? Check out these new **online services** – ***Property Inquiry Service*** and ***Map Viewer*** will help you get information about environmental features & required permits*!*

Check out our website at: ***www.ltc.on.ca***

Ministry of the Environment and Climate Change

P.O. Box 22032
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Fax: 613/548-6908

Ministère de l'Environnement et de l'Action en matière de changement climatique

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Fax: 613/548-6908

Ontario

By email only

November 30, 2016

Municipality of Brighton

Attention: Bill Watson, P. Eng., Chief Administrative Officer
bwatson@brighton.ca

Dear Mr. Watson:

Re: Brighton Wastewater Treatment System, Municipality of Brighton

Thank you for providing the Notice of Study Commencement issued October 14, 2016. The notice indicates that the project is being planned as a schedule B activity in accordance with the Municipal Class Environmental Assessment (Class EA).

Class EA Process

I have also received a copy of an October 24, 2016 letter sent to Viktoria Light, Drinking Water Inspector at MOECC, from Keith Lee, Wastewater Supervisor at the Brighton Water Pollution Control Plant (WPCP) which states that "The municipality has also retained J.L. Richards to complete a Class EA process for the wastewater treatment system. This Class EA will evaluate alternatives to upgrade, and potentially expand, the treatment system for short term and long term servicing conditions". If the municipality proceeds with a Class EA project to expand the system, depending on the specifics of the expansion, the project may need to be elevated to a schedule C project rather than a schedule B project. For example, if the existing rated capacity of a WPCP will be increased by expansion of a sewage treatment plant or lagoons, or by adding sewage storage tanks, the project would be classified as schedule C.

As the MOECC Regional EA Coordinator for this project, I will be responsible for circulating project notices and information to other MOECC reviewers and coordinating the MOECC response during the Class EA process. I am a mandatory contact for all Notices issued for the project. I would prefer to receive copies of notices by email, if possible. In addition, I request copies of other relevant information such as information updates, technical studies, interim reports and technical memoranda, and two copies of the Project Report when it is available.

Please send notices and copies of reports and information packages to the attention of:

Vicki Mitchell, Environmental Assessment Coordinator
Ministry of the Environment and Climate Change
1259 Gardiners Road
P.O. Box 22032
Kingston, Ontario
K7M 8S5

vicki.mitchell@ontario.ca

We normally recommend that intermediate reports or Technical Memoranda, be prepared and circulated for comment before the final Project Report is prepared. This is not a requirement of the Municipal Class Environmental Assessment (Class EA) process; however, it can ensure that consultation with review agencies is carried out in an effective way and that technical comments are received from agencies before the report is finalized.

Supporting technical information, such as proposed effluent criteria, should be submitted at an early stage of the Class EA process, so that this Ministry has an opportunity to confirm our acceptance of the proposal before the report is finalized.

MOECC Technical Review

This Ministry's interest in the project includes problems identified during MOECC inspections of the existing facilities; impacts to the receiving water body due to increase in the discharge of sewage treatment plant effluent; impacts to groundwater and surface water due to construction (i.e. dewatering of trenches during installation of sewers or tanks, control of erosion and sedimentation, construction and/or dredging at outfall location); information on the existing sewage collection system, extent of inflow and infiltration to sewage collection system and any remedial measures under consideration; noise and odour impacts to nearby residents from new infrastructure such as pumping stations; and information on water and sewage service areas.

Impacts to surface water due to increased volumes or concentrations of sewage effluent should be evaluated as soon in the Municipal Class EA process as possible. A site-specific receiving water assessment may need to be conducted to determine the effluent requirements based on the waste assimilative capacity of the receiver. The site-specific effluent requirements derived from the receiving water assessment must be compared to provincial guidelines for effluent discharge (MOECC procedure F-5-1: *Determination of Treatment Requirements for Municipal and Private Sewage Treatment Works Discharging to Surface Waters*), and the most stringent criteria will apply. Receiving water assessments, including background water quality and flow data, must be provided to MOECC by the proponent during the Class EA process.

The Class EA study should consider the need for an adequate buffer area between the sewage treatment facility and residences, and should identify the separation distances between the facility and nearest residences. Adequate buffer area should be acquired for new facilities or enlargements of existing facilities. The study should discuss the potential for odour or noise impacts, and propose appropriate mitigation measures. Please refer to this Ministry's Guideline *D-2 Compatibility between Sewage Treatment and Sensitive Land Use*.

Proponents undertaking a Municipal Class EA project must identify early in the process whether a project is occurring within a source water protection vulnerable area. This must be clearly documented in a Project File report or ESR. If the project is occurring in a vulnerable area, then there may be policies in the local Source Protection Plan (SPP) that need to be addressed (requirements under the Clean Water Act). The proponent should contact and consult with the appropriate Conservation Authority/Source Protection Authority (CA/SPA) to discuss potential considerations and policies in the SPP that apply to the project.

Please include a section in the report on Source Water Protection. Specifically, it should discuss whether or not the project is located in a vulnerable area or changes or creates new vulnerable areas, and provide applicable details about the area. If located in a vulnerable area, proponents should document whether any project activities are a prescribed drinking water threat and thus pose a risk to drinking water (please consult with the appropriate CA/SPA). Where an activity poses a risk to drinking water, the proponent must document and discuss in the Project File Report/ESR how the project adheres to or has regard to applicable policies in

the local SPP. If creating or changing a vulnerable area, proponents should document whether any existing uses or activities may potentially be affected by the implementation of source protection policies. This section should then be used to inform and should be reflected in other sections of the report, such as the identification of net positive/ negative effects of alternatives, mitigation measures, evaluation of alternatives etc. Even if the project activities in a vulnerable area are deemed to not to be a drinking water risk, there may be other policies that apply, so consultation with the local CA/SPA is important.

Consultation with First Nation and Métis Communities

Your proposed project may have the potential to affect Aboriginal communities who hold or claim Aboriginal or treaty rights protected under Section 35 of Canada's *Constitution Act* 1982. The Crown has a legal duty to consult First Nation and Métis communities when it has knowledge of established or credibly asserted Aboriginal or treaty rights, and contemplates decisions or actions that may adversely affect them.

Although the Crown remains responsible for ensuring the adequacy of Aboriginal consultation, it may delegate procedural aspects of the consultation process to project proponents. The MOECC relies on Aboriginal consultation conducted by proponents as part of its assessment of the Crown's obligations and directs proponents during the prescribed process.

Where the Crown's duty to consult is triggered in relation to your proposed project**, the MOECC is delegating the procedural aspects of rights-based consultation to you through this letter.**

Based on information you have provided to date and the Crown`s preliminary assessment you are required to consult with the following Aboriginal communities who have been identified as potentially affected by your proposed project:

- Mohawks of the Bay of Quinte
- Curve Lake First Nation
- Alderville First Nation
- Hiawatha First Nation
- Mississaugas of Scugog First Nation
- Metis Nation of Ontario
- Huron-Wendat (if archaeological assessments will be undertaken)

Steps that you may need to take in relation to Aboriginal consultation for your proposed project are outlined in the "Code of Practice for Consultation in Ontario's Environmental Assessment Process" which can be found at the following link:
https://www.ontario.ca/document/consultation-ontarios-environmental-assessment-process

Additional information related to Ontario's Environmental Assessment Act is available online at:
www.ontario.ca/environmentalassessments

You must contact the Director of Environmental Approvals Branch under the following circumstances subsequent to initial discussions with the communities identified by MOECC:

- Aboriginal or treaty rights impacts are identified to you by the communities;
- You have reason to believe that your proposed project may adversely affect an Aboriginal or treaty right;
- Consultation has reached an impasse; or,
- A Part II Order request or elevation request is expected

The MOECC will then assess the extent of any Crown duty to consult for the circumstances and will consider whether additional steps should be taken, including what role you will be asked to play in them.

Should you or any members of your project team have any questions regarding the material above, please contact me at (613) 540-6852.

Yours sincerely,



V. Mitchell
Environmental Assessment Coordinator
Eastern Region
VM/dv

Ec: J.L. Richards and Associates, Steve Saxton, P. Eng., ssaxton@jlrichards.ca

Viktoria Light, MOECC
Victor Castro, MOECC

J.L. Richards
& Associates Limited
203-863 Princess Street
Kingston, ON Canada
K7L 5N4
Tel: 613 544 1424
Fax: 613 544 5679

January 18, 2017
JLR File: 27271

VIA: Email

Vicki Mitchell, Environmental Assessment Coordinator
Ministry of the Environment and Climate Change
P.O. Box 22032
Kingston, Ontario
K7M 8S5

Dear Ms. Mitchell:

Re: Brighton Wastewater Treatment System MCEA, Municipality of Brighton
Approach to Phase 2 of the MCEA Process

Thank you for your interest in this project. In response to your letter dated November 30, 2016 and subsequent discussion in our pre-consultation meeting held December 20, 2016 we offer the following clarifications and study updates.

Class EA Process

As indicated in the Notice of Commencement (issued October 14, 2016) this project is being planned as a Schedule B activity in accordance with the Municipal Class Environmental Assessment (Class EA). This decision is supported by Phase 1 work investigating property constraints and anticipated growth in the study area.

The lagoon is located on Lot 33 and 34, Concession B, in the Municipality. The existing lagoon cells and wetland take up a good portion of the available property. However, due to the amount of underutilized property and opportunities to re-purpose existing treatment and storage areas, additional property is not anticipated for the preferred solution. We note that, although a title search was not conducted as part of this Class EA, it is understood that the adjacent property is privately held. As such, MOECC Guideline D-2 separation distances between wastewater treatment plants and sensitive land uses (i.e. residences) will be considered in Phase 2 of the Class EA.

An evaluation of growth in the service area was also undertaken as part of Phase 1 of this Class EA. A Technical Memorandum was developed (refer to Appendix C in the Phase 1 Report) which used an existing service population of 6,462 and growth projections for the Municipality to develop residential population projections for the 20- year design populations. Projected average daily per capita wastewater flows from growth are anticipated be approximately 500 L/c/day, in keeping with current flows. Based on these assumptions, 20-year design average day flow is anticipated to be less than the current rated capacity.

CANADA'S BEST MANAGED COMPANIES

As a result of this review it is not anticipated that additional land will be required and it was determined that a capacity expansion will not be needed within the 20 year Class EA planning period. At this time, we wish to confirm that the Class EA is proceeding as a Schedule B undertaking. However, as per the Class EA process the schedule will be confirmed again at the end of Phase 2.

As per the MOECC's letter, all correspondence regarding the Class EA will be directed to Vicki Mitchell, the MOECC Regional EA Coordinator for the project, for circulation to the appropriate MOECC reviewers. Intermediate reports or Technical Memoranda, will be circulated to the MOECC in advance of preparing the Project File. In particular supporting technical information will be submitted at an early stage of the Class EA process.

MOECC Technical Review

From the MOECC's letter and discussions at the pre-consultation meeting on December 20, 2016 we understand that impacts to surface water due to increased volumes or concentrations of sewage effluent should be evaluated as soon as possible in the Municipal Class EA process. The rated capacity and effluent criteria of the plant are not anticipated to change as a result of the outcome of this Class EA. Therefore, at this time a site-specific receiving water assessment is not planned. The need for a receiving water assessment, however, will be confirmed again in subsequent stages of the Class EA process. We note that a conference call will be scheduled with Victor Castro, Surface Water technical Support (MOECC Kingston) to discuss the project further.

As noted previously, the buffer requirements in the Ministry's Guideline D-2 Compatibility between Sewage Treatment and Sensitive Land Use will be considered for all new facilities or enlargements of existing facilities considered in Phase 2 of the Class EA.

We acknowledge that as part of undertaking the Municipal Class EA, proponents must identify early in the process whether the project is occurring within a source water protection vulnerable area. This assessment will be undertaken and documented in the Project File report. Source Water Protection is not likely to apply for this project and further consultation regarding source water impacts with the Conservation Authority/Source Protection Authority is not anticipated.

Consultation with First Nation and Metis Communities

Aboriginal communities identified in the MOECC's letter dated November 30, 2016 will be consulted as outlined in the "Code of Practice for Consultation in Ontario's Environmental Assessment Process". The Director of Environmental Approvals branch will be contacted under the circumstances notes subsequent to initial discussion with the communities identified by the MOECC.

J.L. Richards
& Associates Limited
203-863 Princess Street
Kingston, ON Canada
K7L 5N4
Tel: 613 544 1424
Fax: 613 544 5679

If there are any questions regarding the above, please contact the undersigned.

J.L. RICHARDS & ASSOCIATES LIMITED



Steve Saxton, P.Eng.
Civil Engineer

SS:jw

CC: Viktoria Light MOECC Peterborough (SDWB)
Victor Castro, MOECC Kingston (SW Tech Support)
Adedoyin Adenowo, MOECC Toronto (Approvals Branch)
Bill Watson CAO, Municipality of Brighton
Jane Wilson, J.L. Richards & Associates

CANADA'S BEST MANAGED COMPANIES

MEMORANDUM

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

J.L. Richards & Associates Limited
203-863 Princess Street
Kingston, ON Canada
K7L 5N4
Tel: 613 544 1424
Fax: 613 544 5679

To: Vicki Mitchell, Environmental Assessment Coordinator
Ministry of the Environment and Climate Change
P.O. Box 22032
Kingston, Ontario

From: Steve Saxton, P.Eng.

RE: Brighton Wastewater Treatment System MCEA
Effluent Criteria Rational

Date: January 30, 2017

Job No.: 27271

CC: Bill Watson, P.Eng., CAO - Town of Brighton

In response to your letter dated November 30, 2016 and subsequent discussion in our pre-consultation meeting held December 20, 2016 this memorandum is being provided to detail the current effluent objectives and criteria for the Brighton Wastewater Treatment System and the rationale for maintaining these criteria in subsequent phases of the Class EA process. We are seeking concurrence from the MOECC on this rationale before getting to far into Phase 2 of the Class EA process.

Existing Environmental Compliance Approval Requirements (ECA No. 3081-9XQNZK)

The wastewater treatment system is rated for an Average Day Flow (ADF) of 4,600 m^3/day. The objective and compliance requirements for the treatment system are outlined in Table 1 and Table 2 below. Effluent "objectives" are set for the wetland; however, the effluent compliance limits are imposed on the waste stabilization pond (Lagoon No. 2).

Table 1 Effluent Objectives - Constructed Wetland (ECA No. 3081-9XQNZK)

Parameter	Concentration in Effluent
CBOD5	15.0 mg/L
Total Suspended Solids	15.0 mg/L
Ammonia + Ammonium Nitrogen	10.0 mg/L * May 01 to October 30 15.0 mg/L ** November 01 to April 30
Total Phosphorus	0.8 mg/L
E.coli	200 organisms per 100 mL
pH	6.0 - 9.5

Table 2 Effluent Compliance Limits – Waste Stabilization Pond (ECA No. 3081-9XQNZK)

Parameter	Concentration in Effluent	Loading in Effluent	Non-compliance
CBOD5	30.0 mg/L	138.0 kg/day	• Annual Average Concentration exceeds concentration • Annual Average Loading exceeds concentration specified during any 12 consecutive calendar months
Total Suspended Solids	40.0 mg/L	184.0 kg/day	• Annual Average Concentration exceeds concentration • Annual Average Loading exceeds concentration specified during any 12 consecutive calendar months
Ammonia + Ammonium Nitrogen	14.0 mg/L * 17.0 mg/L **	64.4 kg/day * 78.2 kg/day **	• Monthly Average Concentration exceeds concentration • Monthly Average Loading exceeds concentration
Total Phosphorus	1.0 mg/L	4.6 kg/day	• Monthly Average Loading exceeds concentration during any 12 consecutive calendar months

Notes	* from May 01 to October 30 ** from November 01 to April 30

Proposed Rationale for Maintaining Current Criteria as part of this Class EA

An evaluation of growth in the service area was undertaken as part of Phase 1 of this Class EA. A Technical Memorandum was developed (refer to Appendix C in the Phase 1 Report) which used an existing service population of 6,462 and growth projections for the Municipality to develop residential population projections for the 20- year design populations. Projected average daily per capita wastewater flows from growth are anticipated to be approximately 500 L/c/day, in keeping with current flows. Based on this information, the 20-year design average day flow is anticipated to be less than the current rated capacity and there will be no need for any increase to the ECA rated capacity.

From the MOECC's letter and discussions at the pre-consultation meeting on December 20, 2016, we understand that impacts to surface water due to increased volumes or concentrations of sewage effluent should be evaluated as soon as possible in the Municipal Class EA process. As noted previously, no changes to the treatment system's rated capacity are being proposed. The process modifications being investigated will be intended to improve effluent quality to ensure current ECA requirements are met (i.e. the intent of this Class EA is to solve a current treatment problem with the existing system and not expand the system).

In our meeting you indicated that the MOECC originally considered that the effluent quality requirements for the constructed wetland portion of the system were established in order to obtain performance data and that these were never intended to be compliance criterion. We understand that consideration may be given to removing these requirements.

J.L. RICHARDS & ASSOCIATES LIMITED

Prepared by:

Steve Saxton, P.Eng.
Senior Project Engineer

Reviewed by:

Brian Hein, P.Eng.
Chief Environmental Engineer

Jane Wilson

From: Steve Saxton
Sent: March 1, 2017 4:04 PM
To: Castro, Victor (MOECC)
Cc: Brian Hein; Jane Wilson
Subject: Brighton WWTP Effluent

Hi Victor,
Thanks for the chat today. It was good to continue our conversation from a few weeks ago and go through the items in a little more detail.

To summarize what we discussed, we will proceed with the understanding that the existing limits will remain in place for the current parameter list. The primary objective of the Class EA exercise will continue to be to recommend implementation of systems will improve effluent ammonia levels to meet the current limits. In addition, a secondary objective will be to recommend improvements to phosphorus treatment from the waste stabilization pond in order to consistently meet the imposed limits.

From the Ministry's perspective, there is a recognition that the overall current effluent criteria limits at the site are dated and not in line with current Provincial and Federal levels for secondary treatment, particularly for BOD and TSS. There is also recognition that the facility is not currently meeting these current levels for BOD and TSS on an monthly average basis. (However, the site does meet them on an annual average basis.) Should those criteria limits be imposed (on a monthly average basis), the municipality would be facing additional challenges on top of the persistent documented ammonia issues they currently have. This is something they are not anticipating.

With that being said, the Ministry would expect to see improvements in effluent quality of these parameters since it is anticipated that introduction of most add-on treatment options will produce spin-off improvements to the overall effluent quality. As such, the evaluation of alternatives within the Class EA should consider that certain options may provide additional treatment of parameters other than ammonia.

Improvements to effluent quality with respect to BOD and TSS will help the municipality when faced with the potential for meeting more stringent effluent criteria for these parameters at some point in the future. Overall, water quality in Presquile Bay is an important factor and overall improvement to effluent quality will help this.

With respect to the constructed wetland, the Ministry does not anticipate giving credit to the effluent quality improvements that the constructed wetland may provide. It is acknowledged that the wetland may offer varying levels of additional treatment for some parameters, but it is not something that the Ministry is looking to formally recognize at this time.

Please let me know if I have anything incorrect in my understanding above. You mentioned that you'd likely be able to provide a brief piece of correspondence through Vicki confirming the above items over the next couple of weeks.

Thanks again,
Steve

Steve Saxton, P.Eng.
Civil Engineer

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203 - 863 Princess Street, Kingston, ON K7L 5N4
Tel: 613-544-1424 Fax: 613-544-5679

J.L. Richards & Associates Limited
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CANADA'S BEST MANAGED COMPANIES

Jane Wilson

From: Steve Saxton
Sent: March 28, 2017 9:41 AM
To: Castro, Victor (MOECC); Mitchell, Vicki (MOECC)
Cc: Brian Hein; Jane Wilson
Subject: RE: Brighton WWTP Effluent

Thanks Victor.

Steve Saxton, P.Eng.
Civil Engineer

J.L. Richards & Associates Limited
203 - 863 Princess Street, Kingston, ON K7L 5N4
Tel: 613-544-1424 Fax: 613-544-5679



From: Castro, Victor (MOECC) [mailto:Victor.Castro@ontario.ca]
Sent: March 28, 2017 9:33 AM
To: Steve Saxton; Mitchell, Vicki (MOECC)
Subject: RE: Brighton WWTP Effluent

Hi Steve,

The letter you are looking for is on the short list. Your email of March 1, 2017 summarizes our discussion and reflects my position. I will provide you a more formal response shortly.

Victor

From: Steve Saxton [mailto:ssaxton@jlrichards.ca]
Sent: March 21, 2017 5:10 PM
To: Mitchell, Vicki (MOECC)
Cc: Castro, Victor (MOECC)
Subject: RE: Brighton WWTP Effluent

Hi Vicki,
Just shooting an email over to see about timing for the correspondence previously discussed with yourself and Victor.
Thanks,
Steve

Steve Saxton, P.Eng.
Civil Engineer

J.L. Richards & Associates Limited
203 - 863 Princess Street, Kingston, ON K7L 5N4

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From: Steve Saxton
Sent: March 6, 2017 3:39 PM
To: 'Mitchell, Vicki (MOECC)'
Cc: Castro, Victor (MOECC)
Subject: FW: Brighton WWTP Effluent

Hi Vicki,
Apologies, I should have copied you on this email (below) back to Victor. I just realized now.
The Town is wondering if they can share the Phase 1 report with their council or other interested individuals. In addition to a confirmation letter coming from Victor, would you mind giving us a quick heads up whether there was anything in MOECC opinion to prevent that report from being shared at this time?
Thanks for the assistance.
Steve

From: Steve Saxton
Sent: March 1, 2017 4:04 PM
To: Castro, Victor (MOECC)
Cc: Brian Hein; Jane Wilson
Subject: Brighton WWTP Effluent

Hi Victor,
Thanks for the chat today. It was good to continue our conversation from a few weeks ago and go through the items in a little more detail.

To summarize what we discussed, we will proceed with the understanding that the existing limits will remain in place for the current parameter list. The primary objective of the Class EA exercise will continue to be to recommend implementation of systems will improve effluent ammonia levels to meet the current limits. In addition, a secondary objective will be to recommend improvements to phosphorus treatment from the waste stabilization pond in order to consistently meet the imposed limits.

From the Ministry's perspective, there is a recognition that the overall current effluent criteria limits at the site are dated and not in line with current Provincial and Federal levels for secondary treatment, particularly for BOD and TSS. There is also recognition that the facility is not currently meeting these current levels for BOD and TSS on an monthly average basis. (However, the site does meet them on an annual average basis.) Should those criteria limits be imposed (on a monthly average basis), the municipality would be facing additional challenges on top of the persistent documented ammonia issues they currently have. This is something they are not anticipating.

With that being said, the Ministry would expect to see improvements in effluent quality of these parameters since it is anticipated that introduction of most add-on treatment options will produce spin-off improvements to the overall effluent quality. As such, the evaluation of alternatives within the Class EA should consider that certain options may provide additional treatment of parameters other than ammonia.

Improvements to effluent quality with respect to BOD and TSS will help the municipality when faced with the potential for meeting more stringent effluent criteria for these parameters at some point in the future. Overall, water quality in Presquile Bay is an important factor and overall improvement to effluent quality will help this.

With respect to the constructed wetland, the Ministry does not anticipate giving credit to the effluent quality improvements that the constructed wetland may provide. It is acknowledged that the wetland may offer varying levels of additional treatment for some parameters, but it is not something that the Ministry is looking to formally recognize at this time.

Please let me know if I have anything incorrect in my understanding above. You mentioned that you'd likely be able to provide a brief piece of correspondence through Vicki confirming the above items over the next couple of weeks.

Thanks again,

Steve

Ministry of the Environment and Climate Change

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Ontario

M E M O R A N D U M

July 13, 2017

TO: V. Mitchell
Environmental Assessment Coordinator
Technical Support Section
Eastern Region

FROM: V. Castro
Surface Water Scientist
Technical Support Section
Eastern Region

RE: Municipality of Brighton
Brighton Wastewater Treatment System
Municipal Class Environmental Assessment
Phase 2 Report (Draft)

I have reviewed the report titled *"Municipality of Brighton, Brighton Wastewater Treatment System, Municipal Class Environmental Assessment, Phase 2 Report (Draft)"* dated April 10, 2017 prepared by J.L. Richards & Associates Limited and offer the following comments for your consideration.

The Municipality of Brighton sewage system consists of a 0.68 ha single cell aerated lagoon, a single cell 5.44 ha waste stabilization pond with baffle partition curtains, and a two cell constructed wetland with a total surface area of 6.2 ha. A chemical storage/feed system doses the influent continuously after the aeration lagoon and prior to the waste stabilization pond for phosphorus removal. The sewage works operates under Environmental Compliance Approval (ECA) No. 3081-9XQNZK issued July 7, 2015 and has a design rated capacity of 4,600 m^3/day. Treated effluent is discharged continuously to the constructed wetland which in turn discharges to a natural wetland system located in Presqu'ile Bay.

Presqu'ile Bay is a small and relatively sheltered coastal embayment located west of the Bay of Quinte on the north shore of Lake Ontario. Located along the west and southern shoreline, Presqu'ile Peninsula offers some protection from the open waters of Lake Ontario. This peninsula forms Presqu'ile Provincial Park. The Town of Brighton lies along the north shore of Presqu'ile Bay.

At its most northeastern point, Presqu'ile Bay connects to the western portion of the Bay of Quinte through the Murray Canal. Presqu'ile Bay connects to the open waters of Lake Ontario through a narrow channel at its most south eastern point. Several streams flow into Presqu'ile Bay. The two main streams are Smithfield Creek and Butler Creek (also known as Proctor's Creek).

Within the immediate vicinity of Presqu'ile Bay, land use consists of a mixture of rural, agricultural, and urban lands. The urban area is largely restricted to the north central portion of the bay, extending north to the town centre. The eastern extent of the bay is a mixture of shoreline residential properties, rural, and agricultural lands. The western and southern extent of

the bay is dominated by open parklands (Presqu'ile Provincial Park) along with shoreline residential properties. The outlying areas surrounding Presqu'ile Bay consist of a mixture of agricultural and rural lands.

Discharge from the Brighton sewage works makes up less than 1% of the water found in Presqu'ile Bay, except for the northwest inlet where the sewage discharge enters the bay. In this inlet, sewage discharges account for approximately 5 to 10% of the volume. Presqu'ile Bay also experiences large exchange flows with Lake Ontario and the Murray Canal leading to short resident times for water (Nettleton, 2015).

Daily sewage flows from 2011 to 2016 have averaged 71% of the approved design rated capacity (4,600 m^3/day). Twenty year growth projections for the Town of Brighton suggest that the existing design rated capacity of the sewage works is sufficient to handle future flows.

Phase 1 of the Class EA identified that raw sewage is relatively high strength even with high per capita flow rates. Possible sources of high strength sewage and flows include industrial and other non-residential contributors. The main concern with the sewage system over the last several years has been related to effluent quality and non-compliance with ammonia-N limits and occasionally total phosphorus. This has been attributed to high organic loadings and physical limitations of the current treatment system.

Since the main objective of the Class EA is to provide a preferred solution to address deficiencies with nitrification, the consultant is proposing that the existing effluent compliance limits, objectives and loadings be maintained in the amended ECA. I am prepared to accept these effluent criteria since no physical expansion of the sewage works is proposed. As part of the Phase I review and presubmission consultation meetings, I have indicated to the consultant that the municipality should give consideration in their Class EA evaluation to selecting a technology that can provide incidental improvements in the overall effluent quality, as more stringent effluent criteria will likely be imposed in the future. This approach will provide the municipality with flexibility when they do propose further upgrades and expansion.

The preferred solution is to install a specialized treatment system to complement the existing sewage lagoon system in combination with optimizing/modifying current lagoon operations (ie. desludging program, upgrading baffles, optimize alum dosing, refurbish constructed wetland). In addition, the municipality will investigate and divert high strength waste streams entering the collection system. In terms of the specialized treatment system, the preferred option is a fixed film biological process located downstream of the stabilization pond (e.g. SMBR, MBBR).

The proposed compliance limits, design objectives and loadings are as follows:

Parameter	Design Objective (mg/L)	Effluent Limit (mg/L)	Effluent Loading (kg/day)
$CBOD_5$	15	30	138
Total Suspended Solids	15	40	184
Total Phosphorus	0.8	1.0	4.6
Total Ammonia-N - Summer (May 1 to Oct. 31)	10	14	64.4
- Winter (Nov. 1 to April 30)	15	17	78.2
E. coli	200 counts/100 ml	n/a	n/a

The limits and loadings noted in the above table for TAN and TP are based on monthly averages, with the exception of *E. coli* which should be calculated as a monthly geometric mean.

The limits and loadings noted in the above table for $CBOD_5$ and TSS are based on annual averages as per the current ECA.

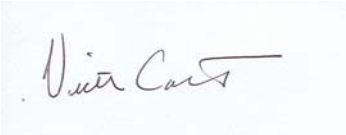
Historically, the compliance point for the Brighton sewage system has been imposed upstream of the constructed wetland. This compliance point should be maintained in the new design.

The existing ECA also has a set of effluent objectives for the constructed wetland; however, historical sampling has shown that the wetland portion of sewage system does not provide significant treatment for most of the parameters of concern. The continued use of the constructed wetland in its role as a natural polishing system is supported by this office; however, the design objectives in the ECA should be applied to the actual treatment system (discharge from fixed biological treatment process), and not on the discharge from the constructed wetland.

It would be prudent to maintain some form of monitoring program for the constructed wetland effluent but this is more for information purposes, data continuity and due diligence.

In summary, I am satisfied with the proposed effluent criteria for the upgrades to the Brighton sewage system.

If you have any questions regarding these comments please contact me at (613) 540-6862.



Victor Castro B.Sc. M.Pl.
VC/dv

ec: G. Faaren
V. Light
J. Fuller

c: File SW NO BR 03 07 (Town of Brighton Sewage System)

Jane Wilson

From: Steve Saxton
Sent: December 7, 2016 11:55 AM
To: Jane Wilson
Subject: FW: Study Commencement - Municipality of Brighton - Wastewater Treatment System

FYI.

Steve Saxton, P.Eng.
Civil Engineer

J.L. Richards & Associates Limited
203 - 863 Princess Street, Kingston, ON K7L 5N4
Tel: 613-544-1424 Fax: 613-544-5679

J.L. Richards & Associates Limited
ENGINEERS • ARCHITECTS • PLANNERS

BEST MANAGED COMPANIES

From: Steve Saxton
Sent: December 7, 2016 11:55 AM
To: 'Tolles, Cheryl (MTO)'
Cc: Bill Watson (BWatson@brighton.ca); DeVos, Kevin (MTO)
Subject: RE: Study Commencement - Municipality of Brighton - Wastewater Treatment System

Hi Cheryl,
Thank you for the reply. We confirm MTO non-involvement as a stakeholder and appreciate the contact information you provided.
Regards,
Steve

From: Tolles, Cheryl (MTO) [mailto:Cheryl.Tolles@ontario.ca]
Sent: December 7, 2016 11:48 AM
To: Steve Saxton
Cc: Bill Watson (BWatson@brighton.ca); DeVos, Kevin (MTO)
Subject: Study Commencement - Municipality of Brighton - Wastewater Treatment System

Dec 7, 2016

Steve, I am in receipt of the notification of Study Commencement sent to Kevin DeVos at the MTO Downsview complex for the proposed wastewater treatment project in Brighton. The Municipality of Brighton falls under the jurisdiction of MTO Eastern Region and Kevin forwarded the correspondence directly to me for response.

Thank you for providing an opportunity to review and provide any comments. In this instance, the only provincial highway in the Municipality of Brighton is Highway 401 and this project is not within the MTO

Highway 401 permit control area. MTO does not require any further correspondence or notification on this project and no MTO approvals or permits are required.

For any further projects you may have in Eastern Ontario, please direct them to the Corridor Management Section at the MTO Kingston address noted below. MTO Eastern Region consists of everything east of the Durham/Northumberland boundary to the Quebec border and north into the County of Haliburton, including the Municipality of Highlands East in Haliburton, and north on Highway 17 to the Nipissing Boundary.

Again, thank for your informing MTO of your project.

Cheryl Tolles

Ministry of Transportation

Corridor Management Planner

Highway Corridor Management Section

1355 John Counter Blvd.

Kingston, ON K7L 5A3

Cheryl.Tolles@ontario.ca

613-545-4744

Toll Free: 1-800-267-0295



Ontario
Infrastructure Ontario

One Dundas Street West, Suite 2000, Toronto, ON M5G 2L5
1, rue Dundas Ouest, bureau 2000, Toronto, ON M5G 2L5

December 9, 2016

Response to EA Notice

Thank you for providing Infrastructure Ontario (IO) with a copy of your Environmental Assessment Notice. From the information you have provided, it is unclear if you are proposing to use lands under the control of the Ministry of Infrastructure (MOI lands) to support your proposed project.

Prior to MOI consenting to the use of MOI lands, the applicable environmental assessment, duty to consult Aboriginal peoples (if triggered) and heritage obligations will need to be met. In order for MOI to allow you access to MOI lands and to carry out proposed activities, MOI must ensure that provincial requirements and due diligence obligations are satisfied. These requirements are in addition to any such obligations you as the proponent of the project may have.

You as the proponent of the project will be required to work with Infrastructure Ontario (IO) to fulfill MOI's obligations which may include considering the use of any MOI lands as part of your individual environmental assessment. All costs associated with meeting MOI's obligations will be the responsibility of the proponent. Please note that time should be allocated in your project timelines for MOI to ensure that its obligations have been met and to secure any required internal government approvals required to allow for the use of the MOI lands for your proposed project.

In order for MOI and IO to assist you to meet your required project timelines, please recognize that early, direct contact with IO is imperative. The due diligence required prior to the use of MOI lands for your proposed project, may include but may not be limited to the following:

- Procedural aspects of the Provincial Crown's Aboriginal Duty to Consult obligations – *see Instruction Note 1*
- Requirements of the MOI Public Work Class Environmental Assessment – *see Instruction Note 2*
- Requirements of the Ministry of Tourism Culture and Sport (MTCS) Standards and Guidelines for Consultant Archaeologists– *see Instruction Note 3*
- Requirements of the MTCS Standards and Guidelines for the Conservation of Provincial Heritage Properties Consultant Archaeologists – *see Instruction Note 4*

Representatives from IO are available to discuss your proposed project, the potential need for MOI lands and the corresponding provincial requirements and due diligence obligations.

Please review the attached instruction notes which provide greater detail on the due diligence obligations associated with the use of MOI lands for your proposed project. We are providing this information to allow you as the proponent to allocate adequate time and funding into your project schedule and budgets. If your project requires you to study MOI lands, then an agreement is required and all studies undertaken on MOI lands will be considered confidential until approval is received. IO will require electronic copies of all required studies on MOI lands that you undertake.

We strongly encourage you to work with IO as early as possible in your process to identify if any MOI lands would be required for your proposed project. Please note that on title MOI control may

be identified under the name of MOI or one of its predecessor ministries or agencies which may include but is not limited to variations of the following: Her Majesty the Queen/King, Hydro One, MBS, MEI, MEDEI, MGS, MOI, OLC, ORC, PIR or Ministry of Public Works[1].

Please provide Rita Kelly with a confirmation in writing of any MOI lands that you propose to use for your proposed project and why the lands are required along with a copy of a title search for the MOI lands.

For more information concerning the identification of MOI lands in your study area or the process for acquiring access to or an interest in MOI lands, please contact:

Rita Kelly
Project Manager
Land Transactions, Hydro Corridors & Public Works
Infrastructure Ontario
1 Dundas Street West, Suite 2000
Toronto, ON
M5G 2L5
Tel: (416) 212-4934
Email: rita.kelly@infrastructureontario.ca

An application package and requirements checklist is attached for your reference. Please note that transfer of an interest in MOI lands to a proponent can take up to one year and there is no certainty that approval will be obtained.

For more information concerning the MOI Public Work Class Environmental Assessment process and due diligence requirements, please contact:

Lisa Myslicki
Environmental Specialist
Infrastructure Ontario
1 Dundas Street West, Suite 2000
Toronto, ON
M5G 2L5
Tel: (416) 557-3116
Email: lisa.myslicki@infrastructureontario.ca

[1] MBS - Management Board Secretariat; MEI - Ministry of Energy and Infrastructure; MEDEI – Ministry of Economic Development, Employment and Infrastructure; MGS - Ministry of Government Services; MOI - Ministry of Infrastructure; OLC - Ontario Lands Corporation; ORC - Ontario Realty Corporation; PIR - Ministry of Public Infrastructure Renewal

If MOI lands are not to be impacted by the proposed project, please provide a confirmation in writing to Infrastructure Ontario.

Thank you for the opportunity to provide initial comments on your proposed project.

Sincerely,

Patrick Grace
Director
Land Transactions, Hydro Corridors & Public Works
Infrastructure Ontario
1 Dundas Street West, Suite 2000
Toronto, ON, M5G 2L5

INSTRUCTION NOTE 1

Provincial Crown's Aboriginal Duty to Consult obligations

The Crown has a constitutional Duty to Consult (DTC) in certain circumstances and Aboriginal consultation may be required prior to MOI granting access to MOI lands or undertaking other activities. The requirement for Aboriginal consultation may be triggered given Aboriginal or treaty rights, established consultation or notification protocols, government policy and/or program decisions, archaeological potential or results, and/or cultural heritage consultation obligations. The requirement for Aboriginal consultation will be assessed by MOI.

Prior to the use of MOI lands, MOI must first meet any duty to consult obligations that may be triggered by the proposed use of MOI lands. It is incumbent on you to consult with IO as early in the process as possible once you have confirmed that MOI lands would be involved.

MOI will evaluate the potential impact of your proposed project on Aboriginal and treaty rights. MOI may assess that the Crown's Duty to Consult (DTC) requires consultation of Aboriginal communities. Proponents should discuss with IO whether MOI will require consultation to occur and if so, which communities should be consulted.

Where MOI determines that Aboriginal consultation is required, MOI will formally ask you to consult or continue to consult with Aboriginal peoples at the direction of MOI.

On behalf of MOI you will also be required to:

1. Maintain a record and document all notices and engagement activities, including telephone calls and/or meetings;
2. Provide the Ministry updates on these activities as requested; and
3. Notify the Ministry of any issues raised by Aboriginal communities.

If consultation has already occurred, IO strongly encourages you to provide complete Aboriginal consultation documentation to IO as soon as possible. This documentation should include all notices and engagement activities, including telephone calls and/or meetings.

Any duty to consult obligations must be met prior to publically releasing the Notice of Completion for the assessment undertaken under the MOI PW Class EA.

INSTRUCTION NOTE 2

Requirements of the MOI Public Work Class Environmental Assessment

MOI has an approved Class EA (the Ministry of Infrastructure Public Work Class Environmental Assessment (Public Work Class EA) to assesses undertakings that affect MOI lands including disposing of an interest in land or site development. Details on the Public Work Class EA can be found at:
http://www.infrastructureontario.ca/Templates/Buildings.aspx?id=2147490336&langtype=1033

You may be required to work with IO to complete an environmental assessment under the Public Work Class EA for the undertakings related to MOI lands. IO will work with you to ensure that all of the MOI undertakings or activities related to the use of MOI lands are identified, that the appropriate Category of undertaking is used and a monitoring and report back mechanism is established to ensure that MOI's obligations are met.

The completion of another environmental assessment process that assesses the undertakings related to MOI lands may satisfy MOI's obligations under the Public Work Class EA. You will be required to work with IO to determine the most appropriate approach to meeting the Public Work Class EA obligations for undertakings related to MOI lands on a case by case basis.

Where it is decided that the assessment of undertakings related to MOI lands can be assessed as part of the environmental assessment being undertaken by the proponent then it is likely that the following provisions will be required:

- that the environmental assessment documents set out that one process will be relied on by both the proponent and MOI to evaluate their respective undertakings and meet their respective obligations to assess the potential impacts of their undertakings;
- that the proponent's description of the undertaking to be assessed include all of the MOI undertakings related to the use or access to MOI lands (see Glossary of Terms);
- the associated EA Category from the Public Works Class EA be identified and met by the environmental assessment (see Figure 22. Category Listing Matrix and/or Tale 2.1 EA Category Identification Table);
- that the proponent's environmental assessment indicate that MOI would be relying on the proponent's assessment to satisfy MOI's obligations under the *Environment Assessment Act*;
- establish a monitoring and report back mechanism to ensure that any obligations of MOI resulting from the assessment will be met; and

An environmental assessment consultation plan be developed to ensure that all stakeholders required to be consulted regarding the undertakings on the MOI lands are consulted

Other Due Diligence Requirements

There may also be other additional due diligence requirements for the use of MOI lands in the proposed project. These may include:

- Phase One Environmental Site Assessment and follow up
- Stage 1 Archaeological Assessment and follow up

- Survey
- Title Search
- Species at Risk Survey(s)
- Appraisal

INSTRUCTION NOTE 3 – ARCHAEOLOGY - (see also *Instruction Note on Duty to Consult*)

Archaeological sites are recognized and protected under the *Ontario Heritage Act*. Carrying out archaeological fieldwork is a licensed, regulated activity under the 2011 Ministry of Culture Standards and Guidelines for Consulting Archaeologists. Please visit……

Archaeological due diligence is required for any proposed project on MOI land that could cause significant below ground disturbance such as, new building construction, installation/modification of site services, and installation/maintenance of new pipelines or transmission lines.

You, as the proponent, must engage IO prior to undertaking any archaeological work on MOI lands.

IO has two in-house licensed archaeologists who should be consulted early in the preparatory stages of a proposed project when geographic and site locations are being considered so that the potential for archaeological resources including historic and Aboriginal material (ion Aboriginal villages and burials sites) can be assessed.

To support both the Public Work Class EA and MOI's duty to consult analysis, archaeological assessments are required to determine if there are any significant findings that may be of cultural value or interest to Aboriginal people (e.g., archaeological or burial sites).

Archaeological work can begin before the assessment under the Public Works Class EA begins but the Class EA cannot be completed until the duty to consult that may be triggered regarding archaeological resources are fulfilled.

Depending upon the number or significance of resources found, the duty to consult may be triggered during any of the 4 phases of archaeological work (see below) or anytime during project construction.

The discovery of Aboriginal resources can impact on activities, including project and site plans, timelines and all costs. As the proponent, you are expected to ensure that you project timelines include adequate time and resources to address MOI due diligence obligations, including internal government approvals. All costs associated with meeting MOI's archaeological obligations will be the responsibility of the proponent.

For Archaeological Assessments (Stages 1 through 4), proponents must adhere to the four stage archaeological fieldwork process prescribed by the Ontario Ministry of Tourism, Culture and Sport (MTCS) as per the 2011 Standards and Guidelines for Consultant Archeologists. Not all noted Stages will be necessary for all work. Respondents must follow industry procedures and practices as per the MTCS Standards and Guidelines for Consultant Archeologists 2011 for each Stage of archaeological assessment, all reporting criteria and formatting, and any other license requirements and/or obligations.

- Stage 1 Background Study - Evaluation of Archaeological Potential
  - Archival research and non-intrusive site visit

- Stage 2 Property Assessment

- In-field systematic pedestrian survey or test pitting and reporting
-

- Stage 3 Site-specific Assessment
  - Limited excavation to determine site significance and size
  - Field works and reporting

- Stage 4 Site mitigation
  - Through either avoidance/protection or excavation Field work 4 to 8 weeks
  - Develop summary report
  - MTCS review – expedited review of summary report 6 weeks
  - Final report
  - Time to develop and implement mitigation measures – negotiation, legal protections, avoidance

IO Contact Information and direction to IO website….

INSTRUCTION NOTE 4 – HERITAGE REQUIREMENTS

Built Heritage/Cultural Landscapes

Built heritage/cultural landscapes (cultural heritage) are recognized and protected under the Ontario Heritage Act, the regulations to that Act and the 2010 Ministry of Culture Standards and Guidelines for Conservation of Provincial Heritage Properties (S&Gs) Criteria for determining cultural heritage value or interest are set out in O. Reg. 9/06 and 10/06. The S&Gs set out a process for identifying properties of cultural heritage value, and the standards for protection, maintenance, use and disposal of these properties. Please visit…….

Cultural heritage due diligence will be required for any proposed project on MOI land with the potential to impact cultural heritage resources, such as new building construction, installation/modification of site services, landscape modifications and installation/maintenance of new pipelines, transmission lines.

To support MOI's heritage and MOI PW Class EA obligations, proponents will be required to undertake cultural heritage assessments for all projects that require MOI lands. This will help to determine if the MOI lands are of cultural value or interest to the Province and the level of heritage significance. Where a property has heritage value, proponents may be required to develop appropriate conservation measures/plans and heritage management plans.

You, as the proponent, are strongly encouraged engage IO heritage staff as early in your project planning process as possible and in advance of beginning any cultural heritage assessment work. IO staff will be able to provide advice on the S&Gs and will provide any available heritage information for the MOI lands.

Proponents must also follow industry procedures and practices for all components of cultural heritage assessment work, all reporting criteria and formatting, and any other requirements and/or obligations. IO heritage staff can help identify any required reports.

Should MOI lands be identified under the S&Gs as a Provincial Heritage Property (local significance) or a Provincial Heritage Property of Provincial Significance, IO must be engaged to determine next steps.

Please note that if a Provincial Heritage Property of Provincial Significance is to be impacted, it is likely that consent from the Minister, Ontario Minister, Tourism, Culture and Sport (MTCS) will be required prior to access being granted to MOI lands. Minister's consent requires a detailed application and approvals should land dispositions or building demolitions be applied for as part of the proposed project.

As the proponent, you are expected to ensure that your project timelines include adequate time and resources to address MOI's heritage due diligence obligations, including internal government approvals. All costs associated with meeting MOI's heritage obligations are the responsibility of the proponent.

Staff contacts……

J.L. Richards
& Associates Limited
203-863 Princess Street
Kingston, ON Canada
K7L 5N4
Tel: 613 544 1424
Fax: 613 544 5679

January 18, 2017
JLR File: 27271

VIA: Email

Lisa Myslicki, Environmental Specialist
Infrastructure Ontario
1 Dundas Street West, Suite 2000
Toronto, ON M5G 2L5
Tel: (416) 557-3116
Email: lisa.myslicki@infrastructureontario.ca

Dear Ms. Myslicki:

Re: Brighton Wastewater Treatment System MCEA, Municipality of Brighton

Thank you for your interest in this project. In response to your letter dated December 9, 2016 we wish to confirm that no lands under the control of the Ministry of Infrastructure (MOI lands) are anticipated to be required or affected by the proposed project. If MOI lands are found to be impacted, IO will be contacted and the due diligence required prior to the use of MOI lands for the propose project, will be completed.

If there are any questions regarding the above, please contact the undersigned.

J.L. RICHARDS & ASSOCIATES LIMITED



Steve Saxton, P.Eng.
Civil Engineer

SS:jw

CC: Bill Watson, CAO, Municipality of Brighton
Jane Wilson, J.L. Richards & Associates

CANADA'S BEST MANAGED COMPANIES

Jane Wilson

From: Steve Saxton
Sent: December 13, 2016 12:38 PM
To: Spang, Elizabeth (MNRF)
Cc: bwatson@brighton.ca; Jane Wilson
Subject: RE: Brighton Wastewater Treatment System Class EA; MNRF file 16-MURR-NOR-EAE-2352

Ms. Spang,
Thank you for providing feedback to the Notice as well as providing additional site specific information for our review and consideration. We also appreciate the offer to consult with you if we have any questions.
Kind regards,
Steve

From: Spang, Elizabeth (MNRF) [mailto:Elizabeth.Spang@ontario.ca]
Sent: December 13, 2016 11:47 AM
To: Steve Saxton
Cc: bwatson@brighton.ca
Subject: Brighton Wastewater Treatment System Class EA; MNRF file 16-MURR-NOR-EAE-2352

Dear Mr. Saxton:

MNRF Peterborough District has received your Commencement Notice for the Brighton Wastewater Treatment System Class Environmental Assessment. We can provide you with the information below to inform your project.

General: MNRF Data and Information

We would like to inform you that MNRF's natural heritage and natural resources data and information (including wetlands, ANSIs) for the study area can be obtained through the Land Information Ontario Warehouse (LIOW) through the Ministry's Land Information Ontario (LIO) website at: https://www.ontario.ca/environment-and-energy/land-information-ontario.
You may also view natural heritage information online (e.g. Provincially Significant Wetlands, ANSIs, Woodlands, NHIC 1 km screening squares) using Natural Heritage Make a Map at: https://www.ontario.ca/environment-and-energy/make-natural-heritage-area-map.

You can also obtain Species at Risk occurrence information on our Natural Heritage Information Centre website: https://www.ontario.ca/environment-and-energy/get-natural-heritage-information. In addition, the official Species at Risk in Ontario (SARO) List can be obtained at: http://www.e-laws.gov.on.ca/html/regs/english/elaws_regs_080230_e.htm

We recommend that you use the above-noted sources of information during the review of your project proposal.

Wetlands
The project area, including the southern portion of the sewage lagoons, is located within the Presqu'ile Bay Marsh Provincially Significant Wetland (PSW). I have attached a summary report for the wetland evaluation. The Presqu'ile Bay Marsh PSW is extremely unique and diverse and is considered a significant colonial waterbird nesting area, including colonial waterbirds that are listed as species at risk (see SAR section below). The wetland is also a provincially significant staging area as well as a regionally significant moulting area. The wetland is greater than 1000 hectares in size, making it one of the larger coastal wetlands.

MNRF recommends that further expansions of the existing infrastructure (if required) not be placed within the PSW and that alternatives for wastewater treatment options outside of the PSW be considered. Where possible, water quality and discharge to the PSW and associated watercourses should be improved. The EA should consider impacts and mitigation measures to protect the significant coastal wetland features and functions for each alternative.

Fisheries

The project area contains watercourses. The creek in the northern section that crosses both Lot 33 and 34 (north and east sides of the sewage lagoons) is a coldwater stream. Our office does not have data to indicate whether trout or salmon species are present. Fish species on file include: banded killifish, blackchin shiner, brook stickleback, creek chub, fathead minnow, northern redbelly dace, white sucker, yellow perch. If impacts to the cold water stream are possible, additional fisheries assessments are required to determine if the stream is being used for any trout or salmon species before a timing window can be determined. Our office can be contacted for further advice on in-water work timing windows once additional fisheries assessments are done. Please note that a Scientific Collector's Permit is required for fish sampling – see section below.

The stream located solely in within the lower half of Lot 34 (Proctor's Creek) is also a coldwater stream which supports both brook trout and rainbow trout and is fully within the PSW. Fish species on file include: brook trout, common shiner, creek chub, eastern blacknose dace, longnose dace, mottled sculpin, northern redbelly dace, rainbow trout, white sucker.

We also recommend contacting Lower Trent Conservation Authority for information on potential approvals for work within watercourses.

Significant Wildlife Habitat

Presqu'ile Bay Marsh PSW is known to contain Black Tern nesting colonies, colonial waterbird nesting area, including colonial waterbirds that are listed as species at risk, and waterfowl staging areas.

The site may also contain other significant wildlife habitat which typically must be identified during site-specific investigations. Significant wildlife habitat may include features such as: seasonal concentration areas for wildlife species (e.g. snake hibernaculum), rare vegetation communities (e.g. tallgrass prairie), specialized habitats of wildlife (e.g. turtle nesting and over-wintering areas), habitats of species of conservation concern (e.g. Special Concern species as identified on the Species at Risk in Ontario list) and animal movement corridors (e.g. amphibian movement corridors). We recommend that you contact the local planning authority to determine whether any Significant Wildlife Habitat has been identified in this area. In addition, when no information is available, we refer you to the Significant Wildlife Habitat Technical Guide and the recently approved Ecoregion 6E Criterion Schedule for the identification of Significant Wildlife Habitat (January 2015). The Ecoregion Criterion Schedules and newly approved Significant Wildlife Habitat Mitigation Support Tool (MiST) can be downloaded here: https://www.ontario.ca/search/natural-heritage-planning-resources-municipal-planning. MNRF considers these documents to be the best available information to identify significant wildlife habitat.

Species at Risk/ Endangered Species Act

A review of our best available information indicates that there are observations and/or occurrences of American Eel (Endangered), Bank Swallow (Threatened), Barn Swallow (Threatened), Butternut (Endangered), Eastern Pondmussel (Endangered), King Rail (Endangered), Least Bittern (Threatened), Northern Map Turtle (Special Concern), Snapping Turtle (Special Concern), Wood Thrush (Special Concern), and Pale-bellied Frost Lichen (Endangered-historical) in the immediate area of the site. Also, there are observations and/or occurrences of American Ginseng (Endangered), Bald Eagle (Special Concern), Black Tern (Special Concern), Blanding's Turtle (Threatened), Bobolink (Threatened), Eastern Meadowlark (Threatened), Eastern Musk Turtle (Special Concern), Eastern Wood-Pewee (Special Concern), Loggerhead Shrike (Endangered), Monarch Butterfly (Special Concern), Piping Plover (Endangered), Red Knot rufa subspecies (Endangered), Yellow Rail (Special Concern) in the general area (5 km) of the proposed activities. Although no other

threatened or endangered species or their habitat have been documented in the area of the proposed project, these features may be present and this list should not be considered complete.

Species listed as endangered or threatened on the Species at Risk in Ontario (SARO) list are protected under the Endangered Species Act, 2007 (ESA). Section 9(1) of the ESA prohibits a person from killing, harming, harassing, capturing or taking a member of a species listed as endangered, threatened or extirpated on the SARO list. Section 10(1) of the ESA prohibits the damage or destruction of habitat of a species listed as endangered or threatened on the SARO list.

Since comprehensive mapping for most Species at Risk is not available, a site assessment is recommended to identify the presence of any Species at Risk and/or their habitat on the subject lands, as a decision should not be made in the absence of such information. The focus of the site assessment can include a review of the information about observations and/or occurrences provided by MNRF above along with other information sources such as species distributions and habitat requirements as well as field visits using MNRF approved protocols during the appropriate seasons by a qualified professional. **Suggested studies/surveys include, but are not limited to, Breeding Bird survey, Marsh Bird Survey, Whip-Poor-Will survey (protocol attached), Turtle Basking Survey, and Amphibian survey. Further surveys may be warranted dependent on habitat types observed during ELC mapping/vegetation surveys.** Due to the species that are potentially present at this site, the following recommendations should help prevent adverse impacts:

Birds

Workers must be vigilant and check work areas for the presence of breeding birds and nests containing eggs and/or young. If breeding birds and/or nests are encountered, works should not continue in the location of the nest until after August 1 (or as soon as it has been determined that that the young have left the nest). Please note that the breeding bird season in the subject area extends from April 15 to July 31.

Specific Barn Swallow Information: Barn Swallow nests may be present under bridges and/or culverts. Therefore, the underside of these structures should be assessed for Barn Swallow nests before proceeding. If no nests are present, a contravention of the ESA is unlikely. However, if nests are present, construction should not begin until after August 15 of any year. If nests will be impacted during the nesting season or if the structure will no longer be suitable for nesting post-construction, ESA requirements will apply to the activity. A regulatory provision is available that allows eligible activities that impact to Barn Swallow to register and follow all the rules in regulation in place of applying for a permit under the ESA. See this website for more information on regulatory requirements for Barn Swallow: https://www.ontario.ca/page/alter-structure-habitat-barn-swallow.

Turtles and Snakes

Workers must be vigilant and check work areas for the presence of turtles. If turtles or snakes are encountered, whenever possible, work should be temporarily suspended until the animal is out of harm's way. Workers should report any turtle observations (including photographs and coordinates) to the Peterborough District Office immediately at (705) 755-2001. Please note that the turtle nesting season in the subject area extends from May 15 to Aug 15. Therefore, activities which may cause adverse impacts to a species or habitat (e.g. use of heavy equipment) should commence after Aug 15.

Butternut:

If a Butternut tree(s) is identified and is to be removed, trimmed or is in close proximity to the application of herbicides, a Butternut Health Assessment should be conducted by an individual trained and certified by MNRF as a Butternut Health Assessor (BHA) under the Butternut Health Assessment in Ontario protocol. All Butternut Health Assessments must be submitted to the MNRF District office for a 30 day review period before proceeding. Depending on the results of the assessment, you may have different options for how to proceed. Please see the following online factsheet (http://www.ontario.ca/environment-and-energy/butternut-trees-your-property) for more information. Please note that the ideal time of year to properly identify Butternut (and to distinguish between Butternut and Butternut Hybrids) is between the leaf on and leaf off period (approximately June to August). Workers should report any Butternut observations (including photographs and coordinates) to the Peterborough District office immediately upon discovery.

For those Butternut that are not proposed for removal, a minimum protective buffer of a 25 metre radius from the stem of each Butternut is required to prevent root disturbance. A larger area up to 50 m may also be considered protected habitat for the tree. In this buffer area, activities that would remove or significantly compact the roots and soil, and cause direct harm to the Butternut are not permitted. Activities that would damage or destroy habitat e.g. by impacting the tree's ability to disperse seeds are also not permitted. Removal of other vegetation and careful logging practices within this radius are permitted.

As of July 1, 2013, there are new regulatory provisions provided under the ESA. This regulatory provision allows eligible activities, such as work undertaken to repair, modify, demolish, replace or general maintenance of a structure or the removal of buildings and/or excavation of land, vegetation removal, etc. that is considered to be species at risk habitat to proceed without a permit, provided the proponent register with the Ministry of Natural Resources and Forestry and then follow the specific rules in regulation under the ESA. These rules include, but are not limited to, preparing a mitigation plan and implementing steps to minimize the adverse effects of the activity on the species identified. Information on the new ESA regulatory provision that come into effect on July 1, 2013 can be found at http://www.ontario.ca/environment-and-energy/natural-resources-approvals.

The amended ESA regulation (O.Reg 242/08) can be found at http://www.e-laws.gov.on.ca/html/regs/english/elaws_regs_080242_e.htm.
If an impact to a Species at Risk or its habitat cannot be avoided, a person(s) should contact MNRF to discuss options, including applying for an authorization under the ESA. In situations where an activity is not registered with or authorized by the MNRF, a person(s) must comply with the ESA by modifying proposed activities to avoid impacts to Species at Risk and habitat protected under the ESA.

It is highly recommended that landowners and on-site workers familiarize themselves with information found at the following links:
MNRF Species at Risk website: www.ontario.ca/speciesatrisk

During on-site activities, should any species at risk or their habitat be potentially impacted, MNRF should be contacted immediately and operations should be modified to avoid any negative impacts to species at risk or their habitat until further discussions with MNRF can occur regarding opportunities for mitigation. If any species at risk are found, the Peterborough District MNRF office should be contacted at 705-755-2001. If possible, pictures of the species at risk and coordinates for the location where it was observed should be provided to MNRF.

Public Lands Act
Except for federal canals and harbours, the beds of most lakes and streams are public land in Ontario. Please note that you may require a Work Permit under the Public Lands Act if you are proposing any work in water or near shore areas below the spring high water mark. If you have any questions about the Public Lands Act, please contact the Lands and Waters Technical Specialist at 705-755-3134.

Lakes and Rivers Improvement Act
Approval may be required under the Lakes and Rivers Improvement Act (LRIA) if you are planning to construct, alter, repair or decommission a dam. If you have any questions regarding the LRIA, please contact the Lands and Waters Technical Specialist at 705-755-3134.

Fish and Wildlife Conservation Act
Please note that you may require a Scientific Collector's Permit from our office if you will be doing any fish or wildlife sampling, collection, salvage, or relocation within Peterborough District. For more information about Scientific Collector's Permits, please contact Julie Formsma, Fish and Wildlife Technical Specialist at 705-755-3296.

Other Approvals
It is the responsibility of the proponent to acquire all other information and necessary approvals from any other municipal, provincial or federal authority under other legislation. We recommend that you contact your local

Conservation Authority, Department of Fisheries and Oceans, Parks Canada, Ministry of the Environment and Climate Change, Ministry of Tourism, Culture and Sport, etc.

Don't hesitate to contact me if you have any questions. Please reference the file number in the subject line for any future correspondence.

Best regards,

Liz Spang, M.Pl

District Planner
Peterborough District
Ontario Ministry of Natural Resources and Forestry
300 Water Street, 1st Floor South
Peterborough, ON K9J 8M5
Tel: (705) 755-3360
Fax: (705) 755-3125
Email: Elizabeth.Spang@ontario.ca

Help stop the invasion! Do you know *your* action plan? *Ontario.ca/invasionON*

Peterborough District MNR
Wetland Summary Report

Report Generated: **December-13-16**



Wetland Name: **Presqu'ile Bay Marsh**

Wetland Code: PB-NOR-LT-039 *Significance:* PSW

LIO (OGF) ID: 1251551360 ☐ Historical Record? (No longer in LIO).

OWES Edition: Third Edition *Scoring System:* Southern

Upper Tier Municipalities: County of Northumberland

Lower Tier Municipalities: Municipality of Brighton

Conservation Authority: Lower Trent Conservation

MNR Area Team: Peterborough

Evaluation Notes:
A Provincially significant, Coastal wetland, composed of three wetland types (3% fen, 20% swamp and 80% marsh) (Snider, 2006);

Last Field Evaluation 2006-Mar
Last Desktop Update:
EcoDistrict: Multi
Wetland Size (ha): 1114.5
Catchment Area (ha):

Biological Component:	191
Social Component	221
Hydrological Component:	30
Special Features Component:	250
Total Score:	692
Significance:	PSW

Evaluation Authors: B. Snider Snider's Ecological Services

Dominant Vegetation Forms (%)

h	11	ts	3	be	
c		ls		re	20
dh		gc		ff	
dc		m		f	2
ds		ne	7	su	55
unvegetated					

Soils (%)

clay/loam	
silt/marl	
limestone	
sand	90
humic/mesic	10
fibric	
granite	

Site Type (%)

Isolated	3
Palustrine	10
Riverine	
Riverine (at rivermouth)	
Lacustrine (at rivermouth)	
Lacustrine (enclosed bay)	4
Lacustrine (exposed to lake)	83

Vegetation Communities:

Snider, 2006:
One Form
W2: su coontail, Eurasian milfoil, wild celery, northern water milfoil, large leaf pondweeds, narrow-leaved potamogeton, chara;
M3: re common cattail;
S14: ts slender willow, balsam poplar, speckled alder, white birch, silver maple;

Two Forms
W4: su Canada waterweed, Richardson's pondweed, northern water milfoil; f European frogbit, fragrent white water lily;
F1: ne twigrush; gc marsh fern, silverweed, false dragonhead, royal fern;
M1: ne wild rice; f fragrant white water lily;
M2: re common cattail; gc jewelweed;
M6: re common cattail; ff lesser duckweed;
M9: ne reed canary grass; gc white boneset, purple loosestrife;
M10: ne softstem bulrush; su chara
M12: re common cattail, ne softstem bulrush;
S5: h silver maple, red ash, white birch; ts Salix sp, silver maple;
S7: h red ash; ne grasses

Three Forms
W3: f fragrant white water lily, European frogbit; ff Wolfia; su wild celery, coontail, bracted water milfoil, Potamogeton sp.;
W5:ne wild rice; f fragrant white water lily; su wild celery, coontail;
M4: re common cattail; f European frogbit; gc small bedstraw;
M7: re common cattail; gc purple loosestrife, small bedstraw, jewelweed, water horsetail; ne Canada bluejoint;
M8: ne Canada bluejoint twigrush, canary reed grass, sedge; m mosses; gc purple loosestrife, sensitive fern;
M11: re common cattail; m mosses; gc smal bedstraw, bulb-bearing water hemlock;
S3: h red ash, white birch, silver maple; gc sensitive fern; ls red oiser dogwood;
S6: ts slender willow, red oiser dogwood; ne Canada bluejoint; ls naroow-leaved meadowsweet;
S9: h balsam poplar, white birch, red ash, black cherry; ts red oiser dogwood, common buckthorn, black cherry, annyberry; gc sensitive fern, jewelweed;

S12: c white cedar; h crack willow, Manitoba maple; gc ostrich fern, jewelweed;
S16: ls slender willow; gc horsetail; ne canary reedgrass, twigrush;
S21: ts speckled alder, red oiser dogwood, narrow-leaved meadowsweet; ne sedges, grasses;

Four Forms
W1: f fragrant white water lily, European frogbit; su water milfoil, Canada waterweed, Potamogeten sp.; ne wild rice; re common cattail;
S1: h red ash, white birch, white elm; ts speckled alder; narrow-leaved meadowsweet; gc purple loosestrife, sensitive fern;
S8: h red ash, white birch; ts speckled alder, Canada elderberry, winterberry, narrow-leaved meadowsweet; gc sensitive fern; ne Canada bluejoint;
S10: h crack willow; ts Manitoba maple, common buckthorn, choke cherry; gc jewelweed, wild cucumber; m mosses;
S15: ts red oiser dogwood; gc sensitive fern; ne grasses, sedges; m mosses;
S17: ts slender willow; ne reed canary grass; h eastern cottonwood; gc horsetail;
S19: ff greater duckweed, wolfia; ls water willow; re common cattail; ne Canada bluejoint;
S20: h silver maple, black ash, white birch, balsam poplar; ts speckled alder; gc sensitive fern, jewelweed; ne grasses, lakebank sedge;

Five Forms
S2: ts red maple, white birch, white elm; ls narrow leaved meadowsweet; gc purple loosestrife, white boneset; ne rice cut grass, woolgrass, sedges; dh white elm;
S11: ts slender willow; re common cattail; gc purple loosestrife, nodding beggar's tick, small bedstraw, bulb bearing water hemlock; ne Canada bluejoint, Carex sp; m mosses;
S13: c white cedar; dh white elm; gc ostrich fern, bulbet fern; h red ash, Manitoba maple, crack willow; ts Manitoba maple, apple, nannyberry;
S18: h red ash; ts red ash, black cherry; gc sensitive fern, marsh fern, false nettle, horsetail, nodding beggar's tick; ne ; m mosses

Six Forms
S4: h red ash, silver maple; ts speckled alder, Canada elderberry; ls narrow-leaved meadowsweet; jc jewelweed, sensitive fern; ne grasses; m mosses;

Social Component Summary

Wild Rice Present? ☐ *Source:*

Comm. Fish Present? ☑ *Source:* 2006

Furbearers

muskrat, beaver, raccoon, mink, fox;

Recreational Activity Intensity

Hunting

Nature Enjoyment / Ecosystem Study

Fishing

Proximity to Settlement

to

Threats to Communities:

Moderate distrurbance; localized water pollution (Snider, 2006);

Biodiversity Summary:

Breeding Habitat for Endangered or Threatened Species:

Snider, 2006: King Rail, Least Bittern;

Prov. Sig. Animals:

Snider, 2006: Black-crowned night heron, Monarch butterfly, Caspian tern, Black tern, Great black-bearded gull;

Prov. Sig. Plants:

Regionally Sig. Species:

Snider, 2006: Great lobellia;

Locally Significant Species:

Special Features

Colonial Waterbird Notes:

Winter Cover for Wildlife

Details:

Waterfowl Staging

Waterfowl Moulting

Waterfowl Breeding

Migratory Stopover

Fish Habitat

Details:

Land Uses: Recreational Activities (Snider, 2006):
Hunting- high, Nature Appreciation or Study- high, Fishing- moderate;

Ecological Values:

Nesting of Colonial Waterbirds- black terns, black-crowned night herons, caspian terns (Snider, 2006);
Winter cover for Wildlife- significant in site district (Snider, 2006);
Waterfowl Staging and/or Moulting- staging provincially significant, moulting regionally significant (Snider, 2006);
Waterfowl Breeding- habitat suitable (Snider, 2006);
Migratory Passerine, Shorebird or Raptor Stopover Area- significant in site region (Snider, 2006);
Fish Habitat is present within the wetland (Snider, 2006);
Extra Information- purple loosestrife present (Snider, 2006);
Species of Special Significance- feeding area for osprey (Snider, 2006);

Other Values:

Ownership Information:

22% of wetland in public or private ownership, held under contract or in trust for wetland protection;
56% of wetland area in public ownership, not as above;
22% of wetland area in private ownership, not as above (Snider, 2006);

Offsite Information:

Diversity of Surrounding Habitat (Snider, 2006):
row crops, pasture, abandoned agricultural land, deciduous forest, mixed forest (at least 25% confier and 75% deciduous or vice versa), open lake or deep river, fence rows with cover or shelterbelts;

Hydrologically connected by surface water to other wetlands or open water within 1.5 km (Snider, 2006);

J.L. Richards
& Associates Limited
203-863 Princess Street
Kingston, ON Canada
K7L 5N4
Tel: 613 544 1424
Fax: 613 544 5679

January 18, 2017
JLR File: 27271

VIA: Email

Elizabeth Spang, District Planner, Peterborough District
Ontario Ministry of Natural Resources and Forestry
300 Water Street, 1st Floor South
Peterborough, ON K9J 8M5
Tel: (705) 755-3360
Email: Elizabeth.Spang@ontario.ca

Dear Ms. Spang:

Re: MNRF file 16-MURR-NOR-EAE-2353
Brighton Wastewater Treatment System MCEA, Municipality of Brighton

Thank you for your interest in this project. In response to your email dated December 16, 2016 we offer the following clarifications and study updates.

General: MNRF Data and Information

The information sources indicated in your email have been obtained and will be used during the review of alternatives generated as part of this Class EA process.

Wetlands

The lagoon is located on Lot 33 and 34, Concession B, in the Municipality. The existing lagoon cells and engineered wetland utilize a good portion of the available property. However, due to the amount of underutilized property and opportunities to re-purpose existing treatment and storage areas, additional property is not anticipated for the preferred solution. In keeping with the MNRF recommendation, if further expansions of the existing infrastructure are required they would be placed outside of the Provincially Significant Wetland (PSW).

We note that, where possible, the MNRF requests that water quality and discharge to the PSW and associated watercourses should be improved. The overall intent of the project is to address a current effluent quality problem and no changes are proposed to current ECA treated effluent requirements. The intent of the project is to identify a preferred alternative that will allow the system to meet “current” requirements and improve current effluent quality. As the requirements in the existing ECA are not changing we do not anticipate any further consultation with the MNRF will be required on this matter. However, this will be re-assessed in Phase 2 of the Class EA.

CANADA'S BEST MANAGED COMPANIES

Fisheries/Significant Wildlife Habitat/Species at Risk

As noted above, additional property is not anticipated for the preferred solution. At this time no further Fisheries/Habitat/Species at Risk studies/ assessment are anticipated as part of this Class EA.

Public Lands Act/ Lakes and Rivers Improvement Act/ Fish and Wildlife Conservation Act/Other Approvals

If any proposed work is impacted by the Act's listed above or other approvals are required, the authority having jurisdiction will be notified.

If there are any questions regarding the above, please contact the undersigned.

J.L. RICHARDS & ASSOCIATES LIMITED



Steve Saxton, P.Eng.
Civil Engineer

SS:jw

CC: Bill Watson, CAO, Municipality of Brighton
Jane Wilson, J.L. Richards & Associates

Appendix D

Aboriginal Communities Mailing List
and Correspondence

Russell Ott
Consultation Intake Clerk
Metis Nation of Ontario
75 Sherbourne Street, Suite 311
Toronto, ON M5A 2P9
russello@metisnation.org

Mr. James R. Marsden, Chief
Mississaugas of Alderville First Nation
P.O. Box 4
Roseneath, ON K0K 2X0
jbmarsden@alderville.ca

Mr. R. Donald Maracle, Chief
Mohawks of the Bay of Quinte
24 Meadow Drive
Tyendinaga Mohawk Territory, ON K0K 1X0
rdonm@mbq-tmt.org

Hiawatha First Nation
Chief Laurie Carr
123 Paudash Street
Hiawatha, Ontario
K9J 0E6
chiefcarr@hiawathafn.ca

Chief Phyllis Williams
Government Services Building
Curve Lake First Nation
22 Winookeedaa Road
Curve Lake, Ontario K0L1R0

Chief Kelly LaRocca
Mississaugas of Scugog Island First Nation
Administration Building
22521 Island Road
Port Perry, ON
L9L 1B6



Municipality of Brighton
Schedule 'B' Municipal Class Environmental Assessment
Brighton Wastewater Treatment System

COMMENT FORM

Name (please print): DAVE MOWAT Date: May 2/17

I represent a(n): (please select the most applicable)
☐ Resident ☐ Agency ☐ Public Interest Group ☑ Other Stakeholder
(please specify)

Do you wish to receive updates in regards to this project? ☑ YES ☐ NO

Contact Name: DAVE MOWAT
Agency (if applicable): MISSISSAUGAS OF SCUGOG ISLAND
Address (number, street, and apt. no.): 22521 Island Rd
(City, Province, Postal Code): PORT PERRY ON
Phone: 905-985-3337 E-mail: dmowat@scugogfirstnation.com

Please indicate any issue(s) that need to be explored/investigated as part of this Class EA:

Please provide any additional comments about this Class EA:

We always maintain a concern for the fishery and wetland relevant species. We don't have in-house capacity to fully analyse any engineering/scientific data but the end result of this type project for us is continued expectation that the environment and fishery etc be made safe.

TO FIND OUT MORE VISIT
www.brighton.ca

Steve Saxton, P.Eng.
Civil Engineer
J.L. Richards & Associates Limited
203-863 Princess Street
Kingston, ON K7L 5N4
Email: ssaxton@jlrichards.ca
Phone: 613-544-1424

Bill Watson, P.Eng.
Chief Administrative Officer
Municipality of Brighton
35 Alice Street, P.O. Box 189
Brighton, ON K0K 1H0
Email: bwatson@brighton.ca
Phone: 613-475-0670

MUNICIPALITY OF BRIGHTON

Click here to submit form by E-mail

Note: Comments and information regarding this Study are being collected to assist the Ministry in meeting the requirements of the EA Act. This material will be maintained on file for use during the Study and may be included in project documentation. With the exception of personal information, all comments will become part of the public record

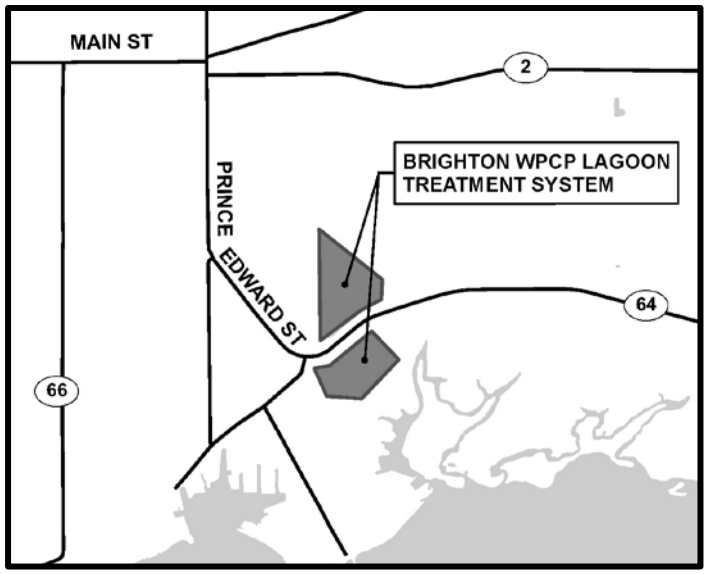
Appendix E

Public Information Centre Materials

Notice of Public Open House

Municipality of Brighton
Brighton Wastewater Treatment System
Schedule B Class Environmental Assessment

The Municipality of Brighton has initiated a Class Environmental Assessment (Class EA) to determine the most suitable process for wastewater treatment in Brighton over the next 20 years.



How Will This Affect Me?

The Class EA study is evaluating various alternatives in order to address historical problems experienced with wastewater treatment (predominantly elevated ammonia concentrations) and also to ensure that increased flows from future growth can be effectively accommodated.

We Want To Hear From You!

Public consultation is a key component to this Study. The proposed consultation plan provides for a single Public Open House to review the future wastewater treatment alternative that are being considered as part of this project. This Public Information Centre will identify existing system constraints and potential alternative solutions.

The 'preferred alternative' currently being considered envisions installing a specialized treatment system to complement the existing lagoon system and optimizing current lagoon operations.

The Open House (or Public Information Centre) is scheduled as follows:

Date:	**Monday, May 29, 2017**
Time:	**Open House from 6:00 – 8:00 p.m.**
Location:	**Brighton Community Centre (King Edward Park Arena)**
Address:	**75 Elizabeth Street, Brighton, ON**

All those interested in the project are urged to attend. Project information will also be available to the public at the municipal office and on the Municipality's website, http://www.brighton.ca/. If you have any questions regarding the study please contact one of the people listed below. We welcome your feedback.

TO FIND OUT MORE VISIT
www.brighton.ca

Steve Saxton, P.Eng.
Civil Engineer
J.L. Richards & Associates Limited
203 – 863 Princess Street
Kingston, ON K7L 5N4
ssaxton@jlrichards.ca
Phone: 613-544-1424

Bill Watson, P.Eng.
Chief Administrative Officer
Municipality of Brighton
35 Alice Street, PO Box 189
Brighton, ON K0K 1H0
bwatson@brighton.ca
Phone: 613-475-0670

This study is being conducted according to the requirements of a Schedule B project under the Municipal Class Environmental Assessment process (October 2000, as amended in 2015).

This Notice issued May 8, 2017

PUBLIC INFORMATION CENTRE

May 29, 2017

MUNICIPALITY OF BRIGHTON

Brighton Wastewater Treatment System Schedule 'B' Municipal Class Environmental Assessment

Welcome! Please Sign In.

MUNICIPALITY OF BRIGHTON

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

PROJECT LOCATION AND OVERVIEW

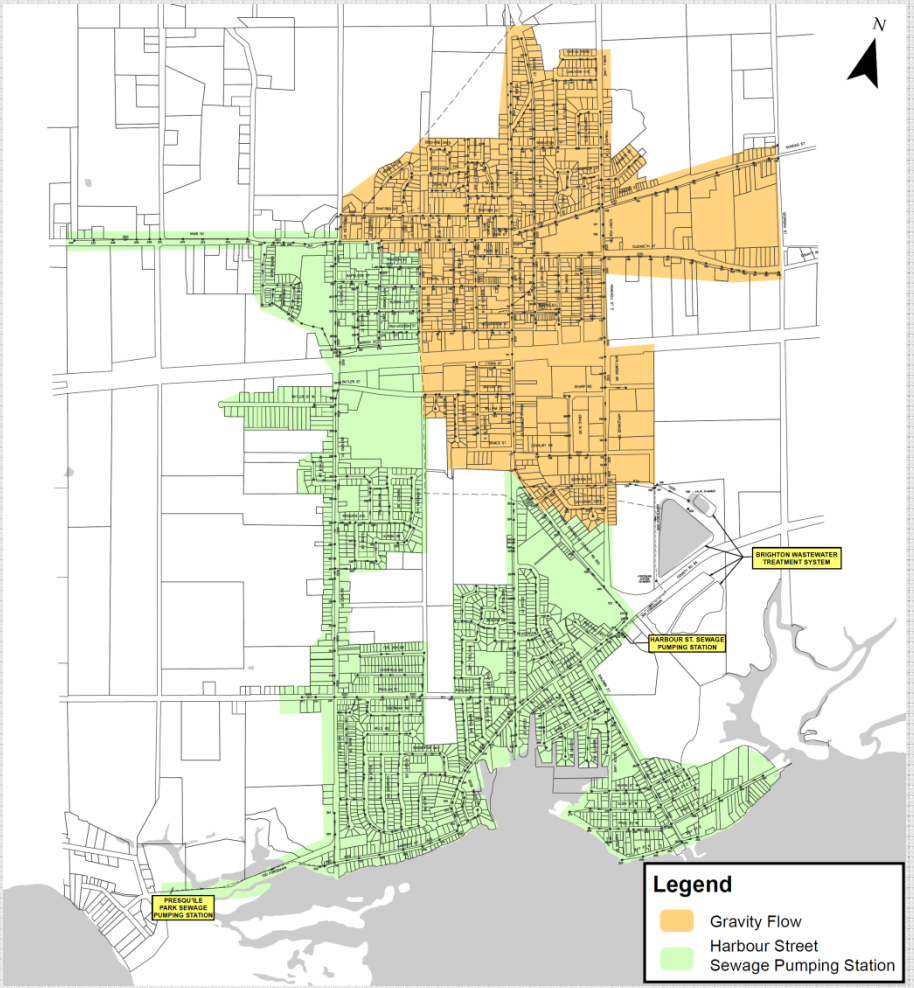


Figure 1 – Brighton Wastewater Collection System

- Several kilometres of gravity collection sewers
- Pumping Stations:
  - One main pumping station on Harbour Street
  - One small pumping station at Presqu'ile Park
- Approximately half of the sewage generated is directed to the Harbour Street Sewage Pumping Station and pumped via forcemain to the lagoon and the other half flows by gravity directly to the lagoon

BRIGHTON LAGOON TREATMENT SYSTEM



Figure 2 – Brighton Lagoon Treatment System Site Plan

- A wastewater treatment system consisting of:
  - A pre-aeration lagoon cell (0.68 ha)
  - A single facultative stabilization lagoon cell (5.44 ha)
  - A constructed wetland (6.2 ha)
  - A chemical storage/feed system
- Brighton Lagoon Treatment System is:
  - A continuously operated system that discharges year-round
  - Currently rated for 4,600 m^3/d average day flow
  - A Class 1 treatment facility operating under the MOECC ECA No. 3081-9XQNZK
  - Historically operating at about 60 - 70% of its rated average day flow capacity

PURPOSE OF THIS STUDY

- To evaluate the Brighton Wastewater System and to identify what is required for it to perform effectively and in accordance with regulations over a 20 year planning period.

SUMMARY OF PROBLEM / OPPORTUNITY STATEMENT

- Difficulties have been experienced in meeting effluent quality compliance criterion and objectives, particularly for ammonia and phosphorus
- The existing wastewater treatment system “struggles” with performance sometimes as a result of:
  - Relatively high organic loading (e.g. Ammonia)
  - Potential hydraulic short circuiting in the lagoon
  - Limited retention time in the lagoon
  - Sludge accumulation
  - Lack of a dedicated nitrification process for ammonia removal
- The Constructed Wetland is not providing significant additional treatment
- Aging infrastructure at the Harbour Street Sewage Pumping Station and the lagoon requires upgrades to maintain the appropriate level of service.
- It has been determined that the current Environmental Compliance Approval (ECA) rated hydraulic capacity does not need to increase for the next 20-year planning horizon.

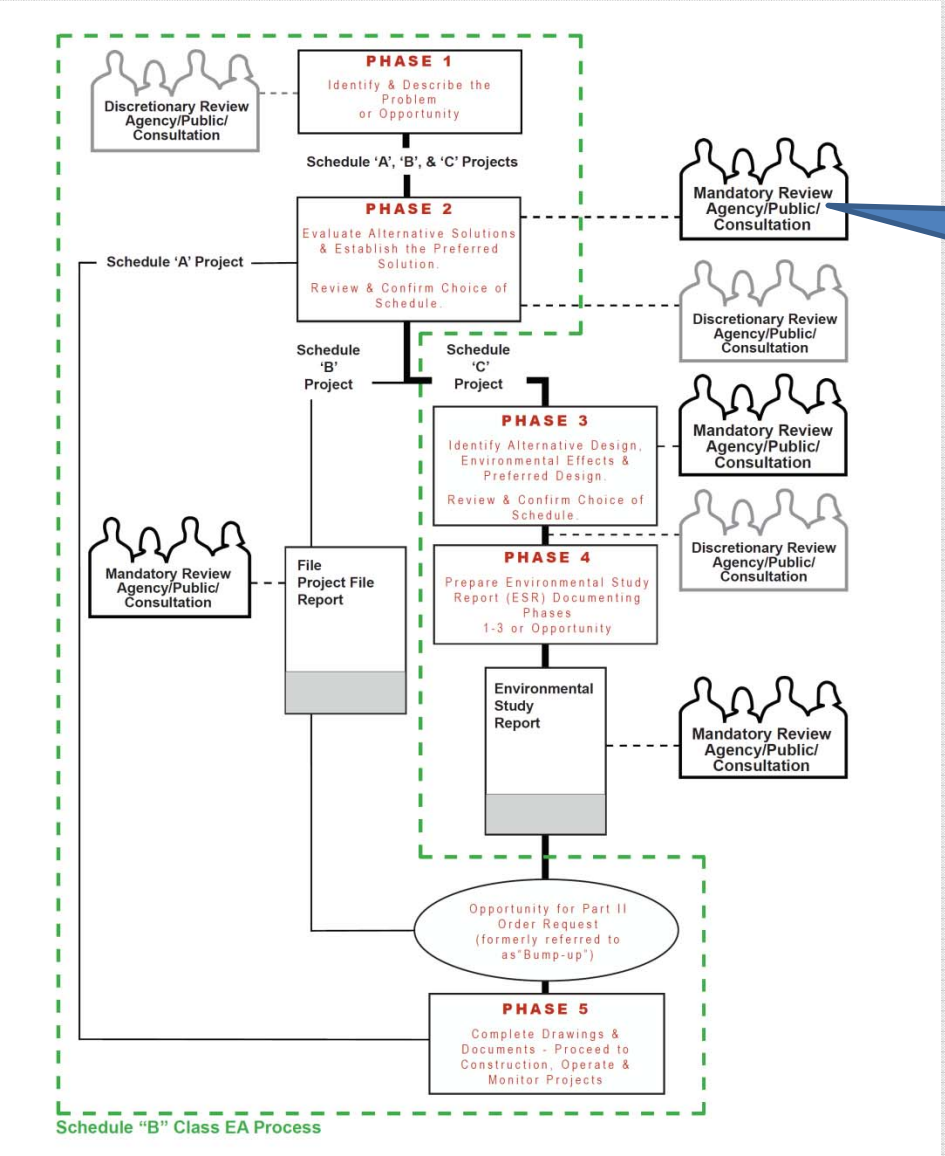
PHASE 1 PROBLEM AND OPPORTUNITY STATEMENT

"The Brighton communal sewage system generally consists of several kilometers of gravity collection sewers, a main pumping station, a smaller sub-area pumping station and a continuously discharged lagoon based treatment system that includes an aeration cell, a waste stabilization pond, a constructed wetland and a continuous chemical feed system for phosphorus removal. The treatment system is currently licensed under Environmental Compliance Approval (ECA) No. 3081-9XQNZK which stipulates certain operational and performance requirements. The system currently services an estimated population of 6,462 and some population growth is projected to occur within the 20-year planning period that will generate additional flows and increase hydraulic loading to the treatment system. The system is currently only operating at approximately 60% to 70% of its ECA rated "hydraulic" capacity.

Based on an evaluation of the available operational historical treated effluent data, it has been determined that the treatment system has regular difficulties in achieving the effluent quality required by ECA No. 3081-9XQNZK, particularly for ammonia and in some cases Total Phosphorus. A review of historical raw sewage quality, hydraulic input and the overall physical configuration of the Lagoon based treatment system, indicates that the relatively high strength raw sewage combined with physical limitations of the treatment system is the primary cause for the treated effluent exceedances. The system, as currently configured, is not capable of treating the organic loadings received from the collection system. Further the constructed wetland portion of the treatment system is not providing any significant treatment with respect to the parameters of concern.

In addition, the Harbour Street SPS and the Lagoon based treatment system were evaluated as part of Phase 1 of the Class EA. Due to the age and condition of the existing infrastructure, within the next 7 years approximately $500,000 in infrastructure rehabilitation and maintenance is required."

OVERVIEW OF THE SCHEDULE B CLASS EA PROCESS



THE MUNICIPAL CLASS EA PROCESS

- What is a Municipal Class Environmental Assessment ?

Municipal Class
Environmental Assessment (MCEA)

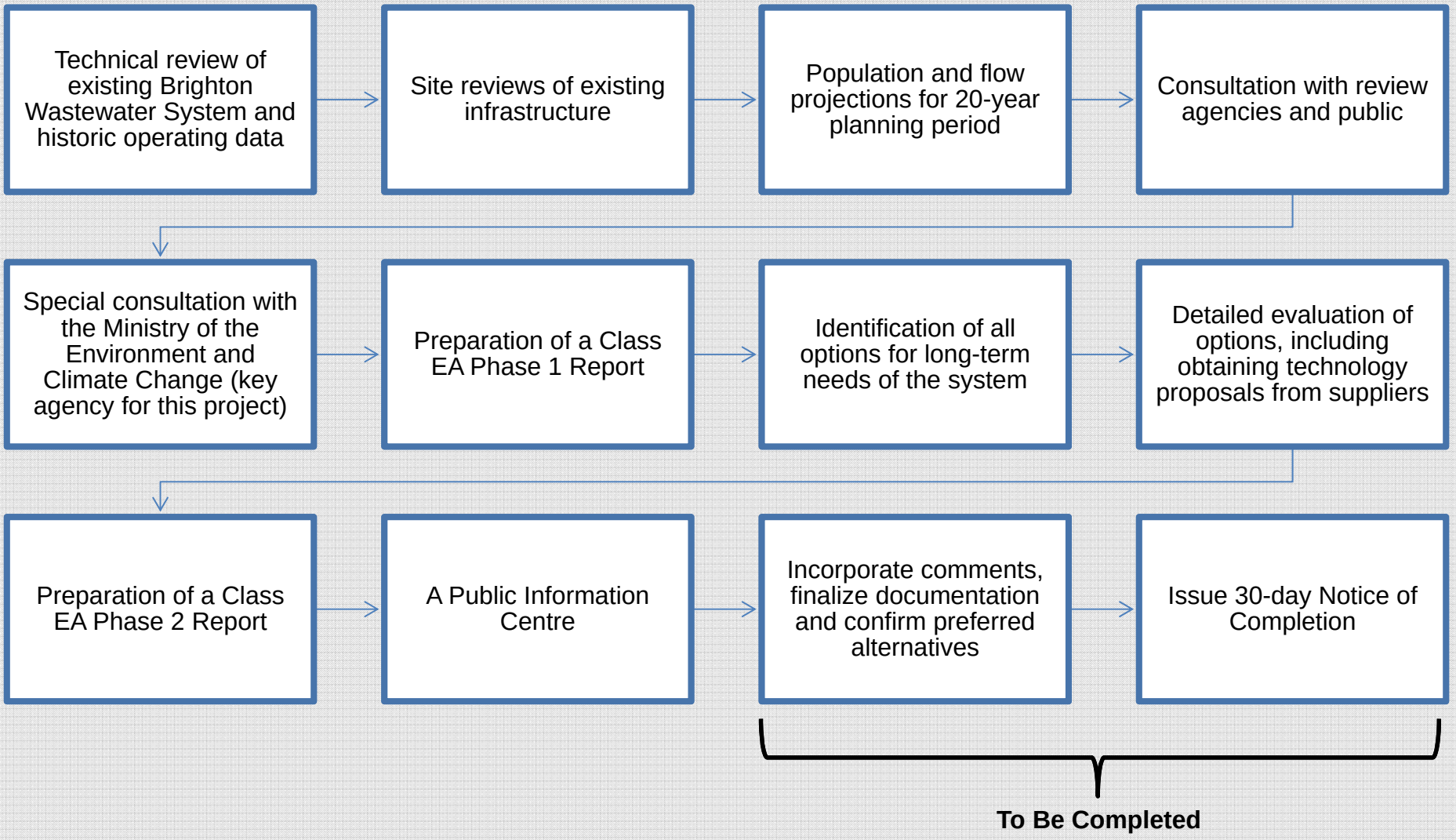
- A **self-assessment** process by which **municipal infrastructure projects** will be planned in accordance with the Environmental Assessment Act

- The Class EA provides for:
  - the identification of problems or opportunities;
  - the **identification**, **evaluation** and **selection** of a preferred means of addressing the problems or opportunities, giving due regard to the need to **protect the environment** and **minimize environmental effects**; and
  - doing the foregoing with the **involvement of affected stakeholders** in the decision-making process

THE MUNICIPAL CLASS EA PROCESS

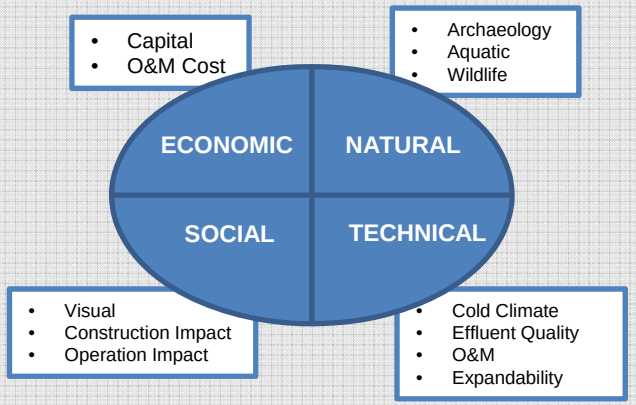
- Municipal Projects can involve:
  - Road Projects
  - Transit Projects
  - Water Projects
  - **Wastewater Projects**
- Projects have various levels of complexity:
  - **Schedule A** projects are limited in scale and are pre-approved.
    - They have minimal adverse effects and often involve normal and maintenance activities
  - **Schedule A+** projects are pre-approved with public notification.
  - **Schedule B** projects have the potential for some adverse impacts.
    - There is mandatory contact with public and review agencies to ensure they are aware of the project and that their concerns are addressed.
  - **Schedule C** projects have the potential for significant adverse impacts.
    - There is mandatory full screening process including filing of an Environmental Study Report (ESR)
    - Generally for construction of new facilities and major expansions (ie. New Mechanical Sewage Treatment Plant)

SUMMARY OF WORK COMPLETED AS PART OF THIS CLASS EA



IDENTIFICATION OF ALTERNATIVE SOLUTIONS

- All options were evaluated against their impact to the natural, social, technical and economic environment.
- The impact for each criterion relative to each potential solution was assessed and evaluated.
- Key consideration was given to whether the option addresses the existing problem and conditions.



OPTION	DESCRIPTION	EVALUATION
1	**Do Nothing**	• Effluent continues to exceed compliance limits • Negative effect on the environment • Existing problem not addressed
2	**Optimize and Modify Current Lagoon Operation** a. Remove sludge from lagoons ✓ b. Optimize and upgrade existing baffles ✓ c. Modify lagoon operating volume and aeration ✗ d. Optimize alum dosage for phosphorus removal ✓ e. Upgrade and refurbish the constructed wetland ✓ f. Investigate and divert high strength wastewater stream from lagoon ✓	• Various optimization and modification measures identified not sufficient to address the existing effluent quality issues • These measures should be carried forward in addition to the preferred solution for improved performance
3	**Install Specialized Treatment System to Complement Existing Lagoon System**	• Meets effluent design and compliance limits • Addresses existing conditions and constrains • Modest capital, operation and maintenance costs
4	**New Mechanical Treatment Plant**	• Improved treatment performance • High capital, operation and maintenance costs

**** RECOMMENDED PREFERRED SOLUTION (WITH MODIFICATIONS TO EXISTING LAGOONS)***

DESCRIPTION OF THE RECOMMENDED PREFERRED SOLUTION

1. Installation of a specialized treatment system, either upstream or downstream of the lagoon, to complement the treatment performance of the existing facility and to target ammonia removal

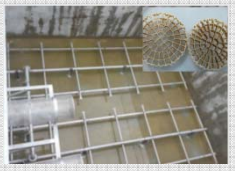
2. Lifecycle upgrades at Harbour Street Pumping Station and Lagoon

3. Various other upgrades to the existing facility, including:
   - De-sludge the existing lagoon
   - Enhance baffling in the stabilization lagoon
   - Optimize chemical dosage
   - Refurbish the constructed wetland
   - Further investigate reasons for high strength wastewater

Opinion of Probable Costs for the Recommended Preferred Solution: $6,500,000 (including engineering and contingency, excluding HST)

EXAMPLES OF AVAILABLE SPECIALIZED TREATMENT TECHNOLOGIES

Option A: **Complete Mix Activated Sludge Process**	**Option B:** **Submersible Aerated Bio-film Reactor**	**Option C:** **Submerged Attached Growth Reactor**
		
▪ Install within the existing aerated lagoon ▪ Suspended growth environment for biomass ▪ Aeration and mixing provided by blowers and diffusers ▪ Proven technology in cold climate ▪ Reliable performance with no new tankage or building	• Install the new system within the stabilization lagoon • Attached growth environment for biomass • Very limited installation in cold climate • Expensive capital investment	• Install new tankage downstream of the wetland • New tankage to house attached growth reactors • Upgrade aeration system in aerated and stabilization lagoons • Proven technology in cold climate • High quality effluent

Option D: **Fixed Film Biological Process (Upstream)**	**Option E:** **Fixed Film Biological Process (Downstream)**	**Option F:** **Activated Sludge with Membrane Technology**
		
• New treatment tanks in part of aerated lagoon • Existing lagoons acts as clarifiers to polish effluent • Proven technology in cold climate	• New treatment tank downstream of the stabilization lagoon • Proven technology in cold climate	• A combination of activated sludge process and membrane technology • New treatment tank within aerated lagoon • Provides highest level of treatment • Most expensive capital investment

EXAMPLE CONCEPT – OPTION E



Figure 3 – Future Brighton Lagoon Treatment System Conceptual Layout

Fixed Film Biological Process (MBBR) Downstream of Lagoons

- Targets ammonia removal in the lagoon effluent to meet compliance requirements
- Small footprint
- Very limited operation and maintenance requirements
- Easily expandable in the future (if required)
- Proven technology in cold climate
- Least intrusive to existing site layout

NEXT STEPS

CURRENT TASKS

- Obtain and evaluate public, stakeholders and agency comments and confirm the preferred solution
- Issue Schedule ‘B’ Class EA Project 30-day Notice of Completion and advise public and stakeholders
- Following the 30-day public review period, finalize Class EA documents

FUTURE TASKS

- Proceed to preliminary and detailed design and project implementation
- Estimated schedule to implement the recommended solution:
  - Design Phase: 8 to 12 months
  - Construction Phase: 12 to 18 months

THANK YOU!
Your Comments are Important to Us

YOUR COMMENTS WILL BE CONSIDERED IN THE FINAL ASSESSMENT AND EVALUATION OF THE PREFERRED SOLUTION

Ongoing information about this project can be found at www.brighton.ca

MUNICIPALITY OF BRIGHTON

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

Brighton Wastewater Treatment System
Schedule B Class Environmental Assessment
Public Information Centre

Comment Sheet

Municipality of Brighton is interested in receiving the community's comments, questions, and concerns regarding the proposed improvements for the Brighton Wastewater Treatment System. Please take a few minutes to fill out this brief comment sheet. All comments will be carefully considered while completing the Class Environmental Assessment study.

1. This study is following the requirements of the Municipal Class Environmental Assessment process for a Schedule B project. *Do you have any questions, comments, or concerns about the decision-making and public consultation process that are being followed to-date?*

_____
_____
_____
_____
_____
_____

2. The need to upgrade the Brighton Wastewater Treatment System is based on the current condition and future servicing requirements within the Municipality. *Do you have any questions, comments, or concerns about the need to upgrade the wastewater treatment system?*

_____
_____
_____
_____
_____
_____

3. The recommended preferred solution is shown in the poster. Do you have any comments or questions on the recommended solution?

_____
_____
_____
_____
_____
_____
_____
_____

(Over to the back)

4. There are several final steps to be undertaken to finalize the Environmental Assessment. *Do you have any comments or questions regarding how this study will be completed?*

5. Do you have any additional comments?

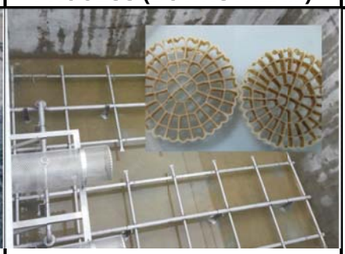
Thank you for taking the time to provide your comments. Comment sheets may be returned to any of the presenters, or can be mailed, or emailed to the individuals below. Please return comment sheets by June 12, 2017.

Steve Saxton, P.Eng.
Civil Engineer
J.L. Richards & Associates Limited
863 Princess Street, Suite 203
Kingston ON K7L 5N4
ssaxton@jlrichards.ca
Phone: 613.544.1424

Bill Watson, P.Eng.
Chief Administrative Officer
Municipality of Brighton
35 Alice Street, PO Box 189
Brighton, ON K0K 1H0
bwatson@brighton.ca
Phone: 613.475.0670

Appendix B

Detailed Treatment Technology Evaluation

MAJOR CRITERIA	MINOR CRITERIA	OPT 3A COMPLETE MIX ACTIVATED SLUDGE PROCESS	OPT 3B SUBMERSIBLE AERATED BIO-FILM REACTORS	OPT 3C SUBMERGED ATTACHED GROWTH REACTOR	OPT 3D FIXED FILM BIOLOGICAL PROCESS (UPSTREAM)	OPT 3E FIXED FILM BIOLOGICAL PROCESS (DOWNSTREAM)	OPT 3F ACTIVATED SLUDGE WITH MEMBRANE TECHNOLOGY
							
NATURAL ENVIRONMENT AND ARCHAEOLOGY	**Effect on Fish and Aquatic Habitat**	POSITIVE: Quality of effluent discharged to surface water will improve.	POSITIVE: Quality of effluent discharged to surface water will improve.	POSITIVE: Quality of effluent discharged to surface water will improve.	POSITIVE: Quality of effluent discharged to surface water will improve.	POSITIVE: Quality of effluent discharged to surface water will improve.	POSITIVE: Quality of effluent discharged to surface water will improve.
	Effect on Wetlands, Woodlands, Wildlife Habitat	NO IMPACT: No construction will occur in the engineered or natural wetland.	NO IMPACT: No construction will occur in the engineered or natural wetland.	NEGATIVE: New treatment cells will reduce the engineered wetland area by approximately 50%.	NO IMPACT: No construction will occur in the engineered or natural wetland.	NO IMPACT: Minimal footprint of new treatment cell could be placed outside of the constructed wetland.	NO IMPACT: No construction will occur in the engineered or natural wetland.
	Effect on Archeological Potential Impacts	NO IMPACT: No archeological potential has been identified on site.	NO IMPACT: No archeological potential has been identified on site.	NO IMPACT: No archeological potential has been identified on site.	NO IMPACT: No archeological potential has been identified on site.	NO IMPACT: No archeological potential has been identified on site.	NO IMPACT: No archeological potential has been identified on site.
ENGINEERING AND TECHNICAL CONSIDERATIONS	**Proven Cold Weather Installations**	POSITIVE: Numerous Canadian/ and cold weather installations, however, process subject to extreme environmental conditions.	NEGATIVE: No full scale Canadian installations and limited number of cold weather installations generally.	POSITIVE: Numerous Canadian/ and cold weather installations, however, subject to extreme environmental conditions.	POSITIVE: Numerous Canadian/ and cold weather installations, however, subject to extreme environmental conditions.	POSITIVE: Numerous Canadian/ and cold weather installations, however, subject to extreme environmental conditions.	NEGATIVE: Limited number of cold weather installations, influent temperature must be above 9 deg. C.
	Ability to Meet Effluent Criteria	POSITIVE: High quality effluent will be produced that is better than the ECA limits for all parameters. Ammonia will be in the range of <5 mg/L.	NO IMPACT: The effluent quality will meet the ECA limits.	POSITIVE: High quality effluent will be produced that is better than the ECA limits for all parameters. Ammonia will be in the range of <5 mg/L.	POSITIVE: Good quality effluent will be produced that is better than the ECA limits for all parameters. Ammonia will be in the 5 – 15 mg/L range.	POSITIVE: Good quality effluent will be produced that is better than the ECA limits for all parameters. Ammonia will be in the 5 – 15 mg/L range.	POSITIVE: High quality effluent will be produced that is better than the ECA limits for all parameters. Ammonia will be in the range of <5 mg/L.
	Degree of Process Control & Availability of Performance Guarantee	POSITIVE: There are a number of process variables that can be controlled. The existing lagoon is not required for treatment; however, it would be used for sludge storage/stabilization.	NEGATIVE: The submersible aerated bio-film reactors have a higher degree of control then a lagoon alone, however, process control is limited and the system may be slow to respond.	NEGATIVE: Submerged attached growth reactors have a higher degree of control then a lagoon alone, however, process control is limited and the system may be slow to respond.	POSITIVE: There are a number of factors that can be controlled in the fixed film biological process; however, the lagoon is still required for treatment.	POSITIVE: There are a number of factors that can be controlled in the fixed film biological process; however, the lagoon is still required for treatment.	POSITIVE: There are a number of process variables that can be controlled in this process. The existing lagoon is not required for treatment.
	Ease of Operation	NEGATIVE: Automated process that may require more regular operator input.	POSITIVE: Limited operator input is required once established.	POSITIVE: Limited operator input is required once established.	NO IMPACT: Automated process that may require periodic operator input.	NO IMPACT: Automated process that may require periodic operator input.	NEGATIVE: A technically advanced process that may require full/part time operator input. Membranes require regular cleaning.
	Capability with existing site (i.e. HGL, electrical servicing, etc)	POSITIVE: No new tankage or buildings are required; flow except for RAS would be by gravity. Site electrical servicing would need upgrading.	POSITIVE: No new tankage or buildings required, flow would continue to be by gravity. Site electrical servicing would need upgrading.	NEGATIVE: New cells are required. Pumping may be required depending on the location of reactor cells. Site electrical servicing would need upgrading.	POSITIVE: No new tankage or buildings are required; flow would continue to be by gravity. Site electrical servicing would need upgrading.	NO IMPACT: New downstream tankage and a blower building would have a minimal footprint. Site electrical servicing may not need upgrading.	POSITIVE: No new tankage or buildings are required; flow except for RAS would be by gravity. Site electrical servicing would need upgrading.

MAJOR CRITERIA	MINOR CRITERIA	OPT 3A COMPLETE MIX ACTIVATED SLUDGE PROCESS	OPT 3B SUBMERSIBLE AERATED BIO-FILM REACTORS	OPT 3C SUBMERGED ATTACHED GROWTH REACTOR	OPT 3D FIXED FILM BIOLOGICAL PROCESS (UPSTREAM)	OPT 3E FIXED FILM BIOLOGICAL PROCESS (DOWNSTREAM)	OPT 3F ACTIVATED SLUDGE WITH MEMBRANE TECHNOLOGY
	Opportunities for Future Expansion	POSITIVE: If a treatment capacity increase is required additional aeration tubes can be added to the modules without the need for additional basins.	NEGATIVE: The number of units can be increased; however, the level of effort to install would be similar to a new installation.	NEGATIVE: The number of process cells could be increased; however, the level of effort would be relatively high and additional land would be required.	POSITIVE: If a treatment capacity increase is required the quantity of the media in the basin can be increased at a low cost and without the need for additional basins.	POSITIVE: If a treatment capacity increase is required the quantity of the media in the basin can be increased at a low cost without the need for additional basins.	POSITIVE: If a treatment capacity increase is required the number of membrane modules can be increased, however, these are relatively high cost.
SOCIAL/ COMMUNITY WELL BEING	**Impacts During Construction**	NO IMPACT: Construction is limited to the existing lagoon site and impacts to neighboring properties would be minimal.	NO IMPACT: Construction is limited to the existing lagoon site and impacts to neighboring properties would be minimal.	NEGATIVE: Construction activities will take place in the wetland and may be disruptive to users of this area.	NO IMPACT: Construction is limited to the existing lagoon site and impacts to neighboring properties would be minimal.	NO IMPACT: Construction is limited to a small footprint and impacts to the area during construction would cause minimal disruption.	NO IMPACT: Construction is limited to the existing lagoon site and impacts to neighboring properties would be minimal.
	Compatibility with Surrounding Land Use and Visual Impact	NO IMPACT: All changes will be in existing lagoon, visible changes will be minor.	NO IMPACT: All changes will be in existing lagoon, visible changes will be minor.	NEGATIVE: Changes in the wetland may not be compatible with current recreational use.	NO IMPACT: All changes will be in existing lagoon, visible changes will be minor.	NO IMPACT: Minimal footprint outside of the constructed wetland would be expected..	NO IMPACT: All changes will be in existing lagoon, visible changes will be minor.
	Noise and Odour Effects during Operation	POSITIVE: Noise and odour will be similar the current operations. May be minor odour improvements due to enhanced treatment.	POSITIVE: Noise and odour will be similar the current operations. May be minor odour improvements due to enhanced treatment.	POSITIVE: Noise and odour will be similar the current operations. May be minor odour improvements due to enhanced treatment.	POSITIVE: Noise and odour will be similar the current operations. May be minor odour improvements due to enhanced treatment.	POSITIVE: Noise and odour will be similar the current operations. May be minor odour improvements due to enhanced treatment.	POSITIVE: Noise and odour will be similar the current operations. May be minor odour improvements due to enhanced treatment.

Appendix C

Conceptual Layouts



PROJECT:

BRIGHTON WASTEWATER TREATMENT SYSTEM CLASS EA

MUNICIPALITY OF BRIGHTON, ONTARIO

DRAWING:

COMPLETE MIX ACTIVATED SLUDGE

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DESIGN:	JW	JLR NO:	27271
DRAWN:	KTK	DRAWING NO.:	OPTION 3A
CHECKED:	SS		

File Location: K:\27000\27271 - Brighton Lagoon\JLR DWG\Plan\27271 Option 3A.mxd

Plot Date: April 11, 2017 3:15:12 PM



PROJECT:

BRIGHTON WASTEWATER TREATMENT SYSTEM CLASS EA

MUNICIPALITY OF BRIGHTON, ONTARIO

DRAWING:

SUBMERSIBLE AERATED BIO-FILM REACTORS

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DRAWN:	KTK	DRAWING NO.:	OPTION 3B
CHECKED:	SS		

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Plot Date: April 10, 2017 2:01:48 PM



PROJECT:

BRIGHTON WASTEWATER TREATMENT SYSTEM CLASS EA

MUNICIPALITY OF BRIGHTON, ONTARIO

DRAWING:

SUBMERGED ATTACHED GROWTH REACTOR

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DRAWN:	KTK	DRAWING NO.:	OPTION 3C
CHECKED:	SS		

File Location: K:\27000\27271 - Brighton Lagoon\JLR DWG\Plan\27271 Option 3C.mxd

Plot Date: April 11, 2017 4:05:24 PM



Note: Wastewater Treatment System property limits are approximate only. Not a legal survey.

PROJECT:

BRIGHTON WASTEWATER TREATMENT SYSTEM CLASS EA

MUNICIPALITY OF BRIGHTON, ONTARIO

DRAWING:

FIXED FILM BIOLOGICAL PROCESS (UPSTREAM)

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DRAWN:	KTK	DRAWING NO.:	OPTION 3D
CHECKED:	SS		

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Plot Date: April 10, 2017 3:32:20 PM



PROJECT:

BRIGHTON WASTEWATER TREATMENT SYSTEM CLASS EA

MUNICIPALITY OF BRIGHTON, ONTARIO

DRAWING:

FIXED FILM BIOLOGICAL PROCESS (DOWNSTREAM)

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DESIGN: JW	JLR NO: 27271
DRAWN: KTK	DRAWING NO.: OPTION 3E
CHECKED: SS	

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Plot Date: April 11, 2017 3:29:17 PM



PROJECT:

BRIGHTON WASTEWATER TREATMENT SYSTEM CLASS EA

MUNICIPALITY OF BRIGHTON, ONTARIO

DRAWING:

ACTIVATED SLUDGE WITH MEMBRANE

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DESIGN:	JW	JLR NO:	27271
DRAWN:	KTK	DRAWING NO.:	OPTION 3F
CHECKED:	SS		

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Plot Date: April 10, 2017 3:29:04 PM

GSS ENGINEERING CONSULTANTS LTD

June 15, 2021

Project # 15-017

Preston Parkinson
Municipality of Brighton
35 Alice Street, P.O. Box 189
Brighton, ON K0K 1H0

Re: Brighton WWTP
Aeration System Upgrades with Option to Expand Capacity

Dear Mr. Parkinson:

As required by MECP, an upgrade to the Brighton WWTP is required to improve treatment of ammonia. An aeration upgrade would also support additional growth in Brighton.

Our original submission of April 13, 2021 provided an outline of the Triplepoint proposal to upgrade aeration in the aerated cell component of the WWTP. This proposal would provide significantly more oxygen as well as full solids mixing in the aerated cell. The proposal includes the following:

1) Remove the existing catwalks, original mechanical mixers and the floating aerators in the aerated cell. The total existing horsepower of the existing mechanical and floating aerators is only 110 horsepower.

2) Installation of the new Triplepoint, shore based blowers (on the west side of the cell) would provide the air supply to the new, submerged aeration units. The aeration units would be distributed over the entire floor area of the aerated cell. Operating horsepower of the new blowers would be 300 hp.

3) Potential new secondary clarifier located at the south end of the aerated cell. The clarifier would separate the biological solids from the cell effluent flow and return the concentrated solids back to the inlet (north) end of the aerated cell.

This proposal does not require screening or grit removal of the raw sewage as the aeration units on the bottom of the aerated cell have no moving parts. As you are aware, we have received a preliminary sizing and design proposal from Triplepoint Environmental who specialize in sewage lagoon aeration projects including cold climate installations. Triplepoint is represented in Ontario by ACG Envirocan, who are a recognized supplier of wastewater treatment equipment in Ontario.

The Triplepoint proposal is included in **Appendix A**. Key features are summarized as follows:

i) Three, 150 hp blowers (2 operating and 1 standby). These blowers would be housed within acoustically treated, weatherproof enclosures. The blowers would be VFD controlled to provide operator flexibility. Total air flow with two blowers running at 100% speed would be approximately 5,050 cubic feet per minute (cfm) and provide approximately 3,900 kg of dissolved oxygen per day to the aerated cell.

ii) The air flow would be delivered evenly to 100 aeration units located on the bottom of the cell. Air flow per aeration unit would therefore be approximately 50.5 cfm per unit. Triplepoint has advised that each unit is designed to run efficiently over an airflow range of 25 to 75 cfm per aeration unit.

iii) The blower sizing has been oversized to provide sufficient mixing of the cell to maintain biological solids in suspension, compared to oxygen supply requirements (i.e. mixing dominates).

iv) At the current rated capacity of the WWTP (4,600 m^3/day), the raw sewage BOD load is estimated to be 900 kg/day and the raw sewage TKN load is estimated to be 275 kg/day.

v) The theoretical oxygen requirement for full removal of BOD and TKN is 1,350 kg/day for BOD removal and 1,270 kg/day for TKN removal. These values are based on 1.5 kg of oxygen per kg of BOD and 4.6 kg of oxygen per kg of TKN. Total oxygen required is therefore approximately 2,620 kg/day for the current, rated capacity of 4,600 m^3/day.

vi) As above, the air flow of 5,050 cfm provides a daily oxygen supply of 3,900 kg/day, or approximately 50% more oxygen than theoretically required for the current design flow of 4,600 m^3/day.

As you are aware, we have recently discussed possible, major residential developments in Brighton. Preliminary calculations of uncommitted, remaining treatment capacity would indicate that it is likely that a rated increase in sewage treatment capacity will be required at some point for Brighton.

Exactly when such an increase in rated capacity is required is difficult to predict. However, it would be reasonable to review the Triplepoint proposal to ensure that such an aeration upgrade (including provision of the secondary clarifier) is suitably sized for an increase in rated capacity.

While preliminary, we suggest the future, rated capacity of the WWTP be estimated as 6,000 m^3/day. This provides a 30% increase over the current rated capacity of 4,600 m^3/day. We note that current, average sewage flows are approximately 3,000 to 3,300 m^3/day. This 30% capacity increase (providing an additional 1,400 m^3/day treatment capacity) would allow connection of at least another 1,000 residential units.

Table 1 below provides a side by side comparison of the Triplepoint aeration system for the current capacity (4,600 m³/day) and the possible, future rated capacity (6,000 m³/day).

TABLE 1

Summary of Flow and Oxygen Demand
Current Rated Capacity and Potential, Future Rated Capacity

Operating Parameter	Current Capacity	Future Capacity
Design Flow Rate	4,600 m³/day	6,000 m³/day
Aeration Cell Volume	± 14,300 m³	± 14,300 m³/day
Air Flow Proposed (Triplepoint)	5,050 cfm	5,050 cfm
Oxygen Provided	3,900 kg/d	3,900 kg/d
BOD Load (at 195 mg/l)	± 900 kg/d	± 1,200 kg/d
BOD Oxygen demand (at 1.5 times BOD load)	± 1,350 kg/d	± 1,800 kg/d
TKN load (at 60 mg/l)	± 275 kg/d	± 360 kg/d
TKN Oxygen demand (at 4.6 times TKN load)	± 1,270 kg/d	± 1,660 kg/d
Total Oxygen demand	± 2,620 kg/d	±3,460 kg/d

As per **Table 1**, the Triplepoint aeration system appears to provide sufficient oxygen to satisfy the future BOD and TKN oxygen demands associated with a rated capacity of 6,000 m³/day. As per **Table 1**, the estimated, future oxygen demand is 3,460 kg/day. This compares with the Triplepoint oxygen supply estimate of 3,900 kg/day.

The surplus supply of oxygen is not surprising given total air flow from the blowers has been sized to provide a complete mix of solids in the aeration cell. This design approach therefore provides surplus oxygen supply for the current rated capacity and for the proposed, increased rated capacity of 6,000 m³/day.

We also provide a preliminary drawing set which details existing conditions, the proposed Triplepoint aeration system installation in the aerated cell, and installation of a secondary clarifier at the south end of the aerated cell.

The clarifier itself does not provide treatment of ammonia or any other pollutant. Rather, the sole function of the clarifier is to separate the biological solids from the effluent of the aerated cell and return these solids to the inlet of the aeration tankage. Maintaining high solids concentrations in the aeration cell is key to achieving ammonia removal.

In mechanical sewage plants, the secondary clarifiers also provide an important function to protect the quality of the secondary effluent. In those cases, the secondary clarifiers are designed to remove solids even at the maximum, peak flow rate. In the case of the Brighton WWTP, protection of secondary effluent quality is not nearly as critical as any biological solids (or other solids) escaping the secondary clarifier will settle out in the large, downstream stabilization lagoon.

The secondary clarifier is one option for removing the solids from the aerated cell. The other method would be to run the aerated cell similar to a Sequencing Batch Reactor system (SBR), which is now a commonly used activated sludge process that achieves aeration followed by quiescent settling, solids removal and decanting of secondary effluent all in a single tank. With the SBR approach, the decanting would be accomplished in Brighton manually (pulling stop logs from the outlet point of the aerated cell) or by way of an automatic decanter operating by PLC control. In either case, the blowers would first need to be turned off to allow the solids to settle before decanting occurs.

Particularly with the secondary clarifier option, rerouting of Arena Creek to the east and to the south east is required. With either option, however, relocation of the Arena Creek channel further east from the east side of the aerated cell is recommended to protect the east berm of the aerated cell from erosion during flood flows.

The secondary clarifier option also requires new inflow and effluent piping, sludge return pumping and piping, relocation of flow measurement facilities and a new location for addition of ferric chloride coagulant.

Process Objectives

The estimated oxygen requirement for effective treatment of BOD and ammonia in the aerated cell has been provided above in Table 1 for both the current rated capacity of 4,600 m^3/day and the proposed, potential rated capacity of 6,000 m^3/day.

Mixing of the aerated cell contents is considered more critical and dictates the size of the blowers. The volume of the aerated cell (included submerged side slope volumes) is approximately 14,300 m^3 at a normal water depth of 3 m. Total surface area of the cell is approximately 6,910 m^2 but the surface area of the cell overtop of the flat bottom area of the cell is approximately 3,600 m^2.

Total blower energy (two blowers running at 100% speed) is 300 hp (225 kW). Mixing energy is therefore 15.7 W per m^3 based on an aeration cell volume of 14,300 m^3 which essentially matches MECP design standards for even mixing of biological solids (MECP design parameters are 16 to 25 W per m^3 for mixing of biological solids).

The Triplepoint aeration unit design is a hybrid diffuser providing part coarse bubble and part fine bubble aeration.

The Triple Point air flow rate of 5,050 cfm (2,400 litres per second) represents an air flow rate of 0.17 l/s per m^3, which is less than the recommended coarse bubble mixing recommendation of 0.33 l/s per m^3 (as per MECP). However, based on an air flow of 2,400 l/s, the surface air flow rate for fine bubble mixing is 0.34 l/s per m^2 for the total area of the cell but is 0.66 l/s per m^2 for the smaller, flat bottom

surface area. The latter aeration rate (0.66 l/s per m² of flat bottom area) exceeds the MECP design recommendation of 0.61 l/s per m² for fine bubble aeration mixing.

Overall, therefore, full mixing of MLSS should be accomplished. Oxygen delivery exceeds oxygen demand requirements by a significant margin indicating that daily oxygen requirements could be provided in say 16 hours of aeration per day, for the current design capacity of 4,600 m³/day, allowing say 8 hours or settle and decant time per day if the overall system is operated as an SBR process.

However, for a future capacity of 6,000 m³/day, there would less time available for decanting and the secondary clarifier is assumed required if the WWTP was rerated to 6,000 m³/day.

Rated Capacity Increase

If rerating the WWTP to 6,000 m³/day, the following would need to be considered:

i) A Schedule C Class EA would have to be completed

ii) As part of the Class EA process, MECP would very likely require more stringent effluent requirements for the increased capacity.

iii) The current effluent compliance values for BOD, Suspended Solids and Total Phosphorus are 30 mg/l, 40 mg/l and 1.0 mg/l, respectively. The values for BOD and Suspended Solids would likely be reduced to approximately 20 mg/l. The compliance limit for phosphorus might remain at 1.0 mg/l or be lowered slightly (i.e. 30%) such that total phosphorus loadings to Presquile Bay stayed the same as currently permitted.

iv) For ammonia, the current compliance limits are 14 mg/l for the summer and 17 mg/l. These would likely be significantly reduced. Likely, future ammonia limits would be approximately 2 mg/l for the summer and 4 mg/l for the winter.

v) Overall, the proposed aeration system upgrade and secondary clarifier should achieve the new, estimated compliance limits for an increased design flow of 6,000 m³/day.

Potential Clarifier

MECP design guidelines recommend maximum overflow rates of 40 m/day for secondary clarifiers for extended aeration plants providing nitrification. This rate is usually based on the worst case peak flow rate. In the case of Brighton however, it is our opinion that the clarifier can be downsized as:

i) Solids wasting in the Brighton system may be accomplished be discharge of the aeration cell mixed liquor to the downstream stabilization lagoon and;

ii) Protection of water quality downstream of the clarifier is not critical as the stabilization lagoon is downstream of the clarifier.

At most, peak flows in the Brighton WWTP have been measured under extreme events as approximately 18,000 m^3 per day with flows rarely exceeding 10,000 m^3 per day. For discussion, it is recommended the clarifier be sized for twice the potential, future rated capacity of the WWTP or 12,000 m^3/day (6,000 m^3/day x 2). Based on this design flow rate (12,000 m^3/day), the required area would be 300 m^2, or equal to a clarifier with a diameter of approximately 20 m (66' ø).

Sludge Management

All biological treatment systems continuously produce sludge. As such, surplus sludge management is required. In sewage lagoons, it is quite common for surplus sludge to build up on the bottom of the lagoons over time. One method to deal with such accumulated sludge in lagoon systems is to periodically dredge or remove sludge from the lagoon bottom with application of the sludge on approved farmland.

However, accumulated sludge can release ammonia back to the flow stream as it degrades. Such ammonia feedback from bottom sludges appears to occur periodically in the Brighton lagoon system.

As such, alternatives for proactive sludge management should be considered for Brighton. If the clarifier was provided, the following options would be available for active sludge management:

i) Discharge surplus sludge to the facultative lagoon from the sludge return line but recognize that very regular lagoon removal of sludge from the north end of the lagoon would be required. Sludge removal would be required at least once per year.

ii) Regular (i.e. weekly) discharge of surplus sludge from the sludge return line to the sludge drying beds at the north end of the aerated cell. The underdrains from the sludge drying beds drain to the inlet of the aerated cell such that any ammonia in the underdrains is retreated in the aerated cell. Covering of the sludge drying cells may be necessary for winter operation.

iii) Periodic (i.e. monthly) discharge of surplus sludge from the sludge return line to new sludge dewatering facilities (i.e. geotubes) located near the edge of the aerated cell. Proper location of the geotubes would be required to ensure drainage from the tubes flows back into the aerated cell for retreatment.

Preliminary System Drawing

Drawing 15017-03 provides an overall layout of the proposed new blowers, air delivery lines and the 100 submerged aeration units. As well, the secondary clarifier is shown as well as new feed and effluent piping from the clarifier, the sludge return line to the inlet of the aeration cell, the new coagulant dosing point and a new flow measurement facility.

Budget Pricing

- Supply of Triple Point ACG Air Diffuser package, three blowers and associated air lines - $850,000

- Additional Cost for Radial Blowers versus conventional PD type blowers and other system upgrades $200,000

- Install blowers and aeration equipment including VFD's - $400,000

- Upgrade 600 V, 3 phase power supply - $200,000

Subtotal - $1,650,000 plus 30 % contingencies and engineering = $2,150,000 plus net HST. Note that the cost of relocation of Arena Creek is not included.

If Secondary Clarifier system also included:

- Construct new 20 m ø secondary, concrete clarifier including scraper mechanisms etc. - $1,500,000

- New clarifier inflow and effluent piping, sludge pumping system and sludge return line, new coagulant feed, new Parshall flume, manholes, etc. - $800,000

Subtotal Cost of Secondary Clarifier Upgrade = $2,300,000 plus 30% contingencies and engineering = $3,000,000 plus net HST. Note that cost of relocation of Arena Creek is not included.

Total preliminary cost estimate of the aeration upgrade and the secondary clarifier is therefore approximately $5,150,000 plus net HST. The cost of relocation of Arena Creek is not included.

Conclusion

If the proposed upgrade concept was considered further, we recommend the following:

i) That this proposal be peer reviewed by an engineering firm fully experienced in advanced sewage plant process design to confirm that year round ammonia removal (nitrification) would be provided in the aeration cell. Such peer review to consider ammonia feedback from any sludge stored in the downstream facultative lagoon.

ii) That Brighton apply to MOECC for an ECA that approved firstly the aeration upgrade and secondly the clarifier upgrade. The objective would be to seek approval to install only the aeration system now but to install the secondary clarifier once an approval to increase the rated capacity to 6,000 m^3/day was achieved through the Class EA process.

iii) While the WWTP operates under the current rated capacity of 4,600 m^3/day, operate the aerated cell as an SBR (no clarifier) to retain solids within the aerated cell. If the SBR decanting mode does not prove successful in maintaining elevated solids levels in the aerated cell, complete installation of the secondary clarifier as Phase 2 of the overall upgrade project in advance of rerating the system to 6,000 m^3/day.

Sincerely,

GSS Engineering Consultants Ltd.

Jeff Graham, P. Eng.
Designated Consulting Engineer

JTG/nc

APPENDIX A

Triple Point Aeration Proposal

Aeration Basis of Design

Date: 4/1/2021
Project Name: Brighton, ON
Project Number: 6303

The Aeration Process

Biological Oxygen (BOD) Calculations

Removal of BOD (and CBOD) takes place naturally in an aerated lagoon. The Characteristic Equation for treatment efficiency of 5-Day Biological Oxygen Demand is given in Equations 1 through 3, at bottom of report. These calculations are used to size the lagoons. They are independent of the aeration calculations and assume that sufficient dissolved oxygen levels are maintained in the water. The equation is dependent on time and temperature. For lagoons operated in series, the equation is applied separately to each cell and the results are combined.

Aeration Requirement Calculations

Aeration calculations are more complicated than biological calculations as they depend on several factors. These include:

- Site conditions, such as treatment depth, elevation, and temperature.
- Design parameters, such as minimum dissolved oxygen (DO) level and oxygen supply rate.
- Actual Oxygen Requirement (AOR) which is based on the nutrient loading rates (these can include BOD/CBOD and TKN/NH_3-N and are based on the product of nutrient concentrations and the wastewater flow-rate).
- Type of aerator
- Oxygen transfer efficiency (OTE) of the aerator, which should be measured by an independent lab.
- Field condition adjustments (see Equation 2, below).
- Mixing requirements, such as complete or partial mix. The former is generally only required for activated sludge basins (ASB) or other high strength processes with short detention times.

Aerated Lagoons - Long Treatment Times

Aerated lagoons are typified by their comparatively large size and long treatment times (usually greater than 10 days). Influent concentrations are low to moderate (usually less than 300 mg/L of BOD). The bulk of the treatment takes place aerobically with additional anaerobic respiration taking place on the lagoon floor. Aerated lagoons do not generally have a mixed liquor suspended solids (MLSS) or return activated sludge (RAS) component. Partial mixing is required to prevent stratification and eliminate dead-zones; however, complete mix is not necessary.

Aerated lagoons are typically designed to operate at a minimum DO level of 2 mg/L. Oxygen is usually supplied at a rate of 1.5 times the BOD demand. If nitrification/denitrification takes place, the oxygen supply rate is designed for 4.6 times the nitrogenous oxygen demand (NBOD).

Activated Sludge Basins (ASB)

Activated sludge basins (ASB) and other related wastewater tanks and lagoons are characterized by short treatment times (usually from 1 to 5 days), high wastewater strengths, and an active biomass that must be maintained in suspension to prevent rapid sludge accumulation. A high strength (greater than 2,000 mg/L) return activated sludge (RAS) component is usually fed back into the basin from a downstream clarifier. Biological nutrient removal is much faster in these basins.

ASBs are typically designed to operate at a minimum DO level of 1 to 2 mg/L. Oxygen is supplied at a rate of 1.0 to 1.5 times the BOD demand. If nitrification/denitrification takes place, the oxygen supply rate is designed for 4.0 to 4.6 times the nitrogenous oxygen demand (NBOD). Aeration system is based on both oxygenation requirements and complete mix requirements, whichever is greater.

TRIPLEPOINT ENVIRONMENTAL
Detailed Design Calculations: Aeration
Brighton, ON

SUMMARY - General Design Parameters

v3.7.6		**Design Scenario Name**		**Rated Capacity**	**ADF**
	1	Influent Flowrate	m3/day	4600.000	3129.000
	2	Influent Concentration	mg/L	195.0	195.0
	3	Effluent Concentration (summer)	mg/L	22.2	15.7
	4	Effluent Concentration (winter)	mg/L	39.8	29.0
	5	Actual Oxygen Supplied	kg/day	3899.1	3899.1
	6	Has air been provided for nitrification?		Yes	Yes
	7	Number of Aerators		100	100
	8	Estimated Tubing Length	ft	1400	1400
	9	Airflow	scfm	5046.87	5046.87
	10	Design Pressure (includes cushion)	psig	6.03	6.03
	11	Projected Brake Horsepower	bhp	140.62	140.62
	12	Suggested Design Horsepower	hp	250.0	250.0

1. $FTE = \alpha\ (SOTE)\ \theta^{(T-20)}\ (\beta\ C^*_{\infty T} - DO) \div C^*_{\infty 20}$ *field transfer efficiency*

   Where,

α	contaminant factor {contaminants, depth, bubble-size} (range: 0.40 – 0.70)
β	TDS factor {total dissolved solids} (range: 0.90-1.00)
$\theta = 1.024$	temperature factor
DO	target dissolved oxygen level (mg/L)
$C^*_{\infty T}$	saturation oxygen concentration at site – adjusted for water depth
$C^*_{\infty 20}$	sat. oxygen concentration at STP conditions – adjusted for water depth
T	water temperature (Celsius)

2. Airflow = AOR / (25.056 * FTE)
3. E = 2.3 * k * t / (1 + 2.3 * k * t) *biological treatment efficiency*

   Where,

k = varies	kinetic coefficient {related to temperature} (range: 0.06 to 0.12)
t = time	treatment time in days

SUMMARY - Biological Treatment Calculations	Item	Description	Units	Rated Capacity	ADF
	1	Number of Treatment Cells		1	1
	2	Flow Regime		Series	Series
	3	Site Elevation - HWL	MSL - m	80	80
Cell 1					
	4	Wastewater Flowrate	m3/day	4600.000	3129.000
	5	Treatment Volume	m3	14302.1	14302.1
	6	Treatment Time	days	3.1	4.6
	7	Treatment Type	-	Complete Mix	Complete Mix
	8	Standard Reaction Rate, k_{20}	$days^{-1}$	2.5	2.5
Summer	9	Design Water Temp	°C	20	20
	10	Design Reaction Rate, k_T	$days^{-1}$	1.087	1.087
	11	Biological Treatment Efficiency	%	88.6%	92.0%
	12	Influent BOD Loading	kg/day	895	608
	13	Influent BOD Concentration	mg/L	195.0	195.0
	14	BOD Removed	kg/day	793	560
	15	Effluent BOD Loading	kg/day	102	49
	16	Effluent BOD Concentration	mg/L	22.2	15.7
Winter	17	Design Water Temp	°C	0.5	0.5
	18	Biological Treatment Efficiency	%	79.6%	85.1%
	19	BOD Removed	kg/day	712.0	518.1
	20	Effluent BOD Concentration	mg/L	39.8	29.0
	N1	Influent NBOD Loading	kg/day	275	187
	N2	Influent NBOD Concentration	mg/L	0.0	0.0
	N3	NBOD Removed* (Assumed)	kg/day	275	187
	N4	Effluent NBOD Loading*	kg/day	0	0
	N5	Effluent NBOD Concentration*	mg/L	0	0

SUMMARY - Aeration Calculations	Item	Description	Units	Rated Capacity	ADF
	1	Site Elevation	m	80	80
	N1	O_2 Loading Factor (BOD_5)	kg-O2/kg-BOD	1.5	1.5
	2	Alpha-value, α		0.60	0.60
	3	Beta-value, β		0.95	0.95
	4	Theta-value, θ		1.02	1.02
Cell 1					
	5	Lagoon Side Water Depth	m	2.71	2.71
	6	Air Release Depth	m	2.48	2.48
	7	AOR - Total	kg/day	2455	1700
	8	SOTE/m	%/m	6.23%	6.23%
	9	SOTE	%	15.44%	15.44%
	10	Design DO Concentration	mg/L	2.0	2.0
	11	FTE		6.80%	6.80%
	12	Air requirement	scfm	5047	5047
	13	Airflow per aeration unit	scfm	50.5	50.5
	14	Aerator Type		750T	750T
	15	Number of aeration units	units	100	100
	16	Water Pressure	psig	3.95	3.95
	17	Aerator Pressure Loss	psig	0.58	0.58
	18	Header/Feeder Pressure Allowance	psig	0.49	0.49
	19	Total Operating Pressure	psig	5.03	5.03
	20	Design Motor Pressure	psig	6.03	6.03

Aeration Budgetary Quote

Date: 4/1/2021
Project Name: Brighton, ON
Project Number: 6303

QUOTE TO:

Kris Montgomery
ACG-Envirocan

Phone Number: (905) 856-1414 ext. 224
Email: kris@acg-envirocan.ca

PREPARED BY:

Patrick Hill
Triplepoint Environmental LLC

Phone Number: (314) 873-7141
Email: patrick@lagoons.com

AERATION EQUIPMENT

Ares Aeration Equipment

- Designed to treat a maximum average daily flow of 4,600 m^3/day
- Designed to supply 3,899.1-kg of Oxygen Per Day.
- Capable of injecting air at 5,046.87 SCFM and 6.03 PSI.
- **Total Cost: $665,800 USD**

Standard Package	Quantity	Unit
750T Aerator	100	ea
1.5" Barbed Fittings: Stainless Steel	100	ea
1.5" Weighted Flexible Tubing	1400	ft
1.5" Full Port Ball Valve & Fittings	100	ea
Hose Mender: Stainless Steel	10	ea
Estimated Duty Blower: Kaeser HB950C 150 HP	2	ea
Blower Starter Panel: NEMA 4X	1	ea
Orifice Plate: Air Balancing	100	ea
Estimated Redundant Blower: Kaeser HB950C 150 HP	1	ea

NOT Included: Optional Items

Triplepoint Installation Supervision.....$2,000.00/day*
Blower Startup & Training.....$2,000.00
Shipping to Site.....To Be Determined
*Minimum (2) days.

TERMS & CONDITIONS

Scope of Supply

Triplepoint Environmental will supply all process expertise and equipment as part of this quote. The customer is responsible for the costs associated with the installation and infrastructure needed, including the concrete tanks, pumps (if required), operations building (as needed) and any influent/effluent/connecting piping that may be necessary.

Payment Terms

The quote in this proposal remains valid for a period of 30 days. Fifty percent (50%) is due upon contract acceptance, forty (40%) is due upon offer to ship, and the final ten percent (10%) is due upon startup by Triplepoint's personnel.

Currency & Taxes

All quotes are in United States Dollars. This price does not include local taxes and/or duties fees/taxes. Sales tax exception certificate must be submitted when applicable. All non-exempt taxes will be self-accessed payable by the customer to the local tax authority.

Design Limitations

The preliminary design(s) presented in this document were calculated with information provided at the time of proposal request. The design is only as good as the information provided. If incorrect or incomplete data was provided, assumptions have been made in order to develop the finished design. Prior to product installation, design properties and considerations must be reviewed and validated by the purchasing parties.

Delivery

All equipment will be delivered within a period of ten (10) to twenty-four (24) weeks. Lead time begins once items have been approved by owner or engineer of record. All packing and shipping costs are FOB ORIGINATION.

Installation Supervision

If included, a Triplepoint certified project manager will provide supervision of installation, inspection, testing, training and startup for a minimum of two (2) days during installation.

Force Majeure

Neither Party will be liable for any default or delay in performing an obligation under this Agreement when caused by strike, riot, war, terrorism, Act of God, generalized lack of availability of raw materials or energy, or other similar circumstances beyond our control.

Recommended Influent Screening

Due to the presence of sanitary wipes and/or other debris in influent collection systems, influent screening is highly recommended. Triplepoint has consistently found that aeration systems of all types collect rags, which ultimately prevent proper operation. Screening down to 1/4" at a minimum is recommended.

Warranty

Triplepoint Environmental warrants your Aeration™ products to be free from defects in material and workmanship for a period of five (5) years from the date of substantial project completion for Municipal applications and a period of two (2) years from the date of substantial project completion for Industrial applications. If a defect is discovered in any of the constituent components covered by this warranty, Triplepoint will repair at our option using new or refurbished components for equal or improved quality.

If a suitable repair is not possible, the product will be replaced. All defective parts, assemblies, and products become the property of Triplepoint Environmental. Any soft costs incurred during a warranty claim, including costs associated with removing, shipping and re-installing a warranted component, shall be the responsibility of the customer. Warranty is voided in the event issues are caused due to excessive existing sludge and/or ragging which inhibit proper operation.

Aeration Process Guarantee

Triplepoint Environmental guarantees your Aeration™ process for a period of five (5) years from the date of substantial project completion for Municipal applications. The guarantee assumes site conditions match design conditions and is voided in the event of excessive existing sludge and/or ragging which inhibit proper operation.

Limits of Liability

Triplepoint Environmental shall not be liable for any loss of profits, business, goodwill, interruption of business, nor for incidental or consequential merchantability or fitness of purpose, damages related to this quote.

Confidentiality Notice

The Aeration™ Process is the subject of one or more confidential patents or patent applications filed in the United States Patent Office, and may be the subject of one or more confidential foreign patent applications, the customer and any other related parties contracted recognize the importance of maintaining the continued confidentiality of the design of the Aeration Process. The customer and any other parties contracted all agree that they shall not sell, transfer or disclose any such confidential information relating to the design of the Aeration Process to any other person, organization, or corporation without the express written authorization of Triplepoint Environmental LLC and pursuant to an enforceable agreement of confidentiality, except as required by law or as necessary in connection with the use, operation, maintenance, repair, or replacement of the system. Additionally, the customer and any other parties contracted all agree to preserve the confidentiality of this proposal and all materials attached and not to distribute or copy such materials for any other party's not previously authorized by Triplepoint.

January 19, 2022 RVA 216011

35 Alice Street,
Brighton, Ontario K0K 1H0

Attention: Ms. Amy Russel, Environmental Services Manager, Municipality of Brighton, ON

Dear Ms. Russell:

Re: Technical Review of the Brighton WWTP Upgrade

Please find the enclosed Final Report for the referenced project.

Please contact the undersigned if you have any questions.

Yours very truly,

R.V. ANDERSON ASSOCIATES LIMITED



Harpreet Rai, Ph.D., P.Eng.
Project Manager



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Encls.

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Brighton WPCP Proposed Upgrade

Technical Review

Final

Municipality of Brighton

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RVA 216011

January 19, 2022

Brighton WPCP Proposed Upgrade
Technical Review

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1.0 INTRODUCTION

The existing Brighton Wastewater Pollution Control Plant (WPCP) is a lagoon-based system. The WPCP is located at 100 County Road 64. Wastewater collected from the serviced area of the Municipality passes through four treatment components at the WPCP, in the order listed below:

1- A 0.68-hectare flow through Aerated Cell (Lagoon #1) with two stationary mixers with power ratings of 7.5 kW and 11.2 kW in the North section: and three floating aerators in the south section with power ratings of 18.6 kW, 18.6 kW and 11.2 kW.

2- A chemical mixing chamber where ferric chloride is added.

3- A 5.44-hectare facultative Waste Stabilization Pond (Lagoon #2) equipped with three floating baffles to improve flow distribution.

4- A two-celled Constructed Wetland having a total surface area of 6.2 hectares.

The influent passes through the flow-through aerated lagoon, followed by a facultative stabilization lagoon and a constructed wet land to polish the aerated lagoon effluent. The effluent from the constructed wetland is discharged continuously into a provincially significant natural wetland that borders Presqu'ile Bay, which is located off the northeast shore of Lake Ontario. The WPCP is currently operating at 72% of its rated capacity of 4,600 m^3/d. The effluent from the waste stabilization pond has been exceeding the seasonal compliance limits for Total Ammonia Nitrogen (TAN) limits stated in the Plant Environmental Compliance Approval (ECA).

1.1 Project Background

In December 2018, JL Richards Consulting Engineers (JL) completed a Schedule B Class EA to review alternatives to upgrade the Brighton WPCP to lower levels of total ammonia nitrogen (TAN) in the treated effluent to ensure compliance with the Brighton ECA. The Class EA report identified six general alternatives that JL identified as potential, feasible alternatives. One of these (Option 3E) was a fixed film, biological process at the downstream end of the lagoon system. This process (the MBBR) was selected as the recommended preferred solution and was the basis for the MBBR project that was tendered in the fall of 2020.

However, the quoted prices of "Brighton WPCP-MBBR Addition" Tender were much higher than the originally estimated budget by JL and the Municipality is now reviewing another feasible alternative.

In June 2021, GSS Engineering, acting as owner's engineer in the Class EA process, reviewed a proposal submitted by Triplepoint™ to upgrade aeration in the aerated cell component of Brighton WPCP. GSS found the Triplepoint's proposed aeration system appears to provide sufficient oxygen to satisfy the future BOD and TKN oxygen demands associated with both the current and anticipated future rated capacities of 4,600 m^3/d and of 6,000 m^3/d respectively. GSS suggested to build a new secondary clarifier to separate the biological solids from the cell effluent flow and return the concentrated solids back to the inlet of the aerated cell. GSS also suggested that the system does not require screening or grit removal for the raw sewage as the aeration units have no moving parts. However, the proposed upgrade includes a screen downstream of the aerated cell to protect the moving equipment in the secondary clarifier.

Further to that the Municipality retained R.V. Anderson Associates Limited (RVA) to conduct a technical review of the proposed upgrade of the Brighton WPCP to address the ongoing issue of non-compliance with the plant's effluent ammonia limits. The objective of this Technical Review is to review the conceptual design of the proposed upgrade regarding the validity of the concepts used in preliminary design, process sizing, and the technical viability of the concept to meet the treatment objectives, as presented in the memo entitled – Brighton WPCP Aeration System Upgrades with Option to Expand Capacity, Dated June 15, 2021– by GSS Engineering Consultants Limited.

It should be noted that the review is limited to the conceptual viability of the proposed upgrade and does not include a review of the process mechanical design and/or installation details of the proposed upgrades and/or equipment. For instance, design information pertaining to the installation of blowers, electrical and control systems, piping design, and all associated installation details have not been reviewed.

2.0 EXISTING TREATMENT PROCESS

The existing WPCP is a lagoon-based system with an aerated lagoon followed by a larger waste-stabilization facultative lagoon for sludge storage and polishing of the aerated lagoon effluent. The raw sewage enters the aerated cell on the northwest end and the mixed liquor comprising treated effluent and bacterial biomass exits on the southeast corner. The mixed liquor from aerated cell enters the facultative lagoon at its northwest corner. The aerated lagoon has a total volume of 14,300 m^3 and has five (5) mechanical aerators (2x18.6 kW, 2x11.5 kW and one 7.5 kW). The volume of the aerated lagoon corresponds to a Hydraulic Retention Time (HRT) of 4.3 d at current average flow of 3,317 m^3/d and 3.1 d at design flow of 4,600 m^3/d. Since it is a flow-through aerated lagoon with no recycle of the active sludge back to the lagoon, the Solids Retention Time (SRT) in the aerated cell equals the HRT.

The mixed liquor from the aerated lagoon enters the polishing lagoon at its Northwest corner and flows through four (4) compartments in the polishing lagoon created by using partitioning curtains, with an objective to prevent hydraulic short circuiting and maximizing effective use of the lagoon volume. Prior to the mixed liquor entry in the polishing lagoon, ferric chloride is added to the mixed liquor to remove phosphorus. The precipitated phosphorus along with the biomass in the mixed liquor settles in the polishing lagoon, and the treated effluent from aerated lagoon gets additional treatment via natural physical and biological activity in the polishing lagoon. The effluent from this lagoon flows into a constructed wetland located east of the lagoon. The design intent of the constructed wetland was to provide further polishing of the effluent via removal of organics and nutrients contained in the polishing lagoon effluent. While it does provide some degree of polishing to the lagoon effluent, the treatment provided is non consistent and therefore can not be relied upon to meet effluent objectives. The constructed wetland effluent flow finally discharges into a natural wetland that borders Presqu'ile Bay of Lake Ontario. Figure 2.1 shows the process schematic of the WPCP.

The rated capacity of the WPCP is 4,600 m^3/d, with discharge compliance limits for $cBOD_5$, TSS, TAN and TP, of 30 mg/L, 40 mg/L, 14/17 mg/L (summer/winter) and 1.0 mg/L respectively, and the corresponding objectives of 15 mg/L, 15 mg/L, 10/15 mg/L (summer/winter), and 0.8 mg/L respectively. Also, it is important to note that the compliance limits and objectives are applicable on the stabilization lagoon effluent and not the constructed wetland per the current ECA (# 6166-AJJTGW, dated: March 20, 2017) given the unreliability of the latter to provide consistent treatment.

The WPCP has never had any exceedance issues with $cBOD_5$, TSS and TP. However, there have been recurring events of TAN exceedance over the past several years. In

addition, frequent exceedances of TSS objectives and E-Coli limits/objectives have been observed over the last four (4) years.

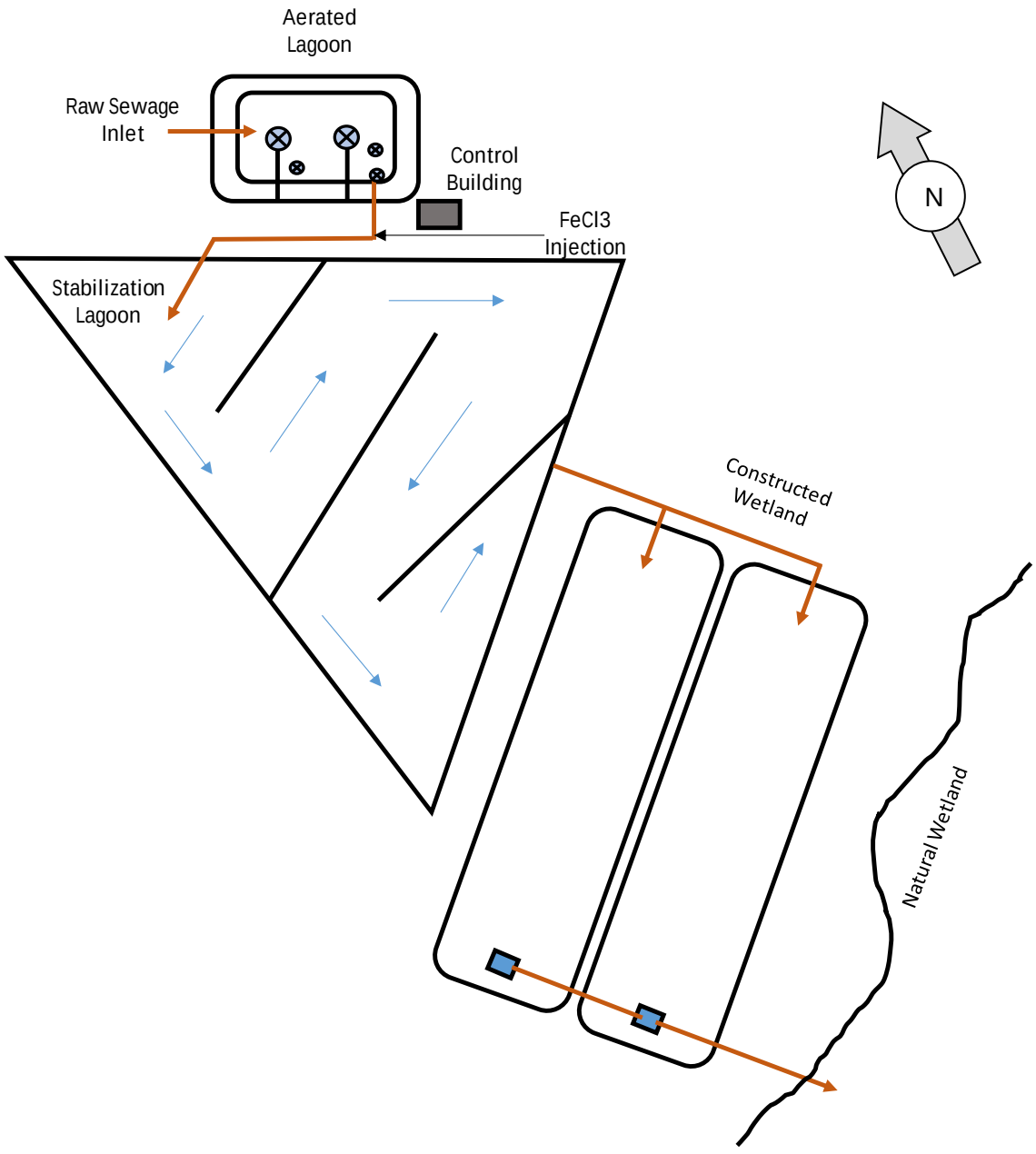


Figure 2.1 – Process Schematic of the Existing WPCP

3.0 WPCP INFLUENT FLOW AND CHARACTERISTICS

3.1 Influent Flowrates and Characteristics

Table 3.1 and 3.2 illustrate the historic average monthly flowrates and characteristics. The historic flow data indicates average day flow (ADF) value of 3,317 m^3/d which is 72% of the current rated capacity of the plant. The absolute and 99.5 percentile peak day flows (PDF) values over the reported historic period are 14,009 m^3/d and 9,960 m^3/d, translating into PDF peaking factor of values of 3.93 and 2.89 respectively. With less than 1% frequency of the peaking factor exceeding 2.89, this value flows represents a realistic peaking factor for the plant. It is also important to note that high flows typically occur from late winter to spring (January to May) as the high flows coupled with low temperatures during these months has a major bearing on nitrification in the aerated cell. See Figure 3.1 for historic monthly average flow trends based on the flow measurements of the aerated cell effluent. The average and maximum month influent characteristics represent a low to medium strength sewage for $cBOD_5$ and TSS, medium to strong sewage for TP and TKN. See Table 3.2 for details.

Table 3.1 – Brighton WPCP Historic Influent Flow Data

Month	Influent Flow (m^3/d)				
	2018	2019	2020	2021	Average
Jan	3583	3534	5175	2952	
Feb	4910	3260	3873	2137	
Mar	3794	4314	5943	2951	
Apr	6724	6016	4512	2855	
May	4043	7112	4777	2254	
Jun	3270	5487	1501	1489	
Jul	2285	3812	1146	2242	
Aug	1921	3178	1295	1993	
Sep	2079	2592	1433	2640	
Oct	2219	3083	2222	3052	
Nov	3500	3526	2124	-	
Dec	3627	3677	2939	-	
Average	3,480	4,137	3,071	2,421	3,317
Max Day	13,087	10,614	14,009	11,313	
Max Month	6,724	7,112	5,943	3,052	

Table 3.2 – Brighton WPCP Influent Characteristics

Year	$cBOD_5$		TSS		TP		TKN	
	Annual average	Max month	Annual average	Max month	Annual average	Max month	Annual average	Max month
2018	113	175	185	239	5.2	7.5	45	65
2019	121	167	179	319	5.5	7.0	47	58
2020	97	169	189	359	5.1	8.6	45	76
2021	120	160	207	289	6.5	8.3	58	71
Average	113	168	190	301	5.6	7.8	49	68

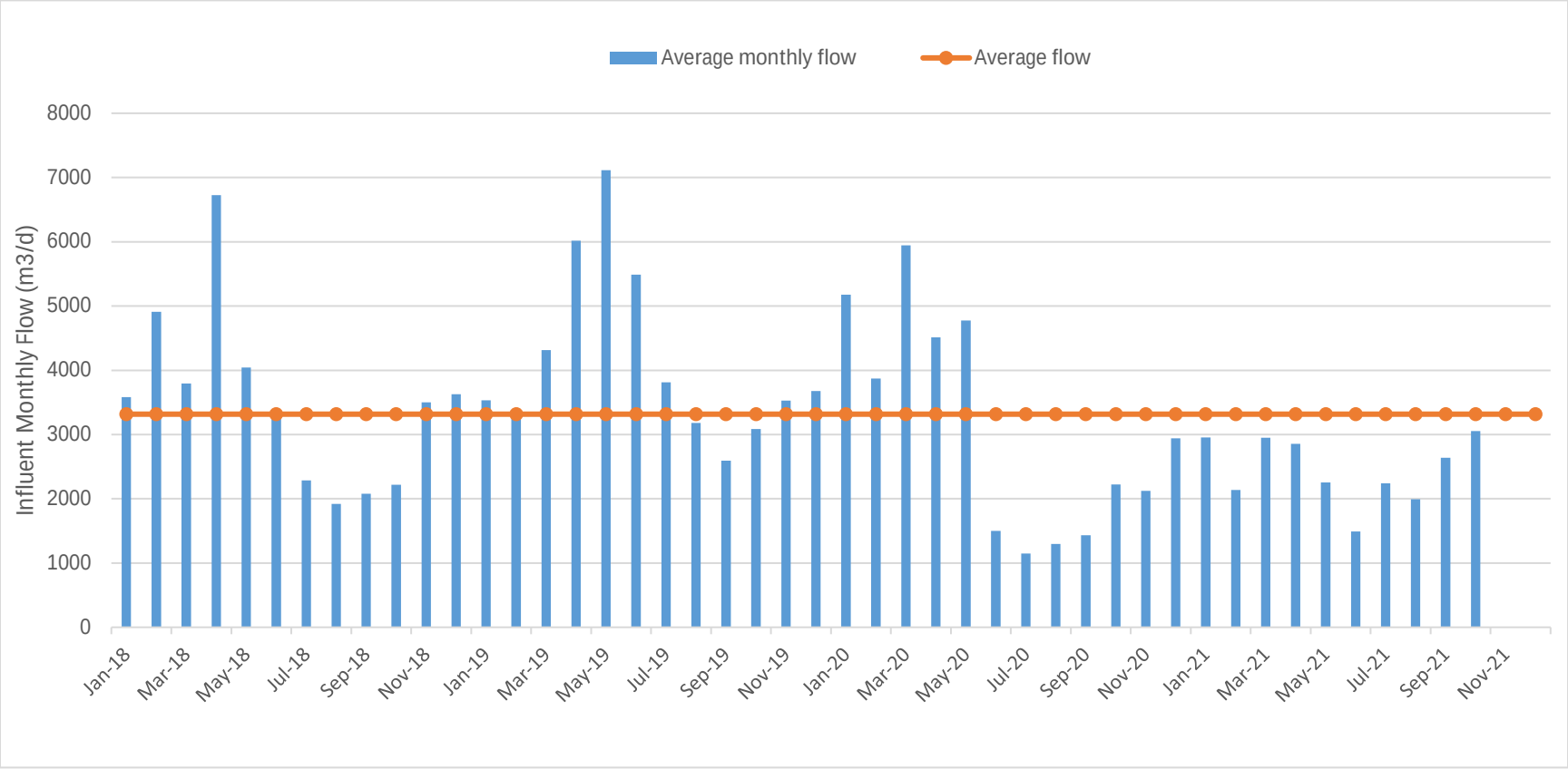


Figure 3.1 – Brighton WPCP Historic Influent Flows

4.0 WPCP HISTORIC PERFORMANCE AND ISSUES

4.1 Aerated Cell and Stabilization Pond Effluent Characteristics

Tables 4.1 and 4.2 summarize the historic effluent characteristics of the aerated cell and the stabilization pond.

Table 4.1 – Aerated Cell Effluent Characteristics

Item	Unit	2018	2019	2020	2021	Average
$cBOD_5$	mg/L	28	24	24	25	25
TSS	mg/L	120	113	253	194	170
TP	mg/L	3.2	2.4	5.0	4.5	3.8
TAN	mg/L	14.0	10.2	9.5	14.4	12.1

Table 4.2 – Stabilization Lagoon Effluent Characteristics

Item	Unit	2018	2019	2020	2021	Average
$cBOD_5$	mg/L	2.8	3.7	2.6	3.7	3.2
TSS	mg/L	7.2	7.8	7.8	9.1	8.0
TP	mg/L	0.2	0.2	0.2	0.3	0.2
TAN	mg/L	15.1	11.7	12.5	18.0	14.3

4.2 General Observations on WWTP Performance

Figure 4.1 illustrates the monthly average $cBOD_5$ and TSS values in the stabilization lagoon effluent with comparison to the ECA objectives and limits. As indicated, there were no exceedances of $cBOD_5$ and TSS limits, while there are occasional minor exceedances of the monthly average TSS objective of 15 mg/L.

The high effluent $cBOD_5$ and TP in the aerated cell effluent are primarily contributed by the high TSS in the aeration cell effluent, which means a major fraction of these parameters is in particulate form in the aerated cell effluent. As such the treatment provided by the stabilization lagoon is primarily the removal of particulate fractions via settling.

The average values of total ammonia nitrogen (TAN) in the stabilization pond are 10-30% higher than those in the aerated cell effluent. This means that not only is there little or no TAN removal in the stabilization pond, but some TAN gets added to the aerated cell effluent loads leading to worsening of effluent quality for this parameter. See Figure 4.2 for details.

Figure 4.4 illustrates the monthly *E.Coli* values of the stabilization lagoon and constructed wetland effluents. The ECA stipulated that the Geometric Mean Density of *E.Coli* in the constructed wetland effluent should not exceed 200 organisms per 100 millimeters for any calendar month. However, Figure 4.2 indicates that the stabilization lagoon effluent has roughly exceeded the *E. Coli* objective in all cold weather months (Nov throughout May). Further, while the constructed wetland effluent shows some reduction in *E.Coli* in most cases, there are numerous instances when the *E.Coli* in wetland effluent exceeded than in the stabilization effluent, which is a further confirmation of the unreliability and inconsistency in the treatment provided by the same.

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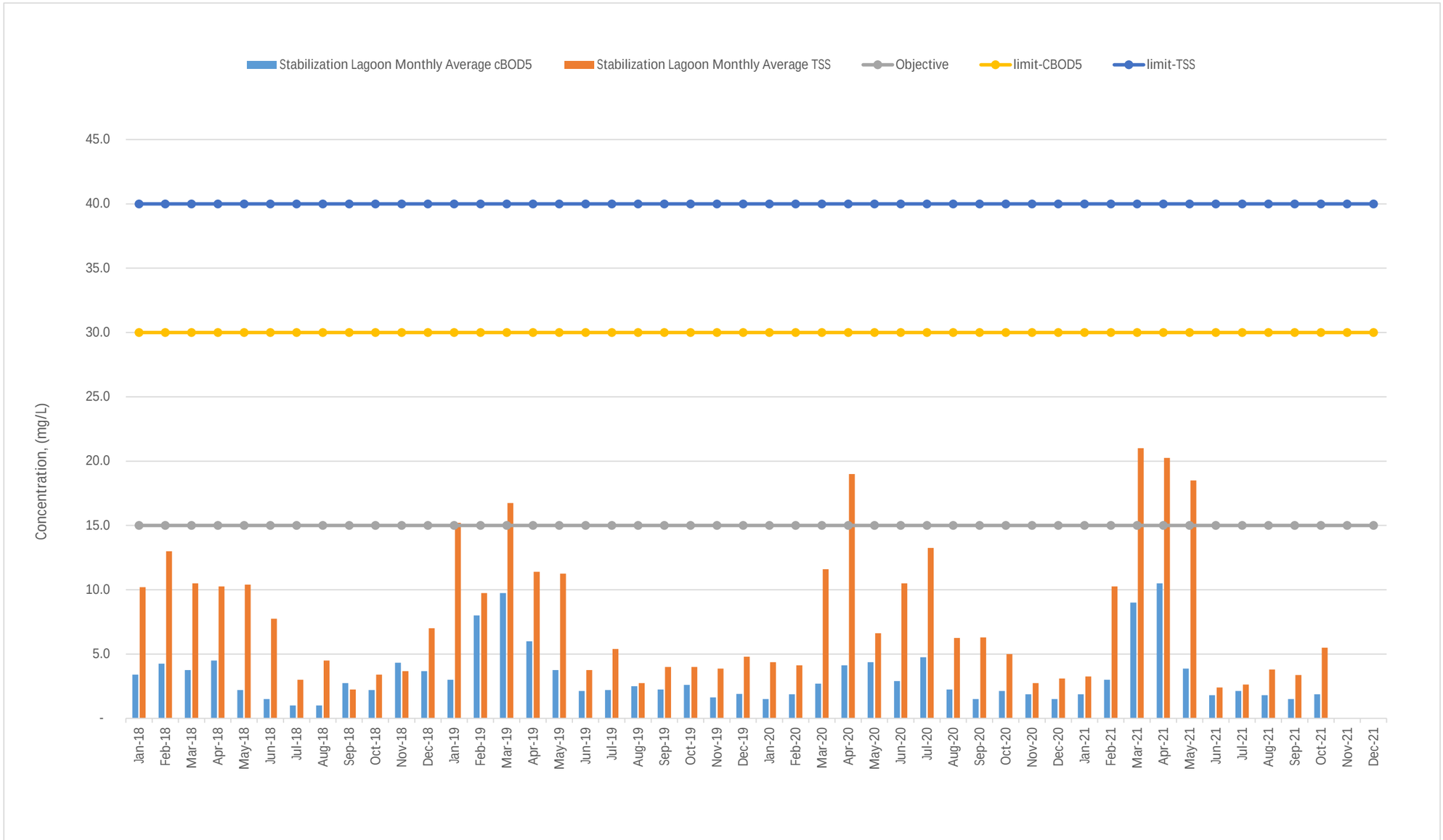


Figure 4.1 – Stabilization Lagoon Effluent $cBOD_5$ and TSS Trends

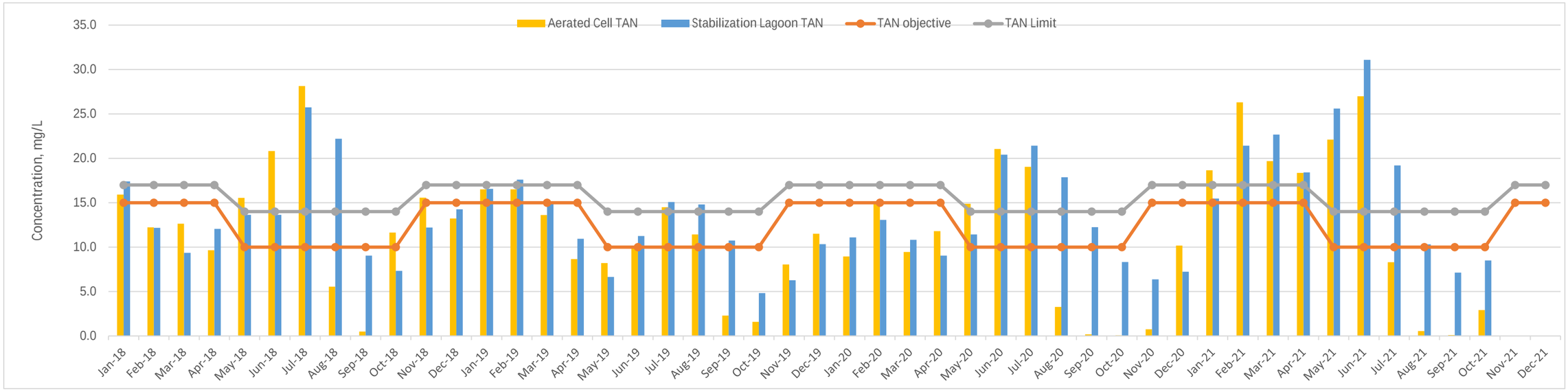


Figure 4.2 – Aerated Cell and Stabilization Lagoon Effluent TAN Trends

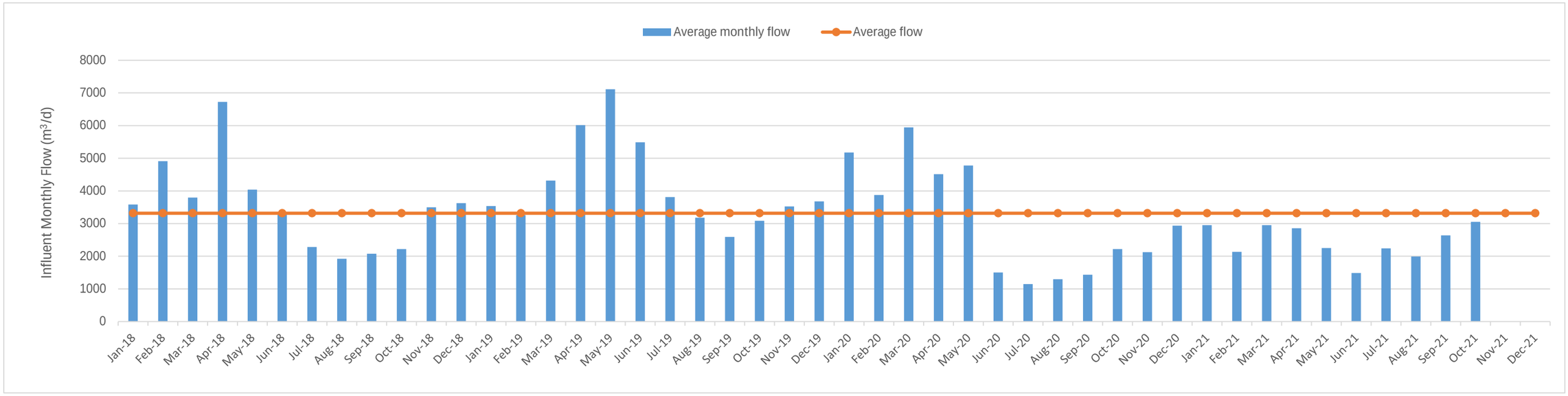


Figure 4.3 – Monthly Average Influent Flow Trends

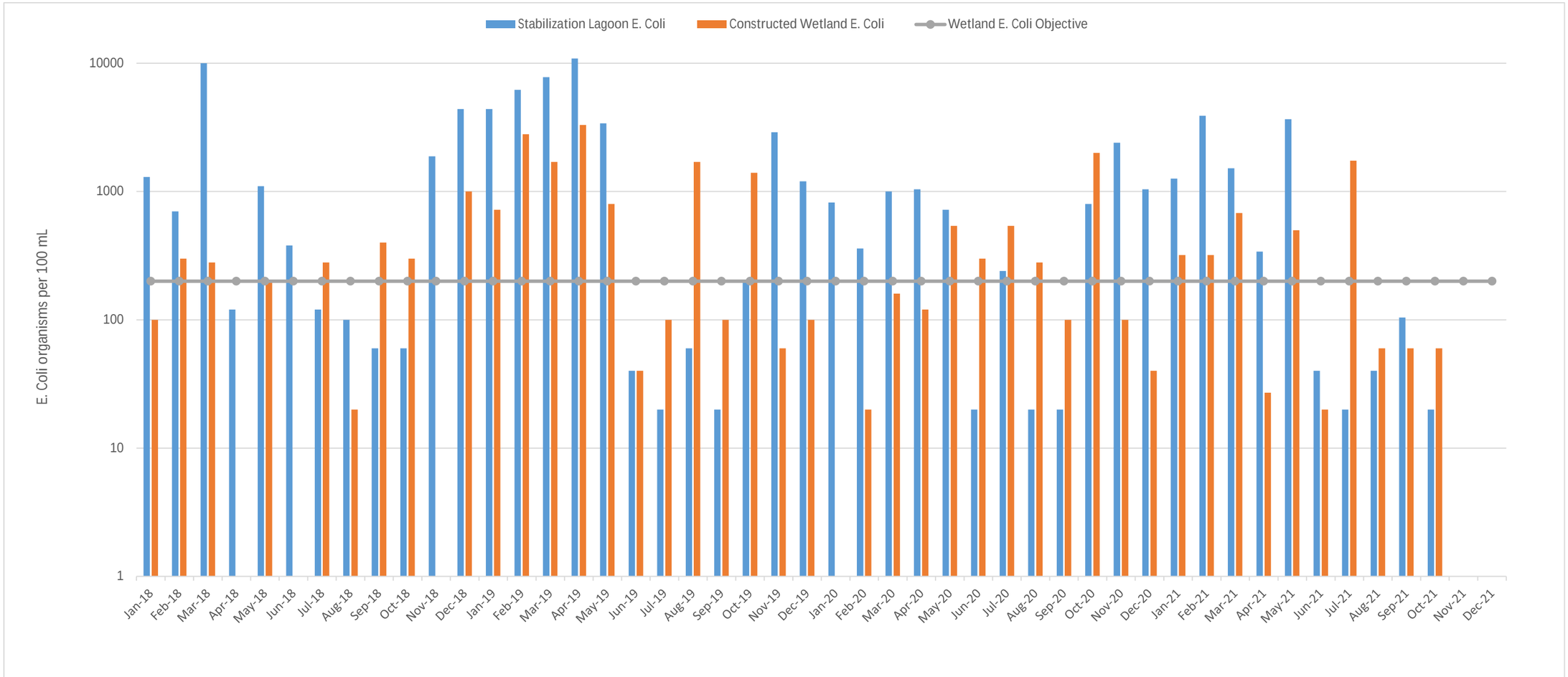


Figure 4.4 – Stabilization Lagoon and Constructed Wetland E. Coli Trends

4.3 TAN Removal in the Aerated Cell

Given below are the key observations on TAN removal in the aerated cell.

- Figure 4.3 illustrates the historic monthly average TAN of both aerated cell and stabilization lagoon effluent verses the ECA objectives and limits. As indicated, there are frequent exceedances of TAN objectives and/or limits in the aerated cell and stabilization lagoon effluents most of the year with the exception of some months in fall.
- Effluent ammonia trends indicate limited nitrification in the aerated cell with ammonia levels mostly ranging between 10-20 mg/L for most months except for the period between August to October when it falls to 5 mg/L or below indicating significant nitrification activity.
- Nitrification limitation in winter months is likely due to combined effect of low temperatures and high flows due to wet weather. The flows during these months average around 4,500 m^3/d, decreasing the SRT of the aerated cell to 3.2 d from an already low annual average of approximately 4.3 days. This coupled with the low temperature range (2-10°C) in the cell during these months' limits nitrification.
- The high effluent TAN values during winter and spring are typically followed by further spikes in the months of June and July before a decrease to 5 mg/L or below from August to September and extending as far as November in some years.
- The high TAN values in the month of June and July are likely due to increase in temperature in the aerated cell, and enhanced activity in the bottom zone bringing any settled solids into the upper mixed and biologically active layers. The settlement of mixed liquor and influent solids during the other months indicates mixing limitation of currently installed mechanical aerators in the aerated cell. Breakdown of these sludge solids leads to release of ammonia causing the TAN spikes during these months.
- The above period is followed by the typically dry period from August to September when the flows average between 1,500 -2,500 m^3/d giving an SRT range of 6-9 days at average temperature of 20°C. These operating conditions enhance the nitrification activity leading to removal of the solubilized TAN in the preceding months and marked reduction in the TAN concentration in the aerated cell effluent during this period.

4.4 TAN Removal in the Stabilization Lagoon

The effluent TAN values from the stabilization lagoon are mostly equal or slightly lower than the aerated cell effluent during most months except for dry and warm period from August to September (some years extending up to November). This indicates little to no TAN removal in the stabilization lagoon. This means either no nitrification activity in the stabilization lagoon or nullification of any TAN removal by TAN release from the sludge deposits during most months. In August and September however, the TAN release from the sludge deposits decisively exceeds any TAN removal in the stabilization lagoon leading to the high TAN values in the lagoon effluent causing exceedances despite near full nitrification achieved in the aerated cell. These high TAN values produced by the stabilization lagoon are indicative of significant sludge deposits in the lagoon.

5.0 PROPOSED UPGRADE ASSESSMENT

5.1 Upgrade Design Concept

On June 15, 2021, GSS provided an outline of the Triplepoint proposal to upgrade aeration in the aerated cell component of the WPCP and convert it into a fully oxygenated and mixed activated sludge basin (ASB). In addition, the ASB will be equipped with active SRT control via solid separation either by operating it in sequential batch reactor (SBR) mode or provision of a secondary clarifier with a return activated sludge (RAS) facility.

The proposal includes the following:

1- Removal of the existing catwalks, original mechanical mixers, and the floating aerators in the aerated cell.

2- Installation of the new Triplepoint shore based three 150 hp air blowers (2 duty /1 standby) along with the submerged aeration units. These blowers would be housed within acoustic weatherproof enclosures. The Triplepoint design indicates that the blowers are to be VFD controlled and the total air flow with two blowers running at 100% speed would be approximately 8,883 m^3/h (5.050 cfm) and provide approximately 3,900 kg of dissolved oxygen per day to the aerated cell.

3- Construction of new secondary clarifier to separate the biological solids from the cell effluent flow and return the concentrated solids back to the aerated cell. The proposed clarifier diameter is 20 m, which translates into a HRTs of 6.6 h at the rated capacity flow of 4,600 m^3/d.

GSS also suggested that screening aerated cell effluent upstream of the secondary clarifier to protect the moving parts in the latter. Screening and/or grit removal from raw sewage was deemed unnecessary based on a rationale that the aeration cell would not have any moving parts.

As a supplement to the proposed upgrade to the liquid train, GSS also suggested the following alternatives for proactive sludge management:

- Discharge surplus sludge to the stabilization lagoon from the sludge return line and allow for annual sludge removal from the lagoon.
- Regular discharge of waste sludge from the sludge return line to the sludge drying beds at the north end of the aerated cell, drainage from the bed recycled back to the inlet of the aerated cell and covering of the sludge drying cells for winter operation.

- Periodic discharge of waste sludge from the sludge return line to geotubes located near the edge of the aerated cell and directing the drained liquid back into the aerated cell.

5.2 WPCP Operation Assessment with Proposed Upgrade

BioWin software was used to model the current plant rated capacity (4,600 m^3/day) and the proposed future upgraded rate capacity of (6,000 m^3/day). One of the basis assumptions in the modelling is that the lagoons have been emptied of sludge, to avoid the impacts seen in the existing which leads to TAN exceedances. In both models, influent characteristics higher than the average historical influent characteristics were used to present tougher operation conditions. Given the significant difference in operation of the upgraded and current systems, particularly the varying SRT and mechanic aeration in the existing system, a calibrated model of the existing system was not prepared to predict the performance of the upgraded system. As such, models of the upgraded system for the current and future rated capacities were prepared using the default values of BioWin operating parameters to achieve this goal. Both models were set for 20 days SRT (minimum 15 days per the MECP guideline), for efficient nitrification and partial sludge stabilization. Table 5.1 illustrates the influent characteristics used in both models.

Note that while the influent BOD_5 values used in the model are higher than the observed maximum month value, the TKN value is lower than the observed maximum month value. See Tables 3.2 and 5.1 for comparison of the BOD_5 and TKN values. The excess BOD_5 value used in the model compensates for the lower TKN value. As such the values given in Table 5.1 were used as such in the models. Further the TP value in Table 5.1, despite being lower than the recorded values was used as such as this has no bearing on the air demand and nitrification ability of the system. The higher TP value observed in the field can be addressed by increasing the dose of ferric chloride.

For both rated capacities, the alternative of Complete Mix Activated Sludge was modeled using BioWin by converting the aerated cell into a completely mixed activated sludge cell with the addition of the proposed 20 m diameter Secondary Clarifier. Table 5.2 illustrates the treatment facilities dimensions.

The operating parameters of the complete-mix activated sludge models at both rated capacities of 4,600 and 6,000 m^3/day at summer and winter are summarized in the in Table 5.3.

Table 5.1 – Influent Characteristics Used in BioWin Modeling

Operating Parameter	Unit	Current Capacity		Future Capacity	
		Summer	Winter	Summer	Winter
Rated Capacity	m^3/day	4,600		6,000	
Influent Temp	°C	20	10	20	10
Influent BOD_5	mg/L	200	200	200	200
Influent TSS	mg/L	250	250	250	250
Influent TKN	mg/L	60	60	60	60
Influent TP	mg/L	3.3	3.3	3.3	3.3

Table 5.2 – Aerated Cell and Secondary Clarifier Dimensions

Unit Process	Unit	Value
Aerated Cell		
Volume	m^3	14,300
Depth	m^3	2.7
Secondary Clarifier		
Diameter	m	20
Depth	m	4.0
Volume	m^3	1,256
HRT at current capacity	h	6.5

Table 5.3 – Operation Summary for Current and Future Capacity

Parameter	Unit	Current Capacity		Future Capacity		Remarks/ guideline
		Summer	Winter	Summer	Winter	
Average Day Flow (ADF)	m^3/d	4,600		6,000		
Peak Day Flow (PDF)[1]	m^3/d	13,294		17,340		
Peak Hourly Flow (PHF)[2]	m^3/d	17,813		23,236		
Influent Temp	°C	20	10	20	10	
MLSS	mg/L	1021	1065	1316	1374	
HRT	h	75	75	57	57	> 15
SRT	d	20	20	20	20	> 15

Parameter	Unit	Current Capacity		Future Capacity		Remarks/ guideline
		Summer	Winter	Summer	Winter	
Mixing Air Demand, Coarse Bubble	m^3/h	16,988	16,988	16,988	16,988	0.33 L/ (m^3.s)
Mixing Air Demand, Fine Bubble	m^3/h	11,631	11,631	11,631	11,631	0.61 L/ (m^2.s)
Biological Air Demand	m^3/h	4,775	4,597	6,442	6,202	
Average mixing Demand[3]	m^3/h	14,309	14,309	14,309	14,309	
Overall air demand[4]	m^3/h	14,309	14,309	14,309	14,309	
Aeration capacity of proposed system	m^3/h	8,883	8,883	8,883	8,883	
Sec Clarifier SOR at PHF	m^3/m^2-d	57	57	74	74	< 37
Sec Clarifier SLR at PDF	kg/m^2-d	74	74	74	74	< 170
Effluent $cBOD_5$	mg/L	2.5	2.8	2.9	3.3	
Effluent TSS	mg/L	8.8	8.9	11.8	11.8	
Effluent TAN	mg/L	0.08	0.16	0.08	0.16	
Wasted Sludge	m^3/day	235	236	229	229	
Wasted Sludge Conc	%	0.30%	0.30%	0.40%	0.40%	

1. Based on historic PDF factor of 2.89
2. Based on WEF guidelines for PDF and PHF peaking factor
3. Average of the coarse-bubble and fine-bubble mixing demands
4. Higher of the mixing and biological air demands.

Given below are the key observations on the predicted performance of the upgraded WPCP.

- The complete-mix activated sludge lagoon provides very long hydraulic retention time (HRT), 75 and 57 hour for the plant rated capacities of 4,600 and 6,000 m^3/day, respectively, which are much higher than the minimum 15 h requirement for extended aeration systems per the MECP guidelines.
- The proposed secondary clarifier with 20 m diameter has surface overflow rates (SOR) of 57 and 74 m^3/m^2-d at the design peak hourly flows under the current and future capacity respectively. These SOR values are significantly higher than the MECP guideline of maximum 37 m^3/m^2-d, which indicates a high probability of effluent TSS spikes in the secondary effluent to the stabilization pond during peak flows. On the other hand, the solids loading rates (SLR) range of 22-39 kg/m^2-d at peak day flows for the current and future capacity is significantly lower than the MECP guideline of

maximum of 170 kg/m^2-d. As such, the low SLR and the solids removal in the stabilization lagoon are significant mitigating factors for the high SOR for the secondary clarifier.

- The biological air demands for summer season are 4,775 and 6,442 m^3/h, respectively for rated capacities 4,600 and 6,000 m^3/d respectively. The required aeration capacity for complete mixing of the lagoon is calculated for both coarse and fine bubble diffusers aeration. The mixing aeration demands with coarse bubble and fine bubble aeration demands are estimated at 16,988 m^3/h and 11,631 m^3/h respectively based on the MECP guideline. As the aeration system in the proposed upgrade provides both coarse-bubble and fine-bubble aeration, the overall estimated demand, taken as the average of the above two value, equals 14,309 m^3/h, which is significantly higher than the aeration capacity of 8,883 m^3/h of the proposed aeration system. As such while the proposed system has adequate capacity for biological demand for both capacities, it does not meet the requirements for mixing based on MECP guidelines. This will mean that the aerated cell will not be “completely mixed” and that the incomplete mixing will lead to settlement of solids in the unmixed zones.

    - The predicted wasted sludge flowrate at the plant rated capacity of 4,600 m^3/d after converting the aerated cell into complete-mix activated sludge lagoon is 235 m^3/d at 0.3% solids concentration. The waste sludge will be further stabilized and expected to be naturally thickened (typically of 8-10% solids concentration) in the polishing lagoon the wasted sludge will be.

    - Given the existing sludge accumulation and the associated ammonia release issues with the same, the proposed approach of waste sludge storage in the lagoon would nullify the upgrade benefits to a large extent unless the accumulated sludge is removed and disposed off periodically.

Note that the approach for intermittent aeration to operate the aerated cell in the SBR mode is not considered practically viable without the automated controls, equipment to operate it as an SBR, and modifications to the aeration cell. Further, the tank geometry and depth would not only make the SBR equipment retrofit a challenge, but also pose significant operational challenges as an SBR system. As such, this option for design upgrade is not recommended and therefore not given any further consideration.

5.3 Operation Cost Implications

The aeration blowers in the proposed upgrade have rated power of 300 HP or 225 kW, which is approximately 225 kW higher than the combined power of 59.6 kW of the existing four mechanical aerators. Considering current average power cost of approximately $0.12/kW-h, this translates into approximately $160K of additional

energy cost per annum, which is significant. Further, the increased power demand at the plant should be compared with the existing power supply to identify upgrades required if any to the power supply, and the cost implications of these upgrades considered in the overall cost analysis.

6.0 CONCLUSIONS SUMMARY AND SUGGESTED IMPROVEMENTS

6.1 Existing WWTP

- The TAN exceedances in the existing WWTP are caused by operational limitations in both the aerated cell as well as the stabilization lagoon. The aerated cell being a flow through system operates at low average SRT of 3 days which is insufficient for nitrification in during wet weather and/or winter months.
- The existing aeration system provides limited mixing in the aerated cell thereby allowing some settlement of the solids in the mixed liquor. Over time, these settled solids undergo anoxic degradation as the cell temperature increases in the months of May and June, resulting in release of ammonia, leading to elevated TAN concentrations in aerated cell effluent during these months (as shown in the results). This period is followed by the typically warmer and dryer condition in the period from August to September (sometimes extending further into Fall) when the high temperatures and high SRTs (induced by low flows) enhance the nitrification activity leading to removal of the solubilized TAN in the preceding months and marked reduction in the TAN concentration in the aerated cell effluent during this period.
- There is very little to no TAN removal in the stabilization lagoon. This means either no nitrification activity in the stabilization lagoon or nullification of any TAN removal by TAN release from the sludge deposits during most months. In August and September however, the TAN release from the sludge deposits decisively exceeds any TAN removal in the stabilization lagoon leading to the high TAN values in the lagoon effluent causing exceedances despite near full nitrification achieved in the aerated cell. These high TAN values produced by the stabilization lagoon are indicative of significant sludge deposits in the lagoon.

6.2 Proposed Upgrade

The proposed upgrade concept recognizes most of the limitations in the existing system and is designed to address the same. Provision of a completely mixed aeration system with full oxygenation capacity and mixing, together with the addition of proper secondary clarification with capability of returning sludge would be able to mitigate the current effluent TAN exceedances. However, there are the following limitations in the proposed upgrades that would need to be addressed further to achieve the desired improvements:

- Given the existing sludge accumulation and the associated ammonia release issues with the same, the proposed approach of waste sludge storage in the stabilization lagoon would likely nullify the benefit of the proposed upgrade (particularly for the warm months) to a large extent unless the existing accumulated sludge is removed

and disposed off, and this practice is adopted as a scheduled maintenance activity on a periodic basis. However, it should be noted that this activity can incur significant operational cost. As such other options of sludge management suggested in the GSS proposal including – geotube dewatering and storage, or dewatering via the existing sludge drying beds – should be considered against lagoon storage with regard to capital and operational costs and other operational considerations including ease of operation, maintenance and odour potential.

- The proposed upgrade does not include removal of accumulated solids from the aerated cell and the stabilization lagoon, a factor, that is potentially critical to achieving the desired outcome with the upgrades. As such, this step needs to be included as a pre-requisite to implementation of the proposed upgrades.

- Provision of a screen between the aerated cell and the secondary clarifier, while protecting the latter, will not be protective of the aerated cell as the rags could be a significant operational risk for aeration diffusers. In addition, the absence of grit removal from raw sewage would lead to grit accumulation in the aerated cell which would not only lower the effective treatment volume over time but also be an additional fouling risk for the fine bubble aeration system. As such screening and grit removal facilities upstream of the aerated cell must be an essential component of the upgrade for a robust and complete upgrade solution.

- The method of installation of diffusers and the ability to inspect and clean, repair or relace diffusers should be considered carefully. In addition, installation methods and support provisions for air piping need to properly designed.

- The aeration system capacity of 8,585 m^3/hr in the proposed upgrade, while adequate for the biological demands for the current and future capacities of 4,600 m^3/d and 6,000 m^3/d, is limited for mixing based on the MECP guidelines. The design aeration capacity of the proposed upgrade seems adequate to provide mixing at the flat bottom of the lagoon, but not the entire cell. This could cause accumulation of the sludge on the sloped sides of the cell, which in the longer run would create anerobic condition and high-concentration ammonia bleed-outs in the summer and fall months as experienced with the current system.

- The proposed secondary clarifier with 20 m diameter is hydraulically limited for the design peak hourly flows for both current and future capacity, as the peak SOR values of 57 m^3/m^2-d and 74 m^3/m^2-d significantly exceed the MECP guideline of maximum 37 m^3/m^2-d. While the low peak SLR values at the current and future capacity could mitigate the hydraulic limitation to some extent, there is still the danger of solids loss to the effluent. Also, while the availability of the stabilization lagoon provides a buffer to capture potential high effluent TSS from the secondary clarifier,

the consultant should select a design SOR value that protect the process from solids washout, and that can be defended to the ministry during ECA amendment of the WWTP.

- It is also noted that the MECP guidelines are normally conservative and there are references in the WEF guidelines of lower unit rates for mixing with fine-bubble systems. In addition, the mixing demand calculation in this assessment report was based on the average cross-sectional area of the aerated cell as opposed to the bottom area used by the supplier. As such there may be mitigating conditions for the identified aeration limitation. Should that be the case the proponent should be asked for a guarantee to meet both mixing and oxygenation requirements and ensure that the design of the aeration system should either satisfy the MECP reviewer's requirements and support the ECA amendment or is upsized to meet the MECP guidelines.
- The approach for intermittent aeration to operate the aerated cell in the SBR mode is not considered practically viable without automated controls, proper equipment to operate it as an SBR, and modifications to the aeration cell, and therefore not recommended for this upgrade.
- The Consulting Engineer should ask Triplepoint™, the mode of securing/anchoring the air-feed pipe and diffuser assemblies to prevent their movement and damage. Also, the bearing capacity of the aerated cell bottom should be considered for the latter's ability to support the diffuser assembly bases, which appear to be made of steel and therefore carrying concentrated weights.
- The proposed upgrade has the potential to set-up the WPCP for future re-rating to a capacity of 6,000 m^3/d. The existing aerated cell and the proposed aeration system in the current upgrade are large enough to accommodate a rated capacity of 6,000 m^3/d and therefore would not require upsizing for the higher capacity. The headworks facility (screening and grit removal), the secondary clarifier and the sludge management facility will however have to be sized for 6,000 m^3/d in the current upgrades to set-up the WPCP for re-rating in future. It should be noted that while upsizing these unit processes in the current upgrade will add a marginal cost to the upgrades for 4,600 m^3/d capacity, it will be significantly more cost-effective compared to a future expansion to 6,000 m^3/d. The MECP should be pre-consulted for their buy-in for this approach particularly with regard to the anticipated effluent criteria for the rated capacity of 6,000 m^3/d.

Based on the above discussion and suggestions, Table 6.1 gives a summary of the key processes and considerations for a robust solution for the WWTP upgrade.

Table 6.1 – Proposed Upgrade Summary and Additional Considerations

Unit Process	Upgrade	Consideration
Headworks	New Headworks facility with screening (6 mm or less) and grit removal system	Recommended to be provided upstream of the aerated cell.
Aerated cell	Installation of fine-bubble aeration system	The air supplied by the proposed aeration system should be confirmed with the supplier for its ability to provide full mixing of the aerated cell.
	Removal and disposal of the accumulated sludge	The accumulated sludge in the aerated cell needs to be removed and properly disposed as a part of this upgrade, and this cost should be included in the upgrade cost estimate.
Secondary Clarifier	A new secondary clarifier with sludge recycling facility	Upsizing the proposed clarifier diameter should be considered to bring it closer to MECP guidelines.
Stabilization pond	Removal and disposal of the accumulated sludge	The accumulated sludge in the stabilization pond needs to be removed and properly disposed as a part of this upgrade, and this cost should be included in the upgrade cost estimate.
Sludge management	Provision/implementation of a sludge management facility/plan	Waste sludge storage in the stabilization lagoon, geotube dewatering/storage, or dewatering via sludge drying beds should be evaluated with regard to capital and operational costs, O&M requirements and odours, and the best option implemented as a part of this upgrade. The capital cost of any sludge management facility/plan cost should be included in the upgrade cost estimate and/or life-cycle cost analysis.

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Revision: Final

December 22, 2022

Class EA Addendum Report

Municipality of Brighton Wastewater Treatment System Class EA Addendum

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

Value through service and commitment

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Appendix A Previous Studies:
- 2017 Schedule 'B' Class Environmental Assessment for Brighton Wastewater Treatment System by J.L. Richards & Associates Limited
- 2021 Brighton Wastewater Treatment System Aeration Conceptual Design by GSS Engineering Consultants Ltd.
- 2022 Brighton Wastewater Treatment System Technical Review by R.V. Anderson Associates Limited

Appendix B EA Addendum Studies and Reports:
- Technical Memorandum No.1: Updated Growth Evaluation
- Technical Memorandum No.2: Headworks Evaluation
- Technical Memorandum No.3: Solids Treatment and Sludge Management Evaluation
- Natural Heritage Memorandum, Brighton (Cambium, 2022)

Appendix C Public and Stakeholder Consultation
- Public Consultation Records
- Agency and Stakeholder Consultation Records
- Project Meeting Minutes

1.0 INTRODUCTION

1.1 Background

J.L. Richards & Associates Ltd. (JLR) was retained by the Municipality of Brighton (Municipality) to complete and addendum to the 2017 Schedule 'B' Class Environmental Assessment for Brighton Wastewater Treatment System. Since potential changes to the preferred wastewater treatment alternative are being contemplated by the Municipality, the conclusions and recommendations must be validated considering an updated understanding of the contributory information and other changes due to the lapse in time from the previous study.

The Municipality includes the former Town and Township of Brighton and is the most eastern municipality within the County of Northumberland. The Municipality is bounded by the City of Quinte West to the east and the Township of Cramahe to the west, with the shoreline of Lake Ontario to the south. Highway 401 provides the main east-west corridor through the Municipality, which tends to be a regional focus for hamlets in the surrounding areas. Refer to Figure 1 for an overview of the Municipality and the urban area of Brighton (study location).

The communal sewage system generally consists of the Brighton Wastewater Treatment Lagoon system (currently rated for 4,600 m^3/day), the Harbour Street Sewage Pumping Station (SPS) and forcemain, a small sub-area sewage pumping station and forcemain servicing Presqu'ile Provincial Park, and several kilometers of gravity collection sewer. Approximately half of the sewage generated in the collection system is directed to the Harbour Street SPS and pumped via a 0.82 km long, 300mm forcemain to the Lagoon and the other half flows by gravity to the Lagoon. Refer to Figure 2 for an overview of the Brighton urban settlement area serviced by the communal sewage system.

The Harbour Street SPS receives sewage from a significant portion of the collection system, including pumped flow from Presqu'ile Provincial Park. The Harbour Street SPS is currently being upgraded and expanded. The SPS generally consists of a wet well/dry well configuration and is equipped with three dry pit centrifugal type raw sewage pumps (lead/lag/standby operation) complete with inlet and outlet piping, a standby diesel generator, a wet well emergency overflow to Butter Creek, and related instrumentation and controls for the station.

The wastewater treatment system consists of a 0.68 ha single cell aerated lagoon, a single cell 5.44 ha waste stabilization pond with baffle partition curtains, and a 2-cell constructed wetland with a total surface area of 6.2 ha. There is also a chemical storage/feed system used to facilitate continuous phosphorus removal. Chemical is introduced after the aerated lagoon and upstream of the waste stabilization pond. Treated effluent from the waste stabilization pond is discharged continuously to the constructed wetland and from the constructed wetland it continuously discharges to a natural wetland and ultimately to Presqu'ile Bay, which is located off the northeast shore of Lake Ontario.

The following is a summary of the previous studies and activities at the Brighton Wastewater Treatment System. Refer to Appendix A for a copy of the previous study reports.

1.1.1 2017 Schedule 'B' Class Environmental Assessment for Brighton Wastewater Treatment System by J.L. Richards & Associates Limited

The Municipality of Brighton (the Municipality) initiated a Class Environmental Assessment (Class EA) of their wastewater treatment system in August 2016 to address various problems experienced with treatment at their treatment lagoon (e.g., elevated ammonia concentrations in the treated effluent), and also to ensure that increased influent flows from future growth can be effectively accommodated. J.L. Richards & Associates Limited (JLR) was retained by the Municipality to define the problems and identify a preferred solution to address these issues. The Class EA was completed in 2017. The preferred solution included the following:

- Installation of a specialized treatment system (such as a complete mix activated sludge process or a fixed film biological process)
- Upgrading baffles in the stabilization pond
- Optimizing alum dosing
- Refurbishing the constructed wetland
- Diverting high waste streams
- Desludging program

1.1.2 2020 Brighton Wastewater Treatment System Design by GHD

Additional efforts have been undertaken by the Municipality since the completion of the 2017 Schedule 'B' Class EA to address treatment deficiencies. A moving bed biofilm reactor (MBBR) system was selected as the preferred treatment technology. The Brighton Wastewater Treatment System upgrades were then designed and tendered in 2020. However, due to budgetary constraints, the project was cancelled.

1.1.3 2021 Brighton Wastewater Treatment System Aeration Conceptual Design by GSS

With an effort to address the effluent quality issues, in June 2021, the Municipality retained GSS Engineering Consultants Ltd. (GSS), who acted as the Municipality's Engineer, to develop conceptual level design for aeration upgrades in the aerated lagoon cell. In addition, GSS recommended implementing a secondary clarifier after the aerated cell and adding screening and grit removal processes. For sludge management, GSS suggested the alternatives to either discharge waste sludge to a drying bed or Geotubes®, or discharge waste sludge to the stabilization lagoon and remove annually.

The proposed conceptual design was presented to Council in August 2021. The proposed upgrades were approved by Council, and a motion was passed to proceed with a working group and retain a consultant for a technical review of the conceptual design.

1.1.4 2022 Brighton Wastewater Treatment System Technical Review by R.V. Anderson Associates Limited

The Municipality retained R.V. Anderson Associates Limited (RVA) to undertake a technical feasibility review of GSS's design. RVA proposed the following changes to the GSS's design which include the following:

- Implementing a new headworks facility upstream of the aerated lagoon cell
- Confirming proposed aeration rate to provide adequate mixing
- Upsizing proposed clarifier
- Removing accumulated sludge from aerated cell and stabilization pond
- Evaluating options for sludge storage and dewatering in a later study

The technical review was presented to Council in April 2022. The review and proposed upgrades were approved, and a motion was passed to proceed with the next steps to update the existing Class EA with an Addendum.

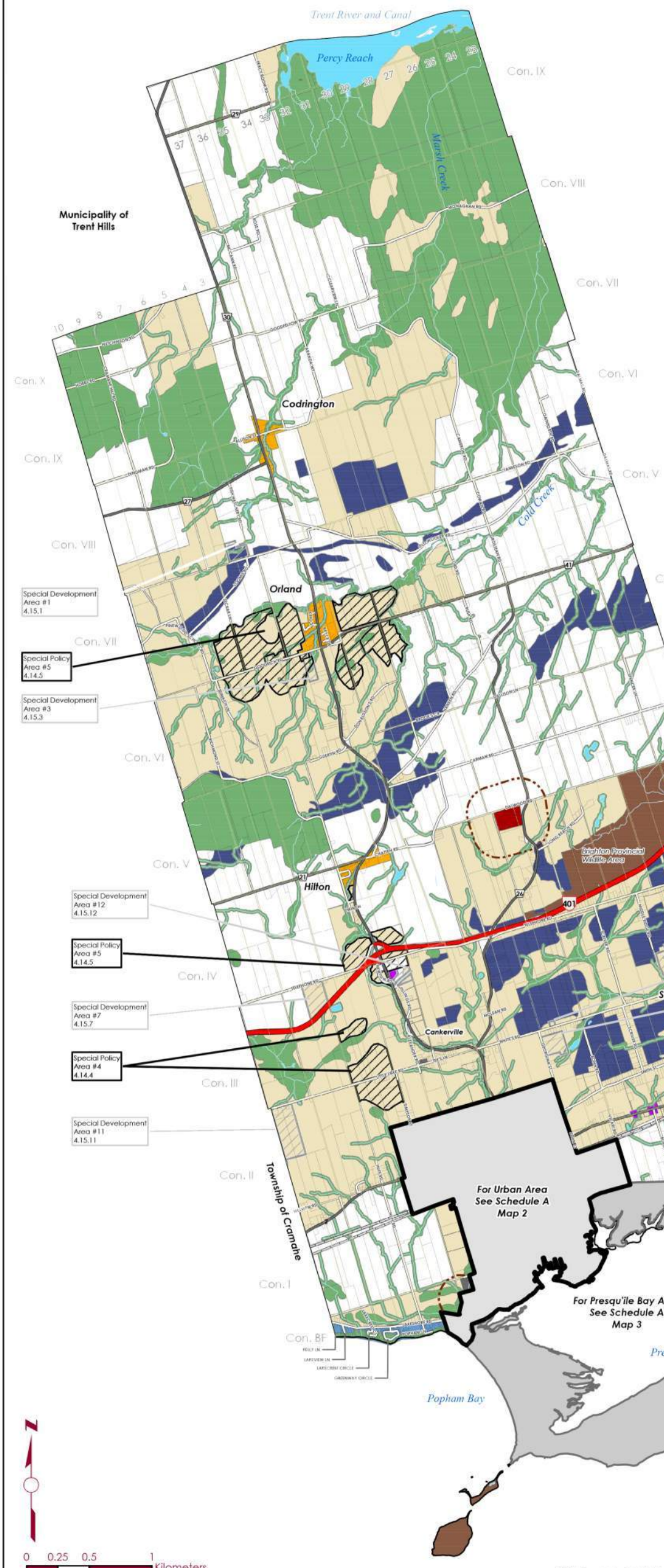
1.1.5 2022 Brighton Wastewater Treatment System Schedule 'B' Class EA Addendum

In 2022, the Municipality retained JLR to complete a Class EA Addendum to capture the changes that have occurred since the completion of the previous Schedule 'B' Class EA for the Brighton Wastewater Treatment System. These changes include updated growth projections and design basis, the proposed liquid and solids treatment by GSS and RVA, and sludge management options.

1.1.6 2022 Brighton Wastewater Treatment System Lagoon Cleanout

In August/September 2022, the Municipality retained GFL Environmental (GFL) to survey, collect and remove sludge from the existing stabilization lagoon. The intention of the cleanout is to improve the performance of the lagoon and mitigate impacts to the quality of the treated effluent. GFL started at the inlet pipe on the north side of the lagoon, where a high volume of sludge had settled. Approximately one third of the north side of the stabilization lagoon was cleaned out before exceeding the contract budget limits. The Municipality will be monitoring the effluent test results to note improvements in treatment performance.

Municipality of Brighton, Ontario
Official Plan
Land Use
Brighton Rural Area
Schedule "A"
Map 1



Land Use Designations

- Environmental Protection
- Aggregate Resource
- Industrial
- Highway Commercial
- Hamlet
- Shoreline Residential
- Waste Disposal Area
- Rural
- Agriculture
- Crownland

Features

- Provincial Highway
- County Road
- Municipal Road
- Property Boundary
- Special Policy Area
- Special Development Area
- Gas Lines
- Oil Line
- Transmission Lines
- Rail Lines
- Waste Disposal Assessment Area
- Watercourse Intermittent
- Watercourse Permanent
- Waterbodies

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PROJECT:
BRIGHTON WASTEWATER TREATMENT SYSTEM CLASS EA ADDENDUM
MUNICIPALITY OF BRIGHTON, ONTARIO

DRAWING:
Urban Area Location Plan

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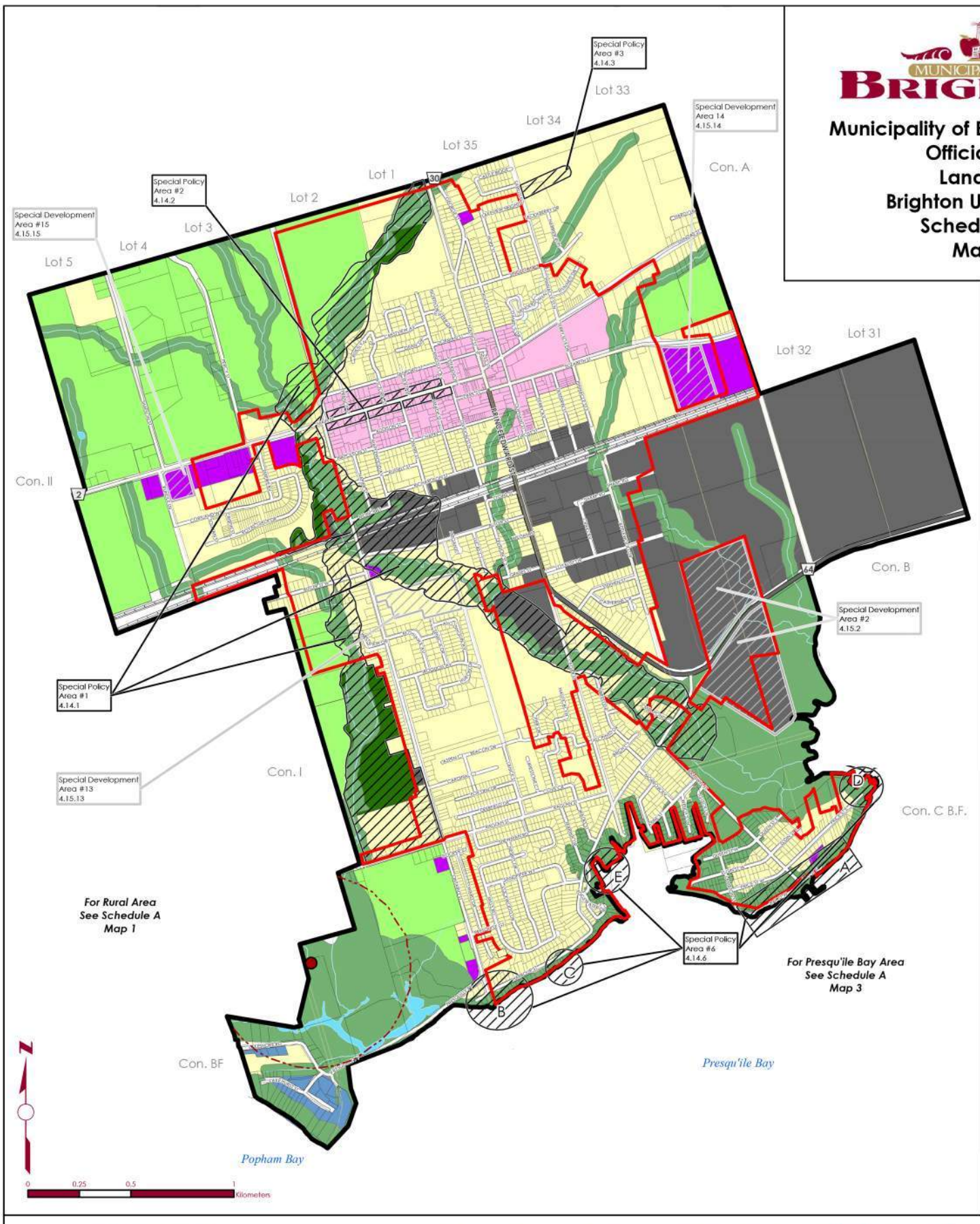
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DESIGN:	MM	JLR NO:	31795
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Municipality of Brighton, Ontario
Official Plan
Land Use
Brighton Urban Area
Schedule "A"
Map 2



Land Use Designations

- Environmental Protection
- Core Commercial
- Highway Commercial
- Residential
- Shoreline Residential
- Industrial
- Greenfield

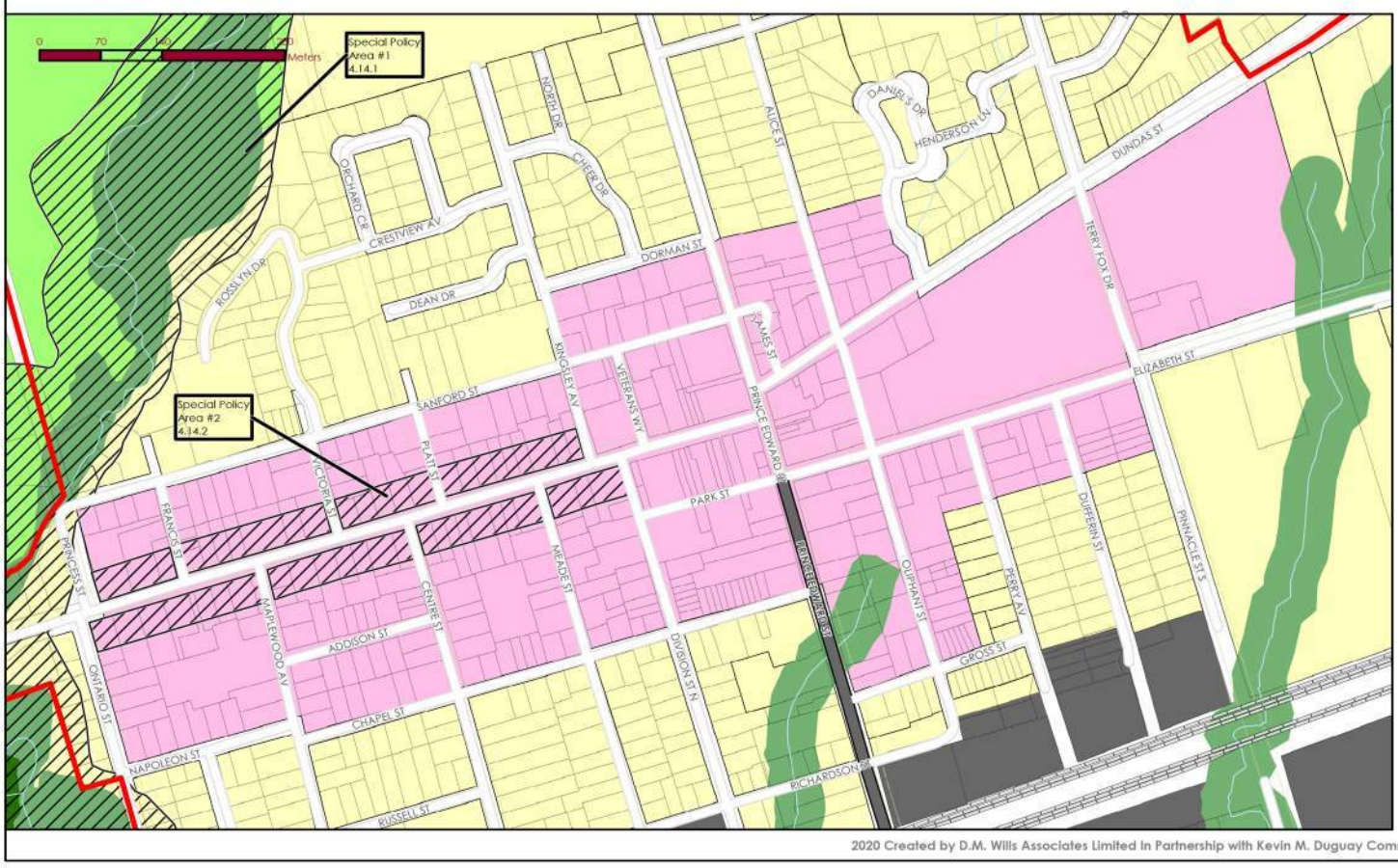
Special Policy Area #1 Land Use

- Community Facilities and Open Space

Features

- Special Policy Area
- Special Development Area
- Intensification Boundary
- Urban Settlement Boundary
- Property Boundary
- County Road
- Municipal Road
- Rail Lines
- Watercourse Permanent
- Waterbodies
- Waste Disposal Assessment Area
- Landfill

Schedule A Map 2 i



Schedule A Map 2 ii

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WILLS

Kevin M. Duguay Community Planning and Consulting Inc.

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PROJECT:
BRIGHTON WASTEWATER TREATMENT SYSTEM CLASS EA ADDENDUM
MUNICIPALITY OF BRIGHTON, ONTARIO

DRAWING:
Urban Settlement Area

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1.2 Class Environmental Assessment Process

The Ontario Environmental Assessment Act (the Act) sets out a planning and decision-making process so that potential environmental effects are considered before a project begins. The purpose of the Act is to provide for the protection and conservation of the natural environment (R.S.O. 1990, c.E.18, s.2).

The Municipal Class EA process is followed for common types of projects to streamline the review process while ensuring that the project meets the requirements of the Act. It involves detailed site-specific information gathering and studies, as well as consultation with the public and stakeholder agencies. In 1987 the first Class EA prepared by the Municipal Engineers Association (MEA) on behalf of Ontario Municipalities was approved under the Act. Updates and amendments were subsequently made in 1993, 2000, 2007, 2011, and 2015.

This Class EA was initiated as a Schedule B project under the Class EA process. Projects categorized as Schedule B undertakings have the potential for significant environmental effects, and are required to follow Phase 1 and Phase 2 specified under the Municipal Class EA. This includes consultation with all parties that may potentially be affected by the project, and the preparation of a Class EA project file that documents the Class EA process for the project. At the end of Phase 2, the project Schedule is reviewed to determine if the project is complete under a Schedule B Schedule or if the project needs to proceed as a Schedule C undertaking, in which case Phases 3 and 4 of the Class EA process are completed.

The Class EA framework defines the process for each type of project. For Schedule B projects, the completion of the following Phases of the Class EA process are required:

- Phase 1 – Identify the Problem and/or Opportunity
- Phase 2 – Identify Alternative Solutions to the Problem and/or Opportunity

The Project File shall be made available for public and agency review at the completion of Phase 2 of the Class EA process for a mandatory 30-day period. If there are no requests to the Minister of the Environment and Climate Change (MOECC) for a 'Part II Order' within this 30-day review period, then the project may proceed to implementation (Phase 5).

A Class EA Addendum is prepared when there is any significant modification to the project or change in the environmental conditions of the project. For this project, the Project Team has planned to undertake public consultation at three project milestones, including the Notice of Study Commencement for EA Addendum, the Notice of Public Information Centre (PIC), and the Notice of Filing of Addendum. The Notices will be sent to those who were notified during the preparation of the original Class EA, with the addition of any new members of the public or review agencies that are potentially affected with the proposed changes. Like the original Class EA process, the Addendum will be made available for public review for a mandatory 30-day period. During this review period, only the Addendum (the changes to the project) shall be open for review or considered in a request for a Part II Order.

1.3 Objectives of the Class EA Addendum

The purpose of the Class EA Addendum is to describe the proposed modification to the original Class EA, describing the circumstances necessitating the change, including any potential environmental impacts and proposed mitigation measures.

Technical memoranda (TM) and reports are to be prepared to summarize various elements of the overall project. Technical Memoranda and reports will form part of the Class EA Addendum Project File, which is anticipated to be the key deliverable for this project.

The following documents and reports and have been prepared and cover the following topics:

- Conceptual design by GSS
- Treatment System Technical Review by R.V. Anderson
- Updated Growth Evaluation Report (TM 1) by J.L. Richards
- Headworks Evaluation Report by (TM2) J.L. Richards
- Solids Treatment and Sludge Management Evaluation (TM3) Report by J.L. Richards

The Class EA Addendum is proceeding in accordance with the Schedule B requirements of the Ontario Municipal Class EA, October 2000, as amended in 2015, but the Schedule will be reconfirmed at the completion of the Updated Growth Evaluation Report.

1.4 Project Team

The following Project Team was involved in carrying out this Class EA Addendum:

Proponent:
The Municipality of Brighton
35 Alice Street
Brighton, ON K0K 1H0
Contact: Bob Casselman

Consultant:
J.L. Richards & Associates Limited
203-863 Princess Street
Kingston, ON K7L 5N4
Contact: Susan Jingmiao Shi, P.Eng., M.Eng.

Sub-Consultant (Environmental Impact Assessment):
Cambium Inc.
625 Fortune Crescent, Unit 1
Kingston, ON K7P 0L5
Contact: Matthew Wheeler, Senior Ecologist

The Municipality of Brighton, as the Proponent, initiated this project in June 2022. The Municipality has actively participated in directing and administering this EA Addendum work. JLR provided

project coordination, prepared all Technical Memoranda, advised/liaised with stakeholders and prepared the documentation for this EA Addendum.

Both the Municipality and JLR were responsible for issuing the Notice of Commencement, Notice of Public Information Centre, and Notice of Filing EA Addendum to the public and review agencies, and communicating with key review agencies such as the Ministry of the Environment, Conservation and Parks (MECP).

2.0 Changes Since Completion of Schedule B Class EA

The following section provides an overview of the key changes to the 2017 Schedule 'B' Class EA, including a summary of the Technical Memoranda prepared as part of this EA Addendum.

2.1 Updated Growth Evaluation (Technical Memorandum No.1)

The main objective of Technical Memorandum No.1 (TM No.1) is to provide an update of the anticipated growth in the Brighton wastewater servicing area over a 20-year planning period, with consideration of the local and regional official plans. Refer to TM No. 1 in Appendix B for further details.

For the population projections in the Class EA Addendum, the historical housing grown rate (69 houses per year) was used. Based on the Northumberland County draft official plan forecast update, the urban population growth was estimated to be 86% of the total population growth. Therefore, the housing forecast for the urban settlement area is approximately 59.3 houses per year. Refer to the urban settlement population forecast in Table 1 and the resulting wastewater influent flow projection in Table 2.

Table 1: Brighton Urban Settlement Population Forecast

Year	Population
2016	6,800
2041	10,212

Table 2: 20-Year Brighton Wastewater Influent Flow Projection

5-year (2017-2021) Average Day Flow (ADF)	3,290 m^3/day
Residential Unit Projected Flow (2021-2041)	1,201 m^3/day
ICI Projected Flow (2021-2041)	6 m^3/day
Projected ADF (2041)	4,497 m^3/day
Percentage of Treatment System Rated Capacity (4,600 m^3/day) in 2041	98%

Since the 20-year flow projections are within the Brighton Wastewater Treatment System's rated capacity, the Municipality has decided to continue with the Schedule B EA Addendum process. The subsequent design for the Schedule B EA Addendum should be based on the existing rated capacity of the treatment system at 4,600 m^3/d, and considerations for provisions to facilitate future expansion.

2.2 Updated Design Basis

The following section is a summary of the updated design basis for the proposed upgrades.

2.2.1 Influent Characteristics

Table 3 below shows the average and maximum month influent characteristics entering the Wastewater Treatment System based on the RVA 2022 report.

Table 3: Brighton Wastewater Treatment System Influent Characteristics (RVA 2022)

Year	$CBOD_5$[(1)]		TSS[(2)]		TP[(3)]		TKN[(4)]	
	Annual Average	Max Month	Annual Average	Max Month	Annual Average	Max Month	Annual Average	Max Month
2018	133	175	185	239	5.2	7.5	45	65
2019	121	167	179	319	5.5	7.0	47	58
2020	97	169	189	359	5.1	8.6	45	76
2021	120	160	207	289	6.5	8.3	58	71
Average	**113**	**168**	**190**	**301**	**5.6**	**7.8**	**49**	**68**

Notes:
1) $CBOD_5$ refers to 5-day Carbonaceous Biochemical Oxygen Demand
2) TSS refers to Total Suspended Solids
3) TP refers to Total Phosphorus
4) TKN refers to Total Kjeldahl Nitrogen

It is recommended that the influent characteristics be confirmed during detailed design, in order to establish the design basis and validate the existing BioWin model. For the purposes of the Class EA, influent quality was assumed to be consistent with this 4-year average.

2.2.2 Design Flows

As outlined in TM No. 1 - Updated Growth Evaluation Report, the wastewater treatment system will maintain its current rated capacity (4,600 m^3/d) over the next 20 years.

For the purposes of the EA Addendum, peak flows were estimated based on the future Harbour Street Pumping Station rated capacity and the flow split of 40% to 60% between gravity and pumped flow, since the current flow meter only records daily flows, not peak hourly flow or peak instantaneous flow. It is recommended that the Municipality install flow metering that collects peak instantaneous flows, or

to conduct a flow monitoring program prior to detailed design, to assess the actual peak flows in the wastewater system.

Table 4 summarizes the design flows for the wastewater treatment system:

Table 4: Summary of Design Flows and Peaking Factors

Design Flow	Peaking Factor	Flow (m^3/d)
Average Day Flow (ADF)	n/a	4,600
Peak Day Flow (PDF)	2.89(1)	13,294
Peak Hourly Flow (PHF)	3.87(2)	17,813
Peak Instantaneous Flow (PIF)	4.70	21,600(3)

Notes:
(1) Historical PDF factor (RVA 2022)
(2) WEF guidelines for peaking factor, based on Population (RVA 2022)
(3) Estimation based on design PIF of pumped flow from Harbour St. Pumping Station (150 L/s), with the assumption that pumped flows are approximately 60% of total flows (based on feedback provided by Municipality Operators).

2.2.3 Final Effluent Requirements

The Wastewater Treatment System is currently operating under the Amended Environmental Compliance Approval No. 7701-CDNKQA, issued April 21, 2022. Table 5 below summarizes the final effluent criteria sampled upstream of the constructed wetland.

Table 5: Brighton Wastewater Treatment System Effluent Criteria

Final Effluent Parameter	Design Objectives (1)	Compliance Limits (1)	Loading Limits (1)
CBOD5	15.0 mg/L	30.0 mg/L	138.0 kg/day
Total Suspended Solids	15.0 mg/L	40.0 mg/L	184.0 kg/day
Total Phosphorus	0.8 mg/L	1.0 mg/L	4.6 kg/day
Total Ammonia Nitrogen			
from May 01 to October 31	10.0 mg/L	14.0 mg/L	64.4 kg/day
from November 01 to April 30	15.0 mg/L	17.0 mg/L	78.2 kg/day
E. coli	100 CFU/100mL(2)	200 CFU/100mL(2)	N/A
pH	6.5 – 9.0 inclusive	6.5 – 9.0 inclusive	N/A

Notes:
(1) Sample location is upstream of the constructed wetland.
(2) Correction to E.coli objective and limit per a consultation meeting with the MECP dated September 23, 2022. Refer to Appendix C for meeting notes.

Since the wastewater treatment system will maintain its current rated capacity (4,600 m^3/d) over the next 20 years, the ECA effluent criteria is expected to remain consistent for the new upgrades.

2.3 Proposed Unit Processes

2.3.1 Headworks Evaluation (Technical Memorandum No.2)

The main objective of Technical Memorandum No.2 (TM No.2) is to evaluate and select the technologies for the new headworks system. Refer to TM No.2 in Appendix B for further detail with the identification and evaluation of the alternatives.

The preferred solution for headworks facility is summarized in Table 6.

Table 6: Summary of Headworks Preferred Solutions

	Preferred Solution
Preferred Headworks Location	Upstream of Aerated Lagoon
Preferred Screening Technology	Inclined Auger Screen
Preferred Grit Removal Technology	Horizontal Flow Grit Channel

Due to the nature of substantial head loss from headworks equipment, plant hydraulics upstream of the aerated lagoon were reviewed to determine if an influent pumping station is required. It was determined that the available head between inlet manholes (MHs) 130/131 and aerated lagoon is insufficient to accommodate a full headworks facility by gravity and that an influent pumping station will likely be required to pump the plant influent that is conveyed by gravity. The size of the pump will be dependent on the following, which will be confirmed during detailed design:

- Elevation/grade of the headworks building.
- Pumping for combined pumped (Harbour St PS) /gravity influent flow or just the gravity influent flow.
- Operating water level in aerated lagoon.

In summary, the headworks upgrades will consist of the following:

- A headworks building to house the inclined auger screen, bypass manual bar screen, screening bin, electrical equipment, instrumentation and control equipment and odour control.
- An influent pumping station, comprising of a wet well with submersible pumps.
- Two grit channels to be installed outdoors and cleaned manually.

2.3.2 Previously Proposed Liquid Treatment Upgrades

The liquid train upgrades as proposed by GSS will consist of the following:

- Replacement of aeration system in aerated lagoon.
  - GSS proposed an aeration capacity of 8,883 m^3/h. RVA noted that while this rate would provide sufficient oxygen for the biological demand of the process, it is insufficient to meet MECP design guidelines for full mixing of the aerated lagoon. RVA estimated a mixing air demand of approximately 11,631 m^3/h and 16,988 m^3/h for coarse and fine bubble aeration respectively. It was recommended for the new aeration system to be sized for both full mixing and oxygen demand, whichever aeration rate is higher.
- New secondary clarifier
  - GSS proposed a 20m diameter clarifier. RVA noted that this is undersized and would exceed the maximum surface overflow rate (SOR) per the MECP design guidelines for the peak hourly flow rates for the current and proposed future capacity. RVA recommended for a larger size to comply with the MECP guidelines.

Refer to Appendix A for the Conceptual Design by GSS and the Technical Review by R.V. Anderson Associates for more information. It should be noted that for the purpose of this EA Addendum, JLR has carried the recommendations from the above-mentioned studies for the future liquid treatment upgrades. JLR did not undertake a separate review of these recommendations as these concepts have already been approved by the Municipality.

2.3.3 Disinfection

As a result of the proposed upgrades, the wastewater will no longer be passing through the facultative lagoon and benefitting from natural pathogen removal. The treatment system upgrades must therefore include a new effluent disinfection system to meet the ECA *E.Coli.* removal requirements. The requirement for disinfection was also confirmed during a consultation meeting with MECP on September 23, 2023. The most common disinfection technologies are chlorination/dechlorination and UV disinfection.

Chlorination/Dechlorination system typically consist of injecting a chlorine solution (e.g., sodium hypochlorite) or chlorine gas. A chlorine contact tank is usually required to ensure sufficient contact time for reaction. After chlorine disinfection is complete, the effluent will need to undergo dechlorination prior to discharge into the natural environment. A dechlorination chemical (e.g., sodium bisulphite, sodium metabisulphite, etc.), is used to reduce the total chorine residuals. The chlorination/dechlorination system can be designed to be automatically monitored and controlled.

A UV disinfection system consists of a series of lamps which are electrically powered. UV light disrupts genetic material sequencing of the cell, preventing

replication and reduces the number of *E.Coli.* counts in the wastewater effluent. Unlike chemical-based disinfection processes, UV disinfection does not generate any chemical byproducts or residuals. The UV system can be designed to be automatically monitored and controlled.

The selection of the disinfection system should be determined in the detailed design phase, based on a number of factors including space available, building requirements, cost, performance, etc.

2.3.4 Sludge Treatment and Solids Management Evaluation (Technical Memorandum No.3)

The main objective of Technical Memorandum No.3 (TM No.3) is to evaluate and select the preferred strategy and technology for sludge treatment and solids management. Refer to TM No.3 in Appendix B for further detail with the identification and evaluation of the alternatives.

The preferred sludge treatment and solids management solutions from the detailed evaluation is summarized in Table 7.

Table 7: Summary of Sludge Treatment and Solids Management Preferred Solutions

Preferred Solution	Description
Lagoon Stabilization/Storage with Supplemental Aeration	• No thickening • Lagoon stabilization • Lagoon storage with periodic clean-out. • Land application of biosolids
Lagoon Stabilization with Supplemental Aeration and Periodic Geotube® Dewatering	• No thickening • Lagoon Stabilization • Geotube® Dewatering used for periodic lagoon cleanout to reduce hauled volume. A concrete pad with drainage is required for Geotube® placement. • Land Application of dewatered biosolids

The upgrades to the existing system required for the preferred solution will consist of the following:

- Modifications of existing facultative lagoon to a WAS storage lagoon. Recommended modifications will include the following:
  - Modification of effluent chamber to disconnect from WAS storage lagoon.
  - New shoreline chamber for supernatant collection and pumping to liquid treatment process.

  - Installation of supplemental aeration in the lagoon for odor control, freezing prevention, etc.
- Monitoring of sludge level and progression of stabilization. The biosolids in the lagoon will be cleaned out for land application. A Geotube® system may be implemented to facilitate sludge dewatering.

2.4 Proposed Plant Block Flow Diagram

Refer to Figure 3 for the block flow diagram of the wastewater treatment system following the proposed upgrades.

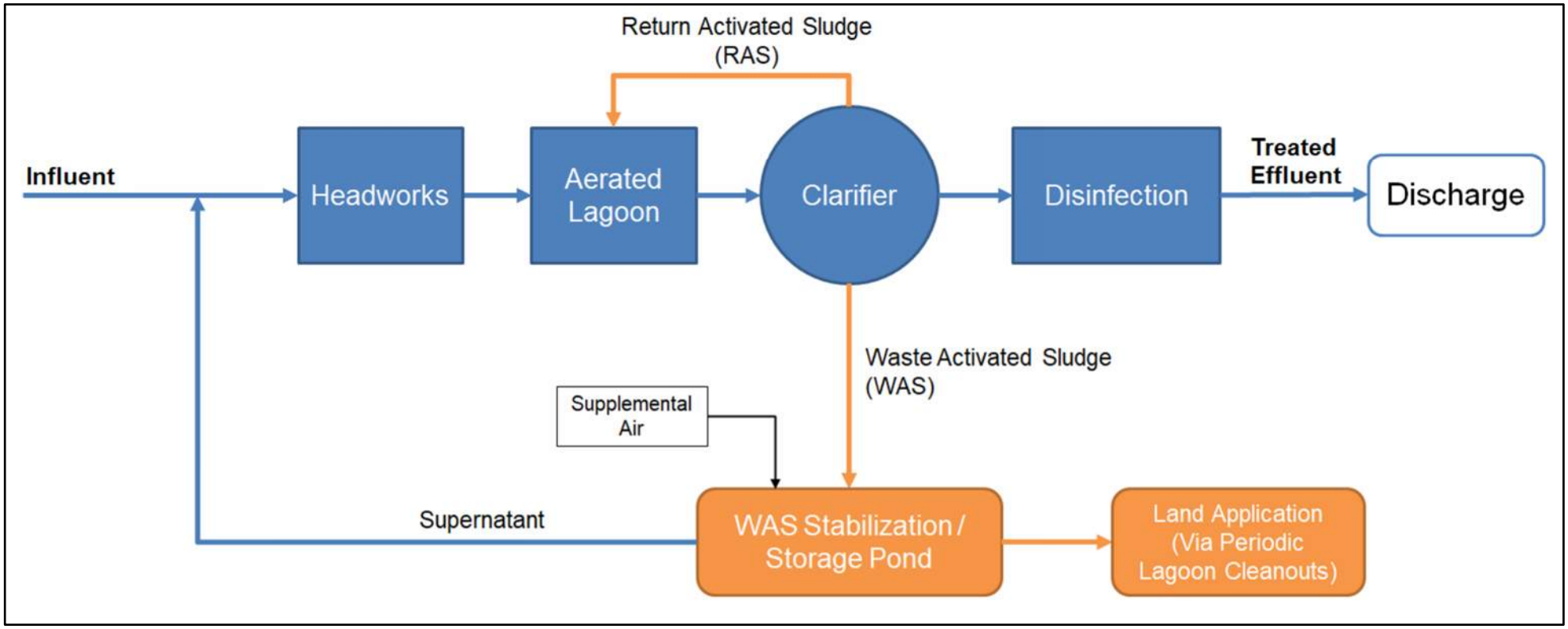


Figure 3: Block Flow Diagram of Proposed Upgrades

3.0 Project Description

3.1 Overview

Table 8 shows a summary of the updated proposed upgrades for the Brighton Wastewater Treatment System based on the past and recent studies previously discussed.

Table 8: Summary of Updated Proposed Upgrades

Process Description	Updated Proposed Upgrades Summary
Liquid Treatment Train	
Headworks	• New headworks building complete with odour control • New influent pumping • One new inclined auger screen and one bypass manual screen • Two new horizontal flow grit removal channels
Secondary Treatment	• Upgrade aeration system in existing aerated lagoon • New secondary clarifier c/w sludge collection
Disinfection	• New effluent disinfection system
Effluent Piping	• New piping from disinfection to effluent discharge (upstream of constructed wetland)
Solids Treatment Train	
Sludge pumping	• New RAS and WAS pumping and piping
Sludge Stabilization and Thickening / Biosolids Storage	• Modify existing facultative lagoon into the WAS stabilization/storage pond: o Disconnect existing facultative lagoon effluent chamber to disconnect the new WAS stabilization/storage lagoon from plant effluent. o New shoreline chamber for supernatant collection and return to liquid treatment process. o Installation of supplemental aeration in the WAS stabilization/storage lagoon to mitigate freezing risks and odor impacts.
Site-Wide Upgrades	
Civil	• Yard piping, grading, access/driveway upgrades, etc. • Arena Creek relocation
Electrical	• Power supply upgrades • Electrical equipment upgrades
Instrumentation and Controls	• New plant-wide instrumentation and controls

3.2 General Site Layout

Figure 4 shows the conceptual site layout of the proposed upgrades.



Figure 4: Conceptual Site Layout of Proposed Upgrades

3.3 Opinion of Probable Costs

Table 9 provides the Opinion of Probable Costs for the proposed upgrades as outlined previously. It shall be noted that the Opinion of Probable Costs (OPC) were completed using 2022 dollars value. An OPC with a Class 'D' (Indicative Estimate) level of accuracy was developed for each alternative solution and includes allowances for design elements that have not fully been developed. Class 'D' OPCs developed for this assignment are expected to be within +/- 30%. The OPCs were developed based on past experience on similar projects, professional judgment, and equipment costs provided by suppliers. Design completed as part of this Class EA is conceptual in nature for the purpose of obtaining Class 'D' cost estimates. All design parameters should be confirmed during detailed design. Any provided estimate of costs or budget is an OPC that is based on historic construction data and does not include labour, material, equipment, manufacturing, supply, transportation or any other cost impacts in relation to COVID-19. JLR shall not be responsible for any variation in the estimate caused by the foregoing factors but will notify the Municipality of any conditions which JLR believes may cause such variation upon delivery of the estimate.

Table 9: Opinion of Probable Costs

Item	OPC(1)
Liquid Train Upgrades	
Headworks Facility (see TM No.2)	$ 3,700,000
Aerated Lagoon Upgrades (outdoor installation)	$ 2,700,000
New Clarifier (outdoor installation)	$ 4,100,000
Effluent Disinfection (outdoor installation)	$ 1,700,000
Solids Treatment Train	
Convert Facultative Lagoon to WAS Storage Lagoon (see TM No.3)	$ 1,500,000
Site-Wide Upgrades	
Electrical, Instrumentation and Control Upgrades (3)	$ 1,500,000
Civil Site Works (Incl. Arena Creek Relocation)	$ 900,000
Subtotal (2)	**$ 16,100,000**
Engineering and Contingency (~40%)	$ 7,000,000
OPC Total (Incl. Engineering, Contingency, Contractor Fees. Excl. HST)	**$ 23,100,000**

Notes:
1) All OPCs exclude HST.
2) Capital OPCs include costs for installation, contractor markup (~25%)
3) Excludes Hydro One service upgrades costs.

The OPC above does not include the costs for the following:

- Any extensive dewatering that might be necessary for the construction of the headworks facility, clarifier and disinfection system. Further geotechnical and hydrogeological investigation would be required.
- The cost for the new clarifier is based on a rated capacity of 4,600 m^3/d. The cost increase to construct a bigger clarifier to accommodate 6,000 m^3/d is approximately $800,000 to $1,000,000.
- GSS provided an optional cost to supply and install radial blowers instead of standard positive displacement blowers, estimated at $200,000 in 2021. This addition can be discussed as a value engineering item in detailed design.

3.4 Design Considerations

The following are considerations to be explored during the detailed design of the proposed upgrades. Additional considerations are noted in the GSS Conceptual Design and RVA's technical review found in Appendix A, and the TM No.2 and TM No.3 found in Appendix B.

- The proposed upgrades design will need to consider the future expansion of the wastewater treatment system beyond the 20-year growth forecasts. Some considerations may include sizing new structures (such as the headworks, clarifier, and disinfection) to accommodate a flow rate beyond the rated capacity, including provisions for the construction of additional treatment trains, etc.
- The existing treatment system will need to maintain operation during the construction of the new upgrades. The location and sequencing of the new infrastructure will need to be considered.
- The relocation of Arena Creek may be necessary to allow for the construction of the clarifiers. The final location of the creek relocation should be confirmed following the confirmation of the proposed site plan.
- It is recommended for the Municipality to conduct a flow monitoring program, or to provide a new influent flow meter, to confirm the actual peak flows in the wastewater system. This will better define the peak flow design basis for the detailed design of proposed upgrades.
- The power supply and other electrical considerations will need to be reviewed based on the selection of new equipment for the proposed upgrades

3.5 Project Implementation Schedule

Table 10 shows the estimated timelines for the design and construction of the upgrades proposed in this Class EA Addendum.

Table 10: Project Implementation Schedule

Milestone	Schedule
Preliminary Design	6 Months
Detailed Design	6-9 months
Environmental Compliance Approvals	12 months
Construction	18-24 months

3.6 Additional Field Studies, Permits and Approvals

A number of additional field studies are recommended prior to implementing the proposed works. These may include:

- Geotechnical investigation
- Hydrogeological investigation
- Field Environmental Impact Assessment for Arena Creek relocation

A number of approvals are required prior to implementing the proposed works. These may include:

- Amendments to the Environmental Compliance Approval
- Environmental Activity Sector Registry (EASR) or Permit to Take Water (PTTW)_ for Construction dewatering from the MECP, if required
- Site Plan approval from the Municipality
- Building Permit from the Municipality
- Ministry of Natural Resources/ Conservation Authority Consultation
- Fisheries and Oceans Canada (DFO) Request for Review consultation
- Electrical Safety Authority (ESA) Permit
- Screening of the project in accordance with the requirements of the Canadian Environmental Assessment Act, should any Federal approvals be required or should funding be provided by the Federal Government for this project.

4.0 Potential Effects and Mitigation Measures

4.1 Planning and Policy

The 2020 Provincial Policy Statement (PPS) provides general policy guidance on matters of provincial interest related to land use planning and development. The 2020 PPS provides policy direction for appropriate development while protecting resources of provincial interest, public health and safety as well as the quality of the natural environment. All local planning matters must be consistent with the 2020 PPS, which is issued under Section 3 of the Planning Act. The Planning Act requires that decisions of Council be consistent with the Statement. Policies related to infrastructure, servicing (sewer and water), climate change, natural heritage wetlands and water, and aboriginal interests may have implications at the Class EA level.

Section 1.6 of the 2020 PPS outlines policies for sewage, water and stormwater facilities. In particular, Infrastructure and public service facilities shall be provided to be financially viable, prepared for the impacts of a changing climate and accommodating for forecasted growth. The detailed design phase will develop the proposed upgrades to address these policies.

Section 2.1 of the 2020 PPS states that development and site alteration within or on adjacent lands to significant natural heritage features (identified in policies 2.1.4, 2.1.5, and 2.1.6), unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions (PPS 2020). Refer to Section 5.0 in this report for potential impacts and mitigation measures to align with the policies in the PPS.

The Site is also subject to The Growth Plan for the Greater Golden Horseshoe, which was consolidated by the Ontario Government in 2020 to provide a framework for the development of regional growth plans and guidelines for short and long-term planning policies. The Plan is to be read in conjunction with the Provincial Policy Statement. According to the Growth Plan, the majority of growth is to be allocated to existing delineated settlement areas, with the goal of intensification and providing a mixed range of housing options.

The site is not subject to the Oak Ridges Moraine Conservation Plan, the Niagara Escarpment Plan, the Greenbelt Plan, or the Lake Simcoe Protection Plan.

4.2 Geotechnical Conditions

A geotechnical investigation report was prepared in 2019 by Cambium Inc., as part of the MBBR design by GHD Ltd. The boreholes and investigation focused on the eastern corner of the stabilization pond, near the proposed location of the MBBR system. Geotechnical information for the rest of the site is limited. It is proposed that a field geotechnical assessment be completed during preliminary and detailed design to identify and address any geotechnical issues for the construction of the new infrastructure.

4.3 Source Water Protection

According to the and the Ontario Source Protection Information Atlas (Figure 5) and Trent Source Protection Plan (Figure 6), the wastewater treatment system is located outside of the Wellhead Protection Area within the Municipality of Brighton. The risk to this protection area is expected to be very low.

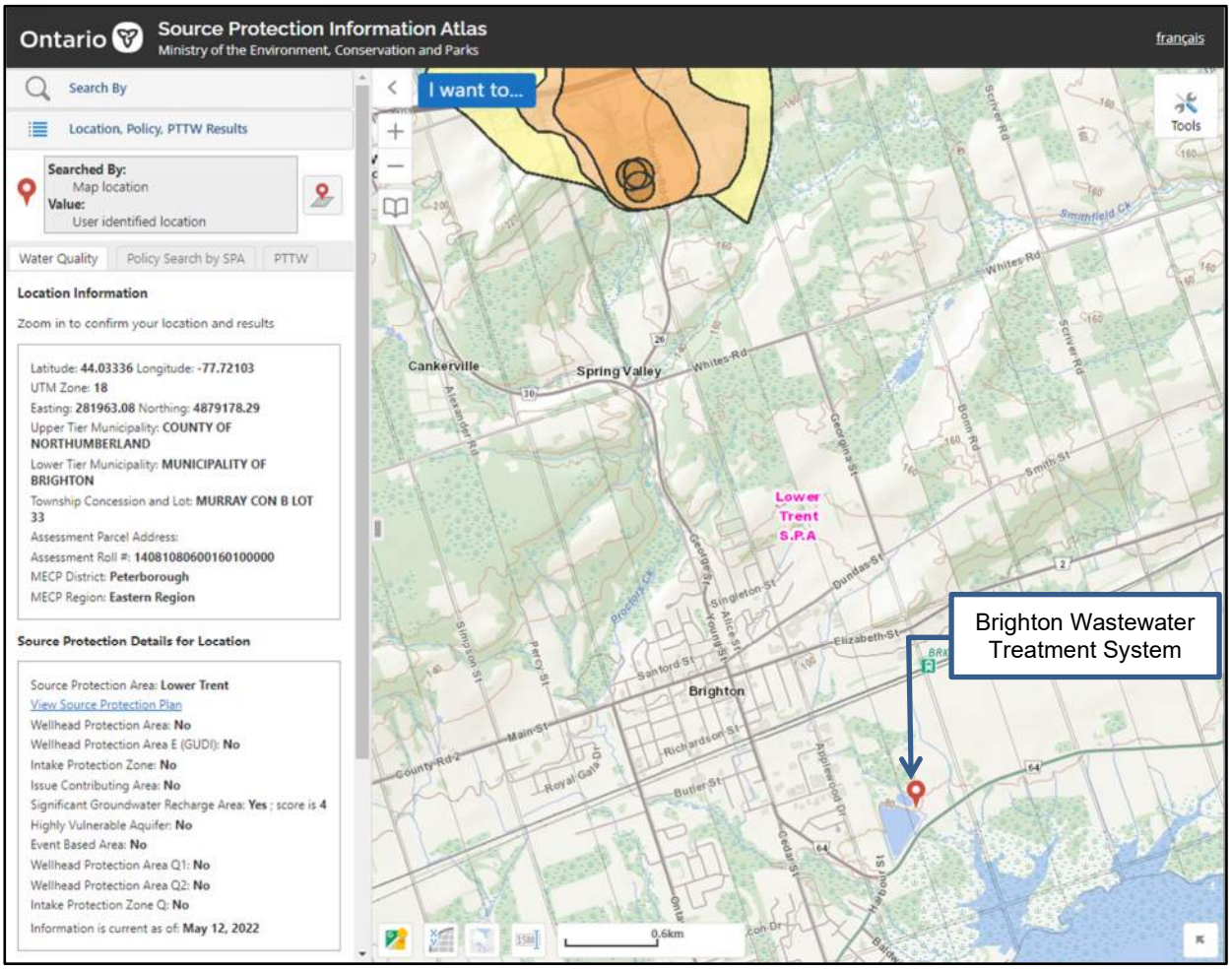
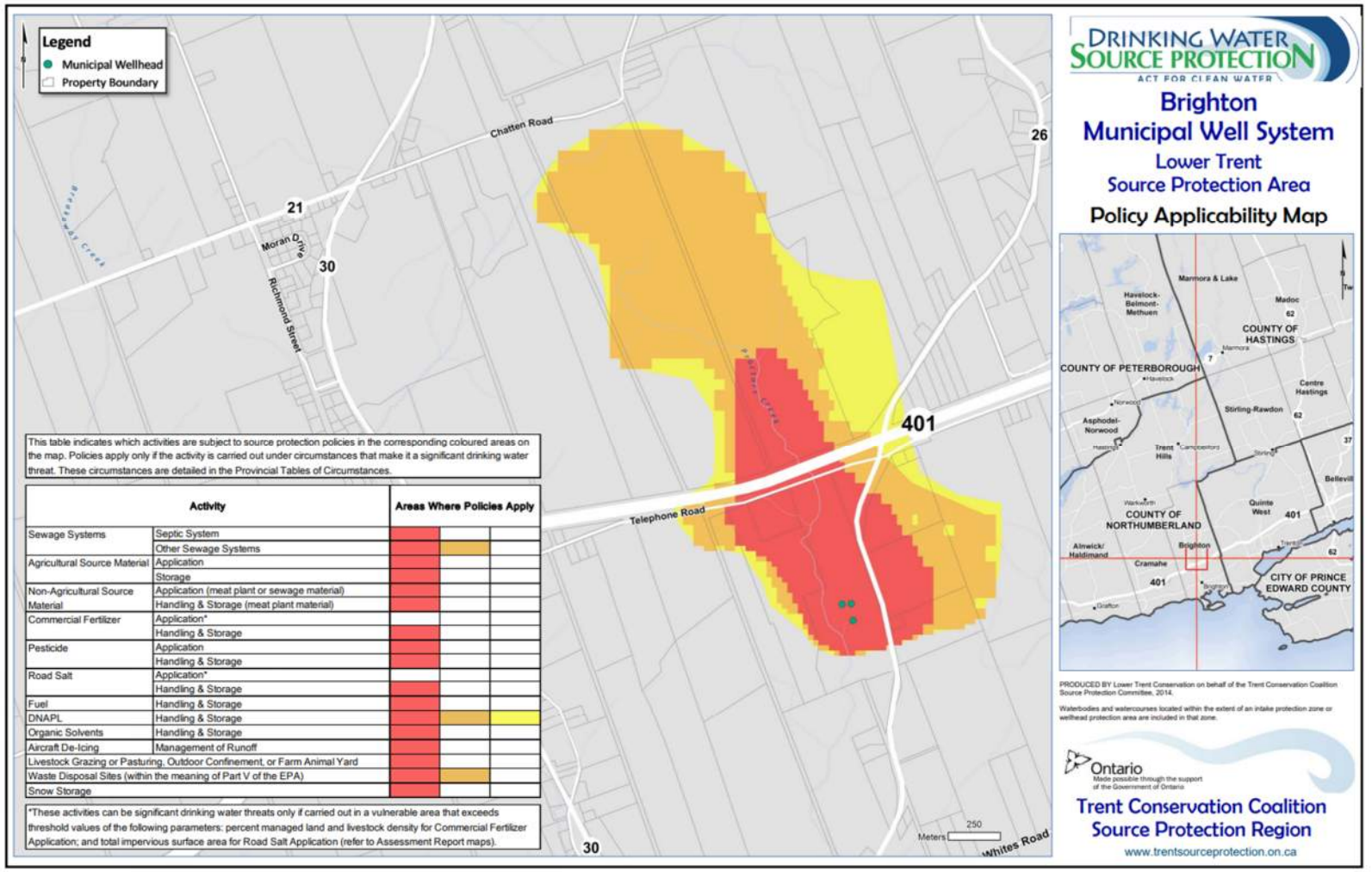


Figure 5: Ontario Source Protection Information Atlas (Land Information Ontario, updated March 24, 2022)



This table indicates which activities are subject to source protection policies in the corresponding coloured areas on the map. Policies apply only if the activity is carried out under circumstances that make it a significant drinking water threat. These circumstances are detailed in the Provincial Tables of Circumstances.

Activity		Areas Where Policies Apply		
Sewage Systems	Septic System			
	Other Sewage Systems			
Agricultural Source Material	Application			
	Storage			
Non-Agricultural Source Material	Application (meat plant or sewage material)			
	Handling & Storage (meat plant material)			
Commercial Fertilizer	Application*			
	Handling & Storage			
Pesticide	Application			
	Handling & Storage			
Road Salt	Application*			
	Handling & Storage			
Fuel	Handling & Storage			
DNAPL	Handling & Storage			
Organic Solvents	Handling & Storage			
Aircraft De-Icing	Management of Runoff			
Livestock Grazing or Pasturing, Outdoor Confinement, or Farm Animal Yard				
Waste Disposal Sites (within the meaning of Part V of the EPA)				
Snow Storage				

*These activities can be significant drinking water threats only if carried out in a vulnerable area that exceeds threshold values of the following parameters: percent managed land and livestock density for Commercial Fertilizer Application; and total impervious surface area for Road Salt Application (refer to Assessment Report maps).

PRODUCED BY Lower Trent Conservation on behalf of the Trent Conservation Coalition Source Protection Committee, 2014.

Waterbodies and watercourses located within the extent of an intake protection zone or wellhead protection area are included in that zone.

Made possible through the support of the Government of Ontario

Policy Applicability Map

Trent Assessment Report Map Reference: 5-29

Figure 6: Brighton Policy Applicability Map (Trent Source Protection Plan)

4.4 Climate Change

Global warming is unequivocal, raising global average temperatures. The effects this locally can drastically vary between regions. A study done by CBCL to produce projections for the national capital region (NCR) (CBCL 2020) can be used to provide estimates for high similarities in the Brighton region. Key points from this study relevant to the Brighton Wastewater Treatment System are as follows:

- Increasing total precipitation (except for summer)
  - Annual total precipitation for the region expected to increase approximately 4% in the 2030s, 7% in the 2050s, and about 10% in the 2080s, with increased concentrations in the winter and shoulder seasons and none for the summer.
- No alterations to frequency of wet days
  - Precipitation is anticipated to be concentrated within the same number of wet days (exceeding 1 mm of precipitation).
- Increase for precipitation intensity
  - Annual maximum precipitation in one day expected to rise approximately 5%, 12%, and 15% in the 2030s, 2050s, and 2080s, respectively. Multiple varying duration intensities (sub-daily, daily, multi-day) are expected to increase. Short-period intensities are expected to rise 5%, 15%, and 20% by the 2030s, 2050s, and 2080s, respectively.

Since a typical sanitary system is susceptible to infiltration, projections of increased total precipitation and precipitation intensities could lead to even higher incoming flows during wet periods. The design basis for Wastewater Treatment System upgrades should take into account climate change impact from precipitation. During detailed design, design basis should be reviewed, validated and confirmed for processes that treat the peak flows, e.g., influent pumps, clarifier, disinfection system, etc.

The detailed design will also consider equipping pumps with variable frequency drives (VFDs). VFDs reduce energy demands, and hence greenhouse gas emissions (GHGs), by enabling electric motors to operate at less than full speed. During the design stage, consideration for the material choice and installation method for the new structures and its associated carbon footprint would also be given. The sizing of the upgrades will be optimized to require fewer building materials, which would generally lead to reduced GHG emissions during material manufacturing and construction phase.

4.5 Air Quality, Dust and Noise

A construction mitigation plan will be developed to incorporate noise and air quality control measures in order to mitigate adverse noise impacts to nearby residential land uses within the study area.

The noise from construction can be mitigated via limiting the operation hours of noisy machinery (e.g., hoe ramming) and advance notice to the neighboring property owners. The reduced air quality can be mitigated via promoting offsite manufacturing and onsite assembling practices. The

construction vehicles can be hosed down prior to leaving the site to reduce mud carry over onto the streets.

4.6 Natural Environment, Ecology and Species at Risk

Cambium Inc. was retained to conduct a desktop review of the natural heritage existing conditions and impact assessment within the Wastewater Treatment System. The study area included the wastewater treatment system site and within 120m adjacent to the site. The complete memorandum can be found in Appendix B.

Table 11 provides a summary of the natural heritage features identified in the desktop review.

Table 11: Summary of Natural Heritage Features (Cambium, 2022)

Natural Heritage Feature	Identified Potential Site Concerns (On site or in Adjacent Lands Within 120 m of Site Location)
Significant habitat of Endangered and Threatened Species (SAR)	Wood Thrush (Special Concern) Black Tern (Special Concern) Midland Painted Turtle (Special Concern) Snapping Turtle (Special Concern) Blanding's Turtle (Threatened) Bard Swallow (Threatened) Least Bittern (Threatened)
Significant wetlands	None
Significant coastal wetlands or coastal wetlands	Presqu'ile Bay Marsh (on adjacent lands)
Significant valley lands	None
Significant woodlands	None
Significant wildlife habitat	None
Significant Areas of Natural and Scientific Interest	None
Fish Habitat	Arena Creek (on Site and adjacent lands): • Cold water fish habitat • No SAR documented to be present Presqu'ile Bay Marsh and Adjacent Lands South of County Road 64: • Grass Pickerel (Special Concern) • Eastern Pondmussel (Special Concern) • Bridle Shiner (Special Concern) • Pugnose Shine (Threatened) • Shortnose Cisco (Endangered)
Other Natural Heritage Features:	Woodlands (on Site and adjacent lands), not identified as Significant. Unevaluated wetlands (on Site and adjacent lands).

The creek relocation should be designed to comply with protection provisions for fish and fish habitat as outlined in the *Fisheries Act*. Pre-consultation with Fisheries and Oceans Canada (DFO) is recommended near the completion of the creek relocation detailed design, and further approval may be required. In-water work is permitted from July 16 to March 31, outside of the fish spawning window. Any in-water work between April 1 and July 15 is prohibited.

Vegetation clearing (including low-lying vegetation and shrubs) should occur outside of the migratory bird breeding season (April 15 and August 15). If any vegetation clearing is required within this time, a qualified biologist should be contacted prior to any work commencing to inspect if any active nests are present.

An environmental consultant knowledgeable in fish habitat regulations and design strategies should be retained as part of the design for the relocation of the creek. The consultant should perform a field investigation to identify the fish species present, including aquatic SAR, and confirm the construction constraints for the new channel.

The desktop study also noted that the site is located adjacent to potential habitats for turtles. The workers should become aware that turtle nesting season is May 15 to July 15, with eggs hatching around late August to September. Cambium's memo suggests some mitigation measures including exclusion silt fencing around the construction area and stockpiled materials. Any turtles or nests found on site should be documented and left undisturbed until the turtle has moved away or the eggs have hatched. If a nest needs to be moved, a qualified biologist should be contacted.

4.7 Surface Water

Construction activities should include provisions for erosion and sediment control for any site runoff around surface water sources. Typical temporary measures include silt fencing, stockpile protection, rip-rap, straw/rock check dams, etc. The construction contractor will be required to monitor these protections throughout the construction process, and repair/replace any that are broken or not effective.

Storage and handling of materials as well as vehicle refueling will be kept away from watercourses. The contractor will be required to prepare a spill response plan and keep a spill kit on site. Any spills causing impact to the natural environment will be reported to the local MECP District Office immediately.

The detailed design of the site plan layout will also consider the management of stormwater flow to mitigate or eliminate any adverse effects from site runoff.

4.8 Groundwater

Hydrogeological conditions are not known for the site. A hydrogeological investigation is recommended to be conducted in the Design Phase to identify groundwater conditions and determine the need of dewatering for excavations. Should dewatering be required, the investigation should indicate whether an Environmental Activity and Sector Registry (EASR) or

Permit to Take Water (PTTW) is required from the MECP. The contractor will be required to perform dewatering activities in accordance with the provisions of the EASR/PTTW.

4.9 Excess Materials Management and Contaminated Sites

A geotechnical engineering consultant should be retained during the detailed design to review excess soil management strategies and issues related contaminated site conditions. All activities involving the management of excess soil will be completed in accordance with O.Reg. 406/19 and the MECP's current guidance document tilted "Management of Excess Soil – A Guide for Best Management Practices". All waste materials generated during construction will be disposed of in accordance with ministry's requirements.

4.10 Services, Utilities and Facilities

The design and construction sequencing for wastewater treatment system upgrades should be planned to maintain the operation and treatment quality as much as feasible. In accordance with the conditions within the current ECA, the MECP should be notified in advance of any planned disruptions and bypassing of the system. The ECA also outlines actions to be taken by the system's operating agency before, during, and after a bypass event.

During preliminary design, any potential service and utility conflicts will be identified. These conflicts will be addressed during detailed design by either protection/relocation, or a revision of the proposed site layout. The affected utility companies or agencies will be contacted for as required for review and approval of any anticipated disturbances to their infrastructure.

4.11 Archaeological Conditions

There are no known archaeological conditions associated with this site. The site has been previously disturbed within the proposed works footprint, and the proposed works are not exceeding site boundaries. The project team contacted archaeologicalsites@ontario.ca and has confirmed that there are no reported archaeological sites on or in the immediate vicinity of the Brighton Wastewater Treatment System. Refer to Appendix C for the correspondence.

With additional consultation, Ministry of Tourism and Culture and Sport (MTCS) provided a letter identifying their interest in the project and the required screenings. As part of this, the MTCS provided "*Criteria for Evaluating Archaeological Potential"*; a checklist to determine if an archaeological assessment is required. This completed checklist can be found in Appendix C.

Completing the checklist in consideration of site conditions, Question #12 ('Recent deep underground disturbance, i.e., post 1960, widespread and deep land alterations') was answered yes. The site is largely occupied by the aerated lagoon, process building and waste stabilization pond, all of which were constructed after the 1970s. As such, the majority of the property has been subjected to recent, extensive and intensive disturbances, as described on the checklist instructions. Therefore, per the scoring of the results, the site has low archaeological potential and no further archaeological assessment is required.

4.12 Built Heritage Resources and Cultural Heritage Landscapes

The Ministry of Tourism and Culture and Sport (MTCS) provided "*Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes"*; a checklist to help determine whether an EA project may impact built heritage resources and/or cultural heritage landscapes. This completed checklist can be found in Appendix C.

Completing the checklist in consideration of site conditions, all screening questions for known or potential cultural heritage value were answered no, except for Question 4d ('contains buildings or structures that are 40 or more years old'). The wastewater treatment system was first installed in 1970 with an aerated lagoon and a waste stabilization pond. A small structure (6.8m x 8.5m and 2.8m tall) was constructed in 1977, housing electrical equipment and chemical dosing/storage. The building is constructed with concrete block walls and a standard flat roof. In consulting with the MTCS, it was determined there is a very low potential for built heritage or cultural heritage landscape for the existing structures on site and therefore no further investigations are required. Refer to Appendix C for the correspondence.

4.13 Monitoring and Mitigation

The contract documents for the proposed upgrades will be developed to notify the contractor of the environmental considerations and the expected provisions/standards for protection and mitigation of impacts. The contractor and Municipality's inspector will monitor throughout the construction period to ensure that the standards are upheld, and protection measures are working effectively.

Following construction, temporary protection measures would be removed, and any disturbed area be restored. Permanent protection measures will continue to be monitored. A post-construction inspection will also be conducted to ensure the final restoration and cleanup are completed.

5.0 Public and Stakeholder Consultation Activities

5.1 Notice of Study Commencement

A notice of study commencement was issued to the public on June 17, 2022. The notice was posted to the Municipality's website www.brighton.ca. The notice provided a general overview of study purpose and how the public would be affected by it. The notice also provided a means of acquiring additional information or inquiring about the study, as well as an expected period for a Public Information Centre to be held.

5.2 Public Information Centre

A Public Information Centre (PIC) was held on November 3, 2022, to discuss the Class EA Addendum. In advance of the PIC, a direct mailing was sent to individuals and stakeholders on the project mailing list and notices were posted on the Municipality's website www.brighton.ca.

The PIC was an open house format, with a series of project boards showing the steps taken during the Class EA Addendum process and the evaluation process to recommend the proposed 'preferred solution'. Project staff from the Municipality and JLR were available to answer questions about the project. No comment was received during and after the PIC. Refer to Appendix C for a copy of the PIC presentation.

5.3 Ministry of Environment, Conservation and Parks (MECP) Consultation

Two Consultation Meetings were held in September 2022 with the Municipality, MECP and JLR in attendance. JLR presented the three Technical Memoranda as well as the selected alternatives for the proposed upgrades. In particular, the sludge treatment process was a focus of the discussion. MECP has no concerns with the proposed conversion of the existing facultative lagoon into a WAS stabilization and storage pond. Their comment is that the pond shall not discharge to the receiver and that odours will need to be monitored. If a berm is to be installed in the pond, it must be an earthen berm constructed to be a complete separation of pond contents from the other side.

MECP has indicated a preference for the Municipality to proceed with the design of the full scope of proposed upgrades. The Municipality has committed to move forward with the upgrades as soon as possible.

Refer to Appendix C for meeting minutes.

5.4 Stakeholder comments

A project mailing list was kept up to date throughout the project identifying stakeholders that required full documentation, partial documentation, and other parties that either declined participation unless the project scope changes to affect their respective agency or provided no response. Refer to Appendix C for stakeholder comments received, and responses provided and an updated stakeholder distribution list.

Table 12: Summary of Review Agency Comments

REVIEW AGENCY COMMENTS / RESPONSES
Review Agency **Ministry of Environment, Conservation and Parks (MECP)**
Comments: 1. The MECP Letter provided general guidance on the Class EA Process, Schedule 'B' Process, MECP contacts, MECP technical review details and consultation with First Nations and Métis Communities, and various considerations.
Responses: 1. JLR will address these comments in the Report and subsequent public consultation process.

REVIEW AGENCY COMMENTS / RESPONSES
Review Agency **Ministry of Heritage, Sport, Tourism and Culture Industries**
Comments: 1. The MHSTCI provided a letter to provide guidance on the archaeological resources, built heritage resources, and cultural heritage landscapes aspects to be addressed during this Class EA.
Responses: 1. JLR will address these comments in the Report.
Hydro One Networks Inc.
Comments: 1. Hydro One has existing distribution assets within the study area, and requests to be consulted at all stages of the project as more information becomes available.
Responses: 1. JLR will continue consultation with Hydro One in further stages of the project.
Health Canada
Comments: 1. Heath Canada is unable to carry out a review of the project without a request by other reviewing bodies (e.g., Impact Assessment Agency of Canada, review panels, Indigenous groups and/or other jurisdictions)
Responses: 1. JLR will continue consultation with the above-noted groups.

Table 13 shows a summary of project meetings between JLR, the Municipality and Agencies. Meeting minutes are available in Appendix C.

Table 13: Summary of Project Meetings

MEETING NO.	DATE	DESCRIPTION
1.	May 26, 2022	Project Initiation Meeting (JLR and Municipality). Review of project scope, deliverables and schedule.
2.	June 28, 2022	Progress Meeting (JLR and Municipality). Discussing draft population growth projections and confirmation of Class EA schedule.
3.	August 18, 2022	Sludge Management Workshop (JLR and Municipality). JLR presented an overview and led discussions with Municipality for the initial screening of potential sludge treatment and solids management options.
4.	September 14, 2022	Progress Meeting (JLR and Municipality). JLR presented a brief summary of Tech Memos #2 and #3. Meeting also reviewed the presentation slides for the upcoming consultation meeting with the MECP.

MEETING NO.	DATE	DESCRIPTION
5.	September 15, 2022	Consultation meeting with MECP (JLR, Municipality and MECP). JLR provided an overview of the EA Addendum Project and the draft preferred solution.
6.	September 23, 2022	Follow-up Consultation Meeting with MECP (JLR, Municipality and MECP). JLR reviewed the sludge treatment and solids management options currently being proposed in the EA Addendum and discussed the MECP's initial comments from the previous meeting.
7.	October 3, 2022	Progress Meeting (JLR and Municipality) discussing the minutes from the MECP consultation meetings and discussing revisions to the sludge treatment and solids management options.

5.5 First Nation Consultation

MECP has instructed the Project team to consult with the following First Nation communities who have been identified as potentially affected by the proposed project:

- Alderville First Nation
- Curve Lake First Nation
- Hiawatha First Nation
- Mississaugas of Scugog Island
- Kawartha Nishnawbe

Table 14 shows a summary of comments received from First Nations communities at the time of this Report. Comments are available in Appendix C.

Table 14: Summary of First Nations Comments

FIRST NATIONS CONSULTATION COMMENTS / RESPONSES
Alderville First Nations
Comments: 1. Alderville First Nations is interested to review the proposed lagoon upgrades.
Responses: 1. JLR will provide the Addendum Report for review.
Curve Lake First Nations
Comments: 1. Curve Lake First Nations is interested to review the proposed lagoon upgrades.
Responses: 1. JLR will provide the Addendum Report for review.

6.0 References

- Metcalf & Eddy Inc., Wastewater Engineering Treatment and Reuse, Fourth Edition, 2003.
- Ministry of the Environment, Conservation and Parks, MOE Design Guidelines for Sewage Works, 2008.
- Water Environment Federation, Design of Water Resource Recovery Facilities, Manual of Practice No. 8, Sixth Edition, 2017.
- Ontario Ministry of Municipal Affairs and Housing, Provincial Policy Statement, 2020.
- Trent Conservation Coalition Source Protection Region, Trent Source Protection Plan, approved 2014, updated 2021.
- CBCL Limited. (2020). 'Climate Projections for the Nation Capital Region'. <http://ottwatch.ca/meetings/file/646969> (Jul. 06, 2021)
- GSS Engineering Consultants Ltd., Brighton WWTP Aeration System Upgrades with Option to Expand Capacity, 2021.
- R.V. Anderson Associates Ltd., Brighton WPCP Proposed Upgrade Technical Review, 2022.
- Land Information Ontario, Source Protection Information Atlas, last updated Mar 24, 2022.

7.0 Limitations

This report has been prepared by J.L. Richards & Associates Limited for the Municipality of Brighton's exclusive use. Its discussions and conclusions are summary in nature and cannot properly be used, interpreted or extended to other purposes without a detailed understanding and discussions with the client as to its mandated purpose, scope and limitations. This report is based on information, drawings, data, or reports provided by the named client, its agents, and certain other suppliers or third parties, as applicable, and relies upon the accuracy and completeness of such information. Any inaccuracy or omissions in information provided, or changes to applications, designs, or materials may have a significant impact on the accuracy, reliability, findings, or conclusions of this report.

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Appendix A

Previous Studies

Appendix B

EA Addendum Studies and Reports

Appendix C

Public and Stakeholder Consultation

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Appendix B

Brighton WWTS Upgrades
Technical Memorandum

JLR No.: 32296-001
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September 18, 2023

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TM 1 – Design Basis – Draft

Brighton Wastewater Treatment System Upgrades

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1.0 Background

In June 2023 the Municipality of Brighton (the Municipality) retained J.L. Richards & Associates Limited (JLR), as the prime consultant, to provide engineering services for the preliminary and final design of the Brighton Wastewater Treatment System (WWTS) upgrades.

The Municipality is the easternmost municipality within the County of Northumberland and is subject to the Growth Plan for the Greater Golden Horseshoe. The Municipality is bounded by the City of Quinte West to the east and the Township of Cramahe to the west, with the shoreline of Lake Ontario to the south. Highway 401 provides the main east-west corridor through the Municipality, which tends to be a regional focus for hamlets in the surrounding areas.

The communal sewage system generally consists of the Brighton WWTS (currently rated for an average daily flow of 4,600 m^3/day), the Harbour Street Sewage Pumping Station (SPS) and forcemain, a small sub-area sewage pumping station and forcemain servicing Presqu'ile Provincial Park, and several kilometers of gravity collection sewer. Approximately half of the sewage generated in the collection system is directed to the Harbour Street SPS and pumped via a 0.82 km long, 300 mm forcemain to the WWTS, while the other half flows by gravity to the WWTS.

The WWTS is a lagoon system consisting of a 0.68 ha single cell aerated lagoon, and a 5.44 ha single cell waste stabilization pond with baffle partition curtains. The effluent from the stabilization pond feeds to a 2-cell constructed wetland with a total surface area of 6.2 ha, which is not part of the wastewater treatment system as per the site's Amended Environmental Compliance Approval (ECA), number 7701-CDNKQA. There is also a chemical storage/feed system used to facilitate continuous phosphorus removal. Ferric Chloride coagulant is introduced after the aerated lagoon and upstream of the waste stabilization pond. Treated effluent from the waste stabilization pond is discharged continuously to the constructed wetland, which itself discharges into a natural wetland and ultimately to Presqu'ile Bay off the northeast shore of Lake Ontario.

While the existing Brighton WWTS has capacity for the next 20 years, it has experienced chronic issues with high total ammonia nitrogen (TAN) concentrations in the effluent, particularly in the months of May to July. The Municipality has taken steps in the past to address the issue, including increasing the number of aerators in the aeration lagoon, piloting a BioDome aeration unit in the facultative lagoon, removing a high strength waste stream, and undertaking facultative lagoon desludging. Exceedances in effluent TAN have continued despite efforts. Period exceedances of design objectives and/or limits have also occurred for total suspended solids (TSS) and *E.coli*. The main objective of the Brighton WWTS Upgrades project is to implement the preferred alternative identified in the recent Addendum to the Class EA (JLR, 2022), which involves:

- Implementation of a headworks facility
- Conversion of the lagoon-based system to an extended aeration facility
- Implementation of a disinfection process
- Conversion of the facultative lagoon to a waste sludge stabilization lagoon with supplemental aeration

During the project kick-off meeting on July 20, 2023, the Municipality has expressed interest in implementing a septage receiving station (SRS) as well as peak flow shaving/storage.

During the conceptual design phase, the following Technical Memoranda (TM) are being prepared to address project specific requirements, including;

- TM 1 – Design Basis
- TM 2 – Septage Receiving and Headworks Facility
- TM 3 – Liquid Treatment Train
- TM 4 – Solids Treatment Train
- TM 5 – Power Requirements and Innovative Energy

2.0 Objectives

This Technical Memorandum (TM) is intended to:

- Summarize the design basis of the WWTS upgrades by reviewing historic plant influent and effluent flow and quality characteristics, establishing projected future plant influent flow and quality characteristics with and without a septage receiving station, and confirming plant effluent design limits and objectives; and
- Provide an overview of site-wide design assumptions and constraints.

Overall, the information presented in this TM will serve as the design basis for the Brighton WWTS Upgrades

3.0 Design Basis – Treatment System

3.1 Review of Historic Raw Wastewater Data

The Brighton WWTS currently provides secondary equivalent treatment to municipal wastewater collected in the Municipality of Brighton sanitary sewer network. The Brighton WWTS operators record the total daily plant influent and effluent volumes in the logged sampling and flow data. Table 1 provides a summary of the historic WWTS flow from 2020 to 2022. It illustrates that historically, the Brighton WWTS receives an average daily flow (ADF) of 2,766 m^3/d, which is 60% of the rated capacity of the plant. The plant effluent flow rate is presented in this table as a comparison and shows consistency between influent and effluent flows.

Table 1: Historic WWTP Flows

	Average Daily Influent Flow (m^3/d)	Average Daily Effluent Flow (m^3/d)	Max Daily Influent Flow (m^3/d) (1)	Max Day Peaking Factor	Max Month Influent Flow (m^3/d) (2)	Max Month Peaking Factor
2020	2,969	3,074	11,460	3.86	5,176	1.74
2021	2,524	2,712	8,746	3.46	3,408	1.35
2022	2,804	2,692	8,395	2.99	4,206	1.50
Average	**2,766**	**2,816**	**9,534**	**3.44**	**4,263**	**1.53**
Rated Capacity	**4,600**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**

Notes:
1. Max daily influent flow is the maximum daily volume recorded in a year.
2. Max month influent flow is the highest monthly average flow recorded in a year.

Table 2 below shows the annual average and maximum monthly raw wastewater influent characteristics entering the WWTS according to the weekly logged wastewater sampling data. Raw wastewater concentrations are fairly consistent between years with the exception of BOD_5, which was significantly higher in 2022 compared to 2020 and 2021. The Municipality may wish to investigate whether a change in sampling/testing procedure occurred in late 2021 or early 2022 which would account for this difference. Table 3 displays the monthly average raw wastewater pH and temperature from 2020-2022.

Table 2: Brighton WWTS Raw Wastewater Concentrations and Loading (2020-2022)

Year	BOD_5 (1)		TSS (2)		TP (3)		TKN (4)	
	Conc. (mg/L)	Load (kg/d)	Conc. (mg/L)	Load (kg/d)	Conc. (mg/L)	Load (kg/d)	Conc. (mg/L)	Load (kg/d)
2020 – Average	85	233	171	466	4.4	12	44	118
Max Month	*148*	*315*	*355*	*755*	*6.6*	*15*	*66*	*146*
2021 – Average	92	233	158	393	5.4	14	48	119
Max Month	*121*	*367*	*233*	*517*	*6.7*	*19*	*63*	*144*
2022 – Average	164	453	172	476	4.2	11	42	116
Max Month	*219*	*659*	*212*	*729*	*5.1*	*17*	*49*	*160*
Average	**114**	**306**	**167**	**445**	**4.6**	**12**	**45**	**118**
Max Month Loading Factor		**1.46**		**1.49**		**1.37**		**1.28**

Notes:
(1) BOD_5 refers to 5-day Biochemical Oxygen Demand
(2) TSS refers to Total Suspended Solids
(3) TP refers to Total Phosphorus
(4) TKN refers to Total Kjeldahl Nitrogen

Table 3: Brighton WWTS Raw Wastewater Average Monthly Temperature and pH (2020-2022)

Monthly Average	pH	Temperature (°C)
Jan	7.9	10
Feb	7.9	11
Mar	7.8	11
Apr	7.7	12
May	7.8	14
Jun	7.8	15
Jul	7.7	17
Aug	7.9	19
Sep	7.8	18

Monthly Average	pH	Temperature (°C)
Oct	7.9	18
Nov	7.9	15
Dec	7.9	12

3.2 Review of Plant Effluent Discharge Requirements and Historical Performance

Through the previous moving bed bioreactor (MBBR) project did not proceed to construction, the Municipality has received an Amended Environmental Compliance Approval No. 7701-CDNKQA, issued on April 21, 2022. No further amendment was made since 2022. As such, the Brighton WWTS is currently operating under the Amended ECA with MBBR system listed as the proposed upgrades. Table 4 below summarizes the final effluent criteria, which is to be sampled upstream of the constructed wetland.

Table 4: Current Brighton WWTS Effluent Criteria

Final Effluent Parameter	Design Objectives (1)	Compliance Limits (1)	Loading Limits (1)
$cBOD_5$ (2)	15.0 mg/L	30.0 mg/L	138.0 kg/day
TSS	15.0 mg/L	40.0 mg/L	184.0 kg/day
TP	0.8 mg/L	1.0 mg/L	4.6 kg/day
TAN			
from May 01 to October 31	10.0 mg/L	14.0 mg/L	64.4 kg/day
from November 01 to April 30	15.0 mg/L	17.0 mg/L	78.2 kg/day
E. coli	200 CFU/100mL	--	N/A
pH	6.5 – 9.0 inclusive	6.0 – 9.5 inclusive	N/A

Notes:
(1) Sample location is upstream of the constructed wetland. Loading limits for cBOD5 and TSS is based on annual average daily loadings. Loading limits for TP and TAN is based on monthly average daily loadings. pH is to be based on single grab sample result. *E.Coli* is based on monthly geometric means.
(2) $cBOD_5$ refers to 5-day Carbonaceous Biochemical Oxygen Demand.

Since the WWTS will maintain its current rated capacity (4,600 m^3/d) over the next 20 years, the ECA effluent criteria are expected to remain largely consistent for the new upgrades, with the exception of *E. coli* where a compliance limit is expected to be imposed. Anticipated criteria are shown in Table 5.

Table 5: Anticipated Future Bright WWTS Effluent Criteria

Final Effluent Parameter	Design Objectives (1)	Compliance Limits (1)	Loading Limits (1)
$cBOD_5$ (2)	15.0 mg/L	30.0 mg/L	138.0 kg/day
TSS	15.0 mg/L	40.0 mg/L	184.0 kg/day
TP	0.8 mg/L	1.0 mg/L	4.6 kg/day

Final Effluent Parameter	Design Objectives (1)	Compliance Limits (1)	Loading Limits (1)
TAN			
from May 01 to October 31	10.0 mg/L	14.0 mg/L	64.4 kg/day
from November 01 to April 30	15.0 mg/L	17.0 mg/L	78.2 kg/day
E. coli (3)	100 CFU/100mL	200 CFU/100mL	N/A
pH	6.5 – 9.0 inclusive	6.0 – 9.5 inclusive	N/A

Notes:
(1) Sample location is upstream of the constructed wetland. Loading limits for cBOD5 and TSS is based on annual average daily loadings. Loading limits for TP and TAN is based on monthly average daily loadings. pH is to be based on single grab sample result. *E.Coli* is based on monthly geometric means.
(2) $cBOD_5$ refers to 5-day Carbonaceous Biochemical Oxygen Demand
(3) Change to E.coli objective and limit per consultation meeting with MECP dated September 23, 2022.

Table 6 summarizes effluent characteristics from the stabilization lagoon from 2020-2022. The WWTS has not had exceedance issues with $cBOD_5$, TSS, TP, and pH. However, the system has had frequent instances of exceedance in the effluent TAN concentration objective and limit, as well as the *E.coli* objective. TAN exceedances typically occur in the spring and early summer months (often spanning multiple months from May to July, lasting into August) following the period of increased daily flow that is seen in the late winter and spring due to spring melt and storm events. Though less frequent, exceedances have also occurred in winter (see Table 7). The operator has reported that the aeration lagoon is often run in batch mode. Stop logs are put in place to stop aeration lagoon discharging to the stabilization lagoon from 3 pm and 8 am, during which the aeration is turned on. At 8 am, the stop logs are removed with aeration turned off to allow aeration lagoon to discharge to the stabilization lagoon.

Table 6: Brighton WWT System Stabilization Lagoon Effluent Characteristics

Year		CBOD5 (mg/L)	TSS (mg/L)	TP (mg/L)	TAN (mg/L)	pH	E.Coli (CFU/100mL)
2020	Annual Average	3	8	0.19	12	7.3	312
	Max Month	*5*	*19*	*0.36*	*21*	*7.5*	*2400*
2021	Annual Average	4	8	0.24	16	7.5	151
	Max Month	*11*	*21*	*0.49*	*31*	*7.8*	*3900*
2022	Annual Average	8	13	0.28	14	7.4	246
	Max Month	*19*	*32*	*0.60*	*21*	*7.7*	*3480*
Average		**5**	**10**	**0.24**	**14**	**7.4**	**226**
Max Month		***19***	***32***	***0.60***	***31***	***7.8***	***3900***

The Brighton WWTS operators take weekly TAN samples. Table 7 shows average monthly TAN effluent concentration from the stabilization lagoon by month and year. Data up to Jun 2023 have been included in the analysis. All numbers bolded and italicized in Table 7 are TAN concentrations that exceed the compliance limits. The trend seen in Table 7 supports the previous statement that TAN concentration in effluent peaks between May to July, and that this is a problem characteristic for the WWTS. The coming TM's will investigate means of addressing high ammonia levels through upgrades to the existing WWTS.

Table 7: Brighton WWTS Stabilization Lagoon Effluent TAN Monthly

Year	Monthly Average Effluent TAN (mg/L) (1)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2020	11	13	11	9	11	***20***	***21***	***18***	12	8	6	6
2021	15	***21***	***23***	***18***	***23***	***31***	***19***	10	7	8	7	10
2022	***18***	***21***	11	14	***16***	***20***	***17***	9	9	7	7	13
2023	3	***4***	***4***	***10***	16	***21***	-	-	-	-	-	-
Compliance Limit	17	17	17	17	14	14	14	14	14	14	17	17

Notes:
(1) Effluent sampling from the stabilization lagoon

3.3 Future Septage Generation and Loadings

The Municipality is considering adding a Septage Receiving Station (SRS) to the WWTS, which would receive hauled waste from unserviced properties in the surrounding area for treatment. Given that the WWTS currently does not accept hauled waste, it has been assumed that any future waste received would be from sources that currently utilize SRS facilities at other nearby plants. Figure 1 shows the locations of known WWT facilities within approximately 30 km of the Brighton WWTS, and whether the facility currently accepts hauled waste from outside municipal borders. Based on conversations with local haulers, waste from within the Municipality of Brighton is typically either land applied or taken to the Trenton WWTP in the City of Quinte West.

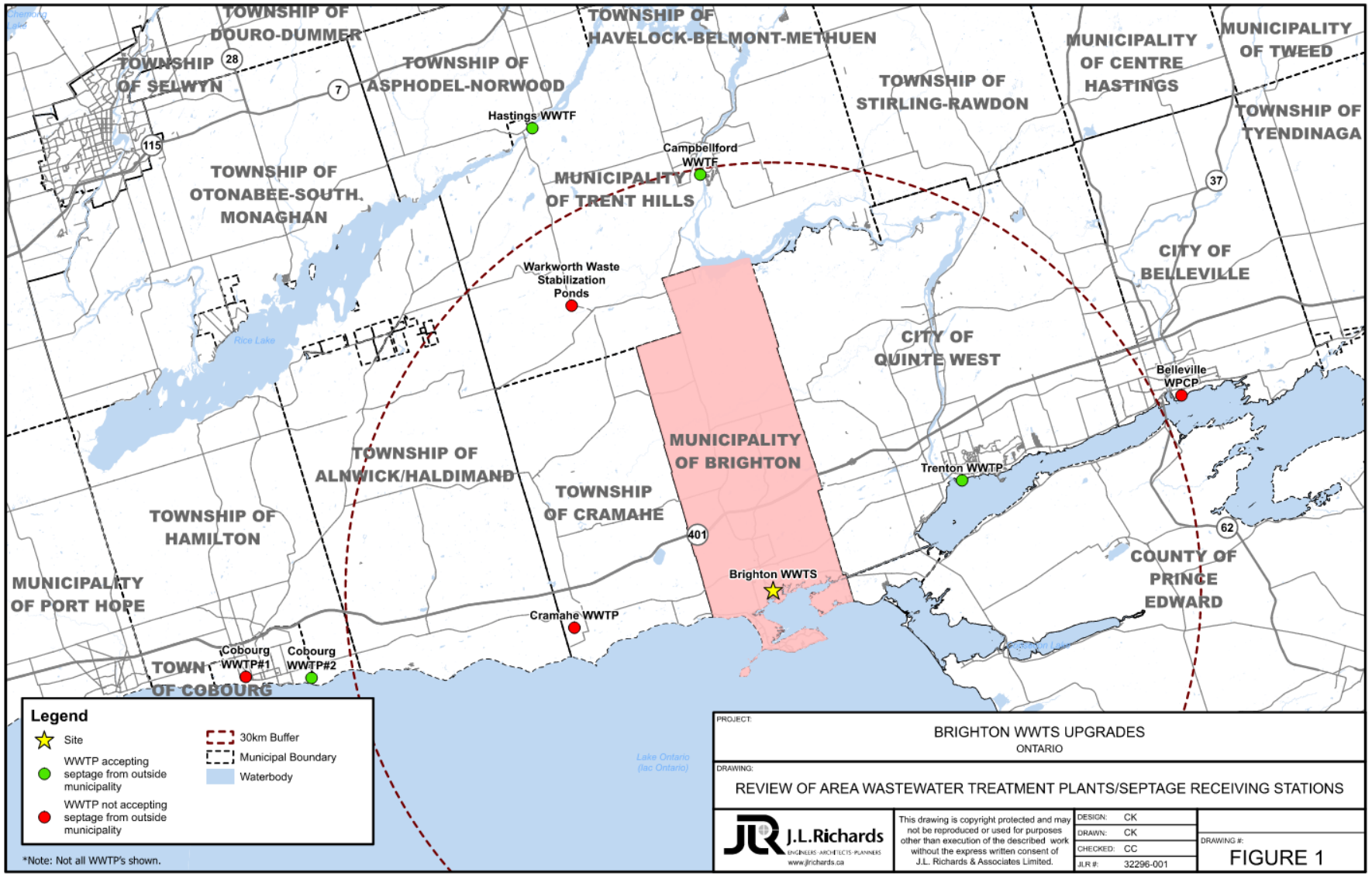


Figure 1: Review of Area WWTPs/ Septage Receiving Stations

Table 8 summarizes estimates of septage quantity and quality within the Municipality of Brighton. These values are based on the following assumptions:

- Within the next 20 years, MECP may require septage to be treated rather than land applied.
- The WWTS will handle all hauled waste generated within the Municipality, but none from other Municipalities.
- No major wet industry requiring sewage hauling is anticipated.
- Current hauled waste rates within the Municipality are approximately 8-15 tanks per weekday, based on preliminary information from local haulers. Hauling takes place year-round.
- Septage flows will increase proportionally to growth in the unserviced population.
- Septage quality will be similar to typical literature guideline concentrations.

Table 8: Septage Characteristics and Loading

Parameter	Flow (m^3/d)	Concentration (mg/L) (1)	Loading (kg/d)
Average Septage Flow	31	--	--
BOD_5	--	6,500	202
TSS	--	12,900	400
TKN	--	600	19
TAN	--	100	3
TP	--	200	6

Note:
(1) Typical concentrations per MECP Design Guidelines for Sewage Works, 2008

Please note that the flow estimate is preliminary only. Actual future hauled waste volumes are strongly dependent on factors such as:

- Rates charged by Municipality compared to other SRS facilities/ receiving land.
- Municipal policies around accepting hauled waste (e.g. from approved haulers only, from within municipal boundaries only, etc.)
- Provincial regulations relating to land application of septage.

3.4 Design Basis for Future WWTS

Future influent flows to be used as the basis of design for the WWTS upgrades are presented in Table 9. These flow values will be used regardless of whether or not an SRS is included in the design.

Table 9: Summary of Design Flows and Peaking Factors

Parameter	Peaking Factor	Flow (m^3/d)
Average Daily Flow	n/a	4,600
Maximum Monthly Flow	1.53(1)	7,043
Maximum Day Flow	3.44(1)	15,824
Peak Hourly Flow	3.87(2)	17,813

Parameter	Peaking Factor	Flow (m^3/d)
Peak Instantaneous Flow	4.70	21,600(3)

Notes:
(1) Historical peaking factors calculated from 2020-2022 data
(2) WEF guidelines for peaking factor, based on Population (RVA 2022)
(3) Estimation based on design PIF of pumped flow from Harbour St. Pumping Station (150 L/s), given that pumped flows are approximately 60% of total flows

Based on the above analysis, the following raw sewage concentrations and loading values will be used as the basis of design for the treatment system under two potential scenarios:

- Scenario 1 – No Septage Receiving Station
- Scenario 2 – Septage Receiving Station

Table 10: Future Influent Concentrations and Pollutant Loading

Parameter	Scenario 1		Scenario 2	
	Concentration (mg/L) (1)	Loading (kg/d)	Concentration (mg/L) (2)	Loading (kg/d)
BOD_5 (2) – Average	164	754	207	950
Max. Month		*1102*		*1,354*
TSS – Average	167	768	253	1,163
Max. Month		*1143*		*1,653*
TKN – Average	45	205	48	222
Max. Month		*262*		*284*
TAN – Average	37	172	38	174
Max. Month		*226*		*228*
TP – Average	4.6	21	6.0	27
Max. Month		*29*		*37*

Notes:
(1) Future municipal sewage concentrations assumed to be equal to historical 3-year average concentrations, with the exception of BOD_5, where 2022 annual average concentration was used instead.
(2) Projected average concentrations and loading values for Scenario 2 were based on estimated average septage volume of 31 m^3/d and municipal sewage volume of 4,569 m^3/d. Projected maximum monthly loading values were calculated using an estimated maximum septage volume of 40 m^3/d (max month factor of 1.3), municipal sewage volume of 4,560 m^3/d, and the historical max month loading factors for each parameter.

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DRAFT TM 2 – Septage Receiving and Headworks Facility

Brighton Wastewater Treatment System Upgrades

J.L.Richards

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1.0 Background

In June 2023 the Municipality of Brighton (the Municipality) retained J.L. Richards & Associates Limited (JLR) to provide engineering services for the preliminary and final design of the Brighton Wastewater Treatment System (WWTS) upgrades.

The Municipality is the easternmost municipality within the County of Northumberland and is subject to the Growth Plan for the Greater Golden Horseshoe. The Municipality is bounded by the City of Quinte West to the east and the Township of Cramahe to the west, with the shoreline of Lake Ontario to the south. Highway 401 provides the main east-west corridor through the Municipality, which tends to be a regional focus for hamlets in the surrounding areas.

The communal sewage system generally consists of the Brighton WWTS (currently rated for 4,600 m^3/day), the Harbour Street Sewage Pumping Station (SPS) and forcemain, a small sub-area sewage pumping station and forcemain servicing Presqu'ile Provincial Park, and several kilometers of gravity collection sewer. Approximately half of the sewage generated in the collection system is directed to the Harbour Street SPS and pumped via a 820 m long, 300 mm forcemain to the WWTS, while the other half flows by gravity to the WWTS.

The WWTS is a lagoon system consisting of a 0.68 ha single cell aerated lagoon, a 5.44 ha single cell waste stabilization pond with baffle partition curtains, and a 2-cell constructed wetland with a total surface area of 6.2 ha. There is also a chemical storage/feed system used to facilitate continuous phosphorus removal. Chemical is introduced after the aerated lagoon and upstream of the waste stabilization pond. Treated effluent from the waste stabilization pond is discharged continuously to the constructed wetland, which itself discharges into a natural wetland and ultimately to Presqu'ile Bay off the northeast shore of Lake Ontario.

While the existing Brighton WWTS has capacity for the next 20 years, it has experienced chronic issues with high total ammonia nitrogen (TAN) concentrations in the effluent. The Municipality has taken steps in the past to address the issue but has continued to face challenges. The purpose of the Brighton WWTS Upgrades project is to implement the preferred alternative identified in the recent Addendum to the Class EA (JLR, 2022). The Municipality has also expressed interest in implementing a septage receiving station (SRS) as a potential revenue source.

During the preliminary design phase, the following Technical Memoranda (TM) are being prepared to address project specific requirements, including;

- TM 1 – Design Basis
- TM 2 – Septage Receiving and Headworks Facility
- TM 3 – Liquid Train
- TM 4 – Solids Train
- TM 5 – Power Requirements and Innovative Energy

2.0 Objectives

This Technical Memorandum (TM) is intended to:

- Develop a conceptual design for a new headworks building at the Brighton WWTS.
- Summarize costs and benefits of including a septage receiving station at the facility.
- Develop Opinions of Probable Cost (OPCs) for the new septage receiving station and headworks.

3.0 Configuration Options Analysis

3.1 Configuration Options for Headworks

Three general options have been developed for the facility Headworks. Note that a septage receiving facility could be incorporated into any of the three options and is discussed in Section 3.4 below.

3.1.1 Option 1 - Raw Sewage PS to Mechanical Headworks Building

In this option, a raw sewage pumping station (PS) will intercept the incoming gravity sewer carrying flows from both the gravity and pumped portions of the sewer network and lift the flow up to a new headworks facility, which will include outdoor grit channels and a mechanical screen, a manual screen, a bin area, and a separate electrical room within the proposed headworks building. This option requires a raw sewage PS to overcome headlosses through the mechanical screen and grit channels and allow the headworks equipment to be installed at a reasonable elevation for constructability and long-term operation and maintenance.

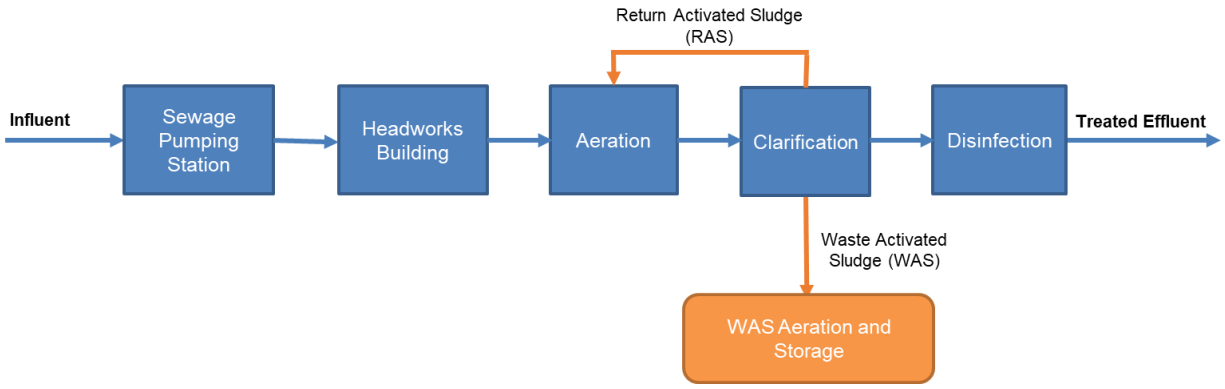


Figure 1 – Option 1 Block Flow Diagram

3.1.2 Option 2 – Raw Sewage PS to Outdoor Headworks

In this option, a raw sewage PS will intercept the incoming gravity sewer carrying flows from both the gravity and pumped portions of the sewer network and lift the flow up to an outdoor headworks facility, which will include outdoor grit channels and manual screen channels. No building or

electrical infrastructure is required for the headworks. This option requires a raw sewage PS to overcome headlosses through the grit channels and allow the equipment to be installed at a reasonable elevation for constructability and long-term operation and maintenance.

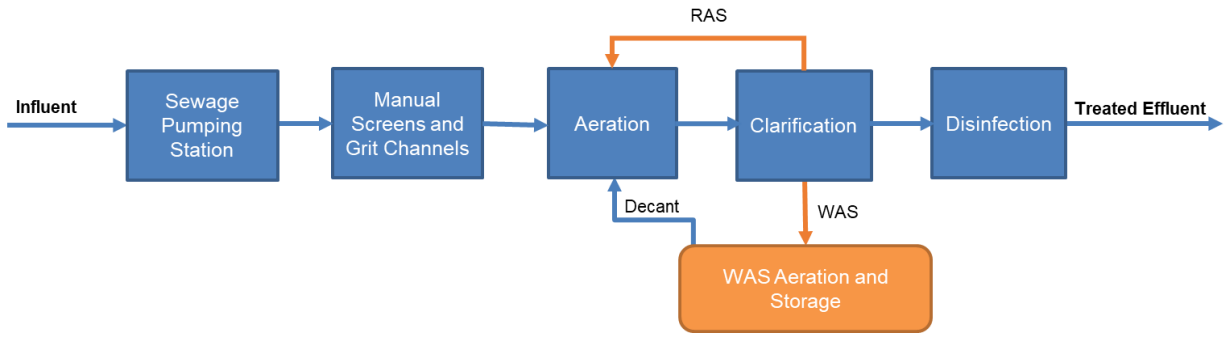


Figure 2 – Option 2 Block Flow Diagram

3.1.3 Option 3 – Gravity Discharge to Manual Screening Area

In this option, raw sewage flow by gravity into the biological treatment system through a screening chamber that must be cleaned manually. Grit removal will be accomplished through settling in the biological treatment system and will be cleaned out periodically. A raw sewage PS is not necessarily needed to lift the influent flow for this option as headlosses through the manual screen will be minimal and the manual screen could potentially be installed as a structure within the existing aeration basin.

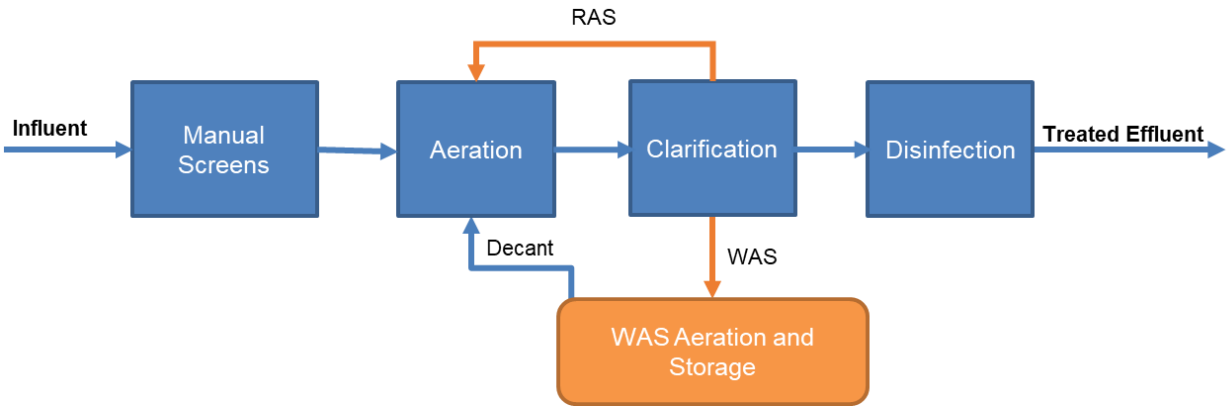


Figure 3 - Option 3 Block Flow Diagram

3.2 Analysis of Configuration Options

Table 1 provides a summary of the advantages and disadvantages of each option.

Table 1 – Summary of Inlet Works Configuration Options

Option	Advantages	Disadvantages
Option 1 - Raw Sewage PS to Mechanical Headworks Building	• Building encloses mechanical screen; operator-friendly • Greatest protection to downstream equipment	• Higher capital costs than options 2 and 3 • Greater number of systems to operate and maintain
Option 2 - Raw Sewage PS to Outdoor Headworks	• Considerable cost savings; headworks footprint in building eliminated	• Manual screen cleaning may be onerous on operators • Increase in O&M costs related to less-thorough screening (i.e. rags clogging sludge pumps.) • Impact is especially severe if installing fully mechanical plant
Option 3 - Gravity Discharge to Manual Screening Area	• Greatest cost savings; headworks footprint in building, pumping station, and grit channels eliminated	• Manual screen cleaning may be onerous on operators • Increase in O&M costs related to less-thorough screening (i.e. rags clogging sludge pumps.) • Reduction in biological treatment capacity as grit accumulates; periodic cleanout required • Impact is especially severe if installing fully mechanical plant

Due to the considerations outlined in Table 1, Option 1 is recommended. This option will present the most comprehensive treatment with the least wear to process instrumentation and equipment.

3.3 Opinion of Probable Cost

The table below provides a summary of Class 'C' Opinion of Probable Cost for the construction of the three inlet works configuration options. All options include an allowance for a package septage receiving station. A further analysis of septage receiving station costs and benefits is presented in the next section.

Table 2 – OPC of Inlet Works Configuration Options

Item	Option 1	Option 2	Option 3
Headworks Building	$2,300,000	-	-
Influent Pumping	$890,000	$890,000	-
Screening	$510,000	$100,000	$100,000
Grit Removal	$260,000	$260,000	-
Septage Receiving Station	$1,280,000	$1,280,000	$1,280,000
Odour Control Unit	$190,000	-	-
Subtotal[1]	$5,430,000	$2,530,000	$ 1,380,000
Contingency (~25%)	$1,360,000	$640,000	$ 350,000
Total[2,3]	**$6,790,000**	**$3,170,000**	**$ 1,730,000**

Item	Option 1	Option 2	Option 3
Notes: (1) Capital OPCs include costs for installation, contractor markup (~20%). (2) All OPCs exclude HST. (3) All OPCs in 2023 dollars			

Note: The above is an opinion of probable cost attainable for the described construction as of the date of this report. It is not a prediction of the low tender price. Tendered prices will be influenced by factors such as the tenderers' methods of pricing and/or interpretations of their probable effort, current or pending projects by others and level of competitiveness in the market at the time of tender, availability of labour and materials, etc., which are not within our control, knowledge and/or ability to predict.

3.4 Septage Cost vs. Benefit

To understand the net financial impact of including septage receiving works in the design, a high-level cost-benefit analysis was performed. The analysis was based on the following assumptions:

- Septage quantity and quality will be as specified in TM1 – Design Basis.
- Quantities and characteristics of Waste Activated Sludge (WAS) and impacts of septage on treatment will be as specified in TM3 – Liquid Train.
- WAS will be stored in an aerated lagoon which will require periodic dredging.
- Dosage of ferric chloride will increase proportional to influent Total Phosphorus loading.
- Average annual SRS operation and maintenance costs are 2% of capital.
- Maximum haulage fee is \$50/m^3 (approximately equal to rate charged at Trenton WWTP).

As per TM1, the design basis assumes an average septage flowrate of 31 m^3/d. Septage receiving volume forecasts can be highly variable due to economic or charge rate influences, new septage receiving facilities and other related items. The Municipality has a relatively high rural population currently being serviced by private septic systems and/or holding tanks, and local septage haulers have indicated that there is demand for an SRS within the Municipality of Brighton. A local SRS would offer increased convenience to residents and haulers currently hauling outside of the Municipality boundaries. Negative social impacts are possible through the introduction of increased odours to the WWTS. This negative impact would be mitigated through the selection of SRS equipment which incorporates odour control or installing odour control in the headworks area of the building. Local truck traffic would also increase.

A packaged SRS could be located at various points onsite and would ultimately discharge upstream of the headworks facilities. The SRS is recommended to include the following at a minimum; note that the Municipality may also wish to consider equalization tankage and pumping in order to mitigate potential impacts of shock loading to the liquid treatment train.

- User automated access/control/billing system
- Upgraded access road
- Truck connection/unloading area
- Piping and interconnections
- Pre-treatment unit(s) to prevent clogging of downstream pumps, complete with building to enclose pre-treatment
- Autosampler

Implementation of a septage receiving facility involves capital and operating cost impacts. As per Section 3.3, the estimated packaged septage receiving system capital cost is $1,280,000. The acceptance of septage increases the treatment demands due to increased pollutant loading as described in TM1. To accommodate the greater pollutant loading, aeration tanks and equipment must be upsized. The differential cost to upgrade aeration for the septage acceptance scenario is estimated to be $650,000. Estimated allowances for operating and maintenance costs consider:

- Electricity/power
- Maintenance and repair
- Additional ferric chloride (to treat increased TSS loading)
- Sludge handling (for increased clean-out frequency)
- Administration and billing

The cost vs. revenue breakdown for two septage demand scenarios is summarized in Table 3.

Table 3 – Septage Receiving Station Cost vs. Revenue

Cost/Revenue[1,2,3]		Full Septage Demand	¼ Septage Demand
Capital Cost	Septage Receiving Station	$1,280,000	$1,280,000
	Upgraded Aeration	$650,000	$650,000
	Total	**$1,930,000**	**$1,930,000**
Annual Recurring	O&M Cost	$210,000	$117,000
	Maximum Revenue	$566,000	$141,000
	Revenue Less Cost	**$356,000**	**$24,000**

Notes:
(1) Capital OPCs include costs for installation, contractor markup (~20%).
(2) All OPCs exclude HST.
(3) All OPCs in 2023 dollars

It is estimated that annual revenue for the SRS could exceed annual costs by up to $356,000 if demand averages the 31 m^3/d design basis. Compared to the total capital cost impact of $1,930,000, the straight payback period could be as low as 6 years. However, this assumes a haulage fee of $50/$m^3$ and a septage flow of 31 m^3/d. If only one-quarter of the design septage demand materializes, the straight payback period could exceed 80 years.

4.0 Conceptual Design

The following is the conceptual design for the recommended headworks option (Option 1), including the raw sewage PS but excluding SRS. The raw sewage PS will have a peak flow capacity of 350 L/s, which is the estimated peak instantaneous influent flow rate. An overflow pipe will be provided to direct any flows higher than 350 L/s to the equalization pond (existing facultative lagoon.) The overall headworks peak instantaneous flow design basis is therefore 350 L/s (refer to TM 1 – Design Basis).

Screening will consist of an inclined auger screen (ex. Auger Monster®) installed inside the plant building. A second channel with a manual screen for by-pass will also be installed. The indoor headworks area will be equipped with an odour control unit to mitigate odours from sewage and septage and will have space to accommodate electrical equipment, instrumentation, and screening bins. Horizontal flow grit channels will be installed outdoors and will need to be cleaned

manually from time to time using a vacuum truck. The conceptual design specifications for the headworks are summarized in Table 4 below.

Table 4 – Concept Design Specifications

Component	Design Specifications
Raw Sewage Pumping Station	• Peak flow capacity of 350 L/s • Triplex submersible sewage pumps, each rated at 175 L/s
Screening	• One (1) inclined cylindrical auger screen, ex. Auger Monster® model ACE480-5010-2250 • One (1) bypass manual screen, 0.65 m/s design velocity
Grit Channels	• Two (2) horizontal flow channels installed outdoors • Proportional outlet weir for velocity control • 0.3 m/s design horizontal velocity, 9 m x 1 m x 0.9 m SWD
Building	• Headworks footprint of 480 m^2 (including electrical and instrumentation) • Odour control unit

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TM 3 – Liquid Train

Brighton Wastewater Treatment System Upgrades

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

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Appendices

Appendix A BioWin Modelling Report
Appendix B Trojan UV Proposal
Appendix C MECP Consultation Record

1.0 Background

In June 2023 the Municipality of Brighton (the Municipality) retained J.L. Richards & Associates Limited (JLR) to provide engineering services for the preliminary and final design of the Brighton Wastewater Treatment System (WWTS) upgrades.

The Municipality is the easternmost municipality within the County of Northumberland and is subject to the Growth Plan for the Greater Golden Horseshoe. The Municipality is bounded by the City of Quinte West to the east and the Township of Cramahe to the west, with the shoreline of Lake Ontario to the south. Highway 401 provides the main east-west corridor through the Municipality, which tends to be a regional focus for hamlets in the surrounding areas.

The communal sewage system generally consists of the Brighton WWTS (currently rated for 4,600 m3/day), the Harbour Street Sewage Pumping Station (SPS) and forcemain, a small sub-area sewage pumping station and forcemain servicing Presqu'ile Provincial Park, and several kilometers of gravity collection sewer. Approximately half of the sewage generated in the collection system is directed to the Harbour Street SPS and pumped via a 820 km long, 300 mm forcemain to the WWTS, while the other half flows by gravity to the WWTS.

The WWTS is a lagoon system consisting of a 0.68 ha single cell aerated lagoon, a 5.44 ha single cell waste stabilization pond with baffle partition curtains, and a 2-cell constructed wetland with a total surface area of 6.2 ha. There is also a chemical storage/feed system used to facilitate continuous phosphorus removal. Chemical is introduced after the aerated lagoon and upstream of the waste stabilization pond. Treated effluent from the waste stabilization pond is discharged continuously to the constructed wetland, which itself discharges into a natural wetland and ultimately to Presqu'ile Bay off the northeast shore of Lake Ontario.

While the existing Brighton WWTS has capacity for the next 20 years, it has experienced chronic issues with high total ammonia nitrogen (TAN) concentrations in the effluent. The Municipality has taken steps in the past to address the issue but has continued to face challenges. The purpose of the Brighton WWTS Upgrades project is to implement the preferred alternative identified in the recent Addendum to the Class EA (JLR, 2022). The Municipality has also expressed interest in implementing a septage receiving station (SRS) as a potential revenue source.

During the preliminary design phase, the following Technical Memoranda (TM) are being prepared to address project specific requirements, including;

- TM 1 – Design Basis
- TM 2 – Septage Receiving and Headworks Facility
- TM 3 – Liquid Train
- TM 4 – Solids Train
- TM 5 – Power Requirements and Innovative Energy

2.0 Objectives

This Technical Memorandum (TM) is intended to:

- Summarize the operation of the existing liquid train and required upgrades;
- Describe conceptual alternatives for upgraded biological treatment;
- Present the results of BioWin™ Modelling analysis for the conceptual alternatives under two loading scenarios, with and without septage;
- Compare and recommend a preferred biological treatment alternative;
- Summarize the conceptual design of the preferred biological treatment alternative;
- Investigate the suitability of two potential disinfection options;
- Compare and recommend a preferred disinfection option;
- Summarize the conceptual design of the preferred disinfection alternative;
- Describe construction sequencing for the preferred alternatives.

3.0 Existing Liquid Train and Required Upgrades

3.1 Existing Works

The existing liquid train is shown schematically in the block flow diagram in Figure 1 below.

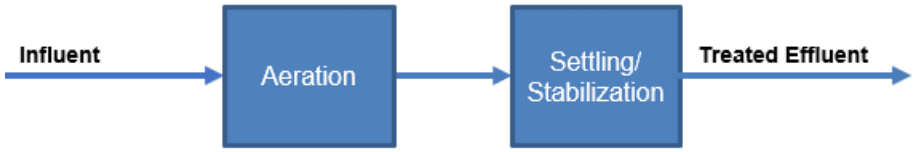


Figure 1: Current Brighton WWTS Liquid Train Block Flow Diagram

3.2 Required Upgrades

3.2.1 Inlet Works

As the new secondary treatment system will have equipment such as pumps and clarifier mechanisms which are vulnerable to damage from grit, rags, etc., new inlet works will be required, including grit removal, screening, and inlet pumping. Refer to TM 2 – Septage Receiving and Headworks Facility for details.

3.2.2 Secondary Treatment

The following general upgrades are required to the secondary treatment system to reliably achieve ammonia objectives:

- Increase the solids retention time (SRT) of sludge by settling mixed liquor in a clarifier and returning activated sludge to the head of the aeration basin. This will allow the slow-growing nitrifying bacteria to be retained in the system even during peak flow periods and continue to provide treatment.
- Increase the capacity of the aeration system. The original mixers and floating aerators do not appear to be sufficient to meet oxygen demand and mixing requirements.

- Remove the facultative lagoon from the treatment train. The lagoon does not reliably reduce ammonia concentrations and in fact appears to release ammonia under certain conditions, worsening effluent quality.

The upgraded secondary treatment system can be described as an “extended aeration” system.

3.2.3 Disinfection

As a result of the proposed upgrades, the wastewater will no longer be passing through the facultative lagoon and benefitting from natural pathogen removal. The treatment system upgrades must therefore include a new effluent disinfection system to meet the ECA *E.Coli* removal requirements. The requirement for disinfection was also confirmed during a consultation meeting with MECP on September 23, 2022.

3.3 Conceptual Upgrades Summary

The proposed liquid train is shown schematically in the block flow diagram in Figure 2 below, where the orange dictates the solids train for the return-activated sludge (RAS) and waste-activated sludge (WAS), and blue dictates the liquid train.

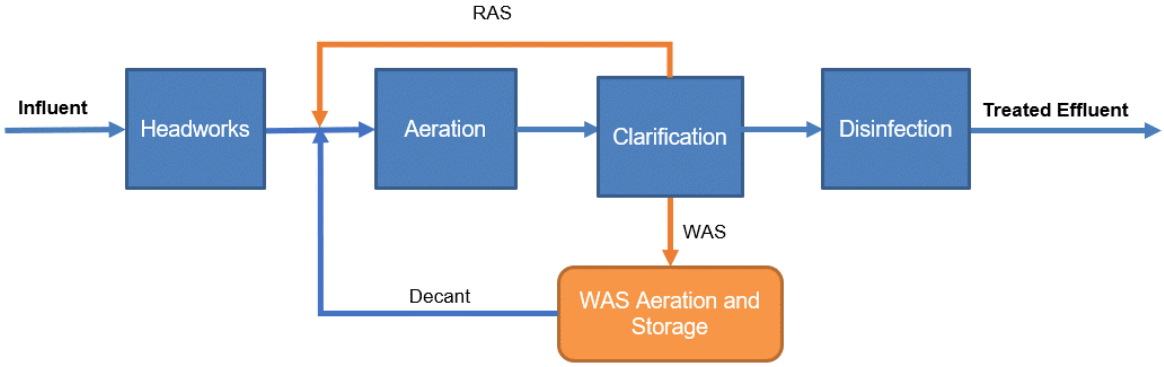


Figure 2: Proposed Brighton WWTS Liquid Train BFD

4.0 Secondary Treatment Alternatives

4.1 Option A – Upgrade Existing Aerated Lagoon

The EA addendum proposed using the existing aerated lagoon as the aeration basin when converting to the extended aeration concept. Proposed upgrades to the secondary treatment include the following:

- Remove catwalks in the aerated lagoon along with the original mixers and floating aerators.
- Install shore-based blowers and submerged aeration units distributed over the floor of the aerated cell.
- Install one or more new secondary clarifier. The new clarifier would separate the biological solids from the aerated lagoon effluent flow and sludge pumps would return the concentrated solids back to the inlet of the lagoon.

4.2 Option B – Upgrade Existing Aerated Lagoon and Divide into Two Cells

This option is identical to option A, with the additional step of installing a berm in the existing aerated lagoon to divide it into two cells. This concept would improve operational flexibility and redundancy.

4.3 Option C – Construct New Mechanical Plant

An alternative secondary treatment upgrade concept is to construct a new mechanical treatment plant on the site. Existing lagoon areas could be retrofitted for uses such as sludge storage/ treatment or equalization. A key advantage of this alternative is that the existing treatment system can remain in place during construction.

4.4 BioWin™ Model Configuration

BioWin™ process modelling software was used to develop the conceptual design of upgrade options for the Brighton WWTS. It was specifically used to confirm the sizing of the bioreactors for each design option to ensure that the upgraded Brighton facility will be capable of consistently meeting seasonal effluent quality requirements, even under variable influent flow and loading conditions. The modelling results also estimate sludge generation rates, which will be used to develop conceptual level requirements for the solids handling system which will be discussed further in TM 4 – Solids Train.

Two future influent loading scenarios were considered for modelling, namely:

- Scenario 1 – Domestic sewage only; and,
- Scenario 2 – Domestic sewage with co-treatment of hauled septage.

Modelled characteristics of these streams are documented in TM 1 – Design Basis. For each influent loading scenario, the three future extended aeration upgrade options described above were modelled, namely:

- Option A – Retaining the existing 14,300 m^3 lagoon cell, increasing oxygenation and mixing capacity, and adding downstream secondary clarification;
- Option B – Dividing the existing lagoon cell into two cells, each 4,900 m^3 and equipped with diffused aeration, and adding downstream secondary clarification; and,
- Option C – Constructing new 4.6 m deep, purpose-built bioreactors equipped with diffused aeration along with secondary clarification. Overall design bioreactor volumes of 2,830 m^3 (Scenario 1) and 3,570 m^3 (Scenario 2) were developed.

The Biowin™ Modelling Report in Appendix A contains detailed descriptions of the model calibration process, and the modelling characteristics and assumptions.

4.5 Biowin™ Modelling Results

4.5.1 Option A – Single Lagoon Cell

The Biowin™ model projects that effluent $cBOD_5$ and TSS concentrations are relatively consistent for all temperatures and loading scenarios. Effluent TAN concentrations are low for all influent loading factors and both with and without septage co-treatment. As expected, effluent TAN concentrations are slightly higher under cold weather operating conditions than warm weather. It

can therefore be concluded that the existing lagoon cell has sufficient volume to support year-round nitrification at the rated capacity of 4,600 m^3/d.

However, the model predicts SRT, organic loading rate (OLR) and food-to-microorganism ratio (F/M_v) values that are outside the typical range for extended aeration systems. This is due to the very large lagoon volume compared to a typical purpose-built bioreactor for the expected loadings. Operating at excessive SRT and very low F/M_v conditions can cause issues with sludge settleability. See the modelled values and typical values of these factors in Table 1.

4.5.2 Option B – Two Lagoon Cells

For Option B, the Biowin™ model projects that effluent $cBOD_5$ and TSS concentrations are relatively consistent for all temperatures and loading scenarios. Effluent TAN concentrations remain low for all influent loading factors for the facility operating both with and without septage co-treatment. As expected, effluent TAN concentrations are slightly higher under cold weather operating conditions than warm weather. It can be concluded that proposed modification of the existing lagoon cell into two smaller cells would have sufficient capacity to support year-round nitrification at the rated capacity of 4,600 m^3/d.

In addition to future modelling scenarios based on both aerated lagoon cells online, additional modelling scenarios were run for Option B based on operating the upgraded Brighton WWTS with only one of the two aerated cells online. The ability to operate the WWTS with only one aerated cell online for a prolonged period would facilitate equipment maintenance, repairs and lagoon cell clean-outs since such works would likely involve having one cell offline for several weeks or more. Under Option B, Scenario 1 (no septage co-treatment), the model-predicted effluent TAN concentrations meet the effluent targets under both warm and cold operating conditions even with one lagoon cell offline. Despite this, the model does predict elevated effluent nitrite nitrogen (NO_2-N) concentration under cold weather conditions and elevated loading rates, suggesting that the capacity of a single online lagoon cell is being reached. Similar results were observed for Scenario 2 (with septage co-treatment), however TAN concentrations were higher due to the increased loadings associated with the septage. This suggests that, under Option B, the WWTS could be operated with just one of the two aerated lagoon cells online under average influent loading conditions, and variable influent loadings in warmer, summer period.

Under Option B, with both cells online, the model predicts SRT and OLR values that are outside the typical range for extended aeration systems (see Table 1), but the values are closer to typical range as some of the original aerated cell volume has been taken up by the dividing berm. F/M_v is within the typical range. Sludge settleability is likely to be better than with Option A. This option provides operators with flexibility to operate with either one or two cells online based on observed loading and performance.

4.5.3 Option C – New Mechanical Extended Aeration Plant

Projected effluent $cBOD_5$ and TSS concentrations are relatively consistent for all temperatures and loading scenarios for Option C. Under warm weather operating conditions, projected effluent TAN concentrations remain low for all influent loading factors and both Scenario 1 and 2. As expected, effluent TAN concentrations are slightly higher under cold weather operating conditions than warm weather, however even at a 3x loading rate, the projected effluent TAN concentrations are well below the treatment targets. It can therefore be concluded that the proposed overall

bioreactor volumes of 2,830 m^3 (Scenario 1) and 3,570 m^3 (Scenario 2) would provide the required level of year-round nitrification performance under variable influent loading conditions.

As tank volumes were sized to meet typical design parameters for the expected loading, the model predicts SRT and F/M_v values within typical range for extended aeration systems, as seen in Table 1. OLR is close to typical range.

4.6 Biowin™ Modelling Summary

Key modelling assumptions and results are summarized below in Table 1. Overall, it can be concluded that all three upgrade options are feasible from a biological treatment (nitrification) capacity perspective. However, the high operating SRTs and large, shallower lagoon cells associated with Options A and B could cause poor sludge settleability, inconsistent biological treatment performance, and difficulty maintaining sufficient DO concentrations and mixing. Options B and C, which provide two bioreactors (or lagoon cells) operating in parallel, provide operational flexibility to allow bioreactor maintenance, repair and/or clean-out while maintaining some biological treatment capacity.

Table 1 – Summary of Future Scenario Modelling Results

Parameter [1]		Option A One Lagoon Cell	Option B Two Lagoon Cells	Option C New Bioreactors	Typical Values
Bioreactor(s)	Number	1	2	2	N/A
	Type	Lagoon cell	Lagoon cell	New purpose built	
	Volume per reactor	14,300 m^3	4,900 m^3	1,425-1,785 m^3	
	Volume total	14,300 m^3	9,800 m^3	2,830-3,570 m^3 [2]	
Modelled Operating Values	MLSS concentration	2,500 mg/L	2,500 mg/L	4,000 mg/L	3000 - 5000 mg/L [3]
	DO concentration	2.0 mg/L	2.0 mg/L	2.0 mg/L	≥2 mg/L[3]
Modelled Bioreactor Temperatures	Cold weather	5 °C	8°C	10 °C	N/A
	Warm weather	15°C	15 °C	15 °C	
Model-Predicted Average Effluent TAN	*Scenario 1*				N/A
	Cold weather	0.53 mg/L	0.48 mg/L	0.60 mg/L	
	Warm weather	0.27 mg/L	0.29 mg/L	0.39 mg/L	
	Scenario 2				
	Cold weather	0.57 mg/L	0.53 mg/L	0.61 mg/L	
	Warm weather	0.28 mg/L	0.31 mg/L	0.40 mg/L	
Model-Predicted Operating SRT	*Scenario 1*	65 d	43 d	18 d	15 - 18 d [4]
	Scenario 2	45 d	32 d	17 d	
Design Average WAS Generation Rate	*Scenario 1*	631 kg/d	653 kg/d	754 kg/d	N/A
	Scenario 2	861 kg/d	894 kg/d	951 kg/d	
Model Predicted Average Operating F/M_v	*Scenario 1*	0.04 d^{-1}	0.06 d^{-1}	0.11 d^{-1}	0.05 - 0.15 d^{-1} [3]
	Scenario 2	0.05 d^{-1}	0.07 d^{-1}	0.11 d^{-1}	
Model Predicted Average Operating OLR	*Scenario 1*	0.05 kg/m^3/d	0.08 kg/m^3/d	0.27 kg/m^3/d	0.17 - 0.24 kg/m^3/d [3]
	Scenario 2	0.07 kg/m^3/d	0.10 kg/m^3/d	0.27 kg/m^3/d	

Notes:
(1) Where Scenario 1 has no septage, and Scenario 2 has co-treatment with septage.
(2) The low end of the range represents the modelled bioreactor volume for Scenario 1, while the upper end of the range is for Scenario 2.
(3) Per MECP Design Guidelines for Sewage Works, 2008
(4) 15 d minimum per MECP Design Guidelines for Sewage Works, 2008. 18 d maximum per Metcalf & Eddy Wastewater Engineering Treatment and Resource Recovery, 2014.

4.7 Analysis of Secondary Treatment Options

Table 4 provides a summary of the advantages and disadvantages of each of the secondary treatment options.

Table 2 – Summary of Secondary Treatment Options

Option	Advantages	Disadvantages
Option A – One Lagoon Cell	• No new aeration tankage or earthworks (berming) required • Uses existing infrastructure	• Performance concerns due to oversized basin • No redundancy • Requires phased construction and temporary treatment of raw sewage in facultative lagoon • Higher risk of discharge compliance limit exceedances during cold-weather construction • Higher capital and operating costs for aeration equipment to mix larger volume • Desludging required before construction
Option B – Two Lagoon Cells	• Redundancy provided enabling future maintenance • Uses existing infrastructure • Higher treatment performance than option 1	• Requires phased construction and temporary treatment of raw sewage in facultative lagoon • Higher risk of discharge compliance limit exceedances during cold-weather construction • Higher capital and operating costs for aeration equipment to mix larger volume • Desludging required prior to construction
Option C – Purpose Built Bioreactors	• Redundancy provided enabling future maintenance • Can be constructed and commissioned in the shortest amount of time without disruption to treatment process or need for temporary treatment • Existing lagoon cells do not need to be cleaned out and can be repurposed for flow equalization and waste activated sludge treatment	• Reduced use of existing infrastructure

Option	Advantages	Disadvantages
	• Best overall treatment performance	

Based on the above analysis and through discussions with the Municipality and the MECP, Option C – Purpose Built Bioreactors is recommended.

4.8 Conceptual Design

The conceptual design of the secondary treatment train is summarized in the table below. Purpose-built concrete aeration tanks equipped with fine-bubble diffuser grids will be located in a new mechanical plant to be located north of the existing lagoons. Exact location will be determined following the completion of ongoing topographical and geotechnical studies. Raw sewage entering the aeration tanks will be combined with return activated sludge and aerated for biological treatment. Mixed liquor leaving the aeration tanks will pass into the new concrete secondary clarifier tanks for solids separation. The secondary clarifiers will be equipped with chain and flight sludge and scum collectors to direct sludge and scum to hoppers from which the sludge and scum can be pumped. Clarified effluent will overflow into weirs and be directed into the disinfection process.

Aeration blowers and sludge pumps will be located in the new building between the aeration tanks and the secondary clarifier tanks. Sludge wasting will be done from the RAS pump discharge line using an actuated valve. Electrical equipment will be housed in the building in a dedicated electrical room.

Table 3 – Conceptual Secondary Treatment Design Parameters

Parameter	Value
Number of Aeration Tanks	2
Aeration Tank Length x Width x Sidewater Depth	33 m x 12.05 m x 4.5 m
HRT at ADF [1]	18.7 h
Actual Oxygen Requirement (AOR) [2]	4,942 kg/d
Secondary Clarifier Surface Area [3]	481 m^2
Number of Clarifiers	2
Clarifier Length x Width x Sidewater Depth	33 m x 9 m x 4 m
Number of RAS Pumps	2 Duty + 1 Standby
RAS Pump Capacity (each)	53.2 L/s

Notes:

(1) Greater than 15h minimum for Extended Aeration per MECP Design Guidelines (2008).
(2) Actual Oxygen Requirement (AOR) is calculated assuming 1.5 kg O2 per kg BOD5 and 4.6 kg O2 per kg TKN is required for Extended Aeration per MECP Design Guidelines (2008). Design BOD5 loading is calculated based on ADF and average influent concentrations. Design TKN loading is calculated based on plant MDF and average influent concentrations.
(3) For Surface Overflow Rate < 37 $m^3/m^2/d$ at Peak Hourly Flow of 17,813 m^3/d, Solids Loading Rate < 170 $kg/m^2/d$ at Maximum Day Flow and MLSS of 4000 mg/L, for Extended Aeration per MECP Design Guidelines (2008).

5.0 Disinfection Alternatives

Based on the discussions with the Municipality and review of disinfection options, the most common disinfection technologies are UV disinfection and chlorination/dechlorination, these options investigated for use at the Brighton WWTS.

5.1 Option 1 – UV Disinfection

UV disinfection is a commonly used disinfection method to treat WWTP effluent. This system consists of a series of lamps which are electrically powered. UV light disrupts genetic material sequencing, preventing cell replication and reducing the number of pathogen counts in the wastewater effluent. In the electromagnetic spectrum, the germicidal wavelength range for UV light is between 200 to 300 nm. The optimal disinfection wavelength is 254 nm. Unlike chemically based disinfection processes, UV disinfection does not generate any chemical byproducts or residuals. UV disinfection performance is dependent on UV light intensity at the optimal 254 nm wavelength as well as the exposure time and absorbance of UV light. Generally speaking, UV lamps can be classified into one of three categories, including low-pressure low-intensity (LPLI), low-pressure high-intensity (LPHI), and medium-pressure high-intensity (MPHI). The decision on which lamp to use is specific to each WWTP. Since UV disinfection equipment is proprietary, the equipment supplier typically provides the selection. Smaller plants, like the Brighton WWTS, are more likely to use low-pressure low-intensity lamps than larger plants. Refer to the supplier quote received from Trojan UV in Appendix B on their proposed system for the Brighton WWTS.

UV disinfection systems are typically located indoors. The lamps would be installed in a new concrete channel, with supporting equipment installed at ground level nearby. A level control device is typically required to ensure that the lamps are submerged with no bypass of treatment, and a flow signal can be used to modulate lamp intensity for energy savings. If the latter approach is used, an effluent flow meter (e.g. flume) could be installed upstream or downstream of the UV system.

The proposed UV system incorporates automatic cleaning of the quartz sleeves, which reduces maintenance efforts by staff. With the proposed low-pressure low-intensity lamps, the lamps would be expected to be replaced at most once per year. Operational cost items include electricity, replacement parts, and operator time.

If this option is selected as the preferred option, a UV transmittance test must be completed by the supplier.

5.2 Option 2 – Chlorination/Dechlorination

Chlorination/dechlorination system typically consist of injecting a chlorine solution (e.g., sodium hypochlorite) or chlorine gas. Chlorination disinfection occurs when the chlorine residual from the selected solution surrounds pathogens present in the influent and oxidizes the cell walls, killing the microorganisms. A chlorine contact tank is usually required to ensure sufficient contact time for reaction. After chlorine disinfection is complete, the effluent will need to undergo dechlorination prior to discharge into the natural environment. A dechlorination chemical (e.g., sodium bisulphite, sodium metabisulphite, etc.) is used to reduce the total chorine residuals. This step is vital to minimize the effect of potentially toxic disinfection byproducts on sensitive ecosystems.

The chlorination/dechlorination system can be designed to be automatically monitored and controlled using online analyzers (e.g. ORP sensor).

The implementation of a chlorination/dechlorination system at the Brighton WWTS would involve new chemical storage within the new plant, metering pumps, instrumentation, an in-ground chlorine contact tank, and a new chemical room to house the new system. The system would be fully automated and integrated into the plant-wide SCADA system.

Operational cost items include chemical supply, equipment calibration, replacement of parts and operator time. For operating cost calculations, sodium hypochlorite and sodium bisulphite were assumed for the chlorination and dichlorination chemicals, respectively.

5.3 Analysis of Disinfection Options

Table 4 provides a summary of the advantages and disadvantages of each of the disinfection option.

Table 4 – Summary of Disinfection Options

Disinfection Option	Advantages	Disadvantages
Option 1 - UV Disinfection	• No chemical handling or chemical delivery cost • Fully automated system with minimum operator monitoring • Chlorine contact tank not required	• Treatment performance is susceptible to effluent quality (e.g. suspended solids) • Higher equipment costs • Higher electricity consumption • New technology to the WWTP operators and requires additional training • Proprietary system that requires supplier site visits to resolve issues
Option 2 - Chlorination/ Dechlorination	• Proven technology not dependent on specific equipment vendor • Lower equipment cost • Low electricity consumption • Operator familiarity with chemical dosing systems	• Construction cost of chlorine contact tank • Increased chemical usage and cost • Handling of hazardous chemicals required • Chemical dosing and treatment performance are susceptible to effluent quality (e.g. nitrite)

As shown, the two technologies have similar advantages and disadvantages as both are now established technologies for wastewater treatment systems of this size, have vulnerabilities related to effluent quality (suspended solids for UV, nitrite for chlorination/dichlorination), and have tradeoffs with respect to various capital and operating cost elements. JLR has performed a 20-year Net Present Value calculation for each alternative, which is summarized in Table 5.

Table 5 – Disinfection Net Present Value Results

	Option 1 – UV Disinfection	Option 2 – Chlorination/Dechlorination
Opinion of Probable Construction Cost	$1,890,000	$1,910,000
Estimated Average Annual Operation and Maintenance Cost	$17,080	$17,780
20-Year NPV	$2,230,000	$2,280,000

Notes:
(1) Capital OPCs include costs for installation, contractor markup (~20%).
(2) All OPCs exclude HST.
(3) All OPCs in 2023 dollars.
(4) NPV calculations assumed an interest rate of 1% and an escalation rate of 2%.

Based on the above analysis, Option 1 – UV Disinfection is the preferred option.

5.4 Conceptual Design

The conceptual design of the disinfection system is summarized in the table below. The disinfection system will be located in a dedicated room in the new building described above. The UV system is installed in an open channel and includes an automatically adjusting gate to control the water level. A second channel is proposed for by-pass/ future expansion purposes.

Table 6 – Conceptual Disinfection Design Parameters

Parameter	Value
Rated Peak Capacity	17,813 m^3/d
Number of UV Banks	3 (2 Duty, 1 Standby)
Number of UV Lamps	72 (24 for redundancy)
UV Channel Width	0.9 m
UV Channel Length	11.1 m

Notes:
(1) Disinfection is sized based on design criteria treatment limit of 126 E.coli/100 mL and total suspended solids of 30 mg/L.

6.0 Construction Sequencing and Temporary Treatment

To implement the recommended alternative, the new mechanical plant with headworks, aeration basins, clarifiers, and disinfection will be constructed while the existing lagoons remain in service. Once the plant is built and commissioned, sewage will be directed to the new plant allowing the lagoons to be modified as required. A key driver in arriving at the recommended alternative was the need to provide comprehensive treatment through the duration of construction. Option C, with its purpose-built aeration basins, removes the need for temporary treatment.

On December 14th, 2023, JLR and the Municipality met with the MECP to discuss temporary treatment options during construction. The MECP specified that the Municipality will remain

responsible for meeting current effluent compliance limits during construction. See the meeting minutes in Appendix C. The temporary treatment method investigated for secondary treatment Option B involved adding aeration to and using the facultative lagoon for biological treatment. Given the combination of past nitrification issues, and that the lagoon construction would occur during cold-weather months when nitrification decreases, there is added risk that the effluent compliance limits would not be met. With secondary treatment Option C, the WWTS will operate as normal during construction.

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Appendix A

BioWin Modelling Report

Draft Technical Memorandum
Brighton WWTS –
Biological Process Modelling

November 7, 2023

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1. Introduction

1.1 Overview

Upgrades are planned for the Brighton WWTS to improve its biological treatment performance, particularly with respect to nitrification. Alternative upgrade options under consideration include modifying the existing flow-through aerated lagoon system into an extended aeration facility, using either the existing lagoon cell or new purpose-built tankage as a bioreactor, and providing downstream secondary clarification with return activated sludge (RAS) pumping. In addition to domestic wastewater, the upgraded facility may also be utilized to provide septage co-treatment, which will impact influent characteristics and loadings, and design requirements of the bioreactor(s), oxygenation system and sludge handling process(es).

Blue Sky EEC has been retained to utilize the biological process modelling software package BioWin™ to assist in the development of conceptual level upgrade options for the Brighton WWTS. In particular, the objective of the modelling will be to confirm the biological treatment capacity of each design option (aerated lagoon cell(s) or new purpose-built aeration tanks) to ensure that the upgraded facility will be capable of consistently meeting seasonal effluent quality requirements, even under variable influent flow and loading conditions. Nitrification performance can be negatively impacted during cold weather periods, and was highlighted as a potential concern for the upgraded facility particularly for options that utilize aerated lagoon cell(s), since these can be expected to operate at temperatures lower than a purpose-built bioreactor during cold weather periods.

1.2 Objectives

The specific objectives of the assignment are to:

- Develop a calibrated model of the Brighton WWTS' existing aerated lagoon;
- Utilize results of the calibration process to predict future nitrification performance to assess the feasibility of two alternative aerated lagoon upgrade options (defined by others);
- Confirm bioreactor sizing requirements for new purpose-built tankage for a new extended aeration mechanical plant;
- Assess the impact of accepting septage for co-treatment on lagoon upgrade options and purpose-built extended aeration tankage;
- Document projected sludge generation rates and oxygen uptake rates; and,
- Identify potential process and operational opportunities and concerns associated with each upgrade option that are not necessarily captured by the BioWin™ modelling.

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2. Model Configuration

2.1 Alternative Configurations Used

A BioWin™ model of the existing Brighton WWTS was developed and a graphical representation (screenshot from BioWin™) is shown in Figure 2.1. This model configuration was used for calibration activities, and consists of a pass-through aerated lagoon.

BioWin™ models of the upgraded Brighton WWTS were also developed for various upgrade options. Graphical representation (screenshot) from BioWin™ are shown in Figures 2.2 to 2.4. The models vary in their assumptions regarding bioreactor number, volume and aeration technology. However, they all assume a new ferric chloride addition point upstream of the new secondary clarifier(s) to provide chemical phosphorus removal.

To simplify the model configuration and output, the following set-up approach was used:

- Only the secondary treatment system was modelled (i.e. the existing effluent holding / polishing cell was not included). Because the model is being used to confirm biological treatment capacity, particularly in terms of nitrification, it was only necessary to ensure that effluent TAN targets (see Section 2.2) can be met immediately downstream of the biological treatment process.
- The lagoon cells were modelled using BioWin™'s bioreactor unit process. Oxygenation was modelled using either mechanical aeration or diffused aeration. Details for each model configuration are discussed in Sections 3 and 4 as appropriate.
- Raw wastewater and septage were modelled as separate influent streams to simplify future modelling runs, and to allow separate adjustment of influent fractions for each influent streams.
- A single secondary clarifier was modelled for all upgraded facility model configurations. An ideal clarifier was used to model secondary sedimentation, which allows for a defined rate of solids removal. BioWin™ has limited capacity to model secondary clarifier performance and, given the current configuration of the WWTS, there were insufficient data available to calibrate a secondary sedimentation system.

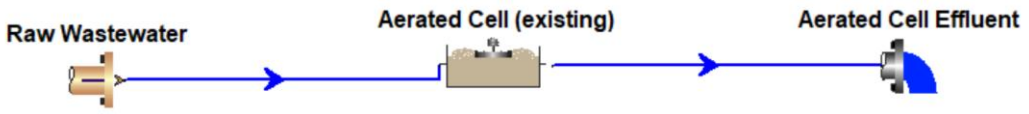


Figure 2.1 – Configuration of the BioWin™ Model of the Existing Brighton WWTS

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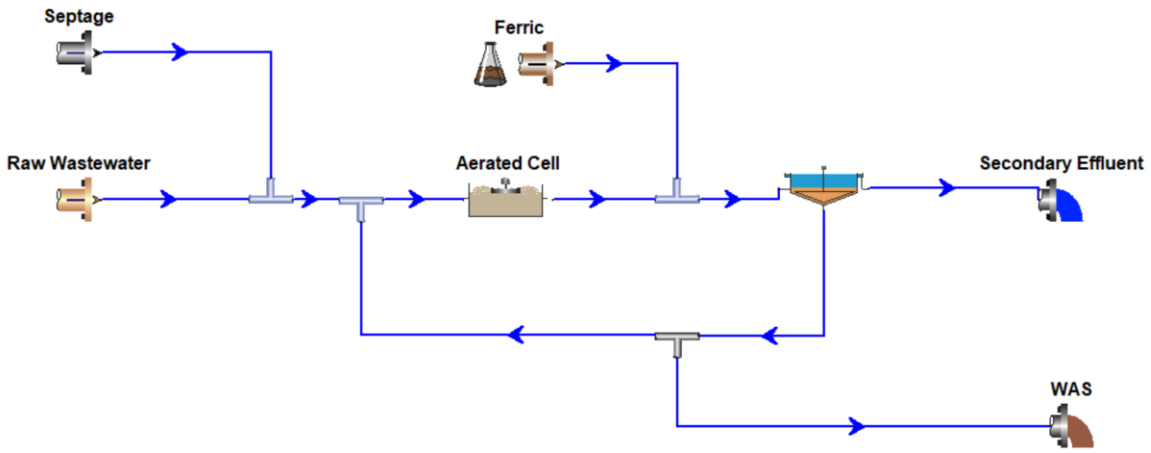


Figure 2.2 – Configuration of the BioWin™ Model of the Brighton WWTS Upgraded to Provide Extended Aeration Using a Single Lagoon Cell (Option A)

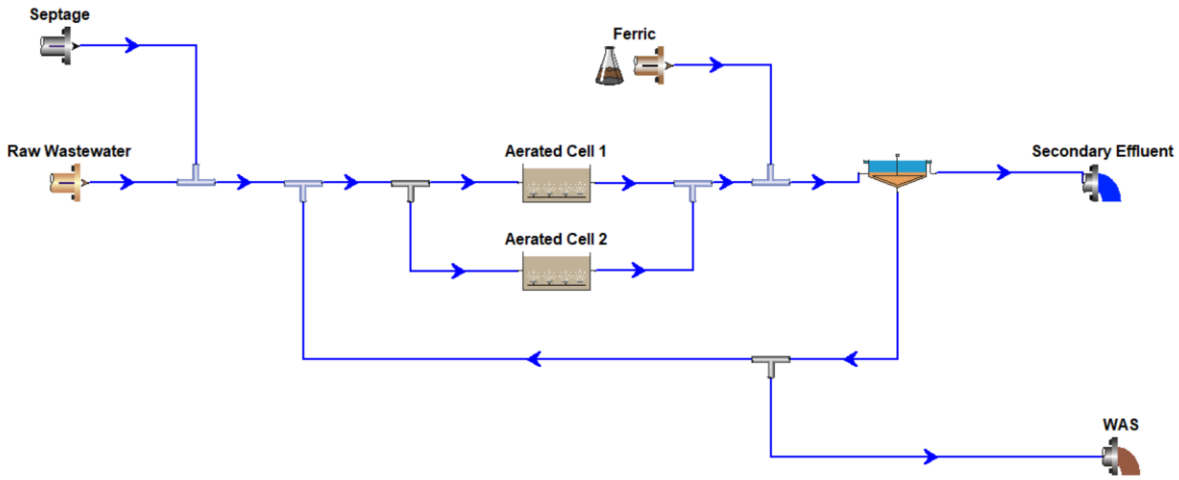


Figure 2.3 – Configuration of the BioWin™ Model of the Brighton WWTS Upgraded to Provide Extended Aeration Using a Two Lagoon Cells (Option B)

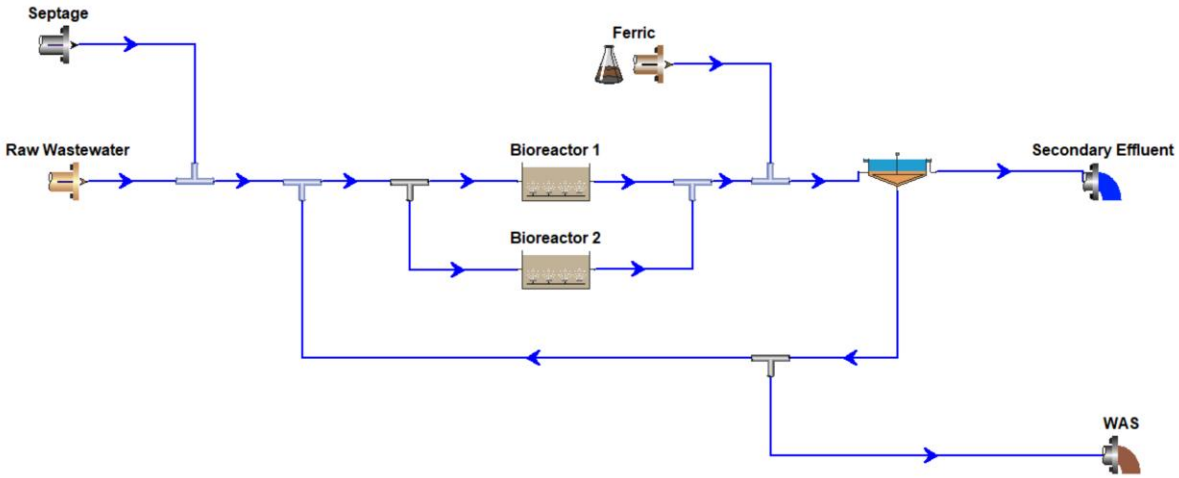


Figure 2.4 – Configuration of the BioWin™ Model of the Brighton WWTS Upgraded to Provide Extended Aeration Using a Purpose-Built Bioreactors (Option C)

2.2 Assumed Treatment Requirements

Anticipated future Brighton WWTS effluent criteria were defined in TM1 – Design Basis (JLR, 2023), and are summarized in Table 2.1. For the purposes of completing the biological process modelling, the key effluent targets are:

- Seasonal effluent TAN limits: Ability to achieve required levels of nitrification is directly related to bioreactor capacity. Bioreactor capacity will be assessed against achieving the seasonal design objectives as indicated in Table 2.1.
- Effluent TP limits: Sufficient coagulant (ferric chloride) must be added to the system to reduce effluent ortho-phosphate (PO_4) concentrations. Coagulant addition results in chemical sludge generation which affects sludge wasting rates and, by extension, bioreactor capacity. The required ferric chloride dose was assessed against achieving a final effluent PO_4-P target concentration of 0.5 mg/L or less under average loading conditions.

Providing consistent year-round nitrification, sufficient coagulant addition and effective sedimentation should allow the upgraded Brighton WWTS to also meet the projected $cBOD_5$ and TSS requirements. Disinfection (not modelled) will be required to meet E. coli targets.

Table 2.1 – Anticipated Future Brighton WWTS Effluent Criteria

Parameter	Design Objective [1]	Compliance Limit [1]
$cBOD_5$	15.0 mg/L	30.0 mg/L
TSS	15.0 mg/L	40.0 mg/L
TP	0.8 mg/L	1.0 mg/L
TAN		
May 1 to Oct 31	10.0 mg/L	14.0 mg/L
Nov 1 to Apr 30	15.0 mg/L	17.0 mg/L
E. coli	100 CFU/100 mL	200 CFU/100 mL
pH	6.5 – 9.0	6.0 – 9.5

Notes:

$cBOD_5$ – 5-day carbonaceous biochemical oxygen demand

TSS – total suspended solids

TP – total phosphorus

1. Sample location upstream of the constructed wetland. pH based on single sample grab result. E. coli based on monthly geometric mean.

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3. Model Calibration

3.1 Approach, Data and Assumptions Used

Model calibration was based on results of operating data over the period Jan-Feb 2021 (cold weather operation) and July-Aug 2022 (warm weather operation), as well as additional raw wastewater sampling data collected over the period August 1 to Augst 11, 2023. Characteristic data were available for the raw wastewater and aerated lagoon effluent. Influent parameter ratios for the raw wastewater were based on available sampling data, while septage characteristic data outlined in TM 1 – Design Basis (JLR, 2023) were used to develop influent parameter ratios for septage.

Influent wastewater temperature was adjusted to recorded values (9.8°C for cold weather, 18.6°C for warm weather), and local aerated lagoon temperature set to recorded values (6.8°C for cold weather, 22.7°C for warm weather). The current WWTS operating strategy involves operating the mechanical aerators from approximately 3 pm to 8 am. From 8 am to 3 pm, aeration is suspended to allow biomass and other solids to settle, and the effluent stop logs are removed allowing effluent flow from the lagoon. Dynamic simulations were run using this aeration strategy; however, due to limitations in the BioWin™ software, it was not possible to model the intermittent effluent flow from a mechanically aerated bioreactor. As a result, all simulations were based on continuous effluent discharge. Dynamic simulations were run for 42 d, and it was assumed that recorded lagoon effluent quality was based on grab sample collection at approximately 1 pm with the exception of dissolved oxygen (DO), which was assumed to be measured at approximately 8 am before aeration in the lagoon cell is suspended.

3.2 Influent Characterization

3.2.1 Raw Wastewater

A "BOD Influent" model process unit was used to characterize the domestic raw wastewater. To match the raw wastewater characteristics data, it was necessary to modify several parameter fractions as outlined in Table 3.1. All other fractions remained at their default values.

Table 3.1 – Raw Wastewater Fractions Adjusted from BioWin™ Default Values During Calibration

Parameter	Default Value	Calibrated Value
Fxsp (non-colloidal slowly biodegradable COD, g COD/g slowly biodegradable COD)	0.7500	0.9153
Fna (ammonia, g NH3-N/g TKN)	0.6600	0.9000
Fpo4 (phosphate, g PO4-P/g TP)	0.5000	0.7400

3.2.2 Septage

A "COD Influent" model process unit was used to characterize the potential septage influent stream. As noted above, key parameter values were taken from TM 1 – Design Basis (JLR, 2023). Additional assumptions were made regarding ratios of volatile / inert and readily biodegradable fractions of various

parameter, and the built-in BioWin™ Influent Specifier Tool was used to adjust parameter fractions as necessary (see Table 3.2). All other fractions remained at their default values.

Table 3.2 – Septage Fractions Adjusted from BioWin™ Default Values During Calibration

Parameter	Default Value	Calibrated Value
Fbs (readily biodegradable, gCOD/g of total COD)	0.1600	0.3731
Fac (acetate, gCOD/g of readily biodegradable COD)	0.1500	0.1340
Fxsp (non-colloidal slowly biodegradable, gCOD/g of slowly degradable COD)	0.7500	0.6904
Fus (unbiodegradable soluble, gCOD/g of total COD)	0.0500	0.0019
Fup (unbiodegradable particulate, gCOD/g of total COD)	0.1300	0.2000

In addition to the above, BioWin™ recommended adjusting various COD : VSS ratios; however, doing so would make a global adjustment to both the septage and raw wastewater influent streams. As a result, the septage "COD Influent" underrepresents design septage influent TSS and VSS concentrations (modelled TSS values of approximately 6,700 mg/L vs. the design value of 12,900 mg/L). The potential impact of this on model-predicted bioreactor performance and WAS generation rates are discussed in more detail in Section 4.

3.3 Results

3.3.1 Calibration of Unit Process Performance

Given the simplicity of the existing system, there were only two modifications that needed to be made to the flow-through aerated lagoon cell, namely:

- Setting a local liquid temperature (6.8°C for cold weather, 22.7°C for warm weather); and,
- Turning the model's "DO Modelling" on, and setting the mechanical aerator input power to 67.7 kW, to match currently installed equipment.

All kinetic parameters were left at their default values.

3.3.2 Comparison of Modelled vs. Actual Performance

Table 3.3 presents key model input parameters, model output and associated plant performance (as measured by operations staff) for both the warm and cold weather calibration periods. The results are discussed in more detail below.

Model predicted values of DO, $cBOD_5$ and TP matched the operating data fairly well under both warm and cold operating conditions. Matching of TSS concentrations was more variable, with good agreement during warm weather operation, but diverging significantly during cold weather operation. Several limitations associated with the model may have contributed to the poor match in effluent TSS data, namely: the model cannot capture settling in the lagoon cell when aerators off; and, the sampling time and/or procedure used could have significant impacts on recorded TSS concentration.

In terms of nitrification performance, effluent TAN matches well for the warm weather period. Model predicted TAN is lower for the cold weather period, however the model also indicates unstable nitrification during the cold weather period (very high effluent nitrite nitrogen, NO_2-N). This suggests that the model was able to accurately predict poor and unstable nitrification performance under the cold weather operating conditions, however with less of a safety factor than the model's warm weather prediction. In terms of effluent nitrate nitrogen (NO_3-N) and NO_2-N concentrations, the model predicted values do not match the operating data well.

There could be a number of reasons for these discrepancies, including the inability for the model to assess the impact of biomass settling during the "aeration off" period and the impact this might have on overall treatment performance, nor is it able to model the impact of variation of DO and/or biomass concentrations throughout the lagoon during periods when the mechanical aerators are on. Given that the model will be used to assess the capacity of the upgraded facility to meet effluent TAN targets, and that future modelling scenarios will be based on bioreactors with improved and constant aeration and mixing, the variations in actual vs. model predicted NO_3-N and NO_2-N concentrations were considered to be acceptable.

Table 3.3 – Calibrated Model Output vs. Actual Plant Performance

Parameter	Warm Weather		Cold Weather	
	Historic Data	Modelled Value	Historic Data	Modelled Value
Model Input Values [1]				
Raw Wastewater Flow (m^3/d)	2,221	2,221	2,440	2,440
Raw BOD_5 (mg/L)	197	197	127	127
Raw TSS (mg/L)	208	208	133	133
Raw VSS (mg/L)	191	191	123	123
Raw TKN (mg/L)	44.9	44.9	45.1	45.1
Raw TP (mg/L)	4.62	4.62	4.8	4.8
Raw pH (mg/L)	7.8	7.8	8.0	8.0
Aerated Cell Effluent				
DO (mg/L)	4.8	4.7	6.7	7.6
$cBOD_5$ (mg/L)	61	55.4	38.3	46.7
TSS (mg/L)	169	146	196	105
TP (mg/L)	3.16	4.62	4.62	4.80
TAN (mg/L)	1.2	1.2	22.5	8.2
NO_3-N (mg/L)	3.7	20.1	1.4	7.5
NO_2-N (mg/L)	3.1	0.13	0.1	16.2
pH	6.8	7.5	7.2	7.6

Notes:

1. Raw wastewater alkalinity left at default value.

4. Modelling Future Upgrade Scenarios

4.1 Assumptions

Two future influent loading scenarios were considered, namely:

- Scenario 1 – Domestic raw wastewater only; and,
- Scenario 2 – Domestic raw wastewater with co-treatment of hauled septage.

Modelled characteristics of these streams are taken from TM 1 – Design Basis and presented in Table 4.1. For each influent loading scenario, several future extended aeration upgrade options were modelled, namely:

- Option A – Retaining the existing 14,300 m^3 lagoon cell, increasing oxygenation and mixing capacity, and adding downstream secondary clarification;
- Option B – Dividing the existing lagoon cell into two cells, each 4,900 m^3 and equipped with diffused aeration, and adding downstream secondary clarification; and,
- Option C – Constructing new 4.6 m deep, purpose-built bioreactors equipped with diffused aeration along with secondary clarification. Overall design bioreactor volumes of 2,830 m^3 (Scenario 1) and 3,570 m^3 (Scenario 2) were developed.[1]

Model runs were completed for both cold and warm operating conditions. A summary of the modelling scenarios and their base influent flows are presented in Table 4.2.

For the lagoon-based options (Option A and B), it was assumed that they would be operated at an MLSS concentration of 2,500 mg/L; for Option C, an MLSS concentration of 4,000 mg/L was assumed, which is the mid-point of the typical design range of 3,000 to 5,000 mg/L (MOE, 2008). For all upgrade options, the operating bioreactor DO was set to 2.0 mg/L. As noted in Section 2, an ideal clarifier was modelled, and it was assumed that solids removal rates would be 99.8% for Options A and B (BioWin™ default value), and 99.9% for Option C. Finally, a RAS : ADF ratio of 100% was assumed for all options, and a ferric chloride dose of 20 mg/L as Fe.

To evaluate performance at increased loading rates, concentrations of raw wastewater parameters were increased step-wise (e.g. at a 2.0 loading factor, concentrations of all parameters would be 2.0 times the values presented in Table 4.1). Increased loadings of septage were simulated by increasing the volume (e.g. at a 2.0 loading factor, the volume of septage would be 2.0 times the value presented in Table 4.1). Typical Design Guidelines (MOE, 2008) base minimum design SRT on the ability of a system to maintain required treatment performance at an influent loading factor of 1.5. Given the potential underestimate of model predicted effluent TAN concentrations under cold weather operating conditions (see Section 3), and uncertainties regarding variability in future influent loadings associated with septage co-treatment, all future modelling scenarios were assessed against meeting required effluent TAN quality at a loading factor of 3.0, or twice the typical design loading factor.

[1] Based on a design solids retention time (SRT) of 15 d, assumed operating MLSS concentration of 4,000 mg/L and typical WAS yield of 1 kg WAS/kg influent BOD_5.

Table 4.1 – Future Projected Raw Wastewater and Septage Concentrations Used in Modelling Runs

Parameter	Raw Wastewater	Septage
$cBOD_5$ (1)	164 mg/L	6,597 mg/L (2)
TSS	167 mg/L	6,735 mg/L (3)
TP	45.0 mg/L	100 mg/L (4)
TKN	4.6 mg/L	600 mg/L (4)
pH	8.0	7.30 (5)

Notes:

Raw wastewater alkalinity was adjusted as necessary to maintain bioreactor pH at approximately 7.0.

1. As a conservative measure, projected BOD_5 concentrations were modelled as $cBOD_5$ concentrations.
2. Calculated by BioWin™ based on influent ratios and an inputted COD of 13,000 mg/L. Consistent with TM 1 design value of 6,500 mg/L.
3. Calculated by BioWin™ based on influent ratios. Less than the TM 1 design value of 12,900 mg/L.
4. From TM 1 – Design Basis.
5. Default BioWin™ pH value.

Table 4.2 – Summary of Future Operating Scenarios Modelled

Scenario	Description	Influent Flows		Liquid Temperatures	
		Raw	Septage	Influent	Bioreactor
1A	One lagoon cell (14,300 m^3 total volume)	4,600 m^3/d	0 m^3/d	Cold: 10 °C Warm: 15 °C	Cold: 5 °C Warm: 15 °C
2A		4,596 m^3/d	31 m^3/d		
1B	Two lagoon cells (9,800 m^3 total volume)	4,600 m^3/d	0 m^3/d	Cold: 10 °C Warm: 15 °C	Cold: 8 °C Warm: 15 °C
2B		4,596 m^3/d	31 m^3/d		
1C	New bioreactor tankage (2,830 to 3.570 m^3 total volume)	4,600 m^3/d	0 m^3/d	Cold: 10 °C Warm: 15 °C	Cold: 10 °C Warm: 15 °C
2C		4,596 m^3/d	31 m^3/d		

4.2 Upgrade Option A – Single Lagoon Cell

4.2.1 Projected Nitrification Performance and Effluent Quality

Model predicted secondary effluent quality for Option A (single lagoon cell upgrade) is presented in Table 4.3. Values are presented for Scenario 1 (no septage) and Scenario 2 (with septage) at three influent loading factors: Average, equivalent to the average design values presented in TM 1 – Design Basis; 2 x Average; and 3 x Average.

Table 4.3 – Option A – Model Predicted Secondary Effluent Quality

Parameter	Scenario 1A – No Septage Loading Factors			Scenario 2A – With Septage Loading Factors		
	Average	2 x Average	3 x Average	Average	2 x Average	3 x Average
Cold Weather						
$cBOD_5$ (mg/L)	1.9	2.7	3.5	2.1	3.1	3.8
TSS (mg/L)	10.2	10.5	10.7	10.3	10.5	10.8
TAN (mg/L)	0.53	0.66	0.8	0.57	0.77	1.06
NO_3-N (mg/L)	33.0	65.9	97.7	33.7	66	96.3
NO_2-N (mg/L)	0.10	0.13	0.17	0.11	0.16	0.25
PO_4-P (mg/L)	0.46	0.75	1.41	0.4	0.66	0.87
TP (mg/L)	0.79	1.13	1.78	0.69	0.97	1.18
Warm Weather						
$cBOD_5$ (mg/L)	1.7	2.4	3.0	1.9	2.6	3.3
TSS (mg/L)	10.0	10.1	10.4	10.3	10.4	10.5
TAN (mg/L)	0.27	0.31	0.34	0.28	0.33	0.39
NO_3-N (mg/L)	33.7	67.2	99.9	34.6	67.9	99.4
NO_2-N (mg/L)	0.06	0.07	0.08	0.06	0.07	0.09
PO_4-P (mg/L)	0.49	0.79	1.58	0.44	0.75	1.07
TP (mg/L)	0.81	1.16	1.96	0.73	1.07	1.38

Projected effluent $cBOD_5$ and TSS concentrations were relatively consistent for all temperatures and loading scenarios. As noted above, conditions that promote year-round nitrification also provide high level BOD removal. In addition, because the model utilizes an ideal secondary clarifier, effluent TSS concentration is expected to remain constant since it is a function of operating MLSS concentration only.

Projected effluent TAN concentrations remain low for all influent loading factors and assuming the facility is operating both with and without septage co-treatment. As expected, effluent TAN concentrations are slightly higher under cold weather operating conditions than warm weather. It can therefore be concluded that the existing lagoon cell has sufficient volume to support year-round nitrification at the rated capacity of 4,600 m^3/d.

4.2.2 Projected Waste Sludge Generation Rates

Model predicted average waste sludge generation rates under cold weather operating conditions are:

- Scenario 1A – 549 kg/d; and,
- Scenario 2A – 749 kg/d.

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These represent average sludge generation rates when the facility is operating at its rated capacity of 4,600 m^3/d. Maximum month generation rates would depend on the anticipated peak influent loading rate.

The average sludge generation rates are equivalent to solids yields of 0.73 kg WAS/kg BOD (Scenario 1A) and 0.79 kg WAS/kg BOD (Scenario 2A). These are lower than typically observed yields of 0.9 to 1.1 kg WAS/kg BOD observed at other Ontario extended aeration facilities. This is likely due to the high projected solids retention time (SRT) in the bioreactor (65 d and 45 d on average for Scenarios 1A and 2A, respectively). Operating at high SRT can negatively impact sludge settleability, which could impair actual secondary effluent quality in terms of TSS and particulate fractions of TP and $cBOD_5$.

For the purposes of designing the WAS handling system, it is recommended that a solids yield 15% higher than the BioWin™ predicted value be used (see Section 4.4.2 for rationale). This approach recognizes uncertainties associated with the model development and calibration, including modelled septage TSS less than design values, and will provide a reasonably conservative design value for the solids handling system. This approach results in average design WAS generation rates of 631 kg/d (Option 1A) and 861 kg/d (Option 2A).

4.2.3 Projected Oxygenation Demands

At average loading conditions, BioWin™ predicts the following oxygen uptake rates (OURs) and total power uptake (via mechanical aeration) to maintain an operating DO of 2.0 mg/L:

- Scenario 1A:
  - Cold weather: OUR of 5.08 mg O/L/hr (total oxygen demand of 72.6 kg/hr) and total power uptake of 81 kW; and,
  - Warm weather: OUR of 5.17 mg O/L/hr (total oxygen demand of 73.9 kg/hr) and total power uptake of 83.5 kW.
- Scenario 2A:
  - Cold weather: OUR of 5.81 mg O/L/hr (total oxygen demand of 83.1 kg/hr) and total power uptake of 92.5 kW; and,
  - Warm weather: OUR of 5.94 mg/OL/hr (total oxygen demand of 84.9 kg/hr) and total power uptake of 96 kW.

Detailed design of the upgraded aeration system (whether mechanical, diffused air, or a combination thereof) should account for a reasonable design peaking factor to ensure sufficient oxygenation capacity is provided for high-loading events. Selection of an appropriate peaking factor will depend on anticipated peak raw wastewater loading factors and peak septage loading rates (if any). In addition, consideration will need to be given to ensuring the oxygenation system provides sufficient mechanical mixing energy needed to maintain the biomass in suspension throughout the shallow lagoon cell.

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4.3 Upgrade Option B – Two Lagoon Cells

4.3.1 Projected Nitrification Performance and Effluent Quality

Model predicted secondary effluent quality for Option B (two aerated lagoon cells) is presented in Table 4.4. Values are presented for Scenario 1 (no septage) and Scenario 2 (with septage) at three influent loading factors: Average, equivalent to the average design values presented in TM 1 – Design Basis; 2 x Average; and 3 x Average.

Table 4.4 – Option B – Model Predicted Secondary Effluent Quality

Parameter	Scenario 1B – No Septage Loading Factors			Scenario 2B – With Septage Loading Factors		
	Average	2 x Average	3 x Average	Average	2 x Average	3 x Average
Cold Weather						
$cBOD_5$ (mg/L)	2.2	3.2	4.0	2.5	3.6	4.4
TSS (mg/L)	10.2	10.6	10.8	10.3	10.7	10.9
TAN (mg/L)	0.48	0.61	0.81	0.53	0.75	1.15
NO_3-N (mg/L)	32.8	65.1	96.1	33.4	64.9	94
NO_2-N (mg/L)	0.10	0.13	0.19	0.11	0.17	0.32
PO_4-P (mg/L)	0.36	0.72	1.05	0.31	0.54	0.64
TP (mg/L)	0.68	1.08	1.4	0.6	0.85	0.93
Warm Weather						
$cBOD_5$ (mg/L)	2.0	2.5	2.9	2.2	3.2	4.0
TSS (mg/L)	10.3	10.4	10.6	10.4	10.7	10.7
TAN (mg/L)	0.29	0.32	0.34	0.31	0.39	0.51
NO_3-N (mg/L)	33.4	50	66.3	34.1	66.4	96.6
NO_2-N (mg/L)	0.06	0.07	0.08	0.07	0.09	0.13
PO_4-P (mg/L)	0.39	0.57	0.81	0.35	0.64	0.80
TP (mg/L)	0.72	0.93	1.18	0.64	0.94	1.10

Projected effluent $cBOD_5$ and TSS concentrations were relatively consistent for all temperatures and loading scenarios. As noted above, conditions that promote year-round nitrification also provide high level BOD removal. In addition, because the model utilizes an ideal secondary clarifier, effluent TSS concentration is expected to remain constant since it is a function of operating MLSS concentration only.

Projected effluent TAN concentrations remain low for all influent loading factors for the facility operating both with and without septage co-treatment. As expected, effluent TAN concentrations are slightly higher under cold weather operating conditions than warm weather. It can be concluded that proposed modification of the existing lagoon cell into two smaller cells would have sufficient capacity to support year-round nitrification at the rated capacity of 4,600 m^3/d.

In addition to future modelling scenarios based on both aerated lagoon cells online, additional modelling scenarios were run for Option B based on operating the upgraded Brighton WWTS with only one of the two aerated cells online. The ability to operate the WWTS with only one aerated cell online for a prolonged period would facilitate equipment maintenance, repairs and lagoon cell clean-outs since such works would likely involve having one cell offline for several weeks or more. Model predicted effluent quality for key nitrogen species (TAN, NO3-N, NO2-N) are presented in Table 4.5.

Table 4.5 – Option B – Model Predicted Secondary Effluent Quality for Select Parameters – One Lagoon Cell Online

Parameter	Scenario 1B – No Septage One of Two Lagoon Cells Online Loading Factors			Scenario 2B – With Septage One of Two Lagoon Cells Online Loading Factors		
	Average	2 x Average	3 x Average	Average	2 x Average	3 x Average
Cold Weather						
TAN (mg/L)	0.69	1.28	4.35	0.86	2.27	64.4
NO_3-N (mg/L)	31.6	61.4	65.7	31.5	58.4	0.05
NO_2-N (mg/L)	0.15	0.38	22.5	0.21	1.48	29.4
Warm Weather						
TAN (mg/L)	0.37	0.44	0.54	0.43	0.71	1.27
NO_3-N (mg/L)	32.4	48.2	63.4	32.6	62.4	89.7
NO_2-N (mg/L)	0.08	0.11	0.14	0.10	0.20	0.62

Under Option B and assuming no septage co-treatment, the model-predicted effluent TAN concentrations meet the effluent targets under both warm and cold operating conditions even with one bioreactor (lagoon cell) offline. Despite this, the model does predict elevated effluent NO2-N concentration under cold weather conditions and elevated loading rates, suggesting that the capacity of a single online lagoon cell is being reached. Similar results were observed for Scenario 2B (with septage co-treatment), however TAN concentrations were higher due to the increased loadings associated with the septage. This suggests that, under Option B, the WWTS could be operated with just one of the two aerated cells online under average influent loading conditions, and variable influent loadings in warmer, summer period.

4.3.2 Projected Waste Sludge Generation Rates

Model predicted average waste sludge generation rates under cold weather operating conditions (assuming both aerated cells are online) are:

- Scenario 1B – 568 kg/d; and,
- Scenario 2B – 777 kg/d.

These represent average sludge generation rates when the facility is operating at its rated capacity of 4,600 m^3/d. Maximum month generation rates would depend on the anticipated peak influent loading rate.

The average sludge generation rates are equivalent to solids yields of 0.75 kg WAS/kg BOD (Scenario 1B) and 0.82 kg WAS/kg BOD (Scenario 2B). These are lower typical yields of 0.9 to 1.1 kg WAS/kg BOD

observed at other Ontario extended aeration facilities. This is likely due to the high projected solids retention time (SRT) in the bioreactor of 43 d and 32 d on average for Scenarios 1B and 2B, respectively. Operating at high SRT can negatively impact sludge settleability, which could impair actual secondary quality in terms of TSS and particulate fractions of TP and $cBOD_5$.

For the purposes of designing the WAS handling system, it is recommended that a solids yield 15% higher than the BioWin™ predicted value be used (see Section 4.4.2 for rationale). This approach recognizes uncertainties associated with the model development and calibration, including modelled septage TSS less than design values, and will provide a reasonably conservative design value for the solids handling system. This approach results in average design WAS generation rates of 653 kg/d (Option 1B) and 894 kg/d (Option 2B).

4.3.3 Projected Oxygenation Demands

At average loading conditions, BioWin™ predicts the following OURs to maintain an operating DO of 2.0 mg/L (assumes both aerated cells are online):

- Scenario 1B:
  - Cold weather: OUR of 7.29 mg O/L/hr (total oxygen demand of 71.8 kg/hr); and,
  - Warm weather: OUR of 7.42 mg/OL/hr (total oxygen demand of 73.1 kg/hr).
- Scenario 2B:
  - Cold weather: OUR of 8.28 mg O/L/hr (total oxygen demand of 81.5 kg/hr); and,
  - Warm weather: OUR of 8.46 mg/OL/hr (total oxygen demand of 83.3 kg/hr).

Detailed design of the upgraded aeration system (whether mechanical, diffused air, or a combination thereof) should account for a reasonable design peaking factor to ensure sufficient oxygenation capacity during high-loading events. Selection of an appropriate peaking factor will depend on anticipated peak raw wastewater loading factors and peak septage loading rates (if any). In addition, consideration will need to be given to ensuring the oxygenation system provides sufficient mechanical mixing energy needed to maintain the biomass in suspension throughout the shallow lagoon cells.

4.4 Upgrade Option C – New Mechanical Extended Aeration Plant

4.4.1 Projected Nitrification Performance and Effluent Quality

Model predicted secondary effluent quality for Option C (new purpose-built bioreactors) is presented in Table 4.6. Values are presented for Scenario 1 (no septage) and Scenario 2 (with septage) at three influent loading factors: Average, equivalent to the average design values presented in TM 1 – Design Basis; 2 x Average; and 3 x Average.

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Table 4.6 – Option C – Model Predicted Secondary Effluent Quality

Parameter	Scenario 1A – No Septage Loading Factors			Scenario 2A – With Septage Loading Factors		
	Average	2 x Average	3 x Average	Average	2 x Average	3 x Average
Cold Weather						
$cBOD_5$ (mg/L)	2.7	3.9	4.7	2.7	3.8	4.6
TSS (mg/L)	8.2	8.3	8.4	8.2	8.3	8.4
TAN (mg/L)	0.60	1.06	2.37	0.61	1.13	4.8
NO_3-N (mg/L)	31.7	61.6	87.0	32.4	61.7	51.1
NO_2-N (mg/L)	0.13	0.31	2.93	0.14	0.34	35.6
PO_4-P (mg/L)	0.35	0.50	0.50	0.30	0.38	0.34
TP (mg/L)	0.58	0.74	0.75	0.51	0.59	0.55
Warm Weather						
$cBOD_5$ (mg/L)	2.6	3.6	4.4	2.5	3.6	4.3
TSS (mg/L)	8.0	8.2	8.2	8.0	8.2	8.2
TAN (mg/L)	0.39	0.58	0.95	0.40	0.61	1.04
NO_3-N (mg/L)	32.2	62.9	91.8	33.0	63.3	91.0
NO_2-N (mg/L)	0.09	0.15	0.33	0.09	0.16	0.39
PO_4-P (mg/L)	0.36	0.55	0.55	0.32	0.43	0.37
TP (mg/L)	0.60	0.80	0.79	0.53	0.65	0.58
Notes: 1. xx.						

Projected effluent $cBOD_5$ and TSS concentrations were relatively consistent for all temperatures and loading scenarios. As noted above, conditions that promote year-round nitrification also provide high level BOD removal. In addition, because the model utilizes an ideal secondary clarifier, effluent TSS concentration is expected to remain constant since it is a function of operating MLSS concentration only.

Under warm weather operating conditions, projected effluent TAN concentrations remain low for all influent loading factors and assuming the facility is operating both with and without septage co-treatment. As expected, effluent TAN concentrations are slightly higher under cold weather operating conditions than warm weather, however even at a 3x loading rate, the projected effluent TAN concentrations are well below the treatment targets (see Section 2.2). It can therefore be concluded that the proposed overall bioreactor volumes of 2,830 m^3 (Scenario 1 – no septage) and 3,570 m^3 (Scenario 2 – with septage) would provide the required level of year-round nitrification performance under variable influent loading conditions.

4.4.2 Projected Waste Sludge Generation Rates

Model predicted average waste sludge generation rates under cold weather operating conditions are:

- Scenario 1C – 641 kg/d; and,
- Scenario 2C – 845 kg/d.

These represent average sludge generation rates when the facility is operating at its rated capacity of 4,600 m^3/d. Maximum month generation rates would depend on the anticipated peak influent loading rate.

The average sludge generation rates are equivalent to solids yields of 0.85 kg WAS/kg BOD (Scenario 1C) and 0.89 kg WAS/kg BOD (Scenario 2A). These are slightly lower than the typically observed yield range of 0.9 to 1.1 kg WAS/kg BOD observed at other Ontario extended aeration facilities.

Model predicted average cold weather SRTs are 18 d and 17 d for Scenarios 1C and 2C, respectively, which is consistent with typical design values of 15 to 20 d for extended aeration facilities although slightly lower than the design target of 15 d (see Section 4.1).

For the purposes of designing the WAS handling system, it is recommended that a solids yield of 1.0 kg WAS/kg BOD_5 be used (approximately 15% higher than the BioWin™ predicted value). This approach recognizes uncertainties associated with the model development and calibration, results in a design solids yield that is consistent with typical solids yields for other Ontario facilities, and will provide a reasonably conservative design value for the solids handling system. This approach results in average design WAS generation rates of 754 kg/d (Option 1C) and 951 kg/d (Option 2C).

4.4.3 Projected Oxygenation Demands

At average loading conditions, BioWin™ predicts the following OURs and total oxygen demand to maintain an operating DO of 2.0 mg/L:

- Scenario 1C:
  - Cold weather: OUR of 23.5 mg O/L/hr (total oxygen demand of 66.9 kg/hr); and,
  - Warm weather: OUR of 23.9 mg/OL/hr (total oxygen demand of 68.1 kg/hr).
- Scenario 2C:
  - Cold weather: OUR of 21.47 mg O/L/hr (total oxygen demand of 77.0 kg/hr); and,
  - Warm weather: OUR of 21.90 mg/OL/hr (total oxygen demand of 76.6 kg/hr).

Detailed design of the aeration system should account for a reasonable design peaking factor to ensure sufficient oxygenation capacity during high-loading events. Selection of an appropriate peaking factor will depend on anticipated peak raw wastewater loading factors and peak septage loading rates (if any).

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5. Summary and Conclusions

A BioWin™ model was developed and calibrated based on historic performance of the Brighton WWTS. Despite good agreement with recorded aerated lagoon effluent TAN, DO and TSS, there were limitations associated with the model including inability to assess the impact of variable aeration on biomass suspension, inability to model impact of variation of DO and/or biomass throughout the lagoon cell during mechanical aeration, and underestimate of septage TSS concentrations as compared to the proposed design value. As a result, a conservative approach was taken to modelling future operating scenarios for an upgraded Brighton WWTS, namely assessing biological treatment capacity against a conservative influent loading peaking factor and applying a safety factor to projected WAS generation rates.

Three potential upgrade options were considered, namely:

- Option A – Retaining the existing 14,300 m^3 lagoon cell, increasing oxygenation and mixing capacity, and adding downstream secondary clarification;
- Option B – Dividing the existing lagoon cell into two cells, each 4,900 m^3 and equipped with diffused aeration, and adding downstream secondary clarification; and,
- Option C – Constructing new 4.6 m deep, purpose-built bioreactors equipped with diffused aeration along with secondary clarification.

A summary of key modelling assumptions and results is presented in Table 5.1. Overall, it can be concluded that all three upgrade options are feasible from a biological treatment (nitrification) capacity perspective. However, the high operating SRTs and large, shallow lagoon cells associated with Options A and B could cause poor sludge settleability, inconsistent biological treatment performance, and difficulty maintaining sufficient DO concentrations and mixing. Options B and C, which provide two bioreactors operating in parallel, provide operational flexibility to allow bioreactor maintenance, repair and/or clean-out while maintaining some biological treatment capacity.

Table 5.1 – Summary of Future Scenario Modelling Results

	Option A One Lagoon Cell	Option B Two Lagoon Cells	Option C New Bioreactors
Bioreactor(s)			
Number	1	2	2
Type	Lagoon cell	Lagoon cell	New purpose-built
Volume (per reactor)	14,300 m^3	4,900 m^3	1,415 to 1,785 m^3
Volume (total)	14,300 m^3	9,800 m^3	2,830 to 3,570 m^3 (1)
Modelled Operating Values			
MLSS Concentration	2,500 mg/L	2,500 mg/L	4,000 mg/L
DO Concentration	2.0 mg/L	2.0 mg/L	2.0 mg/L
Modelled Bioreactor Temperatures			
Cold Weather	5°C	8°C	10°C
Warm Weather	15°C	15°C	15°C

Table 5.1 – Summary of Future Scenario Modelling Results

	Option A One Lagoon Cell	Option B Two Lagoon Cells	Option C New Bioreactors
Model-Predicted Average Effluent TAN			
Scenario 1 – No Septage			
Cold Weather	0.53 mg/L	0.48 mg/L	0.60 mg/L
Warm Weather	0.27 mg/L	0.29 mg/L	0.39 mg/L
Scenario 2 – With Septage			
Cold Weather	0.57 mg/L	0.53 mg/L	0.61 mg/L
Warm Weather	0.28 mg/L	0.31 mg/L	0.40 mg/L
Total Average Oxygen Demands			
Scenario 1 – No Septage			
Cold Weather	72.6 kg/hr	71.8 kg/hr	66.9 kg/hr
Warm Weather	73.9 kg/hr	73.1 kg/hr	68.1 kg/hr
Scenario 2 – With Septage			
Cold Weather	83.1 kg/hr	81.5 kg/hr	77.0 kg/hr
Warm Weather	84.9 kg/hr	83.3 kg/hr	76.6 kg/hr
Model-Predicted Operating SRT			
Scenario 1 – No Septage	65 d	43 d	18 d
Scenario 2 – With Septage	45 d	32 d	17 d
Design Average WAS Generation Rate [(2)]			
Scenario 1 – No Septage	631 kg/d	653 kg/d	754 kg/d
Scenario 2 – With Septage	861 kg/d	894 kg/d	951 kg/d

Notes:

1. The low end of the range represents the modelled bioreactor volume for Scenario 1 (no septage), while the upper end of the range is for Scenario 2 (with septage).
2. 15% higher than model-predicted WAS generation rates.

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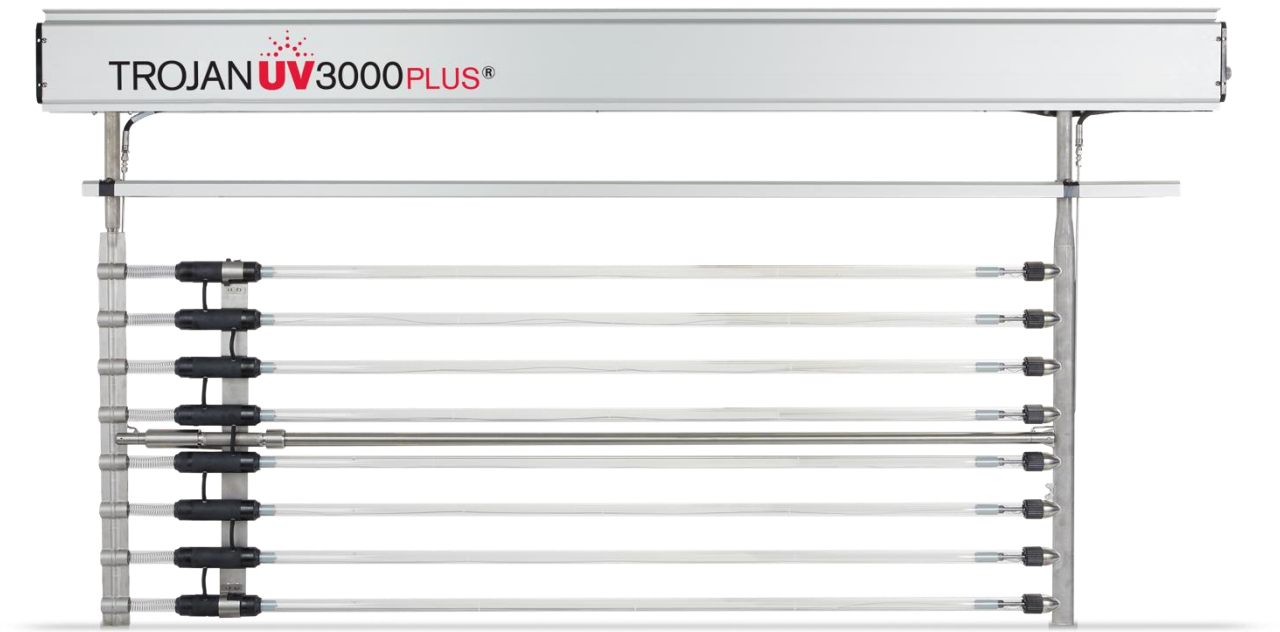
6. References

MOE (2008). Design Guidelines for Sewage Works.

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Appendix B

Trojan UV Proposal



TROJAN UV3000PLUS®

PROPOSAL

FOR THE CITY OF BRIGHTON WWTS, Ontario

QUOTE: 242106

09/25/2023

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Confidential – Company Proprietary

We are pleased to submit this design and quote for the BRIGHTON WWTS 3000PLUS Project. This quotation is based on the TrojanUV3000Plus® system which provides dependable performance, superior electrical efficiency and simplified maintenance that meets your UV treatment needs.

TrojanUV3000Plus: For over 20 years the TrojanUV3000Plus has been continuously refined to include innovative features that have enhanced easy operation and reduced O&M costs. The latest generation product released in 2022 continues to enhance and focus on the features our customers value which is why the TrojanUV3000Plus has been trusted to deliver reliable performance at over 2500 sites globally. Every system includes the following highlighted features:

Validated Performance & A Lifetime Performance Guarantee: Real-world microbial testing on an actual working system is the basis for sizing and design of the TrojanUV3000Plus. Validated data combined with deep domain experience allows us to be the only UV provider that stands behind our systems with a Lifetime Performance Guarantee. Our systems are independently third-party bioassay validated to USEPA and NWRI guidelines. The system relies on an extended lamp warranty with a validated end-of-lamp-life of 98% output after 12,0000 hours and our unique ActiClean® system that is validated to maintain 95% of sleeve transmittance. Get peace of mind with trusted design and performance to meet your treatment requirements.

Automatic Lamp Sleeve Cleaning: Unique in the industry, the the TrojanUV3000Plus uses both mechanical wiping and chemical cleaning which cleans 50% more effectively than mechanical wiping. Automatic chemical and mechanical cleaning means operations are uninterrupted by offline cleans and can rely on consistent UV Dose delivery with the ActiClean system.

Integra™ Lamp Assembly: Built around our high-efficiency stable output 250W amalgam lamp and ballast technology, Trojan Technologies' newest breakthrough is a patented and unique fully sealed integrated lamp and sleeve assembly. The entire assembly is water-tight, with a fewer number of parts to manage, no special handling and a reduction in lamp installation time by more than 50%.

Modular Design: The scalable architecture and modular design ensure efficient and reliable performance and ease of maintenance. Precise sizing and easy expandability can simplify future expansion needs with less upfront costs. The advanced, self-contained UV Module arrives at site factory assembled and tested to reduce installation costs, complexity, and start-up issues. The UV module has been designed to protect cables, lamps and electronic ballasts from effluent and UV light while using convective natural cooling to ensure lasting performance at a lower total cost of ownership.

Support and Service: Your partner in UV treatment, owners and operators have access to free technical service assistance 24/7 through a toll-free number. Leverage the experience of Trojan Technologies with guided troubleshooting, local service, analytical services, in-stock replacement parts and our global network of trained & certified technicians.

We look forward to working with you on this exciting project. We hope that our experience and expertise along with the trusted TrojanUV3000Plus system enable you to provide Water Confidence to your customers and their community.

Design Criteria

BRIGHTON WWTS 3000PLUS

Peak Design Flow:	**17 813 m3/d**
Average Design Flow:	**4 600 m3/d**
UV Transmittance:	**65 %** (minimum)
Total Suspended Solids:	**30** mg/l (30 Day Average, grab sample)
Treatment Limit:	**126 E.coli per 100 ml,** based on a day **30** of consecutive daily grab samples
Design Dose:	**30 mJ/cm^2** (bioassay validated)
Validation Factors:	0.98 end of lamp life factor (Low-Pressure Amalgam Lamps) **0.95** fouling factor (ActiClean-WW™ Chemical / Mechanical Cleaning System)

Design Summary

QUOTE: 242106

Based on the above design criteria, the TrojanUV3000Plus® proposed consists of:

CHANNEL (Please reference Trojan layout drawings for details.)	
Number of Channels:	**1 in Duty**
Approximate Channel Length Required:	**36 ft 6 in**
Channel Width Based on Number of UV Modules:	**12 in**
Channel Depth Recommended for UV Module Access:	**62 in**
Max Upstream Water level using Fixed Weir @ 17,813 m3/d	**34.36 in**
Head loss through system @ 17,813 m3/d	**6.81 in (including free fall after weir)**
UV MODULES	
Total Number of Banks:	**3 (2 Duty, 1 redundant)**
Number of Modules per Bank:	**3**
Number of Lamps per Module:	**8**
Total Number of UV Lamps:	**72 (Including 24 for Redundancy)**
Maximum Power Draw:	**18 kW**
UV PANELS	
Power Distribution Center Quantity:	**3**
System Control Center Quantity:	**1**
MISCELLANEOUS EQUIPMENT	
Level Controller Quantity:	**1**
Type of Level Controller:	**Fixed Weir**
Automatic Chemical / Mechanical Cleaning:	**Trojan ActiClean-WW™**
UV Module Lifting Device:	**Davit Crane and Lifting Sling & Frame**
Standard Spare Parts / Safety Equipment:	**Included**
Start Up & Freight:	**Included**
ELECTRICAL REQUIREMENTS	
1. Each Power Distribution Center requires an electrical supply of one (1) 480/277V 60Hz, 3 Phase, 4 Wire + Ground, 15 Amps, 6.20 kVA	
2. The Hydraulic System Center requires an electrical supply of one (1), 480V 60Hz, 2.5 kVA.	
3. The System Control Center requires an electrical supply of one (1) 120V 1 Ph, 2 Wire + Gnd, 60 Hz, 15 Amps.	
4. Electrical disconnects required per local code are not included in this proposal.	

Commercial Information

Total Capital Cost:	**289 720 (CAD)**

This price excludes any taxes that may be applicable and is valid for 90 days from the date of this letter.

Equipment Warrantees

1. Trojan Technologies warrants all components of the system (excluding UV lamps) against faulty workmanship and materials for a period of 12 months from date of start-up or 18 months after shipment, whichever comes first.
2. UV lamps purchased are warranted for 12,000 hours of operation or 3 years from shipment, whichever comes first. The warranty is pro-rated after 9,000 hours of operation. This means that if a lamp fails prior to 9,000 hours of use, a new lamp is provided at no charge.
3. Electronic ballasts are warranted for 5 years, pro-rated after 1 year.

Appendix C

MECP Consultation Record

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

Preliminary & Final Design Services – Brighton Wastewater Treatment System Upgrades
Virtual Teams Meeting

Brighton WPCP - Engineering Design Project Progress Update
Minutes of Meeting No. 3

Attendance:	Brittney Wielgos	Ministry of the Environment Conservation and Parks (MECP)	brittney.wielgos@ontario.ca
	Viktoria Light	Ministry of the Environment Conservation and Parks (MECP)	viktoria.light@ontario.ca
	Rebecca Troan	Ministry of the Environment Conservation and Parks (MECP)	rebecca.troan@ontario.ca
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	Victor Castro	Ministry of the Environment Conservation and Parks (MECP)	victor.castro@ontario.ca
	Christopher Manning	Ministry of the Environment Conservation and Parks (MECP)	christopher.manning@ontario.ca
	Sarah Baxter	Ministry of the Environment Conservation and Parks (MECP)	sarah.baxter@ontario.ca
	Leslie Whiteman	Municipality of Brighton (Municipality)	lwhiteman@brighton.ca
	Adam Walraven	Municipality of Brighton (Municipality)	awalraven@brighton.ca
	Matt Morkem	J.L. Richards & Associates Limited (JLR)	mmorkem@jlrichards.ca
	Susan Shi	J.L. Richards & Associates Limited (JLR)	sshi@jlrichards.ca
	Cailey Moxam	J.L. Richards & Associates Limited (JLR)	cmoxam@jlrichards.ca

The meeting commenced at 11:00 a.m. on Thursday, December 14, 2023 over Teams.

The following summary of the discussions of this meeting has been prepared to record decisions reached and actions required for the project. Please advise the undersigned of any errors or omissions within the next three business days.

ITEM **ACTION BY**

1.1 **Proposed Design and Construction Sequence Overview**

JLR presented an overview of the proposed process upgrades which include:

- Constructing a new headworks north of the existing lagoons with screening and grit channels
- Dividing the existing aeration lagoon into two extended aeration basins
- Constructing two clarifiers and disinfection facilities within the facultative lagoon footprint
- Converting the facultative lagoon to WAS storage

The construction sequencing plan for the proposed upgrades was then described as summarized below:

- Construct the clarifiers and disinfection facilities first, followed by the aeration basins and headworks
- During construction of the clarifiers and disinfection facilities, the treatment train will remain as normal with flow going from the aeration lagoon and through the facultative lagoon and out the effluent chamber
- The aeration lagoon will be taken offline to construct the berm, during this time the temporary treatment train proposed consists of rerouting flow directly to the facultative lagoon, then to the new clarifiers and disinfection facilities, and then to the effluent discharge chamber
- Aeration will be added to the facultative lagoon to facilitate temporary treatment
- Temporary treatment is expected to be in place for 6-8 months, accounting for desludging, and construction of the upgraded aeration system and berm within the aeration lagoon (noting that construction timelines are subject to change by the contractor)

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Brighton WPCP - Engineering Design Project Progress Update
Minutes of Meeting No. 3

- Aeration installed in the facultative lagoon for temporary treatment will be reused for WAS storage aeration

2.1 **MECP Questions**

Will the facultative lagoon be desludged for the above solution?
The current plan is not to desludge the facultative lagoon, the Municipality confirmed desludging of the north section of the lagoon was undertaken last year.

Are effluent limit exceedances expected?
JLR is concerned with exceedances during cold weather months given this is an unconventional treatment plan, and the facultative lagoon is shallow. Given the temporary treatment train includes the clarifiers and disinfection, TSS, BOD, and P exceedances are not anticipated. TAN is JLR's primary concern, the MECP confirmed this was their primary concern as well. JLR is designing the temporary treatment aeration system to meet MECP guidelines for mixing and aeration demands for TAN. The Ministry highlighted that risk/compliance requirements will ultimately remain as is and it is the responsibility of the Municipality to meet them.

How will WAS be handled during temporary treatment?
WAS will be pumped back to the facultative lagoon with temporary aeration, the exact discharge location is to be determined.

How will the clarifier/disinfection facilities be built, and why did the location of these facilities move from the location proposed in the EA addendum? The MECP noted that the new location appeared risker with respect to compliance.
A cofferdam will be built around the clarifier/disinfection area to section it off from the lagoon, the area will be desludged, tanks will be built, then the area will be backfilled. The cost for excavating elsewhere on site for these facilities is approximately equal to the cost of building within the lagoon. The primary driver for the new location is to avoid Arena Creek which runs along the east side of the aeration lagoon. The creek offers significant constraints given this is a fish habitat and constructing towards the north (as opposed to the previous MBBR location) has structural advantages due to a higher rock shelf.

Are clarifiers sized to handle maximum day flow?
JLR confirmed the clarifiers are sized to meet MECP guidelines, and provisions will be made for future expansion.

Is additional sampling being proposed for temporary treatment?
JLR clarified that the intention of the meeting is to better understand what regulatory requirements are necessary from the MECP's point of view to move ahead with this design, or to pivot to a new concept if deemed unfeasible. Additional sampling can be incorporated if required.
To this end, JLR is to provide a proposed mitigation plan to the MECP with enhanced sampling measures and SOPs to be followed in case of exceedances during temporary treatment. **JLR**

Is the intention to start the clarifiers in the summer?
The current schedule is to be tender ready in the fall, to begin construction in the spring, and to have the clarifiers and disinfection online in the fall 2025. This is subject to the contractor's schedule.

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What will the headworks concept consist of?
The proposed design consists of full headworks with screening and grit channels. It will be built to the north of the lagoons, near the existing sludge drying beds (the drying beds are to be removed as they are not in use). The exact location is dependent on studies being completed currently.

Has an ECA been submitted yet? Will E. coli be a required compliance point with the new disinfection facilities?
An ECA has not been submitted. Currently *E. coli* limits are an objective, expected to become a compliance limit following the addition of disinfection facilities. JLR has developed a design basis technical memorandum which will be shared with the MECP following finalization with the Municipality. **JLR**

2.2 **Municipality Questions**

Will the constructed wetland be kept separate from the treatment plan as it is currently in the ECA?
Yes, given the proposed compliance point is the effluent chamber this will remain the case. As it is an engineered works the wetland is to be included in the ECA, but it will be a sample point, not a compliance point.

Meeting adjourned at 11:50 a.m.
Next meeting will be held on January 23, 2024

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Preliminary & Final Design Services – Brighton Wastewater Treatment System Upgrades
Virtual Teams Meeting

Brighton WPCP - Engineering Design Project Progress Update
Minutes of Meeting No. 3

Prepared by: Issued on: December 15, 2023



Cailey Moxam
Environmental Engineering Intern

Reviewed by:



Susan Jingmiao Shi, P.Eng., M.Eng.
Associate, Senior Environmental Engineer

Distribution: All invitees
CC: None

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JLR No.: 32296-001
Revision: 0

February 6, 2024

Prepared for:

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DRAFT TM 4 – Solids Train

Brighton Wastewater Treatment System Upgrades

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

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1.0 Background

In June 2023 the Municipality of Brighton (the Municipality) retained J.L. Richards & Associates Limited (JLR) to provide engineering services for the preliminary and final design of the Brighton Wastewater Treatment System (WWTS) upgrades.

The Municipality is the easternmost municipality within the County of Northumberland and is subject to the Growth Plan for the Greater Golden Horseshoe. The Municipality is bounded by the City of Quinte West to the east and the Township of Cramahe to the west, with the shoreline of Lake Ontario to the south. Highway 401 provides the main east-west corridor through the Municipality, which tends to be a regional focus for hamlets in the surrounding areas.

The communal sewage system generally consists of the Brighton WWTS (currently rated for 4,600 m^3/day), the Harbour Street Sewage Pumping Station (SPS) and forcemain, a small sub-area sewage pumping station and forcemain servicing Presqu'ile Provincial Park, and several kilometers of gravity collection sewer. Approximately half of the sewage generated in the collection system is directed to the Harbour Street SPS and pumped via a 820 km long, 300 mm forcemain to the WWTS, while the other half flows by gravity to the WWTS.

The WWTS is a lagoon system consisting of a 0.68 ha single cell aerated lagoon, a 5.44 ha single cell waste stabilization pond with baffle partition curtains, and a 2-cell constructed wetland with a total surface area of 6.2 ha. There is also a chemical storage/feed system used to facilitate continuous phosphorus removal. Chemical is introduced after the aerated lagoon and upstream of the waste stabilization pond. Treated effluent from the waste stabilization pond is discharged continuously to the constructed wetland, which itself discharges into a natural wetland and ultimately to Presqu'ile Bay off the northeast shore of Lake Ontario.

While the existing Brighton WWTS has capacity for the next 20 years, it has experienced chronic issues with high total ammonia nitrogen (TAN) concentrations in the effluent. The Municipality has taken steps in the past to address the issue but has continued to face challenges. The purpose of the Brighton WWTS Upgrades project is to implement the preferred alternative identified in the recent Addendum to the Class EA (JLR, 2022). The Municipality has also expressed interest in implementing a septage receiving station (SRS) as a potential revenue source.

During the preliminary design phase, the following Technical Memoranda (TM) are being prepared to address project specific requirements, including;

- TM 1 – Design Basis
- TM 2 – Septage Receiving and Headworks Facility
- TM 3 – Liquid Train
- TM 4 – Solids Train
- TM 5 – Power Requirements and Innovative Energy

2.0 Objectives

This Technical Memorandum (TM) is intended to:

- Summarize the operation of the existing solids train and required upgrades;
- Develop design basis for solids train upgrades;
- Develop a conceptual level design.

3.0 Existing Solids Train and Required Upgrades

3.1 Existing Works

The existing Brighton WWTS does not have a formal solids train. Raw sewage enters the aeration basin where some solids settle out and are retained, sludge biomass is generated, and the liquid/solid mixture flows to the facultative lagoon. In the lagoon, solids generally settle to the bottom. Desludging of the lagoon is performed by a contractor with suction or a vacuum truck on an as-needed basis and the contractor then hauls the solids from the site for disposal or land-application. Desludging was last performed September 2022, at which time one third of the lagoon was desludged beginning from the northern most point.

3.2 Required Upgrades and Design Objectives

As the facility is now being converted to an Extended Aeration treatment system, biosolids will be separated from the liquid stream in the secondary clarifiers and either returned to the head of the aeration basin(s) or removed as Waste Activated Sludge (WAS). Therefore, upgrades are required to manage the WAS stream in an environmentally friendly and cost-effective manner. WAS storage in the existing facultative lagoon, with supplemental aeration, was recommended in the EA Addendum. Given the revised recommendation of building a new mechanical plant with purpose-built aeration basins, it is now proposed that the current aerated lagoon be used for WAS storage, with the addition of supplemental aeration. The use of the lagoon allows for a low capital cost, low maintenance and efficient land use solution for biosolids management. The aerated lagoon is smaller in size than the facultative lagoon and has a greater depth, which is better suited to aerated mixing and periodic desludging. The proposed solids train is shown schematically in the figure below. Note that desludging will need to be performed on a periodic basis but is not required to be completed prior to or during construction.

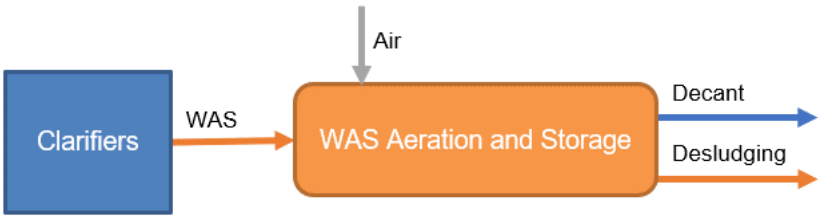


Figure 1 – Block Flow Diagram for Proposed Solids Train

The upgrades must satisfy the following objectives:

- Provide a minimum of 1 year of WAS storage while providing sufficient aeration air to prevent nuisance odours.
- Provide for cost-efficient biosolids removal.

3.3 Design Basis

The design basis for the WAS storage lagoon upgrades is summarized in Table 1.

Table 1: Design Basis of WAS Storage Lagoon Upgrades

Scenario	WAS Generation Rate[1]	Comment
Scenario 1 – No Septage	754 kg/d	See TM3
Scenario 2 – With Septage	951 kg/d	See TM3

Notes:
(1) BioWin Model predicted WAS generation rates under cold weather operating conditions with facility operating at rated capacity of 4,600 m^3/d.

4.0 Conceptual Design

4.1 WAS Storage Lagoon Volume

Key characteristics of the existing 0.68 ha aerated lagoon are summarized in the table below.

Table 2: Existing Aerated Lagoon Characteristics

Parameter	Value[1]
Current Hydraulic Capacity	11,576 m^3
Estimated Sludge Volume	3,866 m^3
Maximum Liquid Depth	3.15 m
Minimum Freeboard[2]	1.41 m

Notes:
(1) Information from Sludge Survey Report dated November 13, 2023. All values assume water elevation of 79.994m.
(2) Assumes minimum top of berm elevation of 81.4 m; to be confirmed with topographical survey.

At the maximum anticipated sludge generation rate of 951 kg/d, assuming a WAS concentration of 0.5% solids, the lagoon has capacity for 2 months of WAS storage without any decanting/thickening, which does not achieve the design objective (1 year minimum to provide flexibility and cost efficiency). Assuming that sludge is thickened to 5% solids through periodic decanting, the lagoon can provide 1.7 years of WAS storage which achieves the design objective. Table 3 summarizes these storage calculations for the scenarios investigated.

Table 3: WAS Storage Summary

Scenario		Years of Storage[1]
0.5% Solids Concentration	No Septage	0.2 (79 days)
	Septage	0.2 (63 days)
5% Solids Concentration	No Septage	2.2 (791 days)
	Septage	1.7 (627 days)

Notes:

Scenario	Years of Storage[1]
(1) Assuming 100% of aerated lagoon volume is used for storage.	

The removal of sludge from the lagoon would not interrupt sewage treatment during desludging as the lagoon would no longer be part of the liquid treatment train.

4.2 WAS Storage Lagoon Aeration System

The objectives of the aeration system are:

- To minimize odour generation by maintaining aerobic conditions within the sludge and preventing the lagoon surface from completely freezing in the winter.
- To improve the natural digestion of sludge through mixing.
- To reduce potential for nuisance algae growth through mixing.

The aeration system will consist of mechanical mixers similar to the existing aerated lagoon system. Key design parameters are summarized in the table below, to be confirmed during preliminary design.

Table 4: Lagoon Aeration Design Parameters

Parameter	Value	Comment
Minimum Power for Aerated Mixing	100 kW	Current power rating of aerators in the lagoon is 48.4 kW

4.3 Lagoon Modifications

To convert the existing aerated lagoon into an aerated WAS storage lagoon, the following additional modifications are required:

- Modification of existing outlet structure.
- Addition of lagoon decant system to remove separated liquid from the sludge after settling, thickening the sludge and making space for future WAS to be added.

4.4 Biosolids Removal and Disposal Alternatives

After desludging, biosolids can be removed to an off-site location for treatment, land application or disposal, or they can be managed further on-site using Geotubes®. This section describes and compares these two alternatives.

4.4.1 Direct Disposal (No Dewatering)

In this alternative, the Municipality would contract a qualified firm to remove and dispose of accumulated thickened biosolids in liquid form (up to 6% solids concentration). In our understanding, no permanent infrastructure would be required as such firms would supply their own pumping equipment. Depending on time of year, the biosolids could be beneficially used as a soil amendment on agricultural fields using typical liquid manure spreading equipment.

4.4.2 Geotube® Dewatering

Geotube® Dewatering Technology is a biosolids treatment, storage and dewatering alternative. Biosolids are loaded into a Geotube® container which is a dewatering filter bag made from high tensile polypropylene fabric. Polymer is added to the biosolids as they are pumped into the bag to aid solids capture. In the dewatering stage, excess water drains from the Geotube® container. This filtrate is collected and returned to the head of a WWTP for treatment. In the consolidation phase, the biosolids in the tube continue to densify as water evaporates. It has been reported that the biosolids volume reduction can be as high as 90%.

Installing Geotubes® would require a concrete dewatering pad and a polymer injection system (to be housed in the process building). Filtrate would drain by gravity into the aerated WAS storage lagoon and pumped to the head of the WWTP using the decant pumps. The proposed design is to replace the Geotubes® twice annually, once in the spring and again in the fall (no winter dewatering structure required). Replacement of the Geotubes® generally consists of cutting open the Geotube®, loading the dewatered biosolids into a truck, cleaning the pad, and installing the new tube. A small front loader would be required to load the dewatered biosolids from the pads to the hauling trucks. Once the Geotube® is fully filled and drained, the biosolids can be disposed of by land application, landfill or other regulated use.

See the Geotube® Design Summary in Table 5.

Table 5: Geotube Design Summary

Parameter		Value
Initial % Solids		5%
Target Dewatered % Solids		20%
Circumference of Geotubes® (m)		23
Length of Geotubes® (m)	*No Septage* *Septage*	19 24
Number of Geotube® Containment Pads		1
Annual Number of Geotubes®		2
Approximate Containment Pad Area (m^2)	*No Septage* *Septage*	210 260

4.4.3 Direct Disposal vs. Geotube® Dewatering Cost Comparison

JLR has performed a 20-year Net Present Value (NPV) calculation for each of the alternatives, which is summarized in Table 6. Note that the WAS storage lagoon would be outfitted with aerators and decant equipment for both alternatives hence there is no additional capital cost noted for the direct disposal option.

Unit costs for biosolids removal and disposal in each alternative were sourced from a local firm (GFL). The estimated costs were \$13-15 per m^3 for liquid biosolids (2.5-6% solids) and \$60 per m^3 for dewatered biosolids cake (20% solids or greater), due to the increased costs to handle and dispose of the cake product. Therefore, although dewatering reduces the volume of biosolids for disposal, this reduction is offset by a fourfold unit cost increase.

Installing Geotubes® on site would come with an increased capital cost of \$1.4M, and operating cost of \$103,000 - \$137,000 annually; the lower end of the direct disposal operating cost range is

associated with achieving 30% solids in the dewatered cake, while the higher end represents achieving 20% solids, compared to the direct disposal annual operating cost of $101,000 – $202,000. The lower end of the direct disposal operating cost range is associated with decanting to achieve 5% solids in the lagoon, while the higher end represents decanting to 2.5% solids.

Table 6: Summary of NPV for Direct Disposal vs. Geotubes®

	Direct Disposal	Geotubes ®
Opinion of Probable Differential Construction Cost	N/A	$1,410,000
Estimated Average Annual Operation and Maintenance Cost	$101K - 202K	$103K - 137K
20-Year NPV	$1.82M - 3.65M	$3.27M - 3.87M

Notes:
(1) For simplicity, only costs related to the scenario where septage is received are presented. Relative costs are similar for the "no septage" scenario.
(2) Capital OPCs include costs for installation, contractor markup (~20%).
(3) All OPCs exclude HST.
(4) All OPCs in 2023 dollars.
(5) NPV calculations assumed an interest rate of 1% and an escalation rate of 2%.

As shown, the NPV ranges for the two options overlap. The Municipality may wish to consider initially operating the plant without Geotubes® to determine what actual solids concentrations can be achieved through decanting alone. If 5% solids can be achieved, the above analysis suggests that there is no benefit to installing Geotube® dewatering equipment.

This report has been prepared by J.L. Richards & Associates Limited for The Municipality of Brighton's exclusive use. Its discussions and conclusions are summary in nature and cannot properly be used, interpreted or extended to other purposes without a detailed understanding and discussions with the client as to its mandated purpose, scope and limitations. This report is based on information, drawings, data, or reports provided by the named client, its agents, and certain other suppliers or third parties, as applicable, and relies upon the accuracy and completeness of such information. Any inaccuracy or omissions in information provided, or changes to applications, designs, or materials may have a significant impact on the accuracy, reliability, findings, or conclusions of this report.

This report was prepared for the sole benefit and use of the named client and may not be used or relied on by any other party without the express written consent of J.L. Richards & Associates Limited, and anyone intending to rely upon this report is advised to contact J.L. Richards & Associates Limited in order to obtain permission and to ensure that the report is suitable for their purpose.

J.L. RICHARDS & ASSOCIATES LIMITED

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TM5 – Electrical, Instrumentation & Control Requirements and Innovative Energy

Brighton WWT System Upgrades

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ENGINEERS · ARCHITECTS · PLANNERS

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Appendix B Helioscope Report for Ground-Mount System

1.0 Background

In June 2023 the Municipality of Brighton (the Municipality) retained J.L. Richards & Associates Limited (JLR) to provide engineering services for the preliminary and final design of the Brighton Wastewater Treatment System (WWTS) upgrades.

The Municipality is the easternmost municipality within the County of Northumberland and is subject to the Growth Plan for the Greater Golden Horseshoe. The Municipality is bounded by the City of Quinte West to the east and the Township of Cramahe to the west, with the shoreline of Lake Ontario to the south. Highway 401 provides the main east-west corridor through the Municipality, which tends to be a regional focus for hamlets in the surrounding areas.

The communal sewage system generally consists of the Brighton WWTS (currently rated for 4,600 m3/day), the Harbour Street Sewage Pumping Station (SPS) and forcemain, a small sub-area sewage pumping station and forcemain servicing Presqu'ile Provincial Park, and several kilometers of gravity collection sewer. Approximately half of the sewage generated in the collection system is directed to the Harbour Street SPS and pumped via a 0.82 km long, 300 mm forcemain to the WWTS, while the other half flows by gravity to the WWTS.

While the existing Brighton WWTS has capacity for the next 20 years, it has experienced chronic issues with high total ammonia nitrogen (TAN) concentrations in the effluent. The Municipality has taken steps in the past to address the issue but has continued to face challenges. The purpose of the Brighton WWTS Upgrades project is to implement the preferred alternative identified in the recent Addendum to the Class EA (JLR, 2022). The Municipality has also expressed interest in implementing a septage receiving station (SRS) as a potential revenue source.

During the preliminary design phase, the following Technical Memoranda (TM) are being prepared to address project specific requirements, including:

- TM 1 – Design Basis
- TM 2 – Septage Receiving and Headworks Facility
- TM 3 – Liquid Train
- TM 4 – Solids Train
- TM 5 – Power Requirements and Innovative Energy

2.0 Objectives

This report constitutes Technical Memorandum No. 5 – Power Requirements and Innovative Energy. Its objectives are as follows:

- Summarize the existing electrical infrastructure at the Brighton WWTS.
- Summarize the proposed electrical systems associated with the proposed upgrades to the Brighton WWTS.

- Present a pre-feasibility study of a photovoltaic (PV) solar power supply for the new WWTS (rooftop and ground-mount solar systems) for the purpose of reducing energy costs and/or providing a backup up power source.

3.0 Existing and Proposed Electrical Systems

3.1 Existing Electrical Systems

The Brighton WWT Lagoon is currently serviced by three utility-owned 75kVA 4.16kV-347V (225 kVA, 4.16kV-600/347kV) pole mount service transformers located on the southeast access road. The access road has four hydro poles servicing the existing station with the three north of the fencing being customer owned and the one south of the fencing being hydro owned. The primary of the service transformers is fed by an overhead feed from a 4.16kV service from highway 64, with the secondary feed routing underground to the existing electrical controls building. The two northmost poles service an overhead controls cable to the existing control building.

The existing electrical controls building contains a main splitter which is fed from the underground hydro service. The splitter feeds a local lighting panel, the floating aerators, and the existing Motor Control Centre (MCC). The MCC services the two dock side aerators, the mixer, and the building house services. A separate splitter is fed from the MCC and services two additional 25HP aerators.

The building is monitored by an alarm system which provides operators with alerts in response to programmed system alarms. Alarms include exterior door access, chemical containment pad leak detection, building temperature, ferric feed, and panic alarms. The basement of the building houses an existing ferric feed system.

3.2 Proposed Electrical System

3.2.1 Utility Service

The existing hydro owned pole mount transformer is to be demolished. Primary feeders are to transition from overhead to underground at the first customer owned pole. Buried service conductors are to travel northwest past the existing control building on the northeast side of the road to a new customer owned pad mount transformer located to the west of the new process building. Preliminary load calculations indicate the plant will require approximately 500-650 kVA of power during peak operation based on the process requirements involving the design of a new dedicated process, headworks, and administration buildings. The process will require 300 HP of aeration loads and 125 HP of sludge lagoon aspirator loads running on a continues basis. As such, a service upgrade to a 750 kVA customer owned pad mount transformer is anticipated to be required for the plant. There are several process peak shaving options which can be implemented to reduce this load if required. The application for the service upgrade is currently in process and confirmation of grid capacity and acceptance of the customer owned transformer has not been confirmed at this time. The previous MBBR design consultant had been approved for a 500kVA utility owned transformer by Hydro One.

The preliminary electrical load calculation was also used to estimate the total peak load and annual energy consumption for the sizing of the solar PV systems, as indicated in Section 4.1, Table 1.

3.2.2 Service Distribution

The pad mount transformer will feed a new service entrance board housed in the new process building's electrical room. The service entrance board will contain a service entrance rated breaker, customer metering, automatic transfer switch, feeds to the Administration, Headworks and Existing Controls Buildings, and a feed to the Process Building MCC.

The new process building's MCC will service new process equipment plantwide which require dedicated motor starters. Where dedicated motor starters are not required, such as the screening and grit removal systems, process equipment will be serviced by local distribution panels. Process equipment within the existing controls building will be largely decommissioned with only the equipment servicing the building's house services to remain.

The municipality wastewater will be rerouted toward a new dedicated headworks building via a dedicated lift station to the west of the new process building. Three 40 HP pumps will run in a two duty one standby mode of operation. Pumps will be fed from dedicated Variable Frequency Drives (VFDs) located within the process building MCC via buried underground conductors. A similar setup will be provided for the septage receiving pumps and sludge decanting pumps.

Headworks process loads such as screening and grit removal will be serviced by a local distribution panel located in the Headworks electrical room. The headworks building will be subject to special equipment requirements due to the presence of explosive and corrosive gasses associated with municipal wastewater. Specialized equipment and appurtenances will be provided to suit. As such the electrical room will be inaccessible from the headworks process area and electrical penetration between the rooms will require EYS fittings to prevent gas migration.

The electrical equipment within the aeration tanks, secondary clarifiers and sludge stabilization lagoon will also require specialized equipment and hardware due to the presence of explosive and corrosive gasses. These areas will however be subject to slightly less stringent requirements due to the open-air nature of these processes. Power will be provided by a combination of integral cables and teck and shall utilize buried trenches and cable tray where applicable.

3.2.3 Transfer Switch and Backup Power Generator

An automatic transfer switch (ATS) will be installed in the service entrance board to provide automatic power transfer from a stand-by generator in the event of a loss of utility power. A panel containing a manual transfer switch complete with external camlock connections, will be installed on the exterior of the process building and will operate in parallel with the automatic transfer switch. The manual transfer switch will allow the plant to operate on back-up power while the stand-by power generator is undergoing maintenance thus ensuring uninterrupted plant

operation. The breaker servicing the automatic transfer switch and the breaker servicing the manual transfer switch, within the service entrance board, will be kirk-keyed together such that only one can be closed at a time. Transfer switch and generator statuses will be monitored by the new PLC in the process building's instrumentation and control room.

The design basis for the stand-by power generator is that the plant will be fully operational during a sustained power outage. As such, the generator will be sized to support the entire plant's peak power requirements including process and house service loads. A diesel generator is proposed due to the limited availability of natural gas in the area.

3.2.4 Uninterruptible Power Supply (UPS)

It has been noted by plant operators that the available hydro power quality is often subject to periodic brownouts. Sustained brownouts can lead to a reduced lifespan of electrical equipment and instrumentation, as well as additional service calls. A true online UPS would be one potential technology which could be implemented to protect critical systems, due to its rapid response time to a loss in utility power. Battery energy storage systems (BESS) are not considered appropriate due to their slower response time (too slow to prevent the tripping of critical systems) and our understanding that the brownouts are typically short in duration. JLR can investigate the addition of a UPS in the electrical room, at the Municipality's request, to mitigate the impact of plantwide brownouts to critical systems.

3.2.5 Surge Suppression

Surge suppression will be provided using a multi-tiered system, starting with a surge suppressor on the 600 V Switchboard. Smaller and faster acting units will be provided at downstream load centres and lighting panels to mitigate transients and peaks generated internally and to further reduce any external surges that may pass through the first tiers.

3.2.1 PV System Interconnection

If PV was to be installed, solar inverters are to be interconnected via an interim transformer to the main switchboard. An interim transformer is likely required to step-up the non-standard 480V inverter output to the plantwide standard of 600V for electrical power distribution. Interposing disconnects will be provided on either side of the transformer. Dedicated metering will be provided at the switchboard.

4.0 Proposed Instrumentation and Control Systems

4.1.1 Instrumentation

Our design approach considers not only just the specifics of each instrument, but also how it will be installed, where the device will be located in the process, and the impact of external influences on the measurement of the process parameter.

Other considerations include accuracy and long-term reliability as well as measurement technology and access for maintenance while minimizing process disruption when the device is taken out of service. The philosophy will

Level, flow, and pressure will be monitored at various points in the process to facilitate the automation of the process equipment. Where instruments will be subject to explosive gasses, intrinsically safe relays will be provided upstream of the instruments. Specific instrumentation technology's will be selected based on detailed design considerations at a future date. The physical and chemical properties of the effluent will be monitored at certain locations for municipal records and to facilitate the automation of the chemical dosing systems.

The process building, headworks building, and new admin building will be fitted with analog temperature sensors, door contacts, and heat/smoke detectors. These instruments will be monitored by the PLC and will annunciate to a callout system of the municipality's choosing.

4.1.1 PLC

To provide monitoring and operational reliability, automated plant control will be provided via a Programable Logic Controller (PLC) based control system circuited to a UPS. A PLC will allow for fine tuning control of pump and blower operations via utilizing multiple input variables such as level and flow sensors, while also providing controls for the remaining process and HVAC systems at the new plant.

A desktop SCADA station will allow for easy operator access to a visual representation of the current statuses of the process pumps, blowers, and instrument values. The SCADA station will also allow the operator to easily modify certain process set points for additional fine tuning of the process. The service entrance board will also be monitored by the PLC and displayed on the SCADA screens for operators use and reference, displaying phase voltages, currents, breaker statuses, and transfer switch position status.

For certain critical pumping systems, a fully redundant tiered control system will be provided for pump control. The PLC will be the main controller for the pumps and an electronic pump control system (e.g. Siemens MultiRanger® HMI 200) complete with hardwired control logic will also be provided and will act as a backup to the PLC and control the influent pumps in the event of a PLC or network failure. Hardwired logic will also be provided for life-safety systems, including gas detection and annunciation. Alarms and statuses from the hardwired logic will be monitored by the main PLC. Alarm statuses will be wired failsafe to the PLCs for improved system reliability and per best practices to ensure that any circuit failure associated with those signals are detected.

The Municipality's preferred system integrator will be carried by the contractor for all PLC programming and commissioning.

4.1.1 SCADA

A facility wide SCADA system will be provided and will facilitate human interface with the PLC. Human Machine interface (HMI) with the PLC control system will be via a SCADA system.

A new SCADA workstation will be provided within the process building's I&C room and will be connected to the new PLC panel via a category 6 Ethernet connection. The SCADA station will come equipped with historian and data storage software. Along with general process and house services systems monitoring, the SCADA system will monitor and trend influent flow rates from the new influent pumping station. The SCADA workstation will be complete with a UPS backup.

The Municipality's preferred system integrator will be carried by the contractor for all SCADA programming and commissioning.

4.1.2 Network Overview

A number of communication networks will be provided within the facility for the different systems that are proposed to be provided. These networks will be Ethernet based and will include process controls utilizing the PLC/SCADA network is one such network. A Star topology will generally be employed.

5.0 Solar Photovoltaic Energy Solutions

The project site provides opportunities for the installation of solar facilities that could significantly offset energy costs and/or provide a backup up power source. While detailed engineering for the solar facilities is out of the scope of this study, this section serves as a pre-feasibility report on the solar options.

5.1 System Sizing and Type

While the overall equipment sizing and electrical loads for the new Brighton WWTS plant are still preliminary, these estimated load parameters (summarized in Table 1) are used for solar sizing purposes.

Table 1 – Estimated load parameters for Brighton WWTS

Peak power	569 kW
Average annual energy use	2,985 MWh/year

This estimate of load and energy consumption was based on system and building equipment power requirements.

This size of load indicates that the new plant would qualify for the Class B rate structure from Hydro One, the electrical utility that serves Brighton. The Net Metering solar billing structure would be the most financially advantageous billing structure for the Municipality for this rate structure.

Net metering is a utility billing structure that allows solar energy generated on site to be consumed there, but any excess solar energy is recorded as a credit on the customer's account so it can be used later to cover the cost of electricity drawn from the grid when not enough solar is available (e.g. at night). This allows the customer to benefit from every kWh of electricity generated.

The plant load is also sufficiently large that a photovoltaic (PV) system on the roof(s) of the new buildings would only offset a relatively small portion of total energy requirement. However, the rooftop PV option is considered the easiest to implement from a regulatory perspective and technically the most defined and least risky option. The rooftop PV option is therefore developed as the primary option in this study.

As a secondary option, a ground-mount PV system is also considered, but at only a conceptual level of study. The main purpose of showing the ground-mount option is to indicate that sufficient potentially unused land area may be available on the Municipality's property to accommodate a much larger ground-mount PV system that may be able to offset as much as 100% of the new WWT system's annual energy consumption.

5.2 Site Review, System Placement and General Approach

5.2.1 Site Review - Rooftop

The potential rooftop PV system locations are shown below in Figure 1. The PV is to be mounted on the proposed headworks/process building and administration building. Because the existing facility is to be decommissioned, it was not considered for PV placement.

It should be noted that at the time of writing this Technical Memo, neither the buildings' size, shape or configuration were confirmed. Only a conceptual building layout was available and this was used as a baseline for sizing the available roof space for PV. Also, no potential HVAC equipment locations on the building roofs were defined, so it was assumed that this equipment would occupy a certain portion of the available roof space. This was factored into the size of the PV system, as further explained in Section 4.3.4 below.

Particularly the headworks building, and possibly all the buildings, may be subject to a hazard classification due to the presence of explosive and corrosive gasses associated with municipal wastewater. It is assumed that the roofs of the buildings will not be affected by this constraint since exhaust air from the buildings will not be exhausted onto the roof. Any openings into the buildings (e.g. doors, windows) will have exclusion areas defined around them (typically 1.5 meters) and no non-rated electrical equipment will be installed in those areas. This is however an issue that will need to be addressed fully in the more detailed design process.

Note that the estimates of energy generation presented in this memo will scale, approximately, with the kW DC rating of the PV system and thus with roof area. If the available roof area was halved, the generation will roughly be halved too. This relationship can be used to estimate energy production if the roof area changes in future design iterations.

5.2.1 Site Review - Rooftop

A potential ground-mount system was considered at the north end of the WWT property shown in

Figure **2** This exercise however was done only to illustrate the concept of a larger PV system and not necessarily compromise all of the final land area that could be used. Installation of a ground-mount PV system in this area would require detailed geotechnical, environmental, land use, and regulatory assessments to confirm the feasibility of such a project. A more detailed feasibility study would be required to address these issues.



Figure 1 – Rooftop PV system locations

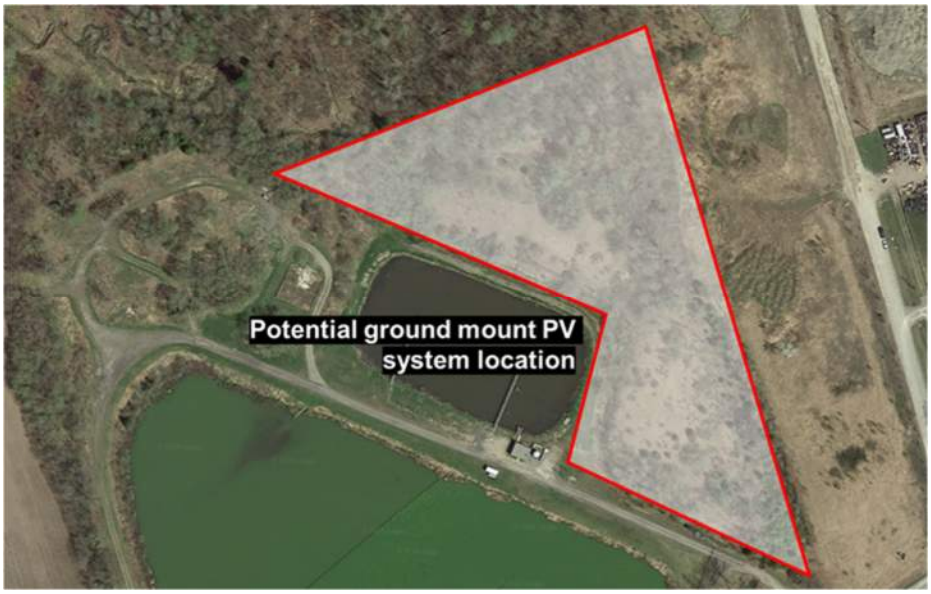


Figure 2 – Potential ground-mount PV system location

5.3 Rooftop PV Design Approach

This section presents an overview of the design approach and main equipment considerations of the rooftop system.

HelioScope, an advanced solar design software developed by Folsom Labs, was used to complete the analysis of design options and estimate AC and DC sizing of the arrays. Commercially available equipment from reputable manufacturers was selected for sizing the rooftop PV arrays and estimating electricity generation. The selected equipment should not be considered a recommendation or endorsement for any particular product or manufacturer.

5.3.1 PV Modules

The LR5-72HPH 550W mono-facial module from LONGi Solar (Figure 3) was selected for the rooftop PV systems. See Table 2 for the module's performance and efficiency characteristics.

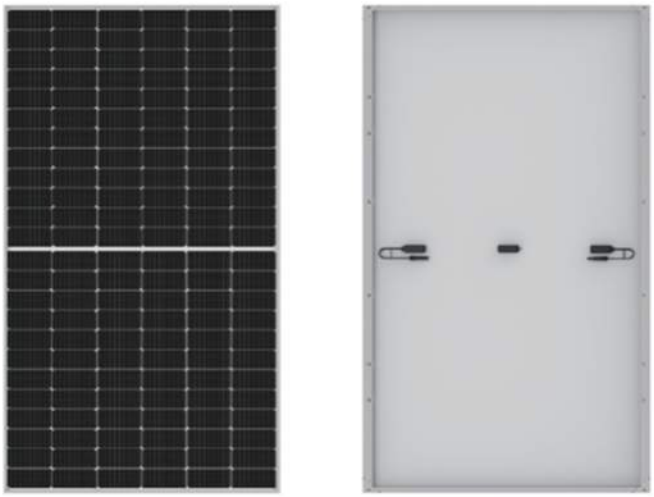


Figure 3 – LONGI Solar LR5-72HPH 550W module

Table 2: Module Performance Characteristics

Characteristic	Performance
Maximum Power	
Standard Test Conditions[1]	550 W
Normal Operating Cell Temperature[2]	411.1 W
Module Efficiency	21.5%
Dimension	2,256 x 1,133 x 35 mm

[1] Standard test conditions are the measured module performance with 1,000 W/m² of irradiance, 25°C cell temperature and a 1.5 spectrum of airmass.
[2] Normal operating cell temperature is the measured module performance with 800 W/m² of irradiance, 20°C air temperature, and 1 m/s wind velocity.

Characteristic	Performance
Weight	27.2 kg
Operational Temperature	-40° to +85°C

5.3.2 Inverters

The Symo Advanced inverter from Fronius (Figure 4) was selected as the three-phase string inverter for the rooftop PV systems. Specifically, the Symo 24.0-3 480 was used. See Table 3 for inverter performance and efficiency characteristics.



Figure 4 – Fronius Symo Advanced String Inverter

Table 3 – Fronius String Inverter Performance Characteristics

Inverter	24.0-3480
Output Power	24 kW AC
Output Voltage	480 / 277 V
Max Efficiency	98%
Input Power	36 kWp DC
Dimensions	510 x 725 x 225 mm
Weight	44 kg
Operational Temperature	-40°C to +60°C

5.3.3 Racking System

A typical ballasted racking system design for commercial flat roof PV systems was used to develop the conceptual layouts for the PV Assessments. See

Table 4 for the racking system design assumptions. These layouts follow best practices for designs and consider shading and obstructions, but do not necessarily represent a fully optimized layout. Layout optimization should be completed during detailed design while working with the racking system manufacturer.

Table 4 - Racking System Design Assumptions for Flat Roofs

Parameter	Design Assumption
Module Tilt	10°
Intra-row Spacing	1.07 m
Azimuth	200°
Edge Setback	1.83 m
Shading Cut-off[3]	30%

A minimum 1.83 m setback from the roof edge was maintained as a safety zone for all PV arrays. Within this zone, the shading analysis determined that no modules were subject to 30% shading on an annual basis, meaning that no modules were excluded from the layout for this reason. This shading cut-off assumption should be re-examined during layout optimization once finalized HVAC equipment locations are determined.

A low-profile racking design is recommended for attaching the PV modules to their respective rooftops. This is the most common design for flat roofs as it maximizes the quantity of modules that can be fitted, reduces racking costs, and will generally not add to snow drift impact on the structure.

5.3.4 System Characteristics

The proposed rooftop PV system has a total of 116 modules, consisting of 60 modules located on the proposed process/headworks building and 56 modules located on the proposed administration building. The rooftop PV HelioScope model is shown in Figure 5.

As stated previously, because exact HVAC equipment placement on the proposed buildings' roofs is not known at this time, it was assumed that the headworks building roof area was reduced by 50% to account for both the HVAC equipment and potential shading from that equipment. Similarly, the process and administration building rooftops were reduced by 25%. It is recommended that HVAC equipment be placed toward the north or northeast sides of each roof.

It is assumed that the heights of the headworks and process buildings are the same.

[3] Shading cut-off is the maximum amount a module can be shaded on an annual basis before it is removed from the design.

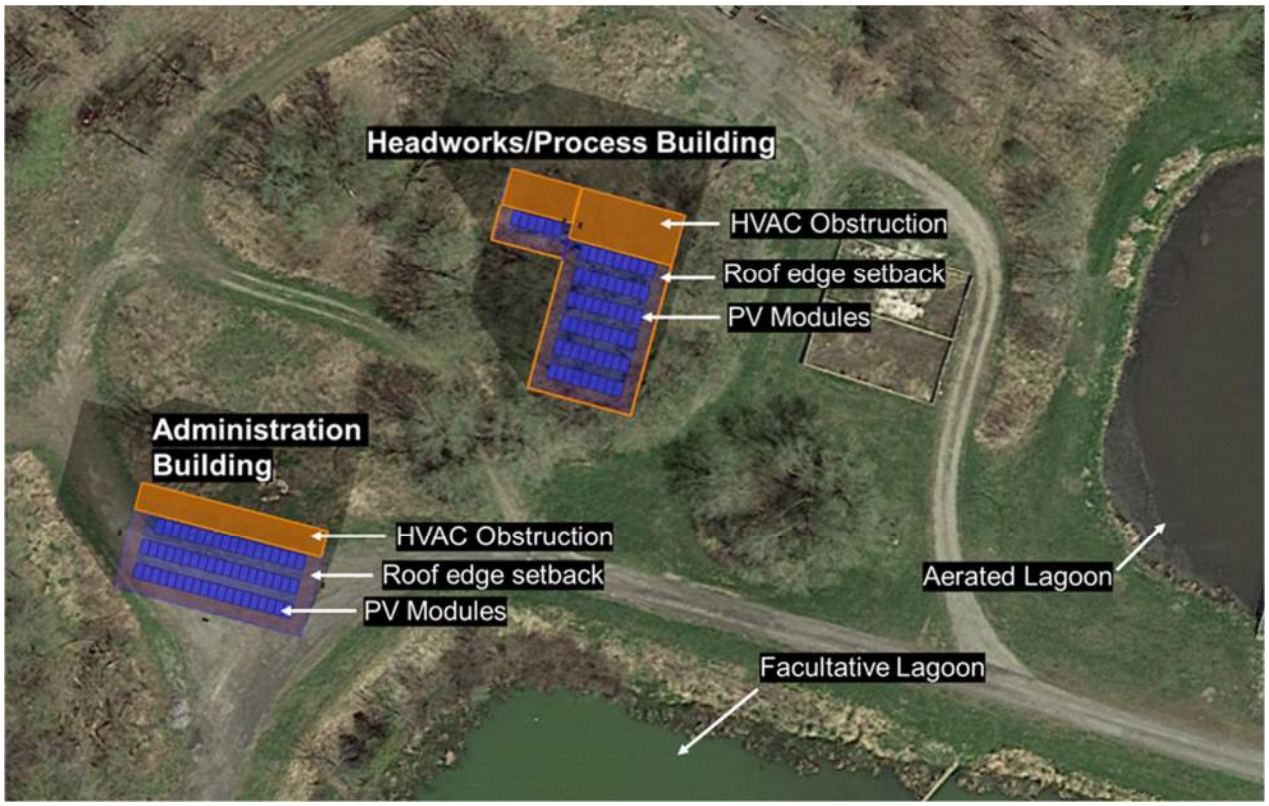


Figure 5 – Rooftop PV HelioScope Model Overview

Table 4 shows the size and power characteristics of each array. To finalize the size and shape of the PV layout, the layout will need to be optimized during the detailed design stage, when all details, including HVAC and possible other obstructions and shading sources are known.

Table 5 – Array Size and Power Characteristics

	Headworks/Process Building	Administration Building
Number of Modules	60	56
Module Size (W)	550	550
Number of Inverters	1	1
Inverter Capacity (kW_{AC})	24	24
PV Array Rating (kW_{DC})	33.0	30.8
Overbuild Ratio	1.38	1.28

Note that each array is served by one 24 kW inverter. Each inverter contains two maximum power point trackers (MPPTs), and each MPPT can serve two strings of modules. For the headworks/process building, MPPT 1 can contain two strings of 16 modules and MPPT 2 can contain two strings of 14 modules. Similarly, for the administration building, MPPT 1 can contain two strings of 16 modules, and MPPT 2 can contain two strings of 13 modules.

Note that the “overbuild ratio,” which is the DC module capacity divided by the inverter AC capacity, is greater than one, which is in keeping with typical industry design practices.

5.4 Potential Ground-mount PV System

There exists a large parcel of land (~23,650 m2) located to the northeast of the existing aeration lagoon and on the Municipality’s property. That land may be suitable for a ground-mount PV array pending detailed land use, geotechnical, environmental, and regulatory investigations that are out of the scope of this study. A concept design for a ground-mount PV system was modelled to indicate how much PV generation capacity could be available here.

The potential ground mount PV system was modeled in HelioScope and includes 3,780 modules (Longi Solar LR5-72HPH 550 modules) mounted on fixed tilt ballasted racking on a 30° tilt. See Figure 6 for an example of a typical ballasted racking ground mount PV module. A ballasted foundation is shown here because no geotechnical information is available to confirm that the available land area is suitable for a pile foundation. But piles and their suitability should be considered during the detailed design stage, especially since the carbon embodied in concrete ballast foundations is significantly higher than in steel piles.

The ground mount PV system has a perimeter setback of 4.2 meters. Row spacing was set to 4.2 meters to reduce interrow shading and to allow for maintenance vehicle access to the modules. Roadways running along the north and east sides of the aeration lagoon, as well as northward toward the top of the array, were incorporated into the layout for access as well. Each row of modules was given an azimuth of 200o, facing south-southwest.

The ground-mount PV system has a DC nameplate capacity of 2,080 kWp and AC nameplate capacity of 1,560 kWp (65 x 24 kW Fronius Symo 24.0-3 480 Inverters), resulting in a 1.33 overbuild ratio. The Helioscope PV model for the potential ground mount system is shown in Figure 7.



Figure 6 – Typical Ballasted Ground-mount Racking System

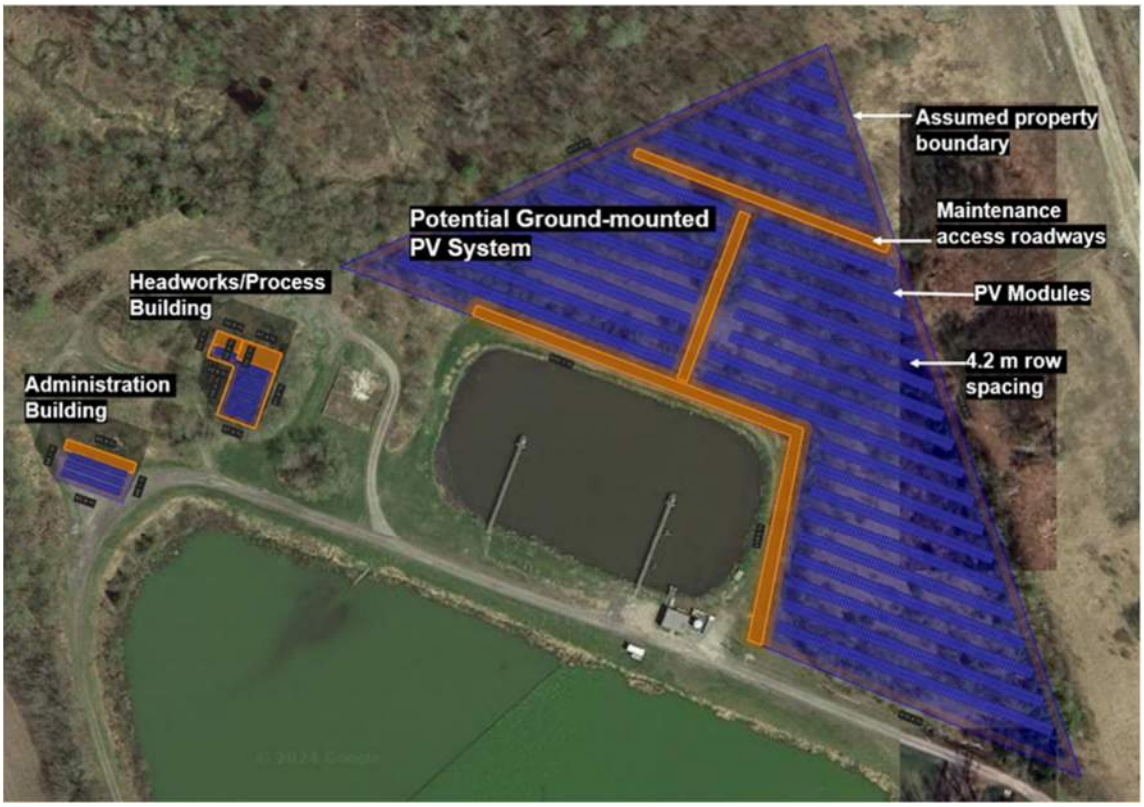


Figure 7 – Rooftop and Ground-mount PV Helioscope Model Overview

5.5 Performance Modeling

HelioScope is a leading commercial, web-based PV modeling software that was used for both the rooftop and ground-mounted PV systems considered in this study. The software uses location specific weather files to generate estimates of electricity generation incorporating all losses typically found throughout the system.

The energy production estimates are based on a typical meteorological year (TMY) data for Cobourg, ON, which was the closest available weather station with TMY data in the form of a 2020 Canadian Weather Energy and Engineering (CWEC) file. This dataset represents an average weather year on an hourly basis for Brighton. The production estimate accounted for all forms of system losses such as module mismatch, wiring, clipping, inverter and AC system losses, reflection, shading and soiling. The snow losses are included in the soiling losses. The snow loss estimates are based on the average of snow losses between Toronto and Ottawa, using Environment and Climate Change Canada's Climate data.

5.6 Energy Generation

The HelioScope model was used to estimate the annual energy produced by the proposed solar arrays. As described above, the estimated energy production considers environmental and system losses.

Table 6 shows the annual energy generation provided by the rooftop and ground-mount PV systems.

It should be noted that all values shown here are conceptual estimates and are subject to change once the designs of the headworks/process and administration buildings are completed and the feasibility and size of the ground-mount solar PV system is clarified.

Table 6 – Estimated Energy Generation, Rooftop PV System

	Rooftop PV	Ground-Mount PV
PV Size (kW DC)	63.8	2,080
PV Size (kW AC)	48.0	1,560
Annual PV Generation (MWh)	77.7	2,549
Annual Facility Electricity Consumption (MWh)	2,985	
PV portion of Annual Consumption (%)	2.6%	85%

5.7 Grid Interconnection

The energy generated by renewable energy systems in Ontario, including PV systems, can be utilized in one of two deployment options. The first option is a load displacement scheme, where electricity would be used to partially supplement plant-wide electricity demand. Specifically, load displacement scenarios are only allowable by the local distribution company (LDC) when the renewable energy generation, if it is ever greater than then facility load, is not permitted to be exported to the grid.

The second deployment option for PV systems is a net metering scheme. In net metering, electricity generated by the PV system that is not needed on site is exported to the grid, and grid electricity is consumed when the PV system does not generate enough to meet on site needs. The facility would be charged for net consumption of grid electricity or credited for net export. Export credits are only carried forward for up to a year, after which any account balance is returned to $0. For most PV systems, the net metering scheme is financially preferrable because it allows the owner to benefit from some or all of the energy that may be exported to the grid from time to time. Typically, there are no account costs or downsides to having a net-metering account, but this should be reviewed at the detailed design stage. This is the approach recommended to Brighton for a rooftop PV system or a smaller ground-mount system.

Any distributed generation project over 10kW in Ontario requires an application and assessment under the Connection Impact Assessment (CIA) process, administered by the Local Distribution Company (LDC), in this case Hydro One. This assesses whether the proposed generation can be accommodated on the local grid and if any electrical infrastructure upgrades are required.

For most rooftop PV systems, the electrical connection is behind the main utility meter, typically on the bus of the main electrical switchboard. For larger systems, such as the ground-mount PV described in this report, more detailed electrical design may be required to accommodate the larger power supply.

5.8 PV System Costing

The cost estimates provided in this study should be considered for budgetary purposes only. The estimates of costs are an "opinion of probable construction cost" (OPCC) that is based on historic construction data and does not include COVID-19 cost impacts related to labour, material, equipment, manufacturing, supply, transportation, or any other element. JLR shall not be responsible for any variation in the estimate caused by the foregoing factors but will notify the Client of any conditions which JLR believes may cause such variation.

5.8.1 Costing of Rooftop Systems

The OPCC provided in this study includes equipment, delivery, and installation costs for:

- PV modules
- Inverters
- AC balance of system
- DC cabling
- Monitoring
- Mounting system
- Grid connectivity

Equipment pricing was based on Q4 2023 estimates provided by a national solar PV equipment distributor. Installation estimates were based on recent price estimates from specialized commercial rooftop PV contractors.

Estimated engineering design fees are included. These include detailed design and production of Issued for Tender (IFT) and Issued for Construction (IFC) drawing packages (with minimal changes, if any), and Contract Administration (CA) services through construction. Structural and electrical studies and upgrades are excluded, assuming the new buildings will be built 'solar ready'. A modest contingency is implicit in all the cost estimates.

Annual operation and maintenance (O&M) costs estimates were based on a DC system size for typical long-term O&M contracts provided by specialized commercial solar PV rooftop service providers. For the economic analysis inverter replacements were assumed to occur in year 15 and assumed a like for like replacement with minimal electrical work required.
System lifetimes of 25-years were considered in this study. It is likely that most components would continue to function for longer (35 to 40 years are not unrealistic) providing on-going generation, and for that reason decommissioning costs at the end of the 25-year life were not included. System costs are summarized in Table 7 below.

Table 7 – Cost Estimate (OPCC) for 63.8 kW DC Rooftop PV System

Category	Estimated Cost ($)
Engineering Design	$35,000
Connection Impact Assessment and Building Permit Fees	$5,830
Equipment and Installation	$122,826
TOTAL	**$163,656**
Total Cost per Watt DC	**$2.57**

5.8.2 Costing of Ground-Mount PV Systems

As mentioned, the ground-mount PV option is considered a secondary priority in this study and is characterized at less detail. Many of the cost elements of a ground-mount PV system are similar to a rooftop system, but they would include extensive site and geotechnical assessments, a land use review, an environmental assessment, and other regulatory considerations. Technically, the ground-mount system will require a specialized racking system and foundations, possibly underground wiring, site work (e.g. grading, drainage, access road, fencing, etc.) and a larger, and thus more complex, electrical interconnection design. The cost estimates presented in the next section are inclusive of typical cost values for all of these site needs.

5.9 Financial Analysis

5.9.1 LCCA Analysis – Rooftop PV

An economic analysis of the rooftop system was conducted through a custom developed lifecycle cost analysis (LCCA) tool.

Key financial assumptions used in the tool include the annual general inflation rate, set at 2%. and the long-term borrowing rate (discount rate) of 4.74% (provided by the Municipality). The effective electricity rate in 2024 is estimated as $0.15/kWh based on Hydro One Class B rates, with an annual escalation rate of 4%.

2025 was selected as Year 0 for the LCCA as this is most likely the earliest construction would be completed. Year 1 represents the first complete year of operation. The project life was set at 25 years to match the power performance warranties of typical PV modules; however, the system will continue to operate and produce electricity at a reduced level. A 0.5% per year degradation in annual production was accounted for in the HelioScope model. As such, costs associated with historical measured degradation from operating solar PV systems is implicitly accounted for in the estimated annual energy generation. No residual value was assumed at end of life.

JLR used its internal LCCA tool to calculate the following financial indicators for the system:

Simple Payback – The number of years required to pay off the system costs based on the net savings/revenue in year 1 is as follows:

$$\boldsymbol{Simple\ Payback} = \frac{\boldsymbol{System\ Cost}}{\boldsymbol{Year\ 1\ Net\ Savings}} = \frac{\$163{,}656}{\$11{,}987} = \textbf{13.7 years}$$

Note however that this number does not account for the costs of equipment maintenance and replacement, financing costs, the time value of money, or any other factors (e.g. electricity rate changes, system degradation, cost of carbon offsets, etc.).

Payback and Cash Flow – A fuller meaning of payback is the first year when the cumulative project cashflow turns positive. This calculation factors in the year over year changes in the electricity rate, escalating annual O&M costs, and periodic maintenance requirements (e.g., inverter replacements). This can be understood visually using the graph below, showing that it will take **12 years** for the system to return a positive cumulative cashflow:

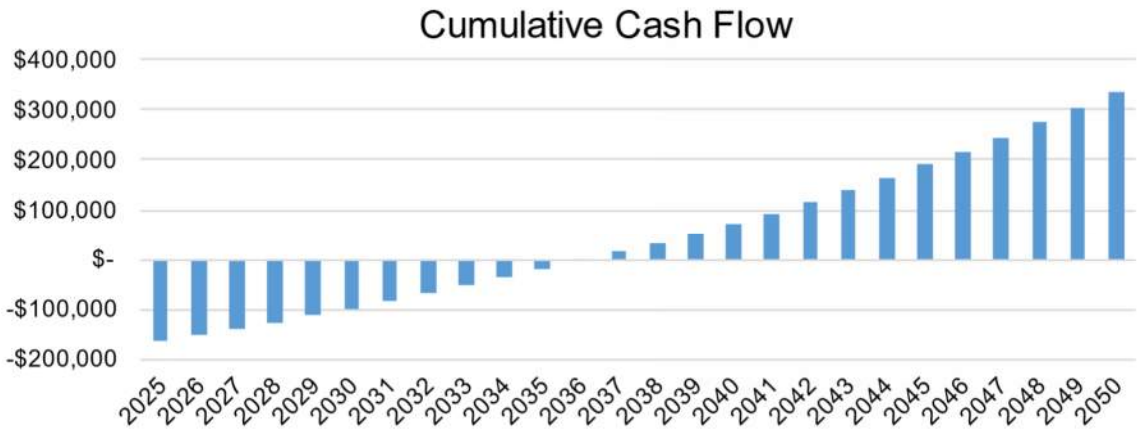


Figure 8 – Cumulative Cash Flow of PV Installation over Project Life

Net Present Value – The 2025 value of all annual cash flows summed over the 25-year life of the system assuming a 4.74% discount rate: $94,443.

5.9.2 Simple payback analysis – Ground-mount PV

A full LCCA analysis of the ground-mount system is not included here. As mentioned earlier, the ground-mount system is included in this report only in abbreviated form, for reference. A simple conceptual estimate of the financials of the ground-mount system are provided in Table 8.

JLR relied on its experience with other larger ground-mount systems in Ontario and used $2/kW DC as a top-down overall system costs, including design, studies, permitting and installation. Helioscope was used to lay out the ground-mount PV array and model its energy production.

Table 8 - Conceptual Financial Parameters for 2.288 MW DC Ground-Mount PV System

Category	Value
System size (kW DC)	2,080
Energy production (kWh/yr)	2,549,000
Total design & installation cost	$4,160,000
Displaced electrictiy cost, Class B rate ($/kWh)	$0.15
Total electrictiy savings ($/yr)	**$382,350**
Simple payback (years)	**10.9**

5.10 Maintenance and Warranty

Most PV modules sold since 2000 have carried 25-year performance and warranties. Generally, these warranties guarantee the modules will produce at about 80% to 85% of their “as new” value after 25 years, with a linear loss of efficiency of approximately 0.8% to 0.6% per year. The Longi Solar LR5-72HPH 550 module has a 25-year power warranty that guarantees 84.80% production at end of life. Additionally, the PV modules will also carry a 10-year product warranty to cover any manufacturers defects.

Inverters are generally expected to have a life of 10 to 15 years; after which they are replaced. This can happen, economically, multiple times over the life of a plant. Most inverter manufacturers provide a standard 10-year warranty that can be extended for up to 20 years.

Required maintenance and operating costs for solar PV systems are minimal. Annual operating and maintenance costs have been conservatively estimated for economic analysis. These costs cover all operating costs, including operator fees for scheduled and unscheduled maintenance, monitoring costs, and inspections. These costs do not include insurance, utility charges, taxes, legal and financing costs, as well as administrative and other costs borne by the owner, nor do they include roof maintenance or replacement. The maintenance costing also does not include component replacement, such as inverters, which are listed as a separate line item in year 15.

5.11 Other Considerations

5.11.1 Financing Support and Grant Opportunities

The Green Municipal Fund provides options to assist Municipalities in financing green investments. This may be of particular interest for the capital-intensive ground-mount PV project option.

The Federation of Canadian Municipalities established the Green Municipal Fund in 2000 to drive local green innovation across the country. The Green Municipal Fund will provide funding for feasibility studies, pilot projects as well as capital projects:

- **Feasibility Studies** – Grant to cover up to 50% of eligible costs to a maximum of $ 175,000 (i.e., $ 350,000 feasibility study).
- **Pilot Projects** – Grant to cover up to 50% of eligible costs to a maximum of $ 500,000 (i.e., $ 1,000,000 pilot project).
- **Capital Projects** – Low-interest loan of up to $ 10,000,000 to cover 80% of eligible costs (i.e., $ 12,000,000 capital project) including a grant for up to 15% of loan amount (i.e., $ 1,500,000).

Eligible costs include items such as: consulting costs to write the funding application incurred up to 90 days prior to application; fees for professional consultant services; and in-kind contributions of staff salaries, up to 10% of eligible costs.

Applications for the Green Municipal Fund are accepted year-round. A Feasibility Study is recommended to be included with applications for capital project funding. This program can be used to fund the next stage of detailed feasibility studies for the selected projects. Once complete, these feasibility studies can be used to support applications for capital funding under this and other funding programs.

5.11.2 Partnership Opportunities

There are third parties interested in being the developers and owners of PV systems, wherein they sell the “green” electricity to the facility. Other financing and leasing arrangements are often possible too. The advantage to the Municipality in considering such an approach is that there is no capital upfront cost, while the operational expenses are typically equal to the cost of buying grid power but yet this innovative partnership secures a long-term carbon-free electricity source

that will be a firm price even if grid electricity costs escalate. Additionally, such entities can qualify for additional incentives, such that cost advantages are greater than if the municipality owns the system. One example entity, OREC (Ottawa Renewable Energy Co-op), would further enable members of the community to become investors in the solar asset.

5.11.3 Floatovoltaics

Floating PV or Floatovoltaics is a relatively new method of installing solar panels on a floating racking system in a body of water, such as perhaps the lagoons of the WWT Plant. This was not assessed in the current technical memorandum due to the system's potential impediments to wastewater treatment, particularly concerning oxygen diffusion in the aerated lagoon and facultative lagoon systems, and a lack of industry experience with such systems in the Canadian climate.

In aerated lagoons, the oxygen transfer efficiency could be compromised as the floating panels would obstruct the surface area available for oxygen exchange. This would limit the effectiveness of aeration systems and potentially lead to decreased treatment performance. Similarly, in facultative lagoons, where oxygen transfer occurs naturally through diffusion at the surface, the presence of floatovoltaics would reduce the surface area available for oxygen diffusion, impeding the natural treatment process.

Notably, floatovoltaics are generally considered infeasible in colder climates due to the risk of ice formation on the water surface. Ice formation could damage the solar panels and disrupt their functionality, making them impractical for use in such environments. Additionally, the cost of implementing floatovoltaics, including installation, maintenance, and potential modifications to existing lagoon systems, is typically significantly higher compared to conventional solar energy solutions.

5.12 Conclusions / Recommendations

The new Brighton WWTS site offers a wide range of opportunities to include Solar PV to offset the energy consumption of the facility. This ranges from a relatively small fraction of power (about 3% of consumption) generated by a conventional rooftop PV system to 85% or more power by utilizing portions of the property for ground-mount solar.

Whereas the rooftop solution is relatively small, it is also relatively "easy" and straightforward technically and from a regulatory perspective. However, the potential hazard classification at the headworks and process buildings due to the presence of explosive and corrosive gases associated with municipal wastewater may limit the size of the overall potential for a rooftop system. This issue should be addressed and resolved early at the detailed design stage.

The opportunity for a ground-mount PV system can provide the biggest green energy impact: the system modeled in this report would offset about 85% of the facility's estimated electrical consumption. This option consists of developing a PV system on top of what visually appears to be the most suitable land area on the property. Additional potentially useable land may exist at the property, and furthermore the generation capacity of the proposed PV system could be increased (e.g. use single-axis tracking, bi-facial modules, etc.). Such changes may allow the Municipality to generate the equivalent of the entire annual energy consumption of the WWTS facility. In any case, the ground-mount site will require detailed land use, environmental,

regulatory, and geotechnical assessments to confirm the feasibility of such a project. All these factors would need to be reviewed in the next stage of feasibility and design.

It is also noted that the electricity consumption of the facility is a very rough estimate at this early stage of the overall WWTS project. Further refinement of the energy consumption may lead to an adjustment of the total PV size and/or the solar contribution ratio.

A smaller ground-mount system (e.g. 500kW AC and 600kW DC) would be expected to be significantly easier to permit and easier to find suitable land for, but it would still provide a significant energy contribution: about 25% of the facility's total annual consumption (generation scales approximately with Watt DC). 500kW AC and smaller systems require a less formal environmental review and potentially fewer other regulatory and utility requirements.

Simple paybacks for the PV systems are estimated at 13.7 and 10.9 years for the rooftop and large ground-mount systems, respectively. The financial analysis should be refined further with further development and optimization of the project, at the more detailed feasibility study stages. A significant financial improvement may be achievable if the Municipality can secure grant or incentive financing (see Section 4.11.1 for opportunities).

Some specific recommendations are presented below:

- Take basic measures during the building design process to prepare the buildings for PV:
    - Address the issue of hazard classification due to potential flammable gases at the headworks and other buildings (i.e. identify areas where solar equipment is to be avoided).
    - Ensure sufficient roof loading capacity for PV (typical ballasted PV weight is 3-7 psf on average).
    - Orient roofs toward the south or southwest to maximize solar energy production and financial benefit.
    - Minimize HVAC and other protuberance on the roofs and move them to the north edges of the roof.
    - Allow for extra space in the electrical room for the solar transformer and disconnect switches (these can also be mounted outside).
- Investigate feasibility of installing a ground-mount PV system (e.g. current and future land use, environmental impacts, regulatory requirements, and geotechnical assessments).
- If a larger ground-mount PV system is considered, then the electrical interconnection will likely require more design effort.
- Investigate availability of grants, incentives, or other financing options for solar that the Municipality may be eligible for.
- Begin the Connection Impact Assessment (CIA) process early to determine if it will be possible to connect this energy generation onto the local grid (i.e. the required amount of interconnection capacity is available on the local grid).

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J.L. RICHARDS & ASSOCIATES LIMITED

INNOVATIVE ENERGY

Prepared by:	Reviewed by:
Vadim Belotserkovsky Senior Energy Systems Project Manager	Joan Haysom, P.Eng., Ph.D. Principal Associate Innovative Energy Market Chief

ELECTRICAL

Prepared by:	Reviewed by:
Simon Buckley, P.Eng. Electrical Engineer	Brennan McGurn, P.Eng. Associate Senior Electrical Engineer

Appendix A

Helioscope Report for Rooftop System

Rooftop Only - New Bright WWT Upgrade, 100 County Rd 64, Brighton, Ontario

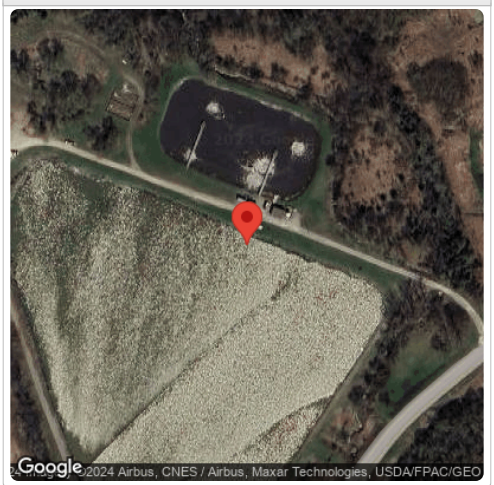
Report

Project Name	Bright WWT Upgrade
Project Address	100 County Rd 64, Brighton, Ontario
Prepared By	Peter Gunn pgunn@jlrichards.ca

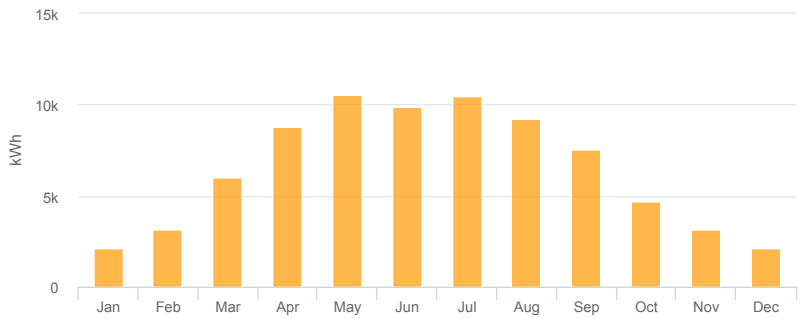
System Metrics

Design	Rooftop Only - New
Module DC Nameplate	63.8 kW
Inverter AC Nameplate	48.0 kW Load Ratio: 1.33
Annual Production	77.68 MWh
Performance Ratio	79.1%
kWh/kWp	1,217.6
Weather Dataset	TMY, COBOURG (AUT), CWEC2011 (custom)
Simulator Version	06edf7d6ab-42ed6b842a-2e07d81e3d-92fa4d4602

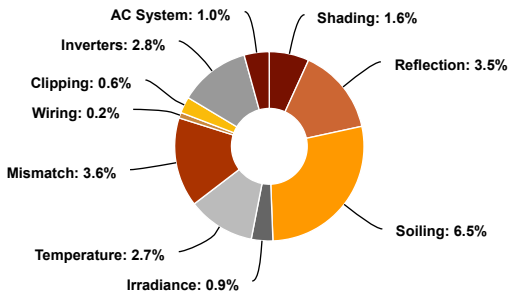
Project Location



Monthly Production



Sources of System Loss



Annual Production

	Description	Output	% Delta
Irradiance (kWh/m²)	Annual Global Horizontal Irradiance	1,425.7	
	POA Irradiance	1,539.3	8.0%
	Shaded Irradiance	1,514.8	-1.6%
	Irradiance after Reflection	1,462.4	-3.5%
	Irradiance after Soiling	1,367.4	-6.5%
	Total Collector Irradiance	**1,367.4**	**0.0%**
Energy (kWh)	Nameplate	87,565.9	
	Output at Irradiance Levels	86,816.8	-0.9%
	Output at Cell Temperature Derate	84,477.5	-2.7%
	Output After Mismatch	81,466.3	-3.6%
	Optimal DC Output	81,282.4	-0.2%
	Constrained DC Output	80,754.3	-0.6%
	Inverter Output	78,467.5	-2.8%
	Energy to Grid	**77,682.8**	**-1.0%**
Temperature Metrics			
	Avg. Operating Ambient Temp		10.3 °C
	Avg. Operating Cell Temp		21.1 °C
Simulation Metrics			
	Operating Hours		4445
	Solved Hours		4445

Condition Set

Description	Updated Condition Set											
Weather Dataset	TMY, COBOURG (AUT), CWEC2011 (custom)											
Solar Angle Location	Project Lat/Lng											
Transposition Model	Perez Model											
Temperature Model	Diffusion Model											
Temperature Model Parameters	Rack Type			U_{const}			U_{wind}					
	Fixed Tilt			20			0					
	Flush Mount			15			0					
	East-West			15			0					
	Carport			29			0					
Soiling (%)	J	F	M	A	M	J	J	A	S	O	N	D
	30	30	20	2	2	2	2	2	2	2	2	20
Irradiation Variance	5%											
Cell Temperature Spread	4° C											
Module Binning Range	0% to 0.6%											
AC System Derate	1.00%											

Module Characterizations	Module	Uploaded By	Characterization
	LR5-72HPH-550M (2021) (Longi Solar)	HelioScope	Spec Sheet Characterization, PAN

Component Characterizations	Device	Uploaded By	Characterization
	Symo Advanced 24.0-3 / 480_OND (Fronius USA)	HelioScope	Default Characterization

Components

Component	Name	Count
Inverters	Symo Advanced 24.0-3 / 480_OND (Fronius USA)	2 (48.0 kW)
Strings	10 AWG (Copper)	8 (539.4 ft)
Module	Longi Solar, LR5-72HPH-550M (2021) (550W)	116 (63.8 kW)

Wiring Zones

Description	Combiner Poles	String Size	Stringing Strategy
Wiring Zone	-	5-17	Along Racking
Wiring Zone 2	-	5-17	Along Racking

Field Segments

Description	Racking	Orientation	Tilt	Azimuth	Intrarow Spacing	Frame Size	Frames	Modules	Power
Field Segment 2	Fixed Tilt	Portrait (Vertical)	10°	199.70981°	3.5 ft	1x1	54	54	29.7 kW
Field Segment 3	Fixed Tilt	Portrait (Vertical)	10°	199.70981°	4.4 ft	1x1	6	6	3.30 kW
Field Segment 4	Fixed Tilt	Portrait (Vertical)	10°	199.1876°	3.5 ft	1x1	56	56	30.8 kW

Detailed Layout



Appendix B

Helioscope Report for Ground-Mount System

Ground Mount Only Bright WWT Upgrade, 100 County Rd 64, Brighton, Ontario

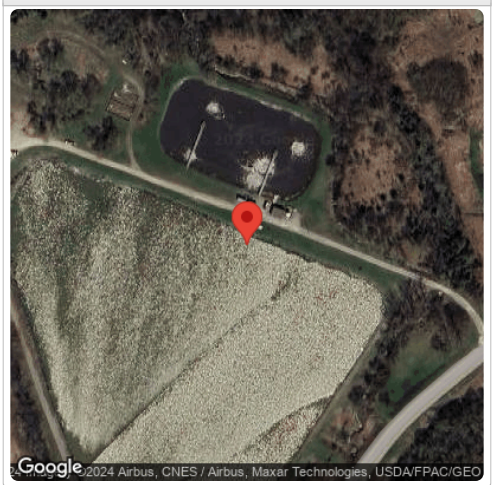
Report

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Project Address	100 County Rd 64, Brighton, Ontario
Prepared By	Peter Gunn pgunn@jlrichards.ca

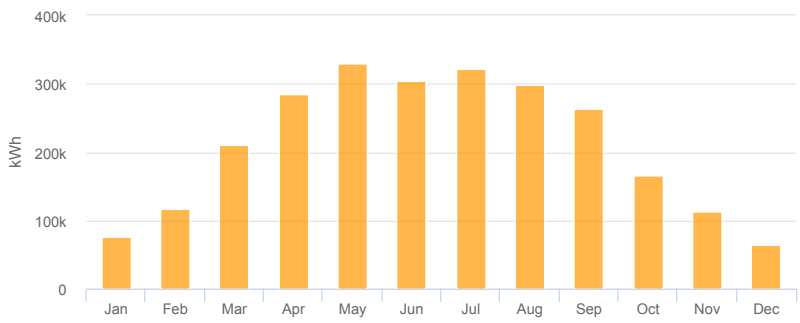
System Metrics

Design	Ground Mount Only
Module DC Nameplate	2.08 MW
Inverter AC Nameplate	1.56 MW Load Ratio: 1.33
Annual Production	2.549 GWh
Performance Ratio	74.0%
kWh/kWp	1,226.2
Weather Dataset	TMY, COBOURG (AUT), CWEC2011 (custom)
Simulator Version	06edf7d6ab-42ed6b842a-2e07d81e3d-92fa4d4602

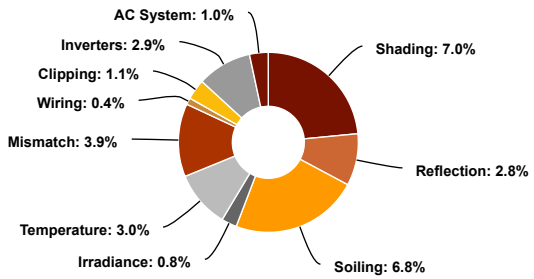
Project Location



Monthly Production



Sources of System Loss



Annual Production

	Description	Output	% Delta
Irradiance (kWh/m²)	Annual Global Horizontal Irradiance	1,425.7	
	POA Irradiance	1,657.1	16.2%
	Shaded Irradiance	1,541.4	-7.0%
	Irradiance after Reflection	1,498.6	-2.8%
	Irradiance after Soiling	1,396.1	-6.8%
	Total Collector Irradiance	**1,395.8**	**0.0%**
Energy (kWh)	Nameplate	2,912,674.0	
	Output at Irradiance Levels	2,888,672.2	-0.8%
	Output at Cell Temperature Derate	2,800,649.5	-3.0%
	Output After Mismatch	2,691,243.2	-3.9%
	Optimal DC Output	2,681,731.7	-0.4%
	Constrained DC Output	2,652,516.1	-1.1%
	Inverter Output	2,575,053.8	-2.9%
	Energy to Grid	**2,549,303.3**	**-1.0%**
Temperature Metrics			
	Avg. Operating Ambient Temp		10.3 °C
	Avg. Operating Cell Temp		21.4 °C
Simulation Metrics			
	Operating Hours		4445
	Solved Hours		4445

Condition Set

Description	Updated Condition Set											
Weather Dataset	TMY, COBOURG (AUT), CWEC2011 (custom)											
Solar Angle Location	Project Lat/Lng											
Transposition Model	Perez Model											
Temperature Model	Diffusion Model											
Temperature Model Parameters	Rack Type			U_{const}			U_{wind}					
	Fixed Tilt			20			0					
	Flush Mount			15			0					
	East-West			15			0					
	Carport			29			0					
Soiling (%)	J	F	M	A	M	J	J	A	S	O	N	D
	30	30	20	2	2	2	2	2	2	2	2	20
Irradiation Variance	5%											
Cell Temperature Spread	4° C											
Module Binning Range	0% to 0.6%											
AC System Derate	1.00%											

Module Characterizations	Module	Uploaded By	Characterization
	LR5-72HPH-550M (2021) (Longi Solar)	HelioScope	Spec Sheet Characterization, PAN

Component Characterizations	Device	Uploaded By	Characterization
	Symo Advanced 22.7-3 / 480_OND (Fronius USA)	HelioScope	Default Characterization
	Symo Advanced 24.0-3 / 480_OND (Fronius USA)	HelioScope	Default Characterization

Components

Component	Name	Count
Inverters	Symo Advanced 24.0-3 / 480_OND (Fronius USA)	65 (1.56 MW)
Strings	10 AWG (Copper)	270 (35,088.1 ft)
Module	Longi Solar, LR5-72HPH-550M (2021) (550W)	3,780 (2.08 MW)

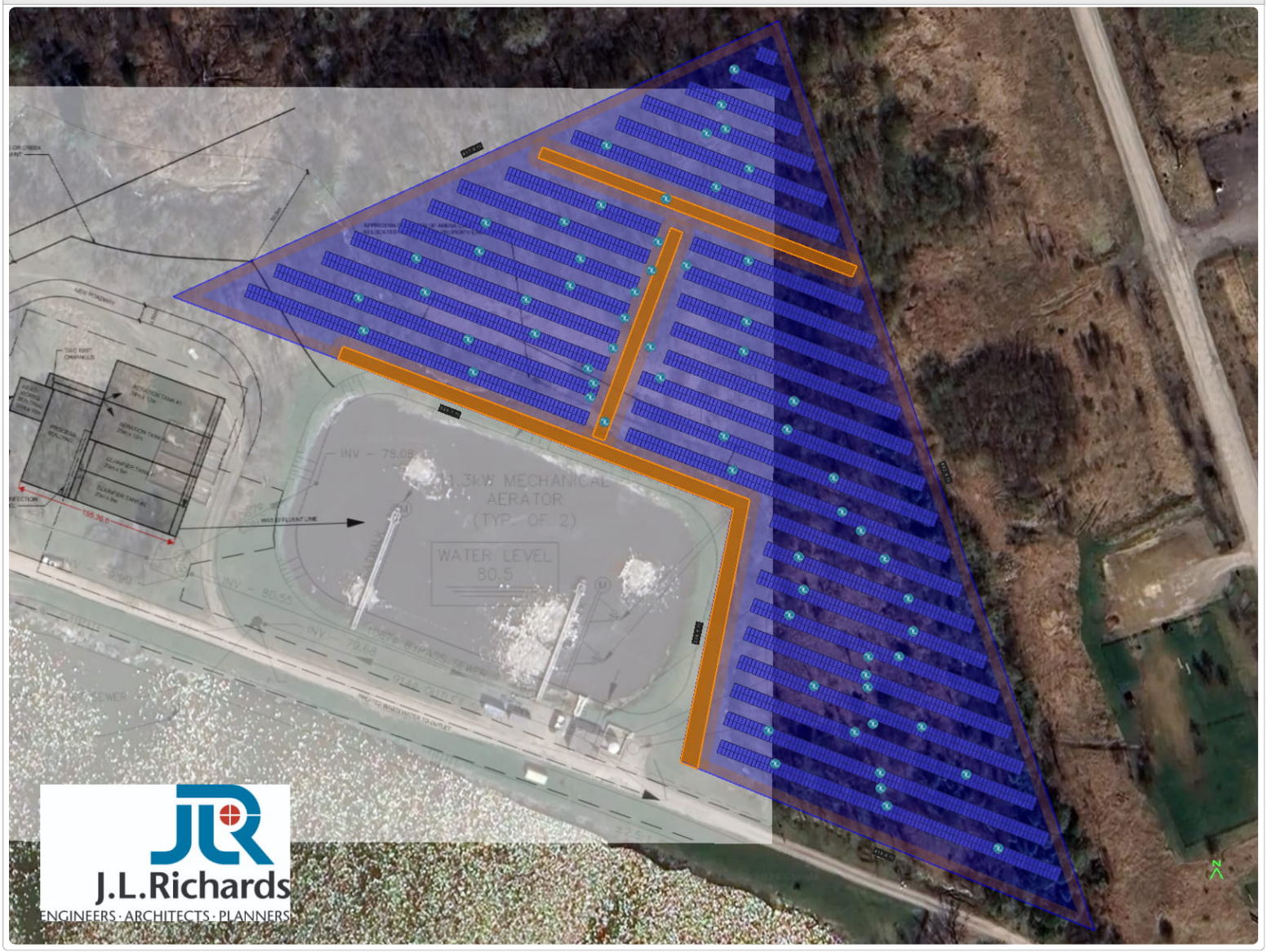
Wiring Zones

Description	Combiner Poles	String Size	Stringing Strategy
Wiring Zone	-	5-17	Along Racking
Wiring Zone 2	-	-	Along Racking

Field Segments

Description	Racking	Orientation	Tilt	Azimuth	Intrarow Spacing	Frame Size	Frames	Modules	Power
Ground Mount Solar	Fixed Tilt	Portrait (Vertical)	30°	200.74232°	13.8 ft	2x5	378	3,780	2.08 MW

Detailed Layout



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MEMO

Date: December 4, 2024

To: Wayne Simpson, P.Eng., Ministry of the Environment, Conservation and Parks (MECP)

From: Susan Jingmiao Shi, P.Eng., M.Eng., J.L. Richards & Associates Limited

CC: Elana Arthurs, Municipality of Brighton
Leslie Whiteman, Municipality of Brighton

Subject: Brighton Wastewater Treatment System Upgrades – Waste Activated Sludge (WAS) Stabilization Lagoon Design Considerations - REVISED

JLR No.: 32296-001.1

1. Background

In June 2024, JLR submitted the 30% design package for the Brighton Wastewater Treatment System (WWTS) to the Ministry of the Environment, Conservation and Parks (MECP). The design package included 30% design drawings and preliminary design report. MECP met with JLR and the Municipality of Brighton on July 9, 2024, to discuss review comments. Refer to the attached meeting minutes.

MECP requested the design intent of the WAS stabilization lagoon and questioned whether it meets the MECP Design Guidelines for Sewage Works Chapter 18 Sludge Storage and Disposal, Section 18.2 Sludge Storage Lagoons. MECP indicated that according to Section 18.2, only fully treated sludge (i.e., stabilized sludge) may be stored in lagoons prior to disposal. JLR indicated that the intent of the WAS stabilization lagoon is to provide WAS stabilization/ treatment with proper mechanical mixing provided to mitigate odour concerns, as approved in the Schedule 'B' Class EA Addendum (December 2022). MECP requested additional information be provided to support the design decision to treat and store WAS in the aerated lagoon and identify key design parameters that deviate from MECP Design Guidelines. MECP would like to see a pre-treatment unit or a digestion process be implemented for this project. In addition, MECP requested additional BioWin™ modeling work done to demonstrate the WAS stabilization lagoon supernatant return impact on extended aeration process.

The objectives of this memorandum are to:

- Update the liquid train BioWin™ modeling results to include WAS supernatant return;
- Document the design basis for the proposed WAS stabilization lagoon;
- Justify the proposed WAS stabilization lagoon design and the deviations from MECP Design Guidelines for Sewage Works; and
- Provide project constraints and limitations that contributes to this design decision.

2. Updated Liquid Train BioWin™ Model to Include WAS Supernatant Return

BioWin™ simulations were run to include the returning WAS stabilization lagoon supernatant to the head of an upgraded and expanded Brighton WWTS. Refer to the attached modelling report. Figure 1 demonstrates the updated BioWin™ process flow diagram.

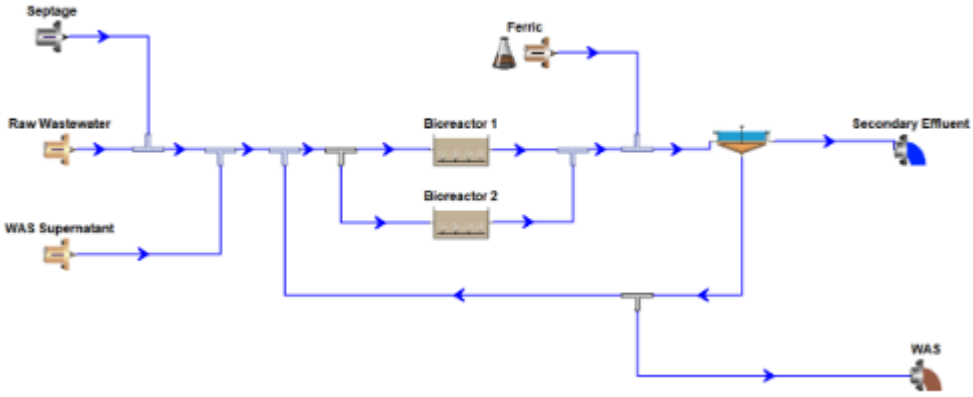


Figure 1: Configuration of BioWin ™ Model of Brighton WWTS (Including WAS Supernatant Return)

Key assumptions include:

- The WWTS will be operating at its future design ADF capacity of 4,600 m^3/d
- The WWTS will be accepting septage (all model runs assume an average septage flow of 31 m^3/d)
- WAS stabilization lagoon supernatant will be returned during “average” operating conditions (i.e. typical influent flows and quality; not during a rain event; not during a process upset; not during a period of high septage loadings)
- The supernatant will be returned at a consistent flowrate over a given day (i.e. pumped in at a consistent flowrate, not a slug load over a short period of time)

The WAS stabilization lagoon supernatant quality has been assumed to be on the high end of “typical” for a gravity sludge settler overflow. The assumed WAS stabilization lagoon supernatant quality for all model runs is summarized in the following table. This is a highly conservation estimate, given the long retention times, quiescent conditions, and likelihood that the lagoon will be operated with a few feet of supernatant at all times (to avoid potential odours).

Table 1: WAS Stabilization Lagoon Supernatant Return Quality

Parameter	Concentration
BOD	1,000 mg/L
TSS	1,000 mg/L
TP	50 mg/L
TKN	100 mg/L

BioWin™ Model runs were completed by incrementally increasing supernatant volumes until the target TAN objective (4.0 mg/L for “cold” weather, 2.0 mg/L for “warm” weather) was exceeded. This allowed definition of a “modelled maximum supernatant volumetric flow rate”. A safety factor was then applied to develop a “recommended design maximum supernatant volumetric flow rate”. A safety factor of 2.0 was applied for all cases to be conservative. Three temperatures were assumed:

- Cold – this is the anticipated coldest temperature the bioreactors will experience. It assumes raw wastewater temperature of 10ºC and supernatant temperature of 0ºC. This was assessed against a TAN objective of 4.0 mg/L. This would mirror the conditions likely to occur in January to March.
- Warm – this is the anticipated coldest temperature the bioreactors will experience during parts of the year during which the more stringent TAN objective (2.0 mg/L) applies in early May. It assumes a raw wastewater temperature of 15ºC and supernatant temperature of 5ºC.
- Summer – this assumes a raw wastewater temperature of 20ºC and supernatant temperature of 20ºC. This would represent conditions during the warmest parts of the year from July to September. This was assessed against a TAN objective of 2.0 mg/L.

As noted above, model runs were completed using BioWin™ air transfer modelling. A bioreactor side water depth (SWD) of 4.5 m and peak design air flow rate of 2,625 m^3/h per aeration tank (as identified in Preliminary Design Report Table 18

– Aeration Tank Design Parameters). In the warmer temperature model runs, the plant's ability to maintain a DO at or above 2.0 mg/L is reached before the effluent TAN concentration exceeds to the objective value. That is the reason why there are two results shown for "summer" conditions – one that is limited by DO concentration, and the other limited by effluent TAN concentration (allowing the model to run at DOs < 2.0 mg/L). Results are summarized in the table below.

Table 2: BioWin^{TM} Liquid Train Model Updates – Maximum Allowable WAS Supernatant Return Flow

Temperature Scenario	Target TAN	Modelled Maximum Supernatant Volumetric Flow	Limiting Factor	Recommended Design Maximum Allowable Supernatant Volumetric Flow
"Cold"	4.0 mg/L	1,200 m^3/d	Effluent TAN	**600 m^3/d**
"Warm"	2.0 mg/L	1,550 m^3/d	Effluent TAN	**775 m^3/d**
"Summer"	2.0 mg/L	2,750 m^3/d	Effluent TAN	1,375 m^3/d
"Summer"	2.0 mg/L	1,700 m^3/d	Bioreactor DO	850 m^3/d

Other items / conclusions to consider:

- The above results are conservative and assume very poor quality WAS stabilization lagoon supernatant quality. As a result, the actual achievable supernatant return flow rates could be higher than those presented above.
- It is recommended that ferric dosage be increased during periods of supernatant return. The ferric dosing will depend on concentration of TP / soluble P in the supernatant.
- It is possible that alkalinity addition may be required during periods of supernatant return. This will depend on the concentration of TKN / TAN in the supernatant. If required, alkalinity addition would only be required during supernatant return, and could be accommodated by adding a bag of bicarbonate (or other alkalinity source) to the bioreactors if required.
- The WWTS should be operated to avoid simultaneous high septage and high supernatant loadings to the liquid treatment train. As noted above, all model runs were completed assuming 31 m^3/d of septage being added to the liquid treatment train (the overall average design septage flow). If supernatant addition is done when septage is not being co-treated, then the plant would be capable of accommodating more supernatant; if the plant is receiving a lot of septage, the volume of supernatant that could be accommodated would be decreased.
- The supernatant volumes above assume that addition to the liquid treatment train will be controlled over the course of a day (i.e. not a slug load added to the liquid treatment train).

In addition to the process evaluation, the effects of precipitation and evaporation were also considered for the future WAS stabilization lagoon, as summarized in the table below. The WAS stabilization storage lagoon surface area (0.68 ha), and typical total precipitation (1,000 mm/year) and evaporation (775 mm/year) were considered. It is anticipated that a total volume of 1,700 m^3 per year of "net precipitation" collected in the lagoon cell that will need to be returned as supernatant. Based on MECP Design Guidelines and septage scenarios, it is anticipated that WAS flow rates will be on the order of 81 to 103 m^3/d. If supernating is done aggressively (85% percent of the WAS volume returned as supernatant), 26,830 to 33,700 m^3 of supernatant per year is expected (including "net precipitation", and assuming the WWTS is operating at its design capacity of 4,600 m^3/d). Given the modelling results (above), the WWTS will need to return supernatant one to two months per year, depending on the months when the WAS supernatant is being returned.

Table 3: Evaluation of WAS Supernatant Return Flow

Typical Total Precipitation	1,000 mm/year
Typical Total Evaporation	775 mm/year
WAS Stabilization Lagoon Surface Area	0.68 ha
Net Precipitation in WAS Stabilization Lagoon	1,700 m^3/year
Undigested WAS Solids Concentration (With P Removal) (1)	0.9%
WAS Generation Rates (2)	754 kg/d (no septage) 951 kg/d (with septage)
Calculated WAS Flow Rate (3)	81 m^3/d (no septage) 103 m^3/d (with septage)
Annual Supernatant Volume (Assumed 85% of WAS volume returned as supernatant)	26,830 m^3/year (no septage) 33,700 m^3/year (with septage)
Daily Maximum Supernatant Volume	600 m^3/d (cold weather return); or 775 m^3/d (warm weather return)
Annual Supernating Period	35 to 45 days (no septage) 43 to 56 days (with septage)

Notes:
(1) MECP Design Guidelines for Sewage Works, Table 16-1 Typical Sludge Generation Rates and Characteristics.
(2) Brighton WWTS Preliminary Design Technical Memorandum No.3 Liquid Train, Table 1 – Summary of Future Scenario Modelling Results, Option C.
(3) Assumed specific gravity of WAS is 1.03.

In summary, the modelling exercise supported the return of WAS Stabilization Lagoon supernatant and concluded that it would not have negative impact on liquid treatment train performance and effluent quality if the volumetric flow rate is limited to 600 to 775 m^3/d (depending on seasonal temperature), under average operating conditions conditions, and that a consistent flowrate is achieved (i.e., not a slug load over a short period of time).

3. Updated WAS Stabilization Lagoon Design Basis

The proposed WAS stabilization lagoon is intended to hold the WAS generated from the extended aeration process for an extended period of time. The supernatant from the WAS stabilization lagoon will decant periodically by gravity into the equalization lagoon. The thickened sludge from WAS stabilization lagoon will be removed annually (by third party) to maintain sufficient stabilization and storage capacity. There is a risk of freezing in the WAS stabilization lagoon due to the large lagoon surface area, intermittent WAS flow, and the depth (existing aerated lagoon depth is approximately 3 m). Supplemental aeration (i.e., floating surface aspirators) will be installed throughout the WAS stabilization lagoon to improve treatment efficiency and reduce odour impacts. The proposed supplemental aeration system allows the top layer of the lagoon to be partially mixed. This still allows for anaerobic fermentation of the settled sludges at the bottom of the lagoon. Surface aspirators will mitigate potential odour generated from natural stabilization. This is the concept that was presented in the Schedule ‘B’ Class EA Addendum completed in 2022. MECP at the time had no major concern over the proposed approach and indicated that the proposed design should meet the ultimate objectives of odour reduction, pathogen reduction and sludge stabilization for sludge treatment. Refer to the attached meeting minutes. The following table summarizes the design basis for the proposed WAS stabilization lagoon.

The proposed WAS stabilization lagoon is a natural sludge stabilization process that does not meet the MECP Design Guidelines definition of a treated sludge storage lagoon, nor an aerobic digester. The proposed design concept is somewhat similar to a lagoon system, in which sludge settles to the bottom for natural digestion and thickening, and supernatant decanted for further treatment.

It is proposed to maintain a minimum 0.5 m liquid cover over the sludge layer in the WAS Stabilization Lagoon to further mitigate odor risks.

Table 4: WAS Stabilization Lagoon Design Basis

	Brighton WWTS Design Basis	**MECP Design Guidelines Reference**
Current Available WAS Stabilization Lagoon Storage Volume (1)	11,575 m^3	-
Liquid Cover	0.5 m (3,400 m^3)	-
Daily WAS Flow (With Septage Receiving)	81 m^3/d (no septage) 103 m^3/d (with septage)	-
WAS Solids Retention Time (SRT) Without Supernatant Removal (2)	100 days (no septage) 79 days (with septage)	45 days for aerobic digester design involving supernatant separation
Estimated WAS SRT With Supernatant Removal (Assumed 85% of WAS volume returned as supernatant)	673 days (no septage) 529 days (with septage)	-
WAS % Solids Input	0.9%	0.9%
Anticipated Stabilized Sludge % Solids	> 5% (3)	-
Side Water Depth	3 m	3.6 to 4.6 m
Air Mixing Requirements (4)	Aeration and mixing in the WAS stabilization lagoon will be provided by 6 floating surface aspirator units of 25 HP (18.6 kW) each, providing 40 lbs O_2/hr at standard conditions. This is equivalent to 0.01 kW/1000 m^3.	<u>Aerobic Digestion (Section 16.3.4):</u> Mechanical aerators are not recommended due to freezing. For minimum mixing and oxygen requirements, an air supply of 0.5 L/(m^3·s) (30 cfm/1000 ft^3) should be provided with the largest blower out of service. <u>Sludge Storage Lagoons (Section 18.2.3 and 18.2.4)</u>: Anaerobically digested sludge storage: The facultative solids basin should have a minimum sidewater depth of 3.7 m (12 ft). The top 0.9 m (3 ft) should be kept aerobic. Aerobically digested sludge storage: A minimum air requirement of 30 m^3/(1000 m^3·min) (30 cfm/1000 ft^3) should be provided. If mechanical surface aerators are used, a minimum power requirement of 2.6 kW/1000 m^3 (0.1 hp/1000 ft^3) should be provided.
Odour Separation Distance	Closest receptor is a single family-dwelling 260 m to the west of the facility.	Odour control facilities should be provided for sludge mixing and treated sludge storage tanks when located within 0.8 km (0.5 miles) of residential or commercial areas.

Notes:

(1) Brighton WWTS, Technical Memorandum No.4 Solids Train, Table 2 – Existing Aerated Lagoon Characteristics; information from Sludge Survey Report dated November 13, 2023. The current available volume is the remaining lagoon volume and excludes current sludge volume of 3,866 m^3.

(2) SRT presented herein excludes the SRT in the extended aeration process. The previous BioWin model predicts a SRT of 17-18 days in extended aeration process.

(3) 5% solids concentration in stabilized sludge is assumed based on observation from other lagoon-based treatment facilities.

(4) Existing aerated lagoon uses two (2) 11.2 kW aerators and two (2) 18.6 kW aerators.

4. Other Plant Examples

The following is a list of other wastewater treatment plants that have the similar lagoon-based WAS stabilization treatment and storage following the mechanical extended aeration process that JLR is aware of.

- Lindsay Wastewater Treatment Plant, City of Kawartha Lakes
- Thornbury Wastewater Treatment Plant, Town of Blue Mountains
- Colborne Wastewater Treatment Plant, Township of Cramahe

JLR contacted the Lindsay Wastewater Treatment Plant and Thornbury Wastewater Treatment Plant operators, and noted the following:

- Thornbury Wastewater Treatment Plant is rated for 5,330 m^3/d average day flow. The plant treats municipal wastewater, along with imported sewage including septage, holding tank waste and leachate. The treatment process consists of headworks, aeration tanks, secondary clarifiers, and UV disinfection. The plant also has three (3) lagoons operating in series, providing treatment for WAS and emergency flow storage from the mechanical plant. To note, lagoon cell #1 receives WAS flow, along with the emergency flow. Lagoon cell #2 and #3 operated in series, receiving and storing discharge from cell #1 with discharge on an as-needed basis to UV disinfection. In discussion with the Town's operators, they noted that the sludge removal process has only occurred once in the past 20 years. The sludge deposit is the highest at the inlet location of cell #1. In terms of odour mitigation, the operators manage it by maintaining a water cover on top of the sludge. No surface aeration is being provided in WAS storage lagoons.
- Lindsay Wastewater Treatment Plant is rated for 21,500 m^3/d average day flow. The plant treats municipal wastewater, along with imported sewage including septage, and abattoir waste. The treatment process consists of headworks, aeration tanks, secondary clarifiers, Actiflo, and UV disinfection. The sludge management is being completed through three sludge stabilization and storage lagoons. The plant also has two flow equalization lagoons, receiving peak flows, supernatant from upstream sludge storage lagoons and abattoir waste. In discussion with the plant operators, WAS is being stored in the storage lagoons and cleaned out once every 5 years. No surface aeration is being provided. The equalization lagoons do not require as frequent cleanout and the last cleanout was in 1990s. The operators also noted that there is no odor from these lagoons.

5. Additional Project Constraints

- Electrical Service Constraints: JLR has been working with Hydro One to upgrade the incoming electrical feed to the Brighton WWTS. Since the plant will be upgraded from a lagoon-based facility to a full mechanical plant, there are major electrical service upgrades that need to be undertaken. There are limitations to the power that Hydro One can allocate to this site. Through consultation, the Brighton WWTS will see a future 750 kVA incoming service and this is the ceiling Hydro One can provide. The proposed WAS stabilization lagoon does not present significant power demand and with the current design, the 750 KVA incoming service will be able to accommodate all plant electrical needs. However, if an aerobic digester process is required, the blowers will have the largest power draw at a plant that will substantially limit power available for the rest of the site.
- Financial Constraints: The update Opinion of Probable Costs (OPC) for the proposed upgrades are $36.8 million, based on current proposed WAS stabilization lagoon concept. JLR is working with staff and council to "value engineer" the project to a manageable cost. A new aerobic digester will further increase the OPC.

6. Equalization Lagoon

In 30% design, JLR proposed to divide up the existing facultative lagoon into two sections, one intended for equalization storage. MECP at the time requested a plan for the second half of the large lagoon.

Upon further review, JLR would like to propose to use the entire facultative lagoon volume for equalization storage, and combine equalization storage with WAS stabilization lagoon supernatant. The supernatant from WAS stabilization lagoon will drain into the equalization lagoon. The proposed concept is very similar to the Thornbury WWTP and Lindsay WWTP. The wastewater in the equalization lagoon will be returned to the head of the plant periodically for treatment. The flow will

be returned during “average” conditions to reduce shock-loading impacts. Table below demonstrates the storage period the equalization lagoon can provide.

Table 5: Emergency Equalization Lagoon Design Basis

Total Emergency Equalization Lagoon Storage Volume (1)	77,093 m^3
Net Precipitation in Equalization Lagoon (2)	12,240 m^3
Storage requirements for WAS Supernatant	26,830 m^3/year (no septage) 33,700 m^3/year (with septage)
Volume Available for Equalization	38,023 m^3/year (no septage) 31,153 m^3/year (with septage)
Peak Instantaneous Flow (3) (*Influent pump station is designed to convey 250 L/s)	21,600 m^3/d
Peak Hourly Flow	17,813 m^3/d
Flow Requiring Equalization	3,787 m^3/d
Equalization Storage Period	10+ days (no septage) 8+ days (with septage)

Note:
(1) Based on sludge survey results. Refer to attachment.
(2) Based on 5.44 hectares existing facultative lagoon surface area identified in ECA, and 225 mm net precipitation per year.
(3) The plant currently does not monitor peak instantaneous flows. The equalization storage calculation is intended to demonstrate the general amount of storage available in the lagoon. The WAS supernatant should be returned prior to the wet weather season to allow maximum storage volume. However, in the event that wet weather event occurs during supernating window, the equalization lagoon can provide storage for over a week’s period.

7. Recommendation

JLR would like to propose the WAS stabilization lagoon and equalization lagoon concept for MECP’s consideration and acceptance, based on the following benefits:

- Maximized use of existing lagoon infrastructure
- Reduced power demand at the facility
- Mitigated the risk of insufficient electrical service
- Reduced capital investment burden on the municipality
- Mitigated the risk of odor issues

Upon approval of the proposed design, JLR will update the design drawings and design report to capture the updated design.

J.L. RICHARDS & ASSOCIATES LIMITED

Prepared by:



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Associate, Senior Environmental Engineer

Reviewed by:



Matthew Morkem, P.Eng.
Senior Associate, Environmental Infrastructure Market Chief

SJS

Attachment: MECP Meeting Minutes
Lagoon Sludge Survey
BioWin™ Modelling Report

Memorandum

To:	Susan Shi, P.Eng., M.Eng., J.L. Richards & Associates Limited (JLR)
From:	Melody Johnson, PhD, P.Eng.
Date:	November 13, 2024
Subject	Brighton WWTS – Biological Process Modelling – WAS Storage Lagoon Supernatant

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1. Introduction

1.1 Background

Upgrades are planned for the Brighton WWTS to improve its biological treatment performance, particularly with respect to nitrification. Blue Sky EEC was previously retained to utilize the biological process modelling software package BioWin™ to assist in the development of conceptual level upgrade options for the Brighton WWTS. The methodology used and results of the process modelling were summarized in Technical Memorandum – Brighton WWTS – Biological Process Modelling (Blue Sky, 2023).

Since then, the preferred upgrade approach has been finalized, which includes constructing new purpose-built bioreactors and secondary clarifiers, and utilizing the existing aerated lagoon as a WAS storage lagoon. To accommodate this design, it will be necessary to periodically return supernatant from the WAS storage lagoon to the liquid treatment train.

Blue Sky EEC has been retained to update the BioWin™ model to reflect the planned upgrades to the Brighton WWTS, and specifically to assess the impact of WAS storage lagoon supernatant return on liquid treatment train performance and effluent quality.

1.2 Objectives

The objectives of this memorandum are to:

- Document the modifications made to the BioWin™ model since issuing the 2023 modelling TM; and,
- Determine the maximum recommended design WAS supernatant return rate for the upgraded and expanded Brighton WWTS, taking into consideration seasonal performance impacts.

2. Modifications to the Brighton WWTS BioWin™ Model

2.1 Configuration

The previously completed BioWin™ process modelling involved developing several model configurations for an upgraded and expanded Brighton WWTS to assess alternative upgrade options. One of these alternatives, Option C, involved modelling the construction of new purpose-built bioreactors and secondary clarifiers. This model configuration was updated from Blue Sky (2023) as follows:

- The bioreactor dimensions were adjusted to 10 m x 40 m x 4.5 m SWD based on final design values provided by JLR; and,
- A new BOD influent was incorporated into the model to represent the WAS supernatant stream.

A graphical representation (screenshot) from BioWin™ of the modified model configuration is presented in Figure 1.

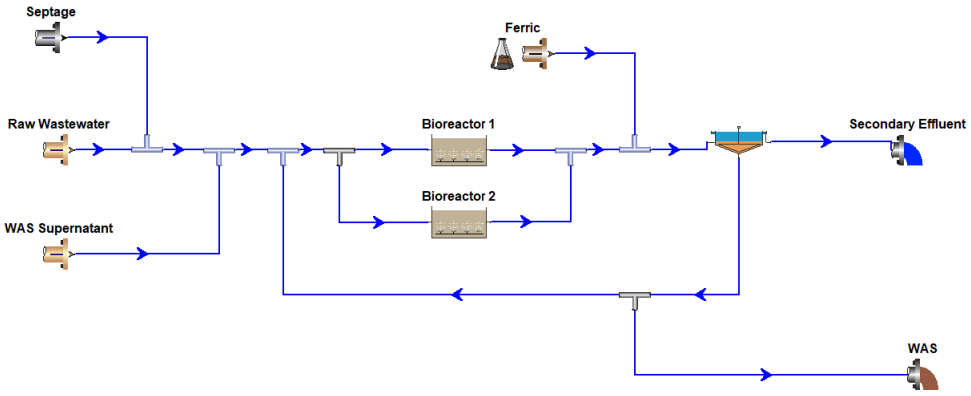


Figure 1 –Configuration of the BioWin™ Model of the Upgraded and Expanded Brighton WWTS including WAS Supernatant Return

2.2 Calibration

No changes were made to the raw wastewater characterization, septage characterization or assumed secondary clarifier removal rates from those presented in Blue Sky (2023). The only change to a model parameter involved modifying the bioreactor aeration modelling from a constant "DO setpoint" of 2.0 mg/L to a constant "air flow rate" of 2,625 m^3/h per tank (based on facility design information provided by JLR). This change allowed the model to estimate operating DO concentrations within the bioreactors at varying influent flow rates and liquid temperatures.

3. Modelling Future Operating Scenarios

3.1 Overview and Assumptions

All future operating scenarios were based on the following assumptions regarding influent flows and loadings:

- The WWTS will be operating at its future design ADF capacity of 4,600 m^3/d and raw wastewater characteristics as defined in Blue Sky (2023).
- The WWTS will be accepting septage at the design flow rate of 131 m^3/d.
- The supernatant will have characteristics as presented in Table 1. These values are taken from the high end of the typical range for a gravity sludge settler overflow (WEF, 2005). Given the long retention times and planned quiescent conditions in the WAS storage lagoon prior to supernating, these values can be considered very conservative and representative of "worst case" conditions.

Combined, the above represent a conservative approach to defining influent flows and loadings associated with the future operating scenarios.

Table 1 – Assumed WAS Lagoon Supernatant Quality

Parameter	Concentration
BOD	1,000 mg/L
TSS	1,000 mg/L
TP	50 mg/L
TKN	100 mg/L

In terms of the operation of the upgraded and expanded Brighton WWTS, the following assumptions were made:

- The bioreactors would be operated at mixed liquor suspended solids (MLSS) concentrations of approximately 4,000 mg/L. This is consistent with the target utilized in Blue Sky (2023).
- Ferric dosages would increase as required to maintain modelled effluent soluble phosphorous (P) concentrations at or below 0.50 mg/L.
- WAS lagoon supernatant would be returned during "average" operating conditions (i.e. typical influent flows and quality). Supernatant will not be returned during wet weather / peak flow events, during a process upset, or during a period of high septage loading.
- The supernatant would be returned at a consistent flowrate over a given day (i.e. returned to the head of the liquid treatment train at a consistent flow rate, not a slug load over a short duration).

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In order to assess the potential impact of WAS supernatant return on the performance of the Brighton WWTS's liquid treatment train, model runs were completed by incrementally increasing supernatant volumes until the target TAN objective (4.0 mg/L for "cold" weather, 2.0 mg/L for "warm" weather) was exceeded. This allowed definition of a "modelled maximum supernatant volumetric flow rate" at which the effluent TAN objective could still be met. In order to define a "recommended design maximum supernatant volumetric flow rate," a safety factor of 2.0 was applied. This represents a conservative approach since a safety factor of 1.5 is typically applied when assessing biological treatment capacity (MOE, 2008).

Three future operating conditions were considered, namely:

- "Cold Weather" – This is the anticipated coldest temperature the bioreactors will experience. It assumes raw wastewater temperature of 10°C and supernatant temperature of 0°C. This was assessed against a TAN objective of 4.0 mg/L. This would mirror the conditions likely to occur in January to March.
- "Warm Weather" – This is the anticipated coldest temperature the bioreactors will experience during parts of the year during which the more stringent TAN objective (2.0 mg/L) applies, specifically early May. It assumes a raw wastewater temperature of 15°C and supernatant temperature of 5°C.
- "Summer" – This assumes a raw wastewater temperature of 20°C and supernatant temperature of 20°C. This would represent conditions during the warmest parts of the year (July to September), and was assessed against a TAN objective of 2.0 mg/L.

Results for each of these are presented in the following sub-sections.

3.2 Cold Weather Results

The results of the cold weather scenario modelling runs are presented in Table 2. Modelled supernatant flows ranged from 1,000 m^3/d to 1,250 m^3/d. The impact of increased supernatant volume on the model-predicted secondary effluent TAN concentration is presented in Figure 2.

Due to the low assumed temperature of the supernatant (0°C) as compared to the raw wastewater (10°C), increasing the supernatant volumetric flow rate results in a decrease in the bioreactor operating temperature (ranging from 8.2 to 7.9°C across runs). Modelled DO remained above 2.0 mg/L for all runs.

The modelled effluent TAN objective of 4.0 mg/L was exceeded at a supernatant volumetric flow rate of approximately 1,200 m^3/d. Applying the safety factor of 2.0 yields a recommended design maximum supernatant volumetric flowrate of 600 m^3/d during cold weather periods.

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Table 2 – Cold Weather Modelling Scenario Results

Parameter	Unit	Run 1	Run 2	Run 3	Run 4
Model Input Parameters					
Raw Wastewater Flow	m^3/d	4,600	4,600	4,600	4,600
Septage Flow	m^3/d	131	131	131	131
Raw Wastewater Temp.	°C	10	10	10	10
Supernatant Flow	m^3/d	1,000	1,100	1,175	1,250
Supernatant Temp.	°C	0	0	0	0
Bioreactor Temp.	°C	8.2	8.1	8.0	7.9
Ferric Flow	L/d	1,600	1,800	1,900	2,000
WAS Flow	m^3/d	260	280	290	300
Model Output Parameters					
WAS Mass Flow	kg/d	2,278	2,464	2,582	2,701
MLSS	mg/L	3,998	3,978	3,998	4,013
Bioreactor DO	mg/L	4.21	4.12	4.06	4.11
Effluent Quality					
TAN	mg/L	2.27	2.98	3.7	5.22
NO_3-N	mg/L	29.5	27.4	24.8	18.2
NO_2-N	mg/L	0.87	1.72	3.4	8.31
Soluble P	mg/L	0.49	0.47	0.47	0.49
TP	mg/L	0.72	0.70	0.70	0.71
TSS	mg/L	7.5	7.42	7.42	7.42
BOD	mg/L	3.74	3.82	3.88	3.93

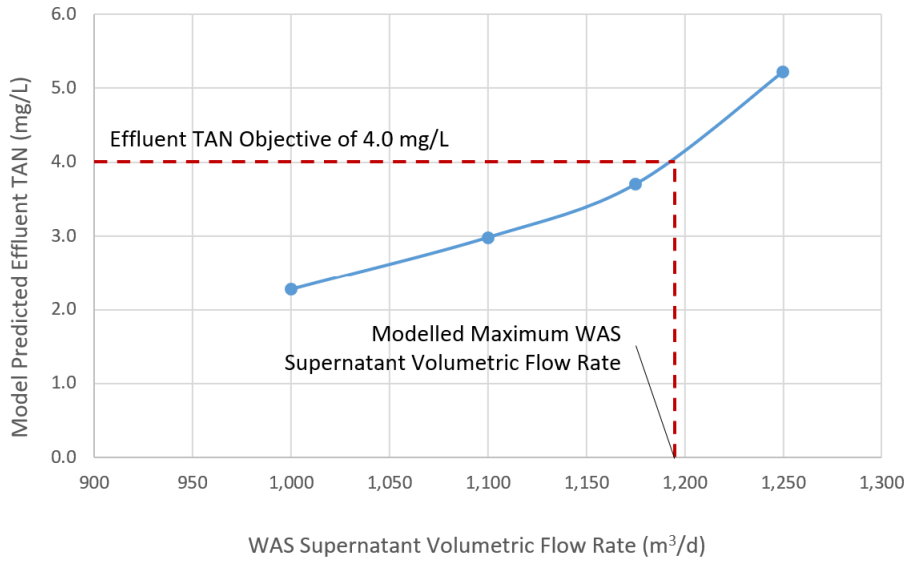


Figure 2 – Model Predicted Effluent TAN vs. WAS Supernatant Volumetric Flow Rate – Cold Weather Results

3.3 Warm Weather Results

The results of the warm weather scenario modelling runs are presented in Table 3. Modelled supernatant flows ranged from 1,500 m^3/d to 1,800 m^3/d. The impact of increased supernatant volume on the model-predicted secondary effluent TAN concentration is presented in Figure 3.

Due to the low assumed temperature of the supernatant (5°C) as compared to the raw wastewater (15°C), increasing the supernatant volumetric flow rate results in a decrease in the bioreactor operating temperature (ranging from 12.5 to 12.2°C across runs). Modelled DO remained above 2.0 mg/L for all runs.

The modelled effluent TAN objective of 2.0 mg/L was exceeded at a supernatant volumetric flow rate of approximately 1,550 m^3/d. Applying the safety factor of 2.0 yields a recommended design maximum supernatant volumetric flowrate of 775 m^3/d during warm weather periods.

Table 3 – Warm Weather Modelling Scenario Results

Parameter	Unit	Run 1	Run 2	Run 3	Run 4
Model Input Parameters					
Raw Wastewater Flow	m^3/d	4,600	4,600	4,600	4,600
Septage Flow	m^3/d	131	131	131	131
Raw Wastewater Temp.	°C	15	15	15	15
Supernatant Flow	m^3/d	1,500	1,600	1,700	1,800
Supernatant Temp.	°C	5	5	5	5
Bioreactor Temp.	°C	12.5	12.4	12.3	12.2
Ferric Flow	L/d	2,250	2,400	2,550	2,700
WAS Flow	m^3/d	330	345	365	370
Model Output Parameters					
WAS Mass Flow	kg/d	3,029	3,197	3,372	3,528
MLSS	mg/L	3,997	4,000	3,953	4,042
Bioreactor DO	mg/L	2.94	2.83	2.81	2.76
Effluent Quality					
TAN	mg/L	1.82	2.15	2.87	3.7
NO_3-N	mg/L	27.3	25.8	21.4	15.5
NO_2-N	mg/L	0.93	1.59	4.82	9.56
Soluble P	mg/L	0.50	0.49	0.49	0.50
TP	mg/L	0.73	0.72	0.71	0.72
TSS	mg/L	7.27	7.24	7.12	7.23
BOD	mg/L	3.89	3.95	4.02	4.09

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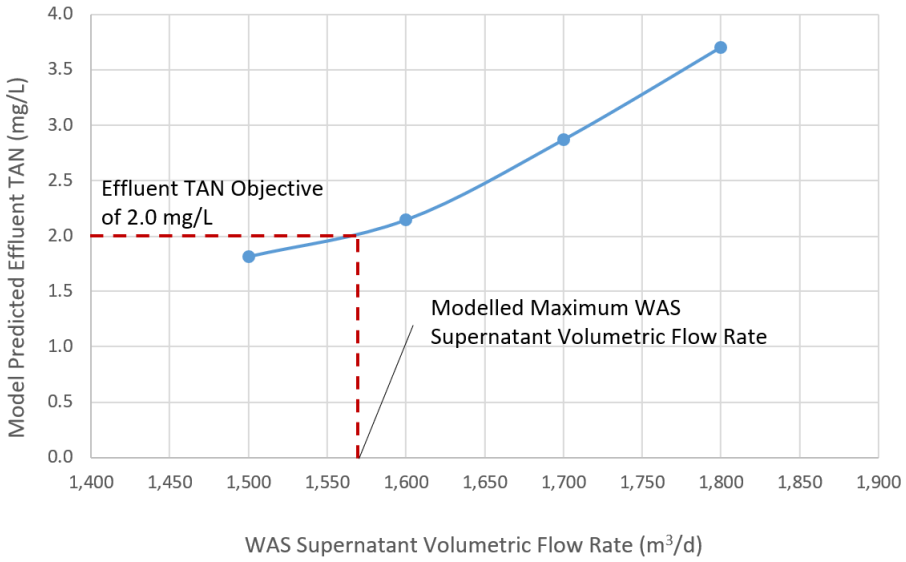


Figure 3 – Model Predicted Effluent TAN vs. WAS Supernatant Volumetric Flow Rate – Warm Weather Results

3.4 Summer Results

The results of the summer scenario modelling runs are presented in Table 4. Modelled supernatant flows ranged from 1,700 m^3/d to 2,900 m^3/d. The impact of increased supernatant volume on the model-predicted secondary effluent TAN concentration is presented in Figure 4.

Because both the supernatant and raw wastewater had the same assumed temperature (20°C), increasing the supernatant volumetric flow rate did not affect the bioreactor operating temperature. Modelled DO concentrations were below 2.0 mg/L for all but Run 1 (supernatant volume of 1,700 m^3/d).

The modelled effluent TAN objective of 2.0 mg/L was exceeded at a supernatant volumetric flow rate of approximately 2,750 m^3/d. Applying the safety factor of 2.0 yields a recommended design maximum supernatant volumetric flowrate of 1,375 m^3/d during summer periods.

Despite the effluent TAN remaining below the objective of 2.0 mg/L, the bioreactor DO is well below the target of 2.0 mg/L at a supernatant volume above 1,700 m^3/d (see Table 4). If maintaining bioreactor DO at a minimum value of 2.0 mg/L is selected as the limiting parameter, the "modelled maximum supernatant volumetric flowrate" reduces to 1,700 m^3/d. Applying a safety factor of 2.0 yields a recommended design maximum supernatant volumetric flow of 850 m^3/d during summer periods.

DRAFT

Table 4 – Summer Modelling Scenario Results

Parameter	Unit	Run 1	Run 2	Run 3	Run 4	Run 5	Run 6	Run 7
Model Input Parameters								
Raw Wastewater Flow	m^3/d	4,600	4,600	4,600	4,600	4,600	4,600	4,600
Septage Flow	m^3/d	131	131	131	131	131	131	131
Raw Wastewater Temp.	°C	20	20	20	20	20	20	20
Supernatant Flow	m^3/d	1,700	1,900	2,100	2,300	2,500	2,700	2,900
Supernatant Temp.	°C	20	20	20	20	20	20	20
Bioreactor Temp.	°C	20	20	20	20	20	20	20
Alum Flow	L/d	2,700	2,825	3,150	3,450	3,800	4,100	4,400
WAS Flow	m^3/d	350	385	405	425	460	490	510
Model Output Parameters								
WAS Mass Flow	kg/d	3,303	3,593	3,924	4,251	4,614	4,958	5,292
MLSS	mg/L	4,029	3,919	3,996	4,052	3,995	3,963	3,997
Bioreactor DO	mg/L	2.07	1.86	1.62	1.41	1.28	1.24	1.15
Effluent Quality								
TAN	mg/L	0.71	0.83	0.94	1.09	1.36	1.9	2.57
NO_3-N	mg/L	27.4	25.5	23.4	20.9	17.5	8.36	1.57
NO_2-N	mg/L	0.24	0.33	0.45	0.72	1.96	9.41	14.1
Soluble P	mg/L	0.49	0.50	0.50	0.50	0.49	0.49	0.49
TP	mg/L	0.72	0.73	0.71	0.73	0.71	0.7	0.71
TSS	mg/L	7.25	6.98	7.04	7.06	6.9	6.79	6.79
BOD	mg/L	3.65	3.75	3.86	3.97	4.08	4.19	4.31

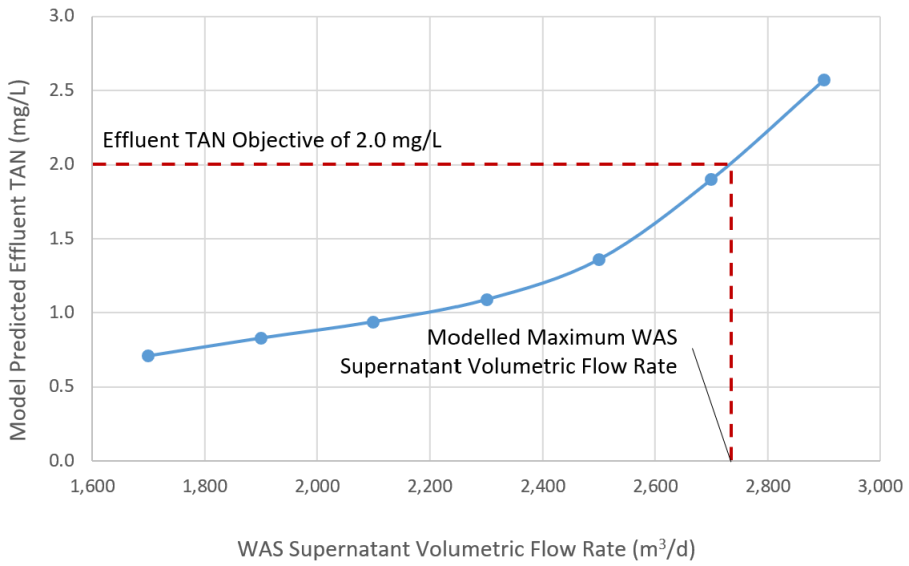


Figure 4 – Model Predicted Effluent TAN vs. WAS Supernatant Volumetric Flow Rate – Summer Results

4. Summary and Conclusions

The results of the BioWin™ modelling are summarized in Table 5. Overall, it is recommended that the design maximum supernatant volumetric flowrate returned to the liquid treatment train be limited to 600 m^3/d to 850 m^3/d (varying based on seasonal temperatures). These estimates are based on conservative assumptions regarding supernatant quality and a conservative safety factor.

Table 5 – Recommended Design Maximum Supernatant Volumetric Flow Rate for the Upgraded Brighton WWTS Under Varying Operating Temperatures

Temperature Scenario	Effluent TAN Target	Modelled Maximum Supernatant Volumetric Flow	Limiting Factor	Recommended Design Maximum Supernatant Volumetric Flow
"Cold Weather"	4.0 mg/L	1,200 m^3/d	Effluent TAN	600 m^3/d
"Warm Weather"	2.0 mg/L	1,550 m^3/d	Effluent TAN	775 m^3/d
"Summer"	2.0 mg/L	2,750 m^3/d	Effluent TAN	1,375 m^3/d
"Summer"	2.0 mg/L	1,700 m^3/d	Bioreactor DO	850 m^3/d

5. Closure

We trust that the above provides you with the information you require at this time. Should you have any questions or concerns, please do not hesitate to contact Melody Johnson at melody@bskyeng.com or 647-721-7644.

References

Blue Sky (2023). Draft Technical Memorandum – Brighton WWTS – Biological Process Modelling, dated November 7, 2023.

MOE (2008). Design Guidelines for Sewage Works.

WEF (2005). Manual of Practice 11, 6th Edition.

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Fax: 613 728 6012

Municipality of Brighton
Brighton Wastewater Treatment System Schedule 'B' Class EA Addendum and Conceptual Design

Project Meeting
MECP Consultation Meeting No.2

Attendance:	Leslie Whiteman (LW)	Municipality of Brighton (Municipality)	lwhiteman@brighton.ca
	Adam Walraven (AW)	Municipality of Brighton (Municipality)	awalraven@brighton.ca
	Vince Pileggi (VP)	Ministry of the Environment, Conservation and Parks (MECP)	vince.pileggi@ontario.ca
	Wayne Simpson (WS)	Ministry of the Environment, Conservation and Parks (MECP)	wayne.simpson@ontario.ca
	Victor Castro (VC)	Ministry of the Environment, Conservation and Parks (MECP)	Victor.castro@ontario.ca
	Matt Morkem (MM)	J.L. Richards & Associates Limited (JLR)	mmorkem@jlrichards.ca
	Susan Shi (SS)	J.L. Richards & Associates Limited (JLR)	sshi@jlrichards.ca

The meeting commenced at 10:00 a.m. on Friday, September 23, 2022 via Video Conference (Microsoft Teams).

The following summary of the discussions of this meeting has been prepared to record decisions reached and actions required for the project. Please advise the undersigned of any errors or omissions within the next three business days.

ITEM **ACTION BY**

1.0 Meeting Objective:

The purpose of the meeting is to review the sludge treatment and solids management options related to WAS storage lagoon option currently being proposed in the EA Addendum.

2.0 Discussions

This section documents the discussion points and action items from the meeting:

- JLR presented the block flow diagram for the proposed upgrades (refer to the email attachment) and explained that the intent is to separate liquid treatment from solids treatment. The secondary clarifier effluent would go directly to the plant effluent. The WAS will be stored and treated in the existing facultative lagoon. Supplemental aeration will be provided in the WAS storage lagoon to mitigate odor and freezing concerns.

- MECP has no major concern over the proposed approach. MECP stated that the proposed design should meet the ultimate objectives of odor reduction, pathogen reduction and sludge stabilization for sludge treatment. Any departure from MECP Design Guideline for Sewage Works should be identified with a plan to deal with such departure. The proposed design should demonstrate proper mixing, aeration to facilitate sludge stabilization. Rationale and engineering calculations should be included in the report to support such decision.

- The objectives and limits on *E.Coli.* were also discussed. MECP will be looking for 200CFU/ 100 mL for limit, and 100 CFU/100mL for objectives.

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Municipality of Brighton
Brighton Wastewater Treatment System Schedule 'B' Class EA Addendum and Conceptual Design

Project Meeting
MECP Consultation Meeting No.2

ITEM	**ACTION BY**
• The phased implementation of the proposed upgrades was briefly discussed. MECP indicated that the decision ultimately lies with Viktoria Light and her supervisor in the compliance branch.	MECP

3.0 ADJOURNMENT

a. Meeting adjourned at 11:00 a.m.

Prepared by: Issued on: October 11, 2022



Susan Jingmiao Shi, P.Eng., M.Eng.
Associate, Senior Environmental Engineer

Distribution: All attendees
CC: Viktoria Light, MECP, Viktoria.light@ontario.ca
Scott Poole, Municipality, spoole@brighton.ca

Attachments: Email communication from Susan Shi on September 19, 2022

Susan Jingmiao Shi

From:	Susan Jingmiao Shi
Sent:	Monday, September 19, 2022 3:52 PM
To:	Simpson, Wayne (MECP); Matthew Morkem
Cc:	Light, Viktoria (MECP); Fuller, Jacqueline (MECP); Bradley, David (MECP); Pileggi, Vince (MECP); Orpana, Jon (MECP); Castro, Victor (MECP); Leslie Whiteman; Scott Poole; Bob Casselman
Subject:	RE: Brighton WPCP - follow up engineering meeting

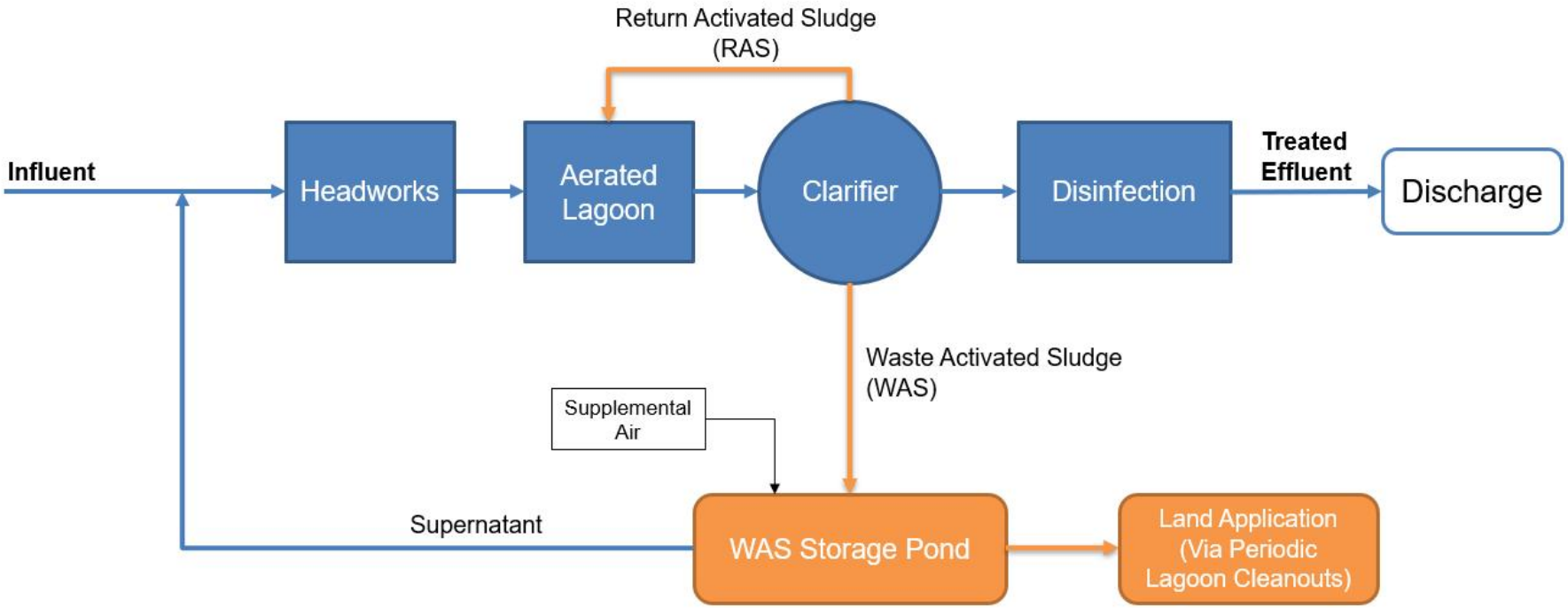
Hello Wayne,

We look forward to our conversation on Friday.

In the meantime, we have developed a block flow diagram to further illustrate the proposed upgrades. The proposed upgrades will not see blending of WAS and treated effluent as suggested by GSS. The solids train and liquid train will be completely separate.

We would also be looking for the decision on disinfection requirement at this meeting. Viktoria has indicated that the E.Coli limit may have been put in the current ECA by mistake? Further clarifications on that would be helpful in us advancing the EA Addendum.

Thanks!
Susan



From: Simpson, Wayne (MECP) <Wayne.Simpson@ontario.ca>
Sent: Thursday, September 15, 2022 4:15 PM
To: Susan Jingmiao Shi <sshi@jlrichards.ca>; Matthew Morkem <mmorkem@jlrichards.ca>
Cc: Light, Viktoria (MECP) <Viktoria.Light@ontario.ca>; Fuller, Jacqueline (MECP) <Jacqueline.Fuller@ontario.ca>; Bradley, David (MECP) <David.Bradley@ontario.ca>; Pileggi, Vince (MECP) <Vince.Pileggi@ontario.ca>; Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>; Castro, Victor (MECP) <Victor.Castro@ontario.ca>; Leslie Whiteman <lwhiteman@brighton.ca>; Scott Poole <SPoole@brighton.ca>; Bob Casselman <BCasselman@brighton.ca>
Subject: Brighton WPCP - follow up engineering meeting

Hi Susan and Matthew,

Thanks for your email. Vince and I are ok for Friday the 23rd 9:30 am or anytime after is fine with us.

We will outline the Ministry's objections to the idea of WAS lagoon storage for this particular situation. Please be prepared to provide an overview of the JL Richards' approach to addressing the TAN compliance issue in light of the guidance provided in the RVA report.

Please send a Teams meeting invite to Vince and myself with a copy to Victor Castro. thanks

regards

Wayne

Wayne Simpson, PMP, P.Eng.
wayne.simpson@ontario.ca
(343) 998-7592
Senior Review Engineer
Municipal Water and Wastewater Permissions Section
Environmental Permissions Branch
Environmental Assessment and Permissions Division
Ministry of the Environment, Conservation and Parks (MECP)



From: Susan Jingmiao Shi <sshi@jlrichards.ca>
Sent: September-15-22 11:30 AM
To: Light, Viktoria (MECP) <Viktoria.Light@ontario.ca>; Leslie Whiteman <lwhiteman@brighton.ca>; Fuller, Jacqueline (MECP) <Jacqueline.Fuller@ontario.ca>; Bradley, David (MECP) <David.Bradley@ontario.ca>; Scott Poole <SPoole@brighton.ca>; Bob Casselman <BCasselman@brighton.ca>; Matthew Morkem <mmorkem@jlrichards.ca>; Pileggi, Vince (MECP) <Vince.Pileggi@ontario.ca>; Simpson, Wayne (MECP) <Wayne.Simpson@ontario.ca>; Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>
Subject: RE: Brighton WPCP - Pre-Consultation Meeting - EA Addendum Recommendations

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Hello all,

It was a constructive meeting! Nice to meet everyone.

The attached are the slides, draft TM2 and TM3.

Matt and I are available on the following dates for a meeting next week:

- Tues, Sept 20, 11-12
- Wed, Sept 21, 9-10

- Thurs, Sept 22, 8:30-9:30
- Fri, Sept 23, 8:30-noon

Let us know what works of your group!

Cheers,
Susan

-----Original Appointment-----

Susan Jingmiao Shi, P.Eng., M.Eng.
Associate
Senior Environmental Engineer

J.L. Richards & Associates Limited
203 - 863 Princess Street, Kingston, ON K7L 5N4
Direct: 343-302-5406



From: Matthew Morkem On Behalf Of Light, Viktoria (MECP)
Sent: Monday, August 29, 2022 11:30 AM
To: Light, Viktoria (MECP); Susan Jingmiao Shi; Leslie Whiteman; Fuller, Jacqueline (MECP); Bradley, David (MECP); Scott Poole; Bob Casselman; Matthew Morkem; Pileggi, Vince (MECP); Simpson, Wayne (MECP); Orpana, Jon (MECP)
Subject: FW: Brighton WPCP - Pre-Consultation Meeting - EA Addendum Recommendations
When: Thursday, September 15, 2022 9:30 AM-10:30 AM (UTC-05:00) Eastern Time (US & Canada).
Where: Microsoft Teams Meeting

-----Original Appointment-----
From: Light, Viktoria (MECP) <Viktoria.Light@ontario.ca>
Sent: Friday, August 26, 2022 4:21 PM
To: Light, Viktoria (MECP); Fuller, Jacqueline (MECP); Bradley, David (MECP); Scott Poole; Bob Casselman; Matthew Morkem; Pileggi, Vince (MECP); Simpson, Wayne (MECP); Orpana, Jon (MECP)
Subject: Brighton WPCP - Pre-Consultation Meeting - EA Addendum Recommendations
When: Thursday, September 15, 2022 9:30 AM-10:30 AM (UTC-05:00) Eastern Time (US & Canada).
Where: Microsoft Teams Meeting

[CAUTION] This email originated from outside JLR. Do not click links or open attachments unless you recognize the sender and know the content is safe. If in doubt, please forward suspicious emails to Helpdesk.

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Preliminary and Final Design Services – Brighton Wastewater Treatment System Upgrades
Virtual Teams Meeting

Brighton WWTS – Engineering Design Project Progress Update
Minutes of Meeting No. 7 (REV 1)

Attendance:	Rebecca Troan	Ministry of the Environment Conservation and Parks (MECP)	rebecca.troan@ontario.ca
	Brittney Wielgos	Ministry of the Environment Conservation and Parks (MECP)	brittney.wielgos@ontario.ca
	Wayne Simpson	Ministry of the Environment Conservation and Parks (MECP)	wayne.simpson@ontario.ca
	Elana Arthurs	Municipality of Brighton (Municipality)	earthurs@brighton.ca
	Leslie Whiteman	Municipality of Brighton (Municipality)	lwhiteman@brighton.ca
	Adam Walraven	Municipality of Brighton (Municipality)	awalraven@brighton.ca
	Matt Morkem	J.L. Richards & Associates Limited (JLR)	mmorkem@jlrichards.ca
	Susan Shi	J.L. Richards & Associates Limited (JLR)	sshi@jlrichards.ca
	Regine Climaco	J.L. Richards & Associates Limited (JLR)	rclimaco@jlrichards.ca

The meeting commenced at 2:00 p.m. on Tuesday, July 9, 2024 via Microsoft Teams.

The following summary of the discussions of this meeting has been prepared to record decisions reached and actions required for the project. Please advise the undersigned of any errors or omissions within the next three business days.

ITEM		ACTION BY	DUE BY

1.0 30% Design Review

MECP (Wayne Simpson) provided the following comments regarding 30% design submission:

1. **Effluent Criteria**
   Wayne indicated that with the proposed extended aeration plant, the facility is considered to be a secondary-level treatment plant. Effluent compliance limits in the new ECA should be based on monthly average concentrations, instead of annual average currently stated in Table 9 of the Preliminary Design Report (PDR). Loading limits, however, can be based on annual average (kg/d).

   Effluent $cBOD_5$ and TSS compliance limit is currently at 30 and 40 mg/L, respectively. Wayne explained that the effluent compliance limit is typically established based on either technology-based assessment or receiver-based assessment. Wayne stated that since the future Brighton WWTS is an extended aeration plant which is capable of producing secondary level treatment effluent quality (i.e., 25 mg/L for cBOD5 and TSS), the effluent compliance limits should consider the technology-based assessment approach. This will be consistent with Procedure F-5.

   Rebecca indicated that the MECP will coordinate internally with technical support team regarding effluent compliance limits and see if there should be a change. — MECP

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Preliminary and Final Design Services – Brighton Wastewater Treatment System Upgrades
Virtual Teams Meeting

Brighton WWTS – Engineering Design Project Progress Update
Minutes of Meeting No. 7 (REV 1)

ITEM		ACTION BY	DUE BY
2.	**Emergency Storage (EQ Storage)** Wayne requested that JLR include the purpose of the Equalization Pond (EQ) as emergency storage in the Preliminary Design Report. JLR should include number of emergency storage time (hours) available in EQ storage.	JLR	
3.	**Monitoring and recording of EQ return and Decant Return** Wayne indicated that MECP prefers to have liquids and solids trains completely separated. Wayne indicated that by sharing the pumping station for WAS stabilization decant and EQ return, flow monitoring and metering needs to be carefully considered in design. JLR will review design and ensure that the return flow is monitored and that two streams are separate.	JLR	
4.	**Facultative Lagoon** Wayne asked about the future plan for the facultative lagoon. JLR indicated that the intent for facultative lagoon has not been determined yet. This will considered in the design process.		
5.	**BioWin** Wayne asked about the BioWin model and whether it considered the future plant expansion. JLR indicated that the BioWin Model is for existing plant capacity only. Wayne suggested that it would be a good idea to run the BioWin model with the plants current design configurations.		
6.	**WAS Stabilization Lagoon** Wayne requested the design intent of WAS Stabilization Lagoon and whether it meets MECP Design Guidelines for Sewage Works Section 18.2. According to Section 18.2 of the design guidelines only fully treated (i.e., stabilized sludge) may be stored in lagoons prior to disposal. Wayne asked JLR to consider including a WAS storage tank in order to accommodate sludge stabilization, VSS destruction and assist with the plant SRT. JLR indicated that the WAS Stabilization Lagoon will act as an aerobic digester to stabilize solids, with proper mechanical mixing and retention time. Wayne indicated that the design basis should be clearly documented in the Preliminary Design Report and that the design should meet the retention time of 45 days for sludge stabilization/storage as per design guidelines. JLR to include intent for WAS stabilization in PDR.	JLR	

2.0 Schedule Updates

Elana indicated that there would be a Special Council Meeting held next Tuesday, July 16th. Council members will be updated with the overall project, decisions made to-date, and JLR's scope changes.

JLR has been asked by the Municipality and Council to pause design until a decision is made regarding outstanding scope changes on July 16th.

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Preliminary and Final Design Services – Brighton Wastewater Treatment System Upgrades
Virtual Teams Meeting

Brighton WWTS – Engineering Design Project Progress Update
Minutes of Meeting No. 7 (REV 1)

ITEM		ACTION BY	DUE BY
	The Municipality has asked about MECP's position and next steps in the event that Council requests more time to review. MECP indicated that a request should be made to extend the September 30, 2024 100% design submission schedule currently written in the compliance report. A plan would also be required in the same request to move the project forward. The Municipality has indicated that an update will be provided to MECP following the July 16th special council meeting.	Municipality	July 17

3.0 Other Business

EA Addendum Status

MECP (Jon Orpana) has inquired about the status of the EA Addendum. JLR indicated that the EA addendum has been paused while Council is reviewing overall project. The EA Addendum will be submitted following the council decision.

Meeting adjourned at 2:45 p.m.

Next meeting will be held on August 13, 2024

Prepared by: Issued on: July 17, 2024

Susan Shi

Susan Jingmiao Shi, P.Eng., M.Eng.
Associate, Senior Environmental Engineer

Distribution: All attendees
CC: Jon Orpana, MECP (jon.orpana@ontario.ca)

Town of Brighton, Sludge Survey Report 2023

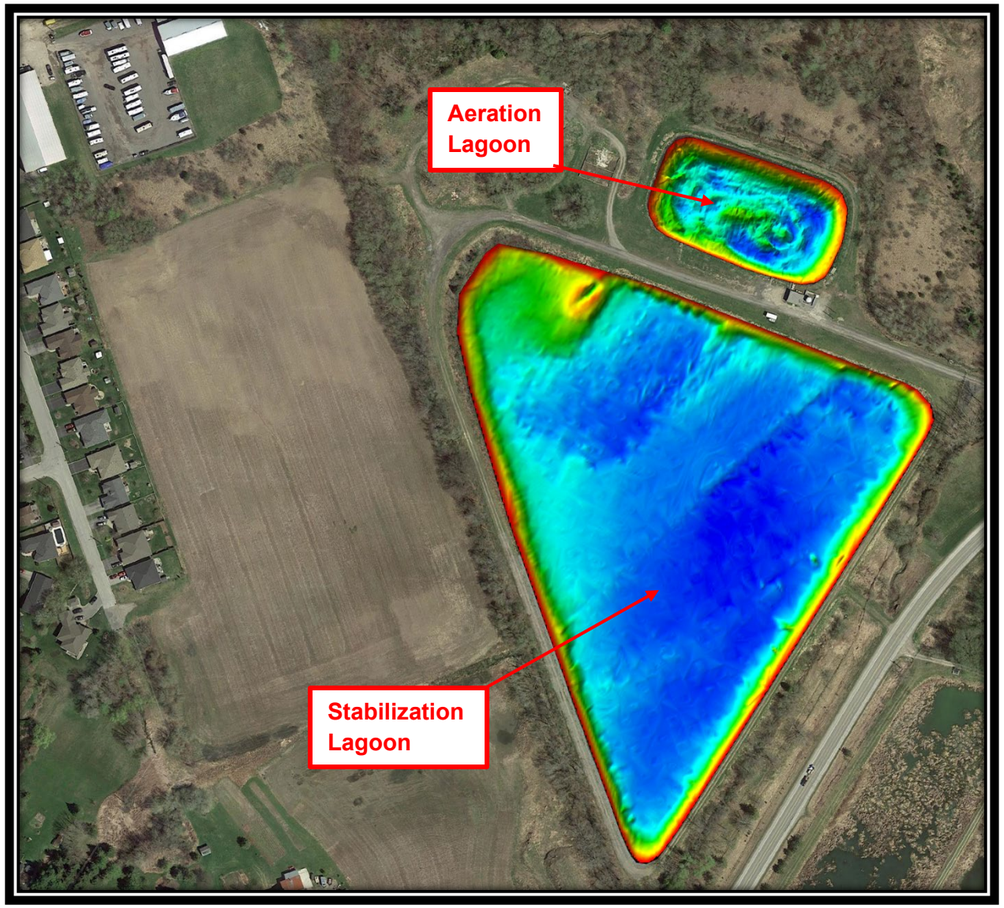


Figure 1 Brighton, ON Wastewater Lagoons Overview

Brighton, ON – Town of Brighton Wastewater Lagoons

This is not a legal survey document
Matrix depths and elevations are interpolated from field measurements
Depths are relative to water level at the time of the survey
Survey data collected on Oct 24 -26, 2023
Report any discrepancies in this report to Sludge Mapper Ltd.
Do not modify or use this report for purposes other than which it is intended
Satellite imagery is for reference purposes only

	Name	Date
Prepared by:	MC	13-11-2023
Reviewed by:	MC	11-11-2023

Unless otherwise specified all dimensions are in meters

SludgeMapper

Project Title	Brighton, ON Wastewater Lagoons Sludge Survey 2023 Report
Project Number	23014
Revision	0
Sheet	Page **1** of **18** — Print Sheet 11x17

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This is not a legal survey document
Matrix depths and elevations are interpolated from field measurements
Depths are relative to water level at the time of the survey
Survey data collected on Oct 24 -26, 2023
Report any discrepancies in this report to Sludge Mapper Ltd.
Do not modify or use this report for purposes other than which it is intended
Satellite imagery is for reference purposes only

	Name	Date
Prepared by:	MC	13-11-2023
Reviewed by:	MC	11-11-2023

Unless otherwise specified all dimensions are in meters

SludgeMapper

Project Title	Brighton, ON Wastewater Lagoons Sludge Survey 2023 Report
Project Number	23014
Revision	0
Sheet	Page **2** of **18** — Print Sheet 11x17

EXECUTIVE SUMMARY

Sludge Mapper conducted a sludge survey at the Town of Brighton Wastewater Lagoon Facility, in Brighton, ON on October 24 - 26, 2023. The purpose of the sludge survey and this report is to map and quantify sludge accumulation in the Town of Brighton Wastewater Lagoons. The Town of Brighton Wastewater Lagoons were in service at the time of the survey.

Location	Water Body ID	Client	Client Contact	Date(s) of Survey	Map Grid Refernce	Vertical Datum	Control Points	Report Prepared by	Survyors
Brighton, ON	Stabilization Lagoon Aeration Lagoon	Town of Brighton	Adam Walraven	24/10/2023 - 26/10/2023	Horizontal Datum: CSRS NAD83 Projection: UTM, Zone 18N	CGVD2013	SMC1 Base Occupied static control point for processing with NRCAN PPP Service	M. Caffray	M. Caffray P. Ireland

Table 1 Summary of project details

Cell	Water Elevation CGVD2013 (m)	Maximum measured liner depth inside toe (m)	Current hydraulic capacity (m^3)	Estimated sludge volume (m^3)	Estimated bone dry tonnes (BDTs) of sludge to be removed	Percent of total cell volume occupied by sludge (at surveyed dimensions)
Stabilization	79.339	2.26	77,093	20,695	2,214	21%
Aeration	79.994	3.15	11,576	3,866	514	25%

Table 2 Summary of sludge survey data points

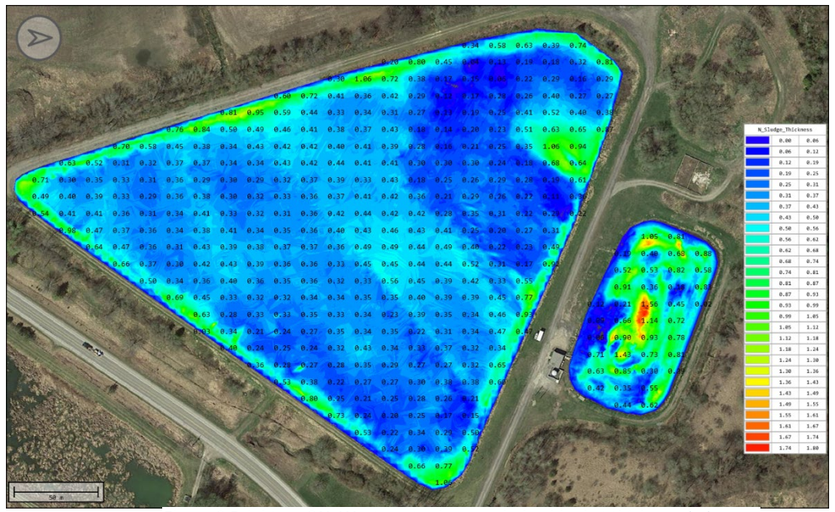


Figure 2 Brighton, ON, Wastewater lagoon sludge blanket thickness (m)

Figure 3 Brighton, ON, Wastewater lagoon liner elevations (m)

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Matrix depths and elevations are interpolated from field measurements
Depths are relative to water level at the time of the survey
Survey data collected on Oct 24 -26, 2023
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Do not modify or use this report for purposes other than which it is intended
Satellite imagery is for reference purposes only

	Name	Date
Prepared by:	MC	13-11-2023
Reviewed by:	MC	11-11-2023

Unless otherwise specified all dimensions are in meters

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Project Title	Brighton, ON Wastewater Lagoons Sludge Survey 2023 Report	
Project Number	23014	
Revision	0	
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AERATION LAGOON – TOP OF SLUDGE ELEVATIONS

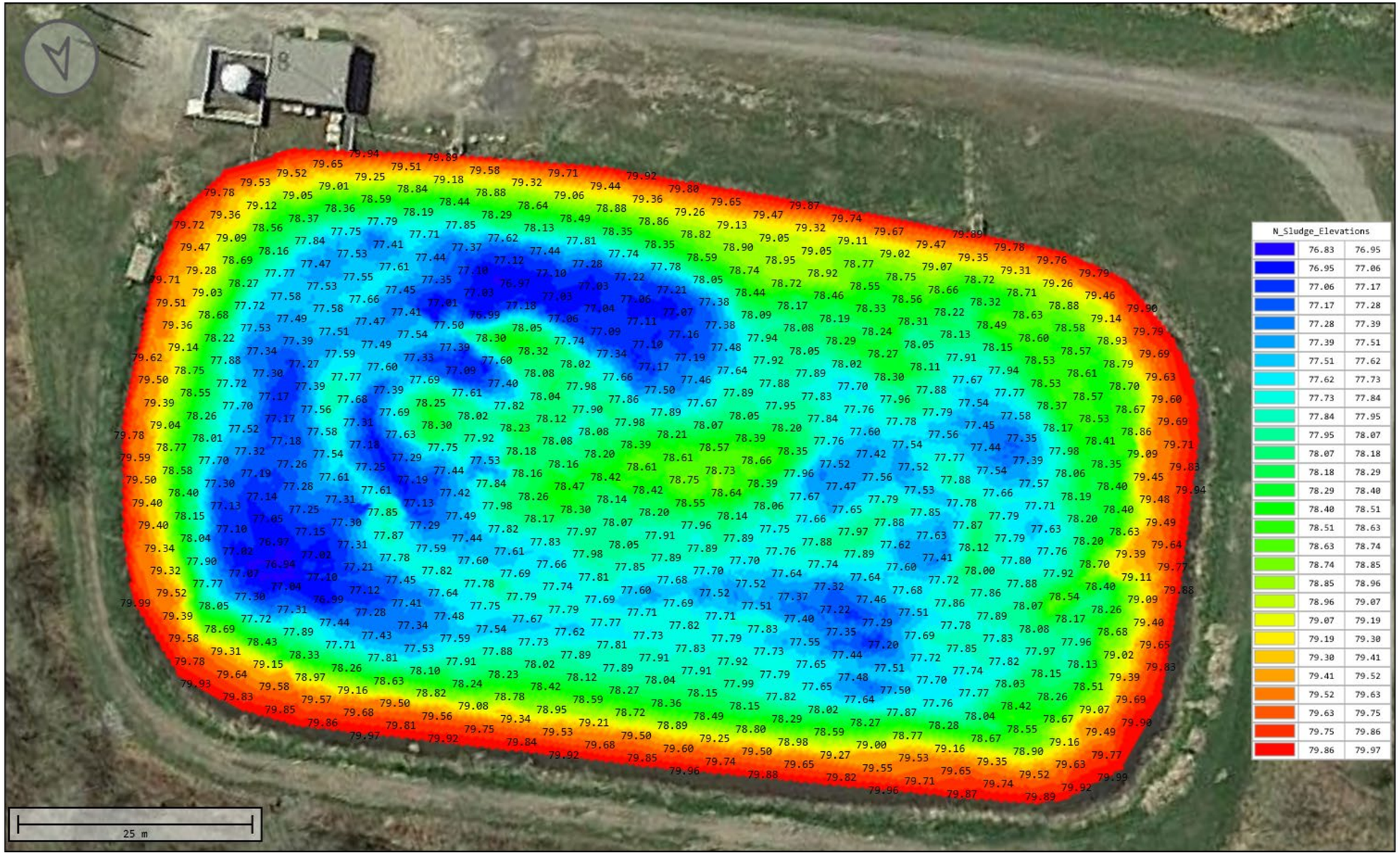


Figure 4 Aeration Lagoon top of sludge blanket elevations (m)

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	Name	Date
Prepared by:	MC	13-11-2023
Reviewed by:	MC	11-11-2023

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Project Title	Brighton, ON Wastewater Lagoons Sludge Survey 2023 Report	
Project Number	23014	
Revision	0	
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STABILIZATION LAGOON – TOP OF SLUDGE ELEVATIONS

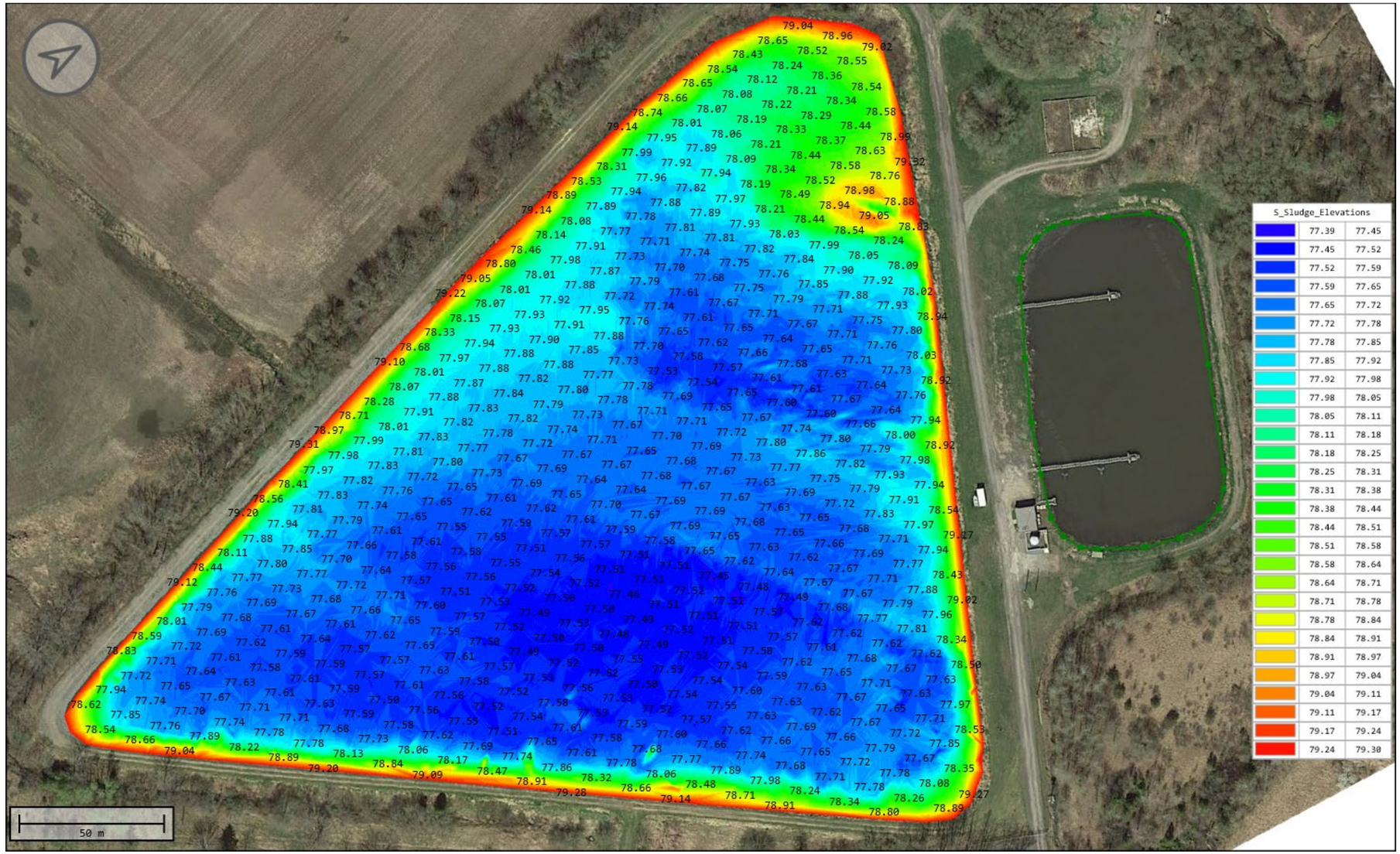


Figure 5 Stabilization Lagoon top of sludge elevations (m).

	Name	Date
Prepared by:	MC	13-11-2023
Reviewed by:	MC	11-11-2023

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AERATION LAGOON – SLUDGE BLANKET THICKNESS

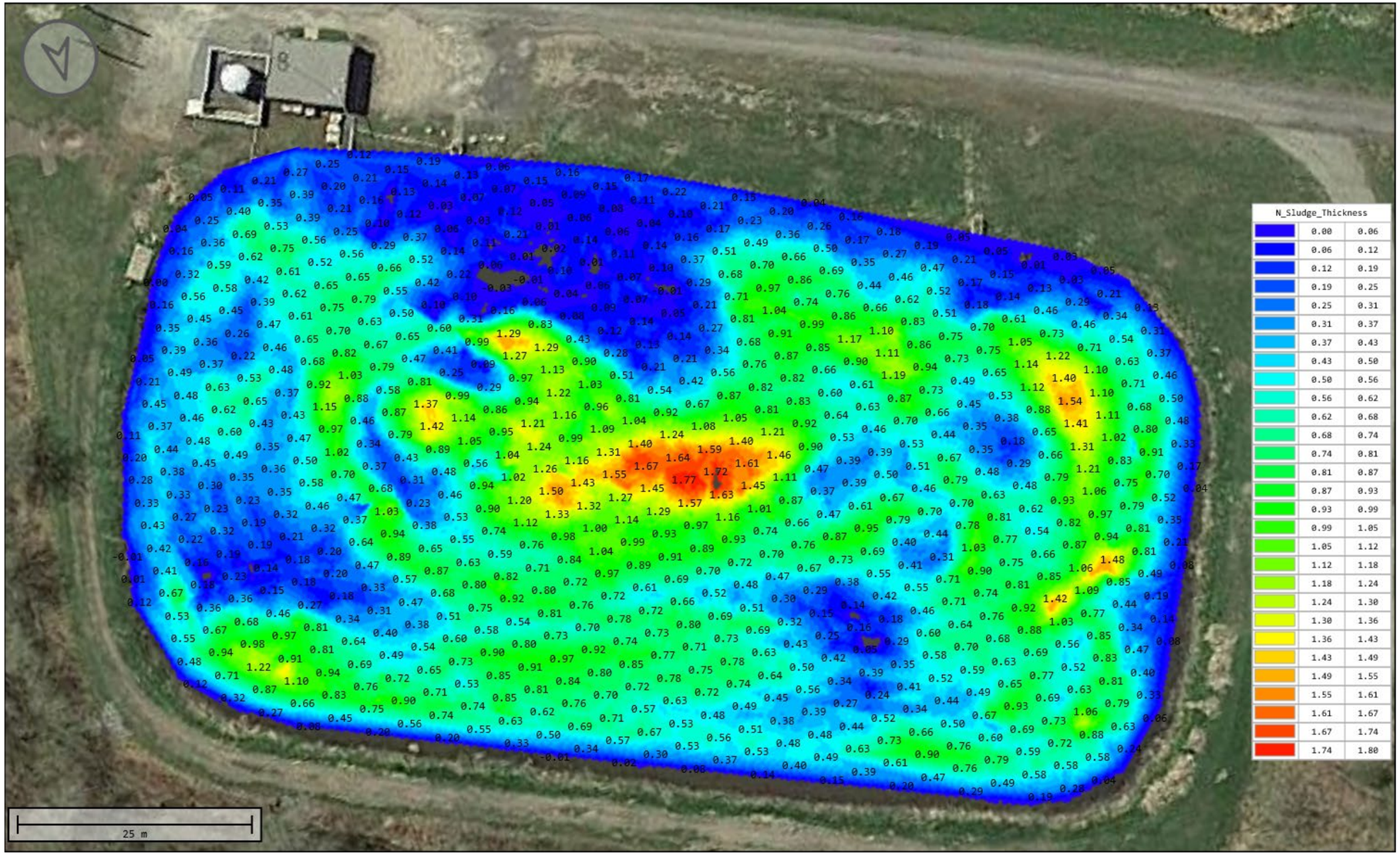


Figure 6 Aeration Lagoon sludge blanket thickness (m)

	Name	Date
Prepared by:	MC	13-11-2023
Reviewed by:	MC	11-11-2023
Unless otherwise specified all dimensions are in meters		

SludgeMapper

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Revision	0
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STABILIZATION LAGOON – SLUDGE BLANKET THICKNESS

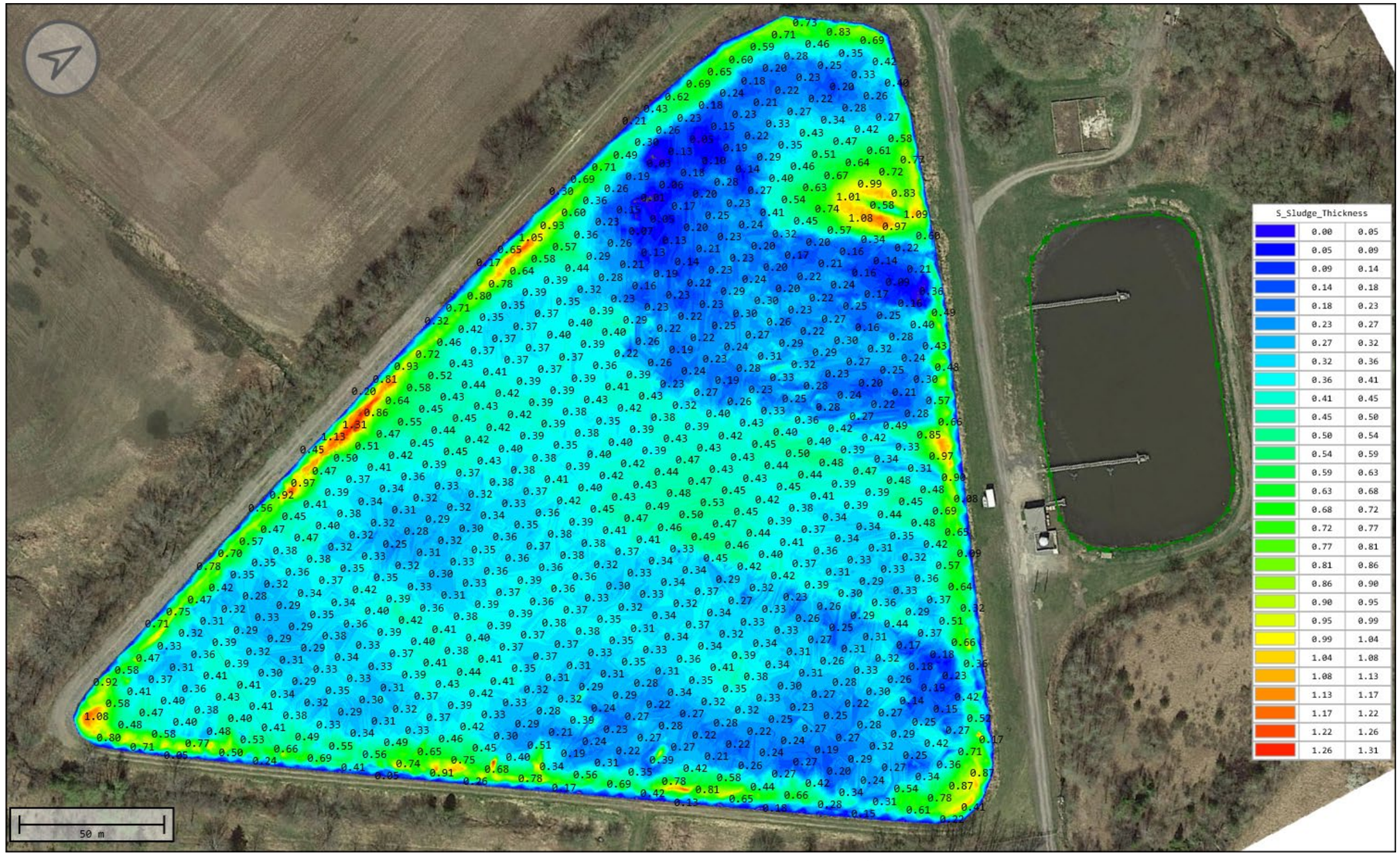


Figure 7 Stabilization sludge blanket thickness (m)

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	Name	Date
Prepared by:	MC	13-11-2023
Reviewed by:	MC	11-11-2023

Unless otherwise specified all dimensions are in meters

SludgeMapper

Project Title	Brighton, ON Wastewater Lagoons Sludge Survey 2023 Report	
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AERATION LAGOON – TOP OF SLUDGE DEPTHS

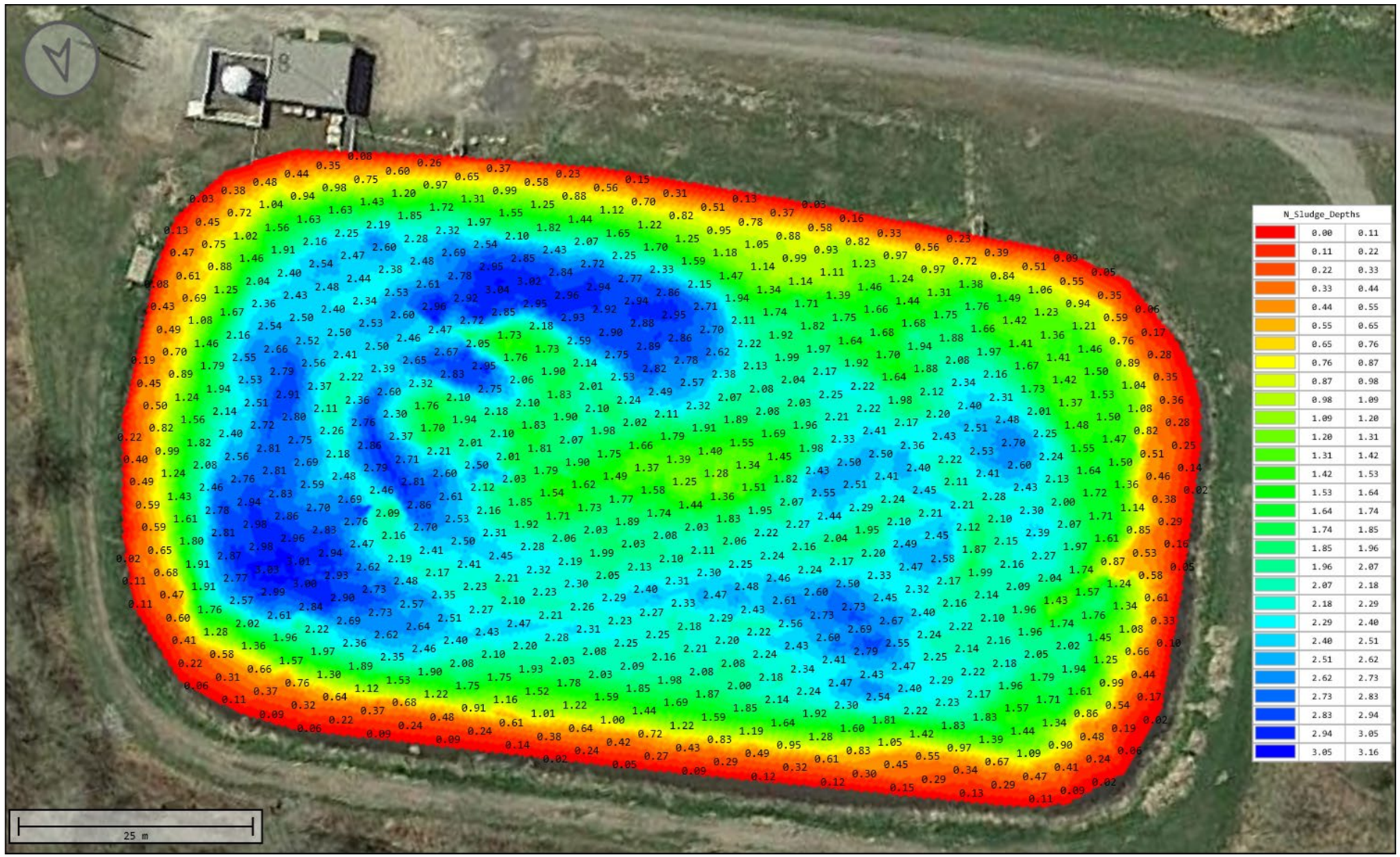


Figure 8 Aeration Lagoon top of sludge depths (m)

	Name	Date
Prepared by:	MC	13-11-2023
Reviewed by:	MC	11-11-2023

Unless otherwise specified all dimensions are in meters

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Project Title	Brighton, ON Wastewater Lagoons Sludge Survey 2023 Report	
Project Number	23014	
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STABILIZATION LAGOON – TOP OF SLUDGE DEPTHS

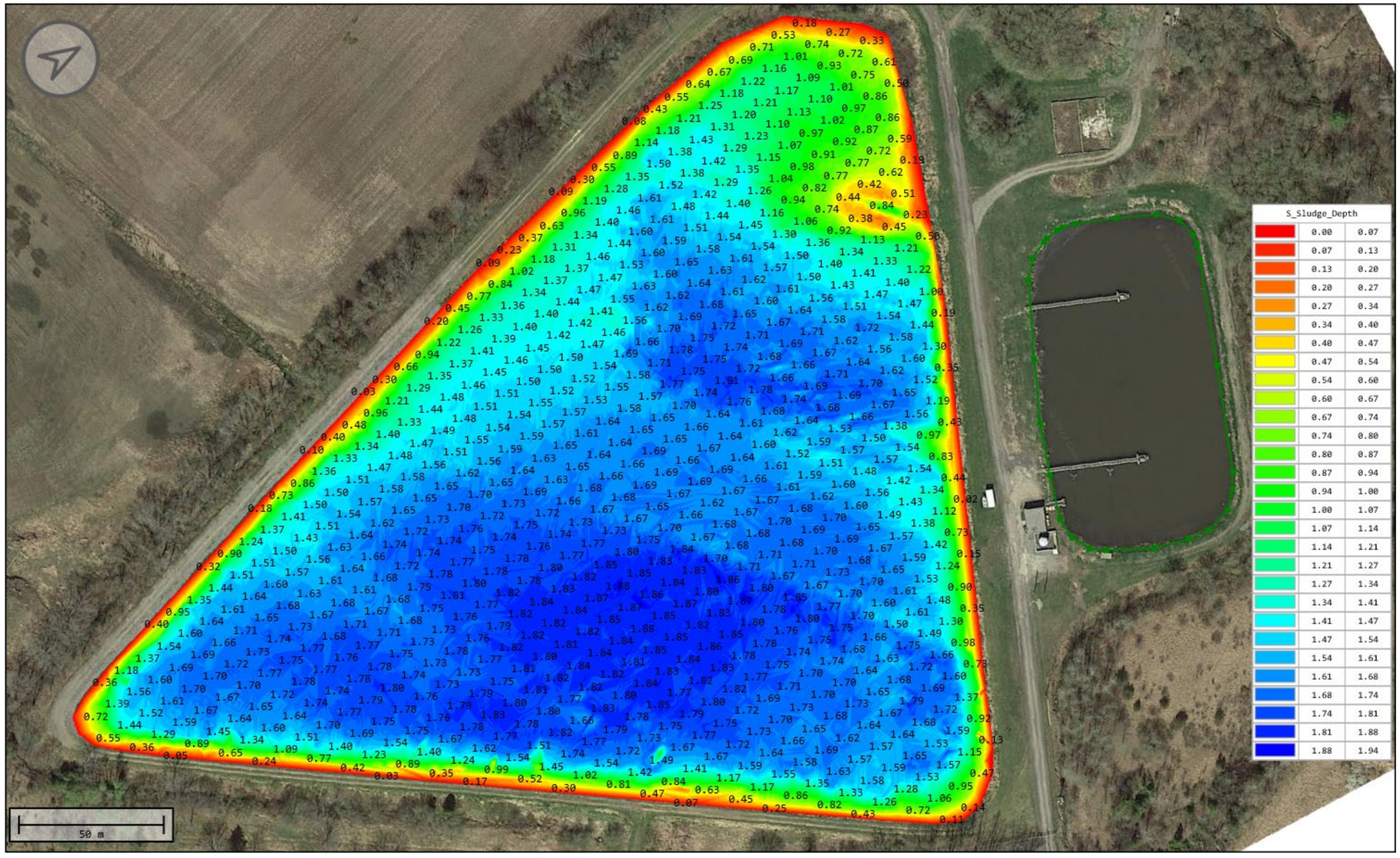


Figure 9 Stabilization Lagoon top of sludge depths (m)

	Name	Date
Prepared by:	MC	13-11-2023
Reviewed by:	MC	11-11-2023

Unless otherwise specified all dimensions are in meters

SludgeMapper

Project Title	Brighton, ON Wastewater Lagoons Sludge Survey 2023 Report	
Project Number	23014	
Revision	0	
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AERATION LAGOON – TRANSPARENT SLUDGE THICKNESS

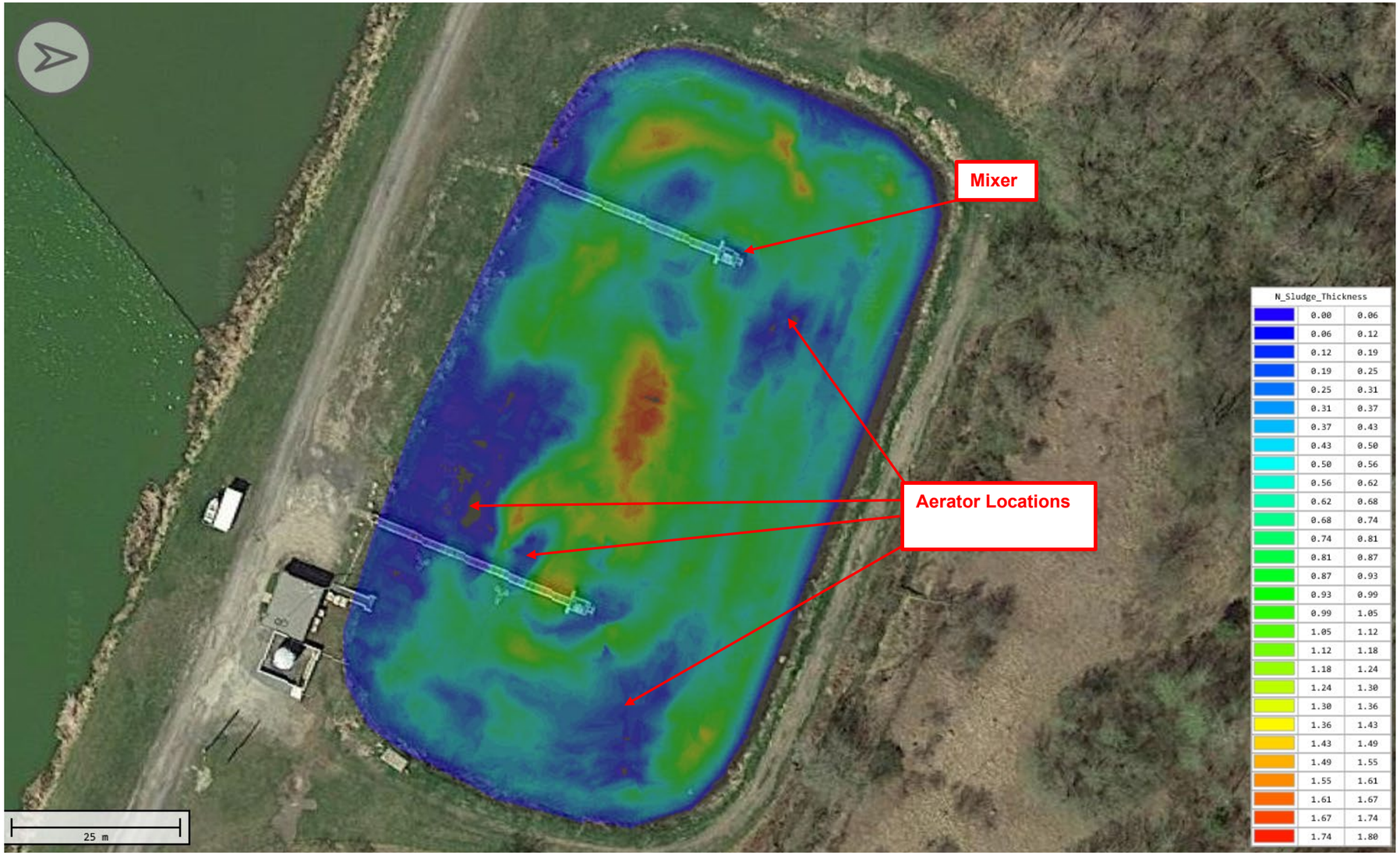


Figure 10 Aeration Lagoon transparent sludge thickness.

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Reviewed by:	MC	11-11-2023

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Project Number	23014	
Revision	0	
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STABILIZATION LAGOON – TRANSPARENT SLUDGE THICKNESS

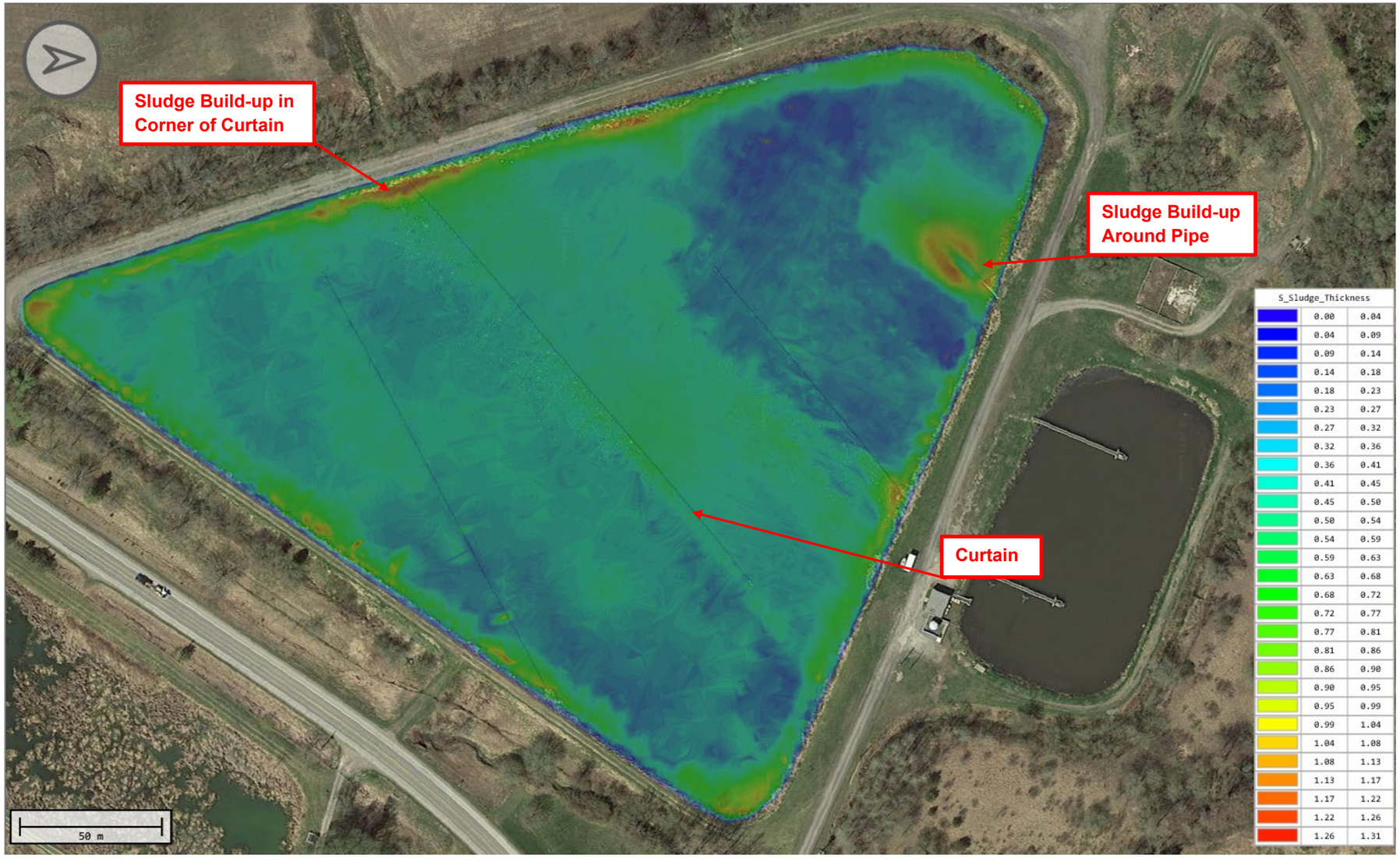


Figure 11 Stabilization Lagoon transparent sludge thickness.

	Name	Date
Prepared by:	MC	13-11-2023
Reviewed by:	MC	11-11-2023

Unless otherwise specified all dimensions are in meters

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Project Title	Brighton, ON Wastewater Lagoons Sludge Survey 2023 Report	
Project Number	23014	
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AERATION LAGOON VOLUMES

AERATION LAGOON ESTIMATED SLUDGE QUANTITY

Estimated sludge volume is calculated using software that compares the measured and interpolated sludge depths with the depths of the lagoon liner obtained from engineered drawings and/or field measurements. A sludge sample is taken for lab analysis to determine total solids and total volatile solids and to obtain dry volume.

CELL :

TOTAL ESTIMATED VOLUME OF SLUDGE TO BE REMOVED (WET) =	**3,866**	**m^3**
TOTAL ESTIMATED VOLUME OF SLUDGE TO BE REMOVED (DRY) =	**499**	**m^3**
SPECIFIC GRAVITY (DRY AS SAMPLED) =	**1.03**	
TOTAL ESTIMATED MASS OF SLUDGE TO BE REMOVED =	**514**	**BDT (Bone Dry Tonnes)**
TOTAL ESTIMATED VOLATILE SOLIDS QUANTITY (DRY) =	**1,465**	**m^3**

NORTH CELL HYDRAULIC CAPACITY AT PRESENT SLUDGE LOADING

Hydraulic capacity calculations for each lagoon are performed by comparing the water level at the time of survey to the sludge profile with results shown below.

ESTIMATED HYDRAULIC CAPACITY - WATER LEVEL @ 79.994 m = **11,576 m^3**

REMAINING CAPACITY OF CELL BASED ON SURVEYED SLUDGE VOLUME

Stage	Depth (m)	Volume (m^3)	Area (m^2)
1	0.0	11,576	6,689
2	1.0	5,729	5,180
3	2.0	1,358	3,218
4	3.0	2	39

Figure 12 Aeration Lagoon volumes

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	Name	Date
Prepared by:	MC	13-11-2023
Reviewed by:	MC	11-11-2023

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Project Number	23014
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STABILIZATION LAGOON VOLUMES

STABILIZATION LAGOON ESTIMATED SLUDGE QUANTITY

Estimated sludge volume is calculated using software that compares the measured and interpolated sludge depths with the depths of the lagoon liner obtained from engineered drawings and/or field measurements. A sludge sample is taken for lab analysis to determine total solids and total volatile solids and to obtain dry volume.

CELL :

TOTAL ESTIMATED VOLUME OF SLUDGE TO BE REMOVED (WET) =	**20,695**	**m^3**
TOTAL ESTIMATED VOLUME OF SLUDGE TO BE REMOVED (DRY) =	**2,070**	**m^3**
SPECIFIC GRAVITY (DRY AS SAMPLED) =	**1.07**	
TOTAL ESTIMATED MASS OF SLUDGE TO BE REMOVED =	**2,214**	**BDT (Bone Dry Tonnes)**
TOTAL ESTIMATED VOLATILE SOLIDS QUANTITY (DRY) =	**6,271**	**m^3**

SOUTH CELL HYDRAULIC CAPACITY AT PRESENT SLUDGE LOADING

Hydraulic capacity calculations for each lagoon are performed by comparing the water level at the time of survey to the sludge profile with results shown below.

ESTIMATED HYDRAULIC CAPACITY - WATER LEVEL @ 79.339 m = **77,093 m^3**

REMAINING CAPACITY OF CELL BASED ON SURVEYED SLUDGE VOLUME

Stage	Depth (m)	Volume (m^3)	Area (m^2)
1	0.0	77,093	53,957
2	0.5	51,011	50,200
3	1.0	27,003	45,426
4	1.5	6,299	33,937

Figure 13 Stabilization Lagoon volumes.

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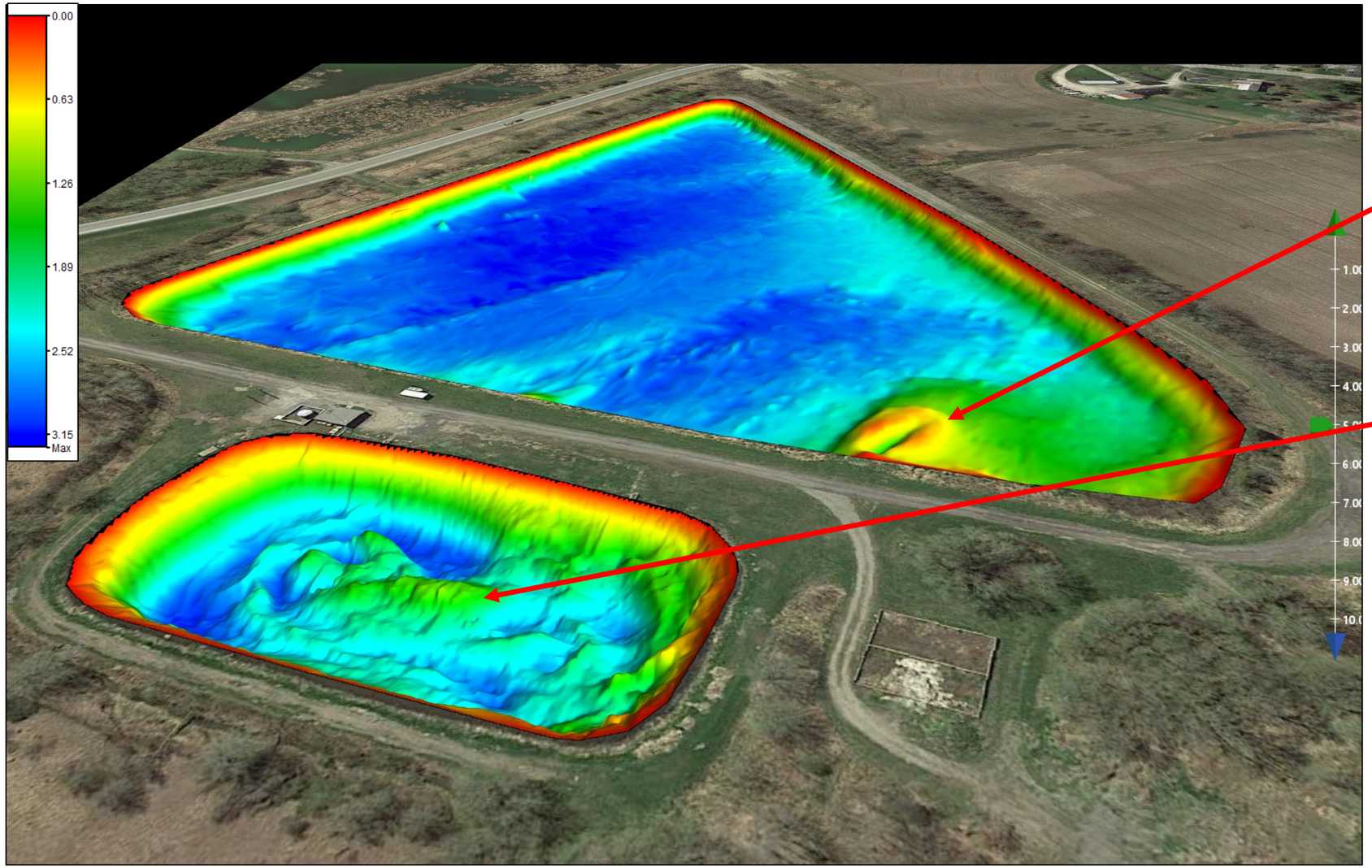
	Name	Date
Prepared by:	MC	13-11-2023
Reviewed by:	MC	11-11-2023

Unless otherwise specified all dimensions are in meters

SludgeMapper

Project Title	Brighton, ON Wastewater Lagoons Sludge Survey 2023 Report
Project Number	23014
Revision	0
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LAGOONS – TOP OF SLUDGE 3D PROFILE



A 5x vertical exaggeration has been applied to the 3D isometric drawing to highlight bottom features.

There is significant sludge build-up around the pipe in the Stabilization Lagoon.

There is sludge build-up in the centre of the Aeration Lagoon.

Figure 14 Town of Brighton Lagoons top of sludge 3D isometric drawing – From N looking S.

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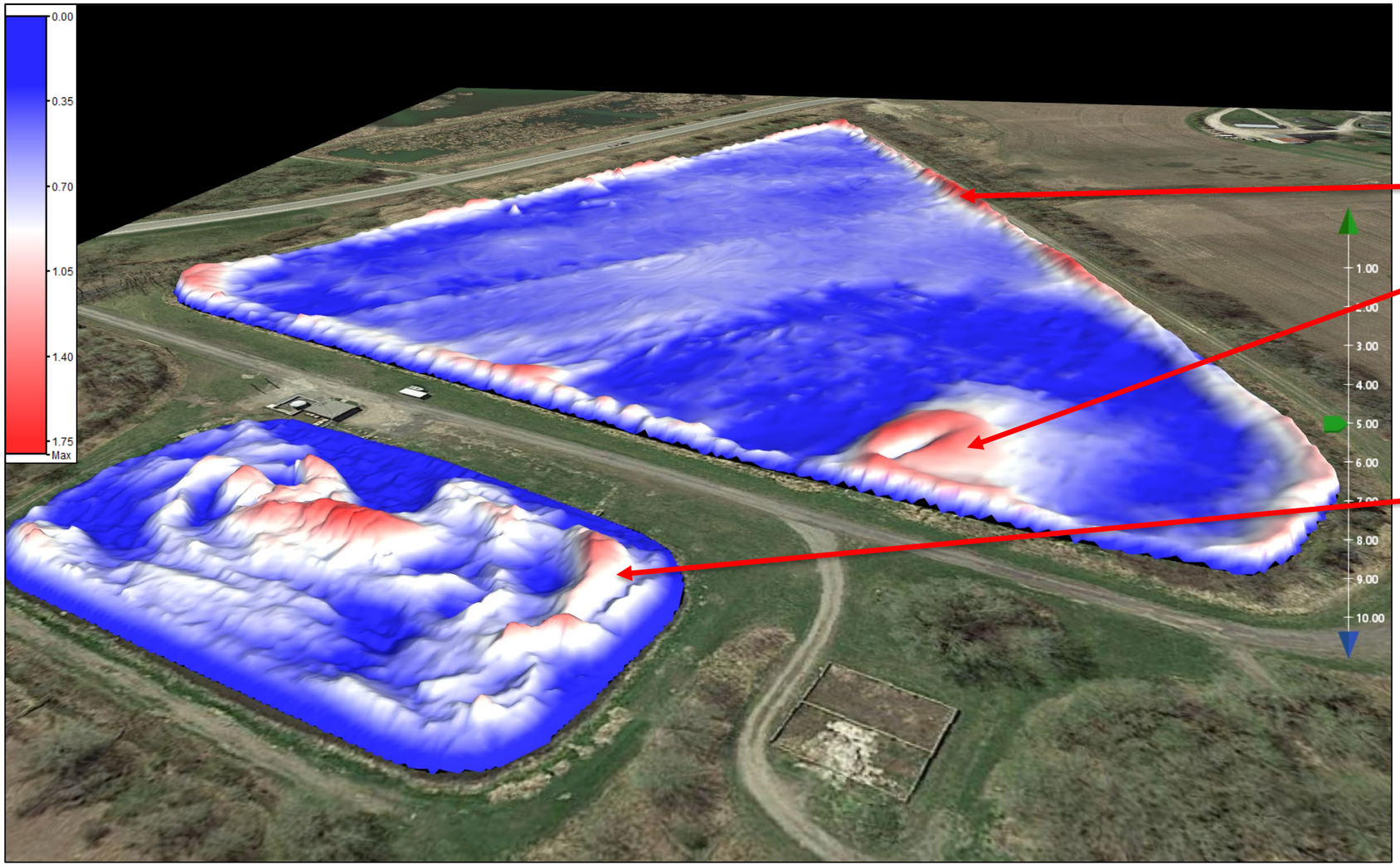
	Name	Date
Prepared by:	MC	13-11-2023
Reviewed by:	MC	11-11-2023

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Project Title	Brighton, ON Wastewater Lagoons Sludge Survey 2023 Report	
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LAGOONS –SLUDGE THICKNESS 3D PROFILE



A 5x vertical exaggeration has been applied to the 3D isometric representation to highlight bottom features.

Sludge accumulation in the corners of the curtains.

Inlet pipe sludge build-up.

Sludge accumulation in the corner and the centre of the Aeration Lagoon.

Figure 15 Town of Brighton Lagoons sludge blanket thickness 3D isometric drawing – N looking S, red denotes levels of sludge build-up

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APPENDIX A – GLOSSARY

Bone dry tonnes (BDT): The in-situ sludge volume reduced to an ideal dry mass in metric tonnes (all moisture removed).

CGVD2013: Canadian Geodetic Vertical Datum of 2013

CGVD28: Canadian Geodetic Vertical Datum of 1928

Echogram: A visualization of acoustic returns displayed as a vertical cross-section (elevation view) or 'slice' of the entire water column (waterline down to sludge) that shows the bottom profile and basic underwater features.

Floating crust: A layer of material (made up of biosolids and synthetic debris) which is less dense and therefore floats on the surface of the effluent and forms a crust.

Sludge accumulation: The amount of sludge (in-depth or volume) that accumulates over a period of time.

Sludge blanket thickness: The amount of sludge and sediment that has accumulated on the bottom of the pond.

Sludge volume: The in-situ sludge volume that exists between the liner and the top of sludge surfaces.

Top of sludge depths: The vertical measurement from the water surface down to the top of the sludge layer, corrected for changing pond levels.

Top of sludge elevations: The elevations mapped at the top of the sludge layer. By tracking these elevations over time sludge accumulation can be accurately monitored or dredging progress can be assessed even with varying pond levels.

Water volume / hydraulic capacity: Volume of water/effluent in the pond at the time of survey. This value represents the hydraulic capacity on top of the settled sludge blanket.

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Project Number	23014
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APPENDIX B – A NOTE ON VOLUME CALCULATIONS

This Sludge Survey Report has been prepared by Sludge Mapper Ltd. (“SM”) for Town of Brighton (herein collectively referred to as the “Client”). It is intended to provide the Client with an estimate of sludge quantity and pond hydraulic capacity.

This report is based on data and information obtained by measuring pond depths with the single beam echosounder, or infrared sludge interface detector and verified using manual checks. Estimated sludge volumes and dry tonne amounts are calculated using software that creates interpolations between the sounding lines measured in the field.

The Client recognizes and acknowledges that estimated sludge volumes will vary from actual sludge volumes and that this report should be used only as a general guideline for planning maintenance desludging or dredging and should not be assumed to be an exact quantification of sludge volume. SM shall not be liable for any damages resulting from any difference between estimated sludge volumes and actual sludge volumes.

Furthermore, the liability of SM to the Client and to all third parties shall be limited to injury or loss caused by the negligent acts, errors or omissions of SM. Notwithstanding the foregoing, the total aggregate liability of SM shall not exceed the lesser of the actual damages incurred, or the total fee of SM for services rendered on this project.

The Client agrees to defend, indemnify, and hold harmless SM, its affiliates, officers, directors, employees, and agents from any and all liabilities, in excess of the limits of SM’s entire liability set out above, incurred by SM or any other party, in connection with the services provided. Such indemnity shall include the costs of the time spent and expenses incurred by SM and its affiliates in connection with the defence of any claims.

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APPENDIX C – TOWN OF BRIGHTON SLUDGE SAMPLE TEST RESULTS

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Project Number	23014
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E3 Laboratories Inc.
SS#4, 360 York Rd., Unit 10, Niagara-on-the-Lake, Ontario L0S 1J0
Email: info@e3labs.ca
Tel: (905) 641-9000, Fax: (905) 641-9001

CERTIFICATE OF ANALYSIS

Sludge Mapper Ltd.
Mark Caffray
373 Downs Road
Quinte West
K8V 5R9
Tel: Fax:
Email: mark@sludgemapper.ca

Work Order No.:2653513
Received : 2023-10-30
PO Number:
Reported: 2023-11-01
Project Name: 23014 Town of Brighton
Chain of Custody No.: 2653513

Client Sample ID	Sample Date	Lab ID	Parameter	Result	Unit	RDL	Date Analyzed	Method
23014 Brighton North Pond	2023-10-25	**776379**	Specific Gravity	1.03		N/A	2023-10-31	AWWA B100-96
			TS (Total Solids)	12.9	%	0.1	2023-10-30	APHA 2540 B mod
			VS (Dry Weight)	37.9	%	0.1	2023-10-30	APHA 2540E,G (GRAV)
23014 Brighton South Pond	2023-10-24	**776380**	Specific Gravity	1.07		N/A	2023-10-31	AWWA B100-96
			TS (Total Solids)	10.0	%	0.1	2023-10-30	APHA 2540 B mod
			VS (Dry Weight)	30.3	%	0.1	2023-10-30	APHA 2540E,G (GRAV)

Reported by:

Nilou Ghazi, Ph.D.,P.Eng.
Laboratory Manager

All work has been performed using accepted testing methodologies, except where otherwise agreed to by the client in writing. Our total liability in connection with this work shall be limited to the amount paid by the client.
Results relate only to items tested as received.

E3 Laboratories Inc.
SS#4, 360 York Rd., Unit 10, Niagara-on-the-Lake, Ontario L0S 1J0
Email: info@e3labs.ca
Tel: (905) 641-9000, Fax: (905) 641-9001

CERTIFICATE OF ANALYSIS

Sludge Mapper Ltd.
Mark Caffray
373 Downs Road
Quinte West
K8V 5R9
Tel: Fax:
Email: mark@sludgemapper.ca

Work Order No.:2653513
Received : 2023-10-30
PO Number:
Reported: 2023-11-01
Project Name: 23014 Town of Brighton
Chain of Custody No.: 2653513

Quality Control Summary

Lab ID	Analyte	QC Recovery	QC limits	Spike Recovery	Spike Limits	Dup RPD	Dup Limits	Blank
776379	Specific Gravity							
	TS (Total Solids)	102	80-120	N/A	N/A	2	0-20	<0.1
	VS (Dry Weight)	92	80-120	N/A	N/A	0	0-20	<0.1
776380	Specific Gravity							
	TS (Total Solids)	102	80-120	N/A	N/A	2	0-20	<0.1
	VS (Dry Weight)	92	80-120	N/A	N/A	0	0-20	<0.1

All work has been performed using accepted testing methodologies, except where otherwise agreed to by the client in writing. Our total liability in connection with this work shall be limited to the amount paid by the client.
Results relate only to items tested as received.

Appendix C

Brighton WWTS Progress Meetings Minutes (MECP, Municipality of Brighton, J.L. Richards)

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

Preliminary & Final Design Services – Brighton Wastewater Treatment System Upgrades
Virtual Teams Meeting

Brighton WPCP - Engineering Design Project Progress Update
Minutes of Meeting No. 1

Attendance:	Brittney Wielgos	Ministry of the Environment Conservation and Parks (MECP)	brittney.wielgos@ontario.ca
	Viktoria Light	Ministry of the Environment Conservation and Parks (MECP)	viktoria.light@ontario.ca
	Bob Casselman	Municipality of Brighton (Municipality)	bcasselman@brighton.ca
	Leslie Whiteman	Municipality of Brighton (Municipality)	lwhiteman@brighton.ca
	Adam Walraven	Municipality of Brighton (Municipality)	awalraven@brighton.ca
	Matt Morkem	J.L. Richards & Associates Limited (JLR)	mmorkem@jlrichards.ca
	Susan Shi	J.L. Richards & Associates Limited (JLR)	sshi@jlrichards.ca

The meeting commenced at 2:00 p.m. on Monday, October 23, 2023 over Teams.

The following summary of the discussions of this meeting has been prepared to record decisions reached and actions required for the project. Please advise the undersigned of any errors or omissions within the next three business days.

ITEM **ACTION BY**

1.1 **Introductions and Project Overview**

JLR presented the proposed schedule and deliverables for the Brighton WWTS Upgrades design:

- Technical Memoranda 1, 2, 3, 4 to be completed December 2023
- Technical Memorandum 5 to be completed January 2024
- 15% Design Package to be submitted February 2024, touchpoint with MECP to be held end of February 2024
- Preliminary Design to be submitted end of May 2024
- Detailed Design draft to be submitted end of September 2024
- Tender ready by end of October 2024

A written order is being prepared to include the timelines of the engineering design as described above.

Discussed the timeline outlined above, JLR is currently working through a series of technical memoranda and will begin full design in the new year. MECP was anticipating tender early 2024, based on the timeline presented tender is anticipated for fall 2024.

2.1 **Next Steps**

The MECP requests monthly schedule updates be provided, and that monthly progress meetings be held between the MECP, the Municipality and JLR, beginning November 2023.

MECP to receive copies of the final technical memoranda for review.

Next meeting will be held November 2023.

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Preliminary & Final Design Services – Brighton Wastewater Treatment System Upgrades
Virtual Teams Meeting

Brighton WPCP - Engineering Design Project Progress Update
Minutes of Meeting No. 1

Prepared by:



Cailey Moxam
Environmental Engineering Intern

Reviewed by:



Susan Jingmiao Shi, P.Eng., M.Eng.
Associate, Senior Environmental Engineer

Distribution: For records
CC: None

J.L.Richards
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Preliminary & Final Design Services – Brighton Wastewater Treatment System Upgrades
Virtual Teams Meeting

Brighton WPCP - Engineering Design Project Progress Update
Minutes of Meeting No. 2

Attendance:	Brittney Wielgos	Ministry of the Environment Conservation and Parks (MECP)	brittney.Wielgos@ontario.ca
	Leslie Whiteman	Municipality of Brighton (Municipality)	lwhiteman@brighton.ca
	Adam Walraven	Municipality of Brighton (Municipality)	awalraven@brighton.ca
	Matt Morkem	J.L. Richards & Associates Limited (JLR)	mmorkem@jlrichards.ca
	Susan Shi	J.L. Richards & Associates Limited (JLR)	sshi@jlrichards.ca
	Cailey Moxam	J.L. Richards & Associates Limited (JLR)	cmoxam@jlrichards.ca

The meeting commenced at 2:00 p.m. on Tuesday, November 28, 2023 over Teams.

The following summary of the discussions of this meeting has been prepared to record decisions reached and actions required for the project. Please advise the undersigned of any errors or omissions within the next three business days.

ITEM **ACTION BY**

1.1 **Project Schedule**

JLR presented the updated schedule for the Brighton WWTS upgrades project. The following technical memoranda (TM) are scheduled to be submitted to the MECP in early January 2024:

- TM 1 – Design Basis
- TM 2 – Septage Receiving and Headworks Facility
- TM 3 – Liquid Train
- TM 4 – Solids Train

The following TM is scheduled to be submitted to the MECP in February 2024:

- TM 5 – Power Requirements and Innovative Energy

The final design is scheduled to be tender-ready October 2024.
JLR is to provide the MECP with the updated project schedule. JLR

1.2 **Conceptual Site Layout**

JLR presented the proposed site layout, see the summary below.

- Liquid Train
  - JLR and the Municipality are currently reviewing three options for headworks facilities which will be located to the north of the lagoons (to be documented in TM 2).
  - Current aeration lagoon to be divided into two cells for extended aeration. As the current lagoon is oversized, dividing will provide better treatment and flexibility.
  - A section of the facultative lagoon will be filled-in and the clarifiers (2) and a process building housing equipment and disinfection facilities (investigating chlorination/de-chlorination and UV – to be documented in TM 3) will be constructed here.
  - Piping will bring effluent from the disinfection building, around the lagoon, to be discharged at the current effluent structure.
- Solids Train
  - Remainder of the facultative lagoon will be converted to WAS storage as per EA addendum design.

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Virtual Teams Meeting

Brighton WPCP - Engineering Design Project Progress Update
Minutes of Meeting No. 2

- Sludge from the clarifiers will be directed to either the aeration cells as return activated sludge or to WAS storage.
- Aeration will be added to the WAS storage.
- JLR and the Municipality are currently investigating the potential of using Geotubes for sludge dewatering (to be documented in TM 4).

JLR is to provide the MECP with the conceptual site layout sketch. JLR

1.3 **Construction Sequencing**

JLR presented proposed construction sequencing plan for the project, as summarized below.

- Construction to begin with the clarifiers and the process building within the current facultative lagoon footprint. A cofferdam would be installed to facilitate construction while flow continues to travel through the lagoon.
- After the clarifiers and the process building have been commissioned, the aeration lagoon would be taken off-line. JLR proposes adding aeration to the facultative lagoon to provide biological temporary treatment while the aeration lagoon is offline.
- Aeration for the temporary biological treatment in the facultative lagoon would be reused for the WAS storage to minimize the 'throw-away' cost for temporary treatment.
- During aeration cell construction, influent would travel through the facultative lagoon with supplemental aeration, to the completed clarifiers which would treat phosphorous, BOD, and TSS, then to disinfection and would discharge to the wetland.
- It is anticipated that the aeration lagoon upgrades, and the duration for temporary treatment, will be at least 8-months (recognizing this would also be at the control of the contractor).

The group discussed concerns around operating the temporary treatment system through the winter months and potential challenges with freezing and nitrification. MECP noted a contingency plan would need to be instated if the proposed plan was approved in case the schedule extends beyond 8-months (ex. on-site storage, hauling sewage).

The MECP is to discuss the proposed plan with internal tech support and approvals teams. MECP

A follow-up meeting is to be coordinated between JLR and the MECP tech support and approvals teams to review the site layout and the proposed construction sequencing plan (to be held the week of December 4th, 2023). MECP, JLR

Meeting adjourned at 2:35 p.m.
Next meeting will be held on January 23, 2024

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Preliminary & Final Design Services – Brighton Wastewater Treatment System Upgrades
Virtual Teams Meeting

Brighton WPCP - Engineering Design Project Progress Update
Minutes of Meeting No. 2

Prepared by: Issued on: November 29, 2023

Cailey Moxam
Environmental Engineering Intern

Reviewed by:



Susan Jingmiao Shi, P.Eng., M.Eng.
Associate, Senior Environmental Engineer

Distribution: All invitees
CC: None

J.L.Richards
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Preliminary & Final Design Services – Brighton Wastewater Treatment System Upgrades
Virtual Teams Meeting

Brighton WPCP - Engineering Design Project Progress Update
Minutes of Meeting No. 3

Attendance:	Brittney Wielgos	Ministry of the Environment Conservation and Parks (MECP)	brittney.wielgos@ontario.ca
	Viktoria Light	Ministry of the Environment Conservation and Parks (MECP)	viktoria.light@ontario.ca
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	Christopher Manning	Ministry of the Environment Conservation and Parks (MECP)	christopher.manning@ontario.ca
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	Leslie Whiteman	Municipality of Brighton (Municipality)	lwhiteman@brighton.ca
	Adam Walraven	Municipality of Brighton (Municipality)	awalraven@brighton.ca
	Matt Morkem	J.L. Richards & Associates Limited (JLR)	mmorkem@jlrichards.ca
	Susan Shi	J.L. Richards & Associates Limited (JLR)	sshi@jlrichards.ca
	Cailey Moxam	J.L. Richards & Associates Limited (JLR)	cmoxam@jlrichards.ca

The meeting commenced at 11:00 a.m. on Thursday, December 14, 2023 over Teams.

The following summary of the discussions of this meeting has been prepared to record decisions reached and actions required for the project. Please advise the undersigned of any errors or omissions within the next three business days.

ITEM **ACTION BY**

1.1 **Proposed Design and Construction Sequence Overview**

JLR presented an overview of the proposed process upgrades which include:

- Constructing a new headworks north of the existing lagoons with screening and grit channels
- Dividing the existing aeration lagoon into two extended aeration basins
- Constructing two clarifiers and disinfection facilities within the facultative lagoon footprint
- Converting the facultative lagoon to WAS storage

The construction sequencing plan for the proposed upgrades was then described as summarized below:

- Construct the clarifiers and disinfection facilities first, followed by the aeration basins and headworks
- During construction of the clarifiers and disinfection facilities, the treatment train will remain as normal with flow going from the aeration lagoon and through the facultative lagoon and out the effluent chamber
- The aeration lagoon will be taken offline to construct the berm, during this time the temporary treatment train proposed consists of rerouting flow directly to the facultative lagoon, then to the new clarifiers and disinfection facilities, and then to the effluent discharge chamber
- Aeration will be added to the facultative lagoon to facilitate temporary treatment
- Temporary treatment is expected to be in place for 6-8 months, accounting for desludging, and construction of the upgraded aeration system and berm within the aeration lagoon (noting that construction timelines are subject to change by the contractor)

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Virtual Teams Meeting

Brighton WPCP - Engineering Design Project Progress Update
Minutes of Meeting No. 3

- Aeration installed in the facultative lagoon for temporary treatment will be reused for WAS storage aeration

2.1 **MECP Questions**

Will the facultative lagoon be desludged for the above solution?
The current plan is not to desludge the facultative lagoon, the Municipality confirmed desludging of the north section of the lagoon was undertaken last year.

Are effluent limit exceedances expected?
JLR is concerned with exceedances during cold weather months given this is an unconventional treatment plan, and the facultative lagoon is shallow. Given the temporary treatment train includes the clarifiers and disinfection, TSS, BOD, and P exceedances are not anticipated. TAN is JLR's primary concern, the MECP confirmed this was their primary concern as well. JLR is designing the temporary treatment aeration system to meet MECP guidelines for mixing and aeration demands for TAN. The Ministry highlighted that risk/compliance requirements will ultimately remain as is and it is the responsibility of the Municipality to meet them.

How will WAS be handled during temporary treatment?
WAS will be pumped back to the facultative lagoon with temporary aeration, the exact discharge location is to be determined.

How will the clarifier/disinfection facilities be built, and why did the location of these facilities move from the location proposed in the EA addendum? The MECP noted that the new location appeared risker with respect to compliance.
A cofferdam will be built around the clarifier/disinfection area to section it off from the lagoon, the area will be desludged, tanks will be built, then the area will be backfilled. The cost for excavating elsewhere on site for these facilities is approximately equal to the cost of building within the lagoon. The primary driver for the new location is to avoid Arena Creek which runs along the east side of the aeration lagoon. The creek offers significant constraints given this is a fish habitat and constructing towards the north (as opposed to the previous MBBR location) has structural advantages due to a higher rock shelf.

Are clarifiers sized to handle maximum day flow?
JLR confirmed the clarifiers are sized to meet MECP guidelines, and provisions will be made for future expansion.

Is additional sampling being proposed for temporary treatment?
JLR clarified that the intention of the meeting is to better understand what regulatory requirements are necessary from the MECP's point of view to move ahead with this design, or to pivot to a new concept if deemed unfeasible. Additional sampling can be incorporated if required.
To this end, JLR is to provide a proposed mitigation plan to the MECP with enhanced sampling measures and SOPs to be followed in case of exceedances during temporary treatment. **JLR**

Is the intention to start the clarifiers in the summer?
The current schedule is to be tender ready in the fall, to begin construction in the spring, and to have the clarifiers and disinfection online in the fall 2025. This is subject to the contractor's schedule.

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Virtual Teams Meeting

Brighton WPCP - Engineering Design Project Progress Update
Minutes of Meeting No. 3

What will the headworks concept consist of?
The proposed design consists of full headworks with screening and grit channels. It will be built to the north of the lagoons, near the existing sludge drying beds (the drying beds are to be removed as they are not in use). The exact location is dependent on studies being completed currently.

Has an ECA been submitted yet? Will E. coli be a required compliance point with the new disinfection facilities?
An ECA has not been submitted. Currently *E. coli* limits are an objective, expected to become a compliance limit following the addition of disinfection facilities. JLR has developed a design basis technical memorandum which will be shared with the MECP following finalization with the Municipality. **JLR**

2.2 **Municipality Questions**

Will the constructed wetland be kept separate from the treatment plan as it is currently in the ECA?
Yes, given the proposed compliance point is the effluent chamber this will remain the case. As it is an engineered works the wetland is to be included in the ECA, but it will be a sample point, not a compliance point.

Meeting adjourned at 11:50 a.m.
Next meeting will be held on January 23, 2024

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Preliminary & Final Design Services – Brighton Wastewater Treatment System Upgrades
Virtual Teams Meeting

Brighton WPCP - Engineering Design Project Progress Update
Minutes of Meeting No. 3

Prepared by: Issued on: December 15, 2023



Cailey Moxam
Environmental Engineering Intern

Reviewed by:



Susan Jingmiao Shi, P.Eng., M.Eng.
Associate, Senior Environmental Engineer

Distribution: All invitees
CC: None

J.L.Richards
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Preliminary & Final Design Services – Brighton Wastewater Treatment System Upgrades
Virtual Teams Meeting

Brighton WPCP - Engineering Design Project Progress Update
Minutes of Meeting No. 4

Attendance:	Brittney Wielgos	Ministry of the Environment Conservation and Parks (MECP)	brittney.wielgos@ontario.ca
	Rebecca Troan	Ministry of the Environment Conservation and Parks (MECP)	rebecca.troan@ontario.ca
	Leslie Whiteman	Municipality of Brighton (Municipality)	lwhiteman@brighton.ca
	Adam Walraven	Municipality of Brighton (Municipality)	awalraven@brighton.ca
	Susan Shi	J.L. Richards & Associates Limited (JLR)	sshi@jlrichards.ca
	Cailey Moxam	J.L. Richards & Associates Limited (JLR)	cmoxam@jlrichards.ca

The meeting commenced at 2:00 p.m. on Tuesday, January 23, 2024 over Teams.

The following summary of the discussions of this meeting has been prepared to record decisions reached and actions required for the project. Please advise the undersigned of any errors or omissions within the next three business days.

ITEM **ACTION BY**

1.1 **Conceptual Design Updates**

JLR presented the key changes that were made to the design since the last project update meeting (held on December 15th, 2023). The new design direction is to construct a compact purpose-built extended aeration facility. The existing aeration and facultative lagoons will no longer be used for extended aeration and sludge stabilization respectively. The change in design was driven by several factors including the risk of poor nitrification from using the oversized aeration lagoon, the construction timeline, and temporary treatment challenges.

JLR introduced the new proposed liquid treatment train, as summarized below:

- A raw sewage pumping station will lift sewage from the gravity sewer and Harbour St. pumping station to a new headworks;
- Headworks will include an Auger Monster screen housed in a building and two outdoor parallel grit channels;
- Flow will be directed from headworks to two parallel extended aeration basins and then to two parallel clarifiers;
- Flow will then travel to UV disinfection which will be housed in the new process building (along with sludge pumps, electrical rooms, SCADA controls, etc);
- Treated effluent will flow by gravity to the current effluent discharge location.

All treatment basins are sized for the rated plant capacity and consideration has been given to future expansion.

JLR also discussed the changes to the solids treatment train, which include the following

- Waste activated sludge from the clarifiers will be stored in the current aeration lagoon with added mechanical mixing;
- The aeration lagoon will function as an aerobic digestor for sludge stabilization.

JLR is to distribute the revised site layout as presented in the meeting the MECP. **JLR**

JLR is to distribute technical memorandum to the MECP following reviews by the Municipality. **JLR**

Meeting adjourned at 2:20 p.m.
Next meeting will be held on February 27, 2024

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Preliminary & Final Design Services – Brighton Wastewater Treatment System Upgrades
Virtual Teams Meeting

Brighton WPCP - Engineering Design Project Progress Update
Minutes of Meeting No. 4

Prepared by:

Issued on: January 23, 2024

Cailey Moxam
Environmental Engineering Intern

Reviewed by:

Susan Jingmiao Shi, P.Eng., M.Eng.
Associate, Senior Environmental Engineer

Distribution: All invitees
CC: None

J.L.Richards
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Preliminary & Final Design Services – Brighton Wastewater Treatment System Upgrades
Virtual Teams Meeting

Brighton WPCP - Engineering Design Project Progress Update
Minutes of Meeting No. 5

Attendance:	Brittney Wielgos	Ministry of the Environment Conservation and Parks (MECP)	brittney.wielgos@ontario.ca
	Rebecca Troan	Ministry of the Environment Conservation and Parks (MECP)	rebecca.troan@ontario.ca
	Jon Orpana	Ministry of the Environment Conservation and Parks (MECP)	jon.orpana@ontario.ca
	Leslie Whiteman	Municipality of Brighton (Municipality)	lwhiteman@brighton.ca
	Susan Shi	J.L. Richards & Associates Limited (JLR)	sshi@jlrichards.ca
	Cailey Moxam	J.L. Richards & Associates Limited (JLR)	cmoxam@jlrichards.ca

The meeting commenced at 2:00 p.m. on Tuesday, February 27, 2024 over Teams.

The following summary of the discussions of this meeting has been prepared to record decisions reached and actions required for the project. Please advise the undersigned of any errors or omissions within the next three business days.

ITEM		ACTION BY
1.0	**Schedule Updates** JLR does not anticipate any change in schedule from previous discussions currently. The 15% conceptual design package is underway and is expected to be complete for late march, the 30% package is to be complete early summer, and final detailed design is scheduled for completion in the fall. Drawings will be shared with the MECP following review and comments by the Municipality.	
	JLR is to provide an updated schedule to the Municipality incorporating the EA Addendum line item.	**JLR**
2.0	**EA Addendum** Since the last meeting the MECP has indicated that an EA Addendum must be completed for the updated design concept before an ECA can be issued. The MECP clarified that the natural landscape and cultural heritage impacts are areas of concern as the location has changed from process location specified in the previous EA and EA Addendum. Changes to the existing lagoons are also to be captured in the EA Addendum. JLR plans to complete the EA Addendum in conjunction with the current design timeline, no impact to schedule is expected.	
3.0	**Conceptual Design Updates** JLR walked through the latest schematic for the proposed process design. MECP had no major concerns at this time and are in alignment with the design direction.	
	JLR to send the updated process layout to the MECP.	**JLR**

Meeting adjourned at 2:40 p.m.
Next meeting will be held on March 26, 2024

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Preliminary & Final Design Services – Brighton Wastewater Treatment System Upgrades
Virtual Teams Meeting

Brighton WPCP - Engineering Design Project Progress Update
Minutes of Meeting No. 5

Prepared by:

Issued on: February 27, 2024

Cailey Moxam
Environmental Engineering Intern

Reviewed by:

Susan Jingmiao Shi, P.Eng., M.Eng.
Associate, Senior Environmental Engineer

Distribution: All invitees
CC: None

J.L.Richards
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Virtual Teams Meeting

Brighton WPCP - Engineering Design Project Progress Update
Minutes of Meeting No. 6

Attendance:	Rebecca Troan	Ministry of the Environment Conservation and Parks (MECP)	rebecca.troan@ontario.ca
	Leslie Whiteman	Municipality of Brighton (Municipality)	lwhiteman@brighton.ca
	Adam Walraven	Municipality of Brighton (Municipality)	awalraven@brighton.ca
	Matthew Morkem	J.L. Richards & Associates Limited (JLR)	mmorkem@jlrichards.ca
	Susan Shi	J.L. Richards & Associates Limited (JLR)	sshi@jlrichards.ca
	Cailey Moxam	J.L. Richards & Associates Limited (JLR)	cmoxam@jlrichards.ca

The meeting commenced at 2:00 p.m. on Tuesday, March 26, 2024 over Teams.

The following summary of the discussions of this meeting has been prepared to record decisions reached and actions required for the project. Please advise the undersigned of any errors or omissions within the next three business days.

ITEM		ACTION BY
1.0	**Schedule Updates** JLR does not anticipate any change in schedule from previous discussions. The 15% design package was submitted to the MECP on March 25th, and the 30% design is underway. This is expected to be complete for the end of May and will include an updated Class D OPC estimate. The 30% design package will be submitted to the MECP following review and comments by the Municipality.	**JLR**
2.0	**15% Design Review** JLR walked the group through the 15% design package and the changes from the previous design layout. The MECP had no major concerns at this time and are in alignment with the design direction.	

Meeting adjourned at 2:20 p.m.
Next meeting will be held on March 26, 2024

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Preliminary & Final Design Services – Brighton Wastewater Treatment System Upgrades
Virtual Teams Meeting

Brighton WPCP - Engineering Design Project Progress Update
Minutes of Meeting No. 6

Prepared by:

Issued on: March 26, 2024



Cailey Moxam
Environmental Engineering Intern

Reviewed by:



Susan Jingmiao Shi, P.Eng., M.Eng.
Associate, Senior Environmental Engineer

Distribution: All invitees
CC: None

J.L.Richards
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Preliminary and Final Design Services – Brighton Wastewater Treatment System Upgrades
Virtual Teams Meeting

Brighton WWTS – Engineering Design Project Progress Update
Minutes of Meeting No. 7

Attendance:	Rebecca Troan	Ministry of the Environment Conservation and Parks (MECP)	rebecca.troan@ontario.ca
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The meeting commenced at 2:00 p.m. on Tuesday, July 9, 2024 via Microsoft Teams.

The following summary of the discussions of this meeting has been prepared to record decisions reached and actions required for the project. Please advise the undersigned of any errors or omissions within the next three business days.

ITEM		ACTION BY	DUE BY

1.0 30% Design Review

MECP (Wayne Simpson) provided the following comments regarding 30% design submission:

1. **Effluent Criteria**
   Wayne indicated that with the proposed extended aeration plant, the facility is considered to be a secondary-level treatment plant. Effluent compliance limits in the new ECA should be based on monthly average concentrations, instead of annual average currently stated in Table 9 of the Preliminary Design Report (PDR). Loading limits, however, can be based on annual average (kg/d).

   Effluent $cBOD_5$ and TSS compliance limit is currently at 30 and 40 mg/L, respectively. Wayne explained that the effluent compliance limit is typically established based on either technology-based assessment or receiver-based assessment. Wayne stated that since the future Brighton WWTS is an extended aeration plant which is capable of producing secondary level treatment effluent quality (i.e., 25 mg/L for cBOD5 and TSS), the effluent compliance limits should consider the technology-based assessment approach. This will be consistent with Procedure F-5.

   Rebecca indicated that the MECP will coordinate internally with technical support team regarding effluent compliance limits and see if there should be a change. — MECP

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Virtual Teams Meeting

Brighton WWTS – Engineering Design Project Progress Update
Minutes of Meeting No. 7

ITEM	ACTION BY	DUE BY

2. Emergency Storage (EQ Storage)
Wayne requested that JLR include the purpose of the Equalization Pond (EQ) as emergency storage in the Preliminary Design Report. JLR should include number of emergency storage time (hours) available in EQ storage. — JLR

3. Monitoring and recording of EQ return and Decant Return
Wayne indicated that MECP prefers to have liquids and solids trains completely separated. Wayne indicated that by sharing the pumping station for WAS stabilization decant and EQ return, flow monitoring and metering needs to be carefully considered in design. JLR will review design and ensure that the return flow is monitored and that two streams are separate. — JLR

4. Facultative Lagoon
Wayne asked about the future plan for the facultative lagoon. JLR indicated that the intent for facultative lagoon has not been determined yet. This will considered in the design process.

5. BioWin
Wayne asked about the BioWin model and whether it considered the future plant expansion. JLR indicated that the BioWin Model is for existing plant capacity only.

6. WAS Stabilization Lagoon
Wayne requested the design intent of WAS Stabilization Lagoon and whether it meets MECP Design Guidelines for Sewage Works Section 18.2. JLR indicated that the WAS Stabilization Lagoon will act as an aerobic digester to stabilize solids, with proper mechanical mixing and retention time. Wayne indicated that the design basis should be clearly documented in the Preliminary Design Report and that the design should meet the retention time of 45 days for sludge stabilization/storage as per design guidelines.

JLR to include intent for WAS stabilization in PDR. — JLR

2.0 Schedule Updates

Elana indicated that there would be a Special Council Meeting held next Tuesday, July 16th. Council members will be updated with the overall project, decisions made to-date, and JLR's scope changes.

JLR has been asked by the Municipality and Council to pause design until a decision is made regarding outstanding scope changes on July 16th.

The Municipality has asked about MECP's position and next steps in the event that Council requests more time to review. MECP indicated that a request should be made to extend the September 30, 2024 100% design submission

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Virtual Teams Meeting

Brighton WWTS – Engineering Design Project Progress Update
Minutes of Meeting No. 7

ITEM		ACTION BY	DUE BY
	schedule currently written in the compliance report. A plan would also be required in the same request to move the project forward. The Municipality has indicated that an update will be provided to MECP following the July 16th special council meeting.	Municipality	July 17

3.0 Other Business

EA Addendum Status

MECP (Jon Orpana) has inquired about the status of the EA Addendum. JLR indicated that the EA addendum has been paused while Council is reviewing overall project. The EA Addendum will be submitted following the council decision.

Meeting adjourned at 2:45 p.m.

Next meeting will be held on August 13, 2024

Prepared by: Issued on: July 15, 2024

Susan Shi

Susan Jingmiao Shi, P.Eng., M.Eng.
Associate, Senior Environmental Engineer

Distribution: All attendees
CC: Jon Orpana, MECP (jon.orpana@ontario.ca)

J.L.Richards
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Preliminary and Final Design Services – Brighton Wastewater Treatment System Upgrades
Virtual Teams Meeting

Brighton WWTS – Engineering Design Project Progress Update
Minutes of Meeting No. 8 (REV 0)

Attendance:	Rebecca Troan	Ministry of the Environment Conservation and Parks (MECP)	rebecca.troan@ontario.ca
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	Wayne Simpson	Ministry of the Environment Conservation and Parks (MECP)	wayne.simpson@ontario.ca
	Elana Arthurs	Municipality of Brighton (Municipality)	earthurs@brighton.ca
	Leslie Whiteman	Municipality of Brighton (Municipality)	lwhiteman@brighton.ca
	Adam Walraven	Municipality of Brighton (Municipality)	awalraven@brighton.ca
	Susan Shi	J.L. Richards & Associates Limited (JLR)	sshi@jlrichards.ca
	Regine Climaco	J.L. Richards & Associates Limited (JLR)	rclimaco@jlrichards.ca
Regrets	Matt Morkem	J.L. Richards & Associates Limited (JLR)	mmorkem@jlrichards.ca

The meeting commenced at 2:00 p.m. on Tuesday, August 27, 2024 via Microsoft Teams.

The following summary of the discussions of this meeting has been prepared to record decisions reached and actions required for the project. Please advise the undersigned of any errors or omissions within the next three business days.

ITEM		ACTION BY	DUE BY
1.0	**Overview of 30% design comments discussed in previous Meeting (No. 7).**		
	• **Revised Effluent Criteria.** MECP (Wayne) indicated that due to the change in treatment technology (i.e., extended aeration process), the technology-based approach is being undertaken to update the proposed future effluent criteria. The following new limits and objectives are being proposed: • $CBOD_5$ – 15 mg/L (objective), 25 mg/L (limit) • TSS - 15 mg/L (objective), 25 mg/L (limit) • TP – 0.8 mg/L (objective), 1 mg/L (limit). • E.Coli – 150 CFU/100 mL (objective), 200 CFU/100 mL (limit) MECP (Wayne) expressed ministry's requirements for more stringent TAN as Presqu'ile Bay is a sensitive receiver. JLR requested another meeting be scheduled to discuss new effluent limits. To be attended by MECP, MECP Technical Support, JLR, and Municipality. JLR asked MECP to provide a written email summarizing the rationale for effluent TAN change to allow JLR to prepare for upcoming meeting with MECP.	MECP	
2.0	**Schedule Updates**		
	• A revised schedule was issued on August 8th. • MECP has requested the Municipality to submit a formal request for schedule extension.	Municipality	

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Preliminary and Final Design Services – Brighton Wastewater Treatment System Upgrades
Virtual Teams Meeting

Brighton WWTS – Engineering Design Project Progress Update
Minutes of Meeting No. 8 (REV 0)

ITEM	ACTION BY	DUE BY
• MECP indicated that Municipality/JLR can apply for priority status when applying for ECA to received expedited review. • MECP was updated on upcoming changes to the Ontario Building Code in 2025. JLR's design will need to substantially complete before end of 2024 to qualify under the current building code. • Estimated contractor mobilization will be approximately 2 months after the project is tendered in March. • 30% OPC is in progress. Delayed due to background discussions around WAS storage to support proposed option. • MECP wants confirmation from Municipality that they have reviewed the 30% OPC when submitted.	Municipality	

Meeting adjourned at 2:45 p.m.

Next meeting will be held on September 10, 2024

Prepared by: Issued on: September 25, 2024

Susan Shi

Susan Jingmiao Shi, P.Eng., M.Eng.
Associate, Senior Environmental Engineer

Distribution: All attendees
CC: Jon Orpana, MECP (jon.orpana@ontario.ca)

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

Preliminary and Final Design Services – Brighton Wastewater Treatment System Upgrades
Virtual Teams Meeting

Brighton WWTS – Engineering Design Project Progress Update
Minutes of Meeting No. 9 (REV 1)

Attendance:

Sarah Baxter	Ministry of the Environment Conservation and Parks (MECP)	Sarah.baxter@ontario.ca
Brittney Wielgos	Ministry of the Environment Conservation and Parks (MECP)	brittney.wielgos@ontario.ca
Brad Jackson	Ministry of the Environment Conservation and Parks (MECP)	brad.jackson@ontario.ca
Wayne Simpson	Ministry of the Environment Conservation and Parks (MECP)	wayne.simpson@ontario.ca
Elana Arthurs	Municipality of Brighton (Municipality)	earthurs@brighton.ca
Leslie Whiteman	Municipality of Brighton (Municipality)	lwhiteman@brighton.ca
Adam Walraven	Municipality of Brighton (Municipality)	awalraven@brighton.ca
Matt Morkem	J.L. Richards & Associates Limited (JLR)	mmorkem@jlrichards.ca
Susan Shi	J.L. Richards & Associates Limited (JLR)	sshi@jlrichards.ca
Regine Climaco	J.L. Richards & Associates Limited (JLR)	rclimaco@jlrichards.ca

The meeting commenced at 2:00 p.m. on Tuesday, September 10, 2024 via Microsoft Teams.

The following summary of the discussions of this meeting has been prepared to record decisions reached and actions required for the project. Please advise the undersigned of any errors or omissions within the next three business days.

ITEM	ACTION BY	DUE BY

1.0 Discussion of updated effluent limits identified in previous meeting (No. 8)

- JLR (Susan) and MECP (Sarah) had a discussion on the updated effluent criteria prior to this meeting. A clarification email was sent on August 30th, 2024 and September 10th regarding effluent criteria. Both emails are attached.
- MECP (Sarah) indicated that limits for TAN are typically lowered for plant upgrades with an increase to hydraulic capacity, which is not the case for this design.
- MECP agreed to the following:
  The existing TAN effluent limits will be maintained for this upgrade. The objectives will be updated to reflect the treatment performance by an extended aeration plant.
  - TAN limit (summer) = 14 mg/L
  - TAN limit (winter) = 17 mg/L
  - TAN objective (summer) = 2 mg/L
  - TAN objective (winter) = 4 mg/L
- MECP indicated that the amended ECA will include a condition to review and update all effluent limits in 3 years based on observed plant performance, on an as-needed basis. Once MECP has 3-years of annual report data, MECP will redefine effluent TAN limits, along with other parameters (if required).

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

Preliminary and Final Design Services – Brighton Wastewater Treatment System Upgrades
Virtual Teams Meeting

Brighton WWTS – Engineering Design Project Progress Update
Minutes of Meeting No. 9 (REV 1)

ITEM		ACTION BY	DUE BY
	Assimilative capacity assessment will not be required by the Municipality for this upcoming limit change.		
2.0	**Sampling**		
	• Samples are currently being taken at the end of the facultative lagoon. • The design intent will change the sampling location downstream of UV disinfection for ease of access by operators. • MECP (Wayne) agrees that it makes sense to move the sampling point up to the end of pipe, rather than at the end of lagoon. • This can be described in the ECA application.		
3.0	**WAS Stabilization**		
	• JLR is working on submitting an updated BioWin model and memo with the process subconsultant. To be submitted to the MECP for review.	JLR	Sept. 30
4.0	**Schedule**		
	• JLR is progressing towards 66% design submission at the end of October.		

Meeting adjourned at 2:30 p.m.

Next meeting will be held on October 8, 2024

Prepared by: Issued on: October 8, 2024

Susan Shi

Susan Jingmiao Shi, P.Eng., M.Eng.
Associate, Senior Environmental Engineer

Distribution: All attendees
CC: Jon Orpana, MECP (jon.orpana@ontario.ca)
Attachments: August 30th, 2024 and September 10th, 2024 Email – From Sarah Baxter

Susan Jingmiao Shi

From: Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>
Sent: September 10, 2024 9:57 AM
To: Susan Jingmiao Shi
Subject: RE: Brighton WWCP - EA Addendum - SW Comments

[CAUTION] This email originated from outside JLR. Do not click links or open attachments unless you recognize the sender and know the content is safe. Do not forward suspicious emails, if you are unsure, please send a separate message to Helpdesk.

Hey Susan,

I chatted with both Victor Castro and Wayne Simpson about the TAN effluent limits. We are all agreeable to maintain the existing TAN effluent limits for now, but we will put a condition in the ECA that requires new TAN effluent limits be developed within 3 years of operation… Using a refined biowin model, performance data, etc. And we will put in the standard pH objectives (6.5-8.5) and limits (6.0-9.5).

I hope this works for you and your client. We can discuss more at 2 PM.

Sarah Baxter
Surface Water Specialist
Technical Support Section – Eastern Region
Ministry of the Environment, Conservation and Parks
1259 Gardiners Road, Unit 3, Kingston ON, K7P 3J6
E: sarah.baxter@ontario.ca

From: Susan Jingmiao Shi <sshi@jlrichards.ca>
Sent: Monday, September 9, 2024 9:24 AM
To: Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>
Subject: Re: Brighton WWCP - EA Addendum - SW Comments

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Thanks Sarah! I'm free between 1-2. Let me know if this works and I'll send you a Teams invite. Thank you!
Susan

Get Outlook for Android

Susan Jingmiao Shi, P.Eng., M.Eng.
J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

Associate; Senior Environmental Engineer;
Practice Lead, Regional Market

203 - 863 Princess Street
Kingston, ON, K7L 5N4

Work: 343-302-5406
sshi@jlrichards.ca

From: Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>
Sent: Monday, September 9, 2024 9:20:27 AM
To: Susan Jingmiao Shi <sshi@jlrichards.ca>
Subject: RE: Brighton WWCP - EA Addendum - SW Comments

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Hi Susan,

I'm back from vacation and am available to chat this afternoon if you have some time.

Sarah Baxter
Surface Water Specialist
Technical Support Section – Eastern Region
Ministry of the Environment, Conservation and Parks
1259 Gardiners Road, Unit 3, Kingston ON, K7P 3J6
E: sarah.baxter@ontario.ca

From: Susan Jingmiao Shi <sshi@jlrichards.ca>
Sent: Wednesday, September 4, 2024 8:05 AM
To: Baxter, Sarah (MECP) <Sarah.Baxter@ontario.ca>
Subject: FW: Brighton WWCP - EA Addendum - SW Comments

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Hi Sarah,

Hope you are doing well! I want to have a separate conversation with you regarding the TAN limits for Brighton before our group meeting next week. Do you have time this week? If you don't mind, can you give me a call directly? Otherwise, let me know a time that works for you and I will book a Teams meeting.

I'm available:

- Wednesday, September 4, 3-3:30pm
- Thursday, September 5, 8-9am, 9:30-11am, 1-3pm
- Friday, September 6, 8-9:30, 10-11 am, 1-2pm

Very much appreciate your feedback!

Thanks!
Susan

Susan Jingmiao Shi, P.Eng., M.Eng.

Associate; Senior Environmental Engineer;
Practice Lead, Regional Market

203 - 863 Princess Street
Kingston, ON, K7L 5N4

Work: 343-302-5406
sshi@jlrichards.ca

From: Troan, Rebecca (MECP) <Rebecca.Troan@ontario.ca>
Sent: Friday, August 30, 2024 10:05 AM
To: Susan Jingmiao Shi <sshi@jlrichards.ca>
Cc: Matthew Morkem <mmorkem@jlrichards.ca>; Elana Arthurs <earthurs@brighton.ca>; Leslie Whiteman <lwhiteman@brighton.ca>; Adam Walraven <AWalraven@brighton.ca>; Regine Climaco <rclimaco@jlrichards.ca>; Wielgos, Brittney (MECP) <Brittney.Wielgos@ontario.ca>; Simpson, Wayne (MECP) <Wayne.Simpson@ontario.ca>
Subject: FW: Brighton WWCP - EA Addendum - SW Comments

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Hello Susan,

Please see the email from Sarah Baxter regarding effluent limits for the proposed works at the Brighton WPCP. Sarah will be away until September 9th. I will schedule a meeting to discuss the effluent limits when she returns. Expect to see a meeting invite shortly.

Rebecca Troan
Provincial Officer
705-313-2517

From: Baxter, Sarah (MECP) Sarah.Baxter@ontario.ca
Sent: Thursday, August 29, 2024 1:16 PM
To: Troan, Rebecca (MECP) Rebecca.Troan@ontario.ca; Wielgos, Brittney (MECP) Brittney.Wielgos@ontario.ca
Cc: Castro, Victor (MECP) Victor.Castro@ontario.ca; Simpson, Wayne (MECP) Wayne.Simpson@ontario.ca; Orpana, Jon (MECP) Jon.Orpana@ontario.ca
Subject: FW: Brighton WWCP - EA Addendum - SW Comments

Hello Rebecca and Brittney,

As you are aware, I previously provided comments regarding effluent limits for the Brighton Wastewater Control Plant (WWCP) (see email below). My previous comments were based on a

lagoon system. It is my understanding that the Brighton WWCP is moving forward with a full mechanical treatment plant capable of providing secondary treatment. Ministry Procedure F-5-1 defines secondary treatment or equivalent as being able to achieve effluent limits of 25/25 mg/L for $CBOD_5$ and TSS. I recommend that this guideline be followed and the existing effluent limits of 30/40 mg/L be reduced. These lowered values should not be difficult to achieve, considering the proposed upgrades to the system. In addition, the existing lagoon works were already capable of consistently achieving this criteria.

Ministry Procedure F-5-1 also requires a TP design objective of 1.0 mg/L. This value is greater than the existing TP objective of 0.8 mg/L, so I recommend that the existing TP limit and objective remain in place.

I previously recommended that an E.coli effluent limit of 100 CFU/100 mL be imposed considering that disinfection is being added to the treatment train, and that the receiver is sensitive and used for a variety of recreational uses. Wayne Simpson, Senior Wastewater Engineer at Approvals Branch, has since advised that the standard effluent objective and limit for UV systems is 150/200 CFU/100 mL. To be consistent, I recommend following Wayne's advice and using the standard values of 150/200 CFU/100 mL.

Ministry Procedure F-5-1 does not discuss effluent limits for TAN. However, the existing TAN limits are high for a secondary equivalent sewage works discharging to a sensitive receiver. For example, Rebecca you provided me with the ECA for the Colborne WWTP that has a similar secondary equivalent system. In this ECA (#6418-BN2NUC), the TAN limits are 4 mg/L in the summer and 8 mg/L in the winter. I recommend that the limits for the Brighton system be similarly lowered, considered the forthcoming improvement in the treatment train. The consultant should propose some effluent values for review.

Please let me know if you have any questions or concerns regarding the comments above. Feel free to forward this email along to the client and consultant for their consideration and comment. I would be pleased to meet and discuss potential TAN values when I return from vacation the week of September 9th.

Sarah Baxter
Surface Water Specialist
Technical Support Section – Eastern Region
Ministry of the Environment, Conservation and Parks
1259 Gardiners Road, Unit 3, Kingston ON, K7P 3J6
E: sarah.baxter@ontario.ca

From: Baxter, Sarah (MECP)
Sent: Thursday, January 12, 2023 2:29 PM
To: Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>
Cc: Castro, Victor (MECP) <Victor.Castro@ontario.ca>
Subject: Brighton WWCP - EA Addendum - SW Comments

Hello Jon,

I have reviewed the "*Class EA Addendum Report, Municipality of Brighton Wastewater Treatment System EA Addendum*" dated December 22, 2022 and prepared by J.L. Richards & Associates Limited. The following comments, relative to surface water impact concerns, are provided for your consideration.

The Brighton Wastewater Control Plant (WWCP) is a facultative lagoon system which includes at 0.68 ha pre-aeration cell, a 5.44 hectare facultative stabilization cell, a 6.2 hectare constructed wetland, and a chemical feed system. The system has a rated capacity of 4600 m^3/d and treated effluent is discharged to Presquile Bay. The plant is regulated by ECA #7701-CDNKQA, which includes the following effluent objectives and limits:

- $CBOD_5$ = 15 mg/L and 30 mg/L;
- TSS = 15 mg/L and 40 mg/L;
- TP = 0.8 mg/L and 1.0 mg/L;
- TAN (summer) = 10 mg/L and 14 mg/L;
- TAN (winter) = 15 mg/L and 17 mg/L;
- E.Coli = 200 CFU/100 mL (objective only); and,
- pH = 6.5-9.0 (limit and objective).

It is my understanding that the WWCP has not been able to consistently meet its effluent limits for TAN and TP, even though the plant is operating at 60-70% of its rated capacity. J.L. Richards suggests this is the result of high strength influent and physical limitations of the facultative lagoon system. As a result, the Municipality has hired J.L. Richards to complete the Class EA process so the system can be upgraded.

J.L. Richards have proposed multiple changes to the WWCP to improve TAN and TP effluent concentrations:

- Installation of a new headworks system, including an inclined auger screen and horizontal flow grit channel, to be located upstream of the aerated lagoon;
- Installation of a new aeration system in the aerated lagoon;
- Installation of a new secondary clarifier;
- Installation of a new disinfection system (type to be determined in detailed design phase); and,
- Modification of the facultative lagoon to a waste activated sludge (WAS) storage lagoon (which will be cleaned out for land application, and possibly dewatered using Geotubes).

J.L. Richards notes that the plant's design capacity will not be increasing above 4600 m3/d. In addition, J.L. Richards has not proposed any changes to the existing effluent criteria outlined in ECA #7701-CDNKQA.

<u>Conclusions/Recommendations:</u>

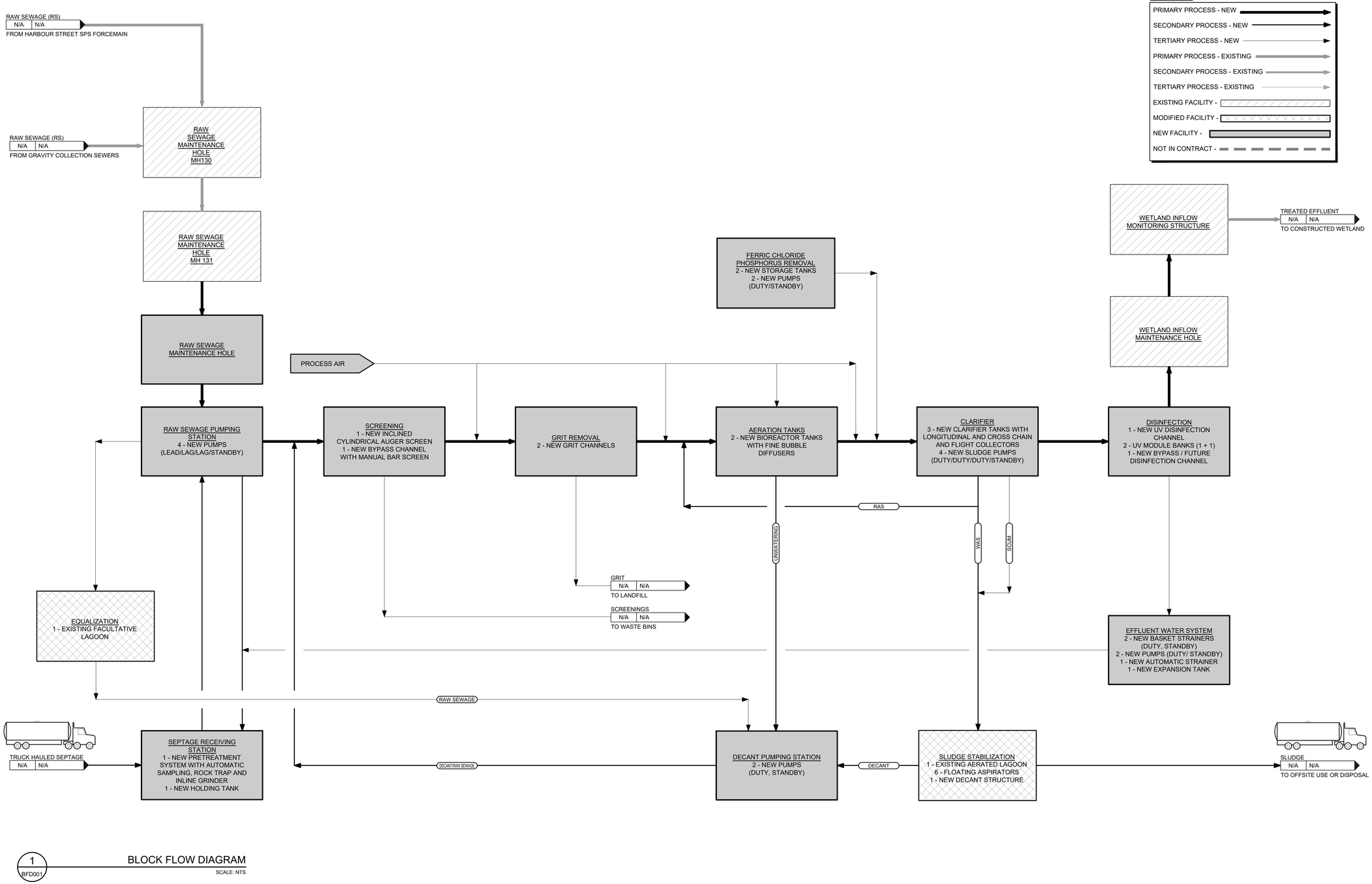
- Except for E.Coli, I agree that effluent objectives and limits (concentration and loading) outlined in ECA #7701-CDNKQA should remain the same.
- An effluent limit (not just objective) for E.Coli should be instated in the amended ECA and it should be 100 CFU/100 mL considering the sensitive nature of the receiver.
- If chlorine is selected as the disinfection method, objectives and limits for chlorine residual should be included in the ECA. The values can determined at a later date.
- I defer to the engineers at Approvals Branch to ensure that the proposed treatment upgrades will improve effluent quality and make the effluent limits achievable.

Please let me know if you have any questions or concerns regarding the above comments. Please forward these comments along the appropriate DO contact, the client, and their consultant.

Sarah Baxter
Surface Water Specialist
Technical Support Section – Eastern Region
Ministry of the Environment, Conservation and Parks
1259 Gardiners Road, Unit 3, Kingston ON, K7P 3J6
E: sarah.baxter@ontario.ca

Appendix D

Proposed Plant Block Flow Diagram

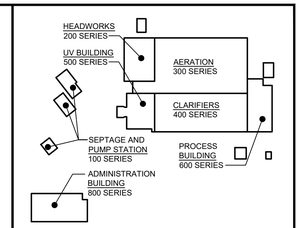


1 BFD001 BLOCK FLOW DIAGRAM

SCALE: NTS

LEGEND

- PRIMARY PROCESS - NEW
- SECONDARY PROCESS - NEW
- TERTIARY PROCESS - NEW
- PRIMARY PROCESS - EXISTING
- SECONDARY PROCESS - EXISTING
- TERTIARY PROCESS - EXISTING
- EXISTING FACILITY -
- MODIFIED FACILITY -
- NEW FACILITY -
- NOT IN CONTRACT -



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CLIENT: MUNICIPALITY OF BRIGHTON

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PROFESSIONAL STAMP

PROJECT NORTH

PROJECT:

BRIGHTON WASTEWATER TREATMENT SYSTEM UPGRADES

100 COUNTY ROAD 64, BRIGHTON ONTARIO

DRAWING:

PROCESS
SITE-WIDE

BLOCK FLOW DIAGRAM

DESIGN: CW/KP	
DRAWN: CVR/EH	DRAWING #:
CHECKED: TP	BFD001
JLR #: 32296-001	

PLOT DATE: October 31, 2024 1:24:48 PM

File Location: P:\32000\32296-001 - Brighton WWT System Upgrades\03-Production\04-Process\32296-001 - BLOCK FLOW DIAGRAM.dwg

Appendix E

Proposed Site Layout

BENCHMARK 1: SURVEY SPIKE
ELEV = 79.61 (NORTH SIDE OF DRIVEWAY ENTRANCE)

BENCHMARK 1: SURVEY SPIKE
ELEV = 79.12 (NORTH SIDE OF DRIVEWAY ENTRANCE)

LEGEND

- EXISTING SANITARY SEWER AND MAINTENANCE HOLE
- 81.58 EXISTING ELEVATION
- EXISTING VEGETATION LINE
- EXISTING TREE
- POLE EXISTING UTILITY POLE
- EX. 50mm Ø WM EXISTING WATERMAIN
- EX. 200mm Ø SAN EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- FM EXISTING SANITARY FORCEMAIN
- U/G B EXISTING UNDERGROUND UTILITY
- EXISTING CULVERT
- EXISTING CULVERT REMOVAL
- EXISTING GRAVEL ROAD
- PROPOSED GRAVEL ROAD AND PARKING
- BERM SLOPE
- FM PROPOSED FORCEMAIN
- W PROPOSED WATERMAIN
- SAN PROPOSED SANITARY MAIN
- PROPOSED SANITARY MAINTENANCE HOLE

REFER TO DRAWING C008

PROPOSED ARENA CREEK LOCATION.
FINAL LOCATION TO BE DETERMINED.

REFER TO DRAWING C003

FUTURE AERATION TANK #3
AERATION TANK #2
AERATION TANK #1
TUNNEL BELOW
CLARIFIER TANK #1
CLARIFIER TANK #2
CLARIFIER TANK #3
FUTURE CLARIFIER TANK #4
HEADWORKS BUILDING
LOADING AREA
HEADWORKS COURTYARD
UV DISINFECTION BUILDING
PROCESS BUILDING
PS
ADMIN BUILDING
GRAVEL PARKING LOT
GRAVEL PARKING LOT EXTENSION

EXISTING CONTROL BUILDING
TO BE REPURPOSED FOR STORAGE.

DECOMMISSION EXISTING
FERRIC SYSTEM.

AERATORS. TYPICAL OF 6
SHOWN. LOCATION AND
QUANTITY TO BE DETERMINED.

OUTFALL

BM1

SLOPE NEW BERM SIDES
AT 3H:1V TO TIE INTO EXISTING
GRADES.

WIDEN BERM TO ACCOMMODATE
NEW SEWER OUTFALL

EQUALIZATION STORAGE
REUSE OF EXISTING
FACULTATIVE LAGOON.

NEW OUTFALL STRUCTURE
ADJACENT TO EXISTING

BM2

COUNTY ROAD 64

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SCALE:

CLIENT: MUNICIPALITY OF BRIGHTON

CONSULTANT: www.jlrichards.ca
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CONSULTANT:

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PROJECT:

BRIGHTON WASTEWATER
TREATMENT SYSTEM UPGRADES

100 COUNTY ROAD 64, BRIGHTON ONTARIO

DRAWING:

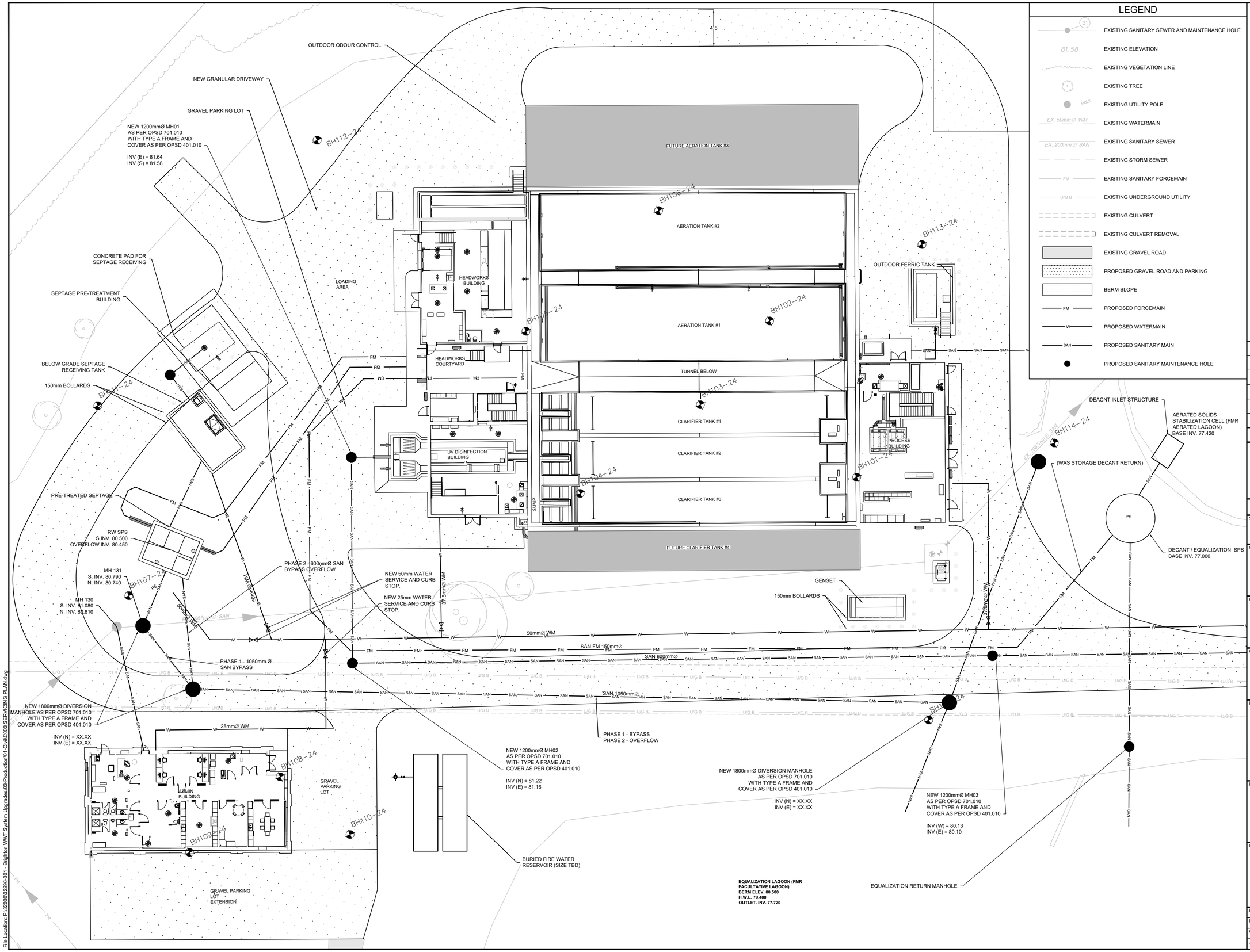
CIVIL
SITE WIDE

SITE PLAN SITE WIDE

DESIGN:	
DRAWN:	DRAWING #:
CHECKED:	C001
JLR #: 32296-001	

File Location: P:\32000\32296-001 - Brighton WWT System Upgrades\03-Production\01-Civil\C001 SITE PLAN SITE WIDE.dwg

PLOT DATE: October 31, 2024 12:30:17 PM



LEGEND

- EXISTING SANITARY SEWER AND MAINTENANCE HOLE
- EXISTING ELEVATION
- EXISTING VEGETATION LINE
- EXISTING TREE
- EXISTING UTILITY POLE
- EXISTING WATERMAIN
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING SANITARY FORCEMAIN
- EXISTING UNDERGROUND UTILITY
- EXISTING CULVERT
- EXISTING CULVERT REMOVAL
- EXISTING GRAVEL ROAD
- PROPOSED GRAVEL ROAD AND PARKING
- BERM SLOPE
- PROPOSED FORCEMAIN
- PROPOSED WATERMAIN
- PROPOSED SANITARY MAIN
- PROPOSED SANITARY MAINTENANCE HOLE

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B	ISSUED FOR 30% CLIENT REVIEW	07/06/24
A	ISSUED FOR 15% CLIENT REVIEW	20/03/24

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VERIFY SHEET SIZE AND SCALES. THE BAR TO THE RIGHT IS 25MM IF THIS IS A FULL SIZE DRAWING. 0 25mm

SCALE:

CLIENT: MUNICIPALITY OF BRIGHTON

CONSULTANT: www.jlrichards.ca

J.L.Richards ENGINEERS · ARCHITECTS · PLANNERS

CONSULTANT:

PROFESSIONAL STAMP

PROJECT NORTH

PROJECT:

BRIGHTON WASTEWATER TREATMENT SYSTEM UPGRADES

100 COUNTY ROAD 64, BRIGHTON ONTARIO

DRAWING:

CIVIL
SITE WIDE
SERVICING PLAN - PLANT & ADMIN AREA

DESIGN:	
DRAWN:	DRAWING #:
CHECKED:	C003
JLR #: 32296-001	

PLOT DATE: October 31, 2024 12:30:52 PM

File Location: P:\32000\32296-001 - Brighton WWT System Upgrades\03-Production\01-Civil\C003 SERVICING PLAN.dwg

BENCHMARK 1: SURVEY SPIKE
ELEV = 79.61 (NORTH SIDE OF DRIVEWAY ENTRANCE)

BENCHMARK 1: SURVEY SPIKE
ELEV = 79.12 (NORTH SIDE OF DRIVEWAY ENTRANCE)



LEGEND

- EXISTING SANITARY SEWER AND MAINTENANCE HOLE
- 81.58 — EXISTING ELEVATION
- EXISTING VEGETATION LINE
- EXISTING TREE
- POLE — EXISTING UTILITY POLE
- EX. 50mm Ø WM — EXISTING WATERMAIN
- EX. 200mm Ø SAN — EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- FM — EXISTING SANITARY FORCEMAIN
- U/G B — EXISTING UNDERGROUND UTILITY
- EXISTING CULVERT
- EXISTING CULVERT REMOVAL
- EXISTING GRAVEL ROAD

PRELIMINARY DESIGN

THESE DOCUMENTS ARE NOT COMPLETE IN ALL DETAILS AND MAY BE SUBJECT TO CHANGE AS DESIGN DEVELOPMENT AND CODE REVIEW IS ADVANCED.

No.	ISSUE / REVISION	DD/MM/YY
C	ISSUED FOR 66% CLIENT REVIEW	01/11/24
B	ISSUED FOR 30% CLIENT REVIEW	07/06/24
A	ISSUED FOR 15% CLIENT REVIEW	20/03/24

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VERIFY SHEET SIZE AND SCALES. THE BAR TO THE RIGHT IS 25MM IF THIS IS A FULL SIZE DRAWING. 0 25mm

SCALE:

CLIENT: MUNICIPALITY OF BRIGHTON

CONSULTANT: www.jlrichards.ca

J.L.Richards ENGINEERS · ARCHITECTS · PLANNERS

CONSULTANT:

PROFESSIONAL STAMP

PROJECT NORTH

PROJECT:

BRIGHTON WASTEWATER TREATMENT SYSTEM UPGRADES

100 COUNTY ROAD 64, BRIGHTON ONTARIO

DRAWING:

CIVIL
SITE WIDE
CREEK RELOCATION - EXISTING CONDITIONS

DESIGN:

DRAWN:

CHECKED:

JLR #: 32296-001

DRAWING #: C008

File Location: P:\32000\32296-001 - Brighton WWT System Upgrades\03-Production\01-Civil\C008 CREEK RELOCATION - EC.dwg

PLOT DATE: October 31, 2024 12:31:22 PM

Appendix F

Desktop Natural
Environment Review
Memorandum (Cambium)

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NATURAL HERITAGE MEMORANDUM

Cambium Inc.
P.O. Box 325
Peterborough, Ontario. K9J 6Z3
Telephone: (705) 742.7900 1 (866) 217.7900

To: Susan Jingmaio Shi, Sr. Environmental Engineer
J.L. Richards and Associates Ltd.
sshi@jlrichards.ca

From: Matthew Wheeler, Sr. Ecologist
Cambium Inc.
matthew.wheeler@cambium-inc.com

Date: May 8, 2024

Re: Natural Heritage Existing Conditions and Impact Assessment Memorandum
Brighton, Ontario
Cambium Project Number: 16197-001
J L Richards Project Number: 31795-000.1

Introduction

The Municipality of Brighton is carrying out an addendum to the Municipal Class Environmental Assessment (MCEA) Schedule B project, for facility upgrades at the existing Wastewater Treatment Plant (WWTP) in Brighton, Ontario. The details of the proposed Schedule B Class EA addendum can be found on the Municipality's public website advertising the Notice of Study Commencement. Cambium Inc. (Cambium) was retained by J.L. Richards and Associates Limited (JLR) to conduct a desktop review of Natural Heritage features as required by the MCEA process (Figure 1).

The existing Brighton Wastewater Pollution Control Plant (WPCP) is a lagoon-based system located at 100 County Road 64, Brighton, Ontario. The WPCP requires updates to the existing infrastructure to ensure compliance with the limits stated in the Environmental Compliance Approval (ECA) for current operations and to meet the municipality's future needs. The entire property will be considered the Site for this report.

Description of Natural Heritage Features

The natural heritage features have been reviewed based on existing publicly accessible data sets. However, a field investigation was not completed as a part of the natural heritage review process. The Site is within Ecoregion 6E of Ontario (Crins, Gray, Uhlig, & Wester, 2009). The Site contains or is adjacent to (within 120 meters [m] of) the following mapped natural heritage and/or hydrologic features:

- Arena Creek (on Site and adjacent lands) provides direct fish habitat with a coldwater thermal regime
- Unevaluated wetlands (on Site and adjacent lands)
- Woodlands (on Site and adjacent lands)
- Presqu'ile Bay Marsh, a coastal Provincially Significant Wetland (PSW) (on adjacent lands)

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- Potential habitat for provincially listed species at risk (SAR) on and adjacent to the Site from element occurrence data from the Natural Heritage Information Centre (NHIC) and air photo interpretation of potential SAR habitat;
    - Barn Swallow (Threatened) (*Hirundo rustica*)
    - Black Ash (Endangered) (*Fraxinus nigra*)
    - Black Tern (Special Concern) (*Chlidonias niger*)
    - Blanding's Turtle (Threatened) (*Emydoidea blandingii*)
    - Butternut (Endangered) (*Juglans cinerea*)
    - Bobolink (Threatened) (*Dolichonyx oryzivorus*)
    - Eastern Meadowlark (Threatened) (*Sturnella magna*)
    - Eastern Small-footed Myotis (Endangered) (*Myotis leibii*)
    - Eastern Wood-pewee (Special Concern) (*Contopus virens*)
    - Grass Pickerel (Special Concern) (*Esox americanus vermiculatus*)
    - King Rail (Endangered) (*Rallus elegans*)
    - Least Bittern (Threatened) (*Ixobrychus exilis*)
    - Little Brown Bat (Endangered) (*Myotis lucifugus*)
    - Northern Myotis (*Myotis septentrionalis*)
    - Pale-bellied Frost Lichen (Endangered) (*Physconia subpallida*)
    - Red-headed Woodpecker (Endangered) (*Melanerpes erythrocephalus*)
    - Tri-colored Bat (Endangered) (*Perimyotis subflavus*)
    - Wood Thrush (Special Concern) (*Hylocichla mustelina*)
- No federally listed aquatic SAR are documented to be present in Arena Creek. However, aquatic SAR are mapped as present within the PSW of Presqu'ile Bay Marsh, approximately 400 m downstream. The creek also connects with Lake Ontario, potentially allowing SAR to travel upstream during high-flow events. The Department of Fisheries and Oceans (DFO) SAR mapping contains records for the following SAR which occur, or may occur, on adjacent lands south of County Road 64 and in Arena Creek;
    - Bridle Shiner (Special Concern) (*Notropis bifrenatus*)
    - Eastern Pondmussel (Special Concern) (*Ligumia nasuta*)
    - Grass Pickerel (Special Concern)
    - Pugnose Shiner (Threatened) (*Notropis anogenus*)
    - Shortnose Cisco (Endangered) (*Coregonus reighardi*)

The provincial and federal background data does not contain a name for the watercourse on the Site. However, it is locally known as Arena Creek, as the watercourse flows through the King Edward Arena property north of

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the Site. The watercourse conveys water on the Site southward and outlets into Presqu'ile Bay Marsh coastal PSW. The Land Inventory Ontario Aquatic Resource Area data set documents the following fish species in this coldwater watercourse; Banded Killifish (*Fundulus diaphanous*), Blackchin Shiner (*Notropis heterodon*), Brook Stickleback (*Culaea inconstans*), Creek Chub (*Semotilus atromaculatus*), Fathead Minnow (*Pimephales promelas*), Northern Redbelly Dace (*Chrosomus eos*), White Sucker (*Catostomus commersonii*), and Yellow Perch (*Perca flavescens*). While the provincial database indicates this is a coldwater thermal regime, the fish species within the data set indicate that it is likely a mixed thermal regime of cool water and warm water species. No fall spawning species are documented in the system.

The Site is within the jurisdiction of the Lower Trent Conservation (LTC) and their regulated area encompasses portions of the Site associated with Arena Creek and the unevaluated wetlands. As the Site contains wetlands and a watercourse, the Study will consider regulations on the infrastructure as required by the *Conservation Authorities Act*, 1990.

The *Endangered Species Act, 2007* (ESA) protects endangered and threatened species and their habitats from harm or destruction. Habitat for endangered and threatened species is also afforded protection under provincial natural heritage policy; however, it is ultimately the proponent's responsibility to ensure that no harm to these species or their habitats occurs on their property.

Preliminary Impact Assessment and Recommendations

Note that the impact assessment and recommendations presented herein are based on the preliminary design alternatives. As such, the impact assessment and recommendations should be updated when a technically preferred alternative is carried forward into detail design.

Fisheries

An environmental consultant knowledgeable in fish and fish habitat regulations, mitigation, and design strategies should be retained as a part of the team designing the relocation of Arena Creek. A field investigation should be performed to determine if fish can pass from south of County Road 64 northward into Arena Creek. In addition, it is recommended that fish community sampling and habitat mapping be completed within Arena Creek and within the proposed channel relocation area. Potential constraints and opportunities for the construction of a new channel should be identified during the field investigation. Confirmation of existing conditions and fish species present, including aquatic SAR, will contribute to the channel relocation detail design.

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The DFO does not typically participate in the pre-construction design or planning of projects. DFO should be engaged to complete a Request for Project Review after the channel relocation detail design is 100% complete. The design team should provide DFO with an explanation of the proposed works, design drawings and a statement demonstrating how the design meets the requirements of the *Fisheries Act* and regulations. The design must quantify the area impact within direct fish habitat. A geomorphologist may be required to review the location and design of the relocated channel to prevent impacts to the embankment of the aeration pond and minimize future maintenance work on the new channel from erosion.

The creek relocation should be designed to comply with fish and fish habitat protection provisions in the *Fisheries Act.* In particular, measures should be implemented to avoid;

- causing the death of fish
- the harmful alteration, disruption or destruction of fish habitat in your work, undertaking or activity

Measures to protect fish should consider:

- **In-water Work Window:** Based on the documented fish assemblage in Arena Creek, the restricted activity timing window to protect fish and fish habitat prohibits all in-water work from April 1 to July 15 when fish are potentially spawning. In-water work is permitted from **July 16 to March 31**.
- **Habitat Elements**: if possible, the new channel design should include substrates or habitat structures to support fish spawning. Where possible, riparian vegetation should be maintained, and re-vegetation areas should include planting and/or seeding of native species. If tree removal is planned, consider utilizing coarse woody debris or root wads for the new channel.
- **Channel Stability**: The new channel should be created in a ‘fish-friendly’ manner with natural channel design to ensure long term stability of the channel. Live willow stakes, a soil bio-engineering technique, can be incorporated into the banks of the new channel to provide biophysical stability, shading of the watercourse and allochthonous materials for fish. Soil bio-engineering will actively prevent erosion of the new watercourse channel.
- **Erosion and Sediment Control**: An erosion and sediment control plan should be developed to prevent sediment from entering the watercourse and harming fish or fish habitat during construction.
- **Permits and Approvals**; It is recommended that the DFO Request for Review process should be undertaken through consultation with DFO. If a *Fisheries Act* Authorization is required, the tender and

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drawings for construction work should include all conditions of the authorization or letter of advice. A Conservation Authority permit is likely required to work within their regulated area (i.e., in-water work, work adjacent to the watercourse and wetlands).

Migratory Birds

Nesting birds and their nests, eggs, and young are protected under the *Migratory Birds Convention Act*, 1994 (MBCA), which prohibits killing, capturing, injuring, taking or disturbing of the listed migratory birds. Including damaging, destroying, removing, or disturbing of nests of all migratory bird species that contain a live birds or viable eggs. In 2022, new Migratory Birds Regulations (MBR) were adopted that afford year-round protection to the nests of 18 migratory species, until the nest is deemed to be abandoned. Nest abandonment must be reported through the Abandoned Nest Registry, administered by Environment and Climate Change Canada (ECCC), if there is a need to damage, disturb, destroy, or remove a nest of a species listed in Schedule 1 of the MBR. The time period to confirm nest abandonment varies by species, and ranges from 12 to 36 months. Vegetation clearing on the Site should occur outside the breeding bird season, which extends from April 15 to August 15 in the local area (as per Environment and Climate Change Canada Guidelines).

If vegetation clearing or construction is to occur between April 15 and August 15, the vegetation should be investigated by a qualified biologist to confirm if any active nests are present, prior to site alteration. Vegetation clearing can proceed provided there are no active nests. If active nests are confirmed, the nests should be left undisturbed until young have fledged or the nest is determined to be inactive. Note that some birds nest on the ground and in low-lying vegetation and shrubs; therefore, all habitat types should be inspected prior to ground disturbance if removals are to occur during the breeding season.

Species at Risk

Blanding's Turtles have the potential to be encountered on and adjacent to the Site. Turtles are particularly vulnerable to construction-related impacts on sites adjacent to wetlands, watercourses, and waterbodies. A field investigation will be required to determine if Arena Creek has suitable conditions to support turtle overwintering. Turtles may utilize the aeration cell, waste stabilization pond, and the watercourse for travel and foraging.

As the Site is located adjacent to potential habitat for turtles, workers should be aware turtles nest in terrestrial habitats from May 15 to July 15. Turtle nests typically incubate and hatch in August to the end of October. As a mitigative strategy, it is recommended that silt fence can be installed around the construction area to exclude turtles from the work area by May 15 and maintained to October 15. All stockpiled materials should be kept

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inside the exclusion fencing area and ideally should be covered and well secured around the base, to prevent turtles from nesting in loose substrates such as sand, soil, wood chips and aggregates. Should any nesting turtles be encountered, work should stop immediately, and the turtle should be left to finish nesting undisturbed. The turtle should be photographed and the nest marked to ensure it is not disturbed during construction or until eggs have hatched (late August – October). If a nest is laid in a stockpile or other area that requires disturbance, Cambium should be contacted to determine if the nest can be relocated. If individual turtles are encountered, they should be photographed and allowed time to move out of harm's way. SAR should not be handled by unauthorized individuals.

Species at risk (SAR) bats may utilize portions of the property for their lifecycle. A field investigation should be undertaken to determine if the Site has suitable habitat features for SAR bats. As needed, SAR bat acoustic surveys can be undertaken to document the species present and their habitat usage on the Site.

Black Ash and Butternut may be present on the Site. A field investigation should be undertaken to document the presence or absence of these SAR trees on the site. Breeding birds will be documented during this survey to see which common and SAR birds are utilizing the Site.

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Closing

This memo provides a description of the existing conditions within the Study Area, a preliminary assessment of potential effects on natural heritage elements and provides recommendations to eliminate or minimize negative environmental effects during and post-construction. Enhancement measures are recommended to provide long-term stability to the new channel and associated terrestrial and aquatic ecosystems. The following field activities are recommended to document existing conditions and assess the impacts of the technically preferred alternative: turtle visual encounter surveys, bat habitat surveys, fisheries and aquatic surveys, Butternut and Black Ash survey, and a breeding bird survey. Agency consultation for permits, approvals and authorizations will be specified to reflect the field-verified natural heritage features and species on the Site. Feel free to contact the undersigned should you have any questions regarding this memo.

Kind regards,

Cambium Inc.

DocuSigned by:

Matthew Wheeler

444192DEEE8D462...

Matthew Wheeler, B.A. Hons.

Project Manager / Senior Ecologist

MBW

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Appendix G

Archeological Potential
Checklist and Consultation

Ontario

Ministry of Tourism, Culture and Sport

Programs & Services Branch
401 Bay Street, Suite 1700
Toronto ON M7A 0A7

Criteria for Evaluating Archaeological Potential

A Checklist for the Non-Specialist

The **purpose of the checklist** is to determine:

- if a property(ies) or project area may contain archaeological resources i.e., have archaeological potential
- it includes all areas that may be impacted by project activities, including – but not limited to:
  - the main project area
  - temporary storage
  - staging and working areas
  - temporary roads and detours

Processes covered under this checklist, such as:

- *Planning Act*
- *Environmental Assessment Act*
- *Aggregates Resources Act*
- *Ontario Heritage Act* – Standards and Guidelines for Conservation of Provincial Heritage Properties

Archaeological assessment

If you are not sure how to answer one or more of the questions on the checklist, you may want to hire a licensed consultant archaeologist (see page 4 for definitions) to undertake an archaeological assessment.

The assessment will help you:

- identify, evaluate and protect archaeological resources on your property or project area
- reduce potential delays and risks to your project

Note: By law, archaeological assessments **must** be done by a licensed consultant archaeologist. Only a licensed archaeologist can assess – or alter – an archaeological site.

What to do if you:

- **find an archaeological resource**

  If you find something you think may be of archaeological value during project work, you must – by law – stop all activities immediately and contact a licensed consultant archaeologist

  The archaeologist will carry out the fieldwork in compliance with the *Ontario Heritage Act* [s.48(1)].

- **unearth a burial site**

  If you find a burial site containing human remains, you must immediately notify the appropriate authorities (i.e., police, coroner's office, and/or Registrar of Cemeteries) and comply with the *Funeral, Burial and Cremation Services Act*.

Other checklists

Please use a separate checklist for your project, if:

- you are seeking a Renewable Energy Approval under Ontario Regulation 359/09 – separate checklist
- your Parent Class EA document has an approved screening criteria (as referenced in Question 1)

Please refer to the Instructions pages when completing this form.

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Project or Property Name

Brighton Wastewater Treatment System Upgrades

Project or Property Location (upper and lower or single tier municipality)

100 County Road 64, Brighton ON, K0K 1H0

Proponent Name

Municipality of Brighton

Proponent Contact Information

Leslie Whiteman, Director of Public Works and Infrastructure (lwhiteman@brighton.ca, (613) 475-1162, ext. 109)

Screening Questions

	Yes	No
1. Is there a pre-approved screening checklist, methodology or process in place?	☐	☑

If Yes, please follow the pre-approved screening checklist, methodology or process.

If No, continue to Question 2.

	Yes	No
2. Has an archaeological assessment been prepared for the property (or project area) and been accepted by MTCS?	☐	☑

If Yes, do **not** complete the rest of the checklist. You are expected to follow the recommendations in the archaeological assessment report(s).

The proponent, property owner and/or approval authority will:

- summarize the previous assessment
- add this checklist to the project file, with the appropriate documents that demonstrate an archaeological assessment was undertaken e.g., MTCS letter stating acceptance of archaeological assessment report

The summary and appropriate documentation may be:

- submitted as part of a report requirement e.g., environmental assessment document
- maintained by the property owner, proponent or approval authority

If No, continue to Question 3.

	Yes	No
3. Are there known archaeological sites on or within 300 metres of the property (or the project area)?	☐	☑
4. Is there Aboriginal or local knowledge of archaeological sites on or within 300 metres of the property (or project area)?	☐	☑
5. Is there Aboriginal knowledge or historically documented evidence of past Aboriginal use on or within 300 metres of the property (or project area)?	☐	☑
6. Is there a known burial site or cemetery on the property or adjacent to the property (or project area)?	☐	☑
7. Has the property (or project area) been recognized for its cultural heritage value?	☐	☑

If Yes to any of the above questions (3 to 7), do **not** complete the checklist. Instead, you need to hire a licensed consultant archaeologist to undertake an archaeological assessment of your property or project area.

If No, continue to question 8.

	Yes	No
8. Has the entire property (or project area) been subjected to recent, extensive and intensive disturbance?	☑	☐

If Yes to the preceding question, do **not** complete the checklist. Instead, please keep and maintain a summary of documentation that provides evidence of the recent disturbance.

An archaeological assessment is not required.

If No, continue to question 9.

	Yes	No
9. Are there present or past water sources within 300 metres of the property (or project area)?	☐	☐

If Yes, an archaeological assessment is required.

If No, continue to question 10.

	Yes	No
10. Is there evidence of two or more of the following on the property (or project area)?	☐	☐

- elevated topography
- pockets of well-drained sandy soil
- distinctive land formations
- resource extraction areas
- early historic settlement
- early historic transportation routes

If Yes, an archaeological assessment is required.

If No, there is low potential for archaeological resources at the property (or project area).

The proponent, property owner and/or approval authority will:

- summarize the conclusion
- add this checklist with the appropriate documentation to the project file

The summary and appropriate documentation may be:

- submitted as part of a report requirement e.g., under the *Environmental Assessment Act, Planning Act* processes
- maintained by the property owner, proponent or approval authority

Instructions

Please have the following available, when requesting information related to the screening questions below:

- a clear map showing the location and boundary of the property or project area
  - large scale and small scale showing nearby township names for context purposes
- the municipal addresses of all properties within the project area
- the lot(s), concession(s), and parcel number(s) of all properties within a project area

In this context, the following definitions apply:

- **consultant archaeologist** means, as defined in Ontario regulation as an archaeologist who enters into an agreement with a client to carry out or supervise archaeological fieldwork on behalf of the client, produce reports for or on behalf of the client and provide technical advice to the client. In Ontario, these people also are required to hold a valid professional archaeological licence issued by the Ministry of Tourism, Culture and Sport.
- **proponent** means a person, agency, group or organization that carries out or proposes to carry out an undertaking or is the owner or person having charge, management or control of an undertaking.

1. Is there a pre-approved screening checklist, methodology or process in place?

An existing checklist, methodology or process may be already in place for identifying archaeological potential, including:

- one prepared and adopted by the municipality e.g., archaeological management plan
- an environmental assessment process e.g., screening checklist for municipal bridges
- one that is approved by the Ministry of Tourism, Culture and Sport under the Ontario government's Standards & Guidelines for Conservation of Provincial Heritage Properties [s. B.2.]

2. Has an archaeological assessment been prepared for the property (or project area) and been accepted by MTCS?

Respond 'yes' to this question, if all of the following are true:

- an archaeological assessment report has been prepared and is in compliance with MTCS requirements
  - a letter has been sent by MTCS to the licensed archaeologist confirming that MTCS has added the report to the Ontario Public Register of Archaeological Reports (Register)
- the report states that there are no concerns regarding impacts to archaeological sites

Otherwise, if an assessment has been completed and deemed compliant by the MTCS, and the ministry recommends further archaeological assessment work, this work will need to be completed.

For more information about archaeological assessments, contact:

- approval authority
- proponent
- consultant archaeologist
- Ministry of Tourism, Culture and Sport at archaeology@ontario.ca

3. Are there known archaeological sites on or within 300 metres of the property (or project area)?

MTCS maintains a database of archaeological sites reported to the ministry.

For more information, contact MTCS Archaeological Data Coordinator at archaeology@ontario.ca.

4. Is there Aboriginal or local knowledge of archaeological sites on or within 300 metres of the property?

Check with:

- Aboriginal communities in your area
- local municipal staff

They may have information about archaeological sites that are not included in MTCS' database.

Other sources of local knowledge may include:

- property owner
- local heritage organizations and historical societies
- local museums
- municipal heritage committee
- published local histories

5. Is there Aboriginal knowledge or historically documented evidence of past Aboriginal use on or within 300 metres of the property (or property area)?

Check with:

- Aboriginal communities in your area
- local municipal staff

Other sources of local knowledge may include:

- property owner
- local heritage organizations and historical societies
- local museums
- municipal heritage committee
- published local histories

6. Is there a known burial site or cemetery on the property or adjacent to the property (or project area)?

For more information on known cemeteries and/or burial sites, see:

- Cemeteries Regulation Unit, Ontario Ministry of Consumer Services – for database of registered cemeteries
- Ontario Genealogical Society (OGS) – to locate records of Ontario cemeteries, both currently and no longer in existence; cairns, family plots and burial registers
- Canadian County Atlas Digital Project – to locate early cemeteries

In this context, 'adjacent' means 'contiguous', or as otherwise defined in a municipal official plan.

7. Has the property (or project area) been recognized for its cultural heritage value?

There is a strong chance there may be archaeological resources on your property (or immediate area) if it has been listed, designated or otherwise identified as being of cultural heritage value by:

- your municipality
- Ontario government
- Canadian government

This includes a property that is:

- designated under *Ontario Heritage Act* (the OHA), including:
  - individual designation (Part IV)
  - part of a heritage conservation district (Part V)
  - an archaeological site (Part VI)
- subject to:
  - an agreement, covenant or easement entered into under the OHA (Parts II or IV)
  - a notice of intention to designate (Part IV)
  - a heritage conservation district study area by-law (Part V) of the OHA
- listed on:
  - a municipal register or inventory of heritage properties
  - Ontario government's list of provincial heritage properties
  - Federal government's list of federal heritage buildings
- part of a:
  - National Historic Site
  - UNESCO World Heritage Site
- designated under:
  - *Heritage Railway Station Protection Act*
  - *Heritage Lighthouse Protection Act*
- subject of a municipal, provincial or federal commemorative or interpretive plaque.

To determine if your property or project area is covered by any of the above, see:

- Part A of the MTCS Criteria for Evaluating Potential for Built Heritage and Cultural Heritage Landscapes

Part VI – Archaeological Sites

Includes five sites designated by the Minister under Regulation 875 of the Revised Regulation of Ontario, 1990 (Archaeological Sites) and 3 marine archaeological sites prescribed under Ontario Regulation 11/06.

For more information, check Regulation 875 and Ontario Regulation 11/06.

8. Has the entire property (or project area) been subjected to recent extensive and intensive ground disturbance?

Recent: after-1960

Extensive: over all or most of the area

Intensive: thorough or complete disturbance

Examples of ground disturbance include:

- quarrying
- major landscaping – involving grading below topsoil
- building footprints and associated construction area
  - where the building has deep foundations or a basement
- infrastructure development such as:
  - sewer lines
  - gas lines
  - underground hydro lines
  - roads
  - any associated trenches, ditches, interchanges. **Note**: this applies only to the excavated part of the right-of-way; the remainder of the right-of-way or corridor may not have been impacted.

A ground disturbance does **not** include:

- agricultural cultivation
- gardening
- landscaping

Site visits

You can typically get this information from a site visit. In that case, please document your visit in the process (e.g., report) with:

- photographs
- maps
- detailed descriptions

If a disturbance isn't clear from a site visit or other research, you need to hire a licensed consultant archaeologist to undertake an archaeological assessment.

9. Are there present or past water bodies within 300 metres of the property (or project area)?

Water bodies are associated with past human occupations and use of the land. About 80-90% of archaeological sites are found within 300 metres of water bodies.

Present

- Water bodies:
  - primary - lakes, rivers, streams, creeks
  - secondary - springs, marshes, swamps and intermittent streams and creeks
- accessible or inaccessible shoreline, for example:
  - high bluffs
  - swamps
  - marsh fields by the edge of a lake
  - sandbars stretching into marsh

Water bodies not included:

- man-made water bodies, for example:
  - temporary channels for surface drainage
  - rock chutes and spillways
  - temporarily ponded areas that are normally farmed
  - dugout ponds
- artificial bodies of water intended for storage, treatment or recirculation of:
  - runoff from farm animal yards
  - manure storage facilities
  - sites and outdoor confinement areas

Past

Features indicating past water bodies:

- raised sand or gravel beach ridges – can indicate glacial lake shorelines
- clear dip in the land – can indicate an old river or stream
- shorelines of drained lakes or marshes
- cobble beaches

You can get information about water bodies through:

- a site visit
- aerial photographs
- 1:10,000 scale Ontario Base Maps - or equally detailed and scaled maps.

10. Is there evidence of two or more of the following on the property (or project area)?

- elevated topography
- pockets of well-drained sandy soil
- distinctive land formations
- resource extraction areas
- early historic settlement
- early historic transportation routes

- **Elevated topography**

  Higher ground and elevated positions - surrounded by low or level topography - often indicate past settlement and land use.

  Features such as eskers, drumlins, sizeable knolls, plateaus next to lowlands, or other such features are a strong indication of archaeological potential.

  Find out if your property or project area has elevated topography, through:

  - site inspection
  - aerial photographs
  - topographical maps

- **Pockets of well-drained sandy soil, especially within areas of heavy soil or rocky ground**

  Sandy, well-drained soil - in areas characterized by heavy soil or rocky ground - may indicate archaeological potential

  Find out if your property or project area has sandy soil through:

  - site inspection
  - soil survey reports

- **Distinctive land formations**

  Distinctive land formations include – but are not limited to:

  - waterfalls
  - rock outcrops
  - rock faces
  - caverns
  - mounds, etc.

  They were often important to past inhabitants as special or sacred places. The following sites may be present – or close to – these formations:

  - burials
  - structures
  - offerings
  - rock paintings or carvings

  Find out if your property or project areas has a distinctive land formation through:

  - a site visit
  - aerial photographs
  - 1:10,000 scale Ontario Base Maps - or equally detailed and scaled maps.

- **Resource extraction areas**

  The following resources were collected in these extraction areas:

  - food or medicinal plants e.g., migratory routes, spawning areas, prairie
  - scarce raw materials e.g., quartz, copper, ochre or outcrops of chert
  - resources associated with early historic industry e.g., fur trade, logging, prospecting, mining

  Aboriginal communities may hold traditional knowledge about their past use or resources in the area.

- **Early historic settlement**

  Early Euro-Canadian settlement include – but are not limited to:

  - early military or pioneer settlement e.g., pioneer homesteads, isolated cabins, farmstead complexes
  - early wharf or dock complexes
  - pioneers churches and early cemeteries

  For more information, see below – under the early historic transportation routes.

- **Early historic transportation routes** - such as trails, passes, roads, railways, portage routes, canals.

  For more information, see:

  - historical maps and/or historical atlases
    - for information on early settlement patterns such as trails (including Aboriginal trails), monuments, structures, fences, mills, historic roads, rail corridors, canals, etc.
    - Archives of Ontario holds a large collection of historical maps and historical atlases
    - digital versions of historic atlases are available on the Canadian County Atlas Digital Project
  - commemorative markers or plaques such as local, provincial or federal agencies
  - municipal heritage committee or other local heritage organizations
    - for information on early historic settlements or landscape features (e.g., fences, mill races, etc.)
    - for information on commemorative markers or plaques

Cailey Moxam

From: von Bitter, Robert (MCM) <Robert.vonBitter@ontario.ca>
Sent: April 25, 2024 3:25 PM
To: Cailey Moxam
Subject: Re: Brighton WWTP - Archaeological Site Data Confirmation

[CAUTION] This email originated from outside JLR. Do not click links or open attachments unless you recognize the sender and know the content is safe. Do not forward suspicious emails, if you are unsure, please send a separate message to Helpdesk.

Cailey,

At the present time no reported archaeological sites are mapping within 300 m of that location.

Regards,

Robert von Bitter

Robert von Bitter
Archaeological Data Co-Ordinator
Archaeology Program Unit
Ministry of Citizenship and Multiculturalism
Citizenship, Inclusion and Heritage Division | Heritage Branch
Robert.vonBitter@ontario.ca

From: Archaeology (MCM) <archaeology@ontario.ca>
Sent: Thursday, April 25, 2024 2:48 PM
To: von Bitter, Robert (MCM) <Robert.vonBitter@ontario.ca>
Subject: Fw: Brighton WWTP - Archaeological Site Data Confirmation

---

From: Cailey Moxam <cmoxam@jlrichards.ca>
Sent: April 25, 2024 1:29 PM
To: Archaeology (MCM) <archaeology@ontario.ca>
Subject: Brighton WWTP - Archaeological Site Data Confirmation

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Good afternoon,

I am contacting you to request a check for recorded archaeological sites on or in the immediate vicinity of the Brighton Wastewater Treatment Plant.

The facility is located at the approximate address of 100 County Road 64, Brighton, ON. Please see attached screenshot and KML file displaying the property location and approximate site limits.

Please advise if there are any known archaeological sites on or near the facility. Let me know if there are any questions or if you require any more information.

Thank you,
Cailey Moxam

Cailey Moxam
Environmental Engineering Intern

203 - 863 Princess Street
Kingston, ON, K7L 5N4
Work: 343-306-5064
cmoxam@jlrichards.ca

Appendix H

Built and Cultural Heritage Potential Checklist and Consultation

Ontario

Ministry of Tourism, Culture and Sport

Programs & Services Branch
401 Bay Street, Suite 1700
Toronto ON M7A 0A7

Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes

A Checklist for the Non-Specialist

The **purpose of the checklist** is to determine:

- if a property(ies) or project area:
    - is a recognized heritage property
    - may be of cultural heritage value
- it includes all areas that may be impacted by project activities, including – but not limited to:
    - the main project area
    - temporary storage
    - staging and working areas
    - temporary roads and detours

Processes covered under this checklist, such as:

- *Planning Act*
- *Environmental Assessment Act*
- *Aggregates Resources Act*
- *Ontario Heritage Act* – Standards and Guidelines for Conservation of Provincial Heritage Properties

Cultural Heritage Evaluation Report (CHER)

If you are not sure how to answer one or more of the questions on the checklist, you may want to hire a qualified person(s) (see page 5 for definitions) to undertake a cultural heritage evaluation report (CHER).

The CHER will help you:

- identify, evaluate and protect cultural heritage resources on your property or project area
- reduce potential delays and risks to a project

Other checklists

Please use a separate checklist for your project, if:

- you are seeking a Renewable Energy Approval under Ontario Regulation 359/09 – separate checklist
- your Parent Class EA document has an approved screening criteria (as referenced in Question 1)

Please refer to the Instructions pages for more detailed information and when completing this form.

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Project or Property Name

Brighton Wastewater Treatment System Upgrades

Project or Property Location (upper and lower or single tier municipality)

100 County Road 54, Brighton ON, K0K 1H0

Proponent Name

Municipality of Brighton

Proponent Contact Information

Leslie Whiteman, Director of Public Works and Infrastructure (lwhiteman@brighton.ca)

Screening Questions

	Yes	No
1. Is there a pre-approved screening checklist, methodology or process in place?	☐	☑

If Yes, please follow the pre-approved screening checklist, methodology or process.

If No, continue to Question 2.

Part A: Screening for known (or recognized) Cultural Heritage Value

	Yes	No
2. Has the property (or project area) been evaluated before and found **not** to be of cultural heritage value?	☐	☑

If Yes, do **not** complete the rest of the checklist.

The proponent, property owner and/or approval authority will:

- summarize the previous evaluation and
- add this checklist to the project file, with the appropriate documents that demonstrate a cultural heritage evaluation was undertaken

The summary and appropriate documentation may be:

- submitted as part of a report requirement
- maintained by the property owner, proponent or approval authority

If No, continue to Question 3.

	Yes	No
3. Is the property (or project area):		
a. identified, designated or otherwise protected under the *Ontario Heritage Act* as being of cultural heritage value?	☐	☑
b. a National Historic Site (or part of)?	☐	☑
c. designated under the *Heritage Railway Stations Protection Act*?	☐	☑
d. designated under the *Heritage Lighthouse Protection Act*?	☐	☑
e. identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office (FHBRO)?	☐	☑
f. located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site?	☐	☑

If Yes to any of the above questions, you need to hire a qualified person(s) to undertake:

- a Cultural Heritage Evaluation Report, if a Statement of Cultural Heritage Value has not previously been prepared or the statement needs to be updated

If a Statement of Cultural Heritage Value has been prepared previously and if alterations or development are proposed, you need to hire a qualified person(s) to undertake:

- a Heritage Impact Assessment (HIA) – the report will assess and avoid, eliminate or mitigate impacts

If No, continue to Question 4.

Part B: Screening for Potential Cultural Heritage Value

	Yes	No
4. Does the property (or project area) contain a parcel of land that:		
a. is the subject of a municipal, provincial or federal commemorative or interpretive plaque?	☐	☑
b. has or is adjacent to a known burial site and/or cemetery?	☐	☑
c. is in a Canadian Heritage River watershed?	☐	☑
d. contains buildings or structures that are 40 or more years old?	☑	☐

Part C: Other Considerations

	Yes	No
5. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area):		
a. is considered a landmark in the local community or contains any structures or sites that are important in defining the character of the area?	☐	☑
b. has a special association with a community, person or historical event?	☐	☑
c. contains or is part of a cultural heritage landscape?	☐	☑

If Yes to one or more of the above questions (Part B and C), there is potential for cultural heritage resources on the property or within the project area.

You need to hire a qualified person(s) to undertake:

- a Cultural Heritage Evaluation Report (CHER)

If the property is determined to be of cultural heritage value and alterations or development is proposed, you need to hire a qualified person(s) to undertake:

- a Heritage Impact Assessment (HIA) – the report will assess and avoid, eliminate or mitigate impacts

If No to all of the above questions, there is low potential for built heritage or cultural heritage landscape on the property.

The proponent, property owner and/or approval authority will:

- summarize the conclusion
- add this checklist with the appropriate documentation to the project file

The summary and appropriate documentation may be:

- submitted as part of a report requirement e.g. under the *Environmental Assessment Act, Planning Act* processes
- maintained by the property owner, proponent or approval authority

Instructions

Please have the following available, when requesting information related to the screening questions below:

- a clear map showing the location and boundary of the property or project area
  - large scale and small scale showing nearby township names for context purposes
- the municipal addresses of all properties within the project area
- the lot(s), concession(s), and parcel number(s) of all properties within a project area

For more information, see the Ministry of Tourism, Culture and Sport's Ontario Heritage Toolkit or Standards and Guidelines for Conservation of Provincial Heritage Properties.

In this context, the following definitions apply:

- **qualified person(s)** means individuals – professional engineers, architects, archaeologists, etc. – having relevant, recent experience in the conservation of cultural heritage resources.
- **proponent** means a person, agency, group or organization that carries out or proposes to carry out an undertaking or is the owner or person having charge, management or control of an undertaking.

1. Is there a pre-approved screening checklist, methodology or process in place?

An existing checklist, methodology or process may already be in place for identifying potential cultural heritage resources, including:

- one endorsed by a municipality
- an environmental assessment process e.g. screening checklist for municipal bridges
- one that is approved by the Ministry of Tourism, Culture and Sport (MTCS) under the Ontario government's Standards & Guidelines for Conservation of Provincial Heritage Properties [s.B.2.]

Part A: Screening for known (or recognized) Cultural Heritage Value

2. Has the property (or project area) been evaluated before and found not to be of cultural heritage value?

Respond 'yes' to this question, if all of the following are true:

A property can be considered not to be of cultural heritage value if:

- a Cultural Heritage Evaluation Report (CHER) - or equivalent - has been prepared for the property with the advice of a qualified person and it has been determined not to be of cultural heritage value and/or
- the municipal heritage committee has evaluated the property for its cultural heritage value or interest and determined that the property is not of cultural heritage value or interest

A property may need to be re-evaluated, if:

- there is evidence that its heritage attributes may have changed
- new information is available
- the existing Statement of Cultural Heritage Value does not provide the information necessary to manage the property
- the evaluation took place after 2005 and did not use the criteria in Regulations 9/06 and 10/06

Note: Ontario government ministries and public bodies [prescribed under Regulation 157/10] may continue to use their existing evaluation processes, until the evaluation process required under section B.2 of the Standards & Guidelines for Conservation of Provincial Heritage Properties has been developed and approved by MTCS.

To determine if your property or project area has been evaluated, contact:

- the approval authority
- the proponent
- the Ministry of Tourism, Culture and Sport

3a. Is the property (or project area) identified, designated or otherwise protected under the *Ontario Heritage Act* as being of cultural heritage value e.g.:

i. designated under the *Ontario Heritage Act*

- individual designation (Part IV)
- part of a heritage conservation district (Part V)

Individual Designation – Part IV

A property that is designated:

- by a municipal by-law as being of cultural heritage value or interest [s.29 of the *Ontario Heritage Act*]
- by order of the Minister of Tourism, Culture and Sport as being of cultural heritage value or interest of provincial significance [s.34.5]. **Note**: To date, no properties have been designated by the Minister.

Heritage Conservation District – Part V

A property or project area that is located within an area designated by a municipal by-law as a heritage conservation district [s. 41 of the *Ontario Heritage Act*].

For more information on Parts IV and V, contact:

- municipal clerk
- Ontario Heritage Trust
- local land registry office (for a title search)

---

ii. subject of an agreement, covenant or easement entered into under Parts II or IV of the *Ontario Heritage Act*

An agreement, covenant or easement is usually between the owner of a property and a conservation body or level of government. It is usually registered on title.

The primary purpose of the agreement is to:

- preserve, conserve, and maintain a cultural heritage resource
- prevent its destruction, demolition or loss

For more information, contact:

- Ontario Heritage Trust - for an agreement, covenant or easement [clause 10 (1) (c) of the *Ontario Heritage Act*]
- municipal clerk – for a property that is the subject of an easement or a covenant [s.37 of the *Ontario Heritage Act*]
- local land registry office (for a title search)

---

iii. listed on a register of heritage properties maintained by the municipality

Municipal registers are the official lists - or record - of cultural heritage properties identified as being important to the community.

Registers include:

- all properties that are designated under the *Ontario Heritage Act* (Part IV or V)
- properties that have not been formally designated, but have been identified as having cultural heritage value or interest to the community

For more information, contact:

- municipal clerk
- municipal heritage planning staff
- municipal heritage committee

---

iv. subject to a notice of:

- intention to designate (under Part IV of the *Ontario Heritage Act*)
- a Heritage Conservation District study area bylaw (under Part V of the *Ontario Heritage Act*)

A property that is subject to a **notice of intention to designate** as a property of cultural heritage value or interest and the notice is in accordance with:

- section 29 of the *Ontario Heritage Act*
- section 34.6 of the *Ontario Heritage Act.* **Note**: To date, the only applicable property is Meldrum Bay Inn, Manitoulin Island. [s.34.6]

An area designated by a municipal by-law made under section 40.1 of the *Ontario Heritage Act* as a **heritage conservation district study area**.

For more information, contact:

- municipal clerk – for a property that is the subject of notice of intention [s. 29 and s. 40.1]
- Ontario Heritage Trust

---

v. included in the Ministry of Tourism, Culture and Sport's list of provincial heritage properties

Provincial heritage properties are properties the Government of Ontario owns or controls that have cultural heritage value or interest.

The Ministry of Tourism, Culture and Sport (MTCS) maintains a list of all provincial heritage properties based on information provided by ministries and prescribed public bodies. As they are identified, MTCS adds properties to the list of provincial heritage properties.

For more information, contact the MTCS Registrar at registrar@ontario.ca.

3b. Is the property (or project area) a National Historic Site (or part of)?

National Historic Sites are properties or districts of national historic significance that are designated by the Federal Minister of the Environment, under the *Canada National Parks Act*, based on the advice of the Historic Sites and Monuments Board of Canada.

For more information, see the National Historic Sites website.

3c. Is the property (or project area) designated under the *Heritage Railway Stations Protection Act*?

The *Heritage Railway Stations Protection Act* protects heritage railway stations that are owned by a railway company under federal jurisdiction. Designated railway stations that pass from federal ownership may continue to have cultural heritage value.

For more information, see the Directory of Designated Heritage Railway Stations.

3d. Is the property (or project area) designated under the *Heritage Lighthouse Protection Act*?

The *Heritage Lighthouse Protection Act* helps preserve historically significant Canadian lighthouses. The Act sets up a public nomination process and includes heritage building conservation standards for lighthouses which are officially designated.

For more information, see the Heritage Lighthouses of Canada website.

3e. Is the property (or project area) identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office?

The role of the Federal Heritage Buildings Review Office (FHBRO) is to help the federal government protect the heritage buildings it owns. The policy applies to all federal government departments that administer real property, but not to federal Crown Corporations.

For more information, contact the Federal Heritage Buildings Review Office.

See a directory of all federal heritage designations.

3f. Is the property (or project area) located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site?

A UNESCO World Heritage Site is a place listed by UNESCO as having outstanding universal value to humanity under the Convention Concerning the Protection of the World Cultural and Natural Heritage. In order to retain the status of a World Heritage Site, each site must maintain its character defining features.

Currently, the Rideau Canal is the only World Heritage Site in Ontario.

For more information, see Parks Canada – World Heritage Site website.

Part B: Screening for potential Cultural Heritage Value

4a. Does the property (or project area) contain a parcel of land that has a municipal, provincial or federal commemorative or interpretive plaque?

Heritage resources are often recognized with formal plaques or markers.

Plaques are prepared by:

- municipalities
- provincial ministries or agencies
- federal ministries or agencies
- local non-government or non-profit organizations

For more information, contact:

- municipal heritage committees or local heritage organizations – for information on the location of plaques in their community
- Ontario Historical Society's Heritage directory – for a list of historical societies and heritage organizations
- Ontario Heritage Trust – for a list of plaques commemorating Ontario's history
- Historic Sites and Monuments Board of Canada – for a list of plaques commemorating Canada's history

4b. Does the property (or project area) contain a parcel of land that has or is adjacent to a known burial site and/or cemetery?

For more information on known cemeteries and/or burial sites, see:

- Cemeteries Regulations, Ontario Ministry of Consumer Services – for a database of registered cemeteries
- Ontario Genealogical Society (OGS) – to locate records of Ontario cemeteries, both currently and no longer in existence; cairns, family plots and burial registers
- Canadian County Atlas Digital Project – to locate early cemeteries

In this context, adjacent means contiguous or as otherwise defined in a municipal official plan.

4c. Does the property (or project area) contain a parcel of land that is in a Canadian Heritage River watershed?

The Canadian Heritage River System is a national river conservation program that promotes, protects and enhances the best examples of Canada's river heritage.

Canadian Heritage Rivers must have, and maintain, outstanding natural, cultural and/or recreational values, and a high level of public support.

For more information, contact the Canadian Heritage River System.

If you have questions regarding the boundaries of a watershed, please contact:

- your conservation authority
- municipal staff

4d. Does the property (or project area) contain a parcel of land that contains buildings or structures that are 40 or more years old?

A 40 year 'rule of thumb' is typically used to indicate the potential of a site to be of cultural heritage value. The approximate age of buildings and/or structures may be estimated based on:

- history of the development of the area
- fire insurance maps
- architectural style
- building methods

Property owners may have information on the age of any buildings or structures on their property. The municipality, local land registry office or library may also have background information on the property.

Note: 40+ year old buildings or structure do not necessarily hold cultural heritage value or interest; their age simply indicates a higher potential.

A building or structure can include:

- residential structure
- farm building or outbuilding
- industrial, commercial, or institutional building
- remnant or ruin
- engineering work such as a bridge, canal, dams, etc.

For more information on researching the age of buildings or properties, see the Ontario Heritage Tool Kit Guide Heritage Property Evaluation.

Part C: Other Considerations

5a. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) is considered a landmark in the local community or contains any structures or sites that are important to defining the character of the area?

Local or Aboriginal knowledge may reveal that the project location is situated on a parcel of land that has potential landmarks or defining structures and sites, for instance:

- buildings or landscape features accessible to the public or readily noticeable and widely known
- complexes of buildings
- monuments
- ruins

5b. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) has a special association with a community, person or historical event?

Local or Aboriginal knowledge may reveal that the project location is situated on a parcel of land that has a special association with a community, person or event of historic interest, for instance:

- Aboriginal sacred site
- traditional-use area
- battlefield
- birthplace of an individual of importance to the community

5c. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) contains or is part of a cultural heritage landscape?

Landscapes (which may include a combination of archaeological resources, built heritage resources and landscape elements) may be of cultural heritage value or interest to a community.

For example, an Aboriginal trail, historic road or rail corridor may have been established as a key transportation or trade route and may have been important to the early settlement of an area. Parks, designed gardens or unique landforms such as waterfalls, rock faces, caverns, or mounds are areas that may have connections to a particular event, group or belief.

For more information on Questions 5.a., 5.b. and 5.c., contact:

- Elders in Aboriginal Communities or community researchers who may have information on potential cultural heritage resources. Please note that Aboriginal traditional knowledge may be considered sensitive.
- municipal heritage committees or local heritage organizations
- Ontario Historical Society's "Heritage Directory" - for a list of historical societies and heritage organizations in the province

An internet search may find helpful resources, including:

- historical maps
- historical walking tours
- municipal heritage management plans
- cultural heritage landscape studies
- municipal cultural plans

Information specific to trails may be obtained through Ontario Trails.

Cailey Moxam

From: Hatcher, Laura (MTCS) <Laura.E.Hatcher@ontario.ca>
Sent: October 3, 2022 9:26 AM
To: Matthew Marcuccio
Cc: Susan Jingmiao Shi
Subject: RE: File 0016944: Municipality of Brighton Wastewater Treatment System Class EA Addendum

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Hi Matthew,

Thank you for checking in about this. You are right this is not likely to be of interest. I recommend including the completed checklist, along with the explanation you have provided here, in your EA documentation.

I hope this helps and please let me know if you have any other questions.

Sincerely,
Laura

Laura Hatcher, MCIP, RPP
A/Heritage Advisor
Heritage Planning Unit | Programs and Services Branch | Heritage, Tourism and Culture Division
Ministry of Tourism, Culture and Sport
Tel. 437-239-3404 New| email: laura.e.hatcher@ontario.ca

From: Matthew Marcuccio <mmarcuccio@jlrichards.ca>
Sent: September 30, 2022 1:49 PM
To: Hatcher, Laura (MTCS) <Laura.E.Hatcher@ontario.ca>
Cc: Susan Jingmiao Shi <sshi@jlrichards.ca>
Subject: File 0016944: Municipality of Brighton Wastewater Treatment System Class EA Addendum

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Good afternoon Laura,

For the above-referenced project, I have filled out the *Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes* as noted in your letter. All questions have been answered 'no', except for Question 4d (contains buildings or structures that are 40 or more years old).

The wastewater treatment system was first installed in 1970 an aerated lagoon and a waste stabilization pond. A small structure (6.8m x 8.5m and 2.8m tall) was constructed in 1977, housing electrical equipment and chemical dosing/storage. The building is constructed with concrete block walls and a standard flat roof (see photo).

Since the building is 40+ years old, the criteria is concluding that there is potential for cultural heritage resources and a CHER is required. However, it is unlikely that this type of structure and facility would be of interest. Is it possible to avoid the requirement for a CHER of this facility?

Thank you,
Matthew

Matthew Marcuccio, P.Eng.
Civil Engineer

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