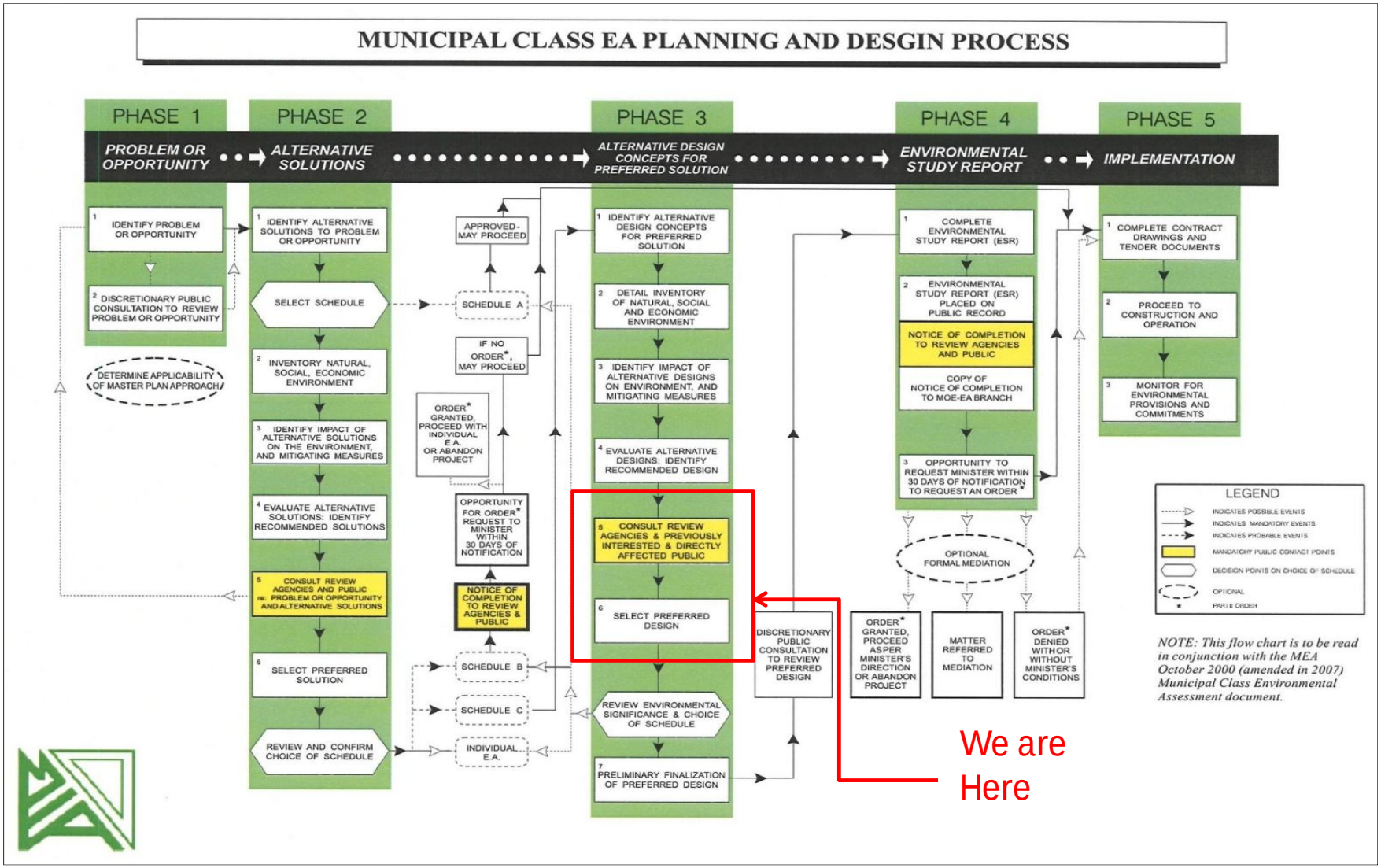
Alexandria Sewage Lagoon Treatment Facility

Municipal Class 'C' Environmental Assessment

Public Information Centre #2

Welcome!

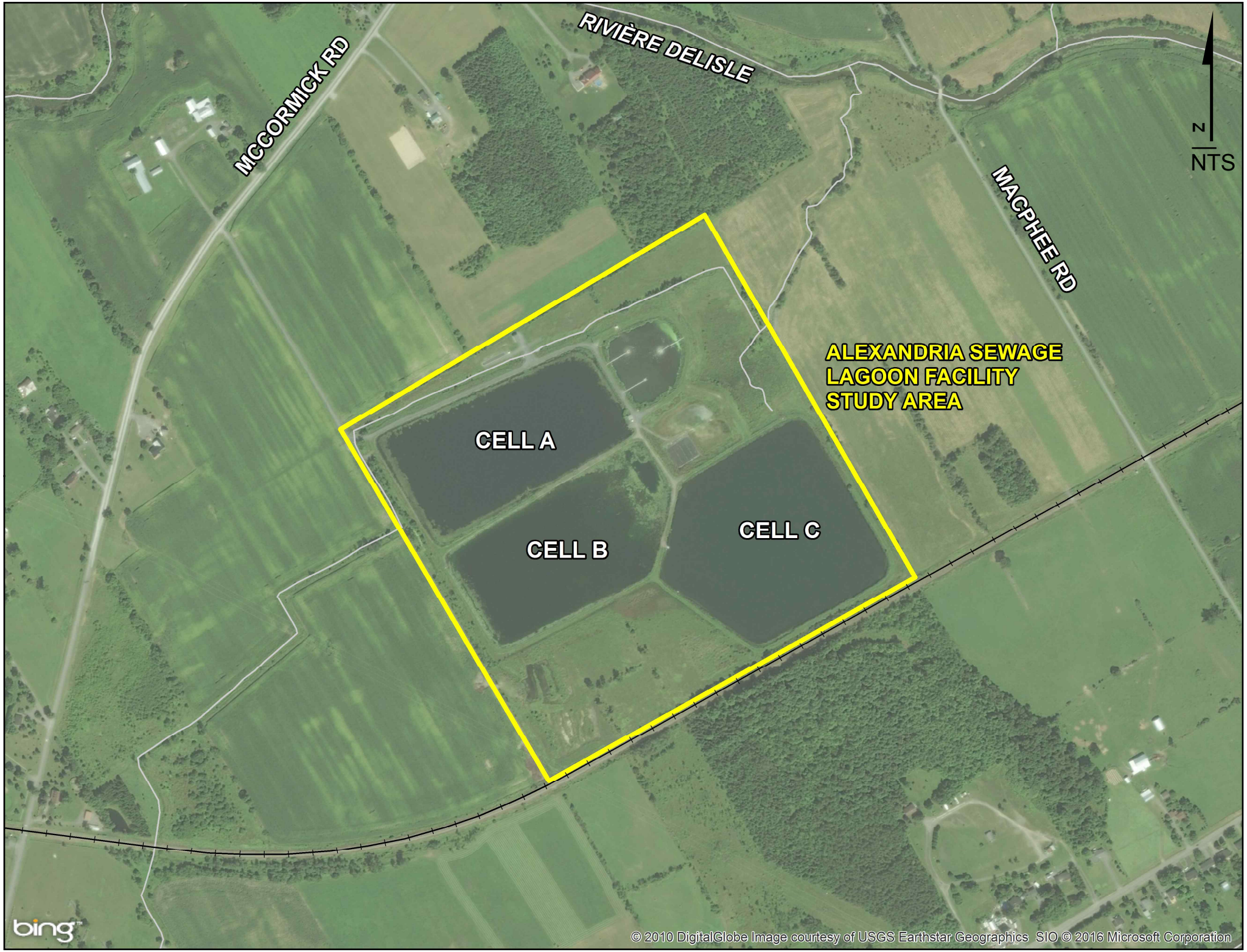
Municipal Class Environmental Assessment Status



Study Overview

The Township of North Glengarry has initiated a Schedule 'C' Municipal Class Environmental Assessment for the proposed expansion of the Alexandria Sewage Lagoon Treatment Facility.

- The Alexandria Sewage Lagoon Treatment Facility is located east of the Town of Alexandria off of McCormick Road. The Alexandria Sewage Lagoon Facility is located approximately 1.8 km northeast from downtown Alexandria
- Owned and operated by the Township of North Glengarry (1962)
- The Township is currently exceeding its approved Ministry of Environment and Climate Change (MOECC) amended Environmental Compliance Approval (ECA) rated capacity
- Since 2008, the Township has taken steps to eliminate infiltration into the collection system such as spot repairs, lining, replacements, manhole sealing/replacements, etc. The Township has also invested into studies for the identification and removal of roof leaders and sump pumps (this summer).
- The lack of capacity is creating a barrier for growth and economic development in the Township


MCCORMICK RD
RIVIÈRE DELISLE
MACPHEE RD
N
NTS
ALEXANDRIA SEWAGE
LAGOON FACILITY
STUDY AREA
CELL A
CELL B
CELL C
bing
© 2010 DigitalGlobe Image courtesy of USGS Earthstar Geographics SIO © 2016 Microsoft Corporation

Existing Lagoon Facility

- The Alexandria Sewage Lagoon Facility is currently operating under MOECC Amended Environmental Compliance Approval (ECA) Reference Number 9324-8WKJD2, August 2, 2012
- Amended ECA for the existing Lagoon Facility has a rated Capacity of 3,237 m^3/day
- 4-Cell Continuous Discharge Lagoon System (3 Facultative Lagoons and 1 Aerating Cell)
- Alum is added to the effluent flow from the aerated lagoon to control Phosphorus
- Effluent flows from lagoon C to B to A before flowing over an adjustable stop log weir
- Lagoon effluent flows by gravity to the disinfection process
- Disinfection is accomplished by chlorination which then goes through a dechlorination process
- Effluent from the dechlorination chamber flows into a facility perimeter ditch and ultimately to the Delisle River
- Bio-solids are currently treated in Geotubes

Problem/ Opportunity Statement

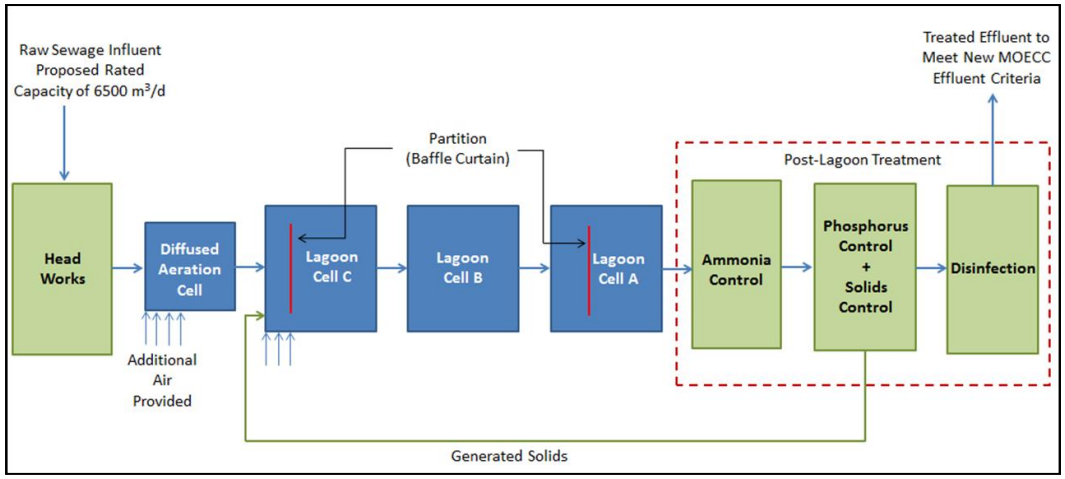
The Alexandria Sewage Lagoon Treatment Facility has exceeded its rated capacity. The lack of capacity is creating a barrier for growth and economic development within the Township. Therefore, the Township has initiated this Schedule 'C' Municipal Class Environmental Assessment to develop a plan to expand the Alexandria Sewage Lagoon Treatment Facility to address capacity issues and future growth.

Phase 2 Preferred Alternative Solution

The identified Preferred Alternative Solution is *Alternative 3b: Post Lagoon Effluent Treatment*. The Preliminary Preferred Alternative Solution is the result of the detailed evaluation, in addition to input from the Technical Advisory Committee (MOECC and Raisin Region Conservation Authority), Township Council, Governing Agencies and the Public.

The preferred alternative solution will consist of upgrading the existing facility and implementing new treatment technologies:

- Pre-lagoon treatment for the removal of large objects;
- Aeration for organics removal; and
- Post-lagoon treatment for ammonia, phosphorus and solids control and disinfection.



Phase 3 Identification of Design Concepts

The Alternative Design Concepts identified for the Phase 2 - Preferred Alternative Solution for the expansion of the Alexandria Sewage Lagoon Facility are as follows:

Pre-Lagoon Treatment

Screening

Alternative 1: Manually Cleaned Bar Screens

Alternative 2: Mechanically Cleaned Bar Screens

Grit Removal

Alternative 1: Gravity Settling

Alternative 2: Centrifugal Systems

Aeration

Alternative 1: Upgrade the aeration system by increasing number of mechanical aerations

Alternative 2: Upgrade the aeration system by augmenting its capacity with fine bubble diffusers

Alternative 3: Upgrade the aeration system by replacing mechanical aerators with fine bubble diffusers

Identification of Design Concepts Continued

Post-Lagoon Treatment

Ammonia Control

- Alternative 1: Sequencing Batch Reactor (SBR)
- Alternative 2: Aerobic Submerged Fixed-Bed Reactors
- Alternative 3: Membrane Bioreactor
- Alternative 4: Rotating Biological Contactor (RBC)
- Alternative 5: Submerged Attached Growth Reactor (SAGR)
- Alternative 6: Moving Bed Biofilm Bioreactor (MBBR)

Phosphorus and Solids Control

- Alternative 1: Surface Filters
- Alternative 2: Loose Media Filters
  - Alternative 2a: Conventional Down-flow Sand Filters
  - Alternative 2b: Deep-bed up-flow continuous backwash filters
- Alternative 3: Adsorption
- Alternative 4: Ballasted Clarification

Disinfection

- Alternative 1: Chlorination/Dechlorination
- Alternative 2: Ultraviolet (UV) Disinfection

Key Considerations / Design Criteria

- Delisle River is a Policy 2 receiver for total phosphorus, in that concentrations exceed the Provincial Water Quality Objective (PWQO; MOE 1994) of 0.03 mg/L for Protection of Aquatic Life. Policy 2 requirements stipulate that there can be no further degradation of the receiving stream, and that all reasonable measures should be undertaken to improve water quality to the objective.
- The Township of North Glengarry aims to grow at a moderate pace with development taking place primarily in the urban areas. Therefore, the projected average day wastewater flow rate is 6,500 m^3/d (next 50 years).

Parameter	Effluent Limits Range	Compliance	Design Objectives
$CBOD_5$	10 – 15 mg/L	10	8
TSS	10 – 20 mg/L	15	10
Total Ammonia Nitrogen			
Summer	1 – 3 mg/L	1	1
Winter		3	2
Total Phosphorus	0.1 – 0.3 mg/L	0.2	0.1
E-coli	Counts/100mL	150	100

Note: The above proposed effluent discharge limits still need to be confirmed and approved by MOECC during the detail design.

- MOECC also requested that consideration be given to incorporating new innovative technology that will aid in the reduction of ammonia and phosphorus concentration levels being discharged to the Delisle River.

Evaluation Criteria

Each alternative design concept was evaluated based on its potential impact to the natural, socio-economic and cultural environments. However, in order to be considered a viable option, the alternative design concept needed to meet the following key criteria:

- Ability to remove desired constituents as per treatment level objectives
  - Is the alternative design concept capable and efficient at removing constituents that the technology was designed to remove? If applicable, does the alternative design concept achieve effluent design objects set by MOECC ?
- Treatment Reliability on full-scale applications and ability to handle cold weather climate?
  - Can the alternative design concepts, more specifically alternative design concepts for nitrification, achieve desired constituent removals in a low temperature environment?
- Ability to process varying design flows?
- System complexity and maintenance of treatment facility?
- Footprint of treatment system?
  - Is the selected alternative design concept reasonably sized? Does it fit within the existing property limits?
- Use of existing assets (for the aeration cell upgrade)?
- Effects on the Environment (Terrestrial/ Aquatic/Ecological Habitat/Vegetation/Species at Risk Impacts)?
  - Will there be Environmental Impacts during Construction and Operation? Are there potential impacts to the existing environment and/or the potential to provide mitigation measures or create habitat?

Evaluation of Alternative Design Concepts

Pre-Lagoon Treatment Evaluation

Screening:

The automated cleaning and/or mechanical bar screen systems have similar disadvantages and advantages with respect to potential environmental (natural and social) impacts. However, the mechanical system will have a higher capital and operational cost, whereas the manual system will be more labour intensive to operate. Based on the screening evaluation, the automated cleaning and/or mechanical bar screens are both appropriate treatments for the proposed facility and therefore, at this time both systems have been elected to be carried forward to the detailed design. *Refer to Table 1*.

Grit Removal:

The gravity and centrifugal based systems have similar disadvantages and advantages with respect to potential environmental (natural and social) impacts. However, the centrifugal system will have a higher capital and operational cost, whereas the gravity system will be more labour intensive to operate. Therefore Based on the grit removal evaluation, the *Alternative 1 - Gravity Settling* system was carried forward based on the Township's desire to keep the system as simple as possible. *Refer to Table 2*.

Aeration Cell:

The addition of air in the existing partially mixed aeration cell would ensure adequate oxygen for organics removal ($CBOD_5$) as flow to the facility increased. Three treatment technologies were evaluated, *refer to Table 3.*

Based on the Aeration Cell evaluation, *Alternative 2 - Upgrade the aeration system by augmenting its capacity with fine bubble diffusers* is the preliminary preferred design concept. Alternative 2 makes use of the existing mechanical aerators and reduces the footprint of the required blowers' to be located in the headworks building. The flexibility of the system allows for the addition of additional blowers as required.

Evaluation of Alternative Design Concepts

Post-Lagoon Treatment Evaluation

Ammonia Control:

To meet the total ammonia nitrogen effluent criteria year-round, the lagoon effluent will need to be treated by a biological nitrification treatment process that has been proven to achieve nitrification at cold water temperatures. Six treatment technologies were evaluated, *refer to Table 4.*

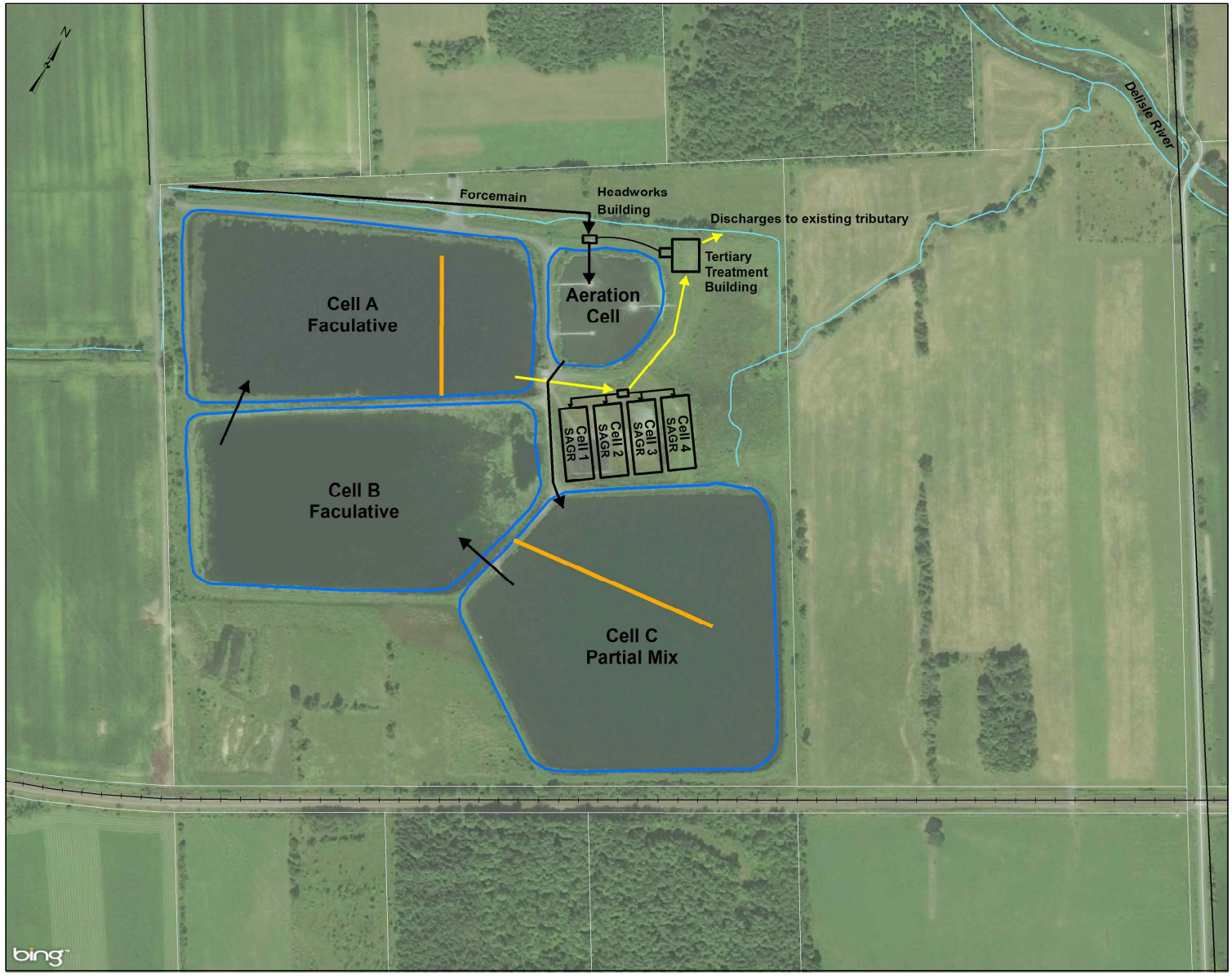
Based on the Ammonia Control evaluation, *Alternative 5 - Submerged Attached Growth Reactor (SAGR)* is the preliminary preferred design concept. The SAGR has been proven to effectively and efficiently treat lagoon effluent at low temperatures and provide ammonia control.

Phosphorus and Solids Control:

To meet the stringent Total Phosphorus (TP) effluent design and limit objectives, tertiary treatment will be required to polish the effluent. Six treatment technologies for phosphorus and solids control were evaluated, *refer to Table 5*.

Based on the evaluation of phosphorus and solids control technologies, four treatment technologies were considered to be capable of meeting the design criteria and controlling phosphorus and solids. Therefore, it is being recommended that the following treatment technologies be carried forward to the detail design phase to allow for flexibility in the design:

- Alternative 1: Surface Filters
- Alternative 2: Deep bed filtration
- Alternative 3: Adsorption
- Alternative 4: Ballasted Clarification



LEGEND

- Roadway
- Railway
- Watercourse
- Parcel Boundary
- Alexandria Lagoon Cells
- Cell 1 SAGR — Submerged Attached Growth Reactor Cells
- Tertiary Treatment Building for Phosporus/Solids Removal and UV Disinfection. Includes Backup Generator.
- Effluent Flow Direction
- Post Lagoon Effluent Flow Direction
- Baffle

REFERENCE

GIS data provided by Ontario Ministry of Natural Resources, 2015 and the North Glengarry Township, 2015.

100 50 0 100
Scale 1:3500 Metres

CLIENT: TOWNSHIP OF NORTH GLENGARRY

PROJECT: ALEXANDRIA SEWAGE LAGOON FACILITY EXPANSION

TITLE: PRELIMINARY PREFERRED DESIGN CONCEPT SITE LAYOUT

MCINTOSH PERRY
115 Walgreen Rd., RR#3, Carp, ON K0A1L0
Tel: 613-836-2184 Fax: 613-836-3742

PROJECT NO: CM14-0312	FIGURE: 1
Date	Nov. 03, 2016
GIS	SK
Checked By	LM

Document Path: H:\01 Project - Proposals\2014 Jobs\0CM-14-0312 Twp North Glengarry - EA - Alex Sewage Works\12 GIS\mxd\CM14-0312_NorthGlengarryEA_ConceptualSiteDesign_FinalReport.mxd

Evaluation of Alternative Design Concepts

Post-Lagoon Treatment Evaluation

Phosphorus and Solids Control Continued:

The above identified forms of treatment are all considered well established technologies of similar scale and have proven to be reliable forms of phosphorus and solids control treatment options in cold climates. All four alternatives will be constructed at the same location and will generally have the same overall footprint. As such, it is believed that the environmental impacts are comparable for all four alternatives.

Disinfection:

Both the chlorination/dechlorination and UV treatment are reliable and effective treatment processes for removing a wide spectrum of pathogenic organisms. However, chlorination/dechlorination treatment has a number of environmental disadvantages:

- Chlorine is highly corrosive and toxic, which poses a risk during shipping, storage and handling;
- Chemical dechlorination can be difficult to control, especially when near zero levels of residual chlorine are required (typically excess dosing is utilized); and
- Long-term effects of discharge dechlorinated compounds into the environment are unknown.

Chlorination/dechlorination is currently being used at the Alexandria Sewage Lagoon Facility; however, the system is causing operation and maintenance issues and is causing severe corrosion of the building. Therefore, the Township would like to cease using this form of treatment at the facility.

Based on the disinfection evaluation, *Alternative 2 - UV disinfection* is the preliminary preferred design concept. UV disinfection is effective at inactivating most viruses, spores, and cysts, as well as provides a friendlier working environment.

Preliminary Preferred Design Concept Costing

Process	Design Concept #1 SAGR® + Cloth Filter	Design Concept #2 SAGR® + Phosphorus Adsorption Media System	Design Concept #3 SAGR® + Deep Bed Sand Filter	Design Concept #4 SAGR® + High rate ballasted clarification processes
Headworks				
Building[1]	$619,000	$619,000	$619,000	$619,000
Process Equipment[2][2a]	$420,000	$420,000	$420,000	$420,000
Aeration cell upgrade with fine bubble diffusers [3]	$163,000	$163,000	$163,000	$163,000
Ammonia Control - SAGR [4]	$3,396,000	$3,396,000	$3,396,000	$3,396,000
Tertiary treatment				
Building[5]	$1,093,000	$1,199,000	$1,947,000	$1,606,000
Phosphorus Control[6]	$1,484,000	$1,131,000	$1,722,000	$1,995,000
UV Disinfection[6]	$289,000	$289,000	$289,000	$289,000
Site Works and Miscellaneous[7]	$629,000	$629,000	$629,000	$629,000
SUBTOTAL	*$8,093,000*	*$7,846,000*	*$9,185,000*	*$9,117,000*
Contingency (20%)	$1,619,000	$1,569,000	$1,837,000	$1,823,000
Engineering (15%)	$1,214,000	$1,177,000	$1,378,000	$1,368,000
TOTAL	$10,926,000	$10,592,000	$12,400,000	$12,308,000

Notes:

(1) Including gravel access, modified forcemain at site, electrical upgrades, building mechanical, rooms for: process, blowers, electrical

(2) Cost provided for mechanically cleaned bar screens and grit systems

(2a) Selecting manually cleaned bar screens (opposed to mechanical) will reduce the headworks process equipment cost, displayed in the table above, by $400,000

(3) Blowers, diffusers, air lines

(4) Process equipment and civil work for process

(5) Including electrical, building mechanical, rooms for: process, blowers, electrical, lab/office, washrooms with lockers

(6) Process equipment with installation

(7) Including general site works, emergency power supply, fire control systems

(8) The total operating costs for the options range from $430,000 to $480,000

Next Steps & Scheduling

Milestone	Deadline
Public Consultation Centre #2 – Present Phase 3	December 20, 2016
Update to Council	January 4, 2017
Phase 3 - Comment Period Expires	January 6, 2017
Select Technically Preferred Conceptual Design	January 6, 2017
Finalize Environmental Study Report	January 9, 2017
3rd Mandatory Consultation - Notice of Study Completion	January 9, 2017
Deadline for Comments and Part II Orders	February 7, 2017
Letter to MOECC and Municipality Indicating Class EA has been completed	February 8, 2017

For further information on the expansion of Alexandria Sewage Lagoon Treatment Facility, please contact:

Corporation of the Township of North Glengarry
Ryan Morton, MPM, CIPM
Director of Public Works
63 Kenyon Street West
Alexandria, Ontario, K0C 1A0
Phone: 613-525-3087
Fax: 613-525-1649
ryanmorton@northglengarry.ca

McIntosh Perry Consulting Engineers Ltd.
Lisa Marshall, P. Eng.
Project Manager/Environmental Engineer
115 Walgreen Road, R.R.3
Carp, Ontario, K0A 1L0
Phone: 613-836-2184 ext. 2224
Fax: 613-836-3742
l.marshall@mcintoshperry.com

The Phase 3 Environmental Study Report is currently available for viewing on the Township website's (http://northglengarry.ca/en/townhall/waterandsewage.asp)