Town of SOUTH BRUCE PENINSULA

Municipal Class Environmental Assessment

Upgrade/Expansion of the Wiarton Wastewater Treatment Plant

Public Open House

Wednesday, November 12, 2014

4:00 p.m. to 7:00 p.m.

Welcome!

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Welcome to Open House #1

- Please sign in and take a comment sheet.
- The **purpose** of this open house is to:
  - Review the project with the public
  - Present the alternative solutions being considered
  - Present the preliminary preferred alternative solution
  - Seek your input and comments
  - Explain next steps
- If you have questions, our team members are available to discuss the project with you.
- Please place your comment sheets in the "Comment Box" or send them before **November 28, 2014** to:

Tom Gray, C.E.T.
Manager of Public Works
Town of South Bruce Peninsula
E-mail: tsbppwmanager@bmts.com

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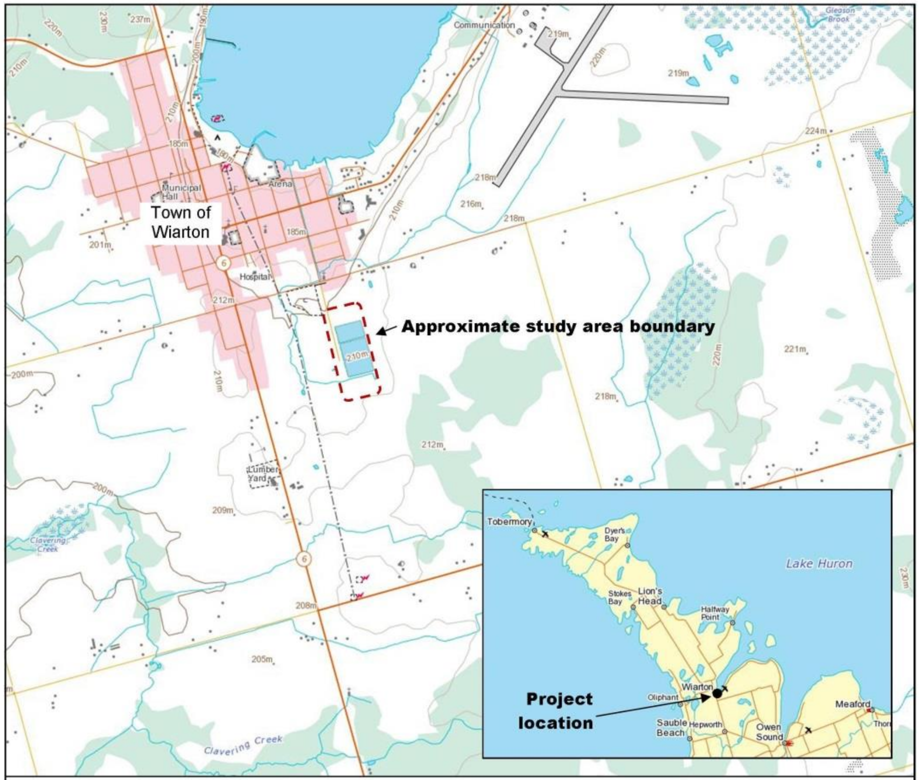
About this Study

- **Study purpose**: To expand its capacity from the current average daily flow capacity of 2,500 cubic metres per day to 4,000 cubic metres per day.
- The project is being conducted as a Schedule C Municipal Class EA.



Town of South Bruce Peninsula
WIARTON WASTEWATER TREATMENT PLANT CLASS EA
Project Location Map

The property occupied by the Plant is located in the Township of Georgian Bluffs, along the boundary shared with the Town of South Bruce Peninsula. The lands are generally located within an existing agricultural area of Grey County, South East of the intersection of Elm Street and Taylor Street. The property address is Lot 2, Concession 21E, Georgian Bluffs Township, County of Grey.

September 30, 2014

Municipal Class EA Process

- A Class EA is a study to plan for a proposed project, which includes background and technical studies, a review and assessment of potential environmental, social and economic impacts and how they can be avoided, and an evaluation of possible alternatives.
- The result is an Environmental Study Report (ESR), which documents the process and lists the commitments made by the proponent.
- The Class EA process is completed in accordance with the *Environmental Assessment Act*.

Phase 1: Problem or Opportunity Statement

- Definition of Problem or Opportunity
- Identify Problem Statement

Phase 2: Alternative Solutions

- Identify, assess and evaluate alternative solutions
- Consult with public, government agencies, stakeholders
- Select a preferred solution

Phase 3: Alternative Design

- Alternative Design Concepts
- Identify, assess and evaluate alternative designs
- Consult with public, government agencies, stakeholders
- Select the preferred alternative design

Phase 4: Environmental Study Report

- Complete Environmental Study Report (ESR)
- Submit for 30-day public and agency review period
- Submit to Ministry for approval

Phase 5: Implementation

- Detailed design
- Construction
- Monitoring

we are here (Phase 2)

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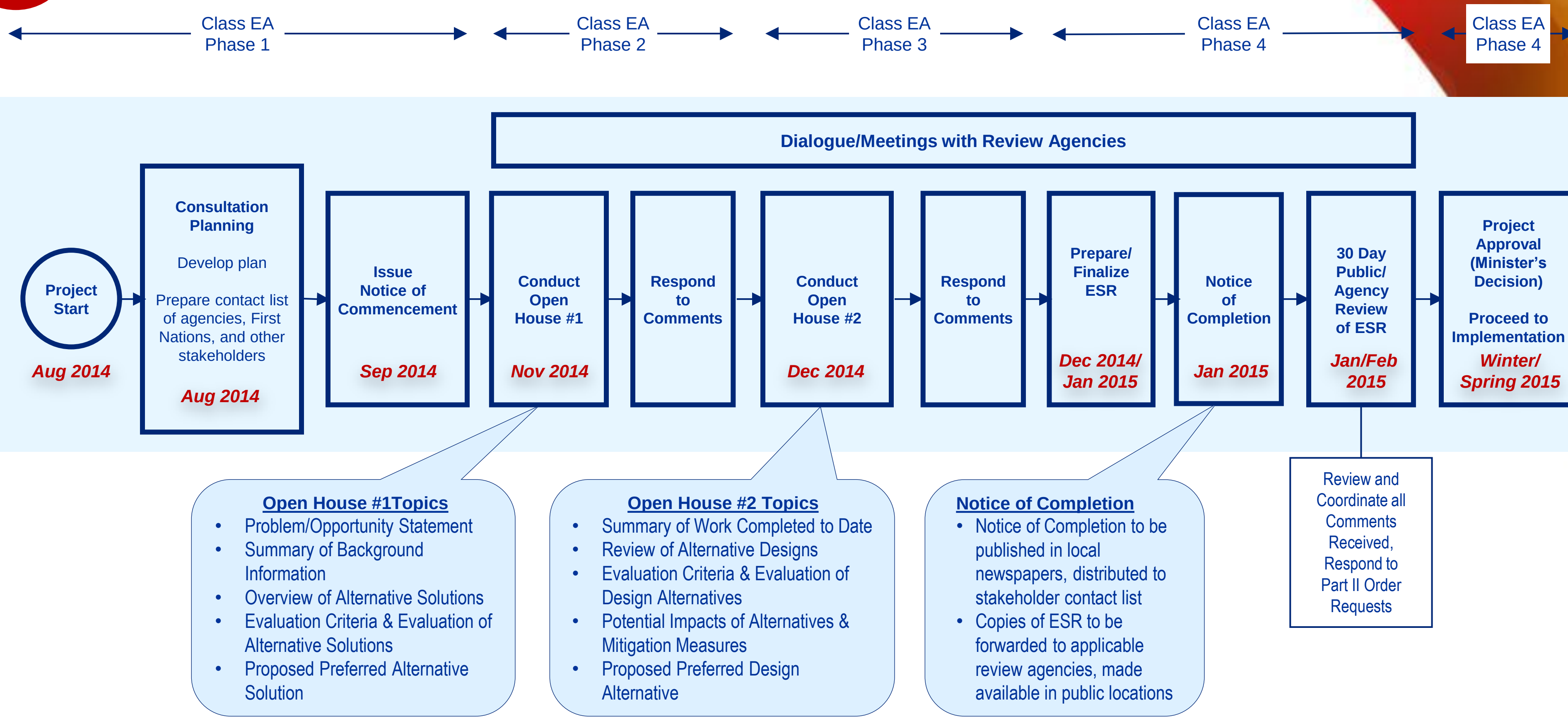
Consultation Process

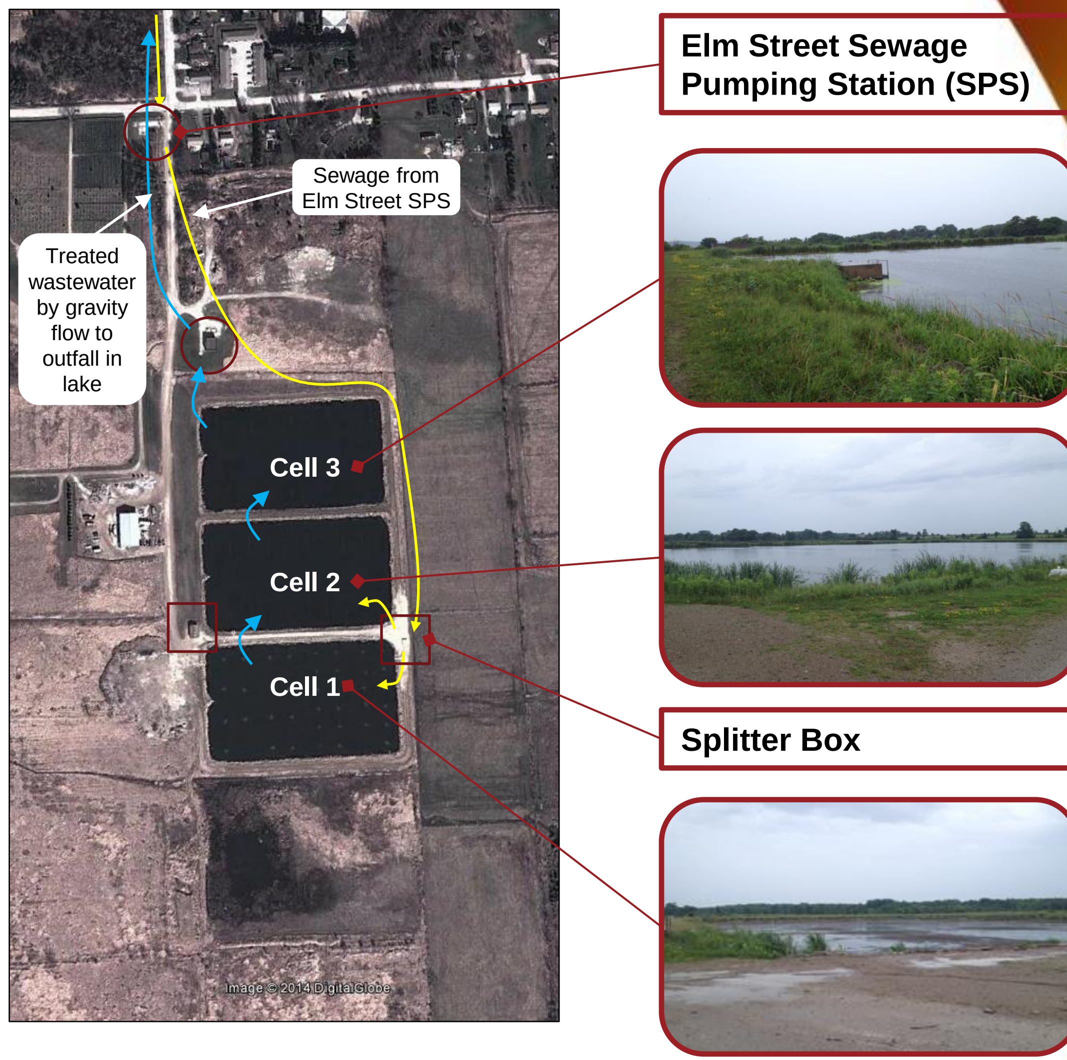


On-going Consultation Activities

- Responding to questions & comments from the general public, agencies and other interested stakeholders
- Tracking of questions, comments and project team responses

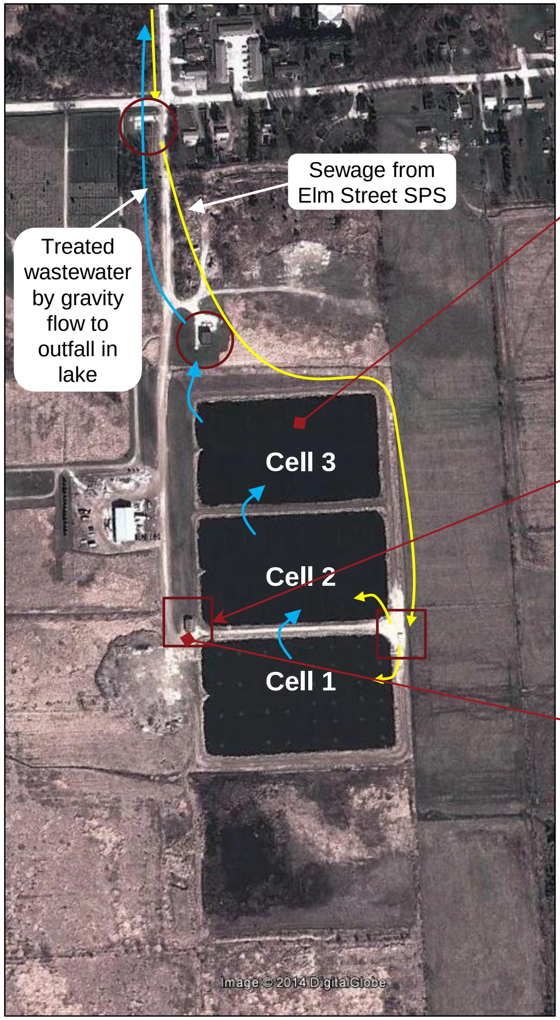
Overview: Existing WWTP

- The current wastewater Treatment Plan (WWTP) includes three consecutive waste stabilization lagoons (also called “cells”).
- Combined, the lagoons cover an area of 6 hectares, and each have a depth of about 1.5 m.
- Raw sewage is pumped from the Elm Street Sewage Pumping Station (SPS) to cell 1 via the Splitter Box (which can send sewage to cell 2 if needed).
- The system uses aeration (i.e., forced air bubbles) in its treatment of wastewater. Beneficial bacteria in the cells help to break down and process the sewage.



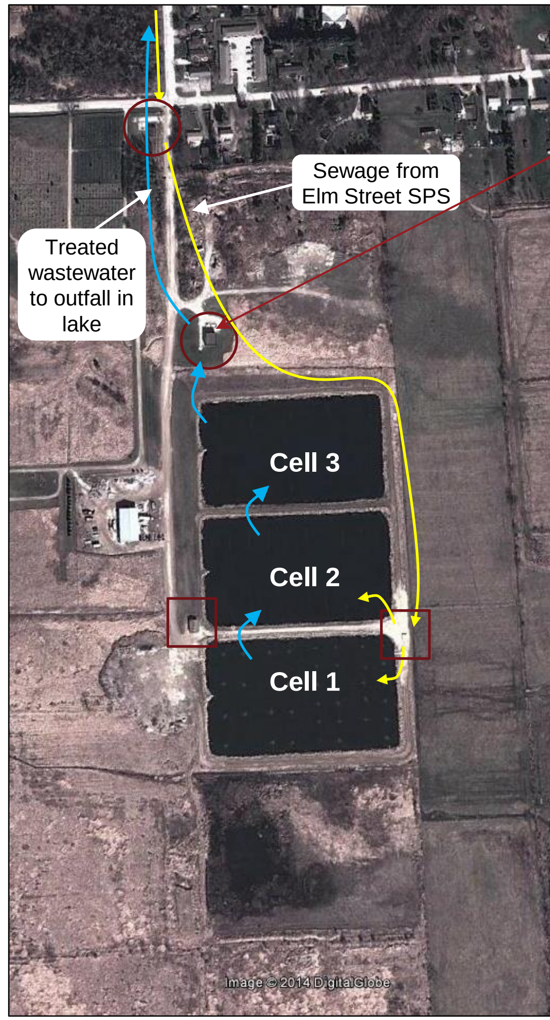
Overview: Existing WWTP

- The Lagoon Facility Control Building (also called the "Blower Building") includes two blowers that pump air into the cells to aerate them. The building also houses the motor control center and other equipment.
- Chlorine is added to cell 3 during September to May to help control algae growth.



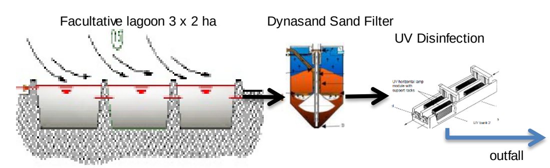
Overview: Existing WWTP

- As wastewater moves from cell 3 to the UV/filtration building, a chemical treatment system is used to help remove phosphorus.
- After being treated with chemicals, the wastewater is piped through the DynaSand Rapid Sand Filter, which removes the solids and phosphorous from the wastewater.
- The filtered wastewater is then disinfected by the UV light system, which has a peak design capacity of 8,000 cubic metres per day.
- The treated wastewater is then safely discharged to the lake.



* SPS = sewage pumping station

Current WWTP Treatment Schematic



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Current Plant Performance

- Overall, the WWTP performs well and meets all applicable standards.
- Currently, there are no applicable standards for ammonia. However, in January 2015 the federal government will be introducing a new federal standard of 1.25 mg/l of un-ionized ammonia.
- The Ontario Ministry of Environment and Climate Change (MOECC) is currently reviewing its ammonia discharge requirements for WWTPs.

	Average Day Flow	Effluent BOD	Effluent S.S.	Effluent Total Phosphorus	Effluent Ammonia	Septage Volume
Current Approved Limits for WWTP	2.500 cubic m/d	20 mg/l	24 mg/l	0.5 mg/l	N/A	N/A
Range for 2011 to 2013	1,430 to 1,992 cubic m/d	2.6 to 5 mg/l	4.6 to 13 mg/l	0.17 to 0.18 mg/l	2.3 to 4.4 mg/l	Approx. 4 to 5 cubic m/d
Standard Met?	✓	✓	✓	✓	**N/A**	**N/A**

- *Average Day Flow – the average flow of incoming sewage/wastewater per day*
- *Effluent BOD – The Biological Oxygen Demand of the treated outgoing effluent*
- *Effluent S.S. – The amount of suspended solids in the treated outgoing effluent*
- *Effluent Total Phosphorous – The amount of total phosphorous in the treated outgoing effluent*
- *Effluent Ammonia – the concentration of ammonia in the treated outgoing effluent*
- *Septage Volume – the amount of tanked-in sewage per day (e.g., sewage from portable toilets, RV's, septic tanks, etc.)*

Evaluation Process

- A long list consisting of three alternatives were initially considered for improving the Wiarton WWTP, including:
  1. Add a Moving Bed Biofilm Reactor, with nitrification.
  2. Deepen one of the lagoon cells, with nitrification.
  3. Convert to an activated sludge system.
- The three alternatives were screened to determine if they would be carried forward to the short list.
- The short list of alternatives were carried forward and assessed in greater detail.

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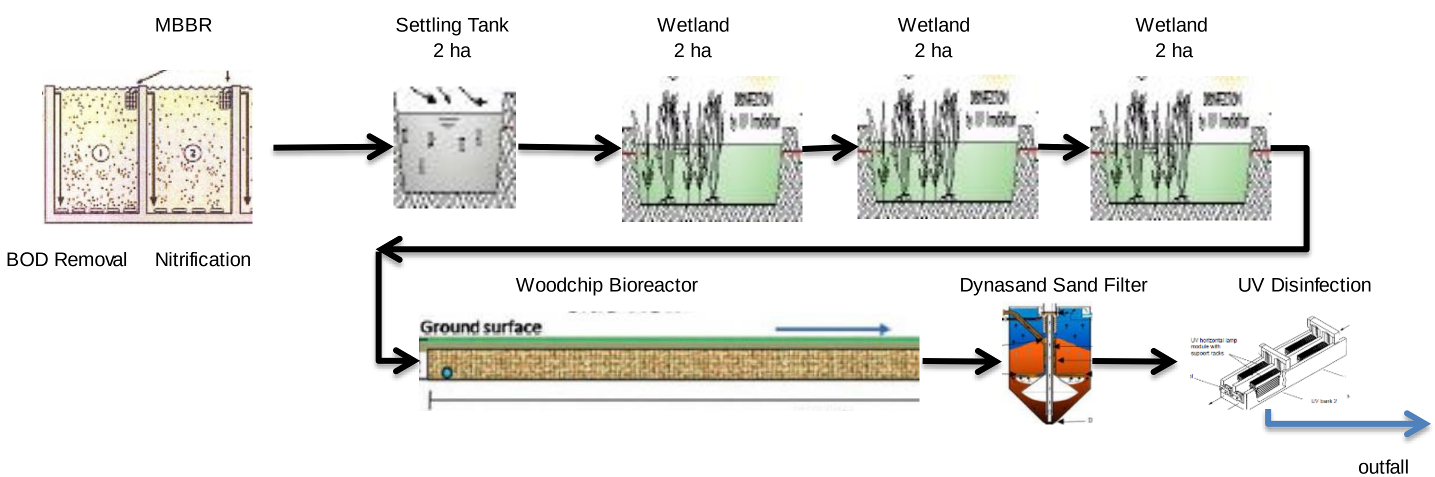
Alternative Solutions

Alternative # 1: Add Moving Bed Biofilm Reactor with Nitrification

- The system could be reinforced by adding a Moving Bed Biofilm Reactor (MBBR) with nitrification.
- A MBBR reactor (or tank) is filled with small plastic carriers that increase microbial action in the tank by maximizing the surface area where the beneficial bacteria grow.
- Nitrification is a biological process where bacteria convert ammonia in wastewater to nitrate.

MBBR Plastic Carriers (examples)

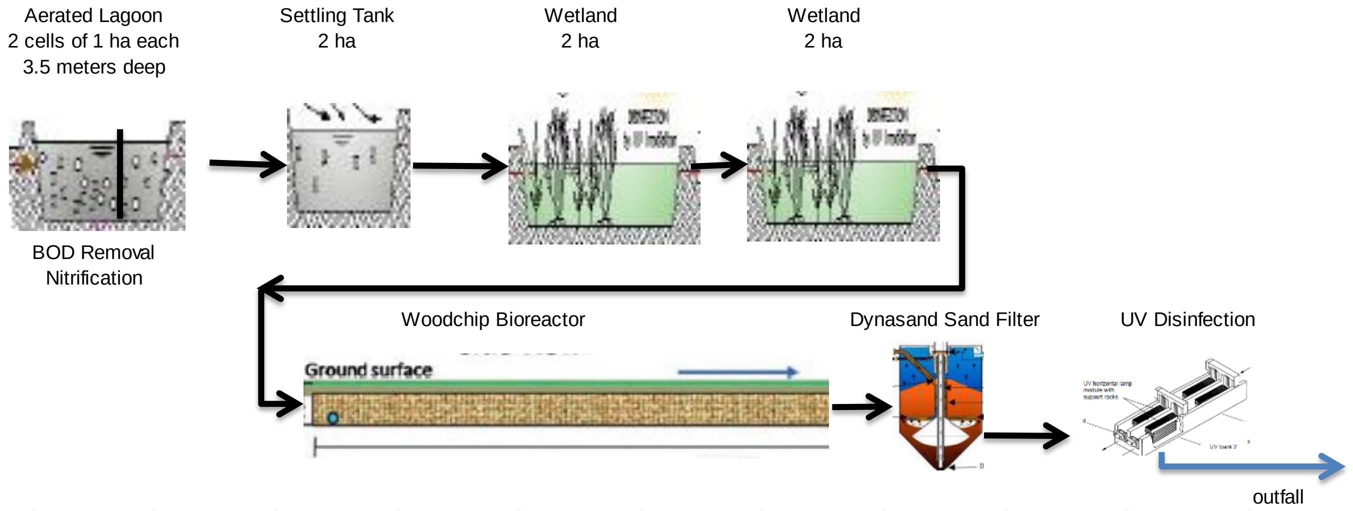
- One of the existing lagoon cells could be used as a settling tank and for sludge storage.
- The remaining cells could be converted to engineered wetlands to further treat the wastewater effluent.
- A denitrification ditch could be used to remove the nitrate from the wastewater effluent. The denitrification ditch uses a carbon source (e.g., woodchips) to convert nitrate to nitrogen gas.
- The treated wastewater would then continue through the UV/Filtration building before being discharged.



Alternative Solutions

Alternative # 2: Deepen Lagoon Cell, with Nitrification

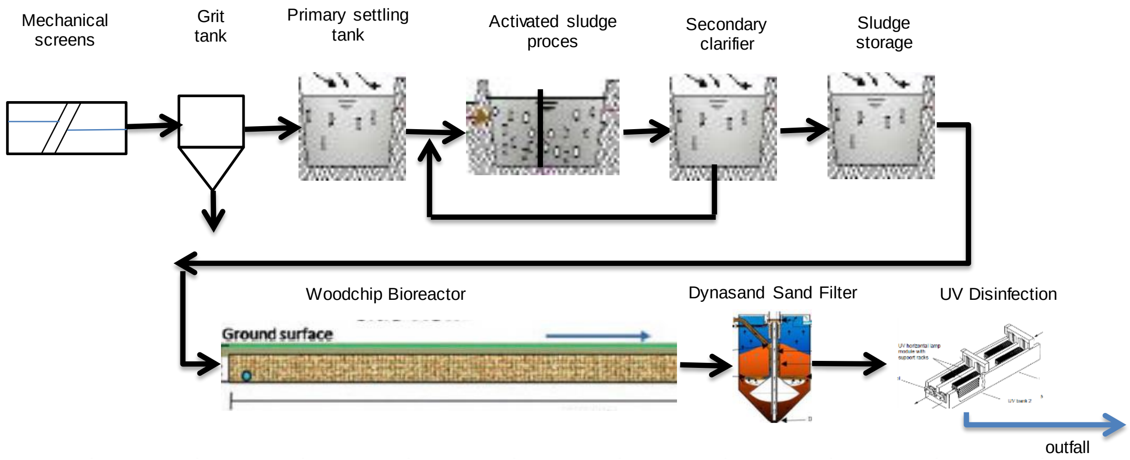
- Alternative 2 would see the exiting system reinforced by deepening one of the lagoon cells and adding nitrification. This would include:
  - Deepening one of the cells and creating and two compartments for BOD removal and nitrification.
  - Using another cell for settling solids and sludge storage.
  - Converting a third cell into an engineered wetland.
- The engineered wetland would be used in conjunction with a natural wetland in close proximity.
- A denitrification ditch could be used to remove the nitrate from the wastewater effluent. The denitrification ditch uses a carbon source (e.g., woodchips) to convert nitrate to nitrogen gas.
- The treated wastewater would then continue through the UV/Filtration building before being discharged.



Alternative Solutions

Alternative #3: Conventional Activated Sludge Treatment

- In Alternative 3, the raw sewage first undergoes “Primary Treatment,” as grit and solids mechanically removed.
- The sifted sewage then flows into a sedimentation tank modified from an existing cell. Solids settle in the tank, and the liquid waste flows on to aeration cells. Pipe realignment, new valves and other engineering would be needed to modify the cell.
- Two new aeration tanks would be installed to help speed up biodegradation of wastewater solids.
- The next cell would be converted into a secondary clarifier, where wastewater would be aerated and more solids allowed to settle. Sludge removed from the wastewater (also called Waste Activated Sludge, or WAS) would be sent to a third cell for storage until it can be sent offsite for disposal or land application.
- Some sludge (called Return Activated Sludge, or RAS) from the secondary clarifier would be piped back into the first cell to inoculate new sewage entering the Plant. This helps activate the process. New piping and pumps would need to be installed.
- A denitrification ditch could be used to remove the nitrate from the wastewater effluent. The denitrification ditch uses a carbon source (e.g., woodchips) to convert nitrate to nitrogen.
- The treated wastewater would then continue through the UV/Filtration building before being discharged.



Screening of Alternatives

Screening Criteria

- **Hydraulic Loading**: the flexibility of the alternative to accommodate variable flow rates.
- **Pre-treatment**: the amount of pre-treatment required for the effluent before entering the treatment process
- **Sludge Production**: the amount of sludge produced by the process, which would require further treatment/management.
- **Sludge Recirculation**: whether recirculation of sludge is required for the treatment process (a portion of the sludge would be put back into cell 1 in order to inoculate the system with the beneficial bacteria).
- **Resistance to Temperature Fluctuations**: the ability of the technology to function in a range of temperatures.
- **Capital Cost**: The cost to build/install the system.
- **Operating cost**: The annual cost to operate the system.

Screening Results

Alternative	Hydraulic Loading Flexibility	Pre-Treatment	Sludge Production	Sludge Recirculation	Temperature Resistance	Operating Cost	Capital Cost	Carried Forward to Short List?
1. MBBR	**High** Alternative is flexible	**Moderate** Fine screening, grit chamber	**Low** Relatively low volumes generated	Not required	**Moderate** Has good resistance to temperature variations	**Low** Relatively less expensive operating cost	**High** \$4M to \$5M	
2. Deep Lagoon/ Nitrification	**High** Alternative is flexible	None required	**Low** Relatively low volumes generated	Not required	**High** High resistance, protection not required	**Low** Relatively less expensive operating cost	**Medium** \$3M to \$4M	
3. Activated Sludge	**Low** Alternative is not very flexible	**Moderate** Optional screens, grit chamber	**High** Relatively high volumes generated	Required	**Low** Protection required	**High** Relatively more expensive operating cost	**High** \$5M to \$6M	

Evaluation of Short List

Proposed Evaluation Criteria

Natural Environment

- Impact on aquatic resources
- Impact on terrestrial environment, such as woodlots, parks or habitats

Technical

- Ability to meet effluent quality objectives
- Impacts on existing operations
- Ease of implementation
- Flexibility to meet long-term objectives
- Maintainability of plant equipment and processes
- Ease of operation

Social/Cultural

- Land availability
- Archaeological

Financial

- Capital costs
- Operating and maintenance costs

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DETAILED EVALUATION CRITERIA

Criteria	Criteria Description	Criteria Measure Guideline
Natural Environment Criteria		
Water quality and aquatic systems	The potential of the alternative to minimize adverse impacts to the receiving water quality and aquatic systems	**Excellent**: There is no significant risk of adverse effects on receiving water quality and aquatic systems **Average**: There is some risk of adverse effects on receiving water quality and aquatic systems **Below average**: There is a high risk of adverse effects on receiving water quality and aquatic systems
Terrestrial systems	The potential of the alternative to minimize impact to terrestrial habitats or systems, including possible effects on the shoreline and wildlife (including mammals, reptiles, and birds) and terrestrial features/functions	**Excellent**: There is no risk of adverse effects on terrestrial systems **Average**: There is some risk of adverse effects on terrestrial systems **Below average**: There is a high risk of adverse effects on terrestrial systems
Social/Cultural Criteria		
Land availability	The potential of the alternative to be constructed within the bounds of the property owned by the Town at the existing site	**Excellent**: The alternative will stay within the boundaries of the existing property **Below average**: The alternative will require land beyond the boundaries of the existing property
Archaeology	The potential of the alternative to not affect any archaeologically significant findings on the site	**Excellent**: There is no risk of the alternative affecting archaeologically significant findings on the site **Good**: There is no significant risk of the alternative affecting archaeologically significant findings on the site **Below average**: There is a high risk of the alternative affecting archaeologically significant findings on the site

Criteria	Criteria Description	Criteria Measure Guideline
Economic Criteria		
Capital costs	Comparative costs for capital works	**Excellent**: The lowest overall capital costs **Good:** Proportionately higher costs than the alternative ranked "excellent" **Below average**: The highest overall capital costs
Operating and maintenance costs	Estimated operating costs for staff resources, energy needs, and ongoing route operation and maintenance (O&M) activities	**Excellent**: The lowest overall O&M costs **Good**: Proportionately higher O&M costs than the strategy ranked "excellent" **Below average**: The highest overall O&M costs
Technical Criteria		
Performance	Ability to meet effluent quality objectives Minimal impacts on existing operation requirements and performance	**Excellent**: The treatment alternative is extremely reliable, meets or exceeds effluent quality objectives, and does not impact the performance of the existing plant **Good**: The treatment alternative is reliable, meets effluent quality objectives, and only moderately impacts the performance of the existing plant **Below average**: The treatment alternative is not reliable, may not meet effluent quality objectives, and impacts the performance of the existing plant
Ease of implementation	The alternative can be easily implemented on a technical, regulatory, and practical basis (land availability, operational aspects, etc.)	**Excellent**: The treatment alternative can be very easily implemented **Good**: The treatment alternative can be implemented **Below average**: The treatment alternative is difficult to implement

Criteria	Criteria Description	Criteria Measure Guideline
Flexibility	The ability of the alternative to meet long-term requirements, that is, space available on-site, flexible with respect to implementation of other technologies, and ability to meet future demands	**Excellent**: The treatment alternative effectively meets long-term requirements **Good**: The treatment alternative meets long-term requirements **Below average**: The treatment alternative does not meet long-term requirements
Maintainability	The ease at which the plant equipment and processes can be maintained	**Excellent**: The treatment alternative effectively minimizes requirements for maintenance **Good**: The treatment alternative minimizes requirements for maintenance **Below average**: The treatment alternative requires a high level of maintenance
Ease of operation	The ease with which plant operators can operate the plant while continuing to meet air, effluent, and health and safety requirements	**Excellent**: The plant is very easy to operate **Good**: The plant can be operated without major disruptions **Below average**: The plant can't be operated without regular disruptions

Evaluation of Short List

Evaluation Summary

Alternatives	Evaluation Criteria					
	Technical					
	Ability to meet Effluent Quality Objectives	Impacts on Existing Operations	Ease of Implementation	Flexibility to Meet Long Term Objectives	Maintainability of Plant Equipment and Process	Ease of Operation
Alternative 1: MBBR with Nitrification	Excellent Better effluent quality can be achieved more reliably.	Excellent No impact on existing operation is impacted	Excellent Alternative can be very easily implemented	Good In case on additional required capacity; the MBBR may be a bit constrained	Good Some maintenance of the MBBR required	Good The process is easy to operate
Alternative 2: Deep Lagoon with Nitrification	Good Better effluent quality is achievable	Good Moderate impacts expected due to deepening of the lagoon	Good Some disruption in plant operation expected while deepening one lagoon.	Excellent It may be easier to accommodate future additional flow using this alternative	Excellent Little maintenance required	Excellent Ranked highest in ease of operation

Evaluation of Short List

Evaluation Summary

Alternatives	Evaluation Criteria					
	Natural Environment		Social/Cultural		Financial	
	Impact on Aquatic Resources	Impact on Terrestrial Environment	Land Availability	Archaeological	Capital Cost	Annual Operating Cost
Alternative 1 MBBR with Nitrification	Excellent Will meet effluent standards most reliably	Excellent No additional land required; therefore no impacts	Excellent No additional property required	Good Preliminary archaeological review indicates likely need for Stage 2 review	Good $4M to $5M	Excellent Approx. $300,000
Alternative 2 Deep Lagoon with Nitrification	Good Will meet effluent standards reliably	Excellent No additional land required; therefore no impacts	Excellent No additional property required	Excellent Archeological review indicates no potential for impacts	Excellent $3M to $4M	Excellent Approx. $300,000

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Preferred Alternative Solution

Alternative # 1: Add Moving Bed Biofilm Reactor with Nitrification

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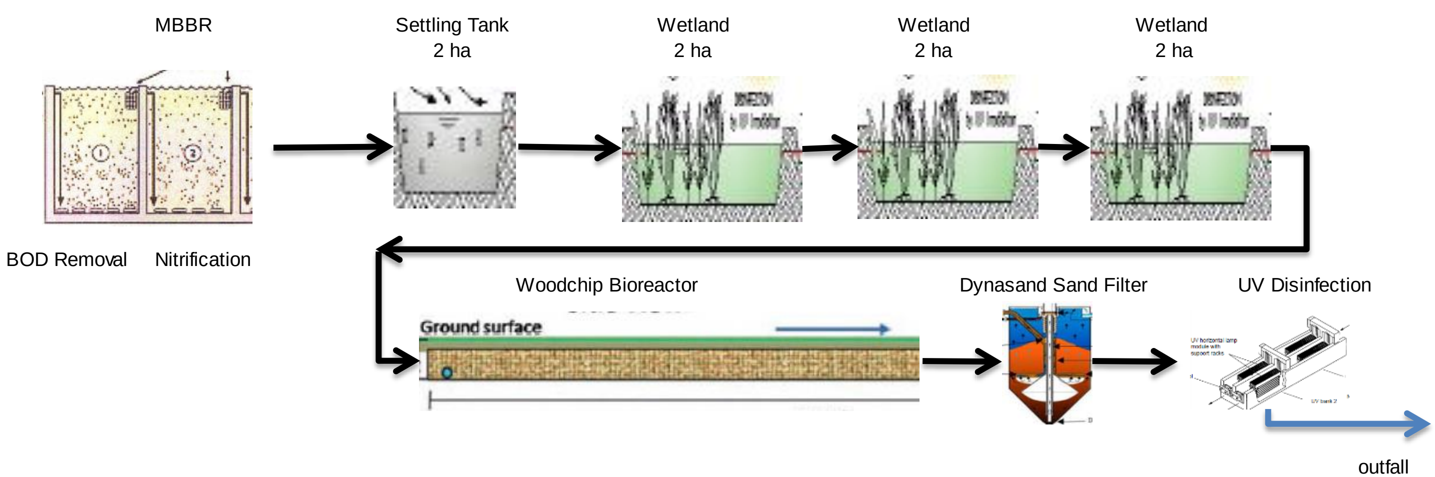

Next Steps

Step	Timing
Complete Phase 2	November 2014
Hold Public Open House #2	December 2014
Complete/Submit EA Report for Review and Approval	December 2014/January 2015
Conduct Preliminary Design	January – February 2015
Final Design	March – April 2015
Tendering	April 2015
Construction	May – December 2015

We want to hear from You!

Please send us your thoughts, comments and suggestions by November 28, 2014.

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