

REPORT TO COUNTY COUNCIL

Norwich Wastewater Treatment Plant Capacity Expansion Municipal Class Environmental Assessment Study

To: Warden and Members of County Council

From: Director of Public Works

RECOMMENDATIONS

- That County Council authorize staff to proceed with Alternative 3 Upgrade the Existing Lagoon-Based System – Submerged Attached Growth Reactor, as the preferred solution for the Norwich Wastewater Treatment Plant Capacity Expansion Class Environmental Assessment Study, as summarized in Report PW 2025-26;
- 2. And further, that County Council authorize staff to issue a Notice of Completion and post the Schedule C Environmental Study Report for the Norwich Wastewater Treatment Plant Capacity Expansion in the public record for 30 days in accordance with the requirements of the Municipal Class Environmental Assessment process.

REPORT HIGHLIGHTS

- The purpose of this report is to obtain Council approval of the preferred alternative solution for the Norwich Wastewater Treatment Plant (WWTP) Class Environmental Assessment (Class EA) study and to issue the Notice of Completion which triggers the mandatory 30-day public review period and posting of the Environmental Study Report (ESR) for the Norwich WWTP on the public record.
- This study has been conducted to address the future wastewater servicing needs of the growing Community of Norwich. Alternative 3 – Upgrade the Existing Lagoon-Based System
 Submerged Attached Growth Reactor (SAGR) has been identified as the preferred design alternative for ammonia treatment, as it achieved the highest evaluation score based on operational, economic, environmental, social, and cultural considerations. It is recommended for the expansion of the Norwich WWTP to ensure sufficient wastewater capacity through to 2046.



IMPLEMENTATION POINTS

Following Council's adoption of this report, a Notice of Study Completion will be published in the local newspapers and County website. The Notice will be mailed to adjacent property owners and sent via e-mail to groups of interest (review agencies, Township of Norwich, County Councillors, Indigenous Communities, etc.).

The Notice will inform the public and interested parties of the completion of the Class EA Study project and the start of the 30-day public review period of the Class EA Study ESR. Under section 16 of the Class EA Study process the Minister of Environment Conservation and Parks (MECP) has the authority and discretion to make an order for the project to undergo further study, monitoring or consultation. If no Section 16 order requests are received during the 30-day review period, staff shall commence the process of formulating budgetary plans and executing design and construction.

Financial Impact

The recommendations outlined in this report do not have an immediate financial impact. The funds necessary to complete this Class EA study were included in the 2025 Business Plan and Budget.

The fiscal implications associated with the forthcoming project based on preliminary high level planning estimates, suggest that the anticipated cost for the Norwich WWTP upgrades, including detailed design and construction, is approximately \$21 million. These cost estimates are expected to undergo further refinement through the detailed design, which is expected to start in 2027.

Through the 2024 Development Charges Background Study, the estimated cost of the Norwich WWTP Expansion was \$10.8 million. The next fulsome update of the background study is anticipated to commence in 2028, where the refined cost estimates will be included and an increase of the Wastewater Development Charge for development within the Community of Norwich is likely. Staff have used this cost estimate in the 2025 Asset Management Plan and will continue to provide updates as the project progresses.

Communications

Consultation with the public, property owners, review agencies and other impacted stakeholders early and often throughout the process is a key component of any Class EA Study. All interested parties were notified and consulted early and often throughout the development and evaluation of alternative solutions to recommend the preferred alternative solution.

The following is a summary of consultation activities:

• A Notice of Study Commencement (NOCm) was advertised in the Oxford Review (May 20 and 27, 2021). The NOCm was delivered to 46 agency contacts, organizations, local

utility companies and Indigenous Communities who may have been interested in the project.

- Notice of Public Consultation Center number 1 (June 23, 2023) and Public Consultation Center number 2 (December 12, 2024) were sent out to stakeholders and advertised through local media.
- A dedicated project website, https://speakup.oxfordcounty.ca/norwich-wwtp was created to make information about the study publicly available and to provide the opportunity for members of the public who could not attend public meetings to see all documents presented and to advise of future consultation events.

Staff reviewed and considered all public feedback including comment forms, e-mail, and written correspondence. Staff will continue communication efforts during the upcoming design and construction phases to effectively mitigate any potential impacts associated with the project. Ongoing discussions with the Township of Norwich will be maintained throughout the project.

2023-2026 STRATEGIC PLAN

Oxford County Council approved the 2023-2026 Strategic Plan on September 13, 2023. The Plan outlines 39 goals across three strategic pillars that advance Council's vision of "Working together for a healthy, vibrant, and sustainable future." These pillars are: (1) Promoting community vitality, (2) Enhancing environmental sustainability, and (3) Fostering progressive government.

The recommendations in this report support the following strategic goals.

Strategic Plan Pillars and Goals

PILLAR 1	PILLAR 2	PILLAR 3	
		115-11	
Promoting community vitality	Enhancing environmental sustainability	Fostering progressive government	
Goal 1.2 – Sustainable infrastructure and development		Goal 3.1 – Continuous improvement and results- driven solutions	

See: Oxford County 2023-2026 Strategic Plan

DISCUSSION

Background

The Community of Norwich is the largest urban community in the Township of Norwich and is the only settlement with wastewater services. With a current population of 4,400 residents, the Community of Norwich is the primary focus for population and employment growth in the Township, in accordance with County planning policies.

The Norwich WWTP has an existing treatment capacity of 1,530m³/day annual average flow. The projected treatment capacity for the Norwich WWTP in 2046 is expected to be 2,191m³/day. The Class EA study and ESR have been prepared to address the future capacity requirements of the Norwich WWTP.

Comments

The Norwich WWTP Class EA Study was initiated by staff in the Spring of 2021 with the assistance of engineering Consultant, R.V. Anderson Associates Limited (RVA). The study was initiated because of approved future growth in Norwich and associated projected increases in the WWTP flow rates.

The Class EA study was conducted in accordance with the planning and design process for Schedule C projects outlined in the Municipal Engineers Association (MEA) Municipal Class Environmental Assessment (October 2000, as amended in 2007, 2011, 2015), which is an approved process under Ontario's Environmental Assessment Act. This project was initiated prior to the release of the 2023 Municipal Class EA document in March 2023, which provided updates to the classification of some projects, although the general process is unchanged. As such, the 2015 MEA document continued to govern the EA process for this study.

Schedule C projects are required to complete all five phases of the Municipal Class EA process as summarized in the following paragraphs.

Phase 1 – Identification of the Problem or Opportunity

The Norwich WWTP Class EA addresses the following Problem/Opportunity Statement:

To determine the most cost effective, environmentally sound, and sustainable approach to provide wastewater treatment that will accommodate future growth within the 25-year planning horizon in the Community of Norwich.

Phase 2 – Identification and Evaluation of Alternative Solutions and Selection of the Preferred Solution(s)

The Class EA Study project team identified three preliminary alternative solutions to the problem statement, described in detail below:

- <u>Alternative 1 Do nothing</u>: This alternative would result in no measures for improving the performance of the lagoons aside from regular maintenance and operation.
- <u>Alternative 2 Construct a New Mechanical Wastewater Treatment Facility</u>: This design concept considers building a new mechanical treatment facility and converts the existing lagoons into storage ponds. The basis of design for the new facility will be conventional activated sludge process followed by tertiary treatment.
- <u>Alternative 3 Upgrade the Existing Lagoon System</u>: This design concept considers upgrading the existing lagoons with new aeration systems and a new sludge treatment system.

Alternative 1 – Do nothing - This alternative does not support the future growth of the community for full planning horizon up to 2046. Therefore, this alternative is not an option but is considered as a baseline for comparison to other alternatives in terms of all evaluation criteria.

Alternative 2 and Alternative 3 – These alternatives were evaluated based on the potential impacts on the following categories: financial, technical, environmental, social, cultural, and archeological. Attachment 1 shows the evaluation of Alternative 2 and Alternative 3. The overall objective of the evaluation was to identify a Preferred Solution among the two alternatives identified that provides the most favourable solution to the Project Opportunity Statement.

Based on the above, Alternative 3, "upgrade the existing lagoon-based system to treat projected future flows," has been deemed the most cost effective, environmentally sound, and sustainable approach to servicing the Norwich WWTP and meeting the wastewater servicing needs of the community to 2046.

To implement this alternative, a range of technological solutions can be applied to enhance its treatment capacity and operational performance. In Phase 3 of the Class EA study, various technologies were evaluated to upgrade the existing lagoon system. The assessment identified and explored three distinct design concepts that could enhance the lagoon's performance and operational efficiency. These concepts were developed based on a comprehensive review of available technological solutions, environmental impacts, regulatory requirements, and operational considerations. Each design approach was analyzed for its feasibility, sustainability, and compatibility with the local environment. The findings of this evaluation provide a basis for selecting the most suitable upgrade option that aligns with the problem and opportunity statement.

Phase 3 – Alternative Design Concept Review and Evaluation

Considering the preferred solution (Alternative 3), the project team reviewed three design concepts. The alternative design concepts are described below and further evaluated in Attachment 2.

Alternative Design Concept 1: Fixed Film Attached Growth (FFAG)

A FFAG process provides a fixed media onto which biomass attaches itself, preventing washout and increasing the surface area on which treatment can occur. Increased biomass quantity allows nitrification to occur even when slowed by reduced water temperatures. Various suppliers of this technology are available, each with a proprietary media. Media can be attached to floats or mounted to the lagoon bottom.

The system would be installed within the south lagoon, constructed to achieve Biochemical Oxygen Demand (BOD) and Total Ammonia Nitrogen (TAN) removal in a staged manner. Aeration would be provided in the south lagoon to achieve BOD treatment. Aeration would also be provided locally at the fixed film modules to supply the biomass growing on the media directly with oxygen. BOD is removed in the first portion of the south lagoon. Nitrification can then take place in the remaining section of the south lagoon, as BOD concentrations have been lowered, and conditions are favourable for this slower process to occur. It is expected that a baffle would be installed across the south lagoon to reduce the possibility of short circuiting.

Following the fixed film process, wastewater would travel to the new tertiary filters for removal of any remaining Total Suspended Solids (TSS) and Total Phosphorus (TP) and then onto the disinfection process before being released to the receiver or stored.

Alternative Design Concept 2: Moving Bed Bioreactor (MBBR)

To achieve reliable nitrification, a MBBR system is similar to a FFAG system in that both provide surface area for nitrifying bacteria to proliferate while protected from washout in a favourable environment. Aeration would be provided in the south lagoon to achieve BOD treatment. Following the removal of most of the BOD, effluent would flow out of the south lagoon and into the MBBR tank for nitrification.

The MBBR tank is filled with plastic media which provides significant surface area for the growth of biomass. Aeration is provided to the tank to supply the biomass with oxygen as well as provide mixing to keep the media suspended and encourage excess biomass to be sloughed from the media. Stainless sieves retain the media in the tanks and allow wastewater to pass through for further treatment. A cover, floating or fixed, is typically included to conserve heat. Following the MBBR process, wastewater would travel to the tertiary filters for removal of any remaining TSS and TP and then onto the disinfection process before being released to the receiver or stored.

<u>Note</u> – A subcategory of Alternative 2, known as Alternative 2A – Nitrox Moving Bed Bioreactor, was also discussed in the evaluation process as an extension of Alternative 2 – MBBR. Details of this treatment technology are provided in the ESR report, along with its strengths and weaknesses.

Alternative Design Concept 3: Submerged Attached Growth Reactor (SAGR)

The SAGR system is a proprietary design developed by Nexom which uses clear stone media to host biomass. This reactor is located below grade and is covered with a layer of insulating mulch to conserve heat. Aeration is delivered to the media bed via diffusors.

In this way, a large quantity of biomass can be maintained on the media, ensuring that nitrification can be completed even when reaction rates are reduced due to cold wastewater temperatures. As with the MBBR/Nitrox systems, BOD removal would occur in the southern lagoon via aeration with wastewater passing into the SAGR system for the removal of TAN.

Following the SAGR process, wastewater would travel to the tertiary filters for removal of any remaining TSS and TP and then onto the disinfection process before being released to the receiver or stored.

Maintenance of the SAGR system is limited as the system is designed not to be accessed once constructed. As with the previous alternative, maintenance will be limited to the associated blowers and aeration system. Unlike the FFAG system, the SAGR system will not need to be moved during lagoon desludging.

Alternative Design Concept Evaluation

Staff and RVA team members reviewed and evaluated the three design alternatives detailed above. Consideration and weighting of the design criteria were developed to ensure the County proceeds with the best options available to meet the design criteria set out by the MECP. The three design alternatives were evaluated based on operational, economic, environmental, and social and cultural considerations and are summarized in Table 1 below. The criteria was weighted for a perfect score being 100 points.

Considerations	Maximum Score	1 - Fixed Film Attached Growth	2 - Moving Bed Bioreactor	3 - Submerged Attached Growth Reactor
Operational Considerations	33.3	24.2	26.1	28.2
Economic Considerations	15.2	13.2	13.4	11.1
Environmental Considerations	27.3	18.2	20.6	20.9
Social and Cultural Considerations	24.2	12.4	14.2	17.3
Total	100	68.2	74.4	77.5
Ranking		3 rd	2 nd	1 st

Table 1: Alternative Design Concept Evaluation

Alternative Design Concept 3, SAGR, is the preferred design alternative to use for ammonia treatment as it has been determined to be the highest scoring option and is recommended to be utilized for the expansion of the Norwich WWTP to meet the wastewater serving needs of the community to 2046.

Phase 4 – Completion of the Environmental Study Report (ESR)

An archaeological study will be conducted as part of the preliminary design for the entire project study area, as well as a discharge strategy. The results of the archaeological study and the discharge strategy will inform the final location and footprint of an additional lagoon, if required to provide seasonal effluent storage.

Upon Council approval, a Notice of Study Completion will be advertised letting the public and interested parties know that the complete ESR is available for comment for 30-days. The ESR will be filed with the MECP. If no outstanding concerns under Section 16 of the Environmental Assessment Act require a higher level of study (i.e., requiring an individual/comprehensive EA approval before being able to proceed), or that conditions be imposed (e.g., require further studies), the project will progress to Phase 5 of the Class EA study.

Phase 5 – Project Implementation, Detailed Design, Contractor Procurement and Construction Works

Phase 5 is implementation of the Municipal Class EA Study process and involves the completion of detailed design drawings, specifications, and tender documents to be provided to a successful contractor for the construction of the proposed project. During the implementation phase, the County will adhere to mitigation measures and monitoring plans as documented in the ESR to be posted to the project webpage.

CONCLUSION

Staff recommended that Council approve the preferred solution and design for the Norwich WWTP Capacity Expansion Class EA study, which is to upgrade the existing lagoon system (Alternative 3) and that the SAGR system (Design Alternative 3) technology be utilized for the Ammonia treatment for the upgraded Lagoon.

SIGNATURES

Report author:

Original signed by

Harry Goossens P. Eng Project Engineer

Departmental approval:

Original signed by

Melissa Abercrombie, P. Eng, PMP Director of Public Works

Approved for submission:

Original signed by

Benjamin R. Addley Chief Administrative Officer

ATTACHMENTS

Attachment 1: Alternative Solution Evaluation, February 14, 2025 Attachment 2: Alternative Design Concept Evaluation, November 26, 2024