Town of Hanover Wastewater Treatment Plant (WWTP) Upgrades

Schedule C Class Environmental Assessment

Environmental Study Report – Draft for Public Review

Prepared For:

Town of Hanover

November 2025

TOWN OF HANOVER WWTP UPGRADES SCHEDULE C CLASS EA

ENVIRONMENTAL STUDY REPORT - DRAFT

PROJECT NO. 122059

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Executive Summary

ES – 1 Introduction and Background

The Town of Hanover is completing a Schedule C Municipal Class Environmental Assessment (Class EA) for upgrades to its wastewater treatment system to meet the community's needs through the year 2052. The Hanover Wastewater Treatment Plant (HWWTP) is currently running at about 85% of its design capacity, and the limited remaining capacity is beginning to restrict future development.

This study, documented in an Environmental Study Report (ESR), reviews future servicing needs, evaluates treatment options, and recommends solutions for expanding the plant's capacity. It also includes feedback from public consultations, which helped shape the final recommendations.

The Class EA builds on a 2021 Municipal Servicing Needs Assessment (GM Blue Plan Engineering), which identified where future growth is expected – both within the Town's current boundaries and in surrounding areas. It also considered the need to accept leachate from the Hanover/Walkerton landfill site.

The Town of Hanover started this Class EA in fall 2022 by hiring the Ainley Group to lead the study. The goal is to select the best long-term solution for managing wastewater and to ensure the upgraded treatment plant can support both existing residents and the projected population growth outlined in the Town's Official Plan.

ES – 2 Class Environmental Assessment Process

Ontario's Environmental Assessment Act (henceforth referred to as "the Act") was proclaimed in 1976. The Act requires proponents to examine and document the environmental effects that might result from major projects or activities. Municipal undertakings became subject to the Act in 1981.

The Municipal Class Environmental Assessment document, prepared by the Municipal Engineers Association (MEA) (October 2000, as amended in 2007, 2011, 2015 and 2023), outlines the procedures to be followed to satisfy Class EA requirements for water, wastewater and road projects. The process includes five phases:

- Phase 1: Problem Definition
- Phase 2: Identification and Evaluation of Alternative Solutions to Determine a Preferred Solution
- Phase 3: Examination of Alternative Methods of Implementation of the Preferred Solution
- Phase 4: Documentation of the Planning, Design and Consultation Process
- Phase 5: Implementation and Monitoring

Public and agency consultation are integral to the Class EA planning process. Projects subject to the Class EA process are classified into four possible "Schedules" depending on the degree of expected impacts. It is important to note that the Schedule assigned to a particular project is proponent-driven. Schedule A and A+ undertakings are presently excluded from Ontario's

Environmental Assessment Act (EAA), they are no longer eligible for evaluation to a Schedule B or C procedure. Proponents of these projects have the option to execute a procedure that falls outside process under the EAA procedure. Alternatively, proponents of Schedule B projects might opt to adhere to Schedule C requirements in case the project is notably complex or controversial, thus demanding more than the basic Schedule B prerequisites.

For Schedule B and C projects, the public has the opportunity to request a higher level of study through filing a Section 16 order request to the Minister of Environmental, Conservation and Parks to prevent, mitigate or remedy adverse impacts on the existing Aboriginal and treaty rights of the Aboriginal peoples of Canada.

Major expansions or the construction of new wastewater treatment facilities follow a Schedule C process.

ES – 3 Planning Policy

Various land use planning policies and principles were followed to illustrate the consistency of this project in relation to provincial, regional and municipal planning goals. The following is a list of the land use planning policies and principles reviewed and followed in this project:

- Provincial Policy Statement (2024)
- Clean Water Resources Act (2006)
- Ontario Water Resources Act (1990)
- Town of Hanover Official Plan
- Considering Climate Change in the Environmental Assessment Process (MECP, 2017)

ES – 4 Flow Projection

Table ES-1 below summarizes the projected 2052 ADF, Peak Daily Flow, Peak Hourly Flow, and Peak Instantaneous Flow. While available plant data does not provide a direct basis for projecting peak hourly and peak instantaneous flows, a Peak Hourly Factor (PHF) of 3.2 and a Peak Instantaneous Factor (PIF) of 3.5 have been assumed for the purposes of this study. Since PHF and PIF were not monitored in-plant, the values were assumed based on data from a facility with similar flow projections.

Table ES - 1 – 2052 Flow Projection

Parameter	Projected Flow
Average Daily Flow (ADF)	13,789 m^3/d
Peak Daily Flow (PDF)	32,329 m^3/d
Peak Hourly Flow (PHF)	44,125 m^3/d (511 L/s)
Peak Instantaneous Flow (PIF)	48,262 m^3/d (559 L/s)

ES – 5 Problem and Opportunity Statement

Through an examination of the present performance of the HWWTP, as well as an evaluation of existing and projected future wastewater flows within the service area, the Problem/Opportunity Statement was formulated. It was found that the existing HWWTP is almost at its limit, resulting insufficient capacity to service future growth within the Town. Additionally, there exists high Infiltration and Inflow (I&I) contribution to the plant from the collection system. An additional wastewater treatment ADF capacity of 7,429 m^3/d needed to accommodate the projected 2052 growth based on Appendix A – Projected Future Sewage Flows Technical Memorandum.

ES – 6 Phase 2 Evaluation

As part of Phase 2 of the Class EA process, several alternatives were developed to address the identified problem/opportunity statement. A preliminary screening was conducted to eliminate options that did not effectively respond to the core issues.

The general alternatives evaluated in Phase 2 included:

- Expanding and Upgrading the Existing WWTP;
- Constructing a New WWTP at a Different Location.

Each alternative was evaluated based on the following criteria:

- Technical complexity;
- Compatibility with current policies and regulations;
- Impacts to property owners;
- Impacts to adjacent businesses;
- Capital cost;
- Alignment with the problem/opportunity statement.

Following this evaluation, the preferred general alternative selected was to expand and upgrade the existing WWTP.

ES – 7 Studies

To support the evaluation of design alternatives for the proposed expansion of the HWWTP, a series of technical studies were completed to assess potential impacts across socio-cultural, natural environmental, floodplain, and climate change considerations.

- Socio-Cultural Studies (Archaeological Services Inc.) – three studies were conducted:
    - Stage 1 Archaeological Assessment identified areas with archaeological potential, recommending Stage 2 testing in those zones before any construction.
    - Stage 2 Archaeological Assessment involved test pit surveys, which found no archaeological resources. No further assessment is required.
    - Cultural Heritage Study flagged potential built heritage resources and cultural heritage landscapes near the site. It recommended mitigation strategies such as vibration assessments, construction avoidance, and heritage consultant involvement if the project footprint expands.

- Natural Environmental Assessment (Palmer)
    - A Natural Environment Report was completed to characterize the site's ecological conditions and assess four expansion alternatives. Key natural features include adjacent wetlands and the Saugeen River, supporting some species at risk. Recommendations include minimizing encroachment on sensitive areas and implementing mitigation strategies such as erosion control, tree preservation, and wildlife protection.
- Floodplain Assessment (CAPES Engineering Ltd.)
    - A detailed floodplain analysis was performed using Visual Otthymo and HEC-RAS modeling, supported by LiDAR and field survey data. While the WWTP lies near the Saugeen River floodplain, current infrastructure remains outside flood limits. Two expansion areas were identified within the floodplain. Modeling shows that development with appropriate grading can proceed without significant flood risk impact (less than 2cm increase in flood elevation). Future changes to design may require updated modeling and SVCA approval.
- Climate Change Considerations
    - The project considered both the potential GHG emissions from construction and operations, and the risks posed by climate change (e.g., extreme weather). It acknowledged the need for climate-resilient infrastructure planning in line with MECP guidance.

ES – 8 Phase 3 Evaluation Methodology

The evaluation methodology used to select the preferred design alternatives was established in a manner consistent with the principles of environmental assessment planning and decision-making as outlined in the Municipal Class EA.

Evaluation of each of the treatment processes involved two main steps:

- Identification of a long list of all potential alternatives and the screening of this list down to a shortlist of viable alternatives.
- A detailed evaluation of the short-listed alternatives to identify a recommended preferred alternative solution.

The short-list evaluation process involved identification of potentially viable alternatives followed by conceptual design, sizing, and costing of each alternative and a detailed evaluation using screening criteria. The screening criteria were chosen to reflect key aspects of the component being evaluated. Four primary screening categories were used for the evaluation:

- Social/Cultural Impacts;
- Environmental Impacts;
- Technical Performance;
- Economic Impacts.

Each category was assigned a weighted percentage to reflect its relative importance in evaluating each component.

ES – 9 Phase 3 Design Alternatives and Evaluation

Phase 3 of the Class EA develops Design Alternatives and further details of their socio-cultural, technical, economic, and environmental impacts. The Design Alternatives evaluated in Phase 3 were alternatives related to meeting 2052 average daily flows and full build-out projections, managing current and projected peak flows, and technology alternatives for the plant expansion.

The design alternatives evaluated in Phase 3 were:

- Secondary Treatment:
  - Conventional Activated Sludge (CAS) System
  - Aerobic Granular Sludge Reactor (AGS)
  - Membrane Aerated Biofilm Reactor (MABR)
  - Moving Bed Biofilm Reactors (MBBR)
- Tertiary Treatment:
  - Disc Filter
  - High-rate Clarifier
- Disinfection Treatment:
  - Ultra-Violet (UV) Radiation
- Solids Treatment:
  - Mesophilic Anaerobic Digestion
  - Aerobic Digestion

ES – 10 Recommended Design Alternative

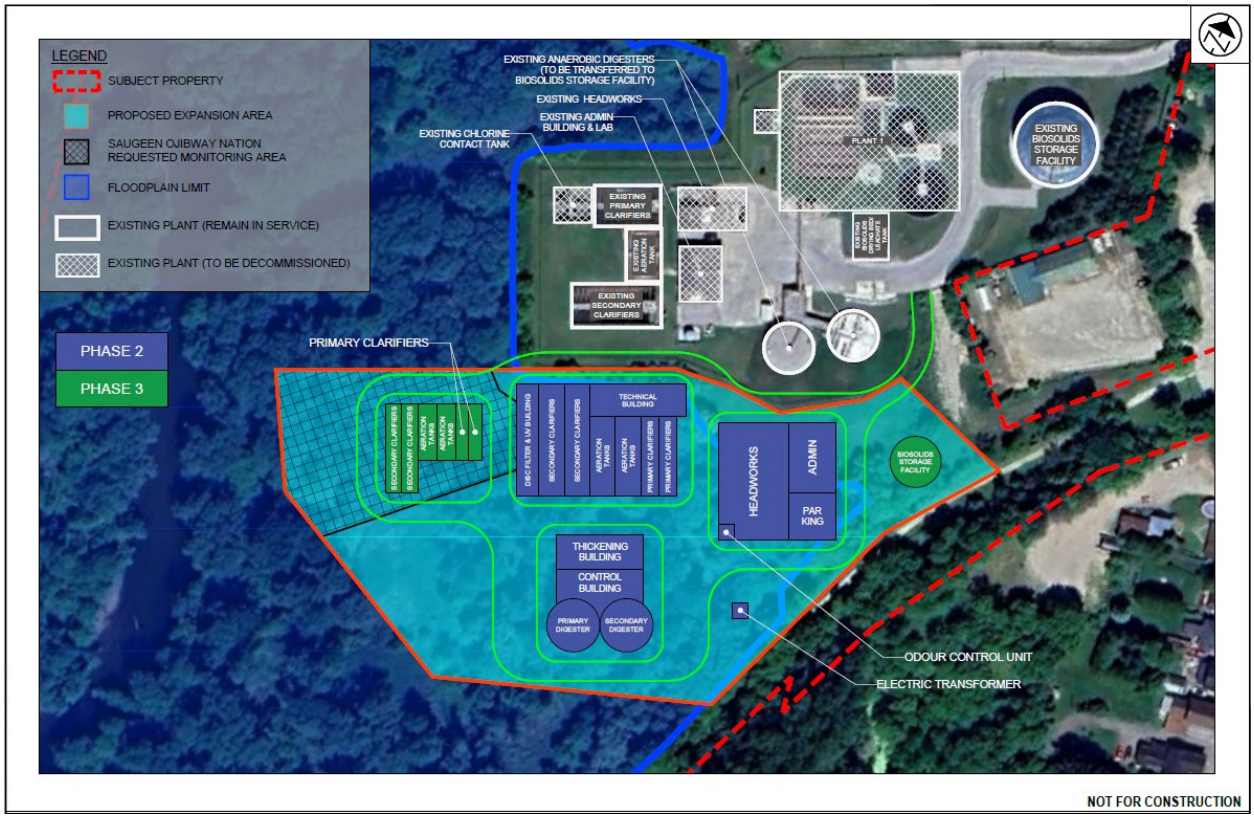
The recommended design alternatives based on the Phase 3 evaluations are summarized in Table ES-2 below.

Table ES - 2 – Recommended Design Alternatives

Process	Recommended Treatment Technology
Preliminary Treatment	Mechanical Screening and Grit Removal with Odour Control
Secondary Treatment	Conventional Activated Sludge
Tertiary Treatment	Disc Filters
Disinfection	UV Radiation
On-site Sludge Stabilization	Anaerobic Digestion

The conceptual layout of the preferred design alternative is shown in Figure ES-1.

Figure ES - 1 – Conceptual Site Plan of Recommended Design Alternative



ES – 11 Phasing Plan

To meet the projected ADF of 13,789 m^3/d by 2052, a phased approach to expanding the HWWTP is recommended. This staged implementation balances long-term capacity needs with cost efficiency and operational flexibility.

Phase 1 (2024 – 2026) involves conducting a plant-wide stress test to confirm that the existing facility can reliably treat 7,000 m^3/d with both Plant 1 and Plant 2 in service. Aging equipment will also be replaced through the ongoing Optimization Project.

Phase 2 (Design: 2026 – 2028; Construction: 2029 – 2031) includes construction of a new treatment facility to increase the capacity to 10,500 m^3/d. This will allow Plant 1 to be decommissioned. The new Headworks facility and new tertiary and disinfection building will be sized for ultimate flows of 13,789 m^3/d (Phase 3 targeted flow), with initial equipment installed to meet the Phase 2 flow requirement. Key infrastructure includes new headworks, primary/secondary treatment systems, tertiary treatment and disinfection facilities, and upgraded sludge handling. The existing digesters will be repurposed for biosolids storage.

Phase 3 (Design: 2034 – 2035; Construction: 2036 – 2038) will complete the plant expansion to its full design capacity of 13,789 m^3/d. This phase will involve installing additional screening, grit removal, treatment, and disinfection systems, as well as expanding sludge stabilization and biosolids storage capacity.

This phased approach ensures timely capacity upgrades while aligning with projected growth and optimizing capital investment over time.

ES – 12 Capital Cost

Ainley Group has prepared an order of magnitude Probable Construction Cost (Class 5) for the HWWTP.

A breakdown of the probable cost is presented in Table ES-3. The probable total capital construction cost for Phase 1, Phase 2, and Phase 3 are $4,026,000, $144,931,000, and $14,310,000 respectively (2024 dollars). The estimated total cost for the wastewater treatment plant to Full Buildout is $163,267,000 (2024 dollars).

Table ES - 3 – WWTP Expansion Capital Cost

	PHASE 1 PROBABLE CAPITAL COST (2024 Dollars)	PHASE 2 PROBABLE CAPITAL COST (2024 Dollars)	PHASE 3 PROBABLE CAPITAL COST (2024 Dollars)
Phase 1 Stress Test	$200,000		
Preliminary Treatment / (6mm Screening)	-	$32,065,000	-
Secondary Treatment / (CAS)	-	$22,388,000	$5,410,000
Tertiary Treatment / (Disc Filter)	-	$8,545,000	-
Disinfection/ (UV Radiation)	-	$1,103,000	$155,000
On-site Sludge Stabilization/ (Anaerobic Digestion)	-	$15,095,000	$2,254,000
Miscellaneous Upgrades (Optimization)	$2,000,000	-	-
SUB TOTAL	**$2,200,000**	**$79,196,000**	**$7,819,000**
General Requirements including Mobilization and Demobilization, Insurance and Bonding, etc. (20%)	$440,000	$15,840,000	$1,564,000
Contractors Profit (8%)	$176,000	$6,336,000	$626,000
Contingency (40%)	$880,000	$31,679,000	$3,128,000
Engineering Fees (15%)	$330,000	$11,880,000	$1,173,000

	PHASE 1 PROBABLE CAPITAL COST (2024 Dollars)	PHASE 2 PROBABLE CAPITAL COST (2024 Dollars)	PHASE 3 PROBABLE CAPITAL COST (2024 Dollars)
TOTAL COSTS	**$4,026,000**	**$144,931,000**	**$14,310,000**

ES – 13 Plant 2 Upgrade

Plant 2 comprises 2 primary clarifiers, 2 aeration tanks, and 2 secondary clarifiers. The facility was constructed in 1980 and is now over 40 years old. Since its original construction, Plant 2 has not undergone any major upgrades. The majority of the equipment is at or beyond its intended service life and requires renewal.

The recommended upgrades for Plant 2 include converting the aeration system to fine bubble aeration, installing new blowers, replacing the RAS and WAS pumps, replacing the sludge pumps, and upgrading the sludge collector and scum collection systems in both the primary and secondary clarifiers. In addition, Plant 2 aeration tank might need to be expanded to meet future effluent criteria depending on the effluent quality observed after the Plant 2 upgrades.

Total cost of upgrades to plant 2 and decommissioning of plant 1 is estimated at approximately $16.0 Million ($8 Million without expansion of aeration tanks) in 2025.

ES – 14 Impacts, Mitigation Measures and Monitoring Program

The proposed expansion of the HWWTP has been evaluated for potential impacts on the social, cultural, technical, natural, and economic environments. Compared to a “Do Nothing” scenario, the preferred solution will allow the plant to meet future growth needs while maintaining effluent quality and protecting the surrounding ecosystems.

No archaeological or cultural heritage impacts were identified. However, construction activities over a three-year period may result in temporary noise, dust, vibration, and traffic impacts. These will be managed through community engagement, traffic planning, and visual buffering.

Technically, the expanded plant will improve capacity to manage both average and peak flows, reducing the risk of untreated overflows. It will continue to meet regulatory effluent limits and maintain water quality in receiving bodies. Additional investigations – geotechnical, hydrogeological, odour, and noise – will be conducted during detailed design to inform appropriate mitigation strategies.

In terms of the natural environment, vegetation clearing will be required, with tree protection plans with wildlife-sensitive timing in place to reduce impacts on birds and bats. Erosion and sediment control (ESC) measures, stormwater management, and water quality monitoring will be implemented to protect the Saugeen River and adjacent wetlands.

The economic impact includes an estimated $163 million capital cost over three phases. To manage this investment, a cost management strategy will be developed, and funding opportunities will be explored.

A comprehensive mitigation and monitoring program will accompany the project through design, construction, and operation. This includes regular environmental inspections, compliance with

permitting requirements, and the submission of a final monitoring report to relevant agencies. The overall approach is designed to responsibly manage growth, protect environmental features, and minimize disruption to the community.

Monitoring of potential environmental impacts and mitigation measures, during and after the implementation of the preferred design alternative, is an important and necessary step. The mitigation measures and monitoring program during the construction and operation of the facilities were identified from social/cultural, technical, natural, and economic aspects.

Table ES-4 summarized the monitoring activities, frequency and timing of survey, and parameters for documentation.

Table ES - 4 – Monitoring Program

Category	Monitoring Activities	Frequency	Documentation
Social/ Cultural	Community Feedback	Bi-annual community surveys to gather feedback on construction impacts and community satisfaction	Assess noise levels, dust complaints, and overall community sentiment regarding the construction process and during operation
	Traffic Monitoring	Monthly assessments during construction	Monitor traffic flow, congestion, and incidents near the construction site to ensure effective implementation of the traffic management plan
Technical	Water Quality Monitoring	Monthly sampling of effluent and downstream water quality during operational phases	Keep records of total phosphorus, nitrogen levels, suspended solids, and biochemical oxygen demand (BOD) parameters
	Surface Water Monitoring	Monthly sampling of final outfall mixing zone during construction	Assessment of potential Cladophora management if warranted
	Stormwater Monitoring	Constant monitoring during wet weather conditions	Keep records of on-site spill events and mitigation measures taken
Natural	Terrestrial Habitat Assessment	Pre-construction, mid-construction, and post-construction assessments	Document any unexpected impacts on the site and surrounding areas, including monitoring for any unanticipated wildlife activity

Category	Monitoring Activities	Frequency	Documentation
Economic	Cost Analysis	Quarterly financial reviews to evaluate capital and operational expenditures	Track operational costs related to energy, chemical usage, and sludge management to assess budget compliance and identify potential savings

ES – 15 Permits and Approvals

Prior to any construction of the works, all necessary approvals from Agencies with jurisdiction, must be in place. At the commencement of the implementation phase, an approvals register should be prepared and reviewed with the appropriate agencies to verify their specific requirements. The following represent the main approvals that will be required on the project:

- Ministry of Environment, Conservation and Parks (MECP): MECP will issue Environmental Compliance Approvals (ECA) for sewage, air and noise, which will delineate the physical extent of the works being approved and the compliance requirements for effluent quality, odour, and noise as well as outlining monitoring and reporting requirements. ECA applications will require completion of the designs and design reports.
- Saugeen Valley Conservation Authority (SVCA): SVCA will require an application for a work permit where the proposed works affect a watercourse, floodplain, wetland, or hazardous lands. The application must be submitted in advance of the proposed construction start date and must include engineered drawings demonstrating the extent of fill required for floodproofing.
- Ministry of Natural Resources and Forestry (MNRF): MNRF will require application for a permit for any works that affect species at risk, fish or bird habitat, as well as work in or near rivers. Applications will require submission of an Environmental Management Plan that delineates all potential impacts as well as planned mitigations.
- Town of Hanover: The Town will require application for building permits for any building works including the HWWTP.
- Grey County: An Arborist Report and Tree Protection Plan may be required for any trees greater than 10 cm DBH that are to be disturbed, injured, or removed within 6 m of the proposed project footprint.
- Utility Company: A range of permits and inspection will be required from Utility Company involving incoming power, protective systems, and installation compliance.
- Technical Standards and Safety Authority (TSSA): TSSA approval will be required for installation of the diesel generator and any fuel systems.

ES – 16 Public Consultation

Public, agency, and Indigenous engagement has been a core component of this Schedule C Class EA, ensuring that all interested parties had the opportunity to participate throughout the

study. A contact list of stakeholders, review agencies, Indigenous communities, and the public was maintained and updated regularly. Project information, notices, and consultation materials were made available on the Town of Hanover's website and published in the local newspaper, *The Post*.

Key notices included the Notice of Study Commencement (October 2022), two Public Information Centres (PIC #1 in May 2024 and PIC #2 in April 2025), and the upcoming Notice of Completion. The PICs shared findings from technical studies, population and flow projections, and alternative evaluations, and provided a forum for public feedback on the preferred design solution.

Engagement with Indigenous communities included regular communication with the Chippewas of Nawash Unceded First Nation, Saugeen First Nation, Saugeen Ojibway Nation Environment Office (SON), Historic Saugeen Métis (HSM), and the Great Lakes Métis Council. Technical documents such as archaeological, cultural heritage, and natural heritage reports were shared for review, and meetings were held to align with consultation protocols. Feedback received, including comments from SON, was reviewed and incorporated into the final reporting where appropriate. This ongoing consultation allows for meaningful consideration of environmental and cultural interests in the development of the preferred solution.

Glossary of Terms

Ainley	Primary engineering consultant for the Class EA process.
Alternative	A possible approach to fulfilling the goal and objective of the study or a component of the study.
Class EA	Municipal Class Environmental Assessment, a planning process approved under the EA Act in Ontario for a class or group of municipal undertakings. The process must meet the requirements outlined in the "Municipal Class Environmental Assessment" document (Municipal Engineers Association, October 2000, as amended). The Class EA process involves evaluating the environmental effects of alternative solutions and design concepts to achieve a project objective and goal and includes mandatory requirements for public consultation.
Design Concept	A method of implementing an alternative solution(s).
EA Act	*Environmental Assessment Act*, R.S.O. 1990, c.E.18 (Ontario)
Effluent	Liquid after treatment. Effluent refers to the liquid discharged from the Waste Water Treatment Plant to the receiving water.
EIA	Environmental Impact Assessment (EIA) is a process of evaluating the likely environmental impacts of a proposed project or development, taking into account interrelated socio-economic, cultural and human-health impacts, both beneficial and adverse.
Evaluation Criteria	Criteria applied to assist in identifying the preferred solution(s).
Geotechnical Investigation	Study of the engineering behavior of earth materials such as soil properties, rock characteristics, natural slopes, earthworks and foundations, etc.
Hydrogeological	Study of the distribution and movement of groundwater in soil or bedrock.
Infiltration/Inflow (I&I)	Rainwater and groundwater that enters a sanitary sewer during wet weather events or due to leakages, etc.
Local Conservation Authority	A conservation authority is a local, community-based natural resource management agency based in Ontario, Canada. Conservation authorities are mandated to develop programs to further the conservation, restoration, development, and management of Ontario's natural resources.
SVCA	Saugeen Valley Conservation Authority
MECP	Ministry of the Environment, Conservation and Parks, the provincial agency responsible for water, wastewater and waste regulation and approvals, and environmental assessments in Ontario.
Official Plan (OP)	An official plan describes your upper, lower or single–tier municipal council's policies on how land in a community should be used. It is prepared with input from members in a community and helps to ensure that future planning and development will meet the specific needs of the community.
Preferred Solution	The alternative solution which is the recommended course of action to meet the objective statement based on its performance under the selection criteria.

Sanitary Sewer	Sewer pipe that conveys sewage to a sewage pumping station or sewage treatment plant. Part of the sewage collection system.
Service Area	The area that will receive sewage servicing as a result of this study.
Sewage	The liquid waste products of domestic, industrial, agricultural and manufacturing activities directed to the wastewater collection system.
Wastewater Treatment Plant (WWTP)	A plant that treats urban wastewater to remove solids, contaminants and other undesirable materials before discharging the treated effluent back to the environment. Referred to in this Class EA as a Wastewater Treatment Plant.
Study Area	The area under investigation in which construction may take place in order to provide servicing to the Service Area.
Wastewater	See Sewage

1 Introduction

This Schedule C Municipal Class Environmental Assessment (Class EA) is being undertaken to provide recommendations for the wastewater treatment of the Town of Hanover to the year 2052. The Hanover Wastewater Treatment Plant (HWWTP) is currently operating at 85% of its rated capacity and the uncommitted capacity reserves are limiting development.

The Class EA process will be documented in an Environmental Study Report (ESR). This ESR presents an overview of the study, provides a problem and opportunity statement and include a discussion of both the methodology used and the technical analysis conducted in accordance with the requirements for a Schedule 'C' Class EA.

The public consultation process carried out as a part of the study has been documented herein. Feedback arising from public consultation is integrated into the study findings. The specific feedback received on the study and the influence imparted on the course of the study is summarized in this report.

In 2021, the Town of Hanover initiated a Municipal Servicing Needs Assessment (GM BluePlan Engineering) to determine planning needs for water and wastewater servicing to the year 2046, including four Special Policy Areas (SPAs) within the current municipal boundary and four Potential Expansion Areas (PEAs) beyond the current municipal boundary. The 2021 assessment is based on the Town of Hanover's Official Plan. The assessment identified where future growth can be accommodated within future development lands situated within and beyond the existing boundary of the Town of Hanover. Based on the projected growth and the understanding of limited reserve capacity at the HWWTP, it is known that local servicing upgrades will be required to satisfy future wastewater treatment needs.

1.1 Authorization

Following the completion of the Municipal Servicing Needs Assessment, the Town of Hanover retained the Ainley Group to complete the HWWTP Class EA. The Town gave the authorization to proceed with the study in September, 2022.

1.2 Purpose and Study Background

The Municipal Servicing Needs Assessment identified that upgrades to the HWWTP will be required to service potentially significant development within the expansion areas both within and beyond the current municipal boundary. The HWWTP will also receive all of the leachate from the Hanover/Walkerton landfill site (currently it receives 50% leachate from the Landfill). The Hanover/Walkerton Landfill Site (HWLS) is undergoing an Environmental Assessment to direct all flows to HWWTP, which results additional half of leachate produced in HWLS to be transferred to HWWTP in the future.

The HWWTP Class EA will identify a preferred general alternative solution for the management of future wastewater flows and also a preferred design alternative solution for expansion of the Town's wastewater treatment capacity. The study is to accommodate wastewater servicing for the existing community and future significant growth as outlined in the Town's Official Plan.

This Class EA follows the planning and design process for Schedule 'C' projects as described in the Municipal Class Environmental Assessment Document (October 2000 as amended in 2007, 2011, 2015 & 2023), published by the Municipal Engineer's Association.

1.3 Study Objectives

The HWWTP services the Town of Hanover, which has an existing population of 7,967 as stated in the 2021 Census of Population. Based on historical wastewater flows at the HWWTP, the flows have reached approximately 85% of plant's design capacity. This study will evaluate various design alternatives and treatment technologies to effectively treat the future wastewater flows from the Town of Hanover.

The Class EA study outlines a problem or opportunity statement and identifies and evaluates potential solutions (Phase 1 and 2) and design alternatives (Phase 3) through examination of the impacts and benefits of each solution/alternative. The approach taken within the HWWTP Class EA is described below:

1.3.1 Identify Alternative General Solutions (Phase 1 and 2)

Refinement of the problem was undertaken through defining the extent of the service area within the existing communities and future development areas. The development of a feasible set of alternatives is critical to providing a thorough evaluation prior to the recommendation of a preferred general solution. A list of general alternative solutions has been identified as part of Phase 2 of the study. Alternatives were evaluated based on existing and projected future scenarios. A description of each alternative has been outlined along with potential impacts and mitigation. Each alternative was reviewed and evaluated based on the available information and documented within the findings of the study. A Public Information Centre and meetings with selected agencies were undertaken to obtain essential stakeholder input.

1.3.2 Identify and Evaluate Alternative Designs (Phase 3 and 4)

Alternative design solutions will be developed for each component of the recommended general alternative solution during this stage of the study. Each of the alternative design solutions identified has associated technical, environmental, social, economic, and cultural impacts. Within the evaluation, the impacts associated with each individual alternative will be identified and documented. Technical feasibility and potential constructability issues will be reviewed in the study through literature review and examination of their application in the context of the study area. A Public Information Centre and meetings with selected agencies will be conducted to obtain essential stakeholder input. The impacts associated with each alternative design concept will be assessed and evaluated to determine which solution has the least overall impact. After conducting a thorough evaluation of each alternative design, one preferred design solution will be presented to the public and ultimately recommended to the Town for implementation.

1.4 Related Documents and Projects

Several documents were relied on to support this Class EA Study. Each document was reviewed for pertinent information related to this project. They are described in brief in the following subsections.

1.4.1 2021 Municipal Servicing Needs Assessment

2021 Municipal Servicing Needs Assessment determined planning needs for water and wastewater servicing from 2021 to 2046, including four Special Policy Areas within the current municipal boundary and four Potential Expansion Areas beyond the current municipal boundary.

1.4.2 Official Plan Amendment #11

The Official Plan Amendment #11 (OPA#11) adopted by Grey County in October 2022 is an extensive update to the County's current official plan regarding growth projections. The OPA#11 includes population, employment, and household growth across a 25-year planning horizon to 2046.

1.4.3 Annual Reports (2017-2022)

The Annual Performance of the HWWTP reports are prepared by the Ontario Clean Water Agency (OCWA) on behalf of the Town of Hanover on an annual basis based on actual plant performance data.

1.4.4 Plant Capacity Review and Plant Optimization (2017)

The report provides recommendations for future expansion and opportunities for plant optimization and operational efficiencies based on the existing wastewater treatment plant capacity and unit processes.

1.4.5 Anaerobic Digesters Assessment (2020)

The report was to assist the Town of Hanover in determining what changes or upgrades are required to various parts of the digester complex to bring the complex up to date with the various codes.

1.4.6 Inflow and Infiltration Study (2020)

The report investigated Inflow and Infiltration (I & I) problems in the Town of Hanover and evaluates flow characteristics within discrete catchments of the wastewater collection system.

1.4.7 Municipal Class EA Document

The Environmental Assessment Act codifies a planning process that requires the evaluation of potential environmental effects and benefits of a project before decisions are made about implementing the project. It applies to activities or projects of public agencies, and major commercial or business undertakings of non-public entities, if designated by regulation.

The Municipal Class EA document outlines the approach to planning water and wastewater servicing that the Town must follow, in order to comply with the Environmental Assessment Act, including the types of impacts that must be assessed and the need to consult with stakeholders and incorporate stakeholder input into the planning process.

1.5 Study Area

The Town of Hanover is situated in southwestern Ontario and is bordered to the east by Grey County and the municipality of West Grey, and Bruce County and the municipality of Brockton to the west.

The study area for the HWWTP Class EA is displayed in the Figure 1 and includes the Town of Hanover, two areas in West Grey County, as well as two areas in Bruce County, which are all adjacent to the Town of Hanover.

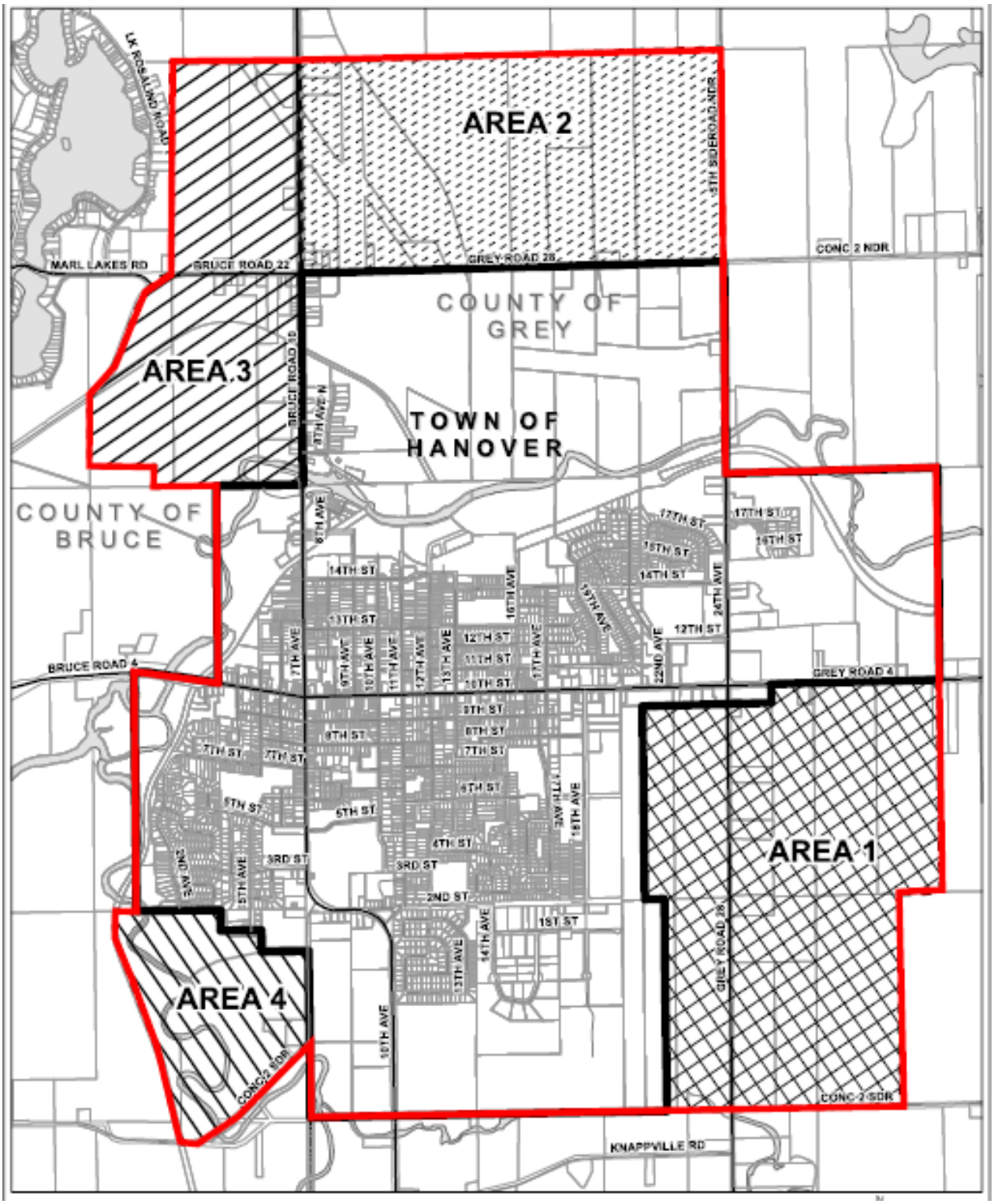


Figure 1 – Study Area

2 Environmental Assessment Process

This section describes the Environmental Assessment process and the specific requirements associated with this study.

2.1 Environmental Assessment Act (EAA)

Ontario's Environmental Assessment Act (henceforth referred to as "the Act") was proclaimed in 1976. The Act requires proponents to examine and document the environmental effects that might result from major projects or activities. Municipal undertakings became subject to the Act in 1981.

The Act defines the environment broadly as:

- Air, land or water
- Plant and animal life, including man
- The social, economic and cultural conditions that influence the human life or a community
- Any building, structure, machine or other device or thing made by man
- Any solid, liquid, gas, odour, heat, sound, vibration or radiation resulting directly or indirect from activities of man
- Any part or combination of the foregoing and the interrelationships between any two or more of them.

The purpose of the Act is the betterment of the people in the whole or any part of Ontario by providing for the protection, conservation and wise management of the environment in the province.

As set out in Section 5(3) of the Act, an EA document must include the following:

- A description of the purpose of the undertaking including:
    - The undertaking.
    - The alternative methods of carrying out the undertaking.
    - Alternatives to the undertaking.
- A description of:
    - The environment that will be affected or that might reasonably be expected to be affected, directly or indirectly, by the undertaking or alternatives to the undertaking.
    - The effects that will be caused or that might reasonably be expected to be caused to the environment by the undertaking or alternatives to the undertaking.
    - The actions necessary or that may reasonably be expected to be necessary to prevent, change, mitigate or remedy the effects upon or the effects that might reasonably be expected upon the environment by the undertaking or alternatives to the undertaking.

- An evaluation of the advantages and disadvantages to the environment of the undertaking, the alternative methods of carrying out the undertaking and the alternatives to the undertaking.

2.2 Principles of Environmental Planning

The Act sets a framework for a systematic, rational and replicable environmental planning process that is based on five key principles, as follows:

- **Consultation with affected parties:** Consultation with the public and government review agencies is an integral part of the planning process. Consultation allows the proponent to identify and address concerns cooperatively before final decisions are made. Consultation should begin as early as possible in the planning process.
- **Consideration of a reasonable range of alternatives:** Alternatives include functionally different solutions to the proposed undertaking and alternative methods of implementing the preferred solution. The "do nothing" alternative must also be considered.
- **Identification and consideration of the effects of each alternative on all aspects of the environment:** This includes the natural, social, cultural, technical, and economic environments.
- **Systematic evaluation of alternatives in terms of their advantages and disadvantages, to determine their net environmental effects:** The evaluation shall increase in the level of detail as the study moves from the evaluation of alternatives to the proposed undertaking to the evaluation of alternative methods.
- **Provision of clean and complete documentation of the planning process followed:** This will allow traceability of decision-making with respect to the project. The planning process must be documented in such a way that it may be repeated with similar results.

2.3 Municipal Class Environmental Assessment

Class Environmental Assessments (EAs) were approved by the Minister of the Environment in 1987 for municipal projects having predictable impacts that can be mitigated. The Class EA approach streamlines the planning and approvals process for municipal projects which have the following characteristics:

- Recurring
- Similar in nature
- Usually limited in scale
- Predictable range of environmental impacts
- Environmental impacts are responsive to mitigation

The Municipal Class Environmental Assessment document, prepared by the Municipal Engineers Association (MEA) (October 2000, as amended in 2007, 2011, 2015 and 2023), outlines the procedures to be followed to satisfy Class EA requirements for water, wastewater and road projects. The process includes five phases:

- Phase 1: Problem Definition

- Phase 2: Identification and Evaluation of Alternative Solutions to Determine a Preferred Solution
- Phase 3: Examination of Alternative Methods of Implementation of the Preferred Solution
- Phase 4: Documentation of the Planning, Design and Consultation Process
- Phase 5: Implementation and Monitoring

Public and agency consultation are integral to the Class EA planning process. Projects subject to the Class EA process are classified into four possible "Schedules" depending on the degree of expected impacts. It is important to note that the Schedule assigned to a particular project is proponent-driven. Schedule A and A+ undertakings are presently excluded from Ontario's Environmental Assessment Act (EAA), they are no longer eligible for evaluation to a Schedule B or C procedure. Proponents of these projects have the option to execute a procedure that falls outside process under the EAA procedure. Alternatively, proponents of Schedule B projects might opt to adhere to Schedule C requirements in case the project is notably complex or controversial, thus demanding more than the basic Schedule B prerequisites.

For Schedule "B" and "C" projects, the public has the opportunity to request a higher level of study through filing a Section 16 order request to the Minister of Environmental, Conservation and Parks to prevent, mitigate or remedy adverse impacts on the existing Aboriginal and treaty rights of the Aboriginal peoples of Canada.

The Class EA process flowchart is provided in Figure 2.

Exempt Projects

Previously referred to as Schedule A and A+ projects, these projects are not subject to the requirements of the EAA. Generally characterized by their limited scope, these projects tend to produce minimal adverse effects on the environment

Eligible to be Screened to Exemption

Based on the outcomes of a screening procedure, these projects (former Schedule A and A+ projects) can qualify for an exemption. Should the screening process determine that the project is not exempt, it becomes necessary to undergo the relevant assessment procedure for Schedule B or C. Additionally, proponents have the option to decide upfront whether to skip the screening process entirely and directly proceed with the applicable B or C processes.

Schedule "B" Projects

Schedule "B" projects generally include improvements and minor expansions to existing facilities where there is potential for some adverse environmental impacts. These projects require screening of alternatives for their environmental impacts and completion of Phases 1 and 2 of the Class EA planning process and public filing of the project file. If outstanding concerns remain regarding Aboriginal or treaty rights after the public review period, any party may request that the Minister of the Environment, Conservation and Parks consider a Section 16 order. If a Section 16 order request is received, an order is issued, and the terms of the order have not been met, or if the Director has issued a notice of a proposed order, proponents are unable to proceed. Provided no significant impacts to Aboriginal or treaty rights are identified and no requests for a Section 16 order are received, Schedule "B" projects are approved and may proceed directly to Phase 5: Implementation. An example of a Schedule "B" wastewater

project would be the establishment, extension or enlargement of a sewage collection system and all works necessary to connect the system to an existing sewage outlet where such facilities are not in an existing road allowance or an existing utility corridor.

Schedule "C" Projects

Schedule "C" projects generally include the construction of new facilities and major expansions to existing facilities. These projects are typically more complex and have the potential for significant environmental effects. As a result, they proceed under full planning and documentation procedures and satisfy all five phases of the Class EA planning process. Phase 3 involves the assessment of alternative methods of carrying out the project, as well as public consultation on the preferred conceptual design. Phase 4 is the preparation of an Environmental Study Report which is filed for public review. If outstanding concerns remain regarding Aboriginal or treaty rights after the public review period, any party may request that the Minister of the Environment, Conservation and Parks consider a Section 16 order. If a Section 16 order request is received, an order is issued, and the terms of the order have not been met, or if the Director has issued a notice of a proposed order, proponents are unable to proceed. Provided no significant impacts to Aboriginal or treaty rights are identified and no requests for Section 16 order an Individual Environmental Assessment are received, Schedule "C" projects are then approved and may proceed to Phase 5: Implementation. An example of a Schedule "C" wastewater project would be construction of a new sewage system, including the construction of treatment and an outfall to a receiving water body and/or a constructed wetland for treatment.

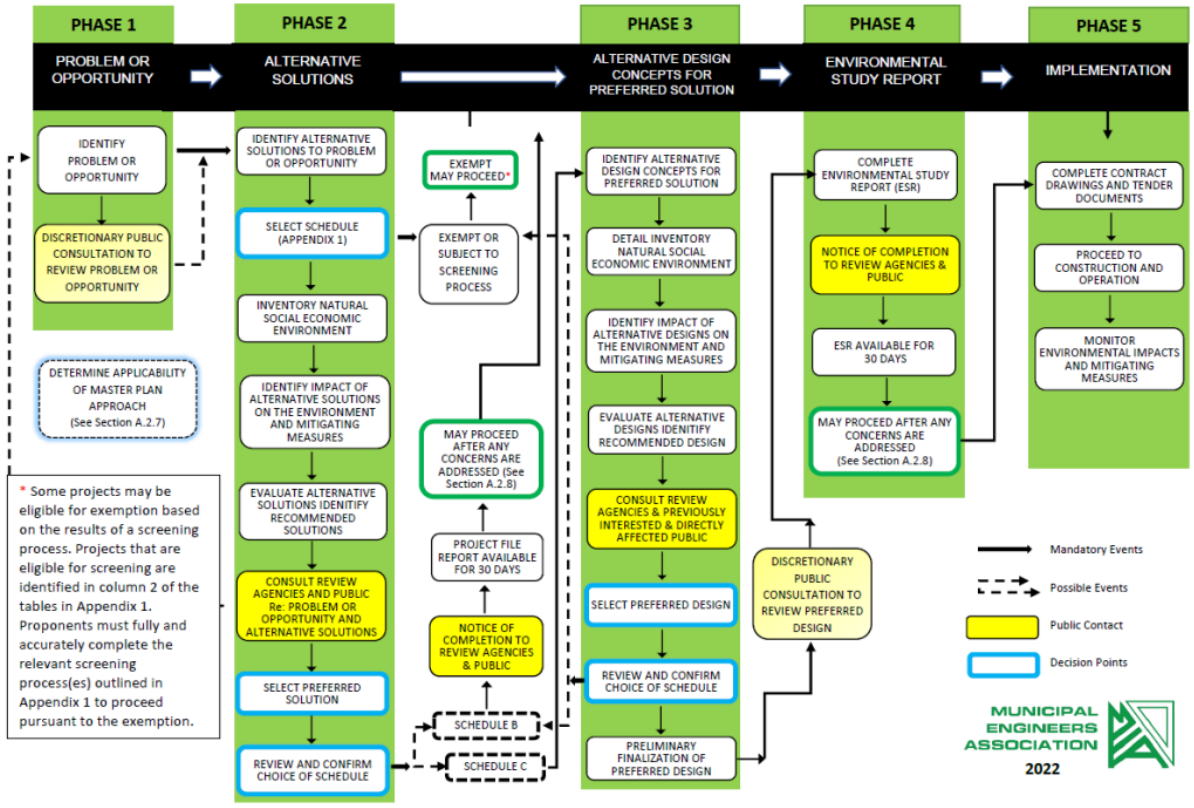


Figure 2 – Municipal Class EA Process

3 Planning Policy

This section provides a brief discussion of various land use planning policies and principles to illustrate the consistency of this project in relation to provincial, regional and municipal planning goals.

3.1 Provincial Policy Statement (2024)

The *Provincial Policy Statement (2024)* provides policy direction relating to land use planning and development in Ontario. Section 3 of the *Planning Act* stipulates that all decisions affecting planning matters are to be consistent with the *Provincial Policy Statement (PPS)*. Policies applicable to this project include the following:

- Section 3.1.1 “Infrastructure and public service facilities shall be provided in an efficient manner while accommodating projected needs.”
- Section 3.6.2 “Municipal sewage services and municipal water services are the preferred form of servicing for settlement areas to support protection of the environment and minimize potential risks to human health and safety. For clarity, municipal sewage services and municipal water services include both centralized servicing systems and decentralized servicing systems.”
- Section 4.1.1 “Natural features and areas shall be protected for the long term.”
- Section 4.6.1 “Protected heritage property, which may contain built heritage resources or cultural heritage landscapes, shall be conserved.”

As the current project is following a Municipal Class Environmental Assessment process consideration is being given to the potential to impact the physical, natural, social, and economic environment prior to selection of the preferred solution. Various studies have been completed to obtain a better understanding of the existing conditions of the study area so that impacts can be properly assessed, and appropriate mitigation developed.

3.2 Clean Water Act (2006)

The purpose of the *Clean Water Act ,2006 (CWA)* is to provide protection of municipal drinking water at the source and to safeguard human health and the environment. It aims to protect existing drinking and future drinking water sources. The CWA and its regulations ensure that municipal drinking water supplies is protected through prevention by the development of watershed-based source protection plans. The source protection plans identify vulnerable areas within each municipality and provide policies to address existing and future risks to municipal drinking water sources. This project is subjected to the Source Protection Plan (October 16, 2015) and is within the Saugeen Valley Source Protection Area.

3.3 Ontario Water Resources Act (1990)

Under the *Ontario Water Resources Act, 1990 (OWCA)*, the construction and operation of wastewater treatment facilities is regulated and controlled in Ontario including the Lake Simcoe Basin. Requirements for the planning, design, construction and operation of sewage works are specified, along with the requirements that systems must satisfy in order for the province to grant approval for establishing, altering, extending, or replacing wastewater system components.

3.4 Town of Hanover Official Plan (2014)

At the municipal level, provincial policy is implemented through the Town of Hanover Official Plan (OP).

The purpose of the OP is to provide a long-term framework for managing growth and development within the Town, aligned with the planning horizon of the County of Grey Official Plan. Its goals, objectives, and policies are intended to guide both public and private decision-making to support the development of livable and attractive communities.

No public works shall be undertaken, and no by-laws shall be passed, that do not conform to the Official Plan.

Municipal servicing policies outlined in the OP focus on ensuring the provision of adequate and reliable water supply and sanitary sewer systems. These services are to be delivered through the extension or improvement of existing piped infrastructure, subject to the availability of uncommitted capacity.

3.5 Climate Change

The MECP document entitled *"Considering Climate Change in the Environmental Assessment Process" (2017)* provides guidance relating to the Ministry's expectations for considering climate change during the environmental assessment process. The Guide is now a part of the Environmental Assessment Program's Guides and Codes of Practice. The environmental assessment of proposed undertakings is to consider how a project might impact climate change and how climate change may impact a project.

4 Existing and Projected Flow Conditions

This section provides a summary of historical data and future conditions in the Town of Hanover. Detailed flow projections are available in Appendix A – Projected Future Sewage Flows Technical Memorandum.

It also includes a summary of historical influent and effluent quality and characteristics. More detailed information can be found in Appendix C – Capacity Assessment and Optimization Study.

4.1 Historical Flows and Quality

4.1.1 Flows from Existing Service Area

The flow trends for the HWWTP were reviewed over the 2017-2022 time period. The flow data used in the study's analysis was taken from the effluent flow meter (Parshall Flume) as no influent flowmeter is available at the plant.

Per ECA number 6173-BKNLVM (Issue Date: March 2, 2020), the plant has a rated capacity of 6,360 m^3/d. Over the 6-year time period, the wastewater treatment plant experienced an average day flow (ADF) of 5,374.7 m^3/d, which is 85% of the rated capacity. Peak hourly flow and peak instantaneous flow data were not recorded and are therefore unavailable for analysis in this Class EA.

Table 1 – Hanover Historical Influent Flow Summary

Year	ADF (m^3/d)	Peak Day Flow (m^3/d)
2017	5,802.7	10,578.0
2018	5,619.0	17,541.0
2019	5,296.6	11,375.0
2020	5,055.6	11,962.0
2021	5,185.9	13,963.0
2022	5,288.7	10,294.0
Average	**5,374.7**	**12,618.8**

4.1.2 Influent / Raw Sewage Quality

The annual (2018 – 2022) average influent concentration for BOD_5, TSS, and TP are presented in Table 2. Based on the historical data, influent / raw sewage entering HWWTP would be classified as medium strength since it's BOD_5, TSS, and TP concentrations have been consistently at the lower and medium range of the typical values for these parameters.

Table 2 – Raw Sewage Concentrations of MECP Regulated Parameters (2018-2022)

Year	Parameter		
	BOD_5 (mg/L)	TSS (mg/L)	TP (mg/L)
2018 Average	169.8	291.8	3.5
2019 Average	159.0	182.8	4.7
2020 Average	158.3	185.2	2.8
2021 Average	221.0	307.8	2.8
2022 Average	191.8	232.6	2.0
5-year Average	**180.0**	**240.1**	**3.2**
Typical Values*	155 - 286	155 - 330	6 - 12

* MOE Design Guidelines for Sewage Works 2008, Table 22-2.

In addition to the regulated parameters, the plant also monitors total ammonia and ammonium (TAN) as N mg/L for raw sewage. Table 3 summarizes historical levels in the raw sewage. From Table 3, it can be seen that the TAN levels in raw wastewater is higher than typical values for domestic wastewater.

Table 3 – Summary of Raw Sewage Historical Concentrations

Year	Parameter
	TAN (mg/L)
2017 Average	18.5

Year	Parameter
	TAN (mg/L)
2018 Average	22.2
2019 Average	18.8
2020 Average	20.7
2021 Average	20.9
5-Year Average	**20.2**
Typical Values*	4 – 13

* MOE Design Guidelines for Sewage Works 2008, Table 22-2.

4.1.3 Exceldor Foods Inc.

The wastewater flow from Exceldor Foods Inc., a meat processing plant, located in Hanover contributes significant flow (34%) to the total wastewater flow received by the HWWTP each year.

The effluent quality from Exceldor Foods Inc. was not monitored separately; its discharge flows directly into the HWWTP along with all other raw sewage flows.

4.1.4 Historical Leachate Flow

The Hanover/Walkerton Landfill Site (HWLS) is currently hauling 50% of the leachate generated at the landfill to the HWWTP and the other 50% is taken to the Walkerton Wastewater Treatment Plant (WWWTP). Table 4 below summarizes the historical l annual volume of leachate hauled to HWWTP and WWWTP along with estimated daily volumes of leachate.

Table 4 – Historical Leachate Flows

Year	Annual Volume (m^3)	Estimated Daily Flow (m^3/d)
2017	3,010.0	8.2
2018	3,118.5	8.5
2019	4,351.5	11.9
2020	5,535.0	15.2
2021	8,329.5	22.8
2022	6,669.0	18.3

4.1.5 Historical Leachate Quality

At present, the leachate from the Hanover/Walkerton Landfill Site is unloaded into the existing underground storage tank at HWWTP and is slowly released into the Headworks. The total hauled landfill leachate and its average contaminant values were calculated and summarized in Table 5. The average leachate volume is approximately 0.2% of the plant's historical ADF.

Table 5 – Summary of Leachate Characteristics

Year	Total Leachate Hauled Off-site (m^3/yr)	Parameter					
		$CBOD_5$ (mg/L)		TSS (mg/L)		TP (mg/L)	
		Avg	Max	Avg	Max	Avg	Max
2018	3,118.5	111.5	420.0	13.5	25.0	0.4	0.7
2019	4,351.5	210.0	595.0	25.7	36.0	0.6	0.8
2020	5,535.0	26.3	34.0	44.0	94.0	0.9	1.3
2021	8,329.5	19.3	34.0	15.3	20.0	1.2	1.9
2022	6,669.0	17.0	-	6.0	-	0.7	-
Average	**5,600.7**	**76.8**	**270.8**	**20.9**	**43.8**	**0.8**	**1.2**

4.1.6 Historical Effluent Quality

The data from the HWWTP's performance between 2018 and 2022 has been used to compile the maximum levels of Five-day Carbonaceous Biochemical Oxygen Demand (CBOD5), Total Suspended Solids (TSS), Total Phosphorus (TP), E.coli, and pH. This information is presented in Table 6, alongside the Environmental Compliance Approval (ECA) objective and the allowable limit for effluent concentrations.

Table 6 – Maximum Monthly Concentrations vs. ECA Requirements

Year	2018	2019	2020	2021	2022	ECA Limit
CBOD5 (mg/L)	8.5	4.3	7.0	5.8	5.7	**25.0**
TSS (mg/L)	8.5	12.3	13.0	11.5	5.7	**25.0**
TP (mg/L)	0.6	0.6	0.4	0.3	0.1	**1.0**
E.coli (CFU/100mL)	139.0	26.4	36.3	73.7	27.5	**200**
pH	8.2	8.2	8.2	8.2	8.2	**6.0 – 9.5**

After analyzing historical concentration data for significant parameters, it was determined that the plant had been operating within the effluent concentration limits established by the ECA over the past five years.

4.2 Projected Future Flows

4.2.1 Population, Employment, and Household Growth Projections

Table 7 below provides a summary of population, employment, and household growth projections in the 5-year intervals to the year of 2046 based on the OPA#11 and the 2021 census.

Table 7 – Summary of Growth in 5-year Intervals

Year	2021	2026	2031	2036	2041	2046	Growth
Population	8,450	9,180	9,870	10,540	11,190	11,870	3,420
Employment	5,120	5,410	5,690	5,970	6,280	6,590	1,470
Household	3,650	4,060	4,420	4,740	5,030	5,350	1,700

4.2.2 Exceldor Foods Inc.

This Class EA assumes a fixed amount of flow (approximately 1,826 m^3/d) directed to the HWWTP originates from Exceldor. This projection is carried forwards until the year of 2052, in light of the fact that Exceldor presently has no expansion plan (based on information provided by the Town).

4.2.3 Leachate Flow from Hanover/Walkerton Landfill Site

The HWLS is undergoing a Class EA process to direct all flows to the HWWTP, which would result in additional quantities of leachate being transferred to the HWWTP in the future. Potential leachate flow contribution based on the HWLS Class EA to the HWWTP is summarized in Table 8.

Table 8 – Projected Leachate Flow to the HWWTP

Year	Annual Volume (m^3)	Average Daily Flow (m^3/d)	Future Contribution to HWWTP (m^3/d)	Peak Leachate Day Flow (m^3/d)
2023-2025	6,669.0	18.3	9.1	270.0
2026-2038	10,500.0	28.8	14.4	405.0
2039-2051	13,500.0	37.0	18.5	510.0
2052	8,400.0	23.0	11.5	510.0

The hauled leachate to the plant is proposed to be stored in on-site tanks and gradually released into the plant's treatment process. As a result, the impact on the overall plant performance is expected to be negligible.

4.2.4 Flow from Approved New Development

Based on the updated development information provided by the Town of Hanover, there are approved lots that are currently under development/construction which are not connected to the Town's collection system. Wastewater flows from these unconnected approved lots will be added after the proposed service year by developers. Calculated flows from these developments are summarised in Table 9.

Table 9 – Flows from Unconnected New Development

Approved Developments Under Construction	Units	Population	ADF Estimate (m^3/d)	Peak Day Flow Estimate (m^3/d)
Saugeen Cedar Heights West Subdivision	123	369	171.7	463.8
(Phase 1) at 651 23rd Avenue	71	213	99.1	267.7
10th St/7th Ave intersection	109	327	152.1	411.0
Splash Pad Flow	-	-	55	55
Total	**303**	**909**	**477.9**	**1,197.5**

4.2.5 Inflow and Infiltration

Over the last several years, the wastewater flows received at the HWWTP have exceeded the water supply flows in the Town, indicating infiltration and inflow (I/I) contribution to the sanitary sewers. In order to quantify and locate I/I sources within the Town's collection system; the Town conducted an I/I study of the collection system. The study occurred over an eight-month period from February 2020 to early of November 2020 in order to capture sufficient dry and wet weather flows. That study found that significant infiltration is generated within the southern (32% - 48% of historical average flow) and north east (21% - 36% of historical average flow) collection system of the Town. It is our understanding that the Town has initiated the rehabilitation of sewers and manholes to reduce I/I in the collection system. At present, the impact of the rehabilitation work on the flows and loadings at the plant are minimal. Therefore, any reduction in wastewater flow resulting from the implementation of rehabilitation work was not incorporated into the flow projections.

4.2.6 Projected Future Flows

Table 10 summaries future ADFs and peak day flows estimated based on population growth, leachate contribution, unconnected approved lots, and I&I consideration. Refer to Appendix A – Projected Future Sewage Flows Technical Memorandum for details of flow projections.

Table 10 – Flow Projections to the 2052 Horizon

Year	Projected Flow Based on Population Growth (m^3/d)	Leachate Contribution (m^3/d)	Flow from Approved Unconnected Developments (m^3/d)	Total ADF (m^3/d)	Peak Day Flow (m^3/d)
2022 (existing)	5,288.7	0.0	0.0	5,288.7	10,294.0
2024	5,998.2	9.1	325.7	6,333.0	13,158.8
2027	6,764.7	14.4	477.9*	7,256.9	15,670.2
2032	8,019.9	14.4		8,512.2	18,877.9
2037	9,295.3	14.4		9,827.6	22,121.5
2042	10,650.9	18.5		11,147.3	25,657.4
2047	11,994.1	18.5		12,490.5	29,045.6
2052	13,299.6	11.5		13,789.0	32,329.2

*477.9 m^3/d flow is expected upon the completion of the approved developments by the end of 2024 specified in section 4.2.4, and is applied to the following years as the projected flow rate.

Table 11 below summarizes the projected 2052 ADF, Peak Daily Flow, Peak Hourly Flow, and Peak Instantaneous Flow. While available plant data does not provide a direct basis for projecting peak hourly and peak instantaneous flows, a Peak Hourly Factor (PHF) of 3.2 and a Peak Instantaneous Factor (PIF) of 3.5 have been assumed for the purposes of this study. Since PHF and PIF were not monitored in-plant, the values were assumed based on data from a facility with similar flow projections.

Table 11 – 2052 Flow Projection Summary

Parameter	Projected Flow
Average Daily Flow (ADF)	13,789 m^3/d
Peak Daily Flow (PDF)	32,329 m^3/d
Peak Hourly Flow (PHF)	44,125 m^3/d (511 L/s)
Peak Instantaneous Flow (PIF)	48,262 m^3/d (559 L/s)

4.2.7 Future Effluent Criteria

Blue Sky Energy Engineering & Consulting Inc. conducted an Assimilative Capacity Study (ACS) for the Saugeen River to support the planned expansion of the HWWTP. The purpose of the study was to assess the river's ability to receive and safely assimilate treated effluent from the upgraded facility, providing ongoing protection of water quality and aquatic life.

Table 12 summarizes the new effluent limits for the plant for 13,789 m^3/d. Refer to Appendix B for full description of ACS.

It is noted that the proposed effluent criteria may be refined during the future design stage, as different treatment technologies can achieve varying effluent characteristics. The final effluent quality will be confirmed during the ECA application stage.

Table 12 – Proposed Effluent Objectives and Limits for 13,789 m^3/d

Effluent Parameter	Proposed Effluent Objectives	Proposed Effluent Limit
$CBOD_5$	9.0 mg/L	11.5 mg/L
TSS	9.0 mg/L	11.5 mg/L
TAN		
Spring (Mar - May)	7.2 mg/L	9.0 mg/L
Summer (Jun - Sep)	2.2 mg/L	2.7 mg/L
Fall (Oct - Nov)	5.6 mg/L	7.0 mg/L
Winter (Dec - Feb)	10.4 mg/L	13.0 mg/L
TP	0.2 mg/L	0.25 mg/L
E. coli [1]	150 CFU/ 100 ml	200 CFU/ 100 ml
pH [2]	6.5 - 8.5	6.0 - 9.5
TRC [3]	Non-Detect	0.02

Notes:
1. TAN objectives and limits presented above were developed based on an assessment of the assimilative capacity of the Saugeen River in the vicinity of the outfall. Final TAN objectives and limits for an upgraded and expanded HWWTP may be more stringent, depending on the liquid treatment train technology(ies) ultimately selected.
2. TRC objective and limit would only apply if the upgraded and expanded HWWTP utilizes chlorination / dechlorination for disinfection.

5 Plant Capacity Review and Plant Optimization (2017)

In 2017, the Town of Hanover hired Ainley Group to conduct a review of the plant processes and to assess current treatment plant's and unit processes capacity. The objective was to identify areas for improvement and offer recommendations for future expansion, plant optimization and operational efficiencies. Several recommendations for plant upgrades were provided to improve plant performance, operational control, and electrical efficiency.

To allow the treatment plant to maintain its capacity even when the unit process with the highest capacity is out-of-service, it was recommended to install an additional screening system and a grit removal system (vortex grit removal) to reduce floatables in downstream processes. It was recommended to install automated fine screening system to ensure peak flows can be treated using an automated screening process to eliminate the need for manual screen cleaning.

To optimize the secondary clarifier's performance, it was recommended to decrease the mixed liquor suspended solids (MLSS) concentrations. This adjustment will help raise the food to microorganism (F/M) ratio closer to the design value. Furthermore, enhancing the aeration systems in both plant 1 and 2 would be beneficial. Upgrading to a fine bubble aeration system with turbo blowers was recommended for both Plant 1 and Plant 2. To accomplish this, appropriately sized new blowers, specifically designed to support more efficient biochemical oxygen demand (BOD) removal and nitrification processes, should be installed.

The current chlorine disinfection system was recommended to be upgraded to include de-chlorination prior to discharging to the Saugeen River to meet requirements with Federal Wastewater Systems Effluent Regulations under the Fisheries Act.

Due to lack of monitoring and instrumentation, installation of flow meters on the WWTP inlet channels and WAS/RAS lines were recommended. There is very limited monitoring and instrumentation at the Hanover WPCP. In order to accurately monitor and evaluate the performance of the plant a number of instrumentation upgrades were also recommended. A centralized SCADA system was also recommended to provide the plant operators with a much greater level of control over the plant and facilitate the optimization of the facility.

6 Anaerobic Digester Assessment (2020)

In 2020, the Town retained Ainley Group to review the existing digester complex and identify required upgrades to meet current codes, including CSA B149.6-15 and TSSA DLB 2016.

The study recommended replacing the aging digester covers (40 years old, with limited maintenance). The primary cover should remain a fixed type but be upgraded with sliding support brackets. The secondary cover should be replaced with a floating gas-holder type, which can store gas (unlike the existing floating pontoon type). Most existing gas safety equipment and hatches can be reused following inspection and replacement of seals and gaskets; however, the updated code requires an additional emergency pressure relief hatch. The new secondary cover will be provided with all required hatches, including the relief hatch, and gas safety equipment. The existing mixing compressor should be replaced with a larger unit of the same type.

7 Capacity Assessment and Optimization Study Upgrade (2023)

This study was carried out to investigate opportunities for improving treatment capacity within the HWWTP. As a component of the re-rating process for the Hanover WWTP, a Technical Memorandum was prepared to evaluate the current capacity and operational status of the HWWTP (Phase 1), along with outlining the plan for conducting stress testing (Phase 2). With the current development plan, the plant rated capacity is anticipated to reach 7,000 m^3/d in 2026. Therefore, completing the re-rating process is critical and urgent to allow continued operation of the HWWTP within ECA requirements.

The desktop capacity assessment and current operation evaluation in Phase 1 suggested that HWWTP has the capacity of ADF 7,000 m^3/d with the new screen system, new CCT baffling wall, and sludge settleability improvement. The Phase 2 Work Plan indicated the studies and system upgrades will take approximately 1 - 1.5 years to complete the re-rating process. Stress testing at the plant in anticipated to be completed in 2026

The plant is currently undergoing upgrades, including replacement of the coarse bubble aeration system in Plant 1 aeration tanks with a fine bubble system, structural and mechanical improvements to the Plant 1 aeration tanks, installation of a new screen, and replacement of the primary clarifier mechanism in Plant 1.

To best utilize the capacity of the existing facility, the stress test of Plant 1 and Plant 2 should test flow rate ADF 7,500 m^3/d after the stress tests on ADF 7,000 m^3/d have succeeded.

The process capacity of the existing plant is summarized in Table 13.

Table 13 – Summary of Capacity Assessment

Treatment Process	Equivalent Average Day Flow (m^3/d)	Spare Capacity above Rated ADF (m^3/d)
Hydraulic Capacity	7,274	-
Pumping Station	7,264	904
Bar Screen	3,360	-
Grit Removal	8,327	1,967
Primary Clarifier	9,500	3,140
Aeration Tank	7,000	640
Secondary Clarifiers (100% RAS rate)	7,196	836
Chlorine Contact Tank (BF=0.7)	5,543	-817
Chlorine Contact Tank (BF=0.95)	7,147	787
Digester	8,053	1,693
Biosolids Storage	7,327	967

A copy of the final report can be found in Appendix C.

8 Problem and Opportunity Statement

Through an examination of the present performance of the HWWTP, as well as an evaluation of existing and projected future wastewater flows within the service area, the Problem/Opportunity Statement has been formulated. It was found that the existing HWWTP is almost at its limit, resulting in insufficient capacity to service the future growth within the Town. Additionally, there exists a high I&I contribution to the plant. An additional wastewater treatment ADF capacity of 7,429 m^3/d is needed to accommodate the projected 2052 growth.

9 Assessment on General Alternative Solutions

To address the problem/opportunity statement, the following potential alternative solutions were considered.

9.1 Alternative 1 – Do Nothing

A “Do-Nothing” alternative has been considered throughout the evaluation and reviewed as a benchmark to gauge the potential impacts of the other alternatives being considered.

9.2 Alternative 2 – Limit the Growth

The official plan projected future growth for the Town of Hanover to year 2046. Therefore, limiting both residential and employment growth could limit future increases to wastewater flow transferred to the HWWTP.

9.3 Alternative 3 – I&I Reduction

The Town is experiencing a significant I&I issue and has initiated the rehabilitation of sewers and manholes to reduce I&I in the collection system. However, the impact of the rehabilitation work on the flows to the plant cannot be accurately assessed. Extra actions to further reduce I&I could help reduce the wastewater flow to the HWWTP.

9.4 Alternative 4 – Optimize Plant Operation

This alternative involves the optimization of the existing unit processes within the HWWTP to enhance its rated capacity. This optimization aims to improve the efficiency and effectiveness of the treatment processes, allowing the facility to handle higher volumes of wastewater while maintaining or even improving its treatment performance.

9.5 Alternative 5 – Rebuild the HWWTP

The current HWWTP consists of two treatment facilities: the West Plant and the East Plant, which together provide a combined capacity of 6,360 m^3/day. This alternative involves demolishing one plant at a time while keeping the other plant operational to maintain continuous treatment during construction.

9.6 Alternative 6 – Expand and Upgrade the HWWTP

The location of the HWWTP is at the northwest corner of the Town's boundary, surrounded by the Saugeen River and a mix of residential and commercial areas. Alternative 6 presents an opportunity to simultaneously carry out expansions and upgrades on the current processes.

9.7 Alternative 7 – Direct Future Wastewater Flows to Another Nearby WWTP

There are existing approved developments which will be connected to the sanitary system upon completion of construction. The wastewater flows resulting from these upcoming developments could potentially be directed to an alternate nearby WWTP (Walkerton WWTP).

9.8 Alternative 8 – Construct a New WWTP at Another Location

As the available space for expansion is limited, building a new wastewater treatment plant at another location in the Town is possible This alternative requires a larger land area than the current HWWTP to accommodate the new developments and future growth. It will require creating a new or adjusted sanitary collection system to direct wastewater flows from new developments and part of the existing servicing area to the new WWTP.

9.9 Alternative 9 – De-centralized WWTPs

The Town could require developers to build de-centralized WWTPs to service their development area needs.

10 Evaluation of Alternatives & Environmental Impacts

10.1 Long-Listed General Alternatives

As part of Phase 2 of the Class EA process, several alternatives have been developed to address the problem/opportunity statement. A preliminary screening was conducted in Table 14 to eliminate alternatives that would not be able to address the problem/opportunity statement.

Table 14 – Long-Listed General Alternatives

Alternative	Ability of Alternative to Address Problem/Opportunity Statement	Carried Forward?
Alternative 1 – Do Nothing	No changes from the existing conditions. Inconsistent with the Grey County and the Town of Hanover Official Plans. This alternative will not solve the problem, as it does not facilitate development. As such this is not a viable solution to address the problem/opportunity statement.	✗
Alternative 2 – Limit the Growth	Contrary to the provisions outlined in the Official Plans of Grey County and the Town of Hanover, this situation also lacks compatibility with the Town's ongoing development efforts. As such this is not a viable solution to address the problem/opportunity statement.	✗
Alternative 3 – I&I Reduction	The outcome of I&I reduction aimed at decreasing the overall wastewater flow to the HWWTP is uncertain. The impact might not be substantial enough to significantly decrease the overall flow. Additionally, the implementation process for typical I&I reduction programs extends over several years and then it takes several additional years before the results are verified. An I&I program is necessary to reduce flows and costs but will not effectively address the treatment requirements related to growth. As such this is not a complete solution to address the problem/opportunity statement, though the Town should continue to implement an I&I program	✓

Alternative	Ability of Alternative to Address Problem/Opportunity Statement	Carried Forward?
Alternative 4 – Optimize Plant Operation	Implement measures to optimize and enhance the performance of the current unit processes within the HWWTP with the objective of expanding its capacity to treat larger volumes of wastewater flow. As such this alternative is not a complete solution to address the problem/opportunity statement, however should be implemented in conjunction with the preferred alternative.	✓
Alternative 5 – Rebuild the HWWTP	Demolish the existing plant and construct a new WWTP at the same location. Wastewater treatment during the demolition process cannot be guaranteed to satisfy the treatment needs. As such this is not a viable solution to address the problem/opportunity statement.	✗
Alternative 6 – Expand and Upgrade the Existing WWTP	Expand the current plant to surrounding Town-owned lands and upgrade existing unit processes within the existing plant. Expansion of the plant on the existing site will require additional land area. The availability of the land within the existing site footprint is constrained by floodplain and the Saugeen River, but expansion is feasible. As such this alternative provides a viable solution to address the problem/opportunity statement.	✓
Alternative 7 – Direct Future Wastewater Flows to Another Nearby WWTP	The feasibility of this alternative relies on the presence of a nearby WWTP capable of accommodating the wastewater flow from the Town of Hanover. Implementing this approach would require the transportation of wastewater over a considerable distance, and would require a willing recipient. This alternative presents significant challenges in terms of practical implementation. As such this is not a viable solution to address the problem/opportunity statement.	✗

Alternative	Ability of Alternative to Address Problem/Opportunity Statement	Carried Forward?
Alternative 8 – Build a New WWTP at Another Location	The certainty of acquiring suitable land for a new WWTP is not guaranteed. A new outfall and a comprehensive ACS of the receiver, and collection system modifications will be required. In addition, there are challenges and inefficiencies related to the diversion of existing sewers between two treatment locations and/or fully redirecting the existing collection system to a new location, however greenfield development may be less costly than building within a constrained site. As such this alternative provides a viable solution to address the problem/opportunity statement.	✓
Alternative 9 – De-centralized WWTP	This alternative would involve the construction of an additional, or several additional WWTP's to service new development. Current development plans do not account for on-site wastewater treatment. This solution would require buy-in from all new developers and would likely deter development. In addition, long term operation of several wastewater treatment facilities would be onerous and costly. Decentralized treatment plants would likely require sub-surface disposal system. As such this is not a viable solution to address the problem/opportunity statement.	✗

Given that alternative 3 and 4 do not comprehensively address the stated issues and opportunities, they will not undergo further evaluation alongside alternative 6 and 8. Instead, they will be integrated into the preferred alternative for consideration.

Alternatives 6 and 8 are advanced for additional assessment. These options will undergo further evaluation in the subsequent section to ascertain whether they effectively align with the problem/opportunity statement.

10.2 Evaluation Matrix for Short-Listed General Alternatives

An unweighted quantitative evaluation using Harvey Balls was conducted to assess the short-listed alternatives. Table 15 below presents the corresponding scores, where 5 indicates the most preferred option and 1 indicates the least preferred.

Table 15 – Harvey Ball Scoring

Harvey Ball	Score
	5
	4
	3
	2
	1

The evaluation criteria applied to assess the alternatives are presented in Table 16 and are as follows:

Complexity: Ease of implementation, integration with current systems, and potential risks are assessed. Approval is given to options with minimal impact on operations, Town activities, and safety.

Compatibility with Current Policies and Regulations: This criterion captures the alternative's ability to align with current policies and growth strategy due to the Town's growth commitment.

Impacts to Property Owners: This criterion captures the potential impacts caused by the alternative to the nearby property owners.

Impacts to Adjacent Business/Commercial Properties: This criterion captures the potential impacts caused by the alternative to the nearby business or commercial properties.

Capital Costs: This criterion pertains to the projected financial investment needed for implementing the alternative.

Addresses the Problem and Opportunity Statement: This criterion captures the alternative's ability to address any of the constraints outlined in the problem statement.

Table 16 – Evaluation Matrix for Short-listed Alternatives

EVALUATION CRITERIA	ALT 6	ALT 8
Complexity	◕	◔
Compatibility with Current Policies and Regulations	◕	◔
Impacts to Property Owners	◕	◑
Impacts to Adjacent Business/Commercial Properties	◑	◑
Capital Costs	◕	◔
Addresses the Problem and Opportunity Statement	●	◕
Total Score	**19**	**12**

Note: A higher score indicates a more preferable option.

10.3 Recommended General Alternative

The preferred alternative is to expand and upgrade the current HWWTP. Additionally, the reduction of I&I along with the optimization of plant operations could complement and enhance the effectiveness of the chosen alternative.

11 Studies

11.1 Socio-cultural Studies

Archaeological Services Inc. (ASI) conducted three studies related to the socio-cultural environment of the subject site to support evaluations of the design alternatives. The three studies included:

- Stage 1 Archaeological Assessment
- Stage 2 Archaeological Assessment
- Cultural Heritage Study

Copies of the final reports by ASI can be found in Appendix D, E, and F.

11.1.1 Stage 1 Archaeological Assessment

The Stage 1 Archaeological Assessment (Background Research and Property Inspection) background study determined that one previously registered archaeological site is located within one kilometre of the Study Area. The property inspection determined that parts of the Study Area exhibit archaeological potential and will require archaeological assessment.

The following recommendations were made:

- Parts of the Study Area exhibit archaeological potential. These lands require Stage 2 archaeological assessment by test pit survey at five metre intervals, where appropriate. Stage 2 is required prior to any proposed construction activities on these lands;
- The remainder of the Study Area does not retain archaeological potential on account of deep and extensive land disturbance or low and wet conditions. These lands do not require further archaeological assessment;
- Should the proposed work extend beyond the current Study Area, further archaeological assessment should be conducted to determine the archaeological potential of the surrounding lands.

11.1.2 Stage 2 Archaeological Assessment

ASI conducted a Stage 2 Archaeological Assessment to satisfy the recommendations of the Stage 1 assessment.

The Stage 2 property survey was conducted from December 13 to 15, 2023, in accordance with the *Ontario Heritage Act* and the *Standards and Guidelines for Consultant Archaeologists* by test pit survey. Approximately 10.4 percent of the Study Area (1,709 square metres) did not have archaeological potential due to previous deep and extensive ground disturbance. These lands include engineered berms relating the infrastructure of the Wastewater Treatment Plant.

The remaining 89.6 percent of the Study Area (1.47 hectares), comprising the woodlot, was subject to test pit survey at five metre intervals, and judgmental test pit survey at 10 metre intervals to confirm previous disturbance such as engineered berms and gleysolic conditions. Portions with intact and non-gleysolic stratigraphy were identified in the central portions of the Study Area.

No archaeological resources were encountered during the Stage 2 survey, and no further archaeological assessment is recommended.

11.1.3 Cultural Heritage Study

ASI conducted a Cultural Heritage Report. The report identifies existing conditions, potential built heritage resources (B.H.R.s), and cultural heritage landscapes (C.H.L.s), and proposes mitigation strategies. While no known heritage features were identified in official registers, seven potential B.H.R.s and three potential C.H.L.s were noted during research and fieldwork.

The following recommendations were made:

- Plan construction to avoid impacting identified built heritage resources and cultural heritage landscapes
- Use mitigation measures such as fencing and crew instructions to protect sensitive areas.
- Conduct a vibration assessment for properties within 50 metres of construction activity, particularly for structures at 703 – 722 7th Avenue and the streetscape from 664 – 590 7th Avenue.
- Engage a heritage consultant if future work extends the study area.

11.2 Natural Environmental Assessment

Palmer completed a Natural Environment Report to support the Class EA for the proposed expansion of the HWWTP. The report characterizes existing environmental conditions and provides ecological input to guide design and mitigate potential impacts.

Fieldwork and background reviews were conducted to identify key natural features, including wetlands, vegetation communities, wildlife, and aquatic habitat adjacent to the plant. The study area includes the Saugeen River and unevaluated wetlands, which support diverse ecological communities and some species at risk.

The report evaluated four design alternatives for the expansion from an ecological perspective. The alternatives varied primarily in footprint size, with smaller options minimizing encroachment on sensitive features. General mitigation strategies were also outlined, including erosion and sediment control, tree preservation, wildlife protection, and invasive species management.

The findings and recommendations will inform future design and permitting requirements, including consultations with relevant authorities.

A copy of the final report by Palmer can be found in Appendix G.

11.3 Floodplain Assessment

CAPES Engineering Ltd. Conducted a Floodplain Assessment to support the proposed HWWTP expansion. The study assessed flood risks associated with the adjacent Saugeen River and examined the potential impacts of various expansion alternatives on local floodplain conditions.

The assessment used hydrologic and hydraulic modeling to determine the extent and depth of flooding from the Saugeen River during a Regional Storm event. A conservative peak flow of 509.08m^3 per second was adopted based on 2009 Greenland Consulting Study. The analysis was completed using Visual Otthymo for hydrology and HEC-RAS for floodplain modeling, supported by a 2023 site-specific topographic survey and Ministry of Natural Resources and Forestry's LiDAR data.

Model results indicate that the western half of the WWTP property lies within the Saugeen River floodplain. However, the existing WWTP infrastructure is situated on elevated land outside of the flood limits. The main access road to the WWTP is also not subject to flooding during a Regional Storm event, ensuring that safe access and egress to the facility is maintained at all times. Two areas were identified as preferred locations for WWTP expansion – one located south of the existing plant (referred to as Area #1) and one to the north (Area #2). Both of these areas are fully located within the floodplain.

To evaluate the feasibility of development within the floodplain, a conceptual grading scenario was modeled for Expansion Area #1 (proposed expansion area). The area was assumed to be filled to an elevation consistent with the existing plant, using a 3:1 side slope transition. The proposed grading scenario was assessed using a modified HEC-RAS model. Results indicated that the floodplain extent remained unchanged, and the maximum increase in flood elevation was less than 2cm – considered a negligible impact.

In conclusion, the study confirms that the proposed WWTP expansion can be accommodated within the existing floodplain without adversely impacting flood risk, provided that the final grading remains consistent with what was modeled. Should the proposed expansion area increase in size or configuration, an updated hydraulic model may be required by the SVCA. All

infrastructure within Expansion Area #1 should be designed with a base flood elevation of 262.22m in mind, and appropriate SVCA permitting will be required for any construction within the regulated area.

A copy of the final report by CAPES Engineering Ltd. can be found in Appendix H.

11.4 Climate Change

As per the MECP guidance document referenced in Section 3.5, the project's potential impacts to climate change and how climate change may impact the project were considered. Climate change concerns generally relate to the increased concentration of greenhouse gases in the atmosphere, which can result in a rise in the global mean surface temperature. Increase temperatures worldwide are creating changes in climate that is resulting in extreme weather events.

The current project is proposing the construction of a new wastewater treatment plant. The infrastructure construction, operations and maintenance activities may increase Greenhouse Gas (GHG) emissions and impacting air quality and climate. Likewise, the implications of climate change on infrastructure can be wide-ranging and can encompass numerous aspects of a project.

12 Evaluation Methodology

An evaluation methodology to identify a recommended treatment technology alternative for HWWTP has been developed based on methodologies and guidelines outlined in the Municipal Class Environmental Assessment. It is proposed to conduct the evaluation based on two (2) distinct WWTP components, which are outlined below:

- Liquid Treatment
- Sludge/Biosolids Treatment/Management

Liquid Treatment refers to the process (treatment train) that treats raw sewage to produce the liquid effluent that will be released into Saugeen River.

Sludge/Biosolids Treatment/Management refers to the system that will treat the solids component of the raw sewage. Treatment can be to a level where the final product can be used or disposed off-site, i.e., applied to agricultural land, to a level that would allow commercial marketing as a fertilizer, or to the minimum level required to allow trucking the sludge/biosolids to an off-site facility for final treatment and use and/or disposal. In this report, sludge is used to indicate unstabilized sludge and biosolids is used to indicate sludge that has been digested or stabilized by another methods.

Evaluation of each of the two (2) treatment mythologies will involve two main steps:

- Identification of a long list of all potential design alternatives and the screening of this list down to a shortlist of viable alternatives.
- A detailed evaluation of the shortlist of design alternatives to identify a recommended alternative solution.

To achieve this goal, the following steps will be undertaken:

- Develop a set of screening criteria to screen the long list of technology alternatives to a short list. This set of criteria is meant to capture features that are considered essential to the success of the WWTP and to establish viability of the alternative.
- Develop a set of evaluation criteria to evaluate the short-listed alternatives. This set of criteria consists of primary and secondary criteria and weightings. These criteria provide a more in-depth analysis of the technologies, sufficient to identify the recommended technology.
- Generate a long list of technologies that could be used for the process being evaluated.
- Use the long-list screening criteria to screen the long-listed technologies to a short list.
- Develop design concepts (treatment trains) using the short-listed technologies.
- Perform detailed evaluations of each design concept, including a life-cycle cost analysis, using the short-list evaluation criteria.
- Identify the recommended treatment technology alternative, based on the results of the detailed evaluation.

12.1 Long-list Technologies Screening Criteria

The criteria selected and descriptions of each criterion for the long-list screening of the liquid train alternatives and sludge/biosolids treatment and management technologies are presented in Table 17 and Table 18.

Table 17 – Liquid Train Long-List Screening Criteria

Criteria	Description
Proven Reliability	Demonstrated track record of consistently meeting and/or exceeding the treatment objectives set forth for the HWWTP Class EA.
Ease of Expansion to Buildout	The system's ability to easily expand to meet the HWWTP's full buildout capacity and the feasibility of the system footprint fitting into the available site.
Operation and Maintenance (O&M)	The simplicity of operation and maintenance and level of staffing required.
Cost	Have benefits/value in-line with the anticipated capital costs and operation and maintenance costs.

Table 18 – Sludge/Biosolids Treatment and Management Long-List Screening Criteria

Criteria	Description
Regulatory Compliance	Ability to meet current and anticipated future regulations for processing and end-use/disposal.
Proven Reliability and Sustainability	Demonstrated successful projects of similar size and high level of flexibility to variations in sludge/biosolids quality and adverse weather conditions.
Staging/Phasing	Ability to easily expand to meet the HWWTP full buildout capacity.
Cost	Have benefits/value that are in line with the capital and operation and maintenance costs.
Resource Recovery/ Revenue Generation	Ability for end product to be used beneficially (e.g. land application) or to generate revenue (e.g. sold commercially as compost or fertilizer)

12.2 Short-list Technologies Screening Criteria

After completion of the Long-list evaluation, the remaining technologies will be subject to, the short-list evaluation process involving the identification of potentially viable alternatives followed by conceptual design, sizing, and costing of each alternative and a detailed evaluation using the screening criteria. The screening criteria were chosen to reflect key aspects of the component being evaluated. Four primary screening categories were used for the evaluation:

- Social/Cultural Impacts;
- Technical Performance;
- Environmental Impacts;
- Economic Impacts.

Each category was assigned a weighted percentage to reflect its relative importance in evaluating each component. The weightings for each category are outlined in Table 19.

Table 19 – Weightings of Each Category

Primary Criteria	Weight	Secondary Criteria	Weight
Social / Culture	15%	Aesthetic Impacts (plant appearance)	10%
		Traffic Impacts (during construction and operation)	30%
		Noise Impacts (during operation)	20%
		Odours Impacts (during operation)	40%
Technical	30%	Ability to Meet Regulatory Objectives	25%
		Technology / Process Robustness	25%
		Ease of Expansion and Phasing to Buildout	10%
		Energy Requirements	10%
		Operation & Maintenance Requirements (simplicity, operator skill level/quantity)	10%
		Site Requirements (plant footprint)	20%
Environmental	30%	Climate Change Impacts / Greenhouse Gas Generation	10%
		Natural Environment Vegetation and Flora Impacts	10%

Primary Criteria	Weight	Secondary Criteria	Weight
		Natural Environment Woodland Impacts	15%
		Natural Environment Wildlife Impacts	15%
		Natural Environment Fisheries and Aquatic Impacts	15%
		Natural Environment Species at Risk Impacts	15%
		Archaeological Impacts	10%
		Stormwater Impacts/Waste Generation	10%
Economic	25%	Capital Cost	30%
		Operation and Maintenance Costs	40%
		Net Present Value	30%

13 Phase 3 Design Alternative and Evaluation

This section provides an overview of the work completed during Phase 3 of the Class EA process. In this phase, design alternatives were developed and assessed in greater detail, including their technical, economic, and environmental impacts. The alternatives evaluated focused on meeting average daily flow projections for 2052 and full build-out conditions, managing current and future peak flows, and exploring technology options for plant expansion.

A detailed evaluation of the design and technology alternatives is provided in the Technology Alternatives Technical Memorandum, included as Appendix I.

13.1 Flow Projection and Expansion Phasing

Based on the 2052 flow projections, the projected ADF at the end of the study period is 13,789 m^3/d. Given that a 30-year horizon is a long-term outlook, it is not necessary for the plant to reach full expansion immediately. Therefore, it is recommended that the expansion of the HWWTP be implemented in the following three phases:

- Phase 1: Conduct plant wide Stress Test to confirm plant can handle 7,000 m^3/d with both Plant 1 and Plant 2 operational. Replace exiting old equipment with new as part of the ongoing Optimization project.
- Phase 2: Construct a new facility to increase the treatment capacity to 10,500 m^3/d with Plant 1 decommissioned. The new facilities will include:
    - New headwork building sized for a treatment capacity of 13,789 m^3/d, including an influent pumping station, screen channel, and grit channel, with equipment initially installed for a capacity of 10,500 m^3/d.

  - New primary and/or secondary treatment, total capacity of 10,500 m^3/d with Plant 2 capacity verified in Phase 1.
  - New tertiary and disinfection building sized for a treatment capacity of 13,789 m^3/d, with equipment initially installed for a capacity of 10,500 m^3/d.
  - New sludge stabilization and storage system, capacity of 10,500 m^3/d.
  - Re-purpose the existing primary and secondary sludge digesters to biosolids storage tanks.
- Phase 3: Expand the new plant to bring the treatment capacity to 13,789 m^3/d. The expansion includes:
  - New screen, grit removal, and pumps in the Phase 2 headworks building
  - Expand Phase 2 primary and/or secondary treatment system
  - Expand the capacity of Phase 2 tertiary and disinfection system.
  - Expand the sludge stabilization tank and build a new biosolids storage tank to store.

Table 20 summarizes the recommended timeline for the implementation of each phase.

Table 20 – Recommended Implementation Timeline

Phasing	Timeline
Phase 1	Stress Testing: 2024-2026
Phase 2	Design: 2026-2028; Construction: 2029-2031
Phase 3	Design: 2034-2035; Construction: 2036-2038

13.2 Liquid Treatment Alternative Evaluation

Treatment of the liquid component of wastewater involves several stages, typically starting with the removal of grit and larger particles and ending with the disinfection of the treated effluent just prior to release into the environment.

A new preliminary treatment facility is necessary to be added to the HWWTP. The new preliminary treatment will include a new mechanical screening system, a new grit removal system, a new headworks building and a new odour control unit.

The technologies that were short-listed for detailed evaluation for the liquid train treatment are listed below:

- Secondary Treatment
  - Conventional Activated Sludge (CAS) System
  - Aerobic Granular Sludge Reactor (AGS)
  - Membrane Aerated Biofilm Reactor (MABR)
  - Moving Bed Biofilm Reactors (MBBR)

- Tertiary Treatment
  - Disc Filter
  - High-rate Clarifier
- Disinfection Treatment
  - Ultra-Violet (UV) Radiation

13.2.1 Secondary Treatment

Alternative 1: Conventional Activated Sludge (CAS)

The CAS process is a widely used biological treatment method that involves a sequence of treatment stages: preliminary treatment, primary clarification, aeration, and secondary clarification. After grit and solids are removed in the preliminary stage, wastewater flows to a primary clarifier where settleable solids are removed and sent to sludge treatment. The clarified water then enters an aeration tank where oxygen is supplied to support the biological conversion of ammonia to nitrate and reduce biochemical oxygen demand (BOD). Following aeration, the water passes to a secondary clarifier that separates out the remaining solids. A portion of the settled sludge is recycled back into the aeration tank (recycle activated sludge), while the rest is directed to sludge treatment as waste activated sludge. Rectangular clarifiers are proposed for ease of construction and potential expansion, though circular clarifiers remain a viable option for future design decisions.

Alternative 2: Aerobic Granular Sludge (AGS)

The AGS process is an advanced form of the sequencing batch reactor (SBR). It operates in distinct phases: filling, reacting, settling, and draining. Wastewater enters a bioreactor where it is treated aerobically by microbial granules that naturally form within the system. These granules are dense, compact, and capable of simultaneously performing multiple biological processes to remove organic pollutants and nutrients. Oxygen is introduced through aeration systems to support microbial activity. One of AGS's key advantages is the rapid settling of these granules, which enables efficient solid-liquid separation within the same tank and removes the need for separate secondary clarifiers. The treated supernatant is then directed to tertiary treatment.

Alternative 3: Membrane Aerated Biofilm Reactor (MABR)

The MABR process combines activated sludge treatment with fixed-membrane biological treatment with gas transfer through specially designed membranes. In this process, air is introduced into hollow-fiber, composite membranes submerged in the wastewater to be treated. Microorganisms grow on the surface of the membrane and create a biofilm. Oxygen from the introduced air diffuses through the membrane to support the microbial activity, allowing efficient removal of organic contaminants and nutrients from the wastewater.

Alternative 4: Moving Bed Biofilm Reactor (MBBR)

The MBBR process uses suspended plastic carriers, typically made of HDPE or PVC, to support the growth of biofilm that biologically removes pollutants from the wastewater. As a stand-alone treatment system, MBBR does not require sludge recirculation; only excess biomass needs to be removed. To manage this waste sludge, the process incorporates a Dissolved Air Flotation (DAF) unit, which separates suspended solids by saturating the effluent with dissolved air under pressure and releasing it at atmospheric conditions. The flotation process effectively clarifies the

MBBR effluent, and since DAF effluent is oxygen-rich, no further re-oxygenation is required to meet effluent dissolved oxygen standards.

The evaluation criteria and weightings used to assess the short-listed secondary treatment technology alternatives, along with the results of the detailed evaluation, are summarized in Table 21. Each alternative was ranked on a scale from 1 to 5 – where 5 represents the most preferred option (i.e., lowest environmental impact), and 1 represents the least preferred option (i.e., highest environmental impact).

The results of the evaluation show that the preferred secondary treatment technology is Conventional Activated Sludge (Alternative 1).

Table 21 – Evaluation Matrix for Short-Listed Secondary Treatment Alternatives

PRIMARY CRITERIA		SECONDARY CRITERIA		ABSOLUTE WEIGHT (WT)	SHORT LISTED ALTERNATIVES							
					Alternative 1 CAS		Alternative 2 AGS		Alternative 3 MABR		Alternative 4 MBBR	
CRITERIA	WEIGHT	CRITERIA	WEIGHT		SCORE*	WT SCORE	SCORE*	WT SCORE	SCORE*	WT SCORE	SCORE*	WT SCORE
Social/Culture	15%	Aesthetic Impacts (plant appearance)	10	1.5	3	0.9	2	0.6	2	0.6	4	1.2
		Traffic (during construction and operation)	30	4.5	3	2.7	3	2.7	3	2.7	3	2.7
		Noise Impacts (during operation)	20	3	3	1.8	3	1.8	3	1.8	3	1.8
		Odour Impacts (during operation)	40	6	4	4.8	4	4.8	4	4.8	4	4.8
Technical	30%	Ability to Meet Regulatory Objectives	25	7.5	5	7.5	5	7.5	5	7.5	5	7.5
		Technology/Process Robustness	25	7.5	5	7.5	5	7.5	5	7.5	5	7.5
		Ease of Expansion and Phasing to Buildout	10	3	3	1.8	3	1.8	3	1.8	4	2.4
		Energy Requirements	10	3	3	1.8	4	2.4	4	2.4	4	2.4
		Operation & Maintenance Requirements (simplicity, operator skill level/quantity)	10	3	4	2.4	3	1.8	4	2.4	3	1.8
		Site Requirements (plant footprint)	20	6	4	4.8	3	3.6	4	4.8	5	6
Environmental	30%	Climate Change Impacts / Greenhouse Gas Generation	10	3	4	2.4	4	2.4	4	2.4	4	2.4
		Natural Environment Vegetation and Flora Impacts	10	3	4	2.4	4	2.4	4	2.4	4	2.4
		Natural Environment Woodland Impacts	15	4.5	4	3.6	4	3.6	4	3.6	4	3.6
		Natural Environment Wildlife Impacts	15	4.5	4	3.6	4	3.6	4	3.6	4	3.6
		Natural Environment Fisheries and Aquatic Impacts	15	4.5	4	3.6	4	3.6	4	3.6	4	3.6
		Natural Environment Species at Risk Impacts	15	4.5	4	3.6	4	3.6	4	3.6	4	3.6
		Archaeological Impacts	10	3	5	3	5	3	5	3	5	3
		Stormwater Impacts	10	3	5	3	5	3	5	3	5	3
Economic	25%	Capital Cost	30	7.5	5	7.5	3	4.5	4	6	4	6
		Operation and Maintenance Costs	40	10	5	10	3	6	3	6	4	8
		Net Present Value	30	7.5	5	7.5	2	3	4	6	3	4.5
		TOTAL SCORE	**100**		**86.2**		**73.2**		**79.5**		**81.8**	

13.2.2 Tertiary Treatment

Alternative 1: Disc Filters

Disc filters are advanced filtration systems that help remove phosphorus and produce very clean water. They work by adding chemicals to the wastewater, which then flows into a tank with rotating filter discs. These discs catch solids while clean water passes through and is collected. Some solids settle to the bottom and are removed from time to time, while others are cleaned off the discs using a vacuum system. This technology is already used in many treatment plants in Canada and is known for providing high-quality results.

Alternative 2: High-Rate Clarifier

A high-rate clarifier is a compact system that quickly removes solids from wastewater. After adding chemicals to help particles stick together, the water flows through a tank with slanted plates or tubes. These help the solids settle to the bottom more easily, where they are removed as sludge. The cleaner water rises to the top and flows out for further treatment or discharge. It's a reliable method used in many types of wastewater systems, including during heavy rain events.

The evaluation criteria and weightings used to evaluate the short-listed tertiary treatment technology alternatives and the results of the detailed evaluation of the alternatives were summarized in Table 22. Each alternative was ranked on a scale from 1 to 5 – where 5 represents the most preferred option (i.e., lowest environmental impact), and 1 represents the least preferred option (i.e., highest environmental impact).

The results of the evaluation show that the preferred secondary treatment technology is Disc Filters (Alternative 1).

Table 22 – Evaluation Matrix for Short-Listed Tertiary Treatment Alternatives

PRIMARY CRITERIA		SECONDARY CRITERIA		ABSOLUTE WEIGHT (WT)	SHORT LISTED ALTERNATIVES			
					Alternative 1 Disc Filter		Alternative 2 High-rate Clarifier	
CRITERIA	WEIGHT	CRITERIA	WEIGHT		SCORE*	WT SCORE	SCORE*	WT SCORE
Social/Culture	15%	Aesthetic Impacts (plant appearance)	10	1.5	3	0.9	4	1.2
		Traffic (during construction and operation)	30	4.5	4	3.6	3	2.7
		Noise Impacts (during operation)	20	3	4	2.4	4	2.4
		Odour Impacts (during operation)	40	6	4	4.8	4	4.8
Technical	30%	Ability to Meet Regulatory Objectives	25	7.5	5	7.5	5	7.5
		Technology/Process Robustness	25	7.5	4	6	4	6
		Ease of Expansion and Phasing to Buildout	10	3	4	2.4	4	2.4
		Energy Requirements	10	3	5	3	4	2.4
		Operation & Maintenance Requirements (simplicity, operator skill level/quantity)	10	3	4	2.4	4	2.4
		Site Requirements (plant footprint)	20	6	3	3.6	4	4.8
Environmental	30%	Climate Change Impacts / Greenhouse Gas Generation	10	3	4	2.4	2	1.2
		Natural Environment Vegetation and Flora Impacts	10	3	4	2.4	4	2.4
		Natural Environment Woodland Impacts	15	4.5	4	3.6	4	3.6
		Natural Environment Wildlife Impacts	15	4.5	4	3.6	4	3.6
		Natural Environment Fisheries and Aquatic Impacts	15	4.5	4	3.6	4	3.6
		Natural Environment Species at Risk Impacts	15	4.5	4	3.6	4	3.6
		Archaeological Impacts	10	3	5	3	5	3
		Stormwater Impacts	10	3	5	3	5	3
Economic	25%	Capital Cost	30	7.5	4	6	3	4.5
		Operation and Maintenance Costs	40	10	4	8	3	6
		Net Present Value	30	7.5	4	6	3	4.5
		TOTAL SCORE		100	**81.8**		**75.6**	

13.2.3 Disinfection Treatment

The existing chlorine contact tank, in service since the 1980s, is recommended for replacement with a new UV disinfection system to simplify operations and maintenance. A new disinfection building and UV channel, sized for a capacity of 13,789 m^3/d, will be constructed in Phase 2. Initially, a UV bank for 10,500 m^3/d will be installed, with a second UV bank added in Phase 4 to reach full capacity. Equipment installation will match phased plant expansion needs. While a simpler, lower-cost portable water-style UV system may be suitable for disc filter effluent, this report takes a conservative approach by assuming a channel-style UV system, with final selection to be confirmed during detailed design.

13.3 Sludge/Biosolids Treatment Alternative Evaluation

For the purposes of this assessment, sludge refers to wastewater solids that have not been stabilized and biosolids refers to wastewater solids that have been stabilized. Sludge does not include screenings and grit that has been removed during preliminary treatment, as these are typically hauled off site.

The on-site sludge stabilization technologies that were short-listed for detailed evaluation were:

- Mesophilic Anaerobic Digestion
- Aerobic Digestion

13.3.1 Biosolids Management

Alternative 1: Mesophilic Anaerobic Digestion

This method uses anaerobic microorganisms to break down organic waste, such as sewage sludge and food waste, in an oxygen-free environment at moderate temperatures (35–38°C). The process produces biogas—mainly methane and carbon dioxide—that can be used as a renewable energy source. Before entering the digester, sludge is thickened to around 5% solids with polymer addition and sludge thickening process. The treated biosolids are stored on-site before being hauled off-site for land application. This approach is widely used for its efficiency in reducing waste and recovering energy and nutrients.

Alternative 2: Aerobic Digestion

In this approach, sludge and scum are sent to an aerobic digester equipped with aeration and mixing systems. Biosolids are then pumped to a thickening or dewatering system where polymers are added to reach about 1.5% solids. The resulting thickened or dewatered biosolids are stored on-site and transported off-site for land application during the summer months. While it does not produce energy like anaerobic digestion, it is a simpler process that supports seasonal nutrient recycling.

The evaluation criteria and weightings used to evaluate the short-listed biosolids management technology alternatives and the results of the detailed evaluation of the alternatives were summarized in Table 23. Each alternative was ranked on a scale from 1 to 5 – where 5 represents the most preferred option (i.e., lowest environmental impact), and 1 represents the least preferred option (i.e., highest environmental impact).

The results of the evaluation show that the preferred secondary treatment technology is Mesophilic Anaerobic Digestion (Alternative 1).

Table 23 – Evaluation Matrix for Short-Listed On-Site Sludge Stabilization Treatment Alternatives

PRIMARY CRITERIA		SECONDARY CRITERIA		ABSOLUTE WEIGHT (WT)	SHORT LISTED ALTERNATIVES			
					Alternative 1 Anaerobic Digestion		Alternative 2 Aerobic Digestion	
CRITERIA	WEIGHT	CRITERIA	WEIGHT		SCORE*	WT SCORE	SCORE*	WT SCORE
Social/Culture	15%	Aesthetic Impacts (plant appearance)	10	1.5	4	1.2	3	0.9
		Traffic (during construction and operation)	30	4.5	3	2.7	3	2.7
		Noise Impacts (during operation)	20	3	3	1.8	3	1.8
		Odour Impacts (during operation)	40	6	3	3.6	3	3.6
Technical	30%	Ability for Beneficial Reuse	25	7.5	4	6	3	4.5
		Technology/Process Robustness	25	7.5	4	6	4	6
		Ease of Expansion and Phasing to Buildout	10	3	4	2.4	4	2.4
		Energy Requirements	10	3	4	2.4	3	1.8
		Operation & Maintenance Requirements (simplicity, operator skill level/quantity)	10	3	4	2.4	3	1.8
		Site Requirements (plant footprint)	20	6	4	4.8	3	3.6
Environmental	30%	Climate Change Impacts / Greenhouse Gas Generation	10	3	4	2.4	4	2.4
		Natural Environment Vegetation and Flora Impacts	10	3	4	2.4	4	2.4
		Natural Environment Woodland Impacts	15	4.5	4	3.6	4	3.6
		Natural Environment Wildlife Impacts	15	4.5	4	3.6	4	3.6
		Natural Environment Fisheries and Aquatic Impacts	15	4.5	4	3.6	4	3.6
		Natural Environment Species at Risk Impacts	15	4.5	4	3.6	4	3.6
		Archaeological Impacts	10	3	5	3	5	3
		Waste Generation	10	3	3	1.8	3	1.8
Economic	25%	Capital Cost	30	7.5	4	6	3	4.5
		Operation and Maintenance Costs	40	10	4	8	3	6
		Net Present Value	30	7.5	4	6	3	4.5
		TOTAL SCORE		**100**	**77.3**		**68.1**	

14 Recommended Design Alternative

The results of the technology alternative evaluations are summarized in Table 24.

Table 24 – Summary of Recommended Treatment Technologies

Process	Recommended Treatment Technology
Preliminary Treatment	Mechanical Screening and Grit Removal with Odour Control
Secondary Treatment	Conventional Activated Sludge
Tertiary Treatment	Disc Filters
Disinfection	UV Radiation
On-site Sludge Stabilization	Anaerobic Digestion

The flow schematic and site plan for the recommended design alternative are presented in Figure 3 and Figure 4.

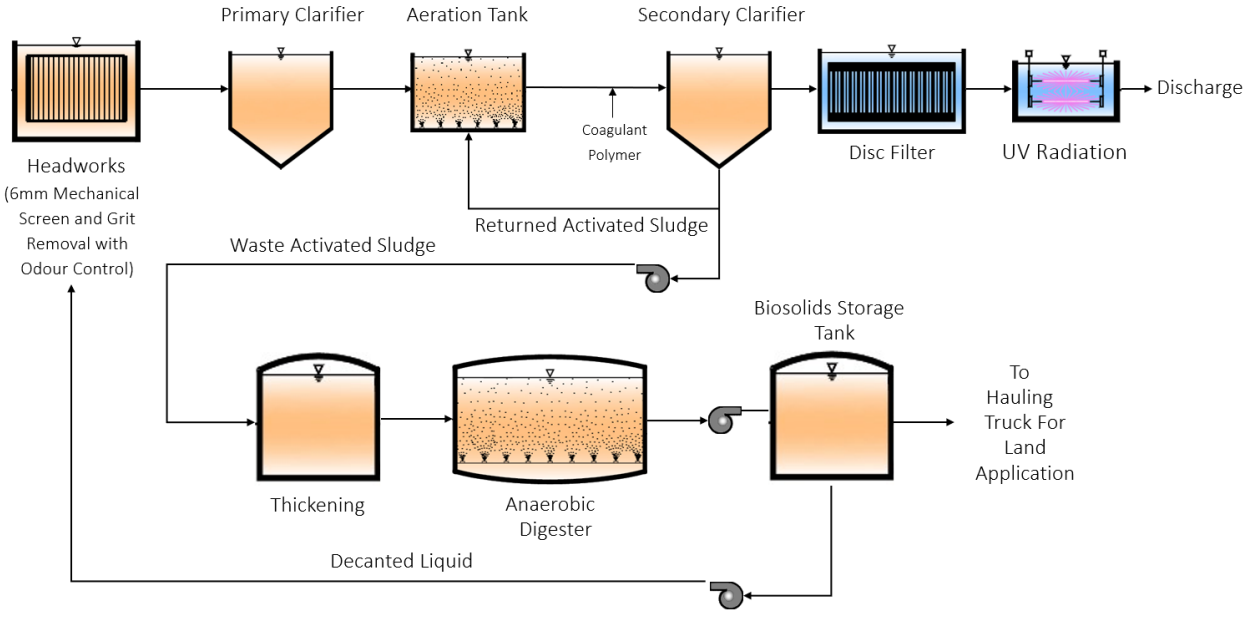


Figure 3 – Flow Schematic of Recommended Treatment Technologies

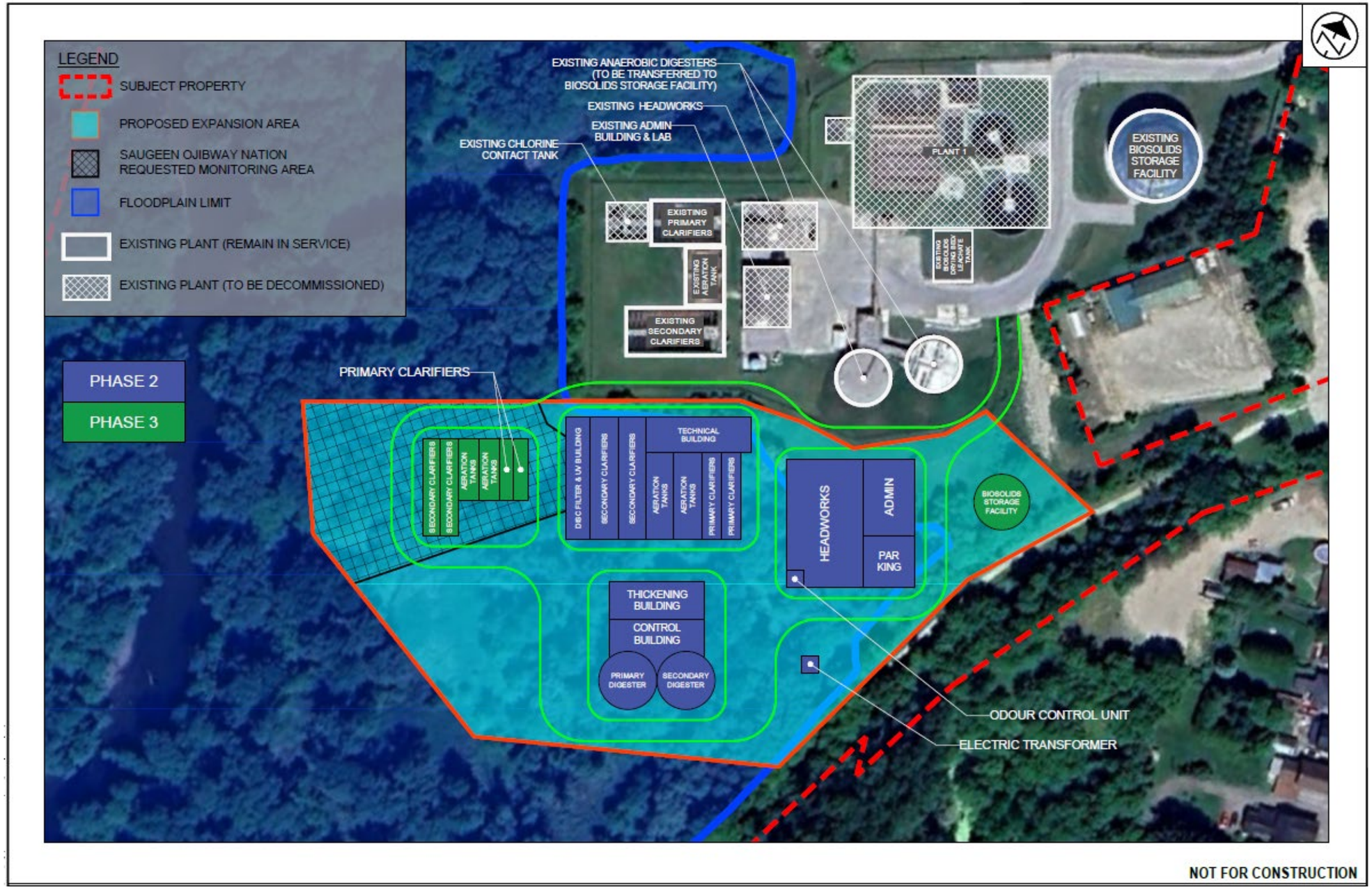


Figure 4 – Conceptual Site Plan of Recommended Design Alternative

15 Capital Costs of Construction

Ainley Group has prepared a rough order of magnitude capital construction probable cost (**Class 5 estimate per AACE International)** for the HWWTP based on the following assumptions:

- Costing of common equipment and construction materials are developed based on Ainley's past project experience.
- Supplier quotes for major equipment.
- Structural and architectural cost estimate is based on Ainley's past experience with similar scope projects as Geotechnical investigation is not available at this time.
- No contaminated soils have been assumed on site.
- Cost for any required site investigations is not included in the estimate.
- Any direct costs from utilities and required permits will be paid by the Town directly.
- Costs to replace existing aging equipment in Plant 2 are not included in this estimate; these are summarized in the following Section 15.

The breakdown of cost estimates is presented in the Table 25 below. The estimates are based on 2024 dollars, as the quotations and calculations were completed in 2024. The costs below do not include upgrades to the existing plant.

Table 25 – WWTP Expansion Capital Cost

	PHASE 1 CAPITAL COST ESTIMATE (2024 Dollars)	PHASE 2 CAPITAL COST ESTIIMATE (2024 Dollars)	PHASE 3 CAPITAL COST ESTIIMATE (2024 Dollars)
Phase 1 Stress Test	$200,000		
Preliminary Treatment / (6mm Screening)	-	$32,065,000	-
Secondary Treatment / (CAS)	-	$22,388,000	$5,410,000
Tertiary Treatment / (Disc Filter)	-	$8,545,000	-
Disinfection/ (UV Radiation)	-	$1,103,000	$155,000
On-site Sludge Stabilization/ (Anaerobic Digestion)	-	$15,095,000	$2,254,000
Miscellaneous Upgrades (Optimization)	$2,000,000	-	-

	PHASE 1 CAPITAL COST ESTIMATE (2024 Dollars)	PHASE 2 CAPITAL COST ESTIIMATE (2024 Dollars)	PHASE 3 CAPITAL COST ESTIIMATE (2024 Dollars)
SUB TOTAL	**$2,200,000**	**$79,196,000**	**$7,819,000**
General Requirements including Mobilization and Demobilization, Insurance and Bonding, etc. (20%)	$440,000	$15,840,000	$1,564,000
Contractors Profit (8%)	$176,000	$6,336,000	$626,000
Contingency (40%)	$880,000	$31,679,000	$3,128,000
Engineering Fees (15%)	$330,000	$11,880,000	$1,173,000
TOTAL COSTS	**$4,026,000**	**$144,931,000**	**$14,310,000**

16 Upgrades to Plant 2, Decommissioning of Plant 1 & Other Structures

Plant 2 comprises two (2) primary clarifiers, two (2) aeration tanks, and two (2) secondary clarifiers. The facility was constructed in 1980 and is now over 40 years old. Since its original construction, Plant 2 has not undergone any major upgrades. The majority of the equipment is at or beyond its intended service life and requires renewal.

The recommended upgrades for Plant 2 include converting the aeration system to fine bubble aeration, installing new blowers, replacing the RAS and WAS pumps, replacing the sludge pumps, and upgrading the sludge collector and scum collection systems in both the primary and secondary clarifiers. In addition, Plant 2 aeration tank might need to be expanded to meet future effluent criteria depending on the effluent quality observed after the Plant 2 upgrades.

Plant 1 was originally constructed in 1934 and expanded in 1963 and 1984. No structural drawings and only limited discipline drawings are available for the existing facilities. While some structures, such as the aeration tanks and primary clarifiers, are undergoing rehabilitation as part of optimization upgrades, and two secondary clarifiers were rehabilitated in 2017, the facility is now over 60 years old. The digesters, over 40 years in service, are out of compliance with current regulatory codes and require major upgrades.

Given these factors, it is recommended that Plant 1 be decommissioned. Certain equipment within the buildings may need to remain in place or be relocated to support the continued operation of Plant 2. The decommissioned tanks could be repurposed to receive leachate from the future landfill expansion, allowing for controlled release into the WWTP. Alternatively, they could be modified for use as stormwater tanks to provide peak flow attenuation during storm events.

The total cost of upgrades to Plant 2 and the decommissioning of Plant 1 is estimated at approximately **$6.0 million** in 2025, excluding the expansion of Plant 2 aeration tanks and modifications to existing tanks.

17 Impacts, Mitigation Measures and Monitoring Program

17.1 Impacts of the Preferred Solution

Through the evaluation of alternatives, potential impacts of expanding the HWWTP evaluated on the social/cultural, technical, natural, and economic aspects of the environment were identified. The potential impacts were evaluated and against the baseline conditions of continuing to maintain the HWWTP (Do Nothing). A summary of the impacts of the preferred solution are presented in the following section.

17.1.1 Social/ Cultural Environment

The site has been reviewed for archaeological and cultural heritage features, and no impacts were identified through the study. As such, no mitigation measures related to archaeological resources, built heritage resources, or cultural heritage landscapes are required during implementation of the proposed solution.

Construction of the proposed works under each phase will occur over a three-year period. During this time, typical construction-related impacts may be experienced in the surrounding area, including noise, dust, potential vibration, and increased local traffic.

The expansion of the HWWTP will take place on lands currently owned by the Town, including a portion of a woodland area.

17.1.2 Technical Environment

The expansion of the HWWTP will improve both the average and peak treatment capacities of the facility. The increased capacity will support the projected growth within the Town's urban area to the year 2052. Additionally, enhanced hydraulic capacity will help manage high peak flows and variable loading conditions at the plant, reducing the risk of untreated overflows into the receiving waterbody.

The upgraded plant will continue to operate within the current effluent loading objectives, with phased upgrades designed to meet future capacity requirements. Effluent quality will be maintained in accordance with the concentration limits prescribed in the HWWTP’s ECA. As a result, the conditions of the lakefront, which support tourism and recreational use, are expected to remain consistent with the baseline conditions.

Geotechnical and hydrogeological conditions at the site have not yet been established. Investigations will be required to determine structural design parameters and identify any dewatering requirements during construction.

Filling the proposed expansion area to certain elevation results in a very small increase in flood elevation and does not expand the floodplain area. This means the flood risk to surrounding lands remains unchanged.

17.1.3 Natural Environment

To support the proposed construction, some tree removals will be needed. Once the final design is chosen, a certified arborist will prepare a Tree Protection Plan to help keep as many trees as

possible. Trees that can be saved will be protected with fencing set up around their roots and trunks to prevent damage from construction equipment and activities. This fencing will be checked before any work starts.

Vegetation removal could also affect birds and bats during their active season, which runs from April 1 to November 30. These species are protected by federal and provincial laws. To reduce impacts, tree or vegetation clearing will be scheduled outside this time whenever possible. If work must happen during the active season, a qualified ecologist will check for nesting activity. If nests are found, the work may be delayed until the young birds have left the nest.

The Saugeen River is not directly affected by the construction, but steps will still be taken to protect it and nearby wetlands. Erosion and sediment control (ESC) measures will be used to prevent soil from washing into water features. These measures include installing fencing, keeping natural vegetation when possible, protecting soil stockpiles, and inspecting the site before and after heavy rain or snowmelt.

If shoreline work requires a barrier in the water, steps may also be taken to safely move any fish that could be trapped. All ESC measures will be fixed within 48 hours if damaged and will be monitored regularly throughout the project.

Throughout the construction, environmental inspectors will check that protection measures are in place and working. They will keep detailed records and submit a final report at the end of the project. This report will describe the work completed, how the environment was protected, and any major changes that were made during construction.

17.1.4 Economic Environment

Capital cost impacts of the proposed solution are significant; the proposed works have a total estimated capital cost of approximately $163 million over the full three-phases of the expansion proposed.

17.2 Mitigation Measures and Monitoring Program

Monitoring of potential environmental impacts and mitigation measures, during and after the implementation of the preferred design alternative, is an important and necessary step. This section outlines the mitigation measures and monitoring program during the construction and operation of the facilities. The mitigation measures and monitoring program identified from social/cultural, technical, natural, and economic aspects are summarized in the following sections.

17.2.1 Mitigation Measures

Social/cultural Environment

Community Engagement: Conduct regular community meetings to inform residents about construction schedules, potential impacts, and mitigation strategies.

Traffic Management Plan: Develop and implement a traffic management plan to minimize disruption caused by construction vehicles, including clear signage and alternate routes.

Aesthetic Impacts: Establish a visual barrier between Hanover Community Trail and the proposed works through the use of a berm and/or tree stand.

Technical Environment

Effluent Quality Assurance: Maintain effluent water quality within the established ECA limits through application of well-established treatment technologies.

Geotechnical Investigation: Conduct a geotechnical investigation to determine the structural requirements for foundation design and underground tank construction.

Hydrogeological Investigation: Conduct a hydrogeological investigation to determine the extent of dewatering necessary to facilitate construction of underground structures.

Effluent Quality Assurance: Maintain effluent water quality within the established ECA limits through application of well-established treatment technologies. Ensure compliance with phosphorus limits through establishment of a chemical phosphorus removal system.

Odour and Air Emission Control: Prepare an emissions summary and dispersion modeling (ESDM) report during detailed design to evaluate odour sources and treatment requirements. Utilize odour control systems to mitigate odour emissions from newly relocated processes as prescribed in the ESDM report, ensuring compliance with odour guidelines. Complete an air dispersion modelling as part of the detailed design and implement best management practices for the mitigation of odour and air emissions. Confirm mitigation measures and obtain Amended ECA (Air and Noise).

Noise Control: Prepare an Acoustic Assessment Report (AAR) during detailed design to evaluate noise sources and mitigation measures. House the noise sources in noise-attenuating structure to shield the environment and residents from the noise. Confirm mitigation measures and obtain Amended ECA (Air and Noise).

Natural Environment

Environmental Management Plan: Complete an Environmental Management Plan during detailed deign to identify the impact to existing trees, stormwater management, impact to existing buildings, and restoration plans.

Site Management: Clearly demarcate construction zones to avoid disturbance to surrounding areas, ensuring that no significant habitat or wildlife is impacted outside of the existing site.

Monitoring Water Quality: Regular monitoring of the effluent and receiving water quality for key parameters to confirm that loading limits are met as capacity increases.

Environmental Protection: Implement erosion and sediment control measures during construction to prevent any runoff affecting nearby water bodies.

Stormwater management: Develop a stormwater management plan during detailed design the ensure pre-development run-off levels are maintained after construction. Develop and implement a site-specific spill management plan.

Climate Change Adaptation: Utilize rating systems targeting at reducing energy usage and meeting climate change targets to improve the energy efficiency during design, construction, and operation and maintenance to reduce GHG emissions. Investigate risk reduction measures at the detailed design stage to manage the additional challenge presented by climate change.

Areas of Potential Environmental Concern (APEC): Confirm designated substances such as asbestos for the existing structure that will be demolished. Conduct investigations for expansion works to identify potential hazards in areas to be excavated in support of developing excess soils management plan and construction dewatering plan.

Economic Environment

Cost Management Plan: Establish a financial management plan that includes regular assessments of operational costs, including energy and chemical use, to ensure budget adherence.

Grants and Funding: Explore potential grants or funding opportunities to offset capital and operational costs, including energy efficiency programs.

17.2.2 Monitoring Program

Table 27 summarized the monitoring activities, frequency and timing of survey, and parameters for documentation.

Table 26 – Monitoring Program

Category	Monitoring Activities	Frequency	Documentation
Social/ Cultural	Community Feedback	Bi-annual community surveys to gather feedback on construction impacts and community satisfaction	Assess noise levels, dust complaints, and overall community sentiment regarding the construction process and during operation
	Traffic Monitoring	Monthly assessments during construction	Monitor traffic flow, congestion, and incidents near the construction site to ensure effective implementation of the traffic management plan
Technical	Water Quality Monitoring	Monthly sampling of effluent and downstream water quality during operational phases	Keep records of total phosphorus, nitrogen levels, suspended solids, and biochemical oxygen demand (BOD) parameters
	Surface Water Monitoring	Monthly sampling of final outfall mixing zone during construction	Assessment of potential cladophora management if warranted
	Stormwater Monitoring	Constant monitoring during wet weather conditions	Keep records of on-site spill events and mitigation measures taken
Natural	Terrestrial Habitat Assessment	Pre-construction, mid-construction, and post-construction assessments	Document any unexpected impacts on the site and surrounding areas, including monitoring for any unanticipated wildlife activity

Category	Monitoring Activities	Frequency	Documentation
Economic	Cost Analysis	Quarterly financial reviews to evaluate capital and operational expenditures	Track operational costs related to energy, chemical usage, and sludge management to assess budget compliance and identify potential savings

18 Public, Agency and Indigenous Consultation

Public engagement and input are integral components of the Class EA process and assist in allowing anyone with an interest in the study to have the opportunity to provide input as the study proceeds.

A database containing the contact information of stakeholders, review agencies, indigenous groups, and other interested parties was developed at the outset of the study to invite participation in the study. The contact list was regularly updated throughout the study as more individuals became aware of the study or provided feedback. Interested parties could request to be added to the contact list at any point during the study in order to receive public notices and newly available public information as well as the opportunity to attend upcoming public events.

To facilitate communication with all stakeholders and other interested parties, the Town posted information relating to the Class EA on its website. The website contained project description, project timeline, project budget, contact information, copies of all issued notices, and the PIC materials.

Notices were distributed directly to key contacts and through local newspaper (*The Post*). All notices were sent directly to each person who requested inclusion in the Notice List. The notices that were provided as part of this Class EA and the date of issue are summarized in Table 28.

A study contact list and a complete consultation record can be found in Appendix J.

Table 27 – List of Public Notices Issued throughout Study

Notice	Date of Issue	Purpose of Notice
Notice of Study Commencement	October 6th, 2022 October 13th, 2022	Informs that the study was underway and to provide information on the study process
Notice of Public Information Centre (PIC) #1	May 2nd, 2024	Notifies of the details, date, and location of PIC, which presented the results of Phase 1 & 2 work of the Study.
Notice of PIC#2	April 3rd, 2025	Notifies of the details, date, and location of PIC, which presented the results of Phase 3 work of the Study.
Notice of Completion	November 13th, 2025	Notifies that the study has been completed and provides a date for when the ESR will be available for review.

18.1 Notice of Commencement

A Notice of Study Commencement was placed in the Hanover newspaper for the October 6th and 13th, 2022 editions. An email was sent out to relevant review agencies as well as Indigenous communities and nations was issued on October 6, 2022 providing notification of the commencement of the project. Copies of the issued letters and notices, as well as the agency mailing list and copies of all comments received and associated responses as a result of the Notice of Study Commencement are included in Appendix J.

MECP staff provided a formal letter dated October 28th, 2022 that acknowledged that the study is following the approved environmental planning process for a Schedule C project under the Municipal Class Environmental Assessment. The letter had attached "Areas of Interest" document that provides guidance regarding the ministry's interests with respect to the Class EA process. The letter continued to describe the Crown's duty to consult and provided information on Indigenous communities the proponent is required to consult with as they may be potentially affected by the proposed project.

18.2 PIC #1

PIC #1 was posted on the Town of Hanover's website on May 2nd, 2024. Printable presentation boards were also made available for pickup at the Town of Hanover Hall.

The PIC#1 virtual presentation material outlined the Municipal Class EA Schedule 'C' planning process and its relevance to the current project. It included a description of existing plant condition and capacity evaluation, population and wastewater flow projection, and the evaluation of the preliminary preferred alternative.

18.3 PIC #2

PIC#2 was posted on Town of Hanover's website on April 3rd, 2025. Printable presentation boards were also made available for pickup at the Town of Hanover Hall.

The PIC #2 was held to give the community an opportunity to learn about and provide feedback on several completed technical studies. These studies focused on archaeological and cultural heritage assessments, natural heritage assessment, floodplain analysis, evaluation of treatment technology alternatives, and a preliminary cost analysis. An Evaluation Table was developed to summarize the potential impacts of each technology alternative. Based on this evaluation, a preferred design solution was identified.

18.4 Notice of Completion

The Notice of Completion was posted on the Town's website, published in local newspapers (*The Post*), and distributed to stakeholders on November 13th, 2025.

18.5 Consultation with Indigenous Communities

Throughout this Class EA, engagement with the following First Nations (FN) has occurred.

- Chippewas of Nawash Unceded First Nation
- Saugeen First Nation
- Saugeen Ojibway Nation Environment Office (SON) (as the consultation contact for Chippewas of Nawash Unceded First Nation and Saugeen First Nation)

- Historic Saugeen Métis (HSM)
- Great Lakes Métis Council

Notice of the Study Commencement, Public Information Centres and Study Completion were issued to the identified communities according to the dates outlined in Table 23.

On October 18, 2023, the Stage 1 Archaeological Assessment Report and Cultural Heritage Report were provided.

On December 8, 2023, the Natural Heritage Report was shared with the relevant parties.

A consultation meeting with SON was held on December 20th, 2023 to review their consultation protocol and expectations.

On March 4th, 2024, HSM confirmed they had no concerns and were satisfied with all documents presented to date (Stage 1 Archaeological Assessment report, Natural Environment Report, and Natural Heritage Report).

The Stage 2 Archaeological Assessment Report was provided to all FNs mentioned above on March 25th, 2024.

HSM provided their comments on May 1st, 2025. The comments and corresponding responses are included in the comment table in Appendix J.

SON submitted comments on the report on April 4th, 2024, and ASI updated the report accordingly.

19 Permits and Approvals

Prior to any construction of the works, all necessary approvals by regulatory agencies must be in place. At the commencement of the implementation phase, an approvals register should be prepared and reviewed with concerned agencies to verify their specific requirements. The following represent the main approvals that will be required on the project:

- Ministry of Environment, Conservation and Parks (MECP): MECP will issue an Environmental Compliance Approvals (ECA) for sewage, air and noise, which will delineate the physical extent of the works being approved and the compliance requirements for effluent quality, odour, and noise as well as outlining monitoring and reporting requirements. ECA applications require the completion of the designs and design reports.
- Saugeen Valley Conservation Authority (SVCA): SVCA will require an application for a work permit where the proposed works affect a watercourse, floodplain, wetland, or hazardous lands. The application must be submitted in advance of the proposed construction start date and must include engineered drawings demonstrating the extent of fill required for floodproofing.
- Ministry of Natural Resources and Forestry (MNRF): MNRF will require application for a permit for any works that affect species at risk, fish or bird habitat, as well as work in or near rivers. Applications will require submission of an Environmental Management Plan that delineates all potential impacts as well as planned mitigations.
- Town of Hanover: The Town will require application for building permits for any building works including the HWWTP.

- Grey County: An Arborist Report and Tree Protection Plan may be required for any trees greater than 10 cm DBH that are to be disturbed, injured, or removed within 6 m of the proposed project footprint.
- Utility Company: A range of permits and inspection will be required from Utility Company involving incoming power, protective systems, and installation compliance.
- Technical Standards and Safety Authority (TSSA): TSSA approval will be required for installation of the diesel generator and any fuel systems.
- Historic Saugeen Métis (HSM): Recommendations from HSM (as mentioned in Section 17.5) should be implemented during design/construction.