

2021 Biosolids Management Master Plan Update

Welcome to Virtual Public Information Centre No. 1

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Project Introduction

The Niagara Region is undertaking a region-wide Biosolid Management Master Plan (BMMP) Update for the future management of biosolids from each of the Region's water and wastewater treatment plants.

As Niagara Region continues to grow, we need to make sure that we plan our infrastructure and services in order to meet increasing demands. More people means more wastewater, which also means more biosolids and a higher demand for treatment and management of these materials. This project will also build upon the recommendations in the 2010 BMMP, by considering regulatory and environmental changes since its implementation.

The 2021 Biosolids Management Master Plan (BMMP) Update will follow the Municipal Engineers Association (MEA) Class Environmental Assessment (EA) process for Master Plans and will satisfy Phases 1 and 2 of the Class EA process.



What are Biosolids?

Biosolids are the organic materials resulting from the physical, chemical and biological treatment of sewage sludge generated at wastewater treatment plants.

Biosolids have many potential beneficial uses such as land application on agricultural lands, landscaping needs, and golf courses. The Region's biosolids are currently land applied throughout Niagara Region.

The Region's biosolids also incorporate residuals from water treatment.



Project Approach

Problem and Opportunity Statement

This project is following the Class Environmental Assessment (EA) process for Master Plan Projects, which is a decision-making process that all Ontario municipalities follow for rehabilitating and building new infrastructure. The 2021 BMMP follows the Municipal Engineers Association (MEA) Class Environmental Assessment (EA) process for Master Plans and will satisfy Phases 1 and 2 of the Class EA process.

The purpose of the Biosolids Management Master Plan Update is to develop a holistic, long-term strategy for biosolids management in Niagara in a manner that is transparent, sustainable, reliable, environmentally friendly, cost-effective and flexible.

PHASE 1	PHASE 2	PHASE 3	PHASE 4	PHASE 5
Problem or Opportunity	Alternative Solutions	Alternative Design Concepts for Preferred Solution	Environmental Study Report (ESR)	Implementation
ldentify Problem or Opportunity	Identify Alternative Solutions to Problem or Opportunity	Identify Alternative Solutions to Problem or Opportunity	Complete Environmental Study Report (ESR)	Complete Contract Drawings and Tender Documents
Discretionary Public Consultation to Review Problem or Opportunity	Inventory Natural, Social, Economic Environment	Detail Inventory Natural, Social, Economic Environment	Environmental Study Report (ESR) Placed on Public Record	Proceed to Construction and Operation
We are here!	Identify Impact of Alternative Solutions on the Environment, and Mitigating Measures	ldentify Impact of Alternative Designs on Environment, and Mitigating Measures	Notice of Completion to Review Agencies and Public	Monitor for Environmental Provisions and Commitments
	Evaluate Alternative Solutions: Identify Recommended Solutions	Evaluate Alternative Designs: Identify Recommended Solutions	Copy of Notice of Completion to MOE-EA Branch	
	Consult Review Agencies and Public. RE: Problem or Opportunity and Alternative Solutions	Consult Review Agencies and Previously Interested and Directly Affected Public.	Opportunity to Request Minister Within 30 Days of Notification to Request and Order*	
	Select Preferred Solution	Select Preferred Design		
		Preliminary Finalization of Preferred Design		

The objectives of this study are to:

- Document the status of the existing biosolids management program at each wastewater treatment plant (WWTP), in terms of process capacity, availability and reliability.
- Document the status of the existing program at Garner Road Biosolids Facility, in terms of process capacity, availability and reliability.
- Identify the limitations in the existing programs with consideration for the opportunities and constraints related to the future management of biosolids.
- Complete a comprehensive review of a broad range of biosolids management options available locally and globally and identify those feasible for each facility.
- Evaluate and select preferred options for each facility and the Region's operations as a whole.
- Identify, evaluate and recommend preferred biosolids management methods.

Public Information Centre (PIC) Objectives



- 1. Present the public and stakeholders with an opportunity to learn about Niagara Region's biosolids management approach and provide insight to future needs.
- 2. Outline the Biosolids Management Master Plan Update project schedule and what steps are being taken to support the decision-making process.
- 3. Answer any questions you may have about the project process or potential outcomes.
- 4. Obtain your feedback on the purpose of the Biosolids Management Master Plan, the long list of alternatives and which evaluation criteria are most important to you.

Questions and comments can be submitted to <u>niagarabmmp@niagararegion.ca</u> until June 28, 2022.

Submit Questions or Comments

Study Area

The 2021 Biosolids Management Master Plan Update is applicable to all wastewater treatment plants and water treatment plants in Grimsby, West Lincoln, Lincoln, St. Catharines, Thorold, Welland, Pelham, Port Colborne, Niagara-on-the-Lake, Niagara Falls, and Fort Erie.

*Although Wainfleet does not have wastewater or water treatment (uses septic tanks and wells), biosolids are utilized on agricultural lands in Wainfleet as well as other area municipalities.



Niagara Region Official Plan Agricultural Land Base

The Region consists of roughly 74% agricultural land use.

- ~51% or 96,452 hectares is categorized as Good General Agricultural Area
- ~23% or 43,542 hectares falls under Unique Agricultural Area

The agricultural industry presents the greatest potential end use market for biosolid management byproducts.



Existing Biosolids Management System

Overall, water treatment residuals and wastewater treatment biosolids are processed at the Garner Road Biosolids Facility, Walker Environmental N-Viro Facility, or both, before being converted into a product appropriate for land application in the form of fertilizer or liquid biosolids.



Wastewater Treatment Biosolids

Liquid biosolids from the Region's wastewater treatment plants (WWTPs) are transferred to the Garner Road Biosolids Facility storage lagoons. The biosolids may then be used directly for land applications as liquid biosolids or dewatered to create a biosolids cake product. Dewatered biosolids from the Garner Road Biosolids Facility and Niagara Falls WWTP are hauled to the Walker Environmental Facility that uses the N-Viro alkaline stabilization process to create soil amendment that is sold as a fertilizer.

Water Treatment Residuals

Residuals from the Decew Water Treatment Plant (WTP), Grimsby WTP, and Niagara Falls WTP are hauled to the Garner Road Biosolid Facility where they are mixed with liquid biosolids from the Region's WWTPs. Water residuals from Port Colborne WTP, Rosehill WTP, and Welland WTP are discharged to the sanitary sewer system for treatment through the Region's WWTPs.

Exiting Beneficial Use Program

Liquid Biosolids Management



Liquid biosolids and residuals (~50% of biosolids produced in Niagara Region) are:

- 1. Hauled to the Garner Road Biosolids Facility by Third Party Contractor (Thomas Nutrient Solutions),
- 2. Stored and thickened in lagoons at the Garner Road Biosolids Facility,
- 3. Hauled away and applied as a liquid fertilizer to agricultural land by Third Party Contractor (Thomas Nutrient Solution)

Dewatered Biosolids Management



Dewatered biosolids from the Garner Road Biosolids Facility and Niagara Falls WWTP (~50% of biosolids produced in Niagara Region) are:

- 1. Hauled to the Walker Environmental Facility in Niagara Falls,
- 2. Treated using alkaline stabilization (N-Viro process) to produce a high solids, nutrient rich product,
- 3. Hauled away and applied as a solid cake fertilizer to agricultural land by Third Party Contractor.

Wastewater System Existing Conditions and Future Needs

Region Wide



Grimsby





- Address: 160 Lake St, Grimsby, ON
- Historical Flow, 2017-2021 (megalitres per day, MLD): 19.4
- Current Facility Capacity (MLD): 31.3
- Estimated Future Flow to 2051 (MLD): 35.82
- Existing Solids Management Process: Anaerobic digestion and storage
- Planned and Required Biosolids Upgrades by 2051: Digestor capacity upgrades



St. Catharines





- Address:40 Lighthouse Rd, St. Catharines, ON
- Historical Flow, 2017-2021 (megalitres per day, MLD): 34.5
- Current Facility Capacity (MLD): 61.4
- Estimated Future Flow to 2051 (MLD): 45.49
- Existing Solids Management Process: Anaerobic digestion and storage
- Planned and Required Biosolids Upgrades by 2051: Upgrade primary digestion capacity



Port Weller Wastewater Treatment Plant

		Port Weller East Park
Beachaven Drive Park	Port Weller WWTP	RUNCORN
Wastewater Treatment Plant (WWTP)	ENAVE	WELTAN
🗕 🗕 🗕 Sanitary Forcemain	DURHAM DR	DCAN
Sanitary Sewer Network	Y TRL	ALS PRINT

- Address: 27 Lombardy Ave, St. Catharines, ON
- Historical Flow, 2017-2021 (megalitres per day, MLD): 35.6
- Current Facility Capacity (MLD): 56.2
- Estimated Future Flow to 2051 (MLD): 39.09
- Existing Solids Management Process: Anaerobic digestion
- Planned and Required Biosolids Upgrades by 2051: Upgrade primary digestion capacity



Niagara-on-the-Lake





- Address: 1550 Lakeshore Road, Niagara on-the-Lake, Ontario
- Historical Flow, 2017-2021 (megalitres per day, MLD): 4.6
- Current Facility Capacity (MLD): 8.0
- Estimated Future Flow to 2051 (MLD): 5.37
- Existing Solids Management Process: Thickening and Anaerobic Digestion
- Planned and Required Biosolids Upgrades by 2051: Increase sludge equalization storage capacity and thickening capacity



Queenston Wastewater Treatment Plant



- Address: 5 River Frontage Road, Queenston, ON
- Historical Flow, 2017-2021 (megalitres per day, MLD): 0.17
- Current Facility Capacity (MLD): 0.5
- Estimated Future Flow to 2051 (MLD): 0.23
- Existing Solids Management Process: Storage of waste activated sludge
- **Planned and Required Biosolids Upgrades by 2051:** Currently under Schedule B Class Environmental Assessment review.



Niagara Falls

Niagara Falls Wastewater Treatment Plant



- Address: 3450 Stanley Avenue, Niagara Falls, Ontario
- Historical Flow, 2017-2021 (megalitres per day, MLD): 39.6
- Current Facility Capacity (MLD): 68.3
- Estimated Future Flow to 2051 (MLD): 37.75
- Existing Solids Management Process: Anaerobic Digestion, Storage and Dewatering
- Planned and Required Biosolids Upgrades by 2051:



South Niagara Falls Wastewater Treatment Plant



- Address: To be determined.
- Historical Flow, 2017-2021 (megalitres per day, MLD): Not applicable.
- Current Facility Capacity (MLD): 60.0
- Estimated Future Flow to 2051 (MLD): 31.34
- Existing Solids Management Process: Anaerobic Digestion
- Planned and Required Biosolids Upgrades by 2051: None future plant not yet constructed.

Fort Erie





- Address: 1 Anger Avenue, Fort Erie, ON
- Historical Flow, 2017-2021 (megalitres per day, MLD): 14.2
- Current Facility Capacity (MLD): 24.5
- Estimated Future Flow to 2051 (MLD): 18.07
- Existing Solids Management Process: Thickening, Anaerobic Digestion and Storage
- Planned and Required Biosolids Upgrades by 2051: (1) Add redundancy for thickening equipment and (2) Upgrade digestor capacity.



Crystal Beach Wastewater Treatment Plant



- Address: 500 Ridgeway Road, Fort Erie, ON
- Historical Flow, 2017-2021 (megalitres per day, MLD): 5.7
- Current Facility Capacity (MLD): 9.1
- Estimated Future Flow to 2051 (MLD): 6.56
- Existing Solids Management Process: Thickening, Aerobic Digestion and Storage
- Planned and Required Biosolids Upgrades by 2051: (1) Add thickening capacity; (2) Improved sludge storage



Stevensville-Douglastown Lagoons



- Address: 3274 Netherby Road, Fort Erie, ON
- Historical Flow, 2017-2021 (megalitres per day, MLD): 1.6
- Current Facility Capacity (MLD): 2.7
- Estimated Future Flow to 2051 (MLD): 2.45
- Existing Solids Management Process: Facultative lagoon system, with biosolids settling to the bottom of the secondary lagoon.
- Planned and Required Upgrades by 2051: No biosolids upgrades.



Welland

Welland Wastewater Treatment Plant



- Address: 505 River Road, RR#1, Welland, ON
- Historical Flow, 2017-2021 (megalitres per day, MLD): 35.1
- Current Facility Capacity (MLD): 54.6
- Estimated Future Flow to 2051 (MLD): 48.87
- Existing Solids Management Process: Anaerobic digestion and storage
- Planned and Required Biosolids Upgrades by 2051: Digester upgrades



Port Colborne

Seaway Wastewater Treatment Plant



- Address: 30 Prosperity Avenue, Port Colborne, ON
- Historical Flow, 2017-2021 (megalitres per day, MLD): 12.0
- Current Facility Capacity (MLD): 19.6
- Estimated Future Flow to 2051 (MLD): 13.44
- Existing Solids Management Process: Anaerobic digester and storage
- **Planned and Required Biosolids Upgrades by 2051:** No biosolids capacity upgrades are planned or expected to be required. Opportunities to increase the operational flexibility of the storage facility may be considered.



Existing Water Treatment Plants

Region Wide



Grimsby

Grimsby Water Treatment Plant



- Address: 400 N Service Rd West, Grimsby, ON
- Current Facility Capacity (megalitres per day, MLD): 44.0
- Estimated Future Flow to 2051 (MLD): 25.0
- Existing Residuals Management Process: Thickened and transferred to Garner Road Biosolids Facility
- Planned and Required Residuals Upgrades by 2051: Increase sludge holding tank capacity.

St. Catharines

Decew Falls Water Treatment Plant



- Address: 2700 DeCew Rd, St. Catharines, ON
- Current Facility Capacity (megalitres per day, MLD): 227.0
- Estimated Future Flow to 2051 (MLD): 68.0
- Existing Residuals Management Process: Thickened and transferred to Garner Road Biosolids Facility
- Planned and Required Residuals Upgrades by 2051: Increase sludge holding tank capacity.

Niagara Falls

Niagara Falls Water Treatment Plant



- Address: 3599 Macklem St, Niagara Falls, ON
- Current Facility Capacity (megalitres per day, MLD): 145.0
- Estimated Future Flow to 2051 (MLD): 55.0
- Existing Residuals Management Process: Thickened and transferred to Garner Road Biosolids Facility
- Planned and Required Residuals Upgrades by 2051: No expansion needed.

Welland

Welland Water Treatment Plant



- Address: 4 Cross St, Welland, Ontario
- Current Facility Capacity (megalitres per day, MLD): 65.0
- Estimated Future Flow to 2051 (MLD): 34.0
- Existing Residuals Management Process: Discharged to sanitary sewer
- Planned and Required Residuals Upgrades by 2051: No expansion needed

Port Colborne

Port Colborne Water Treatment Plant



- Address: 323 King St, Port Colborne, ON
- Current Facility Capacity (megalitres per day, MLD): 50.0
- Estimated Future Flow to 2051 (MLD): 15.0
- Existing Residuals Management Process: Discharged to the sanitary sewer.
- Planned and Required Residuals Upgrades by 2051: No expansion needed.

Fort Erie

Rosehill Water Treatment Plant



- Address: 300 Rosehill Road, Fort Erie, Ontario
- Current Facility Capacity (megalitres per day, MLD): 50.0
- Estimated Future Flow to 2051 (MLD): 15.0
- Existing Residuals Management Process: Discharged to sanitary sewer.
- Planned and Required Residuals Upgrades by 2051: No expansion needed.

Evaluation Approach

Long List of Biosolids End Use Markets



- 1. Develop Long List of (a) Alternative Treatment Technologies and (b) Alternative End-Use Markets.
- 2. Screen each Long List of Alternatives based on "Must-Have" criteria.
- 3. Develop Alternative Biosolids Management Strategies that combine screened list of technologies, and end use markets.
- 4. Complete Detailed Evaluation of the Biosolid Management Strategies.
- 5. Recommend and Develop the Biosolid Management Plan to include potential Sewer-Use By-Law changes, infrastructure and/or operational requirements at each wastewater treatment plant, water treatment plant and the Garner Road Biosolids Facility, service delivery options, implementation program and schedule, and contingency planning.

Long List of Biosolids End Use Markets



Four potential end use markets of biosolids are:

- 1. **Land Application:** agriculture, silviculture (tree farming), recreational (golf courses, parks), landscaping
- 2. Energy: syngas, bio-oil, biochar
- 3. Industrial: cement additive
- 4. Landfill: monofil, landfill cover

Long List of Biosolids Treatment Technologies

Different technologies can be used to stabilize the biosolids, depending on whether biosolids are in the form of liquid or cake.

Liquid biosolids can be further processed through aerobic digestion, anaerobic digestion or chemical treatment.

- Aerobic digestion technologies include conventional aerobic digestion or Autothermal Thermophilic Aerobic Digestion (ATAD).
- Anaerobic digestion technologies considered include hydrolysis, pre-treatment, acid-gas, mesophilic, and temperature-phased anaerobic digestion (TPAD).
- Chemical treatment using disinfection technologies, such as Clean B[©] or BRC Solids Solutions' Neutralizer[®].

Biosolid Cake, produced from dewatering of liquid biosolids, can be treated through composting, thermal treatment/drying or alkaline treatment.

- Composting of biosolid cake through windrow composting, aerated static pile, agitated bin or tunnel composting.
- Thermal treatment and thermal drying can be conducted in rotary drums, on a belt, using paddles or solar technology, incineration, gasification, pyrolysis, or wet oxidation.
- Alkaline stabilization on sludge using lime (e.g. N-Viro© process).



Screening Criteria for Long List of Alternatives

The long list of alternative treatment technologies, products and end use markets were evaluated against "must-have" screening criteria:

- Maturity of the Technology and Market Availability
- Compatibility with Existing Water and Wastewater Treatment Process and Biosolids Management Programs and Contracts
- Long-term Reliability and Sustainability
- Implementable

Based on the results of screening the long list of technologies and end use markets, biosolids management strategies will be developed.



Examples of biosolids management strategies:

- Digestion producing liquid biosolids suitable for agricultural land use;
- Digestion and Dewatering producing biosolids cake for agricultural land use;
- **Digestion, Dewatering and Thermal Drying** producing a dried product that may be used as fertilizer or for energy recovery
- **Digestion, Dewatering and Composting** producing a compost product that may be used as fertilizer or for energy recovery
- Dewatering and Alkaline Stabilization creates an alkaline stabilized product to be used for fertilizer
- **Incineration** results in residual ash that can be incorporated into cement, used for energy recovery, or deposited into a municipal waste landfill



Draft Detailed Evaluation Criteria

A draft list of detailed evaluation criteria for assessing each biosolids management strategy has been developed to reflect each component of the environment.

- 1. Natural Environment
- 2. Socio-Cultural Environment
- 3. Technical Considerations
- 4. Economic Considerations

Natural Environment

- Terrestrial Systems
- Aquatic Systems
- Surface and Groundwater Quality and Source Water Protection
 Air Quality /Greenhouse Gas
- Emissions

- Technical Considerations
- Performance
- Sustainability / resiliency
- Ease of Operation
 Compatibility with exist
- Compatibility with existing infrastructure
- Energy use and recovery
- Climate change adaptability
- Permits and Approvals

Socio-Cultural Environment

- Odour
- Noise/Vibrations
- Visual/Aesthetics
- Truck Traffic
- Agricultural Use and Users
- Human health and well being
- Existing and Future Land Use Compatibility
- Archaeology / Cultural Heritage





Economic Considerations

- Capital Cost
- Operating and Maintenance Cost
- Life Cycle Costs



Project Schedule



Key Dates

- June 8 to June 28, 2022: Submit questions and comments to Niagara Region
- July 6, 2022: Responses to questions and comments posted on the Niagara Region website.
- **November 2022:** Virtual PIC No. 2 assessment of alternatives and recommended biosolids management strategy.
- Early 2023: Biosolids Management Master Plan Update filed for 30-Day public review.

Get Involved

Public feedback is important. Sign-up to be added to the study contact list and submit any questions or comments to the Project Team. You may also submit comments at the link below, including feedback on the long list of alternatives and the evaluation criteria most important to you.

Sign-Up for Project Updates

Provide Feedback

We encourage you to get provide feedback by filling out <u>this survey</u> by June 28, 2022 to provide any feedback on the study and/or if you would like to receive project information updates. Responses to all comments received will be posted on July 6, 2022. Please click "Project Survey Form" button to access.

Project Survey Form

Contact Us

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Please note that information related to this study will be collected in accordance with the *Freedom of Information and Protection of Privacy Act*. All comments related will become part of the public record and may be included in the study documentation prepared for public review.

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