

# Biosolids Management Master Plan Update

Virtual Public Information Centre No. 2



# 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 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 study will also build upon the recommendations in the 2010 BMMP, by considering regulatory and environmental changes since its implementation. As part of Niagara Region's planning activities, the BMMP will continue to be updated every ten years.

# 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 including land application on agricultural lands and use in landscaping projects in parks, on golf courses and at private residences. The Region's biosolids are currently land applied throughout Niagara Region.

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

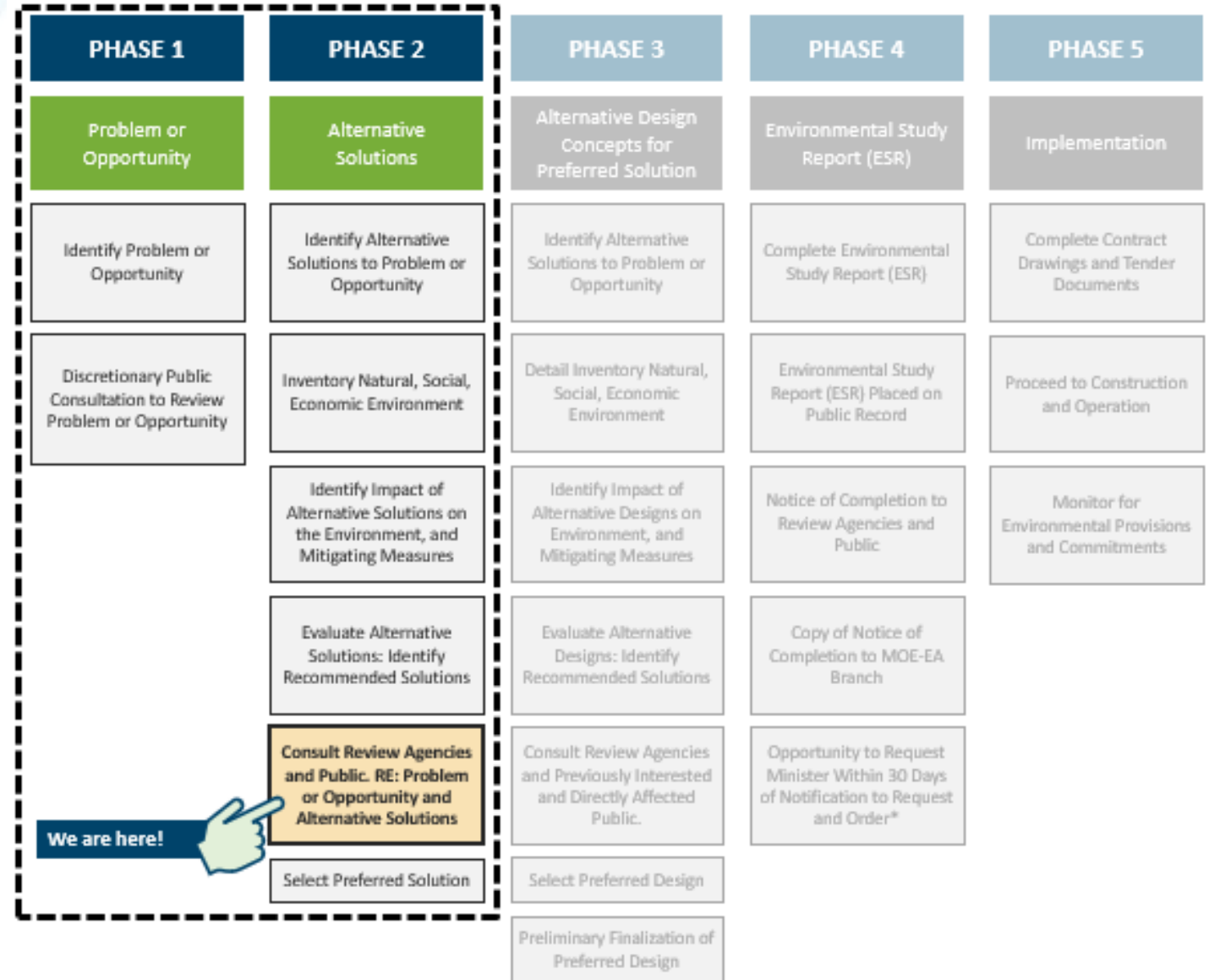




# Project Approach

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.



# Problem and Opportunity Statement

*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.*

# Public Information Centre (PIC) Objectives

## Timeline

**May 17, 2023:**

Project information, project overview video, and transcript posted

**May 17 to May 31, 2023:**

Submit questions or comments related to the PIC No.2 materials to Niagara Region  
[niagarabiosolidssmp@niagararegion.ca](mailto:niagarabiosolidssmp@niagararegion.ca)

**June 14, 2023**

Responses to questions and comments posted



Present the Public and Stakeholders with an opportunity to learn about Niagara Region's biosolids management approach and provide insight to future needs.



Provide a progress update on the Biosolids Management Master Plan and work completed to date.



Answer any questions you may have about the Project process or potential outcomes.

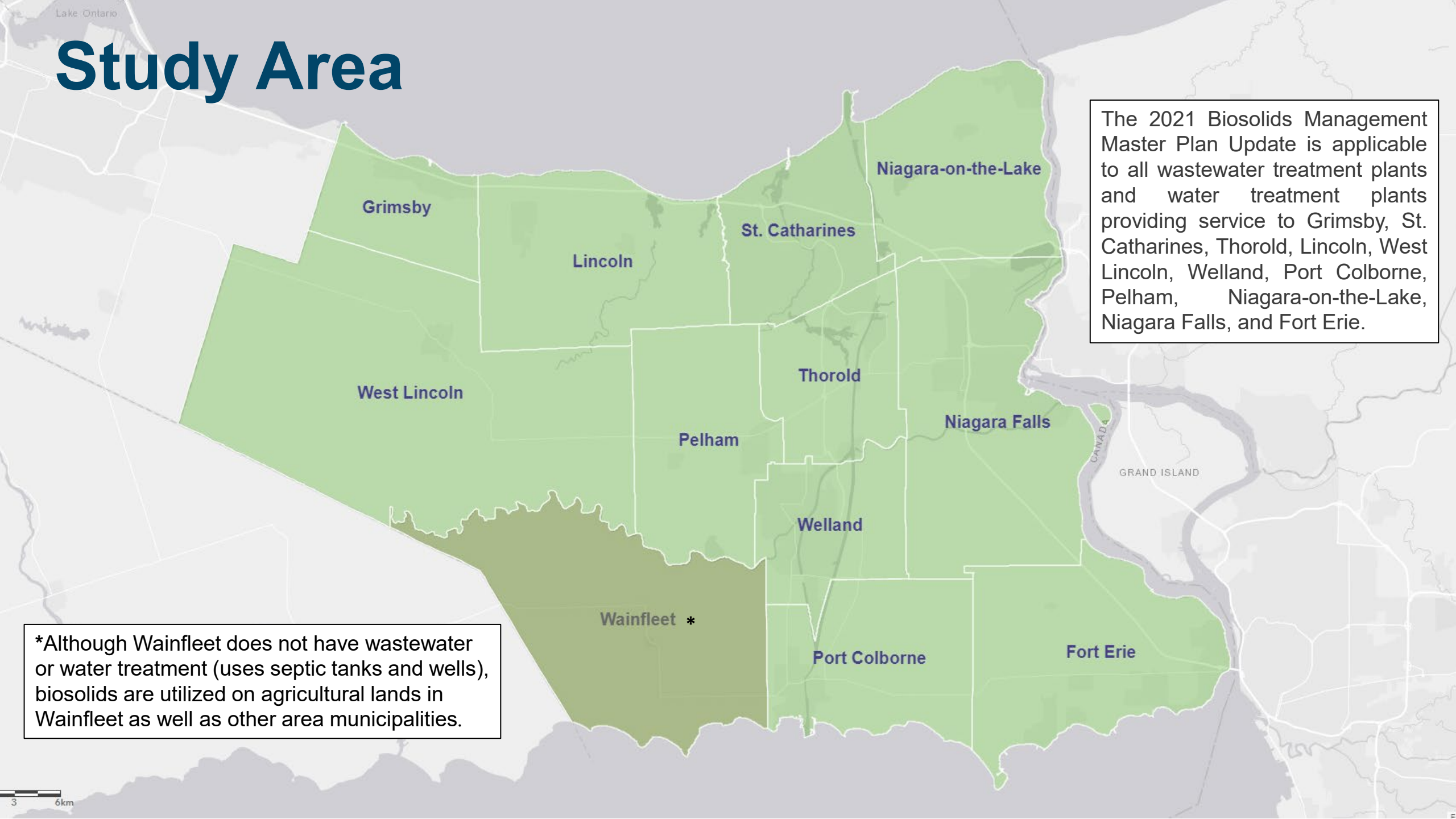


Obtain your feedback and answer any questions you may have on the list of alternative biosolids management strategies, the detailed evaluation of these strategies and preliminary recommendations

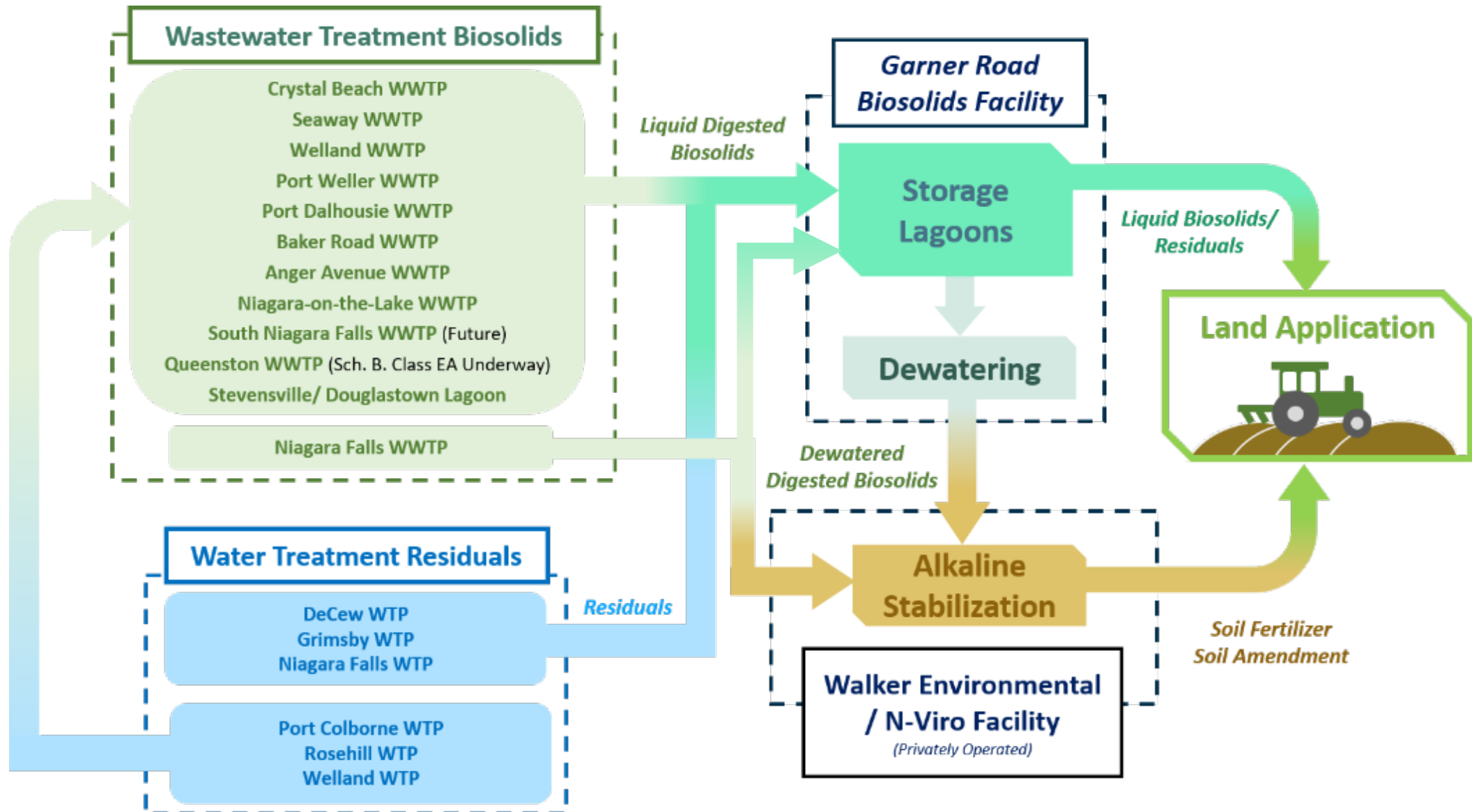
# Study Area

The 2021 Biosolids Management Master Plan Update is applicable to all wastewater treatment plants and water treatment plants providing service to Grimsby, St. Catharines, Thorold, Lincoln, West Lincoln, Welland, Port Colborne, Pelham, 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.



# Existing Biosolids Management System





# Existing Beneficial Uses Program

## Liquid Biosolids Management



Garner Road Biosolids Facility

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

1. Hauled to the Garner Road Biosolids Facility by Third Party Contractor (currently 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 (currently Thomas Nutrient Solution)



Land application of biosolids



# Existing Beneficial Uses Program

## Dewatered Biosolids Management



**Biosolids Management Centre with Alkaline Stabilization**

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

1. Hauled to a privately owned Biosolids Management Facility in Niagara Falls.
2. Treated using alkaline stabilization to produce a high solids, nutrient rich soil-like product
3. Hauled away and applied as a solid cake fertilizer to agricultural land by Third Party Contractor

# Alternative Evaluation Approach

Step 1

Develop Long List of Alternatives

Treatment  
Technologies

End Use Markets

Step 2

Screen Long Lists based on “Must Have Criteria” to develop short lists

Step 3

Develop Alternative Biosolids Management Strategy

Combine short-listed technologies and end use markets to create strategies

Step 4

Detailed Evaluation of Biosolids Management Strategies

Step 5

Recommend and Develop Biosolids Management Plan

- Service Delivery Options (3<sup>rd</sup> party vs In House)
- Sewer Use By Law Changes
- Infrastructure and operational requirements at WWTPs, WTPs and Garner Road Facility
- Implementation and Contingency Plans

# Step 1 – Develop Long List of Biosolids End Use Markets



## Beneficial Reuse

Agriculture, Silviculture and Horticulture

Parks and Recreation Departments

Ontario Ministry of Transportation

Landscape Contractors

Golf Courses

Land Rehabilitation

Co-management with Source Separated Organics

Fuel Additives (ie. syngas, biochar).



## Disposal

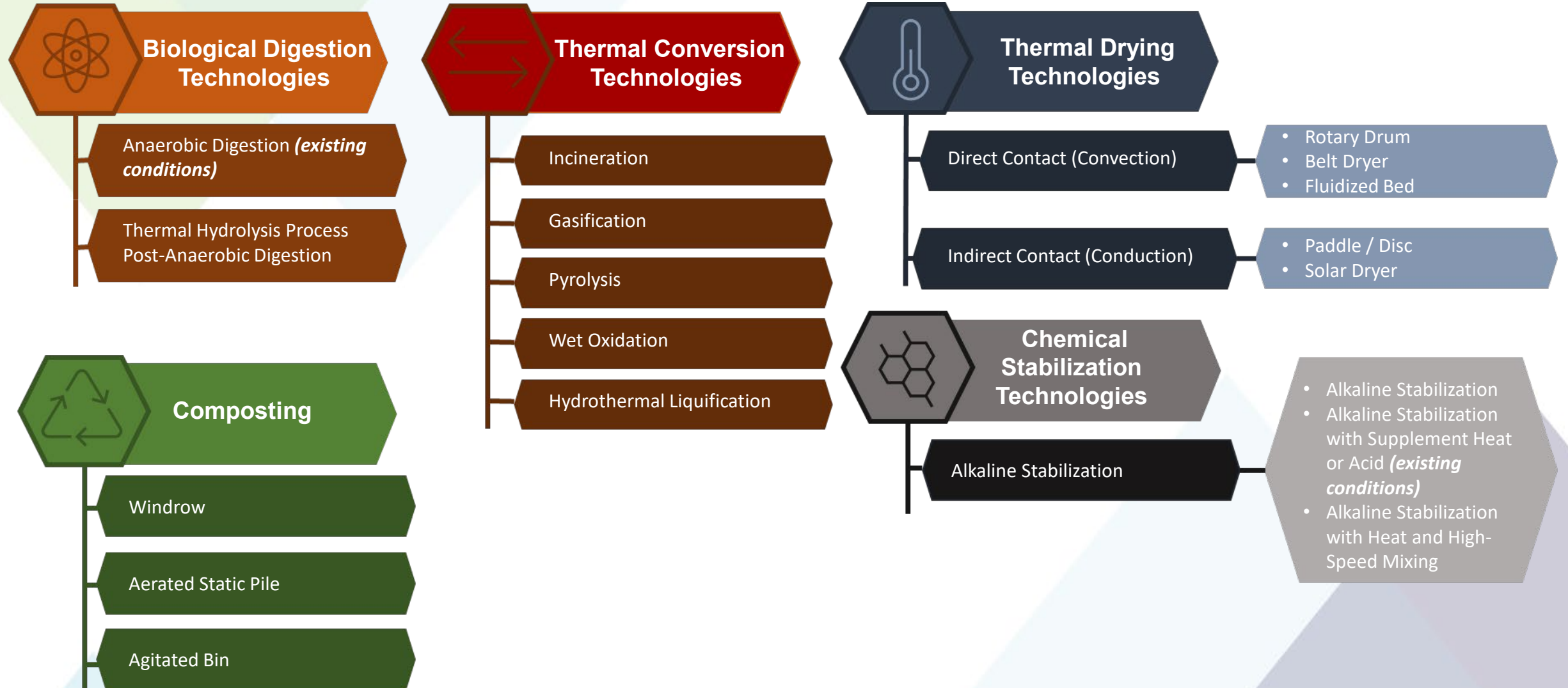
Landfill



























































## Step 2 – Screen Long List of Biosolids End Use Markets

	Market Availability		Compatibility with Current Program		Long Term Reliability and Sustainability		Implementable		Screening Results
<b>Agricultural, Silviculture and Horticulture</b>	✓	Pass	✓	Pass	✓	Pass	✓	Pass	Carried Forward
<b>Parks and Recreation Department</b>	✓	Pass	✓	Pass	✓	Pass	✓	Pass	Carried Forward
<b>Ontario Ministry of Transportation</b>	✗	Fail	✓	Pass	✓	Pass	✓	Pass	Screened Out
<b>Landscape Contractors</b>	✓	Pass	✓	Pass	✓	Pass	✓	Pass	Carried Forward
<b>Golf Courses</b>	✓	Pass	✓	Pass	✓	Pass	✓	Pass	Carried Forward
<b>Land Rehabilitation</b>	✗	Fail	✓	Pass	✗	Fail	✓	Pass	Screened Out
<b>Co-management with Source Separated Organics</b>	✓	Pass	✓	Pass	✓	Pass	✓	Pass	Carried Forward
<b>Fuel Additions (i.e. Syngas)</b>	?	Further Review	✓	Pass	✓	Pass	?	Further Review	Carried Forward
<b>Landfill</b>	✗	Fail	✓	Pass	✗	Fail	✓	Pass	Screened Out

# Step 1 – Develop Long List of Biosolids Treatment Technologies



# Step 2 – Screen Long List of Biosolids Treatment Technologies

		1. Maturity of Technology	2.Compatibility with Existing and Future Site Development and Biosolids End Use Markets	3. Proven Applicability at Similar Scale Facilities	4. Implementable	Consider for Detailed Evaluation
Biological Digestion Technologies	Thermal Hydrolysis Post-Treatment (THP)	 Pass	 Pass	 Pass	 Pass	Carried Forward
Thermal Drying Technologies	Direct Thermal Dryer (Drum Dryer, Belt Dryer)	 Pass	 Pass	 Pass	 Pass	Carried Forward
	Fluidized Bed Dryer	 Pass	 Pass	 Fail	 Fail	Screened Out
	Indirect Thermal Dryer (Paddle Dryer, Disc Dryer)	 Pass	 Pass	 Pass	 Pass	Carried Forward
	Solar Dryer	 Pass	 Pass	 Fail	 Fail	Screened Out
Chemical Stabilization Technologies	Alkaline Stabilization	 Pass	 Pass	 Pass	 Fail	Screened Out
	Alkaline Stabilization with Supplemental Heat or Acid	 Pass	 Pass	 Pass	 Pass	Carried Forward
	Alkaline Stabilization with Supplemental Heat and High-Speed Mixing	 Pass	 Pass	 Pass	 Pass	Carried Forward
Composting Technologies	Composting (Open Technologies Aerated Static Pile and Windrow Composting)	 Pass	 Pass	 Pass	 Pass	Carried Forward
Thermal Conversion Technologies	Incineration	 Pass	 Pass	 Pass	 Pass	Carried Forward
	Gasification	 Fail	 Pass	 Fail	 Fail	Screened Out
	Pyrolysis	 Fail	 Pass	 Fail	 Fail	Screened Out
	Wet Oxidation	 Fail	 Pass	 Fail	 Fail	Screened Out
	Hydrothermal Liquification	 Fail	 Pass	 Fail	 Fail	Screened Out

# Step 2 – Results of Biosolids Treatment Technologies Screening and Associated Products

Short-Listed  
Biosolids  
Technologies

Associated  
Products

## Anaerobic Digestion

- Liquid biosolids
- Dewatered biosolids (when combined with dewatering)

## Thermal Hydrolysis Post- Treatment

- Fertilizer

## Direct Thermal Dryer

- Fertilizer

## Alkaline Stabilization with supplemental heat

- Fertilizer

## Composting

- Compost product

## Incineration

- Residual Ash

Technologies  
currently in use for  
biosolids produced in  
Niagara Region



# Step 3 – Develop Alternative Biosolids Management Strategies

	Management Alternative	Technology	Product	End Use
Strategy 1	Beneficial Use on Land	AD	Stabilized Liquid biosolids	Land application with liquid biosolids
Strategy 2		AD + Dewatering	Stabilized Biosolids Cake	Land application with biosolids cake
Strategy 3		AD+ Advanced Digestion + Dewatering	Fertilizer quality Cake	Land application of cake / un-restricted use
Strategy 4		AD + Dewatering + Advanced Alkaline Stabilization	Fertilizer / soil amendment	Un-restricted use on land
Strategy 5		AD + Dewatering + Composting	Compost	Un-restricted use on land
Strategy 6		AD + Dewatering + Drying	Dried Product	Un-restricted use on land or fuel source
Strategy 7	Thermal Processing	AD + Dewatering + Incineration	Ash	Ash beneficial use + landfill

Strategy 0 – “Do Nothing” was screened out as it does not pass criteria for ‘Long Term Sustainability and Reliability’ due to capacity limitations in existing system to process future biosolids quantities.

AD = Anaerobic Digestion

# Step 4 - Detailed Evaluation Criteria

## Natural Environment



- Terrestrial Systems
- Aquatic Systems
- Surface Water Quality
- Groundwater Quality, Quantity and source water protection
- Soil Quality
- Air Quality/GHG

## Technical Considerations



- Performance
- Sustainability
- Ease of Operation
- Resiliency
- Ease of Implementation
- Compatibility with existing infrastructure
- Energy use and recovery
- Climate change adaptability
- Permits and Approvals

## Socio-Cultural Environment

- Odour
- Noise/Vibrations during operation
- Visual/Aesthetics
- Truck Traffic
- Disruption during Construction
- Property Acquisition and Easements
- Recreational Use and Users
- Agricultural Land Users
- Human health and well being
- Existing and Future Adjacent Land Use Compatibility
- Archaeology / Cultural Heritage




## Economic Considerations

- Capital Cost
- Operating and Maintenance Cost
- Life Cycle Costs
- Best Use of Existing Investments









































































**Approach:** Equal weighting initially followed by sensitivity analysis prioritizing different criteria categories

# Step 4 – Detailed Evaluation Results

**LEGEND**  
Good / Low Impact 

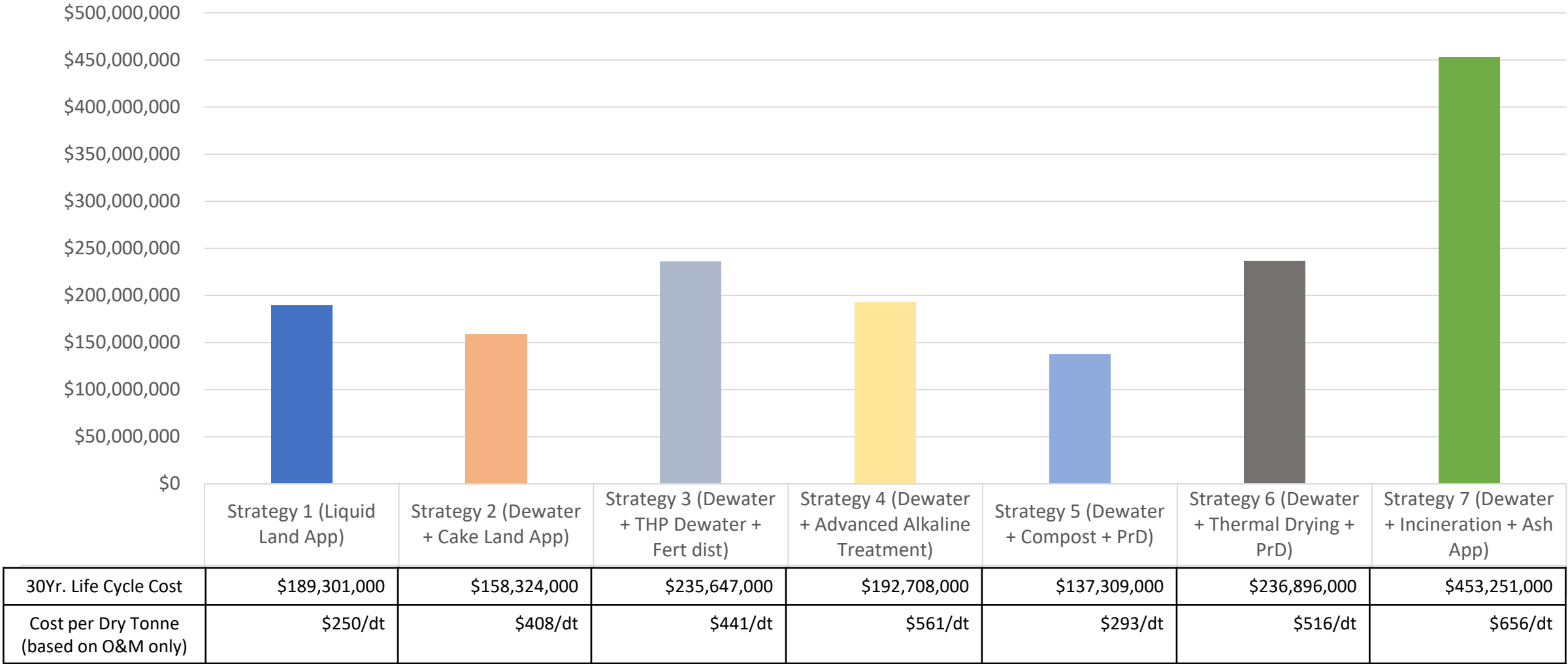
Neutral / Moderate Impact 

Poor / High Impact 

Key Differentiating Criteria	Strategy 1: AD + Liquid Biosolids Land Application	Strategy 2: AD + Dewatering + Cake Land Application	Strategy 3: AD + Advanced Stabilization (THP) + Fertilizer Quality Product	Strategy 4: AD + Dewatering + Advanced Alkaline Treatment	Strategy 5: AD + Dewatering + Composting + Product Distribution	Strategy 6: AD + Dewatering + Thermal Drying + Product Distribution	Strategy 7: AD + Dewatering + Thermal Processing (Incineration)
Greenhouse Gas Emissions	Neutral 	Neutral 	Good 	Neutral 	Good 	Good 	Poor 
Nutrient Recovery and Potential for Beneficial Reuse by Agricultural Users	Good 	Good 	Good 	Good 	Good 	Good 	Poor 
Proven Performance	Good 	Good 	Neutral 	Good 	Good 	Good 	Good 
Odour at Garner Road Facility	Good 	Good 	Good 	Neutral 	Neutral 	Neutral 	Good 
Truck Traffic	Neutral 	Good 	Good 	Neutral 	Good 	Good 	Good 
Long Term Sustainability	Good 	Good 	Good 	Good 	Good 	Good 	Poor 
Ease of Operation	Good 	Good 	Poor 	Good 	Neutral 	Neutral 	Neutral 
Resiliency	Neutral 	Neutral 	Good 	Good 	Good 	Good 	Good 
Ease of Implementation	Good 	Good 	Poor 	Poor 	Poor 	Poor 	Poor 
Life Cycle Cost	Neutral 	Good 	Good 	Good 	Good 	Good 	Poor 
RANKING	3	2	5	1	6	4	7

# Step 4 – Detailed Evaluation Results - Costs

30 Yr. Life Cycle Cost for Biosolids Management Strategies





# Step 4 – Detailed Evaluation Results - RANKING

Develop implementation plan  
to incorporate top 3 strategies

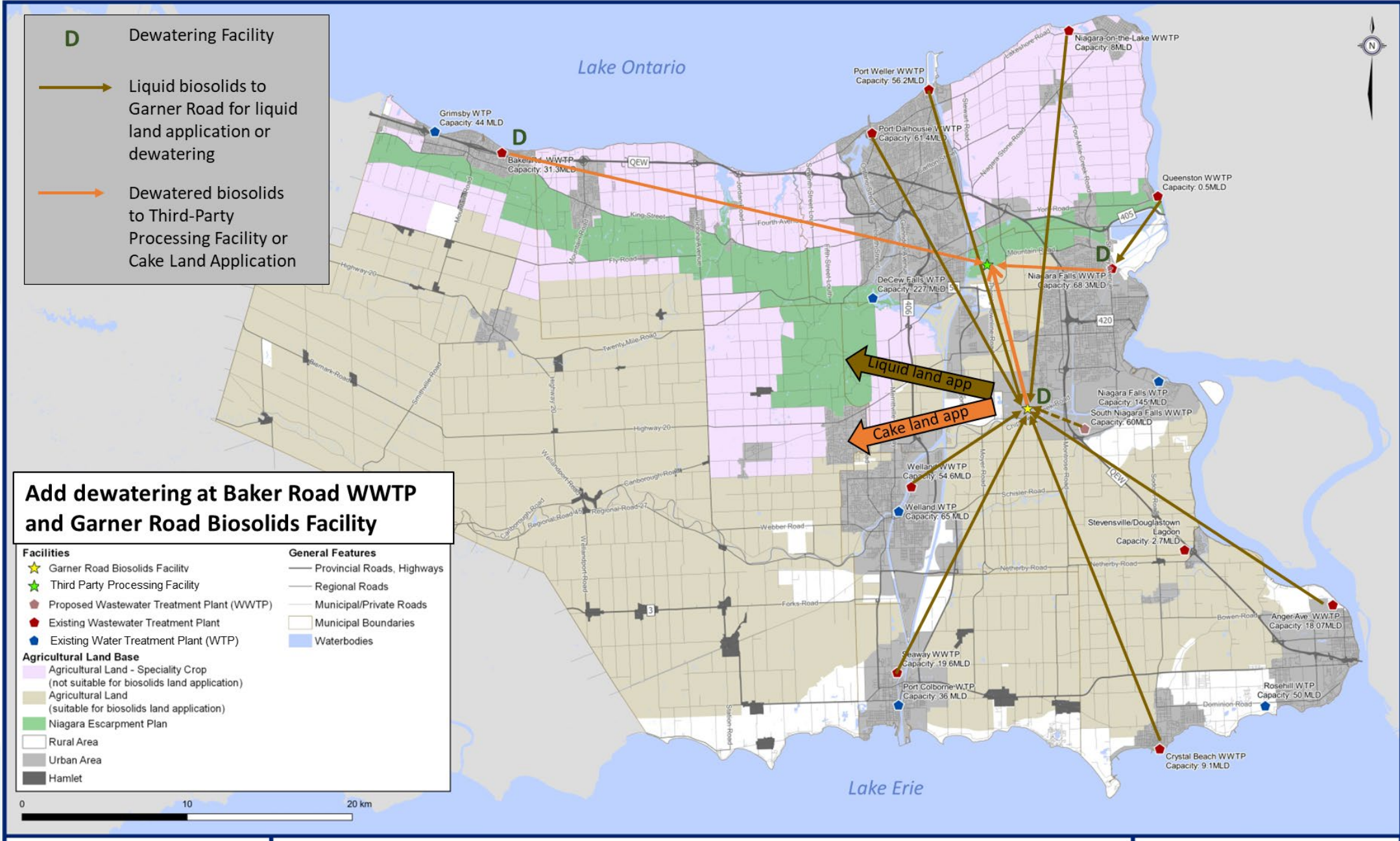


- 1** Strategy 4: AD + Dewatering + Advanced Alkaline Treatment + Fertilizer Quality Product
- 2** Strategy 2: AD + Dewatering + Cake Land Application
- 3** Strategy 1: AD + Liquid Biosolids Land Application
- 4** Strategy 6: AD + Dewatering + Thermal Drying + Product Distribution
- 5** Strategy 3: AD + Advanced Stabilization (THP) + Fertilizer Quality Product
- 6** Strategy 5: AD + Dewatering + Composting + Product Distribution
- 7** Strategy 7: AD + Dewatering + Thermal Processing

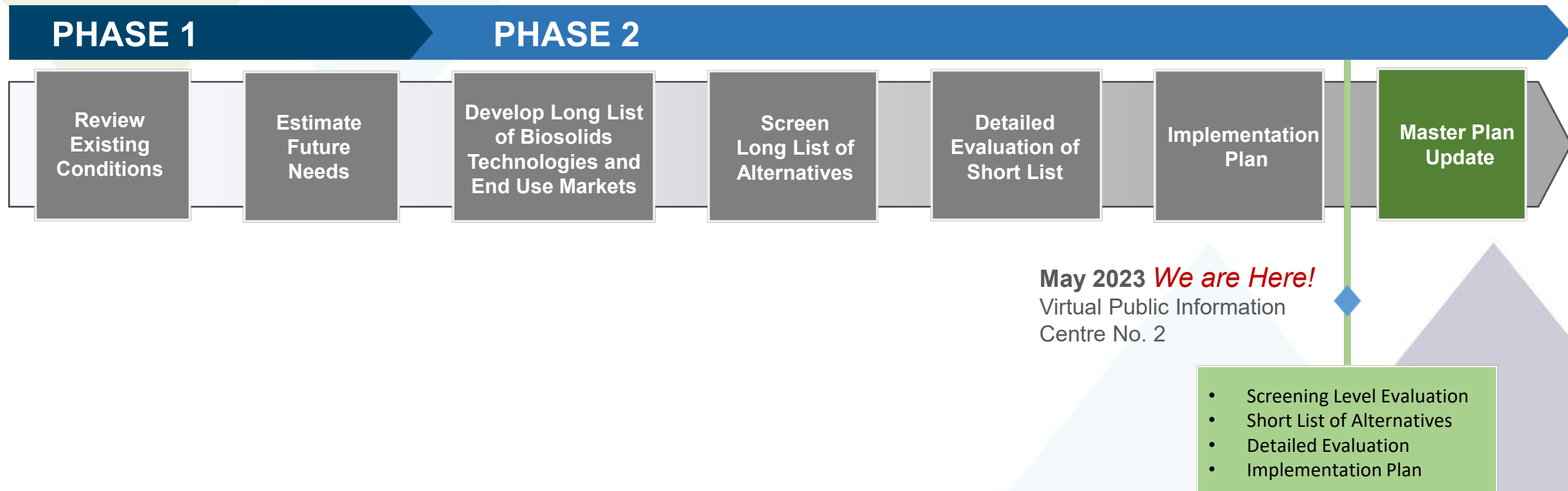
# Step 5 – Preliminary Recommendations and Implementation

- Short Term Solution (1-3 years)
  - Conduct pilot study involving local farmers and third-party hauler to assess feasibility of direct land application of cake
  - Using portable centrifuge for temporary dewatering at Garner Road when existing centrifuges are unavailable
  - Continue transporting dewatered cake to N-Viro from Garner Road and Niagara Falls WWTP
- Mid Term Solution (3-5 years)
  - Add biosolids dewatering at Baker Road WWTP
- Long-Term Solution (5+ Years)
  - Construct additional dewatering capacity at Garner Road, which may incorporate flows from Niagara Falls (NF) WWTP once centrifuge at NF WWTP reaches end of useful life
  - Construct cake storage facility at Garner Road if the pilot program confirms feasible / acceptance
  - Continue liquid storage at Garner Road to maximize flexibility

# Step 5 – Preliminary Recommendations and Implementation



# Project Schedule





# 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.

## Key Dates

- **May 17, 2023 to May 31, 2023:** Submit Questions and Comments to Region
- **June 14, 2023:** Responses to Questions and Comments Posted on the Region Website
- **Summer 2023:** Biosolids Management Master Plan Update files for 30-Day Public Review.

## Sign-up for Project Notification Updates and Provide Feedback

Sign-Up for Project Updates

Project Survey

## Contact Us

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**Project Webpage:** [2021 Biosolids Management Master Plan - Niagara Region, Ontario](#)