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Pond #53 Sediment Removal & Retrofit Project

TRIECA Conference
March 22, 2018

Agenda

1. Introduction / Overview
2. Existing Conditions
3. Watershed WQ Assessment
4. Erosion, Sediment Control and Removal Plan
5. Soil Reuse Opportunity
6. Pond Retrofit and Design Features
7. Monitoring and Mitigation Plan

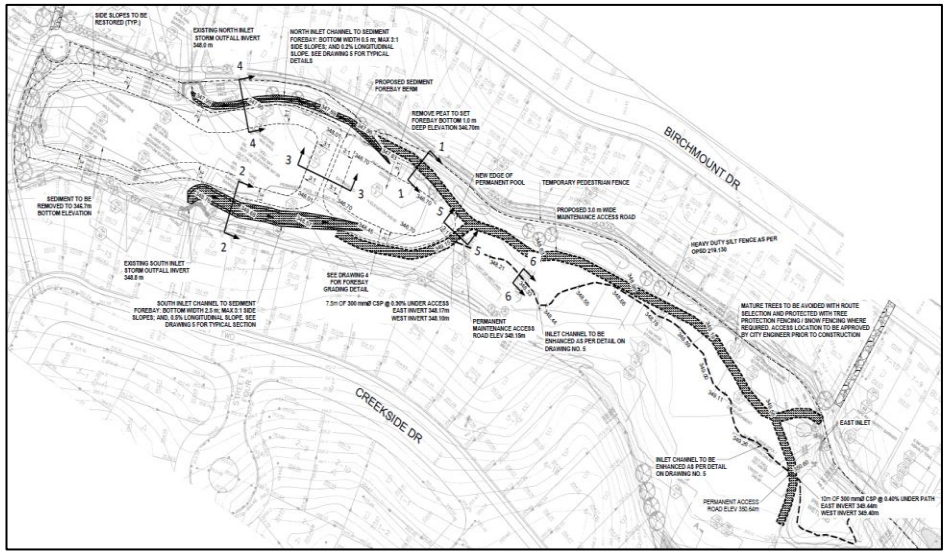
#1: Introduction

Primary Objective:

- Solution to address water **quality / quantity** control issues for current operation

Secondary objectives:

- **Improve efficiencies** in SWMF sediment "clean outs" and sediment disposal
- **Retrofit designs** to improve downstream water quality
- Alternative and/or less expensive **sediment disposal options**



* Approx. 80% of PP volume

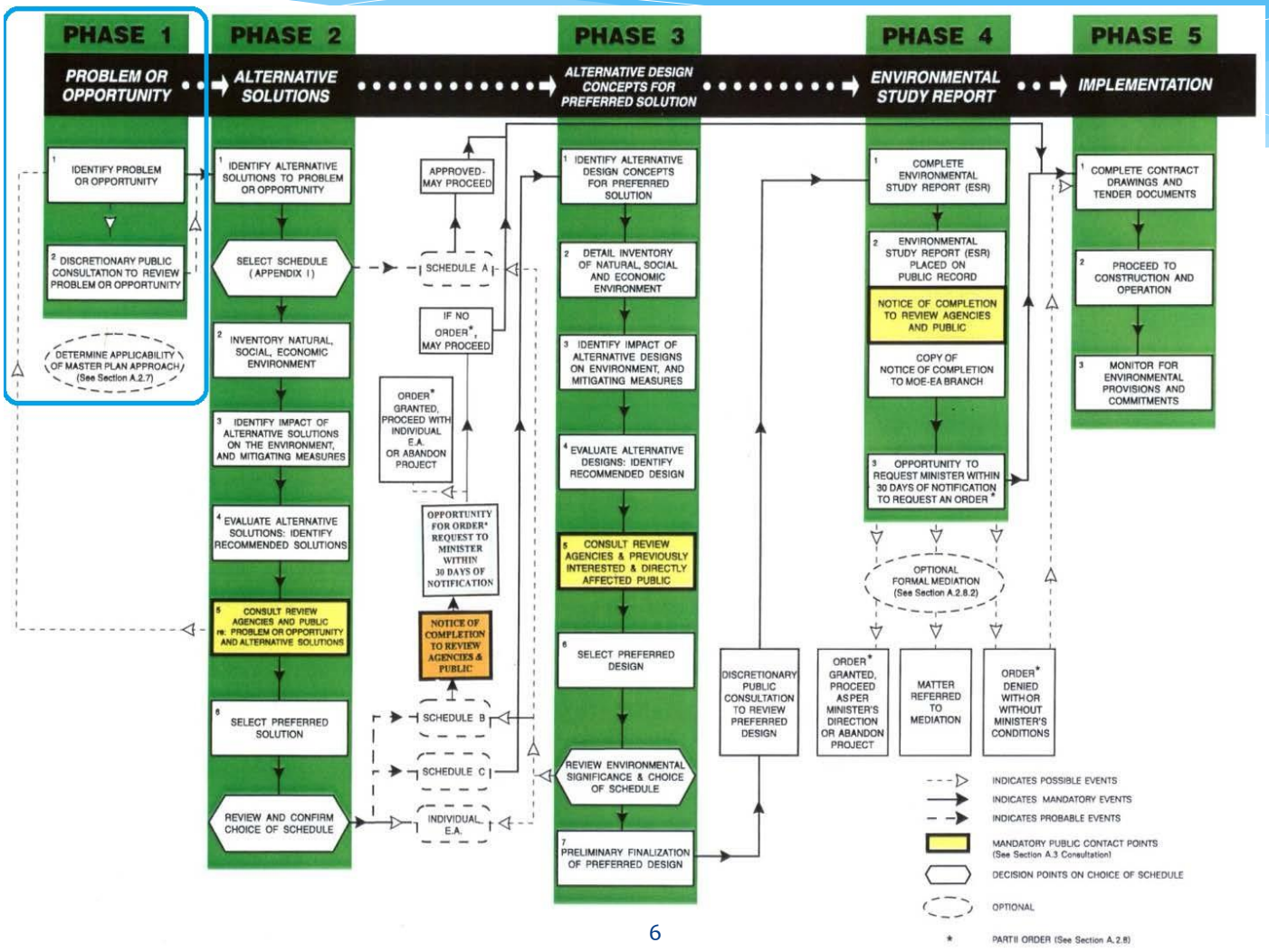
FCM Green Municipal Fund

Total Grant Amount: $350,000

Notable Project Award Factors:

- Reuse of sediment for application in a City ROW
- Increased landfill capacity
- Implementation of innovative technology to improve facility function and WQ

Class EA Process (Schedule A+)



Required Approvals

1. Environmental Compliance Approval (ECA) Application: Amendment

2. Permit to Take Water

3. Conservation Authority Approvals (GRCA)

4. ECA for Approval of a Waste Disposal Site

Ontario MOECC /MEACC

Grand River Conservation Authority

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#2: Existing Conditions

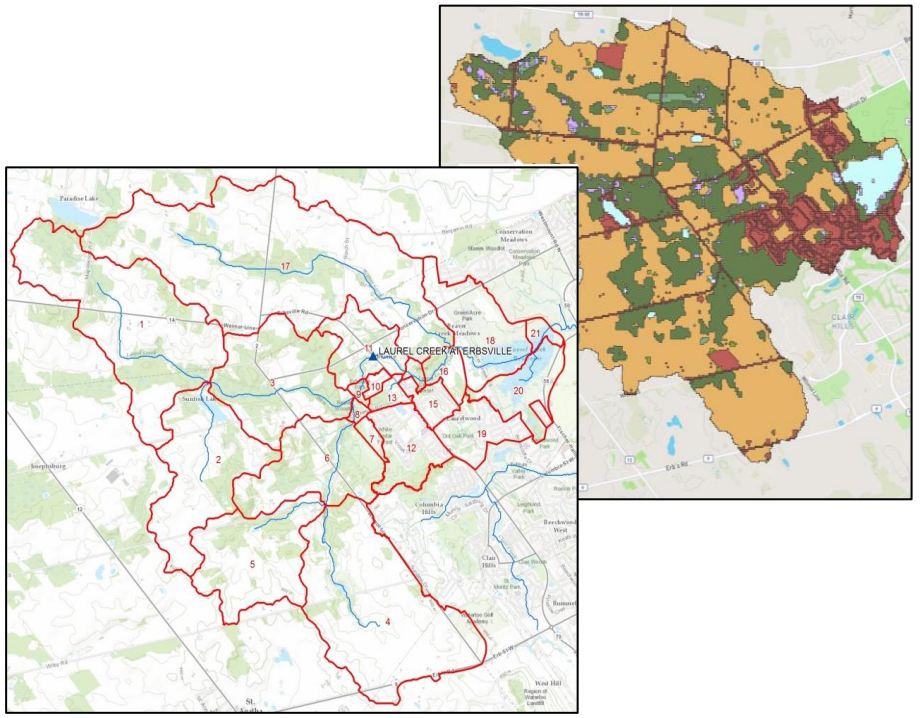
- Sediment forebay cleanout period = 7 years
- Permanent pool design storage = 1,000 m^3
  80% (approx.) filled with sediment
- Water quality extended detention storage = 990 m^3

#3: Watershed Assessment

Nutrient and Sediment Load Analysis

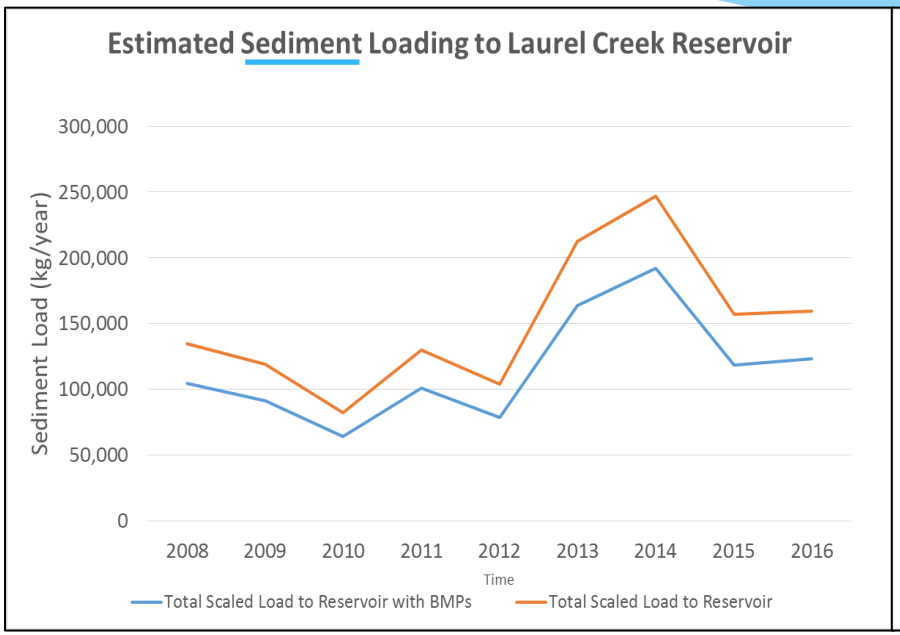
Approach:

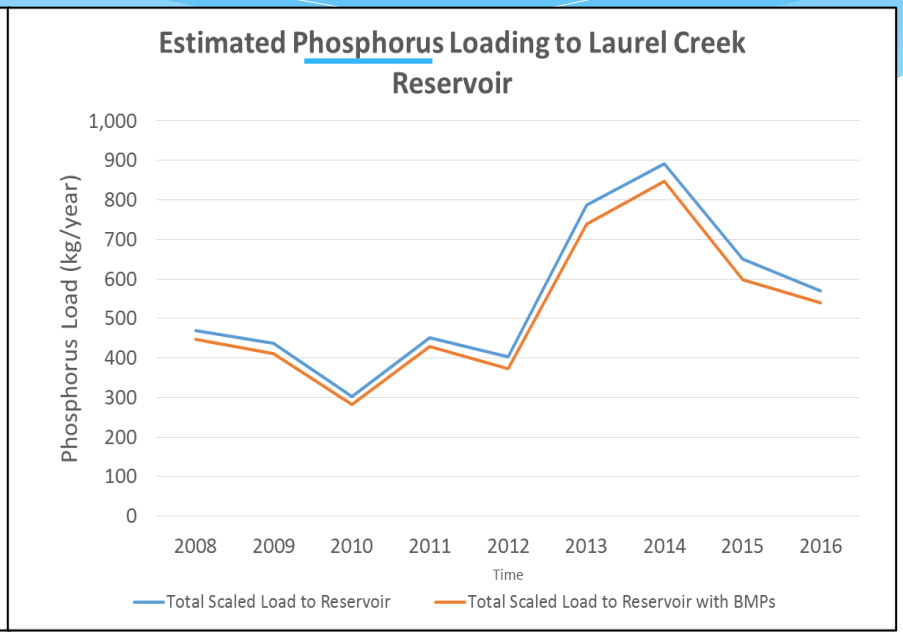
1. Simulated land use based and routing processes (un-calibrated CANWET simulation)
2. Conservative load reductions for similar SWMF retrofits applied in Catchment 11
3. Regression analysis applied to estimate loads (monitoring data available)
4. Simulated results compared against measured flows / concentrations / loads
5. Simulation scaled to estimate loads entering reservoir



#3: Watershed Water Quality Assessment

Nutrient and Sediment Load Analysis cont…





Proposed high efficiency sediment removal systems (est. **90% efficiency**) could reduce on average **23%** of total sediment load to reservoir.

Proposed high efficiency phosphorus removal systems (est. **70% efficiency**) could reduce on average **6%** of total phosphorus load to the reservoir.

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* Application to SWMFs in 48% (332ha) of current settlement \ areas

#4: Erosion, Sediment Control and Removal Plan

Plans required for Project Implementation

- Dewatering
- Construction access
- Flow diversion
- Erosion and Sediment Control
- Construction traffic management
- Sediment removal
- Disposal and Reuse
- Restoration plan

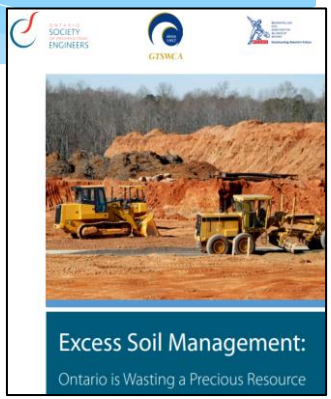
#5: Sediment Beneficial Reuse Opportunity

- **Sediment Volume:** 360m^3
- **Methodology:** Prepared by 3rd party
- **Receiving Site:** Vegetated Medians on Columbia Street, Waterloo ON

#5: Soil Reuse Opportunity cont...

Identified Benefits:

- Cost Savings compared to traditional disposal (reinvestment in upstream solutions)
- Increased landfill capacities throughout Ontario
- Reduced wear on roadways & related transportation infrastructure
- Decreased traffic congestion
- Solution to a major problem faced by all Canadian municipalities



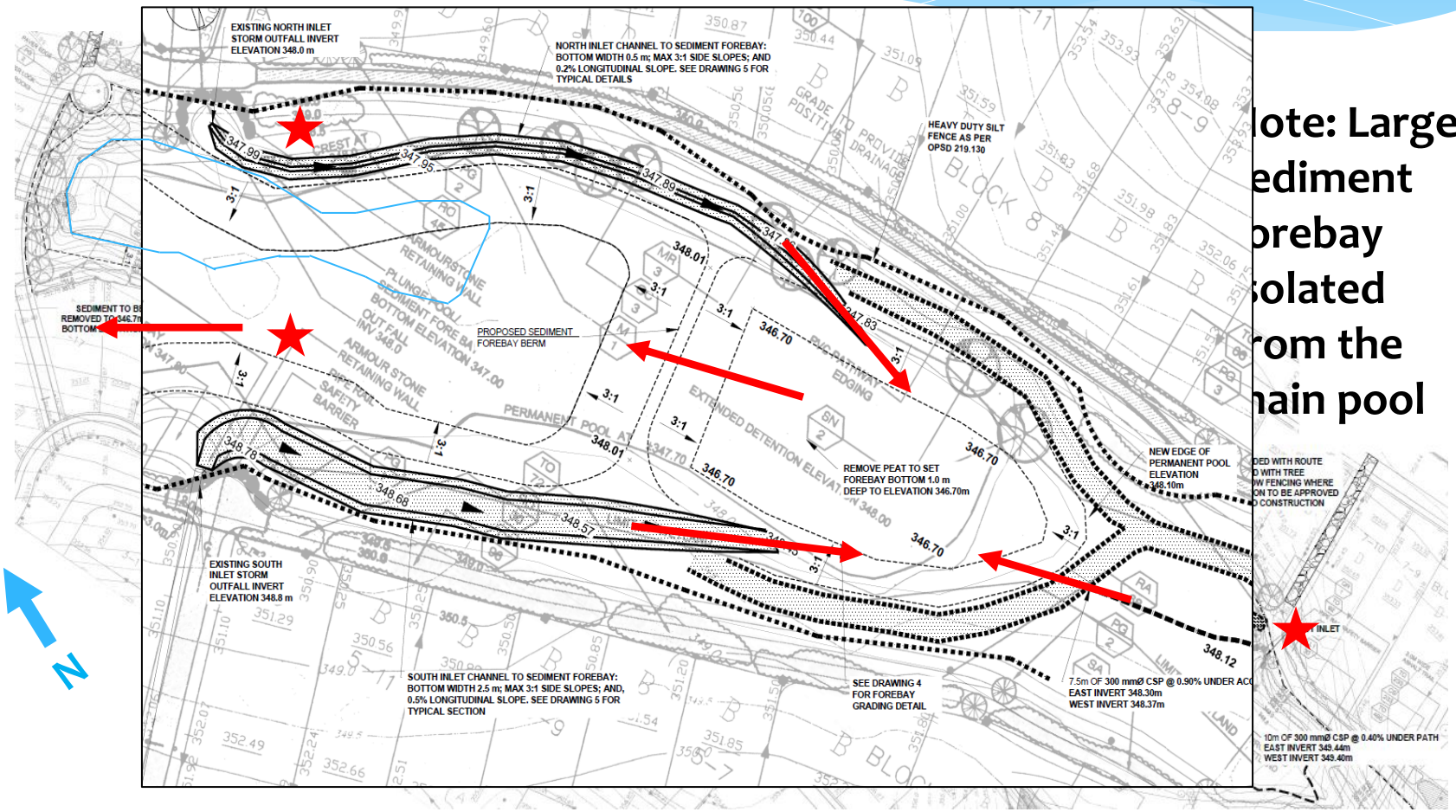
#6: Pond Retrofit – Design Features

- **Larger sediment forebay** isolated from the main pool
- **Energy dissipating flow paths** from the three (3) inlets to new sediment forebay
- **Enhanced contact points** for the Water Lynx product to increase sedimentation efficiencies
- Construction mitigation and restoration features

Water Lynx Blocks Strung in Series

#6: Pond Retrofit – Design Features

cont…



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#6: Pond Retrofit – Design Features

cont…

Inlet Redesign Criteria:

1. Replace individual sediment forebays with energy dissipation structures redirecting flow to the new sediment forebay
2. Addition of Clearflow Water Lynx blocks

Storm Inlet	South Area 221	North Area 225	East Area 224
Drainage Area (ha)	12.0	1.3	1.7

Location	**# of Blocks**
North Inlet:	7
East inlet:	10
South inlet:	45

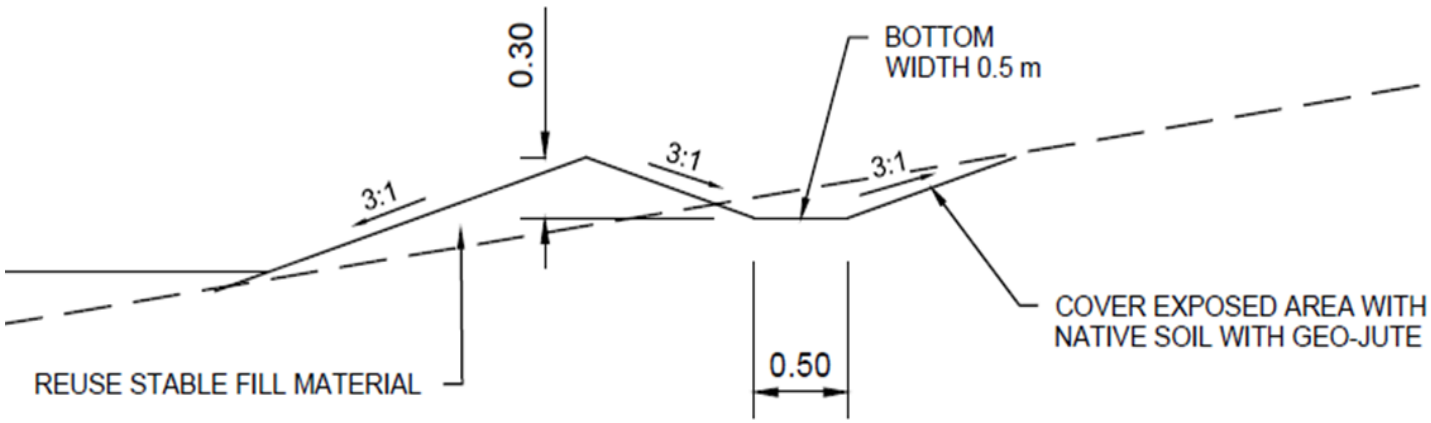
#6: Pond Retrofit – Design Features

cont…

Improved flow path from East Inlet to retrofitted Sediment Forebay

North Channel:
- Slope: 0.2%
- Width: 0.5m

South Channel:
- Slope: 5%
- Width: 3.5m



#6: Pond Retrofit – Design Features

cont…

Pond #53 - Key Retrofit Design Goals:

1. **Maximize potential** to meet the Enhanced Protection objectives outlined in the MOECC SWM Manual (2003)

2. Introduce a **more effective treatment** to further reduce TSS normally removed by prolonged detention (>100 hours)

3. **Reduce phosphorus loading** from 0.11 mg/L to 0.05 mg/L
   * (MOECC 0.1 mg/L)

4. Introduce **improved access** to areas that will require either monitoring or more frequent maintenance

#6: Pond Retrofit – Design Features

Opportunities for Cost Savings ($)

Soil Removal:

- Utilizing Soil Lynx will allow for potential **cost savings of up to 28%*** (compared to traditional removal methods)

Soil Reuse:

- Soil Reuse Volume = **360 m^3****
- Traditional Disposal = $160 - $200 / m^3
- **Potential Savings= $57,600 - $72,000**

Maintenance:

- **Reduction of influent sediments** to permanent pool
- Cleanout area isolated to sediment forebay
- Permanent access roads for maintenance equipment

* Case Study: Demucking of Salt Brine Pond in Fort Saskatchewan

** Reduced volume for proof of concept, future projects will have larger volumes

#6: Monitoring and Mitigation

- Flow
- Water Quality (COD, Na, Al, S / Sulfate)
- Inspection
- Annual Maintenance Checklist

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