City of London Guidance Document: CLI/ECA Schedule F - SWM Pond Sediment and Excess Soil Beneficial Reuse Evaluations

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Discussion Topics

- City of London Infrastructure Renewal Program (IRP) & Stormwater Management Pond (SWMP) sediment maintenance program
- Summary of proposed amendments to the O.Reg. 406/19 excess soil/sediment sampling, analysis & beneficial reuse requirements
- Alternative ECA instrument → O.Reg. 208/19 Schedule F Consolidated Linear Infrastructure (CLI) Environmental Compliance Approval (ECA)
- GHD's checklist for identifying asphalt contaminated soil/sediment to support the proposed exemption rule

Project Objective

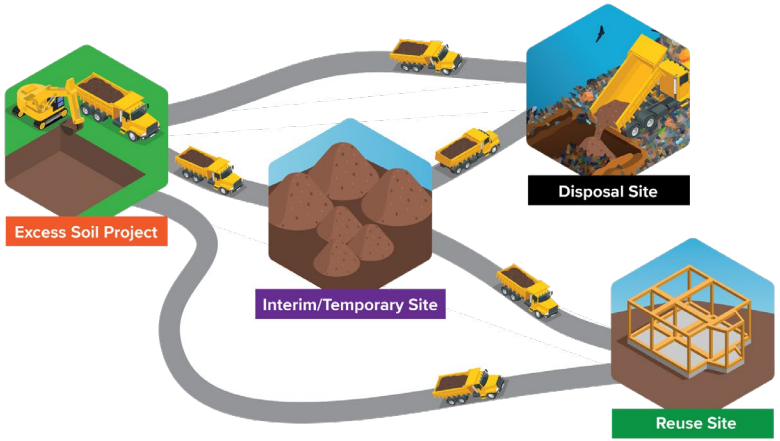
Provide the City of London with guidance for completing the O. Reg. 208/19 CLI ECA application process including text in Schedule F for beneficial reuse of SWMP sediments and IRP soil that cannot be easily reused as excess soil under O.Reg. 406/19

Important Note

The results appearing in this presentation are under review by the MECP. The final Schedule F appearing in the City of London's CLI ECA may differ from the contents in this presentation as comments from MECP will have been addressed.

Objectives of the O.Reg. 406/19

- Support improved management of excess soil in the environment
- Provide clear excess soil reuse rules and clarity around when excess soil is not a waste
- Promote reuse through reuse planning for larger and riskier sites including soil sampling and characterization (if required)
- Restrictions on landfilling clean soil that is suitable for reuse at a sensitive site (subject to certain conditions)



Note – Figure from WSP/Golder and City of London Presentation (2020)

City of London Excess Soil Strategy
Linear Infrastructure Projects and IRPs

- The City of London regularly undertakes projects, including IRPs, which maintains the lifecycle and operation of municipal infrastructure
- All City of London construction projects generate excess soils at Project Areas that are governed by the City's approved CLI ECAs
- IRPs are generally exempt from certain Regulatory requirements; however, project scope can affect exemption eligibility
- Approximately 8 to 10 IRPs are completed each year, with excess soil volumes typically ranging between 5,000 m^3 to 10,000 m^3 per project

City of London Excess Soil Strategy
Linear Infrastructure Projects (IRPs)

- All projects are evaluated for potential exemptions from Regulatory requirements:
  - Fit state of repair
  - Low volume of excess soil generated (e.g., generally less than 2,000 m^3)
  - “Low risk” Project Areas
  - Excess Soil re-use at another City of London infrastructure Project Area
- Regardless of exemption status of the Project Area, City typically requests a low sampling frequency during project planning and design (≈ 50% of the Regulatory sampling frequency
- If required, certain planning documents are prepared during project planning and design (e.g., APU, SCR, SAP) while others are deferred to Contractor’s QP (e.g., ESDAR)

City of London Excess Soil Strategy
SWMP Cleanout

- The City conducts annual stormwater management pond (SWMP) sediment cleanouts, which requires excess soil and potential beneficial reuse evaluations
- As part of the City's SWMP cleanout program sediment surveys are completed and samples are obtained to help inform potential re-use and/or disposal options
- As per the current Soil Rules, additional samples as obtained after material has been removed and dried to support re-use, if applicable

City of London Excess Soil Strategy SWMP Cleanout

- On average, sediment is removed from two to four SWMPs each year
- Average amount of sediment removed is 2,000 m^3 to 2,400 m^3
- Average disposal cost is $190,000 per pond, with landfilling being the primary end destination

City of London Excess Soil - Challenges

- Project Leaders and QPs may disagree on the applicability of certain exemptions.
- Exemption from regulatory requirements often results in varying soil sampling approaches among QPs.
- The City's experience shows consultants tend to overestimate excess soil, and on-site reuse is often feasible.
- Observed recurring analytical results in linear projects, suggests redundancy in the regulatory sampling approach.
- Increase in consultant fees and contractor tendered costs to navigate and manage O.Reg. 406/19 requirements.
- Physical properties of SWMP sediment can prove challenging and limit geotechnical suitability for most common re-use scenarios.

MECP Beneficial Reuse Frameworks

- O. Reg. 406/19 Beneficial Reuse as Excess Soil or Waste
  - Implementation in Soil Rules
  - Generic risk-based ESQS
  - Site-specific ESQS developed by a QPRA

- O. Reg. 208/19 ECA Instrument for Beneficial Reuse as Waste
  - Use of a site-specific instrument such as an O. Reg. 208/19 CLI ECA, including a Schedule F

- O. Reg. 347 Waste Disposal
  - Analysis for TCLP to determine if it may be disposed of at either a registered non-hazardous or hazardous waste management facility

Proposed Schedule F CLI ECA for SWMP Sediment Beneficial Reuse

MECP Asphalt Exemption for Greater Flexibility on Beneficial Reuse Options (October 2025)

(3) **Asphalt-Impacted Excess Soil**

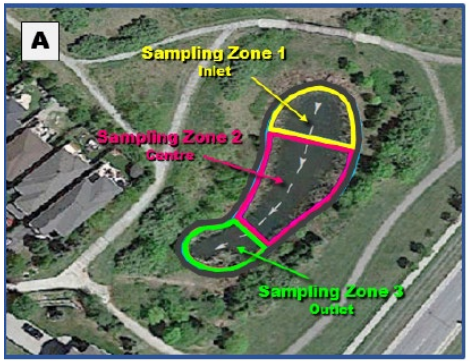
1. For the purposes of paragraph 6 of subsection 5 (1), paragraph 5 of subsection 5.5(1), sub-paragraph 2.i. of subsection 5.7 (1), and sub-paragraph 2.i. of subsection 5.7(2) of the regulation and deemed compliance with *excess soil quality standards* as set out in paragraph 2 of subsection 1 (10.1) of Section A in Part II, before the final placement of the *asphalt-impacted excess soil,* including *asphalt-impacted excess soil* that is part of *recycled engineered aggregate*, it must first be confirmed in accordance with the following that petroleum hydrocarbons F3 and F4 and any polycyclic aromatic hydrocarbons that are detected in the *excess soil* are solely as a result of the discharge of a contaminant from asphalt:

Ontario
Ministry of the Environment, Conservation and Parks

Current Excess Soil SWM Pond Sampling Requirements (October 2025)

- Current excess soil rules require either in-situ sampling of sediment from pond basins, or ex-situ sampling of excavated and dewatered sediments
- Both in-situ and ex-situ methods must follow sampling frequencies based on projected or actual excavation volume
- QP_{ESA} judgement would be required to determine confirmatory ex-situ sampling and analysis requirements for the dewatered sediment

Low Frequency In-situ Sediment Sampling Rather than High Frequency Stockpile Sampling



For the City of London, GHD proposed the following low frequency sampling method:

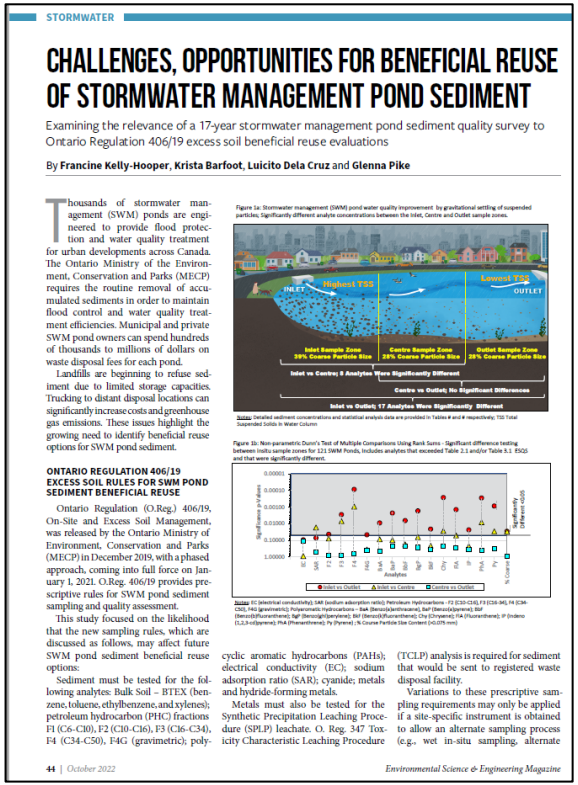
- Multiple discrete samples within each zone combined into 1 composite samples per zone. Minimum 3 sample zones for ponds with 1 inlet. 1 additional sample zone per additional inlet
- e.g. 1 inlet = 3 composite samples
- e.g. 2 inlets = 4 composite samples

SWM Pond Sediment Chemistry Analytes

- Bulk soil analytes
  - Metals
  - BTEX, F1-F4G PHCs, PAHs
  - Electrical conductivity (EC), sodium adsorption ratio (SAR), pH
  - Total organic carbon and nutrients
  - Particle size

- SPLP leachate analysis also completed for a smaller number of samples.

Asphalt - Leading Cause of Excess Soil Quality Standard Exceedances



STORMWATER

CHALLENGES, OPPORTUNITIES FOR BENEFICIAL REUSE OF STORMWATER MANAGEMENT POND SEDIMENT

Examining the relevance of a 17-year stormwater management pond sediment quality survey to Ontario Regulation 406/19 excess soil beneficial reuse evaluations

By **Francine Kelly-Hooper, Krista Barfoot, Lucicito Dela Cruz** and **Glenna Pike**

Thousands of stormwater management (SWM) ponds are engineered to provide flood protection and water quality treatment for urban developments across Canada. The Ontario Ministry of the Environment, Conservation and Parks (MECP) requires the routine removal of accumulated sediments in order to maintain flood control and water quality treatment efficiencies. Municipal and private SWM pond owners can spend hundreds of thousands to millions of dollars on waste disposal fees for each pond.

Landfills are beginning to refuse sediment due to limited storage capacities. Trucking to distant disposal locations can significantly increase costs and greenhouse gas emissions. These issues highlight the growing need to identify beneficial reuse options for SWM pond sediment.

Figure 1a: Stormwater management (SWM) pond water quality improvement by gravitational settling of suspended particles; Significantly different analyte concentrations between the Inlet, Centre and Outlet sample zones.

Notes: Detailed sediment concentrations and statistical analysis data are provided in Tables # and # respectively; TSS Total Suspended Solids in Water Column

Figure 1b: Non-parametric Dunn's Test of Multiple Comparisons Using Rank Sums - Significant difference testing between Insitu sample zones for 121 SWM Ponds, Includes analytes that exceeded Table 2.1 and/or Table 3.1 ESQS and that were significantly different.

Notes: EC (electrical conductivity); SAR (sodium adsorption ratio); Petroleum Hydrocarbons - F2 (C10-C16), F3 (C16-34), F4 (C34-C50), F4G (gravimetric); Polyaromatic Hydrocarbons – BaA (Benzo[a]anthracene), BaP (Benzo[a]pyrene), BbF (Benzo[b]fluoranthene); BghiP (Benzo[ghi]perylene); BkF (Benzo[k]fluoranthene); Chy (Chrysene); FlA (Fluoranthene); IP (Indeno [1,2,3-cd]pyrene); PhA (Phenanthrene); Py (Pyrene) ; % Course Particle Size Content (>0.075 mm)

ONTARIO REGULATION 406/19 EXCESS SOIL RULES FOR SWM POND SEDIMENT BENEFICIAL REUSE

Ontario Regulation (O.Reg.) 406/19, On-Site and Excess Soil Management, was released by the Ontario Ministry of Environment, Conservation and Parks (MECP) in December 2019, with a phased approach, coming into full force on January 1, 2021. O.Reg. 406/19 provides prescriptive rules for SWM pond sediment sampling and quality assessment.

This study focused on the likelihood that the new sampling rules, which are discussed as follows, may affect future SWM pond sediment beneficial reuse options:

Sediment must be tested for the following analytes: Bulk Soil – BTEX (benzene, toluene, ethylbenzene, and xylenes); petroleum hydrocarbon (PHC) fractions F1 (C6-C10), F2 (C10-C16), F3 (C16-C34), F4 (C34-C50), F4G (gravimetric); polycyclic aromatic hydrocarbons (PAHs); electrical conductivity (EC); sodium adsorption ratio (SAR); cyanide; metals and hydride-forming metals.

Metals must also be tested for the Synthetic Precipitation Leaching Procedure (SPLP) leachate. O. Reg. 347 Toxicity Characteristic Leaching Procedure (TCLP) analysis is required for sediment that would be sent to registered waste disposal facility.

Variations to these prescriptive sampling requirements may only be applied if a site-specific instrument is obtained to allow an alternate sampling process (e.g., wet in-situ sampling, alternate

Sediment Chemistry Survey of 121 SWM Ponds

- At least 77% of ponds did not meet any excess soil quality standards for petroleum hydrocarbons (PHCs) due to asphalt particles

Requirements for Documenting Asphalt-Impacted Excess Soil (October 2025)

a) Based on any past reports and any other information available about past uses and activities respecting the *excavation project area* for the *asphalt-impacted excess soil*,
   i. it has been determined that the *excavation project area* was not affected by a *potentially contaminating activity* that may have contributed to the concentrations of petroleum hydrocarbons F3 and F4 and polycyclic aromatic hydrocarbons in the excess soil, and
   ii. a written document has been prepared setting out that determination, the rationale for the determination, and the consideration of any reports and available information.

b) There is no visual or olfactory evidence of contamination in the *asphalt-impacted excess soil* that is not directly associated with asphalt, salt, or naturally occurring elevations as described in paragraph 1 of subsection (4).

No historical potentially contaminating activities

Written document

No visible or odour evidence of any other contamination

Asphalt Identifications to be Completed by a Subject Matter Expert (SME)

For the City of London, GHD recommended the following procedure for identifying asphalt to be conducted by a SME:

- Step 1 – O.Reg. 153/04 PHCs: Non-detectable BTEX, F1, F2 PHCs. Detectable PHCs dominated by F4G.
- Step 2 – F2-F4G Chromatograms: Typical chromatograms do not reach baseline, are primarily composed of a gaussian shaped UCM pattern with only trace resolved peaks
- Step 3 – Priority PAHs: Detectable PAHs should be dominated by 3- to 6-ring groups, with only trace 2-ring groups. PAH concentrations are heavily influenced by the quantity of coal tar that may be used in asphalt mixture and/or used to seal the asphalt pavement.

QP_{ESA} Interpretation of Results

1. SME Identified PHC product(s)
2. Check for volatile PHCs
3. Screen for bulk sediment exceedances
4. Determine if road salt may adversely affect plants or soil organisms
5. Ensure groundwater and surface water will be protected

Flexible Beneficial Reuse Scenarios

- Includes applicable MECP Tier 2 Risk Management Measures
- Parkland reuse
  - Human receptors: parkland visitors and construction workers
  - Ecological receptors: plants, soil organisms, mammals, and birds
- Roadside reuse
  - Human receptors: construction workers
  - Ecological receptors: plants, soil organisms, mammals, and birds
- Industrial / commercial / community (ICC) reuse
  - Human receptors: commercial/industrial workers and construction workers
  - Ecological receptors: plants, soil organisms, mammals, and birds
- Optional hard cap or fill soil cap

Beneficial Reuse Checklist

- ✓ PHC SME asphalt identification completed
- ✓ Bulk soil and Modified Synthetic Precipitation Leaching Procedure (mSPLP) concentrations do not exceed screening values protective of parkland reuse, roadside reuse, or ICC land use
- ✓ A weight of evidence shows that adverse health effects to plant life and terrestrial invertebrates are not expected due to the presence of EC and SAR
- ✓ Leachate concentrations do not exceed Table 1 LSLs or Ground Water SCS

If any of these are not met, consultation with PHC SME and/or QPRA is needed to determine possibility for beneficial reuse

Proposed Schedule F CLI ECA for Soil

Proposed IRP Schedule F Soil Sampling & Analysis

- A Sampling and Analysis Plan shall be prepared
- Stockpile sampling shall be undertaken consistent with the Soil Rules
- Analyte list shall be consistent with the Soil Rules
- QPs may deviate from requirements under certain circumstances at their discretion

Proposed Reductions of In-situ IRP Soil Sample Frequencies

Excess Soil Volume	Regulatory Sampling Frequency*	Proposed Schedule F Sampling Frequency*
600 m^3	3 (minimum)	3 (minimum)
1,000 m^3	5	3
3,000 m^3	15	7
5,000 m^3	25	11
10,000 m^3	50	16
40,000 m^3	117	22
100,000 m^3	147	34

*Leachate (mSPLP) sampling would also be required to support re-use

Proposed Soil / Sediment Mixing Approach

- Mixing of soils and/or sediments of equal or better quality specifically for the purpose of increasing geotechnical stability of the materials is permitted
- Mixing shall not be undertaken for the purpose of diluting concentrations of any chemicals
- Mixed soils may only be beneficially reused on lands owned by the City of London or as otherwise approved by MECP and is subject to QP review

Summary of Schedule F CLI ECA Approach

- Streamline due diligence excess soil sampling protocols
- Streamline SWMP sediment sampling programs
- Enable enhanced reuse
- Allow mixing to improve physical soil properties
- ...all without compromising on the level of human and environmental protection

Questions?