



RESIDENTIAL AND
CIVIL
CONSTRUCTION
ALLIANCE OF
ONTARIO
Constructing Ontario's Future

An Independent Study Commissioned by

RCCAO



Eglinton LRT Project: **Estimated Costs and Impacts of Addressing Excess Construction Soils**

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1.0 Executive Summary

Expanding vital infrastructure to meet the needs of a growing economy and population, as well as the need to replace aging infrastructure components, indicates that the quantity of excess construction soil is likely to increase greatly in coming years.*

The Residential and Civil Construction Alliance of Ontario (RCCAO) is concerned about the growing costs, liabilities, and administrative burdens associated with managing excess construction soils from Ontario construction sites.

As municipalities increase restrictions or introduce bans on the importation of fill and soil from outside of their jurisdictions, higher transport costs and increased greenhouse gas emissions will be experienced as a result of longer distances to transport excess construction soils. Costs will further increase as the number of locations that accept these soils declines.

Thus analysis focuses on a major construction project to demonstrate the potential impacts on the management of excess construction soils. The Metrolinx Eglinton Crosstown Light Rail Transit Project in Toronto will result in the displacement of approximately 1,500,000 cubic metres of soil and fill. Barring options such as the creation of artificial islands in Lake Ontario, the only large-scale sites that can likely accommodate fill quantities in excess of 100,000 cubic metres are landfills. Unfortunately when solid, non-hazardous waste tipping fees can reach \$80 per cubic metre, using valuable capacity for clean soil is not a cost effective option.

This review estimates that the costs associated with managing excess soil for this project could be \$65 million to over \$100 million, depending on variables such as distance, loads, and landfill costs.

Unless population growth and development are stopped, large quantities of excess construction soils will continue to be generated in Ontario.

RCCAO recommends that the Province establish a pragmatic, risk-based, and affordable framework that distinguishes excess construction soils, particularly those from municipal roads and rights of ways, from historic industrial hazardous wastes which are the primary focus of laws such as Ontario Regulation 153/04.

***Note:** There are many phrases used to describe the excess soils that must be transported away from a construction site such as “material” and “fill.” While these excess construction soils are generally considered “clean” or lightly impacted these soils cannot be reused on site because of space limitations, compaction issues or other factors. In some cases excavated soils can be reused in the case of larger projects such as highways where, for example, berms could be created to provide a barrier to other nearby land uses. For the majority of smaller civil construction or residential development projects, however, soils are deemed to be excess and must be transported off-site.

2.0 Introduction

For several years, the Residential and Civil Construction Alliance of Ontario (RCCAO), together with other construction industry associations, has become increasingly concerned with growing costs, liabilities and administrative burdens associated with the management of excess construction soils from Ontario construction sites (see Appendix A). With the need to expand vital infrastructure to meet the needs of a growing economy and population as well as the need to replace aging infrastructure components, the quantity of excess construction soils is likely to increase dramatically over the foreseeable future.

With the introduction of more stringent standards and guidelines for soil quality, sampling, and testing¹ as well as additional restrictions on the placement of excess construction soils, the costs of transporting and placing excess soils can be as high as 15% or more of the capital cost of some infrastructure construction projects, such as sewer and water main projects where there is a relatively large quantity of excess construction fill.² Smaller construction projects, given lower volumes, may result in even higher disposal costs as a percentage of the project's capital costs. Whether the project is a relatively inexpensive sewer and water main project or a complex rail/transit project, the portion of costs associated with the management of excess construction soils is likely to increase with expected escalation in vehicle fuel costs and longer travel times due to road congestion and more remote disposal sites.

Sourcing placement sites for excess construction soils is an equally daunting task. Many municipalities have significant restrictions and, in Clarington Township in Durham Region, the municipality has even banned the importation of any soil or fill, irrespective of the quality of the soil.³ As municipalities increase restrictions or introduce bans on the importation of fill/soil from outside of their jurisdiction, there are fewer and fewer locations available for the placement of fill within a reasonable trucking distance.

In early May 2012, the Ontario Ministry of the Environment released a draft "Soil Management: A Guide for Best Management Practices" (dated April 19, 2012). The Guide calls for the establishment of procedures, controls, records, and financial security not unlike regulatory requirements that are associated with the Certificates of Approvals process for Waste Disposal Sites involving landfill facilities and operations. The Town of East Gwillimbury issued a letter on June 28, 2012 calling on the Ministry of the Environment and the Association of Municipalities of Ontario to establish new regulations and a provincially regulated approval process to govern the quality of soil material and fill imported to a receiving site other than for the purpose of brownfield redevelopment.

One urban infrastructure project in particular, which is now underway, is the Metrolinx Eglinton Crosstown LRT Project. This review briefly summarizes some of the potential costs and impacts associated with this major infrastructure construction project. This review is based on information provided in the project environmental assessment studies and report, completed in March 2010.

3.0 Eglinton Crosstown LRT Project Description

The Toronto Transit Commission is proceeding with the construction of the 33-kilometre (km) Eglinton Crosstown Light Rail Transit (Eglinton Crosstown LRT) that would link the Pearson International Airport with the Kennedy Subway Station. The Eglinton Crosstown LRT would consist of electrically powered light rail transit vehicles running on rails in a dedicated right of way and would replace existing bus service.⁴

The project consists of two phases. In the first phase, the Eglinton East would run from Kennedy subway station in the east end through to the intersection of Jane Street and Eglinton Avenue in the west end, a distance of 19 km. The system is expected to be operational by 2020.⁵ The second phase, running from Jane Street through to Pearson International, will not proceed with detailed design until funding becomes available for that 14 km section.

The eastern section of 19 km consists of about 10 km of underground tunnels between Keele Street in the west and Laird Avenue in the east. The rest of the LRT would be above ground. Construction started in 2010 and tunneling is expected to commence in mid-2012.

A. Quantity of Soil and Fill to be Removed through Construction

The total quantity of soil from the construction of Phase 1 of the Eglinton Crosstown LRT is approximately 1,500,000 cubic metres.⁶ The quantity of soil and fill that will be generated by the tunnel boring machines will be the largest portion (at least 950,000 cubic metres), whereas the remainder will be traditional forms of excavation.

B. Types of Soil to be Removed from Sites

Until the early 1950s, Eglinton Avenue was primarily an arterial road with limited development. Over the decades, the road had various widening projects and several realignments. Consequently, the subsurface soil through which tunneling will take place may have contaminants related to roadway construction and use, such as oils, hydrocarbons, and trace quantities of various other automotive fluids, as well as residual concentrations of road salt and other de-icing compounds. While the majority of the tunneling soil would normally be characterized as Table 1 under current Ministry of Environment Guidelines, a significant portion of the excavated soils could be characterized as Table 2 or Table 3 soils. Soil removed through the tunneling operations is likely to have measurable concentrations of certain boring machine compounds that are added during the tunneling operations to facilitate the cutting and removal of soil, clay, and rock.

4.0 Soil and Fill Placement/Disposal Options

The construction of the Eglinton Crosstown LRT is expected to start generating significant quantities of excess construction fill and soil by mid to late 2012 and continue until 2019, by which time most of the excavation activities will have been completed.

As of early May 2012, there has been no formal soil management plan that has been publicly released. As recently as April 2012, there was media speculation that the excess fill and soil might be used for the construction of artificial islands in Lake Ontario near the mouth of the Humber River.

In the absence of a major soil placement alternative such as artificial islands, it is expected that the excess construction soil from the Eglinton Crosstown LRT will need to be transported to and placed at multiple commercial sites in and near the Greater Toronto Area (GTA). That soil placement will be essentially competing with generators of excess soil from other construction projects in the Toronto area. In fact, the City of Toronto's own water and sewer capital program anticipates generating more than 800,000 cubic metres⁷ of fill between now and the end of the decade.

The only large-scale sites that can likely accommodate fill quantities in excess of 100,000 cubic metres are landfills. However, when solid, non-hazardous waste tipping fees can reach \$80 per cubic metre, using valuable capacity for clean soil is not an appealing option. Consequently, it is likely that excess construction soils from the Eglinton Crosstown LRT project will be transported to the same types of sites currently used by various construction contractors in the civil, residential, and ICI sector.

Without disclosing the identity of certain sites, there would appear to be only about 20 to 30 sites around the Toronto area that are prepared to accept more than a few truck loads of clean fill meeting Table 1 criteria for tipping fees ranging between \$50 and \$100 per 10-cubic-metre load. Those sites vary in distance from the linear construction site, the closest being about 45 km away, while the majority are more than 80 km away from Eglinton Avenue and Yonge Street. It may be necessary to utilize sites as far away as Orillia, Kawartha Lakes, Dundalk, or Owen Sound for the placement of a large percentage of the excess soils.

A commercial website entitled www.cleanfill.ca attempts to broker sites needing clean fill with those sites generating clean fill. Most of the listed sites needing clean fill in the Toronto area are seeking less than 100 truckloads or approximately 1,000 cubic metres.

It is difficult to forecast which soil receiving sites will be available and operating over the next five years, as demand for soil disposal sites increase, other sites reach their intended capacity or choose to discontinue accepting soils due to bylaw restrictions and/or other regulatory liability concerns. Extreme examples may require travel of up to 350 km or more to reach remote sites such as southern areas of Essex County in the west or Stormont Dundas Glengarry in the east end of the Province.

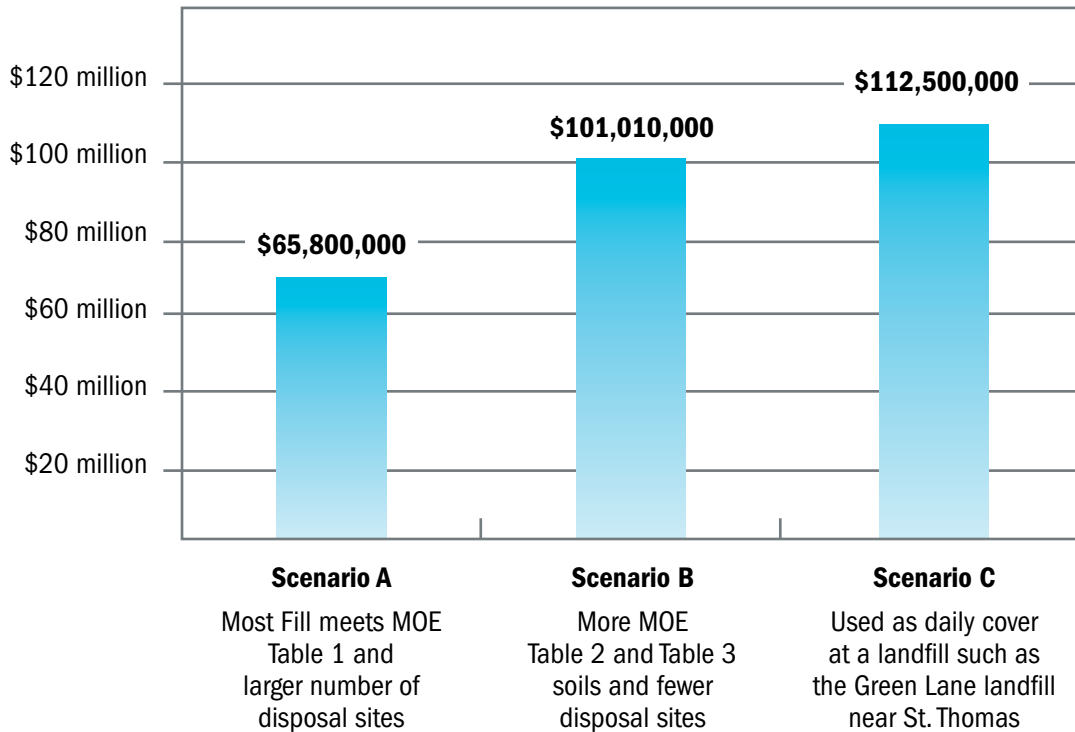
There may be other alternatives available for the placement of excess construction soils from the Eglinton Crosstown LRT, such as using the material as daily cover at the Green Lane or other approved landfill operations. The Green Lane landfill has been taking delivery of municipal waste from the City of Toronto following the closure of the Michigan border in 2010. Even with a discounted tipping fee, the landfill would be forfeiting significant revenues. Airspace at any landfill, including Green Lane, might otherwise be used for waste that would fetch a tipping fee of about \$75 or more per tonne.

5.0 Estimated Impacts of the Need to Export Excess Soils from the Eglinton Crosstown LRT Project

A. Estimated Costs to Transport and Dispose of Soil

Hourly rates for dump trucks and drivers range from \$85 to \$100 per hour as of early 2012. Tipping fees for clean fill (Table 1 soils) range from \$60 per truck load (10 cubic metres) to \$100 or more and the tipping fees for Table 2 or Table 3 soils would be significantly higher, however very few sites appear to be willing to accept Table 2 or Table 3 soils.

Costs of Disposing of Excess Construction Fill from Eglinton Crosstown LRT



Based on typical travel times, the hourly trucking rates, likely tipping fees, and the need to identify at least a dozen possible sites for the excess soil, total costs for transporting and disposing of the 1,500,000 cubic metres of soil would be somewhere between \$65 million to more than \$100 million expressed in 2012 dollars and assuming that all soils meet Table 1 criteria (see preceding table).

The costs would be higher than \$100 million if significant quantities of the soil are characterized as Table 2 or Table 3 or if there are increases in traffic congestion, increasing fuel costs, and competition from other construction contractors.

These estimates exclude any costs related to moving or handling the soil at the construction site, costs for temporary storage of the excess construction soils until a permanent disposal site can be sourced, or soil sampling and analytical costs.

B. Trucks, Fuel and Emissions

Regardless of where it is taken, initial estimates indicate that it would take 150,000 truck trips to handle excess soil from the construction sites. In an optimistic scenario with many disposal sites relatively nearby, those trucks would consume about 12,000,000 litres of diesel fuel and result in the emission of about 32,000 tonnes of carbon dioxide.⁸ In a scenario with disposal sites at a further distance, the trucking of excess soil could consume over 24 million litres and generate over 60,000 tonnes of carbon dioxide. This raises legitimate concerns in terms of the carbon footprint and sustainability aspects of the current approach to handling excess soils from large projects.

C. Supply and Demand Impacts on Soil Disposal

While the costs and greenhouse gas emissions associated with the removal of excess construction soil from the Eglinton Crosstown LRT project may be very significant, perhaps the largest impact related to soil management will be its impact on a very tight supply market of available disposal volumes within a radius of 100 km of the construction site.

6.0 Conclusions

A. Escalating Costs and Fewer Sites for Disposing Excess Construction

Soils and Fill

The management of excess construction soils has become much more challenging and difficult since the 1960s, when excess fill from GTA construction sites could simply be trucked down to the Toronto lakeshore and added to the Leslie Street Spit.⁹ The number of sites willing to accept excess construction soils and that are located within a short driving distance of the City of Toronto will likely decrease over time due to bylaw restrictions (such as those in place in Clarington township), regulatory liability concerns (related for Ontario Regulation 153/04 and the Ministry action against Earthworx in Scugog Township), and higher and better uses of the land for residential and commercial development. Simply stated, there are fewer and fewer sites that will be available to accept large quantities of excess construction soils, and many sites that might be available are likely to be longer distances and/or more expensive to use for the placement of excess construction soils.

B. Ontario Cannot Stop Generating Excess Construction Soils and Fill

Due to increasing traffic congestion, population densities, and concerns about greenhouse gases and other pollution, the provincial and municipal governments in Ontario will need to establish more transit infrastructure similar to the Eglinton Crosstown LRT. Such projects will generate large quantities of excess construction soils that cannot be put back in the place from which it was excavated. Ontario road, sewer, and water mains as well as other core utilities and infrastructure have finite shelf lives and require periodic repairs, reconstruction, and/or replacement. These activities will also generate additional large quantities of excess construction soils. Unless population growth and development are stopped (a most unlikely scenerio) large quantities of excess construction soils will continue to be generated across Ontario.

C. What Ontario Needs Now

At present, there are no clear, consistent, and logical rules which are binding for municipalities and other stakeholders and recognize that the vast majority of excess construction soils pose no human health or environmental hazard for approved, managed placement sites. It is in the broader public interest to establish a pragmatic, risk-based and affordable framework that distinguishes excess construction soils, particularly that from municipal roads and rights of ways, from historic industrial hazardous wastes which are the primary focus of laws such as Ontario Regulation 153/04.



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What is wrong with these pictures?



Infrastructure Construction Project A - 2011

Type: Institutional Infrastructure

Capital Value: Approx. \$10,000,000

Soils Quality: Tested and confirmed as meeting Ontario standards for Full Depth Background Site Conditions, except for salt content.

Disposal: Site was 30 km from the excavation/construction site. This meant a 2 hour round trip time per truck for each of the 6,000 loads that had to be transported.

Soils Transport/disposal costs:
>13% of the capital cost .

Infrastructure Construction Project B - 2011

Type: Road, water & sewer (W Toronto)

Capital Value: \$4,200,000

Soils Quality: Tested and confirmed as meeting Ontario standards for Full Depth Generic Site Conditions in a Potable Ground Water Condition.

Disposal: Site was 49 km from the excavation/construction site, requiring a 2.5 hour round trip time per truck for each of the 2,600 loads that had to be transported.

Soils Transport/disposal costs:
>16% of the capital cost.

Infrastructure Construction Project C - 2011

Type: Road, water & sewer (W Toronto)

Capital Value: \$5,200,000

Soils Quality: Tested and confirmed as meeting Ontario standards for Full Depth Generic Site Conditions in a Potable Ground Water Condition.

Disposal: Site was 52 km from the excavation/construction site, requiring a 2.5 hour round trip time per truck for each of the 1,000 loads that had to be transported.

Soils Transport/disposal costs:
>5% of the capital cost.

Soil transport wastes Millions

Infrastructure projects such as sewer and watermain rehabilitation, road improvements or new health centres usually produce a large amount of excess soil. When it cannot be reused (e.g., compacted to support the weight of road traffic), it must be moved offsite.

Unfortunately, Provincial laws and standards intended to encourage the clean-up of Brownfield and other contaminated sites are being applied as well to excess construction soils, and being imposed by other public agencies and private companies.

Owners of vital infrastructure (provincial and municipal governments, utilities, hospital boards, etc.) typically pass on the obligations to assess soil quality and dispose of excess materials in their construction contracts. This means construction firms are paying millions of dollars each year to move relatively clean soil from construction sites to remote placement sites. Of course, these ever-increasing costs get reflected in contractors' prices to owners, which are then passed on to taxpayers/consumers.

Adding to the problems, over time local sites for excess soils are closing their doors and contractors are required to transport soil further and further away from the excavation sites. There is no practical, organized means to match projects producing excess soils with other owners or companies that can use them. As traffic congestion increases and fuel costs rise, the impact will be a significant erosion of taxpayers' dollars that would otherwise be available for badly-needed infrastructure improvements.

The Residential and Civil Construction Alliance of Ontario is reaching out to all stakeholders, including owners, government agencies, lenders, consultants, scientists, contractors, etc.

We urgently need to find practical solutions to end the escalating costs, and develop best practices to manage these low risk excess soils produced from infrastructure projects.

For more details, contact
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RCCAO members include: Carpenters' Union • Greater Toronto Sewer and Watermain Contractors Association • Heavy Construction Association of Toronto • International Union of Operating Engineers, Local 793 • International Union of Painters and Allied Trades, District Council 46 • Joint Residential Construction Council • LIUNA Local 183 • Residential Carpentry Contractors Association • Toronto and Area Road Builders Association



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RCCAO wants to help take construction soil from a waste to a valued resource.

- Excess construction soils in Ontario should be beneficially reused, based on sustainability principles. As legislative changes will take longer to achieve, work is being done within the existing policy and regulatory frameworks.
- RCCAO continues to work with industry stakeholders, regulators, and local governments to address barriers to beneficial soil reuse.
- On-site reuse of excess soils and the development of approved commercial fill and soil banking facilities are required to divert soils from landfills.
- Practical solutions will require the adoption of progressive risk-based principles, appropriate definitions, standards of practice, and education.
- Improved soil management practices represent a significant opportunity to reduce project costs (*see our ad in ReNew Canada's March/April 2012 edition for details*).
- Ontario's MOE has released a Best Management Practices for public comment. This draft Guide is primarily for large commercial projects but there is recognition that specific solutions for "civil construction and other development activities" will be required.
- RCCAO is endeavouring to fill excess soil management regulatory "gaps" by developing industry-specific best management practices.

RCCAO has established a stakeholder consultation process and management project team to address the requirements for implementing an effective approach to excess construction soils.

For more information and to obtain RCCAO's submissions, go to rccao.com.

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Endnotes

- 1 Many observers view recent amendments to Ontario Regulation 153/04, including Ontario Regulation 511/09, as an indication that the Province of Ontario, through the *Environmental Protection Act*, is increasing the scrutiny and reducing the tolerances for the presence of certain potential contaminants in soil and fill. The Province also took strong regulatory action against Earthworx, a company that was, until 2011, accepting soils of questionable quality at a soil disposal site in Scugog Township. The Township sought the Ministry's assistance in shutting down that site and preventing the import of any additional soils.
- 2 An example is an unnamed road, water, and sewer project in west Toronto that was completed in 2011 with total capital cost of \$4,200,000. Soils were tested and confirmed as meeting Table 2. Disposal site was 49 kilometres from the excavation/construction site requiring a 2.5-hour round trip time for each of the 2,600 loads. Transport and disposal costs were more than 16% of the capital cost of the project.
- 3 See Section 2.5 of the current text of the site alteration bylaw at <http://www.clarington.net/htdocs/documents/Clerks/By-laws/Clarington%20-%20Consolidated%20Financial%20Statements.pdf>
- 4 <http://www.thecrosstown.ca/the-project/the-crosstown>
- 5 http://www.blogto.com/city/2012/04/metrolinx_set_to_endorse_lrt_plan_for_toronto/
- 6 Based on the project description and specifications as contained in the 2010 Environmental Assessment Report for this project, the total excess construction fill is estimated to be 1,531,000 cubic metres.
- 7 <http://www.waterkeeper.ca/2012/04/04/island-life-coming-to-humber/>
- 8 It is estimated that a typical dump truck would consume 35 litres of diesel per 100 km of travel and generates about 2.7 kg of CO₂ for every litre of diesel fuel consumed.
- 9 The Leslie Street Spit is a man-made headland, extending from the city's east end in a roughly southwesterly direction about 5 km into Lake Ontario. Construction of the peninsula began in the late 1950s to provide a breakwater for Toronto's Outer Harbour. Progress was slow until the mid 1960s when larger quantities of rubble and other construction fill became readily available.



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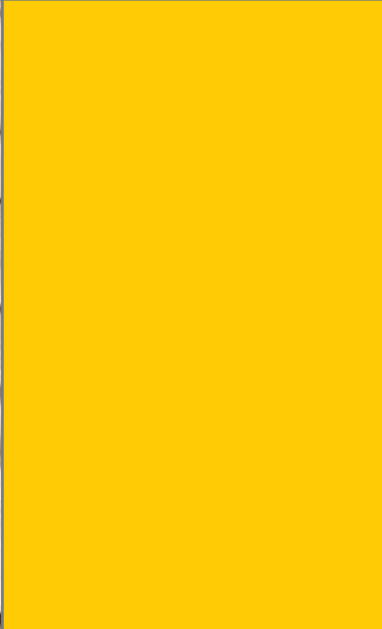
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The Residential and Civil Construction Alliance of Ontario (RCCAO) is composed of management and labour groups that represents a wide spectrum of the Ontario construction industry. The RCCAO's goal is to work in cooperation with governments and related stakeholders to offer realistic solutions to a variety of challenges facing the construction industry and which also have wider societal benefits. For more information on the RCCAO or to view copies of other studies and submissions, please visit the RCCAO website at www.rccao.com

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