Soil Management Plan
Port Lands, Toronto

Prepared for

Waterfront Toronto

Final May 31, 2016

CH2M HILL Canada Limited
245 Consumers Road
Suite 400
Toronto, ON M2J 1R3

Contents

Tables

Figures

Exhibits

Acronyms and Abbreviations

O. Reg.	Ontario Regulation
BOL	bill of lading
ESA	Environmental Site Assessment
ID	identification
km	kilometre
m	metre
m^2	square metre
m^3	cubic metre
masl	metres above sea level
MOE	Ontario Ministry of the Environment
MOECC	Ontario Ministry of the Environment and Climate Change
Operations Manual	*Operations Manual for Air Quality Monitoring in Ontario* (MOE, 2008)
PAH	polycyclic aromatic hydrocarbon
PHC	petroleum hydrocarbon
PM_{10}	particulate matter of aerodynamic diameter less than 10 microns
QP	Qualified Person
RA	Risk Assessment
RFID	radio frequency
RM	Risk Management
RMM	risk management measure
RSC	Record of Site Condition
SLRA	Screening Level Risk Assessment
SMP	Soil Management Plan
SVOC	semivolatile organic compound
Table 3 SCS	*Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition* (MOECC, 2011b)
Table 9 SCS	*Table 9: Generic Site Condition Standards for Use within 30 m of a Water Body in a Non-Potable Groundwater Condition* (MOECC, 2011b)
TCLP	Toxicity Characteristic Leaching Procedure
TRCA	Toronto and Region Conservation Authority
VOC	volatile organic compound
WT	Waterfront Toronto

Tab F. Integrated Soil Management Plan

F.1 Purpose

This Soil Management Plan (SMP) has been developed for the Port Lands flood protection and enabling infrastructure project to guide the management, control, and beneficial reuse of contaminated soil, uncontaminated soil, and demolition rubble. Known soil contaminants include petroleum hydrocarbons (PHCs), volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), and inorganic compounds.

The construction of the new River Valley and spillway for the Don River will excavate and expose contaminated and non-contaminated soil. Roads, bridge buildings, and other structures will be demolished, which will result in concrete rubble, asphalt and other inert materials that could be reused in the naturalization construction activities. This SMP is intended to satisfy the SMP requirement of the Environmental Management Plan (WT, 2009).

F.2 Soil Management Strategy

The goal is to reuse 85 percent of the site soil and available fill materials with less than 15 percent of the contaminated soil disposed of offsite. Rubble and fill materials generated by demolition of buildings, roads, and structures are included in the soil management strategy.

F.3 Baseline Conditions

The soil and fill materials available for reuse will be generated from the following sources:

- River Valley cut
- Over excavation to construct risk management measures (RMMs)
- Additional soils identified during the Screening Level Risk Assessment (SLRA) and geotechnical evaluation to be addressed before redevelopment
- Building, roadway, and dockwall demolition aggregate
- Dredgeate from Keating Channel

The soil balance evaluation has taken into account the soil from the River Valley cut, RMM overexcavation cut, and additional soils. The other sources can be added to the evaluation when volume and quality information becomes available at later stages of project development. The environmental and geotechnical conditions have been described in detail in the Conceptual Site Model (Tab A) and Remediation and Treatment Options (Tab E).

The following assumptions were used in calculating the fill quantities:

- Sediment management basin soil can be reused within the confines of the sediment management basin areas.
- River Valley will be excavated to the subgrade elevations and filled back to final grade with imported construction materials meeting S-GW 3 soil quality criteria, not soil or aggregate fill.
- Clay core is not required in the risk management barriers or to line the River Valley.
- To account for displacement of fill volumes by road-base materials, volume adjustments were made to remove 750 millimetres-thick road base.

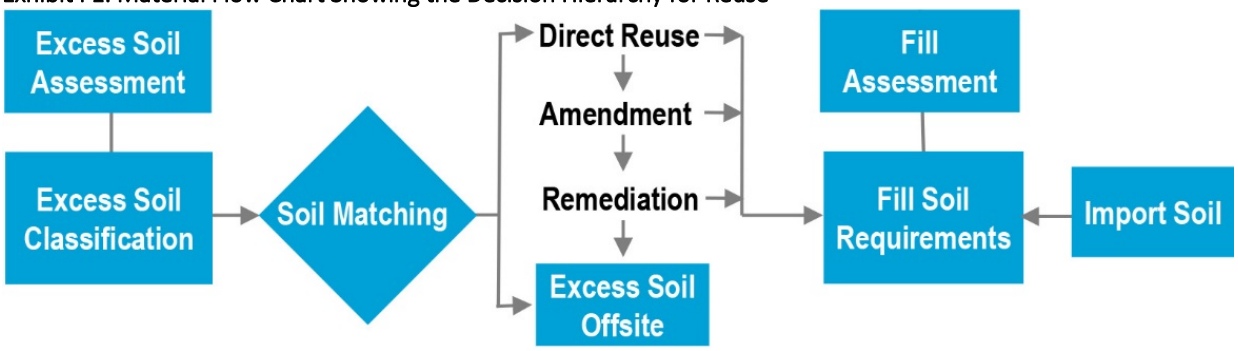
- Soil will be excavated from depths above and below the groundwater table:
  - Dry soil refers to unsaturated soil excavated from depths above the groundwater table.
  - Wet soil refers to saturated soil excavated from depths below the water table.
- Soil that is excavated generates two fractions:
  - Soil that can be directly reused.
  - Soil that has to be remediated or amended to meet minimum soil quality standards defined by the SLRA or geotechnical properties specified by the naturalization design.
- Peat, organic, and clay soils have less desirable geotechnical properties for reuse. Only half of these materials s appropriate for reuse. The remaining materials will be sent offsite for disposal or offsite reuse. As the material volume and properties become better defined, alternatives to offsite disposal will be evaluated.
- Barrier fill required as RMM, also serves functionally as planting media described by Michael Van Valkenburgh Associates Inc. (MVVA) (MVVA, 2015). No separate accommodations were made to achieve horticultural requirements of the planting media. It is likely that a blending operation needs to be added to the Soil Processing Facility to prepare the required material.
- Dry soil (excavated from above the water table) and wet soil (excavated from below the water table) are treated separately because the excavation method is different and ex situ dewatering is required for wet soil regardless of the soil quality. As a result, the processing method will be different.
- The wet soil contains minimum of 30 percent solids.

Excess soil and soil fill areas have been mapped and identified as shown in Figures 36 and 37. The area shown in blue on Figure 36 identifies the locations where excavation is required so that a 1.5 metre (m) barrier can be installed.

F.4 Soil Balance and Matching

Preliminary soil/fill balance analysis including soil volumes that could be reused (based on both environmental and geotechnical conditions), volumes that would require off-site disposal, and soil importation needs to meet the project objectives. The general material flow diagram is as follows:

Exhibit F1. Material Flow Chart Showing the Decision Hierarchy for Reuse



Soil volumes are tabulated in Table F1 and F2; the project sequence numbers correspond to the numbering in Figures 36 and 37. Timing of grade changes has been developed to avoid increasing flood risk if a significant storm event occurs during construction. Toronto and Region Conservation Authority (TRCA) is completing additional flood modeling to confirm construction sequencing does not increase flood risks and existing import piles in several land parcels can remain during early construction until such time as they will be removed and reformed.

Table F1. Preliminary Excavated Soil Volume Estimate (All Cuts)

Project Sequence	Dry (in-situ m^3)	Wet (in-situ m^3)
Excavated Soils from River Valley Area		
C1a	122,000	104,000
C2a	152,000	71,000
C2b	69,000	45,000
C2c	22,000	44,000
C3	95,000	65,000
C4a	17,000	41,000
C4c	34,000	82,000
C4e	70,000	164,000
Excavated Soil to place the RA/RM Barrier (overcut in fill areas to then accommodate up to 1.5-metre barrier)		
Phase 1	102,000	0
Phase 2	90,000	0
Phase 3	15,000	0
Phase 4	90,000	0
Subtotal	**878,000**	**616,000**
Total (dry and wet)	**1,494,000**	

Note:

1. No excavation has been included to accommodate the RA/RM barrier in the F4f and F4g areas, as there is no land use change to a more sensitive site in these areas.

Table F2. Preliminary Fill Volume Estimate (All Fills)

Sequence ID	Area (m^2)	Barrier Volume (in-place m^3)	Lower Fill (in-place m^3)	Lake Fill Required (in-place m^3)
F1a	11,000	15,000	4,000	
F1b	10,000	20,000	9,000	
F1c	12,000	22,000	7,000	
F1d	24,000	36,000	5000	
F1e	27,000	40,000	3000	
F1f	79,000	116,000	11000	
F2a	3,000	4,000	1000	
F2c	63,000	94,000	14,000	
F2e (note 1)	23,000	71,000	37,000	295,000
F2f	9,000	13,000	1000	
F3a	31,000	46,000	13,000	
F3b	15,000	7000	7,000	
F3c	10,000	17,000	6,000	
F4a	17,000	25,000	4000	
F4b	39,000	35000	13,000	
F4c	13,000	10,000	16,000	
F4d	6,000	4,000	1000	
F4e	3,000	4,000	1000	
F4f	25,000	13,000	1000	
F4g	2,000	0	0	
F4h	15,000	11,000	4000	
F4i	22,000	8,000	4000	
Subtotal	**459,000**	**611,000**	**162,000**	**295,000**
Total (barrier and lower fill)		**773,000**		
Total Fill Required		**1,068,000**		

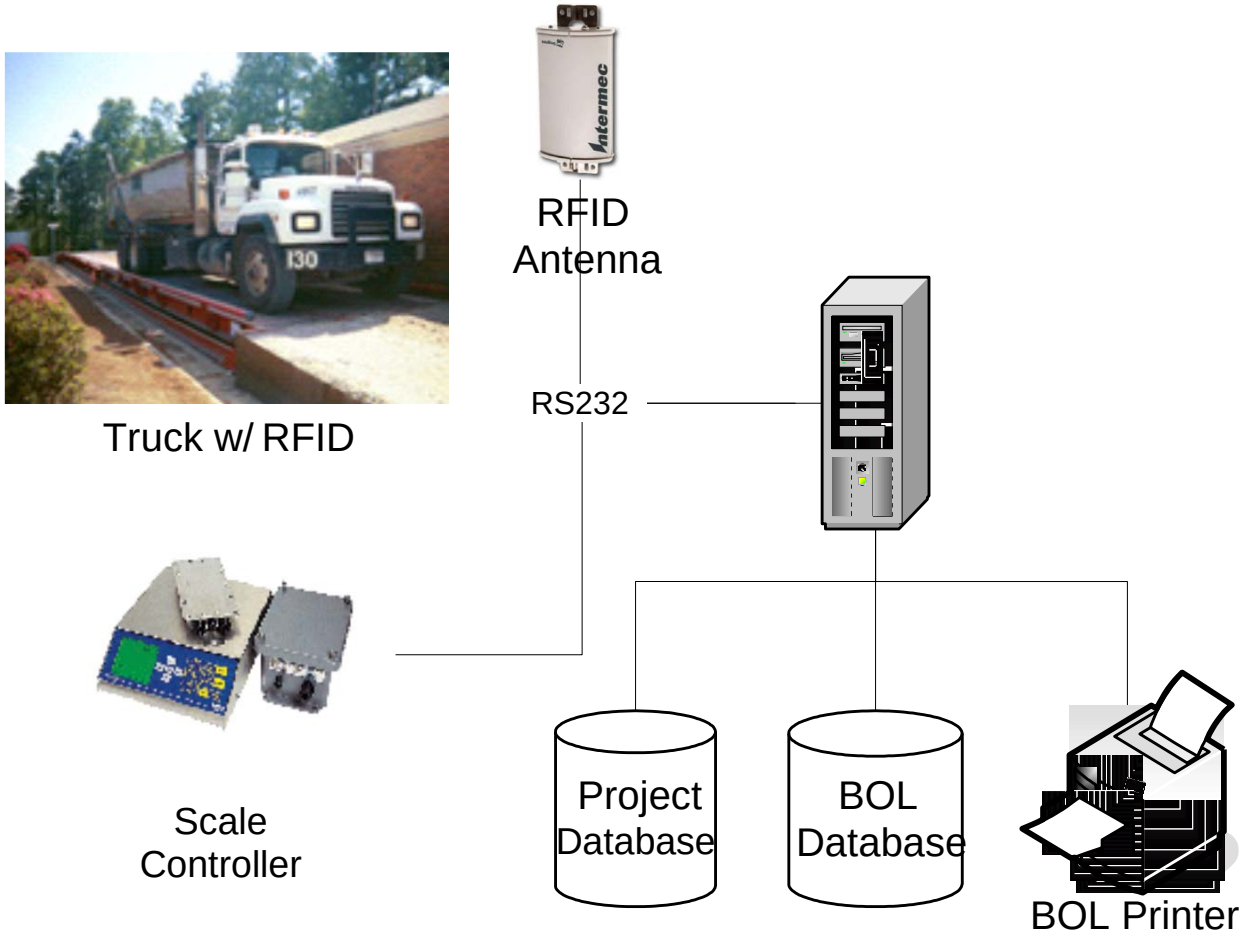
Notes:

1. Lake fill - Essroc Quay below 76.2 masl. Value provided by Riggs Engineering
2. Fill volumes to accommodate settlement due to consolidation have been included as Lower Fill.

Unexpected changes in quantity and quality will occur and will be managed through tracking and coordinating material flow. Soil demands versus supply will be checked for variance and determine compromises, stockpiling, importation and phasing, if required. Matching soil for reuse will require a means to assess, develop, and track inventory and schedule quantities of incoming soil and outbound treated soil. Real-time soil balancing can be supplemented with geographic information system evaluation of the soil-filling progression using the Digital Elevation Model already developed for the project. Tracking soil can be done using radio frequency tracking systems to manage the large volume of shipments. This digital soil-tracking system will incorporate soil origin data and soil chemical

characterization results to support reuse. Whether treated through the Soil Processing Facility or used directly as fill without any treatment other than a coarse screen, the material can be tracked using a relational database that correlates the data with the site where the material was deposited. Each truck can be loaded, weighed, and received a bill of lading (BOL) within minutes of weighing. Information can be retained to associate each shipment with a soil origin. Radio frequency (RFID) tags with a serial number can be placed on each truck. The electronic vehicle system can be used to look up the serial number and the associated tare weight, trucking company, current work assignment, chemical characterization, and load destination. Output from the readers, along with data coming from the scale controller, can be directed to a computer. The continuous process is shown in Exhibit F2. The specifications for tracking and data management will be provided in an Operation and Maintenance Manual to be developed for the Soil Processing Facility in the future.

Exhibit F2. Soil Tracking Schematic



F.5 Soil Sequencing

Preliminary soil matching based on estimated excavation and fill quantities has been completed to guide soil movement through the duration of the naturalization program. Guiding principles were as follows:

- Fill expected to meet *Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition* (Table 3 SCS) (MOECC, 2011b) or *Table 9: Generic Site Condition Standards for Use within 30 m of a Water Body in a Non-Potable Groundwater Condition* (Table 9 SCS) (MOECC, 2011b) or modified versions was reserved for placement in the RM barrier. At present, the surface (barrier)

soil quality requirement is referred to as Table 3 SCS and Table 9 SCS; however, several potential target levels for surface soil are presented in the SLRA (Tab B).

- Fill placed below the RM barrier (subsurface soil) could meet quality criteria less stringent than Table 3 SCS and Table 9 SCS. At present, the subsurface soil quality requirement is referred to as S-GW3 (soil protective of aquatic receptors in surface water) developed in the SLRA (Tab B).
- 85 percent of soil excavated could be reused after segregation, screening, soil washing and remediation. A small percentage was assumed unusable after processing.
- When there is not a reuse match for excavated soil, the soil is removed from the site to a facility appropriately licensed to receive it. Ideally, a reuse opportunity will be identified for the soil. Where possible, offsite disposal will avoid landfill. Specific disposal options will be determined in compliance with applicable regulation based on chemical and physical properties of the soil.
- Imported soil is anticipated to be used for the RM barrier and to also supplement settlement expected in areas with subsurface peat (settlement is described in the Earthworks Methodology [Tab H]).

Table F3 presents the preliminary soil processing program showing for each phase the supply of soil and estimates on volumes of soil directly reused, amended, and remediated. Cut and fill sequencing is presented on Figures 33a, 33b, 33c, 32d and 33e. A summary of the total soil balance is presented in Table F4.

Table F3. Preliminary Soil Processing Program for Excavated Soils

River Valley Cut Areas	Location	Material Type	Total Volume (m^3)	Offsite Disposal	Dry Screening/Wet Processing	Remediate (m^3)	Barrie Soil Available (T3/T9) (m^3)	Lower Fill Available (S-GW3) (m^3)
Phase 1	Former Imperial Oil Lands	dry	122,000	13,000	110,000	98,000	13,000	98,000
		wet	104,000	3,000	102,000	15,000	87,000	15,000
Phase 2a	Channel/spillway juncture	dry	152,000	16,000	136,000	16,000	10,000	127,000
		wet	71,000	2,000	70,000	4,000	66,000	4,000
Phase 2c	West of new Cherry Street	dry	22,000	3,000	20,000	9,000	20,000	0
		wet	44,000	1,000	43,000	4,000	40,000	4,000
Phase 2b	Spillway	dry	69,000	7,000	62,000	0	0	62,000
		wet	45,000	1,000	44,000	5,000	40,000	5,000
Phase 3	North from spillway	dry	95,000	2,000	93,000	57,000	36,000	57,000
		wet	65,000	33,000	33,000	10,000	23,000	10,000
Phase 4a	North along spillway	dry	17,000	4,000	14,000	5,000	10,000	5,000
		wet	41,000	21,000	21,000	9,000	13,000	9,000
Phase 4c	West plug	dry	34,000	4,000	30,000	12,000	19,000	12,000
		wet	82,000	2,000	80,000	12,000	68,000	12,000
Phase 4e	Sediment basin	dry	70,000	7,000	63,000	5,000	43,000	5,000
		wet	164,000	4,000	160,000	23,000	138,000	23,000
RA/RM Barrier Cut								
Phase 1		dry	102,000	21,000	82,000	21,000	61,000	21,000
Phase 2		dry	90,000	9,000	81,000	5,000	76,000	5,000
Phase 3		dry	15,000	2,000	14,000	2,000	12,000	2,000
Phase 4		dry	90,000	9,000	81,000	9,000	72,000	9,000
Subtotal			**1,494,000**	**164,000**	**1,339,000**	**321,000**	**847,000**	**485,000**

Notes:

1. The RA/RM barrier cut is being carried out to accommodate the required 1.5 m thickness for the RA/RM barrier soil in various Fill Zones.

Table F4. Preliminary Cut and Fill Summary Table

	Summary Table		Stage 2 Design	Stage 1 Design	Changes (Stage 2 - Stage 1)	Source of Volume Change Between Design Stages
Cuts	**Volume of Material Cut in River Valley**					
	Dry soil	m^3	581,000	506,000	75,000	Included C4e in excavation volume
	Wet soil	m^3	616,000	442,000	174,000	Included C4e in excavation volume
	Volume of Material excavated for RA/RM barrier					
	Dry excavation	m^3	297,000	256,000	41,000	
	Total Cut	m^3	1,494,000	1,204,000	290,000	
Fills	**Volume of Fill Required**					
	Essroc Quay below 76.2 masl	m^3	295,000	295,000	-	
	Below Barrier (Lower Fill)	m^3	162,000	92,000	70,000	Fill material to offset settlement (64,000 m^3), has been included as part of the Below Barrier Fill Material in Stage 2 Design.
	Barrier Soil	m^3	611,000	716,000	(105,000)	Removed barrier from F4h area reduction; also, due to overall grade change in other areas.
	Total Fill required	m^3	1,068,000	1,103,000	(35,000)	
Soil Amendment	Geotechnical Amendment (dry)	m^3	424,000	663,000	123,000	Additional cut in C4e results in additional soil to be amended. See notes 2 and 4.
	Excess Soil Geotechnical Amendment (dry)	m^3	362,000			See notes 2, 3 and 4.
	Geotechnical Amendment (wet)	m^3	553,000	384,000	169,000	Additional cut in C4e results in additional soil to be amended. See note 4.
	Remediation post amendment (dry)	m^3	321,000	293,000	28,000	Additional cut in C4e results in additional soil to be amended. Soil requires remediation to avoid disposal as waste. See note 5.
Re-use, Waste and Delta of Soils	Amended Soil Available for Re-use as Fill	m^3	1,068,000	983,000	332,500	See note 4.
	Exported soil as waste	m^3	164,000	221,000	(57,000)	The Stage 2 value has been refined to only represent contaminated soil exported as Waste. See note 4.
	Imported Soil	m^3	100,000	160,000	(60,000)	Allowance for imported soil to be used for various features around the site.
	Excess Soil	m^3	362,000	-	362,000	Excess dry soils can be stored on site and go through geotechnical amendment prior to use as fill material (Stage 2).

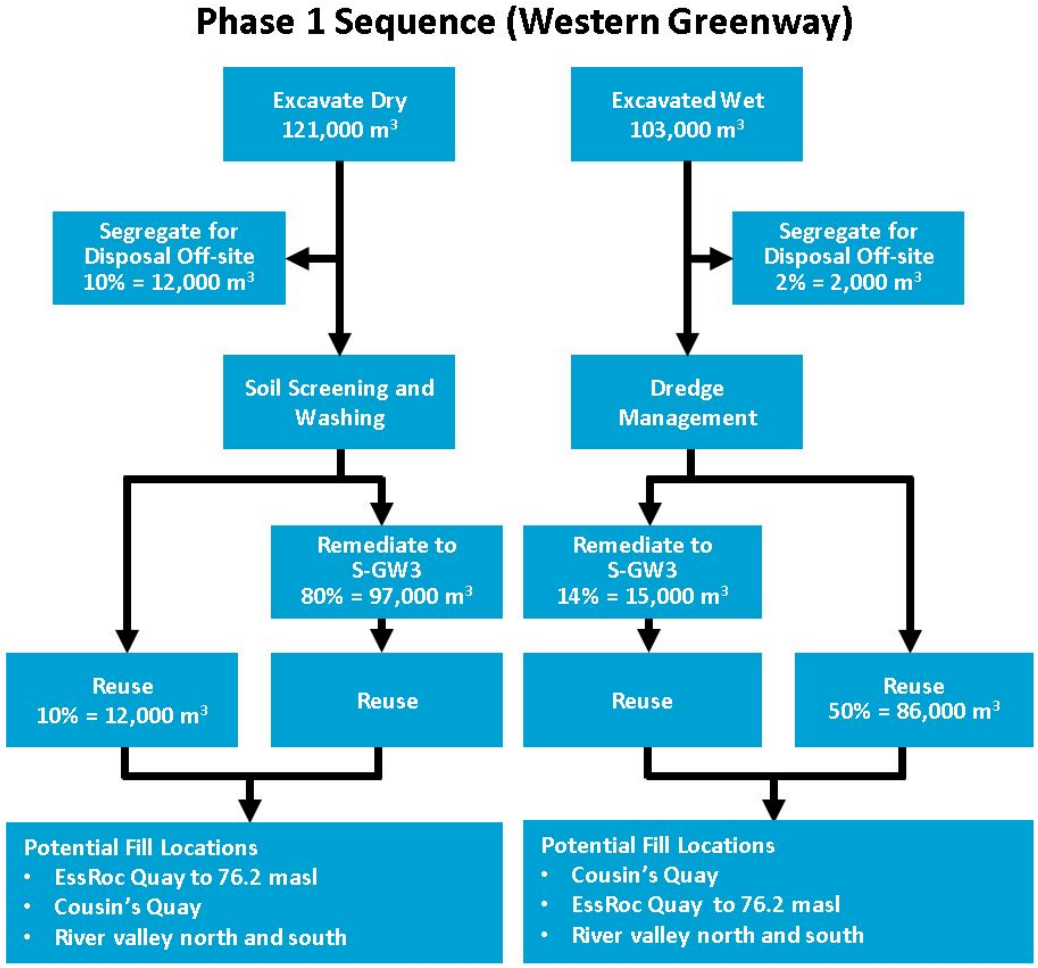
Notes:
1. all volumes are in-situ volumes
2. There will be a total 786,000 m^3 of dry soil to go through Geotechnical Amendment (Including the Dry Excess Soil Geotechnical Amendment).
3. Due to excess soil available on site (the delta from Cut&Fill Balance minus the exported soil as waste), some of the excavated dry soil can be stored on site to go through geotechnical amendment at a later time 272,000 m^3.
4. All excavated soils (dry and wet), will require to go through geotechnical amendment, except the material which is considered waste (Waste material will be directly exported offsite).
5. Some of the soil which has gone through geotechnical amendment will require to go through the environmental remediation post amendment as well.
6. The additional Fill volume required to accommodate settlement due to consolidation, has been included in Stage 2 Fill volumes.

F.6 Soil Processing

A mobile Soil Processing Facility is planned to prepare excavated soil for reuse. The Soil Processing Facility is described in the Geotechnical Conditions report (Tab D). The soil is to be removed, inspected, and assessed for potential reuse at the excavation. Soil will be segregated from the excavation face and sorted into management streams using a mobile soil processing system deployed near the active excavation area. Soil screening, soil washing (for dry soils), and soil dewatering (for wet soils) will be completed. Soil will then be immediately categorized for remediation, geotechnical amendment, or direct reuse based on quality and specification required for the planned reuse. Soil quality monitoring programs described in Section F9.1 will be used to characterize the soil. Soils requiring remediation or amendment following initial processing will be hauled to a long-term Soil Processing Facility for further management. Soil available for reuse directly without further treatment will be hauled to a designated fill zone.

A representative soil-processing flow diagram using the Western Greenway area is provided as Exhibit F3, to demonstrate how processing will be carried out. Truck and vehicle routes, traffic plan, and entrances to and exits from the construction zone to the Soil Processing Facility will be identified, documented, and communicated in a Traffic Control Plan. An operations and environmental control plan will be established for the Soil Processing Facility. Because the facility will process contaminated soil, it is expected the facility will require an Environmental Compliance Approval to operate as a waste processing facility.

Exhibit F3. Representative Soil-processing Flow Diagram for Phase 1 Area



Each step is described in the following sections.

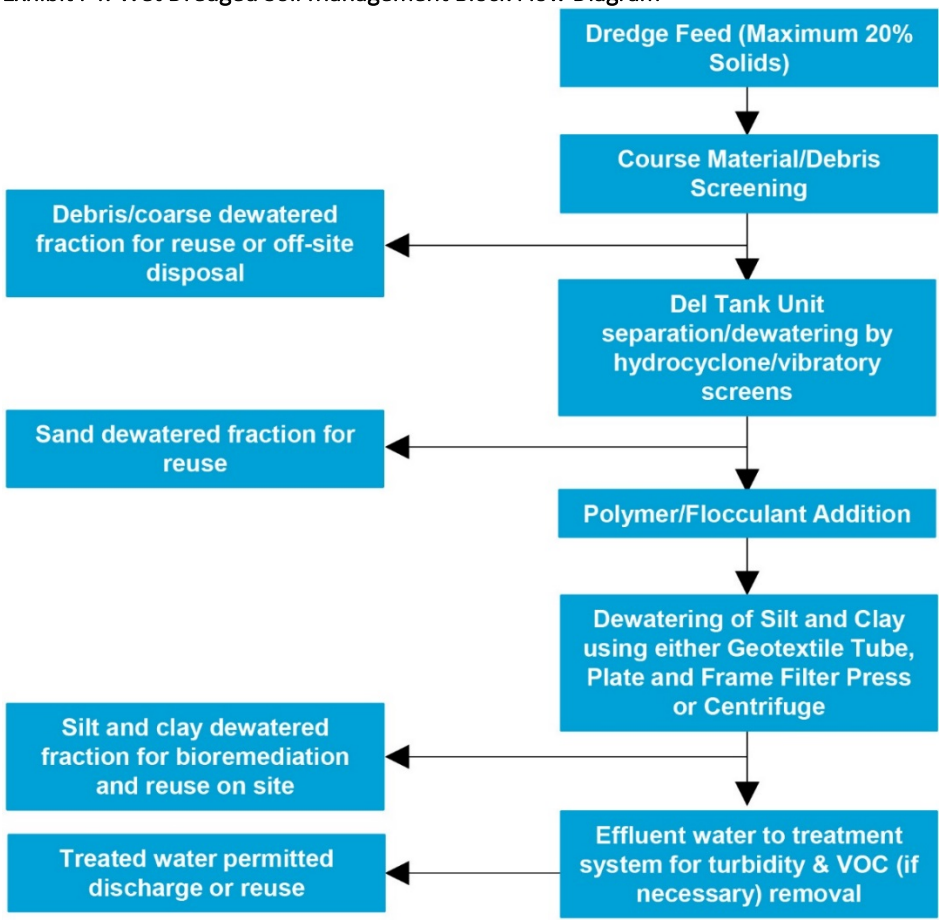
F.6.1 Initial Soil Segregation

Site supervision will include direction on the segregation of contaminated soil, non-contaminated materials, and geotechnically unsuitable materials. Field monitoring, procedural controls and excavation methods will be developed and implemented to prevent the spread of contamination from the excavation areas. Management plans will direct the maintenance of appropriate records relevant to the soil movement.

F.6.2 Excavation Face Soil Screening and Dewatering Plant

The excavated soil will be initially screened and washed at the excavation front and if wet, will be dewatered after it is excavated. The equipment is expected to be mobile and can be stationary for the excavation season and then relocated if required the next excavation season. Grade fractions will be created and assigned further processing or direct reuse approaches based on quality and planned reuse. Potential locations of the Soil Screening and dewatering plant is shown in Figure 35. A block flow diagram for wet, dredged soil management is illustrated in Exhibit F4.

Exhibit F4: Wet Dredged Soil Management Block Flow Diagram



F.6.3 Long-term Soil Processing and Stockpiling Facility

Following dewatering and screening, soil will be hauled from the excavation front screening plant to the Soil Processing Facility. Cousins Quay, north of Commissioners Street and south of the River Valley have been identified as preferred locations for the Soil Processing Facilities based on haul distances and adjacent land uses. A relatively impermeable surface is present across much of Cousins Quay and little surface preparation would be required to set up the facility there. Locations are shown on Figure 35; however, refinement in phasing and construction approaches may find more efficient locations.

Emphasis has been placed on low energy treatment methods, best practices, and leading but proven technologies. Bioremediation has been selected as the preferred approach based on the decision process described in the Remediation and Treatment Options report (Tab E). Geotextile tube dewatering for the wet dredged soils has been selected for dewatering the fines generated at the excavation-face screening and dewatering facility. Bioremediation and soil stockpiling are intended to occur in the long-term Soil Processing Facility.

The Soil Processing Facility will also house surplus soil stockpiles because no immediate fill area is available elsewhere in the project. Stockpiling provides an excellent opportunity to load areas that require subsurface soil consolidation for ground improvements because of soft and compressible subsoils. Stockpiling will be temporary and conducted in accordance with the Ontario Ministry of the Environment and Climate Change's (MOECC's), *Management of Excess Soil – A Guide for Best Management Practices* (2014). Soil stockpiling will consist of placing and grading material received in 300 mm lifts and compacted via vehicle traffic. Materials will be tracked and placed in separate locations based on material type and geotechnical properties, so that they can be readily identified and located at a later time when needed for filling operations.

General guidelines for stockpiling include:

- Stockpile heights will be maintained to less than 3 m unless tarping is used to control wind erosion (with the exception of the existing stockpiles onsite).
- Stockpiles will be managed so that freshly-exposed surfaces are minimized.
- Each stockpile will be treated with water or each stockpile will be kept covered with a tarp, as needed, to control dust. Dislodged or damaged tarps will be repaired or replaced, as required. Stockpiles covered with tarps should be secured with sandbags, as required.
- Silt control features, such as settling ponds, hay bales, and check dams, will be maintained to control sediment transport by storm water. Silt control elements will typically be designed in accordance Ontario Provincial Standard Designs.

F.7 Soil Sourcing (External Soil and Fill Sources)

As shown in Table 2, the preliminary soil balance results in extra soil. However given the preliminary design level, an allowance for imported fill has been included in the project soil balance. If advancement of some fill areas has to proceed before the fill is generated through the Soil Processing Facility, then soil will need to be imported to satisfy disconnects between time-dependent soil supply and demand activities. This may result in changes to the net soil balance estimated at this stage of project development.

Large capital construction, infrastructure renewal, and greenfield development projects outside The Project that are expected to generate large quantities of excess fill materials have been investigated as part of this study. The assessment included an environment and geotechnical quality of the source site soil as it relates to the Port Lands soil needs, schedule, and haul/distance evaluation. Potential soil import source are summarized in Table F5.

During construction, specific details will be required to confirm soils from external sources meet project specifications. Information on supplier and source of imported fill is expected to include:

- Address of the source property
- Former and current uses of the source property
- Identification of potentially contaminating activities at the source property
- Total volume of soil to brought from the source property
- Sampling program including number of samples and analytical parameters
- Analytical data showing the quality of the imported material

- A figure showing where the soil is to be deposited
- Any available reports, including, but not limited to, Phase One and/or Phase Two Environmental Site Assessment (ESA) reports

Soil important and placement will consider the results of the Community Based Risk Assessment (CBRA) currently planned for the Port Lands and anticipated to be completed prior to construction activities. The CBRA will develop soil and sediment Intervention Values (IVs) with consideration of "exposure zones" (CH2M, 2016). Examples of exposure zones include the upper 0.5 m of soil considered to be accessible to a landscape worker or the upper 1.5 m of soil considered to be accessible to deep rooted vegetation, such as trees. The soil and sediment IVs for each exposure zone will be applied to direct the reuse of soil and sediment material excavated during the revitalization of the Port Lands, and can also be applied to direct the placement of imported soil materials. The SMP will combine the results of the CBRA into a practice manual for directing and guiding soil reuse, importation, and placement in the Port Lands.

The documentation regarding imported soil backfill quality and soil sampling frequency must satisfy the requirements of Ontario Regulation (O. Reg.) 153/04 (as amended) for "Soil excavated at, or brought to, a Record of Site Condition (RSC) Property" (MOECC, 2011a) for the RSC properties (as identified in Figure 35). For a RSC property, this soil must be separately tracked and managed so that the documentation trail is directly relatable to the RSC property. For all other areas, not subject to RSCs, the testing procedures will be similar to those described in Section F.9.1 Soil Monitoring.

F.8 Soil Disposal

Throughout this document the term excess soil refers to soils that are not required to meet fill demands and may consist of:

- contaminated soils;
- soils with engineering properties that do not meet project specifications; and
- fill materials other than soil.

Excess soils will be removed offsite to appropriate facilities based on material characteristics. Options and opportunities have been evaluated so that sustainable offsite reuse scenarios can be explored. Table F6 summarizes potential offsite management options for excess soils.

Table F5. Import Soil Sources

Project Location Name (address/major intersection)	Approximate Haul Distance to Port Lands (km)	Material Type (soil/rock)	Contracting Stage	Available Quantities (m^3)	Timeline	Environmental Quality	Geotechnical Quality (soil type/expected grain size)	Sustainability
City of Toronto Outfall (Ashbridges Bay Outfall Tunnel)	5	Rock (Georgian Bay shale)	Start 2018	200,000	n/a	n/a	n/a	n/a
City of Toronto Influent Pumping Station	3	Soil/rock	Detailed design	47,000/120,000	2018 to 2022	n/a	n/a	n/a
East Brampton, Tunnels City of Brampton, mainly along Dixie Road	41	Soil and rock (shale)	Starting predesign	10,000	Construction Start beginning of 2017	n/a	Shale and Soils	n/a
City of Toronto, Coxwell By-Pass	3 to 14	Soil/rock	Detailed design	82,000/602,000	2018 to 2023	n/a	n/a	n/a
Eglington Station Excavation	15	Soil	Start 2016	500,000 to 1,000,000	Start 2016 - several years	n/a	n/a	n/a
Britannia East, Britannia Road, Halton	60	Soil and rock (shale)	Starting Construction	4,000/21,500	Construction Start October 2015	Table 1[a.] (some exceedances for EC, SAR and BA, Table 2 exceedances for EC and SAR)	(Sand/Silt/Clay) / Shale	n/a
Wastewater Landfill - 5768 Nauvoo Rd, 8039 Zion Line, Watford, ON, N0M 2S0	250	Soil	Ongoing	1,000,000	Immediate	Table 1 [a.]	Clayey Silt to Silty Clay [a.]	This material is from excavation of waste cells at the landfill. This can be backhauled.
Miller Group composting - Bloomington/Clarington	45/65	Compost	n/a	20,000 to 30,000/year	Ongoing	Category AA (Table 1)	Compost	Collected from municipal sources

Table F6. Export Disposal Options

Material Type	Disposal Location (address)	Approximate Haulage Distance from Port Lands (km)	Acceptance Criteria (Table 1, Table 2, Table 3, >Table 3, other)	Capacity	Timeline	Cost (tonne)	Haulage Cost from Port Lands per Tonne (if provided)	Sustainability Solutions
Soil meeting Table 3	WM - 14301 Highway 48 Stouffville, Ontario	50	Up to Table 3	600 000 m^3	2 years (preselling capacity)	10-15	n/a	This material is being used in cap restorations. Waste Management will offer full indemnification on these materials to WT.
	Walker - 3081 Taylor Rd, Niagara Falls or 685 River Road, Welland	124/134	TCLP	15 000 tonnes/day	n/a	25 - 35	15 - trailer 20 - dump truck	Walker is also a large generator of carbon offsets and can offset the haulage to make a project carbon neutral. Soil is used for daily cover.
	NewAlta - 65 Green Mountain Road, Stoney Creek, ON	79	TCLP	n/a	n/a	48	n/a	
Soil exceeding Table 3 but non-hazardous	WM - 5768 Nauvoo Rd/ 8039 Zion Line Watford, ON N0M 2S0	250	Solid Nonhazardous Waste- will require TCLP to confirm	n/a	20 years	20	n/a	This material will be used for daily and possibly intermediate cover
	GFL Waterfront - Unwin Ave	3	PHC, VOC, SVOC, metals < Table 3	2,500 tonnes/day	n/a	36	n/a	n/a
	GFL Pickering - 1070 Toy Ave	44	PHC, VOC, SVOC, metals < Table 3	5,000 tonnes/day	n/a	34	n/a	n/a
	GFL Fenmar - 38 Fenmar	38	PHC, VOC, SVOC, metals < Table 3	3,000 tonnes/day	n/a	34	n/a	n/a
	Walker - 3081 Taylor Rd, Niagara Falls or 685 River Road, Welland	124/134	TCLP	15 000 tonnes/day	n/a	25 - 35	15 - trailer 20 - dump truck	Walker is also a large generator of carbon offsets and can offset the haulage to make a project carbon neutral. Soil is used for daily cover.
	NewAlta - 65 Green Mountain Road, Stoney Creek, ON	79	TCLP	n/a	n/a	48	n/a	n/a
Waste from screening	WM - 5768 Nauvoo Rd/ 8039 Zion Line Watford, ON N0M 2S0	250	Solid Nonhazardous Waste- will require TCLP to confirm	n/a	20 years	25	n/a	This material will be landfilled.
	GFL - Unwin Transfer	3	Nonhazardous Solid Waste	500 tonnes/day	n/a	75	n/a	n/a
	Walker - 3081 Taylor Rd, Niagara Falls or 685 River Road, Welland	124/134	n/a	15 000 tonnes/day	n/a	65	15 - trailer 20 - dump truck	Walker is also a large generator of carbon offsets and can offset the haulage to make a project carbon neutral.
	NewAlta - 65 Green Mountain Road, Stoney Creek, ON	79	TCLP	n/a	n/a	48	n/a	n/a
Waste Concrete unsuitable for reuse	WM - 5768 Nauvoo Rd/ 8039 Zion Line Watford, ON N0M 2S0	250	Concrete must be nonhazardous and be 300 mm minus	n/a	20 years	28	n/a	This material will be used within the landfill foot print as base for roads
	GFL Unwin Transfer	3	Nonhazardous Solid Waste	500 tonnes/day	n/a	75	n/a	n/a
	Walker - 3081 Taylor Rd, Niagara Falls or 685 River Road, Welland	124/134	n/a	15 000 tonnes/day	n/a	65	15 - trailer 20 - dump truck	Walker is also a large generator of carbon offsets and can offset the haulage to make a project carbon neutral.
	NewAlta - 65 Green Mountain Road, Stoney Creek, ON	79	TCLP	n/a	n/a	48	n/a	n/a
Asphalt	GFL - Unwin Transfer	3	Nonhazardous Solid Waste	500 tonnes/day	n/a	75	n/a	n/a
	Walker - 3081 Taylor Rd, Niagara Falls or 685 River Road, Welland	124/134	n/a	15,000 tonnes/day	n/a	65	15 - trailer 20 - dump truck	Walker is also a large generator of carbon offsets and can offset the haulage to make a project carbon neutral.
	NewAlta - 65 Green Mountain Road, Stoney Creek, ON	79	TCLP	n/a	n/a	48	n/a	

Notes:

GFL locations are transfer locations only. Waste is shipped to Waste Management at 5768 Nauvoo Rd/ 8039 Zion Line Watford, ON or Lenox, Michigan

SVOC - semivolatile organic compound

TCLP - Toxicity Characteristic Leaching Procedure

WT - Waterfront Toronto

This page intentionally left blank.

Offsite export of soil to sites other than approved waste receiving, processing or transferring facilities must be conducted in accordance with the MOECC's Guide on Management of Excess Soil (MOECC, 2014) and other applicable regulations. Weigh bills must be provided to verify export receiving site and quantities.

F.9 Monitoring Plan

A monitoring plan will be developed in consultation with WT and stakeholders. The monitoring plan will outline a number of auditable performance targets and be in compliance with WT's Environmental Management Plan (WT, 2009) and give consideration to requirements in the MOECC's Guide on Management of Excess Soil (MOECC, 2014). Industry best practices, together with applicable regulatory requirements and appropriate statistical methods will be followed to provide scientifically-defensible documentation and cost-effective management of the soil processing. Key monitoring plans are described herein.

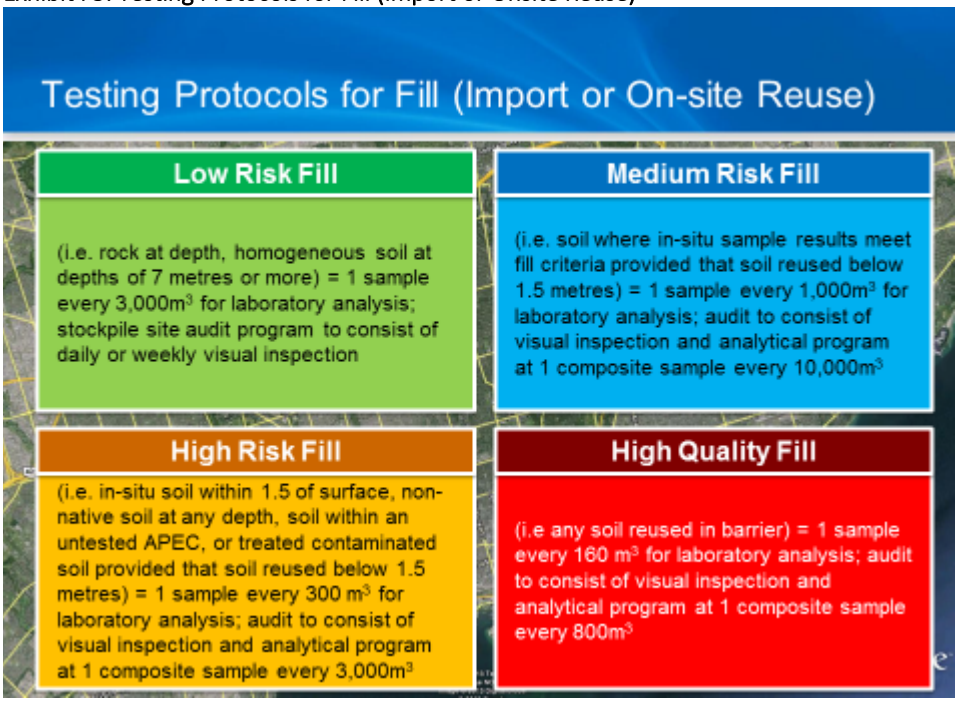
F.9.1 Soil Monitoring

Soil will be monitored to match requirements through field screening techniques supported by laboratory analysis. Understanding soil quality will help soil processing optimization, sorting and segregation, temporary storage requirements, and soil matching with fill sites. Soil will be analyzed before reuse to confirm soil quality meets intended end-use criteria.

If the soil is classified as leachate toxic (according to O. Reg. 347 analysis) and therefore hazardous waste, the soil will be disposed of offsite. The property owner will be required to register as a waste generator and register appropriate waste streams before the disposal of excess soil. Completed waste manifests will be needed for each load, and the waste hauler is required to have a Certificate of Approval for waste haulage. Currently, there is no indication of the presence of hazardous waste; however, further analysis is recommended to confirm findings to date.

For nonhazardous material, the following information on testing protocols is provided as not all material should be treated the same in terms of testing and auditing. Soil at a low risk for contamination warrants a different level of scrutiny than soil with contamination. It is reasonable to develop a scale of increasing level of scrutiny with increasing level of potential risk for contamination and heightened security for soil used in the risk management barriers. The following testing protocol has been established based on the type of source fill and reuse opportunity. Fill to be delivered to the fill sites will be managed in accordance with the testing protocols outline in Exhibit F5.

Exhibit F5. Testing Protocols for Fill (Import or Onsite Reuse)



A Qualified Person (QP) for ESA will be required to assess the functional classification of the fill source. The Exhibit F5 protocol is specific to the Port Lands project with knowledge of the soil requirements and is not intended to apply beyond the confines of this project. It is likely that the full list of contaminants of concern presented in the Conceptual Site Model (Tab A) will require testing but this assumption should be revisited during the Community Based Risk Assessment.

F.9.2 Groundwater Monitoring

A groundwater quality monitoring plan will be developed in recognition of the area-wide groundwater model developed in the Groundwater Management Plan (Tab G). Soil movement and processing activities have the potential to impact local groundwater; therefore, monitoring will be required.

F.9.3 Air Monitoring

A perimeter air monitoring program will be required for the duration of construction, demolition and earthworks. Soil management and mechanical handling of soil and stockpiling are almost certain to generate dust and particulate, even with dust suppression techniques and potential odours from volatiles. Continuous particulate air monitoring, collection and analysis of air samples, and monitoring of meteorological conditions will likely be required at key locations during baseline conditions and development. Release of volatile contaminants and dust from the soil may potentially cause nuisance concerns with neighbours. The approach described herein is to complement the dust control and monitoring programs implemented by the contractor.

Based on the contaminants of concern, a monitoring program should be developed for VOCs, PAHs, and particulate matter of aerodynamic diameter less than 10 microns (PM_{10}). Monitoring at four sites for PM_{10} and PAHs and six sites for VOCs would generally provide sufficient coverage for the construction site.

Approaches for monitoring include:

- PM_{10} monitoring on a continuous basis using a Beta Attenuation Monitor or similar with results uploaded via telemetry on an hourly basis to WT's secure Sharepoint site and notifications could be sent to site personnel should elevated concentrations occur.
- PAH monitoring using a high-volume Tisch® polyurethane foam sampler on a 12-day schedule, with measurement over a 24-hour period.
- VOCs sampled using summa canisters done on a 12-day schedule.
- Use of a wind direction and speed monitor and a compatible datalogger.

Photo of Typical Air Monitoring Station

Trigger thresholds are often established at values less than the applicable standard so that corrective actions can be taken to identify and address the source. Results would be compared to O. Reg. 419 standards; there is no regulatory threshold for PM_{10} specified in O. Reg. 419 or the Canada-wide Standards; however, the World Health Organization does specify a 24-hour PM_{10} guideline value for consideration.

Sampling and monitoring is to be conducted in accordance with the MOE's *Operations Manual for Air Quality Monitoring in Ontario* (Operations Manual) (2008). Locations must meet siting criteria as set out in Section 3.2 of the Operations Manual and satisfy monitoring needs with respect to evaluating impacts on nearby residences, neighbouring workplaces, and sensitive receptors. Toronto Public Health may select or prescribe several specific monitoring locations and discussions should be held prior to final selection of the monitoring locations.

F.10 Permitting

Permitting of a soil management/processing facility is critical path milestones in the Project Schedule. The approval process for a waste processing site under the Part V of the Ontario Environmental Protection Act is streamlined; however, it can be a lengthy process.

Schedule pressures could be alleviated by engaging Contractors with mobile waste processing ECAs or using local facilities that are currently permitted to receive contaminated soil for treatment and disposal.

While stockpiling activities do not trigger the approval process, the incorporation of soil processing does.

The MOE has indicated that it will consider areas within the Toronto Port Lands as a single site, if materials are not transported over public roadways (as per the letter from MOE to WT on December 5, 2007). The intent is to use closure and existing roads to transfer material.

Ontario Water Resources Act approvals will be required for any centralized groundwater treatment system that involves discharge to surface water or groundwater. Additional TRCA and Fisheries and Oceans Canada approvals may be required.

F.11 Record Keeping

The process to retain information on volumes of material, number of vehicle loads, measurements, and sketches and plans to supplement such information must be detailed in a Soil Processing Operation and Maintenance Manual. Documentation is to be maintained in log books, onsite files, or both.

Daily reports will summarize the soil movement activities onsite. At a minimum, this record keeping will include (but is not limited to) the following information:

- Dates and duration of work
- Daily equipment and material inspection records
- Daily inspection of roadways in the work zone
- Log of meteorological conditions for each day of site operation
- Dust control system maintenance records
- Record of high wind conditions
- Summary of dust control and dust suppression activities
- Details of the excavation and haulage equipment used
- Location and depth of excavation conducted every day
- Stockpile and soil processing management details
- Names and contact information of the QP, subcontractors, and haulers
- Receiving, disposal and on-site fill sites for any materials moved
- Collection of all weigh bills and manifests on a daily basis
- Any other methodology or technology used for soil management

All documents generated are likely to be required to be available for review by an MOECC Provincial Officer upon request.

F.12 Complaint Response Plan

A Complaint Response Plan is established to confirm that the local public has the opportunity to voice comments, concerns and/or complains during the soil processing. WT will endeavor to quickly and professionally address any comments, concerns and/or complaints via the following procedures:

F.12.1 Site Signage

WT or designate will post Site signage providing the name, office telephone number, 24-hour cellular number and email address for the main operator of the Soil Processing Facility. Signs will be posted at the main entrance to the Site.

F.12.2 Action Form and Log

The operator will formally log any complaints on a standardized form to record the complainant's personal information, a detailed description of the occurrence, date and time of the occurrence and weather conditions. Upon completion of the initial portion of the form, the operator will distribute the form to the appropriate parties and/or immediately initiate the corrective actions required to address the complaint. The operator will then record a description of the corrective action, time and date the corrective action was implemented, the contact information of the person implementing the corrective action and whether any longer term controls are required. The need for longer-term controls to prevent future issues will be evaluated and an action/contingency plan will be developed if required.

F.13 References

Waterfront Toronto (WT). 2009. *Waterfront Toronto Environmental Management Plan for Project-Related Activities.* January.

Ontario Ministry of the Environment (MOE). 2007. Letter to Waterfront Toronto. December 5.

Ontario Ministry of the Environment (MOE). 2008. *Operations Manual for Air Quality Monitoring in Ontario*. March

Ontario Ministry of the Environment and Climate Change (MOECC). 2011a. *Records of Site Condition — Part XV.1 of the Act*. Environmental Protection Act. Ontario Regulation (O. Reg.) 153/04, as amended.

Ontario Ministry of the Environment and Climate Change (MOECC). 2011b. *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act.* April 15, 2011.

Ontario Ministry of the Environment and Climate Change (MOECC). 2014. *Management of Excess Soil – A Guide for Best Management Practices*.

Michael Van Valkenburgh Associates Inc. (MVVA). 2015. Draft *Lower Don River Due Diligence And Validation Report.* September 15

Waterfront Toronto (WT). 2009. *Waterfront Toronto Environmental Management Plan for Project-Related Activities*. January.