

# SMART *Remediation*

*Soil Management Technology at the Toronto Portlands*



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QM Environmental  
SMART Toronto and Ottawa

Toronto, ON | January 25, 2024  
Ottawa | February 8, 2024

SMART is  
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**VERTEX**  
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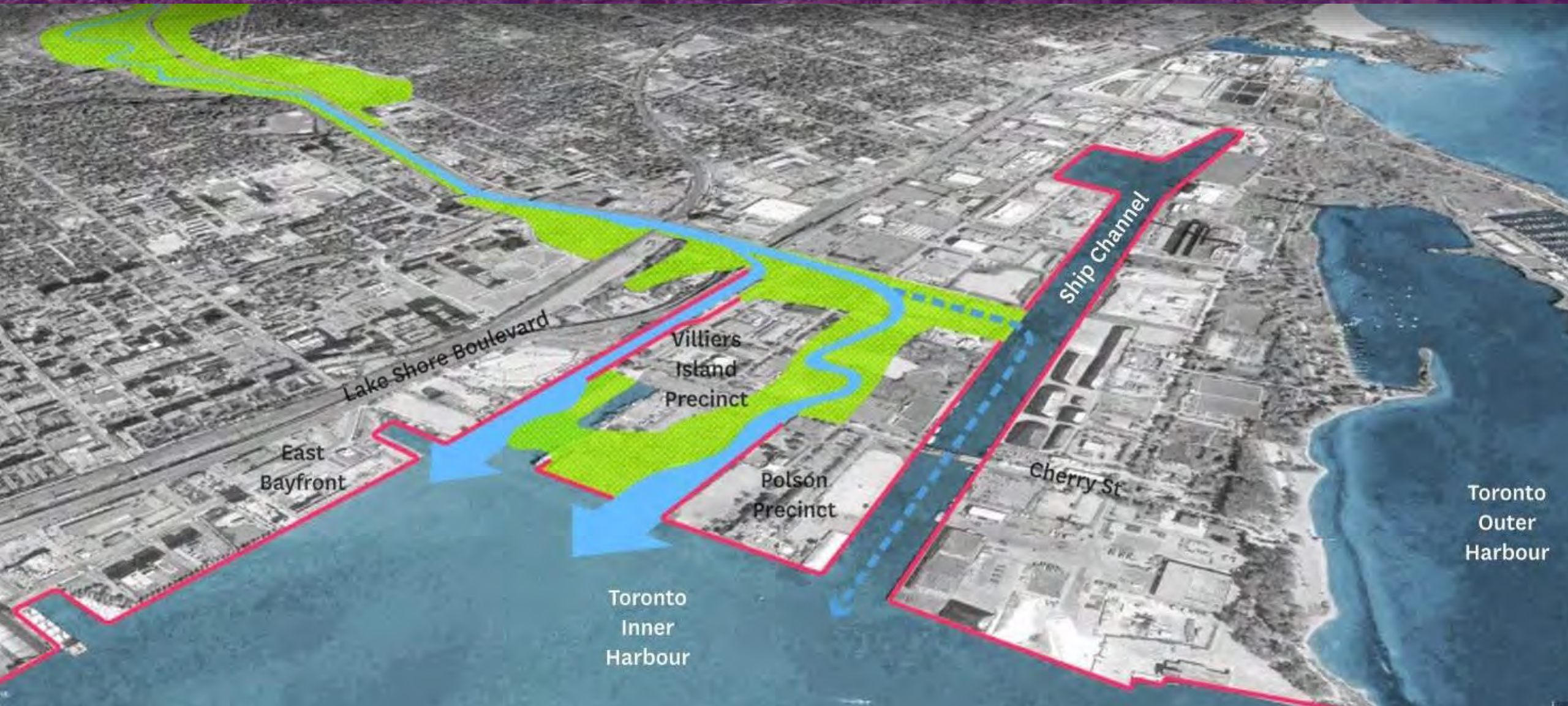
[www.vertexenvironmental.ca](http://www.vertexenvironmental.ca)

# ***SOIL MANAGEMENT TECHNOLOGY***

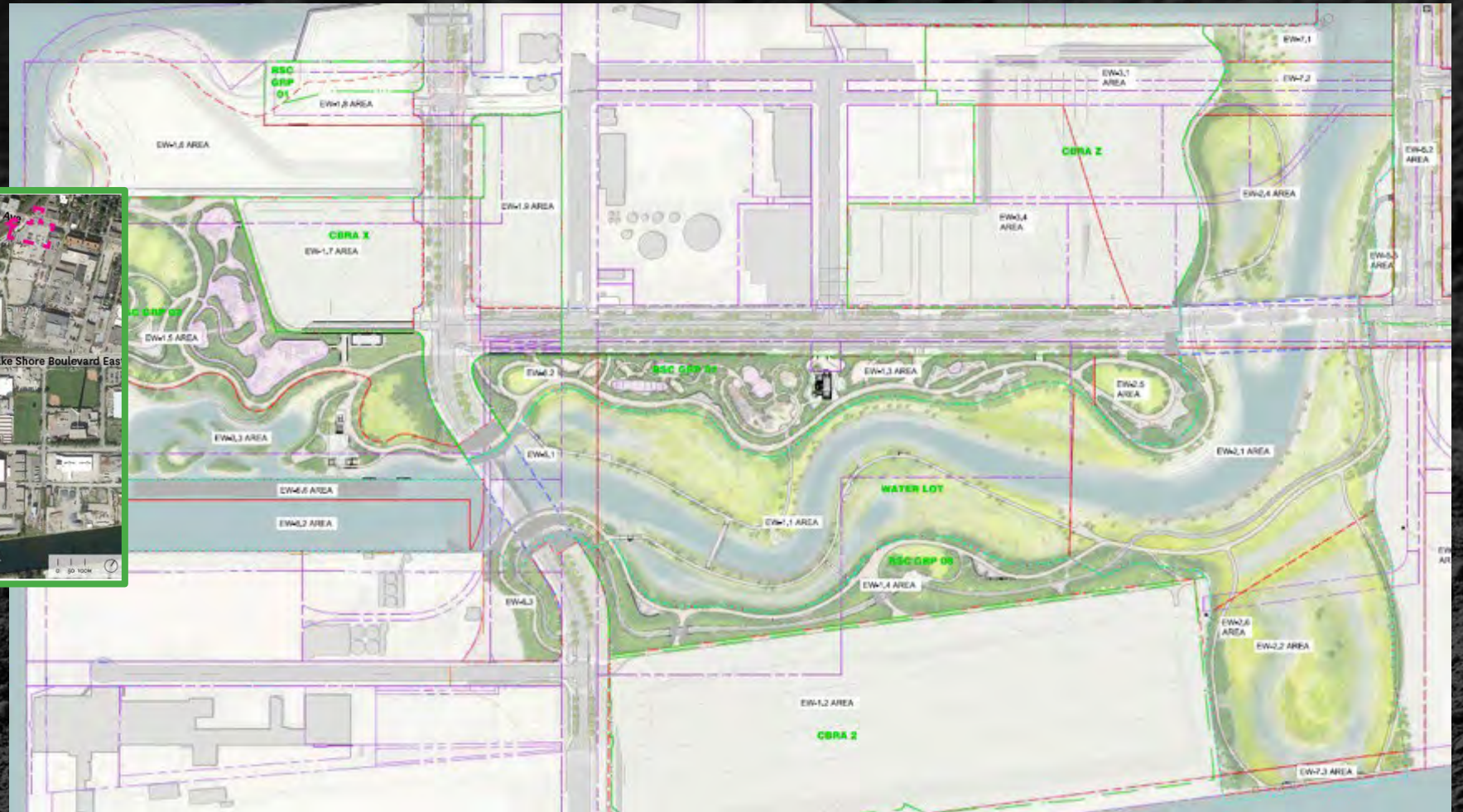
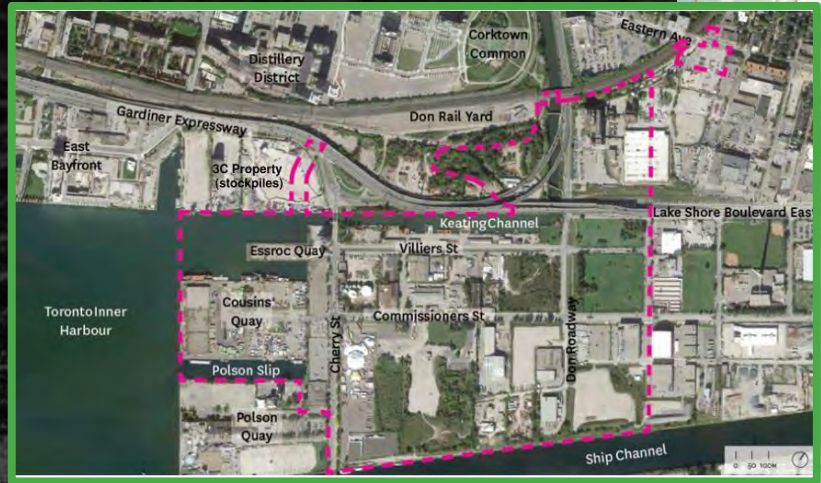
*AT THE TORONTO PORT LANDS*



# PORT LANDS FLOOD PROTECTION ENABLING INFRASTRUCTURE PROJECT OBJECTIVES



# THE DESIGN



# SOIL REUSE OBJECTIVES



- *O.Reg 406/19 promotes the 'beneficial reuse of soil' and diversion from landfill.*
- *Total Excavated ~ 1,354,000 m<sup>3</sup>*
- *Soil Disposed 310,500 m<sup>3</sup>*
- *Soil reused or stockpiled for reuse 1,043,500 m<sup>3</sup>*
- *~78% reuse*

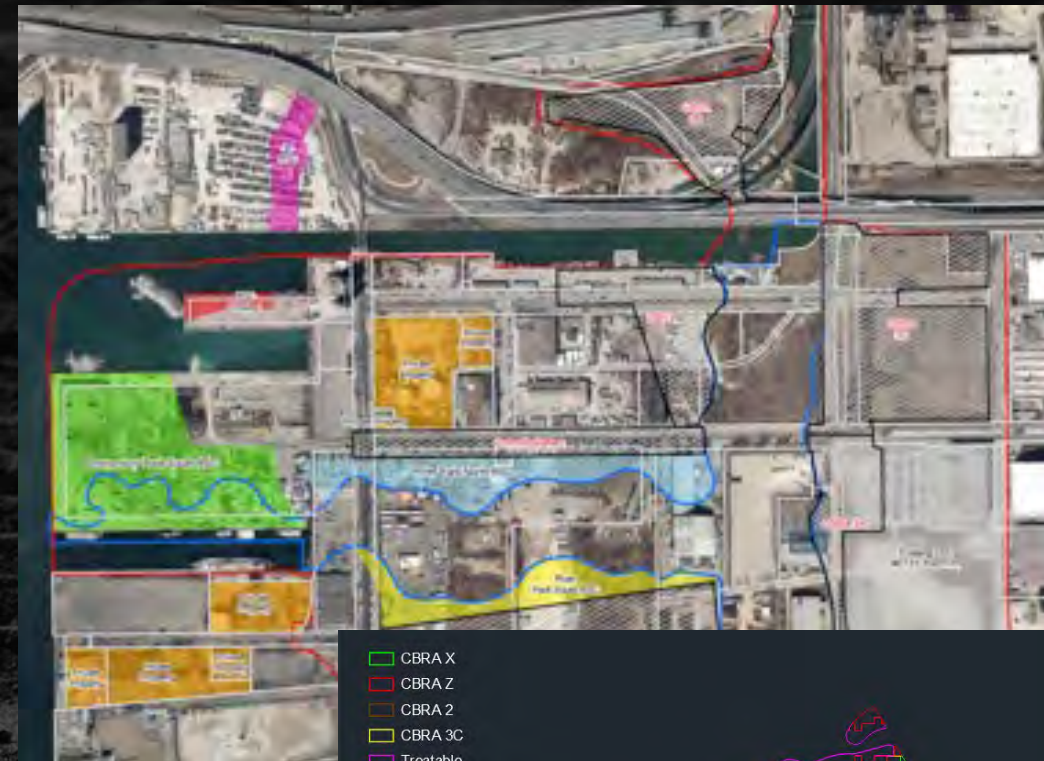
# SOIL REUSE OBJECTIVES



## *BENEFIT OF 1,000,000m<sup>3</sup> OF SOIL SAVED/REUSED?*

- ✓ 100,000 round trips to landfill
- ✓ 6,000,000 km at avg. 60 km round trip
- ✓ ~ 150 TRIPS AROUND THE EARTH!
- ✓ ~ 875 Tonnes in CO<sub>2</sub> Emissions Saved

# SOIL REUSE CRITERIA & REUSE AREAS



- CBRA X
- CBRA Z
- CBRA 2
- CBRA 3C
- Treatable
- Table 3
- Table 9
- Metals
- WP8

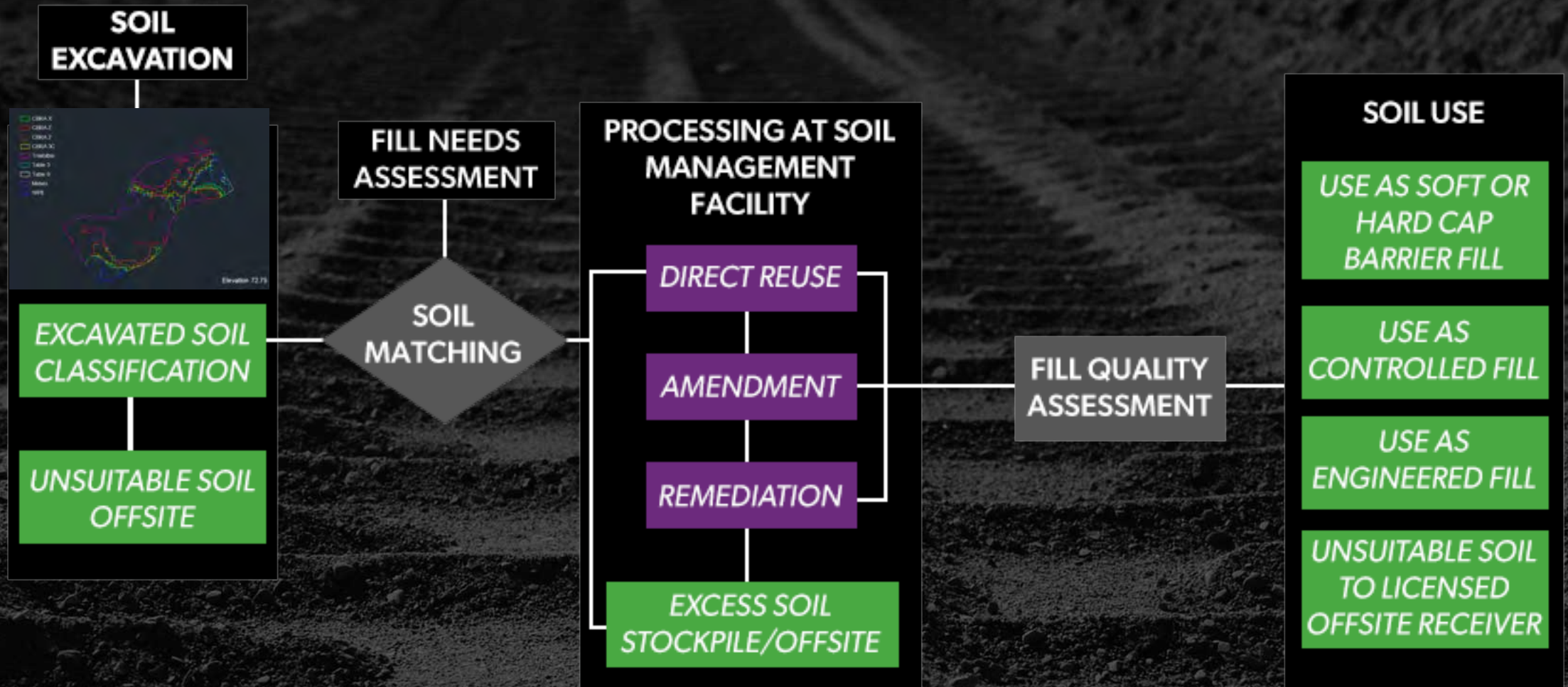


Elevation 72.75

“Digital tracking will include, at a minimum, the following time-stamped criteria for each truck used to move soil or debris material from or within the excavation area shown in the drawings or otherwise identified, commencing with the excavation of source material from the excavation area, and/or the placement of material in a temporary stockpile:

- .1 Unique haul truck identification such as license plate number, registration number or Ministry approval number.
- .2 Load source location (GPS with submeter accuracy coordinates or origin identification), including depth and/or elevation range.
- .3 Load volume.
- .4 Qualitative assessment by Subcontractor of the moisture content (e.g., wet, dry, moist, etc.)
- .5 Load soil type (e.g., sand, fill, silt, etc.)
- .6 Load source soil excavation category as defined on Drawing 4-E-1
- .7 Drop location (spatial coordinates of fill placement) and approximate lift thickness and elevation.”

# CONSTRUCTION METHODOLOGY



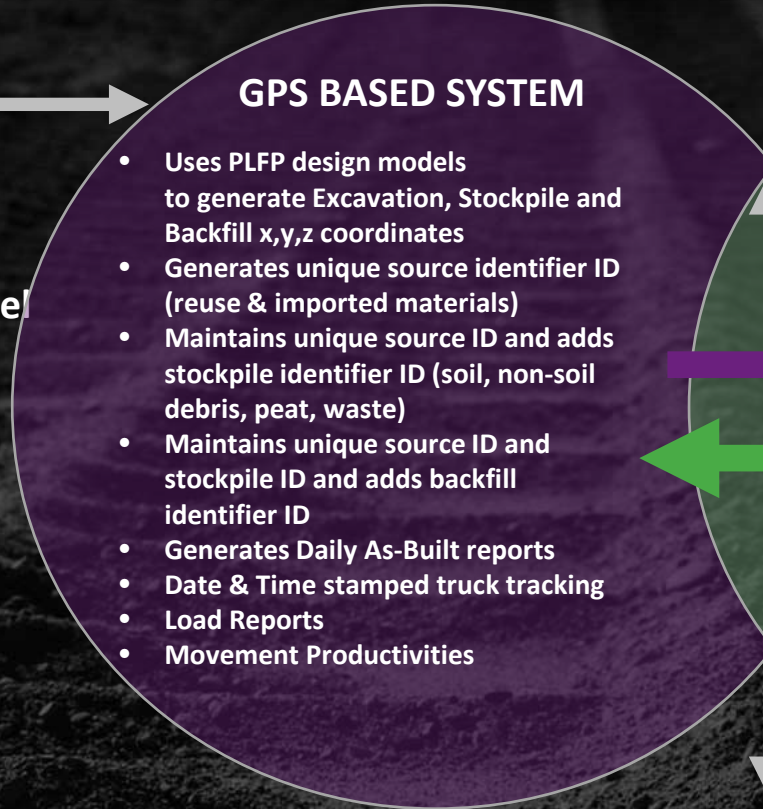


# APPROACH: ENVIRO & GEOTECH STEWARDSHIP



## Inputs:

- PLFP Topo Survey
- PLFP 33.2 Design Limits
- PLFP Geo-Env Model
- PLFP Geotech Model
- Soil Movement Identifiers
- Geofence Extents



## GPS BASED SYSTEM

- Uses PLFP design models to generate Excavation, Stockpile and Backfill x,y,z coordinates
- Generates unique source identifier ID (reuse & imported materials)
- Maintains unique source ID and adds stockpile identifier ID (soil, non-soil debris, peat, waste)
- Maintains unique source ID and stockpile ID and adds backfill identifier ID
- Generates Daily As-Built reports
- Date & Time stamped truck tracking
- Load Reports
- Movement Productivities

## EQulS™ DATABASE/WEBAPP

- Compares GeoEnv results to 14 PLFP Bulk Reuse or Imported Soil Criteria and SPLP Leachate Criteria
- Compares Geotechnical results to 4 PLFP soil type criteria
- Compares Horticultural results to PLFP horticultural criteria
- Retains unique stockpile identifier ID adds sample IDs
- Includes Subcontractor QPESA approval recommendations to Consultant QPESA
- Date & Time stamped

## Inputs:

- Lab EDD files for GeoEnv Reuse /Imported/Treated Soil Sample Results
- Golder Laboratory Geotech Reuse / Imported/Treated Soil Sample Results
- Imported Soil Background Environ Reports/Data
- Horticultural Soil Quality Reports/Soil Sample Results
- Subcontractor QPESA Field Observations and Data (EQulS™ Collect)

## STAKEHOLDER ACCESSIBILITY PLATFORM

- Consultant QPESA (Final Approvals)
  - Consultant QPRA
  - Owner (Waterfront Toronto)
- Construction Manager (EllisDon) – QA Results



# SOIL MANAGEMENT: GRADE CONTROL



# SOIL MANAGEMENT: DATABASE



**wsp GOLDER** Home About Contact

Hihihi Sajid Almetamed@GOMeriv.com Log off

Samples Assessment Attachments

**Sample Name** [Stechnile Summary Report](#)

Sub	Decision	Reassignment	Estimate	Comment
OPG	R1-Reassign	Priority Soil (see Comment for approved Block, SW or FD)	1/26/2023 5:27:53 AM	Parcel of 070416 represented by various SA001, 2, 3, 15, 19 and 20 (see segregation figure) to be used as priority soil (Block 1).  Source: Inherited. Model: Spill, Volume: 0110m3. Disposition 1: Block 1 Property Soil. Disposition 2: PPS Rough Grade material. Disposition 3 - WPS Types to be determined per attached segregation plan. Direct lines and Altering results are attached.
QM	Approve	N/A	1/30/2023 11:58:04 AM	
QM	R1 Reassign	Surcharge Soil (see Comment for approved Block, SW or FD)	4/11/2023 9:20:33 AM	Priority Soil reuse as surcharge @ PPS.  Approved for SW SA001, SA001D, SA002, SA002D, SA003, SA018, SA019 and SA020 per the specification (see file

EWX.X\_AXXX\_ST0416\_C15\_SA001

**EWX.X\_AXXX\_ST0416\_C15\_SA001**

**Controlled F# (≥1.5m)**

CBRA F# Areas	Cherry St.	Parks	River/Waterlot	Roads	Generic	WPS ALDE	WPS West Plugs
CBRA2 CFYC	C#LA	RSC_PPS CFYC	WPS CF	Class 1 WL	Table 1 HPSC	I	ONE
CBRA3B CFYC		RSC_RPS CFYC	Class 2 WL	Table 2 RPI	II	TWO	
CBRA3C CFYC		RSC_RPN CFYC	Class 3 WL	Table 3 K/C	III	THREE	
CBRA4 CFYC			Corros CFYC	Table 4	IV	FOUR	
CBRA1_X CFYC			CBRA4 Assets CFYC	Table 5 HPSC	V	FIVE	

Cap Standards (x1.5m)

Excess Soil Quality Standards

**Leachate Controlled F#**

Leachate	Treatment
SPLP.1.1	StarX WPS CF
SPLP.1.1	StarX T3 RPI
BioPile	

Leachate Excess Soil

**Controlled F# Geotechnical**

Geotech Report	Type CF-1	Type CF-2	Type CF-3	Type CF-4	Organic Content	Soil Texture	Geotech Observation	Visual Observations	Odoratory Observations
WPS	✓	✓	✓	✓	2.3	SP-SM	No Observation	NO	NO

WPS Geotechnical

# SOIL MANAGEMENT: TRACKER



**SYSTEM ACTIVITY REPORTING**

Location	Activity	Date	Status	Notes
1001-001-001-001	Soil Sampling	2023-10-25	Completed	Sample taken at location 1001-001-001-001
1001-001-001-002	Soil Sampling	2023-10-25	Completed	Sample taken at location 1001-001-001-002
1001-001-001-003	Soil Sampling	2023-10-25	Completed	Sample taken at location 1001-001-001-003
1001-001-001-004	Soil Sampling	2023-10-25	Completed	Sample taken at location 1001-001-001-004
1001-001-001-005	Soil Sampling	2023-10-25	Completed	Sample taken at location 1001-001-001-005
1001-001-001-006	Soil Sampling	2023-10-25	Completed	Sample taken at location 1001-001-001-006
1001-001-001-007	Soil Sampling	2023-10-25	Completed	Sample taken at location 1001-001-001-007
1001-001-001-008	Soil Sampling	2023-10-25	Completed	Sample taken at location 1001-001-001-008
1001-001-001-009	Soil Sampling	2023-10-25	Completed	Sample taken at location 1001-001-001-009
1001-001-001-010	Soil Sampling	2023-10-25	Completed	Sample taken at location 1001-001-001-010

**Current Week (2023-10-23 - 2023-10-29)**

**Soil Management Activity Summary**

Activity	Count
Soil Sampling	10
Soil Remediation	5
Soil Testing	3
Soil Monitoring	2

# SOIL MANAGEMENT: ANALYZER



SITE: THE PORTLANDS - TO... | SURVEY: 25 JUN 2021-QM | FILES | REPORTS | SHARE | SETTINGS

MEASURE: Point, Line, Polygon

SURVEY: Search for measurements

DESIGNS: FOLDERS

- EW1.1 CALCS
- EW2.1 CALCS (empty)
- EW2.2 CALCS (empty)
- EW2.4 CALCS (empty)
- RPN CALCS (empty)
- RPS CALCS (empty)
- STOCKPILES (empty)
- Alicia - Stockpile Labels
- Alicia - Measurements
- DRONE - GCPS
- Dan Kalte
- Dave L - Measurements (empty)

Photo viewer | Timeline | POWERED BY **propeller** | 100m | Local Grid (QM-The Portlands\_Toronto\_Calibration.jd) | N 4834 307 144 m | E 316 834 424 m | Z 67 145 m

EXPORT PDF MAP

Current Week (2021-2021)

PROPELLER

PROPELLER

# SOIL MANAGEMENT BY GRADE CONTROL



**Trimble WorksManager** - Portlands

Project > Overview > Dashboard

**PORTLANDS**

- Map
- Designs
- Members
- Devices
- Settings
- My Projects
- My Accounts

**336 FKS1D01R**  
Not Reporting  
Last Reported 1 day ago

**VOLVO EC300 310550**  
Running Use Design  
SDMA - Upland Design v11  
Last Reported 30 minutes ago

**330F**  
Design My to Date  
CanoeC SSP-11network-V2.V04  
Last Reported 17 minutes ago

**Z6A00506**  
No Designs Available  
Last Reported a few seconds ago

**DEVICE STATUS - Mar 30, 2022**

- 1 Not Reporting
- 2 Devices Reporting
- 7 Warnings

View All ↓

**DESIGNS IN USE**

- Show All
- EW5.1 Additional P1.V05
- SDMA - Upland Design V04
- EW5.1 HLF Works V07
- EW1.2 REL SH-04-008-2022-01-10 v04
- Subgrade Drainage Protocols Cover - All Areas.R04
- Canoe Cove - 34.1.V05

View All ↓

0105  
0232  
0151  
0216  
0217  
0205

Device ID	Status	Last Reported
336 FKS1D01R	Not Reporting	1 day ago
VOLVO EC300 310550	Running Use Design	30 minutes ago
330F	Design My to Date	17 minutes ago
Z6A00506	No Designs Available	a few seconds ago

0105  
0232  
0151  
0216  
0217  
0205

# SOIL MANAGEMENT BY GRADE CONTROL



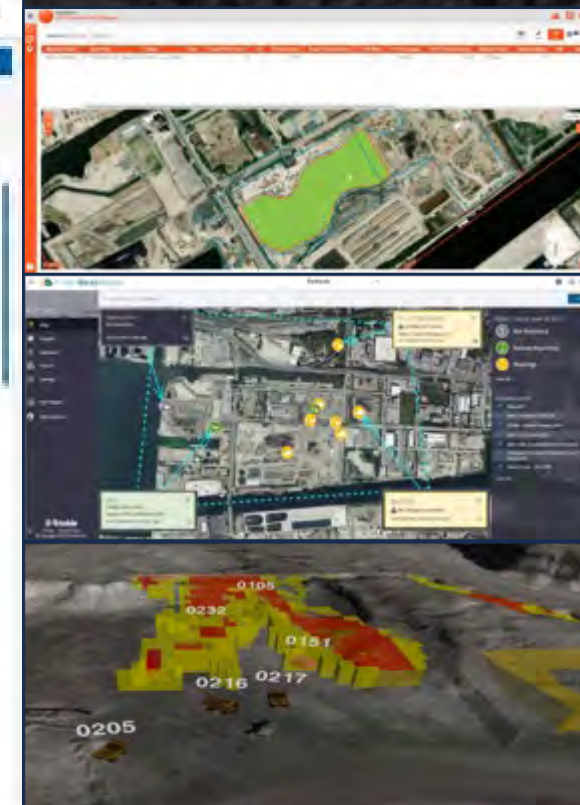
Trimble WorkManager

Portland

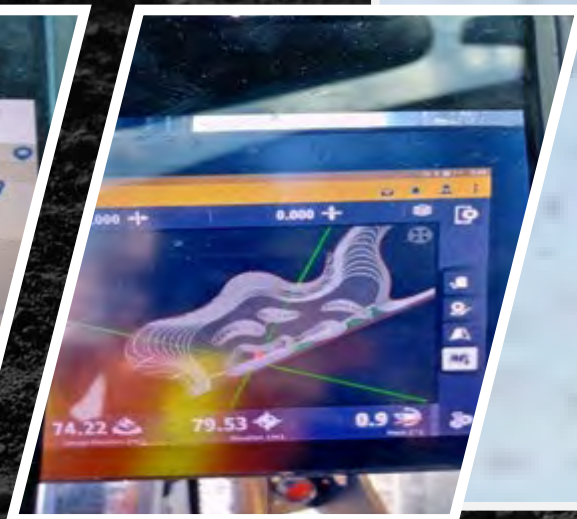
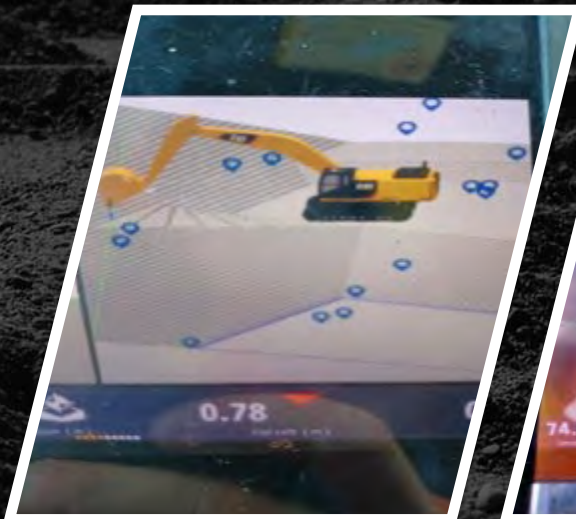
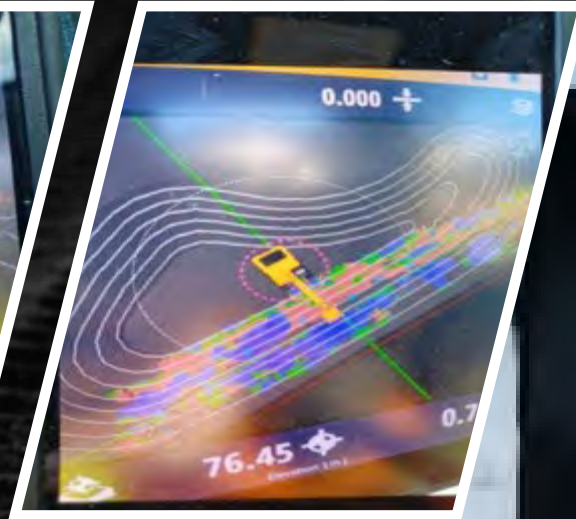
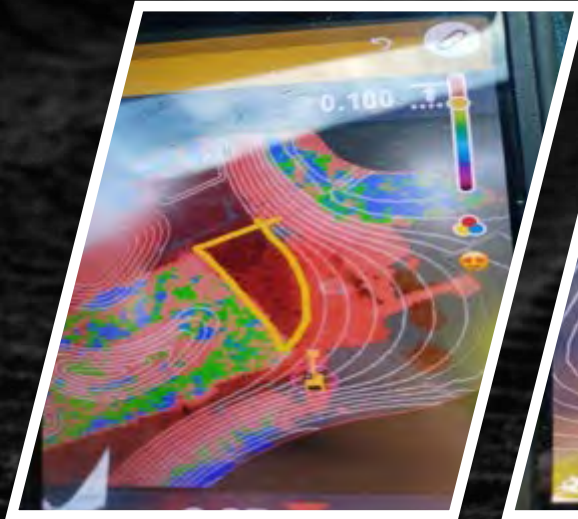
Active Designs

Name	Version	Last Modified	Health/By
Comer Street - 201 North - 10th St. Design	V04	May 08, 2023 @ 10:00 AM	Design/Comer
EWL - Additional Fill	V05	May 08, 2023 @ 10:00 AM	Design/Comer
Fill Applied EEP - Timest	V04	May 08, 2023 @ 10:00 AM	Design/Comer
Endridge Park - Sanitation Removal Park Section	V04	May 08, 2023 @ 10:00 AM	Design/Comer
Endridge Park - Road Slope Removal	V04	May 08, 2023 @ 10:00 AM	Design/Comer
ERS - Fill (Sanitary Removal)	V05	May 08, 2023 @ 10:00 AM	Design/Comer
End - Sanitary Removal and CC Cap Placement	V04	May 08, 2023 @ 10:00 AM	Design/Comer
ERS - Birds - 141 - Sanitary to Removal - updated	V04	May 08, 2023 @ 10:00 AM	Design/Comer
Comer Street - RFP Col - April 22	V04	May 08, 2023 @ 10:00 AM	Design/Comer
Comer - Core - Onetime and Interim - Some Fill	V04	May 08, 2023 @ 10:00 AM	Design/Comer
Comer - Core - Interim - Basin - Some	V04	May 08, 2023 @ 10:00 AM	Design/Comer
Comer - Core - Rip Rap - Underneath Interim - 1st and 2nd	V04	May 08, 2023 @ 10:00 AM	Design/Comer

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# SOIL MANAGEMENT BY GRADE CONTROL





# STAKEHOLDER DATABASE



wsp GOLDER

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HR@AFC@Krusk@GMIW.com Log Off

### Reference Links

Stockpile Sample Key

### Stockpiles Summary

STOCKPILE ID	GEOTECH APPROVALS	LEACHATE APPROVALS	GEOTECH APPROVALS	TREATMENT APPROVALS	
EW1_1_A001_ST0002_B01	X	X	X	X	Samples
EW1_1_AXXX_ST0001_B01	X	X	X	X	Samples
EW1_1_AXXX_ST0007_B06	X	X	X	X	Samples
EW1_1_AXXX_ST0030_B06	X	X	X	X	Samples
EW1_1_AXXX_ST0030_B18	X	X	X	X	Samples
EW1_1_AXXX_ST0031_B18	X	X	X	X	Samples
EW1_1_AXXX_ST0038_B17	X	X	X	X	Samples
EW1_1_AXXX_ST0039_B17	X	X	X	X	Samples
EW1_1_AXXX_ST0040_B17	X	X	X	X	Samples
EW1_1_AXXX_ST0043_B06	X	X	X	X	Samples
EW1_1_AXXX_ST0044_B17	X	X	X	X	Samples

### Map

# STAKEHOLDER DATABASE



wsp GOLDER

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1 New Axxx Stn at 270 / 21 May 2021 10:07 AM

Samples Assessment: Attachment:

[Stockpile Summary Export](#)

Sample Name	Role	Decision	Reassignment	Datetime	Comment
EW2.1_AXXX_ST0270_B51_SA149	GPO	R1-Reversion	FDS 1 (CBRA1_Z), FDS 4 (CBRA1_Z)	11/9/2021 9:34:01 AM	Bulk: Meets CBRA1_Z CFTCr based on the attached statistical analysis (NOTE: Lead, zinc, several PAHs and PNC F3/F4 fail for several samples using single-point compliance. SPLP Meets SPLP 3.1/9.1 Geotech) Meets Interim Fill criteria for all interim fill types noting that organic content is met on average for Type 1 but one sample exceeds 5%. Meets all other interim fill types.
	OM	Approved	NA	11/9/2021 9:50:31 AM	Source: EW2.1, Model: Multiple Model; Volume: 2232m3; Disposition as CBRA Z select, contouring and/or uncontrolled fill.  Approved for disposition as CBRA-Z CFTCr (EW3.1 and EW3.4) and geotechnically based on the WPA Fill and Backfill - Interim Area, Revision # SI-34, dated June 22, 2021 for placement in EW3.1 as Select Fill (see link).

**EW2.1\_AXXX\_ST0270\_B51\_SA149**

Controlled Fill (>1.5m)

Cap Standards (<1.5m)

Excess Soil Quality Standards

Leachate: Controlled Fill

Leachate Excess Soil

CBRA Fill Areas					Parks			River/Waterlot			Roads			Generic			
CBRA3 CFTCr	CBRA3B CFTCr	CBRA3C CFTCr	CBRA3X CFTCr	CBRA1_Z CFTCr	RSC_PPS CFTCr	RSC_RPS CFTCr	RSC_RPM CFTCr	WPS CF	Class 1 WL	Class 2 WL	Control SI CFTCr	CBRA3 Roads CFTCr	Table 1 RPBC	Table 3 RP	Table 3 ICC	Table 9 RPBC	
5	4	8	7	7	10	11	11	4	7	8	1	6	23	9	6	21	

Leachate					Treatment		Controlled Fill Geotechnical					Geotech Report			Geotech Observation		Visual Observations	Odorous Observations
SPLP 3.1	SPLP 9.1	BioFile	StatK WPS CF	StatK T3 RP	StatK WPS CF	StatK T3 RP	WPS Geotechnical	Type CF-1	Type CF-2	Type CF-3	Type CF-4	Organic Content	Soil Texture	Debris, Foreign Objects, Large Rock Fragments, Obstacles		NO	NO	
1	1	11	6	4			WPS Geotechnical	View	2	2	2	5.7	SM			NO	NO	

# STAKEHOLDER DATABASE



**WSP | GOLDER**

Exceedance Summary Table

Category: CBRA3B

Sample Name	Chemical Name	Report Result Value	Action Level
EW2_1_AXXX_ST0270_B51_SA149	Benzo (b) Fluoranthene	2.0	0.70
EW2_1_AXXX_ST0270_B51_SA149	Benzo(a)anthracene	1.4	1.3
EW2_1_AXXX_ST0270_B51_SA149	Benzo(k)pyrene	1.6	1
EW2_1_AXXX_ST0270_B51_SA149	Fluoranthene	2.5	1.9

EW2\_1\_AXXX\_ST0270\_B51\_SA149

Controlled Fill (<1.0m)

Cap Standards (<1.5m)

Excess Soil Quality Standards

LowChloro Controlled Fill

Controlled Fill Geotechnical

Geotech Report

Type CF-1

Type CF-2

Type CF-3

Type CF-4

Organic Content

Soil Texture

Disturb Observations

Visual Observations

Disturb Process Control Log


Chemistry Observations

# STAKEHOLDER DATABASE



Samples Assessment Attachments [Stockpile Summary Export](#)

Role	Decision	Reassignment	Datetime	Comment
QPG	R1-Reassign	FD5.2 (CBRA3C), FD5.3 (CBRA3C), FD5.4 (CBRA3C)	1/11/2022 5:31:35 AM	Environmental: Stockpile meets CBRA 3C CFTCs Leachate: Meets SPLP 3.1/9.1 Geotech: Meets Interim Fill excluding Select Fill. Stockpile contains significant debris (see attached photos) which may require removal during placement
QM	Approve	N/A	1/17/2022 9:45:44 AM	Source: EW2.1; Model: Table 3; Volume: 300m3; Disposition as CBRA 3C contouring or uncontrolled fill.
EW2.1_AXXX_ST0294_B60_SA066				Approved for dispositioned as CBRA-3C and geotechnically based on the WP4 Fill and Backfill - Interim Area, Revision #SI-04- 009 specification, dated January 6, 2022 for placement in EW5.3 and EW5.4 as Contouring Fill and Uncontrolled Fill.
QPO	Approve	N/A	1/20/2022 3:46:49 AM	
ED	Approve	N/A	2/2/2022 4:33:06 AM	Approved for CBRA3c placement based on QPO's comment and submission 033.2-31 23 23-280.



# SOIL MOVEMENT TRACKING



**Materials**

Material

Material	Count from Dispatch	Destination Location	
Asphalt	0		
Concrete	0		
Gravel	0		
Gravel (G)	0		
Gravel (S)	0		
Gravel (M)	0		
Gravel (L)	0		
Gravel (H)	0		
Gravel (V)	0		
Gravel (W)	0		
Gravel (X)	0		
Gravel (Y)	0		
Gravel (Z)	0		

**Edit Haul Category Road Truck**

Material

Material

Material	Date	Unit
Asphalt	1/1	1
Concrete	1/1	1
Gravel	1/1	1
Gravel (G)	1/1	1
Gravel (S)	1/1	1
Gravel (M)	1/1	1
Gravel (L)	1/1	1
Gravel (H)	1/1	1
Gravel (V)	1/1	1
Gravel (W)	1/1	1
Gravel (X)	1/1	1
Gravel (Y)	1/1	1
Gravel (Z)	1/1	1

**Dispatcher**

Dispatcher

Filter

Include hidden routes

Stockpile to Dispatch

- RT1003 CAT730 (Philip Hervey) Ped...
- RT1018 CAT730 (Non Seymour) Bert...
- RT1019 CAT730 (Alberta Lorenco) A...
- RT1022 CAT730 (Sonia James) Justin J...
- RT1024 CAT730 (Juan Carlos) Juan...
- RT1025 CAT730 (John Peter) John Peter
- RT1026 CAT730 (Andre Marandji) An...
- RT1028 CAT730 (Mauri Santosa) Maur...

Stockpile to Placement

- AM-12 (Unassigned) Unassigned
- AM-16 (Unassigned) Unassigned
- AM-30 (Unassigned) Unassigned
- AM-35 (Unassigned) Unassigned
- Somal 107 (Unassigned) Unassigned
- Somal 108 (Unassigned) Unassigned
- Somal 110 (Unassigned) Unassigned
- Somal 115 (Unassigned) Unassigned
- Somal 119 (Unassigned) Unassigned
- Somal 120 (Unassigned) Unassigned
- Somal 121 (Unassigned) Unassigned
- Somal 124 (Unassigned) Unassigned
- AM-57 (Unassigned) Unassigned
- AM-54 (Unassigned) Unassigned
- AM-58 (Unassigned) Unassigned
- AM-10 (Unassigned) Unassigned

# SOIL MOVEMENT TRACKING



### Travel Journal

Logout

#### Journal Summary

May 29, 2023 6:35 am  
Somal 824 - Unassigned

Route: Stockpile to Disposal  
Started: May 29, 2023 6:35 am  
Ended: May 29, 2023 2:41 pm  
Engine Accumulated: 3.0h  
Driver: 85 km

Counts:  
Dump: 12 Fuel: 0  
Load: 12 Bulk: 0

#### Activity Log

- QMLoad May 29, 2023 7:55 am
- QMDump May 29, 2023 8:33 am
- QMLoad May 29, 2023 8:28 am
- QMDump May 29, 2023 8:42 am
- QMLoad May 29, 2023 8:28 am

#### Equipment List

- Excavator to Stockpile: RT1900 CAT730 Kevin Barrow
- Stockpile to Disposal: AM-30 Unassigned
- Excavator to Stockpile: [unassigned]
- Stockpile to Disposal: [unassigned]
- Excavator to Stockpile: [unassigned]
- Stockpile to Disposal: [unassigned]
- Excavator to Stockpile: [unassigned]
- Stockpile to Disposal: [unassigned]
- Excavator to Stockpile: [unassigned]
- Stockpile to Disposal: [unassigned]

#### Map

South Riverdale, 11th Street Expy, 12th Street Expy, 13th Street Expy, 14th Street Expy, 15th Street Expy, 16th Street Expy, 17th Street Expy, 18th Street Expy, 19th Street Expy, 20th Street Expy, 21st Street Expy, 22nd Street Expy, 23rd Street Expy, 24th Street Expy, 25th Street Expy, 26th Street Expy, 27th Street Expy, 28th Street Expy, 29th Street Expy, 30th Street Expy, 31st Street Expy, 32nd Street Expy, 33rd Street Expy, 34th Street Expy, 35th Street Expy, 36th Street Expy, 37th Street Expy, 38th Street Expy, 39th Street Expy, 40th Street Expy, 41st Street Expy, 42nd Street Expy, 43rd Street Expy, 44th Street Expy, 45th Street Expy, 46th Street Expy, 47th Street Expy, 48th Street Expy, 49th Street Expy, 50th Street Expy, 51st Street Expy, 52nd Street Expy, 53rd Street Expy, 54th Street Expy, 55th Street Expy, 56th Street Expy, 57th Street Expy, 58th Street Expy, 59th Street Expy, 60th Street Expy, 61st Street Expy, 62nd Street Expy, 63rd Street Expy, 64th Street Expy, 65th Street Expy, 66th Street Expy, 67th Street Expy, 68th Street Expy, 69th Street Expy, 70th Street Expy, 71st Street Expy, 72nd Street Expy, 73rd Street Expy, 74th Street Expy, 75th Street Expy, 76th Street Expy, 77th Street Expy, 78th Street Expy, 79th Street Expy, 80th Street Expy, 81st Street Expy, 82nd Street Expy, 83rd Street Expy, 84th Street Expy, 85th Street Expy, 86th Street Expy, 87th Street Expy, 88th Street Expy, 89th Street Expy, 90th Street Expy, 91st Street Expy, 92nd Street Expy, 93rd Street Expy, 94th Street Expy, 95th Street Expy, 96th Street Expy, 97th Street Expy, 98th Street Expy, 99th Street Expy, 100th Street Expy

### Travel Journal

Logout

#### Journal Summary

May 29, 2023 6:35 am  
Somal 824 - Unassigned

Route: Stockpile to Disposal  
Started: May 29, 2023 6:35 am  
Ended: May 29, 2023 2:46 pm  
Engine Accumulated: 3.0h  
Driver: 85 km

Counts:  
Dump: 12 Fuel: 0  
Load: 12 Bulk: 0

#### Activity Log

- QMLoad May 29, 2023 8:28 am
- QMDump May 29, 2023 8:43 am
- QMLoad May 29, 2023 8:41 am
- QMDump May 29, 2023 8:44 am
- QMLoad May 29, 2023 8:33 am

#### Equipment List

- Excavator to Stockpile: 86 CAT730 Julio Rosa
- Stockpile to Disposal: M-16 Unassigned
- Stockpile to Disposal: Somal 819 Unassigned
- Stockpile to Placement: AM-70 Unassigned
- Stockpile to Disposal: Somal 824 Unassigned

#### Map

3D terrain view of the site with a blue route and various equipment icons.

# SOIL MOVEMENT TRACKING



System Activity Reporting Logout

Filters Reset

Map

Shows 15 rows Columns Bulk Edit CSV Excel

Load Date/Time	Equipment	Volume (Cubic meters)	Block ID	Material	Characterization	Earthwork Area	Municipal Address	Line Item	Dump Date/Time	Reuse	Block ID	Earthwork Area	Ticket Number	Ticket BOL	Ticket Weight (Metric Tonnes)
2023-04-04 08:11:46	RT184 - CAT730	12.0	E90019	Impacted Soil		EW 6.1	225 Cherry St.	CS	2023-04-04 08:19:40	Excavator to Stockpile	ST0447	EW 1.2			
2023-04-04 08:13:41	Somal 824	11.0	ST0454	Dredging	Waste (C)	EW 8.1	Keating Channel	K2	2023-04-04 08:26:09	Stockpile to Disposal	GF Unwin		252113	051457	30.95
2023-04-04 08:14:06	RT1835 - CAT730	12.0	E90017	Property Soil		EW 6.1	225 Cherry St.	CS	2023-04-04 08:19:41	Excavator to Stockpile	ST0445	EW 1.2			
2023-04-04 08:14:50	RT1819 - CAT730	10.8	E20002	Dredging		EW 4.3	SDMA	A37	2023-04-04 08:28:24	Excavator to Stockpile	ST0435	EW 8.1			
2023-04-04 08:20:39	Somal 821	11.0	ST0454	Dredging	Waste (C)	EW 8.1	Keating Channel	K2	2023-04-04 08:35:52	Stockpile to Disposal	GF Unwin		252116	049120	26.73
2023-04-04 08:23:00	RT1900 - CAT730	12.0	E90017	Property Soil		EW 6.1	225 Cherry St.	CS	2023-04-04 08:28:06	Excavator to Stockpile	ST0445	EW 1.2			
2023-04-04 08:24:12	RT184 - CAT730	12.0	E90019	Impacted Soil		EW 6.1	225 Cherry St.	CS	2023-04-04 08:38:21	Excavator to Stockpile	ST0447	EW 1.2			
2023-04-04 08:28:01	RT1835 - CAT730	12.0	E90017	Property Soil		EW 6.1	225 Cherry St.	CS	2023-04-04 08:31:23	Excavator to Stockpile	ST0445	EW 1.2			

# SOIL MANAGEMENT SURVEY ANALYZER

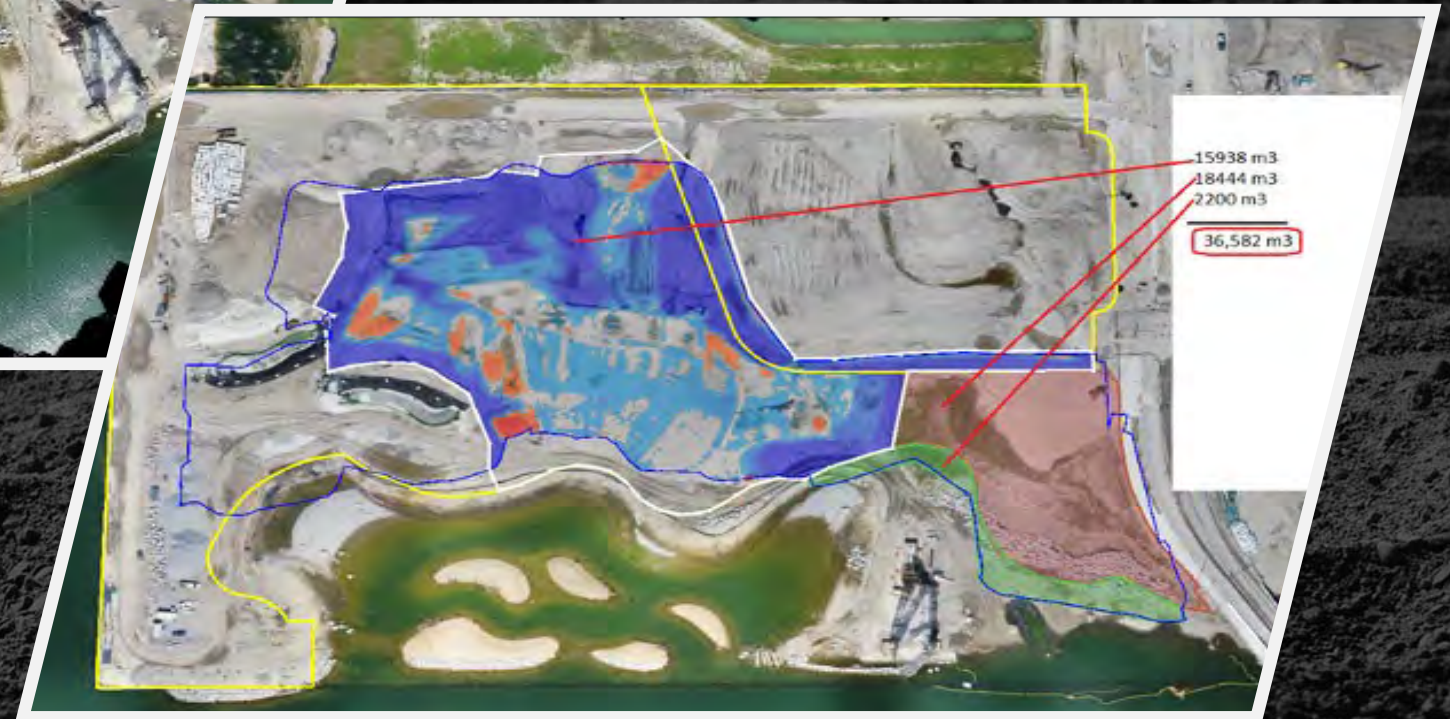
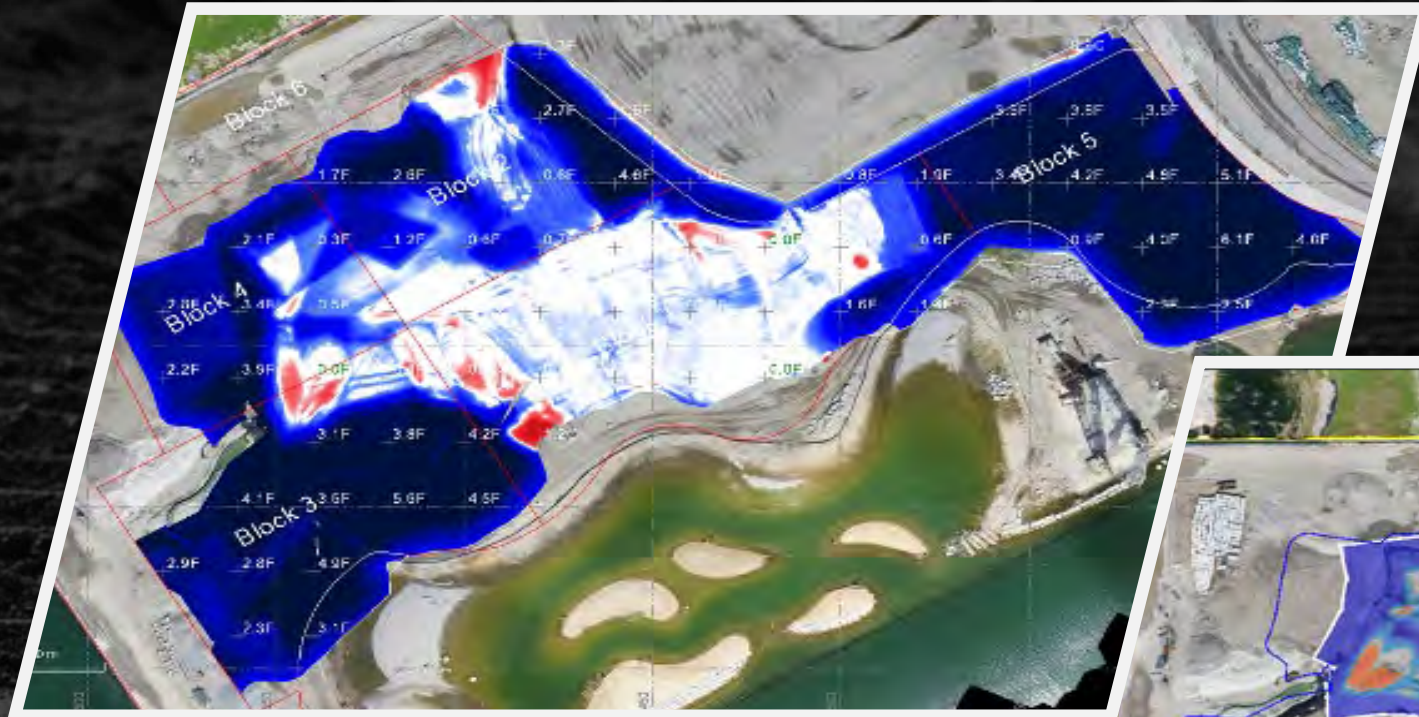




# SOIL MANAGEMENT BY DRONE: VOLUMES



# SOIL MANAGEMENT BY DRONE: PROGRESS SURVEYS



# SOIL MANAGEMENT BY DRONE: PROGRESS SURVEYS



# CHALLENGES TO SOIL REUSE



**1. Stockpiling Space and Balancing  
Excavation with Fills**

**2. Environmental AND Geotechnical Considerations,  
Changing Goal Posts and Stakeholder Buy-in**

**3. Barriers of Entry to Sophisticated Tracking  
Technology and Future Expectations**

# STOCKPILING SPACE



# STOCKPILING SPACE



# GEOTECHNICAL CHALLENGES



## Geotech Summary Comparisons

Sample ID: EW2.1\_AXXX\_ST0241\_B60\_SA063

### Controlled Fill

Soil Classification	Gradation	Proctor	Organic Content
Type CF-1 Limits	Fail	1.765	Fail > 3
Type CF-2 Limits	Fail		Fail > 3
Type CF-3 Limits	Fail		Fail > 3
Type CF-4 Limits	Fail		Fail > 3

### Interim Fill

Soil Classification	Gradation	Proctor	Organic Content
Select Fill Limits	Pass	Pass > 1.6	Pass < 6
Contouring Fill Limits	Pass	--	Pass < 15
Uncontrolled Fill Limits	Pass	--	Pass < 25
Oversized Limits	Pass	--	--

### Wetland & Upland Soils

Soil Classification	Gradation	Saturated Proctor	Organic Content
Type WS-1 Limits	Fail	Pass > 1.82	Pass 3-12
Type WS-2 Limits	Fail	Fail < 1.82 @85%	Pass < 12
Type WS-3 Limits	Fail	Fail < 1.99 @95%	Fail > 2
Type U-I Limits	Fail	--	Pass > 1.5

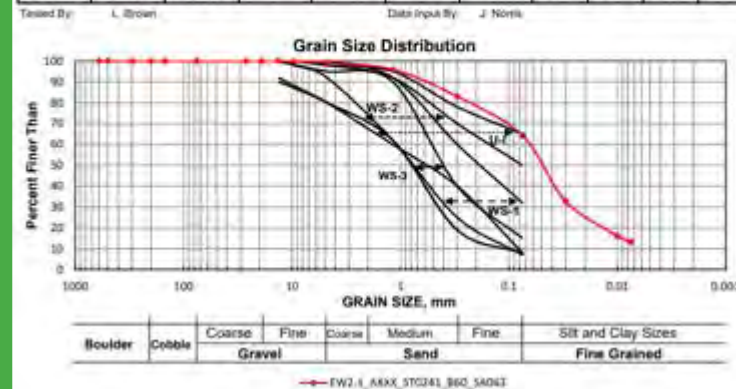
### Work Package 8 Soils

Soil Classification	Gradation	Proctor	Organic Content
Type WP8-1 Limits	Fail	Fail < 1.8	Fail > 2
Type WP8-2 Limits	Pass	Fail < 1.8	Fail > 3
Type WP8-LVB Limits	Pass	Pass > 1.7	Fail > 1

## WETLAND UPLAND INTERIM SOIL (WS UI) PARTICLE SIZE ANALYSIS OF SOILS (MTO LS-702)

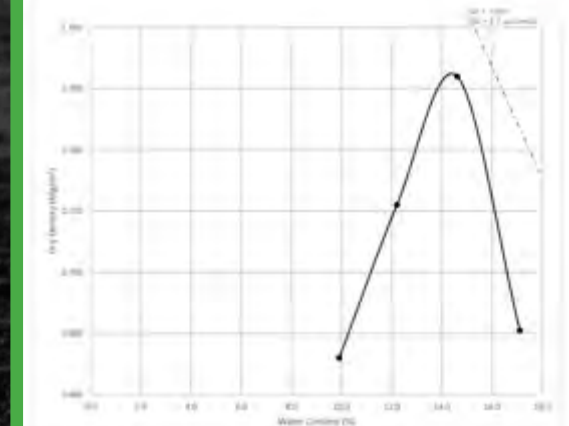
Project Number: 19130908-0032 July 23, 2021  
 Sample ID: EW2.1\_AXXX\_ST0241\_B60\_SA063 Golden Lab No.: 21-1935  
 Soil Classification: Silt Gradation Type WS-1 Pass/Fail: Fail  
 Date Sampled: July 15, 2021 Gradation Type WS-2 Pass/Fail: Fail  
 Date Received: July 16, 2021 Gradation Type WS-3 Pass/Fail: Fail  
 Date Tested: July 19, 2021 Gradation Type U-I Pass/Fail: Fail

Particle Size (mm)	Percent Retained	Percent Passing	Limits				Acceptable				
			Type WS-1	Type WS-2	Type WS-3	Type U-I	Type WS-1	Type WS-2	Type WS-3	Type U-I	
600.0	0.0	100.0	--	--	--	--	--	--	--	--	--
200.0	0.0	100.0	--	--	--	--	--	--	--	--	--
150.0	0.0	100.0	--	--	--	--	--	--	--	--	--
76.0	0.0	100.0	--	--	--	--	--	--	--	--	--
26.5	0.0	100.0	--	--	--	--	--	--	--	--	--
19.0	0.0	100.0	--	--	--	--	--	--	--	--	--
13.2	0.0	100.0	100	90 - 100	90 - 100	92 - 100	Y	Y	Y	Y	Y
9.5	0.2	99.8	98 - 100	87 - 100	87 - 98	88 - 100	Y	Y	N	Y	Y
4.75	0.8	99.2	92 - 100	80 - 98	80 - 95	80 - 98	Y	N	N	N	N
1.18	4.1	95.9	62 - 92	62 - 92	62 - 90	60 - 95	N	N	N	N	N
0.300	17.0	83.0	25 - 60	19 - 70	19 - 40	40 - 78	N	N	N	N	N
0.075	35.7	64.3	7 - 32	8 - 50	8 - 15	8 - 65	N	N	N	Y	Y
0.030	67.3	32.7	--	--	--	--	--	--	--	--	--
0.010	83.8	16.2	--	--	--	--	--	--	--	--	--
0.0075	86.7	13.3	--	--	--	--	--	--	--	--	--



## MOISTURE DENSITY RELATIONSHIP OF SOILS (MTO LS-706)

Project Number: 19130908-0032 July 23, 2021  
 Sample ID: EW2.1\_AXXX\_ST0241\_B60\_SA063 Golden Lab No.: 21-1935  
 Date Sampled: July 15, 2021 Date Received: July 16, 2021  
 Date Tested: July 19, 2021  
 Max Dry Density (Mg/m³): 1.765 Optimum Water Content (%): 14.4  
 Min Wet Density (Mg/m³): 2.619  
 Corrected Max Dry Density (Mg/m³): Not Applicable Natural Water Content (%): Not Available



Furnace Temperature During Test (°C)	440
Duration of Test (nearest 15 minutes)	4470
Mass of Crucible With Lid (g)	57.64
Moist Mass of Specimen Plus Crucible With Lid (g)	161.81
Over Dry Mass of Specimen Plus Crucible With Lid (g)	134.12
Mass of Crucible With Lid Plus Ash (g)	131.52
Water Content (%)	36
Ash Content (%)	96.6
Organic Material (%)	3.4

# STAKEHOLDER BUY-IN!



within 3 m of proposed infrastructures.

(Geotech): Reference to discussion with ED and WT on 27-Oct-23 regarding conditional approval of ST0462, it is recommended by WSP that this material not be used as part of the PLFP project infrastructure (i.e., catch basins and leads, sidewalk, cycle track, etc.); however, it may be used within transitway corridors along new Cherry Street or any other provided environmental suitability. Within transitway corridor, it is recommended that this fill not be placed within 3 m of the proposed infrastructures. We note that if this material is placed within the transitway corridor, it may have to be sub-excavated and replaced by the future transitway team. It is recommended that the locations where this material is placed is



# STAKEHOLDER BUY-IN!



RESPOND. RECLAIM. RENEW.

WP8 environmental reuse criteria are among the most stringent criteria to meet on the project and a limited number of stockpiles meet the environmental criteria. While reviewing the stockpiles that meet the WP8 environmental reuse criteria alongside the WP8 geotechnical specifications the project stakeholders realized that only a small portion of soils would be approved for reuse unless adjustments to the geotechnical specifications were made.

On April 13, 2021, QM received Site Instruction SI-08-017, dated April 13, 2021 that includes revisions to the Work Package 8 Fill and Backfill geotechnical specifications, allowing for a greater ability to reuse soil that meets WP8 environmental reuse criteria. The revisions also translate into the following additional geotechnical tests for stockpiled soils considered for WP8 reuse:

- Direct Shear tests – One per material source
- Atterberg Limit test – On samples with greater than 35% finer than 0.075mm – One per material source

This CCN request provides costs and schedule impacts associated with this incorporation.



# BARRIERS OF ENTRY



*THANK YOU*

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