CLASS ENVIRONMENTAL ASSESSMENT FOR REMEDIAL FLOOD AND EROSION CONTROL PROJECTS

Toronto Island Park Flood and Erosion Mitigation Project

City of Toronto

APPENDIX B –

CONCEPTUAL DESIGN EVALUATION REPORT

Report	Prepared By
Conceptual Design Evaluation Report – Part I Background Overview and Concept Evaluation	Baird, 2024
Conceptual Design Evaluation Report – Part II Detailed Environmental Analysis of the Preferred Alternative Options	Baird, 2024

Toronto Islands Park Flood and Erosion Mitigation Project (Contract #10034747)

Conceptual Design Evaluation Report - Part I Background Overview and Concept Evaluation

October 11, 2024 | 13520.101.R1.Rev1

Baird.
Innovation Engineered.

baird.com

Toronto Islands Park Flood and Erosion Mitigation Project (Contract #10034747)

Conceptual Design Evaluation Report - Part I Background Overview and Concept Evaluation

Prepared for:

Toronto and Region Conservation Authority
101 Exchange Ave.
Vaughan, ON
L4K 5R6

Prepared by:

W.F. Baird & Associates Coastal Engineers Ltd

For further information, please contact
Jennifer Crilly at +1-905-845-5385
jcrilly@baird.com
www.baird.com

13520.101.R1.Rev1

Z:\Shared With Me\QMS\2024\Reports_2024\13520.101.R1.Rev1_Toronto Islands Conceptual Design Evaluation Report Part I.docx

Revision	Date	Status	Comments	Prepared	Reviewed	Approved
A	Oct. 4 2021	Draft	1st Draft Submission for comments	DJE/JJF	JJF	
B	Nov. 12, 2021	Draft	2nd Draft submission for comments	JJF	CDA	
C	Jan. 14, 2022	Draft	3rd Draft for Comments	JJF	CDA	
D	Nov. 17, 2022	Draft	Final Draft for Comments	JJC	CDA	CDA
0	Jul. 22, 2024	Final		ACF/JJC	CDA	CDA
1	Oct. 11, 2024	Final	Revisions incorporated	JJC	CDA	CDA

© 2024 W.F. Baird & Associates Coastal Engineers Ltd (Baird) All Rights Reserved. Copyright in the whole and every part of this document, including any data sets or outputs that accompany this report, belongs to Baird and may not be used, sold, transferred, copied or reproduced in whole or in part in any manner or form or in or on any media to any person without the prior written consent of Baird.

This document was prepared by W.F. Baird & Associates Coastal Engineers Ltd for Toronto and Region Conservation Authority. The outputs from this document are designated only for application to the intended purpose, as specified in the document, and should not be used for any other site or project. The material in it reflects the judgment of Baird in light of the information available to them at the time of preparation. Any use that a Third Party makes of this document, or any reliance on decisions to be made based on it, are the responsibility of such Third Parties. Baird accepts no responsibility for damages, if any, suffered by any Third Party as a result of decisions made or actions based on this document.

Executive Summary

Toronto and Region Conservation Authority (TRCA) has initiated the Toronto Islands Park Flood and Erosion Mitigation Project – Conceptual Design Development (the Project) to design and construct long-term flood and erosion mitigation for the Toronto Islands. W.F. Baird and Associates Coastal Engineers Ltd. (Baird) with Grounded Engineering (Grounded), KWA Consultants (KWA) and 4Sight Engineering (4Sight) were retained by TRCA to undertake this project. The team has developed conceptual designs for four study areas including Ward's Island, Algonquin Island, Centreville, and Roadways on the Islands. The project will be following a Class Environmental Assessment (EA) process in accordance with Conservation Ontario's Class EA for Remedial Flood and Erosion Control Projects.

This report provides a technical summary of the baseline environmental inventory, coastal analyses, and geotechnical investigation, and presents and evaluates a series of conceptual design alternatives for the four study areas. Based on flood depth maps for the 100-year flood event (water level 76.2 m IGLD85), focus areas within each of the four study areas were identified. These focus areas include the ferry dock and residential zone on Ward's Island; the South End, Northwest Shoreline and Queen City Yacht Club (QCYC) on Algonquin Island; Toronto Island Marina, Centre Island Ferry Terminal and Centreville on Centre Island, and 6530 m of roadways along Lakeshore Ave., Cibola Ave., Avenue of the Island, Service Rd., and Chippewa Ave.

The alternative concepts were evaluated based on ability to address flood and erosion hazards, environmental impact, social and cultural value, technical criteria, constructability, construction cost, maintenance requirements and public safety. The alternative concepts are briefly described below, including identification of the highest scoring (preferred) concepts for each focus area:

- **Ward's Island:**
  - **Concept 1: Inland Steel Sheet Pile Flood Wall -** Inland steel sheet pile (SSP) wall that follows the exterior of the residential area on Ward's Island.
  - **Concept 2: Revetment and Vegetated Berm -** Vegetated impermeable berm along the shoreline from the Ward's Island ferry dock to the intersection of First Ave. and Lakeshore Ave.
  - **Concept 3A: Vegetated Berm, 3 Beaches and Groynes -** A multi-functional flood protection/recreation structure consisting of a berm, three groynes, and three beaches. The structure extends from the Ward's Island ferry dock to the intersection of First Ave. and Lakeshore Ave.
  - **Concept 3B: Vegetated Berm, 2 Beaches and Groynes –** Similar concept as above but with two groynes and two beaches, and a flood berm that extends to the intersection of First Ave. and Lakeshore Ave.
  - **Concept 3C**: **Vegetated Berm, Beach and Groyne (Preferred) -** Impermeable berm and one groyne, and sand fill to enhance the existing beach between the Ward's Island ferry dock and Fifth Ave.
- **Algonquin Island – South End:**
  - **Concept 1A: Vegetated Shoreline Flood Berm -** A vegetated impermeable berm along the shoreline of the south end of Algonquin Island.
  - **Concept 1B: Vegetated Inland Berm -** A vegetated impermeable berm that extends inland across the south end of Algonquin Island.
  - **Concept 1C: Vegetated Inland Berm along Wyandot (Preferred) -** A vegetated impermeable berm that extends inland around the Algonquin Island Association Clubhouse (the Clubhouse) and then along Wyandot Ave, minimizing impacts to existing vegetation communities of conservation concern.

  - **Concept 2: Vegetated Inland Berm and Flood Wall:** A vegetated impermeable berm that wraps around the Clubhouse and then transitions into a concrete flood wall along Wyandot Ave.
  - **Concept 3: Wyandot Avenue Flood Wall -** A concrete flood wall along Wyandot Ave. that extends from Seneca Ave. to Omaha Ave.
- **Algonquin Island – Northwest Shoreline:**
  - **Concept 1: Steel Sheet Pile Wall -** SSP wall in front of the existing wall with a raised crest elevation and backfill of the adjacent land area.
  - **Concept 2: Impermeable Berm (Preferred) -** Impermeable flood berm with rip rap or stacked armour stone revetment in front of the existing wall.
  - **Concept 3: Impermeable Berm and Nearshore Habitat:** Impermeable berm along the crest of the existing wall with beach fill and nature-based features in front of the existing wall creating nearshore habitat.
- **Algonquin Island – Queen City Yacht Club (QCYC):**
  - **Concept 1: Steel Sheet Pile Wall -** SSP wall around the perimeter of the club with a raised crest height.
  - **Concept 2: Concrete Dock Wall -** SSP wall with a concrete top. The SSP wall is at the same elevation as the existing wall with a stepped concrete top that increases the height of the dock wall above the 100-year flood level.
  - **Concept 3: Flood Wall -** Inland concrete flood wall that follows the pathway along the perimeter of the club with access gaps to maintain club function.
  - **Concept 4: Land Raising and Raised Walkway (Preferred) –** Raising land above the 100-year flood level along the southwest corner of QCYC to maintain club operations during the design flood. This concept includes flood mitigation works previously implemented by QCYC, including raised walkways and modular flood wall extensions.
- **Centre Island – Toronto Island Marina:**
  - **Concept 1: Land and Road Raising -** Raising the central land area within the marina and raising the main roadway.
  - **Concept 2A: Steel Sheet Pile Wall and Inland Flood Berm -** Raising the central roadways within the marina, new SSP dock wall along the north shoreline and an inland impermeable vegetated berm between the marina and the Toronto Island Beer and BBQ Co. restaurant.
  - **Concept 2B: Steel Sheet Pile Wall and Shoreline Flood Berm –** Raising the central roadways within the marina, new SSP dock wall along the north shoreline and an impermeable vegetated berm along the shoreline between the marina and the Toronto Island Beer and BBQ Co. restaurant.
  - **Concept 3: Steel Sheet Pile Dock Walls and Shoreline Flood Berm -** New SSP dock walls around the centre of the marina with an impermeable vegetated berm between the marina and the Toronto Island Beer and BBQ Co. restaurant along the shoreline.
  - **Concept 4: Land Raising and Shoreline Flood Berm (Preferred) -** Raising the main roadway and land in the boat storage area within the marina's central area, and an impermeable vegetated berm along the shoreline between the marina and the Toronto Island Beer and BBQ Co. restaurant.
- **Centre Island – Ferry Terminal:**
  - **Concept 1: Steel Sheet Pile Wall -** SSP wall with raised crest elevation in front of the existing wall and raised adjacent land extending from the ferry dock east toward the pedestrian bridge to Olympic Island and west toward the Island Beer and BBQ Co. restaurant.

  - **Concept 2: Stacked/Stepped Wall (Preferred) –** Stepped armour stone wall with an impermeable berm extending east from the ferry dock to the pedestrian bridge to Olympic Island and a stepped concrete wall with raised crest elevations extending west from the ferry dock.
  - **Concept 3: Flood Berm and Revetment –** Impermeable berm and rip rap revetment extending from the ferry dock east toward the pedestrian bridge to Olympic Island and west toward the Island Beer and BBQ Co. restaurant.
- **Centre Island – Centreville:**
  - **Concept 1: Steel Sheet Pile Wall -** SSP wall around the perimeter of Centreville and along the north shoreline toward the ferry dock.
  - **Concept 2: Naturalized Shoreline and Flood Berm (Preferred):** Impermeable berm and naturalized shoreline around the perimeter of Centreville and along the north shoreline toward the ferry dock.
  - **Concept 3: Buried Steel Sheet Pile Wall and Naturalized Shoreline -** Buried SSP wall around the perimeter of Centreville and along the north shoreline toward the ferry dock: adjacent land is filled to the top of the wall and the lakeside is filled and naturalized.
- **Roadways:**
  - **Concept 1: Clay Cap (Preferred) -** 6,530 m of roadways around the islands are raised. Design includes an impermeable shoulder by capping the granular base course with low permeability clay.
  - **Concept 2: Concrete Core –** 6,530 m of roadways around the islands are raised. Design includes a low permeability core approximately in the centre of the granular base course, constructed from lean mix concrete.
  - **Concept 3: Concrete Curb -** 6,530 m of roadways around the islands are raised. Design includes an impermeable shoulder by capping the granular base course with a concrete curb.
  - **Concept 4: Crusher Run Limestone -** 6,530 m of roadways around the islands are raised. Design includes constructing the granular base course with low permeability OPSS Granular A Crusher Run Limestone.

The next step in the study is to complete a detailed environmental analysis of the preferred alternative options for each Study Area, in particular to examine key categories investigated in the baseline inventory. Each of the preferred alternatives will undergo a detailed study of their predicted net impact, with the results of this study to be presented in Part II of this report.

Table of Contents

1. Introduction and Project Objectives 1

1.1 Project Background 1

1.2 Scope of Work 1

1.3 Study Areas 3

1.3.1 Ward's Island 3

1.3.2 Algonquin Island 4

1.3.3 Centre Island 6

1.3.4 Roadways 9

1.4 Background Document Review and Data Gaps 10

1.4.1 Data Gaps 11

2. Baseline Inventory Overview 12

2.1 Physical Environment 12

2.1.1 Baseline Hydrogeological Conditions 12

2.1.2 Baseline Environmental Conditions 13

2.1.3 Baseline Geomorphology and Littoral Drift 13

2.2 Coastal Environment 14

2.2.1 Baseline Erosion and Sediment Deposition Zones 14

2.2.2 Baseline Flood Risk 17

2.2.3 Baseline Hazardous Lands/Sites 17

2.2.4 Baseline of Existing Shoreline Structures 18

2.2.5 Subsurface Utility Investigation 20

3. Coastal Analysis 21

3.1 Lake Ontario Water Levels 21

3.1.1 Water Level Terminology 21

3.1.2 Note on Elevations and Vertical Datums 21

3.1.3 Lake Ontario Water Level Regulation Plans 22

3.1.4 Historical Water Level Records 22

3.2 Flood Depth Mapping 25

3.3 Winds 30

3.4 Waves 31

3.4.1 Offshore Wave Conditions 31

3.4.2 Nearshore Wave Conditions 32
3.4.3 Inner Harbour Waves 36
3.5 Shoreline Erosion 37
3.6 Ice 40
3.7 Existing Shoreline Conditions of the Study Areas 40
3.7.1 Ward's Island 40
3.7.2 Algonquin Island 41
3.7.3 Centre Island 43
4. Geotechnical Investigation 46
5. Concept Alternatives 47
5.1 Ward's Island 48
5.1.1 Ward's Island Concept 1: Inland Steel Sheet Pile (SSP) Flood Wall 48
5.1.2 Ward's Island Concept 2: Revetment and Vegetated Berm 52
5.1.3 Ward's Island Concept 3: Vegetated Berm, Beach and Groyne System 57
5.2 Algonquin Island 65
5.2.1 South End 65
5.2.2 Northwest Shoreline 82
5.2.3 Queen City Yacht Club (QCYC) 95
5.3 Centre Island 112
5.3.1 Toronto Island Marina 112
5.3.2 Centre Island Ferry Terminal 129
5.3.3 Centreville Concepts 141
5.4 Roadways 153
5.4.1 Roadways - Concept 1: Clay Cap 154
5.4.2 Roadways - Concept 2: Concrete Core 155
5.4.3 Roadways - Concept 3: Concrete Curb 156
5.4.4 Roadways - Concept 4: Crusher Run Limestone (CRL) 156
5.4.5 Shoreline Protection 157
6. Evaluation of Alternatives 161
6.1 Ward's Island - Evaluation of Alternatives 162
6.2 Algonquin Island - Evaluation of Alternatives 164
6.2.1 Algonquin Island - South End 164

6.2.2 Algonquin Island - Northwest Shoreline 167
6.2.3 Algonquin Island - Queen City Yacht Club (QCYC) 170
6.3 Centre Island - Evaluation of Alternatives 172
6.3.1 Centre Island - Toronto Island Marina 172
6.3.2 Centre Island - Ferry Terminal 175
6.3.3 Centre Island - Centreville 176
6.4 Roadways – Evaluation of Alternatives 178
7. Key Results and Next Steps 181

Appendix A Flood Depth Mapping
Appendix B Shoreline Concept Drawings
Appendix C KWA Road Raising Concept Drawings

Tables

Table 3.1: Estimated Extreme Water Levels at Toronto 25
Table 3.2: Extreme Wind Speeds by Direction for EC48549 at Toronto City Airport 31
Table 3.3: Extreme Wave Heights at Offshore Hindcast Point 32
Table 3.4: Extreme Nearshore Significant Wave Heights (m) 36
Table 3.5: Extreme Inner Harbour Wave Heights by Direction 37
Table 3.6: Annual Shoreline Erosion and Accretion Rates since 1980 39
Table 6.1: Evaluation Matrix for Ward's Island Concept Alternatives 164
Table 6.2: Evaluation Matrix for Algonquin Island South End Concept Alternatives 167
Table 6.3: Evaluation Matrix for Algonquin Island Northwest Shoreline Concept Alternatives 169
Table 6.4: Evaluation Matrix for Algonquin Island Queen City Yacht Club (QCYC) Concept Alternatives 172
Table 6.5: Evaluation Matrix for Centre Island Toronto Island Marina Concept Alternatives 174
Table 6.6: Evaluation Matrix for Centre Island Ferry Terminal Concept Alternatives 176
Table 6.7: Evaluation Matrix for Centre Island Centreville Concept Alternatives 178
Table 6.8: Evaluation Matrix for Roadways Concept Alternatives 180

Figures

Figure 1.1: Location of study areas on Toronto Island Park 2
Figure 1.2: Flood Mapping at Ward's Island for 100-year (76.2 m) Combined Lake Level 4
Figure 1.3: Flood Mapping at Algonquin Island for 100-year (76.2 m) Combined Lake Level 5
Figure 1.4: Overtopping and ponding at Seneca Ave. Seawall during 2017 Flood Event 6
Figure 1.5: Flood Mapping at Centre Island for 100-year (76.2 m) Combined Lake Level 7
Figure 1.6: Flooding at Far Enough Farm during 2019, facing west 8
Figure 1.7: Flooding at Far Enough Farm during 2019, facing northeast 8
Figure 1.8: Flooding along Cibola Ave. during 2019, facing north 9
Figure 1.9: Flood depth on roadways during the 100-year event 10
Figure 2.1: Excerpt of 1906 Canadian National Atlas Map Showing Toronto Harbour (Gov't. of Canada) 14
Figure 2.2: Nearshore Currents Patterns for Predominant Storm Directions – East (left) and Southwest (right) 15
Figure 2.3: Constructed Shoreline Protection at Gibraltar Point 16
Figure 2.4: Historical Sedimentation along Toronto Islands Shoreline 16
Figure 2.5: Existing outer shoreline protection structures at Toronto Islands Park 18
Figure 2.6: Existing shoreline protection structures (numbered 1 to 16) around Toronto Island Park 19
Figure 2.7: Existing shoreline protection structures (numbered 17 to 24) around Toronto Island Park 20
Figure 3.1: Elevation of the Toronto Harbour Gauge house Benchmark 21
Figure 3.2: Mean Monthly Water Levels in Lake Ontario (1918 to present) 23
Figure 3.3: Spaghetti Plot of Daily Water Levels at Toronto 23
Figure 3.4: Historical Static and Surge Water Levels at Toronto 24
Figure 3.5: Flood Mapping at Ward's Island for 100-year (76.2 m) Combined Lake Level 26
Figure 3.6: Flood Mapping at Algonquin Island for 100-year (76.2 m) Combined Lake Level 27
Figure 3.7: Flood Mapping at Centre Island for 100-year (76.2 m) Combined Lake Level 28
Figure 3.8: Flood depths on roadways on Toronto Islands for 100-year (76.2 m) Combined Lake Level 29
Figure 3.9: Wind Rose for EC48549 at Toronto City Airport 30
Figure 3.10: Wave Rose for Offshore Hindcast Point 32
Figure 3.11: MIKE21 Nearshore Wave Model of Toronto Islands Zoomed Out 33
Figure 3.12: MIKE21 Nearshore Wave Model of Toronto Islands Zoomed In 34
Figure 3.13: Offshore Hindcast Point and Nearshore Extraction Points 34

Figure 3.14: Variation of Nearshore Wave Conditions by Offshore Wave Direction 35
Figure 3.15: Historical Shorelines at Toronto Islands.....38
Figure 3.16: Historical Shoreline Position at Hanlan's Point Beach 39
Figure 3.17: Historical Shoreline Position at Gibraltar Point Beach.....39
Figure 3.18: Historical Shoreline Position at Centre Island Beach 39
Figure 3.19: Historical Shoreline Position at Ward's Island Beach.....39
Figure 3.20: Armour stone beach curb and walking path (left) and revetment north of the beach and Ward's Island ferry terminal (right) completed as part of the emergency works in 2020.....41
Figure 3.21: Rip rap and concrete rubble revetment (right) and concrete panel wall (left) around the northeast and north shoreline of Ward's Island. Right photo source: TRCA, Jan. 2021.....41
Figure 3.22: Algonquin Island seawall along Seneca Ave. Right photo source: TRCA 42
Figure 3.23: Queen City Yacht Club (QCYC) shoreline retained by SSP, vessel breakwater and clubhouse (left). Buildings and concrete tile path adjacent to QCYC shoreline and docks (right). 42
Figure 3.24: Concrete slab shore protection and low-lying vegetated shoreline around Far Enough Farms.....43
Figure 3.25: Concrete and timber wall along the north shoreline between Centreville and the ferry terminal (left). Erosion of the unprotected shoreline and flanking of the east end of the concrete wall (right) 44
Figure 3.26: Concrete panel and timber cap wall to the east and west of the Centre Island Ferry dock.....44
Figure 3.27: Concrete slab (left) and rip rap and groynes (right) along the north shoreline 44
Figure 3.28: Various dock walls within the Toronto Island Marina showing use of decking (left) and steel and paving brick (right) 45
Figure 3.29: Main road (Avenue of the Island) running through Toronto Island Marina (left) and deteriorating steel dock wall (right).....45
Figure 5.1: Ward's Island Concept 1: Inland Steel Sheet Pile Flood Wall.....49
Figure 5.2: Section W1A for Ward's Island Concept 1.....50
Figure 5.3: Section W1C for Ward's Island Concept 1 50
Figure 5.4: Flood depth during the 100-year flood event for Ward's Island for Concept 1 51
Figure 5.5: Ward's Island Concept 2: Revetment and Vegetated Berm 53
Figure 5.6: Section W2B of Ward's Island Concept 2 showing vegetated earth berm and revetment at the shoreline.....54
Figure 5.7: Section W2B of Ward's Island Concept 2 variation with articulated concrete block mattress and revetment at the shoreline.....54
Figure 5.8: Articulated concrete block mattress, vegetated (left) and placed on a bank (right). (Photo from Nilex Civil Environmental Group, 2021).....55
Figure 5.9: Flood depth during the 100-year event on Ward's Island for Concept 2 56

Figure 5.10: Ward's Island Concept 3A: Vegetated Berm, 3 Beaches and Groynes 58
Figure 5.11: Ward's Island Concept 3B: Vegetated Berm, 2 Beaches and Groynes 59
Figure 5.12: Ward's Island Concept 3C: Vegetated Berm, Beach and Groyne 60
Figure 5.13: Typical groyne sections for Ward's Island Concept 3 61
Figure 5.14: Typical section showing the impermeable berm and sand beach, for Ward's Island Concept 3 61
Figure 5.15: Flood depth during the 100-year flood event on Ward's Island for Concept 3A 62
Figure 5.16: Flood depth during the 100-year flood event on Ward's Island for Concept 3B 63
Figure 5.17: Flood depth during the 100-year flood event on Ward's Island for Concept 3C. 64
Figure 5.18: Concept 1A for the South End of Algonquin Island: Vegetated Shoreline Flood Berm 66
Figure 5.19: Typical section for Concept 1A: Vegetated Shoreline Flood Berm 67
Figure 5.20: Flood depth during the 100-year flood event on Algonquin Island for Concept 1A 68
Figure 5.21: Concept 1B for the South End of Algonquin Island: Vegetated Inland Berm 69
Figure 5.22: Typical section for Concept 1B: Vegetated Inland Berm 70
Figure 5.23: Flood depth during the 100-year flood event on Algonquin Island for Concept 1B 71
Figure 5.24: Concept 1C for the South End of Algonquin Island: Vegetated Inland Berm along Wyandot 72
Figure 5.25: Flood depth during the 100-year flood event on Algonquin Island for Concept 1C 73
Figure 5.26: Concept 2 for the South End of Algonquin Island: Vegetated Inland Berm and Flood Wall 75
Figure 5.27: Typical flood wall section for Concept 2 for the south end of Algonquin Island 76
Figure 5.28: Flood depth during the 100-year flood event on Algonquin Island for Concept 2 77
Figure 5.29: Concept 3 for the south end of Algonquin Island: Wyandot Avenue Flood Wall 79
Figure 5.30: Typical flood wall section for Concept 3 for the south end of Algonquin Island 80
Figure 5.31: Flood depth during the 100-year flood event on Algonquin Island for Concept 3 for Northwest Shoreline 81
Figure 5.32: Concept 1 for Northwest Shoreline: Steel Sheet Pile Wall 83
Figure 5.33: Typical Steel Sheet Pile Wall section for Concept 1 for Northwest Shoreline 84
Figure 5.34: Flood depth during the 100-year flood event for Northwest Shoreline Concept 1 85
Figure 5.35: Concept 2 for Northwest Shoreline: Impermeable Berm with Armour Stone Berm 87
Figure 5.36: Concept 2 for Northwest Shoreline: Impermeable Berm with Stacked Stone Wall 88
Figure 5.37: Typical section variations of an impermeable berm for Northwest Shoreline supported by sloping armour stone berm (N2A) and supported by vertical stacked stone wall (N2B) 89
Figure 5.38: Flood depth during the 100-year flood event for Northwest Shoreline Concept 2 90

Figure 5.39: Concept 3 for Northwest Shoreline on Algonquin Island: Impermeable Berm and Nearshore Habitat 92
Figure 5.40: Typical nearshore habitat and impermeable berm section for Northwest Shoreline Concept 3 93
Figure 5.41: Renderings of nearshore habitat from other Baird projects showing vegetated shoreline and nearshore habitat (right) and a submerged rock shoal retaining sand material (left) 93
Figure 5.42: Flood depth during the 100-year flood event for Northwest Shoreline Concept 3 94
Figure 5.43: Queen City Yacht Club (QCYC) Concept 1: Steel Sheet Pile Wall 96
Figure 5.44: Typical section of Steel Sheet Pile (SSP) wall for Queen City Yacht Club (QCYC) Concept 1 97
Figure 5.45: Flood depth during the 100-year flood event for Queen City Yacht Club (QCYC) Concept 1 98
Figure 5.46: Queen City Yacht Club (QCYC) Concept 2: Concrete Dock Wall 100
Figure 5.47: Typical concrete wall section for Queen City Yacht Club (QCYC) Concept 2 101
Figure 5.48: Queen City Yacht Club (QCYC) Concept 3: Concrete floodwall 102
Figure 5.49: Typical flood wall section for Queen City Yacht Club (QCYC) Concept 3 103
Figure 5.50: Flood depth during the 100-year flood event for Queen City Yacht Club (QCYC) Concept 3 104
Figure 5.51: Queen City Yacht Club (QCYC) Concept 4: Land Raising and Raised Walkway 106
Figure 5.52: Members of QCYC constructing the raised walkway (Source: Ron Mazza, QCYC) 107
Figure 5.53: Modifications to the SSP dock wall at QCYC to accommodate modular wall during flood events (Source: Ron Mazza, QCYC) 108
Figure 5.54: Typical modular flood gate section for Queen City Yacht Club (QCYC) Concept 4 109
Figure 5.55: Typical concrete wall and stone buttress section for Queen City Yacht Club (QCYC) Concept 4 109
Figure 5.56: Typical vegetated inland berm section with walkway for QCYC Concept 4. 110
Figure 5.57: Flood depth during the 100-year flood event for Queen City Yacht Club (QCYC) Concept 4 111
Figure 5.58: Toronto Island Marina Concept 1: Land and Road Raising 113
Figure 5.59: Flood depth during the 100-year flood event for Toronto Island Marina Concept 1 114
Figure 5.60: Toronto Island Marina Concept 2A: Steel Sheet Pile Wall and Inland Flood Berm 116
Figure 5.61: Toronto Island Marina Concept 2B: Steel Sheet Pile Wall and Shoreline Flood Berm 117
Figure 5.62: Typical SSP dock wall section for Toronto Island Marina Concept 2 118
Figure 5.63: Typical inland berm section for Toronto Island Marina Concept 2A 118
Figure 5.64: Typical shoreline berm section for Toronto Island Marina Concept 2B showing vegetated and promenade variations 119
Figure 5.65: Typical section for Toronto Island Marina Concept 2 showing new SSP wall and stone berm around Island BBQ and Beer Co. shoreline 119

Figure 5.66: Flood depth during the 100-year flood event for Toronto Island Marina Concept 2A 120
Figure 5.67: Flood depth during the 100-year flood event for Toronto Island Marina Concept 2B 121
Figure 5.68: Toronto Island Marina Concept 3: Steel Sheet Pile (SSP) Dock Wall and Shoreline Flood Berm 123
Figure 5.69: Typical Steel Sheet Pile (SSP) dock wall section for Toronto Island Marina Concept 3.....124
Figure 5.70: Typical shoreline flood berm section for Toronto Island Marina Concept 3.....124
Figure 5.71: Flood depth during the 100-year flood event for Toronto Island Marina Concept 3.....125
Figure 5.72: Toronto Island Marina Concept 4: Land and Road Raising and Flood Berm 127
Figure 5.73: Flood depth during the 100-year flood event for Toronto Island Marina Concept 4.....128
Figure 5.74: Centre Island Ferry Terminal Concept 1: Steel Sheet Pile (SSP) Wall 130
Figure 5.75: Typical Steel Sheet Pile (SSP) wall section for Centre Island Ferry Terminal Concept 1 131
Figure 5.76: Flood depth during the 100-year flood event for Centre Island Ferry Terminal for Concept 1 132
Figure 5.77: Centre Island Ferry Terminal Concept 2: Stacked/Stepped Wall 134
Figure 5.78: Typical stacked armour stone wall section for Centre Island Ferry Terminal Concept 2.....135
Figure 5.79: Typical stepped concrete wall section for Centre Island Ferry Terminal Concept 2 135
Figure 5.80: Flood depth during the 100-year flood event for Centre Island Ferry Terminal for Concept 2 136
Figure 5.81: Centre Island Ferry Terminal Concept 3: Flood Berm and Revetment 138
Figure 5.82: Typical flood berm section for Centre Island Ferry Terminal Concept 3 139
Figure 5.83: Flood depth during the 100-year flood event for Centre Island Ferry Terminal for Concept 3 140
Figure 5.84: Centreville Concept 1: Steel Sheet Pile (SSP) Wall 142
Figure 5.85: Typical Steel Sheet Pile (SSP) wall section for Centreville Concept 1 143
Figure 5.86: Typical section of naturalized shoreline and flood berm at Centreville for Concept 1.....143
Figure 5.87: Flood depth during the 100-year flood event on Centreville for Concept 1 144
Figure 5.88: Centreville Concept 2: Naturalized Shoreline and Flood Berm.....146
Figure 5.89: Typical section of naturalized shoreline and flood berm at Centreville for Concept 2 with vegetated and promenade variations.....147
Figure 5.90: Flood depth during the 100-year flood event on Centreville for Concept 2 148
Figure 5.91: Centreville Concept 3: Buried Steel Sheet Pile Wall and Naturalized Shoreline 150
Figure 5.92: Typical buried Steel Sheet Pile (SSP) wall and naturalized shoreline section for Centreville Concept 3.....151
Figure 5.93: Flood depth during the 100-year flood event on Centreville for Concept 3 152
Figure 5.94: Road sections included in the Roadways study area.....154

Figure 5.95: Roadways Concept 1: Clay Cap 155
Figure 5.96: Roadways Concept 2: Concrete Core 155
Figure 5.97: Roadways Concept 3: Concrete Curb 156
Figure 5.98: Roadways Concept 4: Crusher Run Limestone 157
Figure 5.99: Roadways at PP-8 (left) and PP-9 (right) in close proximity to the shoreline 158
Figure 5.100: Location along Lakeshore Ave. (PP-8, and PP-9) where shore protection may be required 158
Figure 5.101: Shoreline revetment concept, in plan, along PP-8 and PP-9.....159
Figure 5.102: Typical section for revetment concept along PP-9 shoreline and PP-8 back of beach 160

1. Introduction and Project Objectives

Toronto and Region Conservation Authority (TRCA) has initiated the Toronto Island Park Flood and Erosion Mitigation Project (the Project) to develop long-term flood and erosion mitigation for the Toronto Islands. W.F. Baird and Associates Coastal Engineers Ltd. (Baird), in association with Grounded Engineering (Grounded), KWA Consultants (KWA) and 4Sight Engineering (4Sight), were retained by TRCA to undertake this project. The team has developed conceptual designs for four study areas identified through consultation with TRCA, including Ward's Island, Algonquin Island, Centreville, and Roadways on the Islands. The project will be following a Class Environmental Assessment (EA) process in accordance with Conservation Ontario's Class EA for Remedial Flood and Erosion Control Projects.

This report, intended to support the Class EA, provides a technical summary of the results of a baseline environmental inventory, coastal analysis and geotechnical investigation, and presents and evaluates conceptual design alternatives for the four study areas.

1.1 Project Background

Toronto Island Park is an exceptional public park area that serves as a popular year-round urban attraction of significant economic importance, while showcasing unique natural features, cultural heritage, and sensitive ecosystems. The Park is made up of a group of islands located off the Toronto shoreline, and is home to Billy Bishop Airport, Centreville amusement park, a number of businesses, provincially significant ecosystems and over 309 households.

In recent years, the Toronto Islands have suffered significant economic and physical impacts due to flooding caused by extreme wet weather and record high water levels. An extreme flood event in 2017 due to high water levels on Lake Ontario had devastating impacts on Toronto Island Park. The sustained period of high-water levels resulted in approximately $8M in direct and indirect damages to the City of Toronto related to the closing of the Park. Emergency measures during the flooding event were implemented by TRCA, the City of Toronto, and the Island residents to mitigate flood damage during the 2017 event. The Park was once again subject to extreme water levels in 2019 during which water levels on Lake Ontario reached unprecedented highs, surpassing the previous 2017 record by 10 cm. Lessons learned from the 2017 event aided in the preparation and execution of temporary flood measures during the 2019 event. In 2020, emergency flood mitigation works, based on findings from Baird's Toronto Islands Flood Characterization and Risk Assessment project (2019a), were implemented. The emergency works included construction of 90 m of beach curbs surrounding Ward's Island beach adjacent to the ferry terminal, approximately 510 m of road raised above the 100-year flood elevation, and the installation of earth berms, jersey barriers and a sump pump at the Island Water Treatment Plant. Additionally, design drawings for a flood berm along Seneca Ave. on Algonquin Island were developed and prepared for execution in case of another flood event prior to conclusion of the Class EA; this structure has not been constructed.

A long-term solution for flood and erosion mitigation for the Toronto Island Park is required to replace the temporary and emergency mitigation measures, and to increase the functionality and resilience of the flood control infrastructure on the Islands.

1.2 Scope of Work

The overall project objective is to increase the effectiveness and resiliency of the Toronto Islands' flood control infrastructure and prevent future high-water levels from impacting the Islands. The study scope includes the

development and assessment of alternative concept designs for long-term flood mitigation and erosion control for selected sections of the Toronto Island Park shoreline. This project focuses on four specific areas within the Island Park: Ward's Island, Algonquin Island, Centre Island and Roadways on the Islands. These study areas are highlighted in Figure 1.1. The concept design alternatives consider existing site characteristics, environmental impacts and opportunities, current and future park users and amenities, constructability, cost, and effectiveness. The concept designs discussed in this report will be presented to the community as part of the Class EA process.

The scope of work includes the following key tasks and activities:

- Background review of previous studies and existing data and identification of data gaps,
- Baseline inventory to characterize the physical, biological, socio-economic, and engineering/technical environment components of the Toronto Island Park, completed at a park level,
- Coastal analysis to support concept design development for each study area and to ensure feasibility and long-term efficacy of proposed concepts,
- Geotechnical investigation,
- Development of three concept design alternatives for each of the study areas,
- Delivery of a Conceptual Design Evaluation Package including this report and concept design drawings.

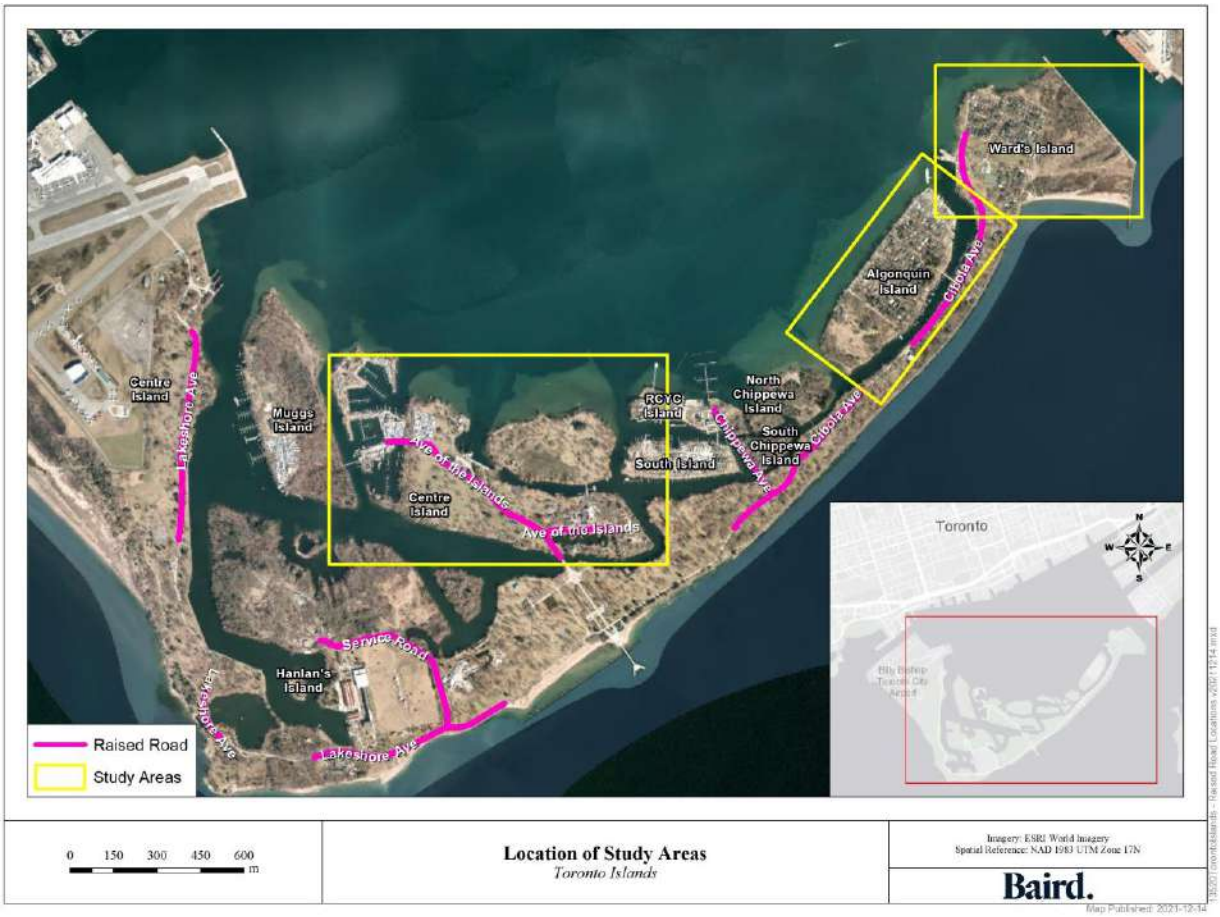


Figure 1.1: Location of study areas on Toronto Island Park

1.3 Study Areas

Site observations, land use mapping and flood mapping were assessed to identify priority areas within each study area. Baird reviewed the historical flooding (in 2017 and 2019), as well as the estimated flooding that would occur during the 100-year flood event (flood maps are provided in Appendix A). The 100-year flood level is 76.2 m IGLD85 (all elevations in this report are referenced to the IGLD85 datum unless otherwise noted). Actively used areas, such as residential zones, important island infrastructure, business areas and areas with heavy tourist traffic, which were indicated as flooded on the flood maps were identified as high priority zones for protection from flooding. Based on the 2019 Flood Study (Baird, 2019a), a significant portion of the financial impacts from island flooding came from forced closure of key public amenities, such as Centreville, and flooded roadways restricting tourist access to various parts of the island. Areas of low use or passive recreation, such as naturalized areas that were indicated as flooded, were considered lower priority and excluded from the focus areas. Based on this analysis, the following focus areas and subsections were identified for flood and erosion mitigation, as discussed in more detail in Sections 1.3.1 to 1.3.4:

- Ward's Island
  - Ward's Island Ferry Terminal and adjacent beach
  - Ward's Island residential area
- Algonquin Island
  - Algonquin Island Park, on the southwest end of the island (South End)
  - Northwest shoreline of the island along Seneca Ave. (Northwest Shoreline)
  - Queen City Yacht Club (QCYC)
- Centre Island
  - Toronto Island Marina
  - Centre Island Ferry Terminal
  - Centreville Amusement Park
- Roadways
  - Flooded main roadways with a depth of 10 cm or more during the 100-year flood event.

Some focus areas are on public lands that are privately leased. Recognizing flood risks at these sites, they have been included in the planning phase of the Class EA to ensure that a comprehensive approach to long-term flood protection is taken. Including these leased lands in the planning phase of the EA does not constitute an obligation or agreement on behalf of the City of Toronto to fund flood protection works on these sites or any privately leased lands. Implementation and funding considerations for any flood control structures to protect privately leased lands will be subject to additional discussion between City of Toronto and lease holders following approval of the Class EA.

1.3.1 Ward's Island

Ward's Island is the easternmost island in Toronto Island Park. The northwest quadrant of the island is a residential area. Ward's Island Park occupies the east side of the island. This area is natural and includes beach/bluff and successional habitat as well as vegetation communities of conservation concern and Provincially Significant Wetlands. The southwest quadrant of the island includes the Ward's Island Ferry dock, a public beach, fields, tennis courts, the Island Café, and some additional residences.

Ward's Island is relatively low-lying and prone to flooding during high lake levels. Figure 1.2 shows the inundation that would occur at the 100-year flood level of 76.2 m. The existing low-lying beach and lack of

adequate flood protection along the shoreline results in significant flooding on the harbour side of the island, specifically along Bayview Ave. and Cibola Ave. and into the adjacent open areas. The open areas near Cibola Ave. and Channel Ave. are particularly low, with potential flood depths exceeding 0.5 m. While emergency works were completed by TRCA and the City of Toronto in 2020, including the installation of beach curbs along the shoreline north and south of the ferry terminal to reduce wave run up and overtopping, they are not watertight and do not prevent flooding during periods of high lake levels. Flooding of this area may restrict the movement of emergency vehicles and access to the ferry terminal. The residential area on Ward's Island is subject to flooding by inundation, overland surface flows, and/or infiltration through permeable soils during periods of sustained high lake levels. Areas within Ward's Island Park could reach flood depths in excess of 1 m during a 100-year flood event; however, this is a natural area and is therefore excluded from the focus area.

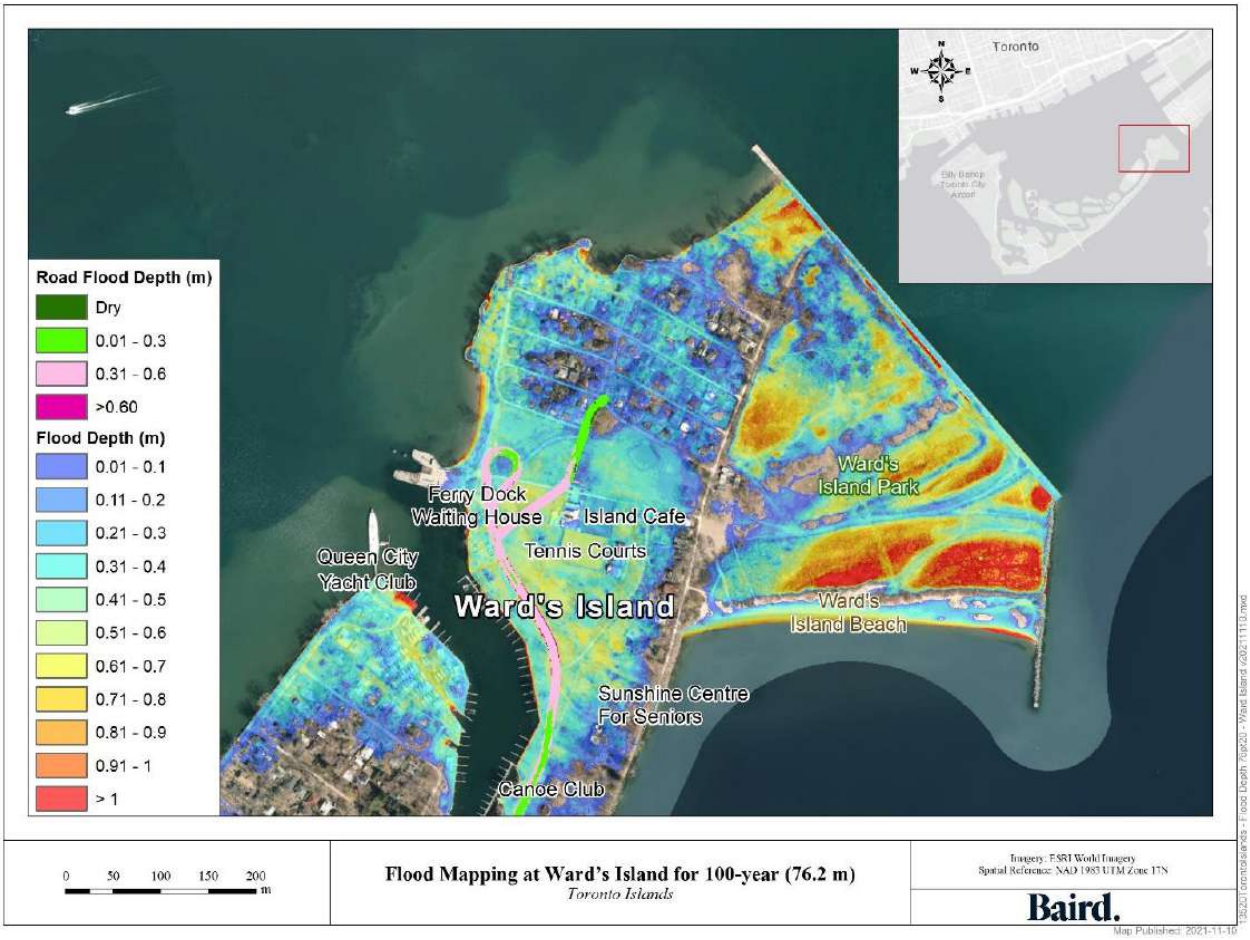


Figure 1.2: Flood Mapping at Ward's Island for 100-year (76.2 m) Combined Lake Level

1.3.2 Algonquin Island

Algonquin Island is located just west of Ward's Island and is largely a residential area. QCYC occupies the northeast end of the island. Algonquin Island Park is a natural area, including a vegetation community of conservation concern at the southwest end of the island. The Clubhouse is located in Algonquin Island Park, adjacent to the intersection of Seneca Ave. and Wyandot Ave.

In comparison to Ward's Island, the terrain of Algonquin Island is generally at a higher elevation. Most of the residential area on this island is above the 100-year flood level (see Figure 1.3). At the north end, the SSP wall containing the QCYC property, and the open boat launch makes this area susceptible to flooding depths up to and exceeding 0.5 m. This can also affect the properties along Nottawa Ave., as redirected surface flows can flood adjacent properties (this was observed in the 2017 flooding event). The areas around Dacotah Ave., Wyandot Ave., and the Clubhouse also have potential flood depths reaching 0.5 m for the 100-year lake level. The unprotected shoreline along the southwestern end of the island leaves Algonquin Island Park susceptible to flooding. In addition, the low elevation of the existing seawall along Seneca Ave. results in wave overtopping during strong W/NW/N winds at high lake levels. The overtopping can lead to ponding on the landside of the wall; this is shown in the photo in Figure 1.4, which was taken during the 2017 flood event.

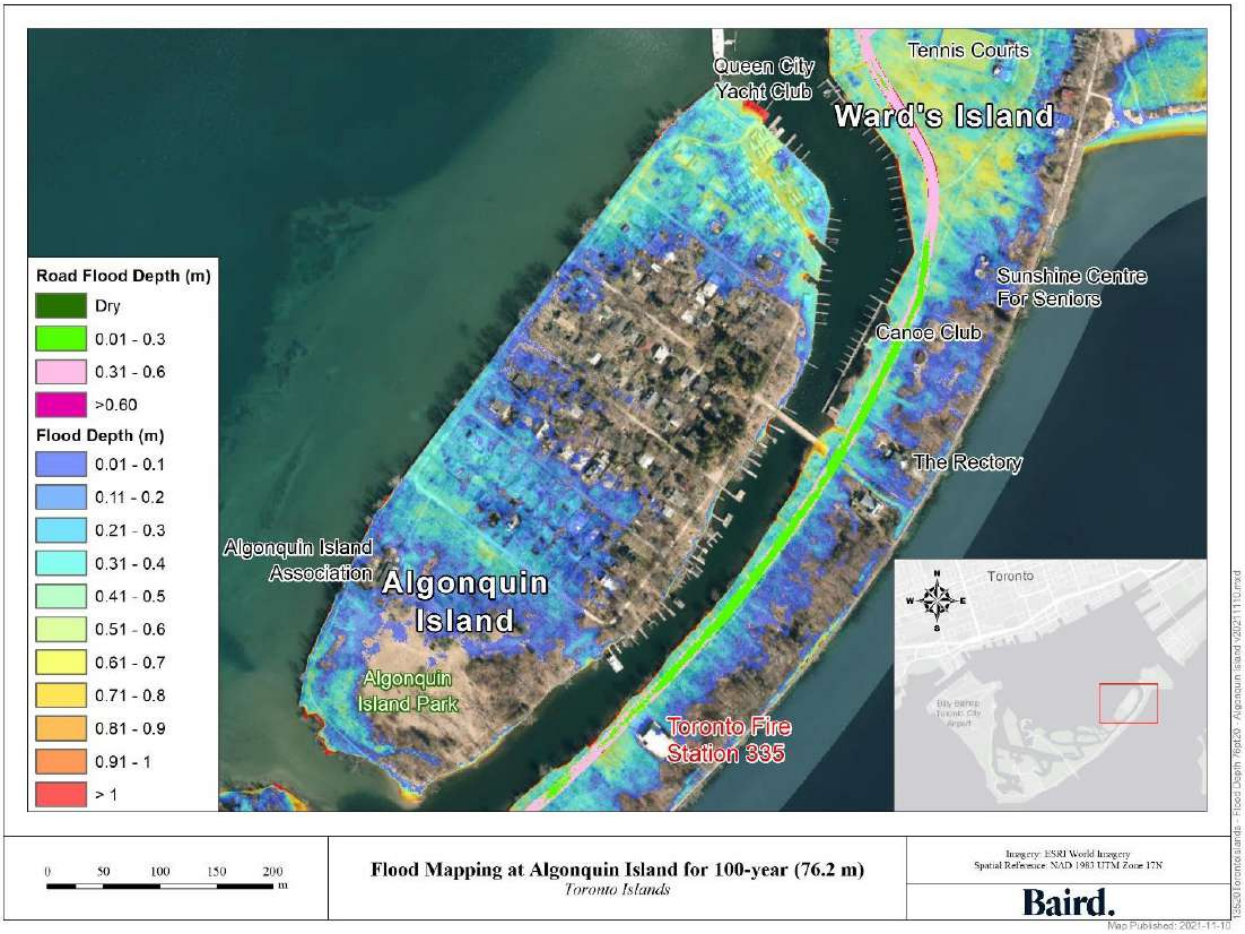


Figure 1.3: Flood Mapping at Algonquin Island for 100-year (76.2 m) Combined Lake Level

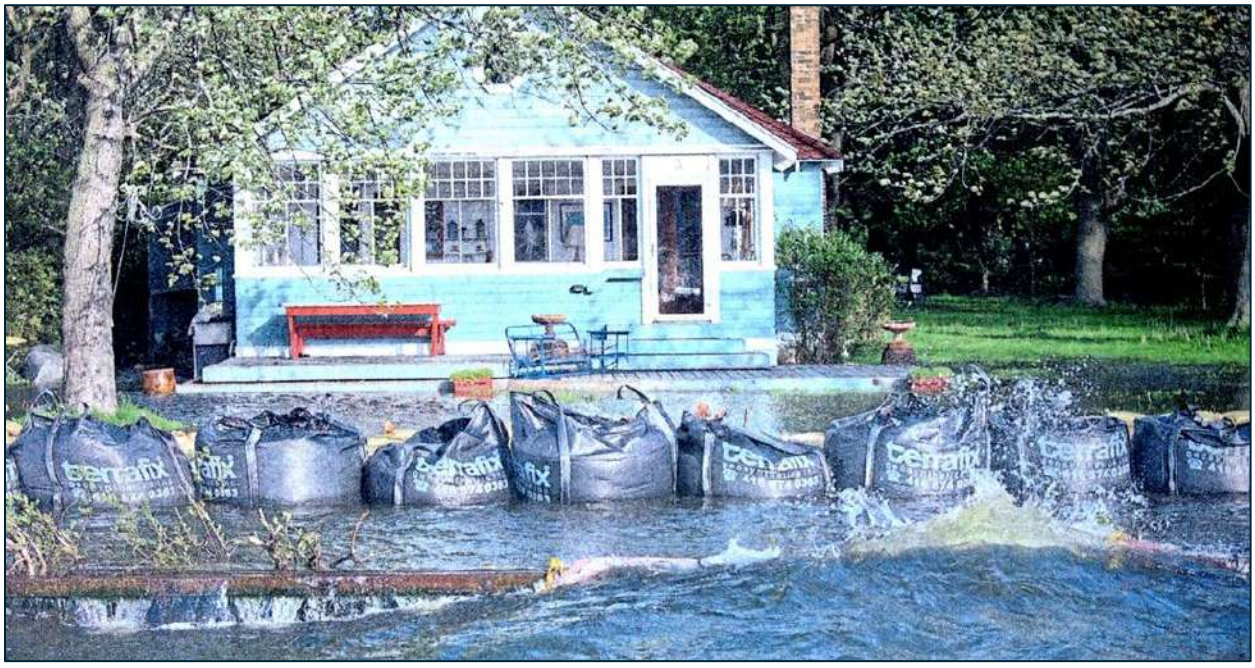


Figure 1.4: Overtopping and ponding at Seneca Ave. Seawall during 2017 Flood Event

1.3.3 Centre Island

Centre Island is located in the middle of the Toronto Island Park. Centreville amusement park is located on the east end of the island. The middle of the island is primarily green space. The Toronto Island Marina is located on the west end of Centre Island. On the northern shore, just east of the marina, is the Toronto Island BBQ and Beer Company, the Centre Island Ferry Terminal, and the Information Centre.

During a 100-year flood event, different parts of Centre Island may be subject to flooding. Based on the flood depth map in Figure 1.5, the Toronto Island Marina may experience widespread flooding during the 100-year flood event. The centre of the marina, including the boat storage yard, main roadway and the clubhouse and restaurant, was identified as a focus area for flood mitigation. The ferry terminal was affected during the 2017 event, but the dock itself was rebuilt in 2019 to accommodate higher lake levels. The land adjacent to the dock and extending west and north to the Toronto Island BBQ and Beer Co. is a high traffic area that is prone to flooding; as such, it has been identified as another focus area. The third focus area for Centre Island includes the shoreline east of the Ferry Dock and Centreville Amusement Park. On the roads within Centreville, the water depths during a 100-year flood event are estimated to be generally less than 0.3 m, reaching up to 0.6 m near Duck Pond. The shoreline around the perimeter of Centreville can become inundated to varying degrees and damage shoreline structures, as was the case during the 2017 flood event. These impacts are discussed in detail in the Flood Risk Study (Baird, 2019a). The area of Centerville most susceptible to flooding is in the main recreational area near Far Enough Farm (see Figure 1.6 and Figure 1.7), where flood depths can exceed 0.6 m during a 100-year flood event. Parts of the Centreville Train Ride track may also become completely submerged and inaccessible/unusable during a 100-year flood event.

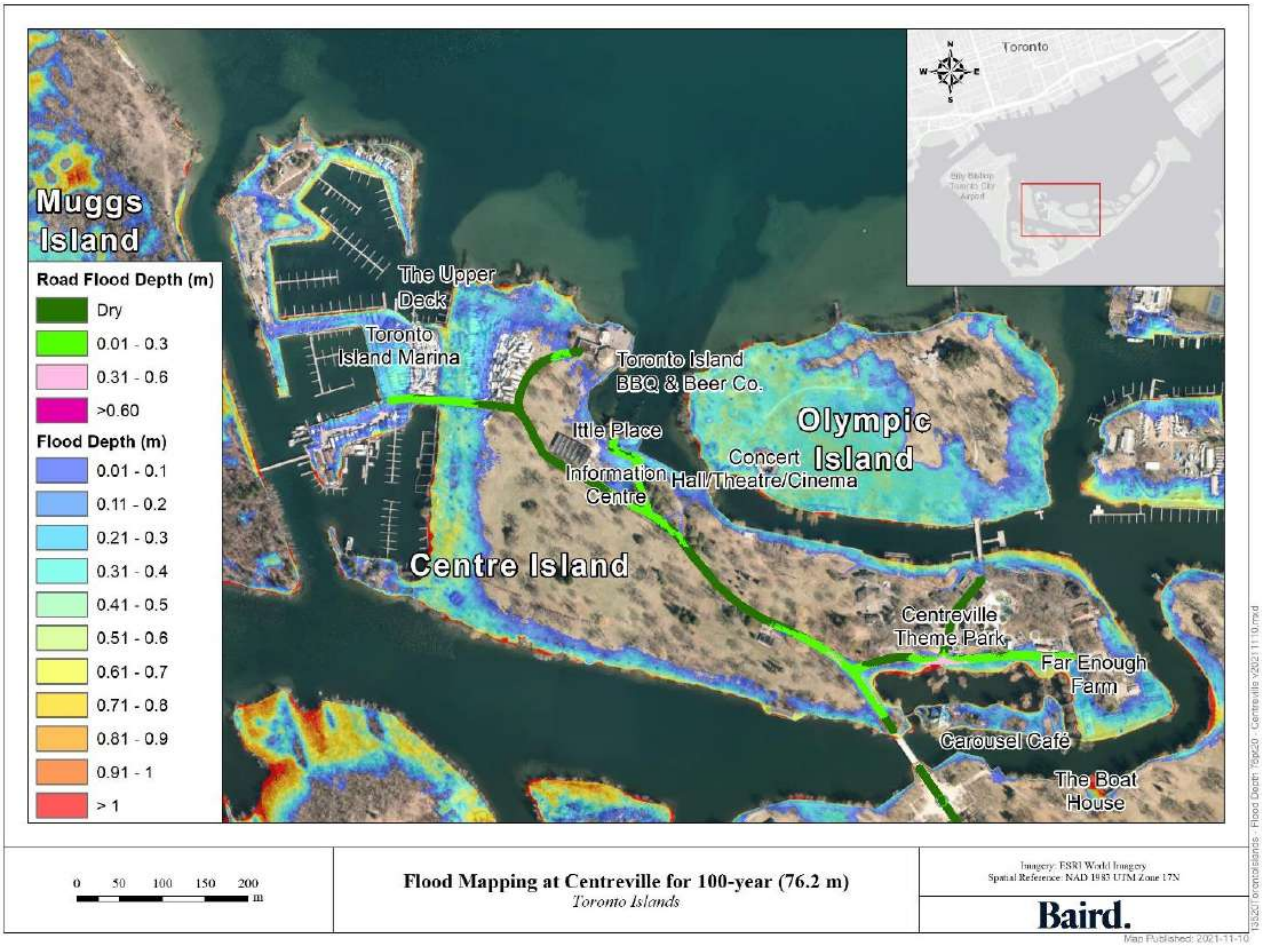


Figure 1.5: Flood Mapping at Centre Island for 100-year (76.2 m) Combined Lake Level



Figure 1.6: Flooding at Far Enough Farm during 2019, facing west



Figure 1.7: Flooding at Far Enough Farm during 2019, facing northeast

1.3.4 Roadways

During the flooding in 2017 and 2019, flooded roadways (Figure 1.8) restricted access and mobility around the island, impacting the residents, emergency services and businesses. Baird's (2019b) Flood Risk Assessment concluded that ferry and road closures during the 2017 flood event were the leading causes of indirect damages to island businesses and many City services. Lakeshore and Cibola Avenues are the main road arteries on Toronto Islands and connect the airport with the Island Water Treatment Plant, Island Public/Natural Science Clubhouse, Fire Station, Ward's Island ferry dock, and residential areas on Ward's and Algonquin Islands. Low spots at Gibraltar Point and south of the Fire Station are vulnerable to flooding. Smaller roads (or pathways) in the residential areas are also vulnerable to flooding. Since the last flood event in 2019, emergency works were completed to raise 270 m of Lakeshore Avenue and 240 m of Cibola Avenue above the 100-year flood level (76.32 m at the centre and 76.25 m at the road edges). A number of other sections of roadways were identified to be raised as part of this project, as indicated in Figure 1.9.



Figure 1.8: Flooding along Cibola Ave. during 2019, facing north

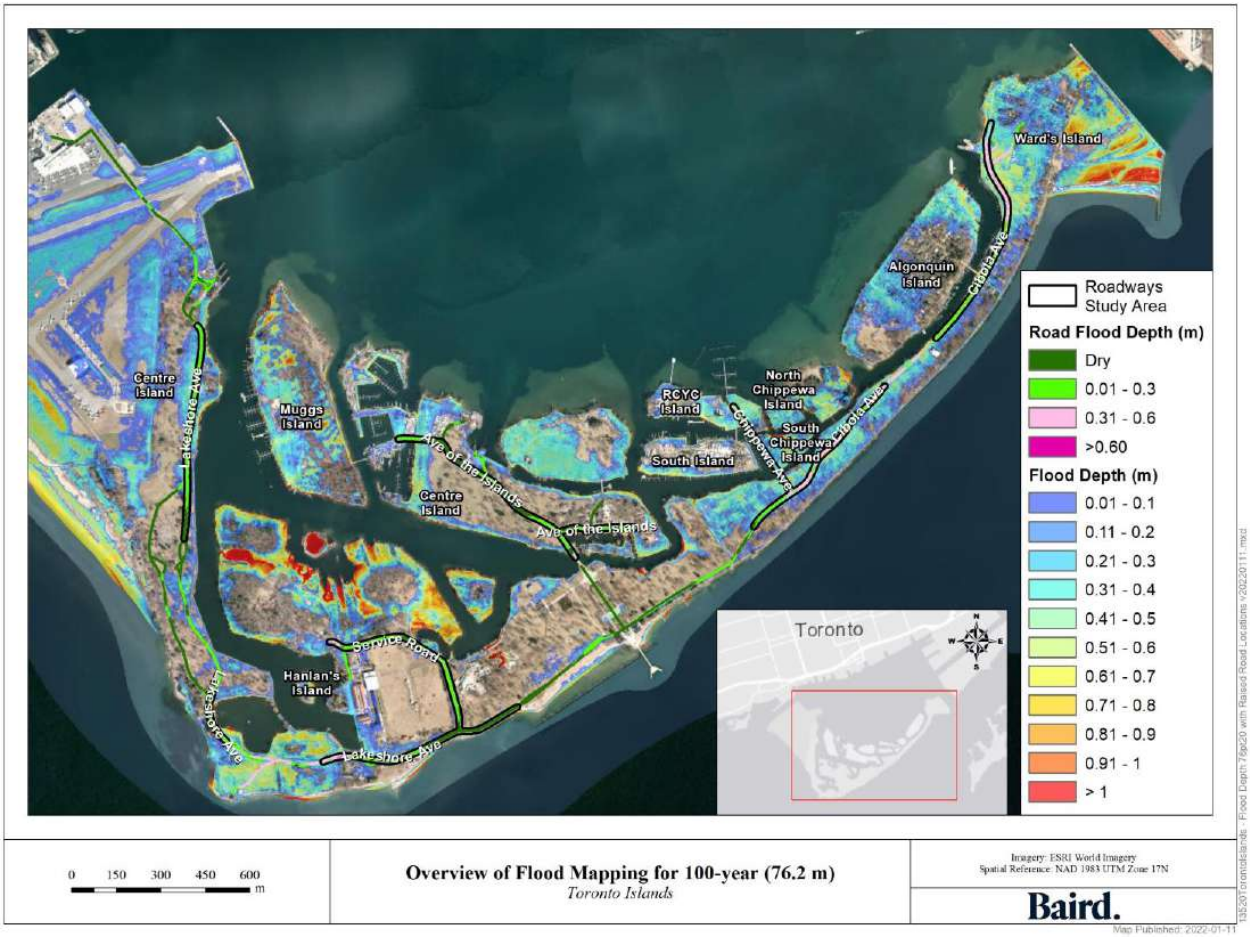


Figure 1.9: Flood depth on roadways during the 100-year event

1.4 Background Document Review and Data Gaps

The project team completed a review of available information, including flood depth mapping, property mapping, LiDAR, historical aerial photography, site photos and previous technical studies. The main documents reviewed, and key data gaps/uncertainties are discussed below.

Toronto Islands Flood Characterization and Risk Assessment Project, Baird 2019

In 2018, TRCA, in collaboration with the City of Toronto, retained Baird to undertake the Toronto Islands Flood Characterization and Risk Assessment Project. The project included three reports. The first report reviewed the conditions that led to the 2017 high water levels on Lake Ontario; updated the return period water levels at Toronto (subsequently updated by following the 2019 flooding (Baird, 2019d)); evaluated the impacts of the change in Lake Ontario regulation plans on the return period water levels; and reviewed recent climate change research related to future Lake Ontario water levels. The second report quantified damages resulting from the return period flood events. The third report evaluated structural design options to mitigate the flood risk.

The results of the flood characterization study found that the 2017 high water levels were the result of extreme wet weather in the Lake Ontario basin, record inflows from Lake Erie, and reduced outflow capacity due to

downstream flooding on the St. Lawrence and Ottawa rivers. Daily average water levels at Toronto were the highest ever recorded to that date, exceeding the May 1973 and May 1993 high water levels by 0.16 and 0.26 m, respectively. Water levels remained above the 100-year flood level from May 7 to July 9, 2017, a period of 63 days. Baird reviewed simulated water levels by Environment Canada under the new regulation plan implemented by the International Joint Commission (IJC) for the St. Lawrence Seaway and Lake Ontario in 2017 (Plan 2014) and the previous plan for the period of 1900 to 2008 and estimated that Plan 2014 resulted in an increase of 0.07 m to the 100-year flood level. Flood depth mapping for the Islands was developed for the 2-, 5-, 10-, 20-, 100-, and 500-year return period flood events.

The project included a flood risk assessment for the Toronto Islands which involved quantifying the financial costs and other impacts to Toronto Island residents, businesses, and the City of Toronto for different return period flood events under existing conditions. Estimated total tangible damages to residents and businesses ranged from $0.5 M to $6.5 M for the 2-year and 500-year flood events, respectively. The average annual tangible damages were estimated to be $387,000 per year. The estimated City of Toronto damages from the 2017 flood were approximately $8 M. Intangible damages (such as impacts to health, society, and the environment) reported by residents included loss of mature trees, development of respiratory conditions due to mould, and increased anxiety and stress over the unknown length and timing of future flood events.

The final report presented flood mitigation alternatives for the Toronto Islands. The alternatives built upon recommendations made by Toronto Island residents, as well as alternatives discussed during brainstorming workshops with the City of Toronto, TRCA, and Baird for the areas most affected by the 2017 flood. Alternatives presented included protecting low-lying residential areas with a berm structure, elevating low-lying roads, increasing the crest elevation of shore protection structures, and directing surface drainage to the sumps that were installed in 2018. The designs were developed using the 500-year design water level (static lake level plus storm surge).

Updated Analysis Using 2019 Water Levels Memo, Baird 2020

Following the flood event in 2019, Baird updated the extreme water level analysis and estimate of return period water levels for the Toronto Islands to include the 2019 water level data. The 100-year flood level was recommended to be updated to 76.2 m IGLD85. This design water level has been used in the development of the concept design alternatives presented herein for the four study areas.

1.4.1 Data Gaps

The geotechnical investigation completed for this study was developed to generate a general understanding of the subsurface composition and characteristics for the four study areas. Depending on the nature of the alternatives selected for execution, an expanded geotechnical investigation, including deep boreholes, may be required along the alignment of some of the proposed shoreline structures to support final design development.

Site specific surveys of the shorelines within the study areas, and the roadways and adjacent areas will be required to support detailed design development.

Flood control structures in the concept design alternatives are designed to mitigate flooding due to high lake levels. However, in the recent flood events in 2017 and 2019, sustained high lake levels also resulted in flooding due to infiltration through the permeable soils that comprise the Islands. A seepage study will be required as part of the detailed design phase to assess seepage rates through and beneath flood control structures. This study should include an assessment of the capacity of existing sump pumps on the island and the definition of additional pumping requirements that should be implemented in conjunction with the preferred flood mitigation concepts.

2. Baseline Inventory Overview

A baseline inventory was completed to characterize the physical environment within the islands and a provide an overview of the relevant characteristics and factors examined for engineering consideration and technical development of the conceptual design alternatives for flood and erosion mitigation at the Toronto Island Park. The baseline inventory was completed at the park level. Several components of the baseline inventory were examined through the geotechnical investigation completed by Grounded Engineering. Grounded's full report is provided in as a separate attachment to this report.

2.1 Physical Environment

2.1.1 Baseline Hydrogeological Conditions

As part of the geotechnical investigation, Grounded completed an assessment of the surface water drainage, groundwater levels and seepage, groundwater recharge and discharge zones. A summary of the investigation results is provided below. Additional detail is provided in the full geotechnical report in a separate attachment to this report.

Existing Surface Water Drainage

During their site inspection in July 2021, Grounded assessed the presence of surface water features within the study areas. The inspection identified vegetated and beach areas, impervious surfaces such as roadways, seawalls and rock berms, locations of sump pumps, and catch basins, and identified the predominant direction/pathway of surface runoff. Key observations are summarized below:

- For Ward's Island, surface runoff appears to flow towards the Lake on the south, west, and north sides of the island or infiltrates into the ground.
- For Algonquin Island, surface runoff appears to flow towards the Lake on the south, west, and east sides of the island or infiltrates into the ground.
- For Centreville, no sump pumps or catch basins were identified. Surface runoff appears to flow towards Duck Pond or the Lake or infiltrates into the ground.
- For the Island Water Treatment Plant, no sump pumps or catch basins were identified. Surface runoff appears to flow towards the Lake or infiltrates into the ground.
- No catch basins or sumps were observed alongside the Cibola Ave., Chippewa Ave., Avenue of the Island, Centre Island Park (Service) Road, and most of Lakeshore Ave. Sump pumps were present alongside the north portion of Cibola Ave. and a portion of Lakeshore Ave.

Groundwater Levels and Seepage

During the geotechnical investigation, measurements were taken at nine monitoring wells around the park (seven pre-existing wells and two monitoring wells installed for this study). The groundwater level was generally found to be at the same elevation as Lake Ontario.

During the July 2021 site inspection, Grounded observed Phreatophyte vegetation along Lakeshore Ave., Centre Island Park (Service) Road, and North of First Street, indicating saturated soils.

Groundwater Recharge and Discharge Zones

The subsurface across the study areas primarily consists of cohesionless sands that are loose

to compact. Infiltration and recharge of precipitation and flood water within the study areas varies depending on the permeability of the surface (i.e., bare, or vegetated ground versus hard surfaces such as buildings, asphalt, concrete).

The islands are generally low lying and flat. Where the ground is saturated due to the high lake levels or groundwater levels, precipitation and flood water will not infiltrate back into the ground. When the lake/groundwater level is high or there are structures at the shoreline, there will be minimal groundwater recharge/discharge and ponding will occur. The flooded areas will remain wet and saturated until the water evaporates/re-infiltrates or is removed using sump pumps.

2.1.2 Baseline Environmental Conditions

Water Quality

Water quality in each study area (excluding roadways) was tested by Grounded in accordance with the Provincial Water Quality Objectives (PWQO). Four groundwater samples collected from monitoring wells were tested for metals and inorganics. The results indicated exceedances in Sulphide, Phosphorous, Cobalt, Iron, Lead compared to PWQO standards within the various study areas. Detailed results of the study are provided in the full Geotechnical Report in a separate attachment to this report.

Soil/Fill Quality

Five soil samples were tested for Benzo(a)pyrene, Metals and inorganics, polychlorinated biphenyls (PCBs), and volatile organic compounds (VOCs) for waste classification purposes against the O.Reg. 555 Schedule. The results of this study indicate that the soil as sampled is considered non-hazardous. Additional details are provided in the Geotechnical Report in a separate attachment to this report.

Contaminated Soils

Chemical testing of soil samples from select boreholes within the study area was conducted to identify potential soil contamination in accordance with O.Reg 153/04. Select soil samples were analyzed for various Contaminants of Potential Concern (CoPCs) and compared to applicable Site Condition Standard for the study area (O.Reg. 153/04 – Table 1 Res/Park). The results of the analysis indicate that the samples exceeded standard levels of ORPs and PHC, and met the standard for metals, hydride-forming metals, and BTEX. Additional details are provided in the Geotechnical Report in a separate attachment to this report.

2.1.3 Baseline Geomorphology and Littoral Drift

Geomorphology of the Toronto Islands

The Toronto Islands were formed in the late-glacial and post glacial periods by sediment supplied to Lake Ontario via rivers and bluff erosion along the Scarborough Bluffs. This resulted in the formation of a sand spit that extended from Ashbridge's Bay to the Toronto Islands. Figure 3.2 shows the Toronto shoreline in 1906. The net direction of sediment transport was in a westerly direction and the spit was an area of deposition. Considerable fill was added to the islands and Toronto Harbour commencing in the mid-1800s and continuing through the 1950s. The Billy Bishop Toronto City Airport, located at the west end of the Toronto Islands is founded on lakefill that was completed in the 1930s.

Over the decades, Toronto Islands was progressively starved of sediment supply through removal of sediment from the littoral system. This was caused by maintenance dredging of the Eastern Channel, the construction of shoreline protection along the Scarborough Bluffs, as well as construction of the Leslie Street Spit. The

present-day harbour is isolated from sediment sources. There is virtually no sediment transport into the Harbour through the Eastern and Western Gaps. The Don River, once a source of sediment to the area, now empties into the Keating Channel, which is regularly dredged. The ongoing Don Mouth Naturalization and Port Lands Flood Protection Project, which will naturalize the mouth of the Don River, includes sediment traps that will require maintenance dredging. The Leslie Street Spit, constructed in the 1950s, effectively forms a complete barrier to littoral transport from the east.

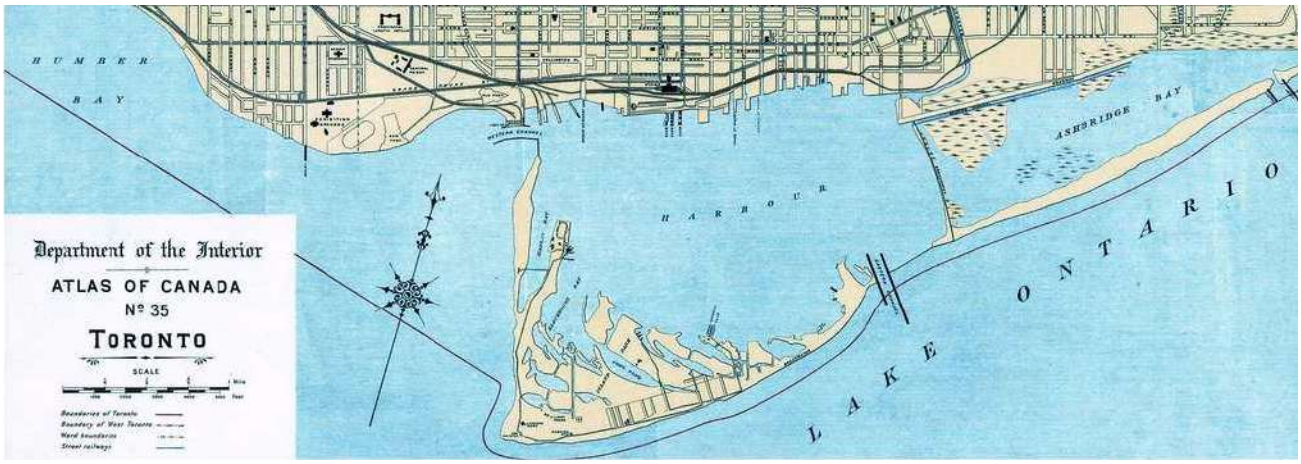


Figure 2.1: Excerpt of 1906 Canadian National Atlas Map Showing Toronto Harbour (Gov't. of Canada)

Littoral Cells

A littoral cell is a coastal compartment that contains a complete cycle of sedimentation including sources, transport pathways, and sinks. The cell boundaries delineate the geographical area within which the sediment budget is balanced.

The lakeside shoreline of Toronto Islands is part of one littoral cell extending from the west side of Tommy Thompson Park / Leslie Street Spit (eastern boundary of littoral cell) to the east side of Ontario Place at the Western Gap (western boundary of littoral cell). The shoreline to the east of Gibraltar Point is protected by an offshore breakwater, shoreline extending groynes, and seawall. Each of these play an important role in impacting the nearshore wave and current conditions that drive the littoral transport. To the west of Gibraltar Point, some sediment may have been historically transported from the outer extension of the Toronto Shelf/Spit complex towards Humber Bay through easterly wave action. A submerged nearshore reef was constructed in 2020 at Gibraltar Point which protects this area from shoreline erosion.

On the harbour side, the northern shoreline is part of one littoral cell that spans from the jetty at Ward's Island in the east to the Western Channel in the west. The protrusion of the airport runway into the Inner Harbour provides a physical barrier to currents and littoral transport.

2.2 Coastal Environment

2.2.1 Baseline Erosion and Sediment Deposition Zones

Numerical modelling using two different 2D hydrodynamic models (MIKE21 and HYDROSED) was undertaken to understand the sediment transport behaviour within the lakeside littoral cells. Both models include the ability to simulate spectral wave transformation, hydrodynamics, and sediment transport. The models have been verified through laboratory experiments as well as field measurements and have been used on numerous

projects by Baird; for example, the HYDROSED model was used by Baird (2018) to support the design of the Gibraltar Point erosion mitigation project.

Nearshore wave transformations and wave-induced currents were simulated in both models for two storm events, one from the southwest and the other from the east. These incoming wave directions represent the predominant wave conditions and particularly extreme wave conditions experienced at Toronto Islands.

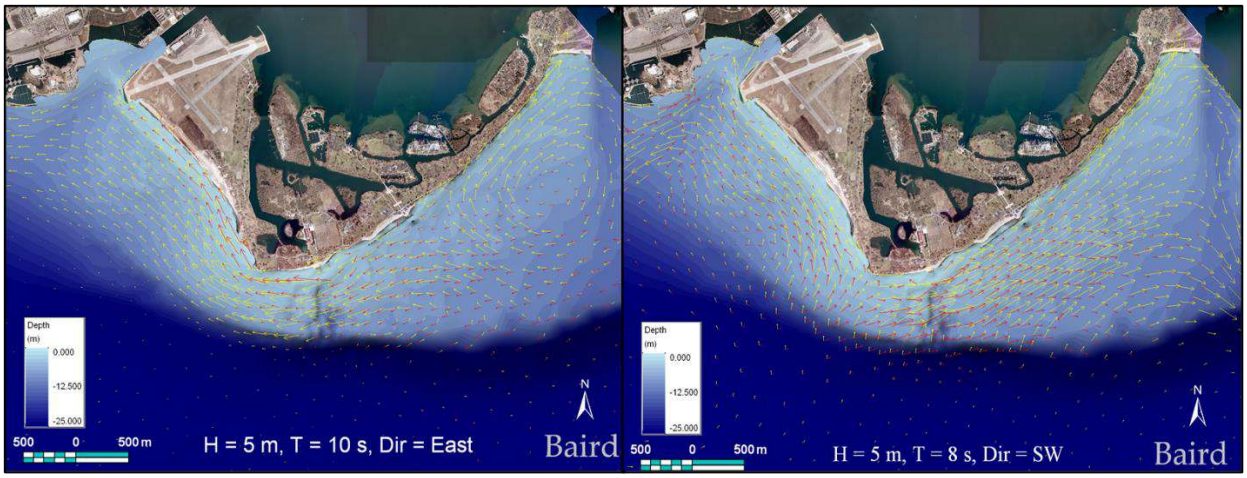


Figure 2.2: Nearshore Currents Patterns for Predominant Storm Directions – East (left) and Southwest (right)

Both models showed similar results in terms of wave characteristics and current patterns. During storms from the east, Tommy Thompson Park provides sheltering to the east side of the island (near Ward's Island Beach and along the seawall). The groynes located along the seawall towards Centre Island Pier provide some level of sediment retention in each of their own cells (typically spaced 50 to 75 m apart along the seawall and protruding approximately 25 m into Lake Ontario); however, analysis of both recent aerial imagery and visual inspection by Baird in 2021 showed minimal to no sediment retention in these cells. Currents along the offshore breakwater west of Centre Island Pier are reduced in the nearshore area, but in general tend to increase towards and beyond Gibraltar Point and along Hanlan's Beach to the Western Gap.

For storms from the southwest, a natural split in longshore currents occurs at Gibraltar Point, with currents moving northwest along Hanlan's Beach towards the Western Gap, as well as currents moving northeast along Gibraltar Beach, Centre Island Beach, and the seawall.

In 2018 to 2020, an offshore reef was constructed off the southwest tip of Gibraltar Point to provide a long-term solution to shoreline erosion at that location. The stone reef, shown in an aerial photo in Figure 2.3, provides significant wave attenuation, thus protecting Gibraltar Point from erosion and also provides some reduction of currents in that area, as well as reduction in sediment supply to Hanlan's Beach; however, the overall trend of westward longshore currents does prevail.



Figure 2.3: Constructed Shoreline Protection at Gibraltar Point

As part of the Gibraltar Point Study, Baird (2018) analyzed two island-wide bathymetric surveys from 1993 and 2009 to assess overall sediment transport patterns over this 17-year period. Based on the surveys, it appears that some sediment accretion naturally occurred near Ward's Island Beach and along the seawall during this time period. Moving southwest along the seawall to and beyond Centre Island Pier and Gibraltar Point, there was evidence of erosion, with the peak erosion centred around Gibraltar Point. The net transport westward around the island resulted in sediment accretion along Hanlan's Beach.

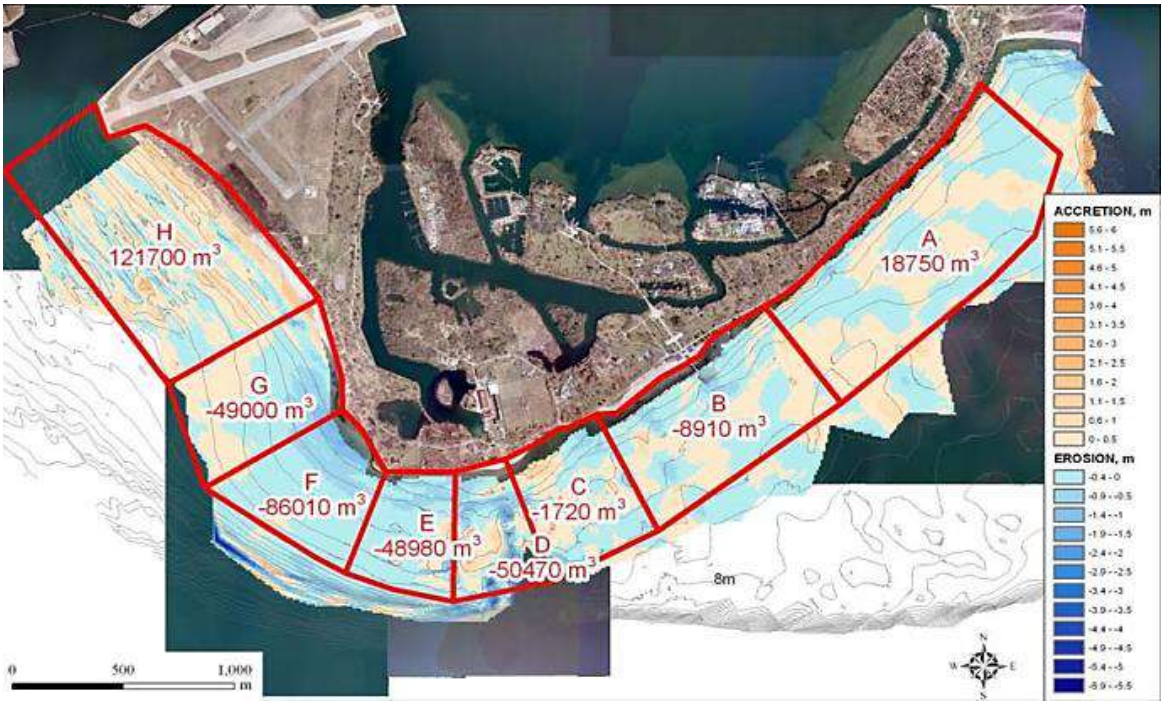


Figure 2.4: Historical Sedimentation along Toronto Islands Shoreline

When winds are blowing from the east, fetch-limited waves will be generated within the Inner Harbour that will cause nearshore currents moving westward; the opposite is true for winds from the west. Analyses of these conditions are outlined in Section 3. In general, it is expected that these currents and the resulting sediment transport would be small in magnitude within the Inner Harbour and along the inner shorelines.

2.2.2 Baseline Flood Risk

As part of the Toronto Island Flood Characterization and Risk Assessment Project, Baird (2019c) undertook flood depth mapping across the islands using a range of calculated extreme water levels and terrain datasets on the island. As part of the current study, the flood mapping was updated using a range of representative lake levels (in 10 cm increments) and an underlying digital elevation model (DEM). Lake levels from 75.3 m IGLD85 to 76.2 m IGLD85 (approximately the 1-year to 100-year return period combined lake levels) were superimposed on a LiDAR based DEM that was collected in 2014 and 2015. This was done to understand what areas of the island are susceptible to flooding at different lake levels and the spatial distribution of potential flood risk. This provides valuable information in terms of assessing the flood risk for a given study area, the nature of the risk, and how it can be mitigated.

The resulting flood maps are shown in Appendix A and discussed in further detail for each of the study areas in Section 3.2. Each of the flood maps provided show the potential flooding at different lake levels; the onset and severity of flooding in different areas around the islands can be observed from these maps.

A severe flood event can cause considerable disruption to City activities, damages to City-owned assets and infrastructure, as well as loss of access to different City services and public amenities. The Toronto Island ferry service carries over one million passengers and generates approximately $8M to $10M in annual revenue for the City of Toronto. During the 2017 flood event, the City of Toronto suspended ferry services for several months, reducing services to only residents and authorized personnel. This reduced the number of people able to travel to the islands, and had a significant effect on tourism, businesses on the islands, and way of life for the residents. Following the 2017 event, the City of Toronto rebuilt docks to accommodate higher lake levels and were able to maintain operations during 2019, despite an even higher water level. Based on the flood mapping completed by Baird, the Ward's Island ferry terminal is most affected from the flooding (compared to the other ferry terminals) as the connecting access roads (namely Cibola Ave., and surrounding area in general) may be inundated by up to 0.6 m during the 100-year flood event.

In addition to affecting various services, flooding across the islands results in the loss of large open public spaces and amenities. For example, Ward's Island Park, Algonquin Island Park, Olympic Island Park, Snake Island Park, Snug Island Park, and areas surrounding Hanlan's Point could become inundated with water depths exceeding 1 m in some areas during the 100-year flood event. At risk forested and green areas around Toronto Islands are shown and discussed in detail in the Flood Risk Study (Baird, 2019c).

2.2.3 Baseline Hazardous Lands/Sites

Nine pavement (asphalt) core samples were collected around the study area and tested for asbestos. The results indicated that the asphalt is not considered an asbestos containing material under O.Reg. 278/05. Additional details are provided in the Geotechnical Report in a separate attachment to this report.

Slope Stability

A visual inspection across the study area, completed by Grounded, concluded that there were no areas that warranted a slope stability review. Additional details are provided in the Geotechnical Report in a separate attachment to this report.

2.2.4 Baseline of Existing Shoreline Structures

A review of aerial imagery and site reconnaissance were completed to assess the characteristics of existing shore protection structures around the Islands. Most of the exposed shorelines of Toronto Island Park are protected by shore protection structures, including seawalls, jetties, revetments, and groynes. The existing shoreline conditions for each study area are described in more detail in Section 0. Figure 2.5 summarizes the shore protection structures noted around the Island Park. Figure 2.6 and Figure 2.7 show zoomed in aerial photos from Google Earth of shore protection structures as numbered in Figure 2.5. The majority of the shore protection structures are hard engineered structures. This includes shore parallel structures such as seawalls (structures 1, 3, 4, 5, 8, 9, 10, 13, 16, 20, and 24) which are typically constructed of steel sheet piling, concrete and/or timber, and revetments (structures 4, 6, 11, 15, 18, and 21) constructed of stone or concrete rubble. There are a number of groynes (structures 4, 7, 16, and 19), and jetties (structures 2, 12, and 14) which are shore perpendicular, and two breakwaters (structures 17 and 22). A submerged nearshore reef provides shore protection at Gibraltar Point (structure 23).



Figure 2.5: Existing outer shoreline protection structures at Toronto Islands Park

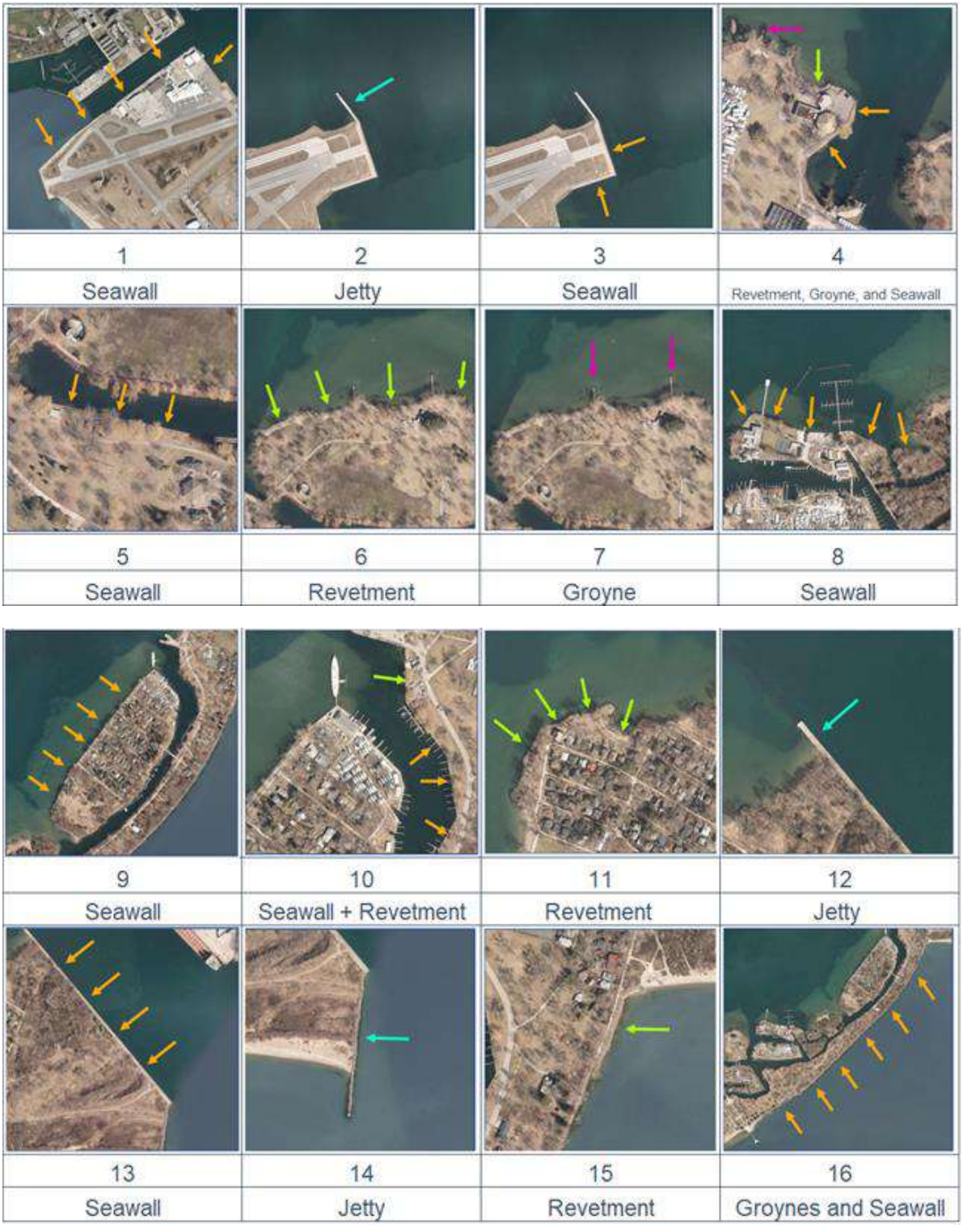


Figure 2.6: Existing shoreline protection structures (numbered 1 to 16) around Toronto Island Park



Figure 2.7: Existing shoreline protection structures (numbered 17 to 24) around Toronto Island Park

2.2.5 Subsurface Utility Investigation

A subsurface utility investigation was completed by 4Sight Engineering. The report is provided in a separate attachment to this report.

3. Coastal Analysis

This section summarizes the coastal analysis that was completed to support the development of conceptual designs for the four study areas. The coastal analysis involved both qualitative and quantitative analyses of extreme water levels, wind conditions, wave conditions, littoral transport patterns, shoreline erosion, and the assessment of the performance of existing erosion and flood protection infrastructure within the study areas.

3.1 Lake Ontario Water Levels

3.1.1 Water Level Terminology

This report uses of the following definitions from Ontario Ministry of Natural Resources (OMNR, 1989):

- **100-year flood level –** the peak stillwater level due to the combined occurrences of mean monthly lake levels and storm surge having a total probability of 1% of being equalled or exceeded during any year.
- **Static water level –** elevation of surface of the water in the absence of wind, wave, atmospheric and/or tidal disturbances.
- **Storm surge (wind setup) –** a rise above the normal static water level on the open coast due to the action of wind stress on the water surface.
- **Stillwater level –** the elevation that the surface of the water would assume if wind setup and other atmospheric displacements of the water body occurred, but wave action was absent.
- **Wave setup –** super-elevation of the water surface, averaged over time shoreward of the wave breaking zone, over normal surge elevation due to onshore mass transport of the water by wave action.

3.1.2 Note on Elevations and Vertical Datums

Unless otherwise noted, all water levels and elevations are reported in International Great Lakes Datum 1985 (IGLD85). IGLD85 is 8.4 cm below Canadian Geodetic Vertical Datum 1928-1978 Ontario Adjusted Version (CGVD 1928:1978), and 49.6 cm below Canadian Geodetic Vertical Datum 2013 (CGVD 2013) at the Canadian Hydrographic Service benchmark 0011959U9526 (also known as 00159U9526, 59U9526, and TORO 1-1959). The benchmark is located at the Toronto Harbour Gauge house at the south side of Queen's Quay. The elevation of the benchmark relative to the different datums is shown in Figure 3.1.

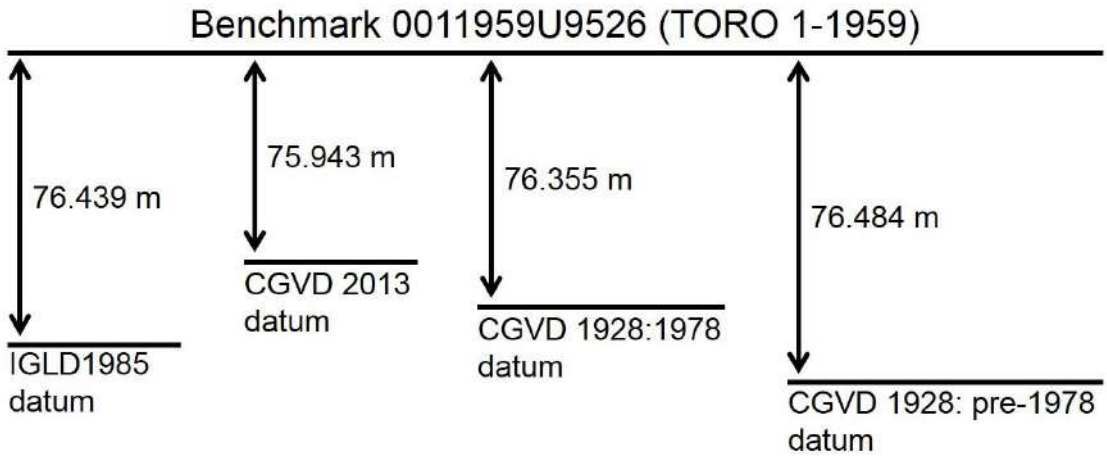


Figure 3.1: Elevation of the Toronto Harbour Gauge house Benchmark

3.1.3 Lake Ontario Water Level Regulation Plans

The 1952 and 1956 Orders of Approval for the St. Lawrence River Power Project were the beginning of regulation of Lake Ontario water levels and outflows. Since then, many studies have concluded that regulation caused damage to ecosystems, most notably due to the compression of the range of water levels which caused wetlands to degrade (IJC, 2014). On December 8, 2016, the IJC issued an order replacing Plan 1958DD with Plan 2014. Plan 2014 went into effect on January 7, 2017 (Caldwell, 2017b).

Plan 2014 is a combination of mechanistic release rules (called Bv7) and discretionary decisions made by the International Lake Ontario-St. Lawrence River Board (ILOSLRB) to deviate from those rules. Some of the key terms from Plan 2014 are summarized below.

- **I-limit:** An upper limit flow rate to allow for stable ice formation in the St. Lawrence River and reduce the risk of ice jams. The limit is 6,230 m3/s (IJC, 2016).
- **F-limit:** A flow rate that "balances" flooding upstream and downstream of the Moses-Saunders Dam at Cornwall, Ontario. The balancing strategy is multi-tiered and is based on decisions during high water events in the 1990s. The flow rate is adjusted to balance the water levels in Lake Ontario and Lake Pointe Claire using a lookup table.
- **L-limit:** Defines the maximum outflow that will maintain adequate levels and safe velocities for navigation in the international section of the St. Lawrence River.
- **Criterion H14:** An upper limit water level, beyond which the board is allowed to deviate from Plan 2014 and increase the flows beyond the Rule Curve limits. This water level is defined as the 2% exceedance water level for a particular quarter-month (IJC, 2016).
- **Plan 2014 Rule Curve:** A stage-discharge relationship derived from pre-project (pre-1950s) open water conditions, adjusted to recent long-term supply conditions.

The key difference between Plan 2014 and Plan 1958DD is the increased variability in Lake Ontario water levels due to natural processes. However, no significant difference exists between the two plans under extreme weather conditions, as the regulation of outflows becomes determined by safety considerations (I-limit, F-limits, and L-limits) rather than the Plan 2014 rule curve.

3.1.4 Historical Water Level Records

3.1.4.1 Static Water Levels

Lake Ontario water levels are generally highest in the spring and early summer, due to snowmelt, increased precipitation and inflows from Lake Erie. Lake Ontario water levels depend on the volume of water flowing into and out of the lake and evaporation. About 80-85% of the inflows come from Lake Erie, with the remaining amount falling as precipitation on the lake's surface or within the drainage basin. Net water supplies follow natural cycles that have timescales ranging up to decades. The causes of the long-term wet/dry cycles are not fully understood (IJC, 2014); however, it is believed that the cycles may be driven by large-scale atmospheric and oceanic circulation patterns (Hanrahan et al., 2014; Watras et al., 2014).

A database of monthly mean water levels for Lake Ontario (and the other Great Lakes) is available from the Department of Fisheries and Oceans (DFO). A network of gauging stations on both sides of the US/Canada border on each of the lakes is used to determine the average water level for each month. Water levels are collected by the Canadian Hydrographic Service (CHS) for the Canadian gauges and by the National Ocean and Atmospheric Associate (NOAA) for the American gauges. For Lake Ontario, the network consists of measurement stations at Port Weller, Toronto, Cobourg, Kingston, Rochester (US) and Oswego (US).

This database provides minimum, mean and maximum monthly water levels for Lake Ontario from 1918 to present. This information is also disseminated in monthly water level bulletins published by DFO. In the US, the US Army Corps of Engineers (USACE) also maintains a database with the same Great Lakes data. Long-term monthly mean water levels for Lake Ontario were extracted from 1918 to present and are shown in Figure 3.2.

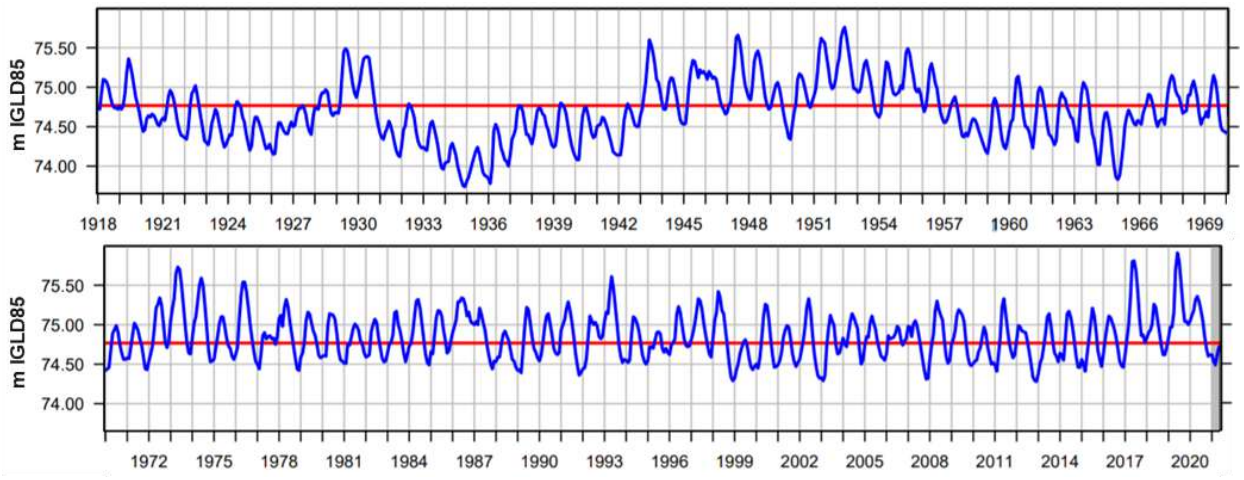


Figure 3.2: Mean Monthly Water Levels in Lake Ontario (1918 to present)

Lake Ontario has been relatively consistent in terms of minimum and maximum monthly lake levels over the past several decades, with some lows in the mid-1960s and highs in the 1970s. Notable extreme peaks were observed in 1952 and 1973. More recently, in 2017 and 2019, maximum lake levels reached new extremes, with severe flooding of the Toronto Islands. A spaghetti plot of the daily water levels recorded at Toronto over the past 60 years is shown in Figure 3.3.

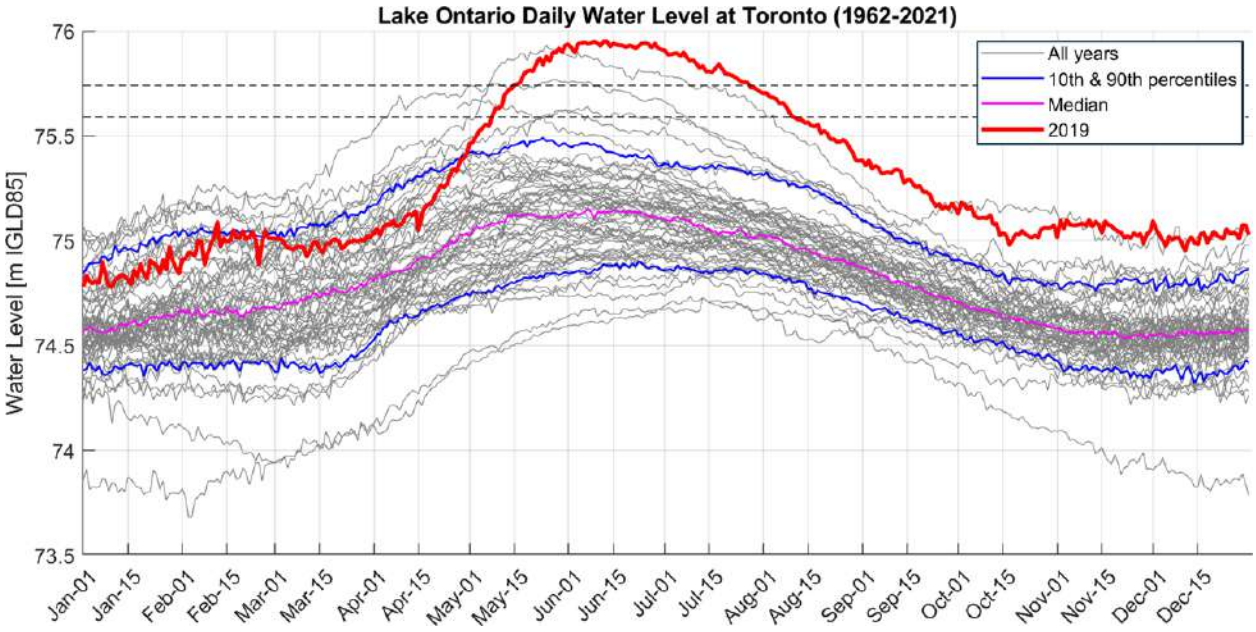


Figure 3.3: Spaghetti Plot of Daily Water Levels at Toronto

The historical average water level from May through July is 75.1 m. In 2017, Lake Ontario reached a maximum monthly mean water level of 75.81 m, a maximum daily mean water level of 75.88 m, and a peak hourly water level of 75.98 m at Toronto. In 2019, the maximum monthly mean water level reached 75.91 m, the daily mean reached 75.95 m, and the peak hourly water level reached 76.03 m. The 2017 and 2019 flooding events correspond with the two highest lake levels recorded at Toronto over the past 100+ years.

3.1.4.2 Storm Surges

Storm surges represent a localized, short-term increase (or decrease) in water level associated with the passage of individual storm events over the lake. On the Great Lakes, storm surge is predominantly caused by wind stress on the water surface, with variations in atmospheric pressure being a secondary factor. Hourly observations of water levels for Toronto are available from DFO; these data are collected at Queens Quay Terminal (MEDS Station 13320, located at 43.639771˚ N, 79.380286˚ W). Baird extracted hourly water level data spanning from 1962 to present. This database provides 60 years of water level data under regulation conditions similar to the present.

In order to quantify the surge levels experienced at Toronto, Baird updated the water level analysis previously completed in the Flood Characterization Report (Baird, 2019a), and subsequently updated in Baird's 2019 memo to include water levels during the 2019 flood.

In the analysis, static water levels were calculated using a Gaussian-weighted 30-day moving average filter to eliminate the stairstep effect between months. Surge was calculated by subtracting the hourly water level measurements from the "smoothed" static water level (Figure 3.4).

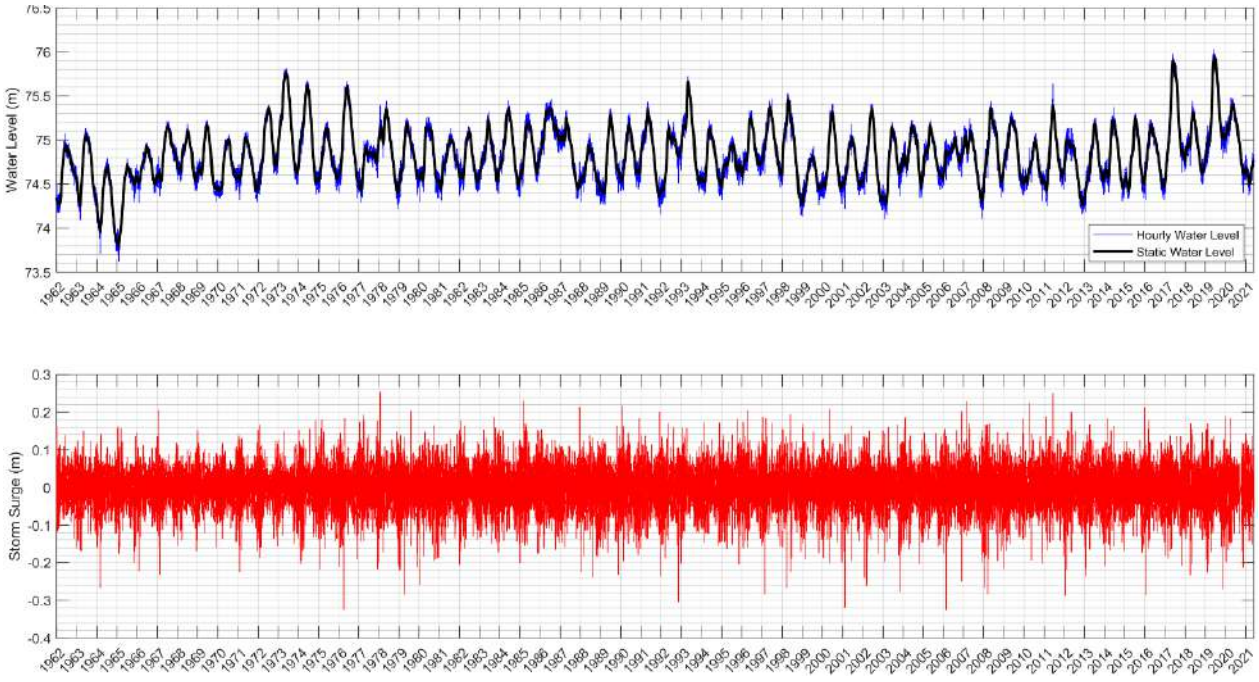


Figure 3.4: Historical Static and Surge Water Levels at Toronto

Positive surge indicates an increase in the water level (generally due to onshore winds), while a negative surge indicates a decrease in water level (generally due to offshore winds). Based on the analyses above, extreme storm surges at Toronto may reach -0.3 m to 0.3 m. Given the intermittent and short-term nature of storm

surges, flooding at Toronto Islands is mostly due to static water levels on Lake Ontario as opposed to individual storm events; this finding is demonstrated by the 2017 and 2019 flooding events, when extreme high lake levels were sustained for several months.

3.1.4.3 Extreme Water Levels

The HYDSTAT software package was used to perform a joint probability analysis (JPA) on the static water levels and surge levels to estimate different return period water levels. The program fits observed water levels to the most used hydrologic statistical distributions and allows for estimation of extreme values. A JPA was performed using the static and surge records, as opposed to simply using combined water level records, because the static water levels on Lake Ontario are largely statistically independent from the surge events. This means that various combinations of low or high static lake levels may occur with low or high surge levels, with no real discernable pattern. A JPA treats these two variables separately to produce extreme values for each and also estimates combined extreme values.

The JPA was performed for the 60-year period for which both the maximum monthly and hourly water level measurements overlapped, specifically 1962 to present. Annual maximums of monthly mean water levels were extracted from the data. Surge levels were extracted using the 30-day Gaussian smoothing technique. Then, extreme surge levels were extracted using a peak-over-threshold (POT) method. A probability distribution was then fit to both datasets (Log Pearson III produced the highest level of agreement) to determine extreme values and combinations of each parameter. Table 3.1 summarizes static, storm surge and combined levels for various return periods based on the HYDSTAT analysis of historical water level records at Toronto, including the impact of changes associated with the implementation of Plan 2014.

The 100-year combined water level, 76.2 m IGLD85, has been adopted as the design condition for the development of flood and erosion mitigation concepts in this study.

Table 3.1: Estimated Extreme Water Levels at Toronto

	2	5	10	25	50	100	200	500
Surge	0.18	0.20	0.22	0.24	0.26	0.28	0.30	0.34
Static	75.14	75.36	75.50	75.66	75.78	75.89	76.00	76.14
Combined	75.34	75.56	75.70	75.87	75.98	76.10	76.21	76.35
2014 Plan Difference	0.05	0.12	0.15	0.15	0.12	0.07	0.07	0.07
Updated Combined	75.39	75.68	75.85	76.02	76.10	76.17	76.28	76.42

3.2 Flood Depth Mapping

Flood depth mapping was produced for the Island Park to assess potential flood depths at the 100-year water level (76.2 m IGLD85) to provide context for the flood mitigation alternatives presented in the report. Flood depth maps for the island park are provided in Appendix A. The maps use one colour scale to show the depth of flooding on land, and another scale to show the depth of flooding on the arterial roads. The flood depth maps for each study area are shown in Figure 3.5 to Figure 3.8.

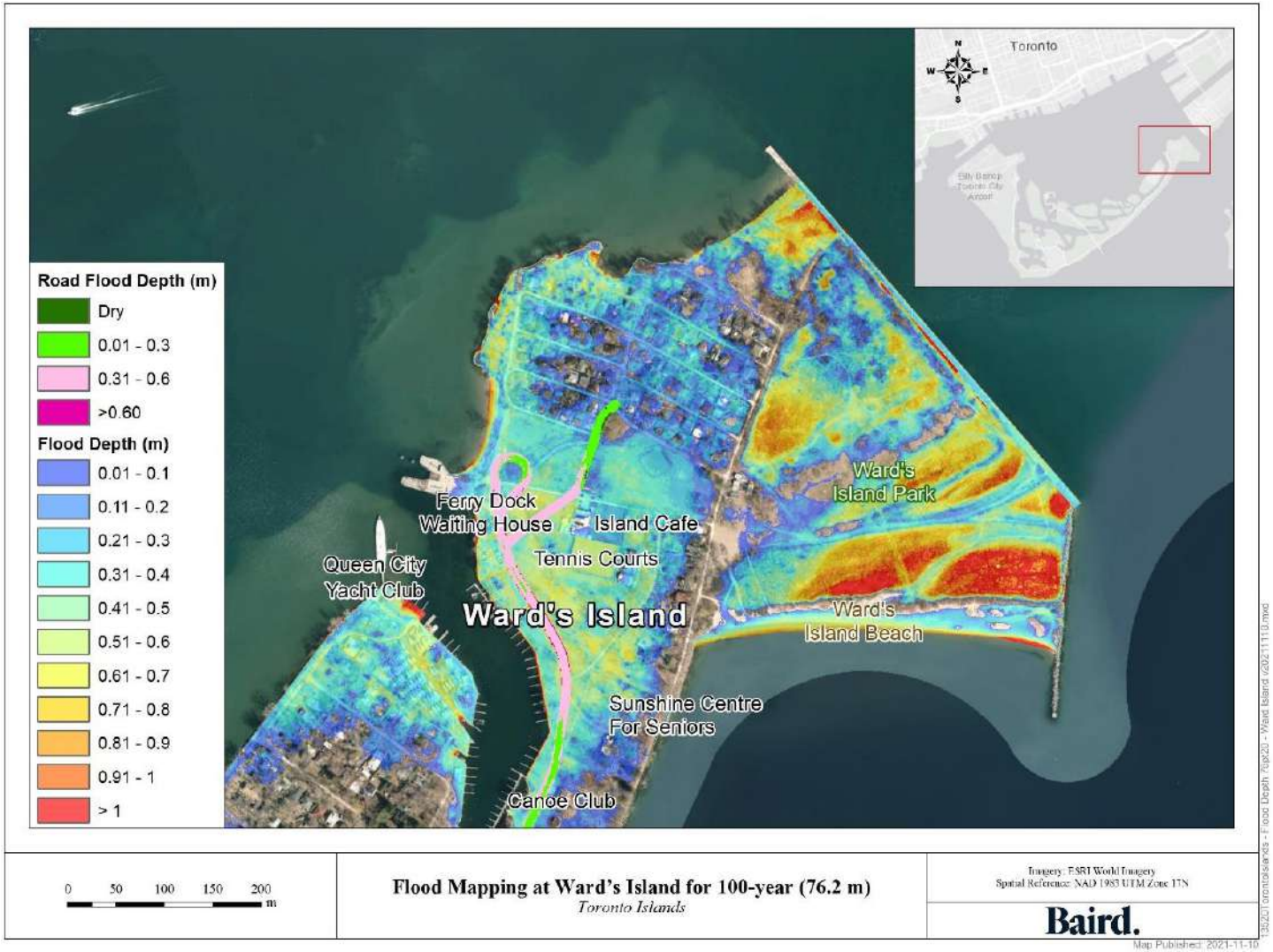


Figure 3.5: Flood Mapping at Ward's Island for 100-year (76.2 m) Combined Lake Level

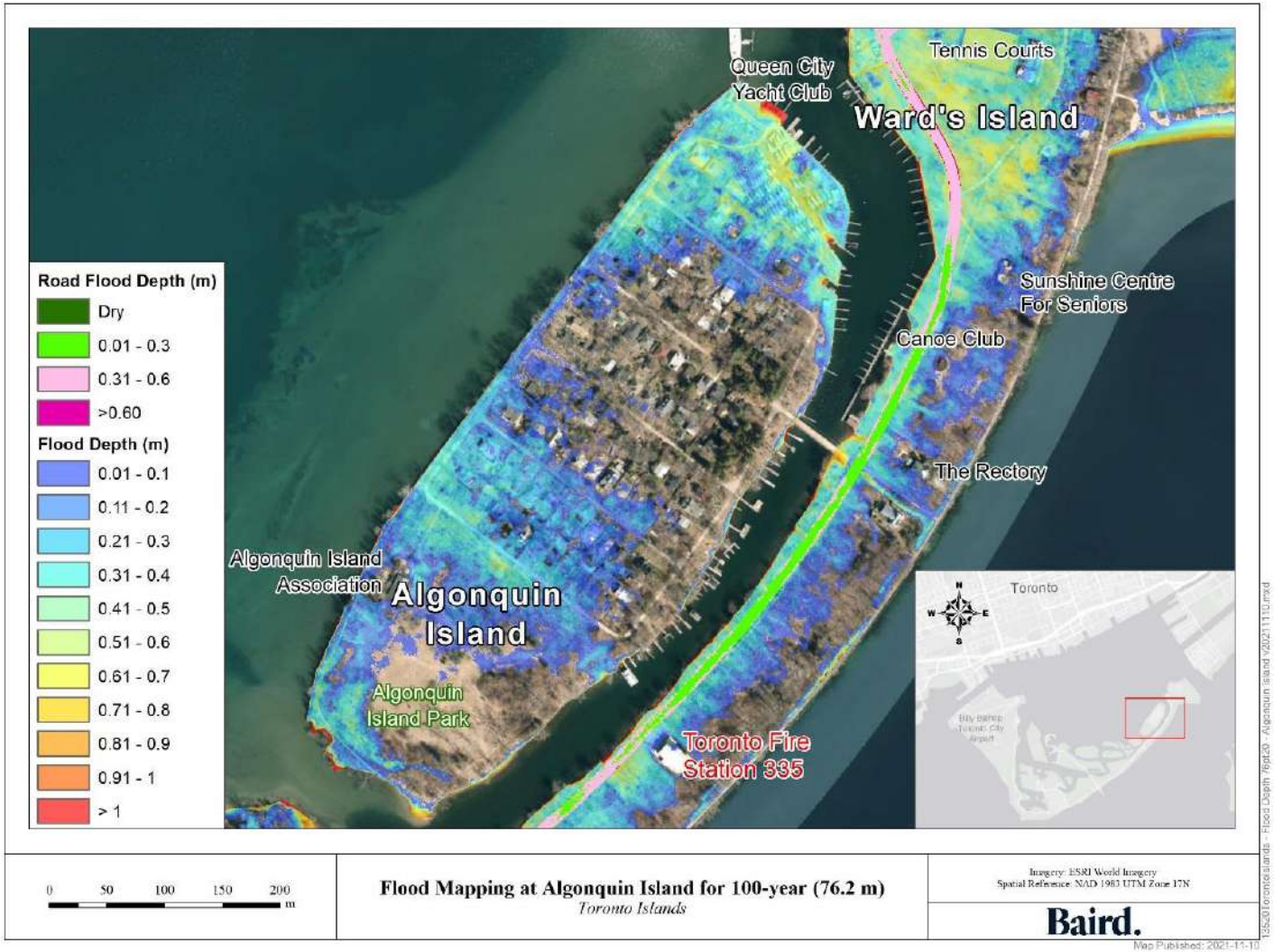


Figure 3.6: Flood Mapping at Algonquin Island for 100-year (76.2 m) Combined Lake Level

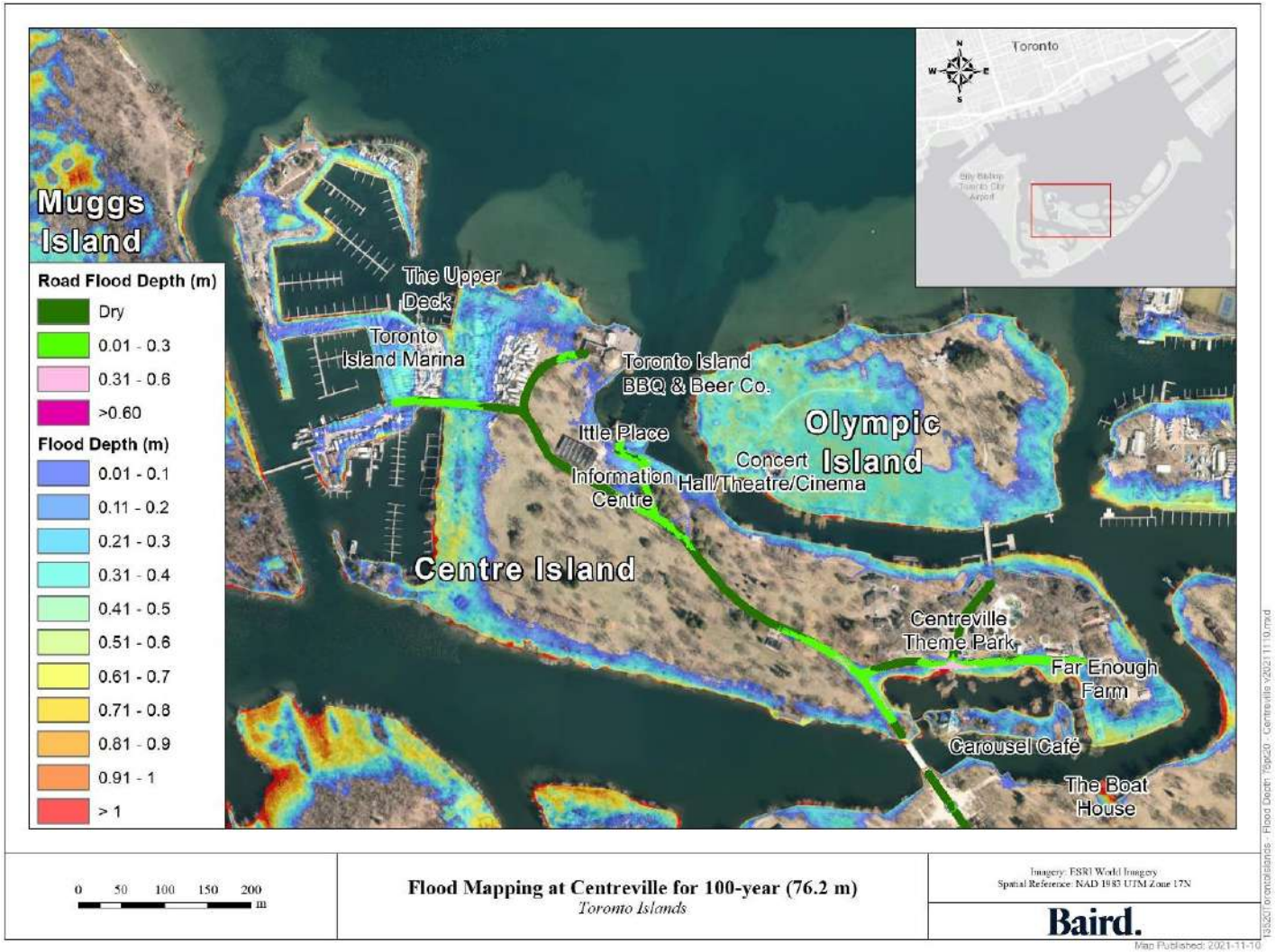


Figure 3.7: Flood Mapping at Centre Island for 100-year (76.2 m) Combined Lake Level

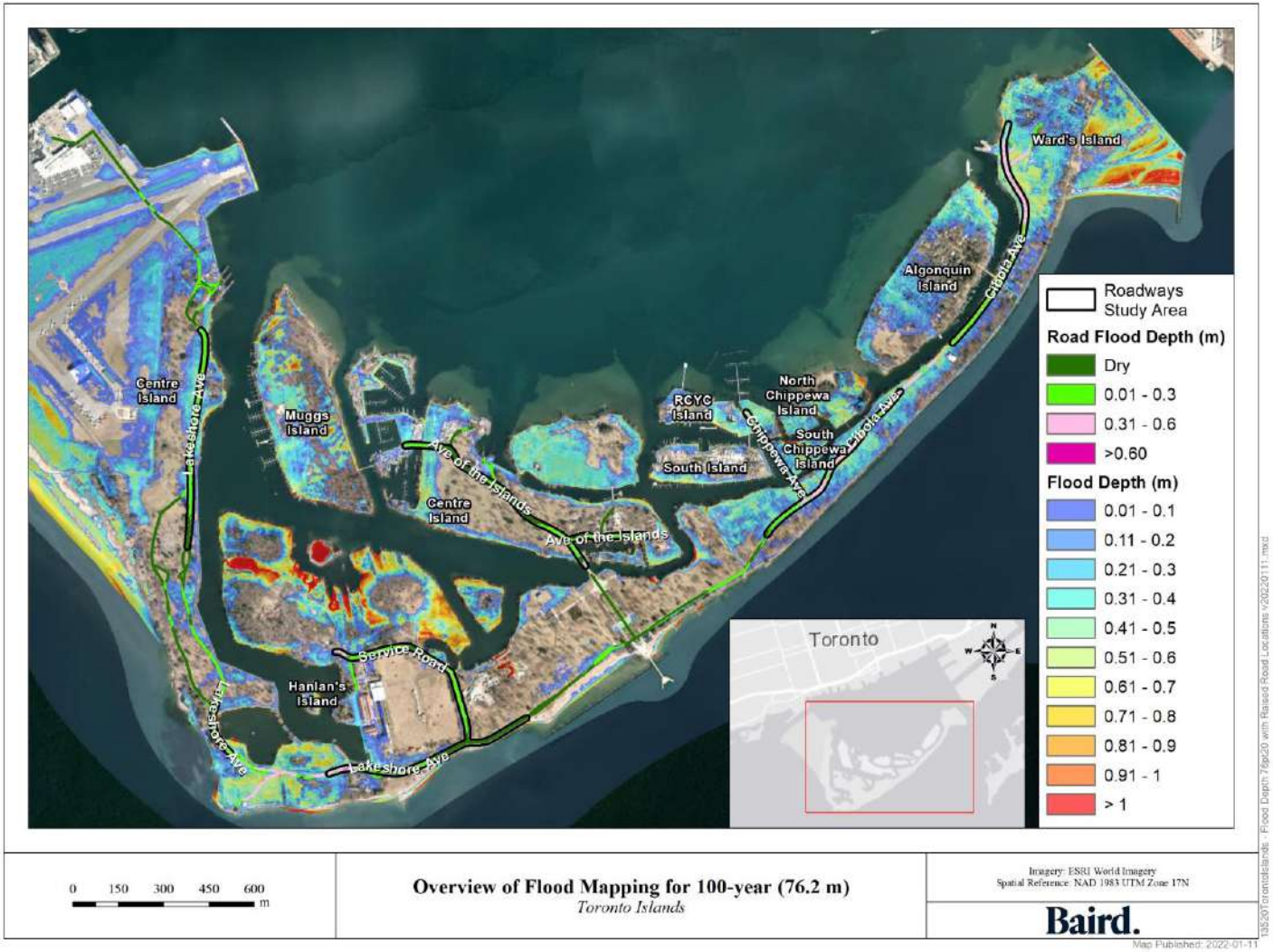


Figure 3.8: Flood depths on roadways on Toronto Islands for 100-year (76.2 m) Combined Lake Level

3.3 Winds

Historical wind data was collected and analyzed to understand the meteorological trends that influence wave behaviour around the islands. Hourly wind speed and direction measurements were collected from Environment Canada (EC) Station 48549 at Toronto City Airport. Figure 3.9 is a wind rose showing the frequency of both wind direction and speed at this location. The wind rose shows that the most frequent directions are from the east (centered around 90˚) and from the west (centered around 270˚), with winds from the northwest to southwest contributing most of the remaining conditions. While wind speeds above 100 km/h have been measured historically, the 50th percentile (median) wind speed was determined to be 16 km/h, while the 90th percentile was determined to be 32 km/h.

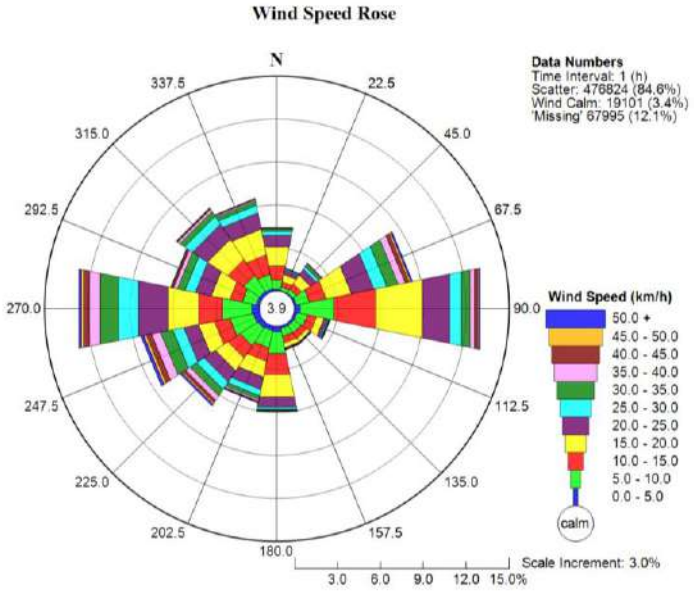


Figure 3.9: Wind Rose for EC48549 at Toronto City Airport

To compute extreme wind speeds at Toronto, a peak over threshold (POT) analysis was performed on the historical wind data. Following this step, the peak wind speeds extracted from the POT were then fit with a statistical distribution (Weibull provided the best fit) to extrapolate out to different return periods. This was done for the entire dataset (all directions), as well as the most common wind directions. Table 3.2 summarizes the extreme wind speeds at Toronto for various return periods.

Table 3.2: Extreme Wind Speeds by Direction for EC48549 at Toronto City Airport

Return Period	Wind Speed (km/h)				
	From East	From West	From Northwest	From Southwest	All Directions
2	60	65	50	66	69
5	65	71	55	75	76
10	69	75	59	81	83
20	73	80	64	88	90
25	74	82	65	90	92
50	79	86	69	97	100
100	83	91	73	103	108
200	87	96	78	110	117
500	92	102	83	119	129

The results of the extreme wind speed analysis show that while winds are most common from the east and west directions, the highest wind speeds tend to approach from the southwest quadrant.

3.4 Waves

3.4.1 Offshore Wave Conditions

Offshore wave conditions at Toronto Islands were extracted from Baird's in-house Lake Ontario wave hindcast model. The hindcast uses the second-generation WAVAD spectral wave model and is driven by CFSR meteorological conditions. Subsequent to the Flood Characterization Report (Baird, 2019a), Baird has made improvements to the wave hindcast model. Most notably, these improvements include the incorporation of several years of additional data (now spanning from 1979 to 2018 inclusive), as well as air-sea temperature correction to accurately estimate the pressure gradient near the air-sea interface; this affects the energy transfer from winds to the water surface. These updates provide a longer range of model output, as well as more accurate estimates of wave conditions during extreme storms. The model results were validated against two multi-year sets of wave buoy measurements (from MEDS and NDBC), as well as data from various shorter-term buoy deployments.

The offshore hindcast output consists of an hourly time series of modelled wave height, period, and direction (and other parameters) at a location offshore of Toronto Islands where the waves are unaffected by the water depth. This offshore hindcast output point is shown in Figure 3.13.

A wave rose summarizing the frequency of both wave direction and height at this location is shown in Figure 3.10. In general, the offshore wave conditions are dominated by waves from the east and southwest with extreme wave heights exceeding 5 m during some storms.

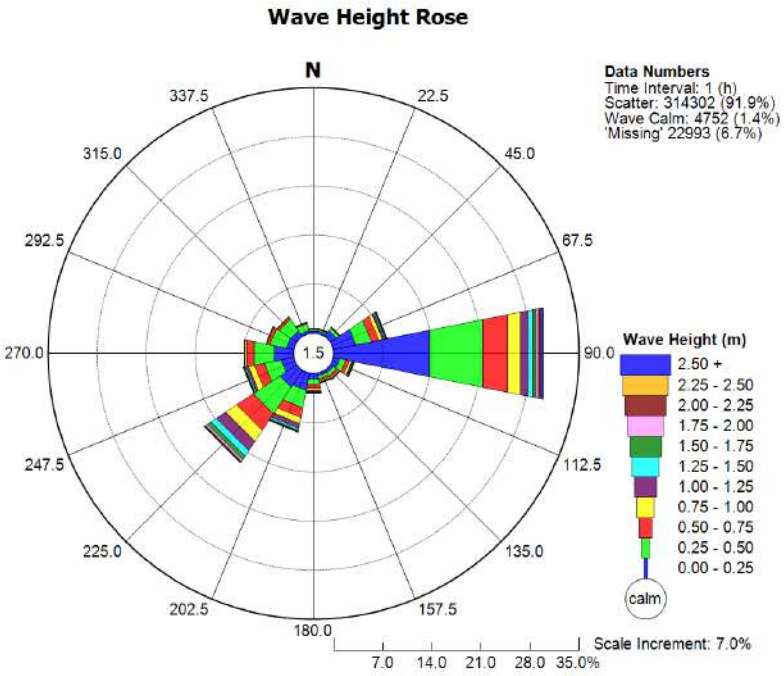


Figure 3.10: Wave Rose for Offshore Hindcast Point

Similar to the procedure used to estimate extreme wind speeds, the offshore hindcast output was filtered through a POT analysis to isolate historical events. This list of wave conditions was then fit with a statistical distribution (Weibull provided the best fit) to extrapolate out to various return periods. The resulting wave conditions are summarized in Table 3.3.

Table 3.3: Extreme Wave Heights at Offshore Hindcast Point

Return Period	Significant Wave Height (m)
2	3.2
5	3.7
10	4.0
20	4.4
25	4.5
50	4.8
100	5.2
200	5.5
500	5.9

3.4.2 Nearshore Wave Conditions

As offshore waves propagate into shallower water, they are transformed through their interaction with the bathymetry by means of refraction, diffraction, shoaling and breaking. An island-wide nearshore wave model

was developed using the MIKE21 coastal modelling suite to quantify the transformation of waves from offshore to nearshore. This island-wide model is shown in Figure 3.11 and Figure 3.12.

Given the long duration of the hindcast model, it is computationally prohibitive to simulate the entire timeseries. Instead, Baird employed a standard approach of quantifying wave transformation. This approach consists of running a concise matrix of wave conditions that encapsulates the full range of observed wave conditions in the offshore hindcast output. The derived transformation coefficients are then used to transform the entire offshore hourly time series to the nearshore. To understand the spatial variation of wave conditions across the islands, Baird chose seven output points at a water depth of approximately 8 m (based on low water datum), as shown in Figure 3.13.

Depending on the direction of incoming waves, different areas of the islands are more exposed, while some areas are more sheltered. For incoming waves approaching from the east (the most frequent incident wave direction), Point 1 and Point 2 experience some degree of sheltering from Tommy Thompson Park, while Point 3, Point 4, and Point 5 are most exposed. Further west, Point 6 and Point 7 also experience sheltering from Gibraltar point and the orientation of the shoreline at this location. Figure 3.14 shows the spatial distribution of nearshore wave conditions at each of the output locations for varying incoming wave directions.

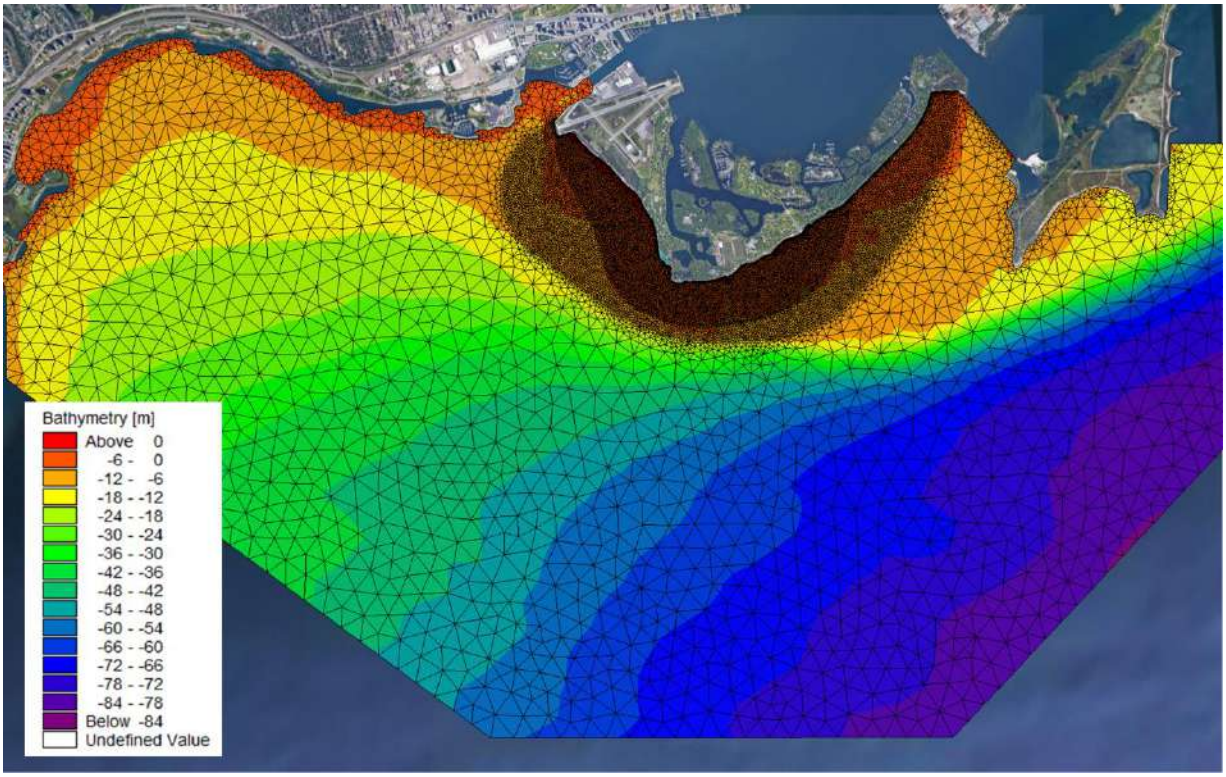


Figure 3.11: MIKE21 Nearshore Wave Model of Toronto Islands Zoomed Out

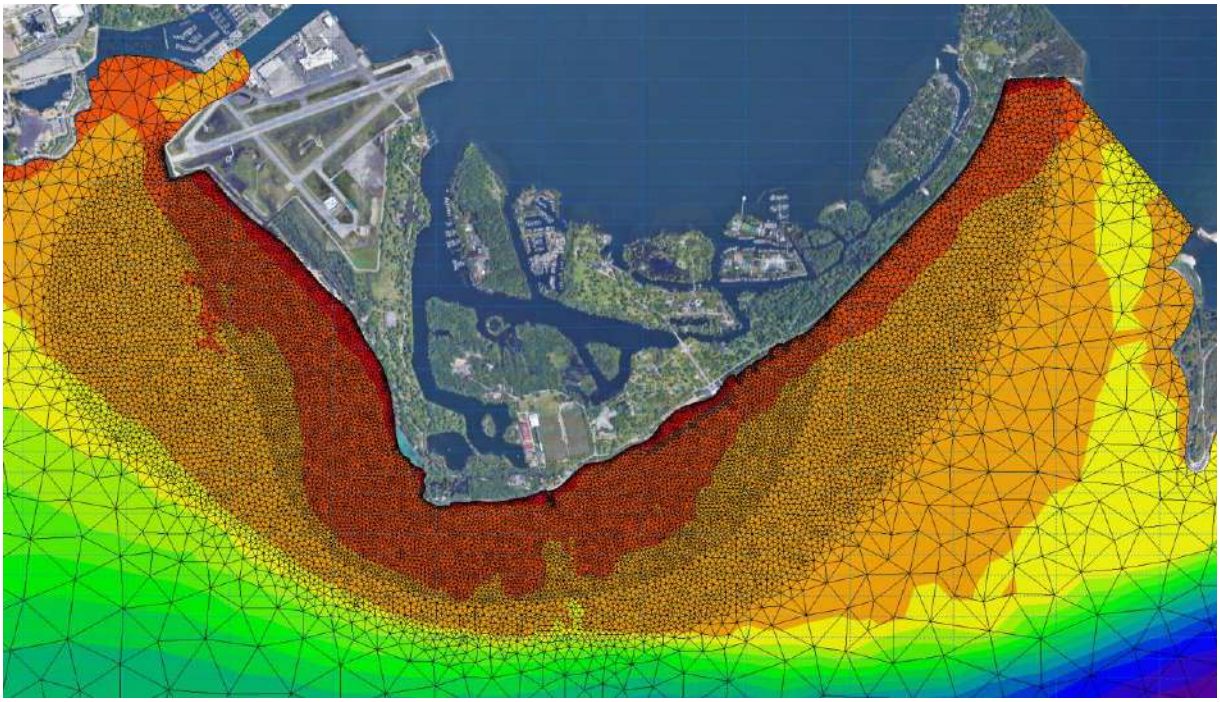


Figure 3.12: MIKE21 Nearshore Wave Model of Toronto Islands Zoomed In



Figure 3.13: Offshore Hindcast Point and Nearshore Extraction Points

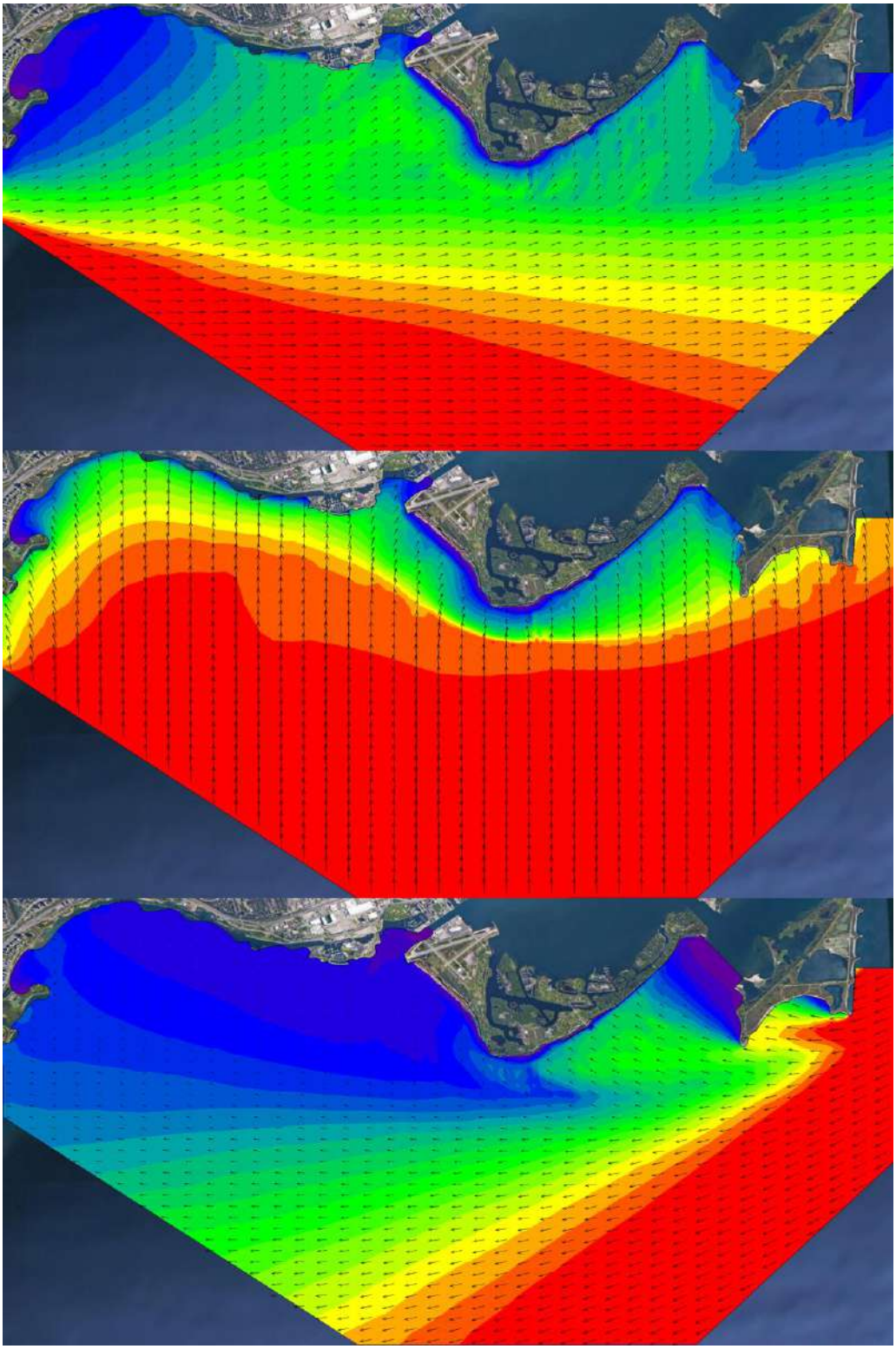


Figure 3.14: Variation of Nearshore Wave Conditions by Offshore Wave Direction

Nearshore wave conditions vary along the perimeter of the islands due to differences in bathymetry, sheltering, and the length of fetch available for wave development. Table 3.4 summarizes the extreme wave conditions computed at each of the nearshore points; as noted earlier, these points are located in a water depth of approximately 8 m (based on low water datum). The most severe wave conditions are predicted to occur at Point 3.

Table 3.4: Extreme Nearshore Significant Wave Heights (m)

Return Period	Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7
2	1.7	2	2.6	2.1	2.2	2.1	2.0
5	1.8	2.2	2.9	2.3	2.3	2.3	2.2
10	1.9	2.4	3.1	2.4	2.5	2.4	2.3
20	1.9	2.5	3.3	2.5	2.6	2.5	2.4
50	2.0	2.7	3.5	2.6	2.7	2.6	2.5
100	2.1	2.8	3.7	2.7	2.8	2.7	2.6
200	2.2	3.0	3.9	2.8	2.9	2.8	2.7
500	2.7	3.2	4.2	3.0	3.1	3.0	2.8

3.4.3 Inner Harbour Waves

Waves impacting the northern shore of Toronto Islands are generated by winds blowing across the Inner Harbour. Due to the relatively short distances across the harbour, these waves are “fetch limited”. This means that waves will reach a fully developed state within a short period of time (less than an hour for the Inner Harbour), and that wave heights depend solely on the wind speed, open water fetch distance and water depth.

Return period wave heights within the Inner Harbour were estimated by conducting an extreme value analysis of wind speeds at Toronto Island Airport (presented in Section 3.3) and using empirical wave hindcasting methods to estimate the resulting wave heights. Wave heights were calculated according to the Shore Protection Manual (USACE, 1977) using the extreme wind speeds presented in Table 3.2. The wave heights were calculated by incident direction, as well as for all directions. Fetches were conservatively chosen to be 3 km for easterly and westerly waves and 2 km for northwesterly waves. A water depth of 8 m was assumed.

The estimated extreme wave heights are presented in Table 3.5; these estimates do not consider wave attenuation as the waves propagate into shallow water near the shoreline. The results indicate that the 100-year significant wave height (Hs) is 1.4 m considering all wind directions. The extreme wave height at the shoreline would likely be less due to the effects of wave refraction, shoaling and breaking.

Table 3.5: Extreme Inner Harbour Wave Heights by Direction

Return Period	Significant Wave Height (m)			
	From East	From West	From Northwest	All Directions
2	0.7	0.8	0.6	0.8
5	0.8	0.9	0.6	0.9
10	0.8	0.9	0.7	1.0
20	0.9	1.0	0.8	1.2
25	0.9	1.0	0.8	1.2
50	1.0	1.1	0.8	1.3
100	1.0	1.1	0.9	1.4
200	1.1	1.2	1.0	1.5
500	1.2	1.3	1.0	1.7

3.5 Shoreline Erosion

To understand the historical evolution of Toronto Islands, and to assess shoreline erosion, Baird collected historical shoreline data for the islands dating from as far back as 1881 to as recent as 2019. A GIS-based comparison of these data demonstrates that the Toronto Islands shoreline has undergone significant changes over the past century, as depicted in Figure 3.15.



Figure 3.15: Historical Shorelines at Toronto Islands

The most significant changes observed in shoreline evolution since 1980 includes erosion of the Gibraltar Point area, accretion at Hanlan's Point Beach, and accretion at Ward's Island Beach. The remaining shoreline east of Gibraltar Point to Ward's Beach appears to have remained relatively stable.

Baird quantified the erosion and accretion of the shoreline at each of the public beaches on the lakeside of the islands, these included Hanlan's Point Beach, Gibraltar Point Beach, Centre Island Beach and Ward's Island Beach. Profiles were positioned perpendicular to the shoreline at each of these locations, and the change in the shoreline over time (difference between historical profiles) was calculated. Three profiles were taken at Hanlan's Point Beach, and two at Ward's Island Beach to capture the spatial variability along the shoreline; these profiles were then averaged and presented as annual erosion/accretion rates. The post-1980 shoreline erosion and accretion rates are shown in Table 3.6. In this table, positive values indicate accretion while negative indicates erosion.

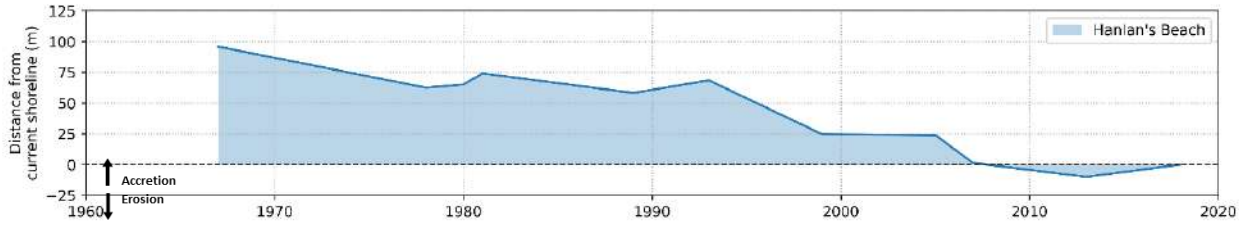


Figure 3.16: Historical Shoreline Position at Hanlan's Point Beach

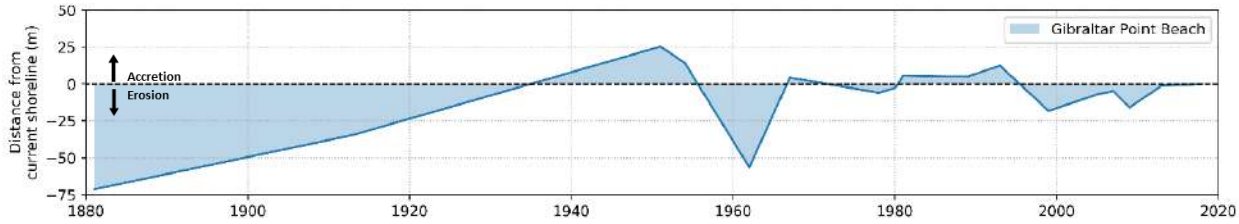


Figure 3.17: Historical Shoreline Position at Gibraltar Point Beach

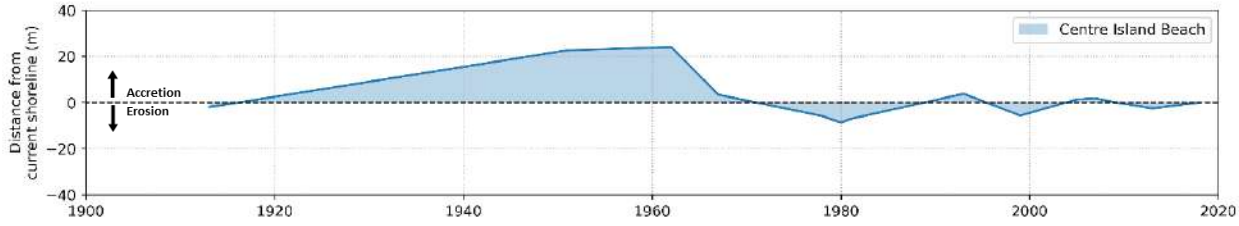


Figure 3.18: Historical Shoreline Position at Centre Island Beach

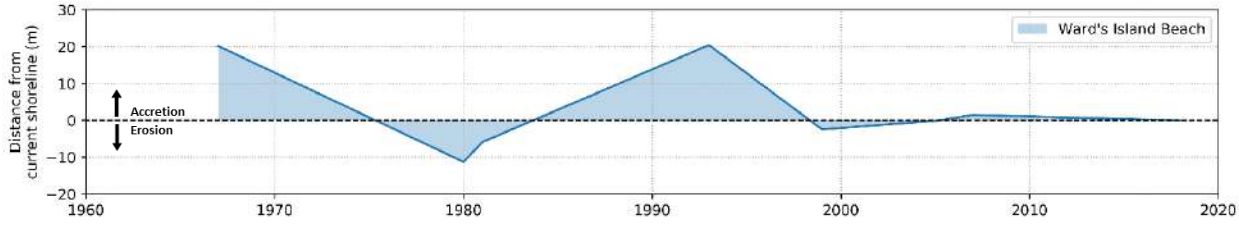


Figure 3.19: Historical Shoreline Position at Ward's Island Beach

Table 3.6: Annual Shoreline Erosion and Accretion Rates since 1980

Public Beach	Annual Shoreline Change (m/year)
Hanlan's Point Beach	2.03
Gibraltar Point Beach	-0.03
Centre Island Beach	-0.15
Ward's Island Beach	-0.55

3.6 Ice

Ice is a significant design factor for any marine construction project in the Great Lakes region. Ice may damage coastal and marine structures due to forces resulting from thermal expansion, horizontal forces due to ice floes, and ice scour. Limited ice data are available for the Inner Harbour, from Environment Canada's Ice Service. Previous work undertaken by Baird suggests ice thicknesses in the range of 55 cm and 65 cm for 30 year and 100-year return periods, respectively.

During the winter months, the ice sheet within Toronto Harbour has generally been broken up by the Toronto Fire Department's Fire Rescue Boat (the William Lyon Mackenzie) on a daily basis, as needed, to provide safe ferry access to the Toronto Island. This breaking up of the ice sheet helps to reduce ice loads applied on marine and coastal structures in the harbour. For the purposes of this study, it has been assumed that the ice breaking service will continue to operate in the future as it has in the past.

3.7 Existing Shoreline Conditions of the Study Areas

A limited review of the performance of existing shore protection structures and shoreline condition was completed for each study area. The performance review included review of detailed investigations previously completed and land-based visual assessment of the above water portions of the structures for which no detailed investigation was available. The assessments for structures in the Ward's Island, Algonquin Island and Centre Island study areas are described in this section.

3.7.1 Ward's Island

North and south of the Ward's Island ferry terminal, the shoreline is protected by a rip rap revetment and armour stone curb which were recently improved during the 2020 emergency works completed by TRCA in partnership with the City of Toronto (the City). The north revetment transitions into an armour stone beach curb at the back of an approximately 90 m long sand beach. As part of the emergency works, a rip rap and armour stone revetment was also constructed at the north end of the sand beach. The emergency works have crest elevations ranging from 76.5 m to 76.8 m and were designed to reduce wave overtopping during the design event. However, these structures are not watertight and seepage through the structures will still occur during high lake levels. A concrete walking path is located landward of the beach and leads into the residential area at the north end of Ward's Island.

A rip rap and concrete rubble revetment begins at the north end of the beach, north of the emergency works, and follows the shoreline around the northern shoreline of Ward's Island until the Eastern Channel. The revetment provides some protection from shoreline erosion; however, the revetment varies in size and shape along its length. As the crest elevation is below the 100-year flood level, it does not provide protection from flooding during the 100-year event. There is a low, embedded concrete wall that is visible behind the revetment in some places along the shoreline parallel to Bayview Ave. The crest elevation of the concrete wall is similar to the crest elevation of the revetment. The condition and extent of the wall below grade is unknown. Sandbags were placed landward of the revetment and concrete wall during the flooding in 2017 and 2019.

The northwest shoreline is characterized by a jetty that extends off the northern point of Ward's Island. A seawall retains the east edge of Ward's Island and forms the west edge of the Eastern Channel. The seawall transitions into an armour stone revetment along the southeast edge of the island, and groyne extending off of the east end of the Ward's Island Park beach. The jetty, seawall and groyne are outside of the identified focus areas for Ward's Island for this project, so a visual assessment of these structures was not completed. However, a condition assessment for these structures was completed by Shoreplan Engineering in 2018.



Figure 3.20: Armour stone beach curb and walking path (left) and revetment north of the beach and Ward's Island ferry terminal (right) completed as part of the emergency works in 2020



Figure 3.21: Rip rap and concrete rubble revetment (right) and concrete panel wall (left) around the northeast and north shoreline of Ward's Island. Right photo source: TRCA, Jan. 2021

3.7.2 Algonquin Island

The northwest shoreline of Algonquin Island, parallel to Seneca Ave. is retained by a SSP wall which was constructed in 1985. The condition of the seawall was assessed by Baird (2020). At the time, the seawall was expected to have a remaining useful design life of 25 years. However, the assessment concluded that the wall would likely fail due to additional loading if a flood berm was constructed along the top of the wall. Additionally, the surcharge associated with sandbags placed at the top of the wall as a temporary flood mitigation measure could also lead to instability or possible failure of principal wall elements. Baird's (2020) assessment also concluded that welding an extension to the existing SSP wall is not recommended, as creating a watertight seal between the existing wall and the extension would be difficult and it is unlikely that the welded connection would be able to withstand the hydrodynamic loads.

An analysis of wave overtopping of the Seneca Ave. seawall was previously completed in the Flood Risk Study (Baird, 2019a). The results of this analysis concluded that overtopping was expected during the 100-year flood

event. Indeed, wave overtopping was observed at the Algonquin Sea wall during the 2017 and 2019 flood events.

The southwest end of Algonquin Island is vegetated and includes provincially significant wetland areas and vegetation communities of conservation concern. The shoreline in this region is naturalized. The Clubhouse is the only building located within this area. All other residents and buildings are located northeast of Wyandot Ave.

QCYC is located at the north end of Algonquin Island. The QCYC shoreline around the northeast end of the Island is retained by steel sheet piling and fronted by floating docks. A grounded vessel off the north tip of Algonquin Island acts as a breakwater for the docks. There is a concrete tile pathway and a number of buildings adjacent to the club shoreline. The clubhouse is located at the north point of the club, immediately adjacent to the SSP wall. There are two boat launches along the southeast club shoreline, including a significant marine railway system that is used to launch boats in the spring and recover them in the fall. The interior of the club property is used as a boat storage yard.

Members of QCYC recently completed improvements to assist with flood mitigation. These include raising the elevation of the walkway around the perimeter of the club and installing a wooden extension to the top of the dock wall (personal communication with Ron Mazza of Queen City Yacht Club (QCYC), Jan. 2022).



Figure 3.22: Algonquin Island seawall along Seneca Ave. Right photo source: TRCA



Figure 3.23: Queen City Yacht Club (QCYC) shoreline retained by SSP, vessel breakwater and clubhouse (left). Buildings and concrete tile path adjacent to QCYC shoreline and docks (right).

3.7.3 Centre Island

In this project, the focus area within Centre Island is on Centreville, the Centre Island Ferry Terminal, and the Toronto Island Marina.

The shoreline at Centreville along the Duck Pond and around Far Enough Farms is low lying with stacked concrete slabs. Landward of the slabs, the land is vegetated. The Centreville Train tracks run parallel to the shoreline around the southern and eastern perimeter of Centreville. The east shoreline of Centreville includes a short section of SSP wall.

The northern shoreline between Centreville and the Centre Island Ferry Terminal is retained by a vertical concrete panel wall with a timber cap. The concrete wall appears to be in poor condition; the concrete and timber are deteriorating, and the steel tie rods are protruding from the wall. There is an unprotected section of shoreline between the east pedestrian bridge and the concrete wall where the shoreline has been eroded and flanking of the east end of the concrete wall is evident.

The shoreline east of the ferry terminal to the western pedestrian bridge leading to Olympic Island, and the shoreline west of the terminal to the Toronto Island BBQ and Beer Co., are retained by vertical concrete walls with a timber cap and cross beams. The condition of the wall is unknown as it is mostly submerged and access to the wall is restricted; however, some deterioration of the timber and emerged concrete were visible. The ferry dock walls are constructed of steel sheet piling.

The shoreline between the Toronto Island BBQ and Beer Co. restaurant and the Toronto Island Marina is irregular and has a mix of ad-hoc shoreline protection measures, including concrete slabs, rip rap and groynes. The land area adjacent to this section of shoreline is parkland.

The Toronto Island Marina is located on the west side of Centre Island. The condition and composition of the dock walls within the marina are unknown as access and visibility was limited. However, vertical steel walls were noted in some locations, with some corrosion and deterioration of these walls being observed. The boat storage area in near the club house and Upper Deck restaurant is on low-lying ground.



Figure 3.24: Concrete slab shore protection and low-lying vegetated shoreline around Far Enough Farms



Figure 3.25: Concrete and timber wall along the north shoreline between Centreville and the ferry terminal (left). Erosion of the unprotected shoreline and flanking of the east end of the concrete wall (right)



Figure 3.26: Concrete panel and timber cap wall to the east and west of the Centre Island Ferry dock



Figure 3.27: Concrete slab (left) and rip rap and groynes (right) along the north shoreline



Figure 3.28: Various dock walls within the Toronto Island Marina showing use of decking (left) and steel and paving brick (right)



Figure 3.29: Main road (Avenue of the Island) running through Toronto Island Marina (left) and deteriorating steel dock wall (right)

4. Geotechnical Investigation

A geotechnical investigation was completed by Grounded to support the Class EA for the Project. Grounded's geotechnical report is provided in a separate attachment to this report. The geotechnical investigation included completion of a background review of engineering reports and previous borehole information, a visual site inspection and field investigation, including nine shallow boreholes and nine pavement cores. Grounded synthesized this information to develop baseline geotechnical, hydrogeological and environmental conditions for the Toronto Islands. This includes a description of the soil stratigraphy, groundwater conditions, surface drainage and stormwater infrastructure, water and soil quality, slope stability assessment and identification of hazardous lands. Grounded provided geotechnical support and input into the development of conceptual designs for road raises, earth berms, gravity and SSP walls.

5. Concept Alternatives

The concept design alternatives for each study area are described in this section. Concept drawings are provided in Appendix B. Expected resulting flood depth maps for each concept are provided and discussed. Flood depth maps are based on shoreline flooding during the 100-year flood event and do not consider overland flow or groundwater seepage.

Concepts presented in this report include increasing the elevation of roads, pathways, and shoreline protection structures. The concept plans and typical cross-sections are representative and do not show site specific details or transitions. Localized modifications to the selected alternatives may be considered and incorporated during the detailed design phase to accommodate site constraints such as space limitations, mature vegetation, etc. The concept designs were developed with consideration given to the ability to comply with City of Toronto accessibility guidelines and the Accessibility for Ontarians with Disabilities Act (AODA). Details including, but not limited to, roadway/pathway slopes, widths and transitions to adjacent areas will be reviewed in detailed design. Additionally, compliance with the City of Toronto Climate Action Strategy (Transform TO) is achievable based on the concept designs and will be addressed during detailed design.

The use of an impermeable membrane versus a clay core are compared as follows:

- A clay core is not as readily compacted in small footprints; therefore, an impermeable membrane may be preferred for smaller areas.
- Import of adequate material for the clay core is required, whereas an impermeable membrane doesn't require as much material import.
- An impermeable membrane is at greater risk of damage when compared to a clay core for the following reasons:
  - Vegetation may damage an impermeable membrane.
  - Any post hole digging, or other excavation work may damage an impermeable membrane.
  - Impermeable membrane is a manufactured material and will degrade over time (Note: design life is typically 75 years).
- A clay core should provide a more robust groundwater barrier compared to an impermeable membrane.

Although the use of an impermeable membrane is feasible for shoreline berm, it is not preferred over a clay core for the following reasons:

- A clay core for the shoreline berm is a large enough feature that large compaction equipment will be required regardless of the core material.
- A clay core is more resilient and robust for the reasons outlined above.
- The shoreline berm is more critical than the inland berms and should be designed accordingly.
- From a geotechnical perspective, a clay core should provide a more robust groundwater barrier than an impermeable membrane.

An impermeable membrane may be preferred for inland berms for the following reasons:

- Smaller berms are more accessible and easier to repair.
- If the inland berm is to be used to support a formalized path the use of granular materials as base materials is preferred from a pavement perspective.
- Large compaction equipment may not be required for smaller inland berms with an impermeable membrane but would be required for a clay core.

- Inland berms may be less critical in their role as a flood protection landform, and therefore a less robust design may be adequate.

5.1 Ward's Island

5.1.1 Ward's Island Concept 1: Inland Steel Sheet Pile (SSP) Flood Wall

This concept, shown in plan in Figure 5.1, includes a SSP wall that follows the existing walking path along the back of the beach and along Bayview Avenue, then turns east, following the perimeter of the northernmost houses, and then runs parallel to First Avenue. The SSP wall will have a crest elevation of 76.5 m.

The concept design (Figure 5.2) shows the walkway being restored at higher elevation to create a more seamless look between the curb wall, SSP wall, and raised roadway. Alternatively, if the walkway is not raised, the exposed portion of the wall (above ground) could be encased with another material, such as concrete or brick, to make the wall more aesthetically pleasing, as shown in Figure 5.3.

At the back of the beach, north of the ferry terminal, the wall would be installed adjacent to the existing beach curb. The SSP wall would provide an impermeable barrier landward of the curb, while the beach and curb would continue to mitigate wave runup and overtopping during storms. The existing sidewalk/pathway will likely need to be removed along the south end of Bayview Ave. to accommodate the installation of the SSP wall and then reinstated.

Figure 5.4 shows the residual flood depth expected on Ward's Island during a 100-year flood event if Concept 1 were implemented.



Figure 5.1: Ward's Island Concept 1: Inland Steel Sheet Pile Flood Wall

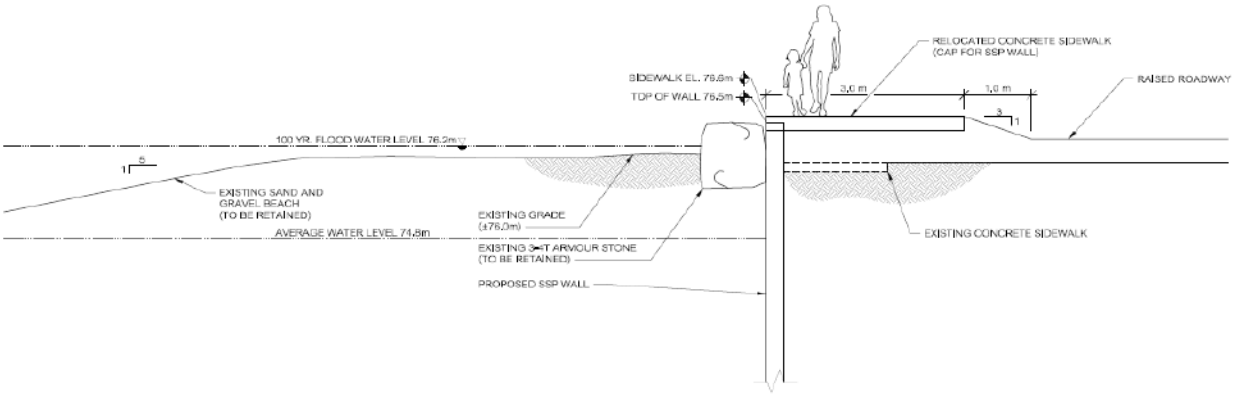


Figure 5.2: Section W1A for Ward's Island Concept 1

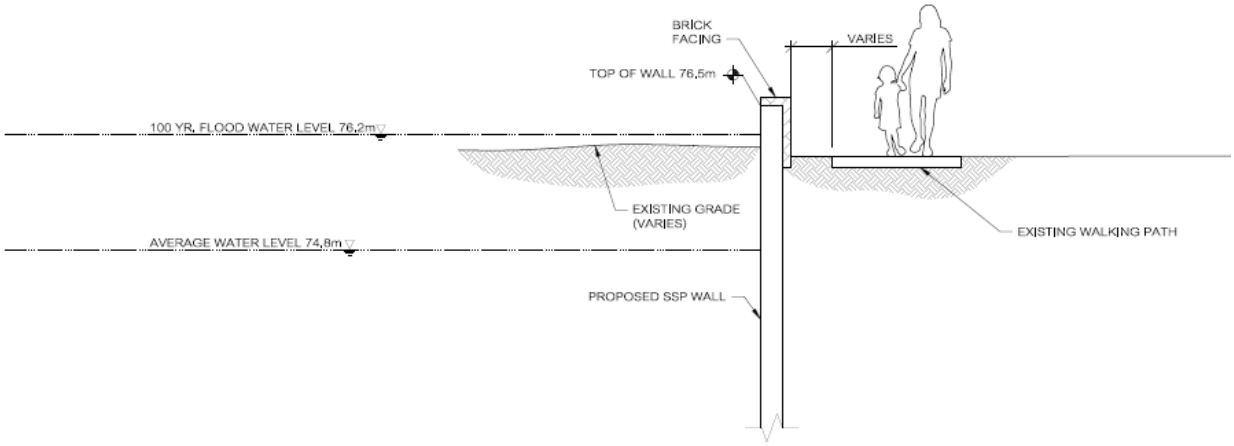


Figure 5.3: Section W1C for Ward's Island Concept 1

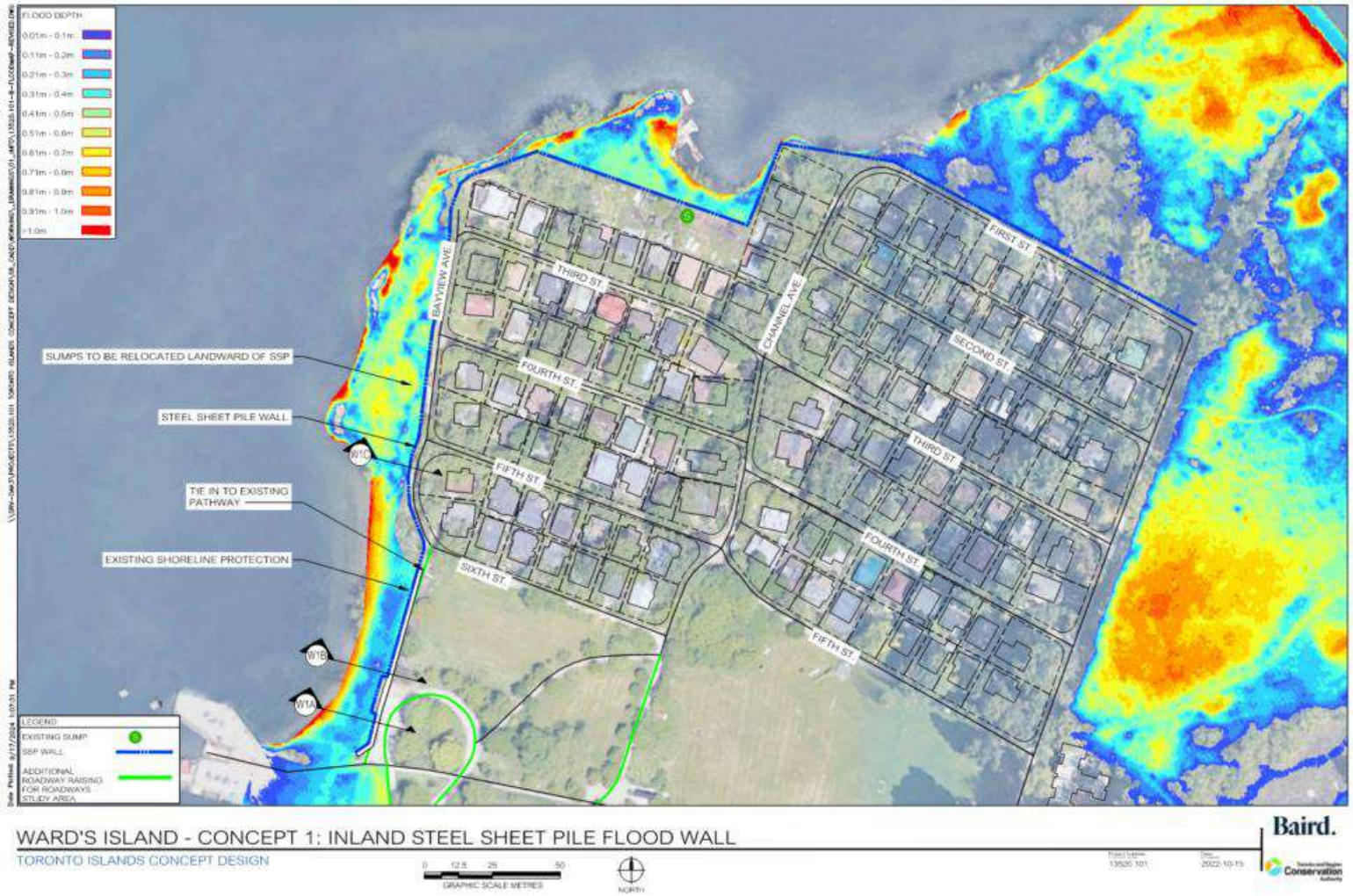


Figure 5.4: Flood depth during the 100-year flood event for Ward's Island for Concept 1

5.1.2 Ward's Island Concept 2: Revetment and Vegetated Berm

This concept, shown in plan in Figure 5.5, includes a vegetated berm that extends from the Ward's Island Ferry Terminal, north along the back of the beach and around the north edge of the island, following the shoreline until First Street, where it runs inland, adjacent to the street. The berm along the back of the beach and the shoreline consists of an impermeable clay core, while the inland berm along first street includes an impermeable geomembrane.

For the section along the back of the beach, the berm would be integrated with the existing armour stone curb wall. Due to the limited space between the pathway and the curb wall, the curb wall would be relocated lakeward.

For the section of berm along the shoreline, the berm is protected by a layer of heavy rip rap added to the existing revetment, as shown in Figure 5.6. The lakeward edge of the berm along the shoreline is protected by cobbles, and the landward side and crest is compacted earth fill with suitable vegetation cover. Aquatic habitat features, such as strategically placed mounds of stone to create habitat (habitat stone) can be incorporated on the lakebed at the base of the revetment during the detailed design phase.

There are a number of design variations that can be considered in during the detailed design phase should the berm be selected as the preferred option. For instance, the inland berm cross section includes an impermeable geomembrane as an alternative to the clay core; however, either berm could be used inland. It is the recommended design option to use impermeable geomembranes for inland berms, and clay core for shoreline berms.

Alternative materials, such as an articulated concrete block mattress (typical section shown in Figure 5.7 and photo example in Figure 5.8) could be considered for the lakeward slope and crest of the berm along exposed shoreline sections. The berm configuration shown in the Concept 2 plan represents a vegetated berm that is 1 m wide at the crest and does not include a formal walking path. Concept 3 is presented in plan in the next section and in typical section W3E (refer to Appendix B). Inclusion of public use features can be added during the detailed design phase if desired. This will be determined through coordination with the City of Toronto's Master Plan and feedback received through the public engagement process.

Figure 5.9 shows the expected resulting flood depth map for Ward's Island during a 100-year flood event if Concept 2 were implemented.



Figure 5.5: Ward's Island Concept 2: Revetment and Vegetated Berm

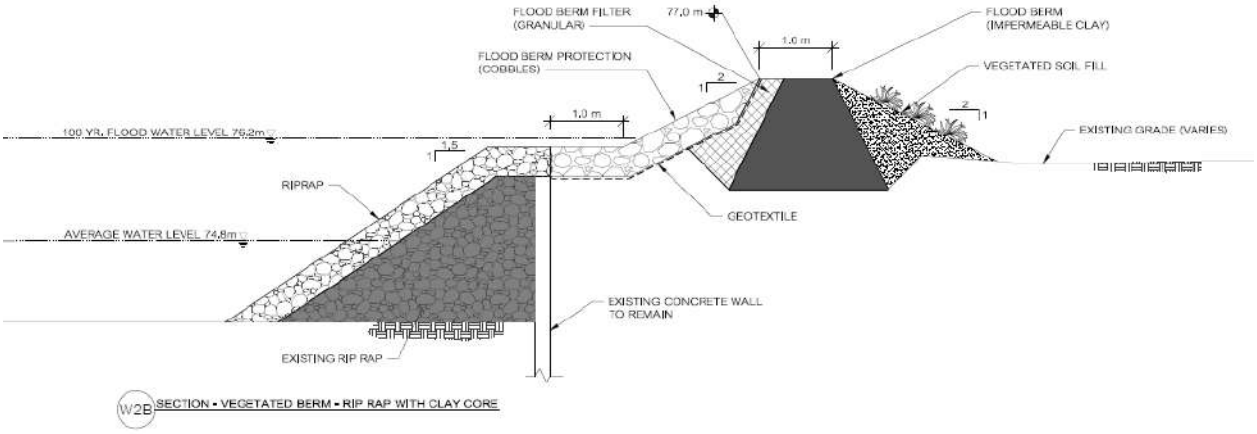


Figure 5.6: Section W2B of Ward's Island Concept 2 showing vegetated earth berm and revetment at the shoreline

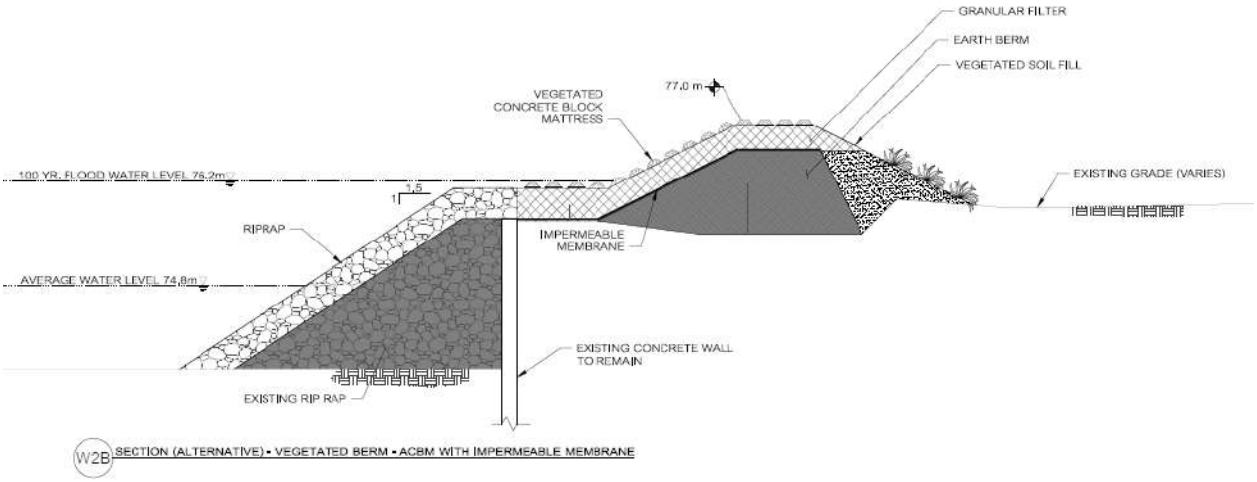


Figure 5.7: Section W2B of Ward's Island Concept 2 variation with articulated concrete block mattress and revetment at the shoreline



Figure 5.8: Articulated concrete block mattress, vegetated (left) and placed on a bank (right). (Photo from Nilex Civil Environmental Group, 2021)

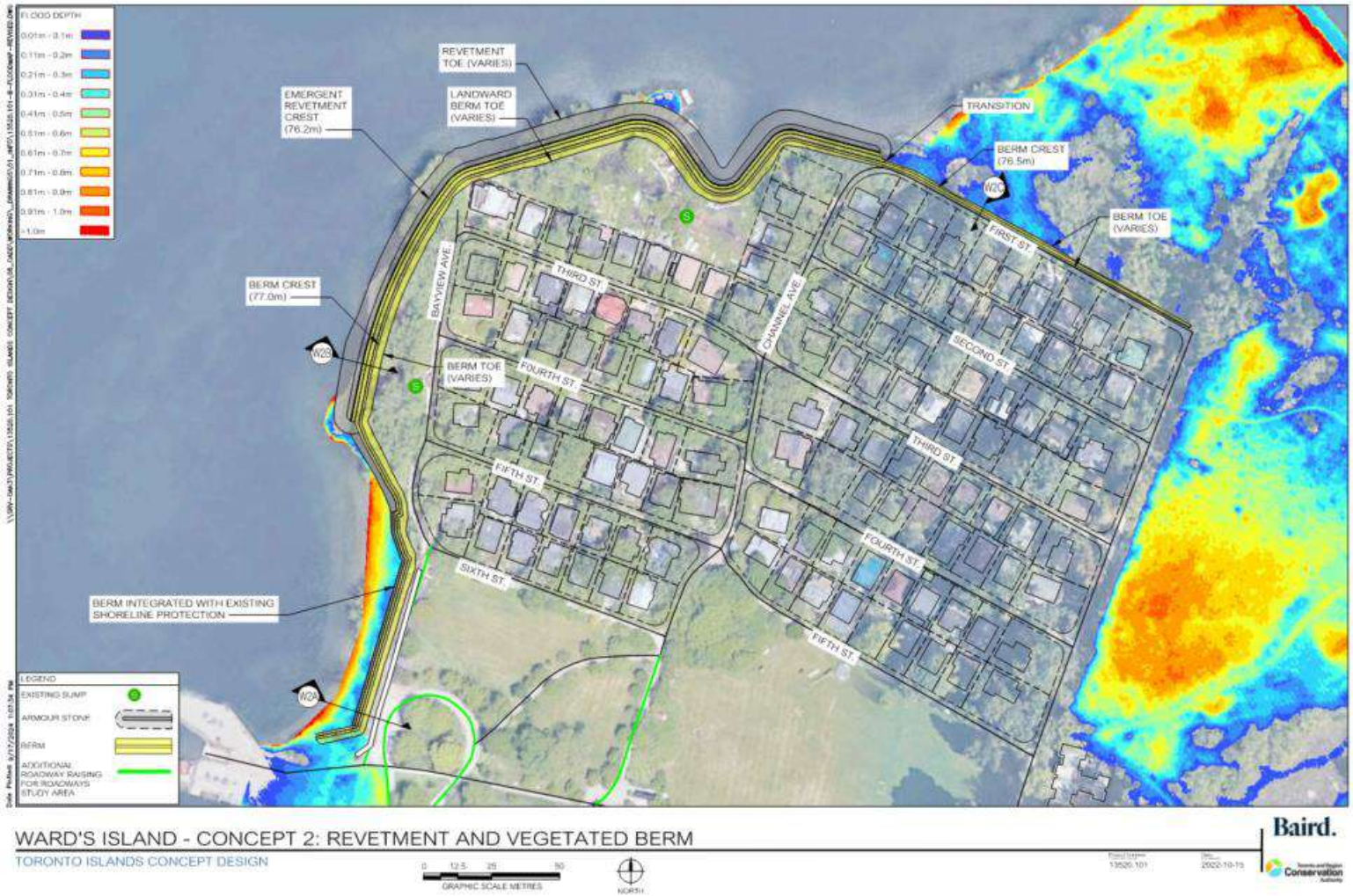


Figure 5.9: Flood depth during the 100-year event on Ward's Island for Concept 2

5.1.3 Ward's Island Concept 3: Vegetated Berm, Beach and Groyne System

Concept 3 for Ward's Island includes a beach, groyne and vegetated berm system that is presented in staged sub-concepts, as Concept 3A (Figure 5.10), 3B (Figure 5.11) and 3C (Figure 5.12). Concept 3A includes three sand beaches retained by three armour stone groynes. Concept 3B has two beach/groyne segments. Concept 3C includes just one groyne and expansion of the existing beach north of the ferry terminal. Improvements to the beach include adding sand to increase the size and crest height of the beach. The enlarged beach would be retained by a curved armour stone groyne located midway along the west shoreline of Ward's Island. A typical groyne section is shown in Figure 5.13. In all three sub-concepts, the beaches would reduce wave runup and provide recreational opportunities for park users. The shape and size of the groynes can be adapted to suit recreational features such as a viewing platform or fishing pier.

The concept design includes an impermeable berm along the back of the beach and around the northern shoreline of the island, as shown in Figure 5.14. The shoreline berm would include an impermeable clay core to provide flood protection A low concrete wall or beach curb feature could be added at the back of the beach to prevent over wash of sand and water onto the berm. Details concerning the inclusion of public use features can be developed in during the detailed design phase and will be determined through coordination with the City of Toronto's Master Plan in addition to feedback received through the public engagement process. Additionally, aquatic habitat features, such as habitat stone, woody-mattresses and aquatic vegetation can be incorporated on the lakebed at the base of the revetment or on the submerged portion of the beaches during the detailed design phase.

The expected extent of flooding for the 100-year flood event for Concepts 3A, 3B and 3C and shown in Figure 5.15, Figure 5.16, and, Figure 5.17 respectively.

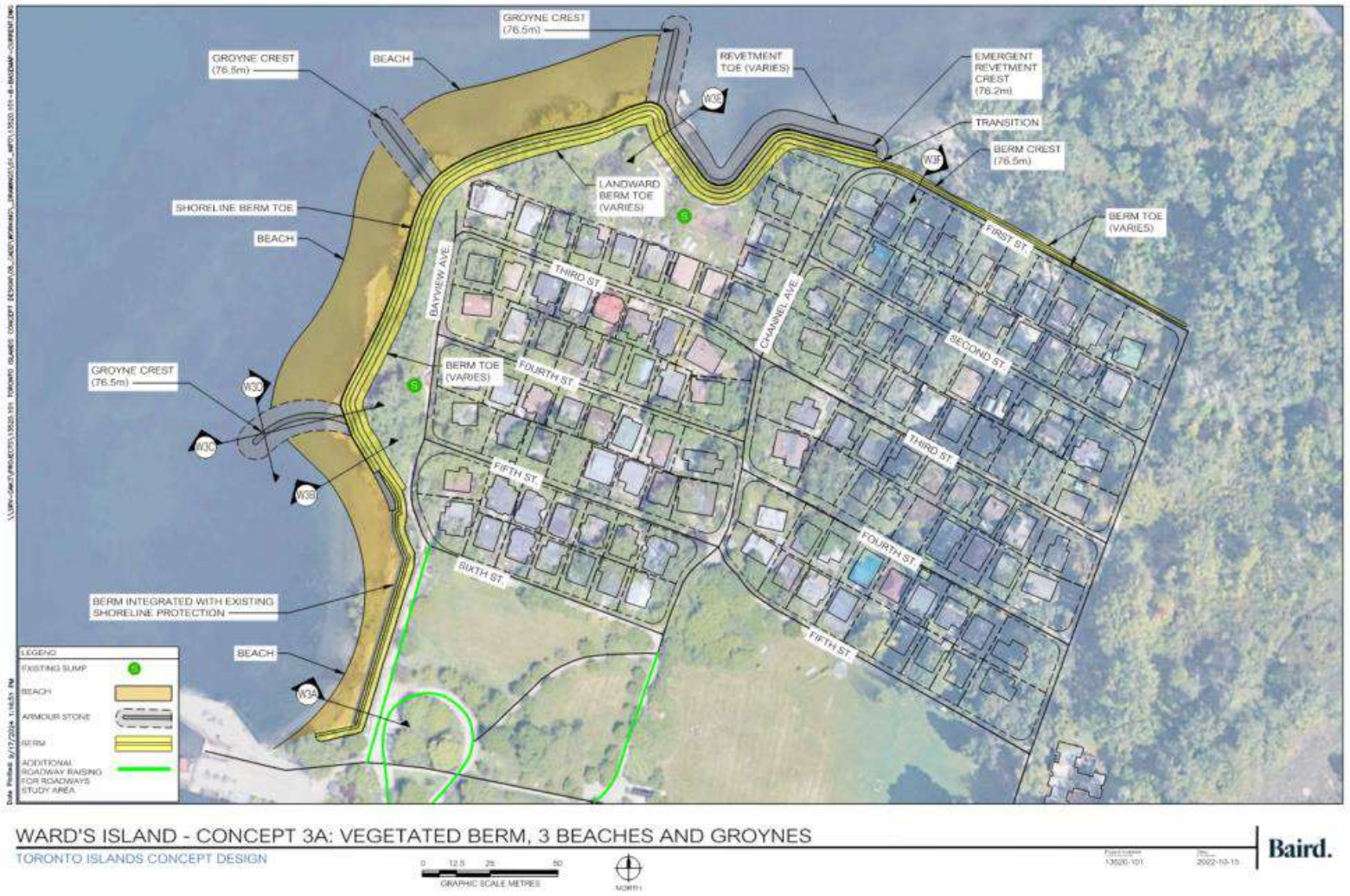


Figure 5.10: Ward's Island Concept 3A: Vegetated Berm, 3 Beaches and Groynes

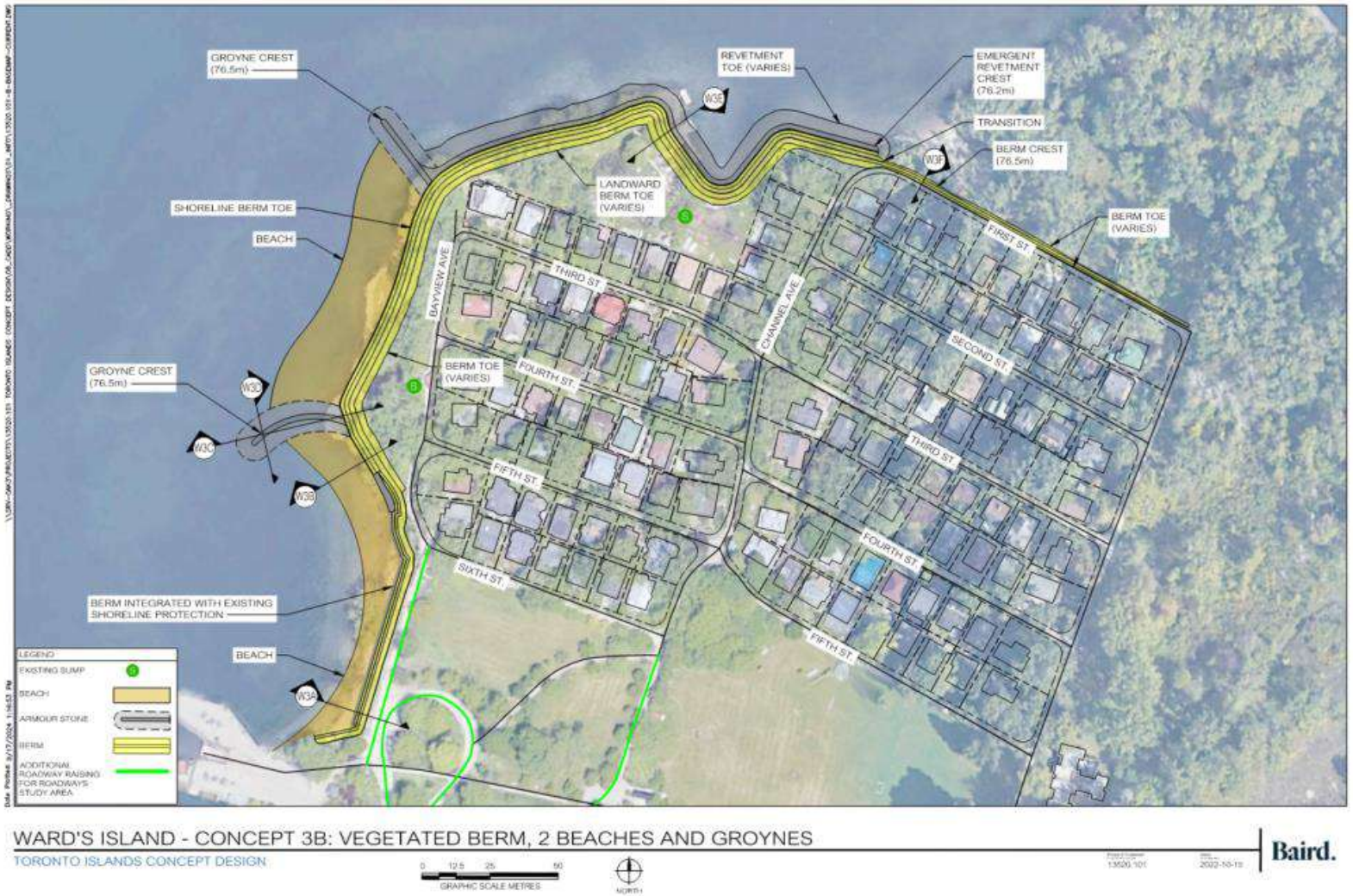


Figure 5.11: Ward's Island Concept 3B: Vegetated Berm, 2 Beaches and Groynes



Figure 5.12: Ward's Island Concept 3C: Vegetated Berm, Beach and Groyne

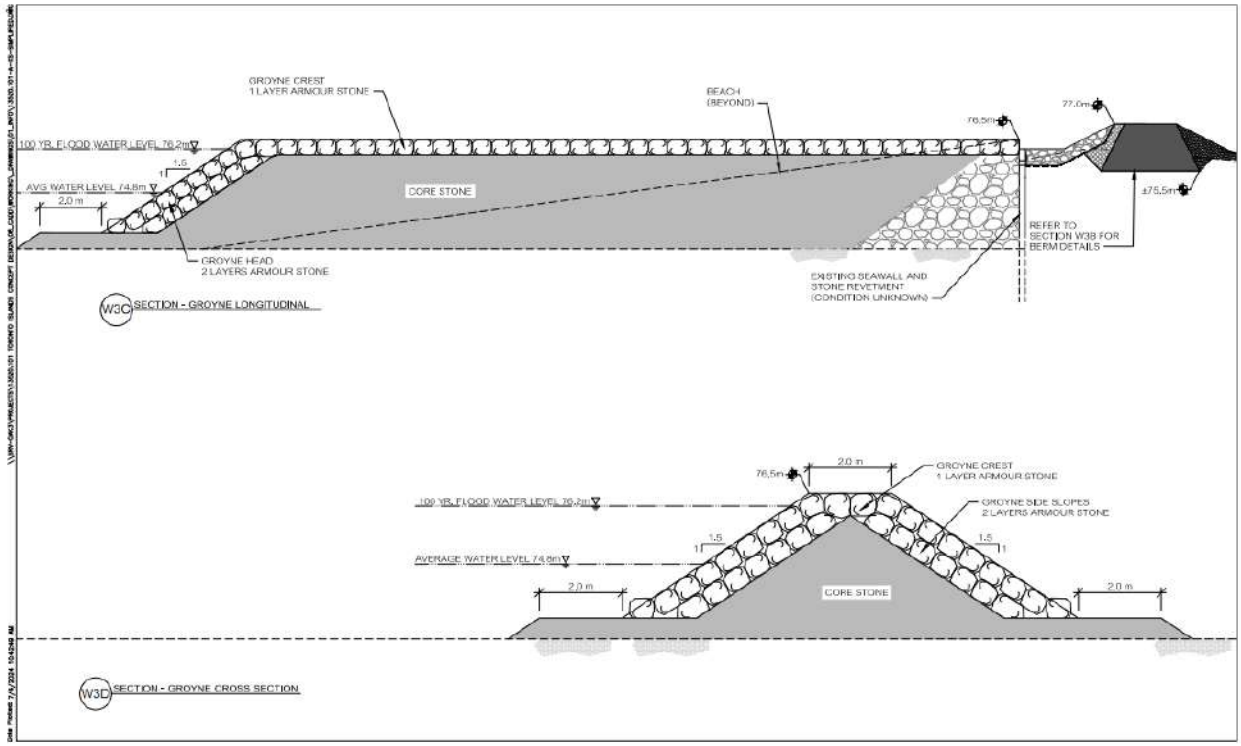


Figure 5.13: Typical groyne sections for Ward's Island Concept 3

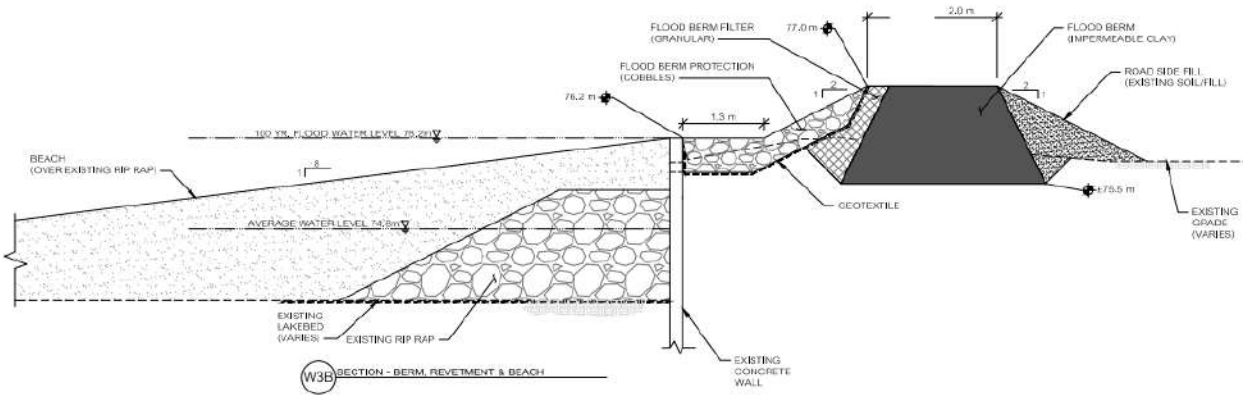


Figure 5.14: Typical section showing the impermeable berm and sand beach, for Ward's Island Concept 3

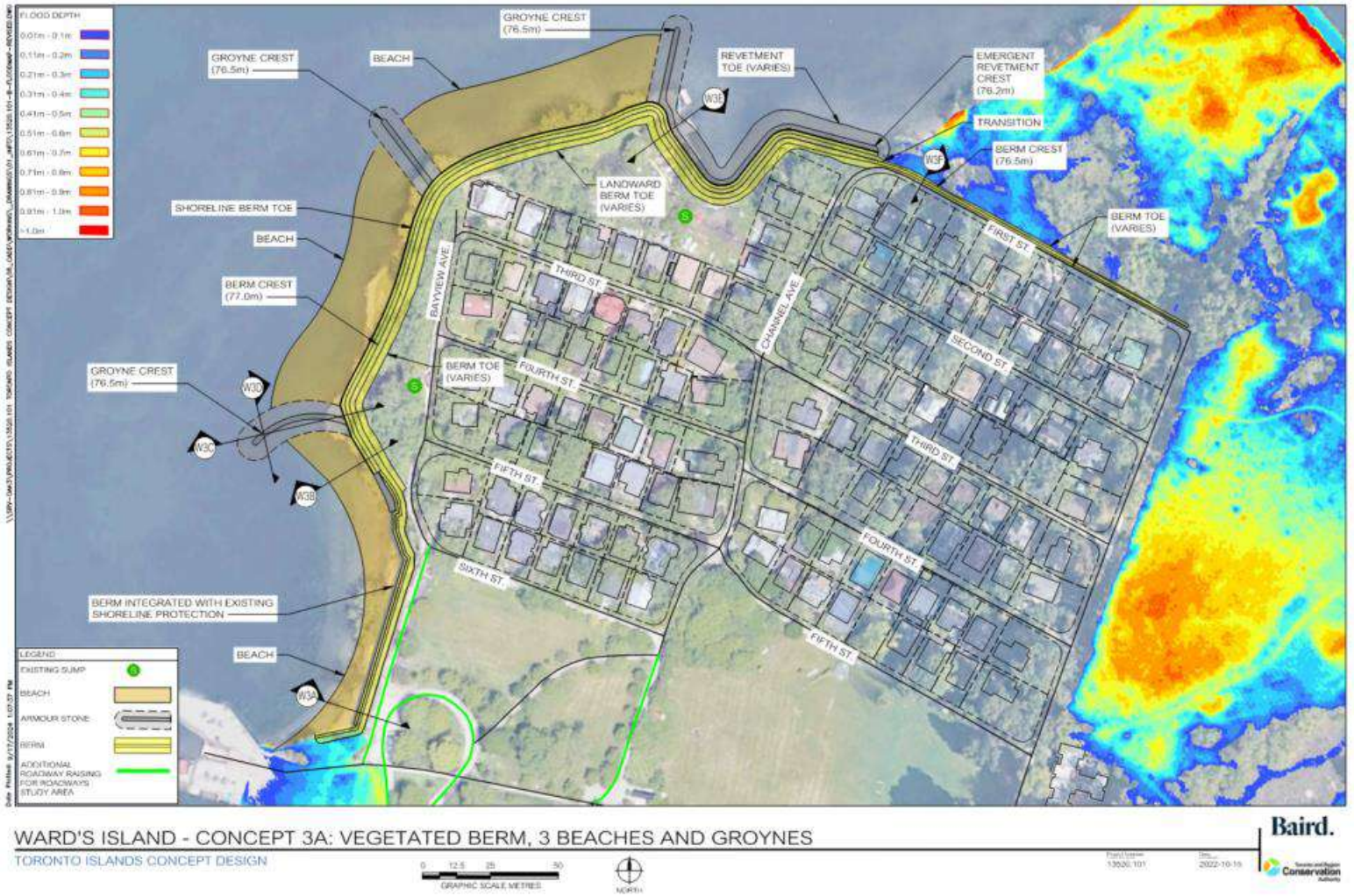


Figure 5.15: Flood depth during the 100-year flood event on Ward's Island for Concept 3A

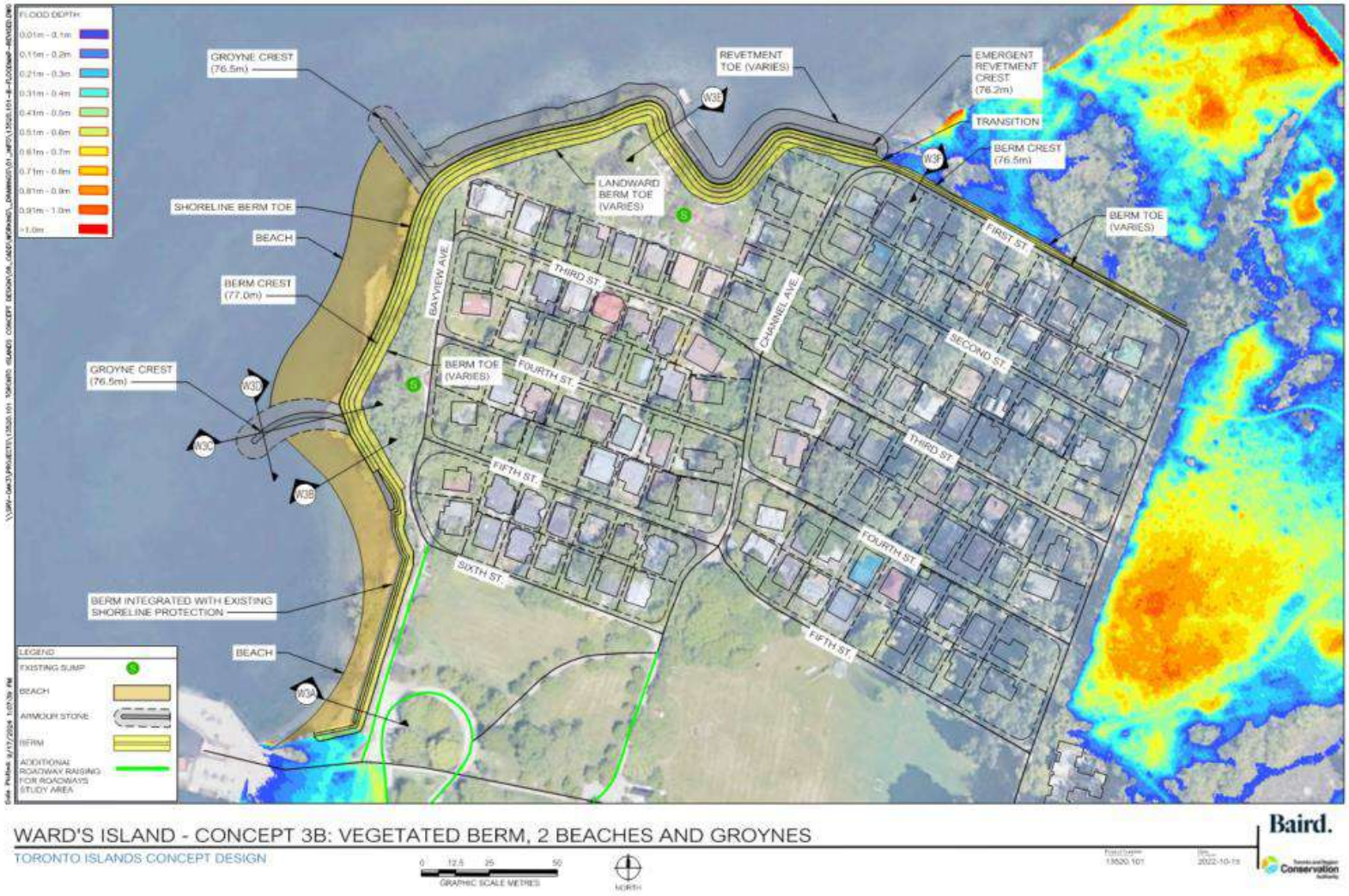


Figure 5.16: Flood depth during the 100-year flood event on Ward's Island for Concept 3B

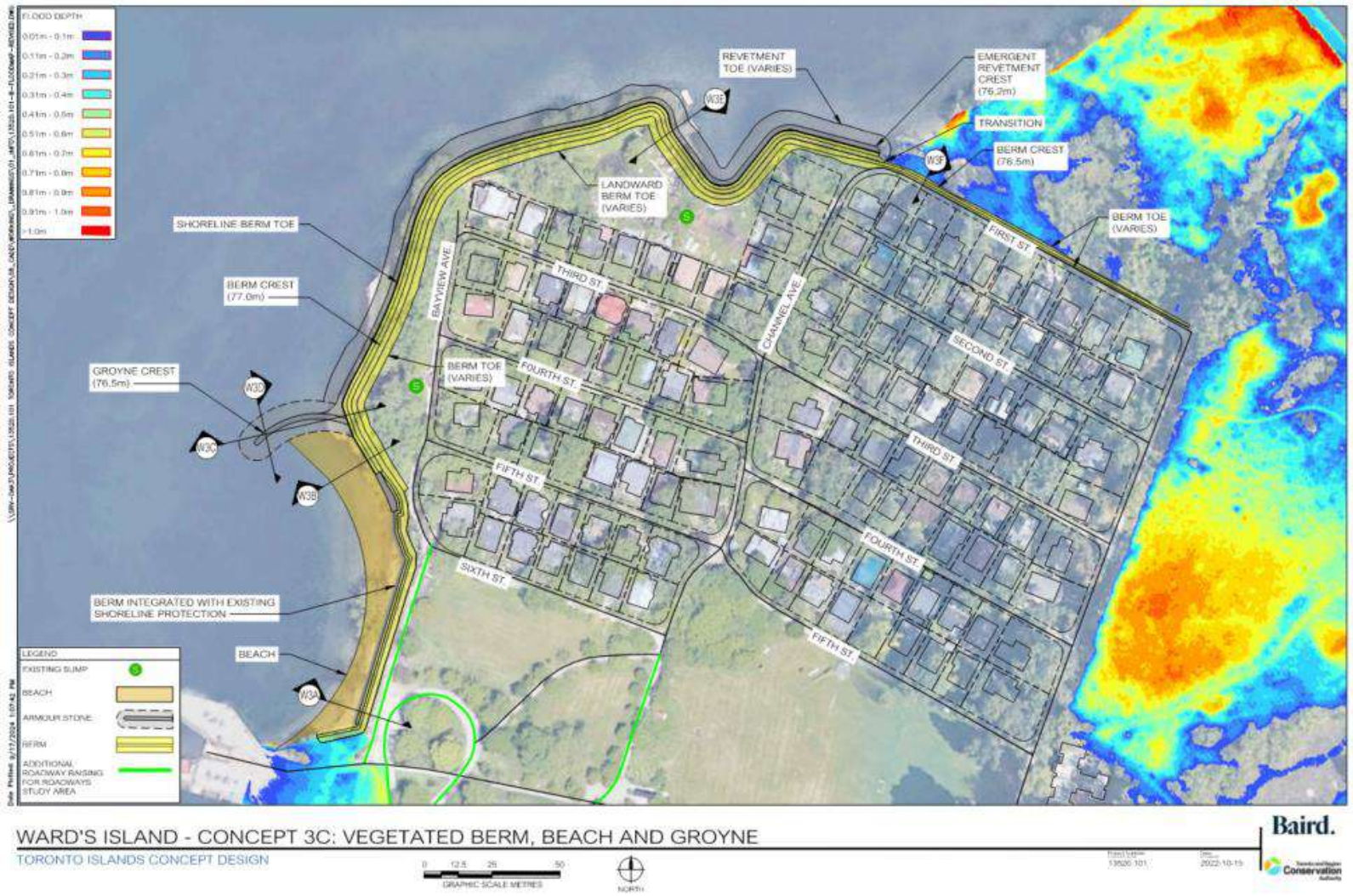


Figure 5.17: Flood depth during the 100-year flood event on Ward's Island for Concept 3C.

5.2 Algonquin Island

The Algonquin Island study area has been divided into three focus areas: South End, Northwest (NW) Shoreline, and QCYC. The flood mitigation concepts for these focus areas are presented and discussed in this section.

5.2.1 South End

5.2.1.1 South End Concept 1: Vegetated Flood Berm

The south end of Algonquin Island is a low-lying natural area and includes Provincially Significant Wetland designated areas and vegetation communities of conservation concern. Concept 1 for the south end of Algonquin Island includes an impermeable berm, with three sub-concepts having different planform alignments that will result in varying degrees of disruption to the ecologically sensitive area. Concept 1A (Figure 5.18) shows the berm located along the southern shoreline and maximizes the land area protected from flooding. As the southern shoreline is sheltered from the open lake, the lakeward side of the berm for Concept 1A is naturalized and vegetated with aquatic plants (refer to cross-section in Figure 5.19); however, construction of a shoreline berm would require significant disruption to the natural shoreline. This shoreline berm would include an impermeable clay core. Concept 1B (Figure 5.21) and Concept 1C (Figure 5.24) show inland variations for the berm alignment. The cross-section of the inland berm (Figure 5.22) includes an impermeable geomembrane and a crest elevation of 76.5 m. An impermeable geomembrane or clay core could be used for the inland berm. For Concept 1B, the berm location crosses the forested area along the most open pathway to minimize tree removals and disruption to the ecologically sensitive area. Concept 1C also reduces impacts to the sensitive ecosystem but may require more tree removals than Concept 1B; the berm encloses the Clubhouse, then follows Wyandot Ave. toward Omaha Ave. The inland berm is shown as vegetated in the various concept alternatives; however, public use features can be incorporated if desired. The northwest shoreline of the south end would be protected by a shoreline flood berm. The berm would have a crest elevation of 77 m and an impermeable clay core. The berm and existing SSP seawall would be supported by a rip rap berm. During the detailed design phase, the wetland hydrology will be reviewed, and a mitigation plan will be developed prior to the implementation of these concepts.

Figure 5.20, Figure 5.23, and Figure 5.25 show the expected resulting flood depth maps for Concepts 1A, 1B and 1C, respectively during a 100-year flood event. As shown in these figures, the spatial extent of flooding progressively increases for Concepts 1A, 1B and 1C.



Figure 5.18: Concept 1A for the South End of Algonquin Island: Vegetated Shoreline Flood Berm

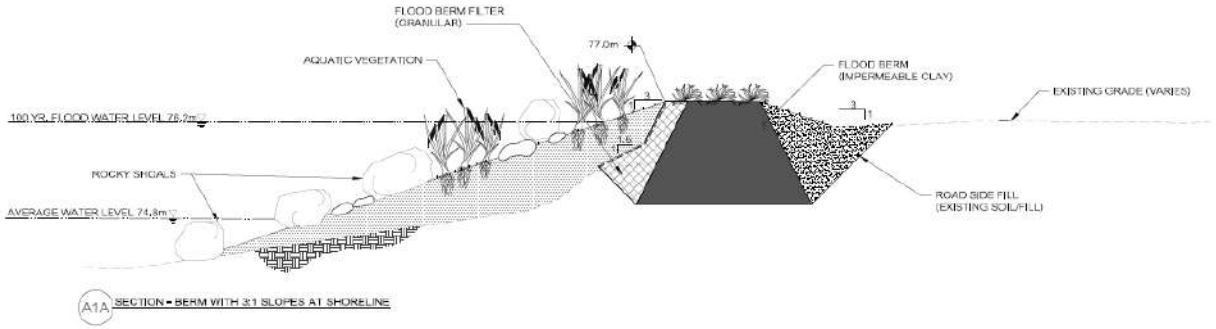


Figure 5.19: Typical section for Concept 1A: Vegetated Shoreline Flood Berm



Figure 5.20: Flood depth during the 100-year flood event on Algonquin Island for Concept 1A



Figure 5.21: Concept 1B for the South End of Algonquin Island: Vegetated Inland Berm

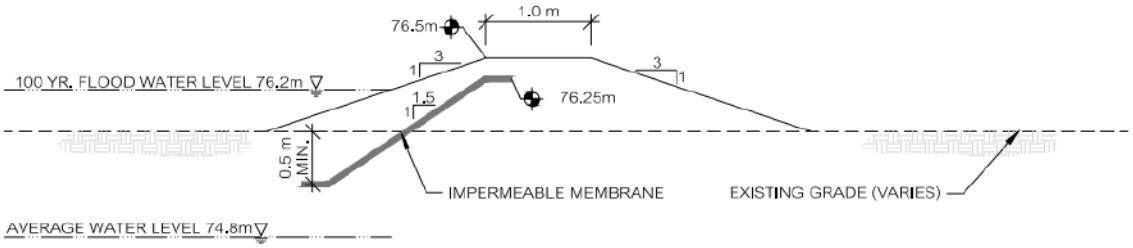


Figure 5.22: Typical section for Concept 1B: Vegetated Inland Berm

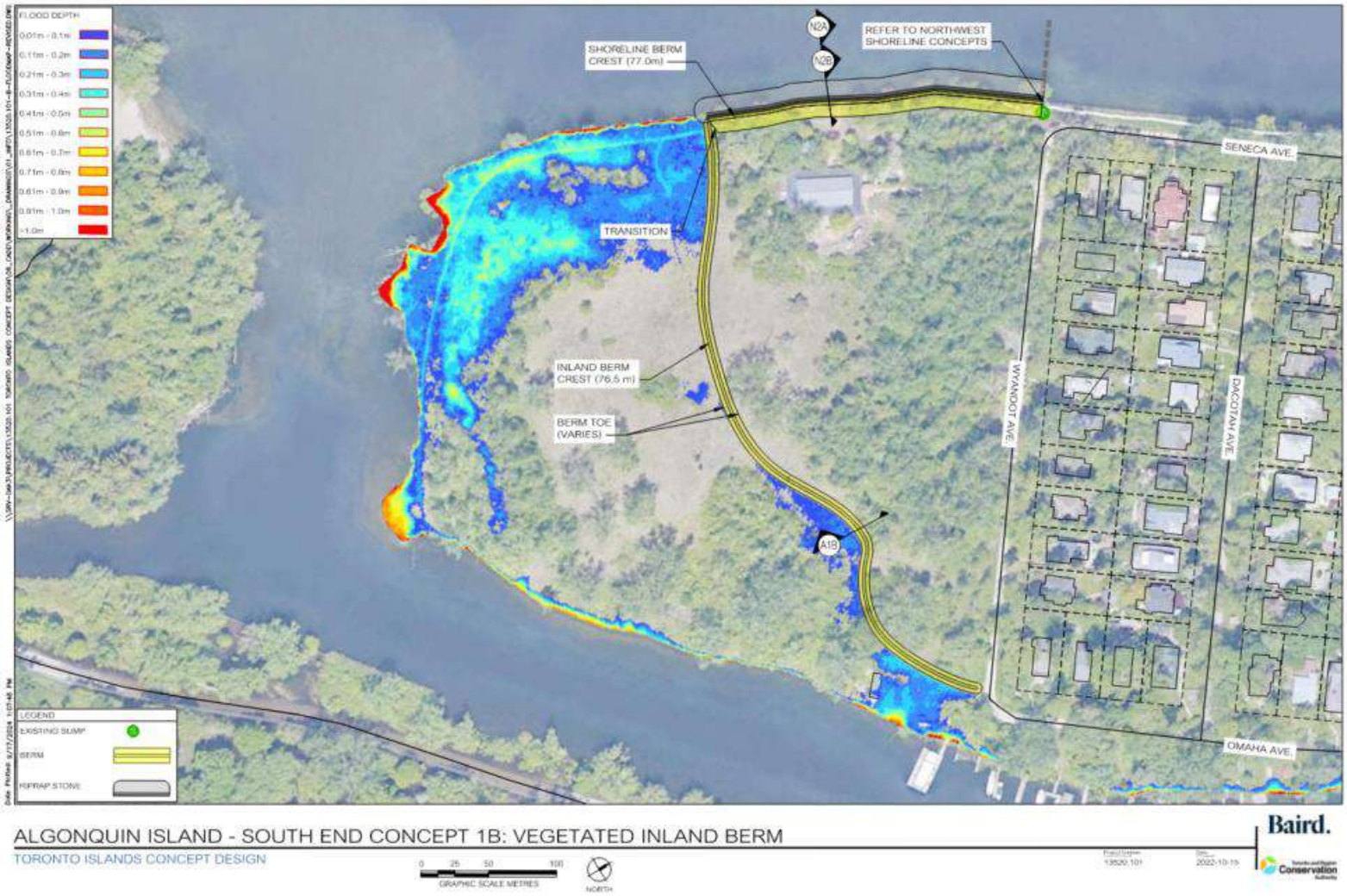


Figure 5.23: Flood depth during the 100-year flood event on Algonquin Island for Concept 1B

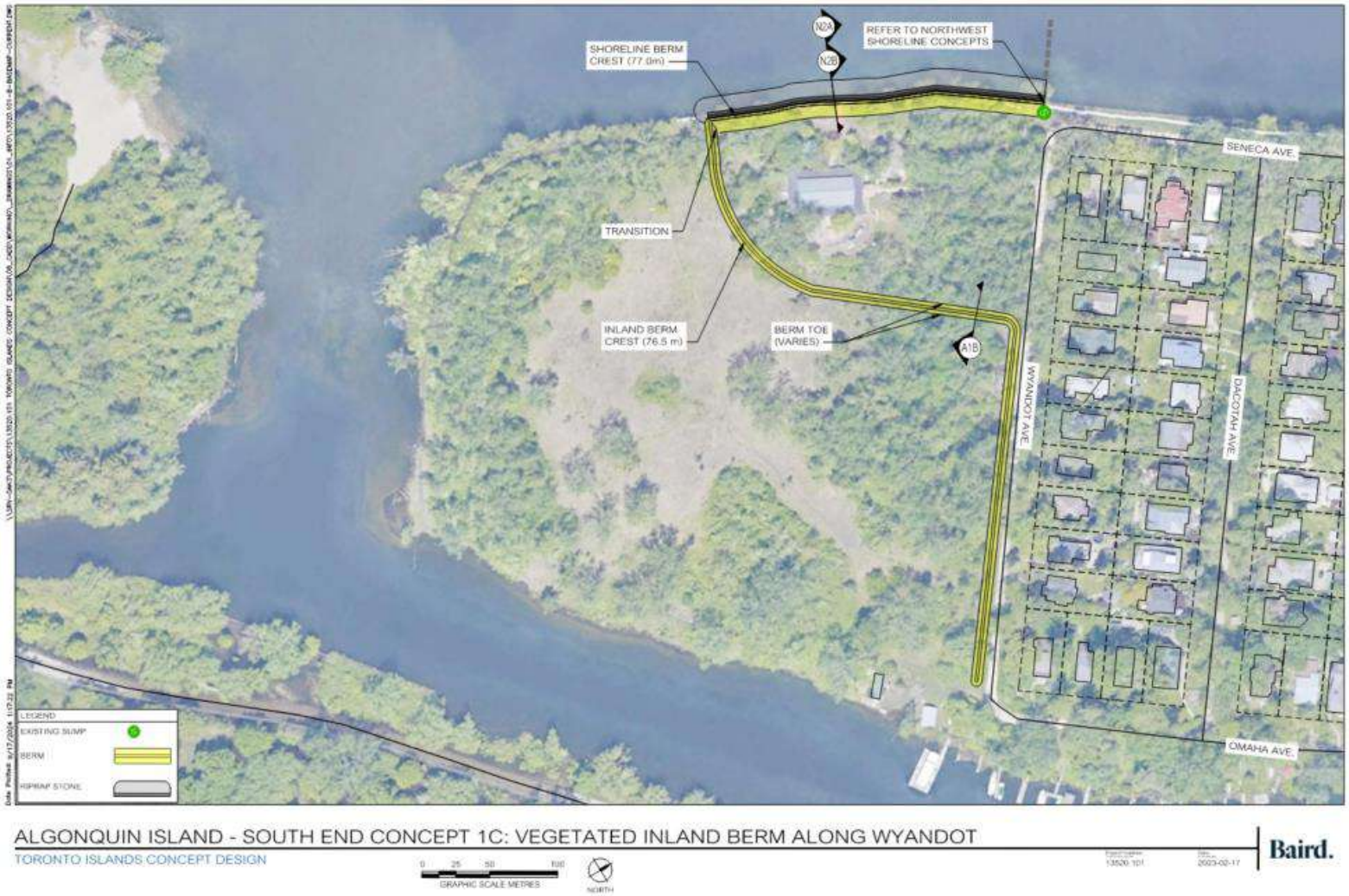


Figure 5.24: Concept 1C for the South End of Algonquin Island: Vegetated Inland Berm along Wyandot

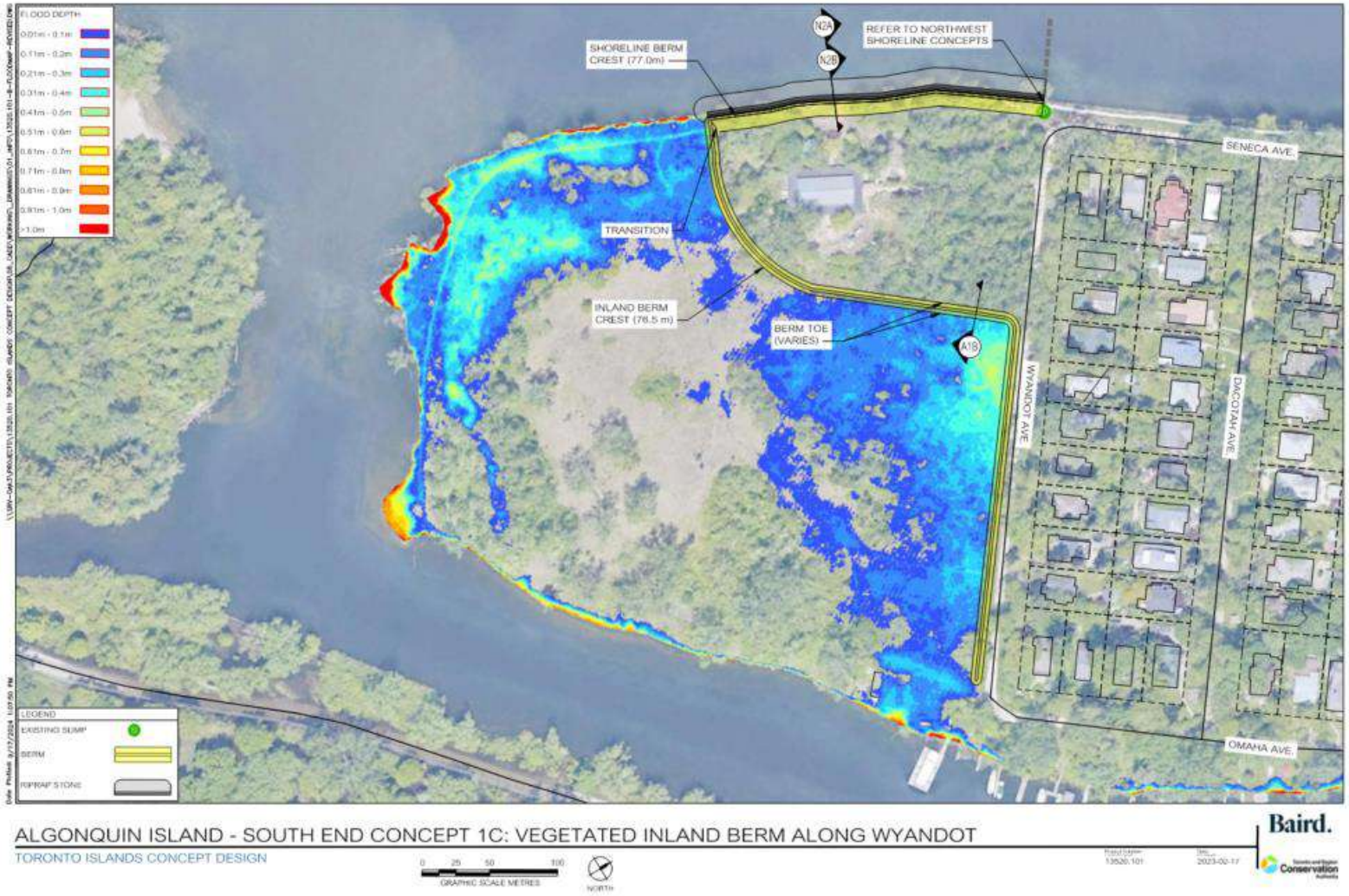


Figure 5.25: Flood depth during the 100-year flood event on Algonquin Island for Concept 1C

5.2.1.2 South End Concept 2: Vegetated Inland Berm and Flood Wall

Concept 2 for the south end of Algonquin Island, shown in plan in Figure 5.26, is similar to Concept 1B, in that it reduces the degree of disturbance to the ecologically sensitive area while protecting the Clubhouse. A vegetated inland flood berm, starting at the Northwest Shoreline, wraps around the Clubhouse and connects with Wyandot Ave. From there, the berm connects with a concrete flood wall (typical section shown in Figure 5.27) that follows Wyandot Ave. to Omaha Ave. The expected resulting flood depth map for this concept is shown in Figure 5.28. During the detailed design phase, the wetland hydrology will be reviewed, and a mitigation plan will be developed prior to implementation.



Figure 5.26: Concept 2 for the South End of Algonquin Island: Vegetated Inland Berm and Flood Wall

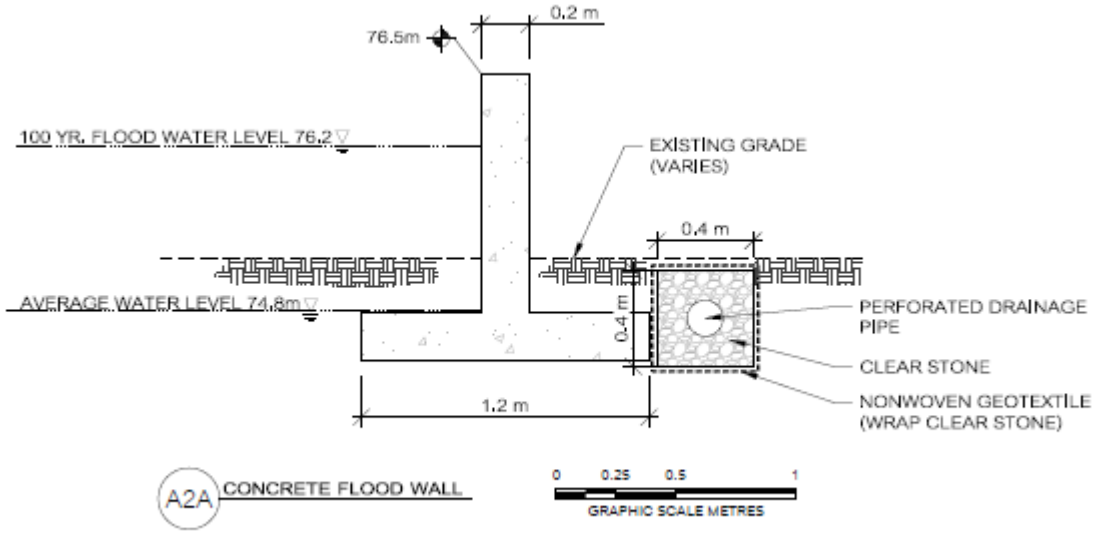


Figure 5.27: Typical flood wall section for Concept 2 for the south end of Algonquin Island

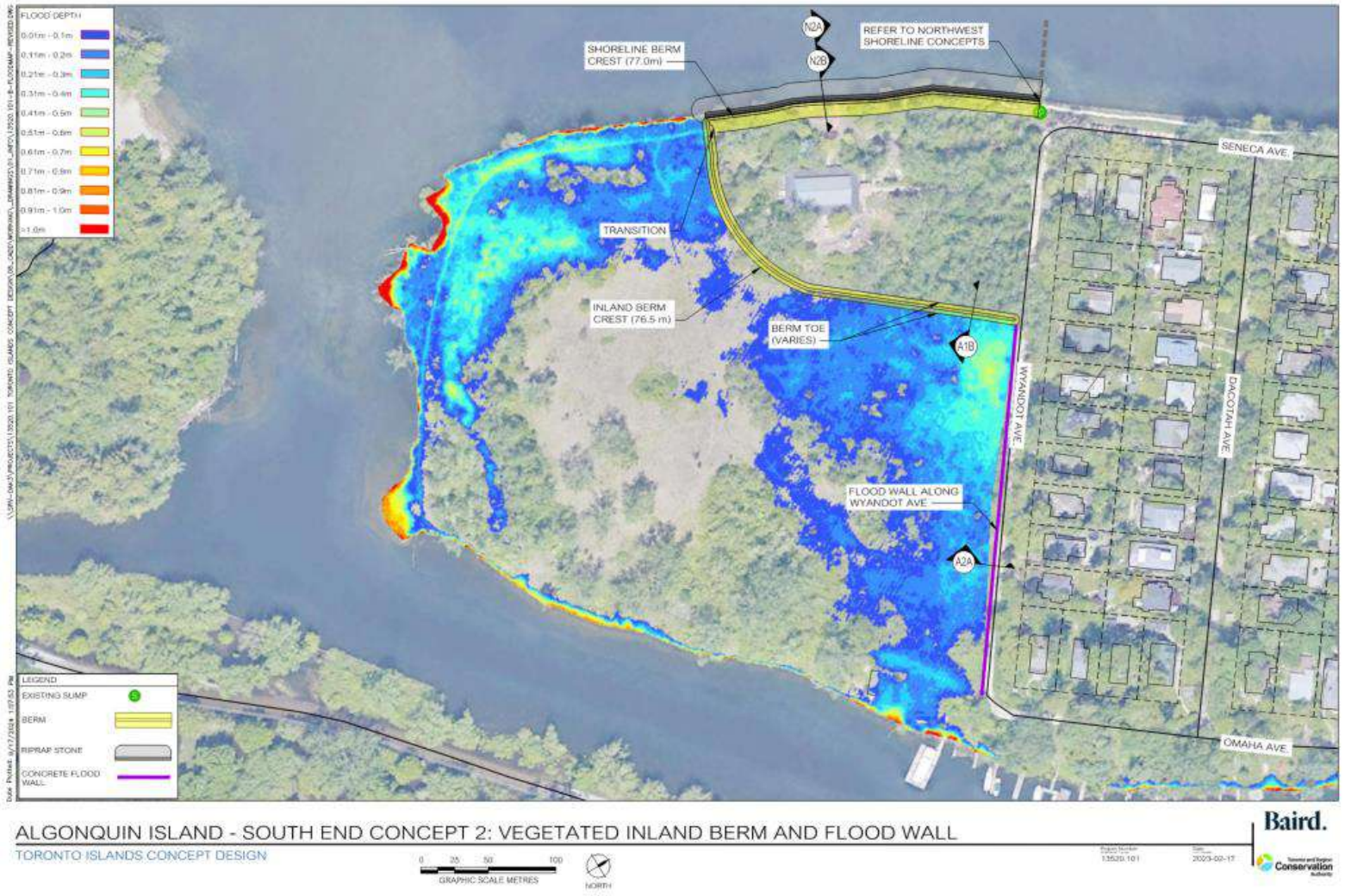


Figure 5.28: Flood depth during the 100-year flood event on Algonquin Island for Concept 2

5.2.1.3 South End Concept 3: Wyandot Avenue Flood Wall

Concept 3, shown in plan in Figure 5.29 and in section in Figure 5.30, includes a concrete flood wall along Wyandot Avenue. The south end of Algonquin Island is left in its natural state and allowed to flood during the 100-year flood event. For this concept, the Clubhouse and the pathway leading to the Clubhouse are outside of the flood protection system and would be vulnerable to flooding during the 100-year flood event. The first-floor elevation of the Clubhouse is 76.7 m (Baird, 2019b), which is 0.5 m above the 100-year flood level; it is unknown if there is a basement or crawl space that would be subject to flooding. The pathway leading to the Clubhouse is below the 100-year flood level and would need to be raised above 76.2 m to maintain access to the Clubhouse during a 100-year flood event. The surrounding property and parking area would remain vulnerable to flooding and likely unusable during the design event. The expected resulting flood depth map for Concept 3 during the 100-year flood event is show in Figure 5.31.



Figure 5.29: Concept 3 for the south end of Algonquin Island: Wyandot Avenue Flood Wall

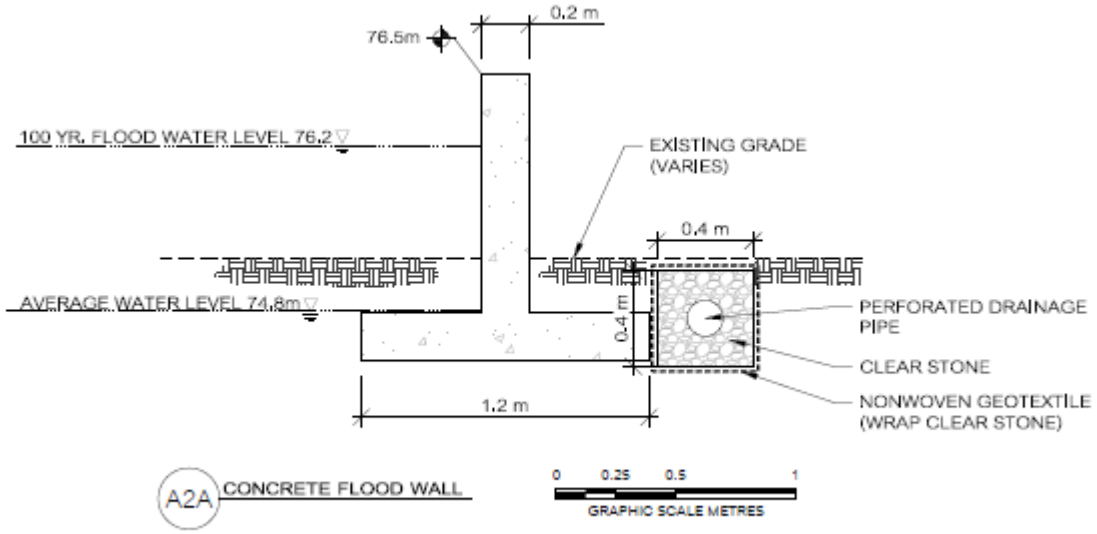


Figure 5.30: Typical flood wall section for Concept 3 for the south end of Algonquin Island

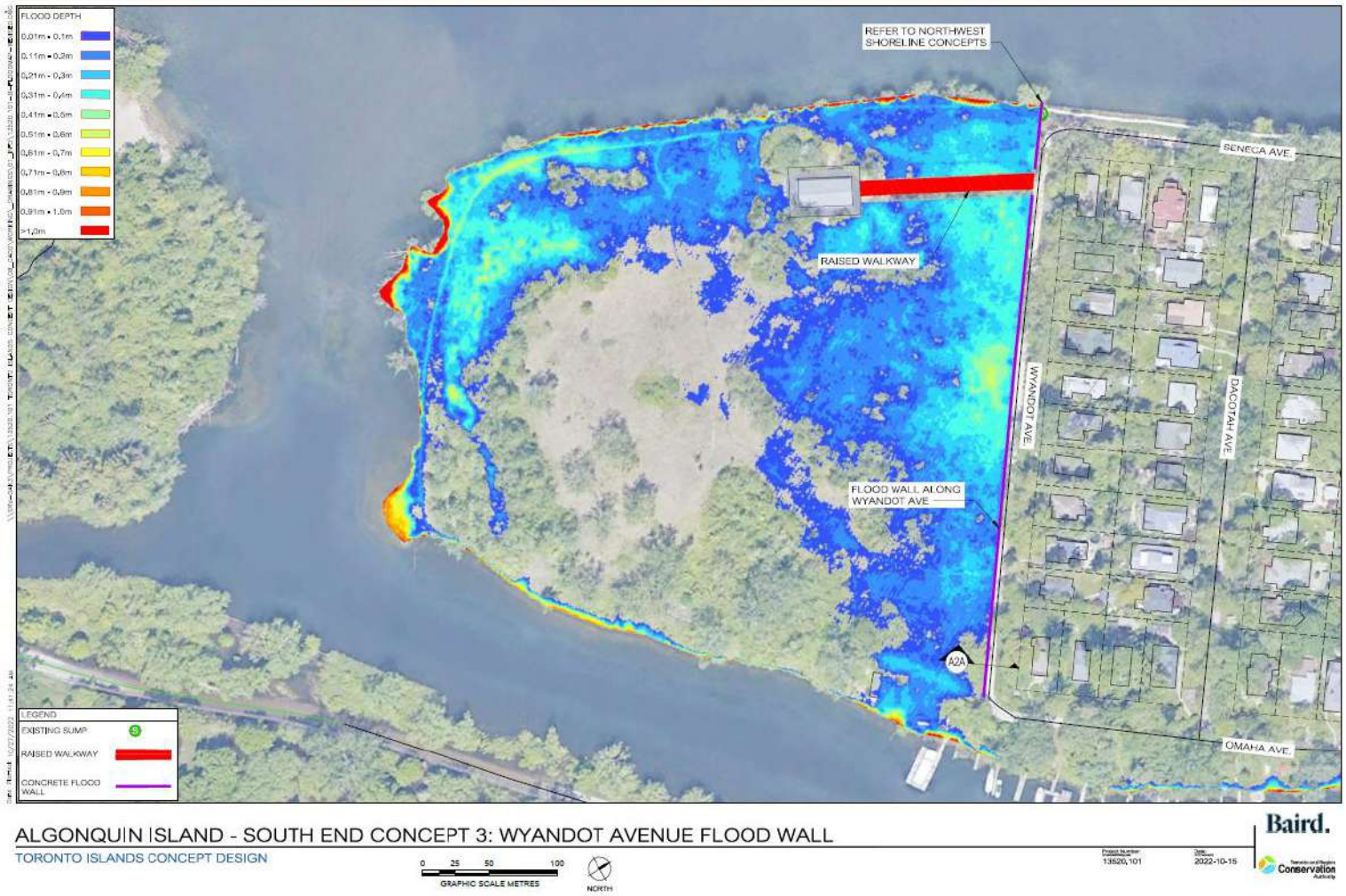


Figure 5.31: Flood depth during the 100-year flood event on Algonquin Island for Concept 3 for Northwest Shoreline

5.2.2 Northwest Shoreline

5.2.2.1 Northwest Shoreline Concept 1: Steel Sheet Pile Wall

During the detailed assessment of the existing seawall along Seneca Ave. (Baird, 2020), Baird investigated the feasibility of adding a vertical extension to the existing SSP wall to raise the crest elevation. The assessment concluded that it would be very difficult to achieve a proper seal between the existing wall and the extension. In addition, Baird's (2020) assessment concluded that the construction of a raised flood berm adjacent to the existing wall could result in damage/failure of the wall.

Concept 1 for the northwest shoreline involves installing a new, higher SSP wall in front of the existing seawall, as shown in plan in Figure 5.32 and in cross-section in Figure 5.33. The new wall would have a higher crest elevation of 77 m. This design concept would allow for small craft mooring along the new wall (if desired), with the maximum vessel size constrained by the water depth in front of the wall. The land adjacent to the wall would be raised using clean fill material to match the top of the new wall. The wall would extend west and east to tie into preferred concepts for the south end and QCYC. The expected residual flood depth map during the 100-year event for this concept, assuming effective flood protection is also implemented around the south end and QCYC, is shown in Figure 5.34.



Figure 5.32: Concept 1 for Northwest Shoreline: Steel Sheet Pile Wall

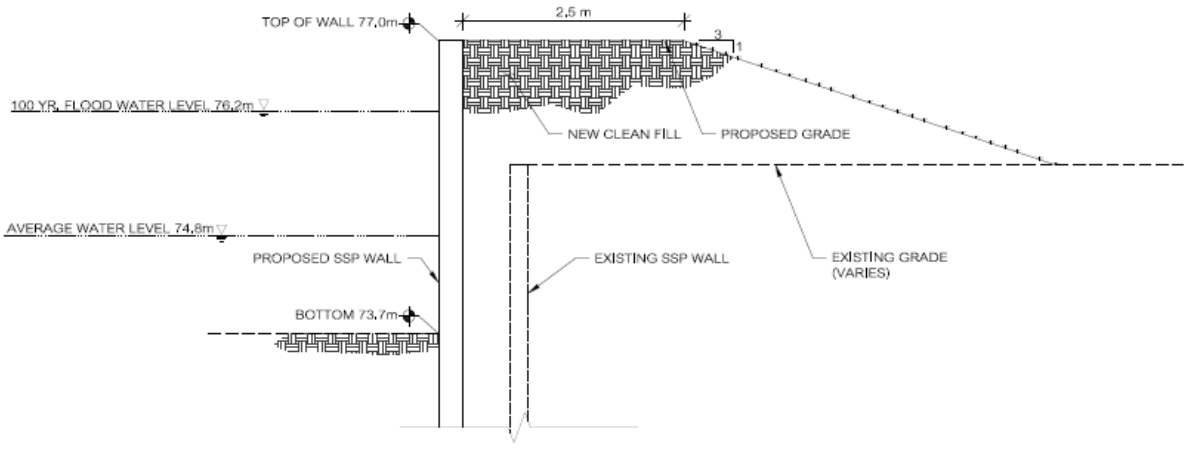


Figure 5.33: Typical Steel Sheet Pile Wall section for Concept 1 for Northwest Shoreline



Figure 5.34: Flood depth during the 100-year flood event for Northwest Shoreline Concept 1

5.2.2.2 Northwest Shoreline Concept 2: Impermeable Berm

Concept 2 includes an impermeable flood berm along the northwest shoreline of Algonquin Island. As noted previously, a condition assessment of the existing seawall completed by Baird (2020) concluded that the existing SSP wall may not be able to support the additional loading associated with the flood berm. As such, a stone berm in front of the seawall is required to provide structural support. This stone berm could be designed in various ways. One option would be a sloping stone revetment extending from the lakebed to the top of the wall; however, the underwater slope would preclude docking along the wall and be a hazard to boaters. A second option would be a stacked stone wall in front of the existing seawall; the stacked stone wall would facilitate docking alongside the seawall. The armour stone berm is shown in plan in Figure 5.35 and the stacked stone wall is shown in plan in Figure 5.36. Cross sections of both variations are shown in Figure 5.37.

The shoreline berm design includes an impermeable clay core. The typical section shows the crest and landward side of the berm vegetated. The lakeward side of the berm is protected by cobble. An alternate section is shown which includes a variation of the berm where the crest and lakeward side of the berm are protected with a vegetated articulated concrete block mattress. The berm concepts are shown with a protected and vegetated crest; however, the final design of the berm, including selection of crest protection (block mattress or stone) could include a wider crest to incorporate public use features. Localized modifications to the preferred alternative will be completed in detailed design to support spatial constraints in this area and could consider opportunities for recreational access and mooring, as well as recreational features such as seating areas and lookout points.

The expected residual flood depth map during the 100-year event for this concept is shown in Figure 5.38. This flood depth map is representative of both variations of the stone berm.



Figure 5.35: Concept 2 for Northwest Shoreline: Impermeable Berm with Armour Stone Berm



Figure 5.36: Concept 2 for Northwest Shoreline: Impermeable Berm with Stacked Stone Wall

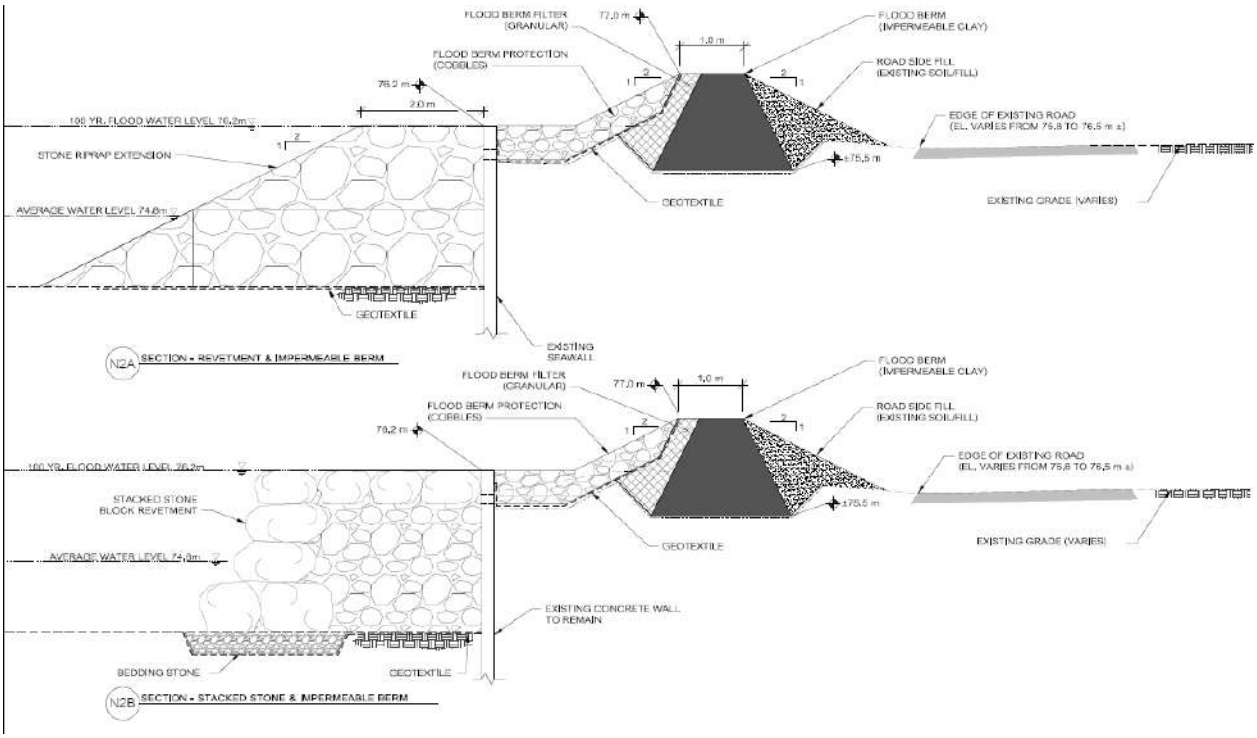


Figure 5.37: Typical section variations of an impermeable berm for Northwest Shoreline supported by sloping armour stone berm (N2A) and supported by vertical stacked stone wall (N2B)

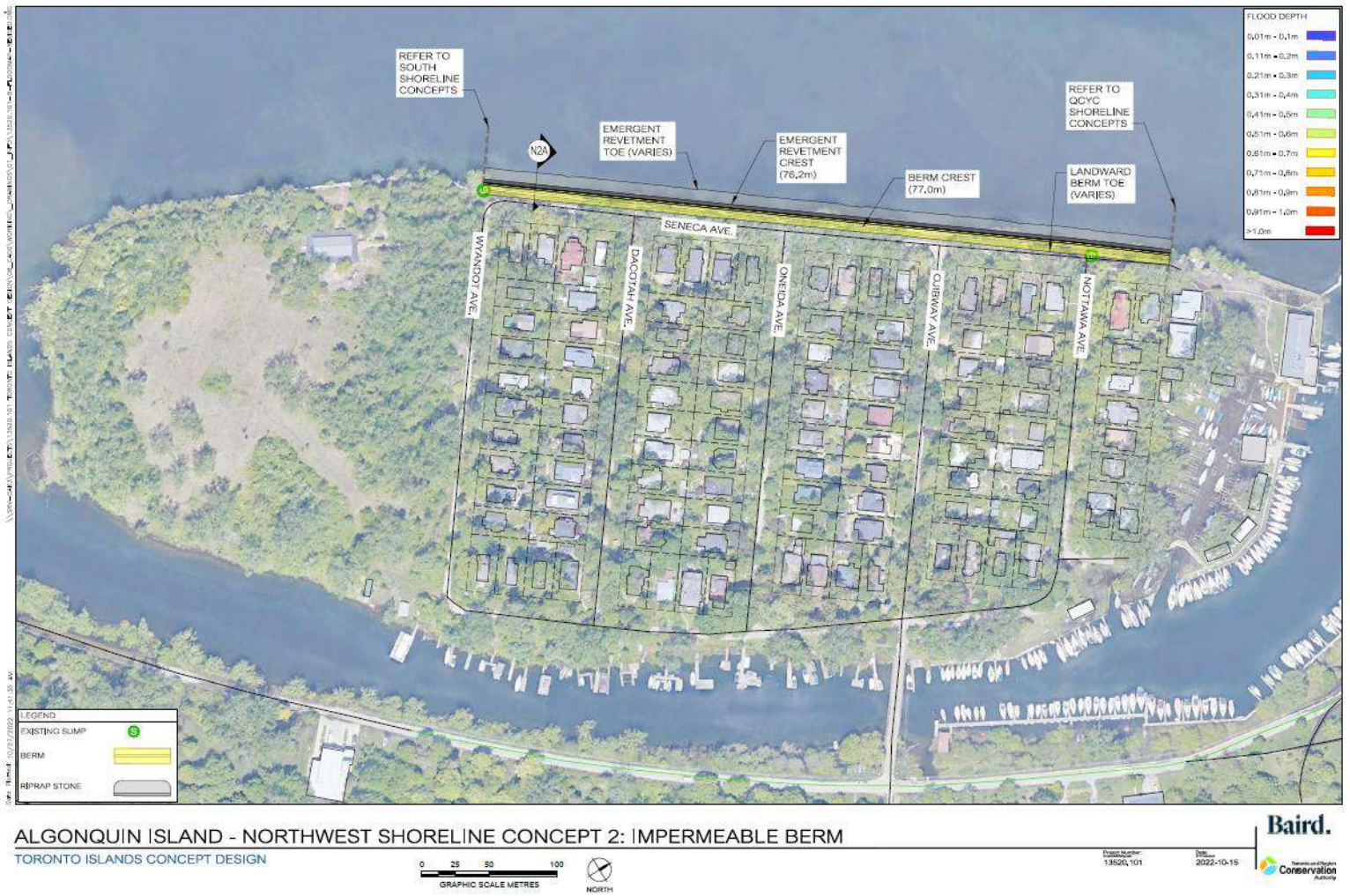


Figure 5.38: Flood depth during the 100-year flood event for Northwest Shoreline Concept 2

5.2.2.3 Northwest Shoreline Concept 3: Impermeable Berm and Nearshore Habitat

Concept 3, shown in plan in Figure 5.39, includes an impermeable berm along the top of the existing SSP wall to provide flood protection along the northwest shoreline. A typical section for this concept is shown in Figure 5.40. Renderings of similar concepts from other Baird projects are shown in Figure 5.41, which demonstrate nearshore habitat and use of rock shoals. Localized modifications to the preferred alternative will be developed during the detailed design phase to support spatial constraints in this area and consider opportunities for recreational access and mooring, as well as recreational features such as seating areas and lookout points.

The existing SSP wall would be supported by suitable fill materials placed in front of the wall to create a sloping nearshore habitat. The nearshore fill area would include aquatic habitat features such as rock shoals, aquatic plants, and woody mattresses. The fill would be retained by a stone berm on the lakeward edge, by the existing vessel breakwater at the north end near QCYC, and by a groyne or solid jetty at the south end.

The expected residual flood depth map during the 100-year event for this concept is shown in Figure 5.42.

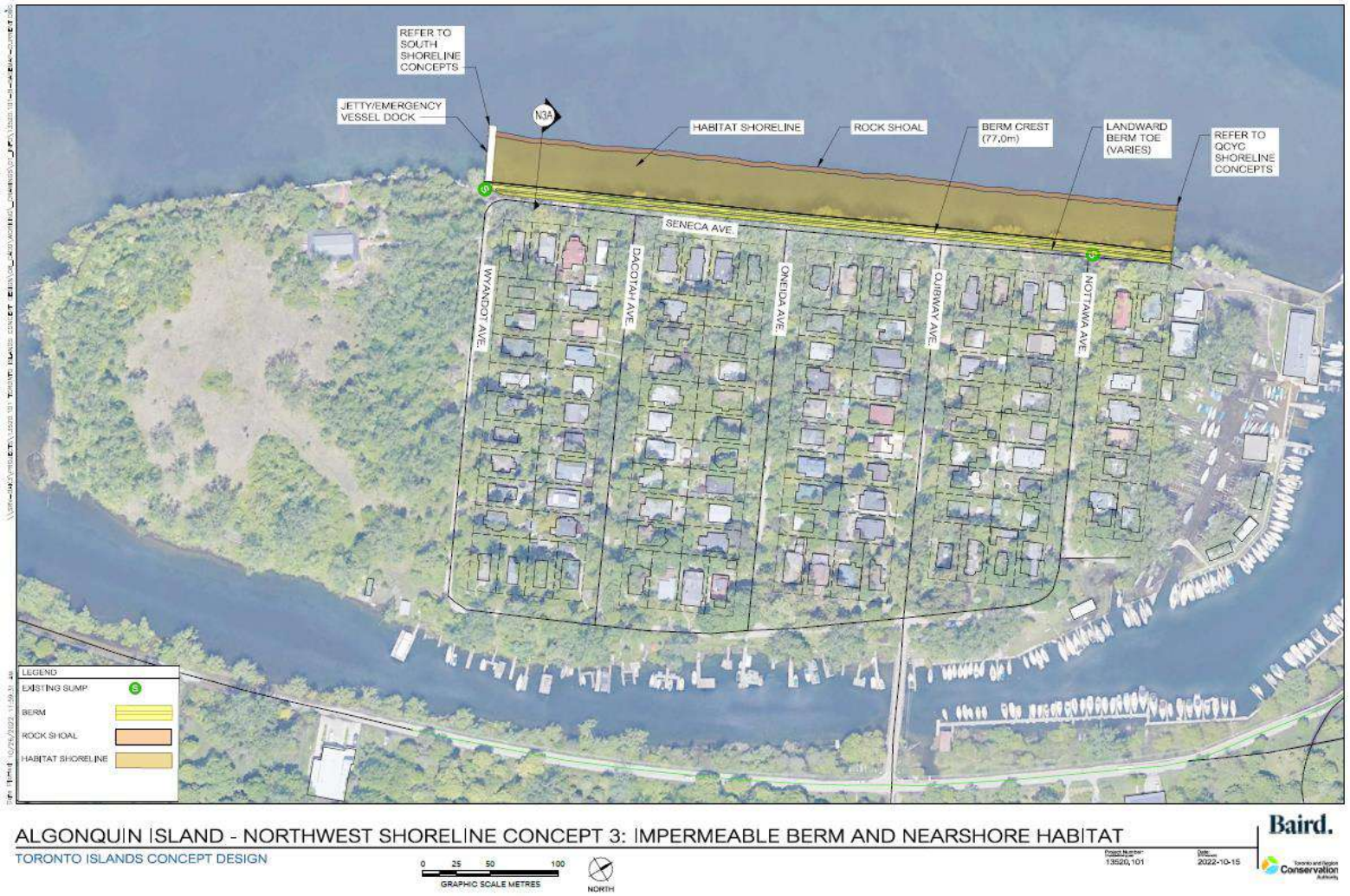


Figure 5.39: Concept 3 for Northwest Shoreline on Algonquin Island: Impermeable Berm and Nearshore Habitat

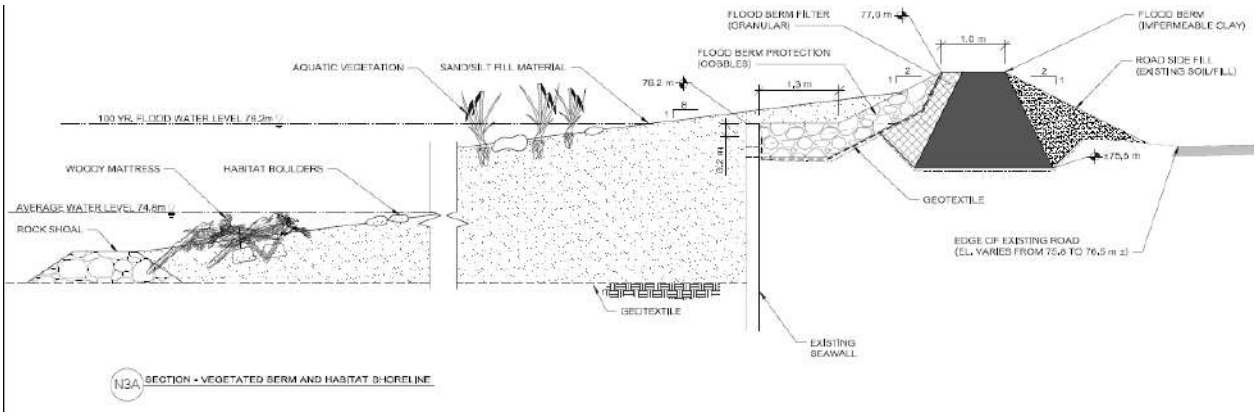


Figure 5.40: Typical nearshore habitat and impermeable berm section for Northwest Shoreline Concept 3



Figure 5.41: Renderings of nearshore habitat from other Baird projects showing vegetated shoreline and nearshore habitat (right) and a submerged rock shoal retaining sand material (left)

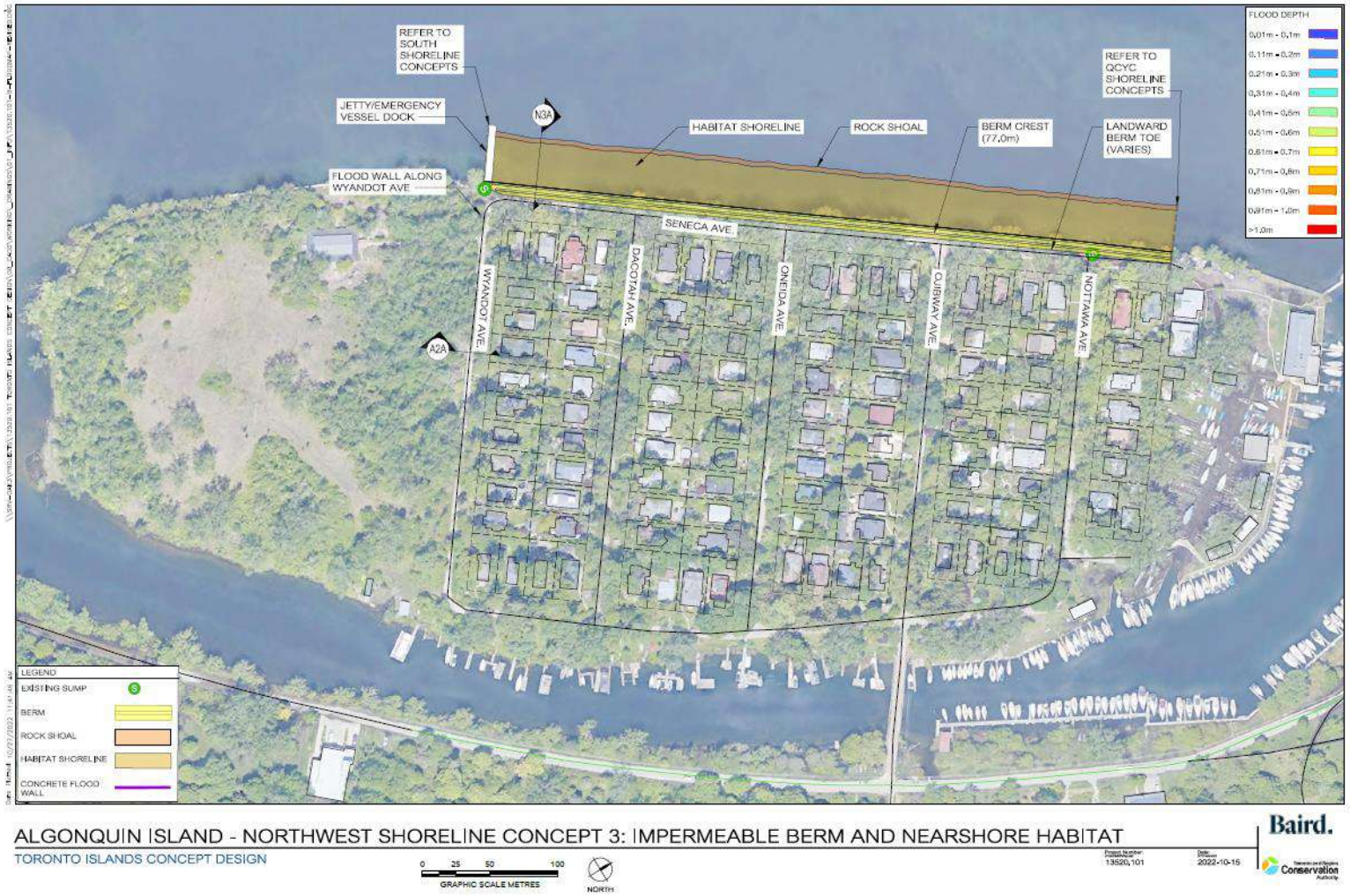


Figure 5.42: Flood depth during the 100-year flood event for Northwest Shoreline Concept 3

5.2.2.4 Emergency Vessel Docking

A design consideration for the northwest shoreline was accommodation for emergency vessels, specifically a police boat docking somewhere along Seneca Ave. The typical police boats that would service the Toronto Islands are 10 m long and have a 1 m draft, however police dive boats are sometimes used as well and are 12 m long and have a 1.2 m draft. Presently, the only suitable area for the police boat to dock at Algonquin Island is on the western side at the intersection of Wyandot Ave. and Seneca Ave. as the water becomes too shallow east of this area. The concepts for the Northwest Shoreline flood mitigation are required to maintain or improve the level of access for police boats wherever possible. Although the design is outside the scope of this project, a jetty could be incorporated into any of the concepts presented to accommodate emergency vessel docking.

Toronto Fire uses a fire vessel that is 25 m long and has a 2.4 m draft; this vessel is too large to dock along Seneca Ave. given the existing water depths. Toronto Fire has a station on the Island Park and is able to access Algonquin Island from land; they also have procedures in place to deliver additional staff and water to Algonquin Island in case of a large fire (personal communication with Toronto Fire staff). Therefore, accommodation for docking fire vessels is not required for Algonquin Island.

5.2.3 Queen City Yacht Club (QCYC)

5.2.3.1 Queen City Yacht Club (QCYC) Concept 1: Steel Sheet Pile Wall

Concept 1 for QCYC includes the installation of a new SSP seawall along the QCYC shoreline with a higher crest elevation than the existing wall. Effectively, this concept represents an extension of Concept 1 for the northwest shoreline of Algonquin Island around the QCYC property, with the wall terminating at the bridge connecting Algonquin and Ward's Islands. Figure 5.43 shows this concept in plan view. A detailed investigation of the existing seawall has not been completed. Hence, similar to the existing SSP wall along Seneca Ave., it is assumed that a vertical extension to the existing seawall around the QCYC shoreline would not be an effective solution; therefore, a new SSP wall in front of the existing wall is proposed.

A typical cross-section for this concept is shown in Figure 5.44. This concept would result in some encroachment into the water and consequentially a reduced navigation lane between the slips on either side of the Channel by 1-2 m. This may adversely impact navigation at the narrowest part of the channel (near the bridge). In addition, his concept would require new dock connections and might require longer dock access ramps, as the difference between the crest of the wall and the docks at low water levels would be greater than existing conditions. The walkway and land area adjacent to the seawall would be backfilled to the same elevation as the top of the wall. Temporary closure measures, such as sandbags, stop logs or gates, would be required at the marine railway, southwest boat launch and dock access gaps during flood events.

The expected residual flood depth map during the 100-year event for this concept is shown in Figure 5.45.

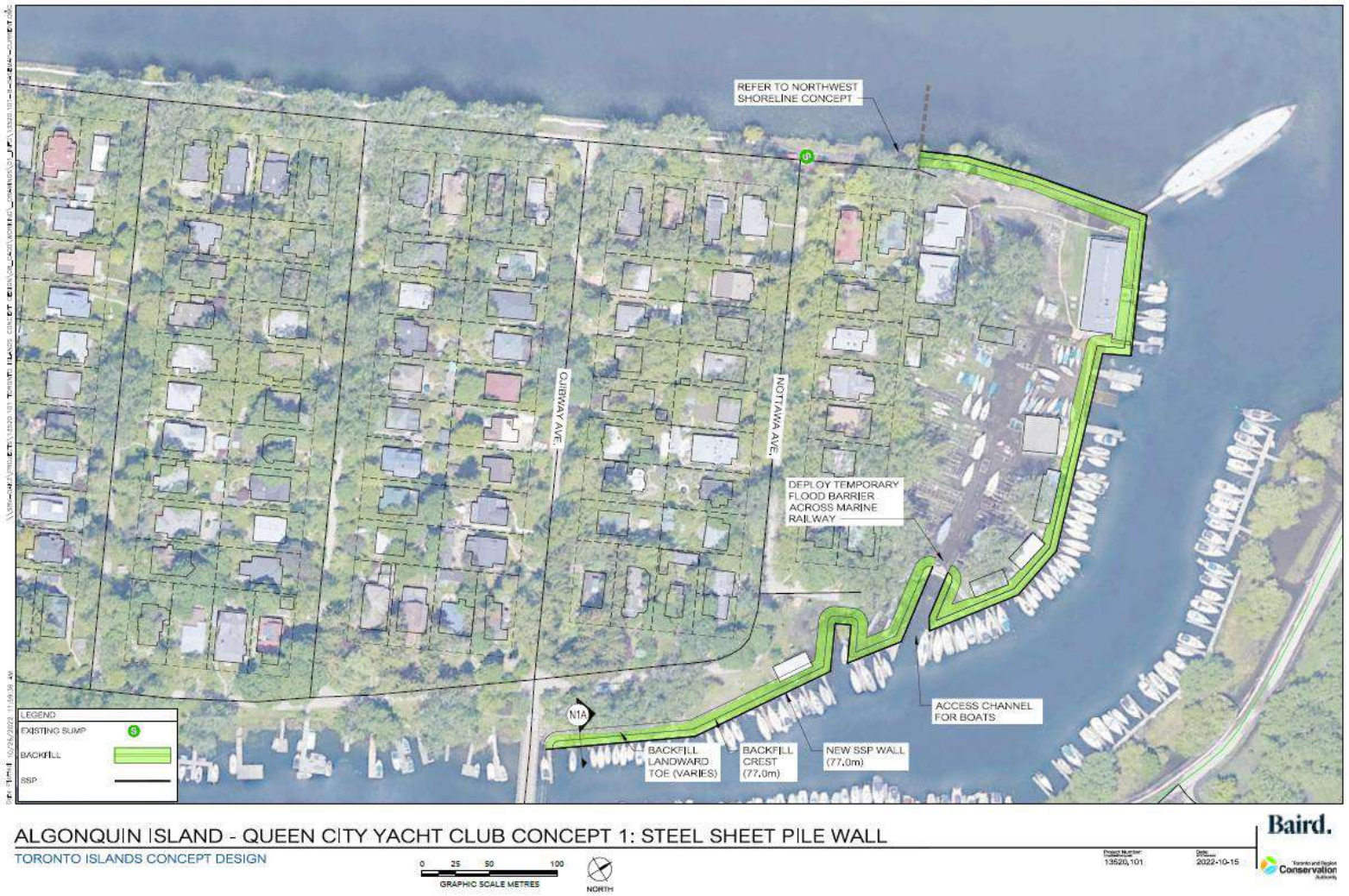


Figure 5.43: Queen City Yacht Club (QCYC) Concept 1: Steel Sheet Pile Wall

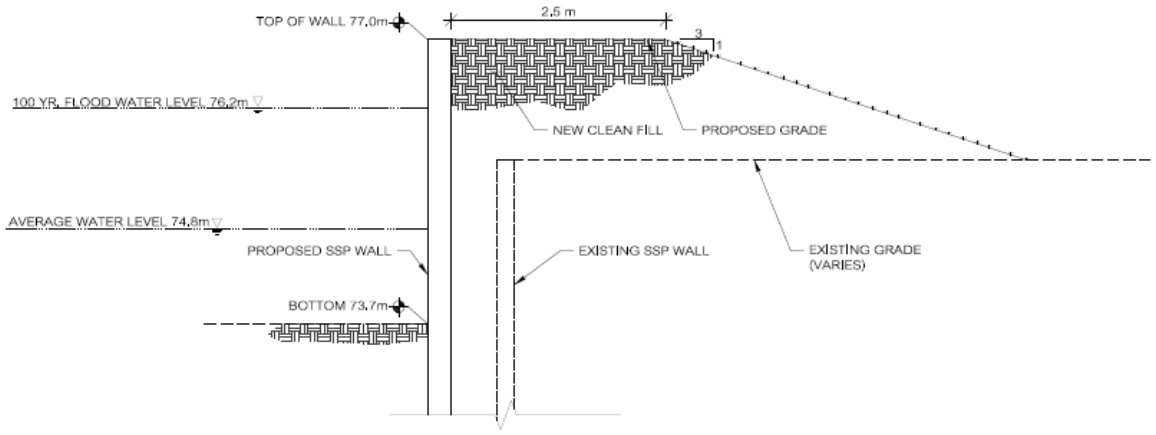


Figure 5.44: Typical section of Steel Sheet Pile (SSP) wall for Queen City Yacht Club (QCYC) Concept 1



Figure 5.45: Flood depth during the 100-year flood event for Queen City Yacht Club (QCYC) Concept 1

5.2.3.2 Queen City Yacht Club (QCYC) Concept 2: Concrete Dock Wall

Concept 2 for QCYC includes a new SSP seawall with stepped concrete promenade built in front of the existing vertical wall (Figure 5.46). A detailed condition assessment of the existing wall would be required to determine if the existing wall has the capacity to support the added weight of the concrete top. It has been assumed at this stage of design that the existing wall cannot support additional loading; hence, the design concept includes the addition of a new SSP wall and fill in front of the existing wall. The stepped concrete wall would have a crest height of 76.5 m to provide flood protection, as shown in the typical section in Figure 5.47. The walkway and land area adjacent to the wall would be raised to match the level of the crest of the wall, and the steps would provide access to the docks. This alternative would require new connections to the docks; however, the lower-outer step would be at approximately the same elevation as the existing wall, so the existing ramps could probably be reused. A gangway connection is an example of a new connection that may be added to allow for connection to the docks. An example of this connection can be seen in section QB2 in Appendix B. The northwest shoreline along QCYC would be protected with the same SSP wall described in Concept 1 as there are no docks to accommodate along this shoreline stretch.

This concept would result in some encroachment into the water and consequentially a 1-2 m reduction in the width of the navigation lane between the slips on either side of the Channel. This may adversely impact navigation at the narrowest part of the channel (near the bridge). Temporary closure measures, such as sandbags, stop logs or gates, would be required at the marine railway, southwest boat launch and dock access gaps during flood events.

The expected residual flood depth map for this concept during the 100-year flood event is the same as Concept 1 (Figure 5.45).



Figure 5.46: Queen City Yacht Club (QCYC) Concept 2: Concrete Dock Wall

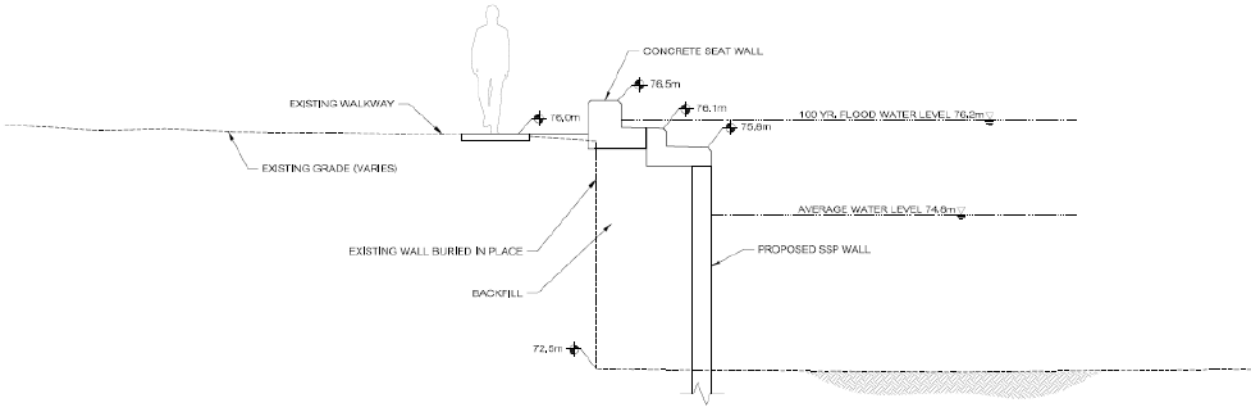


Figure 5.47: Typical concrete wall section for Queen City Yacht Club (QCYC) Concept 2

5.2.3.3 Queen City Yacht Club (QCYC) Concept 3: Flood Wall

Flood mitigation at QCYC for Concept 3 includes the installation of a concrete flood wall landward of the existing walkway around the QCYC property, as shown in Figure 5.48. The flood wall would generally follow the alignment of the existing walkway. Gaps in the wall would be located where access to buildings is required and at the marine railway; these gaps would require the installation of temporary closure measures, such as sandbags, stop logs or gates, during flood events. The existing pathway may need to be temporarily removed and reconstructed to facilitate construction of the wall and its footing. A typical cross-section for this concept is shown in Figure 5.49. The northwest shoreline along QCYC and the shoreline around the clubhouse would be protected by the SSP wall and backfill presented in Concept 1 to tie into protection on the Northwest Shoreline and provide continuous protection at the shoreline (not inland) for the entire length of the Algonquin Island northwest shoreline.

The expected residual flood depth map during the 100-year event is shown in Figure 5.50 for Concept 3.

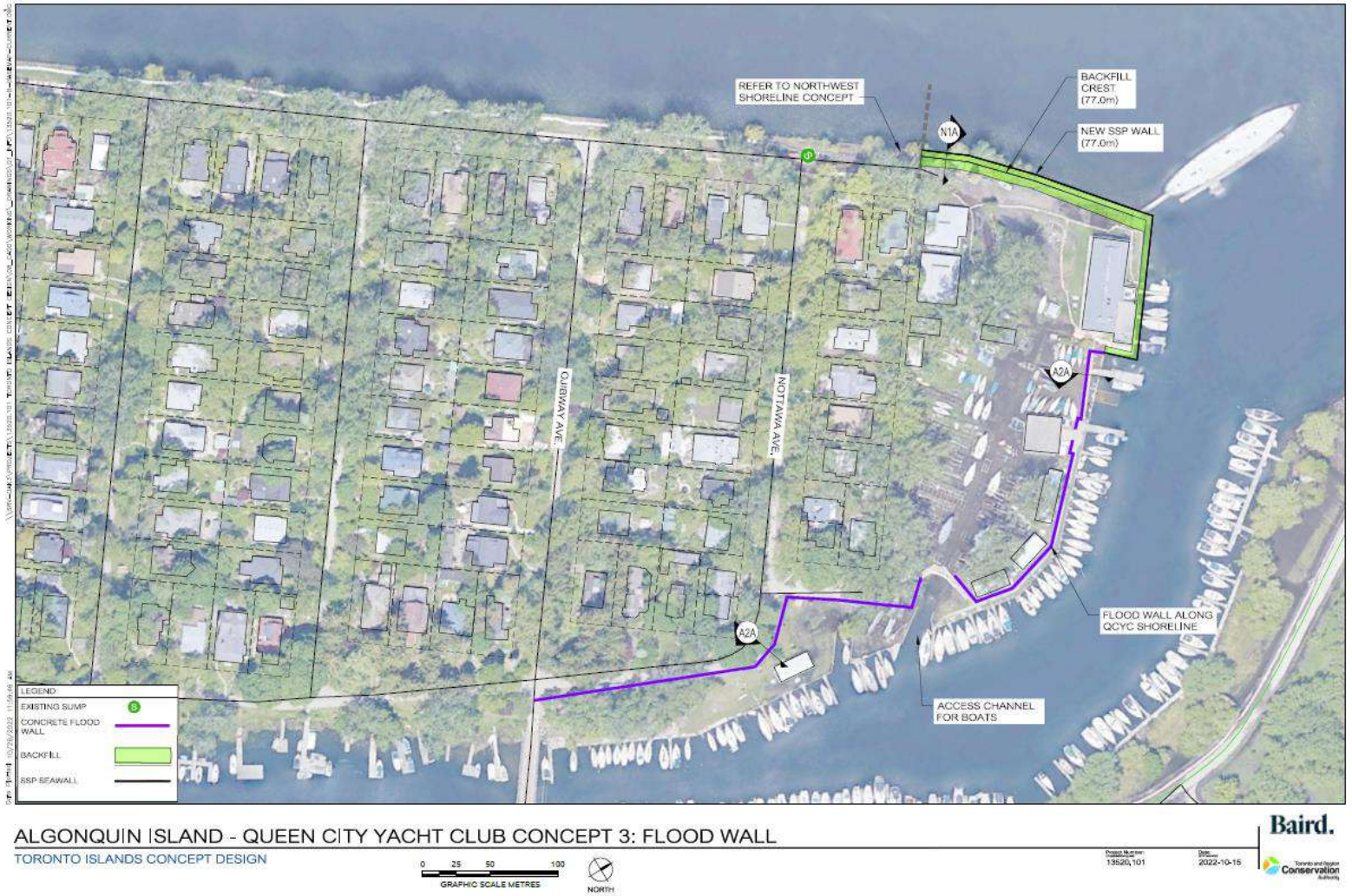


Figure 5.48: Queen City Yacht Club (QCYC) Concept 3: Concrete floodwall

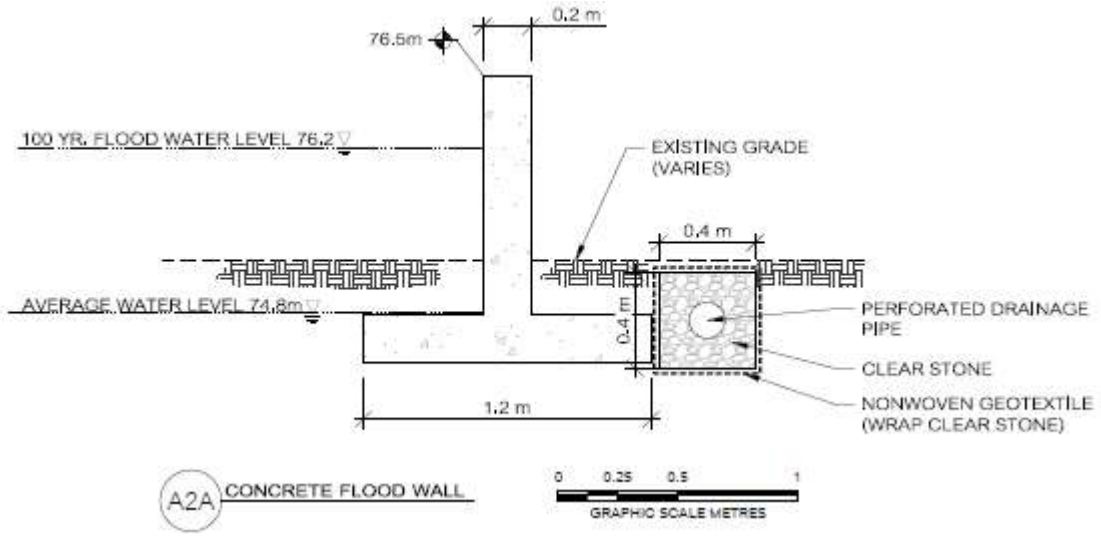


Figure 5.49: Typical flood wall section for Queen City Yacht Club (QCYC) Concept 3

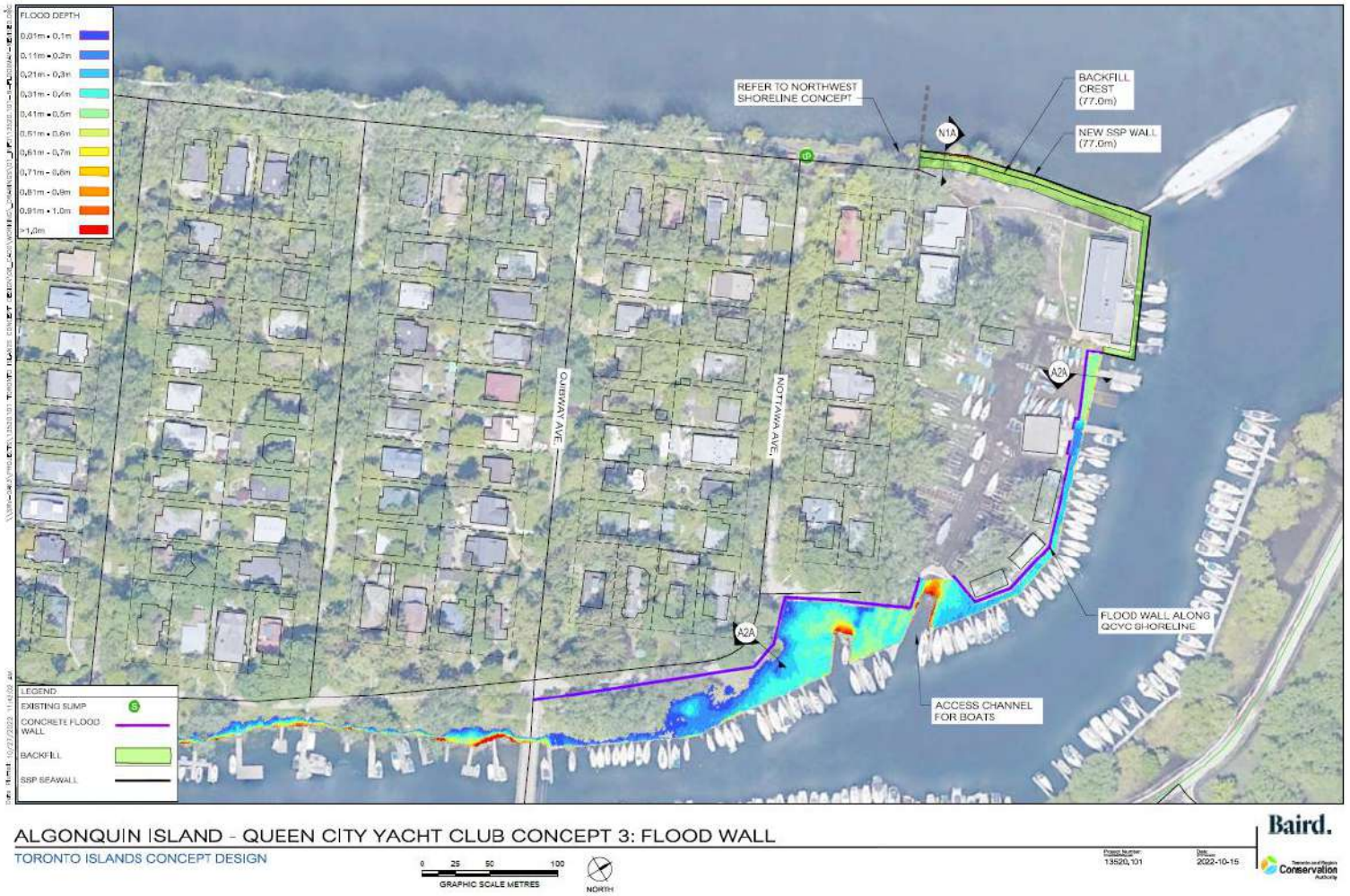


Figure 5.50: Flood depth during the 100-year flood event for Queen City Yacht Club (QCYC) Concept 3

5.2.3.4 Queen City Yacht Club (QCYC) Concept 4: Land Raising and Raised Walkway

Concept 4 (Figure 5.51) for QCYC includes raising the land along the south area of QCYC above the 100-year flood level and considers existing flood mitigation measures implemented by the club following the 2019 flood event. The south area of the club (an area of approximately 1250 square metres) would be raised to a minimum elevation of 76.3 m to remain accessible during the 100-year event. Members of QCYC completed flood mitigation measures along the east shoreline of the club following the 2019 flood event, including construction of a raised walkway and modifications to the existing dock walls to allow for installation of modular flood walls during a flood event. The raised walkway was constructed from mounded and buried sandbags. Concrete slab pavers were placed on top of the mound to create an elevated walkway (Figure 5.52). The finished elevation of the elevated walkway is approximately 76.2 m, however this must be confirmed by an Ontario Land Surveyor prior to detailed design. The modifications to the existing eastern SSP dock walls included bolting ¼ inch thru plates (otherwise known as Y plates) to the SSP at regular intervals. During a flood event, wood posts would be slotted into the thru plates and secured. Two (2) 2 x 8-inch timber boards would be stacked across the gaps and screwed into the posts to effectively raise the height of the wall to an elevation above the flood level (Figure 5.53). The raised land at the south of the club would end at the marine railway, with a flood gate to be installed across the marine railway. The flood gate would only be deployed during flood events, with the marine railway to remain operational during normal conditions. The flood gate would tie into the raised land on the west side and the raised walkway on the east side. The northwest shoreline of QCYC would include a buttressed concrete wall along the top of the existing SSP wall (existing site constraints along this section of the shoreline does not provide enough space for a berm). Due to the added weight of the concrete flood wall, the existing SSP wall would be supported by a stone berm/armour stone buttress. Lastly, a berm with a pathway will be placed along the southeastern shore to create a raised walkway which will protect this area from flooding while maintaining access to the docks. This berm would extend to the end of the focus area limits, terminating near the Algonquin Island Bridge, but its exact layout would be confirmed during detailed design and would take into consideration existing infrastructure, special constraints, and structural conditions along the shoreline. The typical cross-section shows the berm walkway set back from the shoreline, but if spatial constraints require placement closer to the shore, an in-water buttress may be required in this area to support the existing seawall.

The expected residual flood depth map during the 100-year event is shown in Figure 5.57 for Concept 4.

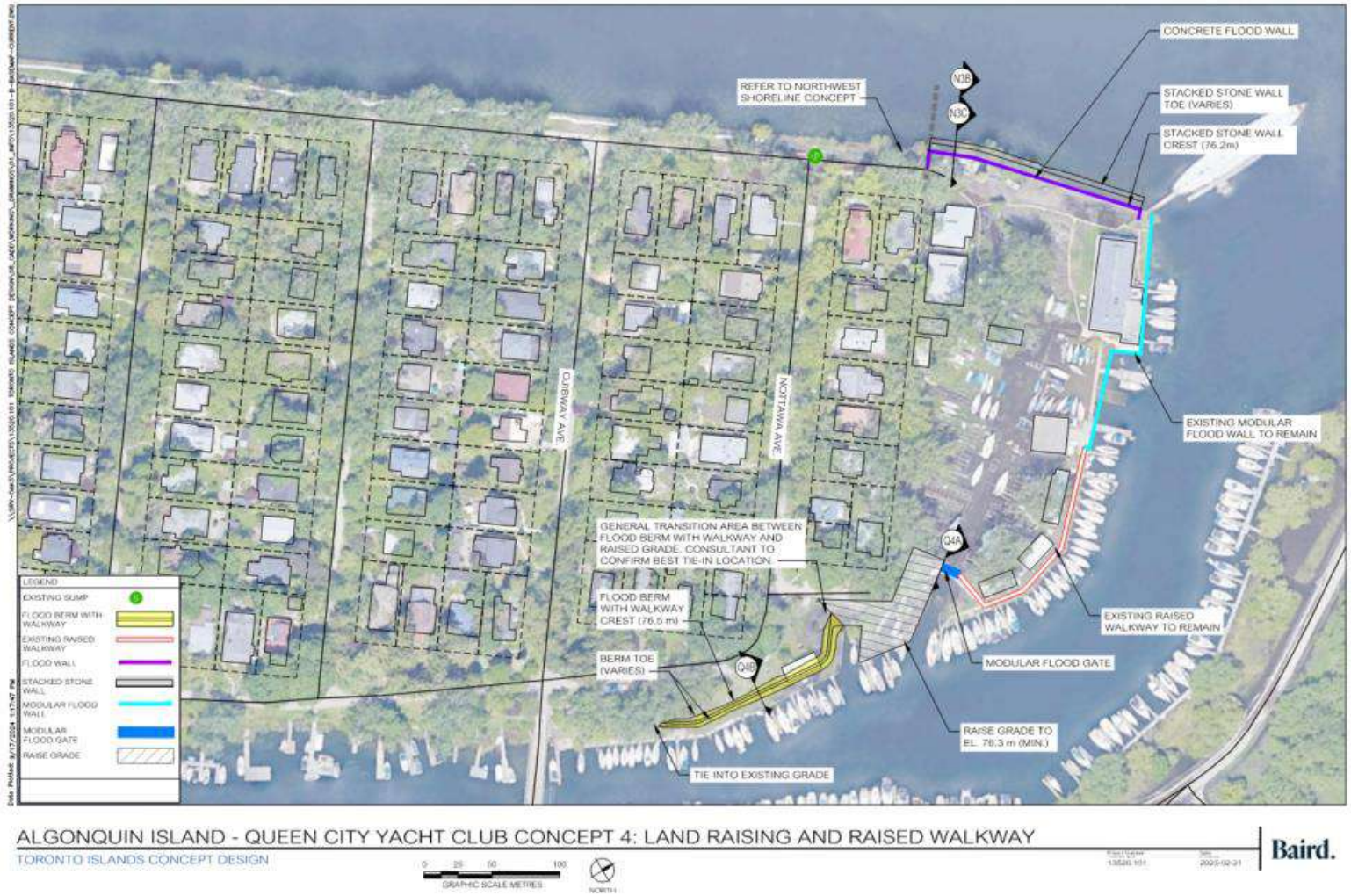


Figure 5.51: Queen City Yacht Club (QCYC) Concept 4: Land Raising and Raised Walkway



Figure 5.52: Members of QCYC constructing the raised walkway (Source: Ron Mazza, QCYC)

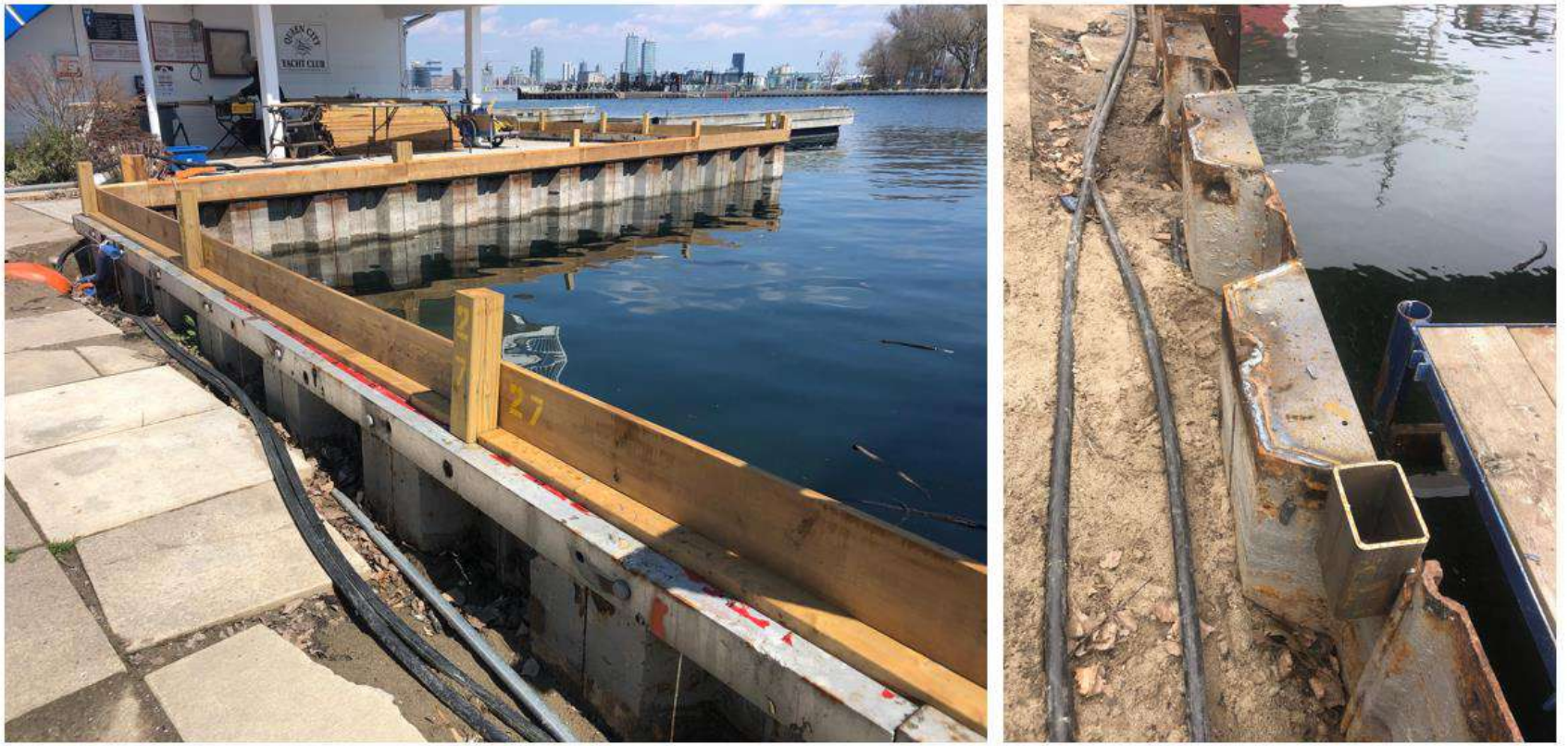


Figure 5.53: Modifications to the SSP dock wall at QCYC to accommodate modular wall during flood events (Source: Ron Mazza, QCYC)

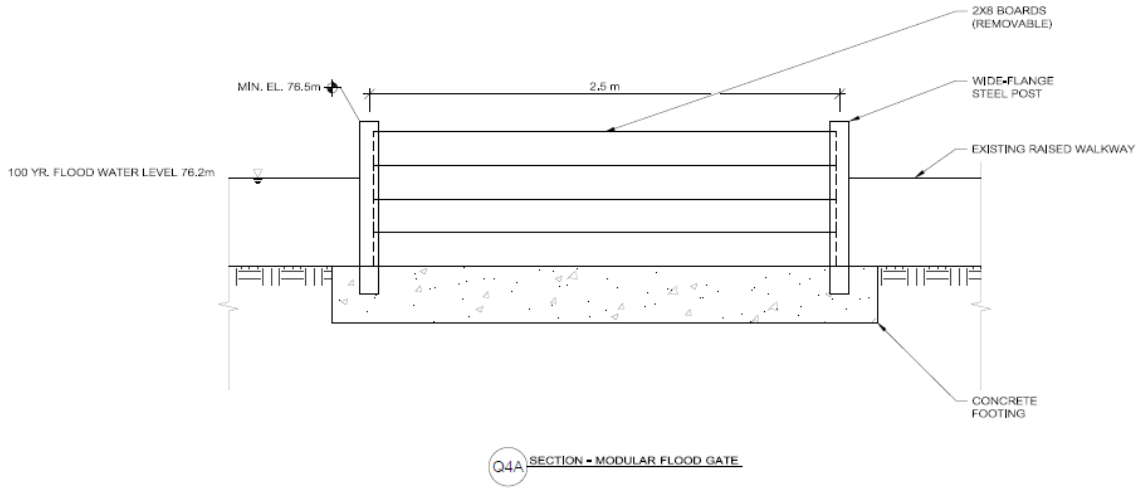


Figure 5.54: Typical modular flood gate section for Queen City Yacht Club (QCYC) Concept 4

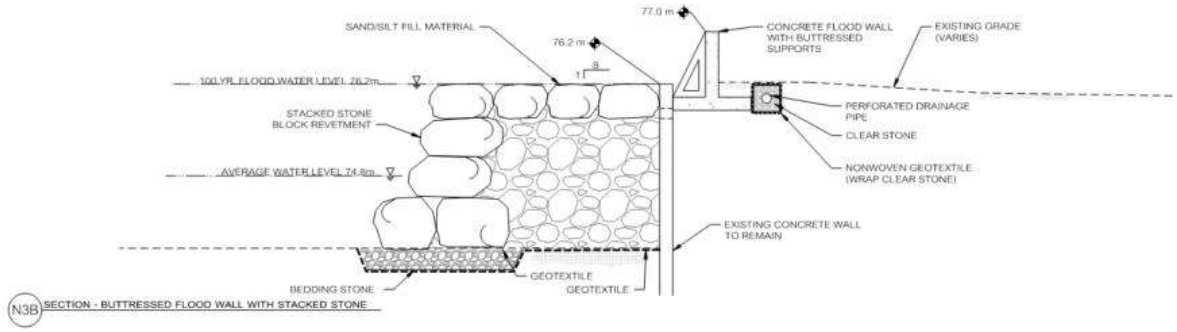


Figure 5.55: Typical concrete wall and stone buttress section for Queen City Yacht Club (QCYC) Concept 4

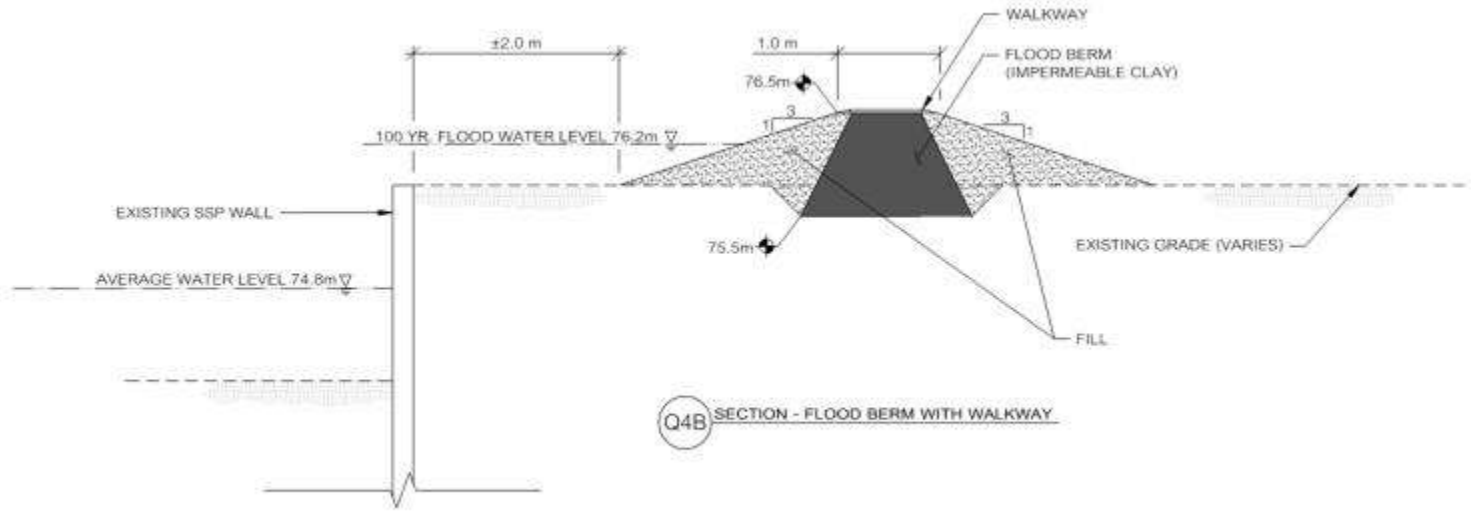


Figure 5.56: Typical vegetated inland berm section with walkway for QCYC Concept 4.



Figure 5.57: Flood depth during the 100-year flood event for Queen City Yacht Club (QCYC) Concept 4

5.3 Centre Island

The Centre Island study area has been divided into three focus areas: Toronto Island Marina, Centre Island Ferry Terminal, and Centreville. The flood mitigation concepts for these focus areas are presented and discussed in this section.

5.3.1 Toronto Island Marina

5.3.1.1 Toronto Island Marina Concept 1: Land and Road Raising

In Concept 1, the central land area within the Toronto Island Marina, including the boat storage yard, club house, and restaurant, would be raised above the 100-year flood elevation. The main roadway within the marina (Avenue of the Island) and the pathway leading to the southern end of the marina would be raised above the 100-year flood level as required to maintain safe access during the 100-year flood event. This concept is shown in plan in Figure 5.58. The green lines on Figure 5.58 represent roads that will be raised for the Roadways study area and are not specific to the Toronto Island Marina concept. Conversely, red lines represent roads that will be raised for the Toronto Islands marina Concept 1.

The expected residual flood depth map for Concept 1 during the 100-year event is shown in Figure 5.59. While the central area in the Marina would be raised above the design flood level, the park land between the marina and the ferry terminal, including the Island BBQ and Beer Co. would remain vulnerable to flooding.



Figure 5.58: Toronto Island Marina Concept 1: Land and Road Raising

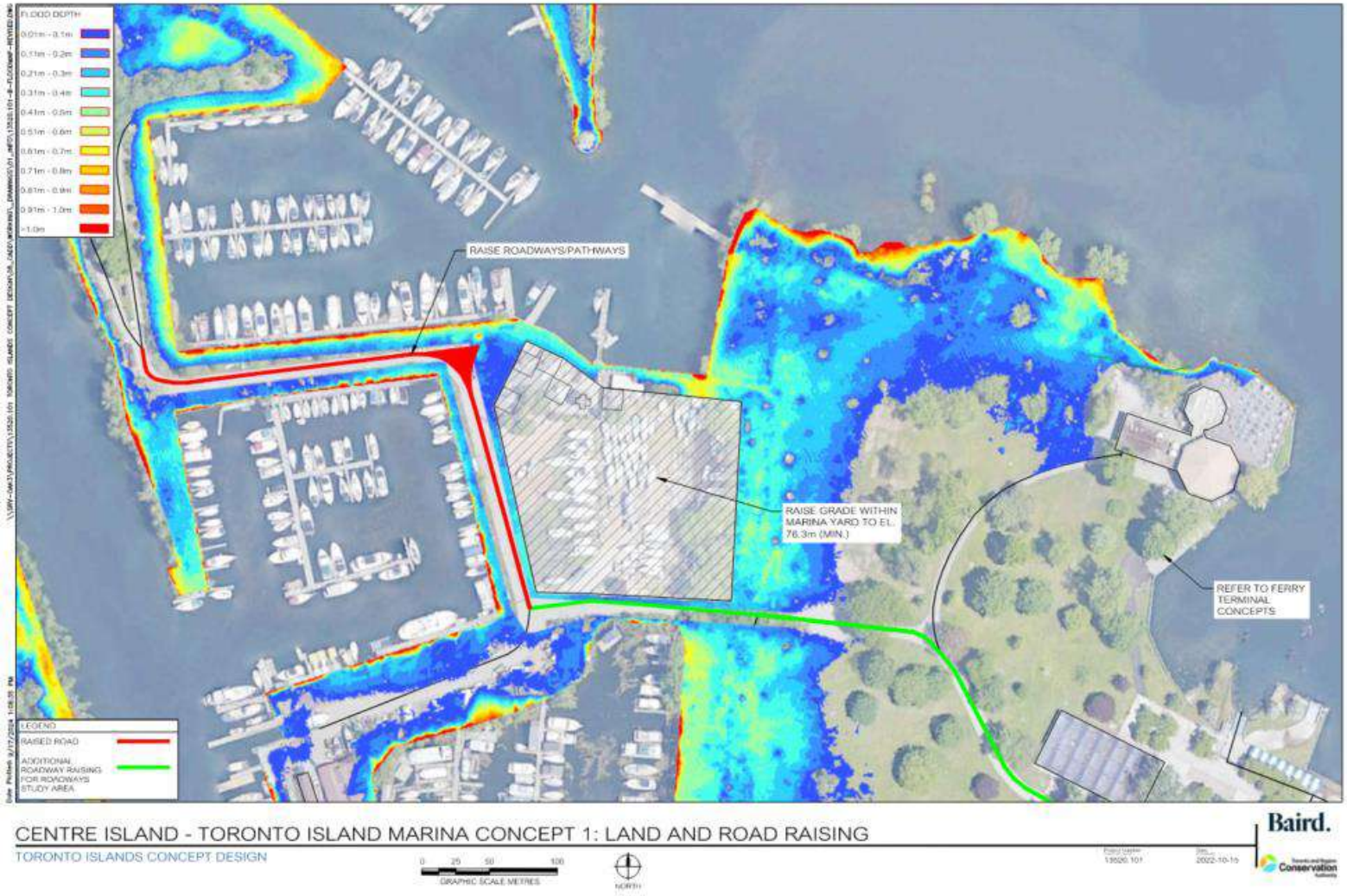


Figure 5.59: Flood depth during the 100-year flood event for Toronto Island Marina Concept 1

5.3.1.2 Toronto Island Marina Concept 2: Steel Sheet Pile Wall and Inland Flood Berm

This concept includes raising the roads around the central land area within the marina above the 100-year flood elevation and a new SSP dock wall and impermeable berm across the north shoreline in the focus area. Concept 2A, shown in plan in Figure 5.60, includes a variation with an inland berm. Concept 2B, shown in plan in Figure 5.61, includes a variation with the berm along the northern shoreline. The raised roads would form a flood barrier on the south and west sides. Along the north shoreline, near the Upper Deck restaurant, a new SSP dock wall would be constructed with an increased crest height (Figure 5.62). The Island BBQ and Beer Co. would be protected by a new SSP wall around the restaurant shoreline, with a stone revetment placed in front of the wall to mitigate wave runup and overtopping (Figure 5.65).

For Concept 2A, an inland berm (Figure 5.63) with an impermeable geomembrane would be constructed just inland from the waters edge along the northeast shoreline in the marina, and then east across the parkland toward the Island BBQ and Beer Co. restaurant. For Concept 2B, the berm would follow the shoreline between the marina and the Toronto Island BBQ and Beer Co. restaurant. The shoreline berm in Concept 2B would have an impermeable clay core. The berm along the shoreline would be vegetated on the landward side and include a naturalized shoreline on the lakeward side. The naturalized shoreline would include a mix of aquatic vegetation, and rock shoals. There are some existing groynes and small nearshore breakwaters that provide some protection to this shoreline; however, where the shoreline is directly exposed to the harbour, additional rip rap may be required to mitigate wave runup/overtopping and protect the shoreline from erosion. If desired, the berm could be designed to accommodate a walkway or biking path along the crest during the detailed design phase. This would require a wider berm than indicated on the concept drawings presented herein. Figure 5.64 shows the berm section variations.

The expected residual flood depth map during the 100-year event is shown in Figure 5.66 and Figure 5.67 for Concepts 2A and 2B, respectively.



Figure 5.60: Toronto Island Marina Concept 2A: Steel Sheet Pile Wall and Inland Flood Berm



Figure 5.61: Toronto Island Marina Concept 2B: Steel Sheet Pile Wall and Shoreline Flood Berm

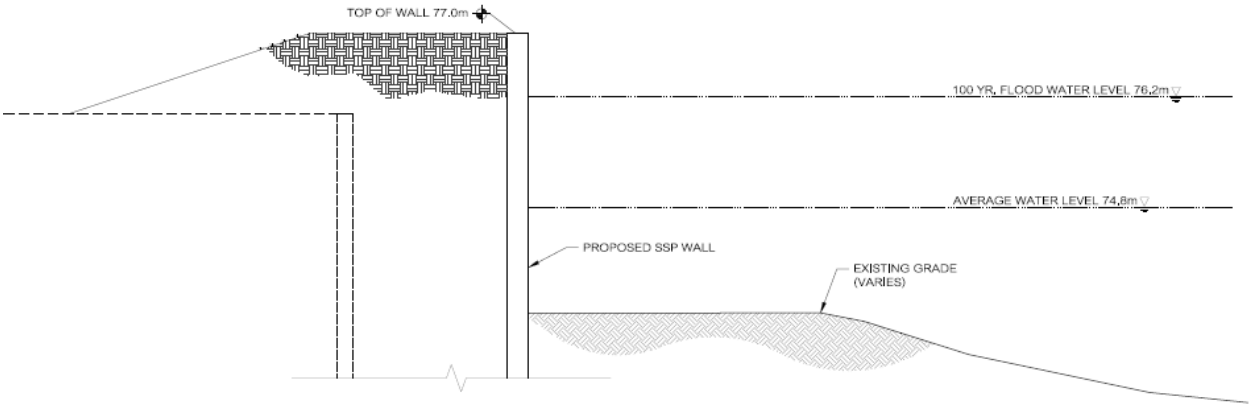


Figure 5.62: Typical SSP dock wall section for Toronto Island Marina Concept 2

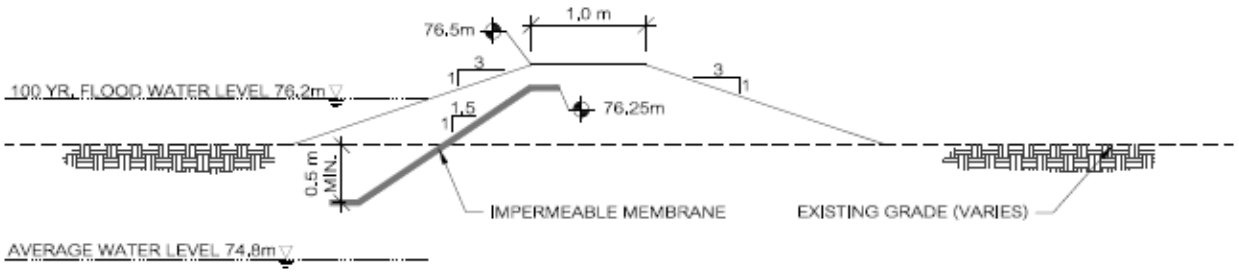


Figure 5.63: Typical inland berm section for Toronto Island Marina Concept 2A

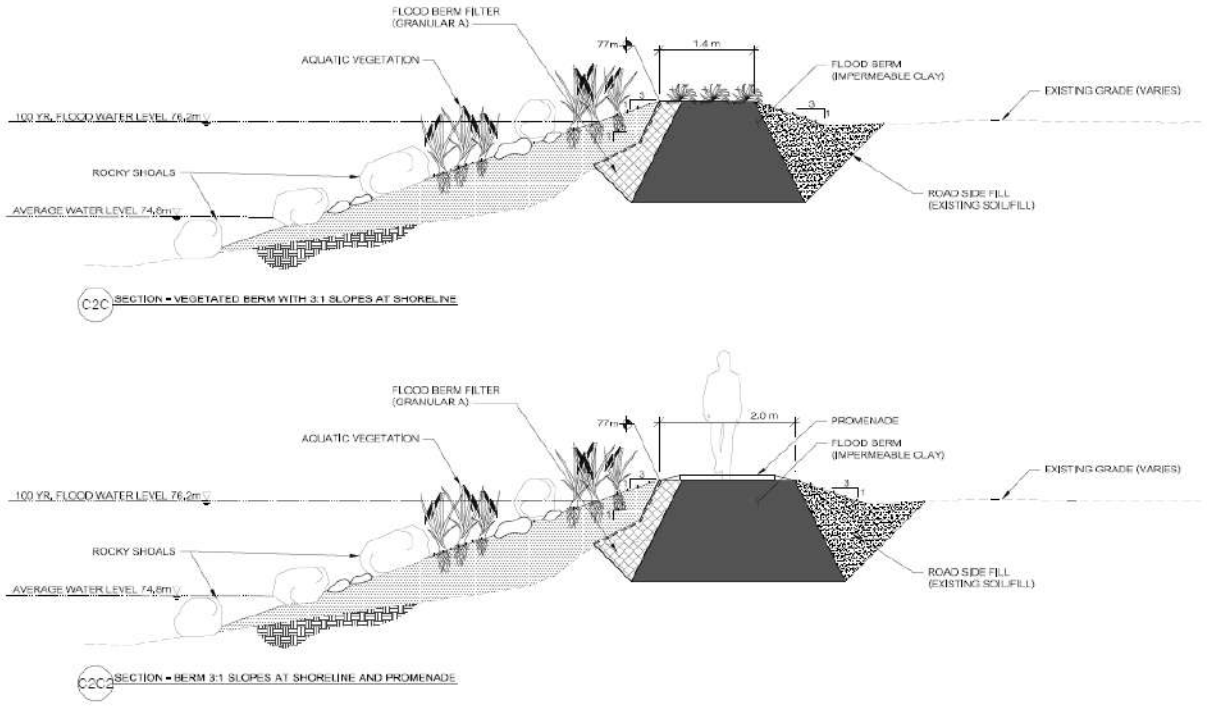


Figure 5.64: Typical shoreline berm section for Toronto Island Marina Concept 2B showing vegetated and promenade variations

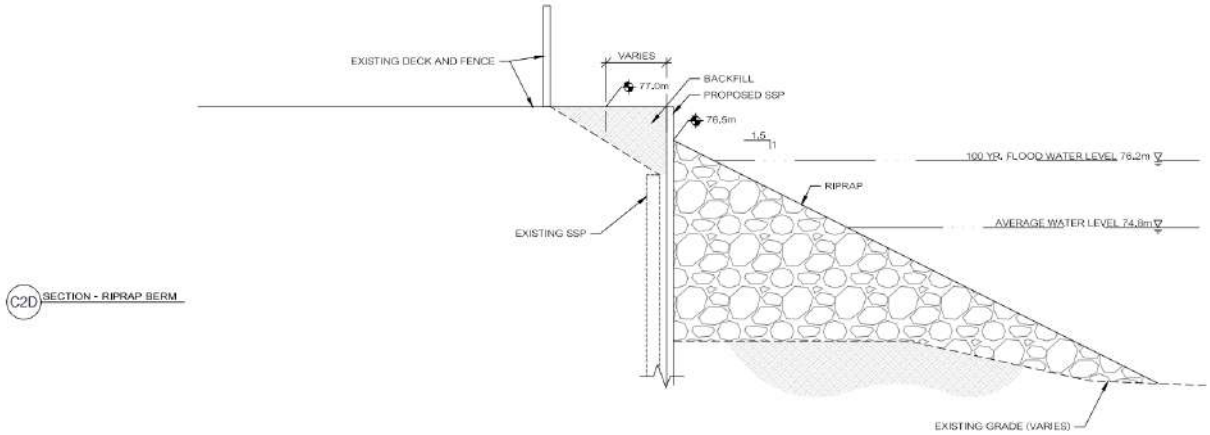


Figure 5.65: Typical section for Toronto Island Marina Concept 2 showing new SSP wall and stone berm around Island BBQ and Beer Co. shoreline

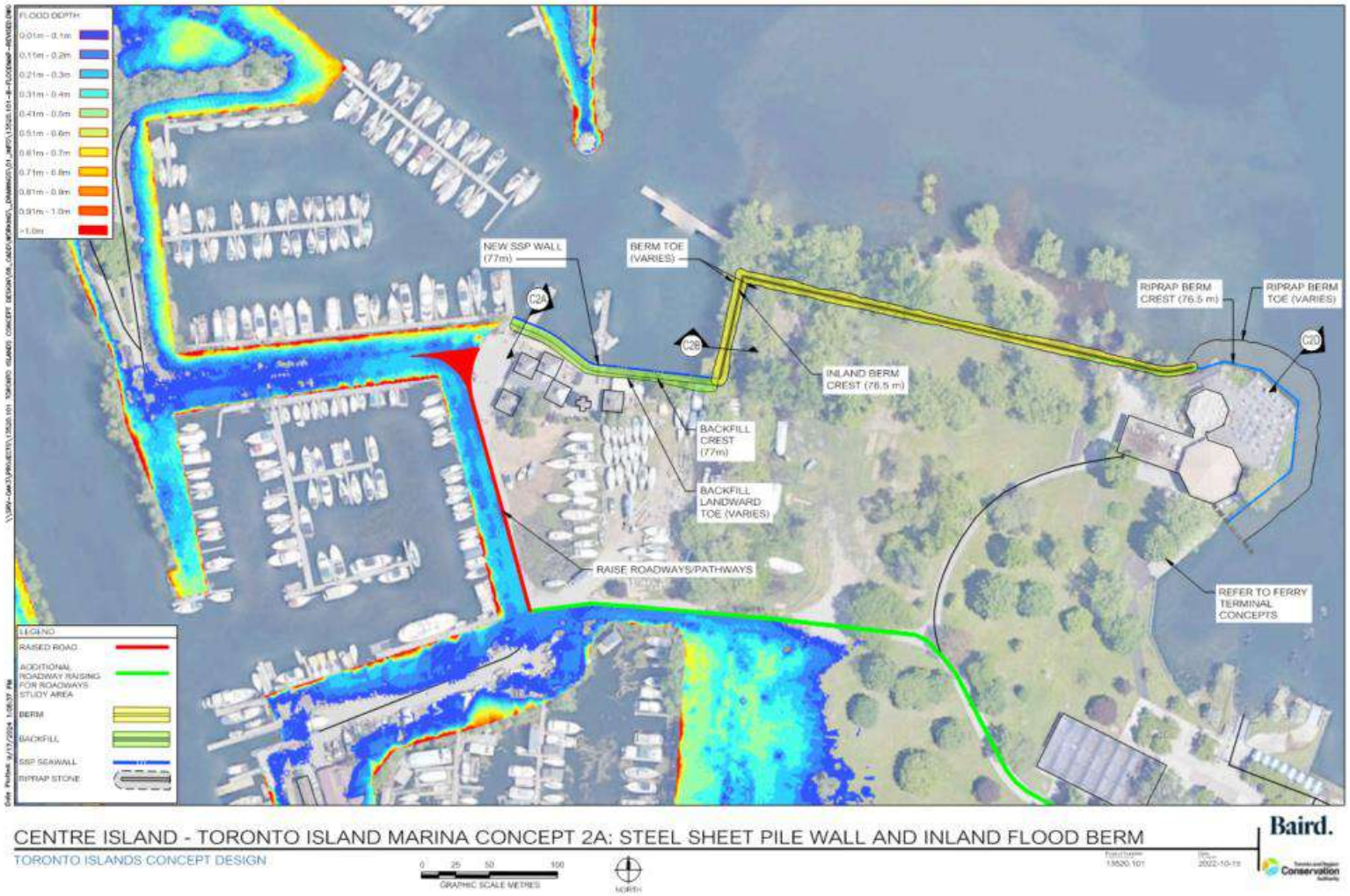


Figure 5.66: Flood depth during the 100-year flood event for Toronto Island Marina Concept 2A

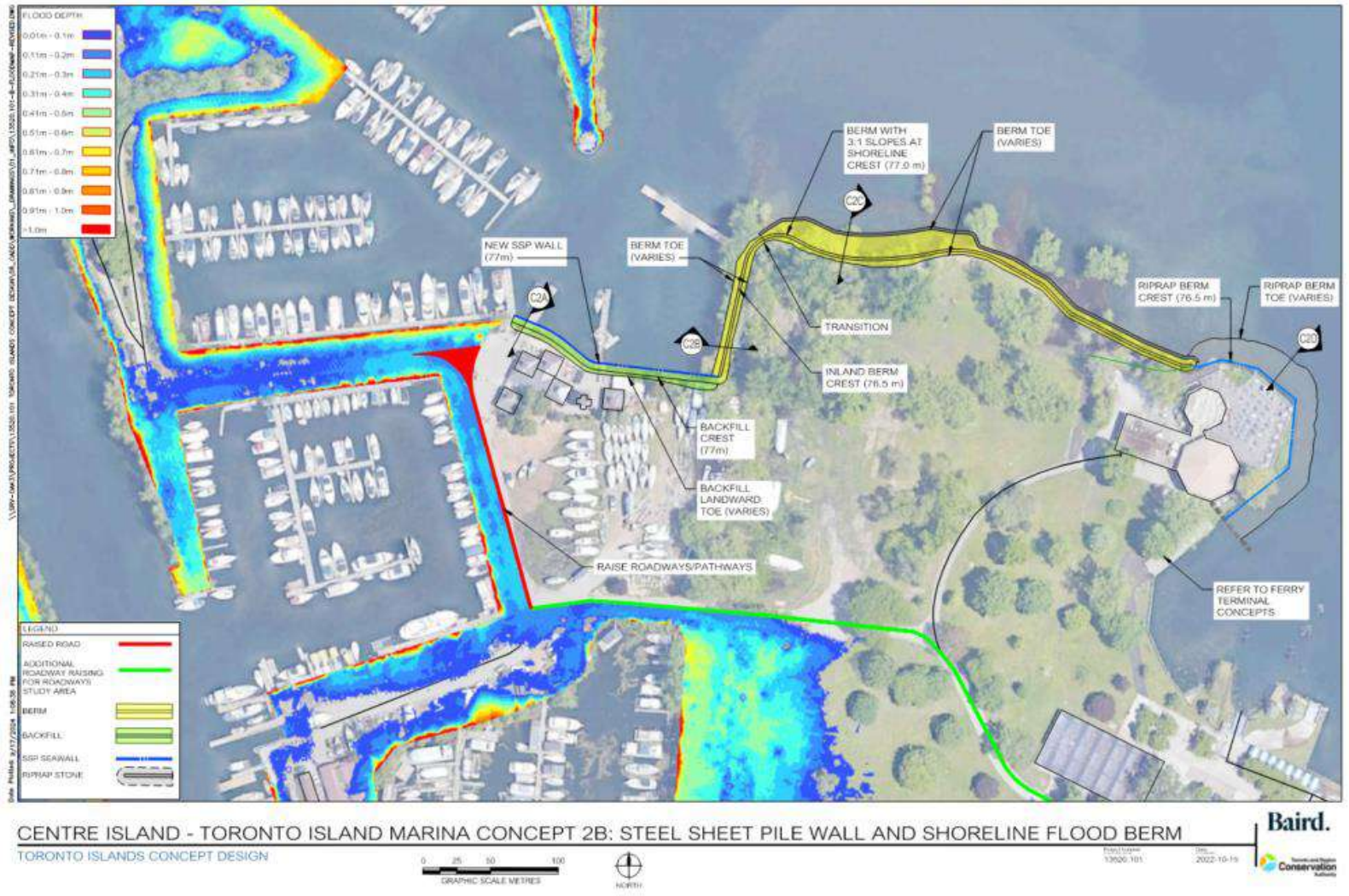


Figure 5.67: Flood depth during the 100-year flood event for Toronto Island Marina Concept 2B

5.3.1.3 Toronto Island Marina Concept 3: Steel Sheet Pile (SSP) Dock Walls and Shoreline Flood Berm

Concept 3 for the Toronto Island Marina, as shown in Figure 5.68, includes new SSP dock walls around the central area of the Marina. The new dock walls would have a higher crest elevation to provide flood protection. This would require new connections for docks; in addition, the new SSP would be some distance in front of the existing wall, thus reducing the water area in the marina. The landward side of the wall would be backfilled to bring the adjacent land to the same grade as the top of the wall, as shown in Figure 5.69.

To the south of the boat storage area, the roadway would be raised above the 100-year flood level (included in the Roadways study area) to provide flood protection from the south. An inland flood berm with a geomembrane impermeable core would be constructed along the east shoreline leading north from the marina. When the berm switches to follow the shoreline between the marina and the Toronto Island BBQ and Beer Co. restaurant, the core would switch to clay. The clay core berm along the shoreline would be vegetated on the landward side and include a naturalized shoreline on the lakeward side, as shown in the typical section in Figure 5.70. The naturalized shoreline would include a mix of aquatic vegetation, and rock shoals. There are some existing groynes and small nearshore breakwaters that provide some protection for this shoreline; however, where the shoreline is directly exposed to the harbour, additional rip rap on the shoreline may be required to mitigate wave runup/overtopping and protect the shoreline from erosion. Inclusion of a promenade or walking features can be added during the detailed design phase if desired. This will be determined through coordination with the City of Toronto's Master Plan and feedback received through the public engagement process.

The Island BBQ and Beer Co. would be protected by a new SSP wall around the restaurant shoreline, with a stone revetment placed in front of the wall to mitigate wave runup and overtopping.

The expected residual flood depth map during the 100-year event is shown in Figure 5.71.



Figure 5.68: Toronto Island Marina Concept 3: Steel Sheet Pile (SSP) Dock Wall and Shoreline Flood Berm

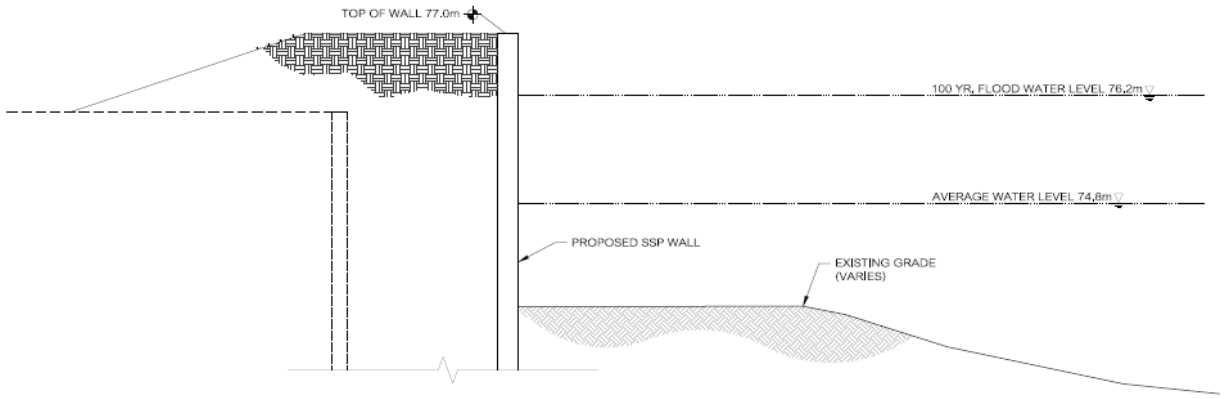


Figure 5.69: Typical Steel Sheet Pile (SSP) dock wall section for Toronto Island Marina Concept 3

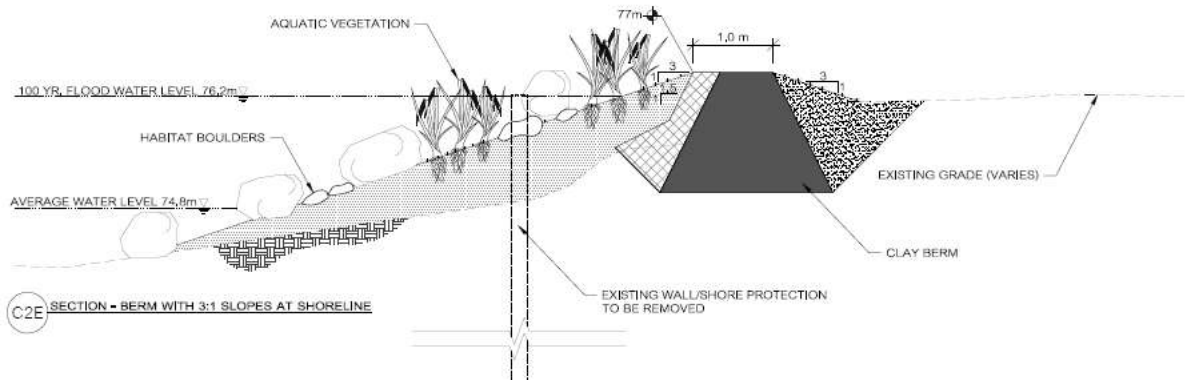


Figure 5.70: Typical shoreline flood berm section for Toronto Island Marina Concept 3

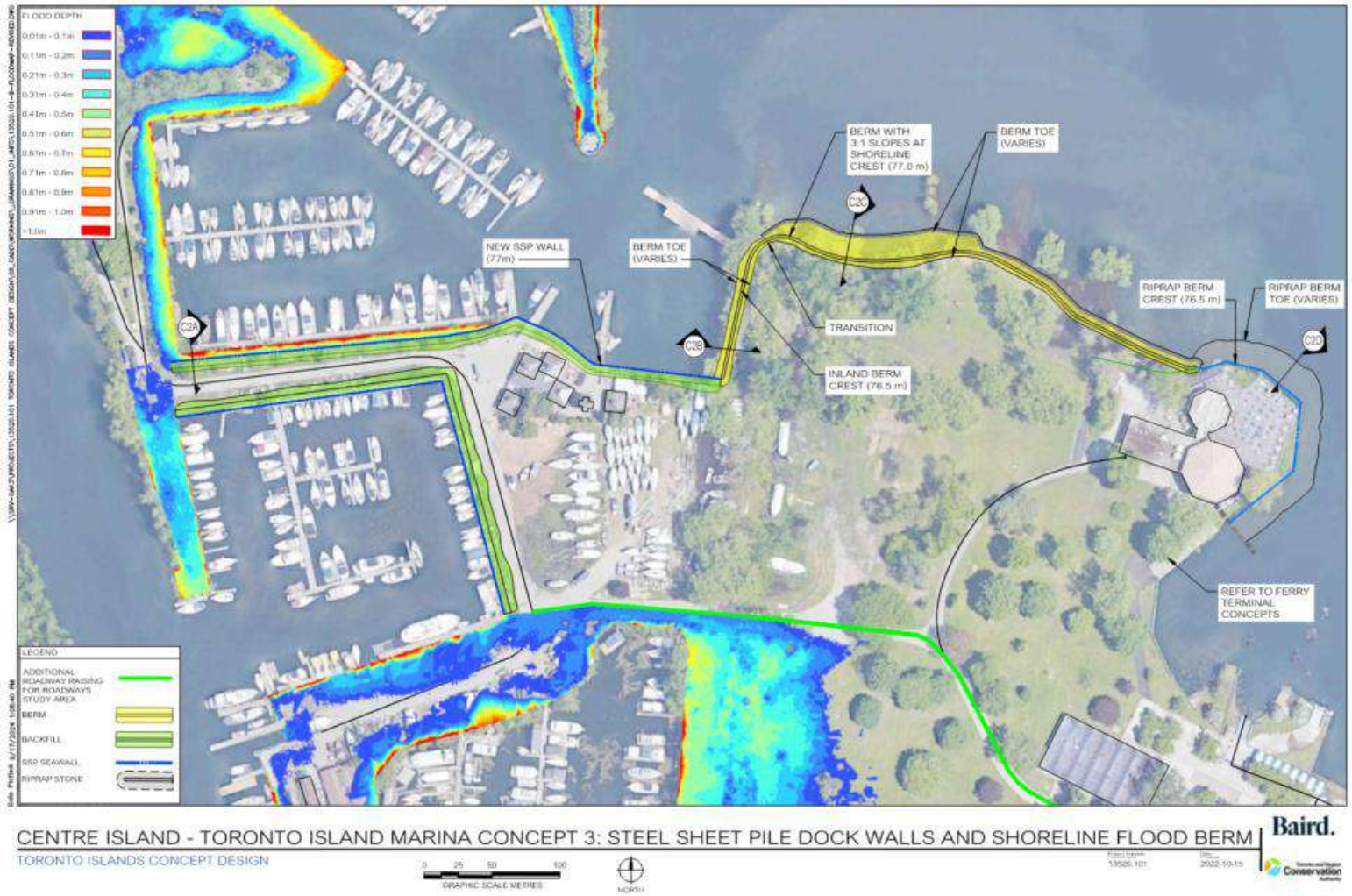


Figure 5.71: Flood depth during the 100-year flood event for Toronto Island Marina Concept 3

5.3.1.4 Toronto Island Marina Concept 4: Land Raising and Flood Berm

Concept 4 for the Toronto Island Marina includes raising the west side of the boat storage yard above the 100-year flood elevation, raising key roadways within the marina, and a shoreline flood berm. The main roadway within the marina (Avenue of the Island) would be raised above the 100-year flood level as required to maintain safe access during the 100-year flood event (included in Roadways study area). The road east of the boat storage yard which is used by fuel trucks will also be raised above the 100-year flood level to maintain fueling operations during a design flood. The northeast shoreline would be protected by an inland geomembrane berm connecting to a shoreline clay core berm along the north shoreline of the park between the Toronto Island Marina and the Island BBQ and Beer Co. restaurant. The Island BBQ and Beer Co. would be protected by a new SSP wall around the restaurant shoreline, with a stone revetment placed in front to mitigate wave run up and overtopping. Inclusion of a promenade or walking features on the flood berm can be added in detailed design if desired and will be determined through coordination with the City of Toronto's Master Plan in addition to feedback received through the public engagement process. Figure 5.72 shows this concept in plan.

Figure 5.73 shows the expected residual flood depth map for Concept 4 during the 100-year flood event.

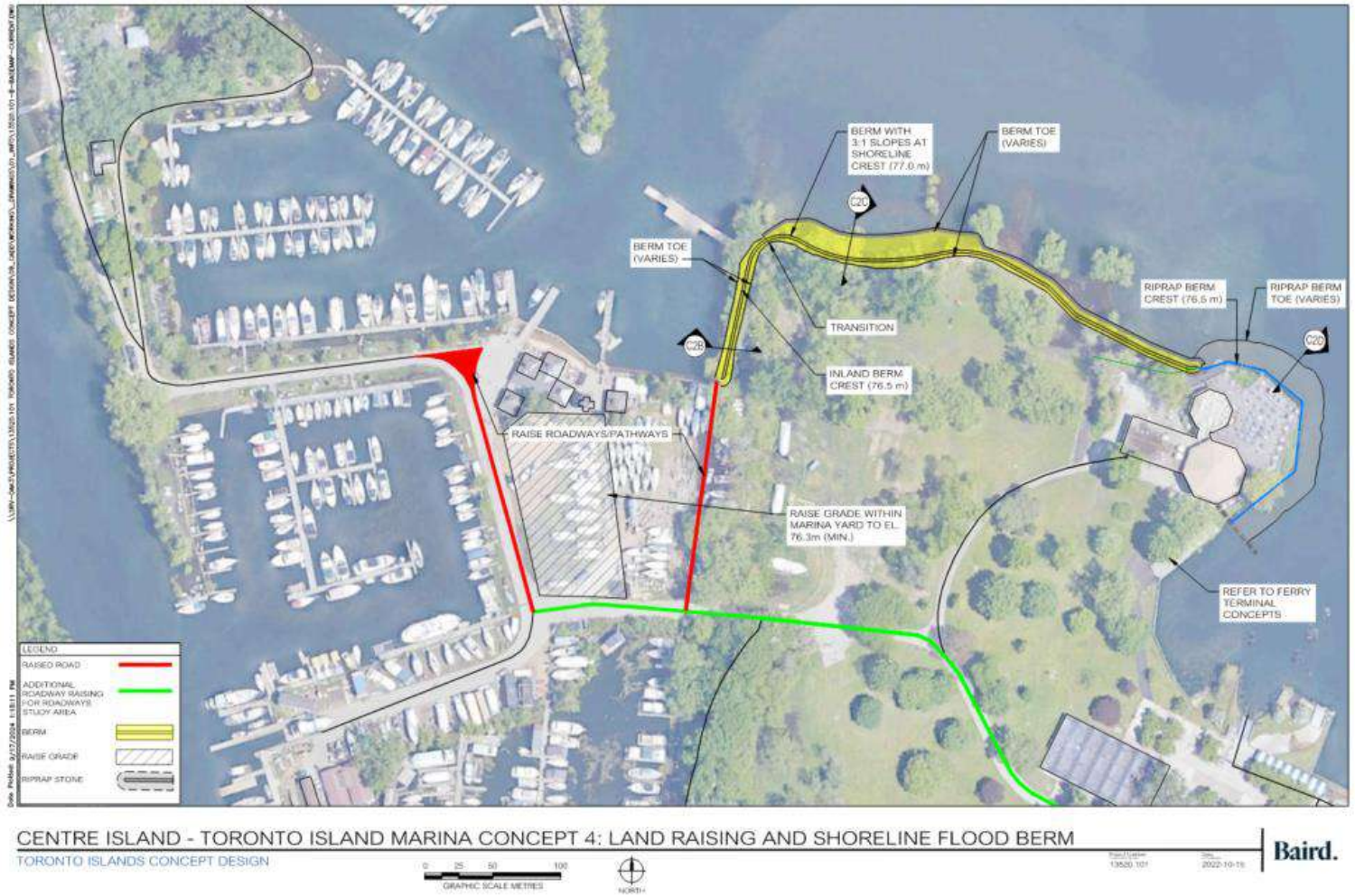


Figure 5.72: Toronto Island Marina Concept 4: Land and Road Raising and Flood Berm

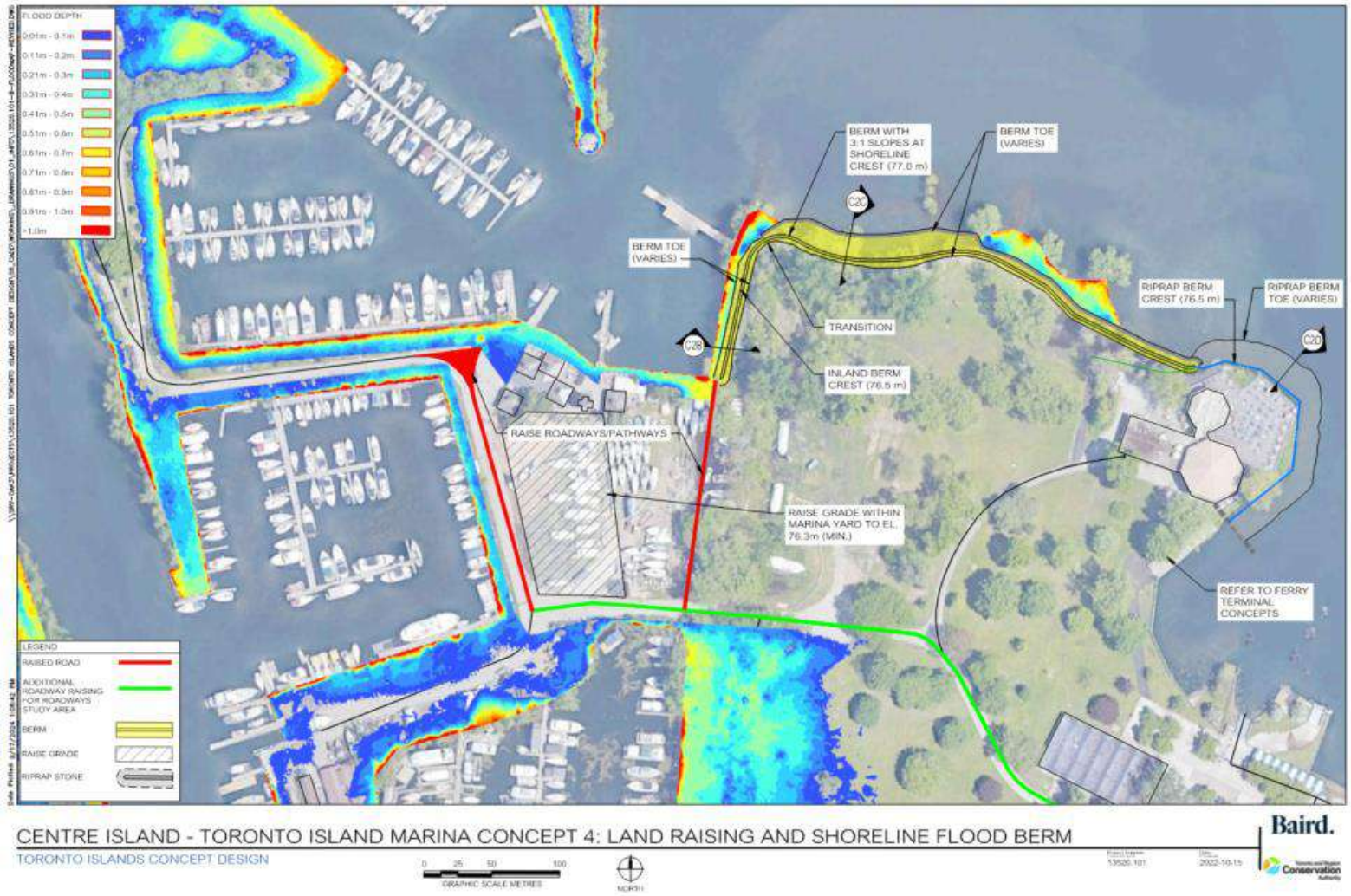


Figure 5.73: Flood depth during the 100-year flood event for Toronto Island Marina Concept 4

5.3.2 Centre Island Ferry Terminal

Concept designs for the Centre Island Ferry Terminal include modifications to the existing vertical seawalls. This shoreline is located in a high traffic area due to the ferry terminal and proximity of the restaurant, therefore safety railings along the future modified shoreline are recommended to increase public safety near the waters edge. The location and design of the safety railings will be finalized during the detailed design phase.

5.3.2.1 Centre Island Ferry Terminal Concept 1: Steel Sheet Pile Wall

Concept 1, shown in plan in Figure 5.74, includes a SSP wall constructed in front of the existing seawall adjacent to the Centre Island ferry dock to increase the height of the wall. In addition to increasing the height of the wall, for the concept design phases there could be safety railings on all the Ferry terminal concepts to increase public safety. The land adjacent to the new seawall would be raised using clean fill material to blend into the existing backshore areas, as shown in the cross-section in Figure 5.75. This concept would not impact docking in this area.

Figure 5.76 shows the expected residual flood depth map for Concept 1 during the 100-year flood event.

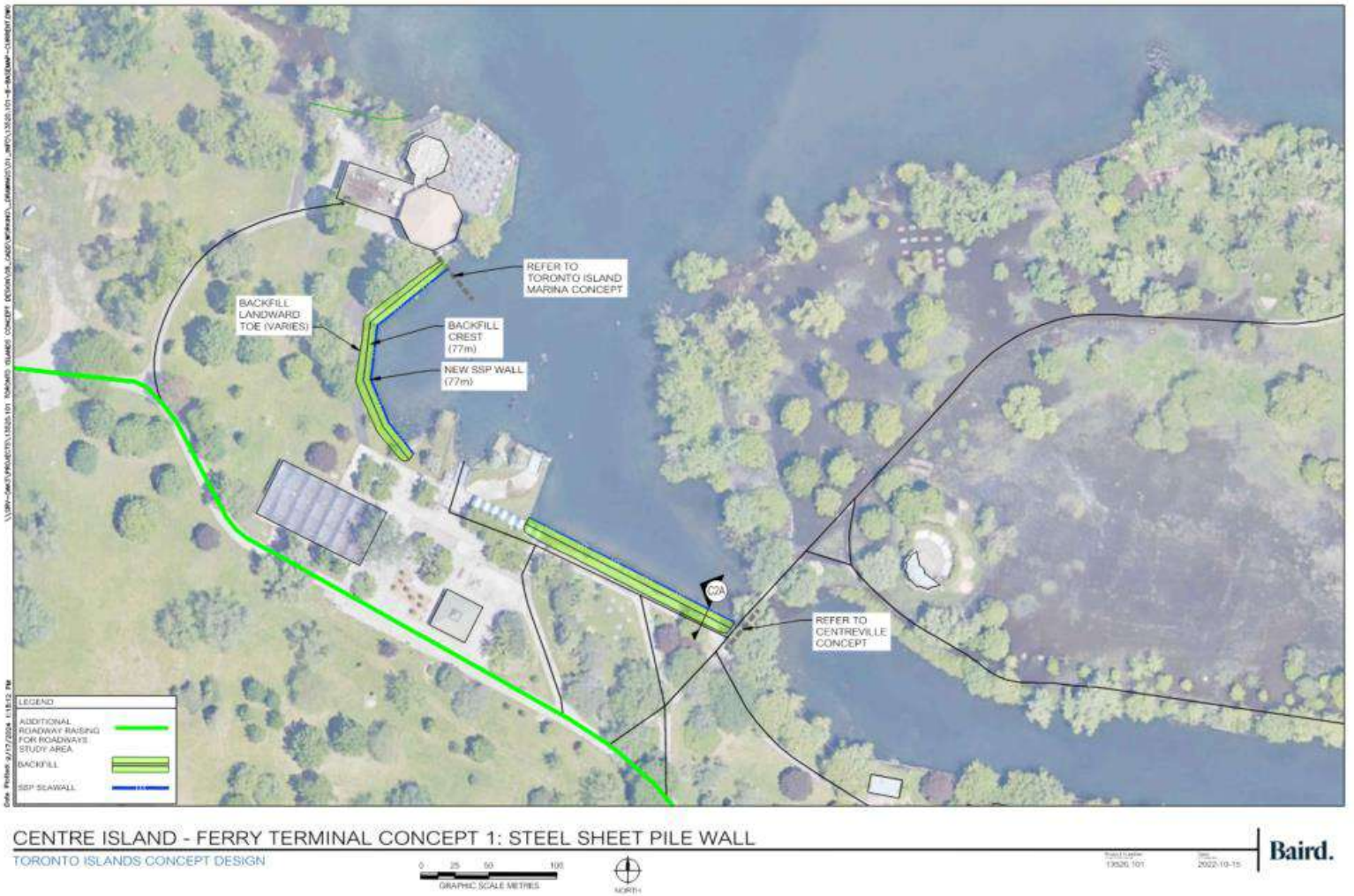


Figure 5.74: Centre Island Ferry Terminal Concept 1: Steel Sheet Pile (SSP) Wall

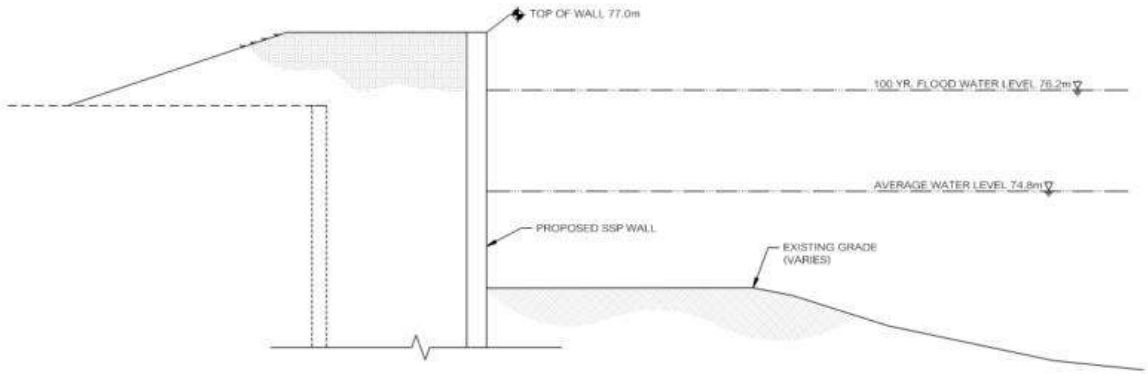


Figure 5.75: Typical Steel Sheet Pile (SSP) wall section for Centre Island Ferry Terminal Concept 1

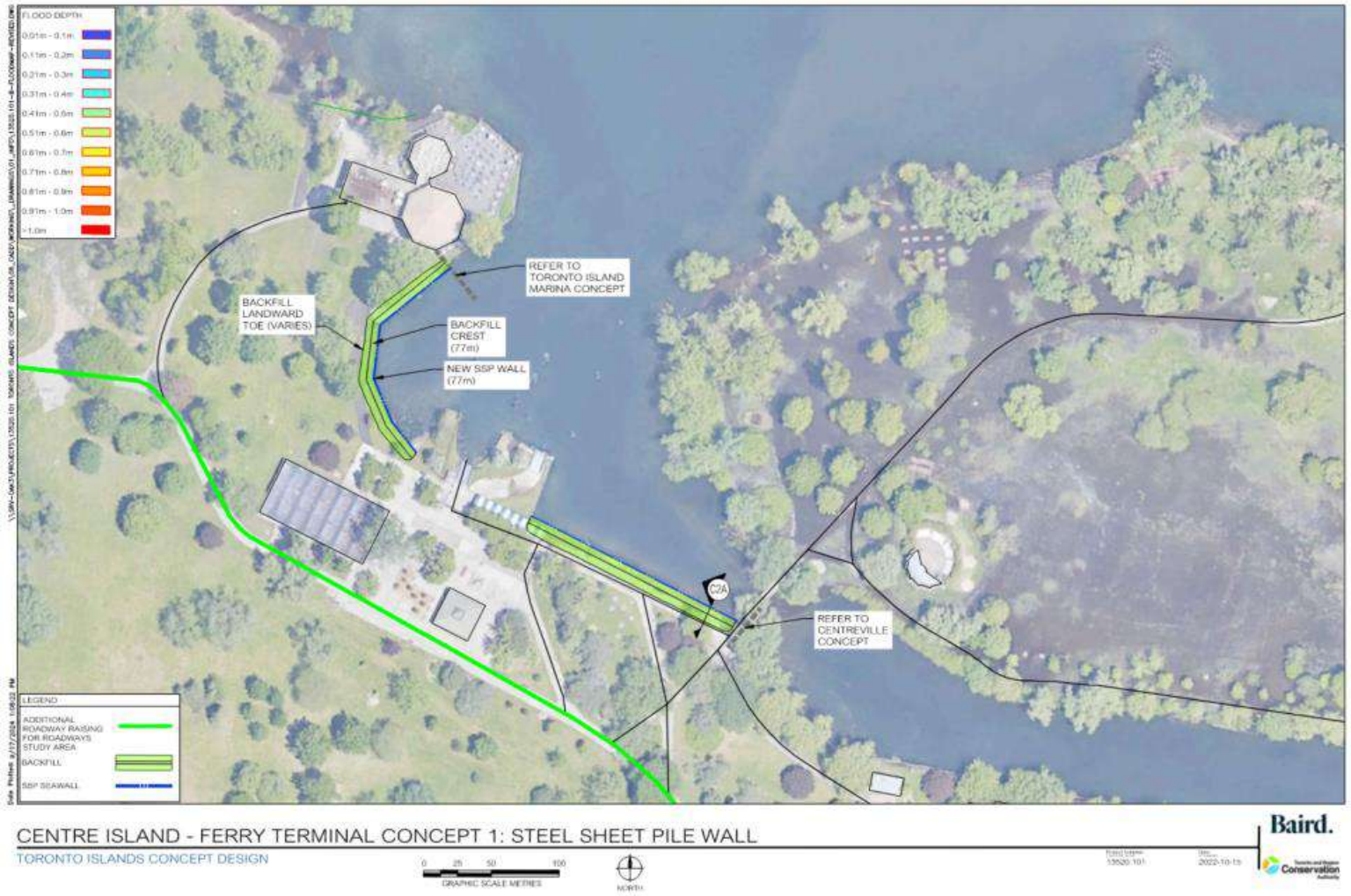


Figure 5.76: Flood depth during the 100-year flood event for Centre Island Ferry Terminal for Concept 1

5.3.2.2 Centre Island Ferry Terminal Concept 2: Stacked/Stepped Wall

Concept 2, shown in plan in Figure 5.77, includes an impermeable shoreline berm extending east from the ferry dock to the bridge connecting to Olympic Island, and a stepped concrete seawall in front of the existing wall extending west from the ferry dock to the Island BBQ and Beer Co. The berm and concrete wall would have crest elevations of 77 m.

A detailed condition assessment of the concrete panel wall east and west of the ferry dock has not been completed; for the purposes of this study, it has been assumed that the existing wall would not have the capacity to withstand additional loading associated with a berm without additional support in front of the existing wall. To support the berm to the east of the ferry dock, a stacked armour stone wall will be installed in front of the berm and will reduce wave run up and overtopping. A row of armour stone is added to the crest of the wall to increase the wall height above the 100-year flood elevation. A small earth berm with an impermeable clay core would be constructed immediately landward of the crest stone to provide flood protection, as shown in Figure 5.78. The crest of the berm could be vegetated or could include a promenade. The distance between the berm and the top row of armour stone could be increased to incorporate landscaping features such as vegetation. These details would be considered in coordination with the Toronto Island Master Plan during the detailed design phase.

To the west of the ferry docks, includes a new SSP wall in front of the existing concrete panel wall with a stepped concrete terrace built in front of the existing vertical wall. The top step would have a crest height of 77 m to provide flood protection, as shown in the typical section in Figure 5.79. The walkway and land area adjacent to the wall would be raised to match the level of the crest of the wall, and the stepped promenade would provide seating for park goers waiting for the ferry. Currently, water taxis and other boats dock alongside the shoreline south of the Island BBQ and Beer Co. The implementation of this concept will impact docking in this area. Watercraft docking may need to be relocated or localized changes to the concept in this area will need to be considered during the detailed design phase in order to accommodate docking at all water levels. Habitat stone could be placed at the base of the new wall to increase complexity of the lakebed adjacent to the vertical wall.

Figure 5.80 shows the expected residual flood depth maps for Concept 2 during the 100-year flood event.

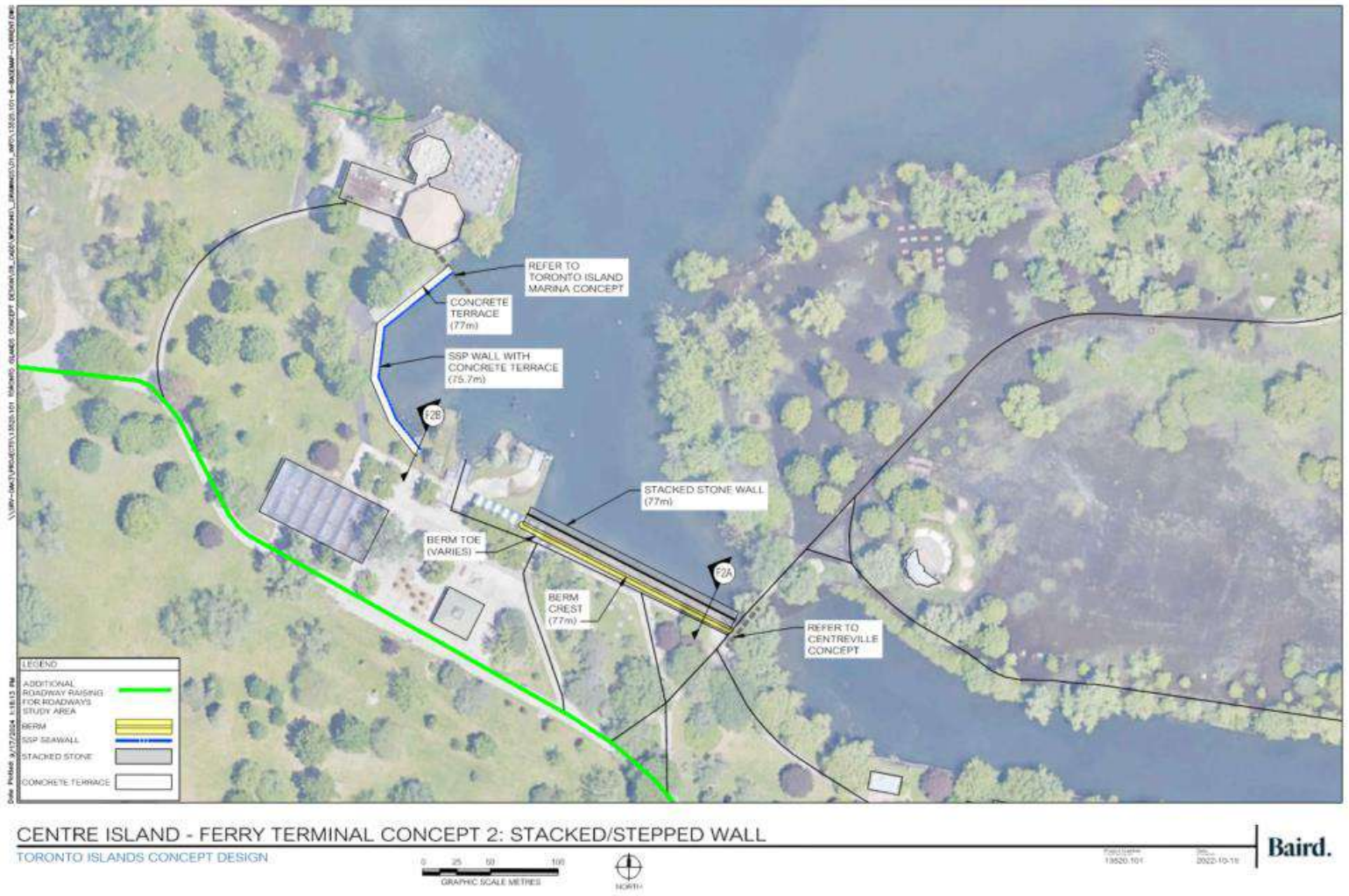


Figure 5.77: Centre Island Ferry Terminal Concept 2: Stacked/Stepped Wall

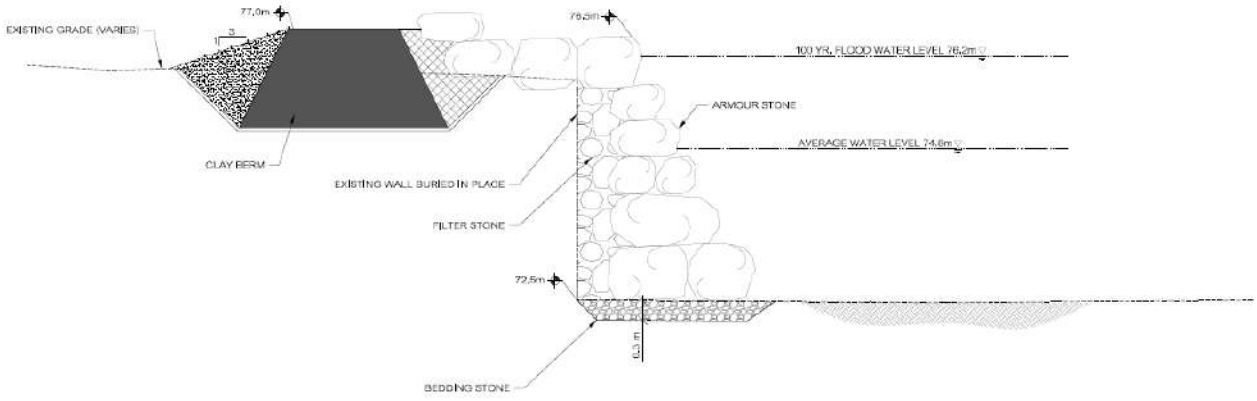


Figure 5.78: Typical stacked armour stone wall section for Centre Island Ferry Terminal Concept 2

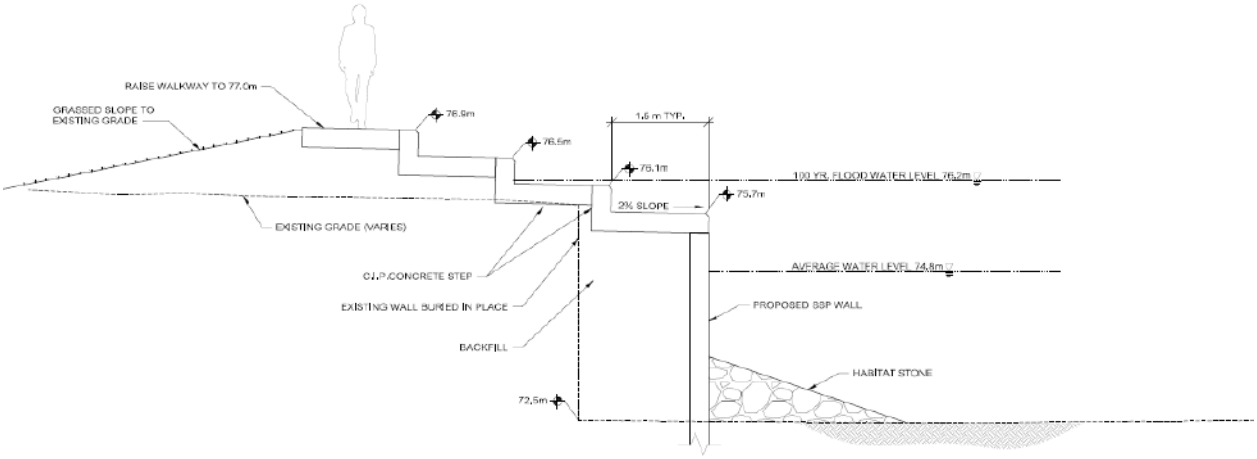


Figure 5.79: Typical stepped concrete wall section for Centre Island Ferry Terminal Concept 2

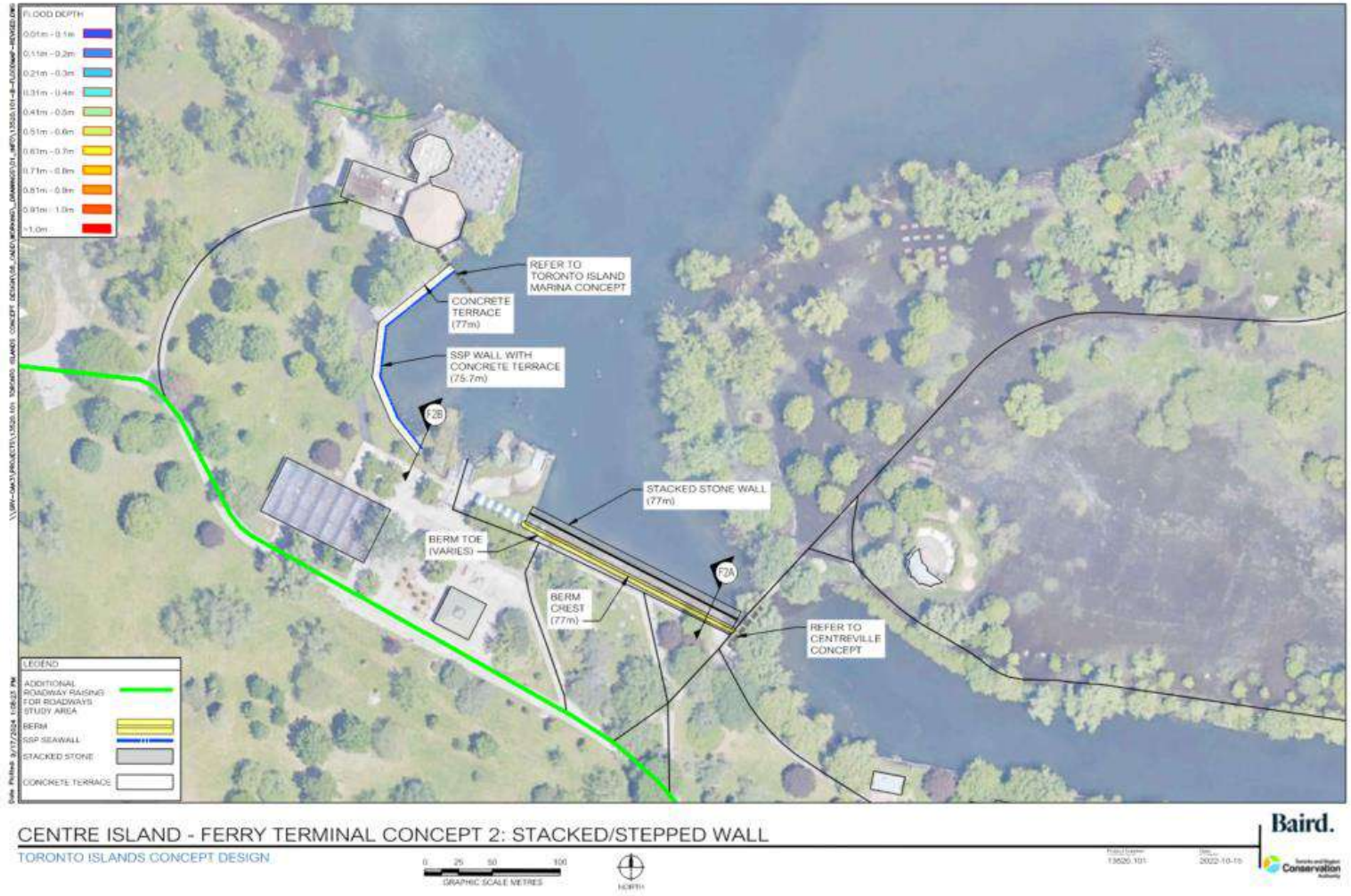


Figure 5.80: Flood depth during the 100-year flood event for Centre Island Ferry Terminal for Concept 2

5.3.2.3 Centre Island Ferry Terminal Concept 3: Flood Berm and Revetment

Concept 3, shown in plan in Figure 5.81, includes a flood berm along the shoreline east and west of the ferry dock. The berm would have an impermeable clay core to provide flood protection and would be vegetated on the landward slope. The lakeward slope and crest would be protected by stone or an articulated concrete block mattress (Figure 5.82). The berm could be widened to accommodate a walking or biking pathway. As discussed in Concept 2, the capacity of the existing wall to withstand loading from a berm is unknown; therefore, a rip rap revetment has been added in front of the existing wall to provide structural support and to reduce wave runup and overtopping. Due to the implementation of the flood berm for this concept, there will be docking implications in this area.

The expected residual flood depth map for this concept during the 100-year flood event is shown in Figure 5.83.

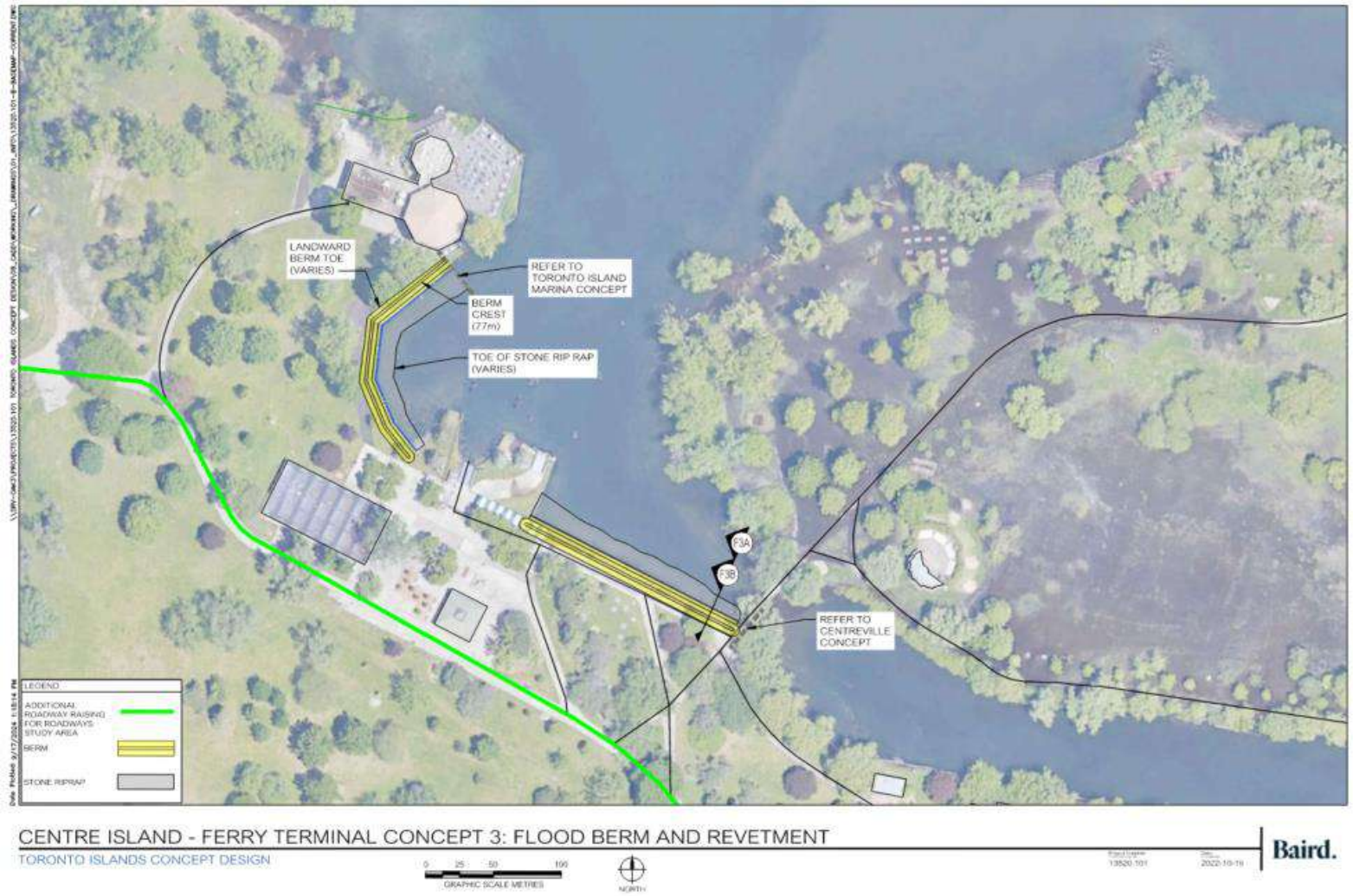


Figure 5.81: Centre Island Ferry Terminal Concept 3: Flood Berm and Revetment

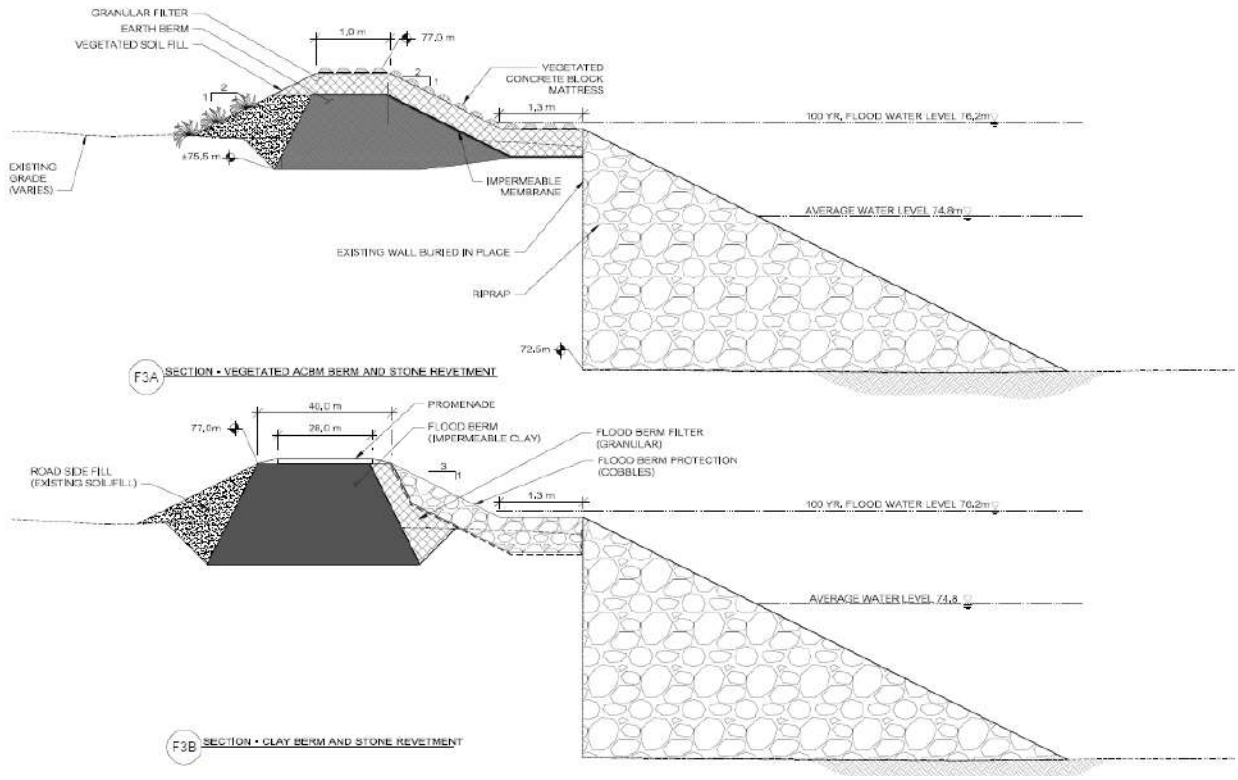


Figure 5.82: Typical flood berm section for Centre Island Ferry Terminal Concept 3

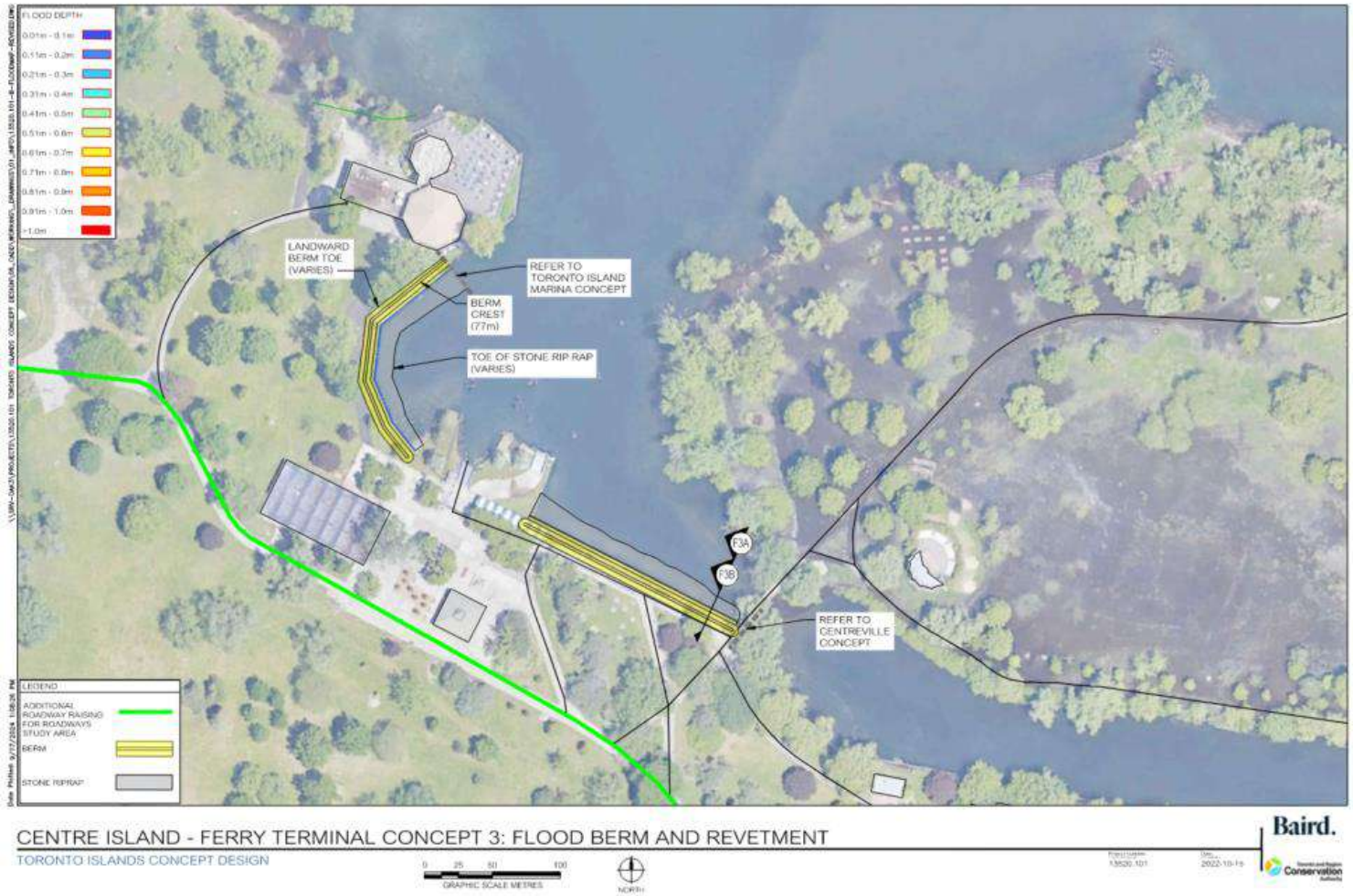


Figure 5.83: Flood depth during the 100-year flood event for Centre Island Ferry Terminal for Concept 3

5.3.3 Centreville Concepts

5.3.3.1 Centreville Concept 1: Steel Sheet Pile Wall

Concept 1 for Centreville, shown in plan in Figure 5.84 and cross-section in Figure 5.85, includes a new SSP wall that would extend around the Centreville shoreline. The landward face of the SSP wall could be covered with other material to improve the visual appearance for visitors to the amusement park. The Centreville train track is located adjacent to the shoreline and crosses the Duck Pond and channel on low-lying bridges. Given the proximity of the train tracks to the shoreline, implementation of shore protection works will impact the train tracks. Overall integration with and/or relocation of track segments relative to shoreline protection will need to be carefully considered during the detailed design phase. The central road along the north shoreline of Duck Pond is included in the raised roads in the Roadways study area and would provide flood protection for Centreville from the south.

The island shoreline east of Carousel Cafe to the bridge leading to Far Enough Farms would be protected with a naturalized shoreline and clay core flood berm (Figure 5.86). The road running behind Carousel Café would be raised above the 100-year flood level. The bridges on either side of the small island may need to be raised to match the new elevation of the road and traverse the shoreline berms and maintain access to the Duck Island during a flood event.

The expected residual flood depth map for this concept during the 100-year flood event is shown in Figure 5.87.

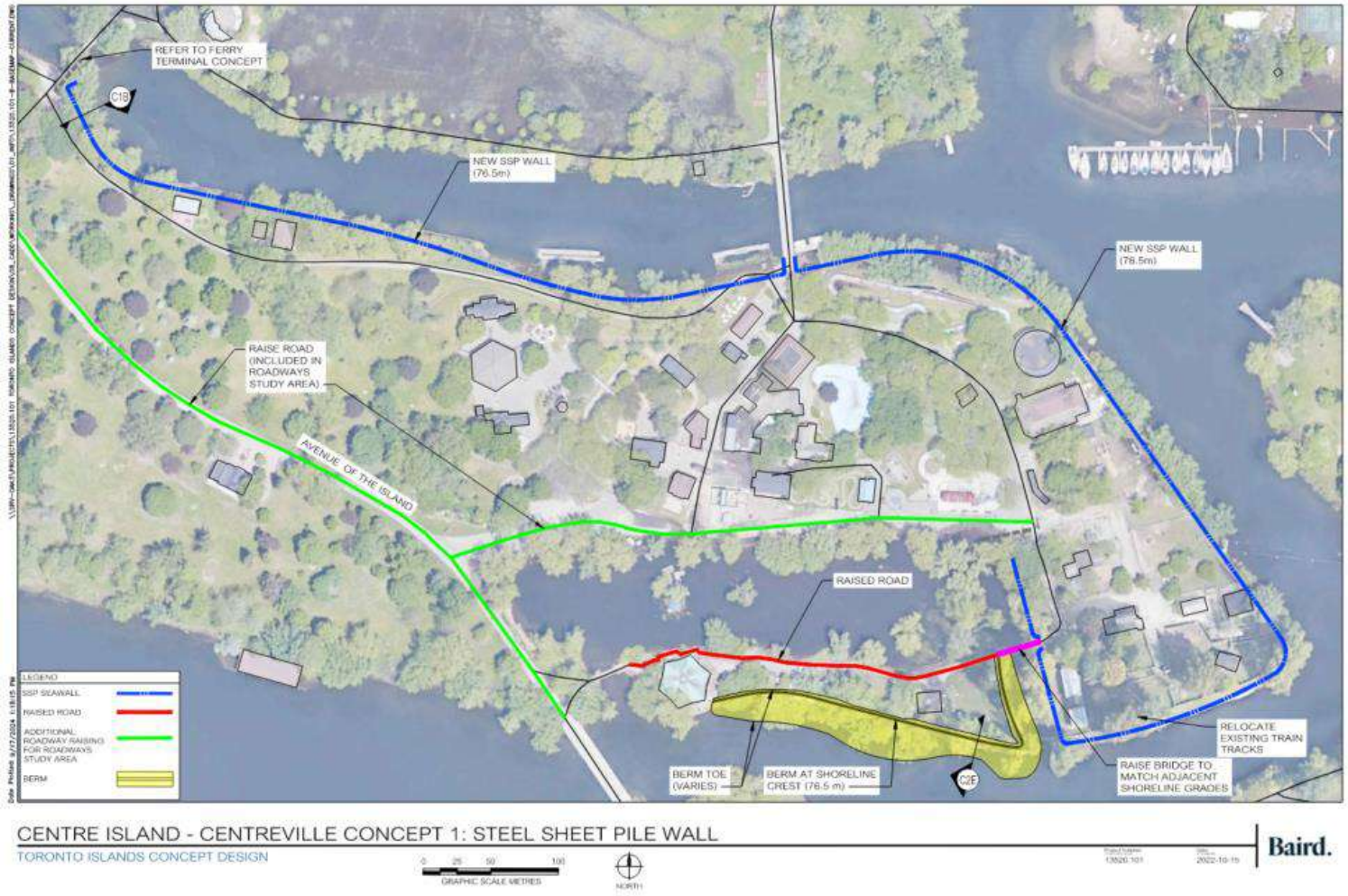


Figure 5.84: Centreville Concept 1: Steel Sheet Pile (SSP) Wall

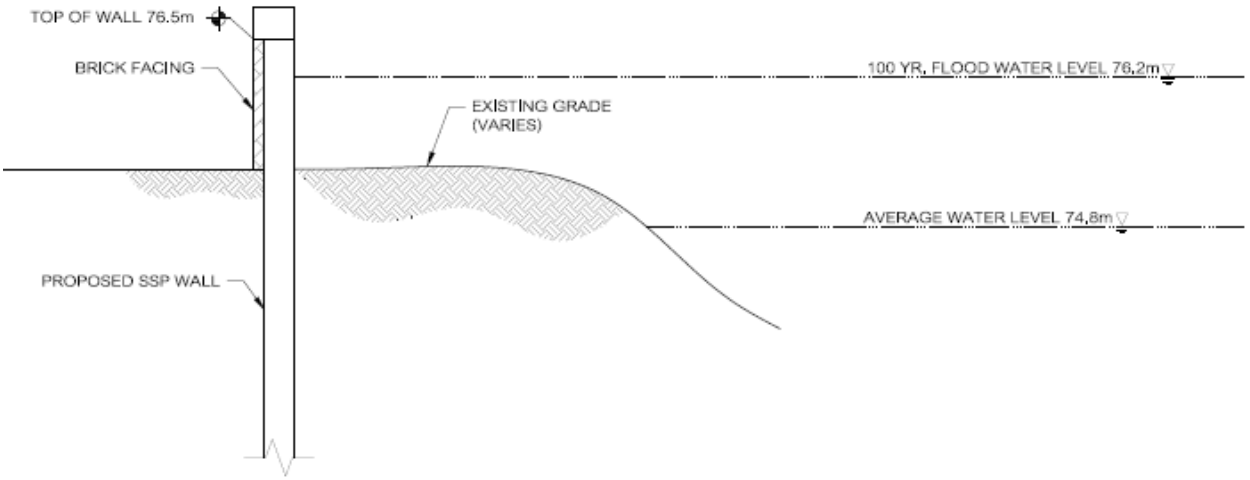


Figure 5.85: Typical Steel Sheet Pile (SSP) wall section for Centreville Concept 1

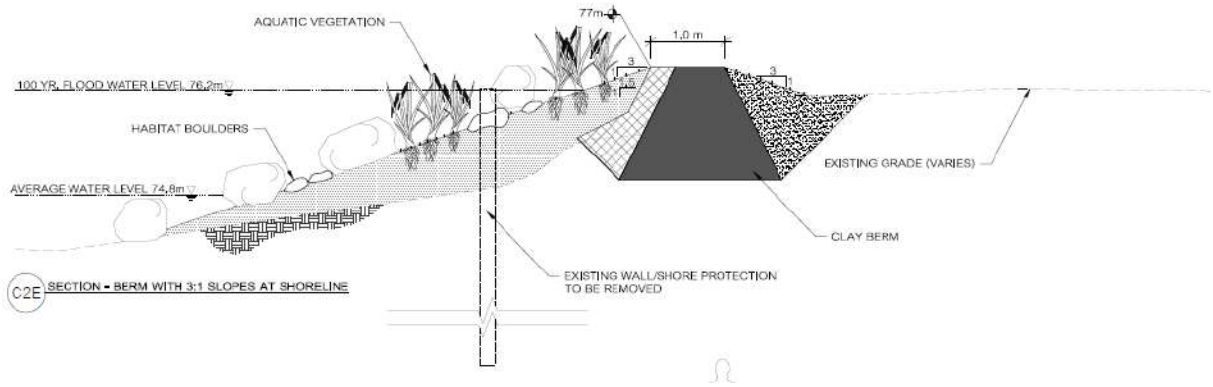


Figure 5.86: Typical section of naturalized shoreline and flood berm at Centreville for Concept 1

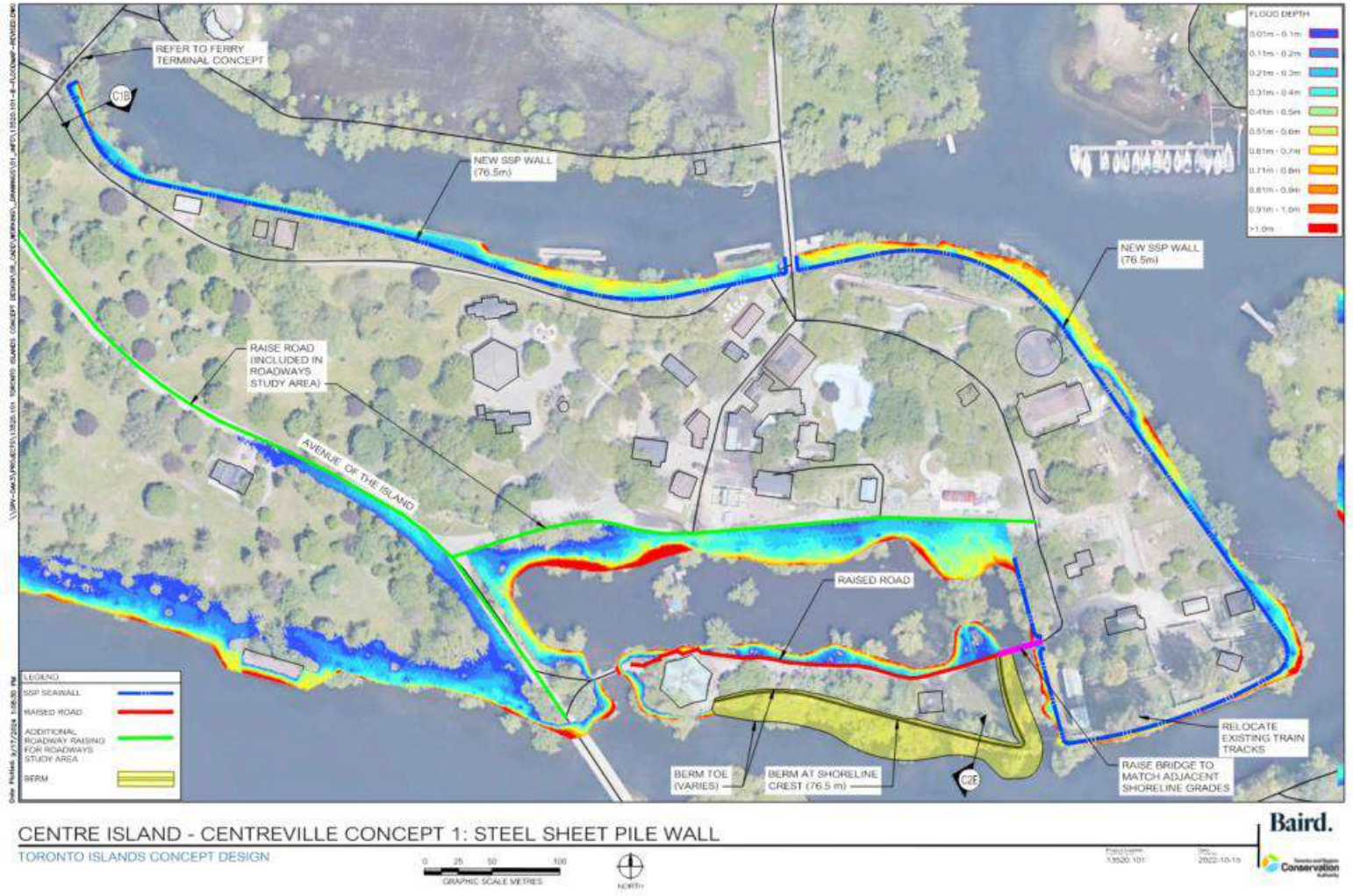


Figure 5.87: Flood depth during the 100-year flood event on Centreville for Concept 1

5.3.3.2 Centreville Concept 2: Naturalized Shoreline and Flood Berm

The shoreline between the two bridges connecting Centre Island with Olympic Island, and around Centreville towards Far Enough Farms, is adjacent to a narrow channel sheltered from the harbour which appears to be cut off from motorized vessels. Concept 2, shown in Figure 5.88, therefore, includes a naturalized shoreline and clay core flood berm extending from Manitoulin Bridge by Carousel Café, around the Duck Pond and southern shoreline at Centreville to the westernmost bridge connecting Centre Island to Olympic Island. The berm would include an impermeable clay core and have a crest elevation of 76.5 m to provide flood protection. The lakeward edge of the berm would include a mix of stone and aquatic vegetation to provide a softer, naturalized shoreline. Existing shoreline protection, such as the concrete slabs and the vertical wall between the bridges on the north shoreline, would be removed. Inclusion of a promenade or walking features on the berm can be considered during the detailed design phase if desired. This will be determined through coordination with the City of Toronto's Master Plan and feedback received through the public engagement process. Typical sections with vegetated berm and promenade variations are shown in Figure 5.89. The naturalized shoreline and impermeable clay core flood berm would also extend from the east side of Carousel Café along the shoreline to the bridge that crosses the water toward Far Enough Farm. The road running behind Carousel Café would be raised above the 100-year flood level. The bridges on either side of the small island may need to be raised to match the new elevation of the road and traverse the shoreline berms and maintain access to the Duck Island during a flood event.

This concept is not expected to impact channel navigation/waterways as the toe of the structure would remain in generally the same location as the existing shoreline toe. Localized modifications to the shoreline treatment will be considered and incorporated during the detailed design phase to accommodate specific spatial constraints in key areas (i.e., near mature trees, train tracks, etc.). Given the proximity of the Centreville train tracks to the shoreline, implementation of shore protection will impact the train tracks. Overall integration with and/or relocation of track segments relative to shoreline protection will require careful consideration during the detailed design phase.

The expected residual flood depth map for this concept during the 100-year flood event is shown in Figure 5.90.

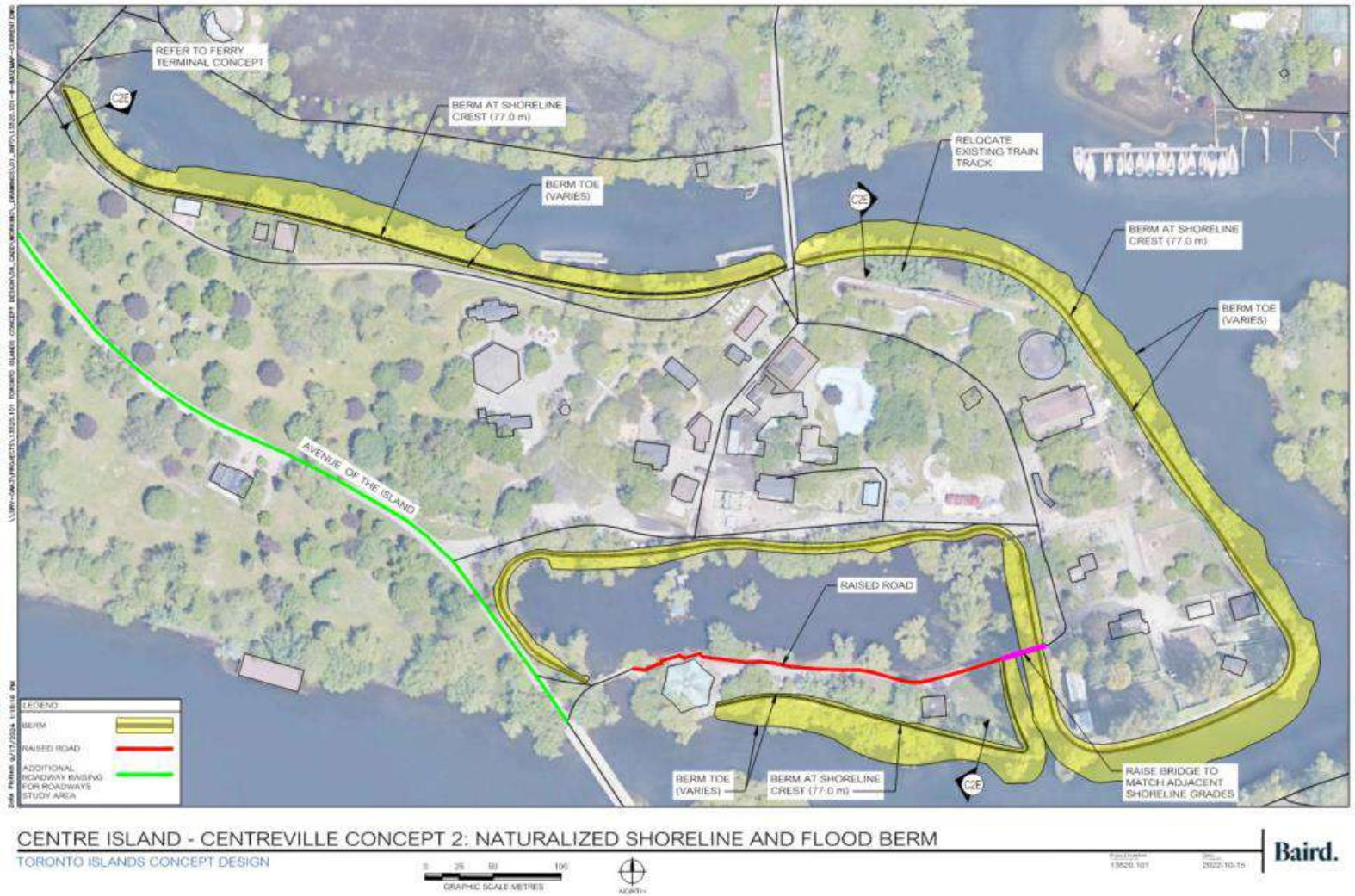


Figure 5.88: Centreville Concept 2: Naturalized Shoreline and Flood Berm

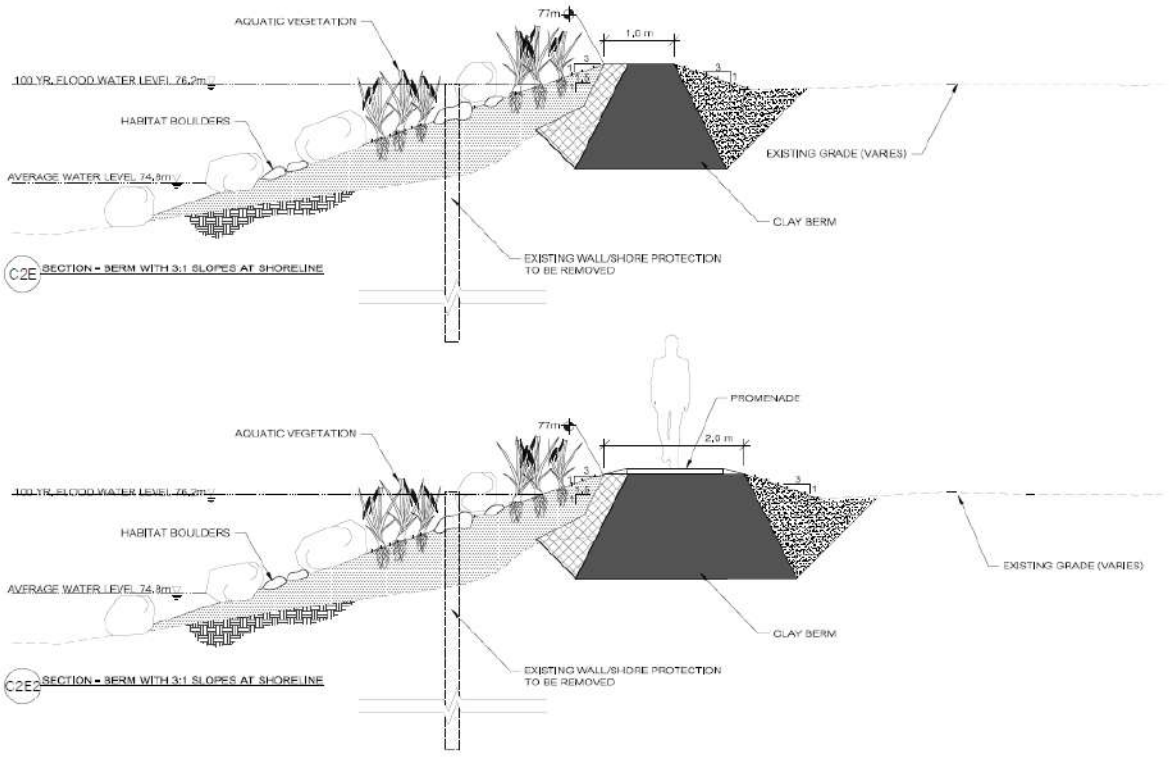


Figure 5.89: Typical section of naturalized shoreline and flood berm at Centreville for Concept 2 with vegetated and promenade variations

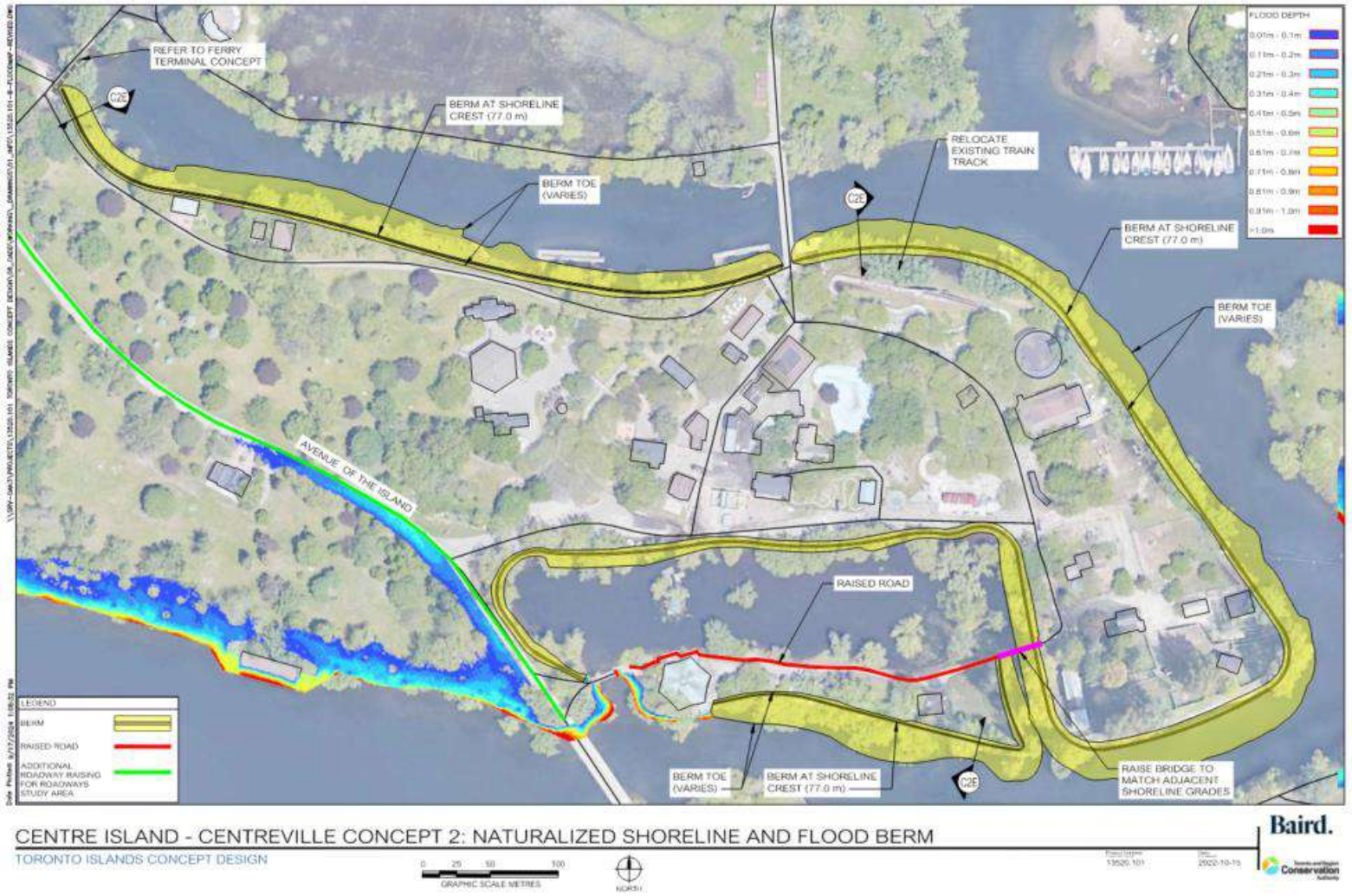


Figure 5.90: Flood depth during the 100-year flood event on Centreville for Concept 2

5.3.3.3 Centreville Concept 3: Buried Steel Sheet Pile Wall and Naturalized Shoreline

Concept 3 for Centreville, as shown in plan in Figure 5.91, includes a SSP wall along the shoreline around Centreville and along the northern shoreline. The crest elevation of the wall would be 76.5 m. The land adjacent to the wall would be filled to the same elevation to obscure the wall from view. The lakeward side of the wall would be naturalized. A typical section is shown in Figure 5.92. This may include some fill, grading, and planting of woody and aquatic vegetation. Aquatic habitat features such as boulder clusters could also be added. The island shoreline east of Carousel Cafe to the bridge leading to Far Enough Farms would be protected with a naturalized shoreline and impermeable clay core flood berm. The road running behind Carousel Café would be raised above the 100-year flood level. The bridges on either side of the small island may need to be raised to match the new elevation of the road and traverse the shoreline berms in order to maintain access to the Duck Island during a flood event.

This concept extends further into the lake than the existing shoreline toe; however, is not expected to have significant impacts on channel navigation/waterways. Localized modifications to the shoreline treatment will be considered and incorporated during the detailed design phased to accommodate specific spatial constraints in key areas (i.e., near mature trees, train tracks, etc.). Given the proximity of the Centreville train tracks to the shoreline, implementation of shore protection will impact the train tracks. Overall integration with and/or relocation of track segments relative to shoreline protection will require careful consideration during the detailed design phase.

The expected residual flood depth map for this concept during the 100-year flood event is shown in Figure 5.93.

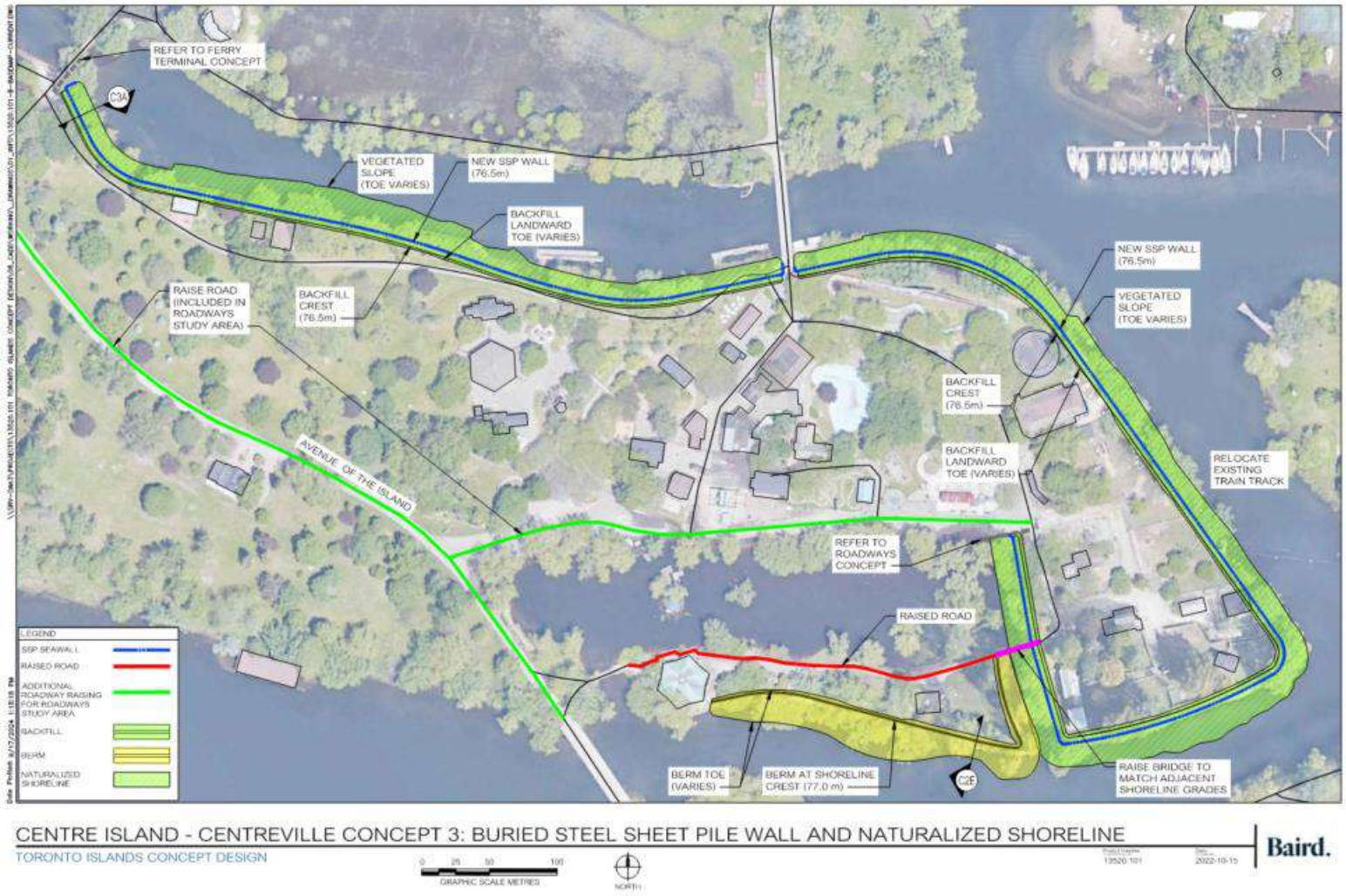


Figure 5.91: Centreville Concept 3: Buried Steel Sheet Pile Wall and Naturalized Shoreline

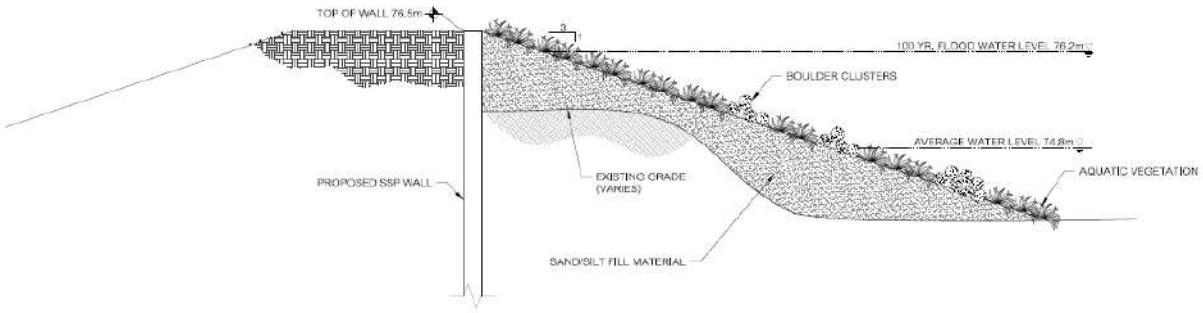


Figure 5.92: Typical buried Steel Sheet Pile (SSP) wall and naturalized shoreline section for Centreville Concept 3

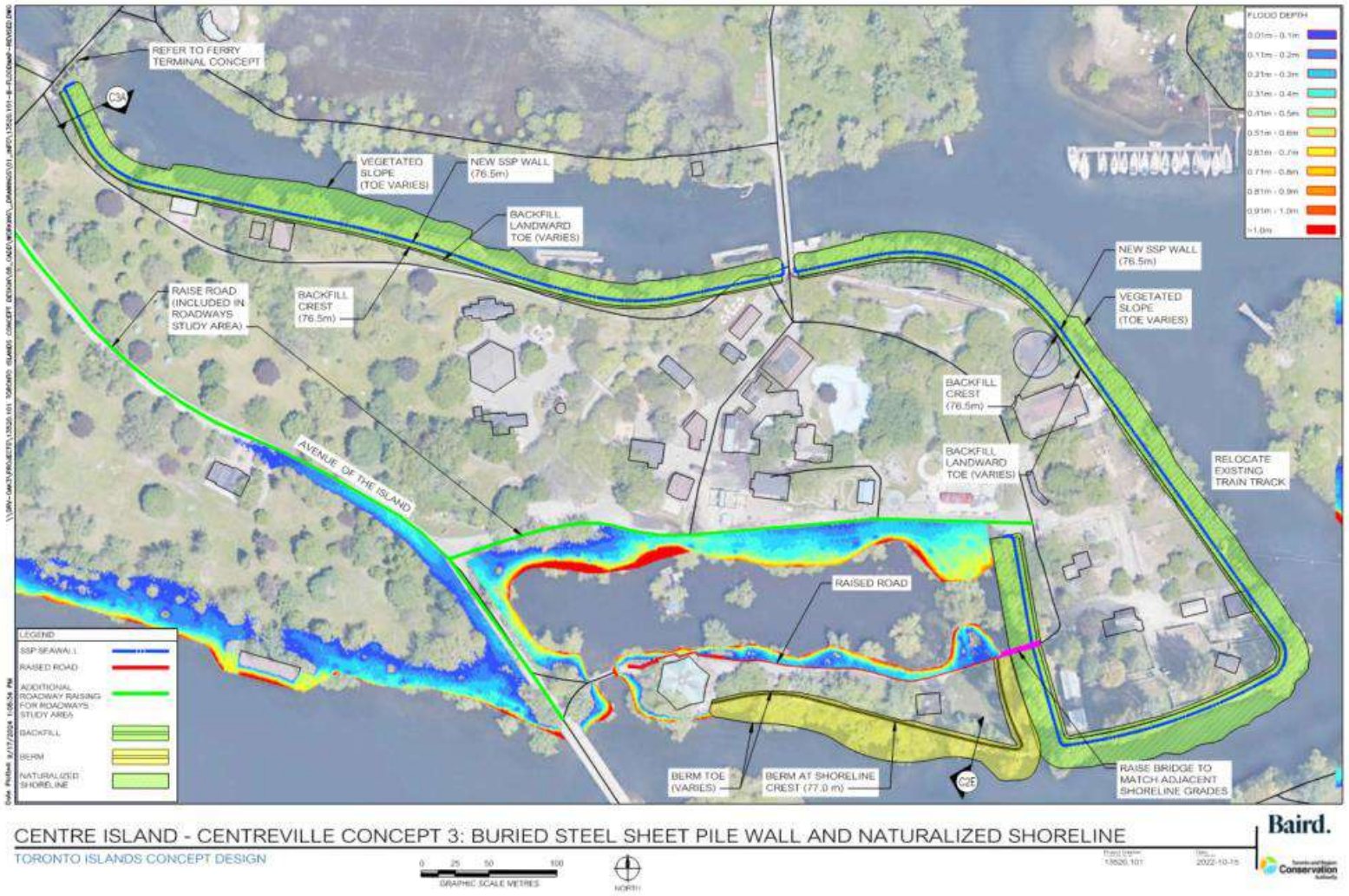


Figure 5.93: Flood depth during the 100-year flood event on Centreville for Concept 3

5.4 Roadways

Concept design alternatives for the roadways involve raising critical sections above the 100-year flood level to an elevation of 76.25 m. The total length of road raising is 6530 m, which includes 990 m of roadway near Hanlan's Point, 990 m of roadway on Centre Island, 540 m of roadway on Ward's Island and 4,010 m of roadway along Lakeshore Road and Cibola Rd. All road raising alternatives incorporate an impermeable barrier within the cross-section to prevent flood waters from passing through the roadway; thus, the raised roadway functions as a flood berm while also allowing safe pedestrian and vehicular access during a 100-year flood event. The concepts also incorporate features to prevent internal erosion by piping. Four concept alternatives were developed by KWA for flood resistant road raising. The critical roadway sections included in this study are indicated in Figure 5.94, while the alternative cross-sections developed by KWA are presented in figures in the following sections. All roadway concept drawings are included in Appendix C.

In high traffic areas or areas where there is significant grade change between adjacent land and proposed grade of the raised road (greater than 0.3 m), such as Ward's Ferry Terminal and Lakeshore Avenue on Centre Island, increasing the road elevation may create barriers to perpendicular movement of foot traffic. In such cases, localized variations in the roadway elevation will be considered during the detailed design phase to better tie into surrounding land area and existing infrastructure while also maintaining elevations above the 100-year flood elevation. In addition, alternatives such as ramps or elevating adjacent land may be considered during the detailed design phase. Potential enhancement of roadway designs/finishes (i.e., pavers along edges) can be added during the detailed design phase if desired. This would be determined based on coordination with the City of Toronto and feedback/direction received through the public engagement process. Additionally, raising critical sections may also require for electric, hydro, and communication lines to be raised as well to ensure clearance for larger vehicles. Further review of impacts, including the appropriate measures for mitigation will be competed during the detailed design phase. Additionally, more analysis is needed to confirm the final recommendation for the built height of roads during detailed design, including further review of any settlement concerns.



Figure 5.94: Road sections included in the Roadways study area

5.4.1 Roadways - Concept 1: Clay Cap

This option involves the design of an impermeable shoulder by capping the side slopes of the roadway fill with low permeability clay. A typical section for Concept 1 is shown in Figure 5.95.

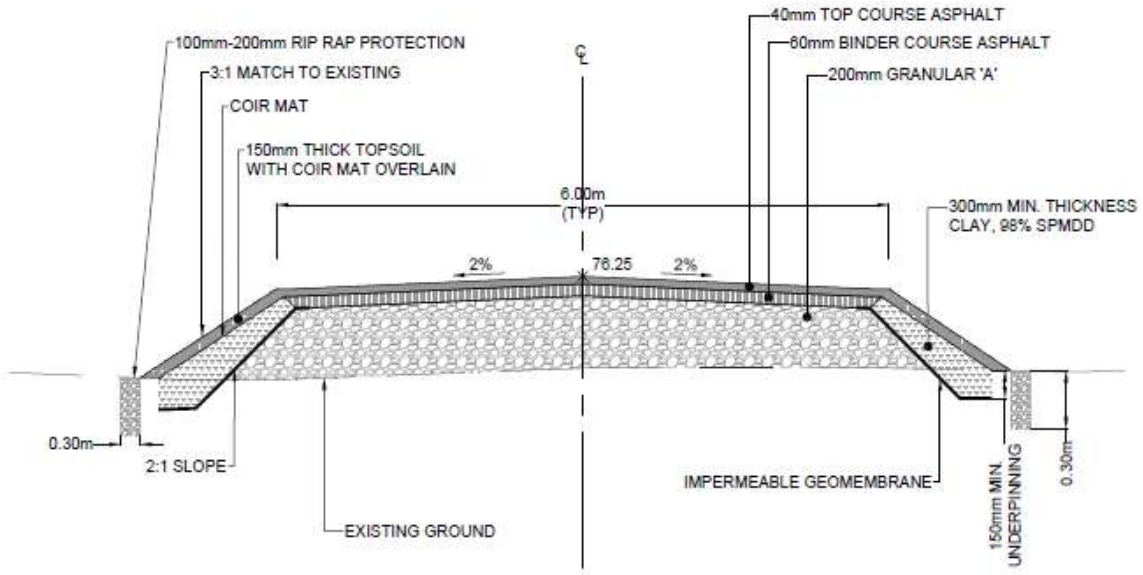


Figure 5.95: Roadways Concept 1: Clay Cap

5.4.2 Roadways - Concept 2: Concrete Core

This option involves the design of a low permeability core approximately in the centre of the granular base course, constructed from lean mix concrete. A typical section for Concept 2 is shown in Figure 5.96.

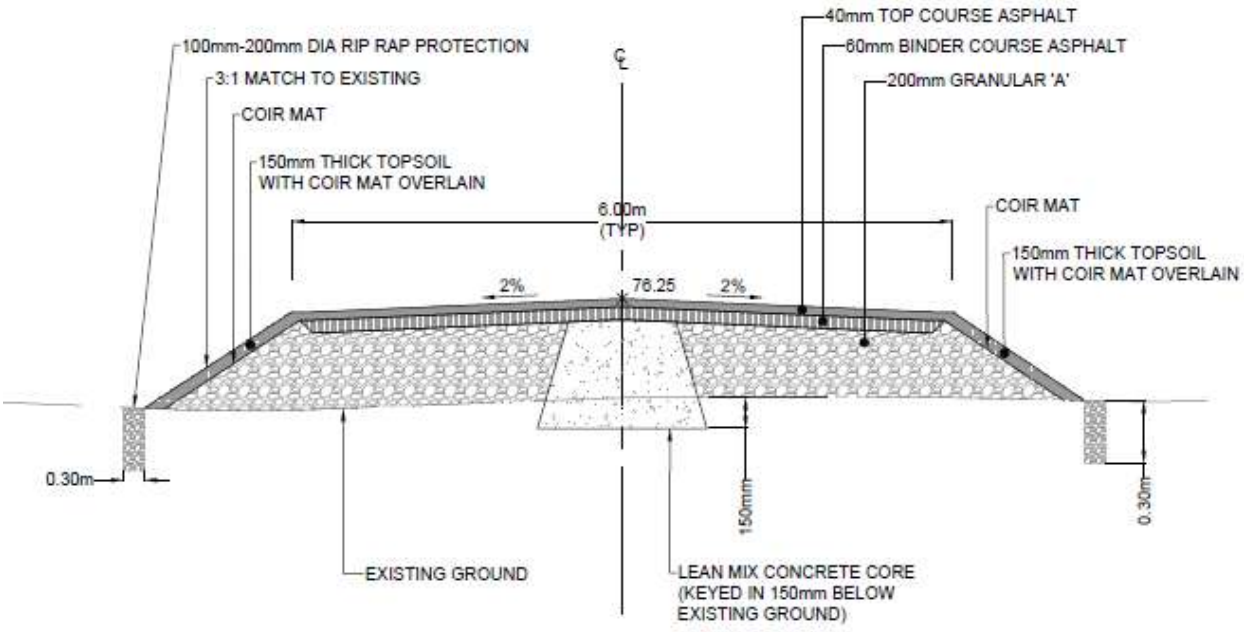


Figure 5.96: Roadways Concept 2: Concrete Core

5.4.3 Roadways - Concept 3: Concrete Curb

This option involves the design of an impermeable shoulder by installing a deep concrete curb along the exposed/flood side of the roadway. A typical section for Concept 3 is shown in Figure 5.97.

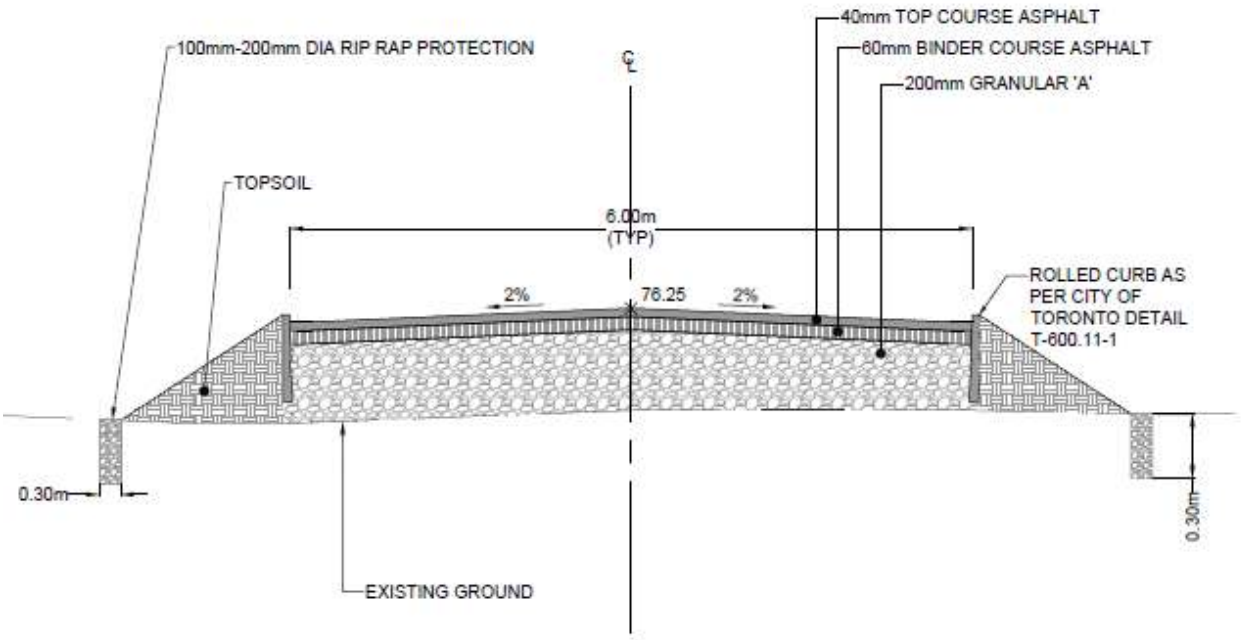


Figure 5.97: Roadways Concept 3: Concrete Curb

5.4.4 Roadways - Concept 4: Crusher Run Limestone (CRL)

This option involves constructing the granular base course with low permeability OPSS Granular A Crusher Run Limestone. A typical section for Concept 4 is shown in Figure 5.98.

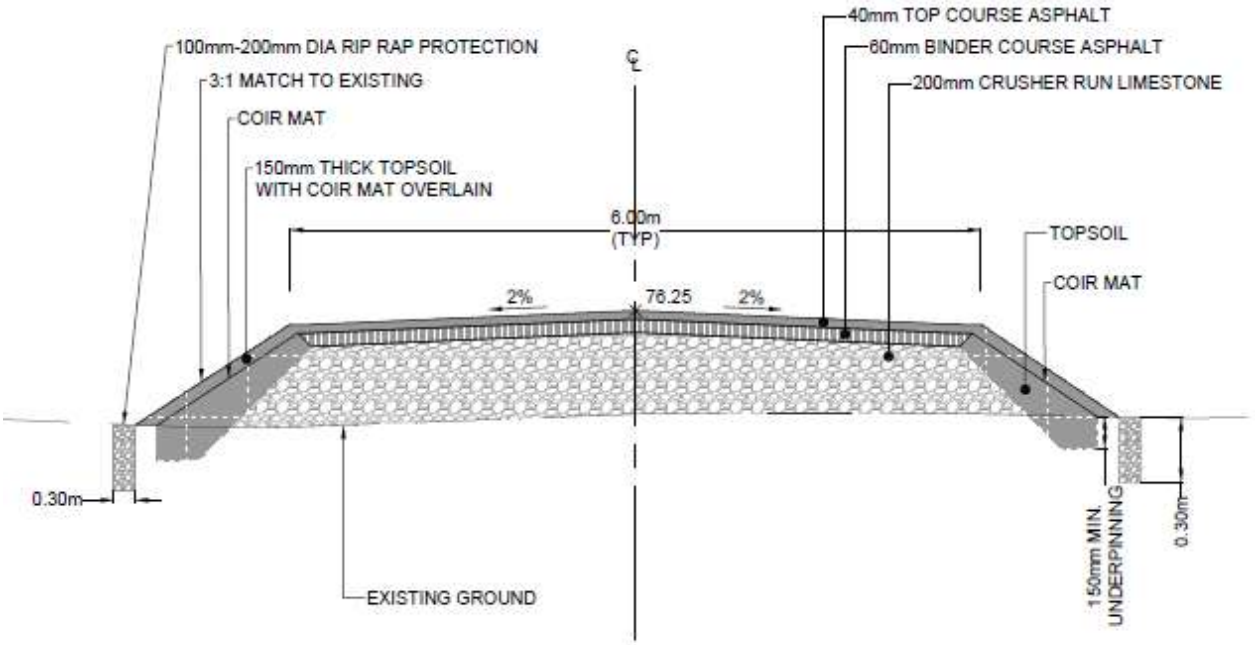


Figure 5.98: Roadways Concept 4: Crusher Run Limestone

5.4.5 Shoreline Protection

The section of roadway along Lakeshore Ave. (PP-8 and PP-9) just south of the service road by the Water Treatment Plant runs very close to the shoreline. Shore protection may be required along this stretch to prevent erosion of the roadway embankment and to reduce wave runup and overtopping onto the road. This location is indicated in Figure 5.100. Figure 5.99 shows aerial photos of these roadway sections. There is ad-hoc rubble along the shoreline at PP-9 and there appears to be erosion of the backshore. A stone revetment is recommended at this location, with the revetment designed to resist extreme storm waves during periods of high lake levels and also to accommodate erosion/scour of the lakebed fronting the structure. There is an existing beach along the shoreline at PP-8; however, the beach would be fully submerged during the 100-year flood event. It is recommended that the revetment design along PP-9 include a partially buried beach curb to protect against wave action during the 100-year flood event and prevent erosion/piping of roadway fill materials and damage to the roadway surface by overland flows associated with wave overtopping. This is shown in plan in Figure 5.101, and cross-section in Figure 5.102.



Figure 5.99: Roadways at PP-8 (left) and PP-9 (right) in close proximity to the shoreline



Figure 5.100: Location along Lakeshore Ave. (PP-8, and PP-9) where shore protection may be required



Figure 5.101: Shoreline revetment concept, in plan, along PP-8 and PP-9

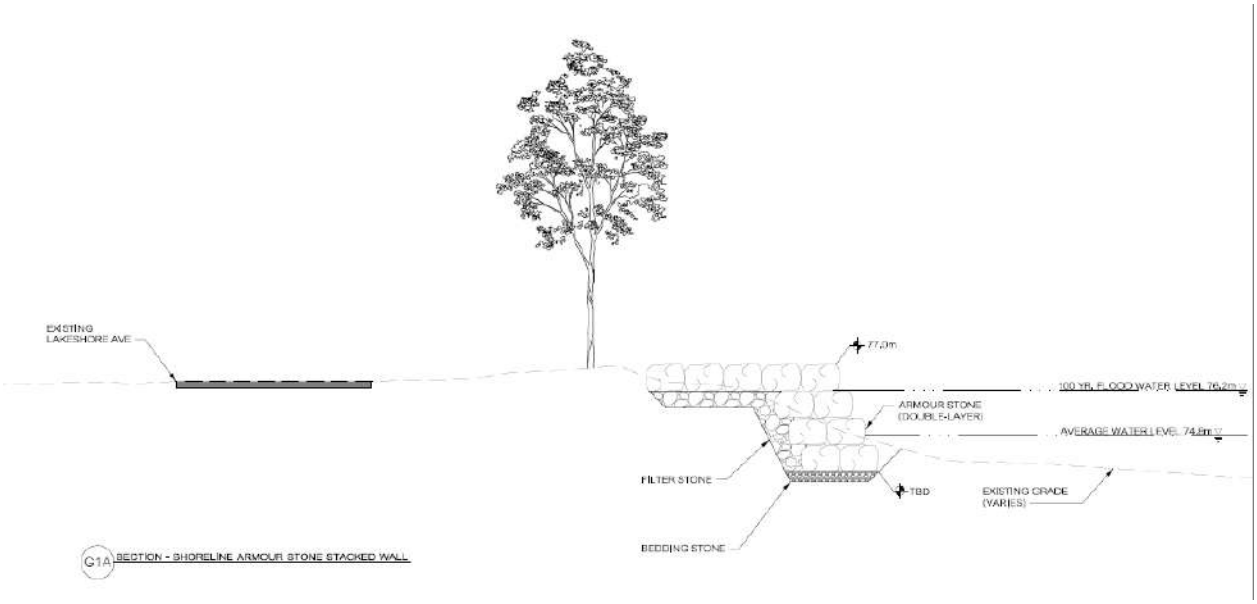


Figure 5.102: Typical section for revetment concept along PP-9 shoreline and PP-8 back of beach

6. Evaluation of Alternatives

The concept alternatives for each study area were evaluated based on consideration of the following factors:

- Extent and effectiveness against flooding and erosion hazards
- Environmental design principles, including:
  - Ability to replicate the natural environment (i.e., “soft” vs. “hard” solutions)
  - Preservation of migratory features or corridors
  - Consideration of the potential quality of the local ecosystem
  - Environmental impacts
- Ability for the alternative to re-establish, maintain, or enhance the natural function and appearance of the system while preserving existing cultural and archaeological features of the Project Area
- Coastal processes, including impacts on sediment transport
- Complexity of permitting
- Applicable legislation, regulations, policies, and guidelines
- Social and cultural environmental impacts, including recreational benefits to park users, impacts to indigenous peoples and aesthetic value
- Impacts on navigation and mooring (Queen City Yacht Club (QCYC) and Toronto Island Marina)
- Technical feasibility
- Construction cost
- Long term durability and maintenance requirements

A discussion of the evaluation process and results, in a tabular matrix, are provided for each study area in the following sections. For each study area, each concept alternative is evaluated under the various criteria and scored from 1 to 4; 4 is excellent performance, 3 is good performance, 2 is moderate performance and 1 is poor performance. The “do nothing” alternative is provided as a baseline for comparison purposes.

Preferred alternatives will undergo a more detailed evaluation and screening process to determine potential impacts under key criteria and mitigation opportunities in Part II of the Class EA and Conceptual Design process.

The preferred alternatives for each study are listed below:

- Ward’s Island: Concept 3C: Vegetated Berm, Beach and Groyne
- Algonquin Island, South End: Concept 1C: Vegetated Inland Berm along Wyandot Avenue
- Algonquin Island, Northwest Shoreline: Concept 2: Impermeable Berm
- Algonquin Island, QCYC: Concept 4: Land Raising and Raised Walkway
- Centre Island, Toronto Island Marina: Concept 4: Land Raising and Shoreline Flood Berm
- Centre Island, Ferry Terminal: Concept 2: Stacked/Stepped Wall
- Centre Island, Centreville: Concept 2: Naturalized Shoreline and Flood Berm
- Roadways: Concept 1: Clay Cap

6.1 Ward's Island - Evaluation of Alternatives

Physical and Natural Environment

Concept 1 for Ward's Island provides increased protection against seepage during high lake level events as the wall penetrates below the ground surface and has been given a 4 in the evaluation matrix. The flood berms in Concepts 2 and 3 include a flood barrier that will adequately protect Ward's Island from direct flooding; however, the structures do not address seepage beneath the berm; as such, they have been given a score of 3 for flood protection. Concept 1 is located inland and therefore does not provide any increased protection against shoreline erosion when compared to existing conditions, which is partially protected by a rip rap revetment. Concepts 2 and 3 provide excellent protection against shoreline erosion.

Concept 1 has the smallest footprint and least disturbance to the existing naturalized areas along the shoreline when compared to Concepts 2 and 3, so it has been given a good rating under environmental impact in the matrix, though it does not offer any added ecological benefits. Concepts 2, 3A, 3B, and 3C may impact existing mature trees along the shoreline. Concept 2, which includes a vegetated flood berm and improvements to the existing revetment, includes a slight increase in the structure footprint on the lakebed when compared to existing conditions due to the added layer of rip rap on top of the existing rip rap. Except for the increased footprint, the added layer of rip rap would not significantly impact or change the existing aquatic habitat. In addition to its flood protection capacity, there are ecological benefits to adding a vegetated berm, including carbon sequestration, and habitation creation for native plants, insects and small animals, thus increasing biodiversity along the shoreline. Concept 2 was given a good rating under environmental impact. Concept 3 involves significant filling of the lakebed with beach material and armour stone to create the groyne and beach system. This option has the greatest encroachment onto the existing lakebed, but also creates additional beach and stone habitat in the nearshore area. Additionally, there is an opportunity to include submerged habitat features to add complexity to the beach habitat (such as rock shoals/habitat stone or woody debris). As such, Concept 3 scored well under the environmental impact criteria.

Social and Cultural Environment

Concepts 3A, 3B and 3C offer the most added recreational benefits, including increased recreational beach area, non-motorized boat access (i.e., kayaks, canoes, and paddle boards on the beach) and opportunities for fishing and views of the city from the groyne structures. These concepts are considered to be the most aesthetically pleasing alternatives. In Concept 1, access to the shoreline and naturalized areas is restricted due to the flood wall, unless gaps are left in the wall (which would require temporary closures during flood events) or ramps over the wall are constructed. The additional beaches in Concepts 3A and 3B would likely increase the number of tourists visiting Ward's Island, resulting in a greater impact on existing Island residents. Although there are fewer opportunities for recreational use, Concept 1 involves keeping the existing shoreline the same outside the new Inland Steel Sheet Flood Wall; hence it scored well in terms of impact to the residential community. Residents would also incur fewer impacts during the construction of Concept 1.

Technical Criteria

Receiving approval from regulatory agencies may by complex for projects with significant lake fill; therefore, Concepts 3A and 3B scored the lowest for this criterion. It is likely that Concepts 1, 2, and 3C would be the least complex with respect to acquiring the required approvals and permits from the regulatory agencies.

Concept 1 is expected to have a design life of 35 – 50 years with minimal maintenance requirements. The design life for the berm included in Concepts 2 and 3 would be a minimum of 35 years. Some maintenance to the stone revetment and flood berm would be expected toward the end of the design life or after a design event. Concepts 2 and 3C may require annual maintenance for vegetation on the landward side of the berm, depending on the type of vegetation installed. Concepts 3A and 3B may also require occasional beach

nourishment over the design life. Concept 3C would also require beach nourishment; however, Concepts 3A and 3B would require more. The required frequency of beach nourishment and maintenance will vary based on details to be determined in final design. These details include, but are not limited to, beach material grain size and final dimensions of the groynes and beaches.

Concept 1 includes and inland SSP wall, which would have the greatest impact to subsurface infrastructure, given its alignment with Bayview Ave. and First St. Each of the other concepts were given the same ranking, as they all have the same alignment with existing roadways and infrastructure but differ in their offshore structures.

Constructability

For all concepts, access for construction may require temporary removal/relocation of utilities and the existing walkway. Concepts 2 and 3 will require removal of some trees and vegetation along the shoreline to accommodate construction and provide sufficient space for the flood berm. The landward side of the flood berm in Concepts 2 and 3 could be vegetated to replace some vegetation lost during construction. Concept 3 (A, B and C) may require the use of marine plant (barges) to support construction. Concept 1 is likely to require minimal tree removal though it may disrupt properties along the northeast shoreline. Concepts 3A and 3B are likely to have the longest construction schedule given the significant volume of material required. Concept 1 would have a shorter construction schedule than Concepts 2 and 3.

Cost

Concept 1 is the highest cost alternative though it is expected to have minimal maintenance costs. Concept 2 and 3C are the least cost alternatives and will have moderate maintenance costs over the course of the design life.

Public Safety

All options are considered relatively safe with respect to public access and enjoyment. Concept 1 was rated as excellent because it restricts access to the water's edge.

The evaluation matrix for the Ward's Island concepts is provided in Table 6.1. The preferred alternative is Concept 3C: 1 Beach and Groyne.

Table 6.1: Evaluation Matrix for Ward's Island Concept Alternatives

Ward's Island

Objective	Criteria	Comment	Do Nothing	Concept 1	Concept 2	Concept 3A	Concept 3B	Concept 3C
			Existing Conditions	Inland Steel Sheet Pile Flood Wall	Revetment and Vegetated Berm	Vegetated Berm, 3 Beaches and Groynes	Vegetated Berm, 2 Beaches and Groynes	Vegetated Berm, Beach and Groyne
Physical and Natural Environment	Flood Protection	Protection from flooding due to high water levels, wave runup and overtopping, ground water seepage and surface drainage.	1	4	3	3	3	3
	Erosion Protection	Protection from shoreline erosion due to high water levels and wave action.	2	2	4	4	4	4
	Aquatic Habitat	Creation, protection or enhancement of aquatic habitat.	1	1	2	3	3	3
	Environmental Impact	Creation, protection or enhancement of the environment and ecologically sensitive areas. Mitigation of negative environmental impacts.	3	3	3	3	3	3
Social and Cultural Environment	Aesthetic Value	Visual appeal of concept.	1	1	3	4	4	4
	Impact to Island Residents	Anticipated impact of final solution to the residential community.	1	3	2	1	1	2
	Recreational Value	Opportunities for public recreation and enjoyment, both active and passive.	1	1	3	4	4	4
Technical Criteria	Regulatory Agency Acceptance	Complexity of approvals and permitting by Regulatory Agencies.	4	3	3	1	2	3
	Impact on Existing Subsurface Infrastructure	Minimal disruption to subsurface infrastructure identified in the Subsurface Utility Investigation.	4	1	2	2	2	2
	Maintenance Requirements	Minimal maintenance requirements over the design life.	2	4	3	2	2	3
Constructability	Construction Access and Ease	Sufficient access for construction is available with minimal disturbance to existing infrastructure or vegetation.	4	3	3	2	2	3
	Construction Time	Expected length of time to complete construction.	4	3	2	1	1	2
Financial Criteria	Capital Cost	Estimated construction costs.	4	1	3	2	2	3
	Maintenance Costs	Estimated annual maintenance costs.	1	4	3	2	2	3
Public Safety	Potential Risks to the Public	Safe for public access, use and enjoyment. Mitigates and/or protects public from flood and erosion hazards.	1	4	3	3	3	3
Combined Rank (Higher score is preferred)			**34**	**38**	**42**	**37**	**38**	**45**

6.2 Algonquin Island - Evaluation of Alternatives

6.2.1 Algonquin Island - South End

Physical and Natural Environment

The priority areas to protect in the Algonquin Island South End are the Clubhouse and the residential area. Concept 1A for the south end of Algonquin Island provides flood protection for the entire south end of Algonquin Island, while Concept 1B provides flood protection for approximately half of the south end of

Algonquin Island, including the Clubhouse. Concepts 1C and 2 provide flood protection for the Clubhouse only and leave the rest of the vegetated area of the south end to flood. In Concept 3, the flood wall is placed adjacent to Wyandot Ave. to protect the residential portion of the island, while the south end of Algonquin Island, including the Clubhouse, remains vulnerable to flooding during the design flood event. The pathway to the Clubhouse from Wyandot Ave. would need to be raised above the 100-year flood elevation for Concept 3 to allow access to the building; however, based on community feedback, flooding of the surrounding yard and driveway would significantly impact function and use of the Clubhouse.

The berm in Concept 1A follows the shoreline, which is sheltered, thus allowing a naturalized approach to the outer berm slope and protection against shoreline erosion. However, construction of a berm in this location would require significant disruption to the existing natural shoreline, including removal of trees and disturbance to Provincially Significant Wetland areas and vegetation communities of conservation concern. Concept 1A was given a poor score for protection, creation or enhancement of aquatic habitat as this shoreline is already naturalized and is a sensitive shoreline ecosystem. The vegetated berm location in Concept 1B and 1C are optimized to reduce the amount of disturbance to the wetlands and woodlands though there will still be some impacts. Concept 1C will have fewer impacts as it goes along Wyandot Ave. for a considerable portion of the berm. Concepts 1C and 2 also reduce impacts to the natural/vegetated areas. Concept 3 has no impact on the ecologically sensitive ecosystems at the south end of the island and would not require any significant tree removal since Wyandot Ave. offers good construction access. Concepts 1B, 1C, 2 and 3 do not offer shoreline erosion protection around the south end. Within the detailed design phase, wetland hydrology will be reviewed and a mitigation plan to reduce impacts will be developed before the implementation of the proposed concepts.

Social and Cultural Environment

There are limited new recreational opportunities for any of the South End concepts; however, general public use features could be incorporated in Concepts 1A, 1B, and 1C. This opportunity is being explored as part of the Toronto Islands Master Plan study.

Of note, Concept 1A would protect entire South End of Algonquin Island from flooding and thus would allow public access to the entire area for recreational activities during flood events. Concept 1B protects roughly one half of the area while Concepts 1C and 2 protect only a small area around the Clubhouse; hence, the space available for recreational opportunities at the South End of Algonquin Island would be reduced with these concepts. Finally, Concept 3 does not protect any of the South End from flooding and would significantly impact use the Clubhouse as the parking lot and land area around it would flood; hence, Concept 3 would have the greatest impact on island residents. Finally, we note that flood walls are generally considered to be less aesthetically pleasing than flood berms.

Technical Criteria

Given the sensitivity of the ecosystems within Algonquin Island Park, it is expected that with the regulatory approval process for the construction of an engineered berm through these areas (Concepts 1A, 1B) will be more complex than with Concepts 2 and 3. However, the majority of Concept 1C is aligned with Wyandot and will be less have less complex regulatory approval than Concept 1A and 1B. On the other hand, Concepts 1C and 2 have portions of their design aligned with Wyandot Ave. and may have some impacts to subsurface infrastructure that need to be addressed during the detailed design phase. Concept 3 proposes a flood wall the entire length of Wyandot Ave. and would have the greatest impact to subsurface infrastructure.

The design life for the vegetated berms and flood wall would be a minimum of 35 years with some maintenance expected toward the end of the design life. The concrete flood wall in Concepts 2 and 3 is expected to have minimal maintenance requirements over the design life, while the vegetation on the berms (Concepts 1A, 1B, 1C and 2) may require some maintenance over the design life.

Constructability

Concepts 1C, 2 and 3 are expected to have moderate to good construction access via Wyandot Ave., which will improve constructability and reduce construction time. While all concepts will require tree removal, Concept 1A will require more removals to facilitate construction and is expected to take longer to construct than the alternatives that run along Wyandot Avenue.

Cost

From the ROM costing, the lowest cost alternatives are Concepts 1B, 1C, and 3, the middle cost alternative is Concept 2, and the highest cost alternative is Concept 1A. The berm concepts (Concepts 1A, 1B, 1C and 2) are expected to have some annual maintenance costs to maintain the vegetation. Concept 3 is expected to have high maintenance costs as temporary flood protection measures will still be required around the Clubhouse during severe flood events.

Public Safety

All options are relatively safe for public access and use; however, Concept 3 does not include protection of the Clubhouse and surrounding lands; hence, this area may be hazardous during severe flood events.

The evaluation matrix for Algonquin Island South End concepts is provided in Table 6.2. Concept 1C scored the highest.

Table 6.2: Evaluation Matrix for Algonquin Island South End Concept Alternatives

Algonquin Island: South End

Objective	Criteria	Comment	Do Nothing	Concept 1A	Concept 1B	Concept 1C	Concept 2	Concept 3
			Existing Conditions	Vegetated Shoreline Flood Berm	Vegetated Inland Berm	Vegetated Inland Berm along Wyandot	Vegetated Inland Berm and Flood Wall	Wyandot Concrete Flood Wall
Physical and Natural Environment	Flood Protection	Protection from flooding due to high water levels, wave runup and overtopping, ground water seepage and surface drainage.	1	3	3	3	3	1
	Erosion Protection	Protection from shoreline erosion due to high water levels and wave action.	1	3	1	1	1	1
	Aquatic Habitat	Creation, protection or enhancement of aquatic habitat.	4	1	4	4	4	4
	Environmental Impact	Creation, protection or enhancement of the environment and ecologically sensitive areas. Mitigation of negative environmental impacts.	4	1	1	3	3	4
Social and Cultural Environment	Aesthetic Value	Visual appeal of concept.	2	3	3	3	2	1
	Impact to Island Residents	Anticipated impact of final solution to the residential community.	1	4	4	3	2	2
	Recreational Value	Opportunities for public recreation and enjoyment, both active and passive.	1	2	3	2	1	1
Technical Criteria	Regulatory Agency Acceptance	Complexity of approvals and permitting by Regulatory Agencies.	4	1	1	3	3	4
	Impact on Existing Subsurface Infrastructure	Minimal disruption to subsurface infrastructure identified in the Subsurface Utility Investigation.	4	4	4	3	3	2
	Maintenance Requirements	Minimal maintenance requirements over the design life.	2	2	2	2	3	4
Constructability	Construction Access and Ease	Sufficient access for construction is available with minimal disturbance to existing infrastructure or vegetation.	4	1	1	2	2	4
	Construction Time	Expected length of time to complete construction.	4	1	2	2	2	3
Financial Criteria	Capital Cost	Estimated construction costs.	4	1	3	3	2	3
	Maintenance Costs	Estimated annual maintenance costs.	2	3	3	3	3	2
Public Safety	Potential Risks to the Public	Safe for public access, use and enjoyment. Mitigates and/or protects public from flood and erosion hazards.	1	3	3	3	3	1
		Combined Rank (Higher score is preferred)	**39**	**33**	**38**	**40**	**37**	**37**

6.2.2 Algonquin Island - Northwest Shoreline

Physical and Natural Environment

All concepts presented for the northwest shoreline on Algonquin Island provide excellent flood and erosion protection. Concept 1 scored slightly lower on erosion protection as wave overtopping may lead to some erosion behind the SSP wall over time, whereas minimal wave overtopping is expected for Concepts 2 and 3.

Concept 1 includes a vertical SSP wall which is not desirable for aquatic habitat. Concept 2 with armour stone revetement provides some improvement over the existing vertical wall with respect to aquatic habitat as the sloping stone revetment will include interstitial spaces that provide shelter for aquatic life; this improvement would not be realized with Concept 2 with the stacked stone wall. Concept 3 creates excellent aquatic habitat with various habitat features, including rock shoals, vegetation, and sand fill. Landside, all concepts have opportunities to vegetate the land adjacent to the shoreline; however, Concepts 2A and 3 provide greater environmental opportunities as the berm and stone revetment/habitat shoreline allows a more natural connection between the land and water.

Social and Cultural Environment

There are no added recreational benefits to Concept 1; also, SSP walls are not generally considered to be aesthetically pleasing. Concept 2 has limited added recreational benefits, including the opportunity to incorporate general public use features. Concept 3 provides added recreational benefits, including access for non-motorized boats (kayaks, canoes, paddle boards) and additional storage area on the sand area. A groyne would be required at the west end of the sand fill to retain the fill material. Concepts 2 and 3 may result in increased tourist activity on Algonquin Island, with associated impacts on the residential community. The habitat shoreline in Concept 3 would likely have a greater impact on the residents than the stone buttress since tourists may be more attracted to a sand filled shoreline.

Technical Criteria

Concept 3 requires significant filling of the lakebed. The regulatory approval process may be more complex for projects that require significant lakefill. It is likely that obtaining permitting and approvals for Concept 1 and Concept 2 would be less complex.

None of the presented concepts are expected to impact existing subsurface utilities.

The SSP wall in Concept 1 would have a longer design life (expected 35 – 50 years) and less maintenance requirements than Concepts 2 and 3. The design life for Concepts 2 and 3 would be a minimum of 35 years. Maintenance requirements for the stone berm in Concept 2 and the nearshore habitat in Concept 3 would be dependant upon details to be developed in detailed design; however, the nearshore habitat in Concept 3 will have higher maintenance requirements.

Constructability

Construction access is adequate for all three concepts, though Concept 3 may require the use of marine plant (barges) given the amount of lakefill required. Concept 3 is also expected to have a much longer construction schedule than Concepts 1 and 2.

Cost

Concept 1, comprised of a steel sheet pile wall, is significantly higher in cost than the other alternatives but is expected to have minimal maintenance requirements. Concept 2, comprised of an impermeable berm supported by an armour stone berm, is the lowest cost alternative; the cost increases slightly if a stacked stone wall is used for support rather than an armour stone berm. Concept 3 is significantly higher in cost than Concept 2 but significantly lower in cost than Concept 1. Concepts 2 and 3 may require some maintenance over their design life, with Concept 3 expected to have higher maintenance costs than Concept 2.

Public Safety

Concept 1 maintains the existing level of access for small vessels; however, the lakebed is too shallow to allow emergency vessels to dock alongside the wall. The sloping revetment option for Concept 2 does not allow for vessels to dock alongside the shoreline; furthermore, the underwater slope could be considered a hazard to boaters. The stacked stone wall option for Concept 2 has a near vertical face and would be less of a hazard to boaters. Finally, Concept, 3, with a gentle slope from the flood berm down into the lake, is considered safer than Concepts 1 and 2 which have steep drop-offs down into the lake.

The evaluation matrix for Northwest Shoreline concepts is provided in Table 6.3. Concept 2 scored the highest, closely followed by Concept 3.

Table 6.3: Evaluation Matrix for Algonquin Island Northwest Shoreline Concept Alternatives

Algonquin Island: Northwest Shoreline

Objective	Criteria	Comment	Do Nothing	Concept 1	Concept 2	Concept 3
			Existing Conditions	Steel Sheet Pile Wall	Impermeable Berm	Impermeable Berm and Nearshore Habitat
Physical and Natural Environment	Flood Protection	Protection from flooding due to high water levels, wave runup and overtopping, ground water seepage and surface drainage.	1	4	4	4
	Erosion Protection	Protection from shoreline erosion due to high water levels and wave action.	2	3	4	4
	Aquatic Habitat	Creation, protection or enhancement of aquatic habitat.	1	1	3	4
	Environmental Impact	Creation, protection or enhancement of the environment and ecologically sensitive areas. Mitigation of negative environmental impacts.	2	2	3	4
Social and Cultural Environment	Aesthetic Value	Visual appeal of concept.	1	1	3	4
	Impact to Island Residents	Anticipated impact of final solution to the residential community.	1	3	2	1
	Recreational Value	Opportunities for public recreation and enjoyment, both active and passive.	1	1	2	3
Technical Criteria	Regulatory Agency Acceptance	Complexity of approvals and permitting by Regulatory Agencies.	4	2	3	1
	Impact on Existing Subsurface Infrastructure	Minimal disruption to subsurface infrastructure identified in the Subsurface Utility Investigation.	4	4	4	4
	Maintenance Requirements	Minimal maintenance requirements over the design life.	2	4	3	2
Constructability	Construction Access and Ease	Sufficient access for construction is available with minimal disturbance to existing infrastructure or vegetation.	4	3	3	3
	Construction Time	Expected length of time to complete construction. (Shorter construction time is preferred).	4	3	3	2
Financial Criteria	Capital Cost	Estimated construction costs.	4	1	3	2
	Maintenance Costs	Estimated annual maintenance costs.	2	4	3	2
Public Safety	Potential Risks to the Public	Safe for public access, use and enjoyment. Mitigates and/or protects public from flood, erosion or other hazards pertaining to the shoreline (i.e. boating hazards, falls or injury	1	3	3	4
		Combined Rank (Higher score is preferred)	**34**	**39**	**46**	**44**

6.2.3 Algonquin Island - Queen City Yacht Club (QCYC)

Physical and Natural Environment

Concepts 1 and 2 provide good flood protection for the full extent of the QCYC property, though the raised shoreline walls will require access gaps or gangway connections for the docks and marine railway; this will require deployment of temporary closure measures during flood events. Concept 3 provides flood protection for the inner land area at QCYC; however, the shoreline and adjacent walkway will be submerged in the design flood event. This concept would also require the deployment of temporary flood closure measures across the gaps during flood events. Concept 4 includes flood mitigation measures already implemented by the QCYC, adding a concrete flood wall and stone buttress (for structural support) along the existing SSP wall along the northwest shoreline of the Club, and raising the land along the southwest shoreline of the Club. The flood mitigation measures implemented by QCYC include modular flood walls and a raised walkway; of note, these measures have not yet been tested in a flood.

The QCYC shoreline is already hardened and there appears to be little to no erosion within the site; however, Concepts 1 and 2 provide added value compared to existing conditions since their elevation (which is higher than the existing seawall) would provide increased protection during high water levels which exacerbate erosion processes and risk. Concept 4 would provide similar added value during high water levels; however, there would be slightly less protection compared to Concepts 1 and 2 since new structures do not extend across the whole shore in this option. Concept 3 does not provide any added erosion protection since the flood wall is placed inland of the shoreline.

None of the concepts have added environmental benefits and all include a vertical wall on the shoreline which is not considered desirable aquatic habitat. However, the habitat impacts are lower for Concept 3 and Concept 4 due less construction and disruption.

Social and Cultural Environment

The construction of a new wall (Concepts 1 and 2) will require significant modification and disruption to the dock connections. For Concept 1, if gaps are not included in the wall, the adjacent land may need to be raised to the grade of the crest to allow access to the docks, with the associated requirement for new access ramps to the docks. The lower-outer step on the wall in Concept 2 is at similar elevation as the existing dock wall; therefore, it is assumed that the existing ramps can be retained for access to the docks and just new connections would need to be installed. Increasing the height of the dock wall will create challenges with respect to access to the docks; gaps will need to be left in the wall to maintain access, with the associated requirement for temporary closure measures during flood events. Alternatively, steps or ramps over the raised wall could be constructed. Concept 3 does not require modifications to the dock wall or dock connections, though gaps in the flood wall will be required for access to buildings and would have to be blocked during flood events using temporary closure measures. Access to the shoreline for Concept 3 is impeded in some locations by the flood wall. Feedback from the QCYC community indicated that Concepts 1, 2, and 3 would all have significant impacts on the Club's operations, while Concept 4 would have the least impact to the Club's operations. All concepts will benefit the greater Algonquin Island community by providing flood protection at the east end of the island. Concept 4 is the only concept that did not include building a new flood protection wall; therefore, it scored highest on aesthetic value.

Technical Criteria

It is expected that Concepts 3 and 4 would be the least complex with respect to permitting and approvals by regulatory agencies as these concepts have minimal to no encroachment onto the lakebed. Detailed design of all concepts will require consideration of existing subsurface utilities in the area. Concepts 3 and 4 retain the existing dock wall. Concept 4 would have the least impact on existing subsurface infrastructure.

Concepts 1 and 2 encapsulate the existing shoreline structures, thus increasing the design life of the shoreline (expected to be 35 - 50 years) relative to the existing structure. This is not the case for Concepts 3 and 4 as the flood protection works are set back from the existing shoreline. The design life of Concept 3 would be a minimum of 35 years. Minimal maintenance is expected for Concepts 1 and 2, while some maintenance may be required for Concept 3 since the shoreline is allowed to flood during a design event. The design life for the flood mitigation structures implemented by QCYC included in Concept 4 is undefined and less than the design life of Concepts 1, 2 and 3; these structures may require occasional maintenance, particularly after a flood event.

Constructability

For all concepts, access for construction may be challenging and temporary disruption to utilities may be required for construction. It is expected that the construction of Concepts 1 and 2 will be more complex and take longer than Concepts 3 and 4. Concept 4 would likely have the shortest construction time.

Cost

Concepts 1 and 2 are significantly higher cost than Concepts 2 and 3, though are expected to have minimal maintenance costs. Concept 3 is the middle cost alternative. Concept 4 is the lowest cost alternative. Concepts 3 and 4 may have maintenance costs if subjected to a design flood event.

Public Safety

All concepts are considered relatively safe for public use. Concept 2 was scored slightly lower because stepping up and over the concrete wall may create a tripping hazard for boaters accessing their docks if gaps are not created in the wall to allow unimpeded access.

The evaluation matrix for the QCYC concepts is provided in Table 6.4. Concept 4 scored the highest, followed by Concept 3.

Table 6.4: Evaluation Matrix for Algonquin Island Queen City Yacht Club (QCYC) Concept Alternatives

Algonquin Island: Queen City Yacht Club

Objective	Criteria	Comment	Do Nothing	Concept 1	Concept 2	Concept 3	Concept 4
			Existing Conditions	Steel Sheet Pile Wall	Concrete Dock Wall	Flood Wall	Land Raising and Raised Walkway
Physical and Natural Environment	Flood Protection	Protection from flooding due to high water levels, wave runup and overtopping, ground water seepage and surface drainage.	1	4	4	3	3
	Erosion Protection	Protection from shoreline erosion due to high water levels and wave action.	2	4	4	2	3
	Aquatic Habitat	Creation, protection or enhancement of aquatic habitat.	1	1	1	2	2
	Environmental Impact	Creation, protection or enhancement of the environment and ecologically sensitive areas. Mitigation of negative environmental impacts.	2	2	2	2	2
Social and Cultural Environment	Aesthetic Value	Visual appeal of concept.	2	2	2	2	3
	Impact to Island Residents	Anticipated impact of final solution to the residential community.	1	4	4	4	4
	Recreational Value	Opportunities for public recreation and enjoyment, both active and passive.	2	3	3	2	4
Technical Criteria	Regulatory Agency Acceptance	Complexity of approvals and permitting by Regulatory Agencies.	3	2	2	4	4
	Impact on Existing Subsurface Infrastructure	Minimal disruption to subsurface infrastructure identified in the Subsurface Utility Investigation.	4	2	2	2	4
	Maintenance Requirements	Minimal maintenance requirements over the design life.	1	4	4	3	2
Constructability	Construction Access and Ease	Sufficient access for construction is available with minimal disturbance to existing infrastructure or vegetation.	4	1	1	3	3
	Construction Time	Expected length of time to complete construction.	4	2	2	3	4
Financial Criteria	Capital Cost	Estimated construction costs.	4	1	1	2	3
	Maintenance Costs	Estimated annual maintenance costs.	1	4	4	3	2
Public Safety	Potential Risks to the Public	Safe for public access, use and enjoyment. Mitigates and/or protects public from flood and erosion hazards.	1	4	3	4	3
		Combined Rank (Higher score is preferred)	**33**	**40**	**39**	**41**	**46**

6.3 Centre Island - Evaluation of Alternatives

6.3.1 Centre Island - Toronto Island Marina

Physical and Natural Environment

Concept 1 for the Toronto Island Marina includes road raising and raising the grade within the marina yard. The raised roads provide access during a design flood event; however, the surrounding land and shoreline will be vulnerable to flooding. This concept does not require any modifications to the dock walls and does not include any shoreline structures, therefore the dock walls and adjacent shoreline will be submerged during a design flood event and there is no change to erosion protection when compared to existing conditions. Concept 2 also includes raised roads which provide access to the marina during a design flood event and form a flood barrier along the south and west side of the marina yard. A SSP wall along the north shoreline in Concept 2 provides flood protection along the north side of the marina yard. Concept 2 protects a larger area from flooding since the inland berm also provides flood protection for the parkland between the ferry dock and the marina. The SSP wall provides flood protection along the west side of the yard which leaves a gap in protection between the wall and the raised road; temporary measures may be required to close the gaps during flood events. Concept 3 includes a flood berm along the north shoreline between the marina and the Island BBQ and Beer Co. restaurant which protects the parkland from flooding; Concept 3 also includes the construction of new SSP walls along a significant length of the marina basin shorelines. Concept 4 includes raising the land above the design flood elevation for a portion of the boat storage yard, road raising around the central club area, and a shoreline flood berm along the north shoreline to the Toronto Island BBQ and Beer Co. restaurant. This concept maintains access to the central area during a flood event as well as access along the fuel truck lane. Concepts 2, 3 and 4 all provide erosion protection to the Toronto Island BBQ and Beer Co.

restaurant. The SSP wall in Concept 2A will protect a small area along the north shoreline within the marina yard, but since the berm in this option is placed inland it will not provide increased protection to the shoreline north of the parkland. Alternatives 2B and 3 both provide erosion protection within the marina and shoreline north of the parkland because of the SSP walls and shoreline berm. Alternative 4 does not provide any shoreline protection within the marina area but the shoreline berm improves erosion protection along the shoreline north of the parkland.

There is minimal added ecological benefit to the marina shoreline for all concepts. Concept 1, land and road raising requires only limited disturbance to the existing environment. Concepts 2, 3 and 4 may require some tree removal to facilitate construction of the berm. The shoreline berm in Concepts 2B, 3 and 4 includes a naturalized slope with a mix of armour, rock shoals and vegetation to provide mitigation against erosion from wave runup.

Social and Cultural Environment

All concepts maintain access to the main roadway and facilities within the marina during a flood event, though access to the docks may be impeded for Concept 1 and 4 due to shoreline flooding. Concept 4 includes raising the road used by fuel trucks to maintain access for refueling the fuel dock during a flood event. Concepts 2 and 3 would require modifications to the dock connections and walkway adjacent to the new SSP wall; in addition, the adjacent land may need to be raised to the top of the wall, or access steps/ramps over the top of the wall will be required to access the docks.

Concepts 2, 3 and 4 include an opportunity to incorporate a walking or biking path along the top of the flood berm. The shoreline berm in Concepts 2B, 3 and 4 will have a more naturalized appearance than other options and may help enhance lake sightline opportunities along the shoreline north of the parkland if a walking path is integrated into the design.

Technical Criteria

Concepts 1 and 4 are expected to be the least complex with respect to obtaining permits and approvals from the regulatory agencies. Concepts 2 and 3 may be more complex to obtain permits and approvals from the regulatory agencies as they include more extensive changes to the existing shoreline. Concepts 1 and 4 may require disruption to subsurface infrastructure to accommodate land raising.

The land raising in Concepts 1 and 4 is not expected to have any significant maintenance costs in the future and is expected to have a long design life (minimum 50 years). Concepts 2 and 3 are expected to have minimal maintenance requirements and costs. The flood berms are expected to have a minimum design life of 35 years, with some maintenance expected toward the end of the design life.

Constructability

The overall scope of work and duration of construction will be least for Concept 1, moderate for Concepts 2A, 2B and 4 (more for 2A and 2B than 4) and greatest for Concept 3.

The construction of all concepts will result in some level of disruption to existing marina operations and associated impacts on marina staff and users. Road raising for Concepts 1, 2A, 2B and 4 will impact access within/around the marina area to some degree during construction. Raising the grade of the boat storage yard for Concepts 1 and 4 will require temporary relocation of stored boats and other items within the yard; as the land area to be raised is less for Concept 4 than for Concept 1, the duration required for relocation would be less for Concept 4. Concept 3 involves the construction of new SSP walls along a significant length of the marina basin shorelines, with associated impacts on the marina during construction; these impacts could be mitigated by completing construction of the new SSP walls in the winter.

Some impact to the general public may also occur for Concepts 2A, 2B, 3 and 4 during construction of the flood berm to the east of the marina (note that it terminates near the Island BBQ and Beer Co. restaurant). In addition, tree removal will be required to accommodate the flood berms in Concepts 2A, 2B, 3 and 4; we anticipate that the scope of tree removal will be less for the inland berm in Concept 2A than for the shoreline berm in Concepts 2B, 3 and 4.

Cost

Concept 1 is the lowest cost alternative and Concept 4 is the second lowest cost alternative. Concept 1 may have additional temporary flood mitigation costs during a design event, as this concept does not offer flood protection for the green space between the marina and the Toronto Island BBQ and Beer Co. restaurant. Concepts 2A and 2B are the middle cost alternatives, and Concept 3 is the highest cost alternative. Minimal maintenance requirements are expected for Concepts 2A, 2B, 3 and 4.

Public Safety

All concepts are considered safe for public access and use. However, there is more flooding during a 100-year storm event associated with Concept 1. The land raising and lack of shoreline protection causes flooding on the greenspace area between the Toronto Island Marina and the Island BBQ and Beer Co.

The evaluation matrix for Toronto Island Marina concepts is provided in Table 6.6. Concept 4 scored the highest.

Table 6.5: Evaluation Matrix for Centre Island Toronto Island Marina Concept Alternatives

Centre Island: Toronto Island Marina

Objective	Criteria	Comment	Do Nothing	Concept 1	Concept 2A	Concept 2B	Concept 3	Concept 4
			Existing Conditions	Land and Road Raising	Steel Sheet Pile Wall and Inland Flood Berm	Sheet Pile Wall and Shoreline Flood Berm	Steel Sheet Pile Dock Walls and Shoreline Flood Berm	Land Raising and Shoreline Flood Berm
Physical and Natural Environment	Flood Protection	Protection from flooding due to high water levels, wave runup and overtopping, ground water seepage and surface drainage.	1	2	3	3	3	3
	Erosion Protection	Protection from shoreline erosion due to high water levels and wave action.	1	1	3	4	4	3
	Aquatic Habitat	Creation, protection or enhancement of aquatic habitat.	1	2	2	3	3	3
	Environmental Impact	Creation, protection or enhancement of the environment and ecologically sensitive areas. Mitigation of negative environmental impacts.	2	2	2	2	2	3
Social and Cultural Environment	Aesthetic Value	Visual appeal of concept.	2	2	2	3	3	3
	Recreational Value	Opportunities for public recreation and enjoyment, both active and passive.	1	2	3	3	3	3
Technical Criteria	Regulatory Agency Acceptance	Complexity of approvals and permitting by Regulatory Agencies.	3	4	2	2	2	3
	Impact on Existing Subsurface Infrastructure	Minimal disruption to subsurface infrastructure identified in the Subsurface Utility Investigation.	3	1	3	3	3	2
	Maintenance Requirements	Minimal maintenance requirements over the design life.	1	4	3	3	3	4
Constructability	Construction Access and Ease	Sufficient access for construction is available with minimal disturbance to existing infrastructure or vegetation.	4	2	3	3	1	2
	Construction Time	Expected length of time to complete construction.	4	4	2	2	1	3
Financial Criteria	Capital Cost	Estimated construction costs.	4	4	2	2	1	3
	Maintenance Costs	Estimated annual maintenance costs.	1	2	3	3	3	3
Public Safety	Potential Risks to the Public	Safe for public access, use and enjoyment. Mitigates and/or protects public from flood and erosion hazards.	1	3	4	4	4	4
		Combined Rank (Higher score is preferred)	**29**	**35**	**37**	**40**	**36**	**42**

6.3.2 Centre Island - Ferry Terminal

Physical and Natural Environment

Concepts 2 and 3 provide excellent protection against flooding and erosion. Concept 1 provides good protection against flooding and erosion; however, some erosion adjacent to the wall may occur over time due to wave overtopping.

Concepts 1 and 2 offer minimal added ecological benefit since a vertical wall, including a stacked armour stone wall, is not ideal for aquatic habitat. the use of stones in the stacked wall between the Toronto Island BBQ and Beer Co. restaurant and the Ferry Terminal rather than concrete or steel is slightly more beneficial since the stones provide more texture and some interstitial spacing which is used as cover by aquatic life. The stacked armour stones do not allow for vegetation along the face or crest of the structure; however, vegetation could be included on or adjacent to the flood berm. Concept 1 has the smallest footprint and encroachment on the lakebed. Concepts 2 and 3 have larger footprints on the lakebed than Concept 1. Concept 3 includes a flood berm which can be vegetated, and a rip rap revetment which provides structural support to the existing wall and mitigates wave runup and overtopping. This concept has the most ecological benefit since the flood berm can be vegetated and the rip rap will add some habitat diversity on the lakebed and cover/interstitial spaces for aquatic life. The articulated concrete block mattress (ABCM) variation for the crest and lakeward slope of the flood berm provides protection against wave runup and an opportunity to incorporate vegetation on the lakeward face and crest of the berm.

Social and Cultural Environment

The ferry terminal focus area is a high traffic area for park visitors due to the Island Beer and BBQ Co. Restaurant, Information Centre, and the fact that it is the closest ferry access to Centreville which is a major Park destination. Concept 2 provides stepped concrete or armour stone seating for park users and improved aesthetics to the shoreline in this area. The armour stone version of Concept 2 provides a more natural look than concrete version of Concept 2 or the SSP wall (Concept 1). Concept 1 has no added recreational value. The berm in Concept 3 also offers aesthetic value as it provides an opportunity to include a walkway or bike path along the top of the berm; however, there is an existing pathway near the shoreline in this area.

Technical Criteria

It is expected that all concepts could be supported by the regulatory agencies. Although, generally, SSP walls face more regulatory feedback due to their vertical nature being unsupportive for aquatic habitat creation.

The SSP wall (Concept 1) and concrete wall in Concept 2 would have a design life of 35 – 50 years and minimal maintenance requirements. The concepts with the flood berm would have a minimum design life of 35 years and may require some maintenance toward the end of the design life and/or after a design flood event. All Concepts are expected to have minimal disruption to subsurface infrastructure.

Concept 1 does not impact docking between the Island BBQ and Beer Co. and the ferry docks, but Concept 2 and 3 will impact docking in this area.

Constructability

Access to the shoreline for construction is good in this area and the construction time is estimated to be similar for all three concepts.

Cost

Concept 3 is the least cost alternative. Concept 2 is the middle cost alternative, and Concept 1 is the highest cost. Both Concept 1 and Concept 2 would have lower maintenance costs than Concept 3.

Public Safety

All concepts are considered safe for public use and access. It is assumed that the existing fence along the shoreline would be reinstated with all concepts to restrict public access to the water near the ferry terminal.

The evaluation matrix for Centre Island Ferry Terminal concepts is provided in Table 6.6. Concept 2 scored the highest.

Table 6.6: Evaluation Matrix for Centre Island Ferry Terminal Concept Alternatives

Centre Island Ferry Terminal

Objective	Criteria	Comment	Do Nothing	Concept 1	Concept 2	Concept 3
			Existing Conditions	Steel Sheet Pile Wall	Stacked/ Stepped Wall	Flood Berm and Revetment
Physical and Natural Environment	Flood Protection	Protection from flooding due to high water levels, wave runup and overtopping, ground water seepage and surface drainage.	1	3	4	4
	Erosion Protection	Protection from shoreline erosion due to high water levels and wave action.	1	3	4	4
	Aquatic Habitat	Creation, protection or enhancement of aquatic habitat.	1	1	2	3
	Environmental Impact	Creation, protection or enhancement of the environment and ecologically sensitive areas. Mitigation of negative environmental impacts.	2	1	2	3
Social and Cultural Environment	Aesthetic Value	Visual appeal of concept.	1	1	3	3
	Recreational Value	Opportunities for public recreation and enjoyment, both active and passive.	1	1	3	1
Technical Criteria	Regulatory Agency Acceptance	Complexity of approvals and permitting by Regulatory Agencies.	2	2	3	3
	Impact on Existing Subsurface Infrastructure	Minimal disruption to subsurface infrastructure identified in the Subsurface Utility Investigation.	3	3	3	3
	Maintenance Requirements	Minimal maintenance requirements over the design life.	1	3	3	2
Constructability	Construction Access and Ease	Sufficient access for construction is available with minimal disturbance to existing infrastructure or vegetation.	3	3	3	3
	Construction Time	Expected length of time to complete construction.	4	2	2	2
Financial Criteria	Capital Cost	Estimated construction costs.	4	1	2	3
	Maintenance Costs	Estimated annual maintenance costs.	1	4	4	3
Public Safety	Potential Risks to the Public	Safe for public access, use and enjoyment. Mitigates and/or protects public from flood and erosion hazards.	1	3	3	3
		Combined Rank (Higher score is preferred)	**26**	**31**	**41**	**40**

6.3.3 Centre Island - Centreville

Physical and Natural Environment

Concepts 1 and 3 for Centreville, which both include a SSP flood wall, provide increased protection against seepage during high lake levels since the wall penetrates below the ground surface. In contrast, the flood berm in Concept 2 provides protection against direct flooding but does not address seepage beneath the berm. The sloping naturalized shoreline in Concepts 2 and 3 would provide increased protection against wave uprush and shoreline erosion over Concept 1.

Concept 1 is not beneficial from an ecological standpoint since it creates a vertical barrier between the land and the lake. In Concept 3, the SSP wall is covered by raising the grade on either side of the wall to the crest elevation of the wall. This creates a naturalized shoreline and maintains more natural access for wildlife between the land and the water. The lakeward side of the wall would be filled and naturalized to improve the ecological function of the shoreline. This would result in an increased footprint on the lakebed in some locations. For Concept 2, the existing shore protection structures would be removed, and the shoreline would be naturalized lakeward of the flood berm. This would result in minimal change to the lakebed footprint and improved ecological function of the shoreline.

Social and Cultural Environment

In Concept 1, the wall is visible to the public (though it can be covered in different material to improve aesthetics) and restricts access to the shoreline. Concept 1 does not provide any added recreational benefits, although it is possible that the Centreville train track may remain in its existing location for this concept (though it may need to be temporarily moved during construction). The train track would need to be relocated for Concepts 2 and 3. Concept 2 would take up more space on the land adjacent to the shoreline; this may require relocation of some structures and amenities, though it also provides an opportunity to create a walking or bike path on the crest of the berm around the perimeter of Centreville.

Technical Criteria

Projects that require lake filling are often more complex to obtain permitting and approvals for from regulatory agencies. Concepts 1 and 2 do not significantly change the footprint on the channel bed, whereas Concept 3 will result in an increased footprint on the channel bed.

Road raising along the main entranceway at Centreville may disrupt existing amenities and lateral pedestrian flow/accessibility. Concept 2 does not include raising this section of road, but all concepts will have significant impacts on existing infrastructure. For all concepts, there may be disruption to the Centreville train tracks, though Concept 1 may only require temporary disruption. Concept 2 and Concept 3 would require permanent relocation of the train tracks.

Concept 1 is expected to have a design life of 35 – 50 years with minimal maintenance requirements. Some maintenance may be required for Concepts 2 and 3 over the design life to maintain the health of the naturalized shoreline. Concept 2 is expected to have a minimum design life of 35 years, while Concept 3 can be expected to have a design life of 35 – 50 years due to the inclusion of the buried SSP wall.

Constructability

Construction access for all three concepts may require removal of trees and vegetation. It is estimated that Concept 3 would have the longest construction time.

Cost

Concept 2 is a significantly lower cost alternative than Concept 1 and 3. Concepts 2 and 3 may have some maintenance costs over the design life to maintain the vegetated shoreline.

Public Safety

All concepts are considered safe for the public. Concept 1 restricts public access to the shoreline, whereas Concepts 2 and 3 have a gentle slope into the channel and are not considered overly hazardous.

The evaluation matrix for Centreville concepts is provided in Table 6.7. Concept 2 scored the highest, followed by Concept 3.

Table 6.7: Evaluation Matrix for Centre Island Centreville Concept Alternatives

Centre Island: Centreville

Objective	Criteria	Comment	Do Nothing	Concept 1	Concept 2	Concept 3
			Existing Conditions	Steel Sheet Pile Wall	Naturalized Shoreline and Flood Berm	Buried Steel Sheet Pile Wall and Naturalized Shoreline
Physical and Natural Environment	Flood Protection	Protection from flooding due to high water levels, wave runup and overtopping, ground water seepage and surface drainage.	1	4	3	4
	Erosion Protection	Protection from shoreline erosion due to high water levels and wave action.	1	2	3	3
	Aquatic Habitat	Creation, protection or enhancement of aquatic habitat.	1	1	4	4
	Environmental Impact	Creation, protection or enhancement of the environment and ecologically sensitive areas. Mitigation of negative environmental impacts.	1	1	4	4
Social and Cultural Environment	Aesthetic Value	Visual appeal of concept.	1	1	4	4
	Recreational Value	Opportunities for public recreation and enjoyment, both active and passive.	1	1	4	3
Technical Criteria	Regulatory Agency Acceptance	Complexity of approvals and permitting by Regulatory Agencies.	2	3	3	2
	Impact on Existing Subsurface Infrastructure	Minimal disruption to subsurface infrastructure identified in the Subsurface Utility Investigation.	3	2	2	2
	Maintenance Requirements	Minimal maintenance requirements over the design life.	1	3	2	3
Constructability	Construction Access and Ease	Sufficient access for construction is available with minimal disturbance to existing infrastructure or vegetation.	3	2	2	2
	Construction Time	Expected length of time to complete construction.	3	3	3	2
Financial Criteria	Capital Cost	Estimated construction costs.	4	1	3	1
	Maintenance Costs	Estimated annual maintenance costs.	1	4	3	3
Public Safety	Potential Risks to the Public	Safe for public access, use and enjoyment. Mitigates and/or protects public from flood and erosion hazards.	1	3	3	3
		Combined Rank (Higher score is preferred)	**24**	**31**	**43**	**40**

6.4 Roadways – Evaluation of Alternatives

Physical and Natural Environment

The four road raising concepts provide the same level of flood protection and are all designed to be resistant to flooding induced failures by protecting against internal erosion. All concepts were scored the same as the existing conditions for aquatic habitat as there is little change proposed and where revetment is to be constructed there are existing stones.

Social and Cultural Environment

The concepts provide an equal level of benefit to the community by maintaining access across the Island Park during a design flood event.

For all concepts, the road may be vegetated along its edge, improving the aesthetic value as shown in the KWA drawings. Concept 1 has some increased aesthetic value since the raised roads will more uniformly tie in with the existing clay cap raised roads that were constructed during the emergency works compared to the other solutions.

Technical Criteria

Concept 1 has been previously implemented on the Island Park as part of the emergency works, whereas the other designs have not been proof tested on the Islands, as such, obtaining required approvals from regulatory agencies for this concept is expected to be less complex than for the other concepts.

Where the proposed roadways require cuts, the subsurface infrastructure will need to be investigated in detailed design to ensure no adverse impacts. Additionally, settlement concerns and their impacts to subsurface infrastructure will be investigated in the detailed design phase.

The maintenance requirements for all concepts will be similar to maintenance required for existing roads on the Islands.

Constructability

No unique or proprietary products are required to construct Concepts 1-4 (see Section 7.1 on page 29 of the Grounded report). Concept 1 has been successfully implemented at other locations on the Islands. However, when considering construction access and ease, impacts to adjacent infrastructure will need to be considered including allowing enough large vehicle clearance under electric, hydro, and communication lines. Overall familiarity and success with the Concept 1 approach on-site could lead to some construction efficiencies.

Cost

Concepts 1, 2 and 4 are similar in cost. Concept 3 is the highest cost alternative.

Public Safety

The concepts are designed to be safe for public use as a Local Residential Road (see specifications in Section 7.1 on page 29 of the Grounded report).

The evaluation matrix for Roadways concepts is provided in Table 6.8. Concept 1 scored the highest, followed by Concept 2 and 4 which tied with the second highest score.

Table 6.8: Evaluation Matrix for Roadways Concept Alternatives

Toronto Island Roadways

Objective	Criteria	Comment	Do Nothing	Concept 1	Concept 2	Concept 3	Concept 4
			Existing Conditions	Clay Cap	Concrete Core	Concrete Curb	Crusher Run Limestone
Physical and Natural Environment	Flood Protection	Protection from flooding due to high water levels, wave runup and overtopping, ground water seepage and surface drainage.	1	4	4	4	4
	Erosion Protection	Protection from shoreline erosion due to high water levels and wave action.	3	4	4	4	4
	Aquatic Habitat	Creation, protection or enhancement of aquatic habitat.	3	3	3	3	3
	Environmental Impact	Creation, protection or enhancement of the environment and ecologically sensitive areas. Mitigation of negative environmental impacts.	2	2	2	2	2
Social and Cultural Environment	Aesthetic Value	Visual appeal of concept.	2	4	3	3	3
	Impact to Island Residents	Anticipated impact of final solution to the residential community.	1	4	4	4	4
	Recreational Value	Opportunities for public recreation and enjoyment, both active and passive.	2	4	4	4	4
Technical Criteria	Regulatory Agency Acceptance	Complexity of approvals and permitting by Regulatory Agencies.	3	4	3	3	3
	Impact on Existing Subsurface Infrastructure	Minimal disruption to subsurface infrastructure identified in the Subsurface Utility Investigation.	2	2	2	2	2
	Maintenance Requirements	Minimal maintenance requirements over the design life.	2	3	3	3	3
Constructability	Construction Access and Ease	Sufficient access for construction is available with minimal disturbance to existing infrastructure or vegetation.	4	3	3	3	3
	Construction Time	Expected length of time to complete construction.	4	3	2	2	2
Financial Criteria	Capital Cost	Estimated construction costs.	4	2	2	1	2
	Maintenance Costs	Estimated annual maintenance costs.	2	3	3	3	3
Public Safety	Potential Risks to the Public	Safe for public access, use and enjoyment. Mitigates and/or protects public from flood and erosion hazards.	1	4	4	4	4
		Combined Rank (Higher score is preferred)	**36**	**49**	**46**	**45**	**46**

7. Key Results and Next Steps

Conceptual design alternatives were developed to address flooding and erosion hazards on Ward's Island, Algonquin Island, Centre Island and over 6,000 m of roadways across the Island Park. Concept designs were developed based on flood depth mapping corresponding to the 100-year flood level (76.2 m) (note that overland flow and groundwater seepage have not been considered at this time), and coastal and geotechnical information for the islands available through past studies, site visits, and a limited geotechnical study. A number of assumptions were made in the development of the concepts. Advancement of concepts to detailed design will require, at minimum, detailed overland flow and seepage analyses, detailed topographic surveys and nearshore bathymetric surveys, detailed condition assessment of existing seawalls at QCYC and Centre Island, and additional boreholes in locations of proposed SSP walls.

The alternative concepts were evaluated based on their ability to address flood and erosion hazards, environmental impacts, social and cultural value, technical criteria, constructability, construction cost, maintenance requirements and public safety. The preferred concepts for each study area are:

- **Ward's Island: Concept 3C – Vegetated Berm, Beach and Groyne.** This concept is preferred based on cost, ability to mitigate flooding and erosion hazards, and opportunity for recreational value.
- **Algonquin Island South End: Concept 1C – Vegetated Inland Berm along Wyandot:** This concept is a lower cost alternative and reduces disruption and impacts to Provincially Significant Wetlands and vegetation areas of conservation concern while providing flood protection to most of the south end of the island, including the Clubhouse and surrounding area.
- **Algonquin Island Northwest Shoreline: Concept 2 – Impermeable Berm:** This concept is preferred as it provides flood and erosion protection of the northwest shoreline of Algonquin while also providing improved recreational opportunities and the opportunity to incorporate formal docking for emergency vessels and/or public vessels.
- **Algonquin Island Queen City Yacht Club (QCYC): Concept 4 – Land Raising and Raised Walkway:** This concept is a low-cost alternative that incorporates flood mitigation works previously completed by QCYC members. Strategic land raising and inclusion of a modular flood gate at the marine railway will allow the club to remain operational during a flood event without requiring disruption or changes to the existing dock walls.
- **Centre Island Toronto Island Marina: Concept 4 – Land Raising and Shoreline Flood Berm:** This concept is preferred as the central roads and boat storage area within the Toronto Island Marina will be raised to above the design flood level, and the shoreline berm between the marina and the Island BBQ and Beer Co. restaurant will provide flood and erosion protection.
- **Centre Island Ferry Terminal: Concept 2 – Stacked/Stepped Wall:** This concept is a lower cost alternative that utilizes both a stepped concrete wall and stacked armour stone wall with flood berm to provide excellent flood and erosion protection along with the opportunity to provide additional seating and improved aesthetics along the shoreline.
- **Centre Island Centreville: Concept 2 – Naturalized Shoreline and Flood Berm:** This concept has good ecological value through naturalizing the shoreline around Centreville and is a lower cost flood and erosion protection alternative.
- **Roadways: Concept 1 – Clay Cap:** This concept is a lower cost alternative and has been previously implemented on the islands for emergency road raising works.

The next step in the study is to complete a detailed environmental analysis of the preferred alternative options for each Study Area, in particular to further examine key categories investigated in the baseline inventory. Each of the preferred alternatives will undergo a detailed study of their predicted net impact, with the results of this study to be presented in Part II of this report.

References

Baird & Associates (2018). Gibraltar Point Erosion Control: Nearshore Reef Design Report. Prepared for Toronto and Region Conservation Authority.

Baird & Associates (2019a). Toronto Islands Flood Characterization and Risk Assessment Project –Flood Characterization Report. Prepared for Toronto and Region Conservation Authority. March 12, 2019.

Baird & Associates (2019b). Toronto Islands Flood Characterization and Risk Assessment Project –Flood Risk Assessment Report. Prepared for Toronto and Region Conservation Authority. April 30, 2019.

Baird & Associates (2019c). Toronto Islands Flood Characterization and Risk Assessment Project –Flood Mitigation Alternatives Report. Prepared for Toronto and Region Conservation Authority. June 4, 2019.

Baird & Associates (2019d). Updated Analysis Using 2019 Water Levels. Memorandum prepared for Toronto and Region Conservation Authority. September 7, 2019.

Baird & Associates (2020). Algonquin Island – Steel Sheet Pile Wall Assessment. Memorandum prepared for Grounded Engineering. April 20, 2020.

Caldwell, R. (2017b). Great Lakes Water Levels Information. Memorandum from the National Hydrological Services – East: Great Lakes – St. Lawrence Regulation Office. August 4, 2017.

Hanrahan, J., Roebber, P., and Kravtsov, S. (2014). Attribution of Decadal-Scale Lake-Level Trends in the Michigan-Huron System. Water 2014, 6, 2278-2299.

International Joint Commission (2014). Lake Ontario St. Lawrence River Plan 2014. Protecting Against Extreme Water Levels, Restoring Wetlands and Preparing for Climate Change. A Report to the Governments of Canada and the United States by the International Joint Commission.

International Joint Commission (2016). Regulation Plan 2014 for the Lake Ontario and the St. Lawrence River: Compendium Document.

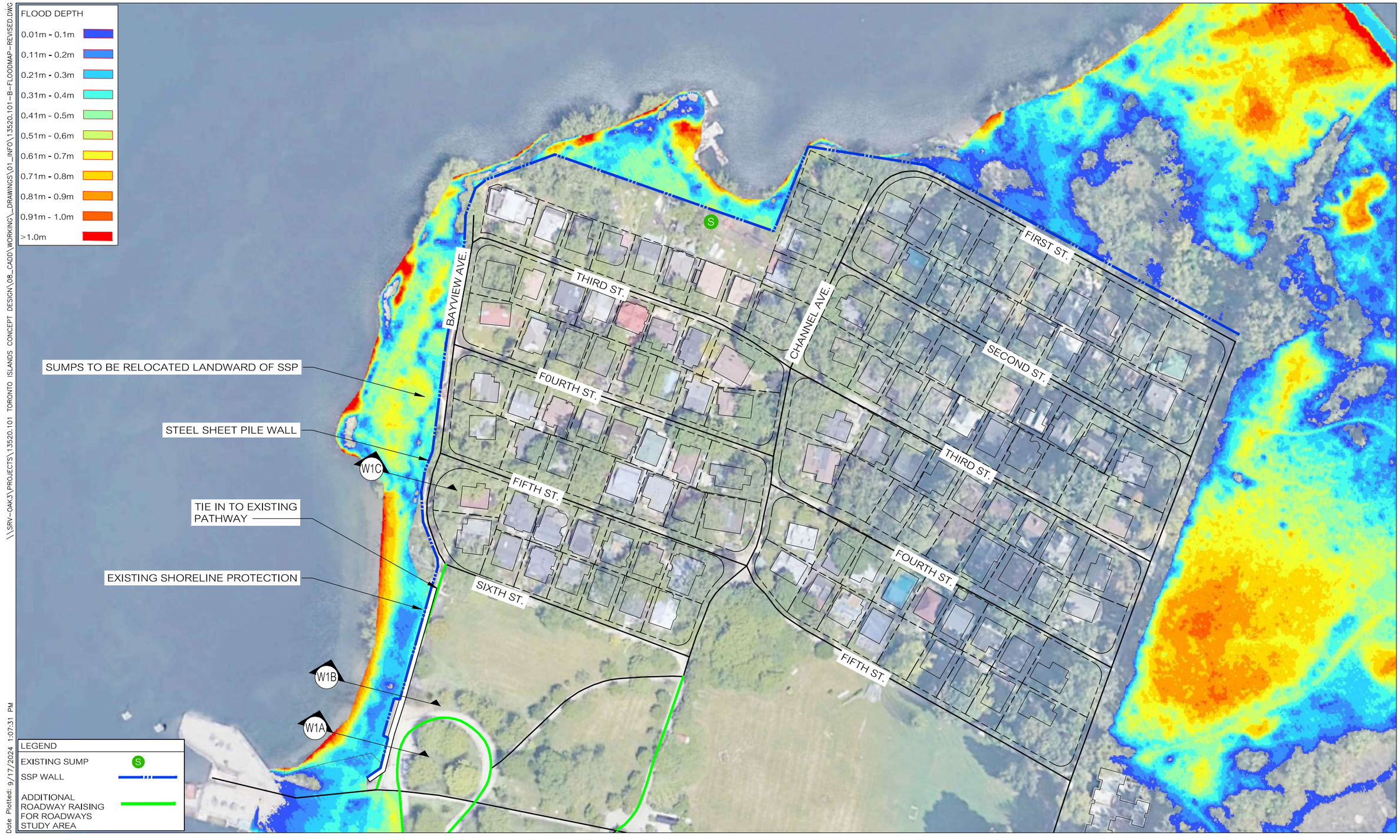
Ontario Ministry of Natural Resources (1989). Great Lakes System – Flood Levels and Water Related Hazards. Conservation Authorities and Water Management Branch.

U.S. Army Corps of Engineers (1977). Shore Protection Manual. U.S. Army Coastal Engineering Research Center. Department of the Army.

Watras, C., Read, J., Holman, K., Liu, Z., Song, Y., Watras, A., Morgan, S., and Stanley, E. (2014). Decadal Oscillation of Lakes and Aquifers in the Upper Great Lakes Region of North America: Hydroclimatic Implications. Geophys. Res. Lett.

Appendix A

Flood Depth Mapping



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-FLOODMAP-REVISED.DWG

Date Plotted: 9/17/2024 1:07:31 PM

WARD'S ISLAND - CONCEPT 1: INLAND STEEL SHEET PILE FLOOD WALL

TORONTO ISLANDS CONCEPT DESIGN

0 12.5 25 50
GRAPHIC SCALE METRES

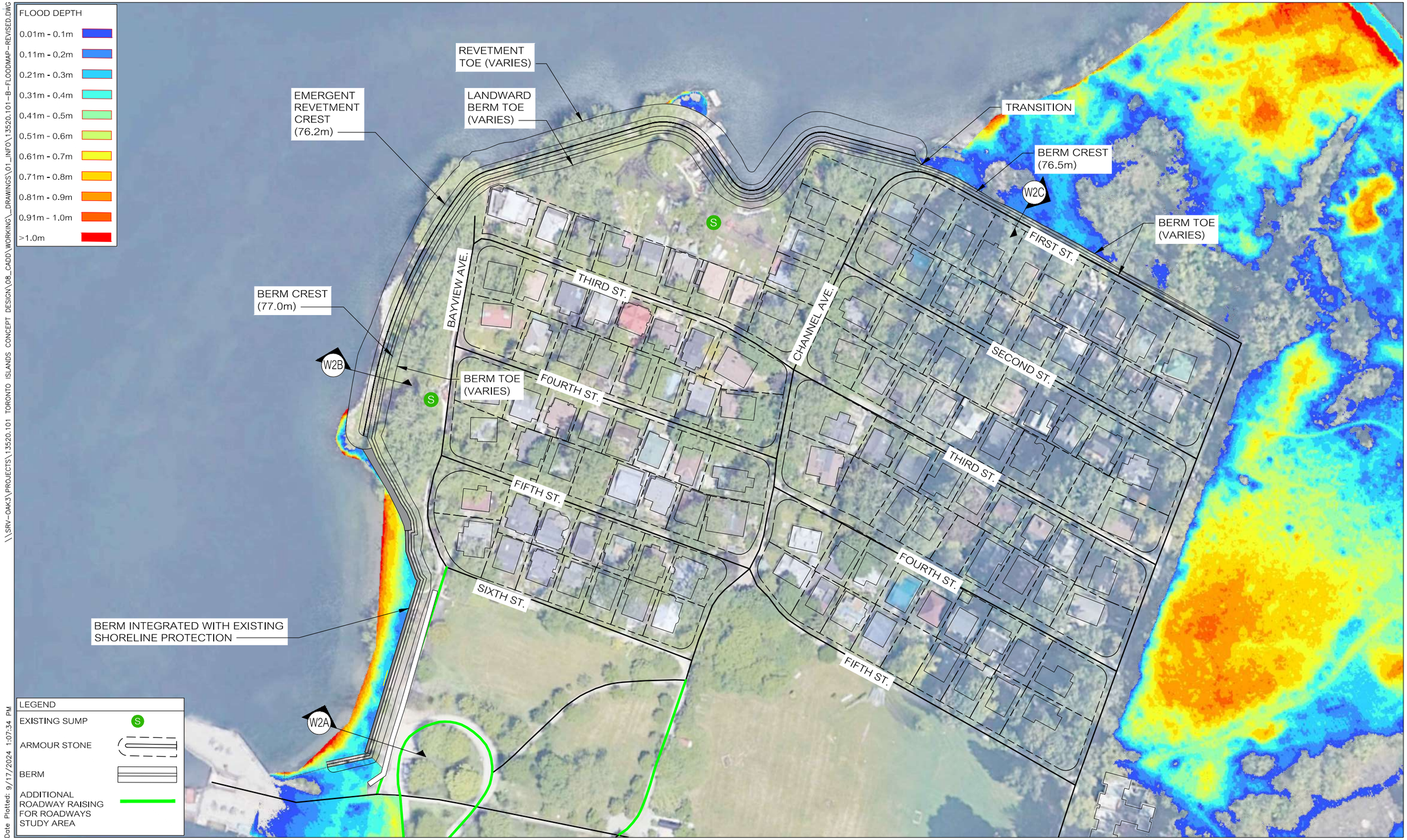
NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-FLOODMAP-REVISED.DWG

Date Plotted: 9/17/2024 1:07:34 PM

WARD'S ISLAND - CONCEPT 2: REVETMENT AND VEGETATED BERM

TORONTO ISLANDS CONCEPT DESIGN

0 12.5 25 50
GRAPHIC SCALE METRES

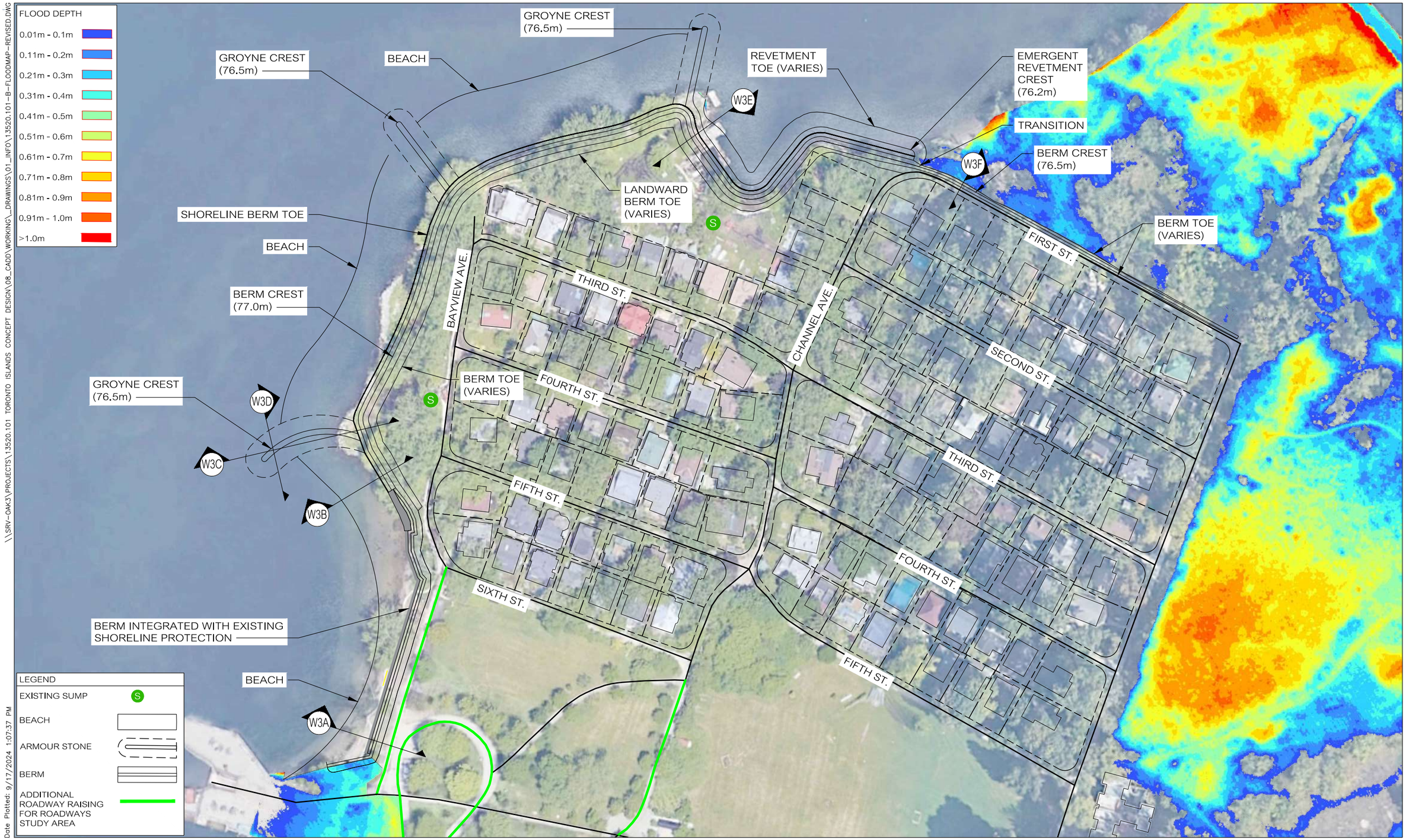
NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-FLOODMAP-REVISED.DWG

Date Plotted: 9/17/2024 1:07:37 PM

WARD'S ISLAND - CONCEPT 3A: VEGETATED BERM, 3 BEACHES AND GROYNES

TORONTO ISLANDS CONCEPT DESIGN

0 12.5 25 50
GRAPHIC SCALE METRES

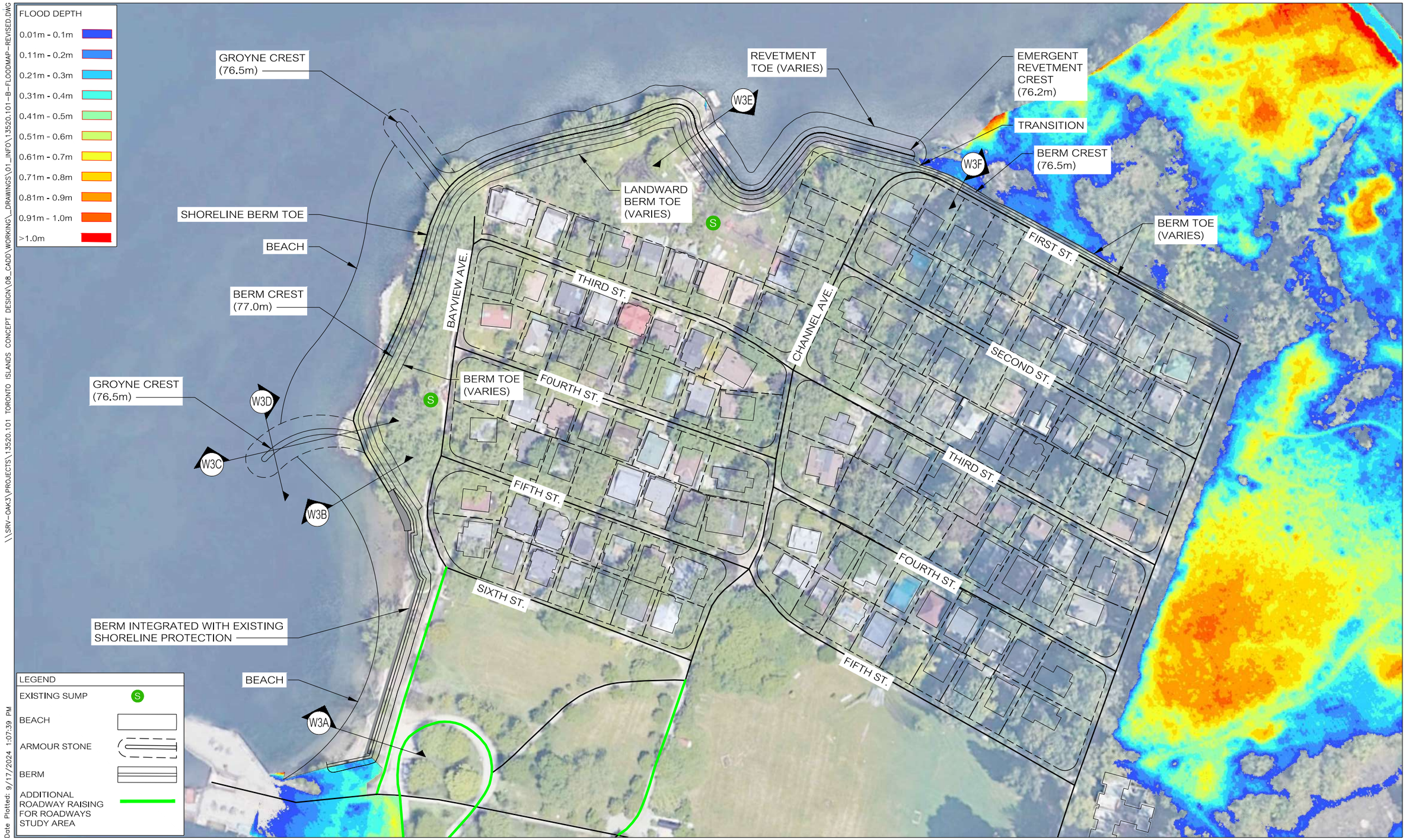
NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-FLOODMAP-REVISED.DWG

Date Plotted: 9/17/2024 1:07:39 PM

WARD'S ISLAND - CONCEPT 3B: VEGETATED BERM, 2 BEACHES AND GROYNES

TORONTO ISLANDS CONCEPT DESIGN

0 12.5 25 50
GRAPHIC SCALE METRES

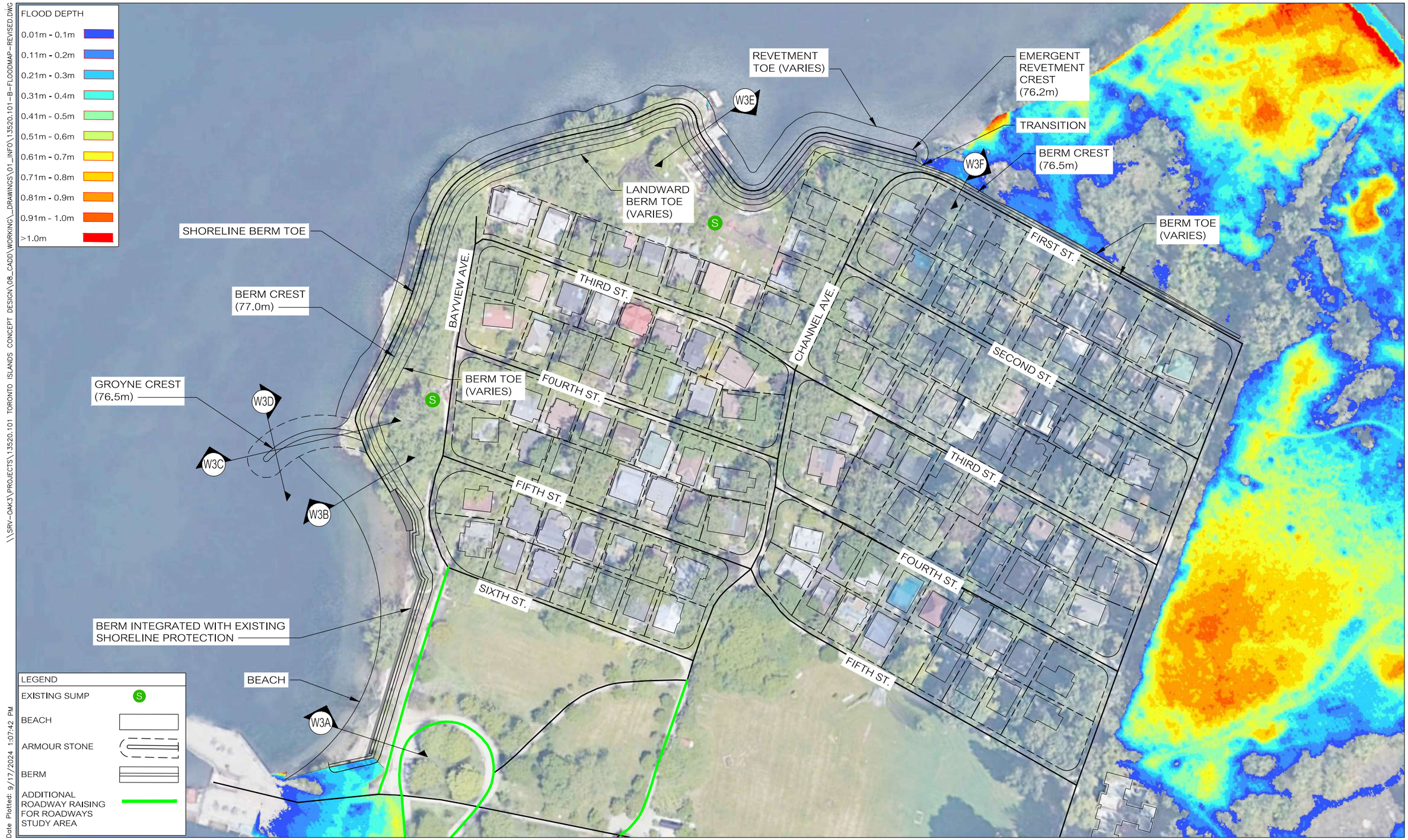
NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-FLOODMAP-REVISED.DWG

Date Plotted: 9/17/2024 1:07:42 PM

WARD'S ISLAND - CONCEPT 3C: VEGETATED BERM, BEACH AND GROYNE

TORONTO ISLANDS CONCEPT DESIGN

0 12.5 25 50
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-FLOODMAP-REVISED.DWG

Date Plotted: 9/17/2024 1:07:45 PM

ALGONQUIN ISLAND - SOUTH END CONCEPT 1A: VEGETATED SHORELINE FLOOD BERM

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

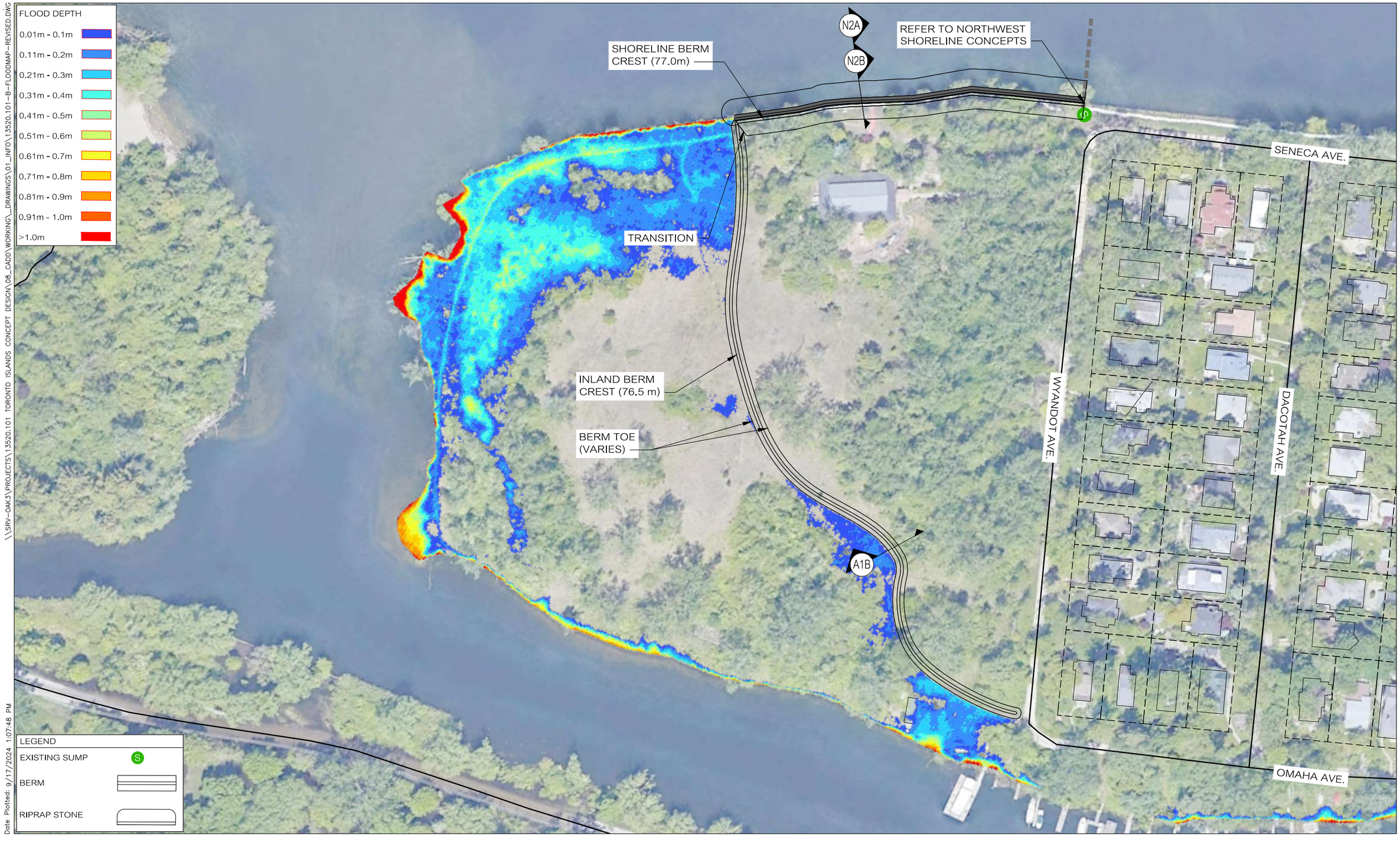
NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-FLOODMAP-REVISED.DWG

Date Plotted: 9/17/2024 1:07:48 PM

ALGONQUIN ISLAND - SOUTH END CONCEPT 1B: VEGETATED INLAND BERM

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

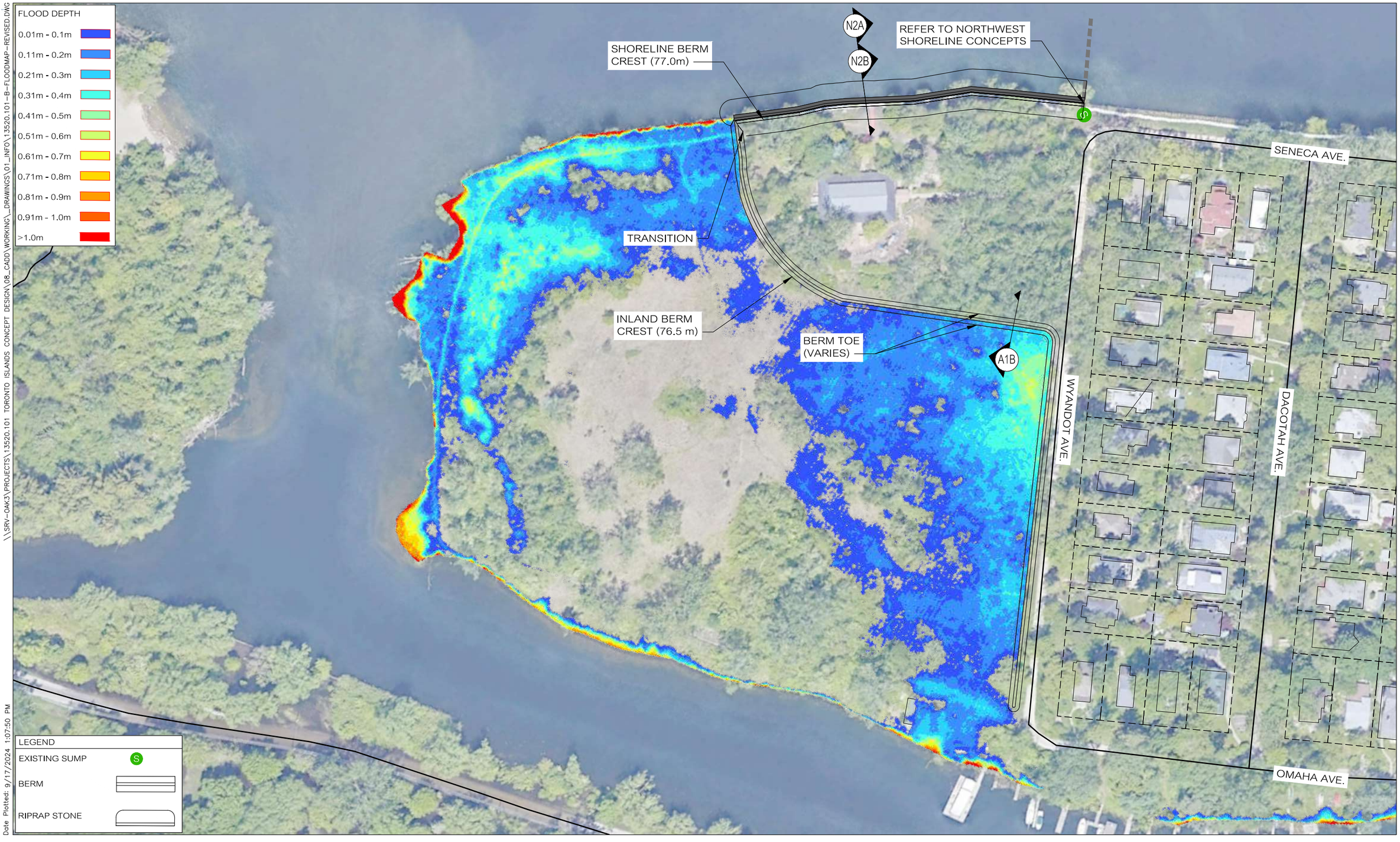
NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-FLOODMAP-REVISED.DWG

Date Plotted: 9/17/2024 1:07:50 PM

ALGONQUIN ISLAND - SOUTH END CONCEPT 1C: VEGETATED INLAND BERM ALONG WYANDOT

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

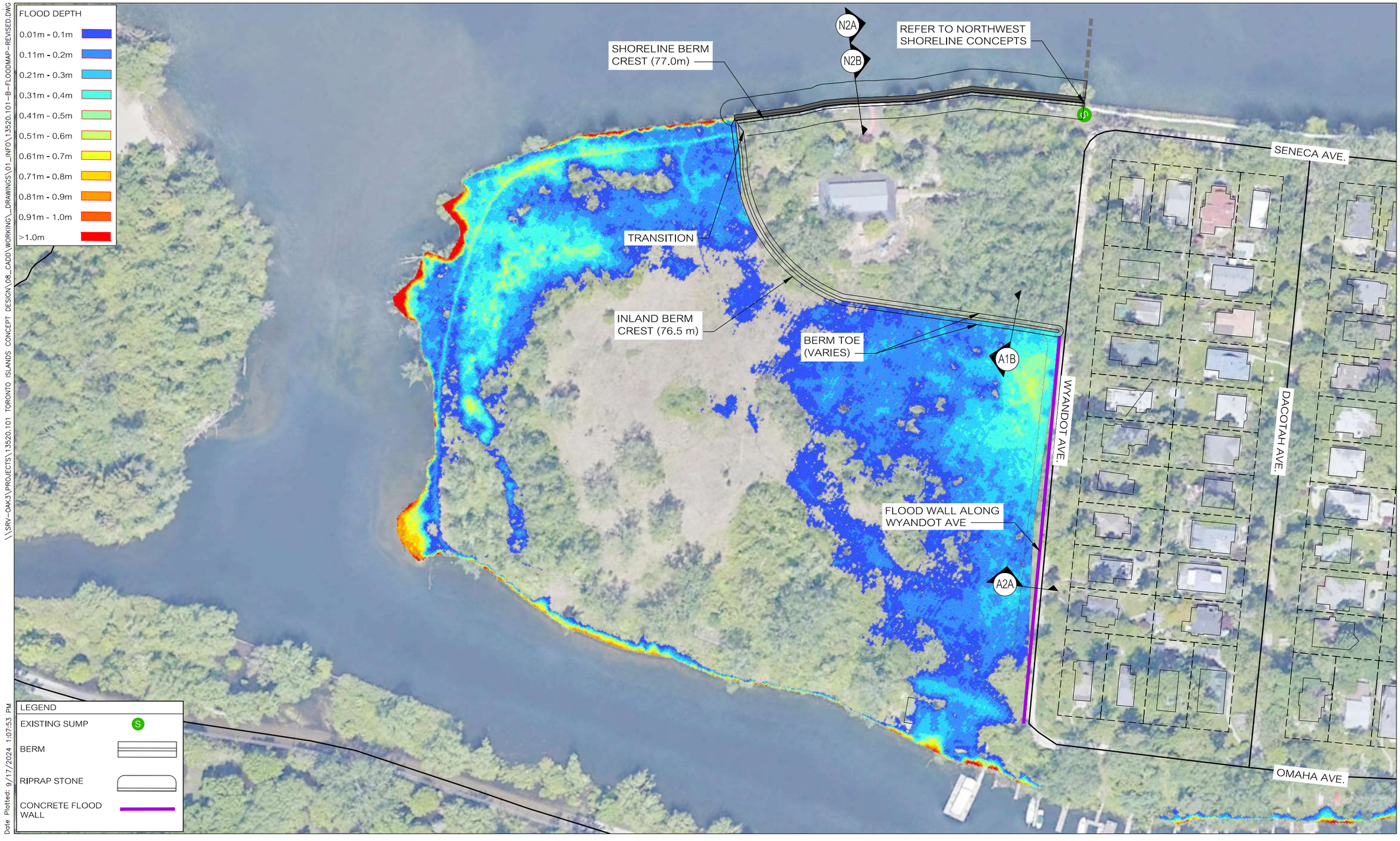
NORTH

Project Number: 13520.101

Date: 2023-02-17

Baird.

Toronto and Region Conservation Authority



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-FLOODMAP-REVISED.DWG

Date Plotted: 9/17/2024 1:07:53 PM

ALGONQUIN ISLAND - SOUTH END CONCEPT 2: VEGETATED INLAND BERM AND FLOOD WALL

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

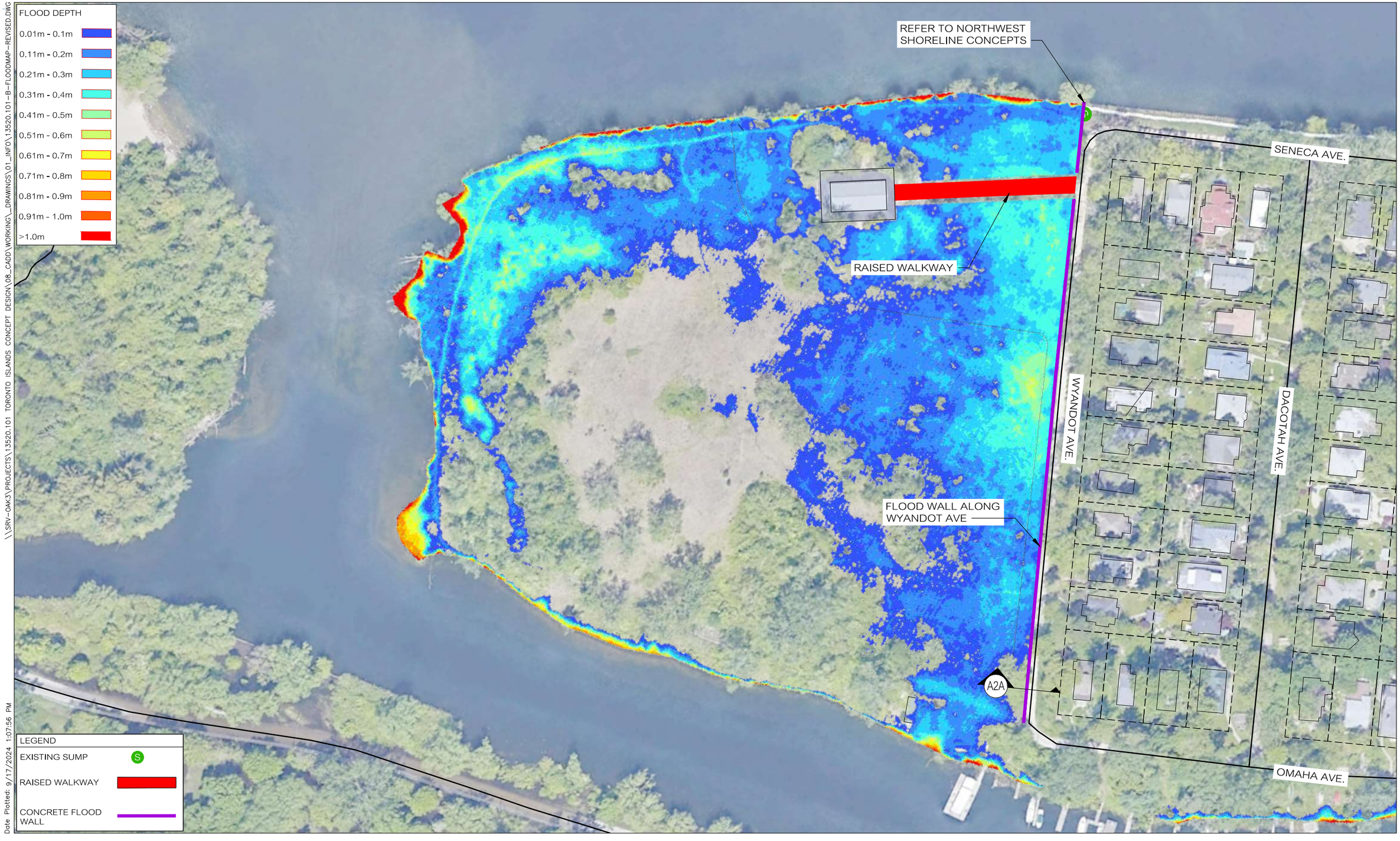
NORTH

Project Number: 13520.101

Date: 2023-02-17

Baird.

Toronto and Region Conservation Authority



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-FLOODMAP-REVISED.DWG

Date Plotted: 9/17/2024 1:07:56 PM

ALGONQUIN ISLAND - SOUTH END CONCEPT 3: WYANDOT AVENUE FLOOD WALL

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

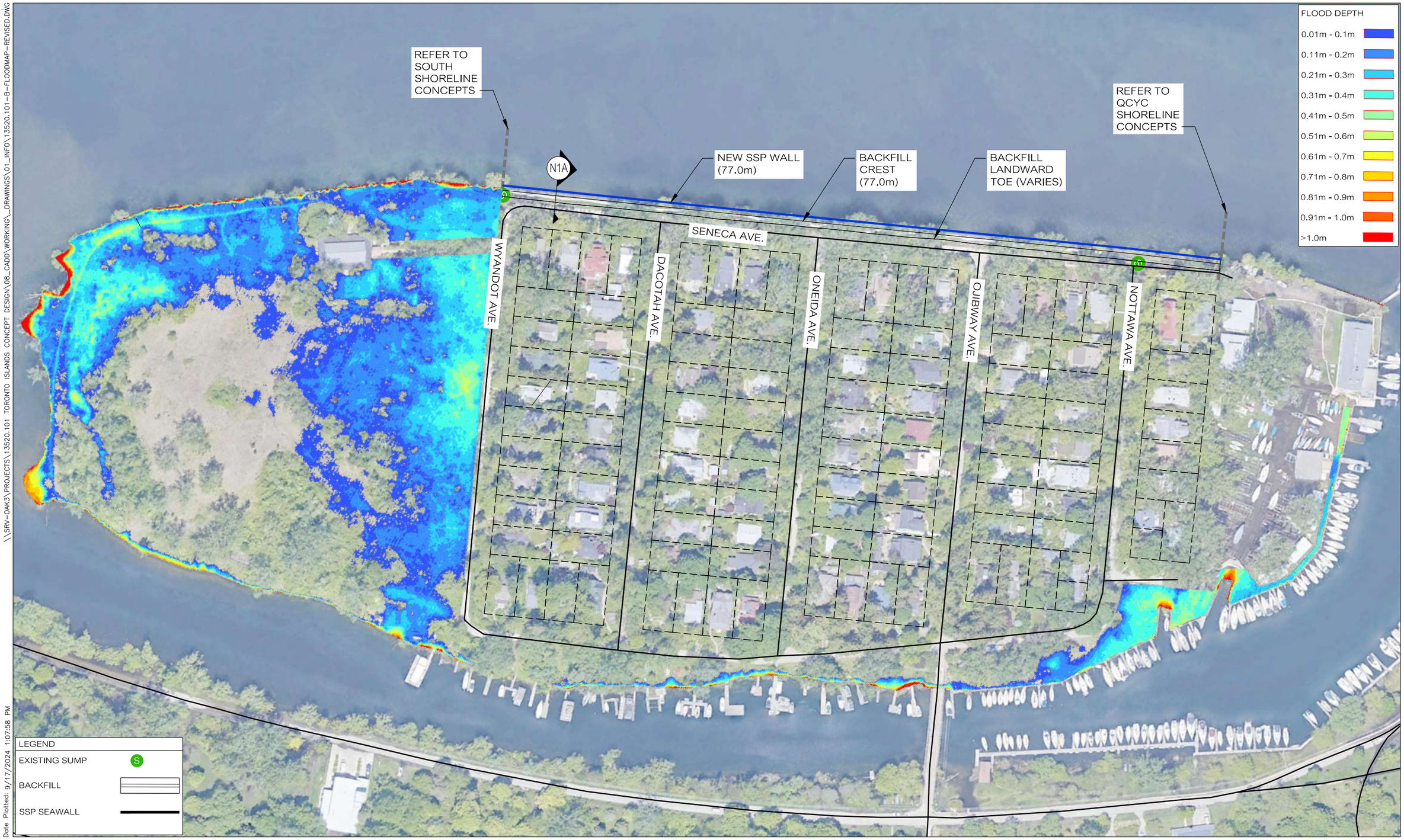
NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-FLOODMAP-REVISED.DWG

Date Plotted: 9/17/2024 1:07:58 PM

ALGONQUIN ISLAND - NORTHWEST SHORELINE CONCEPT 1: STEEL SHEET PILE WALL

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

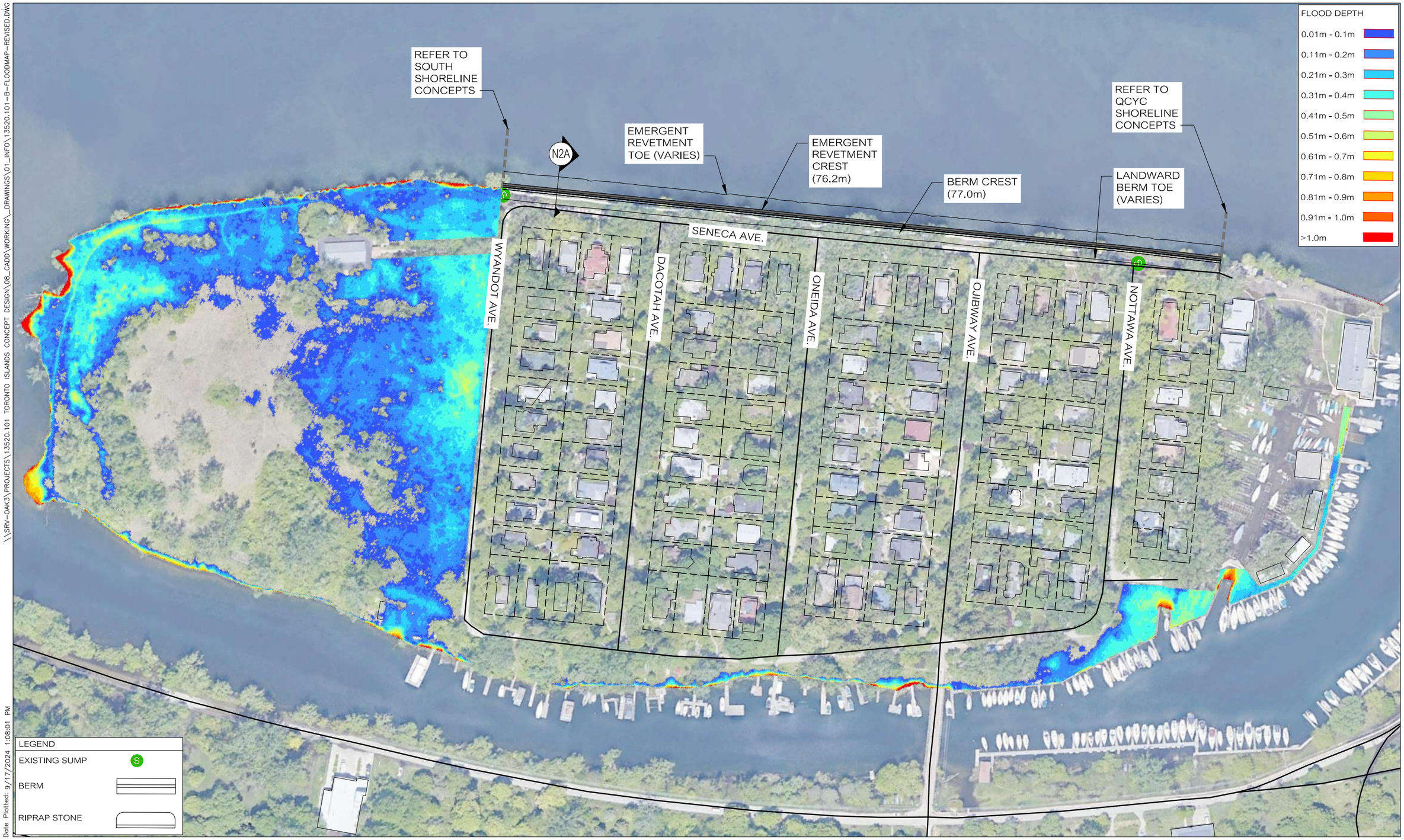
NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-FLOODMAP-REVISED.DWG

Date Plotted: 9/17/2024 1:08:01 PM

ALGONQUIN ISLAND - NORTHWEST SHORELINE CONCEPT 2: IMPERMEABLE BERM

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority

REFER TO SOUTH SHORELINE CONCEPTS

STACKED STONE WALL TOE (VARIES)

STACKED STONE WALL CREST (76.2m)

BERM CREST (77.0m)

LANDWARD BERM TOE (VARIES)

REFER TO QCYC SHORELINE CONCEPTS

N2B

SENECA AVE.

WYANDOT AVE.

DACOTAH AVE.

ONEIDA AVE.

OJIBWAY AVE.

NOTTAWA AVE.

FLOOD DEPTH

0.01m - 0.1m	
0.11m - 0.2m	
0.21m - 0.3m	
0.31m - 0.4m	
0.41m - 0.5m	
0.51m - 0.6m	
0.61m - 0.7m	
0.71m - 0.8m	
0.81m - 0.9m	
0.91m - 1.0m	
>1.0m	

LEGEND

EXISTING SUMP (S)

BERM

STACKED STONE WALL

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-FLOODMAP-REVISED.DWG

Date Plotted: 9/17/2024 1:08:04 PM

ALGONQUIN ISLAND - NORTHWEST SHORELINE CONCEPT 2: IMPERMEABLE BERM

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100

GRAPHIC SCALE METRES

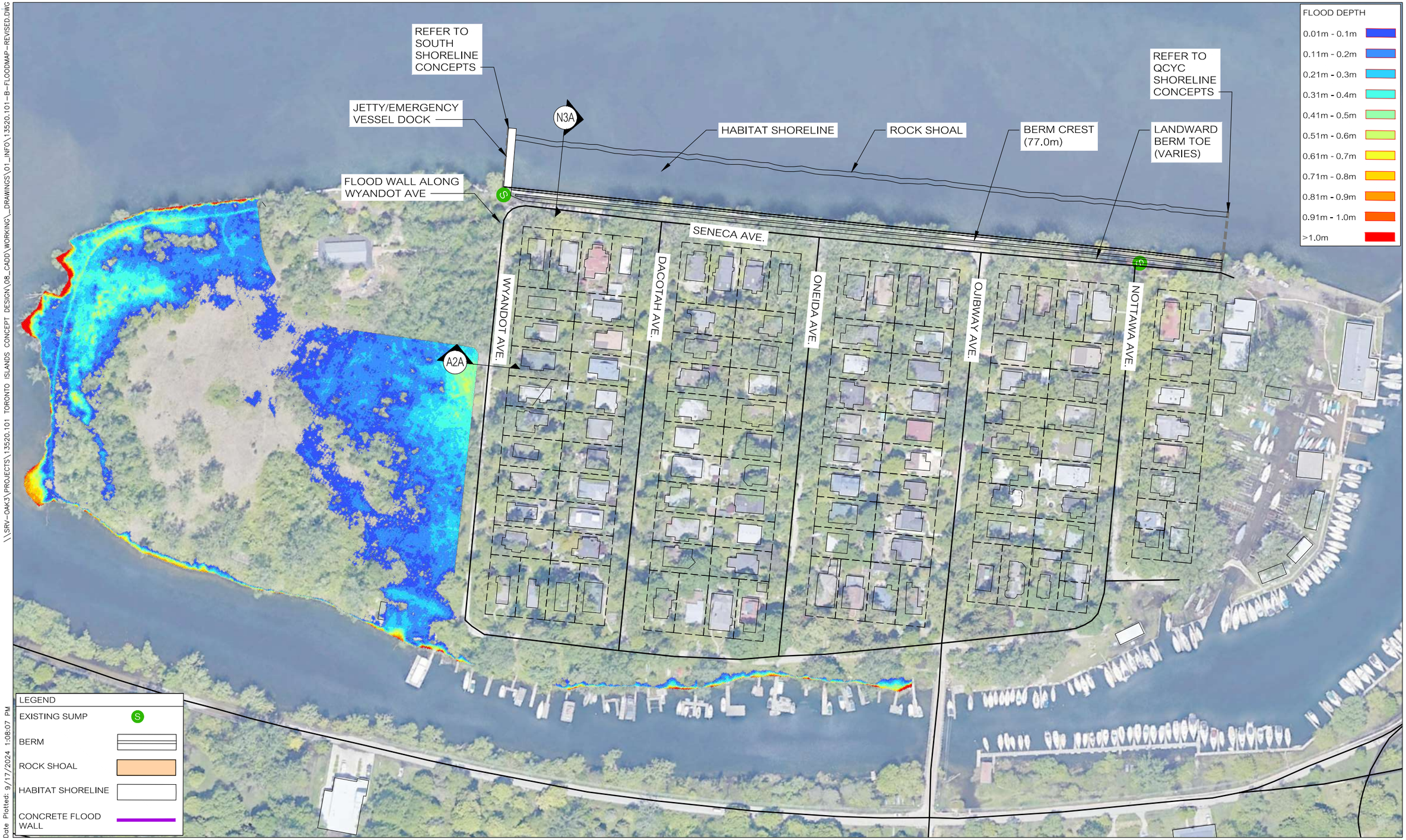
NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-FLOODMAP-REVISED.DWG

Date Plotted: 9/17/2024 1:08:07 PM

ALGONQUIN ISLAND - NORTHWEST SHORELINE CONCEPT 3: IMPERMEABLE BERM AND NEARSHORE HABITAT

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority

FLOOD DEPTH
- 0.01m - 0.1m
- 0.11m - 0.2m
- 0.21m - 0.3m
- 0.31m - 0.4m
- 0.41m - 0.5m
- 0.51m - 0.6m
- 0.61m - 0.7m
- 0.71m - 0.8m
- 0.81m - 0.9m
- 0.91m - 1.0m
- >1.0m

REFER TO NORTHWEST SHORELINE CONCEPT

OJIBWAY AVE.

NOTTAWA AVE.

DEPLOY TEMPORARY FLOOD BARRIER ACROSS MARINE RAILWAY

ACCESS CHANNEL FOR BOATS

N1A

BACKFILL LANDWARD TOE (VARIES)

BACKFILL CREST (77.0m)

NEW SSP WALL (77.0m)

LEGEND
- EXISTING SUMP (S)
- BACKFILL
- SSP

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-FLOODMAP-REVISED.DWG

Date Plotted: 9/17/2024 1:08:10 PM

ALGONQUIN ISLAND - QUEEN CITY YACHT CLUB CONCEPT 1: STEEL SHEET PILE WALL

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-FLOODMAP-REVISED.DWG

Date Plotted: 9/17/2024 1:08:12 PM

ALGONQUIN ISLAND - QUEEN CITY YACHT CLUB CONCEPT 2: CONCRETE DOCK WALL

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-FLOODMAP-REVISED.DWG

Date Plotted: 9/17/2024 1:08:15 PM

ALGONQUIN ISLAND - QUEEN CITY YACHT CLUB CONCEPT 3: FLOOD WALL

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority

FLOOD DEPTH
- 0.01m - 0.1m
- 0.11m - 0.2m
- 0.21m - 0.3m
- 0.31m - 0.4m
- 0.41m - 0.5m
- 0.51m - 0.6m
- 0.61m - 0.7m
- 0.71m - 0.8m
- 0.81m - 0.9m
- 0.91m - 1.0m
- >1.0m

LEGEND
- EXISTING SUMP
- EXISTING RAISED WALKWAY
- FLOOD WALL
- MODULAR FLOOD WALL
- STACKED STONE WALL
- MODULAR FLOOD GATE
- RAISE GRADE

REFER TO NORTHWEST SHORELINE CONCEPT

N3B

N3C

CONCRETE FLOOD WALL

STACKED STONE WALL TOE (VARIES)

STACKED STONE WALL CREST (76.2m)

EXISTING MODULAR FLOOD WALL TO REMAIN

OJIBWAY AVE.

NOTTAWA AVE.

GENERAL TRANSITION AREA BETWEEN FLOOD BERM WITH WALKWAY AND RAISED GRADE. CONSULTANT TO CONFIRM BEST TIE-IN LOCATION.

Q4A

FLOOD BERM WITH WALKWAY CREST (76.5 m)

EXISTING RAISED WALKWAY TO REMAIN

BERM TOE (VARIES)

Q4B

MODULAR FLOOD GATE

RAISE GRADE TO EL. 76.3 m (MIN.)

TIE INTO EXISTING GRADE

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-FLOODMAP-REVISED.DWG

Date Plotted: 9/17/2024 1:08:18 PM

ALGONQUIN ISLAND - QUEEN CITY YACHT CLUB CONCEPT 4: LAND RAISING AND RAISED WALKWAY

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

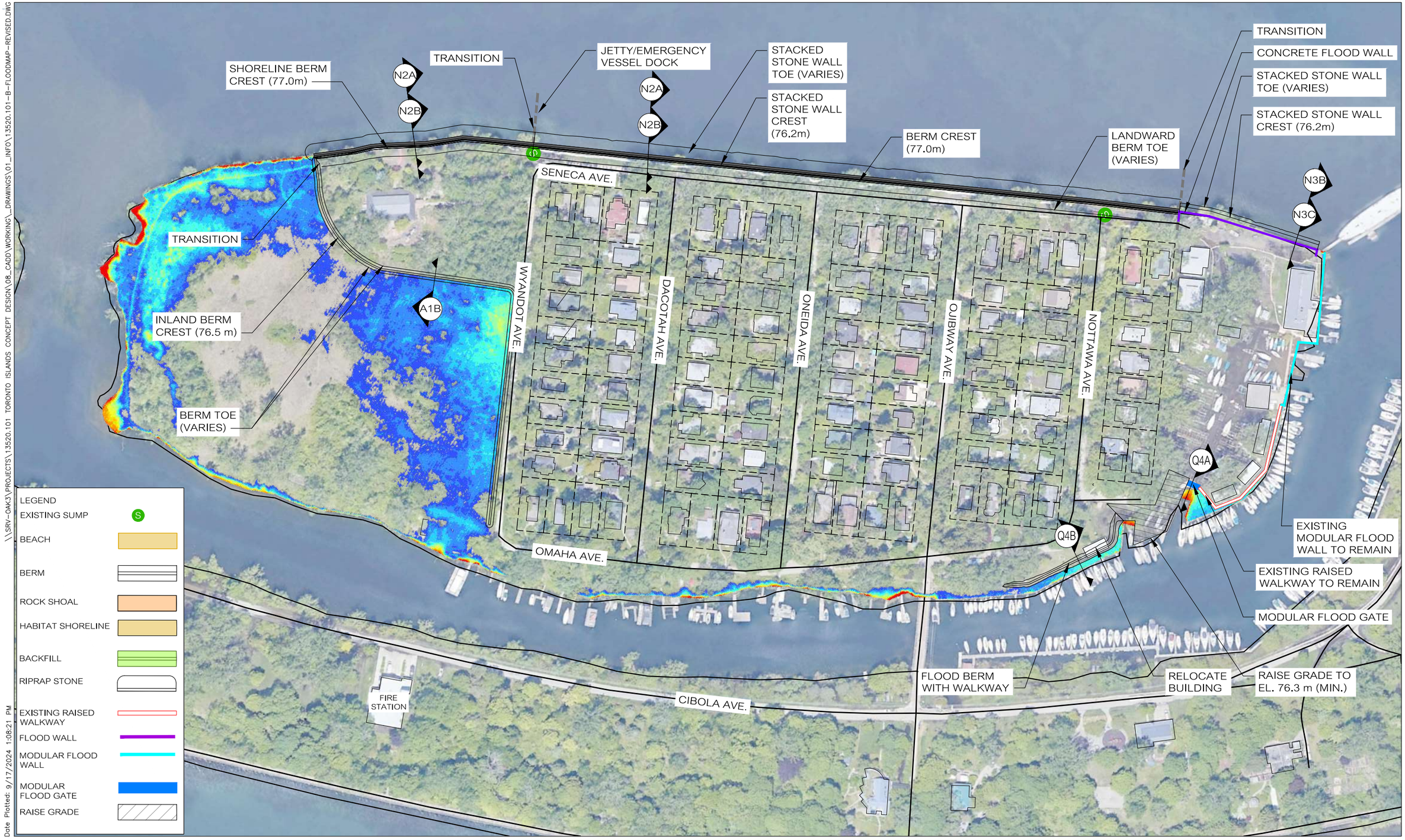
NORTH

Project Number: 13520.101

Date: 2023-02-21

Baird.

Toronto and Region Conservation Authority



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-FLOODMAP-REVISED.DWG

Date Plotted: 9/17/2024 1:08:21 PM

ALGONQUIN ISLAND - OVERVIEW - PREFERRED ALTERNATIVES

TORONTO ISLANDS CONCEPT DESIGN

0 20 40 80

GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2023-02-21

Baird.

Toronto and Region Conservation Authority



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-FLOODMAP-REVISED.DWG

Date Plotted: 9/17/2024 1:08:22 PM

CENTRE ISLAND - FERRY TERMINAL CONCEPT 1: STEEL SHEET PILE WALL

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

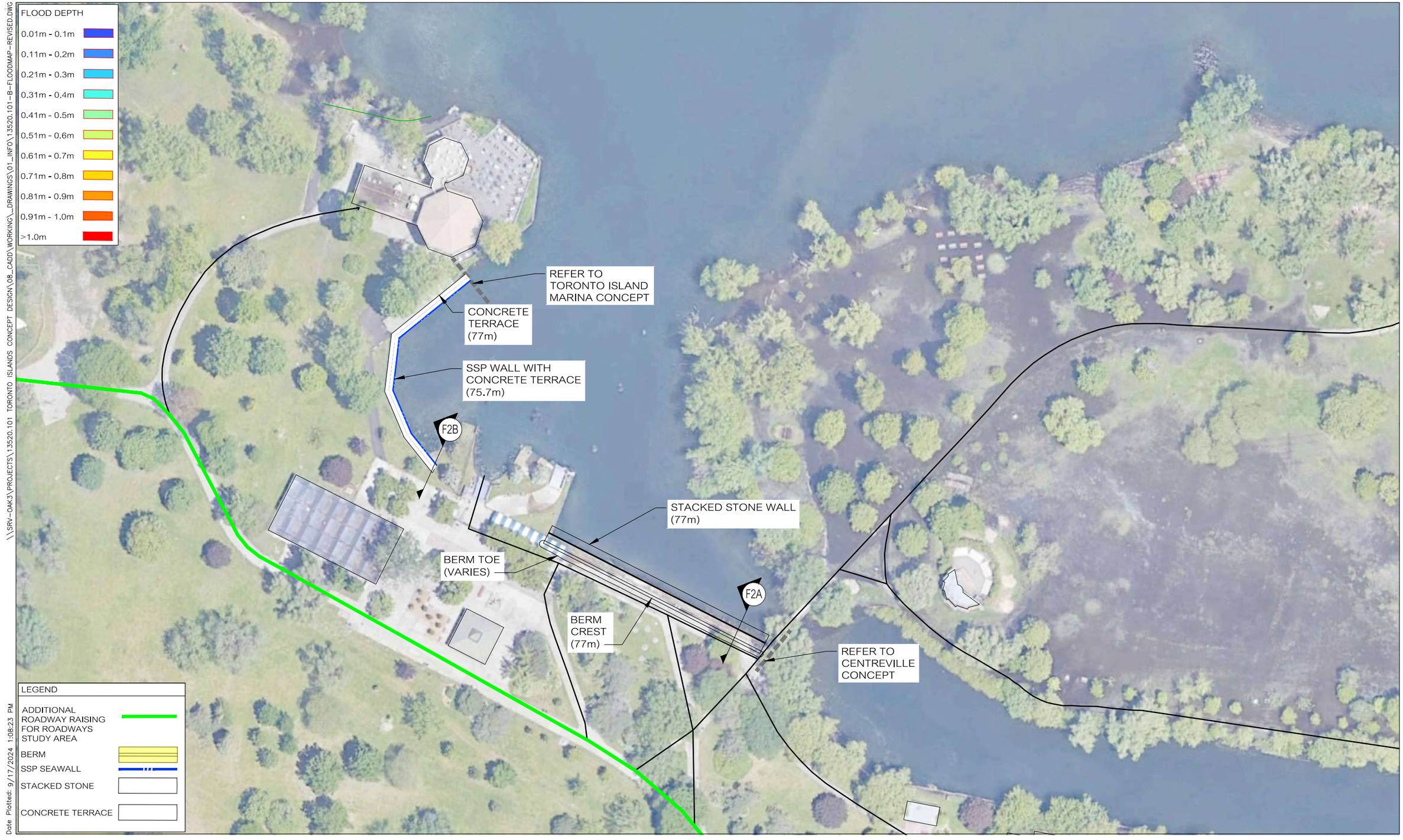
NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-FLOODMAP-REVISED.DWG

Date Plotted: 9/17/2024 1:08:23 PM

CENTRE ISLAND - FERRY TERMINAL CONCEPT 2: STACKED/STEPPED WALL

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100

GRAPHIC SCALE METRES

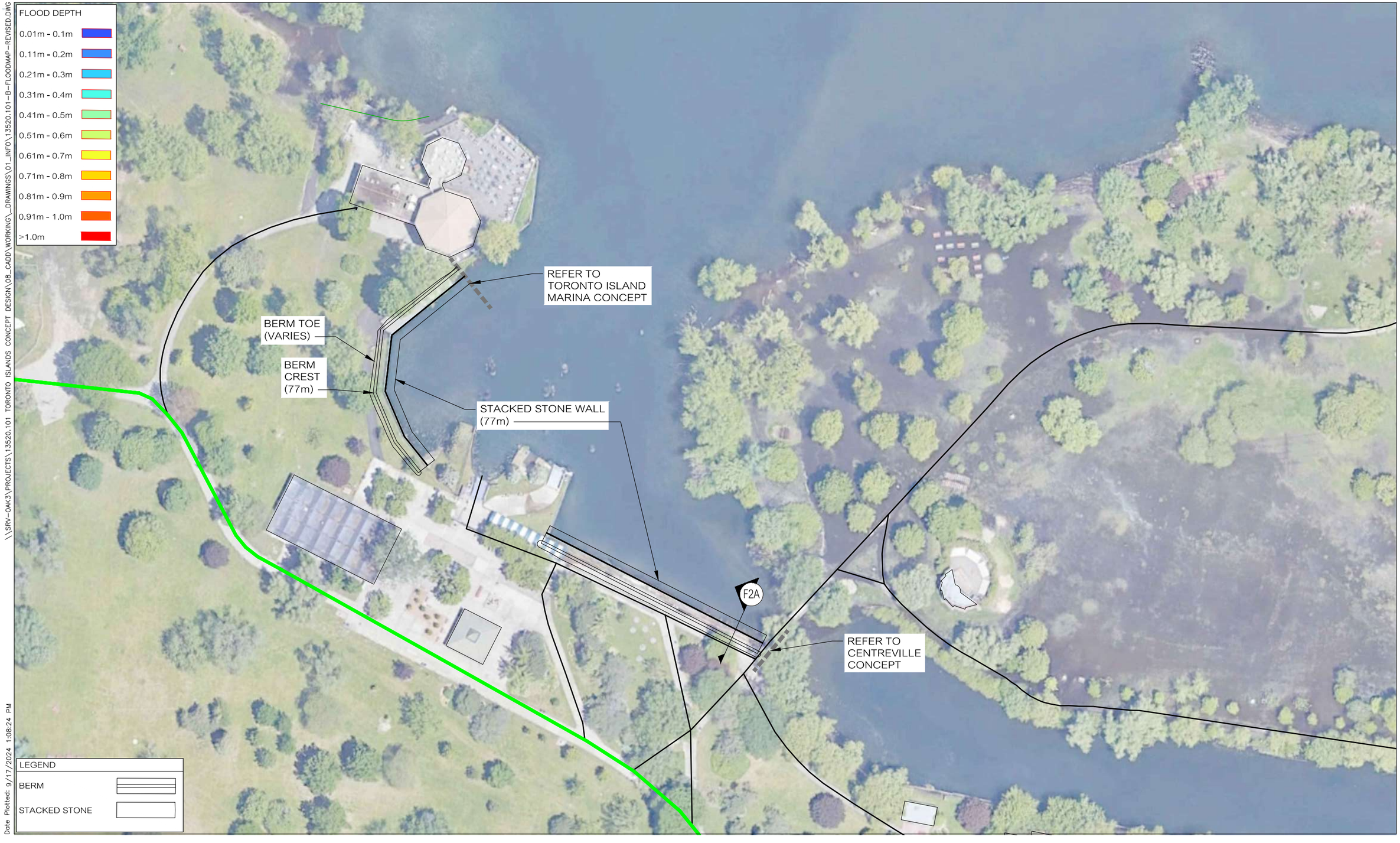
NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-FLOODMAP-REVISED.DWG

Date Plotted: 9/17/2024 1:08:24 PM

CENTRE ISLAND - FERRY TERMINAL CONCEPT 2A: STACKED ARMOURSTONE WALL

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-FLOODMAP-REVISED.DWG

Date Plotted: 9/17/2024 1:08:25 PM

CENTRE ISLAND FERRY - TERMINAL CONCEPT 2B: STEPPED CONCRETE WALL

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-FLOODMAP-REVISED.DWG

Date Plotted: 9/17/2024 1:08:26 PM

CENTRE ISLAND - FERRY TERMINAL CONCEPT 3: FLOOD BERM AND REVETMENT

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

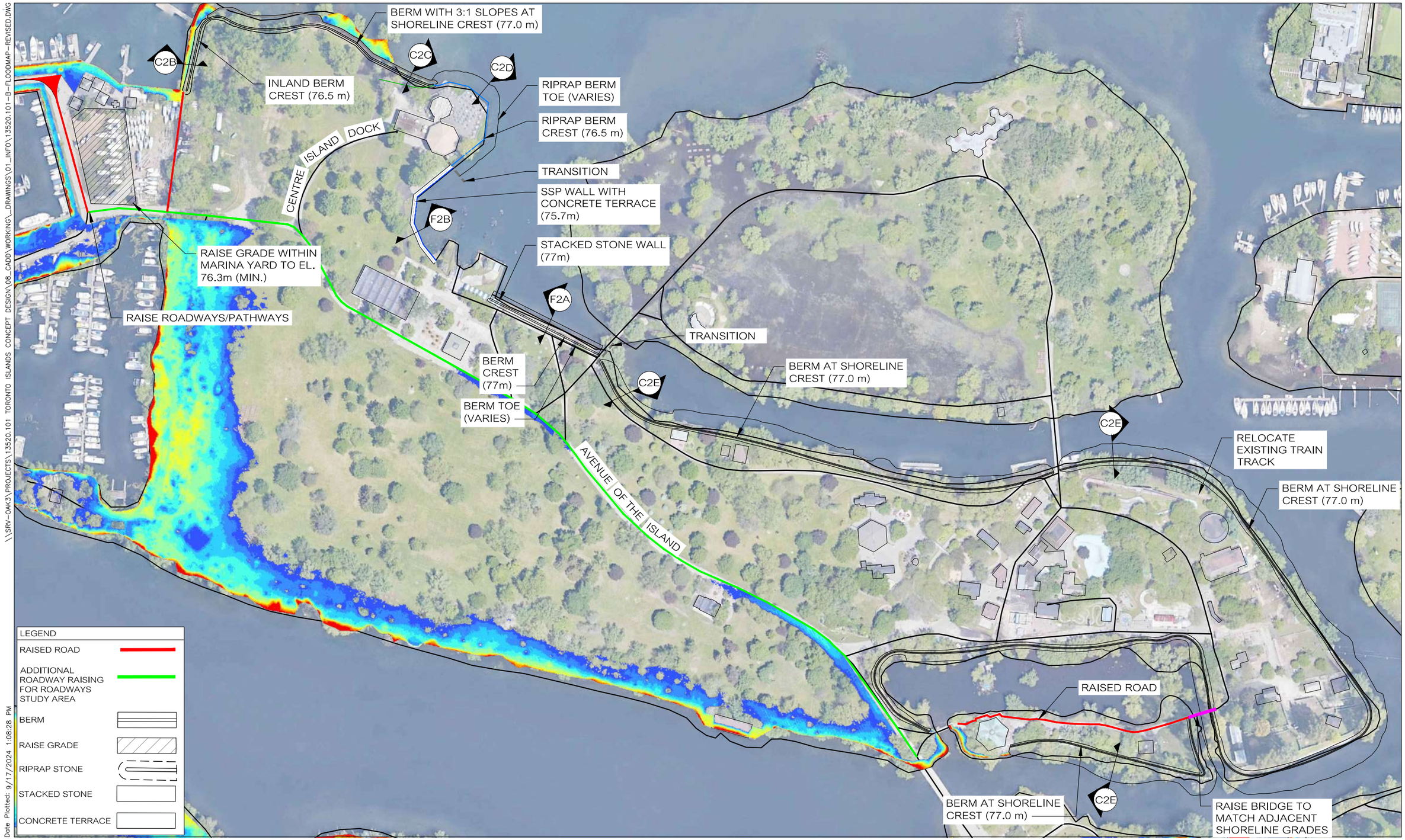
NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-FLOODMAP-REVISED.DWG

Date Plotted: 9/17/2024 1:08:28 PM

CENTRE ISLAND - OVERVIEW - PREFERRED ALTERNATIVES

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2023-03-10

Baird.

Toronto and Region Conservation Authority

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-FLOODMAP-REVISED.DWG

Date Plotted: 9/17/2024 1:08:30 PM

REFER TO FERRY TERMINAL CONCEPT

C1B

NEW SSP WALL (76.5m)

NEW SSP WALL (76.5m)

RAISE ROAD (INCLUDED IN ROADWAYS STUDY AREA)

AVENUE OF THE ISLAND

RAISED ROAD

BERM TOE (VARIES)

BERM AT SHORELINE CREST (76.5 m)

C2E

RELOCATE EXISTING TRAIN TRACKS

RAISE BRIDGE TO MATCH ADJACENT SHORELINE GRADES

FLOOD DEPTH

0.01m - 0.1m
0.11m - 0.2m
0.21m - 0.3m
0.31m - 0.4m
0.41m - 0.5m
0.51m - 0.6m
0.61m - 0.7m
0.71m - 0.8m
0.81m - 0.9m
0.91m - 1.0m
>1.0m

LEGEND

- SSP SEAWALL
- RAISED ROAD
- ADDITIONAL ROADWAY RAISING FOR ROADWAYS STUDY AREA
- BERM

CENTRE ISLAND - CENTREVILLE CONCEPT 1: STEEL SHEET PILE WALL

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100

GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-FLOODMAP-REVISED.DWG

Date Plotted: 9/17/2024 1:08:32 PM

CENTRE ISLAND - CENTREVILLE CONCEPT 2: NATURALIZED SHORELINE AND FLOOD BERM

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

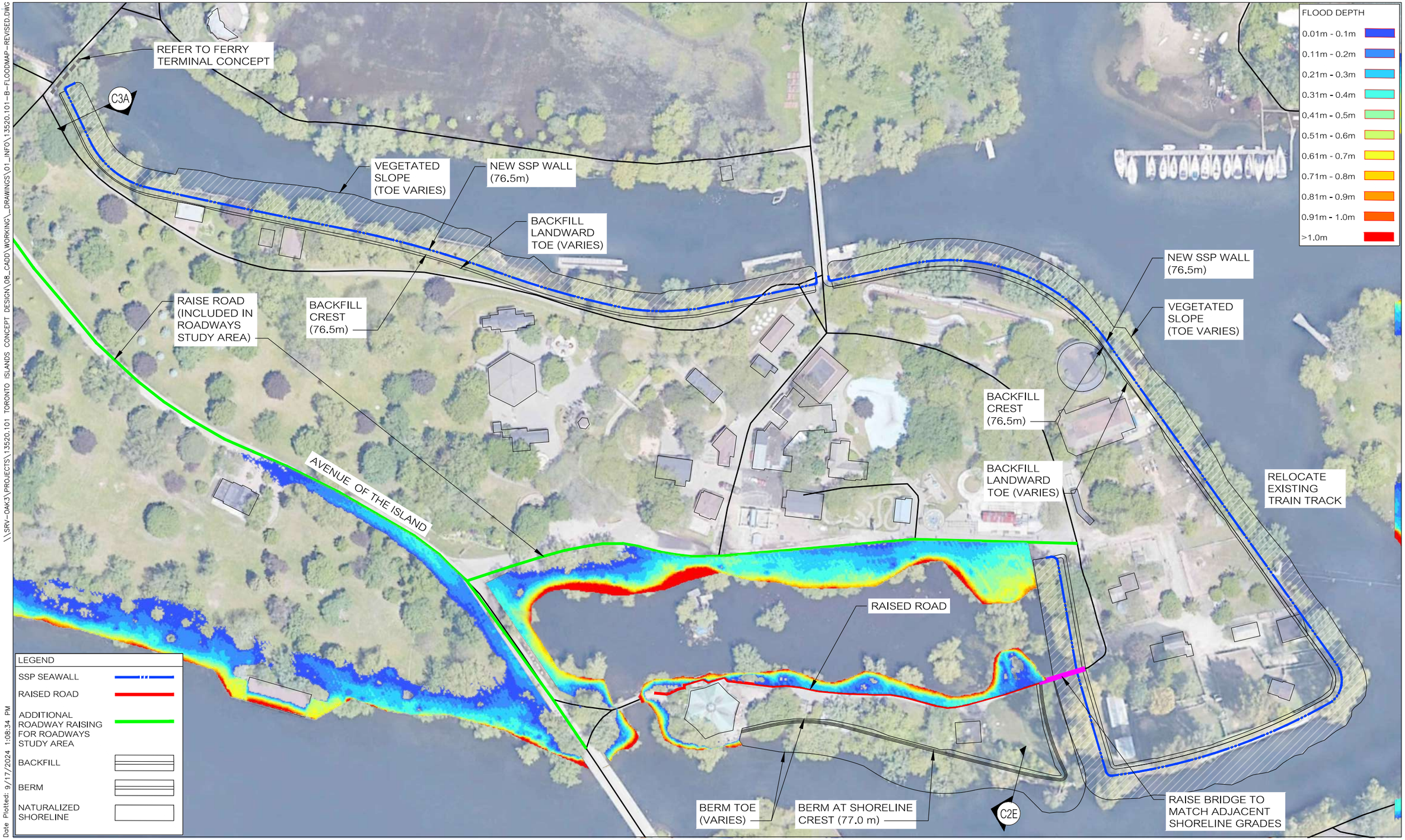
NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-FLOODMAP-REVISED.DWG

Date Plotted: 9/17/2024 1:08:34 PM

CENTRE ISLAND - CENTREVILLE CONCEPT 3: BURIED STEEL SHEET PILE WALL AND NATURALIZED SHORELINE

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

NORTH

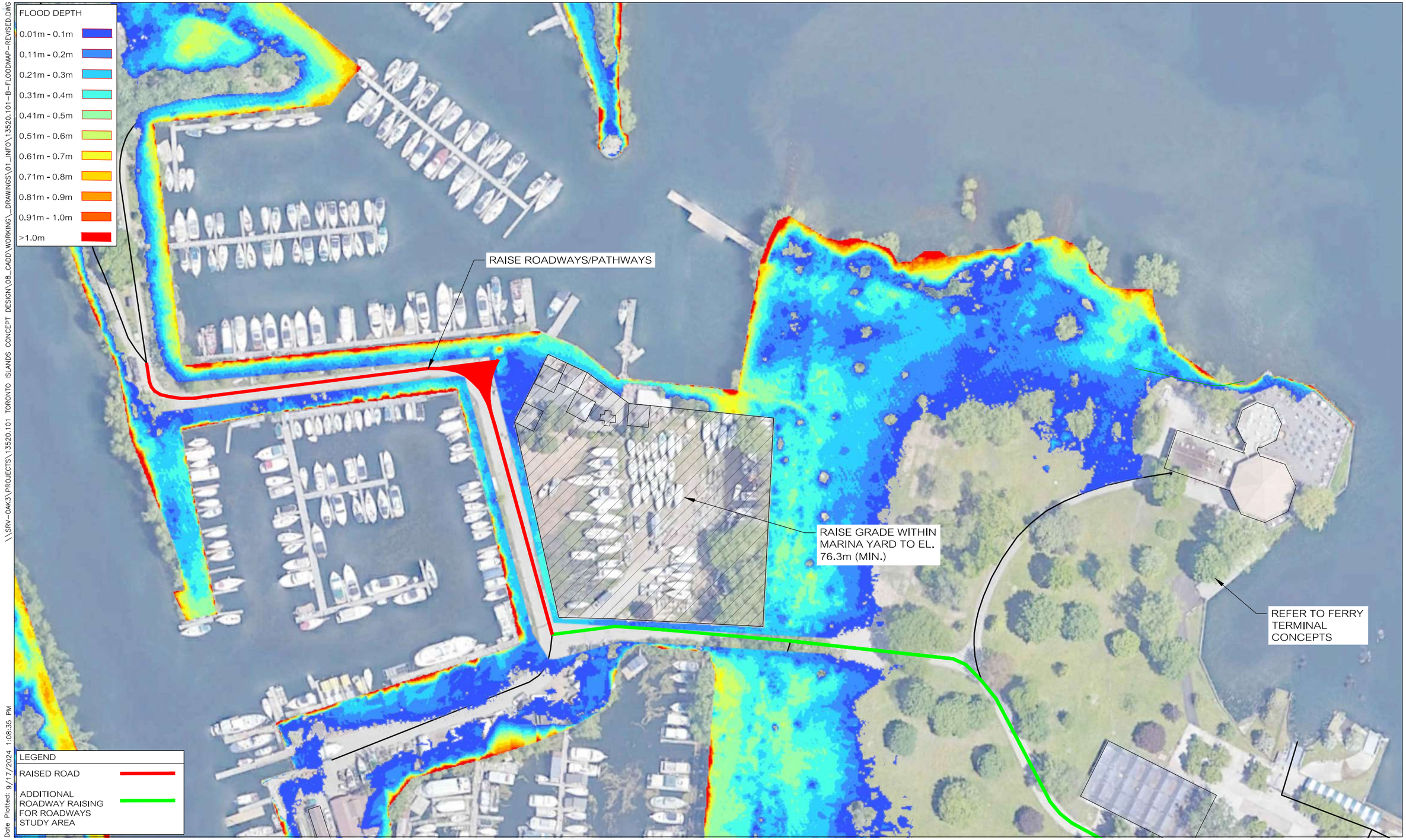
Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-FLOODMAP-REVISED.DWG
Date Plotted: 9/17/2024 1:08:35 PM



CENTRE ISLAND - TORONTO ISLAND MARINA CONCEPT 1: LAND AND ROAD RAISING

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

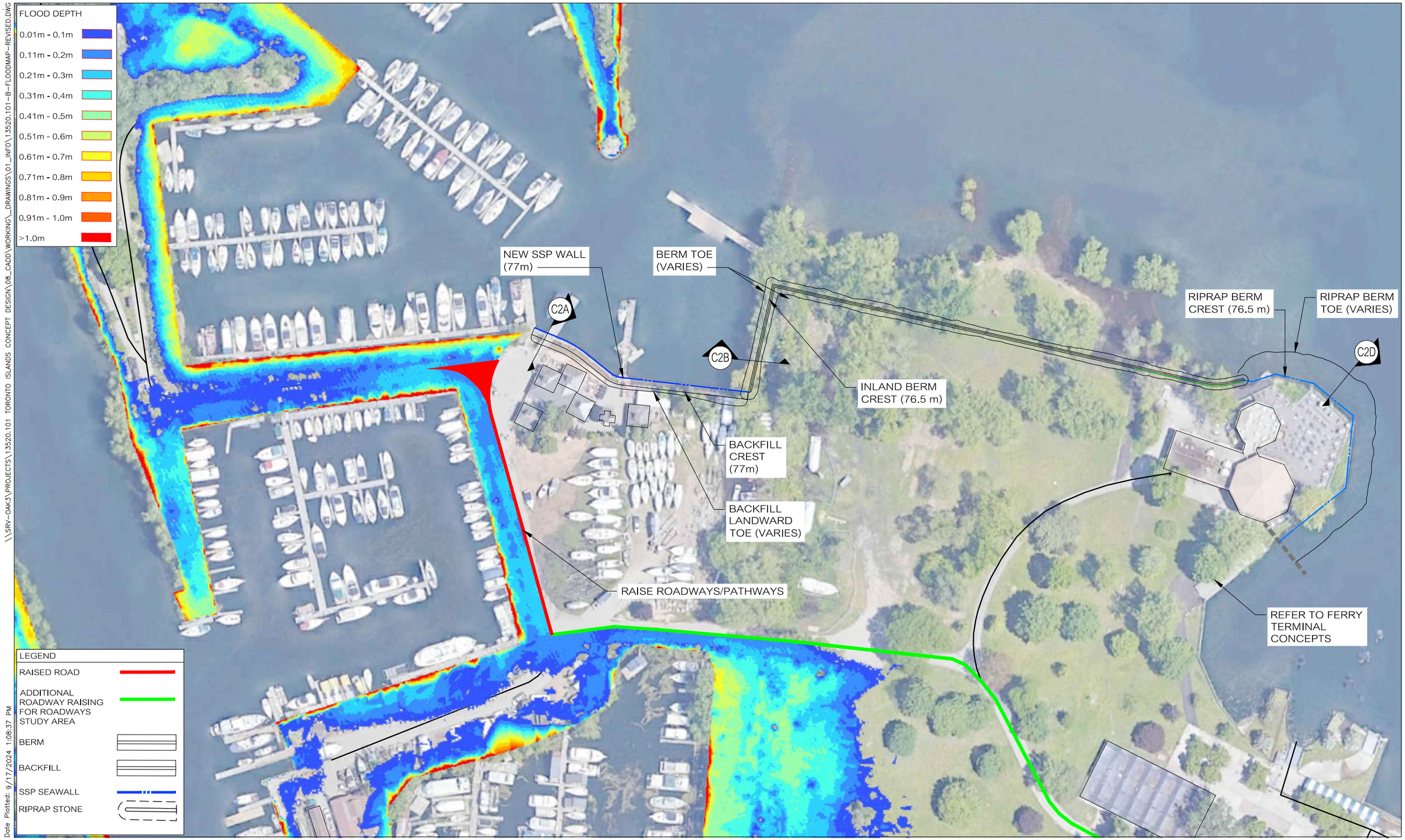
NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-FLOODMAP-REVISED.DWG

Date Plotted: 9/17/2024 1:08:37 PM

CENTRE ISLAND - TORONTO ISLAND MARINA CONCEPT 2A: STEEL SHEET PILE WALL AND INLAND FLOOD BERM

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

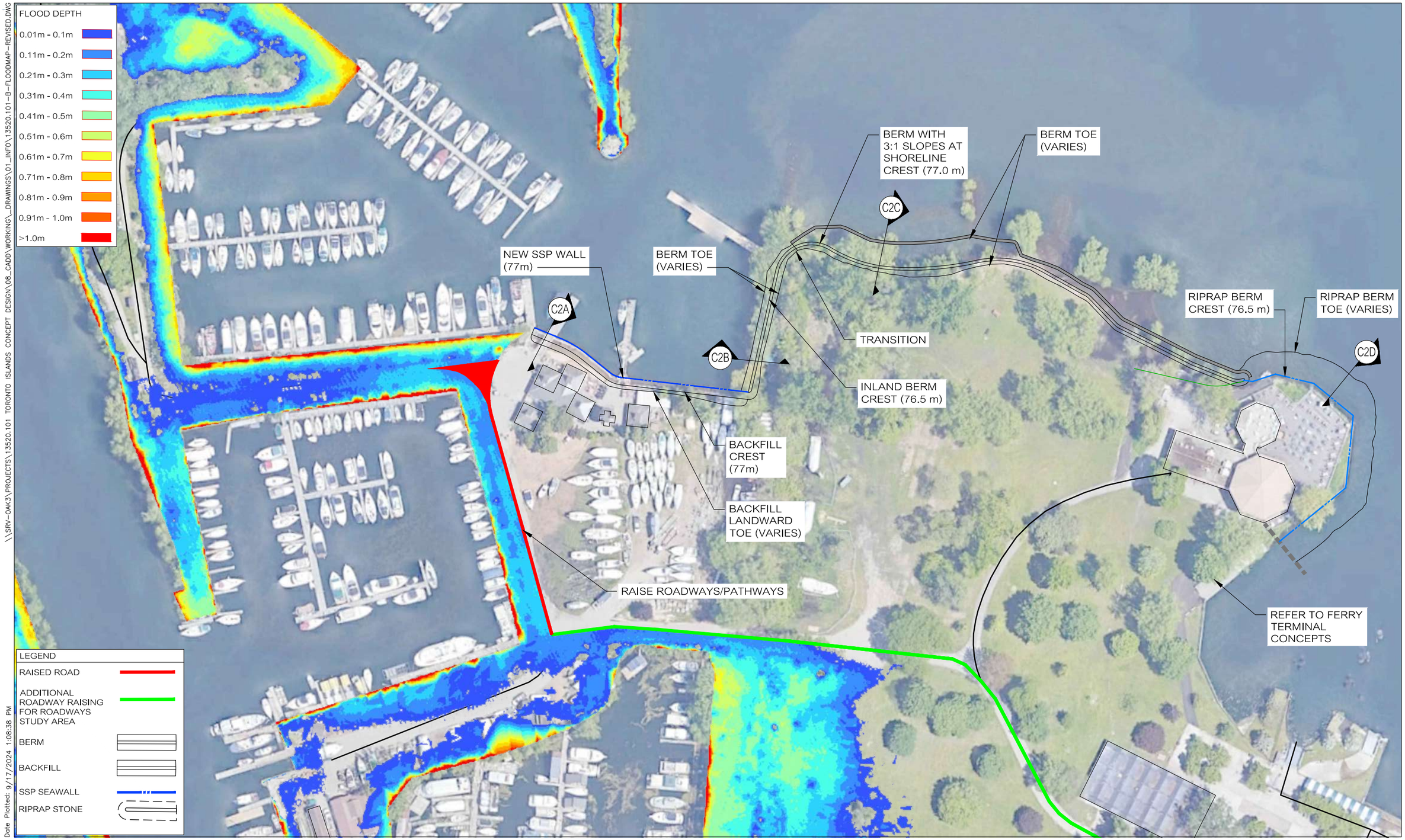
NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-FLOODMAP-REVISED.DWG

Date Plotted: 9/17/2024 1:08:38 PM

CENTRE ISLAND - TORONTO ISLAND MARINA CONCEPT 2B: STEEL SHEET PILE WALL AND SHORELINE FLOOD BERM

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

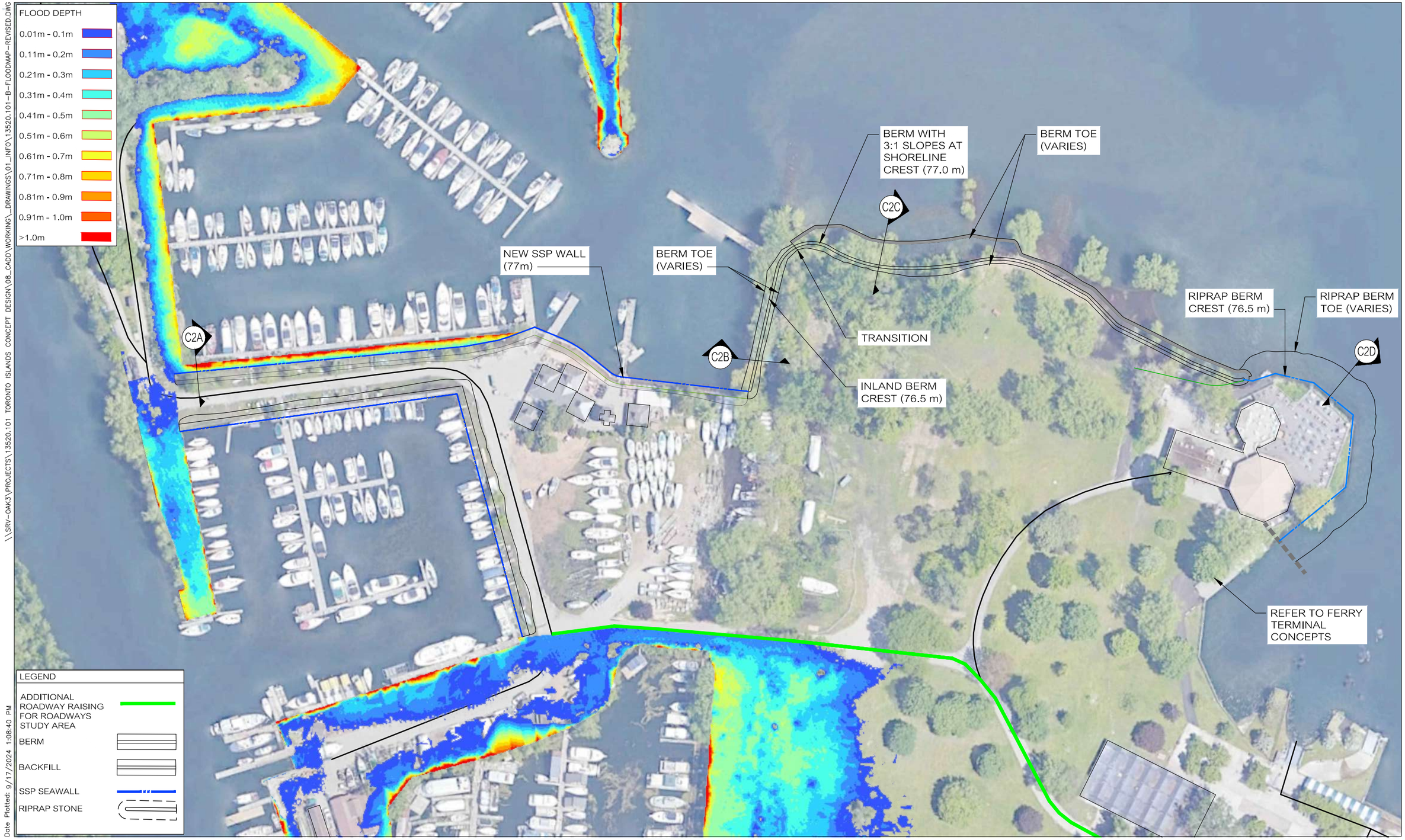
NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-FLOODMAP-REVISED.DWG

Date Plotted: 9/17/2024 1:08:40 PM

CENTRE ISLAND - TORONTO ISLAND MARINA CONCEPT 3: STEEL SHEET PILE DOCK WALLS AND SHORELINE FLOOD BERM

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

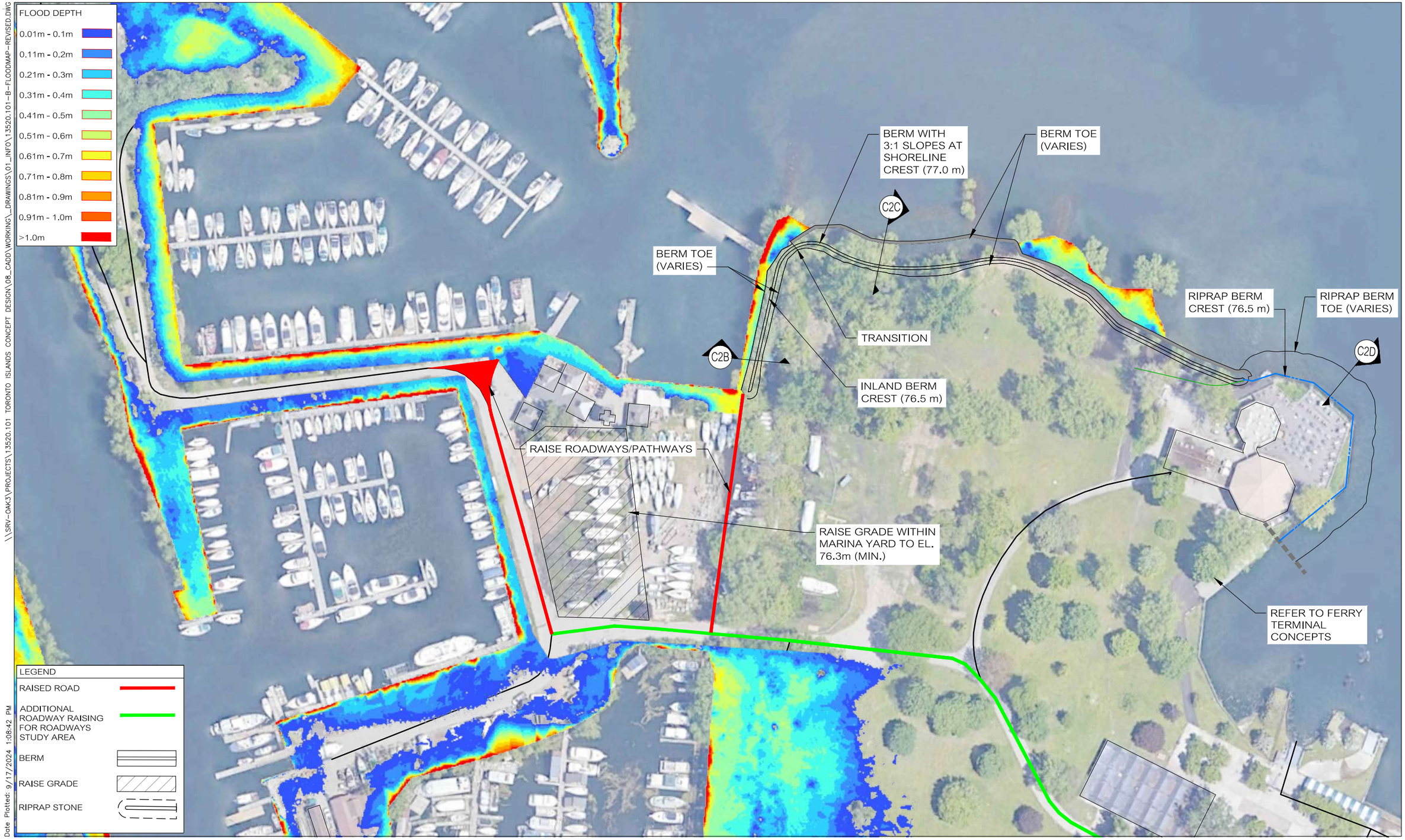
NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-FLOODMAP-REVISED.DWG

Date Plotted: 9/17/2024 1:08:42 PM

CENTRE ISLAND - TORONTO ISLAND MARINA CONCEPT 4: LAND RAISING AND SHORELINE FLOOD BERM

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-FLOODMAP-REVISED.DWG

Date Plotted: 9/17/2024 1:08:43 PM

GIBRALTAR POINT - STACKED ARMOUR STONE WALL CONCEPT

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority

Appendix B

Shoreline Concept Drawings



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-BASEMAP-CURRENT.DWG

Date Plotted: 9/17/2024 1:16:48 PM

WARD'S ISLAND - CONCEPT 1: INLAND STEEL SHEET PILE FLOOD WALL

TORONTO ISLANDS CONCEPT DESIGN

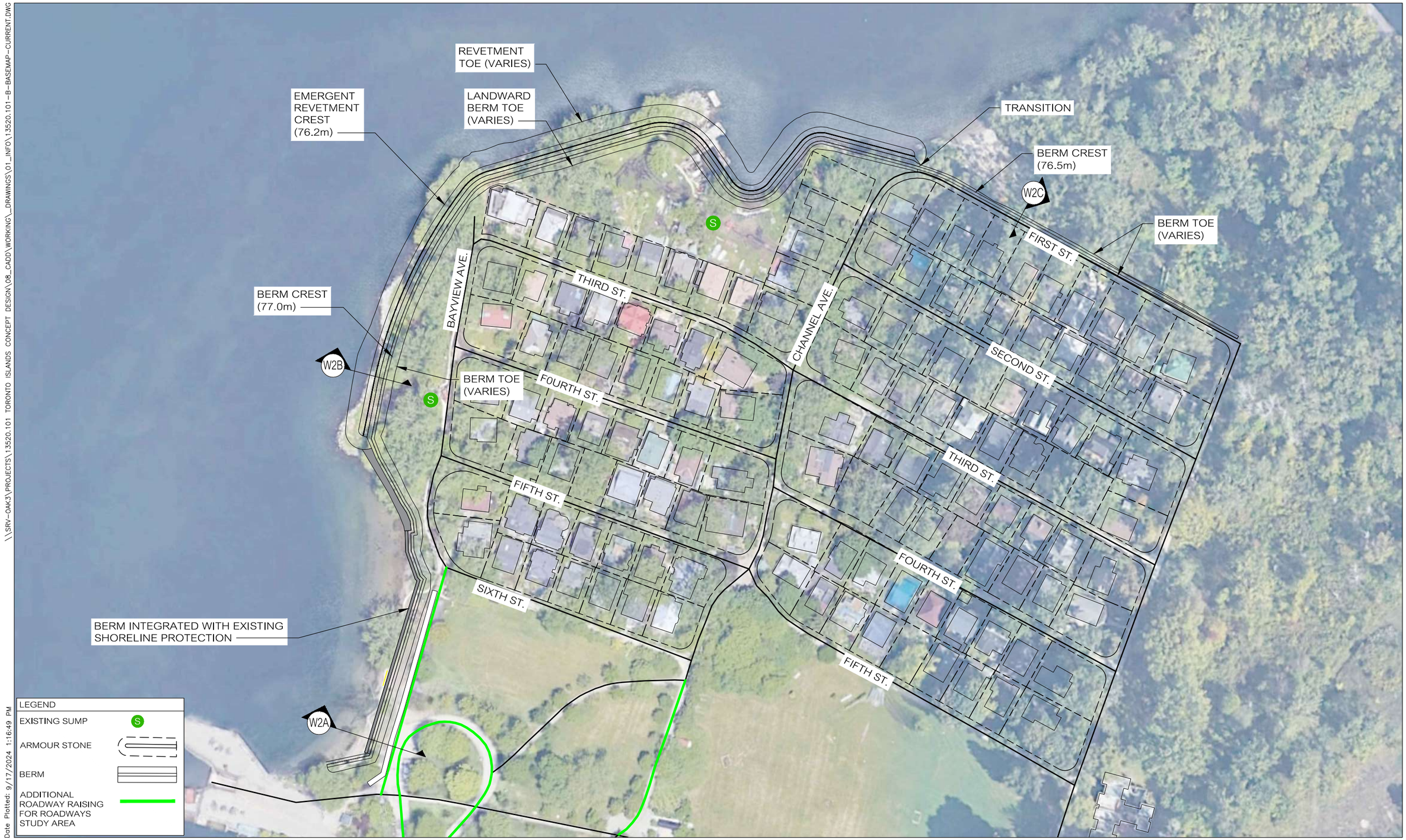
0 12.5 25 50
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-BASEMAP-CURRENT.DWG

Date Plotted: 9/17/2024 1:16:49 PM

WARD'S ISLAND - CONCEPT 2: REVETMENT AND VEGETATED BERM

TORONTO ISLANDS CONCEPT DESIGN

0 12.5 25 50

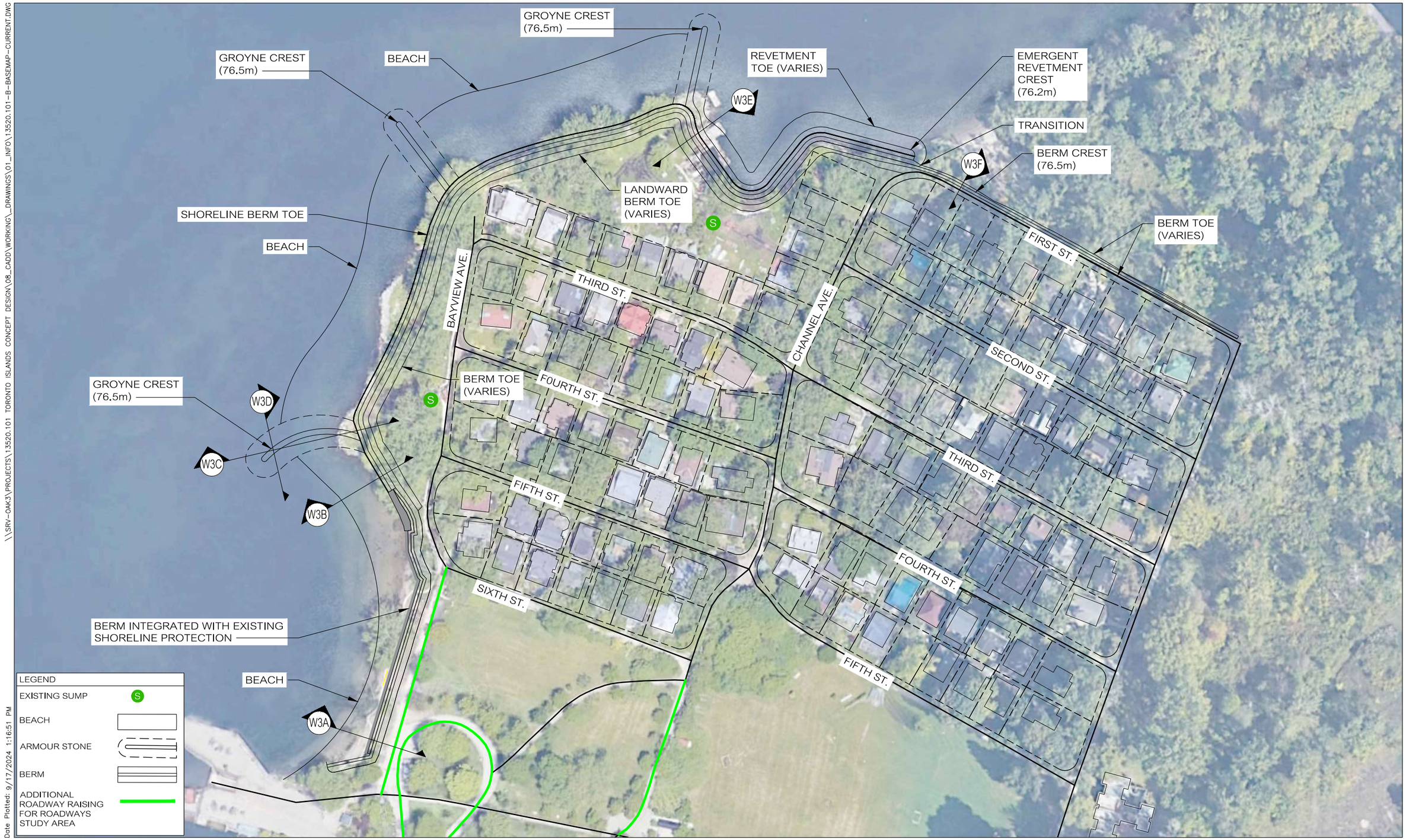
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-BASEMAP-CURRENT.DWG

Date Plotted: 9/17/2024 1:16:51 PM

WARD'S ISLAND - CONCEPT 3A: VEGETATED BERM, 3 BEACHES AND GROYNES

TORONTO ISLANDS CONCEPT DESIGN

0 12.5 25 50

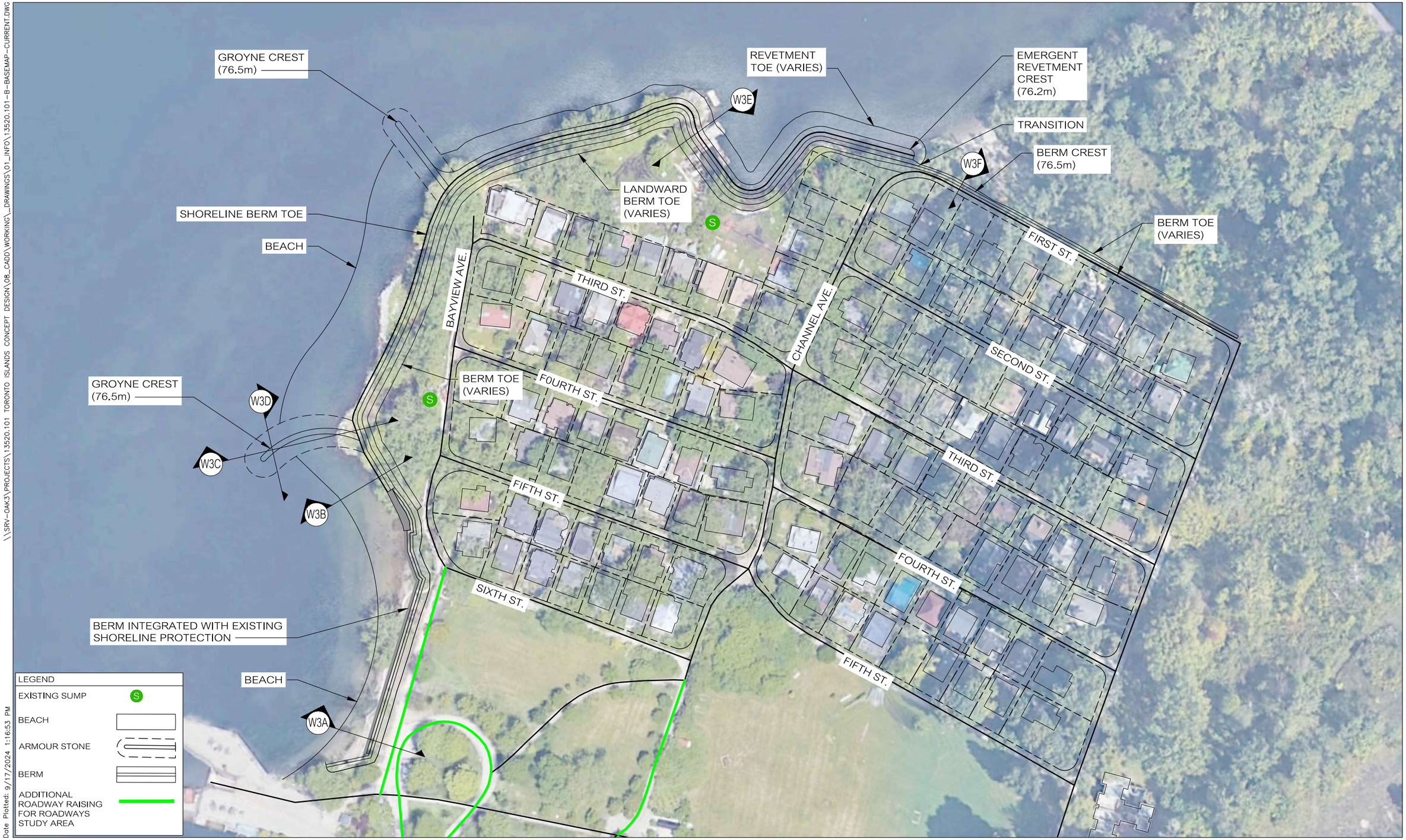
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-BASEMAP-CURRENT.DWG

Date Plotted: 9/17/2024 1:16:53 PM

WARD'S ISLAND - CONCEPT 3B: VEGETATED BERM, 2 BEACHES AND GROYNES

TORONTO ISLANDS CONCEPT DESIGN

0 12.5 25 50
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-BASEMAP-CURRENT.DWG

Date Plotted: 9/17/2024 1:16:54 PM

WARD'S ISLAND - CONCEPT 3C: VEGETATED BERM, BEACH AND GROYNE

TORONTO ISLANDS CONCEPT DESIGN

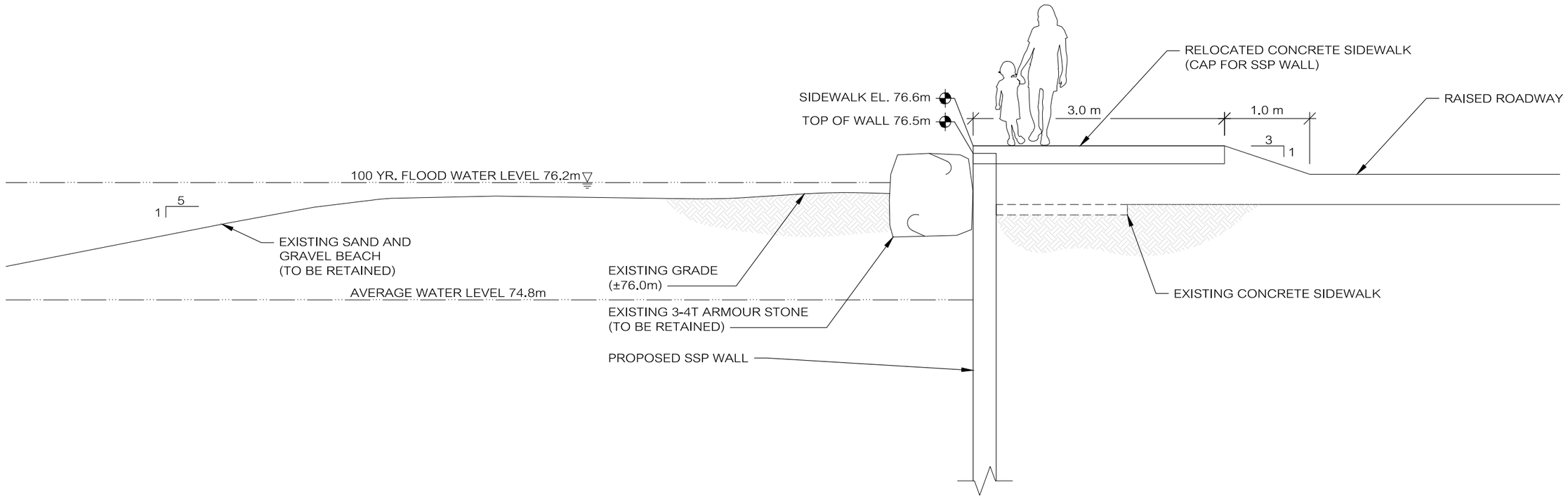
0 12.5 25 50
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.



W1A SECTION - NEW SSP SEAWALL WITH EXISTING ARMOUR STONE & RAISED ROADWAY

TYPICAL SECTIONS - WARD'S ISLAND

TORONTO ISLANDS CONCEPT DESIGN

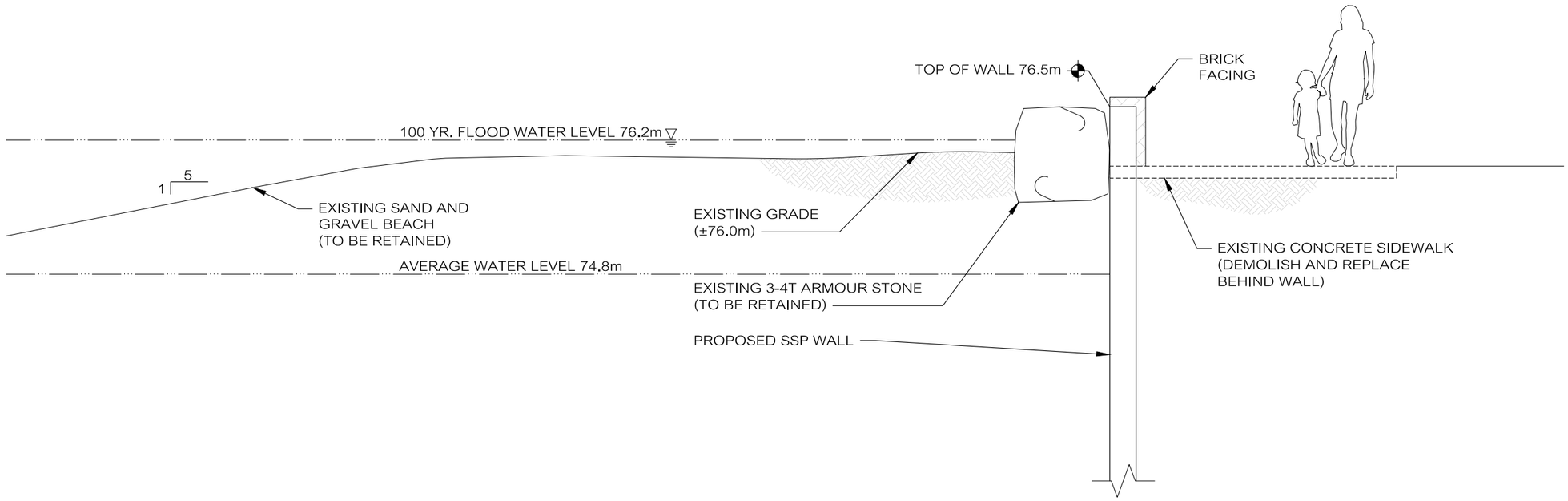
Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG
Date Plotted: 9/17/2024 1:17:09 PM



W1B SECTION - NEW SSP SEAWALL & EXISTING ARMOUR STONE

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG
Date Plotted: 9/17/2024 1:17:10 PM

TYPICAL SECTIONS - WARD'S ISLAND

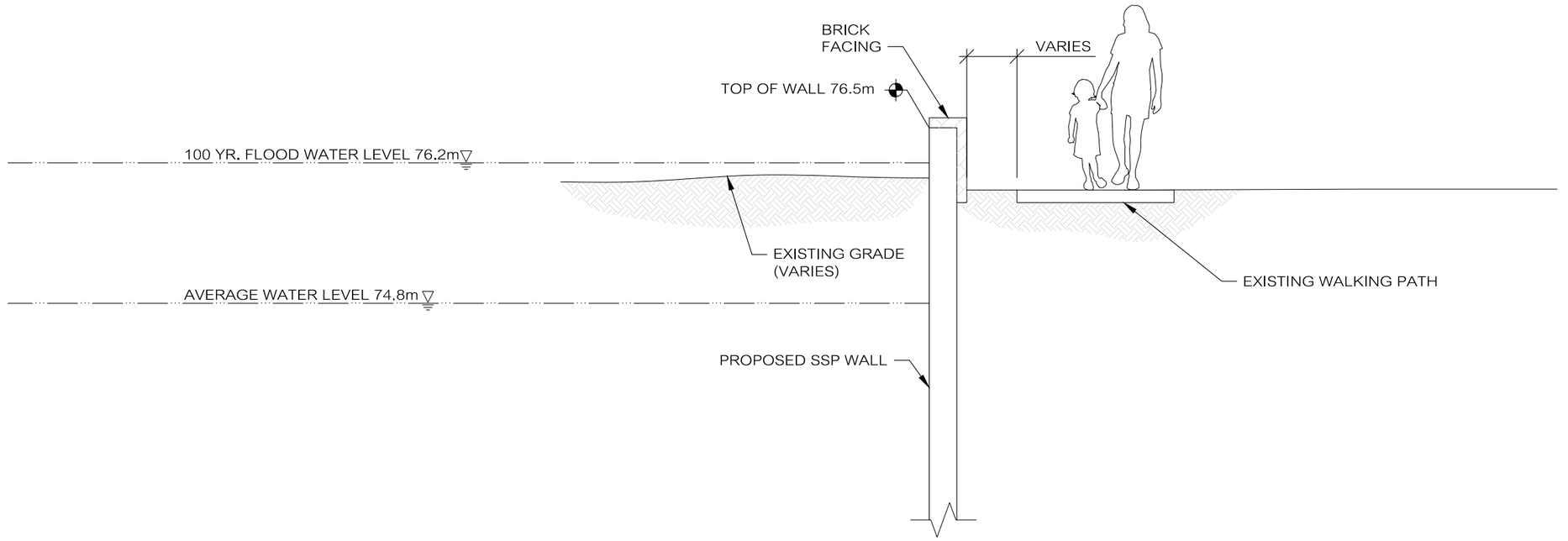
TORONTO ISLANDS CONCEPT DESIGN

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



W1C SECTION - NEW SSP SEAWALL

TYPICAL SECTIONS - WARD'S ISLAND

TORONTO ISLANDS CONCEPT DESIGN

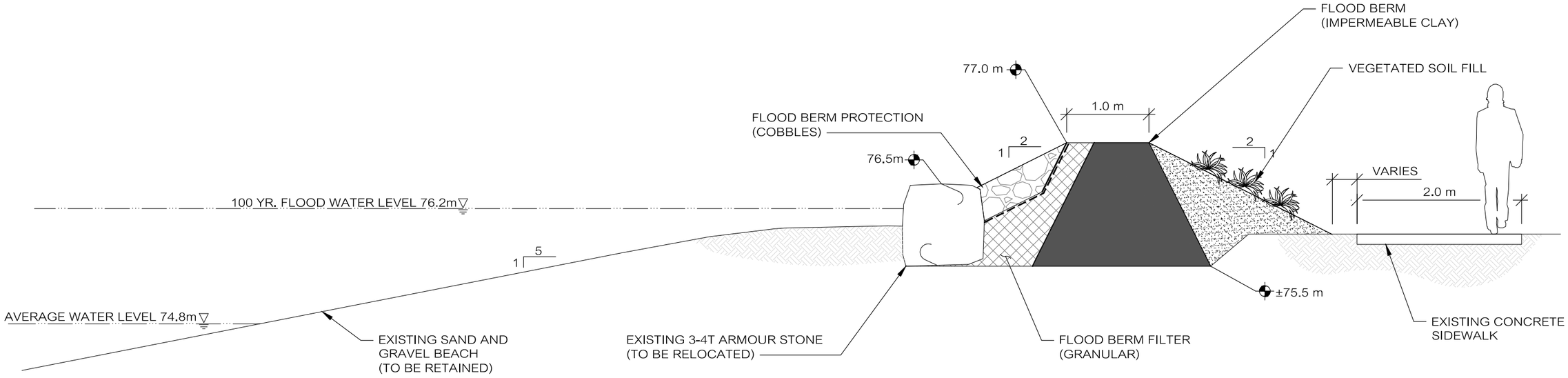
Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority

Date Plotted: 9/17/2024 1:17:10 PM
\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG



W2A SECTION - VEGETATED BERM WITH 3:1 SLOPES INTEGRATED WITH EXISTING ARMOUR STONE

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG

Date Plotted: 9/17/2024 1:17:10 PM

TYPICAL SECTIONS - WARD'S ISLAND

TORONTO ISLANDS CONCEPT DESIGN

0 0.5 1 2
GRAPHIC SCALE METRES

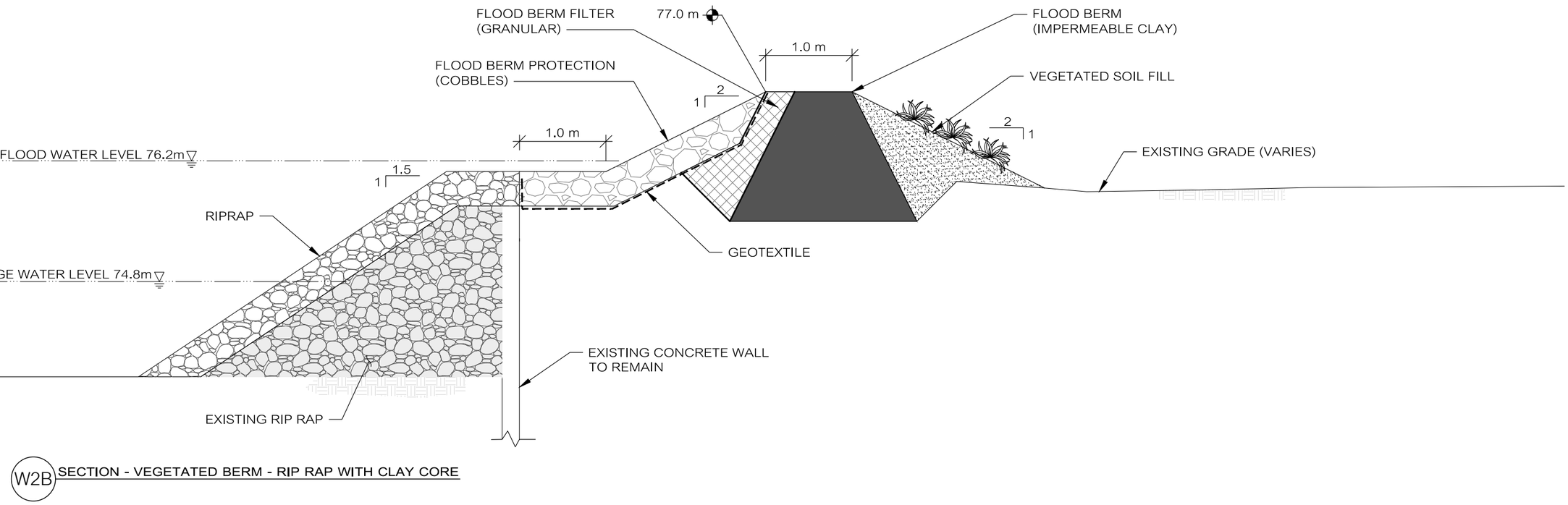
Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG



W2B SECTION - VEGETATED BERM - RIP RAP WITH CLAY CORE

Date Plotted: 9/17/2024 1:17:11 PM

TYPICAL SECTIONS - WARD'S ISLAND

TORONTO ISLANDS CONCEPT DESIGN

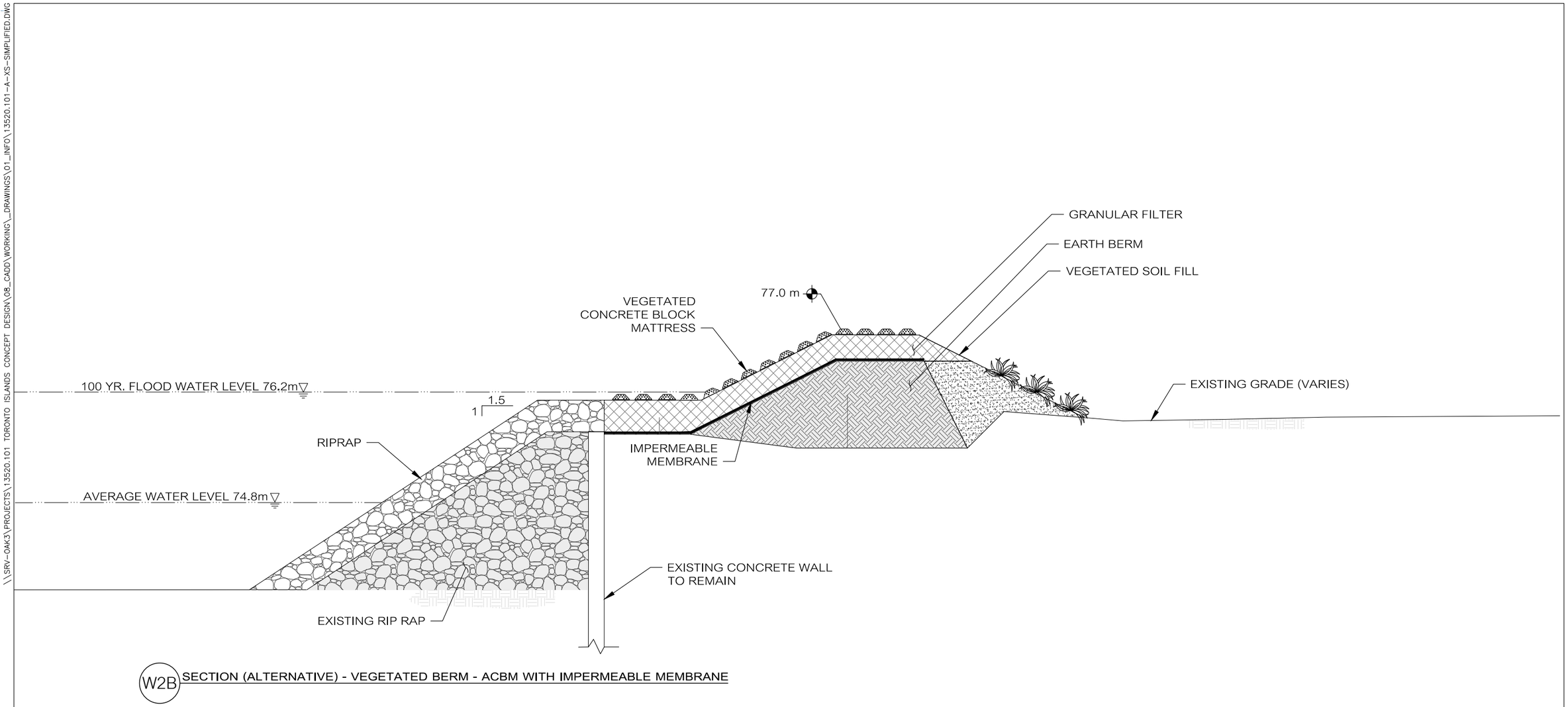
0 0.5 1 2
GRAPHIC SCALE METRES

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



W2B SECTION (ALTERNATIVE) - VEGETATED BERM - ACBM WITH IMPERMEABLE MEMBRANE

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG

Date Plotted: 9/17/2024 1:17:11 PM

TYPICAL SECTIONS - WARD'S ISLAND

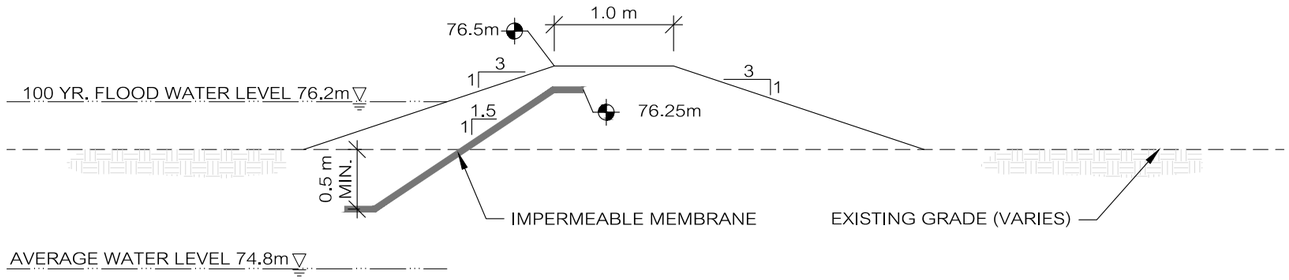
TORONTO ISLANDS CONCEPT DESIGN

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



W2C SECTION - BERM WITH 3:1 SLOPES

Date Plotted: 9/17/2024 1:17:11 PM
\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG

TYPICAL SECTIONS - WARD'S ISLAND

TORONTO ISLANDS CONCEPT DESIGN

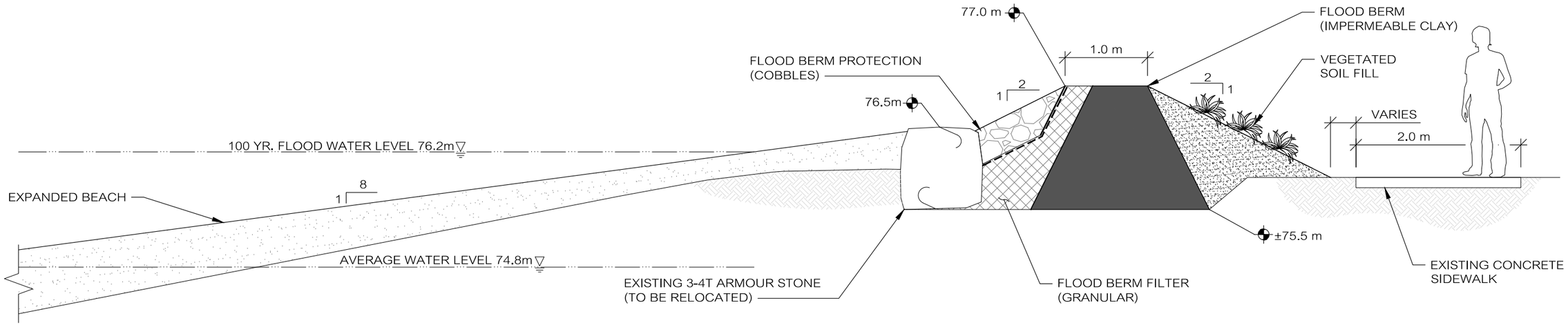
0 0.5 1 2
GRAPHIC SCALE METRES

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



W3A SECTION - BERM AND EXISTING ARMOUR STONE WITH BEACH

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG
Date Plotted: 9/17/2024 1:17:12 PM

TYPICAL SECTIONS - WARD'S ISLAND

TORONTO ISLANDS CONCEPT DESIGN

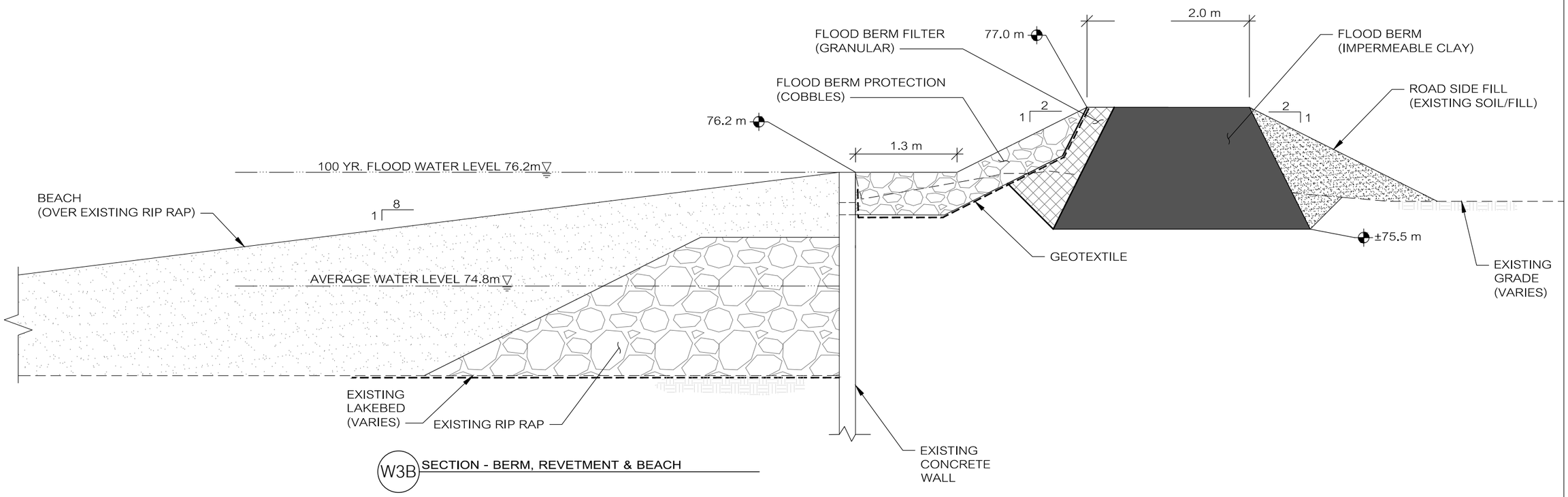
0 0.5 1 2
GRAPHIC SCALE METRES

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



W3B SECTION - BERM, REVETMENT & BEACH

TYPICAL SECTIONS - WARD'S ISLAND

TORONTO ISLANDS CONCEPT DESIGN

0 .5 1 2
GRAPHIC SCALE METRES

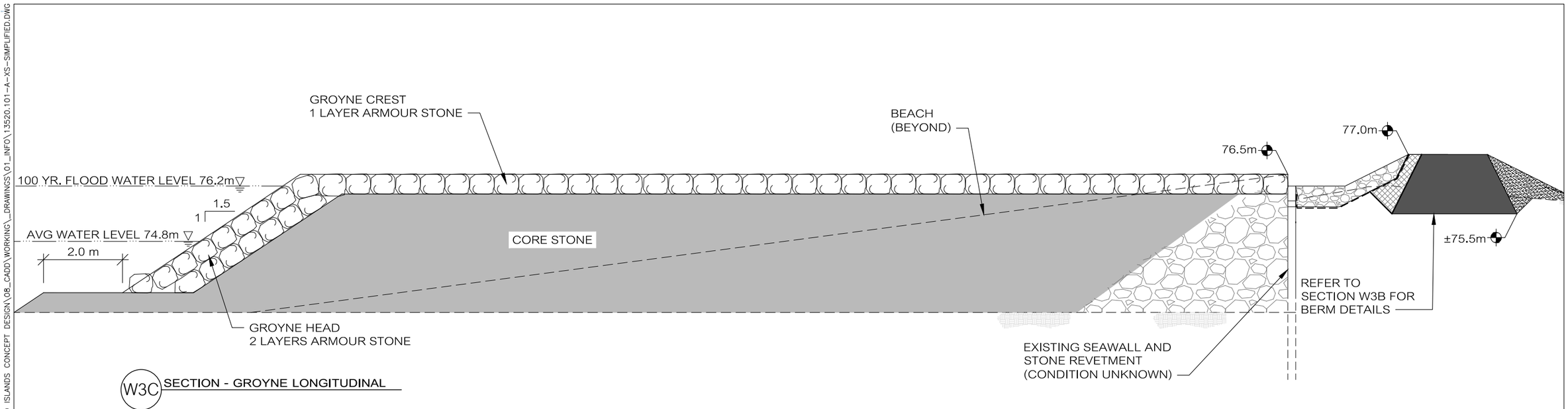
Project Number: 13520.101

Date: 2022-10-15

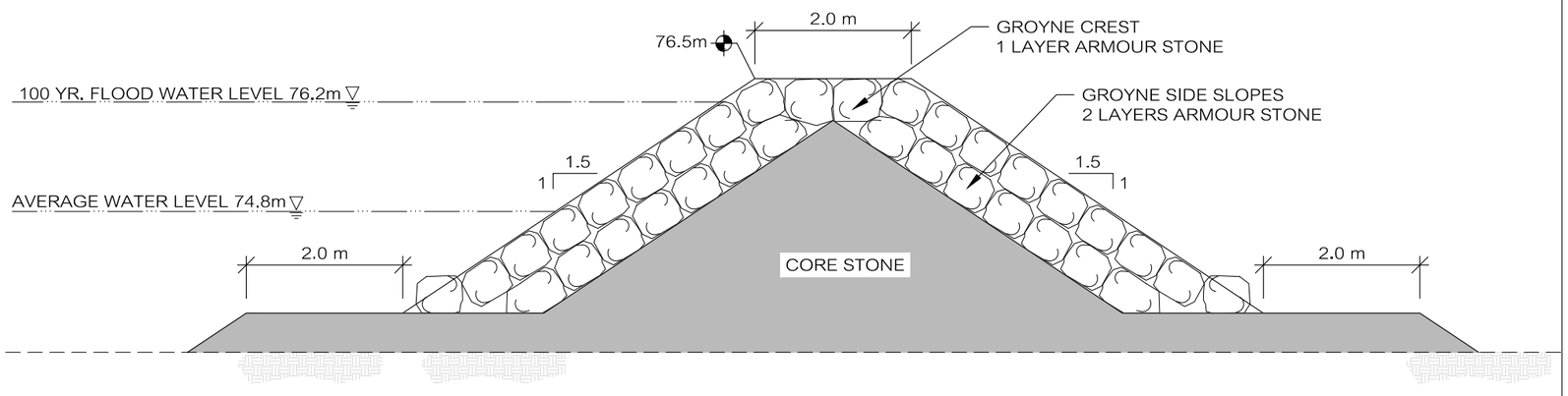
Baird.

Toronto and Region Conservation Authority

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG
Date Plotted: 9/17/2024 1:17:12 PM



W3C SECTION - GROYNE LONGITUDINAL



W3D SECTION - GROYNE CROSS SECTION

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG

Date Plotted: 9/17/2024 1:17:12 PM

TYPICAL SECTIONS - WARD'S ISLAND

TORONTO ISLANDS CONCEPT DESIGN

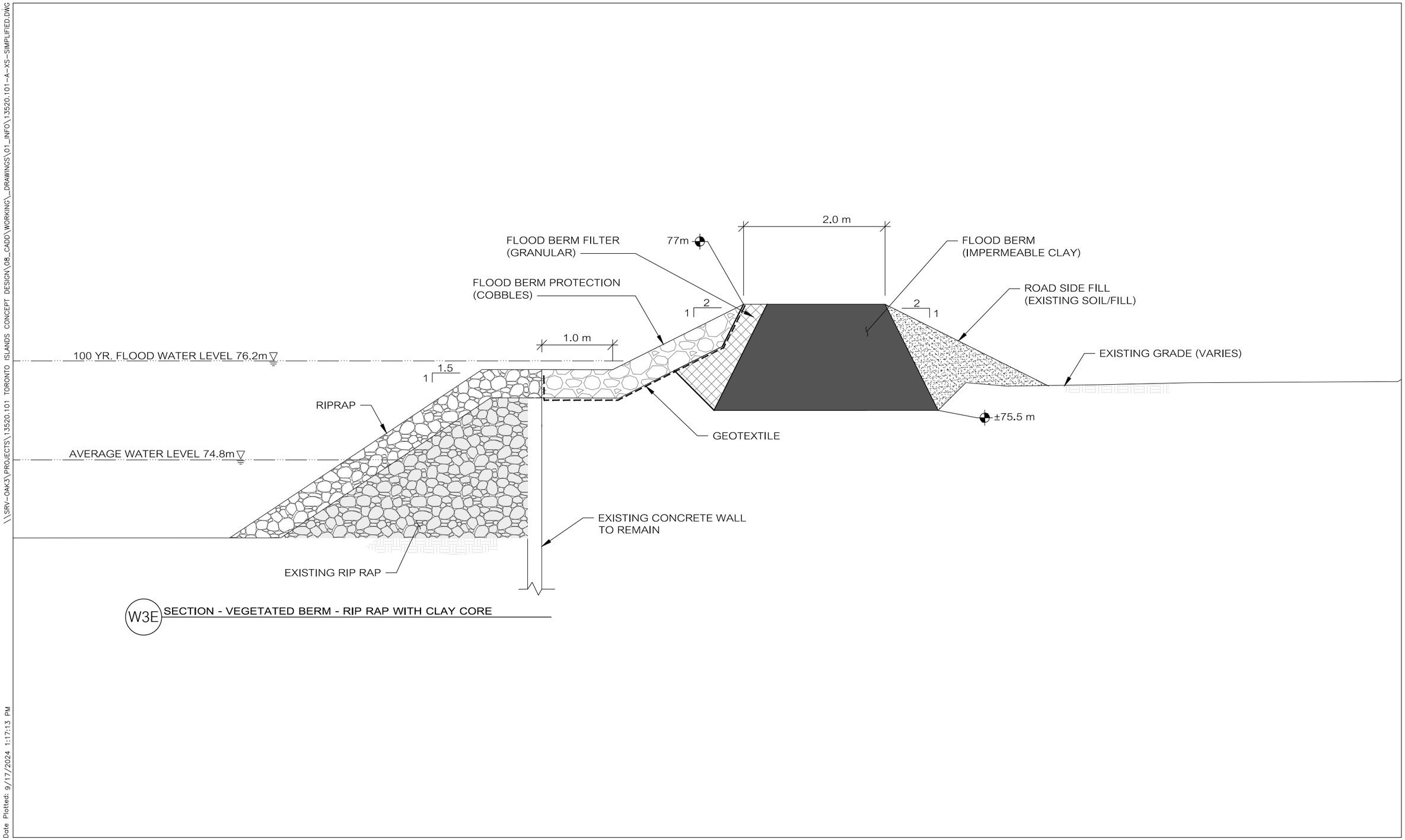
0 1 2 4
GRAPHIC SCALE METRES

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



W3E SECTION - VEGETATED BERM - RIP RAP WITH CLAY CORE

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG

Date Plotted: 9/17/2024 1:17:13 PM

TYPICAL SECTIONS - WARD'S ISLAND

TORONTO ISLANDS CONCEPT DESIGN

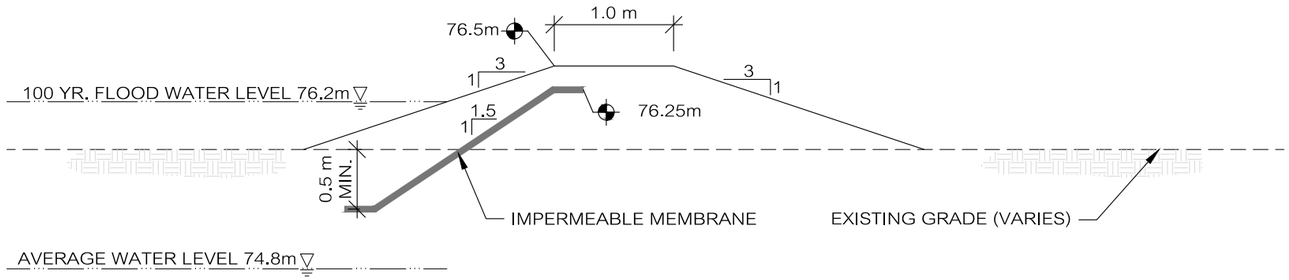
0 .5 1 2
GRAPHIC SCALE METRES

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



W3F SECTION - BERM WITH 3:1 SLOPES

Date Plotted: 9/17/2024 1:17:13 PM
\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG

TYPICAL SECTIONS - WARD'S ISLAND

TORONTO ISLANDS CONCEPT DESIGN

0 0.5 1 2
GRAPHIC SCALE METRES

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-BASEMAP-CURRENT.DWG
Date Plotted: 9/17/2024 1:17:17 PM



ALGONQUIN ISLAND - SOUTH END CONCEPT 1A: VEGETATED SHORELINE FLOOD BERM

TORONTO ISLANDS CONCEPT DESIGN

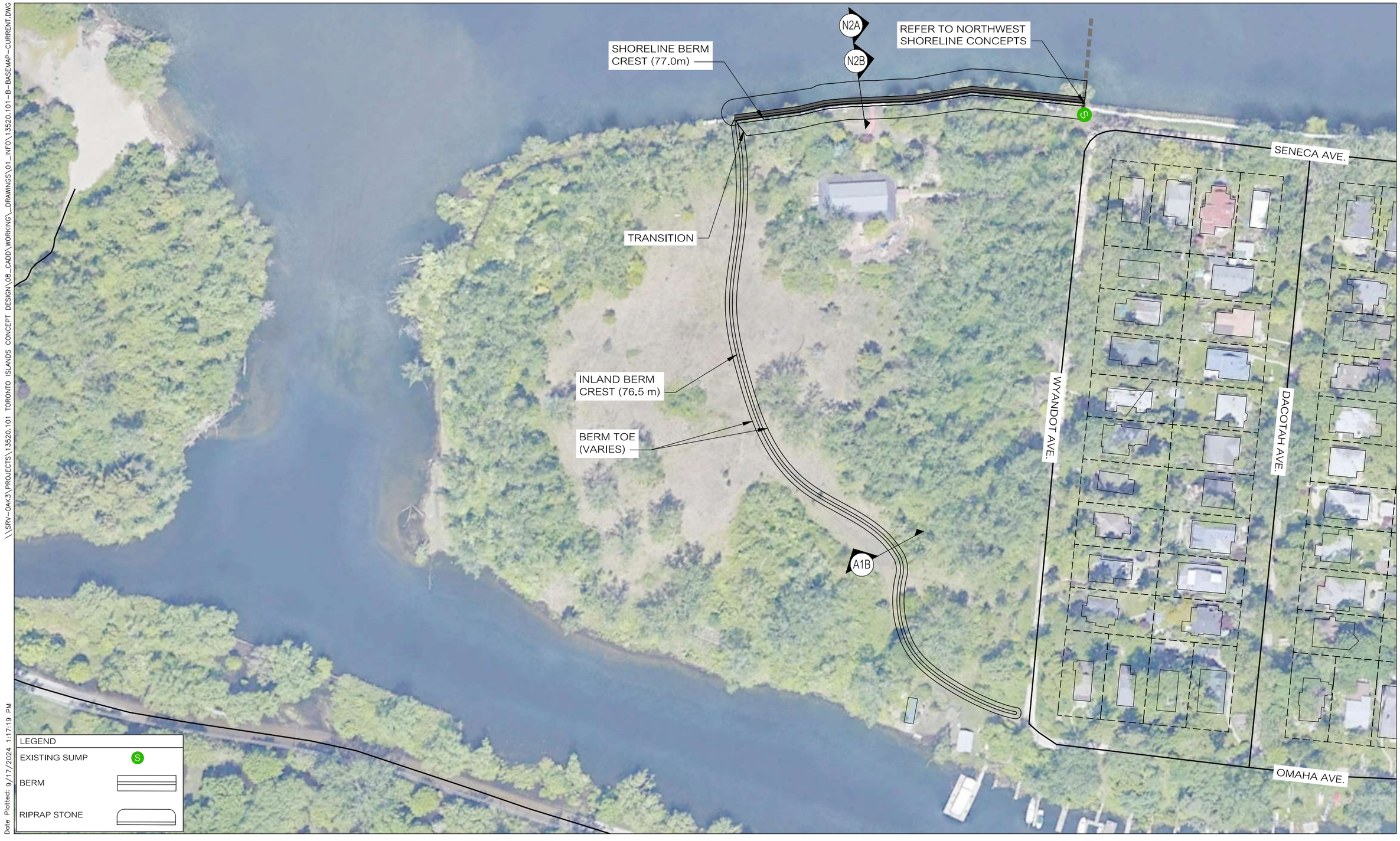
0 25 50 100
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-BASEMAP-CURRENT.DWG

Date Plotted: 9/17/2024 1:17:19 PM

ALGONQUIN ISLAND - SOUTH END CONCEPT 1B: VEGETATED INLAND BERM

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-BASEMAP-CURRENT.DWG

Date Plotted: 9/17/2024 1:17:22 PM

ALGONQUIN ISLAND - SOUTH END CONCEPT 1C: VEGETATED INLAND BERM ALONG WYANDOT

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2023-02-17

Baird.



ALGONQUIN ISLAND - SOUTH END CONCEPT 2: VEGETATED INLAND BERM AND FLOOD WALL

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2023-02-17

Baird.

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-BASEMAP-CURRENT.DWG
Date Plotted: 9/17/2024 1:17:24 PM

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-BASEMAP-CURRENT.DWG
Date Plotted: 9/17/2024 1:17:26 PM



ALGONQUIN ISLAND - SOUTH END CONCEPT 3: WYANDOT AVENUE FLOOD WALL

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.



ALGONQUIN ISLAND - NORTHWEST SHORELINE CONCEPT 1: STEEL SHEET PILE WALL

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-BASEMAP-CURRENT.DWG
Date Plotted: 9/17/2024 1:17:29 PM

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-BASEMAP-CURRENT.DWG
Date Plotted: 9/17/2024 1:17:31 PM



ALGONQUIN ISLAND - NORTHWEST SHORELINE CONCEPT 2: IMPERMEABLE BERM WITH ARMOUR STONE REVETMENT

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.



ALGONQUIN ISLAND - NORTHWEST SHORELINE CONCEPT 2: IMPERMEABLE BERM WITH STACKED STONE REVETMENT

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-BASEMAP-CURRENT.DWG
Date Plotted: 9/17/2024 1:17:34 PM



ALGONQUIN ISLAND - NORTHWEST SHORELINE CONCEPT 3: IMPERMEABLE BERM AND NEARSHORE HABITAT

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-BASEMAP-CURRENT.DWG
Date Plotted: 9/17/2024 1:17:37 PM



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-BASEMAP-CURRENT.DWG

Date Plotted: 9/17/2024 1:17:39 PM

ALGONQUIN ISLAND - QUEEN CITY YACHT CLUB CONCEPT 1: STEEL SHEET PILE WALL

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-BASEMAP-CURRENT.DWG

Date Plotted: 9/17/2024 1:17:42 PM

ALGONQUIN ISLAND - QUEEN CITY YACHT CLUB CONCEPT 2: CONCRETE DOCK WALL

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-BASEMAP-CURRENT.DWG

Date Plotted: 9/17/2024 1:17:44 PM

ALGONQUIN ISLAND - QUEEN CITY YACHT CLUB CONCEPT 3: FLOOD WALL

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-BASEMAP-CURRENT.DWG

Date Plotted: 9/17/2024 1:17:47 PM

ALGONQUIN ISLAND - QUEEN CITY YACHT CLUB CONCEPT 4: LAND RAISING AND RAISED WALKWAY

TORONTO ISLANDS CONCEPT DESIGN

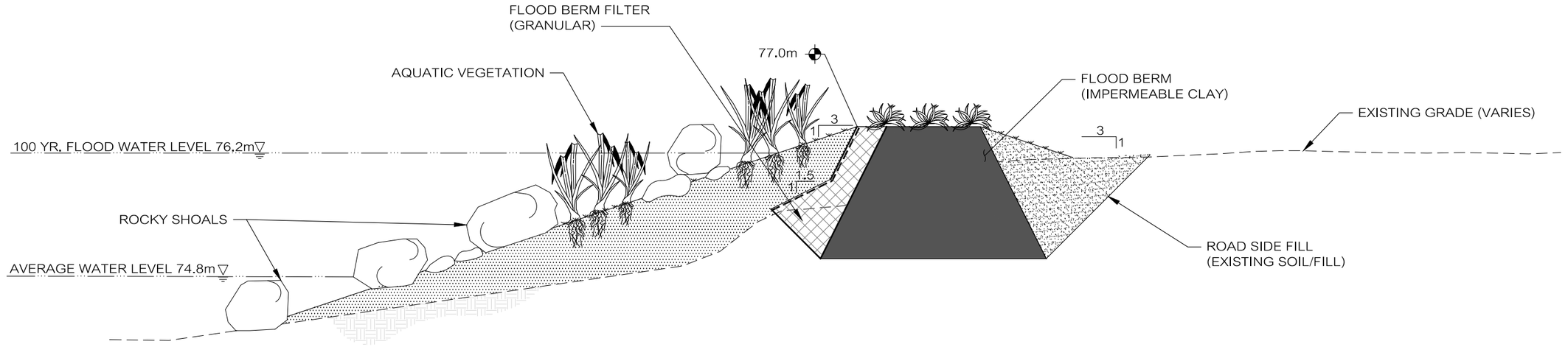
0 25 50 100
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2023-02-21

Baird.



A1A SECTION - BERM WITH 3:1 SLOPES AT SHORELINE

Date Plotted: 9/17/2024 1:18:02 PM
\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG

TYPICAL SECTIONS - ALGONQUIN ISLAND

TORONTO ISLANDS CONCEPT DESIGN

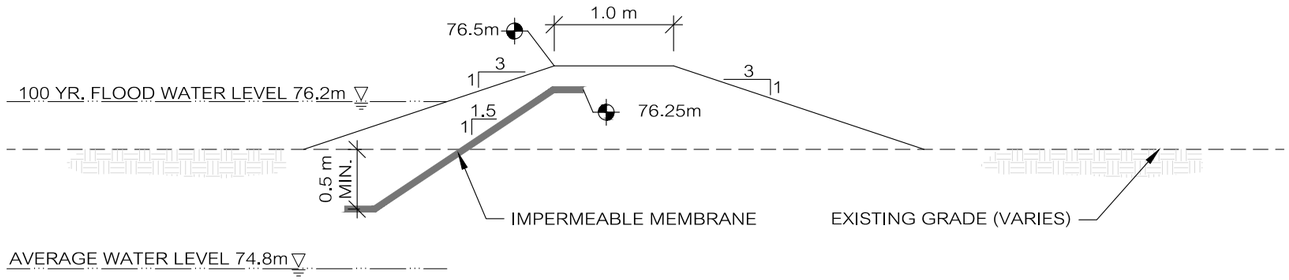
0 .5 1 2
GRAPHIC SCALE METRES

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



A1B SECTION - BERM WITH 3:1 SLOPES

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG
Date Plotted: 9/17/2024 1:18:02 PM

TYPICAL SECTIONS - ALGONQUIN ISLAND

TORONTO ISLANDS CONCEPT DESIGN

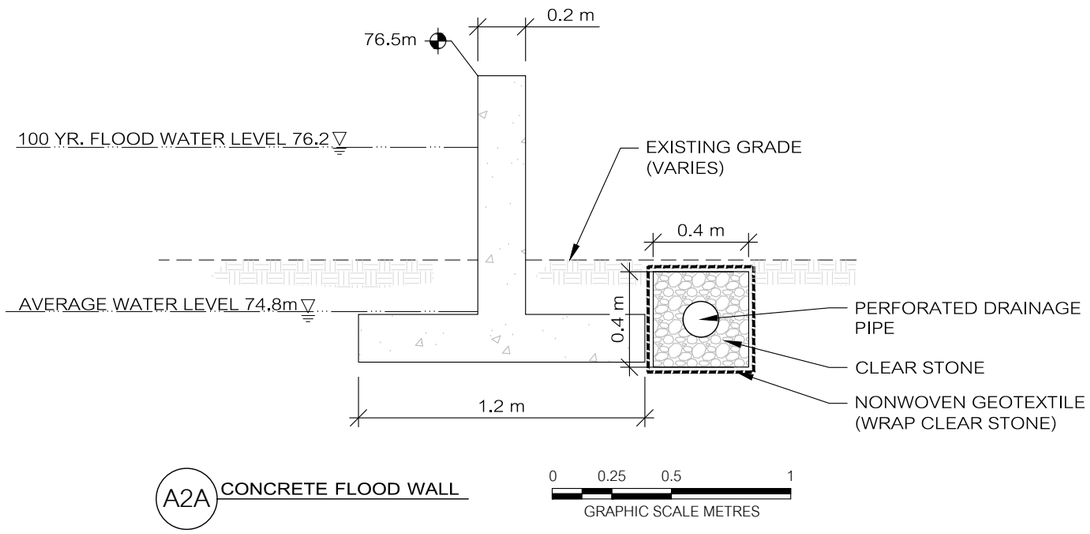
0 0.5 1 2
GRAPHIC SCALE METRES

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



A2A CONCRETE FLOOD WALL

0 0.25 0.5 1
GRAPHIC SCALE METRES

Date Plotted: 9/17/2024 1:18:03 PM
\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG

TYPICAL SECTIONS - ALGONQUIN ISLAND

TORONTO ISLANDS CONCEPT DESIGN

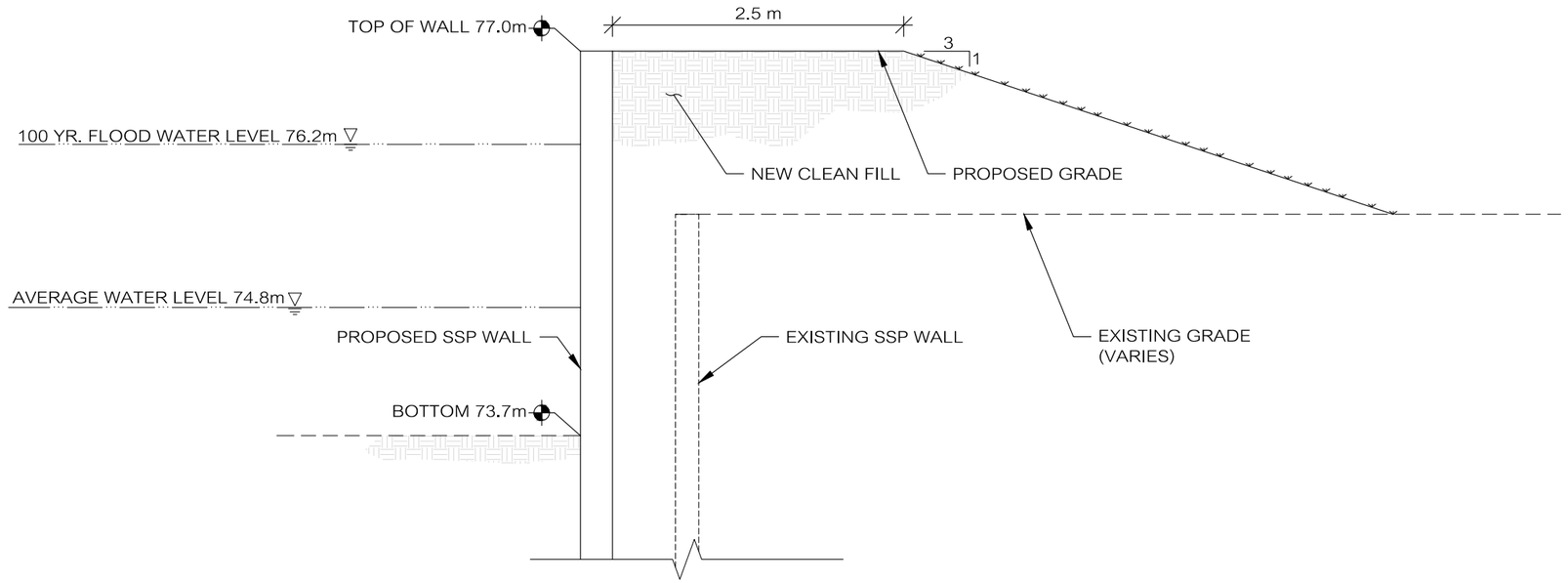
0 0.5 1 2
GRAPHIC SCALE METRES

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



N1A SECTION - NEW SSP SEAWALL

TYPICAL SECTIONS - ALGONQUIN ISLAND

TORONTO ISLANDS CONCEPT DESIGN

0 0.5 1 2
GRAPHIC SCALE METRES

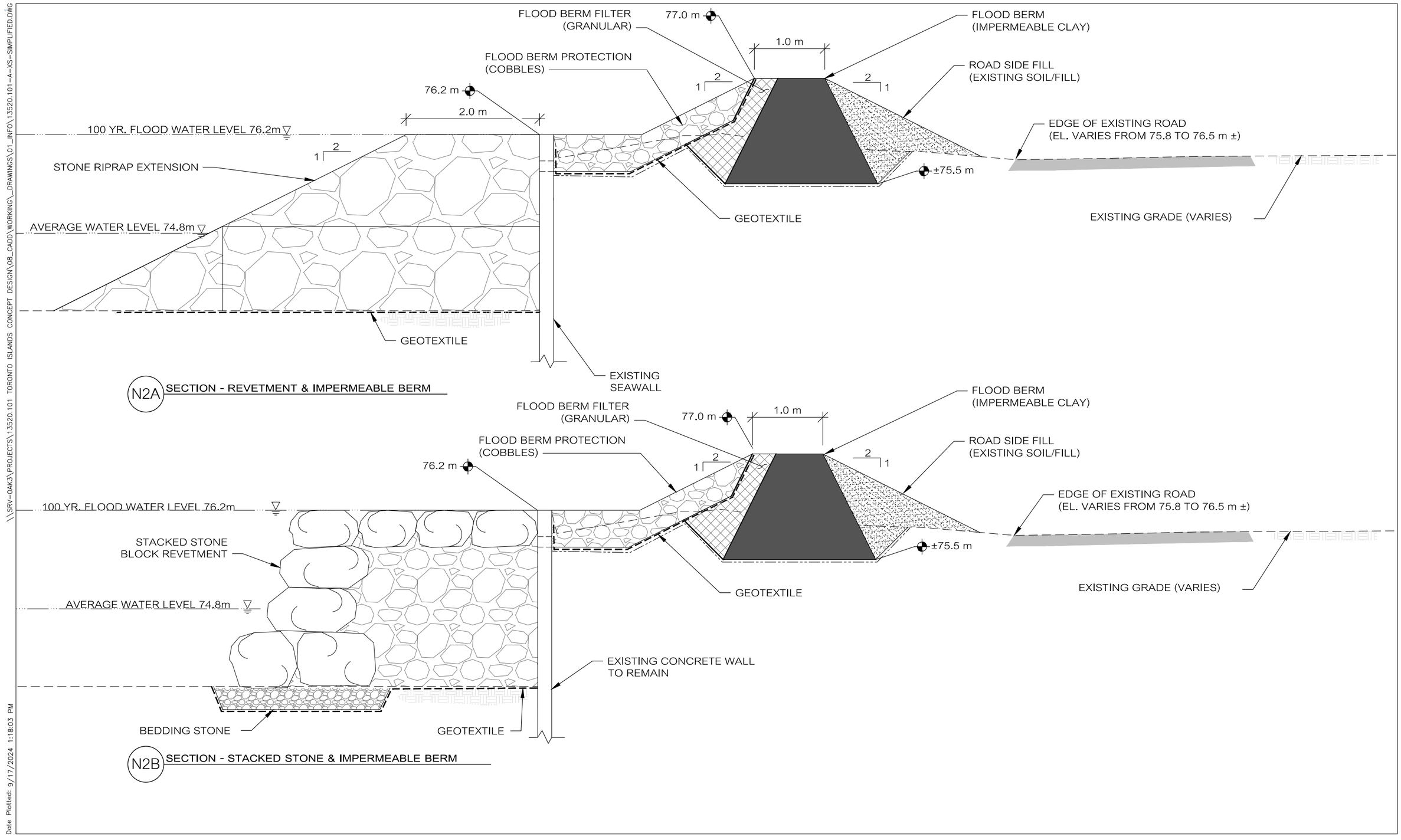
Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority

Date Plotted: 9/17/2024 1:18:03 PM
\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG

Date Plotted: 9/17/2024 1:18:03 PM

TYPICAL SECTIONS - ALGONQUIN ISLAND

TORONTO ISLANDS CONCEPT DESIGN

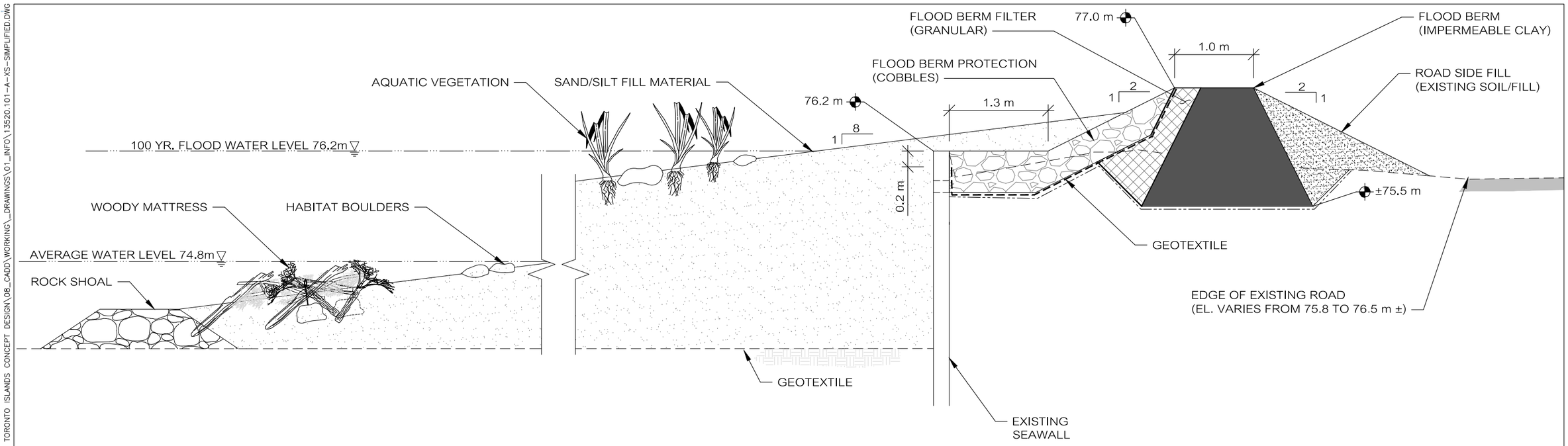
0 0.5 1 2
GRAPHIC SCALE METRES

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



N3A SECTION - VEGETATED BERM AND HABITAT SHORELINE

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG
Date Plotted: 9/17/2024 1:18:04 PM

TYPICAL SECTIONS - ALGONQUIN ISLAND

TORONTO ISLANDS CONCEPT DESIGN

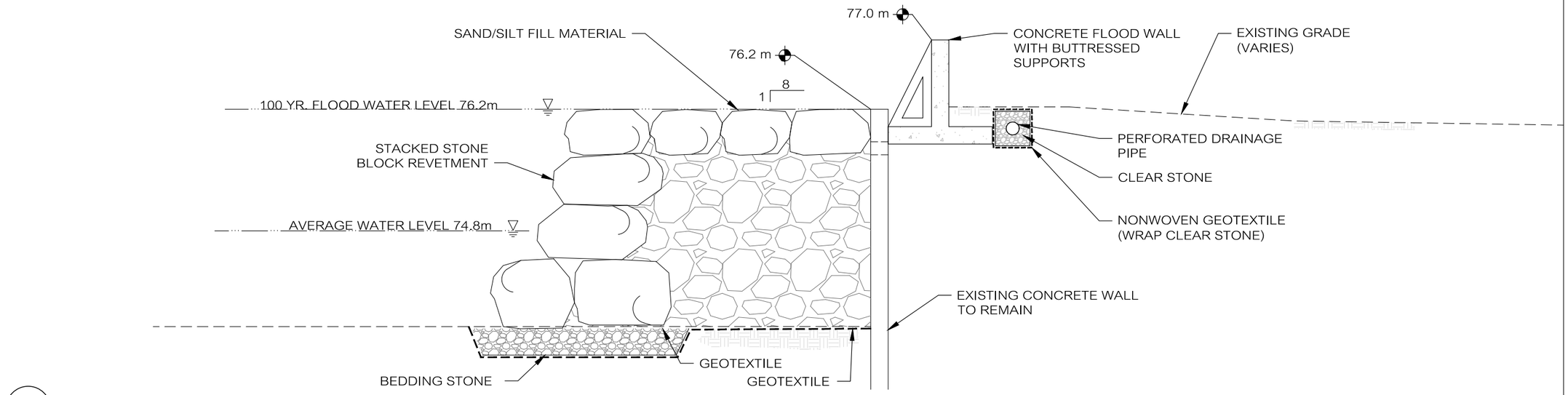
0 0.5 1 2
GRAPHIC SCALE METRES

Project Number: 13520.101

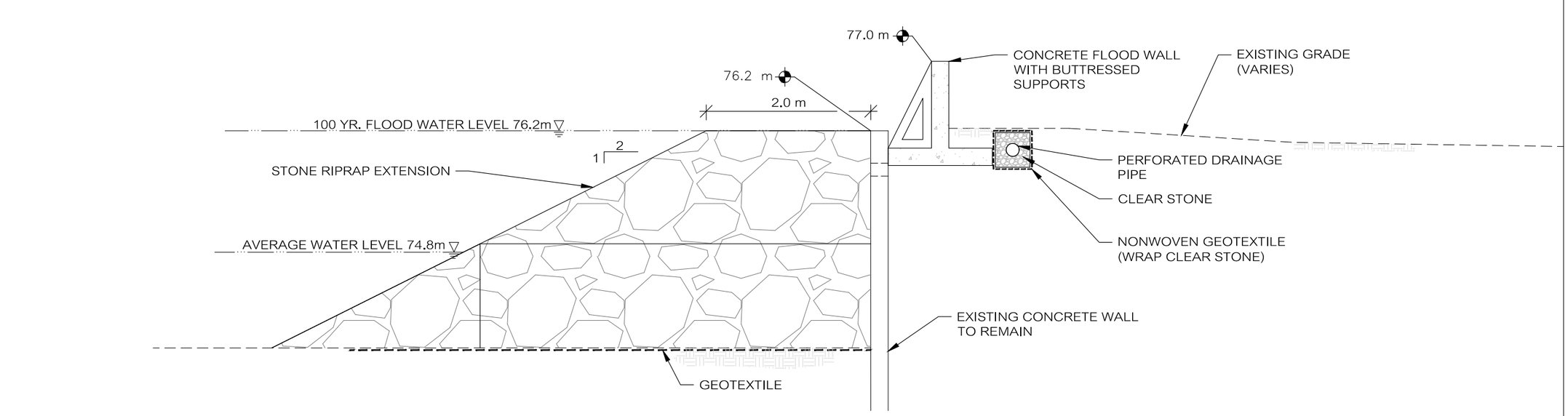
Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



N3B SECTION - BUTTRESSED FLOOD WALL WITH STACKED STONE



N3C SECTION - BUTTRESSED FLOOD WALL WITH ARMOUR STONE REVETMENT

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG

Date Plotted: 9/17/2024 1:18:04 PM

TYPICAL SECTIONS - ALGONQUIN ISLAND

TORONTO ISLANDS CONCEPT DESIGN

0 0.5 1 2
GRAPHIC SCALE METRES

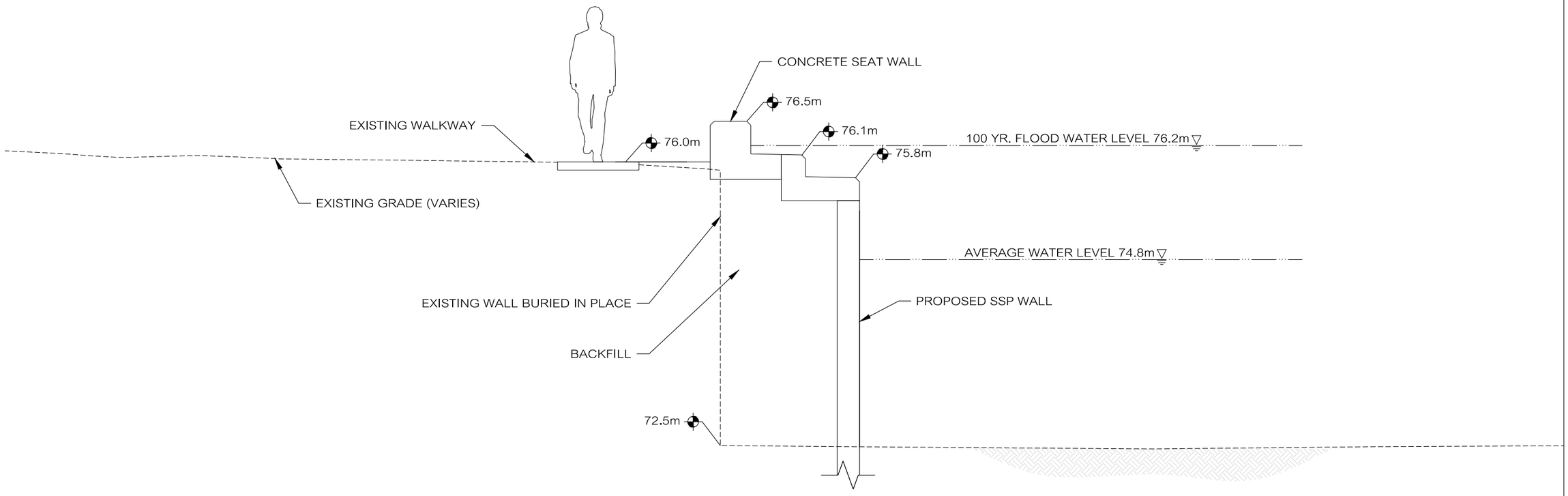
Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG
Date Plotted: 9/17/2024 1:18:05 PM



Q2A SECTION - CONCRETE SEATWALL TERRACE AND SSP WALL

TYPICAL SECTIONS - ALGONQUIN ISLAND

TORONTO ISLANDS CONCEPT DESIGN

0 0.5 1 2
GRAPHIC SCALE METRES

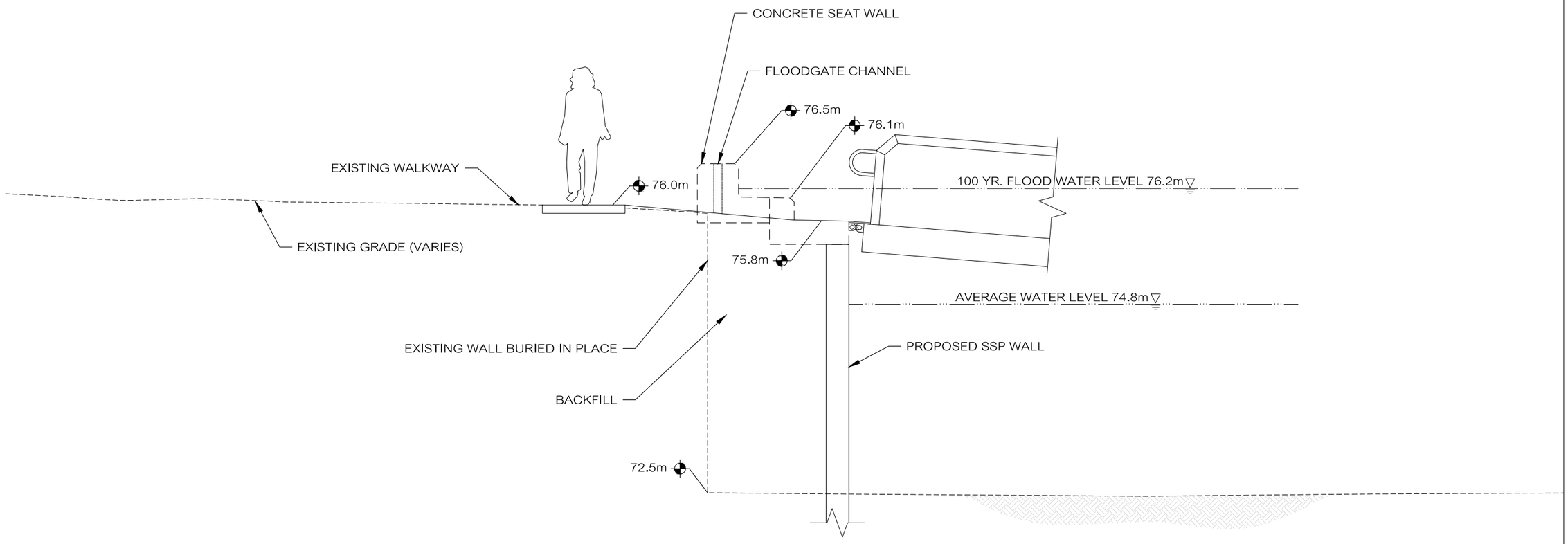
Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG
Date Plotted: 9/17/2024 1:18:05 PM



Q2B SECTION - CONCRETE SEATWALL GANGWAY CONNECTION

TYPICAL SECTIONS - ALGONQUIN ISLAND

TORONTO ISLANDS CONCEPT DESIGN

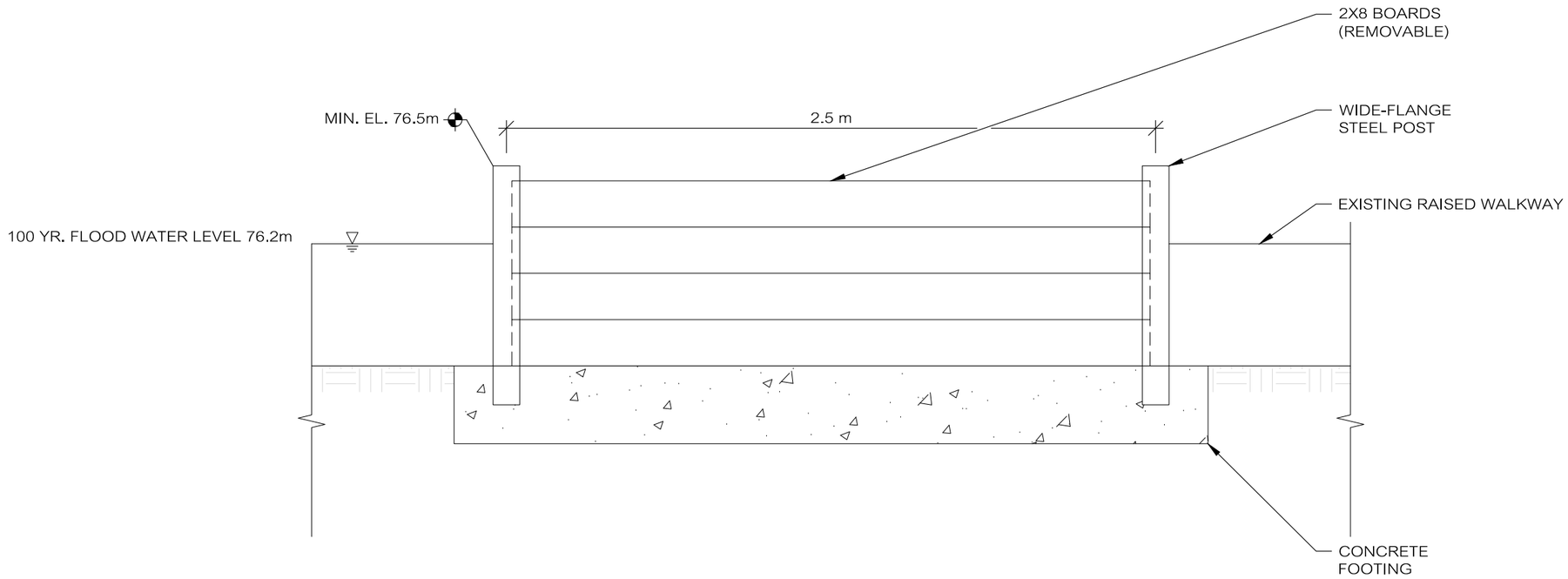
0 0.5 1 2
GRAPHIC SCALE METRES

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



Q4A SECTION - MODULAR FLOOD GATE

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG

Date Plotted: 9/17/2024 1:18:05 PM

TYPICAL SECTIONS - ALGONQUIN ISLAND QCYC

TORONTO ISLANDS CONCEPT DESIGN

0 0.25 0.5 1

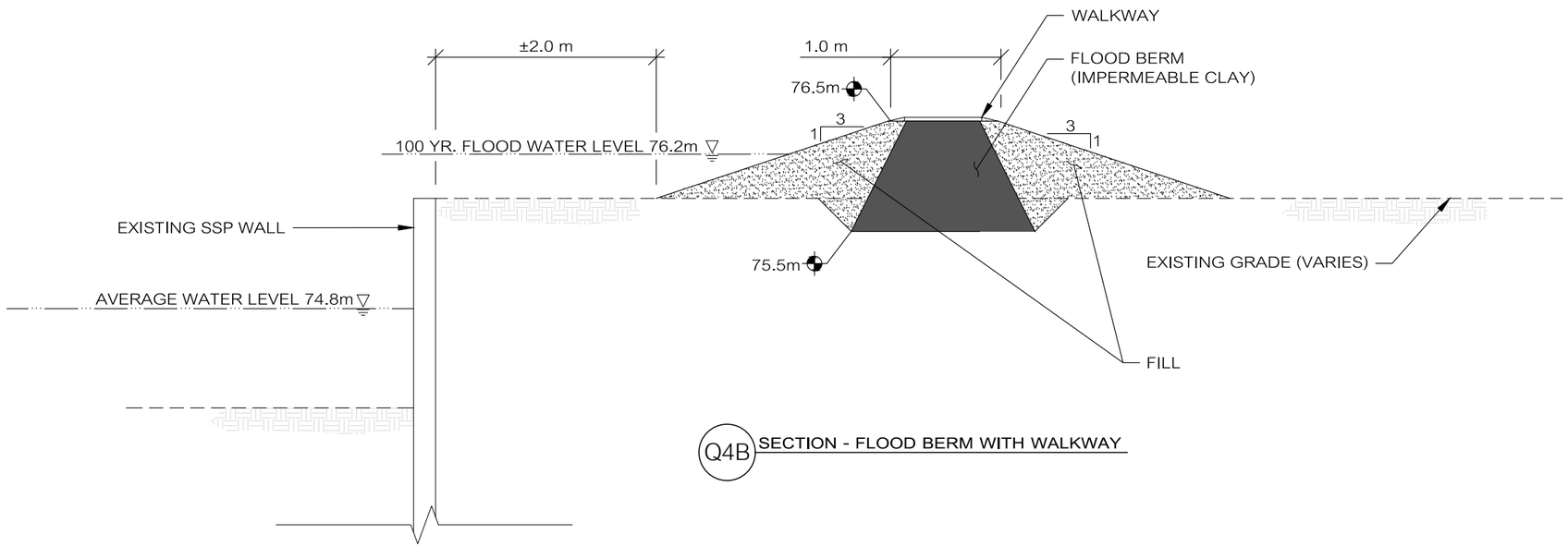
GRAPHIC SCALE METRES

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



Q4B SECTION - FLOOD BERM WITH WALKWAY

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG
Date Plotted: 9/23/2024 11:36:57 AM

TYPICAL SECTIONS - ALGONQUIN ISLAND

TORONTO ISLANDS CONCEPT DESIGN

0 0.5 1 2
GRAPHIC SCALE METRES

Project Number: 13520.101

Date: 2023-02-21

Baird.

Toronto and Region Conservation Authority



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-BASEMAP-CURRENT.DWG

Date Plotted: 9/17/2024 1:18:07 PM

CENTRE ISLAND - TORONTO ISLAND MARINA CONCEPT 1: LAND AND ROAD RAISING

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-BASEMAP-CURRENT.DWG

Date Plotted: 9/17/2024 1:18:08 PM

CENTRE ISLAND - TORONTO ISLAND MARINA CONCEPT 2A: STEEL SHEET PILE WALL AND INLAND FLOOD BERM

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-BASEMAP-CURRENT.DWG

Date Plotted: 9/17/2024 1:18:09 PM

CENTRE ISLAND - TORONTO ISLAND MARINA CONCEPT 2B: STEEL SHEET PILE WALL AND SHORELINE FLOOD BERM

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-BASEMAP-CURRENT.DWG

Date Plotted: 9/17/2024 1:18:10 PM

CENTRE ISLAND - TORONTO ISLAND MARINA CONCEPT 3: STEEL SHEET PILE DOCK WALLS AND SHORELINE FLOOD BERM

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-BASEMAP-CURRENT.DWG
Date Plotted: 9/17/2024 1:18:11 PM

BERM WITH 3:1 SLOPES AT SHORELINE CREST (77.0 m)

BERM TOE (VARIES)

C2C

BERM TOE (VARIES)

TRANSITION

C2B

INLAND BERM CREST (76.5 m)

RIPRAP BERM CREST (76.5 m)

RIPRAP BERM TOE (VARIES)

C2D

RAISE ROADWAYS/PATHWAYS

RAISE GRADE WITHIN MARINA YARD TO EL. 76.3m (MIN.)

REFER TO FERRY TERMINAL CONCEPTS

LEGEND

- RAISED ROAD
- ADDITIONAL ROADWAY RAISING FOR ROADWAYS STUDY AREA
- BERM
- RAISE GRADE
- RIPRAP STONE

CENTRE ISLAND - TORONTO ISLAND MARINA CONCEPT 4: LAND RAISING AND SHORELINE FLOOD BERM

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-BASEMAP-CURRENT.DWG
Date Plotted: 9/17/2024 1:18:12 PM



CENTRE ISLAND - FERRY TERMINAL CONCEPT 1: STEEL SHEET PILE WALL

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.

REFER TO
TORONTO ISLAND
MARINA CONCEPT

CONCRETE
TERRACE
(77m)

SSP WALL WITH
CONCRETE TERRACE
(75.7m)

F2B

STACKED STONE WALL
(77m)

BERM TOE
(VARIES)

F2A

BERM
CREST
(77m)

REFER TO
CENTREVILLE
CONCEPT

LEGEND

- ADDITIONAL ROADWAY RAISING FOR ROADWAYS STUDY AREA
- BERM
- SSP SEAWALL
- STACKED STONE
- CONCRETE TERRACE

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-BASEMAP-CURRENT.DWG

Date Plotted: 9/17/2024 1:18:13 PM

CENTRE ISLAND - FERRY TERMINAL CONCEPT 2: STACKED/STEPPED WALL

TORONTO ISLANDS CONCEPT DESIGN

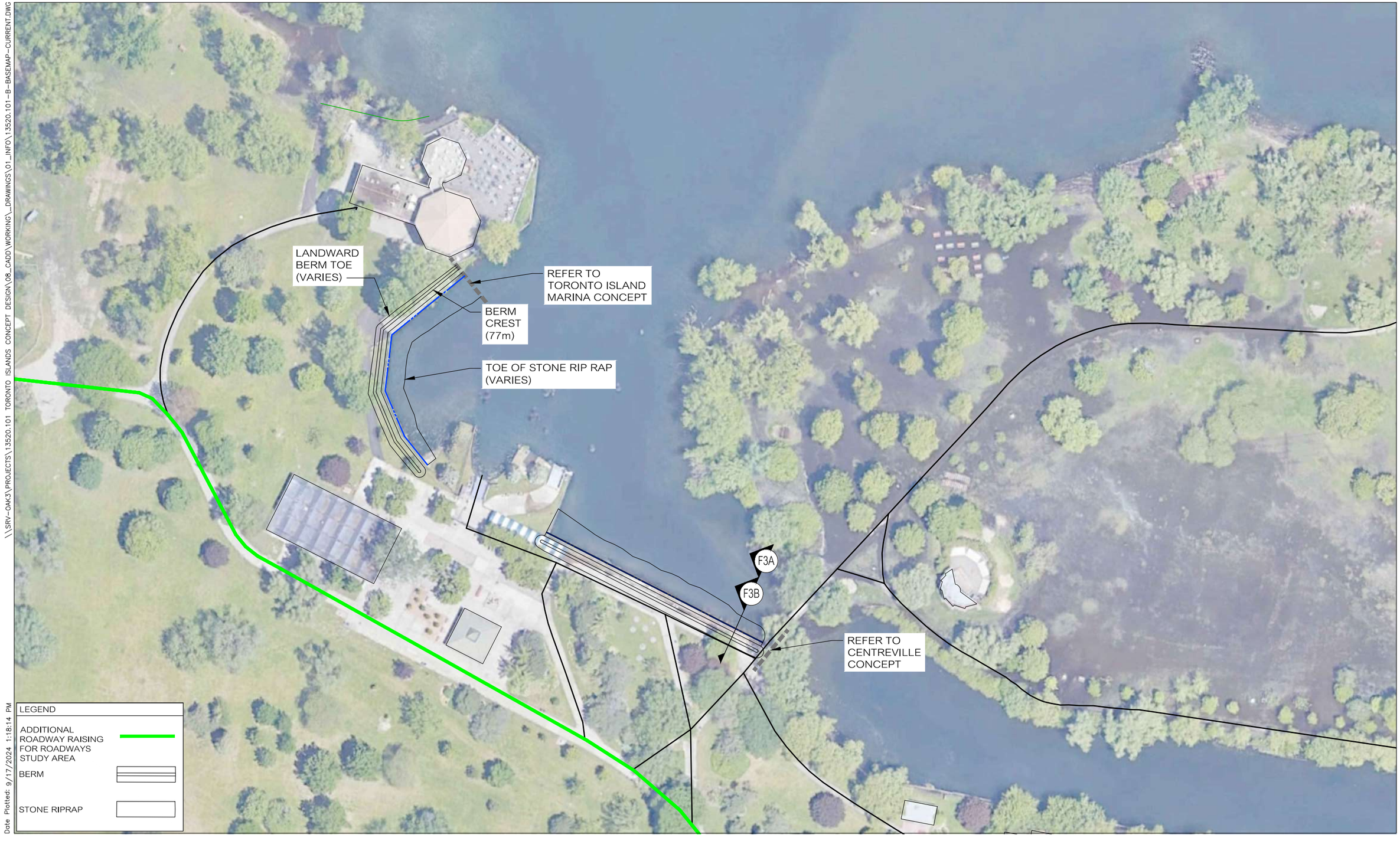
0 25 50 100
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-BASEMAP-CURRENT.DWG

Date Plotted: 9/17/2024 1:18:14 PM

CENTRE ISLAND - FERRY TERMINAL CONCEPT 3: FLOOD BERM AND REVETMENT

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-BASEMAP-CURRENT.DWG
Date Plotted: 9/17/2024 1:18:15 PM

REFER TO FERRY TERMINAL CONCEPT

C1B

NEW SSP WALL (76.5m)

NEW SSP WALL (76.5m)

RAISE ROAD (INCLUDED IN ROADWAYS STUDY AREA)

AVENUE OF THE ISLAND

RAISED ROAD

BERM TOE (VARIES)

BERM AT SHORELINE CREST (76.5 m)

C2E

RELOCATE EXISTING TRAIN TRACKS

RAISE BRIDGE TO MATCH ADJACENT SHORELINE GRADES

LEGEND

- SSP SEAWALL
- RAISED ROAD
- ADDITIONAL ROADWAY RAISING FOR ROADWAYS STUDY AREA
- BERM

CENTRE ISLAND - CENTREVILLE CONCEPT 1: STEEL SHEET PILE WALL

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-BASEMAP-CURRENT.DWG
Date Plotted: 9/17/2024 1:18:16 PM

REFER TO FERRY TERMINAL CONCEPT

C2E

BERM AT SHORELINE CREST (77.0 m)

BERM TOE (VARIES)

RELOCATE EXISTING TRAIN TRACK

C2E

BERM AT SHORELINE CREST (77.0 m)

BERM TOE (VARIES)

AVENUE OF THE ISLAND

RAISED ROAD

BERM TOE (VARIES)

BERM AT SHORELINE CREST (77.0 m)

C2E

RAISE BRIDGE TO MATCH ADJACENT SHORELINE GRADES

LEGEND

- BERM
- RAISED ROAD
- ADDITIONAL ROADWAY RAISING FOR ROADWAYS STUDY AREA

CENTRE ISLAND - CENTREVILLE CONCEPT 2: NATURALIZED SHORELINE AND FLOOD BERM

TORONTO ISLANDS CONCEPT DESIGN

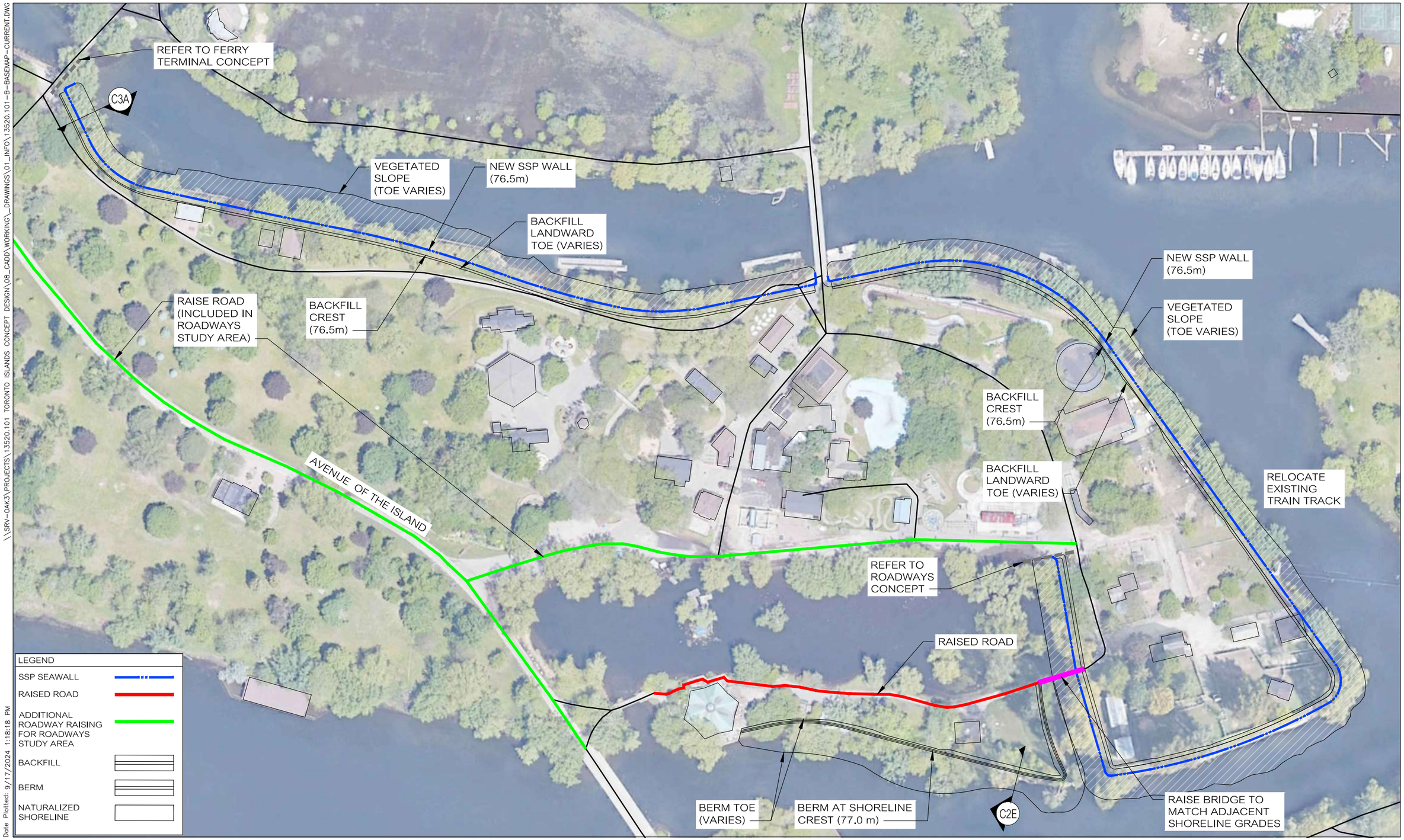
0 25 50 100
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-BASEMAP-CURRENT.DWG

Date Plotted: 9/17/2024 1:18:18 PM

CENTRE ISLAND - CENTREVILLE CONCEPT 3: BURIED STEEL SHEET PILE WALL AND NATURALIZED SHORELINE

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100
GRAPHIC SCALE METRES

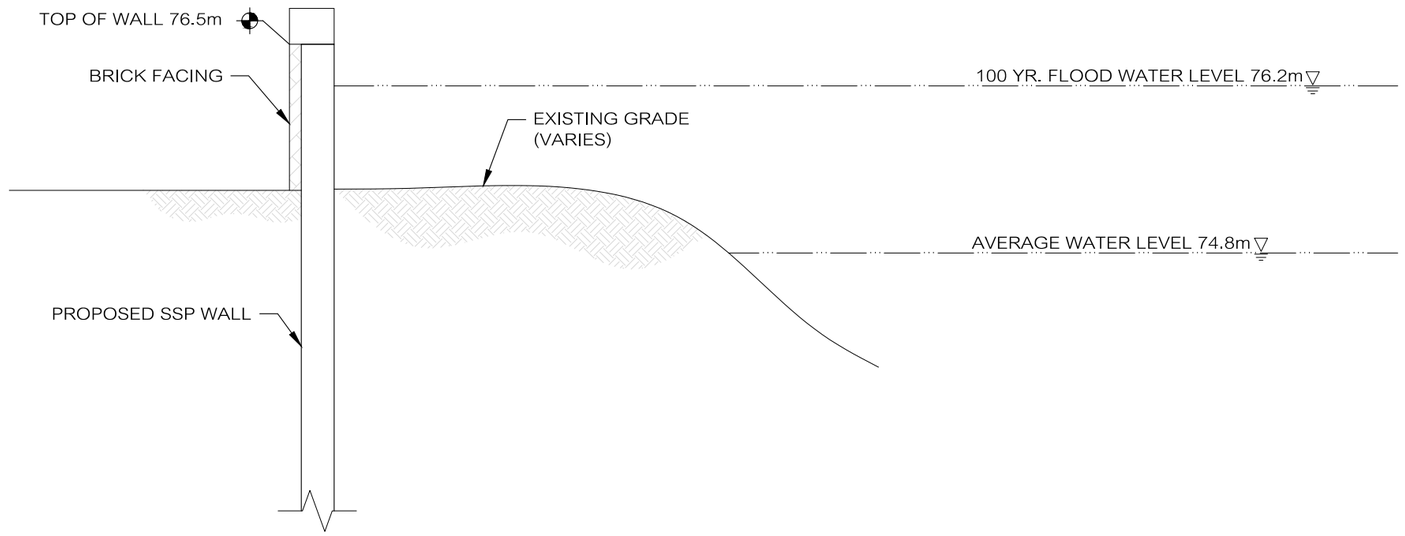
NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.

Date Plotted: 9/17/2024 1:18:26 PM \\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG



C1B SECTION - NEW SSP WALL

TYPICAL SECTIONS - CENTRE ISLAND

TORONTO ISLANDS CONCEPT DESIGN

0 0.5 1 2
GRAPHIC SCALE METRES

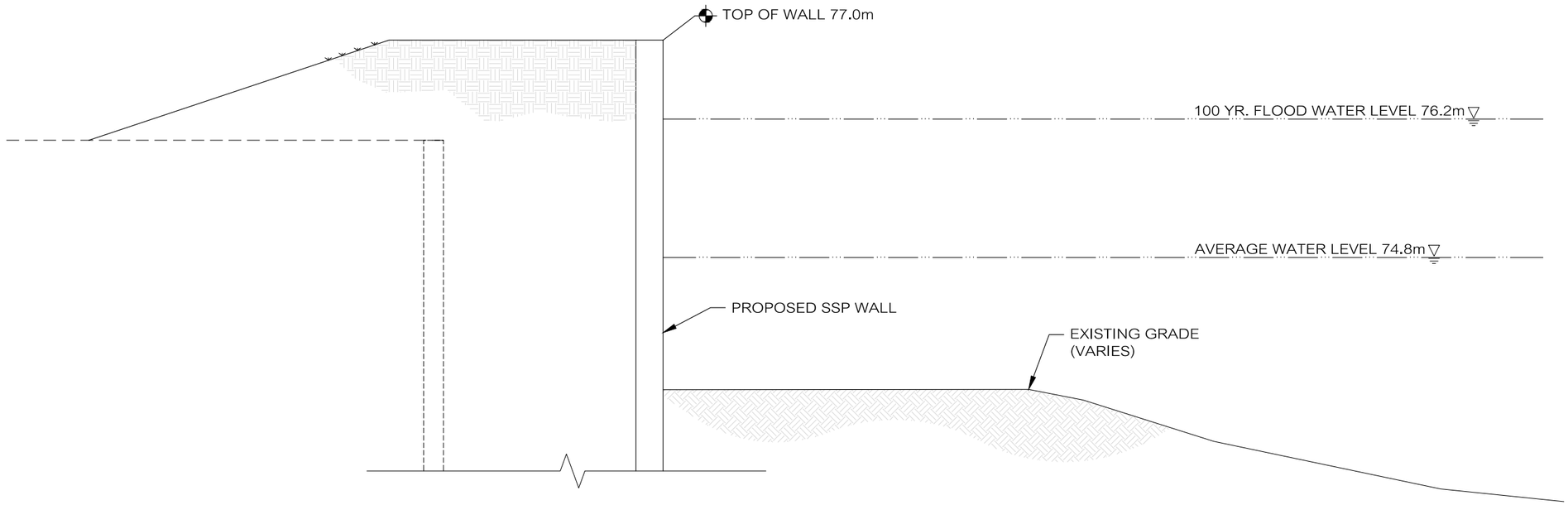
Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority

Date Plotted: 9/17/2024 1:18:26 PM \\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG



C2A SECTION - NEW SSP WALL W/ BACKFILL

TYPICAL SECTIONS - CENTRE ISLAND

TORONTO ISLANDS CONCEPT DESIGN

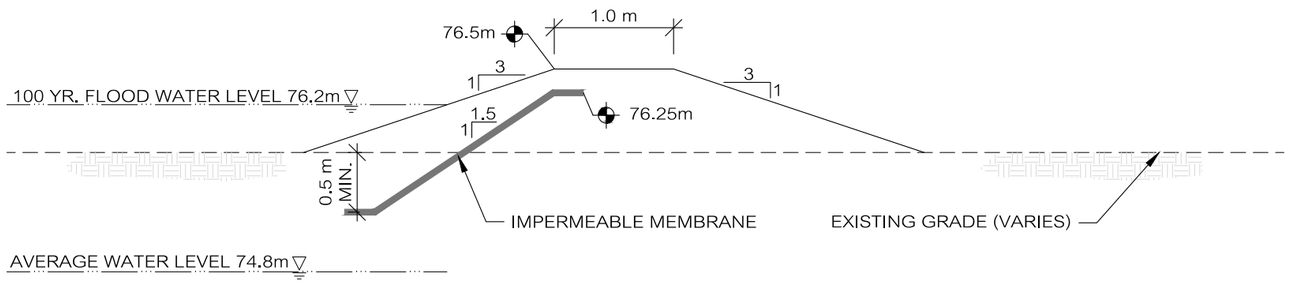
0 0.5 1 2
GRAPHIC SCALE METRES

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



C2B SECTION - BERM WITH 3:1 SLOPES

Date Plotted: 9/17/2024 1:18:26 PM
\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG

TYPICAL SECTIONS - CENTRE ISLAND

TORONTO ISLANDS CONCEPT DESIGN

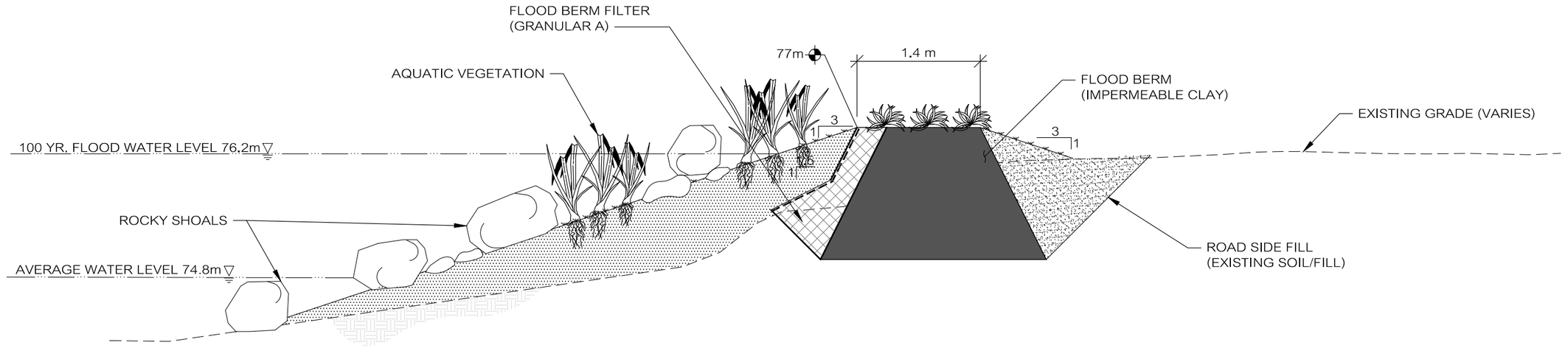
0 0.5 1 2
GRAPHIC SCALE METRES

Project Number: 13520.101

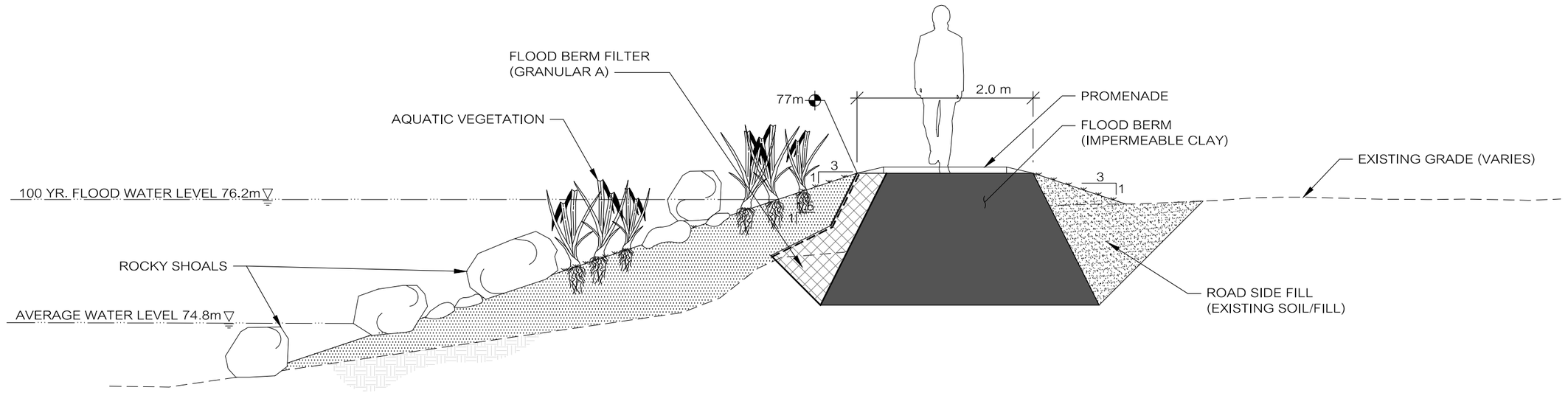
Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



C2C SECTION - VEGETATED BERM WITH 3:1 SLOPES AT SHORELINE



C2C2 SECTION - BERM 3:1 SLOPES AT SHORELINE AND PROMENADE

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG
Date Plotted: 9/17/2024 1:18:27 PM

TYPICAL SECTIONS - CENTRE ISLAND

TORONTO ISLANDS CONCEPT DESIGN

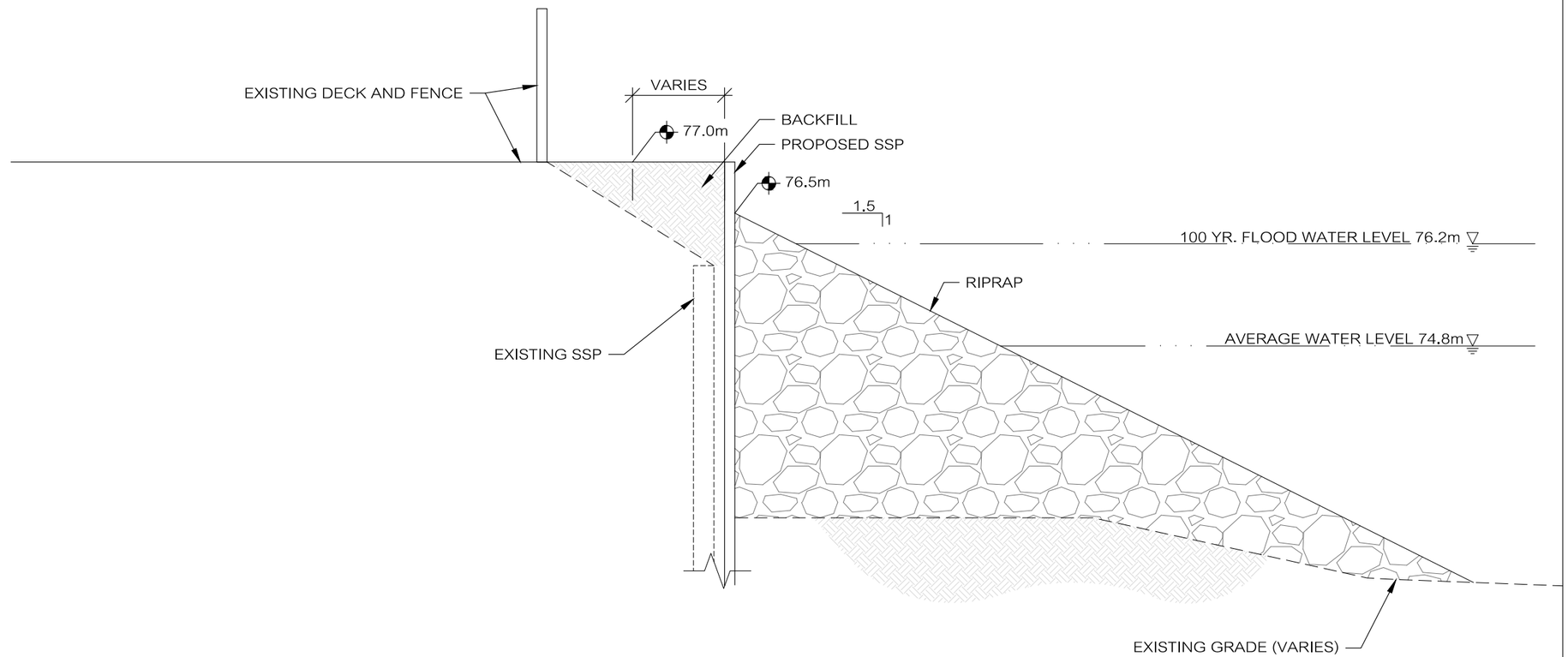
0 .5 1 2
GRAPHIC SCALE METRES

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



C2D SECTION - RIPRAP BERM

Date Plotted: 9/17/2024 1:18:27 PM
\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG

TYPICAL SECTIONS - CENTRE ISLAND

TORONTO ISLANDS CONCEPT DESIGN

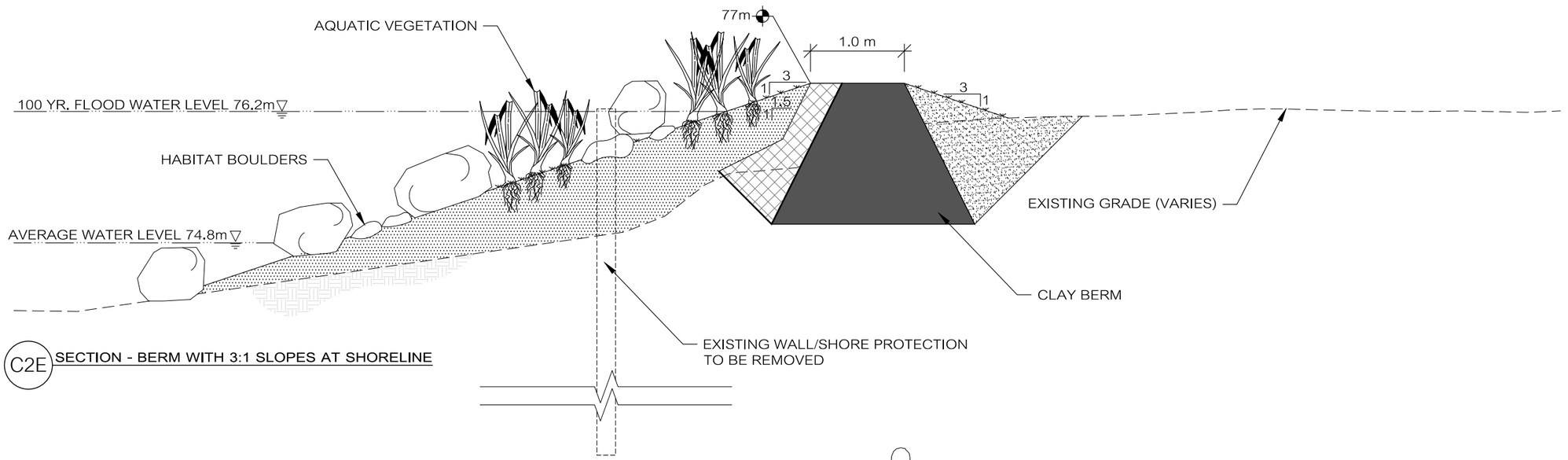
0 0.5 1 2
GRAPHIC SCALE METRES

Project Number: 13520.101

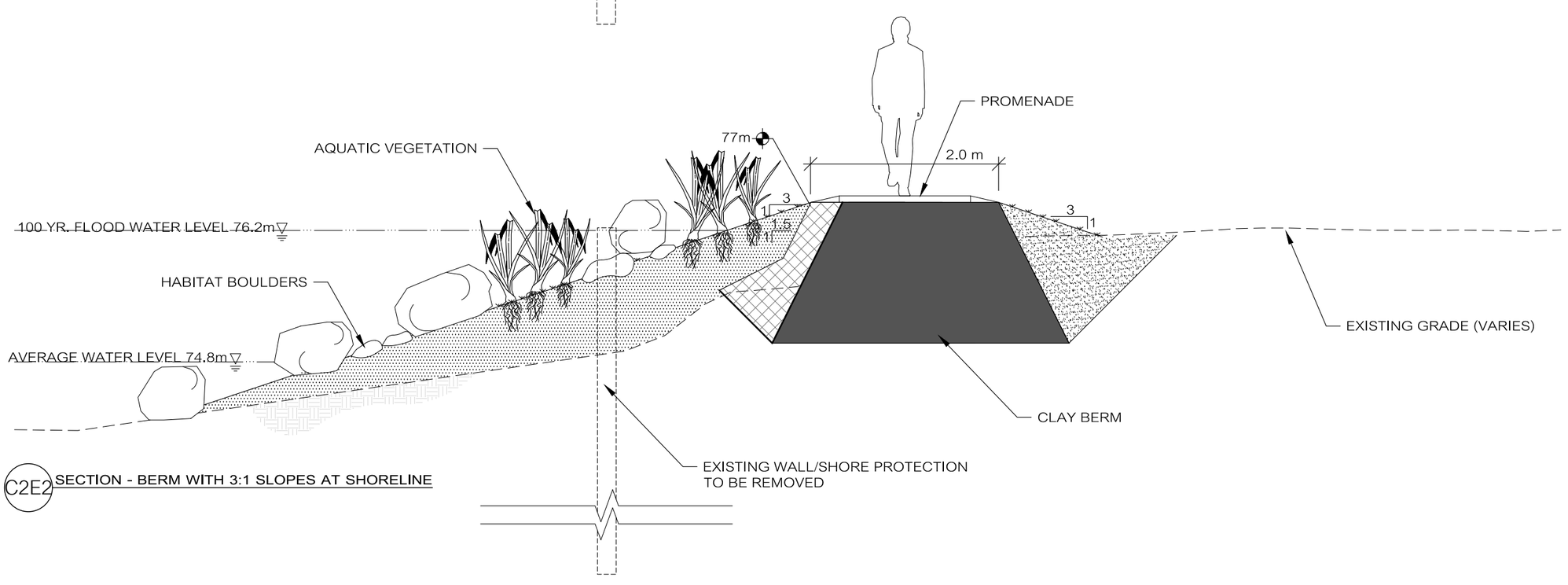
Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



C2E SECTION - BERM WITH 3:1 SLOPES AT SHORELINE



C2E2 SECTION - BERM WITH 3:1 SLOPES AT SHORELINE

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG

Date Plotted: 9/17/2024 1:18:28 PM

TYPICAL SECTIONS - CENTRE ISLAND

TORONTO ISLANDS CONCEPT DESIGN

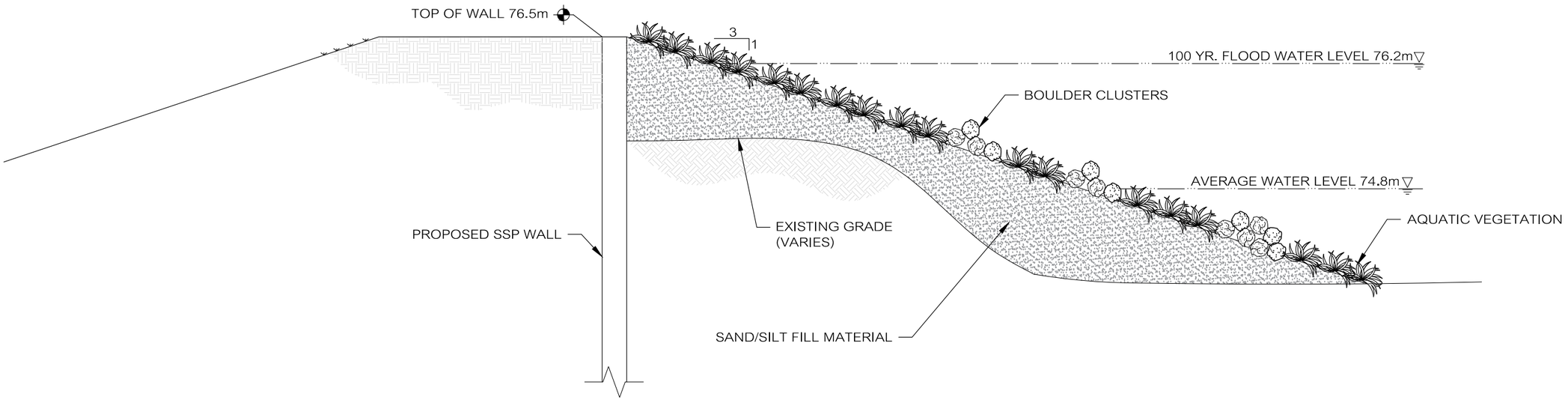
0 .5 1 2
GRAPHIC SCALE METRES

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



C3A SECTION - NEW SSP WALL W/ BACKFILL

TYPICAL SECTIONS - CENTRE ISLAND

TORONTO ISLANDS CONCEPT DESIGN

0 0.5 1 2
GRAPHIC SCALE METRES

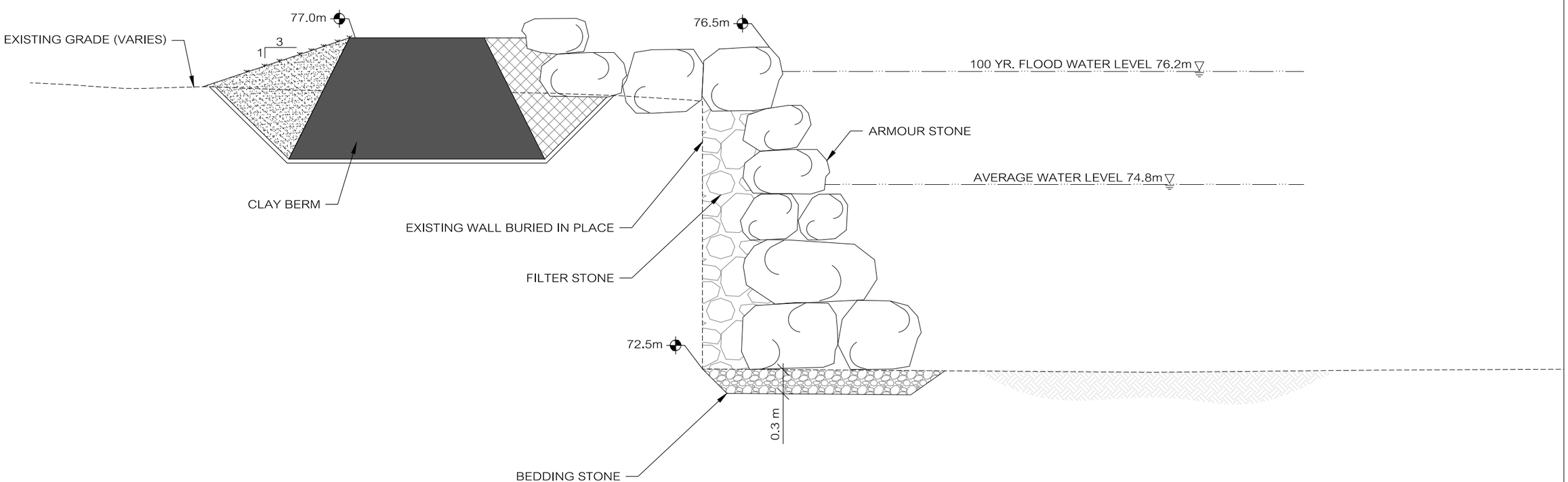
Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG
Date Plotted: 9/17/2024 1:18:28 PM



F2A SECTION - STACKED STONE WALL AND INLAND BERM

Date Plotted: 9/17/2024 1:18:28 PM
\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG

TYPICAL SECTIONS - CENTRE ISLAND

TORONTO ISLANDS CONCEPT DESIGN

0 0.5 1 2
GRAPHIC SCALE METRES

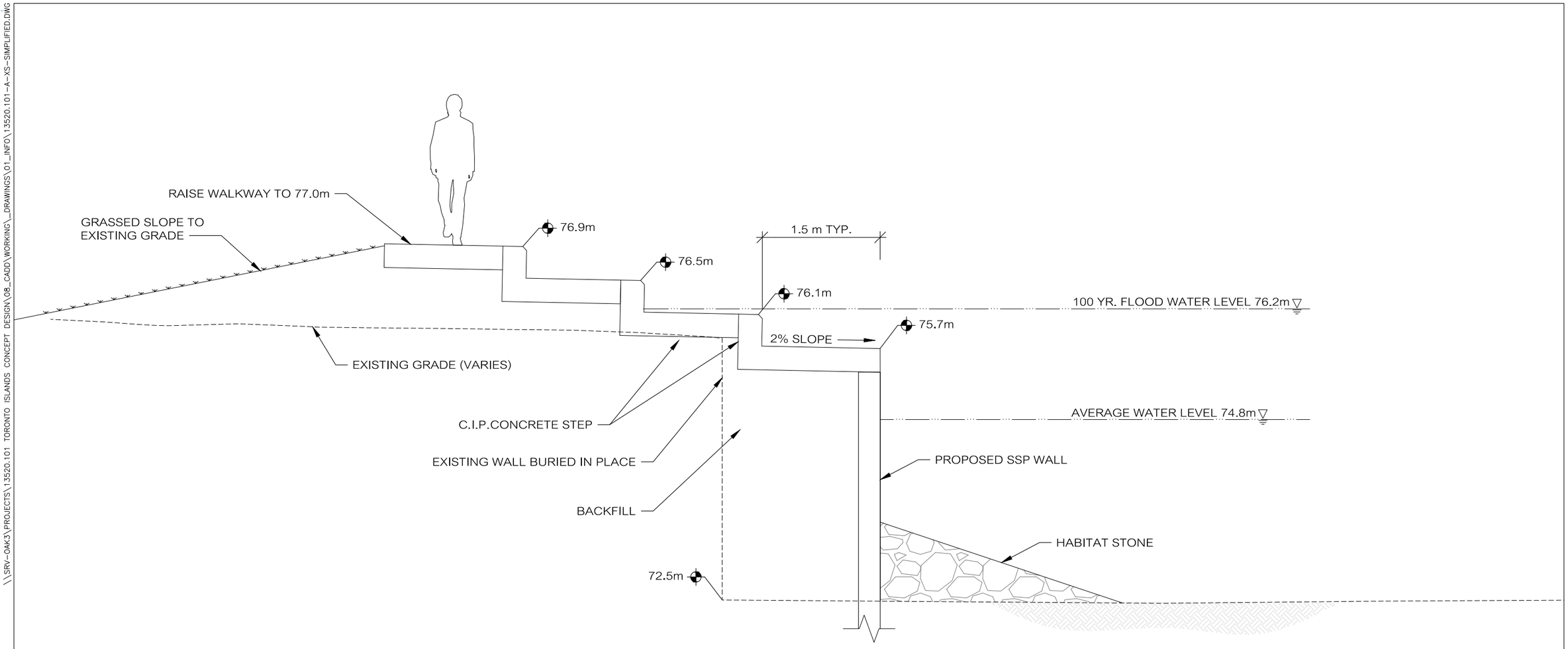
Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG
Date Plotted: 9/17/2024 1:18:29 PM



F2B SECTION - STEPPED CONCRETE TERRACE AND SSP WALL

TYPICAL SECTIONS - CENTRE ISLAND

TORONTO ISLANDS CONCEPT DESIGN

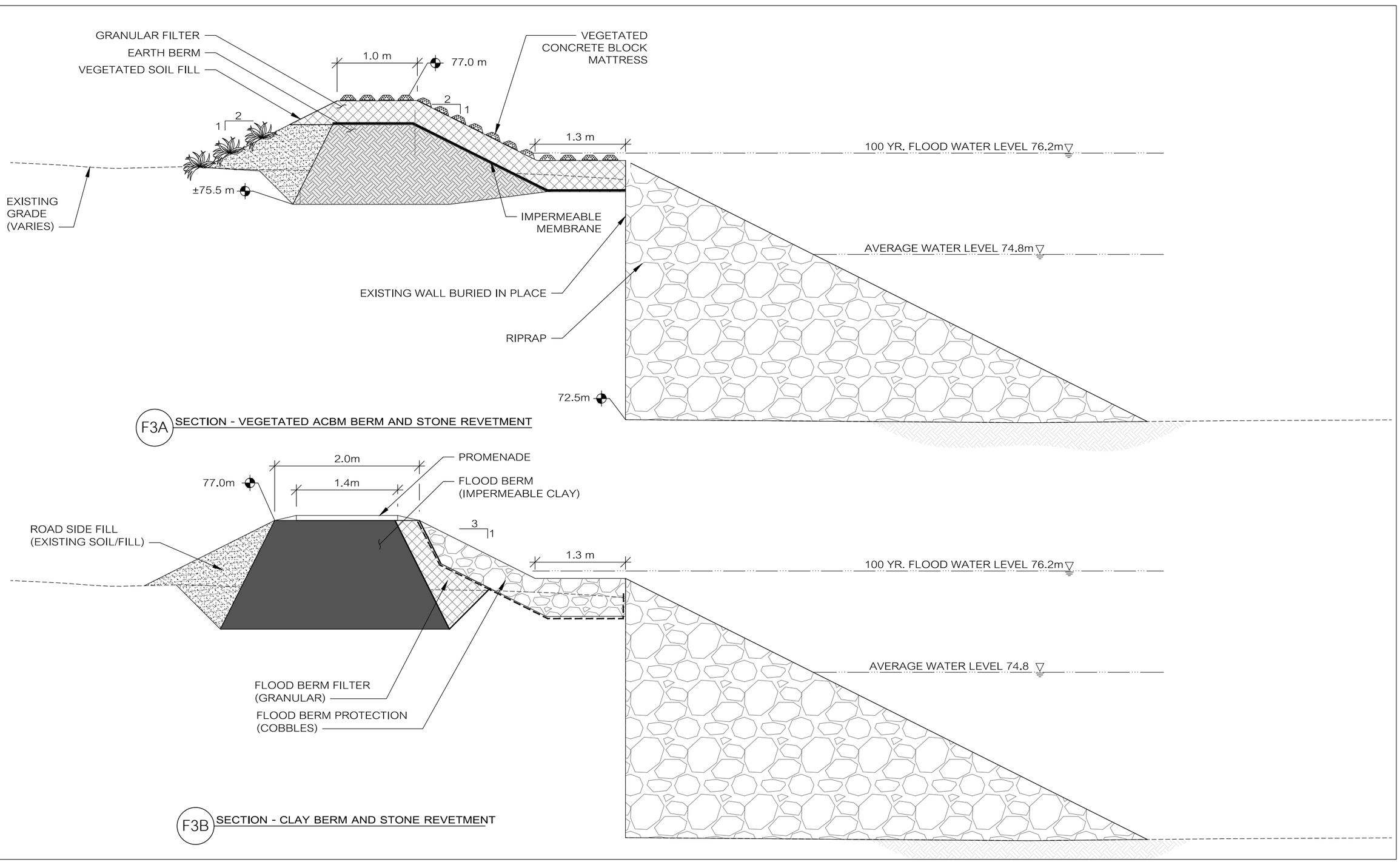
0 0.5 1 2
GRAPHIC SCALE METRES

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG

Date Plotted: 9/17/2024 1:18:29 PM

TYPICAL SECTIONS - CENTRE ISLAND

TORONTO ISLANDS CONCEPT DESIGN

0 0.5 1 2
GRAPHIC SCALE METRES

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-BASEMAP-CURRENT.DWG

Date Plotted: 9/17/2024 1:18:31 PM

GIBRALTAR POINT - STACKED ARMOUR STONE WALL CONCEPT

TORONTO ISLANDS CONCEPT DESIGN

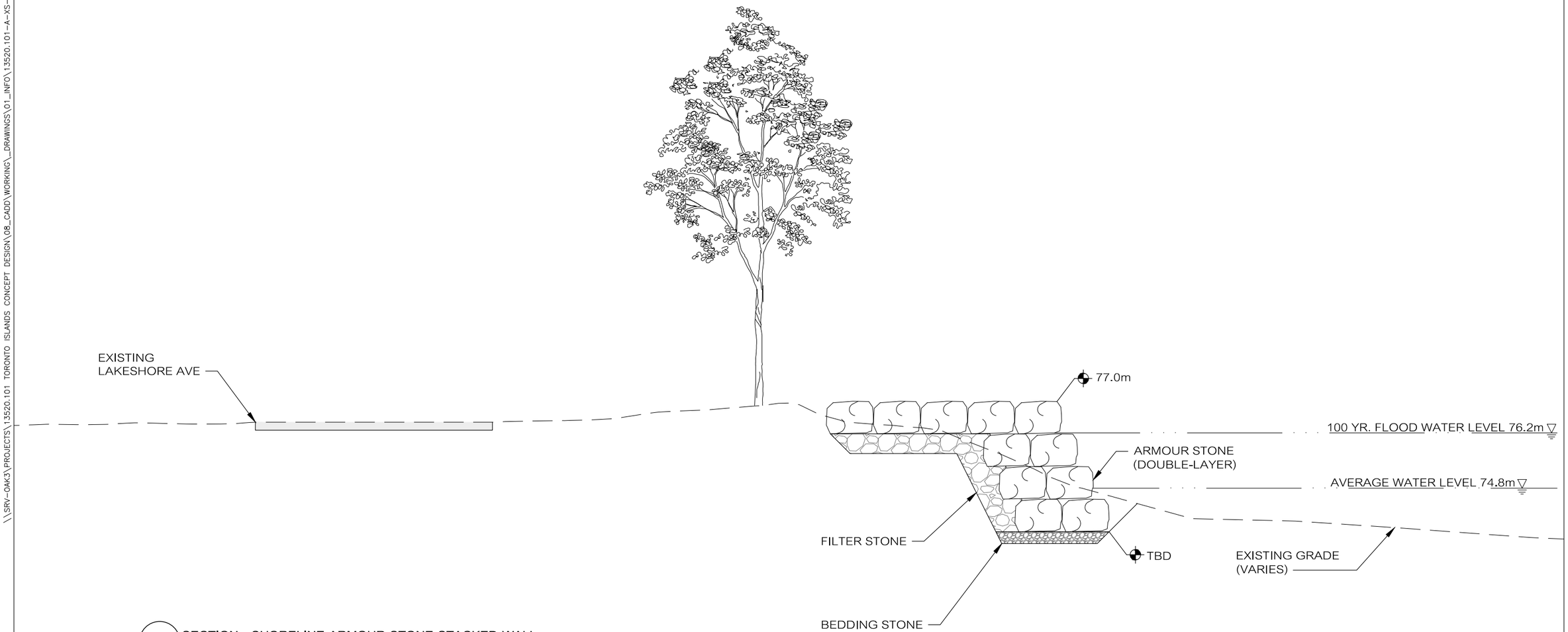
0 25 50 100
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.



G1A SECTION - SHORELINE ARMOUR STONE STACKED WALL

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG
Date Plotted: 9/17/2024 1:18:39 PM

TYPICAL SECTIONS - GIBRALTAR POINT

TORONTO ISLANDS CONCEPT DESIGN

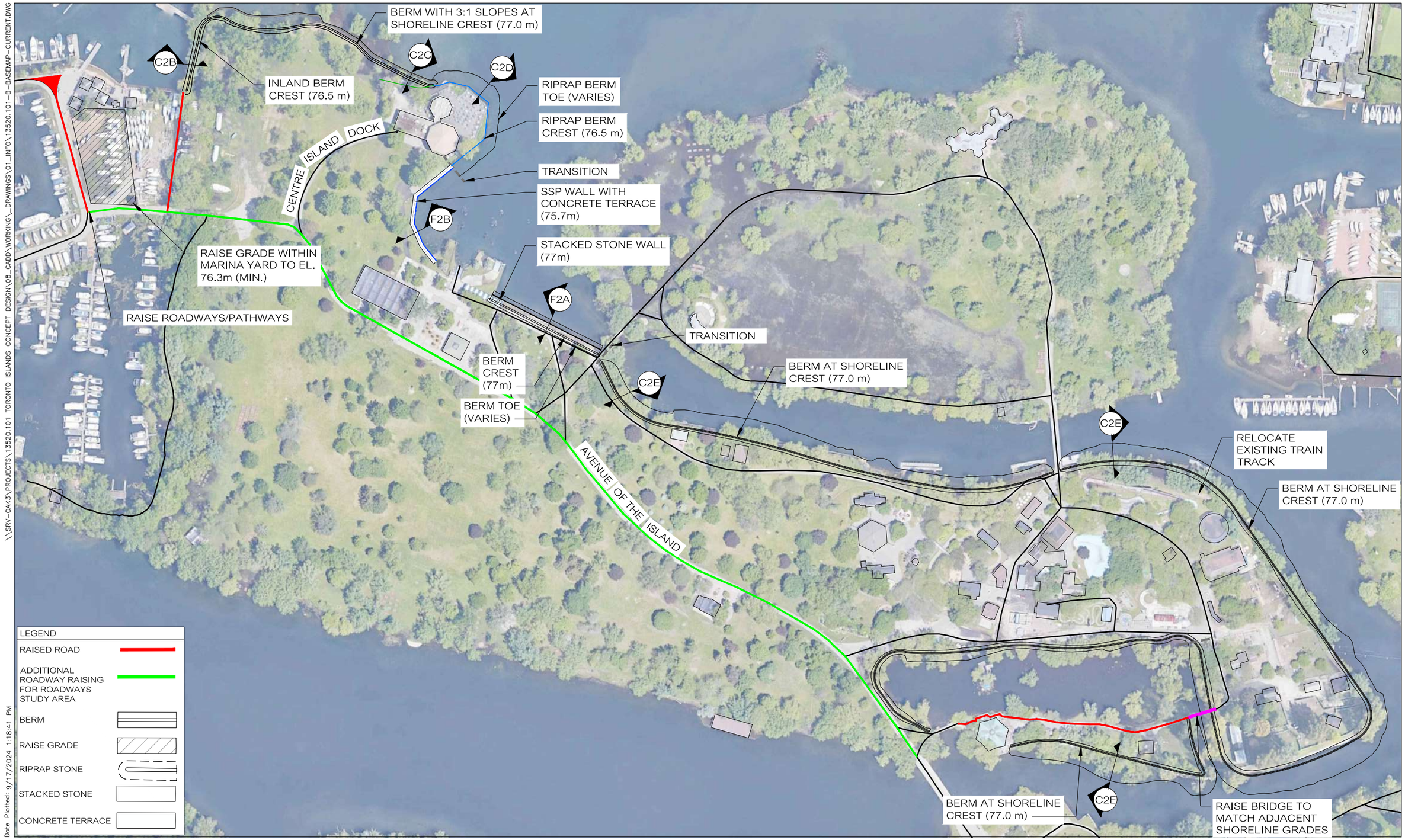
0 1 2 4
GRAPHIC SCALE METRES

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-BASEMAP-CURRENT.DWG

Date Plotted: 9/17/2024 1:18:41 PM

CENTRE ISLAND - OVERVIEW - PREFERRED ALTERNATIVES

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100

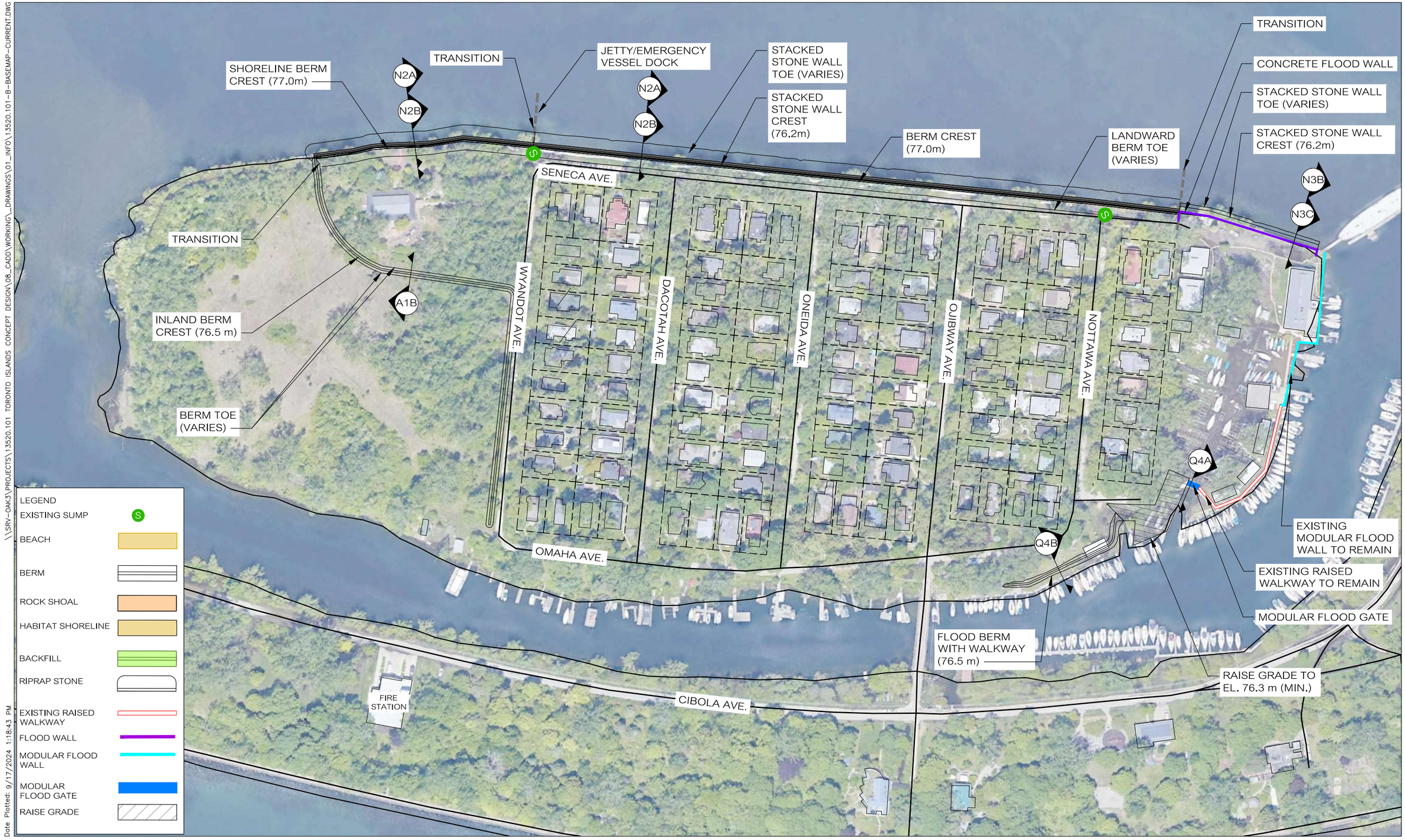
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-BASEMAP-CURRENT.DWG

Date Plotted: 9/17/2024 1:18:43 PM

ALGONQUIN ISLAND - OVERVIEW - PREFERRED ALTERNATIVES

TORONTO ISLANDS CONCEPT DESIGN

0 20 40 80

GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2023-02-21

Baird.

Appendix C

KWA Road Raising Concept Drawings

TORONTO ISLAND PARK FLOOD AND EROSION MITIGATION PROJECT

TORONTO, ONTARIO



DRAWING LIST

DWG NO.		DRAWING NAME
1.	PP-1	LAKESHORE AVE STA -0+020 TO 0+220
2.	PP-2	LAKESHORE AVE STA 0+220 TO 0+450
3.	PP-3	LAKESHORE AVE STA 0+450 TO 0+680
4.	PP-4	LAKESHORE AVE STA -0+020 TO -0+220
5.	PP-5	LAKESHORE AVE STA -0+220 TO -0+420
6.	PP-6	LAKESHORE AVE STA 1+280 TO 1+460
7.	PP-7	LAKESHORE AVE STA 1+780 TO 2+000
8.	PP-8	LAKESHORE AVE STA 2+000 TO 2+220
9.	PP-9	LAKESHORE AVE STA 2+220 TO 2+440
10.	PP-10	LAKESHORE AVE STA 2+440 TO 2+480
11.	PP-11	LAKESHORE AVE STA 2+720 TO 2+920
12.	PP-12	LAKESHORE AVE STA 2+960 TO 3+170
13.	PP-13	LAKESHORE AVE STA 3+170 TO 3+358
14.	PP-14	SERVICE ROAD STA -0+020 TO 0+200
15.	PP-15	SERVICE ROAD STA 0+200 TO 0+420
16.	PP-16	SERVICE ROAD STA 0+420 TO 0+640
17.	PP-17	NORTH WATER TREATMENT FACILITY ACCESS ROAD 0+000 TO 0+132
18.	PP-18	SOUTH WATER TREATMENT FACILITY ACCESS ROAD -0+010 TO 0+038 & -0+060 TO 0+027.09
19.	PP-19	AVENUE OF THE ISLAND (N/S) STA -0+020 TO 0+200
20.	PP-20	AVENUE OF THE ISLAND (N/S) STA 0+200 TO 0+420
21.	PP-21	AVENUE OF THE ISLAND (N/S) STA 0+420 TO 0+640
22.	PP-22	AVENUE OF THE ISLAND (N/S) STA 0+640 TO 0+760
23.	PP-23	AVENUE OF THE ISLAND (E/W) STA -0+020 TO 0+160
24.	PP-24	AVENUE OF THE ISLAND (E/W) STA 0+160 TO 0+280
25.	PP-25	CHIPPEWA AVE STA -0+020 TO 0+200
26.	PP-26	CHIPPEWA AVE STA 0+200 TO 0+420
27.	PP-27	CIBOLA AVE STA 0+000 TO 0+180
28.	PP-28	CIBOLA AVE STA 0+180 TO 0+400
29.	PP-29	CIBOLA AVE STA 0+400 TO 0+620
30.	PP-30	CIBOLA AVE STA 0+620 TO 0+780
31.	PP-31	CIBOLA AVE STA 1+040 TO 1+260
32.	PP-32	CIBOLA AVE STA 1+260 TO 1+480
33.	PP-33	CIBOLA AVE STA 1+480 TO 1+700
34.	PP-34	CIBOLA AVE STA 1+700 TO 1+855
35.	PP-35	BAYVIEW AVE STA 0+000 TO 0+094.69
36.	PP-36	CHANNEL AVE 0+000 TO 0+160

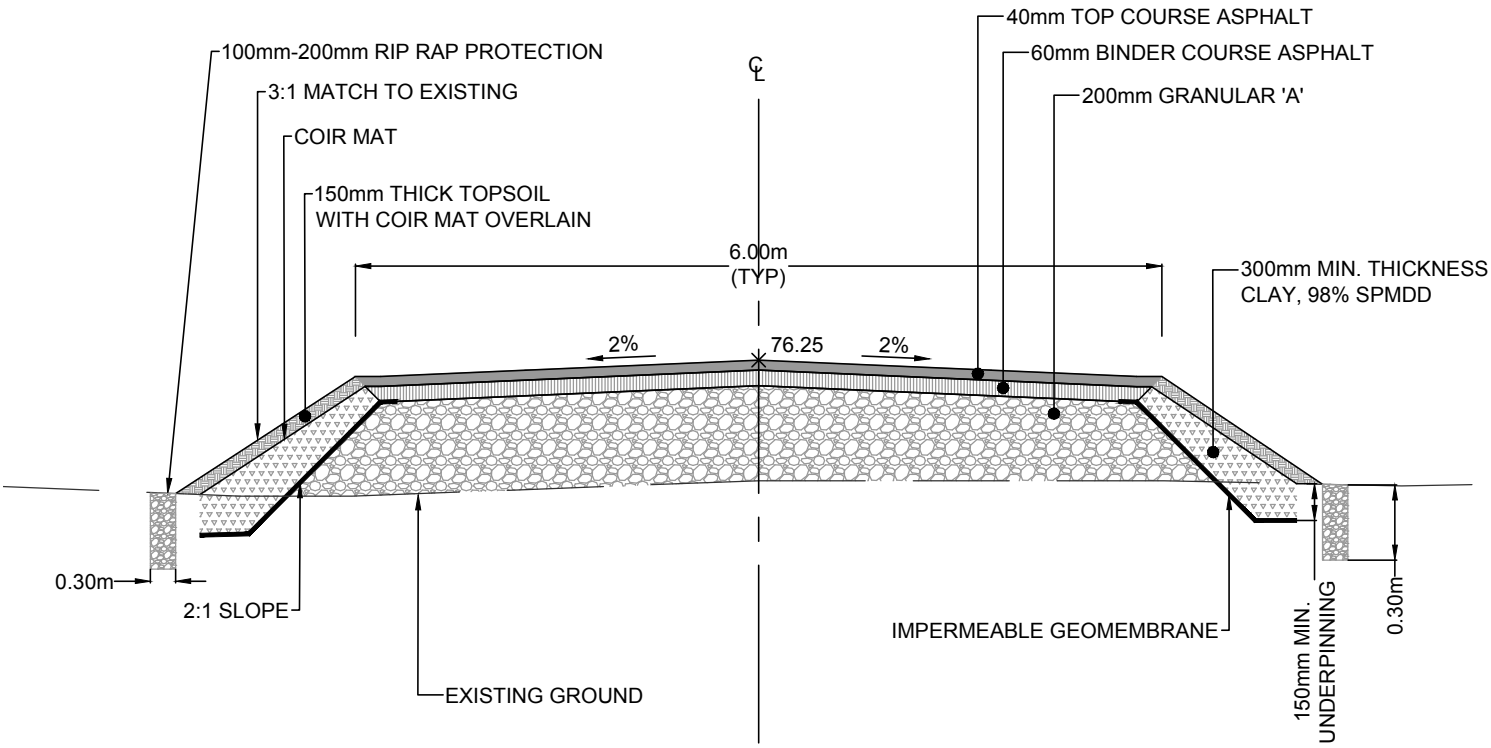
LEGEND

ROAD RAISING WORKS FOR TORONTO ISLAND PARK FLOOD AND EROSION MITIGATION EA

2020 EMERGENCY ROAD RAISING WORKS COMPLETED

DRAFT EA ISSUED
OCTOBER 14, 2022
KWA PROJECT NO. 21600

KWA SITE DEVELOPMENT CONSULTING INC.
2453 Auckland Drive
Burlington, ON L7L 7A9



KWA SITE DEVELOPMENT CONSULTING INC.
2453 Auckland Drive
Burlington, ON L7L 7A9

REVISION BLOCK

#	DATE	DESCRIPTION
1.	11/04/21	ISSUED DRAFT

TYPICAL CROSS SECTION (OPTION 1)

TORONTO REGION CONSERVATION AUTHORITY

TORONTO ISLAND PARK FLOOD & EROSION MITIGATION

TORONTO, ONTARIO

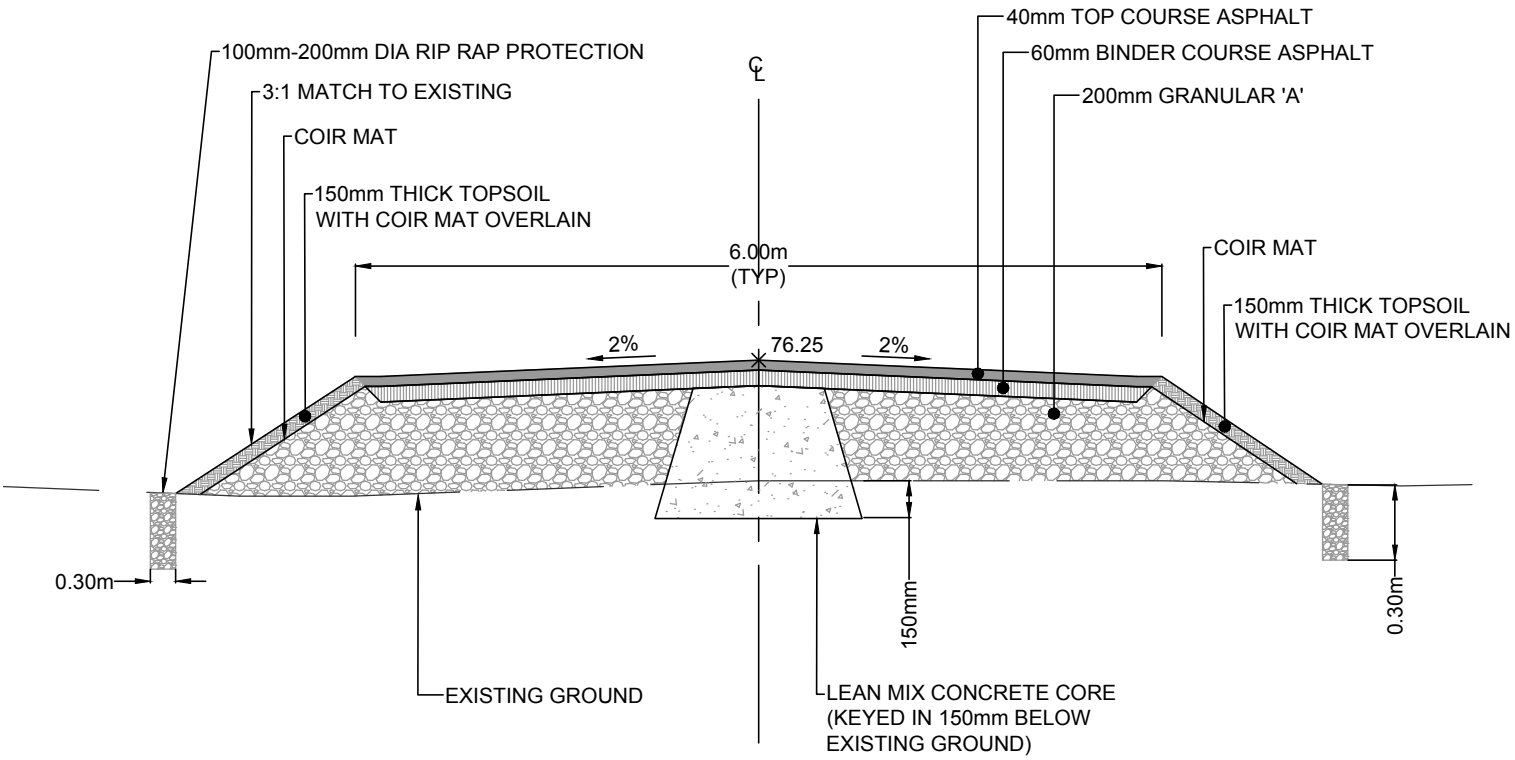
PROJECT No: 21600 | DRAWN BY:ARV | CHECKED BY:CDB

NORTH ARROW

METRIC SCALE

N.T.S.

FIG 1



KWA SITE DEVELOPMENT CONSULTING INC.
2453 Auckland Drive
Burlington, ON L7L 7A9

REVISION BLOCK

#	DATE	DESCRIPTION
1.	11/04/21	ISSUED DRAFT

TYPICAL CROSS SECTION (OPTION 2)

TORONTO REGION CONSERVATION AUTHORITY

TORONTO ISLAND PARK FLOOD & EROSION MITIGATION

TORONTO, ONTARIO

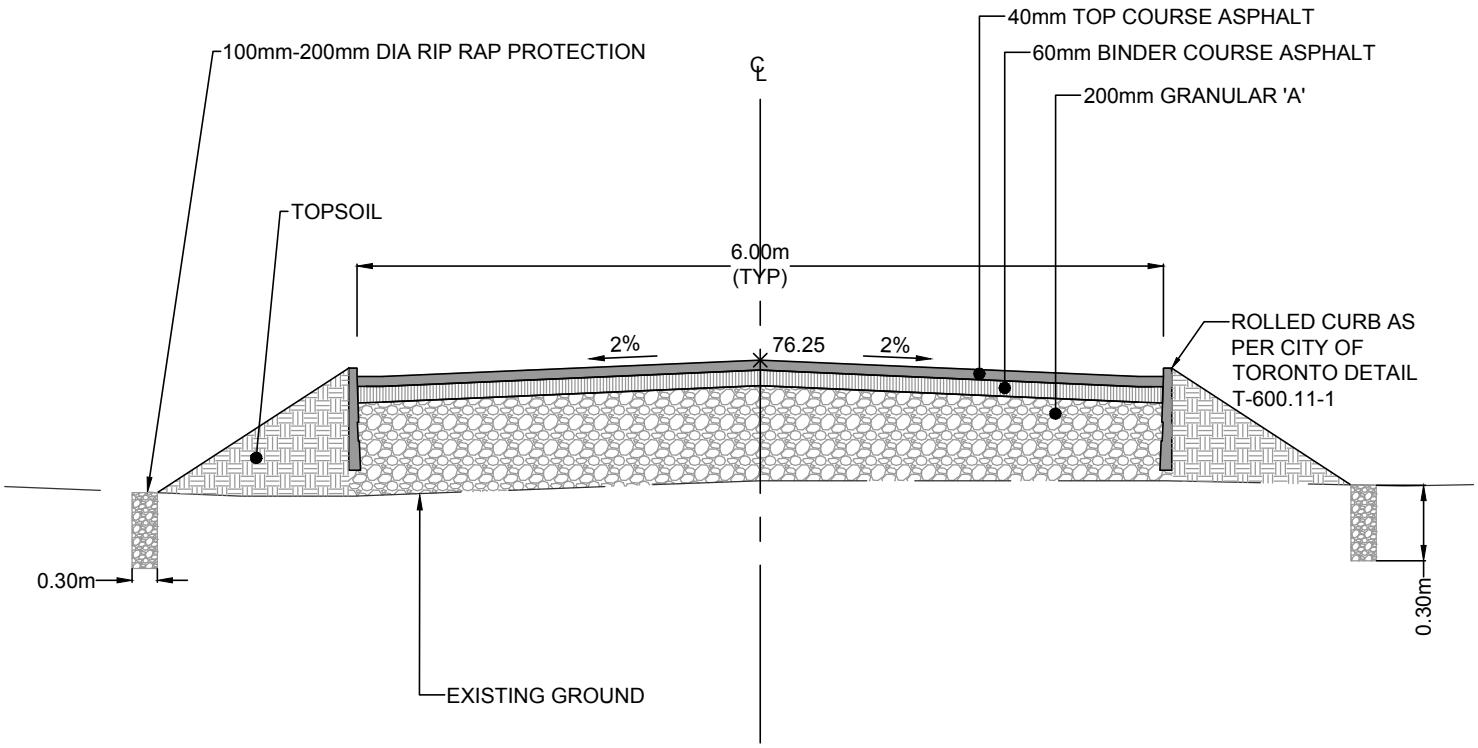
PROJECT No: 21600 | DRAWN BY:ARV | CHECKED BY:CDB

NORTH ARROW

METRIC SCALE

N.T.S.

FIG 2



KWA SITE DEVELOPMENT CONSULTING INC.
2453 Auckland Drive
Burlington, ON L7L 7A9

REVISION BLOCK

#	DATE	DESCRIPTION
1.	11/04/21	ISSUED DRAFT

TYPICAL CROSS SECTION (OPTION 3)

TORONTO REGION CONSERVATION AUTHORITY

TORONTO ISLAND PARK FLOOD & EROSION MITIGATION

TORONTO, ONTARIO

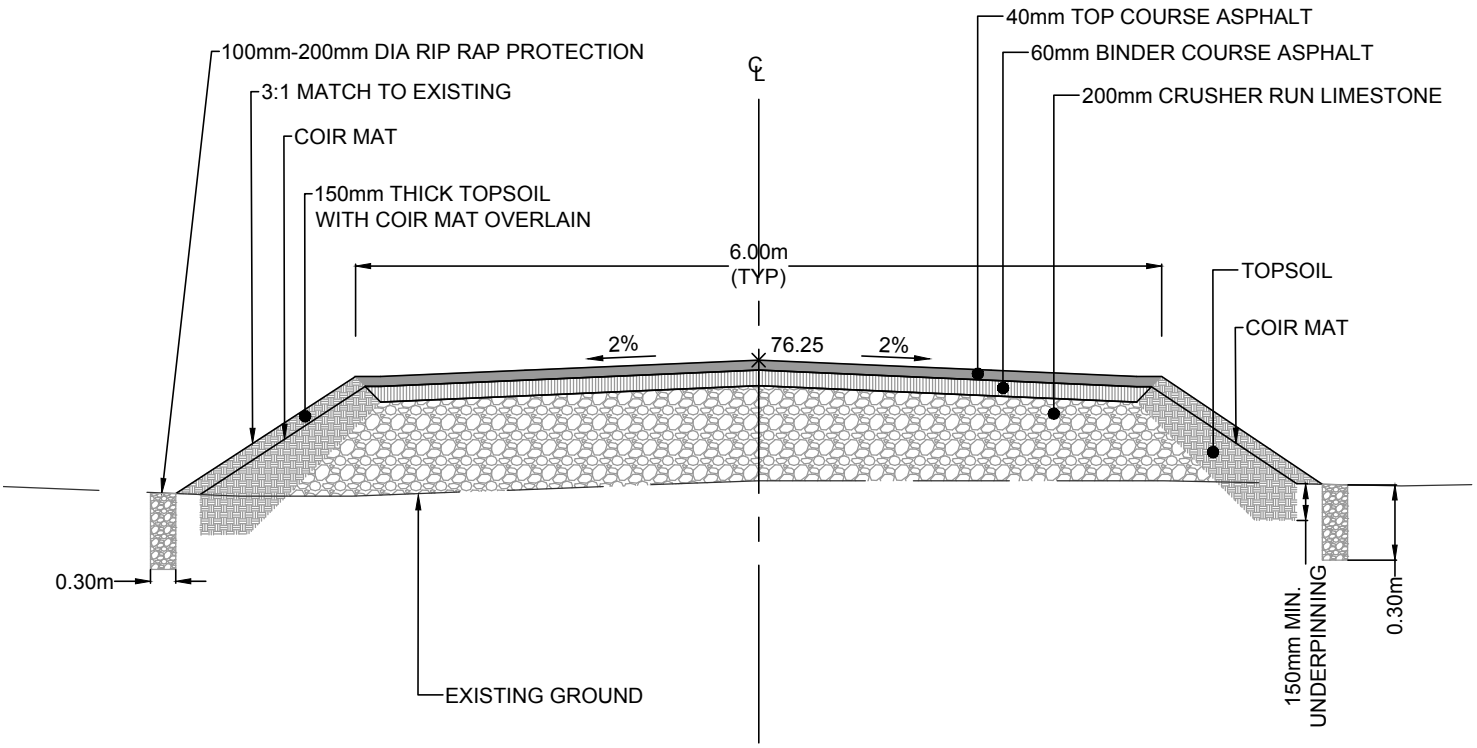
PROJECT No: 21600 | DRAWN BY:ARV | CHECKED BY:CDB

NORTH ARROW

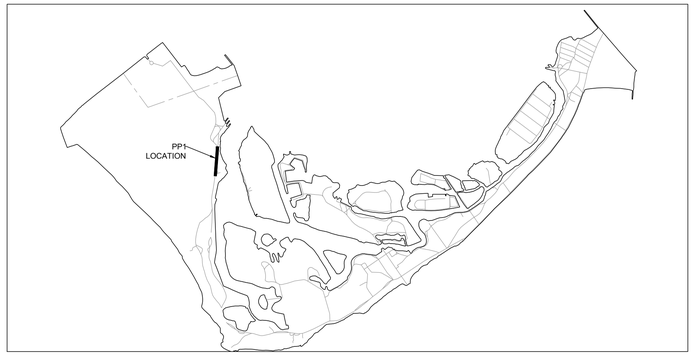
METRIC SCALE

N.T.S.

FIG 3



KWA SITE DEVELOPMENT CONSULTING INC. 2453 Auckland Drive Burlington, ON L7L 7A9	REVISION BLOCK # | DATE | DESCRIPTION 1. | 11/04/21 | ISSUED DRAFT	TYPICAL CROSS SECTION (OPTION 4) TORONTO REGION CONSERVATION AUTHORITY TORONTO ISLAND PARK FLOOD & EROSION MITIGATION TORONTO, ONTARIO PROJECT No: 21600 | DRAWN BY:ARV | CHECKED BY:CDB
NORTH ARROW	METRIC SCALE N.T.S.	FIG 4



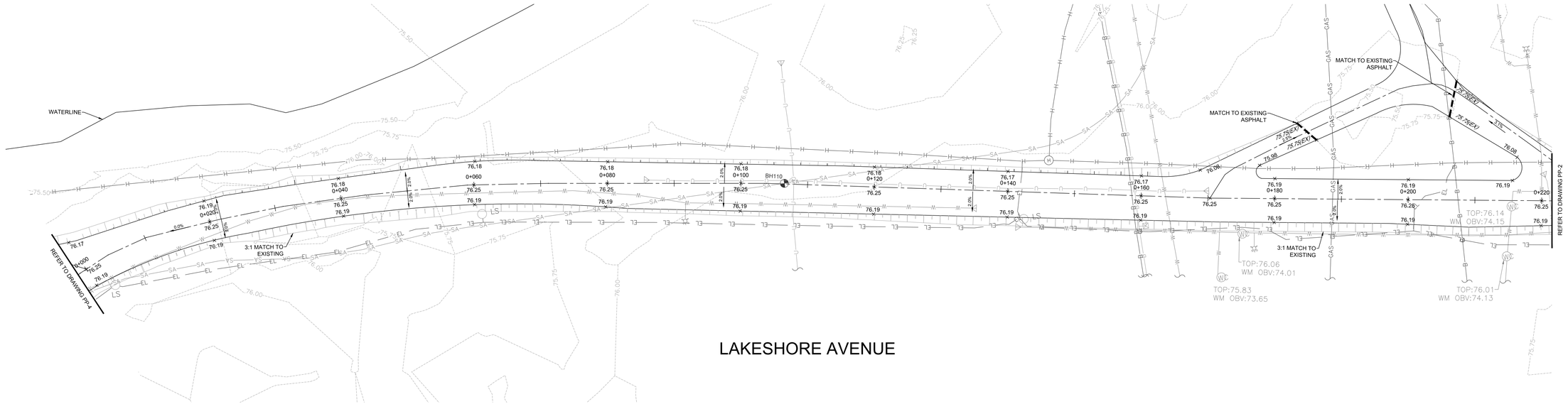
KEYPLAN (N.T.S.)

LEGEND

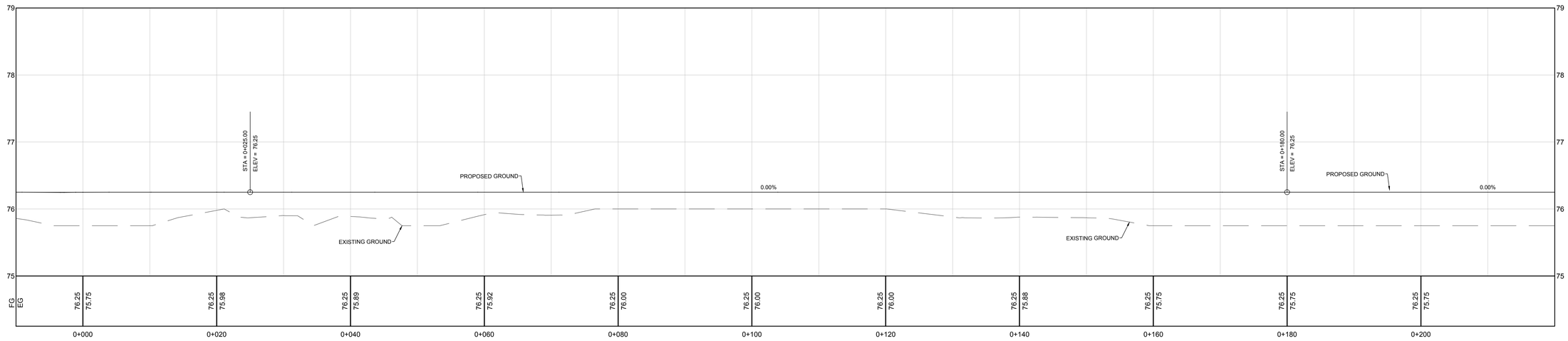
- EXISTING GROUND CONTOUR
- PROPOSED 3:1 SLOPE
- EXISTING CENTRELINE
- PROPSED ELEVATION
- PROPOSED GRADE
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- EXISTING HYDRANT
- EXISTING VALVE BOX
- EXISTING WATER CHAMBER
- EXISTING LIGHT STANDARD
- EXISTING HYDRO
- EXISTING BELL UTILITY
- EXISTING UTILITY
- EXISTING GASMAIN
- EXISTING ELECTRICAL

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS, ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS (OPSD & OPSS), THE WATER RESOURCES ACT, AND THE APPLICABLE ENVIRONMENTAL PROTECTION ACTS. WHERE A CITY OR REGION STANDARD EXISTS, IT SHALL BE USED IN PLACE OF THE PROVINCIAL STANDARD. ALL WORK SHALL CONFORM TO THE APPLICABLE HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2. INFORMATION REGARDING ALL EXISTING UNDERGROUND UTILITIES AND SERVICES SHOWN ON THE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS AND/OR AVAILABLE HISTORICAL DRAWINGS. THE ACCURACY OF THIS INFORMATION HAS NOT BEEN CONFIRMED BY KWA SITE DEVELOPMENT CONSULTING AND ALL UNDERGROUND INFORMATION NEEDS TO BE VERIFIED IN THE FIELD PRIOR TO BIDDING AND CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO ACQUIRE ALL UTILITY LOCATES PRIOR TO CONSTRUCTION AND TO NOTIFY THE ENGINEER OF ANY DISCREPANCIES. ANY LOST TIME DUE TO FAILURE TO IDENTIFY DISCREPANCIES OR NOTIFY THE ENGINEER SHALL BE AT THE CONTRACTOR'S EXPENSE.
3. THIS PLAN SHOULD BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANT'S PLANS AND ANY DISCREPANCIES REPORTED TO THE ENGINEER PRIOR TO CONSTRUCTION.
4. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND ANY DISCREPANCIES REPORTED TO THE ENGINEER. INFORMATION REGARDING PRIVATE ROADS, PARKING LOT CURBS, BUILDING LOCATIONS, AND SETBACKS SHALL BE TAKEN FROM THE SITE PLAN.
5. NO SUBSTITUTIONS SHALL BE ALLOWED WITHOUT ENGINEERS APPROVAL.
6. ALL DISTURBED AREAS SHALL BE REPAIRED TO ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE ENGINEER.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING AT THE SAME TIME AS THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES AND PREVENT CONSTRUCTION CONFLICTS.
8. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL PERMITS INCLUDING THIRD PARTY UTILITY COSTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING ALL NECESSARY SIGNALS, SIGNS, DELINEATORS, MARKERS AND BARRIERS. ALL TRAFFIC AND SAFETY MEASURES SHALL CONFORM TO CITY STANDARDS AND THE ONTARIO TRAFFIC MANUAL, BOOK 7 - TEMPORARY CONDITIONS, LATEST EDITION.
10. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED INSPECTIONS WITH THE CITY AND ANY OTHER REGULATORY AGENCIES. ALL WORK ON CITY PROPERTY OR INFRSTRUCTURE (INCLUDING EASEMENTS, SEWER WORK, AND WATERMAIN WORK) SHALL BE INSPECTED BY THE CITY (AS REQUIRED) PRIOR TO BACKFILLING.
11. THE CONTRACTOR IS RESPONSIBLE TO INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROLS AS REQUIRED BY THIS CONTRACT AND CITY AND PROVINCIAL STANDARDS.
12. CONTRACTOR RESPONSIBLE TO SUPPLY AND INSTALL ALL NECESSARY CONSTRUCTION FENCING.
13. CONTRACTOR TO PROVIDE WEEKLY REDLINE LINE AS-BUILT SURVEY TO THE ENGINEER FOR REVIEW. AS-BUILT TO SHOW PIPE INVERT, PIPE SIZE, AND PIPE MATERIAL.
14. CONTRACTOR TO PROVIDE AS-BUILT SURVEY OF COMPLETED SERVICING AND GRADING WORKS; INCLUDING INVERTS; ALL ABOVE GROUND WORKS AND SPOT ELEVATIONS AT MAXIMUM 15M GRID INTERVAL. SURVEY TO BE PREPARED BY LICENSED ONTARIO LAND SURVEYOR.
15. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE SITE-SPECIFIC GEOTECHNICAL REPORT ENTITLED "_____" PREPARED BY GROUNDED ENGINEERING, DATED_____ AND ALL APPLICABLE ADDENDUMS.



LAKESHORE AVENUE



REVISION BLOCK

#	DATE	DESCRIPTION
1.	10/01/21	ISSUED DRAFT
2.	11/04/21	ISSUED DRAFT
3.	10/14/22	DRAFT EA ISSUED

DRAFT

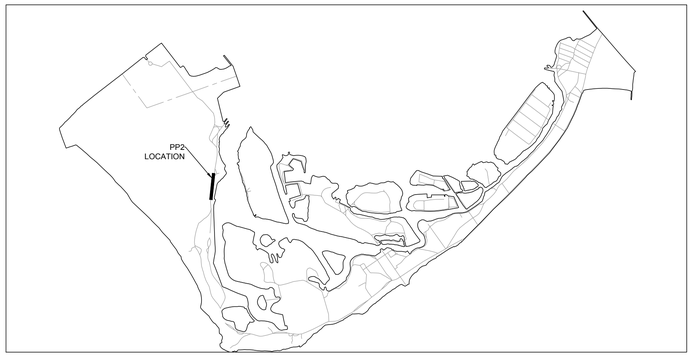
KWA SITE DEVELOPMENT CONSULTING INC.
2055 Upper Middle Road
Burlington, ON L7L 7A9

NORTH ARROW

METRIC SCALE
0 2 5 10
HORZ.1:300 VERT.1:30

LAKESHORE AVE
STA -0+020 TO 0+220
TORONTO REGION CONSERVATION AUTHORITY
TORONTO ISLAND PARK FLOOD & EROSION MITIGATION
TORONTO, ONTARIO
PROJECT No: 21600 | DRAWN BY: ARV | CHECKED BY: CDB

PP-1



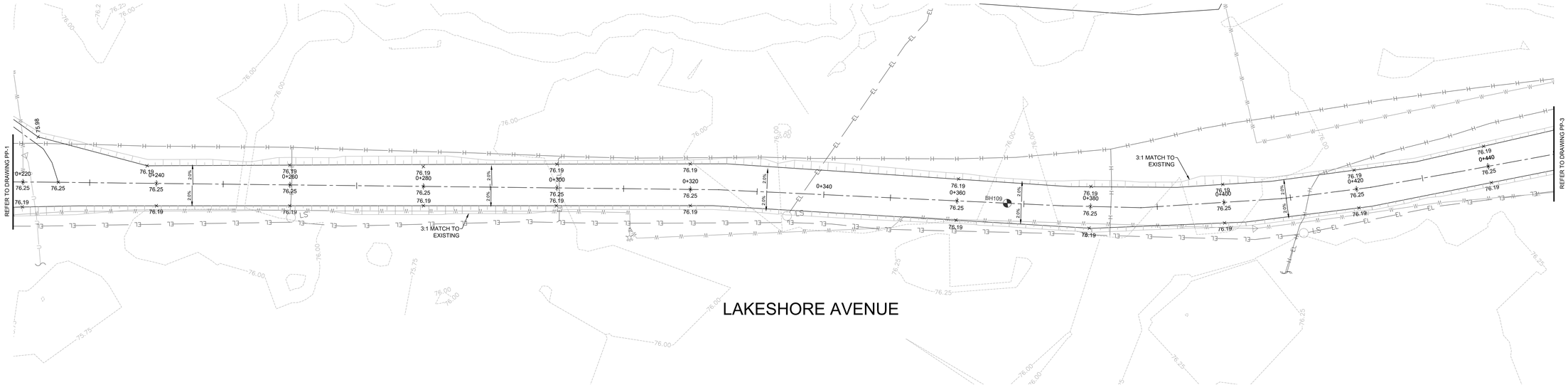
KEYPLAN (N.T.S.)

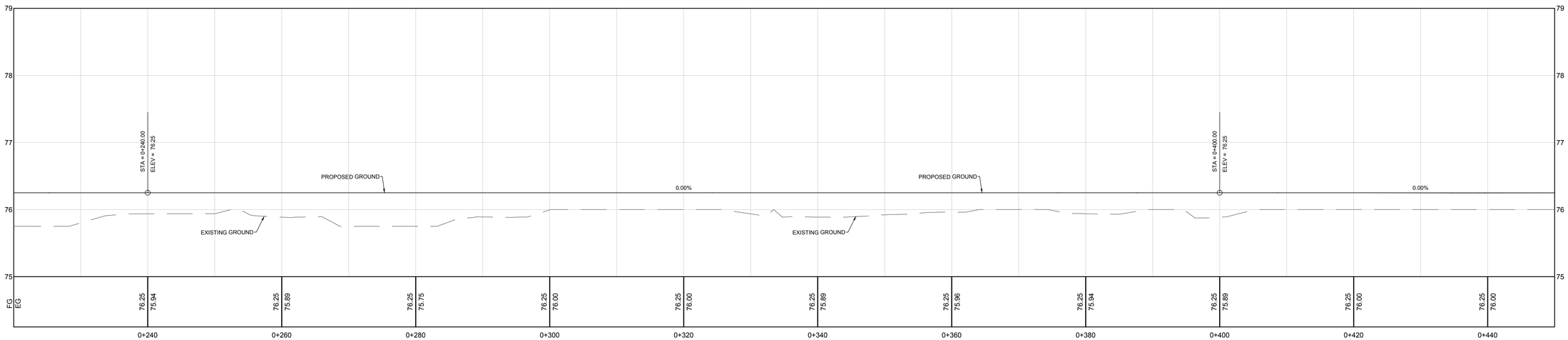
LEGEND

- 76.00 — EXISTING GROUND CONTOUR
- PROPOSED 3:1 SLOPE
- EXISTING CENTRELINE
- × 76.25 — PROPSED ELEVATION
- 2.0% — PROPOSED GRADE
- ST — EXISTING STORM SEWER
- SA — EXISTING SANITARY SEWER
- W — EXISTING WATERMAIN
- EXISTING HYDRANT
- EXISTING VALVE BOX
- EXISTING WATER CHAMBER
- LS — EXISTING LIGHT STANDARD
- H — EXISTING HYDRO
- B — EXISTING BELL UTILITY
- U — EXISTING UTILITY
- GAS — EXISTING GASMAIN
- EL — EXISTING ELECTRICAL

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS, ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS (OPSD & OPSS), THE WATER RESOURCES ACT, AND THE APPLICABLE ENVIRONMENTAL PROTECTION ACTS. WHERE A CITY OR REGION STANDARD EXISTS, IT SHALL BE USED IN PLACE OF THE PROVINCIAL STANDARD. ALL WORK SHALL CONFORM TO THE APPLICABLE HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2. INFORMATION REGARDING ALL EXISTING UNDERGROUND UTILITIES AND SERVICES SHOWN ON THE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS AND/OR AVAILABLE HISTORICAL DRAWINGS. THE ACCURACY OF THIS INFORMATION HAS NOT BEEN CONFIRMED BY KWA SITE DEVELOPMENT CONSULTING AND ALL UNDERGROUND INFORMATION NEEDS TO BE VERIFIED IN THE FIELD PRIOR TO BIDDING AND CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO ACQUIRE ALL UTILITY LOCATES PRIOR TO CONSTRUCTION AND TO NOTIFY THE ENGINEER OF ANY DISCREPANCIES. ANY LOST TIME DUE TO FAILURE TO IDENTIFY DISCREPANCIES OR NOTIFY THE ENGINEER SHALL BE AT THE CONTRACTOR'S EXPENSE.
3. THIS PLAN SHOULD BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANT'S PLANS AND ANY DISCREPANCIES REPORTED TO THE ENGINEER PRIOR TO CONSTRUCTION.
4. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND ANY DISCREPANCIES REPORTED TO THE ENGINEER. INFORMATION REGARDING PRIVATE ROADS, PARKING LOT CURBS, BUILDING LOCATIONS, AND SETBACKS SHALL BE TAKEN FROM THE SITE PLAN.
5. NO SUBSTITUTIONS SHALL BE ALLOWED WITHOUT ENGINEERS APPROVAL.
6. ALL DISTURBED AREAS SHALL BE REPAIRED TO ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE ENGINEER.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING AT THE SAME TIME AS THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES AND PREVENT CONSTRUCTION CONFLICTS.
8. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL PERMITS INCLUDING THIRD PARTY UTILITY COSTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING ALL NECESSARY SIGNALS, SIGNS, DELINEATORS, MARKERS AND BARRIERS. ALL TRAFFIC AND SAFETY MEASURES SHALL CONFORM TO CITY STANDARDS AND THE ONTARIO TRAFFIC MANUAL, BOOK 7 - TEMPORARY CONDITIONS, LATEST EDITION.
10. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED INSPECTIONS WITH THE CITY AND ANY OTHER REGULATORY AGENCIES. ALL WORK ON CITY PROPERTY OR INFRSTRUCTURE (INCLUDING EASEMENTS, SEWER WORK, AND WATERMAIN WORK) SHALL BE INSPECTED BY THE CITY (AS REQUIRED) PRIOR TO BACKFILLING.
11. THE CONTRACTOR IS RESPONSIBLE TO INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROLS AS REQUIRED BY THIS CONTRACT AND CITY AND PROVINCIAL STANDARDS.
12. CONTRACTOR RESPONSIBLE TO SUPPLY AND INSTALL ALL NECESSARY CONSTRUCTION FENCING.
13. CONTRACTOR TO PROVIDE WEEKLY REDLINE LINE AS-BUILT SURVEY TO THE ENGINEER FOR REVIEW. AS-BUILT TO SHOW PIPE INVERT, PIPE SIZE, AND PIPE MATERIAL.
14. CONTRACTOR TO PROVIDE AS-BUILT SURVEY OF COMPLETED SERVICING AND GRADING WORKS; INCLUDING INVERTS; ALL ABOVE GROUND WORKS AND SPOT ELEVATIONS AT MAXIMUM 15M GRID INTERVAL. SURVEY TO BE PREPARED BY LICENSED ONTARIO LAND SURVEYOR.
15. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE SITE-SPECIFIC GEOTECHNICAL REPORT ENTITLED "_____" PREPARED BY GROUNDED ENGINEERING, DATED_____ AND ALL APPLICABLE ADDENDUMS.





REVISION BLOCK

#	DATE	DESCRIPTION
1.	10/01/21	ISSUED DRAFT
2.	11/04/21	ISSUED DRAFT
3.	10/14/22	DRAFT EA ISSUED

DRAFT

KWA SITE DEVELOPMENT CONSULTING INC.
2355 Main Street, Unit 1
Burlington, ON L7L 7A9

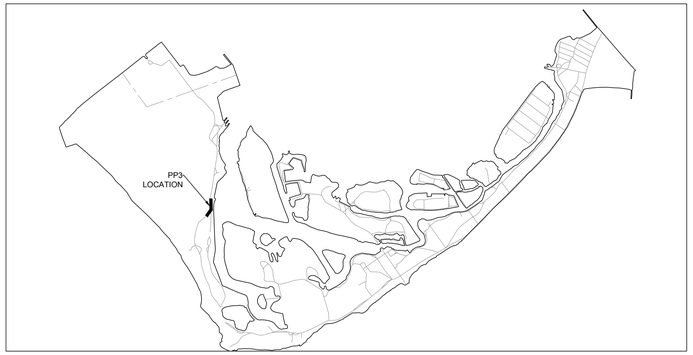
NORTH ARROW

METRIC SCALE
0 2 5 10
HORZ.1:300 VERT.1:30

LAKESHORE AVE
STA 0+220 TO 0+450
TORONTO REGION CONSERVATION AUTHORITY
TORONTO ISLAND PARK FLOOD & EROSION MITIGATION
TORONTO, ONTARIO

PROJECT No: 21600 | DRAWN BY: ARV | CHECKED BY: GDB

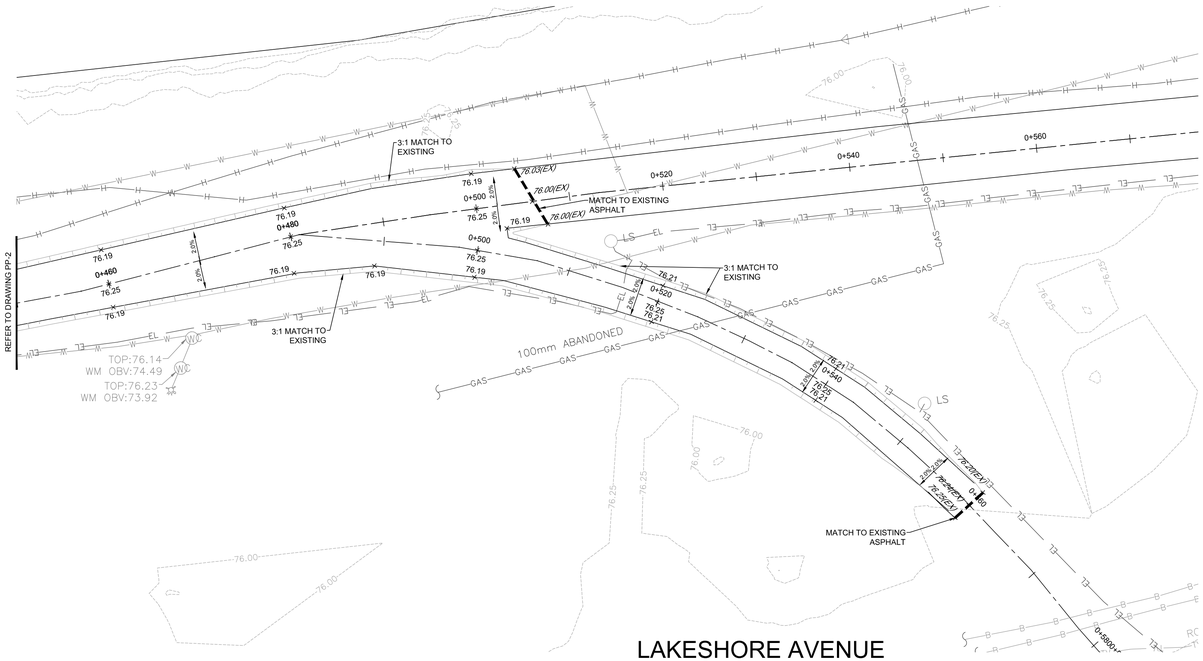
PP-2



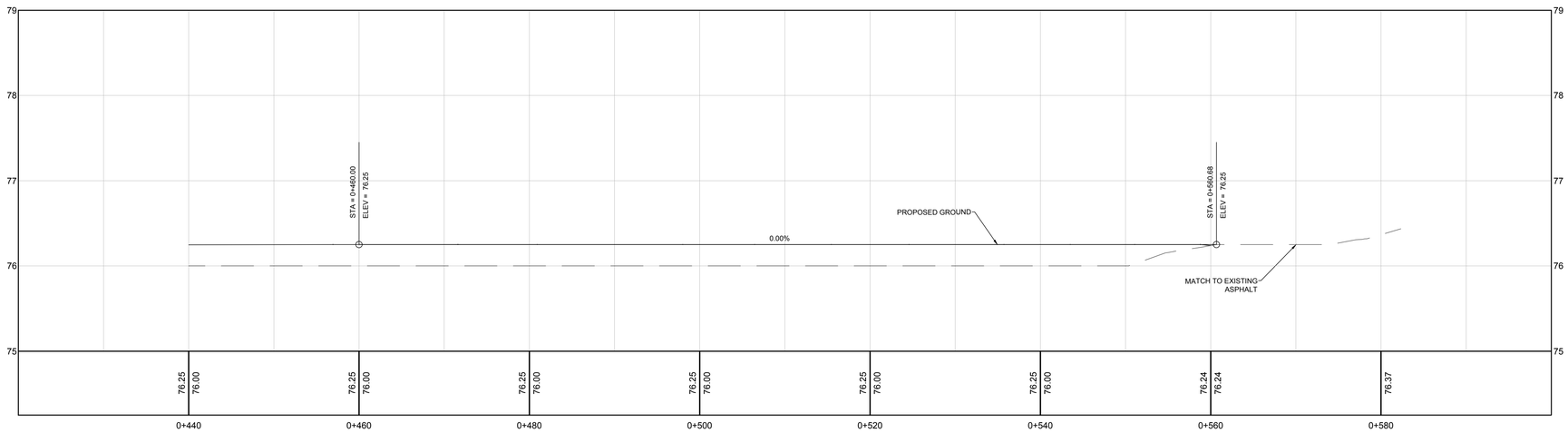
KEYPLAN (N.T.S.)

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS, ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS (OPSD & OPSS), THE WATER RESOURCES ACT, AND THE APPLICABLE ENVIRONMENTAL PROTECTION ACTS. WHERE A CITY OR REGION STANDARD EXISTS, IT SHALL BE USED IN PLACE OF THE PROVINCIAL STANDARD. ALL WORK SHALL CONFORM TO THE APPLICABLE HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2. INFORMATION REGARDING ALL EXISTING UNDERGROUND UTILITIES AND SERVICES SHOWN ON THE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS AND/OR AVAILABLE HISTORICAL DRAWINGS. THE ACCURACY OF THIS INFORMATION HAS NOT BEEN CONFIRMED BY KWA SITE DEVELOPMENT CONSULTING AND ALL UNDERGROUND INFORMATION NEEDS TO BE VERIFIED IN THE FIELD PRIOR TO BIDDING AND CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO ACQUIRE ALL UTILITY LOCATES PRIOR TO CONSTRUCTION AND TO NOTIFY THE ENGINEER OF ANY DISCREPANCIES. ANY LOST TIME DUE TO FAILURE TO IDENTIFY DISCREPANCIES OR NOTIFY THE ENGINEER SHALL BE AT THE CONTRACTOR'S EXPENSE.
3. THIS PLAN SHOULD BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANT'S PLANS AND ANY DISCREPANCIES REPORTED TO THE ENGINEER PRIOR TO CONSTRUCTION.
4. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND ANY DISCREPANCIES REPORTED TO THE ENGINEER. INFORMATION REGARDING PRIVATE ROADS, PARKING LOT CURBS, BUILDING LOCATIONS, AND SETBACKS SHALL BE TAKEN FROM THE SITE PLAN.
5. NO SUBSTITUTIONS SHALL BE ALLOWED WITHOUT ENGINEERS APPROVAL.
6. ALL DISTURBED AREAS SHALL BE REPAIRED TO ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE ENGINEER.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING AT THE SAME TIME AS THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES AND PREVENT CONSTRUCTION CONFLICTS.
8. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL PERMITS INCLUDING THIRD PARTY UTILITY COSTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING ALL NECESSARY SIGNALS, SIGNS, DELINEATORS, MARKERS AND BARRIERS. ALL TRAFFIC AND SAFETY MEASURES SHALL CONFORM TO CITY STANDARDS AND THE ONTARIO TRAFFIC MANUAL, BOOK 7 - TEMPORARY CONDITIONS, LATEST EDITION.
10. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED INSPECTIONS WITH THE CITY AND ANY OTHER REGULATORY AGENCIES. ALL WORK ON CITY PROPERTY OR INFRSTRUCTURE (INCLUDING EASEMENTS, SEWER WORK, AND WATERMAIN WORK) SHALL BE INSPECTED BY THE CITY (AS REQUIRED) PRIOR TO BACKFILLING.
11. THE CONTRACTOR IS RESPONSIBLE TO INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROLS AS REQUIRED BY THIS CONTRACT AND CITY AND PROVINCIAL STANDARDS.
12. CONTRACTOR RESPONSIBLE TO SUPPLY AND INSTALL ALL NECESSARY CONSTRUCTION FENCING.
13. CONTRACTOR TO PROVIDE WEEKLY REDLINE LINE AS-BUILT SURVEY TO THE ENGINEER FOR REVIEW. AS-BUILT TO SHOW PIPE INVERT, PIPE SIZE, AND PIPE MATERIAL.
14. CONTRACTOR TO PROVIDE AS-BUILT SURVEY OF COMPLETED SERVICING AND GRADING WORKS; INCLUDING INVERTS; ALL ABOVE GROUND WORKS AND SPOT ELEVATIONS AT MAXIMUM 15M GRID INTERVAL. SURVEY TO BE PREPARED BY LICENSED ONTARIO LAND SURVEYOR.
15. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE SITE-SPECIFIC GEOTECHNICAL REPORT ENTITLED "_____" PREPARED BY GROUNDED ENGINEERING, DATED_____ AND ALL APPLICABLE ADDENDUMS.



LAKESHORE AVENUE



LEGEND

- EXISTING GROUND CONTOUR
- PROPOSED 3:1 SLOPE
- EXISTING CENTRELINE
- PROPSED ELEVATION
- PROPOSED GRADE
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- EXISTING HYDRANT
- EXISTING VALVE BOX
- EXISTING WATER CHAMBER
- EXISTING LIGHT STANDARD
- EXISTING HYDRO
- EXISTING BELL UTILITY
- EXISTING UTILITY
- EXISTING GASMAIN
- EXISTING ELECTRICAL

REVISION BLOCK

#	DATE	DESCRIPTION
1.	10/01/21	ISSUED DRAFT
2.	11/04/21	ISSUED DRAFT
3.	10/14/22	DRAFT EA ISSUED

DRAFT

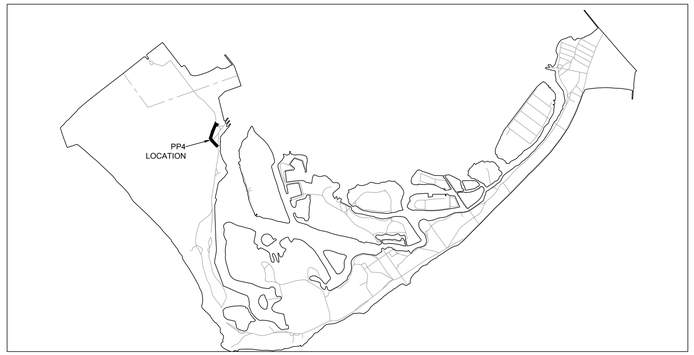
KWA SITE DEVELOPMENT CONSULTING INC.
2055 Appleby Line
Burlington, ON L7L 7A9

NORTH ARROW

METRIC SCALE
0 2 5 10
HORZ.1:300 VERT.1:30

LAKESHORE AVE
STA 0+450 TO 0+680
TORONTO REGION CONSERVATION AUTHORITY
TORONTO ISLAND PARK FLOOD & EROSION MITIGATION
TORONTO, ONTARIO
PROJECT No: 21600 | DRAWN BY: ARV | CHECKED BY: CDB

PP-3



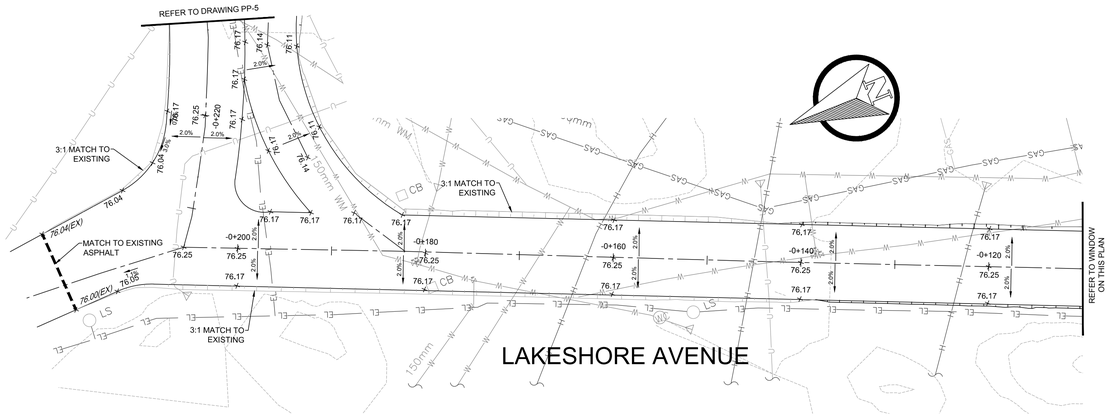
KEYPLAN (N.T.S.)

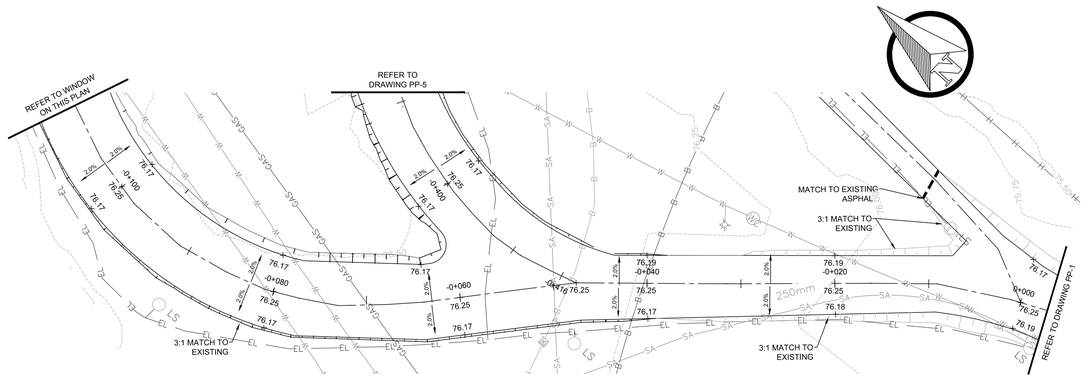
LEGEND

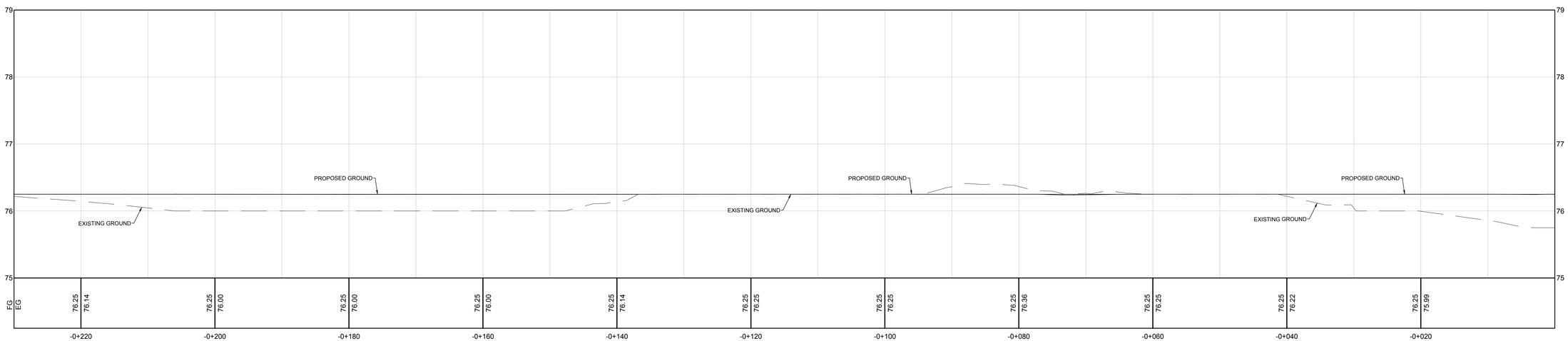
- 76.00 — EXISTING GROUND CONTOUR
- PROPOSED 3:1 SLOPE
- EXISTING CENTRELINE
- × 76.25 — PROPSED ELEVATION
- 2.0% — PROPOSED GRADE
- ST — EXISTING STORM SEWER
- SA — EXISTING SANITARY SEWER
- W — W — EXISTING WATERMAIN
- EXISTING HYDRANT
- EXISTING VALVE BOX
- WC — EXISTING WATER CHAMBER
- LS — EXISTING LIGHT STANDARD
- H — H — EXISTING HYDRO
- B — B — EXISTING BELL UTILITY
- U — U — EXISTING UTILITY
- GAS — GAS — EXISTING GASMAIN
- EL — EL — EXISTING ELECTRICAL

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS, ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS (OPSD & OPSS), THE WATER RESOURCES ACT, AND THE APPLICABLE ENVIRONMENTAL PROTECTION ACTS. WHERE A CITY OR REGION STANDARD EXISTS, IT SHALL BE USED IN PLACE OF THE PROVINCIAL STANDARD. ALL WORK SHALL CONFORM TO THE APPLICABLE HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2. INFORMATION REGARDING ALL EXISTING UNDERGROUND UTILITIES AND SERVICES SHOWN ON THE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS AND/OR AVAILABLE HISTORICAL DRAWINGS. THE ACCURACY OF THIS INFORMATION HAS NOT BEEN CONFIRMED BY KWA SITE DEVELOPMENT CONSULTING AND ALL UNDERGROUND INFORMATION NEEDS TO BE VERIFIED IN THE FIELD PRIOR TO BIDDING AND CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO ACQUIRE ALL UTILITY LOCATES PRIOR TO CONSTRUCTION AND TO NOTIFY THE ENGINEER OF ANY DISCREPANCIES. ANY LOST TIME DUE TO FAILURE TO IDENTIFY DISCREPANCIES OR NOTIFY THE ENGINEER SHALL BE AT THE CONTRACTOR'S EXPENSE.
3. THIS PLAN SHOULD BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANT'S PLANS AND ANY DISCREPANCIES REPORTED TO THE ENGINEER PRIOR TO CONSTRUCTION.
4. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND ANY DISCREPANCIES REPORTED TO THE ENGINEER. INFORMATION REGARDING PRIVATE ROADS, PARKING LOT CURBS, BUILDING LOCATIONS, AND SETBACKS SHALL BE TAKEN FROM THE SITE PLAN.
5. NO SUBSTITUTIONS SHALL BE ALLOWED WITHOUT ENGINEERS APPROVAL.
6. ALL DISTURBED AREAS SHALL BE REPAIRED TO ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE ENGINEER.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING AT THE SAME TIME AS THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES AND PREVENT CONSTRUCTION CONFLICTS.
8. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL PERMITS INCLUDING THIRD PARTY UTILITY COSTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING ALL NECESSARY SIGNALS, SIGNS, DELINEATORS, MARKERS AND BARRIERS. ALL TRAFFIC AND SAFETY MEASURES SHALL CONFORM TO CITY STANDARDS AND THE ONTARIO TRAFFIC MANUAL, BOOK 7 - TEMPORARY CONDITIONS, LATEST EDITION.
10. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED INSPECTIONS WITH THE CITY AND ANY OTHER REGULATORY AGENCIES. ALL WORK ON CITY PROPERTY OR INFRSTRUCTURE (INCLUDING EASEMENTS, SEWER WORK, AND WATERMAIN WORK) SHALL BE INSPECTED BY THE CITY (AS REQUIRED) PRIOR TO BACKFILLING.
11. THE CONTRACTOR IS RESPONSIBLE TO INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROLS AS REQUIRED BY THIS CONTRACT AND CITY AND PROVINCIAL STANDARDS.
12. CONTRACTOR RESPONSIBLE TO SUPPLY AND INSTALL ALL NECESSARY CONSTRUCTION FENCING.
13. CONTRACTOR TO PROVIDE WEEKLY REDLINE LINE AS-BUILT SURVEY TO THE ENGINEER FOR REVIEW. AS-BUILT TO SHOW PIPE INVERT, PIPE SIZE, AND PIPE MATERIAL.
14. CONTRACTOR TO PROVIDE AS-BUILT SURVEY OF COMPLETED SERVICING AND GRADING WORKS; INCLUDING INVERTS; ALL ABOVE GROUND WORKS AND SPOT ELEVATIONS AT MAXIMUM 15M GRID INTERVAL. SURVEY TO BE PREPARED BY LICENSED ONTARIO LAND SURVEYOR.
15. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE SITE-SPECIFIC GEOTECHNICAL REPORT ENTITLED "_____" PREPARED BY GROUNDED ENGINEERING, DATED_____ AND ALL APPLICABLE ADDENDUMS.







REVISION BLOCK

#	DATE	DESCRIPTION
1.	10/01/21	ISSUED DRAFT
2.	11/04/21	ISSUED DRAFT
3.	10/14/22	DRAFT EA ISSUED

DRAFT

KWA SITE DEVELOPMENT CONSULTING INC.
2055 Mountain Grove Ave.
Burlington, ON L7L 7A9

NORTH ARROW

METRIC SCALE
0 2 5 10
HORZ.1:300 VERT.1:30

LAKESHORE AVE STA -0+020 TO -0+220

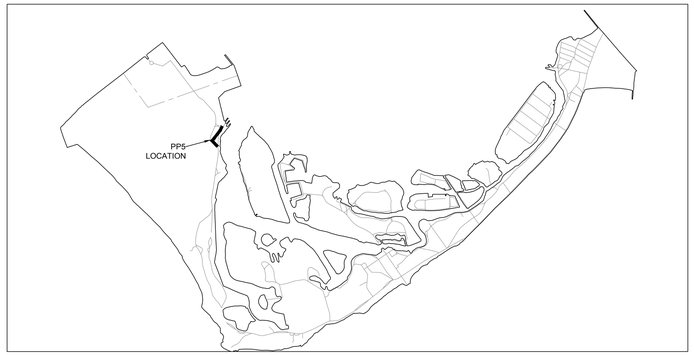
TORONTO REGION CONSERVATION AUTHORITY

TORONTO ISLAND PARK FLOOD & EROSION MITIGATION

TORONTO, ONTARIO

PROJECT No: 21800 | DRAWN BY: ARV | CHECKED BY: CDB

PP-4



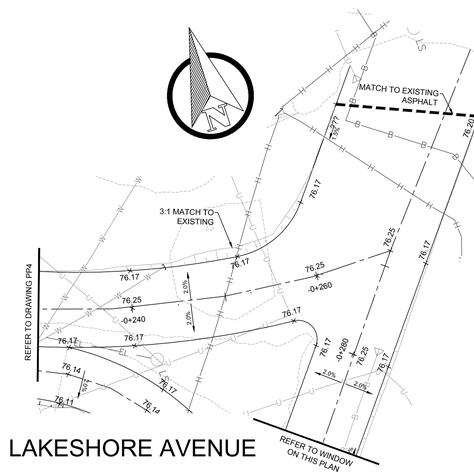
KEYPLAN (N.T.S.)

LEGEND

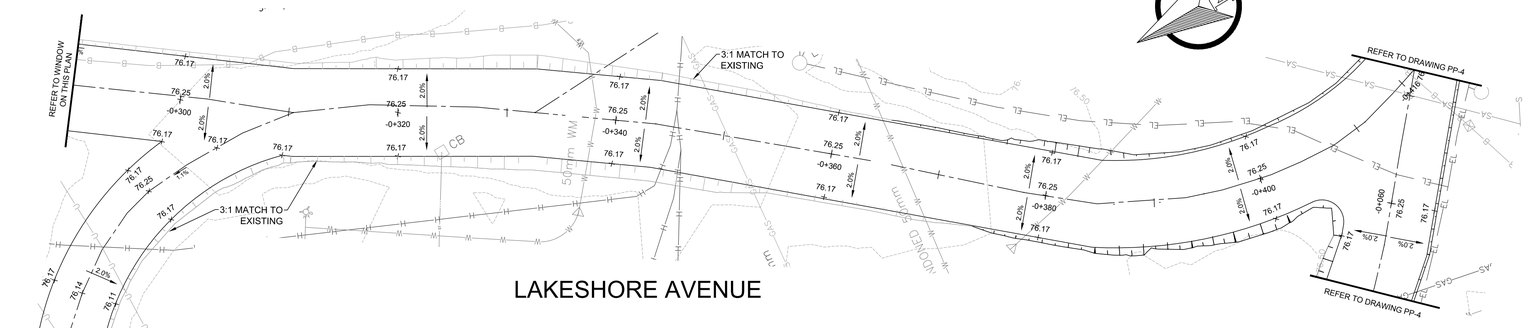
- 76.00 — EXISTING GROUND CONTOUR
- PROPOSED 3:1 SLOPE
- EXISTING CENTRELINE
- × 76.25 — PROPSED ELEVATION
- 2.0% — PROPOSED GRADE
- ST — EXISTING STORM SEWER
- SA — EXISTING SANITARY SEWER
- W — EXISTING WATERMAIN
- EXISTING HYDRANT
- EXISTING VALVE BOX
- WC — EXISTING WATER CHAMBER
- LS — EXISTING LIGHT STANDARD
- H — EXISTING HYDRO
- B — EXISTING BELL UTILITY
- U — EXISTING UTILITY
- GAS — EXISTING GASMAIN
- EL — EXISTING ELECTRICAL

GENERAL NOTES

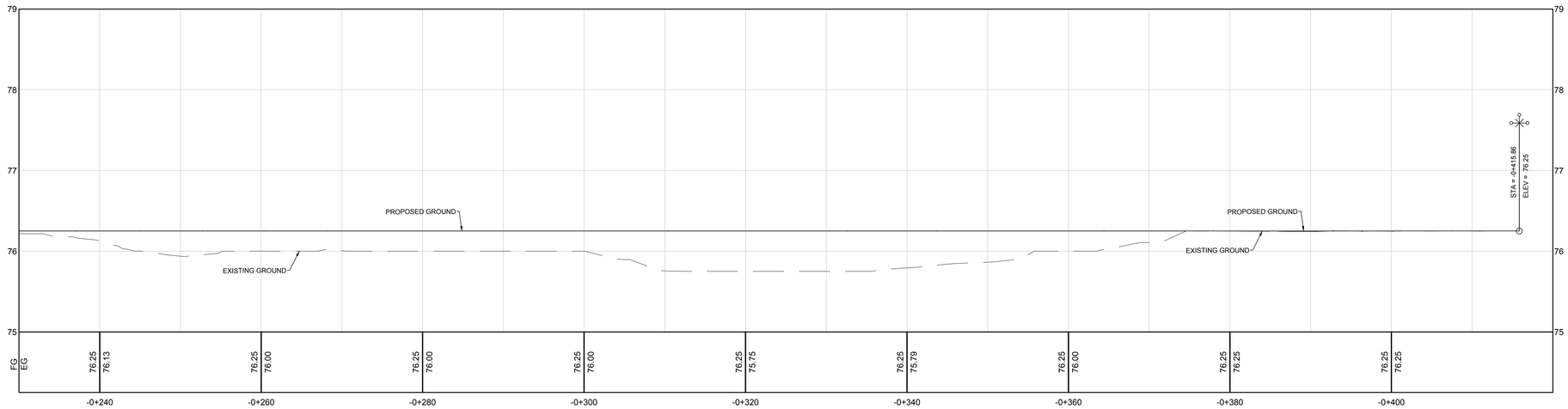
1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS, ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS (OPSD & OPSS), THE WATER RESOURCES ACT, AND THE APPLICABLE ENVIRONMENTAL PROTECTION ACTS. WHERE A CITY OR REGION STANDARD EXISTS, IT SHALL BE USED IN PLACE OF THE PROVINCIAL STANDARD. ALL WORK SHALL CONFORM TO THE APPLICABLE HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2. INFORMATION REGARDING ALL EXISTING UNDERGROUND UTILITIES AND SERVICES SHOWN ON THE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS AND/OR AVAILABLE HISTORICAL DRAWINGS. THE ACCURACY OF THIS INFORMATION HAS NOT BEEN CONFIRMED BY KWA SITE DEVELOPMENT CONSULTING AND ALL UNDERGROUND INFORMATION NEEDS TO BE VERIFIED IN THE FIELD PRIOR TO BIDDING AND CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO ACQUIRE ALL UTILITY LOCATES PRIOR TO CONSTRUCTION AND TO NOTIFY THE ENGINEER OF ANY DISCREPANCIES. ANY LOST TIME DUE TO FAILURE TO IDENTIFY DISCREPANCIES OR NOTIFY THE ENGINEER SHALL BE AT THE CONTRACTOR'S EXPENSE.
3. THIS PLAN SHOULD BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANT'S PLANS AND ANY DISCREPANCIES REPORTED TO THE ENGINEER PRIOR TO CONSTRUCTION.
4. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND ANY DISCREPANCIES REPORTED TO THE ENGINEER. INFORMATION REGARDING PRIVATE ROADS, PARKING LOT CURBS, BUILDING LOCATIONS, AND SETBACKS SHALL BE TAKEN FROM THE SITE PLAN.
5. NO SUBSTITUTIONS SHALL BE ALLOWED WITHOUT ENGINEERS APPROVAL.
6. ALL DISTURBED AREAS SHALL BE REPAIRED TO ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE ENGINEER.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING AT THE SAME TIME AS THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES AND PREVENT CONSTRUCTION CONFLICTS.
8. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL PERMITS INCLUDING THIRD PARTY UTILITY COSTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING ALL NECESSARY SIGNALS, SIGNS, DELINEATORS, MARKERS AND BARRIERS. ALL TRAFFIC AND SAFETY MEASURES SHALL CONFORM TO CITY STANDARDS AND THE ONTARIO TRAFFIC MANUAL, BOOK 7 - TEMPORARY CONDITIONS, LATEST EDITION.
10. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED INSPECTIONS WITH THE CITY AND ANY OTHER REGULATORY AGENCIES. ALL WORK ON CITY PROPERTY OR INFRSTRUCTURE (INCLUDING EASEMENTS, SEWER WORK, AND WATERMAIN WORK) SHALL BE INSPECTED BY THE CITY (AS REQUIRED) PRIOR TO BACKFILLING.
11. THE CONTRACTOR IS RESPONSIBLE TO INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROLS AS REQUIRED BY THIS CONTRACT AND CITY AND PROVINCIAL STANDARDS.
12. CONTRACTOR RESPONSIBLE TO SUPPLY AND INSTALL ALL NECESSARY CONSTRUCTION FENCING.
13. CONTRACTOR TO PROVIDE WEEKLY REDLINE LINE AS-BUILT SURVEY TO THE ENGINEER FOR REVIEW. AS-BUILT TO SHOW PIPE INVERT, PIPE SIZE, AND PIPE MATERIAL.
14. CONTRACTOR TO PROVIDE AS-BUILT SURVEY OF COMPLETED SERVICING AND GRADING WORKS; INCLUDING INVERTS; ALL ABOVE GROUND WORKS AND SPOT ELEVATIONS AT MAXIMUM 15M GRID INTERVAL. SURVEY TO BE PREPARED BY LICENSED ONTARIO LAND SURVEYOR.
15. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE SITE-SPECIFIC GEOTECHNICAL REPORT ENTITLED "_____" PREPARED BY GROUNDED ENGINEERING, DATED_____ AND ALL APPLICABLE ADDENDUMS.



LAKESHORE AVENUE



LAKESHORE AVENUE



REVISION BLOCK

#	DATE	DESCRIPTION
1.	10/01/21	ISSUED DRAFT
2.	11/04/21	ISSUED DRAFT
3.	10/14/22	DRAFT EA ISSUED

DRAFT

KWA SITE DEVELOPMENT CONSULTING INC.
2355 Main Street Unit 1
Burlington, ON L7L 7A9

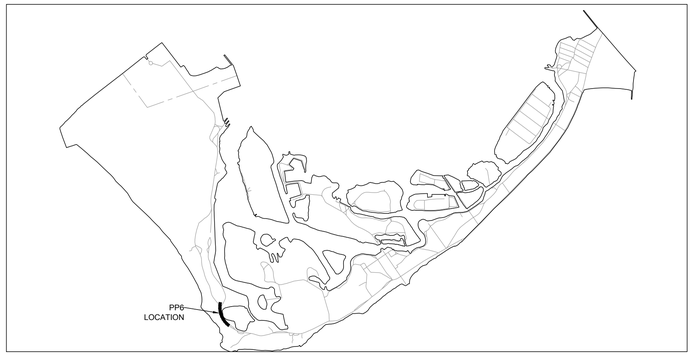
NORTH ARROW

METRIC SCALE
0 2 5 10
HORZ.1:300 VERT.1:30

LAKESHORE AVE
STA -0+220 TO -0+420
TORONTO REGION CONSERVATION AUTHORITY
TORONTO ISLAND PARK FLOOD & EROSION MITIGATION
TORONTO, ONTARIO

PROJECT No: 21600 | DRAWN BY: ARV | CHECKED BY: CDB

PP-5



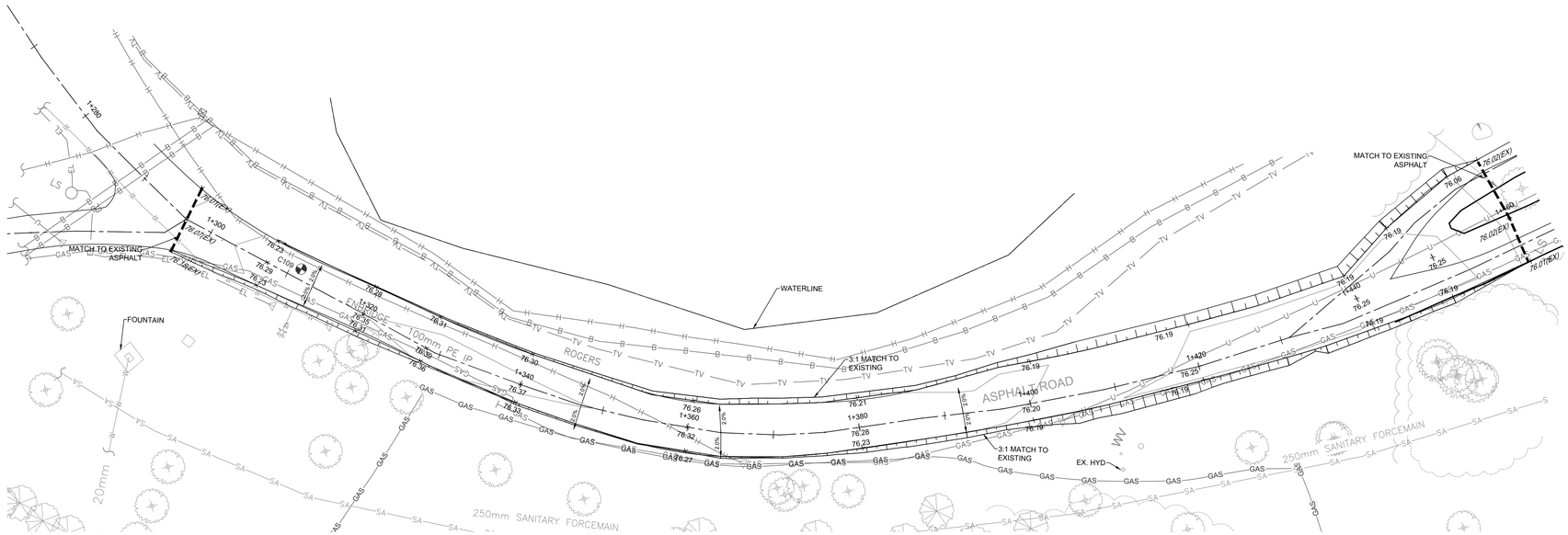
KEYPLAN (N.T.S.)

LEGEND

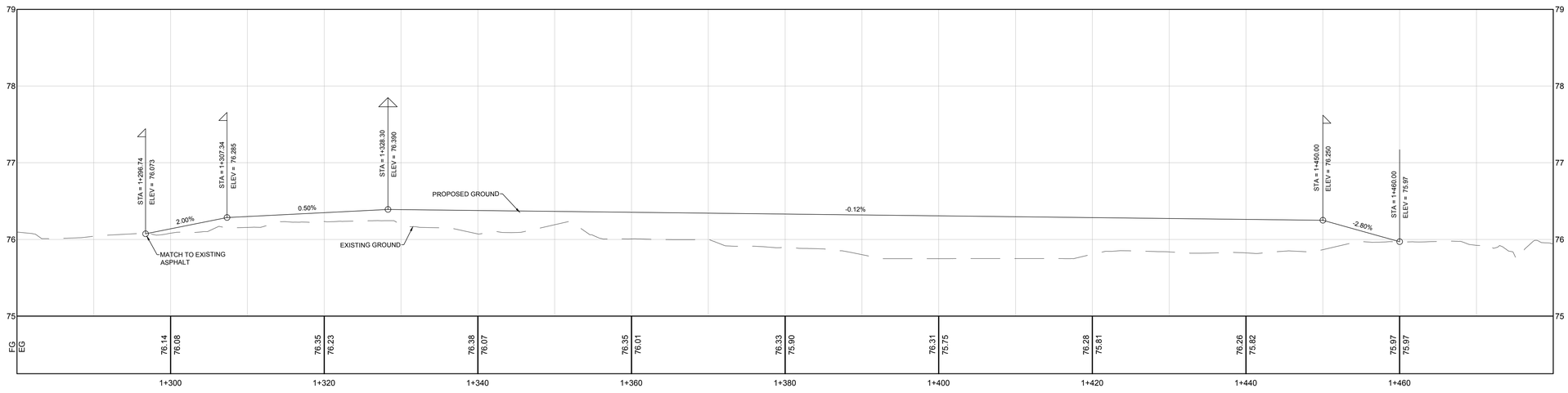
- EXISTING GROUND CONTOUR
- PROPOSED 3:1 SLOPE
- EXISTING CENTRELINE
- PROPSED ELEVATION
- PROPOSED GRADE
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- EXISTING HYDRANT
- EXISTING VALVE BOX
- EXISTING WATER CHAMBER
- EXISTING LIGHT STANDARD
- EXISTING HYDRO
- EXISTING BELL UTILITY
- EXISTING UTILITY
- EXISTING GASMAIN
- EXISTING ELECTRICAL
- EXISTING TREE

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS, ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS (OPSD & OPSS), THE WATER RESOURCES ACT, AND THE APPLICABLE ENVIRONMENTAL PROTECTION ACTS. WHERE A CITY OR REGION STANDARD EXISTS, IT SHALL BE USED IN PLACE OF THE PROVINCIAL STANDARD. ALL WORK SHALL CONFORM TO THE APPLICABLE HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2. INFORMATION REGARDING ALL EXISTING UNDERGROUND UTILITIES AND SERVICES SHOWN ON THE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS AND/OR AVAILABLE HISTORICAL DRAWINGS. THE ACCURACY OF THIS INFORMATION HAS NOT BEEN CONFIRMED BY KWA SITE DEVELOPMENT CONSULTING AND ALL UNDERGROUND INFORMATION NEEDS TO BE VERIFIED IN THE FIELD PRIOR TO BIDDING AND CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO ACQUIRE ALL UTILITY LOCATES PRIOR TO CONSTRUCTION AND TO NOTIFY THE ENGINEER OF ANY DISCREPANCIES. ANY LOST TIME DUE TO FAILURE TO IDENTIFY DISCREPANCIES OR NOTIFY THE ENGINEER SHALL BE AT THE CONTRACTOR'S EXPENSE.
3. THIS PLAN SHOULD BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANT'S PLANS AND ANY DISCREPANCIES REPORTED TO THE ENGINEER PRIOR TO CONSTRUCTION.
4. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND ANY DISCREPANCIES REPORTED TO THE ENGINEER. INFORMATION REGARDING PRIVATE ROADS, PARKING LOT CURBS, BUILDING LOCATIONS, AND SETBACKS SHALL BE TAKEN FROM THE SITE PLAN.
5. NO SUBSTITUTIONS SHALL BE ALLOWED WITHOUT ENGINEERS APPROVAL.
6. ALL DISTURBED AREAS SHALL BE REPAIRED TO ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE ENGINEER.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING AT THE SAME TIME AS THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES AND PREVENT CONSTRUCTION CONFLICTS.
8. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL PERMITS INCLUDING THIRD PARTY UTILITY COSTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING ALL NECESSARY SIGNALS, SIGNS, DELINEATORS, MARKERS AND BARRIERS. ALL TRAFFIC AND SAFETY MEASURES SHALL CONFORM TO CITY STANDARDS AND THE ONTARIO TRAFFIC MANUAL, BOOK 7 - TEMPORARY CONDITIONS, LATEST EDITION.
10. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED INSPECTIONS WITH THE CITY AND ANY OTHER REGULATORY AGENCIES. ALL WORK ON CITY PROPERTY OR INFRSTRUCTURE (INCLUDING EASEMENTS, SEWER WORK, AND WATERMAIN WORK) SHALL BE INSPECTED BY THE CITY (AS REQUIRED) PRIOR TO BACKFILLING.
11. THE CONTRACTOR IS RESPONSIBLE TO INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROLS AS REQUIRED BY THIS CONTRACT AND CITY AND PROVINCIAL STANDARDS.
12. CONTRACTOR RESPONSIBLE TO SUPPLY AND INSTALL ALL NECESSARY CONSTRUCTION FENCING.
13. CONTRACTOR TO PROVIDE WEEKLY REDLINE LINE AS-BUILT SURVEY TO THE ENGINEER FOR REVIEW. AS-BUILT TO SHOW PIPE INVERT, PIPE SIZE, AND PIPE MATERIAL.
14. CONTRACTOR TO PROVIDE AS-BUILT SURVEY OF COMPLETED SERVICING AND GRADING WORKS; INCLUDING INVERTS, ALL ABOVE GROUND WORKS AND SPOT ELEVATIONS AT MAXIMUM 15M GRID INTERVAL. SURVEY TO BE PREPARED BY LICENSED ONTARIO LAND SURVEYOR.
15. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE SITE-SPECIFIC GEOTECHNICAL REPORT ENTITLED "_____" PREPARED BY GROUNDED ENGINEERING, DATED_____ AND ALL APPLICABLE ADDENDUMS.



LAKESHORE AVENUE



REVISION BLOCK

#	DATE	DESCRIPTION
1.	10/01/21	ISSUED DRAFT
2.	11/04/21	ISSUED DRAFT
3.	10/14/22	DRAFT EA ISSUED

DRAFT

KWA SITE DEVELOPMENT CONSULTING INC.
2355 Main Street, Suite 200
Burlington, ON L7L 7A9

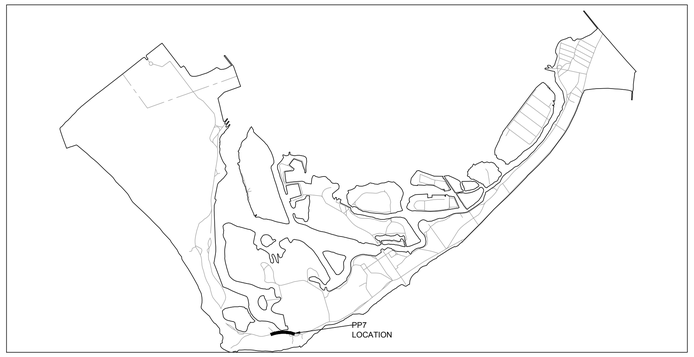
NORTH ARROW

METRIC SCALE
0 2 5 10
HORZ.1:300 VERT.1:30

LAKESHORE AVE
STA 1+280 TO 1+460
TORONTO REGION CONSERVATION AUTHORITY
TORONTO ISLAND PARK FLOOD & EROSION MITIGATION
TORONTO, ONTARIO

PROJECT No: 21600 | DRAWN BY: ARV | CHECKED BY: CDB

PP-6



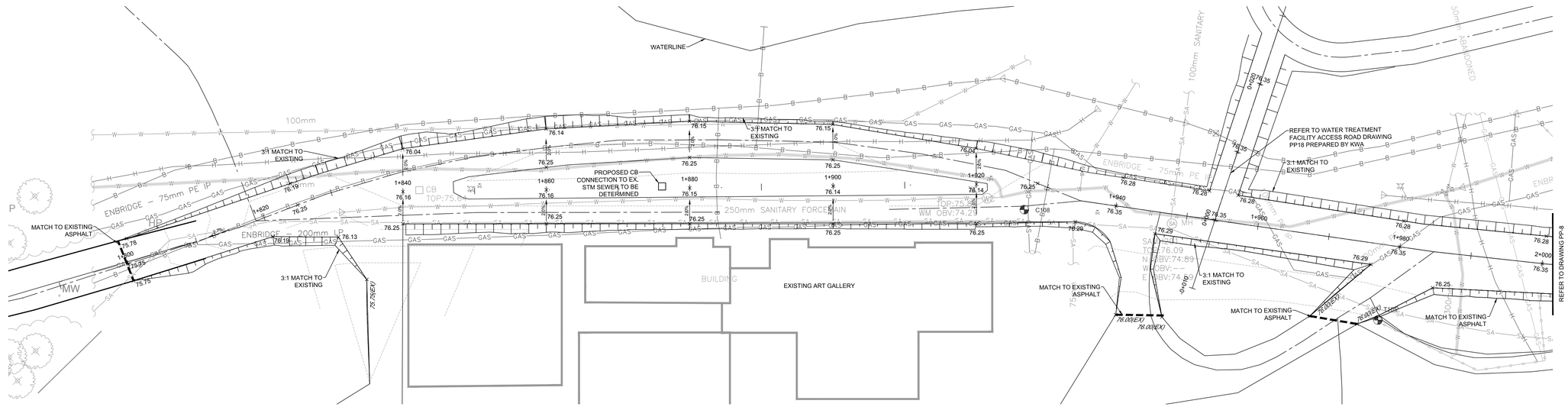
KEYPLAN (N.T.S.)

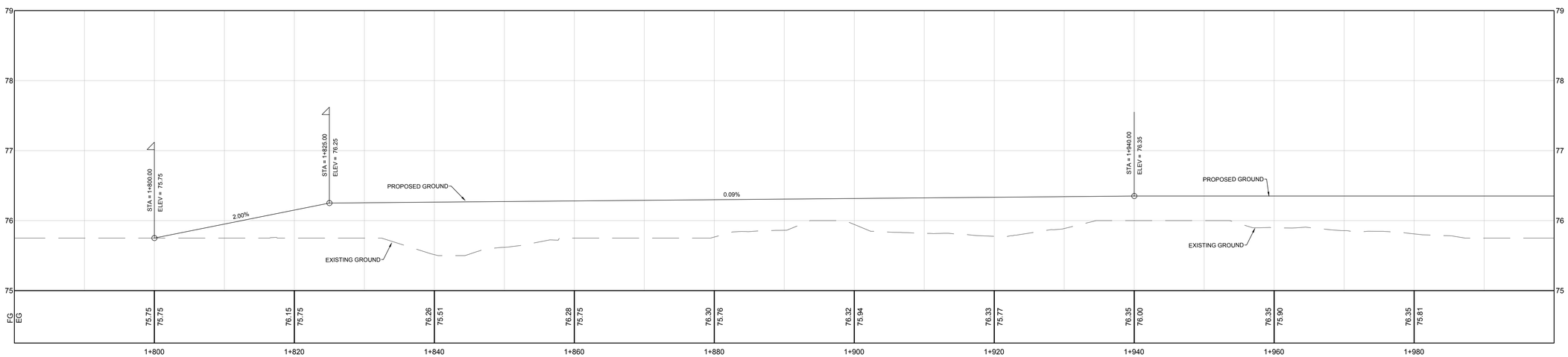
LEGEND

- 76.00 — EXISTING GROUND CONTOUR
- PROPOSED 3:1 SLOPE
- EXISTING CENTRELINE
- × 76.25 — PROPSED ELEVATION
- 2.0% — PROPOSED GRADE
- ST — EXISTING STORM SEWER
- SA — EXISTING SANITARY SEWER
- W — W — EXISTING WATERMAIN
- EXISTING HYDRANT
- EXISTING VALVE BOX
- WC — EXISTING WATER CHAMBER
- LS — EXISTING LIGHT STANDARD
- H — H — EXISTING HYDRO
- B — B — EXISTING BELL UTILITY
- U — U — EXISTING UTILITY
- GAS — GAS — EXISTING GASMAIN
- EL — EL — EXISTING ELECTRICAL

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS, ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS (OPSD & OPSS), THE WATER RESOURCES ACT, AND THE APPLICABLE ENVIRONMENTAL PROTECTION ACTS. WHERE A CITY OR REGION STANDARD EXISTS, IT SHALL BE USED IN PLACE OF THE PROVINCIAL STANDARD. ALL WORK SHALL CONFORM TO THE APPLICABLE HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2. INFORMATION REGARDING ALL EXISTING UNDERGROUND UTILITIES AND SERVICES SHOWN ON THE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS AND/OR AVAILABLE HISTORICAL DRAWINGS. THE ACCURACY OF THIS INFORMATION HAS NOT BEEN CONFIRMED BY KWA SITE DEVELOPMENT CONSULTING AND ALL UNDERGROUND INFORMATION NEEDS TO BE VERIFIED IN THE FIELD PRIOR TO BIDDING AND CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO ACQUIRE ALL UTILITY LOCATES PRIOR TO CONSTRUCTION AND TO NOTIFY THE ENGINEER OF ANY DISCREPANCIES. ANY LOST TIME DUE TO FAILURE TO IDENTIFY DISCREPANCIES OR NOTIFY THE ENGINEER SHALL BE AT THE CONTRACTOR'S EXPENSE.
3. THIS PLAN SHOULD BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANT'S PLANS AND ANY DISCREPANCIES REPORTED TO THE ENGINEER PRIOR TO CONSTRUCTION.
4. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND ANY DISCREPANCIES REPORTED TO THE ENGINEER. INFORMATION REGARDING PRIVATE ROADS, PARKING LOT CURBS, BUILDING LOCATIONS, AND SETBACKS SHALL BE TAKEN FROM THE SITE PLAN.
5. NO SUBSTITUTIONS SHALL BE ALLOWED WITHOUT ENGINEERS APPROVAL.
6. ALL DISTURBED AREAS SHALL BE REPAIRED TO ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE ENGINEER.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING AT THE SAME TIME AS THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES AND PREVENT CONSTRUCTION CONFLICTS.
8. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL PERMITS INCLUDING THIRD PARTY UTILITY COSTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING ALL NECESSARY SIGNALS, SIGNS, DELINEATORS, MARKERS AND BARRIERS. ALL TRAFFIC AND SAFETY MEASURES SHALL CONFORM TO CITY STANDARDS AND THE ONTARIO TRAFFIC MANUAL, BOOK 7 - TEMPORARY CONDITIONS, LATEST EDITION.
10. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED INSPECTIONS WITH THE CITY AND ANY OTHER REGULATORY AGENCIES. ALL WORK ON CITY PROPERTY OR INFRSTRUCTURE (INCLUDING EASEMENTS, SEWER WORK, AND WATERMAIN WORK) SHALL BE INSPECTED BY THE CITY (AS REQUIRED) PRIOR TO BACKFILLING.
11. THE CONTRACTOR IS RESPONSIBLE TO INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROLS AS REQUIRED BY THIS CONTRACT AND CITY AND PROVINCIAL STANDARDS.
12. CONTRACTOR RESPONSIBLE TO SUPPLY AND INSTALL ALL NECESSARY CONSTRUCTION FENCING.
13. CONTRACTOR TO PROVIDE WEEKLY REDLINE LINE AS-BUILT SURVEY TO THE ENGINEER FOR REVIEW. AS-BUILT TO SHOW PIPE INVERT, PIPE SIZE, AND PIPE MATERIAL.
14. CONTRACTOR TO PROVIDE AS-BUILT SURVEY OF COMPLETED SERVICING AND GRADING WORKS; INCLUDING INVERTS; ALL ABOVE GROUND WORKS AND SPOT ELEVATIONS AT MAXIMUM 15M GRID INTERVAL. SURVEY TO BE PREPARED BY LICENSED ONTARIO LAND SURVEYOR.
15. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE SITE-SPECIFIC GEOTECHNICAL REPORT ENTITLED "_____" PREPARED BY GROUNDED ENGINEERING, DATED_____ AND ALL APPLICABLE ADDENDUMS.





REVISION BLOCK

#	DATE	DESCRIPTION
1.	10/01/21	ISSUED DRAFT
2.	11/04/21	ISSUED DRAFT
3.	10/14/22	DRAFT EA ISSUED

DRAFT

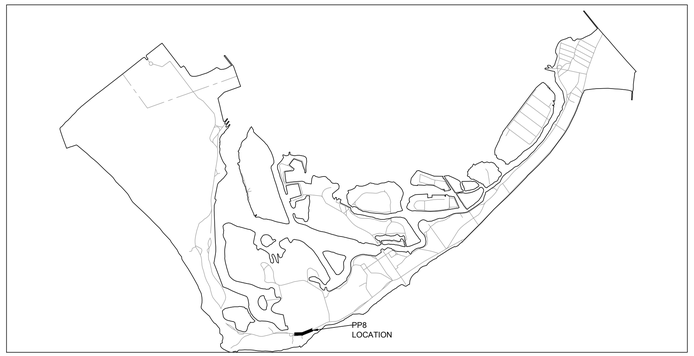
KWA SITE DEVELOPMENT CONSULTING INC.
2055 Appleby Line
Burlington, ON L7L 7A9

NORTH ARROW

METRIC SCALE
0 2 5 10
HORZ.1:300 VERT.1:30

LAKESHORE AVE
STA 1+780 TO 2+000
TORONTO REGION CONSERVATION AUTHORITY
TORONTO ISLAND PARK FLOOD & EROSION MITIGATION
TORONTO, ONTARIO
PROJECT No: 21600 | DRAWN BY: ARV | CHECKED BY: GDB

PP-7



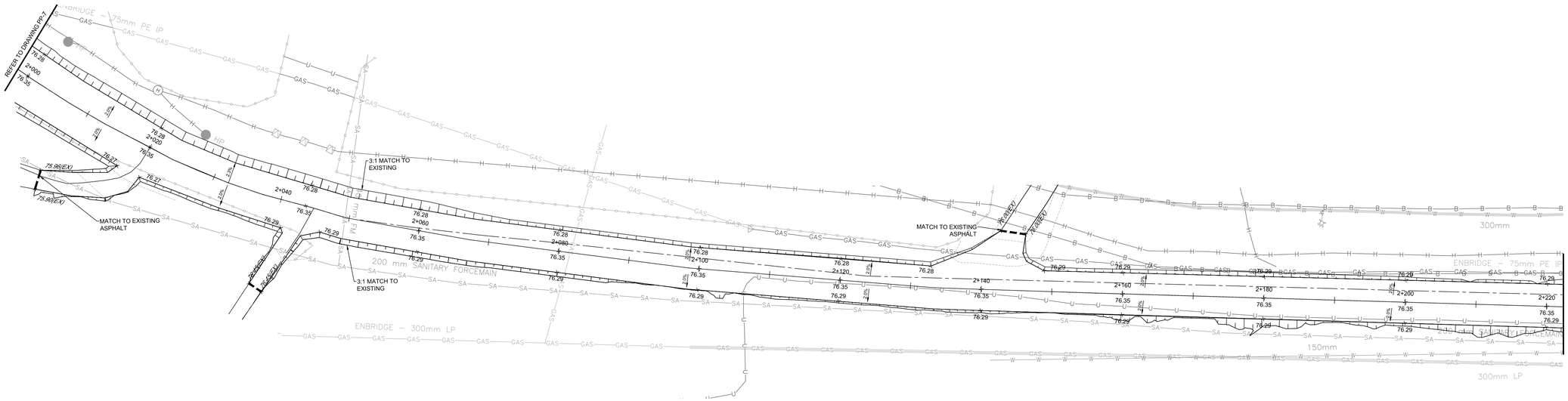
KEYPLAN (N.T.S.)

LEGEND

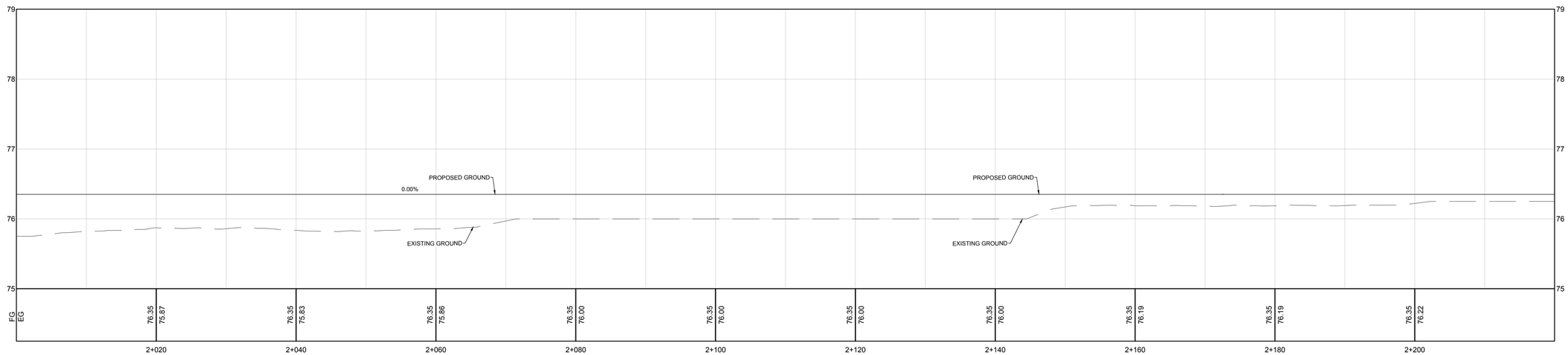
- 76.00 — EXISTING GROUND CONTOUR
- PROPOSED 3:1 SLOPE
- EXISTING CENTRELINE
- × 76.25 — PROPSED ELEVATION
- 2.0% — PROPOSED GRADE
- ST — EXISTING STORM SEWER
- SA — EXISTING SANITARY SEWER
- W — EXISTING WATERMAIN
- EXISTING HYDRANT
- EXISTING VALVE BOX
- WC — EXISTING WATER CHAMBER
- LS — EXISTING LIGHT STANDARD
- H — EXISTING HYDRO
- B — EXISTING BELL UTILITY
- U — EXISTING UTILITY
- GAS — EXISTING GASMAIN
- EL — EXISTING ELECTRICAL

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS, ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS (OPSD & OPSS), THE WATER RESOURCES ACT, AND THE APPLICABLE ENVIRONMENTAL PROTECTION ACTS. WHERE A CITY OR REGION STANDARD EXISTS, IT SHALL BE USED IN PLACE OF THE PROVINCIAL STANDARD. ALL WORK SHALL CONFORM TO THE APPLICABLE HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2. INFORMATION REGARDING ALL EXISTING UNDERGROUND UTILITIES AND SERVICES SHOWN ON THE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS AND/OR AVAILABLE HISTORICAL DRAWINGS. THE ACCURACY OF THIS INFORMATION HAS NOT BEEN CONFIRMED BY KWA SITE DEVELOPMENT CONSULTING AND ALL UNDERGROUND INFORMATION NEEDS TO BE VERIFIED IN THE FIELD PRIOR TO BIDDING AND CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO ACQUIRE ALL UTILITY LOCATES PRIOR TO CONSTRUCTION AND TO NOTIFY THE ENGINEER OF ANY DISCREPANCIES. ANY LOST TIME DUE TO FAILURE TO IDENTIFY DISCREPANCIES OR NOTIFY THE ENGINEER SHALL BE AT THE CONTRACTOR'S EXPENSE.
3. THIS PLAN SHOULD BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANT'S PLANS AND ANY DISCREPANCIES REPORTED TO THE ENGINEER PRIOR TO CONSTRUCTION.
4. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND ANY DISCREPANCIES REPORTED TO THE ENGINEER. INFORMATION REGARDING PRIVATE ROADS, PARKING LOT CURBS, BUILDING LOCATIONS, AND SETBACKS SHALL BE TAKEN FROM THE SITE PLAN.
5. NO SUBSTITUTIONS SHALL BE ALLOWED WITHOUT ENGINEERS APPROVAL.
6. ALL DISTURBED AREAS SHALL BE REPAIRED TO ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE ENGINEER.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING AT THE SAME TIME AS THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES AND PREVENT CONSTRUCTION CONFLICTS.
8. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL PERMITS INCLUDING THIRD PARTY UTILITY COSTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING ALL NECESSARY SIGNALS, SIGNS, DELINEATORS, MARKERS AND BARRIERS. ALL TRAFFIC AND SAFETY MEASURES SHALL CONFORM TO CITY STANDARDS AND THE ONTARIO TRAFFIC MANUAL, BOOK 7 - TEMPORARY CONDITIONS, LATEST EDITION.
10. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED INSPECTIONS WITH THE CITY AND ANY OTHER REGULATORY AGENCIES. ALL WORK ON CITY PROPERTY OR INFRSTRUCTURE (INCLUDING EASEMENTS, SEWER WORK, AND WATERMAIN WORK) SHALL BE INSPECTED BY THE CITY (AS REQUIRED) PRIOR TO BACKFILLING.
11. THE CONTRACTOR IS RESPONSIBLE TO INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROLS AS REQUIRED BY THIS CONTRACT AND CITY AND PROVINCIAL STANDARDS.
12. CONTRACTOR RESPONSIBLE TO SUPPLY AND INSTALL ALL NECESSARY CONSTRUCTION FENCING.
13. CONTRACTOR TO PROVIDE WEEKLY REDLINE LINE AS-BUILT SURVEY TO THE ENGINEER FOR REVIEW. AS-BUILT TO SHOW PIPE INVERT, PIPE SIZE, AND PIPE MATERIAL.
14. CONTRACTOR TO PROVIDE AS-BUILT SURVEY OF COMPLETED SERVICING AND GRADING WORKS; INCLUDING INVERTS; ALL ABOVE GROUND WORKS AND SPOT ELEVATIONS AT MAXIMUM 15M GRID INTERVAL. SURVEY TO BE PREPARED BY LICENSED ONTARIO LAND SURVEYOR.
15. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE SITE-SPECIFIC GEOTECHNICAL REPORT ENTITLED "_____" PREPARED BY GROUNDED ENGINEERING, DATED_____ AND ALL APPLICABLE ADDENDUMS.



LAKESHORE AVENUE



REVISION BLOCK		
#	DATE	DESCRIPTION
1.	10/01/21	ISSUED DRAFT
2.	11/04/21	ISSUED DRAFT
3.	10/14/22	DRAFT EA ISSUED

DRAFT

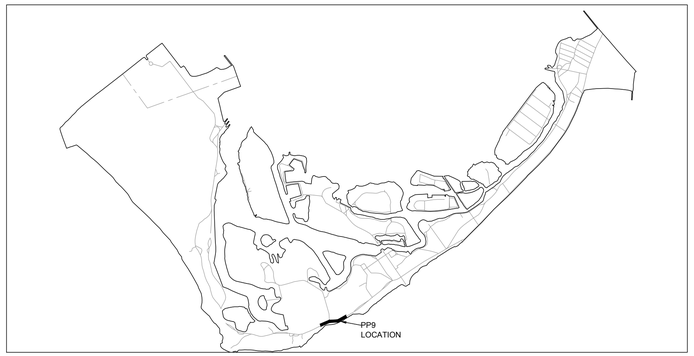
KWA SITE DEVELOPMENT CONSULTING INC.
2355 Main Street, Suite 200
Burlington, ON L7L 7A9

NORTH ARROW

METRIC SCALE
0 2 5 10
HORZ.1:300 VERT.1:30

LAKESHORE AVE
STA 2+000 TO 2+220
TORONTO REGION CONSERVATION AUTHORITY
TORONTO ISLAND PARK FLOOD & EROSION MITIGATION
TORONTO, ONTARIO
PROJECT No: 21600 | DRAWN BY: ARV | CHECKED BY: GDB

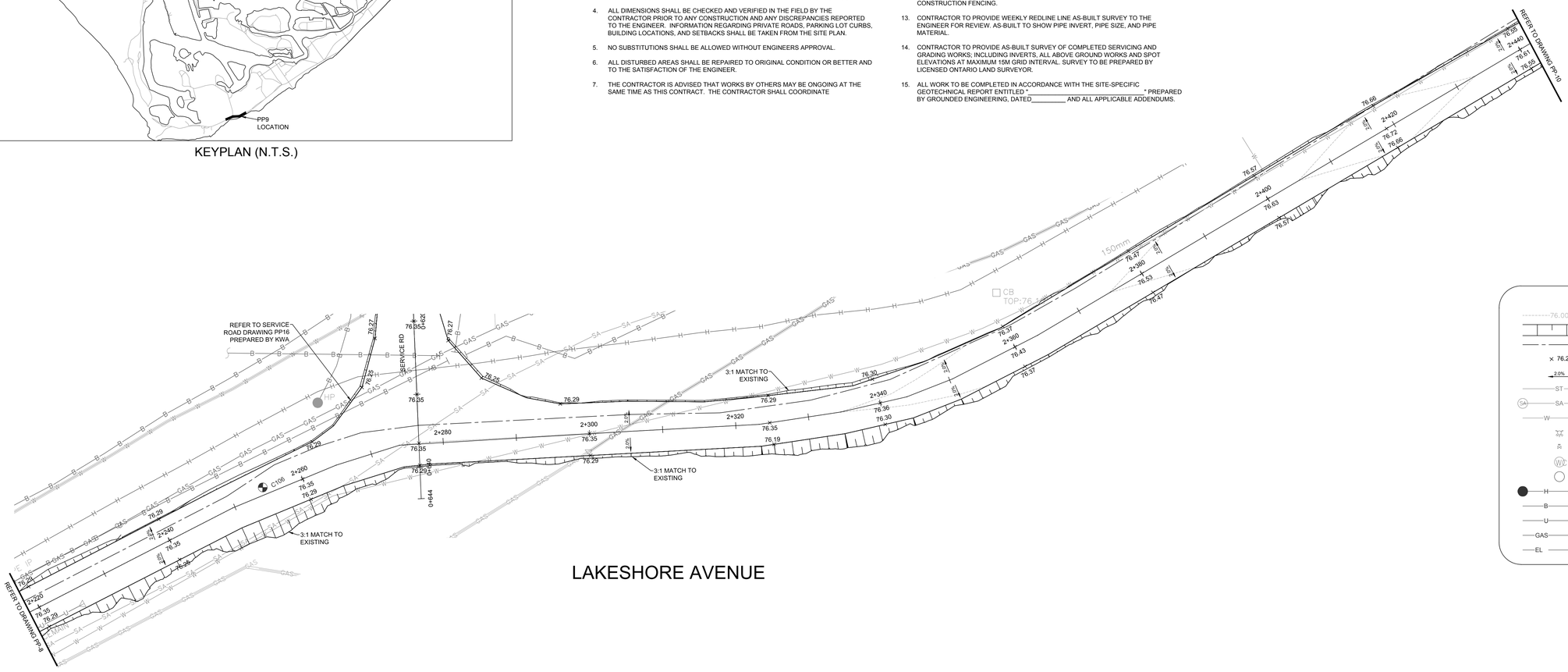
PP-8



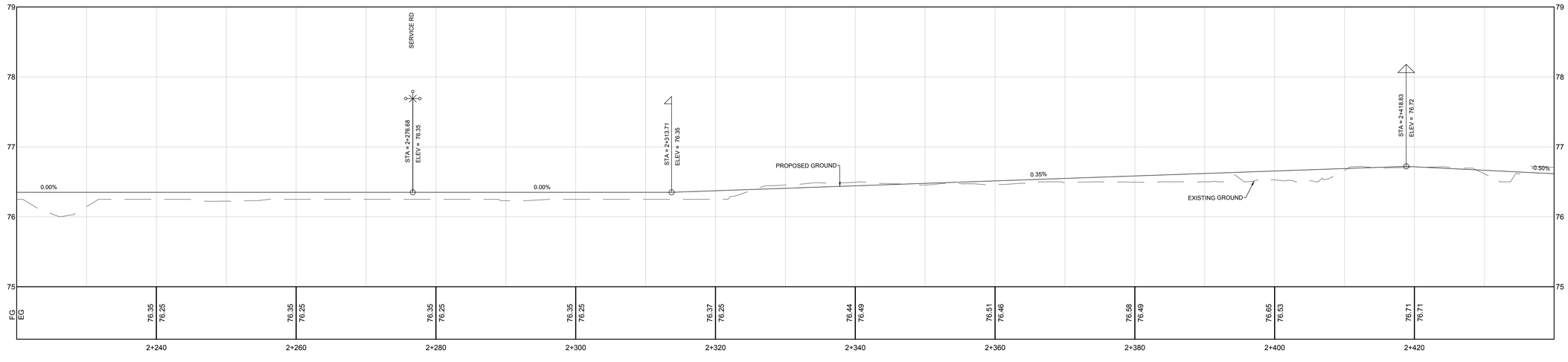
KEYPLAN (N.T.S.)

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS, ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS (OPSD & OPSS), THE WATER RESOURCES ACT, AND THE APPLICABLE ENVIRONMENTAL PROTECTION ACTS. WHERE A CITY OR REGION STANDARD EXISTS, IT SHALL BE USED IN PLACE OF THE PROVINCIAL STANDARD. ALL WORK SHALL CONFORM TO THE APPLICABLE HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2. INFORMATION REGARDING ALL EXISTING UNDERGROUND UTILITIES AND SERVICES SHOWN ON THE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS AND/OR AVAILABLE HISTORICAL DRAWINGS. THE ACCURACY OF THIS INFORMATION HAS NOT BEEN CONFIRMED BY KWA SITE DEVELOPMENT CONSULTING AND ALL UNDERGROUND INFORMATION NEEDS TO BE VERIFIED IN THE FIELD PRIOR TO BIDDING AND CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO ACQUIRE ALL UTILITY LOCATES PRIOR TO CONSTRUCTION AND TO NOTIFY THE ENGINEER OF ANY DISCREPANCIES. ANY LOST TIME DUE TO FAILURE TO IDENTIFY DISCREPANCIES OR NOTIFY THE ENGINEER SHALL BE AT THE CONTRACTOR'S EXPENSE.
3. THIS PLAN SHOULD BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANT'S PLANS AND ANY DISCREPANCIES REPORTED TO THE ENGINEER PRIOR TO CONSTRUCTION.
4. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND ANY DISCREPANCIES REPORTED TO THE ENGINEER. INFORMATION REGARDING PRIVATE ROADS, PARKING LOT CURBS, BUILDING LOCATIONS, AND SETBACKS SHALL BE TAKEN FROM THE SITE PLAN.
5. NO SUBSTITUTIONS SHALL BE ALLOWED WITHOUT ENGINEERS APPROVAL.
6. ALL DISTURBED AREAS SHALL BE REPAIRED TO ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE ENGINEER.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING AT THE SAME TIME AS THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES AND PREVENT CONSTRUCTION CONFLICTS.
8. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL PERMITS INCLUDING THIRD PARTY UTILITY COSTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING ALL NECESSARY SIGNALS, SIGNS, DELINEATORS, MARKERS AND BARRIERS. ALL TRAFFIC AND SAFETY MEASURES SHALL CONFORM TO CITY STANDARDS AND THE ONTARIO TRAFFIC MANUAL, BOOK 7 - TEMPORARY CONDITIONS, LATEST EDITION.
10. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED INSPECTIONS WITH THE CITY AND ANY OTHER REGULATORY AGENCIES. ALL WORK ON CITY PROPERTY OR INFRSTRUCTURE (INCLUDING EASEMENTS, SEWER WORK, AND WATERMAIN WORK) SHALL BE INSPECTED BY THE CITY (AS REQUIRED) PRIOR TO BACKFILLING.
11. THE CONTRACTOR IS RESPONSIBLE TO INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROLS AS REQUIRED BY THIS CONTRACT AND CITY AND PROVINCIAL STANDARDS.
12. CONTRACTOR RESPONSIBLE TO SUPPLY AND INSTALL ALL NECESSARY CONSTRUCTION FENCING.
13. CONTRACTOR TO PROVIDE WEEKLY REDLINE LINE AS-BUILT SURVEY TO THE ENGINEER FOR REVIEW. AS-BUILT TO SHOW PIPE INVERT, PIPE SIZE, AND PIPE MATERIAL.
14. CONTRACTOR TO PROVIDE AS-BUILT SURVEY OF COMPLETED SERVICING AND GRADING WORKS, INCLUDING INVERTS, ALL ABOVE GROUND WORKS AND SPOT ELEVATIONS AT MAXIMUM 15M GRID INTERVAL. SURVEY TO BE PREPARED BY LICENSED ONTARIO LAND SURVEYOR.
15. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE SITE-SPECIFIC GEOTECHNICAL REPORT ENTITLED "_____ " PREPARED BY GROUNDED ENGINEERING, DATED_____ AND ALL APPLICABLE ADDENDUMS.



LAKESHORE AVENUE



LEGEND

- EXISTING GROUND CONTOUR
- PROPOSED 3:1 SLOPE
- EXISTING CENTRELINE
- PROPSED ELEVATION
- PROPOSED GRADE
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- EXISTING HYDRANT
- EXISTING VALVE BOX
- EXISTING WATER CHAMBER
- EXISTING LIGHT STANDARD
- EXISTING HYDRO
- EXISTING BELL UTILITY
- EXISTING UTILITY
- EXISTING GASMAIN
- EXISTING ELECTRICAL

REVISION BLOCK

#	DATE	DESCRIPTION
1.	10/01/21	ISSUED DRAFT
2.	11/04/21	ISSUED DRAFT
3.	10/14/22	DRAFT EA ISSUED

DRAFT

KWA SITE DEVELOPMENT CONSULTING INC.
2355 Main Street, Unit 1
Burlington, ON L7L 7A9

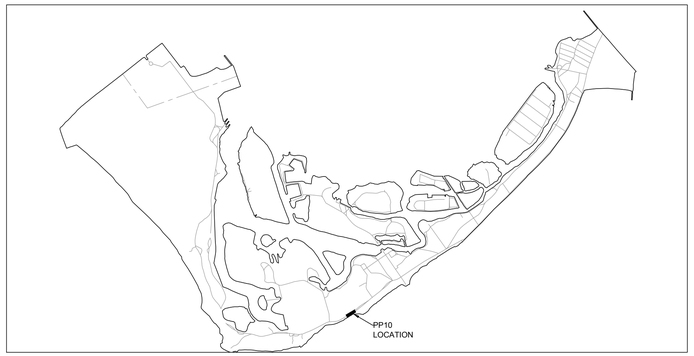
NORTH ARROW

METRIC SCALE
0 2 5 10
HORZ.1:300 VERT.1:30

LAKESHORE AVE
STA 2+220 TO 2+440
TORONTO REGION CONSERVATION AUTHORITY
TORONTO ISLAND PARK FLOOD & EROSION MITIGATION
TORONTO, ONTARIO

CHECKED BY: CDB
DRAWN BY: ARV
PROJECT No: 21600

PP-9



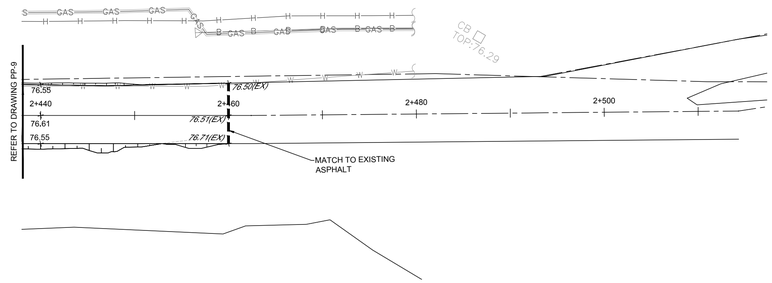
KEYPLAN (N.T.S.)

LEGEND

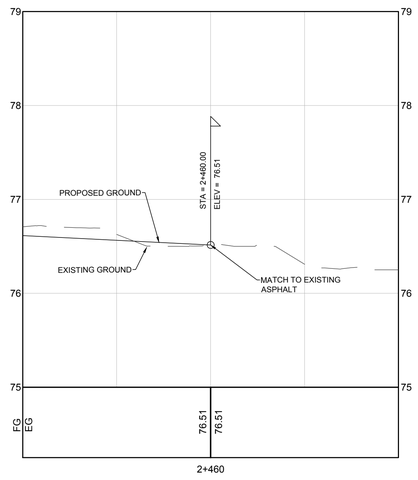
76.00	EXISTING GROUND CONTOUR
	PROPOSED 3:1 SLOPE
	EXISTING CENTRELINE
× 76.25	PROPSED ELEVATION
2.0%	PROPOSED GRADE
ST	EXISTING STORM SEWER
SA	EXISTING SANITARY SEWER
W	EXISTING WATERMAIN
	EXISTING HYDRANT
	EXISTING VALVE BOX
WC	EXISTING WATER CHAMBER
LS	EXISTING LIGHT STANDARD
H	EXISTING HYDRO
B	EXISTING BELL UTILITY
U	EXISTING UTILITY
GAS	EXISTING GASMAIN
EL	EXISTING ELECTRICAL

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS, ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS (OPSD & OPSS), THE WATER RESOURCES ACT, AND THE APPLICABLE ENVIRONMENTAL PROTECTION ACTS. WHERE A CITY OR REGION STANDARD EXISTS, IT SHALL BE USED IN PLACE OF THE PROVINCIAL STANDARD. ALL WORK SHALL CONFORM TO THE APPLICABLE HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2. INFORMATION REGARDING ALL EXISTING UNDERGROUND UTILITIES AND SERVICES SHOWN ON THE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS AND/OR AVAILABLE HISTORICAL DRAWINGS. THE ACCURACY OF THIS INFORMATION HAS NOT BEEN CONFIRMED BY KWA SITE DEVELOPMENT CONSULTING AND ALL UNDERGROUND INFORMATION NEEDS TO BE VERIFIED IN THE FIELD PRIOR TO BIDDING AND CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO ACQUIRE ALL UTILITY LOCATES PRIOR TO CONSTRUCTION AND TO NOTIFY THE ENGINEER OF ANY DISCREPANCIES. ANY LOST TIME DUE TO FAILURE TO IDENTIFY DISCREPANCIES OR NOTIFY THE ENGINEER SHALL BE AT THE CONTRACTOR'S EXPENSE.
3. THIS PLAN SHOULD BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANT'S PLANS AND ANY DISCREPANCIES REPORTED TO THE ENGINEER PRIOR TO CONSTRUCTION.
4. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND ANY DISCREPANCIES REPORTED TO THE ENGINEER. INFORMATION REGARDING PRIVATE ROADS, PARKING LOT CURBS, BUILDING LOCATIONS, AND SETBACKS SHALL BE TAKEN FROM THE SITE PLAN.
5. NO SUBSTITUTIONS SHALL BE ALLOWED WITHOUT ENGINEERS APPROVAL.
6. ALL DISTURBED AREAS SHALL BE REPAIRED TO ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE ENGINEER.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING AT THE SAME TIME AS THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES AND PREVENT CONSTRUCTION CONFLICTS.
8. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL PERMITS INCLUDING THIRD PARTY UTILITY COSTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING ALL NECESSARY SIGNALS, SIGNS, DELINEATORS, MARKERS AND BARRIERS. ALL TRAFFIC AND SAFETY MEASURES SHALL CONFORM TO CITY STANDARDS AND THE ONTARIO TRAFFIC MANUAL, BOOK 7 - TEMPORARY CONDITIONS, LATEST EDITION.
10. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED INSPECTIONS WITH THE CITY AND ANY OTHER REGULATORY AGENCIES. ALL WORK ON CITY PROPERTY OR INFRSTRUCTURE (INCLUDING EASEMENTS, SEWER WORK, AND WATERMAIN WORK) SHALL BE INSPECTED BY THE CITY (AS REQUIRED) PRIOR TO BACKFILLING.
11. THE CONTRACTOR IS RESPONSIBLE TO INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROLS AS REQUIRED BY THIS CONTRACT AND CITY AND PROVINCIAL STANDARDS.
12. CONTRACTOR RESPONSIBLE TO SUPPLY AND INSTALL ALL NECESSARY CONSTRUCTION FENCING.
13. CONTRACTOR TO PROVIDE WEEKLY REDLINE LINE AS-BUILT SURVEY TO THE ENGINEER FOR REVIEW. AS-BUILT TO SHOW PIPE INVERT, PIPE SIZE, AND PIPE MATERIAL.
14. CONTRACTOR TO PROVIDE AS-BUILT SURVEY OF COMPLETED SERVICING AND GRADING WORKS; INCLUDING INVERTS; ALL ABOVE GROUND WORKS AND SPOT ELEVATIONS AT MAXIMUM 15M GRID INTERVAL. SURVEY TO BE PREPARED BY LICENSED ONTARIO LAND SURVEYOR.
15. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE SITE-SPECIFIC GEOTECHNICAL REPORT ENTITLED "_____" PREPARED BY GROUNDED ENGINEERING, DATED_____ AND ALL APPLICABLE ADDENDUMS.



LAKESHORE AVENUE



REVISION BLOCK

#	DATE	DESCRIPTION
1.	10/01/21	ISSUED DRAFT
2.	11/04/21	ISSUED DRAFT
3.	10/14/22	DRAFT EA ISSUED

DRAFT

KWA SITE DEVELOPMENT CONSULTING INC.
2355 Main Street, Unit 1
Burlington, ON L7L 7A9

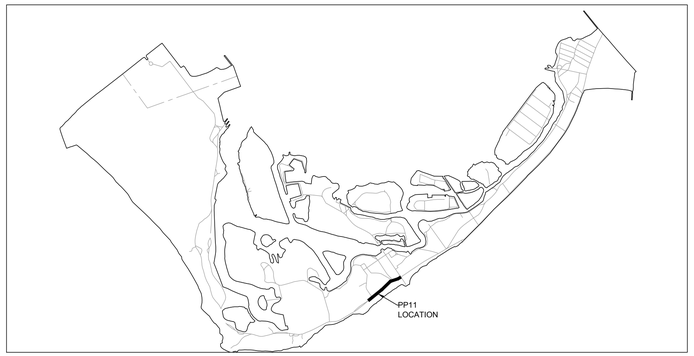
NORTH ARROW

METRIC SCALE
0 2 5 10
HORZ.1:300 VERT.1:30

LAKESHORE AVE
STA 2+440 TO 2+480
TORONTO REGION CONSERVATION AUTHORITY
TORONTO ISLAND PARK FLOOD & EROSION MITIGATION
TORONTO, ONTARIO

PROJECT No: 21600 | DRAWN BY: ARV | CHECKED BY: CDB

PP-10



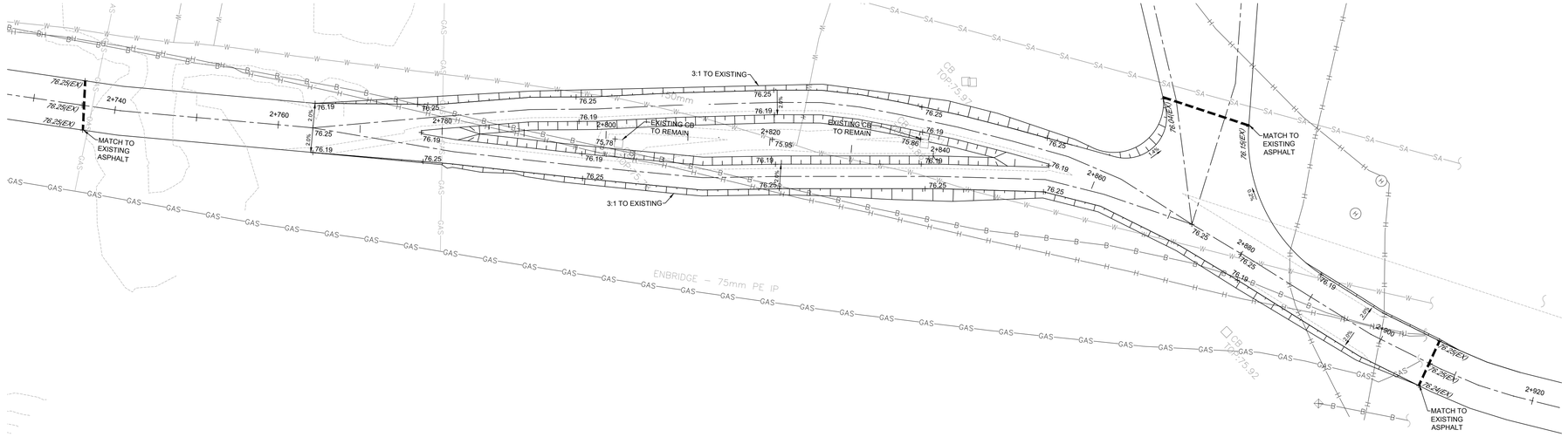
KEYPLAN (N.T.S.)

LEGEND

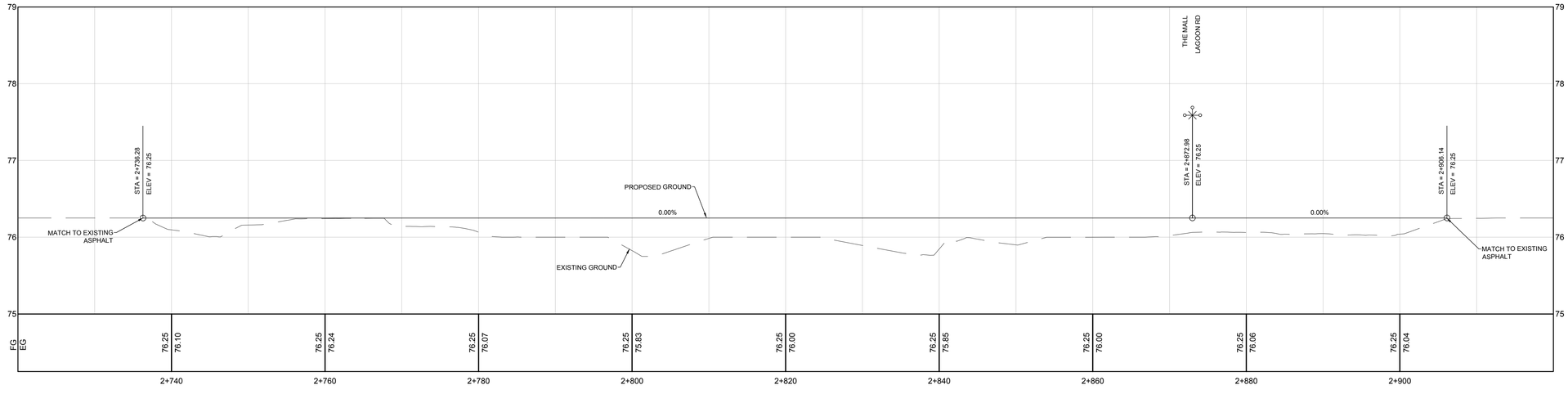
76.00	EXISTING GROUND CONTOUR
	PROPOSED 3:1 SLOPE
	EXISTING CENTRELINE
× 76.25	PROPSED ELEVATION
2.0%	PROPOSED GRADE
ST	EXISTING STORM SEWER
SA	EXISTING SANITARY SEWER
W	EXISTING WATERMAIN
	EXISTING HYDRANT
	EXISTING VALVE BOX
WC	EXISTING WATER CHAMBER
LS	EXISTING LIGHT STANDARD
H	EXISTING HYDRO
B	EXISTING BELL UTILITY
U	EXISTING UTILITY
GAS	EXISTING GASMAIN
EL	EXISTING ELECTRICAL

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS, ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS (OPSD & OPSS), THE WATER RESOURCES ACT, AND THE APPLICABLE ENVIRONMENTAL PROTECTION ACTS. WHERE A CITY OR REGION STANDARD EXISTS, IT SHALL BE USED IN PLACE OF THE PROVINCIAL STANDARD. ALL WORK SHALL CONFORM TO THE APPLICABLE HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2. INFORMATION REGARDING ALL EXISTING UNDERGROUND UTILITIES AND SERVICES SHOWN ON THE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS AND/OR AVAILABLE HISTORICAL DRAWINGS. THE ACCURACY OF THIS INFORMATION HAS NOT BEEN CONFIRMED BY KWA SITE DEVELOPMENT CONSULTING AND ALL UNDERGROUND INFORMATION NEEDS TO BE VERIFIED IN THE FIELD PRIOR TO BIDDING AND CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO ACQUIRE ALL UTILITY LOCATES PRIOR TO CONSTRUCTION AND TO NOTIFY THE ENGINEER OF ANY DISCREPANCIES. ANY LOST TIME DUE TO FAILURE TO IDENTIFY DISCREPANCIES OR NOTIFY THE ENGINEER SHALL BE AT THE CONTRACTOR'S EXPENSE.
3. THIS PLAN SHOULD BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANT'S PLANS AND ANY DISCREPANCIES REPORTED TO THE ENGINEER PRIOR TO CONSTRUCTION.
4. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND ANY DISCREPANCIES REPORTED TO THE ENGINEER. INFORMATION REGARDING PRIVATE ROADS, PARKING LOT CURBS, BUILDING LOCATIONS, AND SETBACKS SHALL BE TAKEN FROM THE SITE PLAN.
5. NO SUBSTITUTIONS SHALL BE ALLOWED WITHOUT ENGINEERS APPROVAL.
6. ALL DISTURBED AREAS SHALL BE REPAIRED TO ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE ENGINEER.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING AT THE SAME TIME AS THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES AND PREVENT CONSTRUCTION CONFLICTS.
8. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL PERMITS INCLUDING THIRD PARTY UTILITY COSTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING ALL NECESSARY SIGNALS, SIGNS, DELINEATORS, MARKERS AND BARRIERS. ALL TRAFFIC AND SAFETY MEASURES SHALL CONFORM TO CITY STANDARDS AND THE ONTARIO TRAFFIC MANUAL, BOOK 7 - TEMPORARY CONDITIONS, LATEST EDITION.
10. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED INSPECTIONS WITH THE CITY AND ANY OTHER REGULATORY AGENCIES. ALL WORK ON CITY PROPERTY OR INFRSTRUCTURE (INCLUDING EASEMENTS, SEWER WORK, AND WATERMAIN WORK) SHALL BE INSPECTED BY THE CITY (AS REQUIRED) PRIOR TO BACKFILLING.
11. THE CONTRACTOR IS RESPONSIBLE TO INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROLS AS REQUIRED BY THIS CONTRACT AND CITY AND PROVINCIAL STANDARDS.
12. CONTRACTOR RESPONSIBLE TO SUPPLY AND INSTALL ALL NECESSARY CONSTRUCTION FENCING.
13. CONTRACTOR TO PROVIDE WEEKLY REDLINE LINE AS-BUILT SURVEY TO THE ENGINEER FOR REVIEW. AS-BUILT TO SHOW PIPE INVERT, PIPE SIZE, AND PIPE MATERIAL.
14. CONTRACTOR TO PROVIDE AS-BUILT SURVEY OF COMPLETED SERVICING AND GRADING WORKS; INCLUDING INVERTS; ALL ABOVE GROUND WORKS AND SPOT ELEVATIONS AT MAXIMUM 15M GRID INTERVAL. SURVEY TO BE PREPARED BY LICENSED ONTARIO LAND SURVEYOR.
15. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE SITE-SPECIFIC GEOTECHNICAL REPORT ENTITLED "_____" PREPARED BY GROUNDED ENGINEERING, DATED_____ AND ALL APPLICABLE ADDENDUMS.



LAKESHORE AVENUE



REVISION BLOCK

#	DATE	DESCRIPTION
1.	10/01/21	ISSUED DRAFT
2.	11/04/21	ISSUED DRAFT
3.	10/14/22	DRAFT EA ISSUED

DRAFT

KWA SITE DEVELOPMENT CONSULTING INC.
2355 Main Street Unit 1
Burlington, ON L7L 7A9

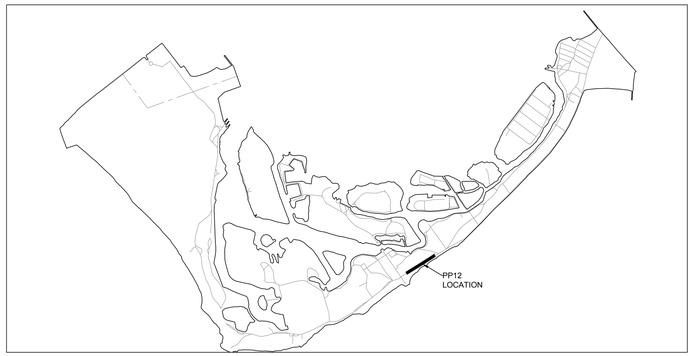
NORTH ARROW

METRIC SCALE
0 2 5 10
HORZ.1:300 VERT.1:30

LAKESHORE AVE
STA 2+720 TO 2+920
TORONTO REGION CONSERVATION AUTHORITY
TORONTO ISLAND PARK FLOOD & EROSION MITIGATION
TORONTO, ONTARIO

PROJECT No: 21600 | DRAWN BY: ARV | CHECKED BY: CDB

PP-11



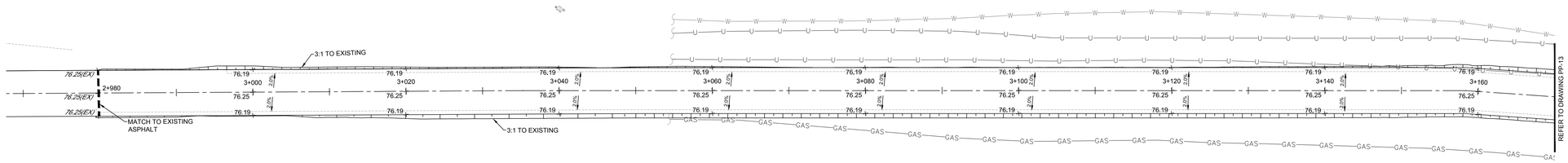
KEYPLAN (N.T.S.)

LEGEND

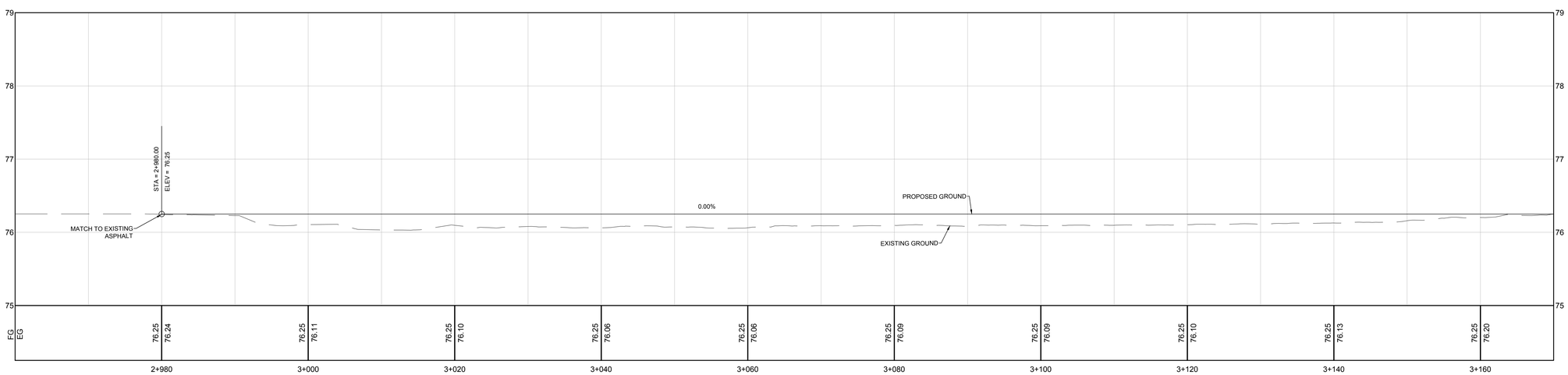
76.00	EXISTING GROUND CONTOUR
	PROPOSED 3:1 SLOPE
	EXISTING CENTRELINE
× 76.25	PROPSED ELEVATION
2.0%	PROPOSED GRADE
ST	EXISTING STORM SEWER
SA	EXISTING SANITARY SEWER
W	EXISTING WATERMAIN
	EXISTING HYDRANT
	EXISTING VALVE BOX
WC	EXISTING WATER CHAMBER
LS	EXISTING LIGHT STANDARD
H	EXISTING HYDRO
B	EXISTING BELL UTILITY
U	EXISTING UTILITY
GAS	EXISTING GASMAIN
EL	EXISTING ELECTRICAL

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS, ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS (OPSD & OPSS), THE WATER RESOURCES ACT, AND THE APPLICABLE ENVIRONMENTAL PROTECTION ACTS. WHERE A CITY OR REGION STANDARD EXISTS, IT SHALL BE USED IN PLACE OF THE PROVINCIAL STANDARD. ALL WORK SHALL CONFORM TO THE APPLICABLE HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2. INFORMATION REGARDING ALL EXISTING UNDERGROUND UTILITIES AND SERVICES SHOWN ON THE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS AND/OR AVAILABLE HISTORICAL DRAWINGS. THE ACCURACY OF THIS INFORMATION HAS NOT BEEN CONFIRMED BY KWA SITE DEVELOPMENT CONSULTING AND ALL UNDERGROUND INFORMATION NEEDS TO BE VERIFIED IN THE FIELD PRIOR TO BIDDING AND CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO ACQUIRE ALL UTILITY LOCATES PRIOR TO CONSTRUCTION AND TO NOTIFY THE ENGINEER OF ANY DISCREPANCIES. ANY LOST TIME DUE TO FAILURE TO IDENTIFY DISCREPANCIES OR NOTIFY THE ENGINEER SHALL BE AT THE CONTRACTOR'S EXPENSE.
3. THIS PLAN SHOULD BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANT'S PLANS AND ANY DISCREPANCIES REPORTED TO THE ENGINEER PRIOR TO CONSTRUCTION.
4. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND ANY DISCREPANCIES REPORTED TO THE ENGINEER. INFORMATION REGARDING PRIVATE ROADS, PARKING LOT CURBS, BUILDING LOCATIONS, AND SETBACKS SHALL BE TAKEN FROM THE SITE PLAN.
5. NO SUBSTITUTIONS SHALL BE ALLOWED WITHOUT ENGINEERS APPROVAL.
6. ALL DISTURBED AREAS SHALL BE REPAIRED TO ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE ENGINEER.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING AT THE SAME TIME AS THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES AND PREVENT CONSTRUCTION CONFLICTS.
8. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL PERMITS INCLUDING THIRD PARTY UTILITY COSTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING ALL NECESSARY SIGNALS, SIGNS, DELINEATORS, MARKERS AND BARRIERS. ALL TRAFFIC AND SAFETY MEASURES SHALL CONFORM TO CITY STANDARDS AND THE ONTARIO TRAFFIC MANUAL, BOOK 7 - TEMPORARY CONDITIONS, LATEST EDITION.
10. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED INSPECTIONS WITH THE CITY AND ANY OTHER REGULATORY AGENCIES. ALL WORK ON CITY PROPERTY OR INFRSTRUCTURE (INCLUDING EASEMENTS, SEWER WORK, AND WATERMAIN WORK) SHALL BE INSPECTED BY THE CITY (AS REQUIRED) PRIOR TO BACKFILLING.
11. THE CONTRACTOR IS RESPONSIBLE TO INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROLS AS REQUIRED BY THIS CONTRACT AND CITY AND PROVINCIAL STANDARDS.
12. CONTRACTOR RESPONSIBLE TO SUPPLY AND INSTALL ALL NECESSARY CONSTRUCTION FENCING.
13. CONTRACTOR TO PROVIDE WEEKLY REDLINE LINE AS-BUILT SURVEY TO THE ENGINEER FOR REVIEW. AS-BUILT TO SHOW PIPE INVERT, PIPE SIZE, AND PIPE MATERIAL.
14. CONTRACTOR TO PROVIDE AS-BUILT SURVEY OF COMPLETED SERVICING AND GRADING WORKS; INCLUDING INVERTS; ALL ABOVE GROUND WORKS AND SPOT ELEVATIONS AT MAXIMUM 15M GRID INTERVAL. SURVEY TO BE PREPARED BY LICENSED ONTARIO LAND SURVEYOR.
15. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE SITE-SPECIFIC GEOTECHNICAL REPORT ENTITLED "_____" PREPARED BY GROUNDED ENGINEERING, DATED_____ AND ALL APPLICABLE ADDENDUMS.



LAKESHORE AVENUE



REVISION BLOCK

#	DATE	DESCRIPTION
1.	10/01/21	ISSUED DRAFT
2.	11/04/21	ISSUED DRAFT
3.	10/14/22	DRAFT EA ISSUED

DRAFT

KWA SITE DEVELOPMENT CONSULTING INC.
2355 Main Street, Unit 2
Burlington, ON L7L 7A9

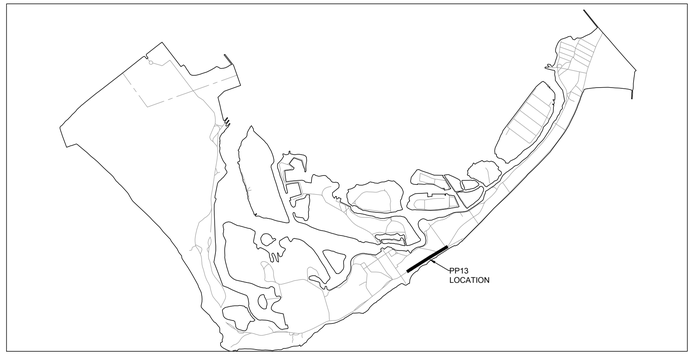
NORTH ARROW

METRIC SCALE
0 2 5 10
HORZ.1:300 VERT.1:30

LAKESHORE AVE
STA 2+960 TO 3+170
TORONTO REGION CONSERVATION AUTHORITY
TORONTO ISLAND PARK FLOOD & EROSION MITIGATION
TORONTO, ONTARIO

PROJECT No: 21600 | DRAWN BY: ARV | CHECKED BY: CDB

PP-12



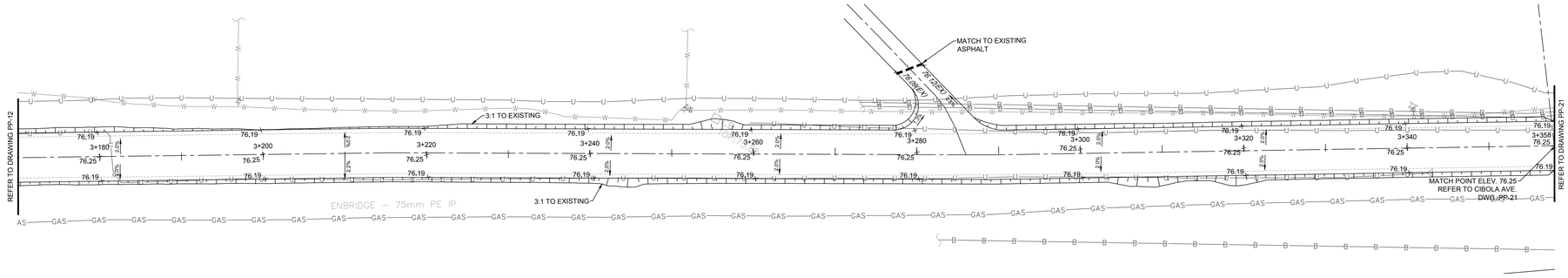
KEYPLAN (N.T.S.)

LEGEND

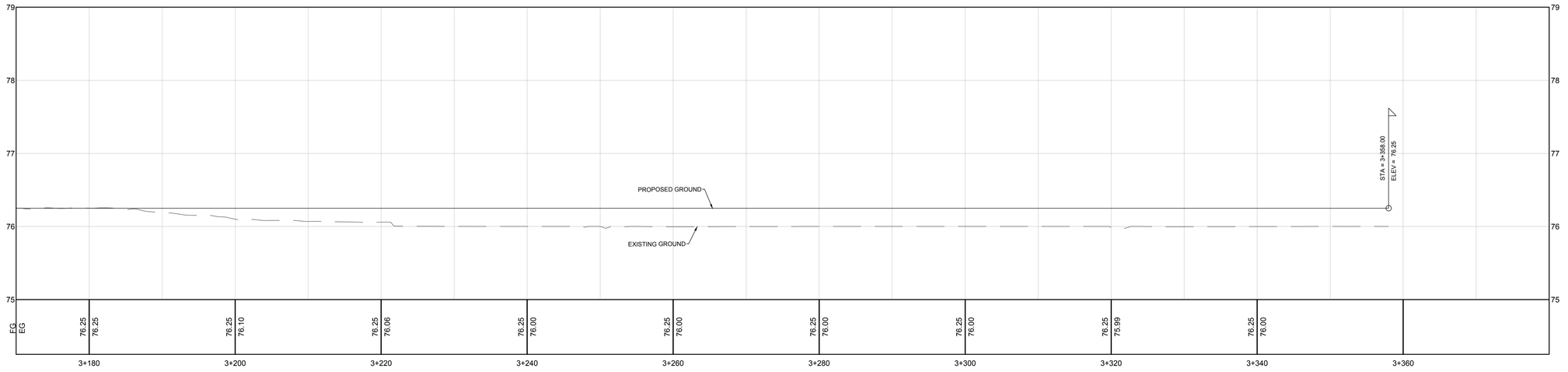
- 76.00 — EXISTING GROUND CONTOUR
- PROPOSED 3:1 SLOPE
- EXISTING CENTRELINE
- × 76.25 — PROPSED ELEVATION
- 2.0% — PROPOSED GRADE
- ST — EXISTING STORM SEWER
- SA — EXISTING SANITARY SEWER
- W — EXISTING WATERMAIN
- EXISTING HYDRANT
- EXISTING VALVE BOX
- EXISTING WATER CHAMBER
- LS — EXISTING LIGHT STANDARD
- H — EXISTING HYDRO
- B — EXISTING BELL UTILITY
- U — EXISTING UTILITY
- GAS — EXISTING GASMAIN
- EL — EXISTING ELECTRICAL

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS, ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS (OPSD & OPSS), THE WATER RESOURCES ACT, AND THE APPLICABLE ENVIRONMENTAL PROTECTION ACTS. WHERE A CITY OR REGION STANDARD EXISTS, IT SHALL BE USED IN PLACE OF THE PROVINCIAL STANDARD. ALL WORK SHALL CONFORM TO THE APPLICABLE HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2. INFORMATION REGARDING ALL EXISTING UNDERGROUND UTILITIES AND SERVICES SHOWN ON THE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS AND/OR AVAILABLE HISTORICAL DRAWINGS. THE ACCURACY OF THIS INFORMATION HAS NOT BEEN CONFIRMED BY KWA SITE DEVELOPMENT CONSULTING AND ALL UNDERGROUND INFORMATION NEEDS TO BE VERIFIED IN THE FIELD PRIOR TO BIDDING AND CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO ACQUIRE ALL UTILITY LOCATES PRIOR TO CONSTRUCTION AND TO NOTIFY THE ENGINEER OF ANY DISCREPANCIES. ANY LOST TIME DUE TO FAILURE TO IDENTIFY DISCREPANCIES OR NOTIFY THE ENGINEER SHALL BE AT THE CONTRACTOR'S EXPENSE.
3. THIS PLAN SHOULD BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANT'S PLANS AND ANY DISCREPANCIES REPORTED TO THE ENGINEER PRIOR TO CONSTRUCTION.
4. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND ANY DISCREPANCIES REPORTED TO THE ENGINEER. INFORMATION REGARDING PRIVATE ROADS, PARKING LOT CURBS, BUILDING LOCATIONS, AND SETBACKS SHALL BE TAKEN FROM THE SITE PLAN.
5. NO SUBSTITUTIONS SHALL BE ALLOWED WITHOUT ENGINEERS APPROVAL.
6. ALL DISTURBED AREAS SHALL BE REPAIRED TO ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE ENGINEER.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING AT THE SAME TIME AS THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES AND PREVENT CONSTRUCTION CONFLICTS.
8. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL PERMITS INCLUDING THIRD PARTY UTILITY COSTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING ALL NECESSARY SIGNALS, SIGNS, DELINEATORS, MARKERS AND BARRIERS. ALL TRAFFIC AND SAFETY MEASURES SHALL CONFORM TO CITY STANDARDS AND THE ONTARIO TRAFFIC MANUAL, BOOK 7 - TEMPORARY CONDITIONS, LATEST EDITION.
10. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED INSPECTIONS WITH THE CITY AND ANY OTHER REGULATORY AGENCIES. ALL WORK ON CITY PROPERTY OR INFRSTRUCTURE (INCLUDING EASEMENTS, SEWER WORK, AND WATERMAIN WORK) SHALL BE INSPECTED BY THE CITY (AS REQUIRED) PRIOR TO BACKFILLING.
11. THE CONTRACTOR IS RESPONSIBLE TO INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROLS AS REQUIRED BY THIS CONTRACT AND CITY AND PROVINCIAL STANDARDS.
12. CONTRACTOR RESPONSIBLE TO SUPPLY AND INSTALL ALL NECESSARY CONSTRUCTION FENCING.
13. CONTRACTOR TO PROVIDE WEEKLY REDLINE LINE AS-BUILT SURVEY TO THE ENGINEER FOR REVIEW. AS-BUILT TO SHOW PIPE INVERT, PIPE SIZE, AND PIPE MATERIAL.
14. CONTRACTOR TO PROVIDE AS-BUILT SURVEY OF COMPLETED SERVICING AND GRADING WORKS; INCLUDING INVERTS; ALL ABOVE GROUND WORKS AND SPOT ELEVATIONS AT MAXIMUM 15M GRID INTERVAL. SURVEY TO BE PREPARED BY LICENSED ONTARIO LAND SURVEYOR.
15. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE SITE-SPECIFIC GEOTECHNICAL REPORT ENTITLED "_____" PREPARED BY GROUNDED ENGINEERING, DATED_____ AND ALL APPLICABLE ADDENDUMS.



LAKESHORE AVENUE



REVISION BLOCK		
#	DATE	DESCRIPTION
1.	10/01/21	ISSUED DRAFT
2.	11/04/21	ISSUED DRAFT
3.	10/14/22	DRAFT EA ISSUED

DRAFT

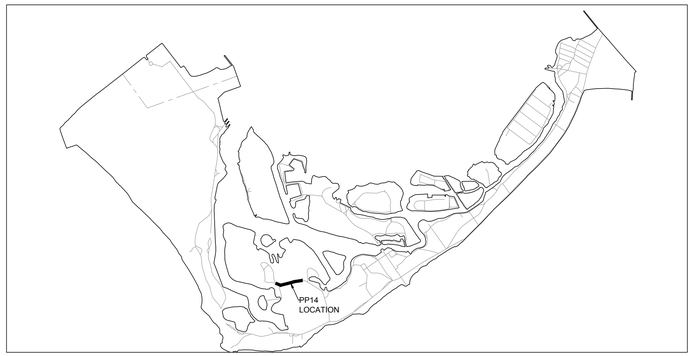
KWA SITE DEVELOPMENT CONSULTING INC.
2355 Main Street Unit 1
Burlington, ON L7L 7A9

NORTH ARROW

METRIC SCALE
0 2 5 10
HORZ.1:300 VERT.1:30

LAKESHORE AVE
STA 3+170 TO 3+358
TORONTO REGION CONSERVATION AUTHORITY
TORONTO ISLAND PARK FLOOD & EROSION MITIGATION
TORONTO, ONTARIO
PROJECT No: 21600 | DRAWN BY: ARV | CHECKED BY: CDB

PP-13



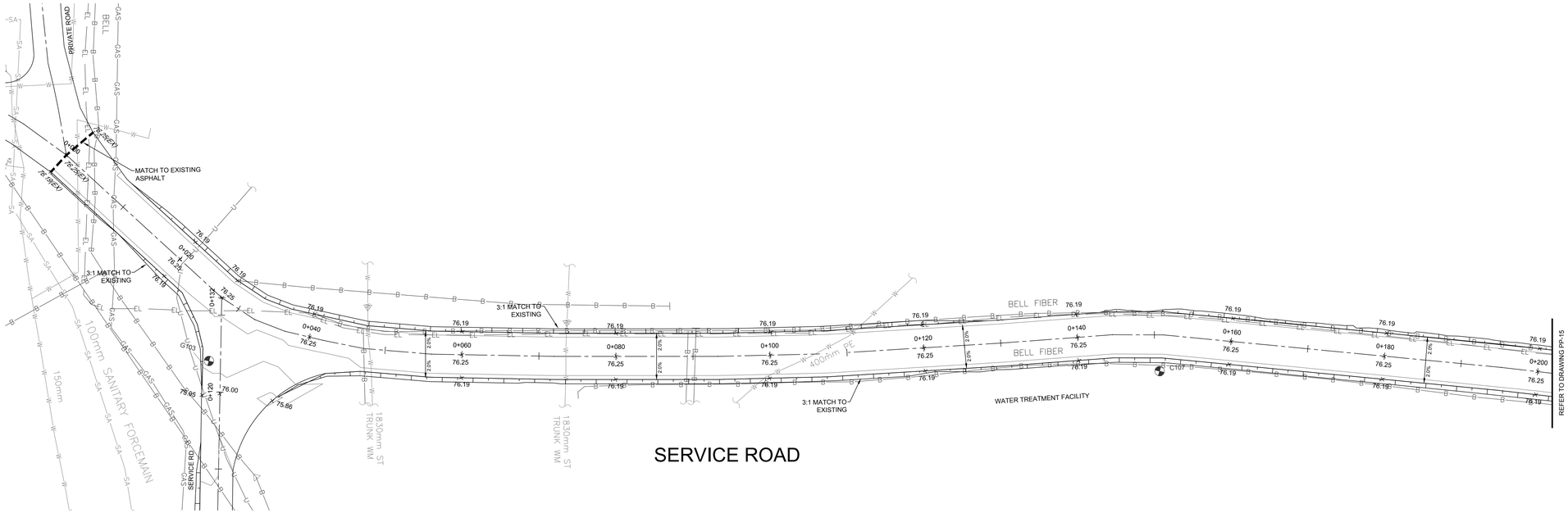
KEYPLAN (N.T.S.)

LEGEND

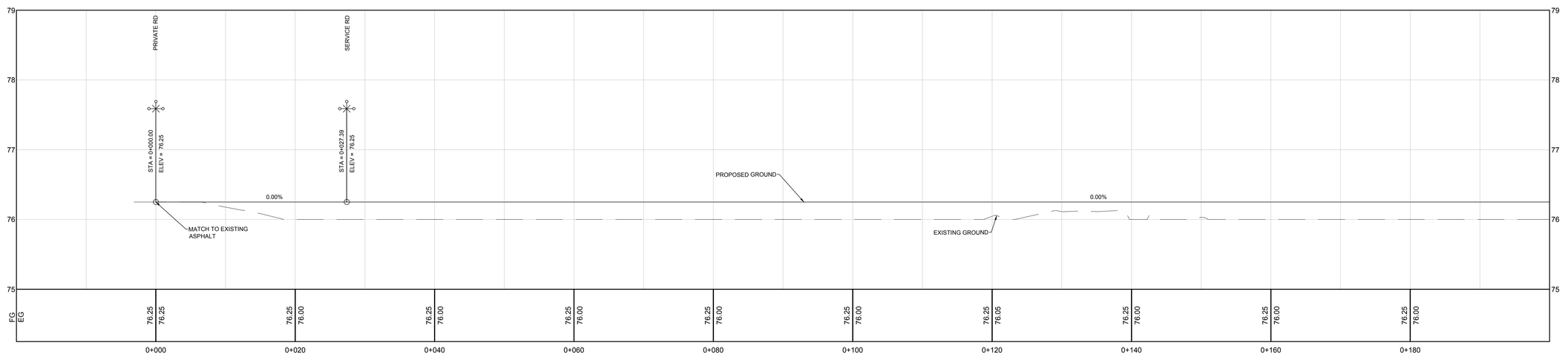
76.00	EXISTING GROUND CONTOUR
	PROPOSED 3:1 SLOPE
	EXISTING CENTRELINE
× 76.25	PROPSED ELEVATION
2.0%	PROPOSED GRADE
ST	EXISTING STORM SEWER
SA	EXISTING SANITARY SEWER
W	EXISTING WATERMAIN
	EXISTING HYDRANT
	EXISTING VALVE BOX
WC	EXISTING WATER CHAMBER
LS	EXISTING LIGHT STANDARD
H	EXISTING HYDRO
B	EXISTING BELL UTILITY
U	EXISTING UTILITY
GAS	EXISTING GASMAIN
EL	EXISTING ELECTRICAL

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS, ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS (OPSD & OPSS), THE WATER RESOURCES ACT, AND THE APPLICABLE ENVIRONMENTAL PROTECTION ACTS. WHERE A CITY OR REGION STANDARD EXISTS, IT SHALL BE USED IN PLACE OF THE PROVINCIAL STANDARD. ALL WORK SHALL CONFORM TO THE APPLICABLE HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2. INFORMATION REGARDING ALL EXISTING UNDERGROUND UTILITIES AND SERVICES SHOWN ON THE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS AND/OR AVAILABLE HISTORICAL DRAWINGS. THE ACCURACY OF THIS INFORMATION HAS NOT BEEN CONFIRMED BY KWA SITE DEVELOPMENT CONSULTING AND ALL UNDERGROUND INFORMATION NEEDS TO BE VERIFIED IN THE FIELD PRIOR TO BIDDING AND CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO ACQUIRE ALL UTILITY LOCATES PRIOR TO CONSTRUCTION AND TO NOTIFY THE ENGINEER OF ANY DISCREPANCIES. ANY LOST TIME DUE TO FAILURE TO IDENTIFY DISCREPANCIES OR NOTIFY THE ENGINEER SHALL BE AT THE CONTRACTOR'S EXPENSE.
3. THIS PLAN SHOULD BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANT'S PLANS AND ANY DISCREPANCIES REPORTED TO THE ENGINEER PRIOR TO CONSTRUCTION.
4. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND ANY DISCREPANCIES REPORTED TO THE ENGINEER. INFORMATION REGARDING PRIVATE ROADS, PARKING LOT CURBS, BUILDING LOCATIONS, AND SETBACKS SHALL BE TAKEN FROM THE SITE PLAN.
5. NO SUBSTITUTIONS SHALL BE ALLOWED WITHOUT ENGINEERS APPROVAL.
6. ALL DISTURBED AREAS SHALL BE REPAIRED TO ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE ENGINEER.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING AT THE SAME TIME AS THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES AND PREVENT CONSTRUCTION CONFLICTS.
8. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL PERMITS INCLUDING THIRD PARTY UTILITY COSTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING ALL NECESSARY SIGNALS, SIGNS, DELINEATORS, MARKERS AND BARRIERS. ALL TRAFFIC AND SAFETY MEASURES SHALL CONFORM TO CITY STANDARDS AND THE ONTARIO TRAFFIC MANUAL, BOOK 7 - TEMPORARY CONDITIONS, LATEST EDITION.
10. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED INSPECTIONS WITH THE CITY AND ANY OTHER REGULATORY AGENCIES. ALL WORK ON CITY PROPERTY OR INFRSTRUCTURE (INCLUDING EASEMENTS, SEWER WORK, AND WATERMAIN WORK) SHALL BE INSPECTED BY THE CITY (AS REQUIRED) PRIOR TO BACKFILLING.
11. THE CONTRACTOR IS RESPONSIBLE TO INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROLS AS REQUIRED BY THIS CONTRACT AND CITY AND PROVINCIAL STANDARDS.
12. CONTRACTOR RESPONSIBLE TO SUPPLY AND INSTALL ALL NECESSARY CONSTRUCTION FENCING.
13. CONTRACTOR TO PROVIDE WEEKLY REDLINE LINE AS-BUILT SURVEY TO THE ENGINEER FOR REVIEW. AS-BUILT TO SHOW PIPE INVERT, PIPE SIZE, AND PIPE MATERIAL.
14. CONTRACTOR TO PROVIDE AS-BUILT SURVEY OF COMPLETED SERVICING AND GRADING WORKS; INCLUDING INVERTS; ALL ABOVE GROUND WORKS AND SPOT ELEVATIONS AT MAXIMUM 15M GRID INTERVAL. SURVEY TO BE PREPARED BY LICENSED ONTARIO LAND SURVEYOR.
15. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE SITE-SPECIFIC GEOTECHNICAL REPORT ENTITLED "_____" PREPARED BY GROUNDED ENGINEERING, DATED_____ AND ALL APPLICABLE ADDENDUMS.



SERVICE ROAD



REVISION BLOCK

#	DATE	DESCRIPTION
1.	10/01/21	ISSUED DRAFT
2.	11/04/21	ISSUED DRAFT
3.	10/14/22	DRAFT EA ISSUED

DRAFT

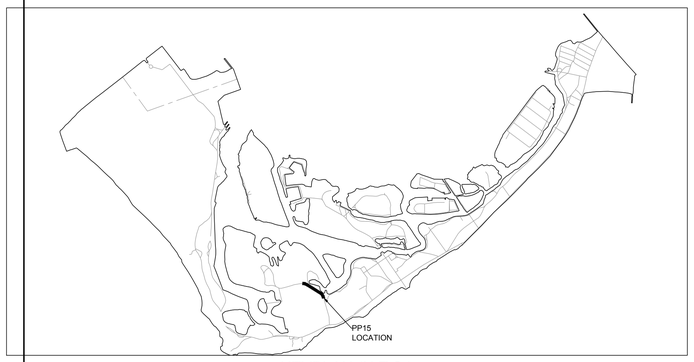
KWA SITE DEVELOPMENT CONSULTING INC.
2355 Main Street, Unit 1
Burlington, ON L7L 7A9

NORTH ARROW

METRIC SCALE
0 2 5 10
HORZ.1:300 VERT.1:30

SERVICE ROAD
STA -0+020 TO 0+200
TORONTO REGION CONSERVATION AUTHORITY
TORONTO ISLAND PARK FLOOD & EROSION MITIGATION
TORONTO, ONTARIO
PROJECT No: 21600 | DRAWN BY: ARV | CHECKED BY: CDB

PP-14



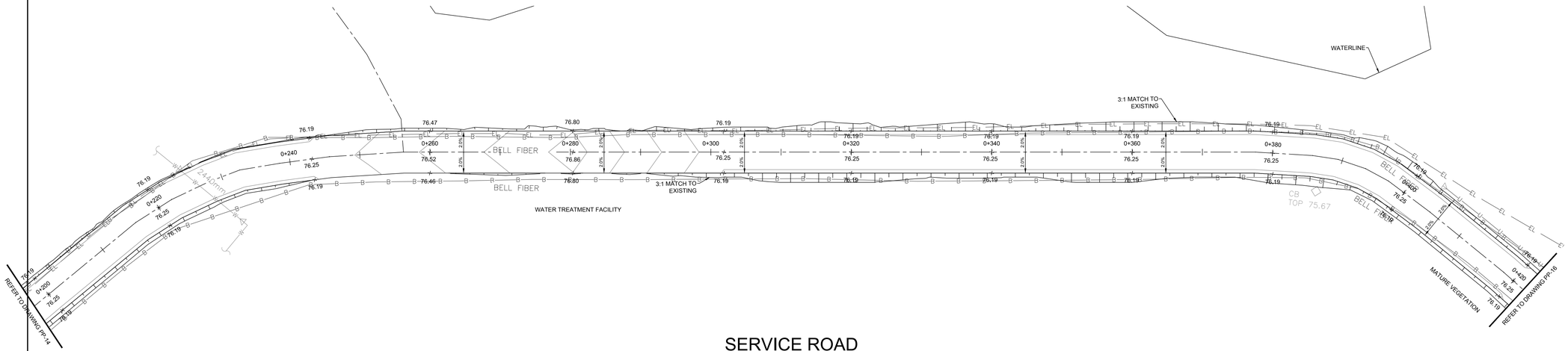
KEYPLAN (N.T.S.)

LEGEND

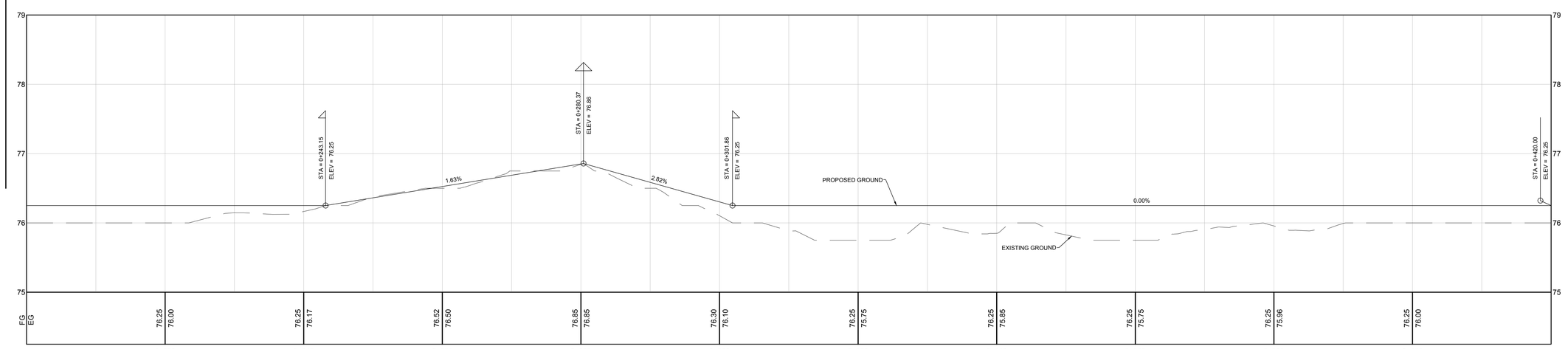
76.00	EXISTING GROUND CONTOUR
	PROPOSED 3:1 SLOPE
	EXISTING CENTRELINE
× 76.25	PROPSED ELEVATION
2.0%	PROPOSED GRADE
ST	EXISTING STORM SEWER
SA	EXISTING SANITARY SEWER
W	EXISTING WATERMAIN
	EXISTING HYDRANT
	EXISTING VALVE BOX
WC	EXISTING WATER CHAMBER
LS	EXISTING LIGHT STANDARD
H	EXISTING HYDRO
B	EXISTING BELL UTILITY
U	EXISTING UTILITY
GAS	EXISTING GASMAIN
EL	EXISTING ELECTRICAL

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS, ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS (OPSD & OPSS), THE WATER RESOURCES ACT, AND THE APPLICABLE ENVIRONMENTAL PROTECTION ACTS. WHERE A CITY OR REGION STANDARD EXISTS, IT SHALL BE USED IN PLACE OF THE PROVINCIAL STANDARD. ALL WORK SHALL CONFORM TO THE APPLICABLE HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2. INFORMATION REGARDING ALL EXISTING UNDERGROUND UTILITIES AND SERVICES SHOWN ON THE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS AND/OR AVAILABLE HISTORICAL DRAWINGS. THE ACCURACY OF THIS INFORMATION HAS NOT BEEN CONFIRMED BY KWA SITE DEVELOPMENT CONSULTING AND ALL UNDERGROUND INFORMATION NEEDS TO BE VERIFIED IN THE FIELD PRIOR TO BIDDING AND CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO ACQUIRE ALL UTILITY LOCATES PRIOR TO CONSTRUCTION AND TO NOTIFY THE ENGINEER OF ANY DISCREPANCIES. ANY LOST TIME DUE TO FAILURE TO IDENTIFY DISCREPANCIES OR NOTIFY THE ENGINEER SHALL BE AT THE CONTRACTOR'S EXPENSE.
3. THIS PLAN SHOULD BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANT'S PLANS AND ANY DISCREPANCIES REPORTED TO THE ENGINEER PRIOR TO CONSTRUCTION.
4. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND ANY DISCREPANCIES REPORTED TO THE ENGINEER. INFORMATION REGARDING PRIVATE ROADS, PARKING LOT CURBS, BUILDING LOCATIONS, AND SETBACKS SHALL BE TAKEN FROM THE SITE PLAN.
5. NO SUBSTITUTIONS SHALL BE ALLOWED WITHOUT ENGINEERS APPROVAL.
6. ALL DISTURBED AREAS SHALL BE REPAIRED TO ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE ENGINEER.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING AT THE SAME TIME AS THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES AND PREVENT CONSTRUCTION CONFLICTS.
8. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL PERMITS INCLUDING THIRD PARTY UTILITY COSTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING ALL NECESSARY SIGNALS, SIGNS, DELINEATORS, MARKERS AND BARRIERS. ALL TRAFFIC AND SAFETY MEASURES SHALL CONFORM TO CITY STANDARDS AND THE ONTARIO TRAFFIC MANUAL, BOOK 7 - TEMPORARY CONDITIONS, LATEST EDITION.
10. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED INSPECTIONS WITH THE CITY AND ANY OTHER REGULATORY AGENCIES. ALL WORK ON CITY PROPERTY OR INFRSTRUCTURE (INCLUDING EASEMENTS, SEWER WORK, AND WATERMAIN WORK) SHALL BE INSPECTED BY THE CITY (AS REQUIRED) PRIOR TO BACKFILLING.
11. THE CONTRACTOR IS RESPONSIBLE TO INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROLS AS REQUIRED BY THIS CONTRACT AND CITY AND PROVINCIAL STANDARDS.
12. CONTRACTOR RESPONSIBLE TO SUPPLY AND INSTALL ALL NECESSARY CONSTRUCTION FENCING.
13. CONTRACTOR TO PROVIDE WEEKLY REDLINE LINE AS-BUILT SURVEY TO THE ENGINEER FOR REVIEW. AS-BUILT TO SHOW PIPE INVERT, PIPE SIZE, AND PIPE MATERIAL.
14. CONTRACTOR TO PROVIDE AS-BUILT SURVEY OF COMPLETED SERVICING AND GRADING WORKS; INCLUDING INVERTS; ALL ABOVE GROUND WORKS AND SPOT ELEVATIONS AT MAXIMUM 15M GRID INTERVAL. SURVEY TO BE PREPARED BY LICENSED ONTARIO LAND SURVEYOR.
15. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE SITE-SPECIFIC GEOTECHNICAL REPORT ENTITLED "_____" PREPARED BY GROUNDED ENGINEERING, DATED_____ AND ALL APPLICABLE ADDENDUMS.



SERVICE ROAD



REVISION BLOCK		
#	DATE	DESCRIPTION
1.	10/01/21	ISSUED DRAFT
2.	11/04/21	ISSUED DRAFT
3.	10/14/22	DRAFT EA ISSUED

DRAFT

KWA SITE DEVELOPMENT CONSULTING INC.
2355 Main Street, Unit 2
Burlington, ON L7L 7A9

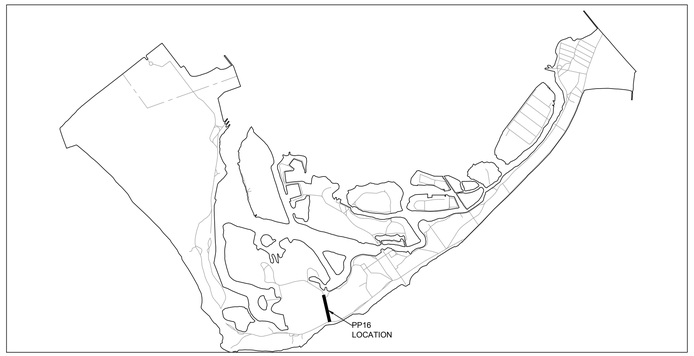
NORTH ARROW

METRIC SCALE
0 2 5 10
HORZ.1:300 VERT.1:30

SERVICE ROAD
STA 0+200 TO 0+420
TORONTO REGION CONSERVATION AUTHORITY
TORONTO ISLAND PARK FLOOD & EROSION MITIGATION
TORONTO, ONTARIO

PROJECT No: 21600 | DRAWN BY: ARV | CHECKED BY: CDB

PP-15



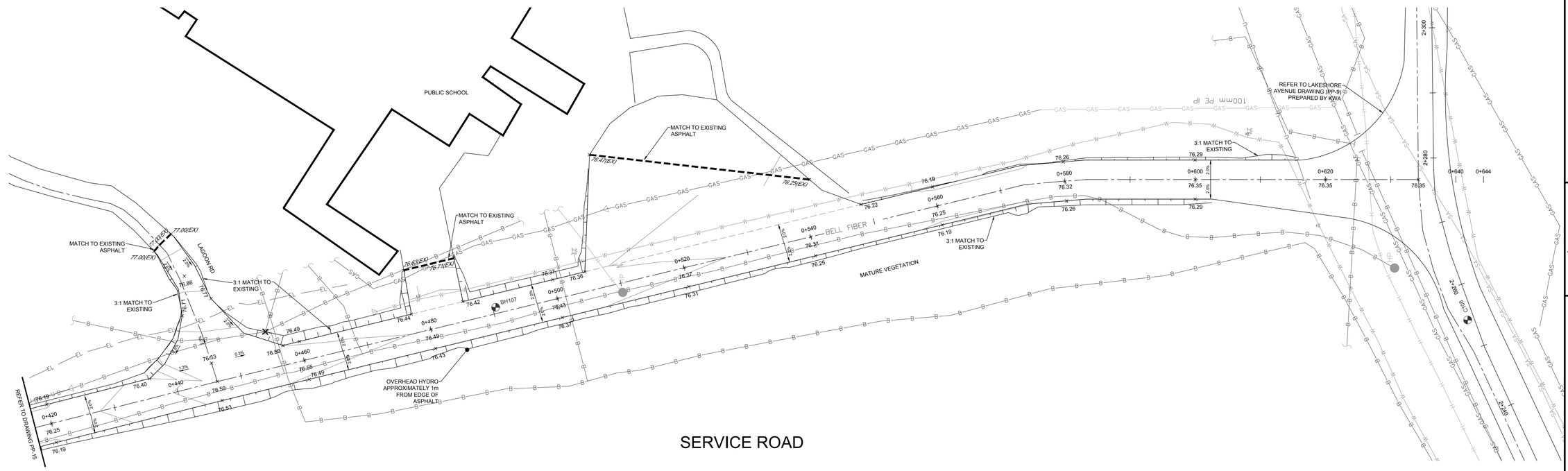
KEYPLAN (N.T.S.)

LEGEND

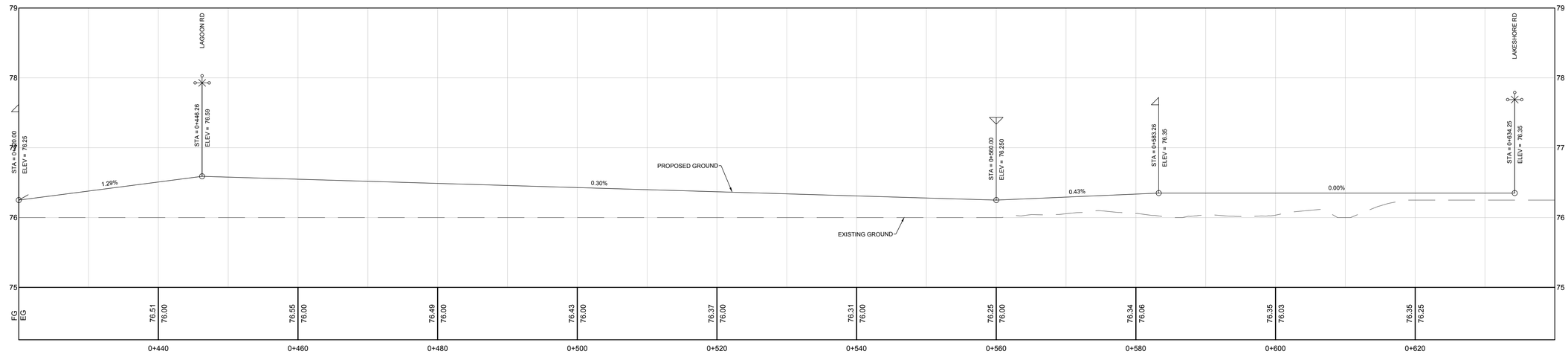
- 76.00 — EXISTING GROUND CONTOUR
- PROPOSED 3:1 SLOPE
- EXISTING CENTRELINE
- × 76.25 — PROPSED ELEVATION
- 2.0% — PROPOSED GRADE
- ST — EXISTING STORM SEWER
- SA — EXISTING SANITARY SEWER
- W — EXISTING WATERMAIN
- EXISTING HYDRANT
- EXISTING VALVE BOX
- WC — EXISTING WATER CHAMBER
- LS — EXISTING LIGHT STANDARD
- H — EXISTING HYDRO
- B — EXISTING BELL UTILITY
- U — EXISTING UTILITY
- GAS — EXISTING GASMAIN
- EL — EXISTING ELECTRICAL

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS, ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS (OPSD & OPSS), THE WATER RESOURCES ACT, AND THE APPLICABLE ENVIRONMENTAL PROTECTION ACTS. WHERE A CITY OR REGION STANDARD EXISTS, IT SHALL BE USED IN PLACE OF THE PROVINCIAL STANDARD. ALL WORK SHALL CONFORM TO THE APPLICABLE HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2. INFORMATION REGARDING ALL EXISTING UNDERGROUND UTILITIES AND SERVICES SHOWN ON THE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS AND/OR AVAILABLE HISTORICAL DRAWINGS. THE ACCURACY OF THIS INFORMATION HAS NOT BEEN CONFIRMED BY KWA SITE DEVELOPMENT CONSULTING AND ALL UNDERGROUND INFORMATION NEEDS TO BE VERIFIED IN THE FIELD PRIOR TO BIDDING AND CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO ACQUIRE ALL UTILITY LOCATES PRIOR TO CONSTRUCTION AND TO NOTIFY THE ENGINEER OF ANY DISCREPANCIES. ANY LOST TIME DUE TO FAILURE TO IDENTIFY DISCREPANCIES OR NOTIFY THE ENGINEER SHALL BE AT THE CONTRACTOR'S EXPENSE.
3. THIS PLAN SHOULD BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANT'S PLANS AND ANY DISCREPANCIES REPORTED TO THE ENGINEER PRIOR TO CONSTRUCTION.
4. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND ANY DISCREPANCIES REPORTED TO THE ENGINEER. INFORMATION REGARDING PRIVATE ROADS, PARKING LOT CURBS, BUILDING LOCATIONS, AND SETBACKS SHALL BE TAKEN FROM THE SITE PLAN.
5. NO SUBSTITUTIONS SHALL BE ALLOWED WITHOUT ENGINEERS APPROVAL.
6. ALL DISTURBED AREAS SHALL BE REPAIRED TO ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE ENGINEER.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING AT THE SAME TIME AS THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES AND PREVENT CONSTRUCTION CONFLICTS.
8. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL PERMITS INCLUDING THIRD PARTY UTILITY COSTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING ALL NECESSARY SIGNALS, SIGNS, DELINEATORS, MARKERS AND BARRIERS. ALL TRAFFIC AND SAFETY MEASURES SHALL CONFORM TO CITY STANDARDS AND THE ONTARIO TRAFFIC MANUAL, BOOK 7 - TEMPORARY CONDITIONS, LATEST EDITION.
10. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED INSPECTIONS WITH THE CITY AND ANY OTHER REGULATORY AGENCIES. ALL WORK ON CITY PROPERTY OR INFRSTRUCTURE (INCLUDING EASEMENTS, SEWER WORK, AND WATERMAIN WORK) SHALL BE INSPECTED BY THE CITY (AS REQUIRED) PRIOR TO BACKFILLING.
11. THE CONTRACTOR IS RESPONSIBLE TO INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROLS AS REQUIRED BY THIS CONTRACT AND CITY AND PROVINCIAL STANDARDS.
12. CONTRACTOR RESPONSIBLE TO SUPPLY AND INSTALL ALL NECESSARY CONSTRUCTION FENCING.
13. CONTRACTOR TO PROVIDE WEEKLY REDLINE LINE AS-BUILT SURVEY TO THE ENGINEER FOR REVIEW. AS-BUILT TO SHOW PIPE INVERT, PIPE SIZE, AND PIPE MATERIAL.
14. CONTRACTOR TO PROVIDE AS-BUILT SURVEY OF COMPLETED SERVICING AND GRADING WORKS; INCLUDING INVERTS; ALL ABOVE GROUND WORKS AND SPOT ELEVATIONS AT MAXIMUM 15M GRID INTERVAL. SURVEY TO BE PREPARED BY LICENSED ONTARIO LAND SURVEYOR.
15. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE SITE-SPECIFIC GEOTECHNICAL REPORT ENTITLED "_____" PREPARED BY GROUNDED ENGINEERING, DATED_____ AND ALL APPLICABLE ADDENDUMS.



SERVICE ROAD



REVISION BLOCK

#	DATE	DESCRIPTION
1.	10/01/21	ISSUED DRAFT
2.	11/04/21	ISSUED DRAFT
3.	10/14/22	DRAFT EA ISSUED

DRAFT

KWA SITE DEVELOPMENT CONSULTING INC.
2355 Main Street, Unit 1
Burlington, ON L7L 7A9

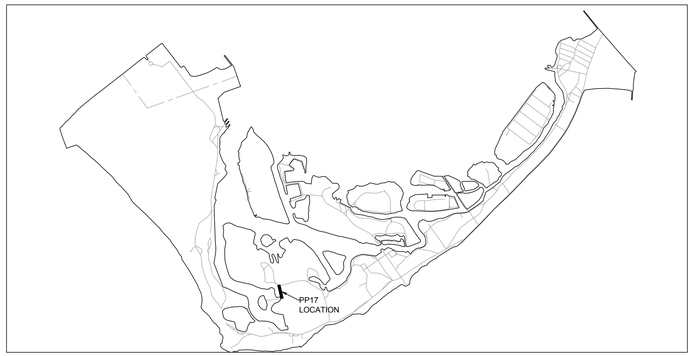
NORTH ARROW

METRIC SCALE
0 2 5 10
HORZ.1:300 VERT.1:30

SERVICE ROAD
STA 0+420 TO 0+640
TORONTO REGION CONSERVATION AUTHORITY
TORONTO ISLAND PARK FLOOD & EROSION MITIGATION
TORONTO, ONTARIO

CHECKED BY: CDB
DRAWN BY: ARV
PROJECT No: 21600

PP-16



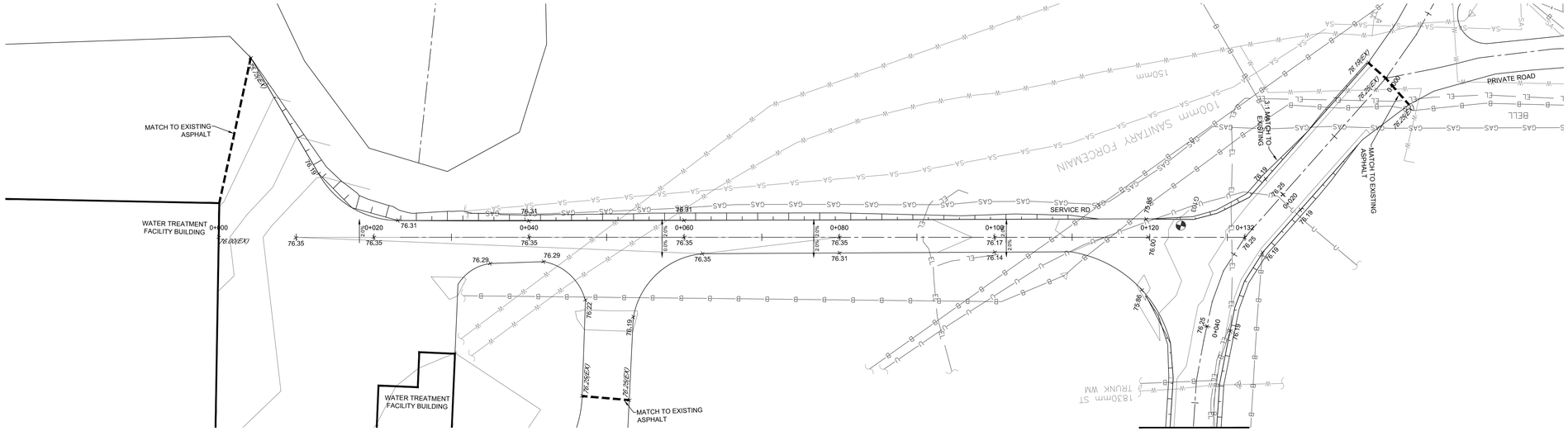
KEYPLAN (N.T.S.)

LEGEND

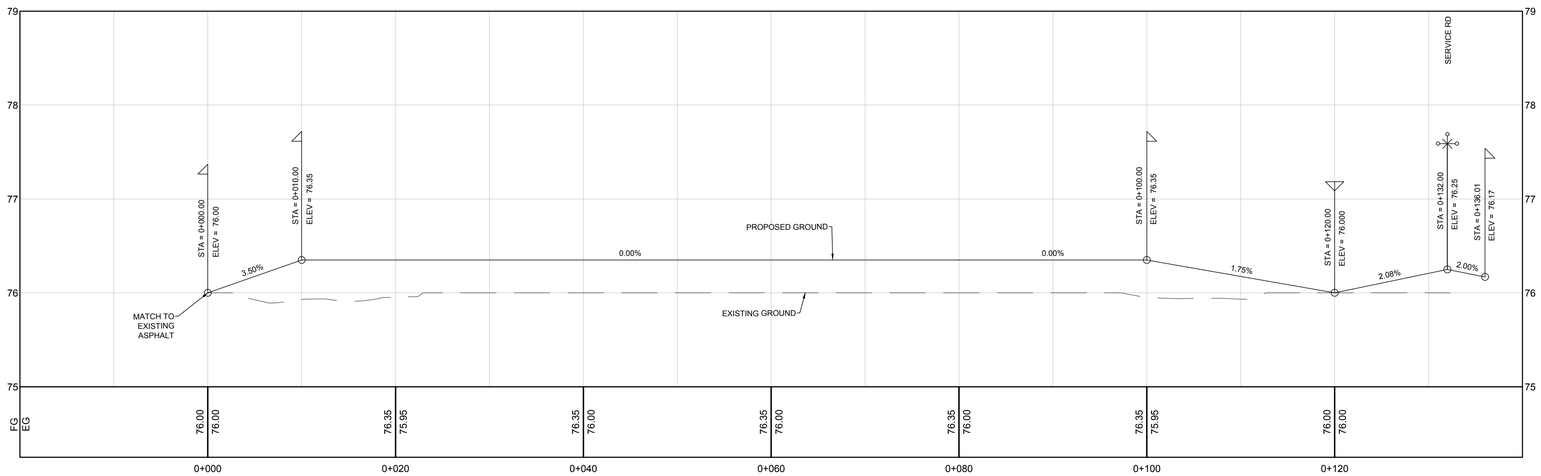
- EXISTING GROUND CONTOUR
- PROPOSED 3:1 SLOPE
- EXISTING CENTRELINE
- PROPSED ELEVATION
- PROPOSED GRADE
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- EXISTING HYDRANT
- EXISTING VALVE BOX
- EXISTING WATER CHAMBER
- EXISTING LIGHT STANDARD
- EXISTING HYDRO
- EXISTING BELL UTILITY
- EXISTING UTILITY
- EXISTING GASMAIN
- EXISTING ELECTRICAL

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS, ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS (OPSD & OPSS), THE WATER RESOURCES ACT, AND THE APPLICABLE ENVIRONMENTAL PROTECTION ACTS. WHERE A CITY OR REGION STANDARD EXISTS, IT SHALL BE USED IN PLACE OF THE PROVINCIAL STANDARD. ALL WORK SHALL CONFORM TO THE APPLICABLE HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2. INFORMATION REGARDING ALL EXISTING UNDERGROUND UTILITIES AND SERVICES SHOWN ON THE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS AND/OR AVAILABLE HISTORICAL DRAWINGS. THE ACCURACY OF THIS INFORMATION HAS NOT BEEN CONFIRMED BY KWA SITE DEVELOPMENT CONSULTING AND ALL UNDERGROUND INFORMATION NEEDS TO BE VERIFIED IN THE FIELD PRIOR TO BIDDING AND CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO ACQUIRE ALL UTILITY LOCATES PRIOR TO CONSTRUCTION AND TO NOTIFY THE ENGINEER OF ANY DISCREPANCIES. ANY LOST TIME DUE TO FAILURE TO IDENTIFY DISCREPANCIES OR NOTIFY THE ENGINEER SHALL BE AT THE CONTRACTOR'S EXPENSE.
3. THIS PLAN SHOULD BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANT'S PLANS AND ANY DISCREPANCIES REPORTED TO THE ENGINEER PRIOR TO CONSTRUCTION.
4. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND ANY DISCREPANCIES REPORTED TO THE ENGINEER. INFORMATION REGARDING PRIVATE ROADS, PARKING LOT CURBS, BUILDING LOCATIONS, AND SETBACKS SHALL BE TAKEN FROM THE SITE PLAN.
5. NO SUBSTITUTIONS SHALL BE ALLOWED WITHOUT ENGINEERS APPROVAL.
6. ALL DISTURBED AREAS SHALL BE REPAIRED TO ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE ENGINEER.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING AT THE SAME TIME AS THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES AND PREVENT CONSTRUCTION CONFLICTS.
8. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL PERMITS INCLUDING THIRD PARTY UTILITY COSTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING ALL NECESSARY SIGNALS, SIGNS, DELINEATORS, MARKERS AND BARRIERS. ALL TRAFFIC AND SAFETY MEASURES SHALL CONFORM TO CITY STANDARDS AND THE ONTARIO TRAFFIC MANUAL, BOOK 7 - TEMPORARY CONDITIONS, LATEST EDITION.
10. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED INSPECTIONS WITH THE CITY AND ANY OTHER REGULATORY AGENCIES. ALL WORK ON CITY PROPERTY OR INFRSTRUCTURE (INCLUDING EASEMENTS, SEWER WORK, AND WATERMAIN WORK) SHALL BE INSPECTED BY THE CITY (AS REQUIRED) PRIOR TO BACKFILLING.
11. THE CONTRACTOR IS RESPONSIBLE TO INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROLS AS REQUIRED BY THIS CONTRACT AND CITY AND PROVINCIAL STANDARDS.
12. CONTRACTOR RESPONSIBLE TO SUPPLY AND INSTALL ALL NECESSARY CONSTRUCTION FENCING.
13. CONTRACTOR TO PROVIDE WEEKLY REDLINE LINE AS-BUILT SURVEY TO THE ENGINEER FOR REVIEW. AS-BUILT TO SHOW PIPE INVERT, PIPE SIZE, AND PIPE MATERIAL.
14. CONTRACTOR TO PROVIDE AS-BUILT SURVEY OF COMPLETED SERVICING AND GRADING WORKS; INCLUDING INVERTS; ALL ABOVE GROUND WORKS AND SPOT ELEVATIONS AT MAXIMUM 15M GRID INTERVAL. SURVEY TO BE PREPARED BY LICENSED ONTARIO LAND SURVEYOR.
15. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE SITE-SPECIFIC GEOTECHNICAL REPORT ENTITLED "_____" PREPARED BY GROUNDED ENGINEERING, DATED_____ AND ALL APPLICABLE ADDENDUMS.



NORTH WATER TREATMENT FACILITY ACCESS ROAD



REVISION BLOCK

#	DATE	DESCRIPTION
1.	10/01/21	ISSUED DRAFT
2.	11/04/21	ISSUED DRAFT
3.	10/14/22	DRAFT EA ISSUED

DRAFT

KWA SITE DEVELOPMENT CONSULTING INC.
2055 Appleby Line
Burlington, ON L7L 7A9

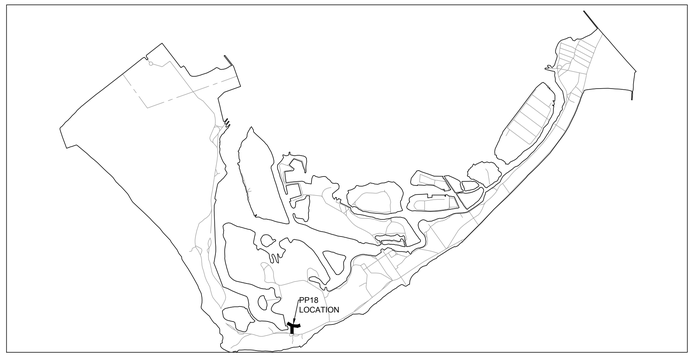
NORTH ARROW

METRIC SCALE
0 2 5 10
HORZ.1:300 VERT.1:30

NORTH WATER TREATMENT FACILITY ACCESS ROAD
STA 0+000 TO 0+132
TORONTO REGION CONSERVATION AUTHORITY
TORONTO ISLAND PARK FLOOD & EROSION MITIGATION
TORONTO, ONTARIO

PROJECT No: 21600 | DRAWN BY: ARV | CHECKED BY: CDB

PP-17



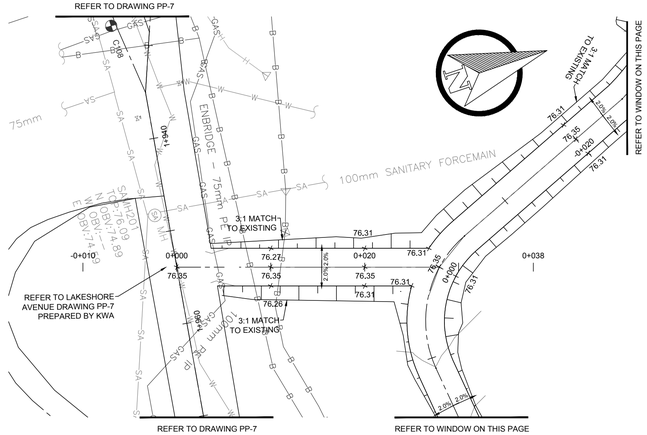
KEYPLAN (N.T.S.)

LEGEND

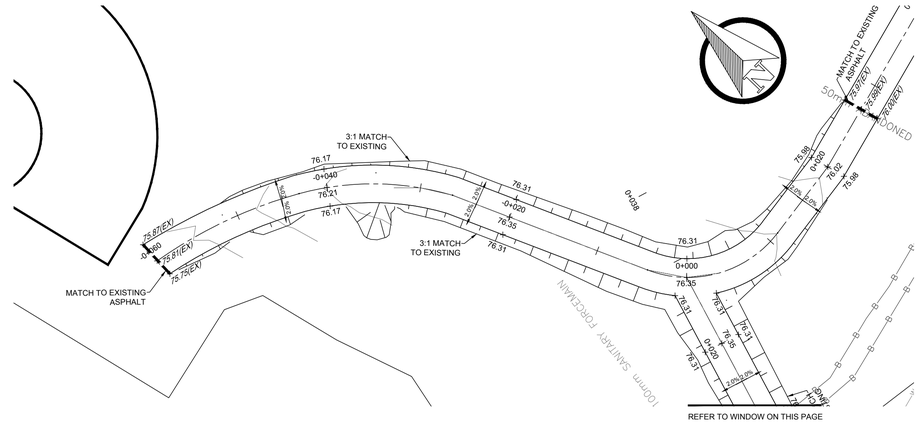
- 76.00 — EXISTING GROUND CONTOUR
- PROPOSED 3:1 SLOPE
- EXISTING CENTRELINE
- × 76.25 — PROPSED ELEVATION
- 2.0% — PROPOSED GRADE
- ST — EXISTING STORM SEWER
- SA — EXISTING SANITARY SEWER
- W — EXISTING WATERMAIN
- EXISTING HYDRANT
- EXISTING VALVE BOX
- EXISTING WATER CHAMBER
- LS — EXISTING LIGHT STANDARD
- H — EXISTING HYDRO
- B — EXISTING BELL UTILITY
- U — EXISTING UTILITY
- GAS — EXISTING GASMAIN
- EL — EXISTING ELECTRICAL

GENERAL NOTES

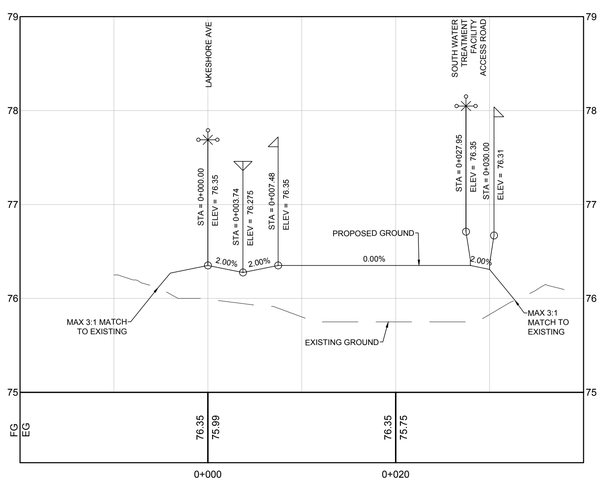
1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS, ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS (OPSD & OPSS), THE WATER RESOURCES ACT, AND THE APPLICABLE ENVIRONMENTAL PROTECTION ACTS. WHERE A CITY OR REGION STANDARD EXISTS, IT SHALL BE USED IN PLACE OF THE PROVINCIAL STANDARD. ALL WORK SHALL CONFORM TO THE APPLICABLE HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2. INFORMATION REGARDING ALL EXISTING UNDERGROUND UTILITIES AND SERVICES SHOWN ON THE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS AND/OR AVAILABLE HISTORICAL DRAWINGS. THE ACCURACY OF THIS INFORMATION HAS NOT BEEN CONFIRMED BY KWA SITE DEVELOPMENT CONSULTING AND ALL UNDERGROUND INFORMATION NEEDS TO BE VERIFIED IN THE FIELD PRIOR TO BIDDING AND CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO ACQUIRE ALL UTILITY LOCATES PRIOR TO CONSTRUCTION AND TO NOTIFY THE ENGINEER OF ANY DISCREPANCIES. ANY LOST TIME DUE TO FAILURE TO IDENTIFY DISCREPANCIES OR NOTIFY THE ENGINEER SHALL BE AT THE CONTRACTOR'S EXPENSE.
3. THIS PLAN SHOULD BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANT'S PLANS AND ANY DISCREPANCIES REPORTED TO THE ENGINEER PRIOR TO CONSTRUCTION.
4. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND ANY DISCREPANCIES REPORTED TO THE ENGINEER. INFORMATION REGARDING PRIVATE ROADS, PARKING LOT CURBS, BUILDING LOCATIONS, AND SETBACKS SHALL BE TAKEN FROM THE SITE PLAN.
5. NO SUBSTITUTIONS SHALL BE ALLOWED WITHOUT ENGINEERS APPROVAL.
6. ALL DISTURBED AREAS SHALL BE REPAIRED TO ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE ENGINEER.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING AT THE SAME TIME AS THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES AND PREVENT CONSTRUCTION CONFLICTS.
8. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL PERMITS INCLUDING THIRD PARTY UTILITY COSTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING ALL NECESSARY SIGNALS, SIGNS, DELINEATORS, MARKERS AND BARRIERS. ALL TRAFFIC AND SAFETY MEASURES SHALL CONFORM TO CITY STANDARDS AND THE ONTARIO TRAFFIC MANUAL, BOOK 7 - TEMPORARY CONDITIONS, LATEST EDITION.
10. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED INSPECTIONS WITH THE CITY AND ANY OTHER REGULATORY AGENCIES. ALL WORK ON CITY PROPERTY OR INFRSTRUCTURE (INCLUDING EASEMENTS, SEWER WORK, AND WATERMAIN WORK) SHALL BE INSPECTED BY THE CITY (AS REQUIRED) PRIOR TO BACKFILLING.
11. THE CONTRACTOR IS RESPONSIBLE TO INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROLS AS REQUIRED BY THIS CONTRACT AND CITY AND PROVINCIAL STANDARDS.
12. CONTRACTOR RESPONSIBLE TO SUPPLY AND INSTALL ALL NECESSARY CONSTRUCTION FENCING.
13. CONTRACTOR TO PROVIDE WEEKLY REDLINE LINE AS-BUILT SURVEY TO THE ENGINEER FOR REVIEW. AS-BUILT TO SHOW PIPE INVERT, PIPE SIZE, AND PIPE MATERIAL.
14. CONTRACTOR TO PROVIDE AS-BUILT SURVEY OF COMPLETED SERVICING AND GRADING WORKS; INCLUDING INVERTS; ALL ABOVE GROUND WORKS AND SPOT ELEVATIONS AT MAXIMUM 15M GRID INTERVAL. SURVEY TO BE PREPARED BY LICENSED ONTARIO LAND SURVEYOR.
15. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE SITE-SPECIFIC GEOTECHNICAL REPORT ENTITLED "_____" PREPARED BY GROUNDED ENGINEERING, DATED_____ AND ALL APPLICABLE ADDENDUMS.

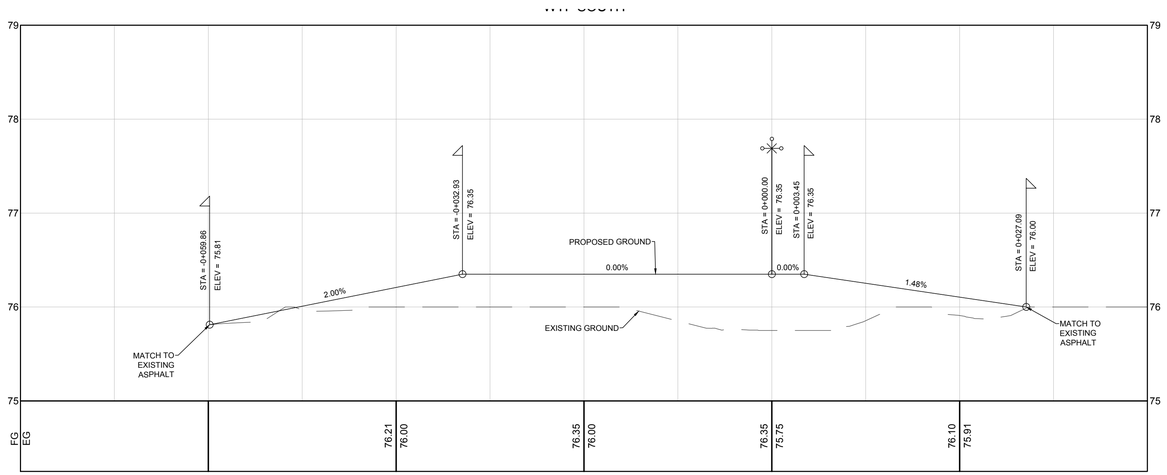


SOUTH WATER TREATMENT FACILITY ACCESS ROAD



SOUTH WATER TREATMENT FACILITY ACCESS ROAD





REVISION BLOCK		
#	DATE	DESCRIPTION
1.	10/01/21	ISSUED DRAFT
2.	11/04/21	ISSUED DRAFT
3.	10/14/22	DRAFT EA ISSUED

DRAFT

KWA SITE DEVELOPMENT CONSULTING INC.
2355 Main Street, Unit 1
Burlington, ON L7L 7A9

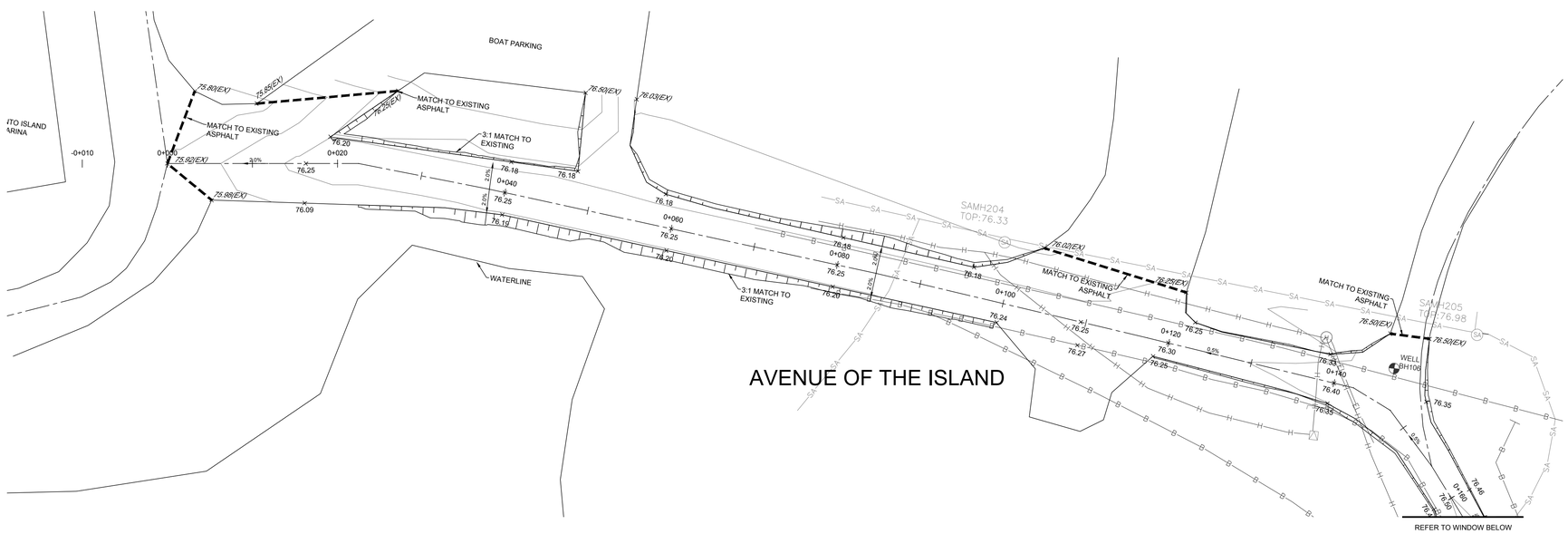
NORTH ARROW

METRIC SCALE
0 2 5 10
HORZ.1:300 VERT.1:30

SOUTH WATER TREATMENT FACILITY ACCESS ROAD STA -0+010 TO 0+038
& STA -0+060 TO 0+027.09
TORONTO REGION CONSERVATION AUTHORITY
TORONTO ISLAND PARK FLOOD & EROSION MITIGATION
TORONTO, ONTARIO

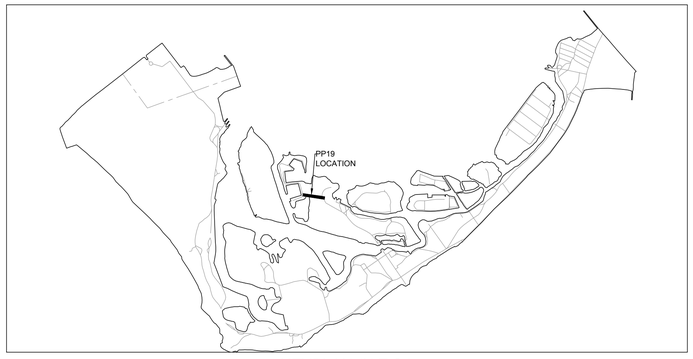
PROJECT No: 21600 | DRAWN BY: ARV | CHECKED BY: CDB

PP-18



LEGEND

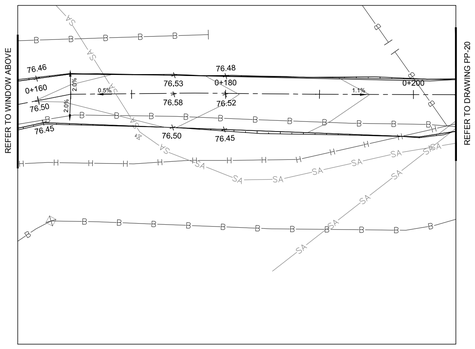
- EXISTING GROUND CONTOUR
- PROPOSED 3:1 SLOPE
- EXISTING CENTRELINE
- PROPSED ELEVATION
- PROPOSED GRADE
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- EXISTING HYDRANT
- EXISTING VALVE BOX
- EXISTING WATER CHAMBER
- EXISTING LIGHT STANDARD
- EXISTING HYDRO
- EXISTING BELL UTILITY
- EXISTING UTILITY
- EXISTING GASMAIN
- EXISTING ELECTRICAL

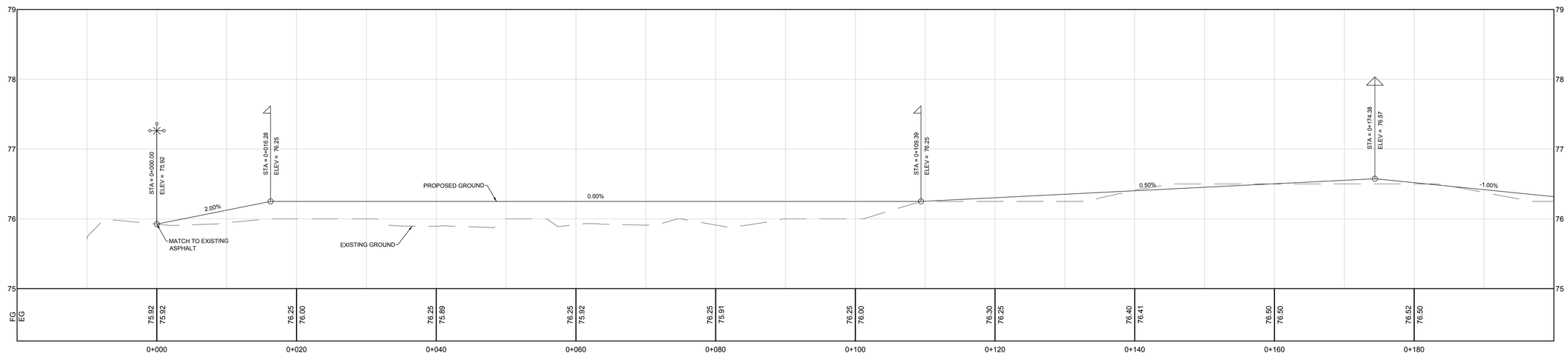


KEYPLAN (N.T.S.)

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS, ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS (OPSD & OPSS), THE WATER RESOURCES ACT, AND THE APPLICABLE ENVIRONMENTAL PROTECTION ACTS. WHERE A CITY OR REGION STANDARD EXISTS, IT SHALL BE USED IN PLACE OF THE PROVINCIAL STANDARD. ALL WORK SHALL CONFORM TO THE APPLICABLE HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2. INFORMATION REGARDING ALL EXISTING UNDERGROUND UTILITIES AND SERVICES SHOWN ON THE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS AND/OR AVAILABLE HISTORICAL DRAWINGS. THE ACCURACY OF THIS INFORMATION HAS NOT BEEN CONFIRMED BY KWA SITE DEVELOPMENT CONSULTING AND ALL UNDERGROUND INFORMATION NEEDS TO BE VERIFIED IN THE FIELD PRIOR TO BIDDING AND CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO ACQUIRE ALL UTILITY LOCATES PRIOR TO CONSTRUCTION AND TO NOTIFY THE ENGINEER OF ANY DISCREPANCIES. ANY LOST TIME DUE TO FAILURE TO IDENTIFY DISCREPANCIES OR NOTIFY THE ENGINEER SHALL BE AT THE CONTRACTOR'S EXPENSE.
3. THIS PLAN SHOULD BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANT'S PLANS AND ANY DISCREPANCIES REPORTED TO THE ENGINEER PRIOR TO CONSTRUCTION.
4. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND ANY DISCREPANCIES REPORTED TO THE ENGINEER. INFORMATION REGARDING PRIVATE ROADS, PARKING LOT CURBS, BUILDING LOCATIONS, AND SETBACKS SHALL BE TAKEN FROM THE SITE PLAN.
5. NO SUBSTITUTIONS SHALL BE ALLOWED WITHOUT ENGINEERS APPROVAL.
6. ALL DISTURBED AREAS SHALL BE REPAIRED TO ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE ENGINEER.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING AT THE SAME TIME AS THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES AND PREVENT CONSTRUCTION CONFLICTS.
8. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL PERMITS INCLUDING THIRD PARTY UTILITY COSTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING ALL NECESSARY SIGNALS, SIGNS, DELINEATORS, MARKERS AND BARRIERS. ALL TRAFFIC AND SAFETY MEASURES SHALL CONFORM TO CITY STANDARDS AND THE ONTARIO TRAFFIC MANUAL, BOOK 7 - TEMPORARY CONDITIONS, LATEST EDITION.
10. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED INSPECTIONS WITH THE CITY AND ANY OTHER REGULATORY AGENCIES. ALL WORK ON CITY PROPERTY OR INFRSTRUCTURE (INCLUDING EASEMENTS, SEWER WORK, AND WATERMAIN WORK) SHALL BE INSPECTED BY THE CITY (AS REQUIRED) PRIOR TO BACKFILLING.
11. THE CONTRACTOR IS RESPONSIBLE TO INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROLS AS REQUIRED BY THIS CONTRACT AND CITY AND PROVINCIAL STANDARDS.
12. CONTRACTOR RESPONSIBLE TO SUPPLY AND INSTALL ALL NECESSARY CONSTRUCTION FENCING.
13. CONTRACTOR TO PROVIDE WEEKLY REDLINE LINE AS-BUILT SURVEY TO THE ENGINEER FOR REVIEW. AS-BUILT TO SHOW PIPE INVERT, PIPE SIZE, AND PIPE MATERIAL.
14. CONTRACTOR TO PROVIDE AS-BUILT SURVEY OF COMPLETED SERVICING AND GRADING WORKS; INCLUDING INVERTS, ALL ABOVE GROUND WORKS AND SPOT ELEVATIONS AT MAXIMUM 15M GRID INTERVAL. SURVEY TO BE PREPARED BY LICENSED ONTARIO LAND SURVEYOR.
15. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE SITE-SPECIFIC GEOTECHNICAL REPORT ENTITLED " " PREPARED BY GROUNDED ENGINEERING, DATED_____ AND ALL APPLICABLE ADDENDUMS.





REVISION BLOCK

#	DATE	DESCRIPTION
1.	10/01/21	ISSUED DRAFT
2.	11/04/21	ISSUED DRAFT
3.	10/14/22	DRAFT EA ISSUED

DRAFT

KWA SITE DEVELOPMENT CONSULTING INC.
2355 Main Street, Unit 1
Burlington, ON L7L 7A9

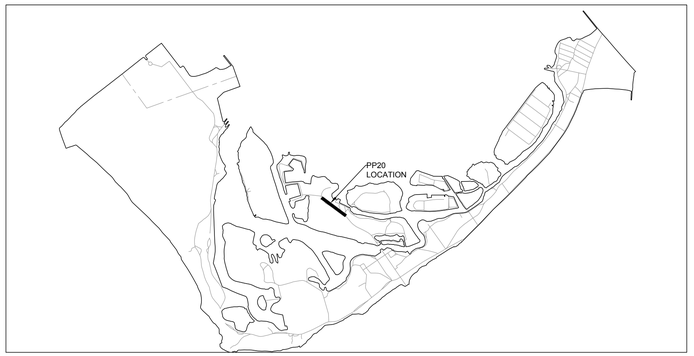
NORTH ARROW

METRIC SCALE
0 2 5 10
HORZ.1:300 VERT.1:30

AVENUE OF THE ISLAND (N/S) STA -0+020 TO 0+200
TORONTO REGION CONSERVATION AUTHORITY
TORONTO ISLAND PARK FLOOD & EROSION MITIGATION
TORONTO, ONTARIO

PROJECT No: 21600 | DRAWN BY: ARV | CHECKED BY: GDB

PP-19



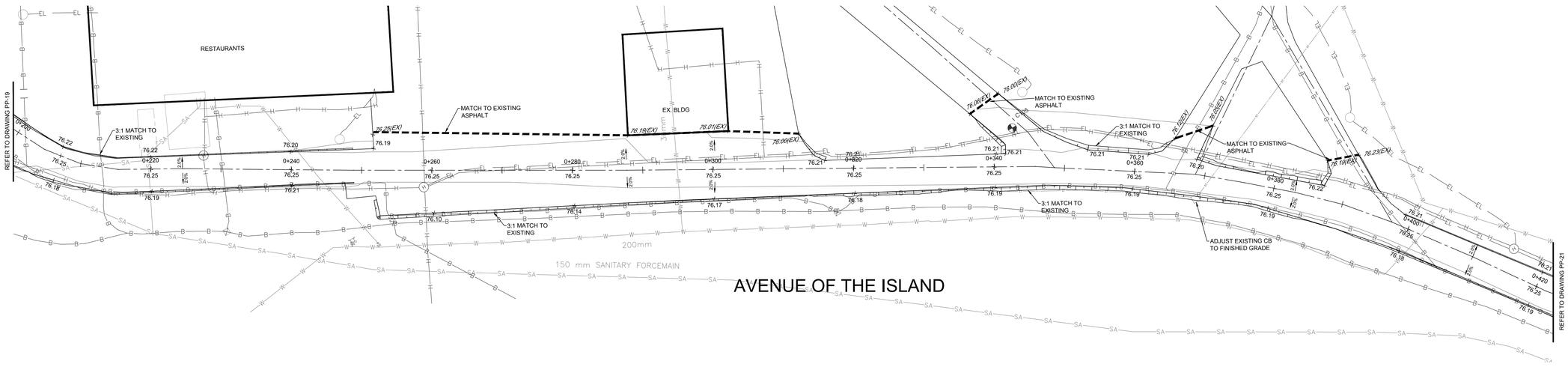
KEYPLAN (N.T.S.)

LEGEND

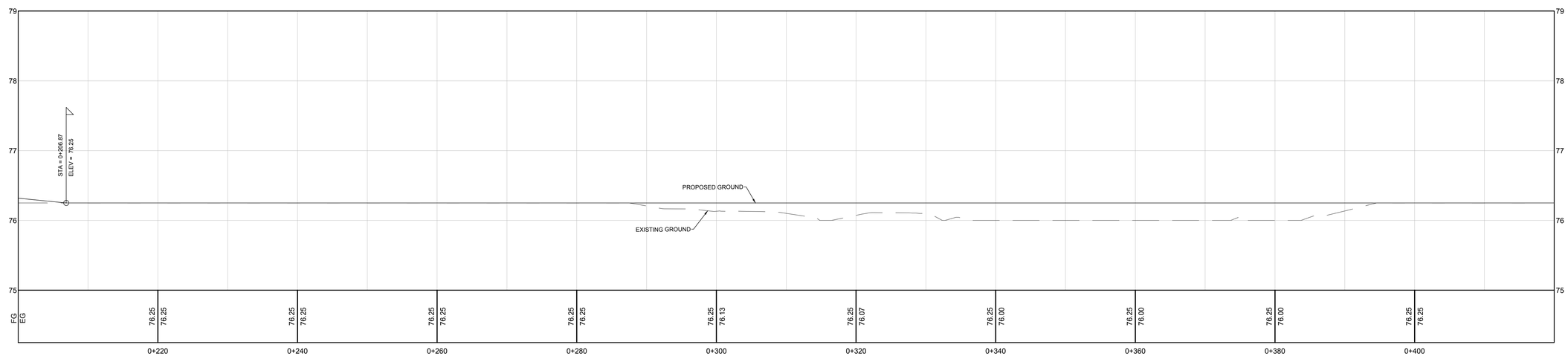
- EXISTING GROUND CONTOUR
- PROPOSED 3:1 SLOPE
- EXISTING CENTRELINE
- PROPSED ELEVATION
- PROPOSED GRADE
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- EXISTING HYDRANT
- EXISTING VALVE BOX
- EXISTING WATER CHAMBER
- EXISTING LIGHT STANDARD
- EXISTING HYDRO
- EXISTING BELL UTILITY
- EXISTING UTILITY
- EXISTING GASMAIN
- EXISTING ELECTRICAL

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS, ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS (OPSD & OPSS), THE WATER RESOURCES ACT, AND THE APPLICABLE ENVIRONMENTAL PROTECTION ACTS. WHERE A CITY OR REGION STANDARD EXISTS, IT SHALL BE USED IN PLACE OF THE PROVINCIAL STANDARD. ALL WORK SHALL CONFORM TO THE APPLICABLE HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2. INFORMATION REGARDING ALL EXISTING UNDERGROUND UTILITIES AND SERVICES SHOWN ON THE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS AND/OR AVAILABLE HISTORICAL DRAWINGS. THE ACCURACY OF THIS INFORMATION HAS NOT BEEN CONFIRMED BY KWA SITE DEVELOPMENT CONSULTING AND ALL UNDERGROUND INFORMATION NEEDS TO BE VERIFIED IN THE FIELD PRIOR TO BIDDING AND CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO ACQUIRE ALL UTILITY LOCATES PRIOR TO CONSTRUCTION AND TO NOTIFY THE ENGINEER OF ANY DISCREPANCIES. ANY LOST TIME DUE TO FAILURE TO IDENTIFY DISCREPANCIES OR NOTIFY THE ENGINEER SHALL BE AT THE CONTRACTOR'S EXPENSE.
3. THIS PLAN SHOULD BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANT'S PLANS AND ANY DISCREPANCIES REPORTED TO THE ENGINEER PRIOR TO CONSTRUCTION.
4. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND ANY DISCREPANCIES REPORTED TO THE ENGINEER. INFORMATION REGARDING PRIVATE ROADS, PARKING LOT CURBS, BUILDING LOCATIONS, AND SETBACKS SHALL BE TAKEN FROM THE SITE PLAN.
5. NO SUBSTITUTIONS SHALL BE ALLOWED WITHOUT ENGINEERS APPROVAL.
6. ALL DISTURBED AREAS SHALL BE REPAIRED TO ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE ENGINEER.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING AT THE SAME TIME AS THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES AND PREVENT CONSTRUCTION CONFLICTS.
8. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL PERMITS INCLUDING THIRD PARTY UTILITY COSTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING ALL NECESSARY SIGNALS, SIGNS, DELINEATORS, MARKERS AND BARRIERS. ALL TRAFFIC AND SAFETY MEASURES SHALL CONFORM TO CITY STANDARDS AND THE ONTARIO TRAFFIC MANUAL, BOOK 7 - TEMPORARY CONDITIONS, LATEST EDITION.
10. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED INSPECTIONS WITH THE CITY AND ANY OTHER REGULATORY AGENCIES. ALL WORK ON CITY PROPERTY OR INFRSTRUCTURE (INCLUDING EASEMENTS, SEWER WORK, AND WATERMAIN WORK) SHALL BE INSPECTED BY THE CITY (AS REQUIRED) PRIOR TO BACKFILLING.
11. THE CONTRACTOR IS RESPONSIBLE TO INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROLS AS REQUIRED BY THIS CONTRACT AND CITY AND PROVINCIAL STANDARDS.
12. CONTRACTOR RESPONSIBLE TO SUPPLY AND INSTALL ALL NECESSARY CONSTRUCTION FENCING.
13. CONTRACTOR TO PROVIDE WEEKLY REDLINE LINE AS-BUILT SURVEY TO THE ENGINEER FOR REVIEW. AS-BUILT TO SHOW PIPE INVERT, PIPE SIZE, AND PIPE MATERIAL.
14. CONTRACTOR TO PROVIDE AS-BUILT SURVEY OF COMPLETED SERVICING AND GRADING WORKS; INCLUDING INVERTS, ALL ABOVE GROUND WORKS AND SPOT ELEVATIONS AT MAXIMUM 15M GRID INTERVAL. SURVEY TO BE PREPARED BY LICENSED ONTARIO LAND SURVEYOR.
15. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE SITE-SPECIFIC GEOTECHNICAL REPORT ENTITLED "_____" PREPARED BY GROUNDED ENGINEERING, DATED_____ AND ALL APPLICABLE ADDENDUMS.



AVENUE OF THE ISLAND



REVISION BLOCK

#	DATE	DESCRIPTION
1.	10/01/21	ISSUED DRAFT
2.	11/04/21	ISSUED DRAFT
3.	10/14/22	DRAFT EA ISSUED

DRAFT

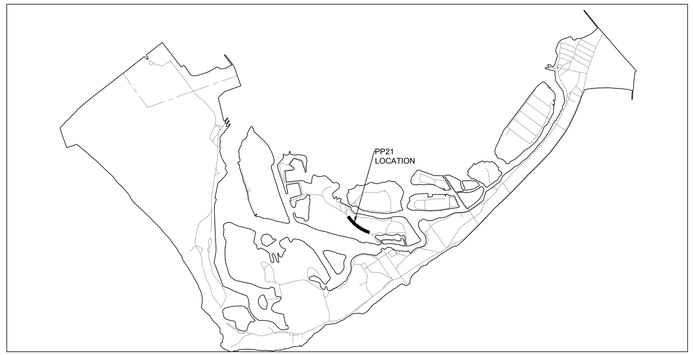
KWA SITE DEVELOPMENT CONSULTING INC.
2355 Main Street, Unit 1
Burlington, ON L7L 7A9

NORTH ARROW

METRIC SCALE
0 2 5 10
HORZ.1:300 VERT.1:30

AVENUE OF THE ISLAND
(N/S) STA 0+200 TO 0+420
TORONTO REGION CONSERVATION AUTHORITY
TORONTO ISLAND PARK FLOOD & EROSION MITIGATION
TORONTO, ONTARIO
PROJECT No: 21600 | DRAWN BY: ARV | CHECKED BY: CDB

PP-20



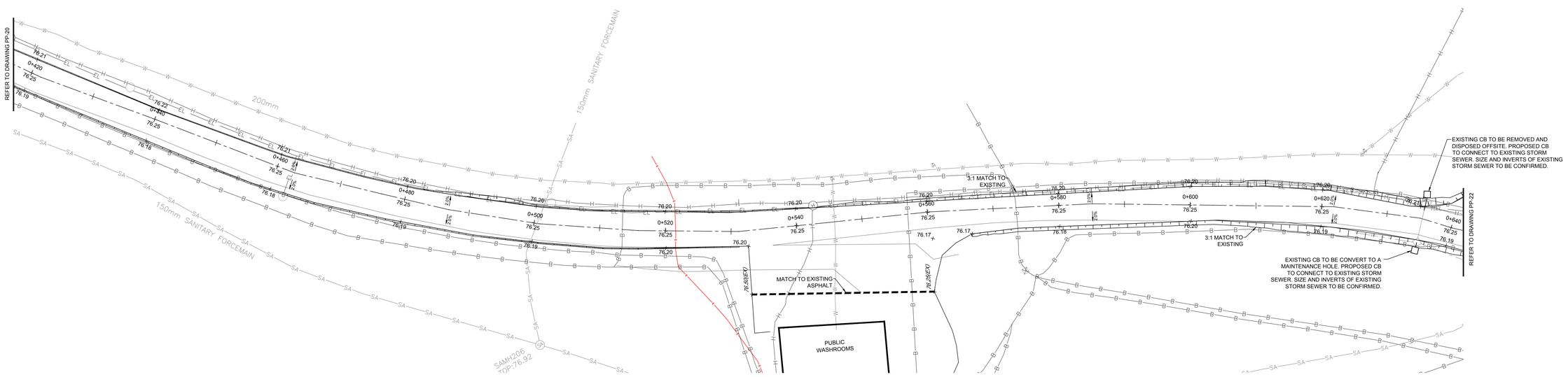
KEYPLAN (N.T.S.)

LEGEND

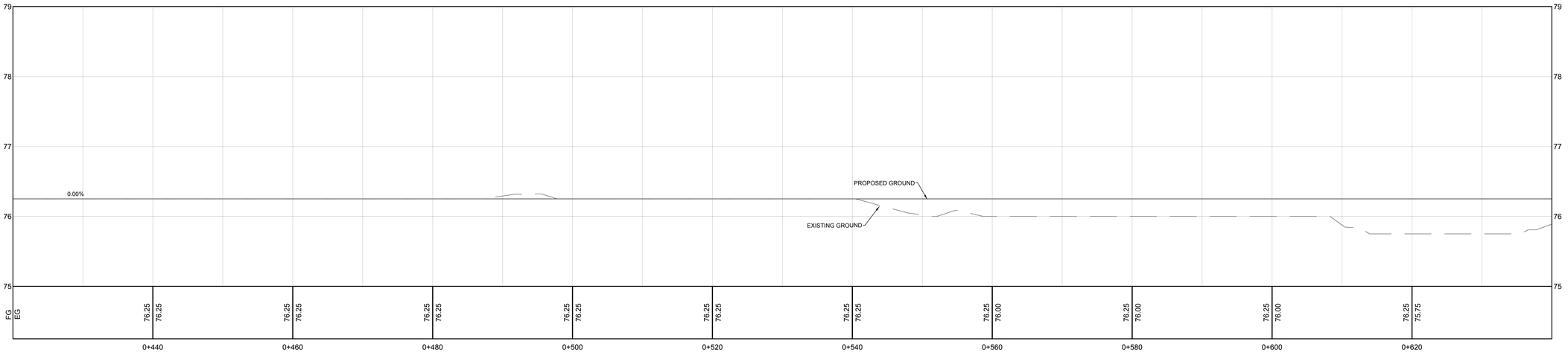
76.00	EXISTING GROUND CONTOUR
	PROPOSED 3:1 SLOPE
	EXISTING CENTRELINE
× 76.25	PROPSED ELEVATION
2.0%	PROPOSED GRADE
ST	EXISTING STORM SEWER
SA	EXISTING SANITARY SEWER
W	EXISTING WATERMAIN
	EXISTING HYDRANT
	EXISTING VALVE BOX
WC	EXISTING WATER CHAMBER
LS	EXISTING LIGHT STANDARD
H	EXISTING HYDRO
B	EXISTING BELL UTILITY
U	EXISTING UTILITY
GAS	EXISTING GASMAIN
EL	EXISTING ELECTRICAL

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS, ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS (OPSD & OPSS), THE WATER RESOURCES ACT, AND THE APPLICABLE ENVIRONMENTAL PROTECTION ACTS. WHERE A CITY OR REGION STANDARD EXISTS, IT SHALL BE USED IN PLACE OF THE PROVINCIAL STANDARD. ALL WORK SHALL CONFORM TO THE APPLICABLE HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2. INFORMATION REGARDING ALL EXISTING UNDERGROUND UTILITIES AND SERVICES SHOWN ON THE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS AND/OR AVAILABLE HISTORICAL DRAWINGS. THE ACCURACY OF THIS INFORMATION HAS NOT BEEN CONFIRMED BY KWA SITE DEVELOPMENT CONSULTING AND ALL UNDERGROUND INFORMATION NEEDS TO BE VERIFIED IN THE FIELD PRIOR TO BIDDING AND CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO ACQUIRE ALL UTILITY LOCATES PRIOR TO CONSTRUCTION AND TO NOTIFY THE ENGINEER OF ANY DISCREPANCIES. ANY LOST TIME DUE TO FAILURE TO IDENTIFY DISCREPANCIES OR NOTIFY THE ENGINEER SHALL BE AT THE CONTRACTOR'S EXPENSE.
3. THIS PLAN SHOULD BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANT'S PLANS AND ANY DISCREPANCIES REPORTED TO THE ENGINEER PRIOR TO CONSTRUCTION.
4. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND ANY DISCREPANCIES REPORTED TO THE ENGINEER. INFORMATION REGARDING PRIVATE ROADS, PARKING LOT CURBS, BUILDING LOCATIONS, AND SETBACKS SHALL BE TAKEN FROM THE SITE PLAN.
5. NO SUBSTITUTIONS SHALL BE ALLOWED WITHOUT ENGINEERS APPROVAL.
6. ALL DISTURBED AREAS SHALL BE REPAIRED TO ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE ENGINEER.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING AT THE SAME TIME AS THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES AND PREVENT CONSTRUCTION CONFLICTS.
8. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL PERMITS INCLUDING THIRD PARTY UTILITY COSTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING ALL NECESSARY SIGNALS, SIGNS, DELINEATORS, MARKERS AND BARRIERS. ALL TRAFFIC AND SAFETY MEASURES SHALL CONFORM TO CITY STANDARDS AND THE ONTARIO TRAFFIC MANUAL, BOOK 7 - TEMPORARY CONDITIONS, LATEST EDITION.
10. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED INSPECTIONS WITH THE CITY AND ANY OTHER REGULATORY AGENCIES. ALL WORK ON CITY PROPERTY OR INFRSTRUCTURE (INCLUDING EASEMENTS, SEWER WORK, AND WATERMAIN WORK) SHALL BE INSPECTED BY THE CITY (AS REQUIRED) PRIOR TO BACKFILLING.
11. THE CONTRACTOR IS RESPONSIBLE TO INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROLS AS REQUIRED BY THIS CONTRACT AND CITY AND PROVINCIAL STANDARDS.
12. CONTRACTOR RESPONSIBLE TO SUPPLY AND INSTALL ALL NECESSARY CONSTRUCTION FENCING.
13. CONTRACTOR TO PROVIDE WEEKLY REDLINE LINE AS-BUILT SURVEY TO THE ENGINEER FOR REVIEW. AS-BUILT TO SHOW PIPE INVERT, PIPE SIZE, AND PIPE MATERIAL.
14. CONTRACTOR TO PROVIDE AS-BUILT SURVEY OF COMPLETED SERVICING AND GRADING WORKS; INCLUDING INVERTS, ALL ABOVE GROUND WORKS AND SPOT ELEVATIONS AT MAXIMUM 15M GRID INTERVAL. SURVEY TO BE PREPARED BY LICENSED ONTARIO LAND SURVEYOR.
15. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE SITE-SPECIFIC GEOTECHNICAL REPORT ENTITLED "_____" PREPARED BY GROUNDED ENGINEERING, DATED_____ AND ALL APPLICABLE ADDENDUMS.



AVENUE OF THE ISLAND



REVISION BLOCK

#	DATE	DESCRIPTION
1.	10/01/21	ISSUED DRAFT
2.	11/04/21	ISSUED DRAFT
3.	10/14/22	DRAFT EA ISSUED

DRAFT

KWA SITE DEVELOPMENT CONSULTING INC.
2055 Mountain Grove Ave.
Burlington, ON L7L 7A9

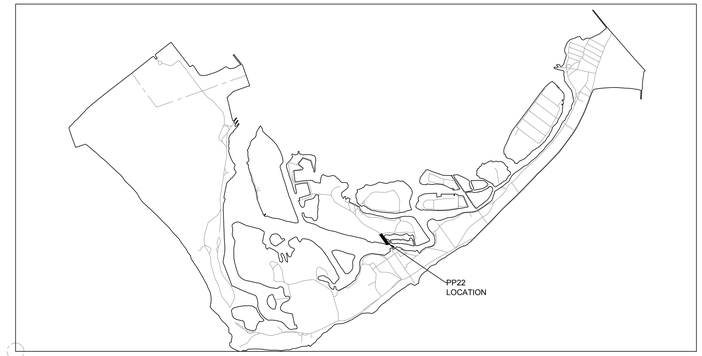
NORTH ARROW

METRIC SCALE
0 2 5 10
HORZ.1:300 VERT.1:30

AVENUE OF THE ISLAND (N/S) STA 0+420 TO 0+640
TORONTO REGION CONSERVATION AUTHORITY
TORONTO ISLAND PARK FLOOD & EROSION MITIGATION
TORONTO, ONTARIO

CHECKED BY: CDB
DRAWN BY: ARV
PROJECT No: 21600

PP-21



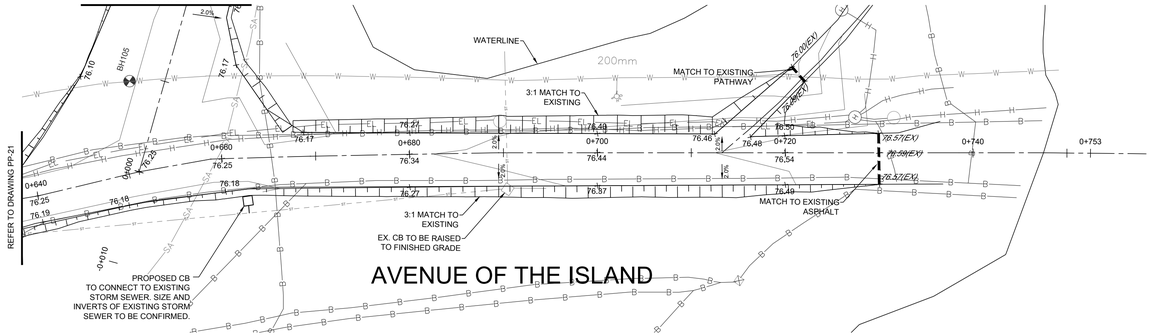
KEYPLAN (N.T.S.)

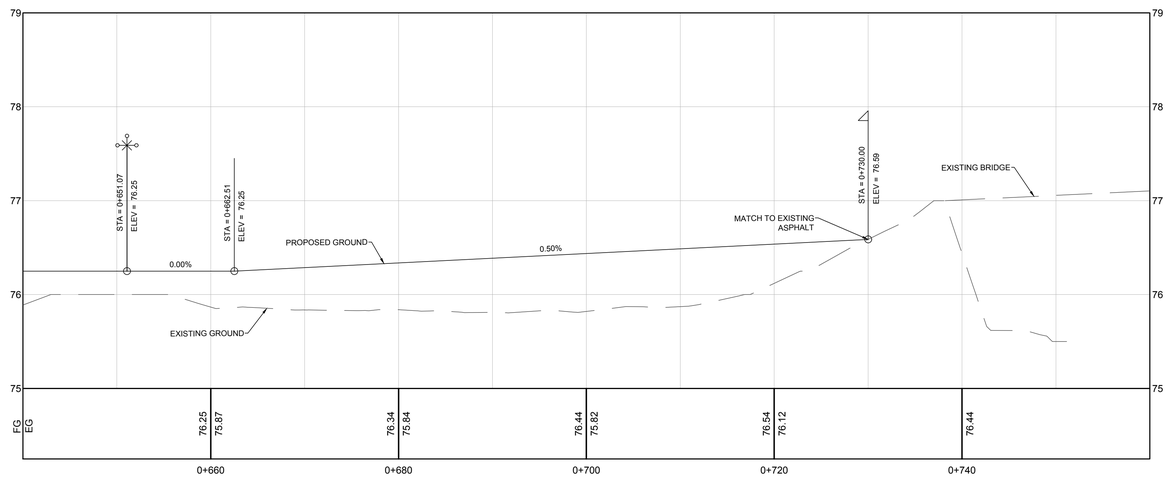
LEGEND

- 76.00 — EXISTING GROUND CONTOUR
- PROPOSED 3:1 SLOPE
- EXISTING CENTRELINE
- × 76.25 — PROPSED ELEVATION
- 2.0% — PROPOSED GRADE
- ST — EXISTING STORM SEWER
- SA — EXISTING SANITARY SEWER
- W — EXISTING WATERMAIN
- EXISTING HYDRANT
- EXISTING VALVE BOX
- EXISTING WATER CHAMBER
- LS — EXISTING LIGHT STANDARD
- H — EXISTING HYDRO
- B — EXISTING BELL UTILITY
- U — EXISTING UTILITY
- GAS — EXISTING GASMAIN
- EL — EXISTING ELECTRICAL

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS, ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS (OPSD & OPSS), THE WATER RESOURCES ACT, AND THE APPLICABLE ENVIRONMENTAL PROTECTION ACTS. WHERE A CITY OR REGION STANDARD EXISTS, IT SHALL BE USED IN PLACE OF THE PROVINCIAL STANDARD. ALL WORK SHALL CONFORM TO THE APPLICABLE HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2. INFORMATION REGARDING ALL EXISTING UNDERGROUND UTILITIES AND SERVICES SHOWN ON THE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS AND/OR AVAILABLE HISTORICAL DRAWINGS. THE ACCURACY OF THIS INFORMATION HAS NOT BEEN CONFIRMED BY KWA SITE DEVELOPMENT CONSULTING AND ALL UNDERGROUND INFORMATION NEEDS TO BE VERIFIED IN THE FIELD PRIOR TO BIDDING AND CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO ACQUIRE ALL UTILITY LOCATES PRIOR TO CONSTRUCTION AND TO NOTIFY THE ENGINEER OF ANY DISCREPANCIES. ANY LOST TIME DUE TO FAILURE TO IDENTIFY DISCREPANCIES OR NOTIFY THE ENGINEER SHALL BE AT THE CONTRACTOR'S EXPENSE.
3. THIS PLAN SHOULD BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANT'S PLANS AND ANY DISCREPANCIES REPORTED TO THE ENGINEER PRIOR TO CONSTRUCTION.
4. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND ANY DISCREPANCIES REPORTED TO THE ENGINEER. INFORMATION REGARDING PRIVATE ROADS, PARKING LOT CURBS, BUILDING LOCATIONS, AND SETBACKS SHALL BE TAKEN FROM THE SITE PLAN.
5. NO SUBSTITUTIONS SHALL BE ALLOWED WITHOUT ENGINEERS APPROVAL.
6. ALL DISTURBED AREAS SHALL BE REPAIRED TO ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE ENGINEER.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING AT THE SAME TIME AS THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES AND PREVENT CONSTRUCTION CONFLICTS.
8. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL PERMITS INCLUDING THIRD PARTY UTILITY COSTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING ALL NECESSARY SIGNALS, SIGNS, DELINEATORS, MARKERS AND BARRIERS. ALL TRAFFIC AND SAFETY MEASURES SHALL CONFORM TO CITY STANDARDS AND THE ONTARIO TRAFFIC MANUAL, BOOK 7 - TEMPORARY CONDITIONS, LATEST EDITION.
10. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED INSPECTIONS WITH THE CITY AND ANY OTHER REGULATORY AGENCIES. ALL WORK ON CITY PROPERTY OR INFRSTRUCTURE (INCLUDING EASEMENTS, SEWER WORK, AND WATERMAIN WORK) SHALL BE INSPECTED BY THE CITY (AS REQUIRED) PRIOR TO BACKFILLING.
11. THE CONTRACTOR IS RESPONSIBLE TO INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROLS AS REQUIRED BY THIS CONTRACT AND CITY AND PROVINCIAL STANDARDS.
12. CONTRACTOR RESPONSIBLE TO SUPPLY AND INSTALL ALL NECESSARY CONSTRUCTION FENCING.
13. CONTRACTOR TO PROVIDE WEEKLY REDLINE LINE AS-BUILT SURVEY TO THE ENGINEER FOR REVIEW. AS-BUILT TO SHOW PIPE INVERT, PIPE SIZE, AND PIPE MATERIAL.
14. CONTRACTOR TO PROVIDE AS-BUILT SURVEY OF COMPLETED SERVICING AND GRADING WORKS; INCLUDING INVERTS, ALL ABOVE GROUND WORKS AND SPOT ELEVATIONS AT MAXIMUM 15M GRID INTERVAL. SURVEY TO BE PREPARED BY LICENSED ONTARIO LAND SURVEYOR.
15. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE SITE-SPECIFIC GEOTECHNICAL REPORT ENTITLED "_____" PREPARED BY GROUNDED ENGINEERING, DATED_____ AND ALL APPLICABLE ADDENDUMS.





REVISION BLOCK

#	DATE	DESCRIPTION
1.	10/01/21	ISSUED DRAFT
2.	11/04/21	ISSUED DRAFT
3.	10/14/22	DRAFT EA ISSUED

DRAFT

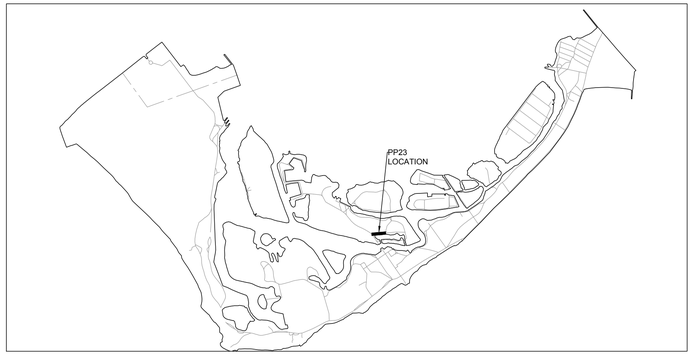
KWA SITE DEVELOPMENT CONSULTING INC.
2355 Main Street West
Burlington, ON L7L 7A9

NORTH ARROW

METRIC SCALE
0 2 5 10
HORZ.1:300 VERT.1:30

AVENUE OF THE ISLAND (N/S) STA 0+640 TO 0+760
TORONTO REGION CONSERVATION AUTHORITY
TORONTO ISLAND PARK FLOOD & EROSION MITIGATION
TORONTO, ONTARIO
PROJECT No: 21600 | DRAWN BY: ARV | CHECKED BY: CDB

PP-22



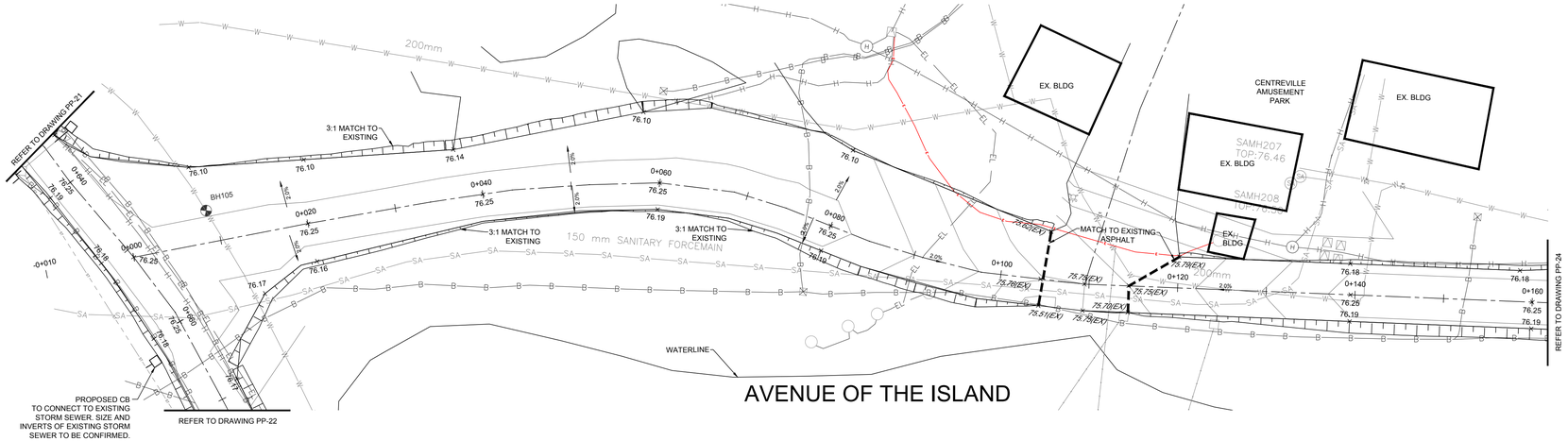
KEYPLAN (N.T.S.)

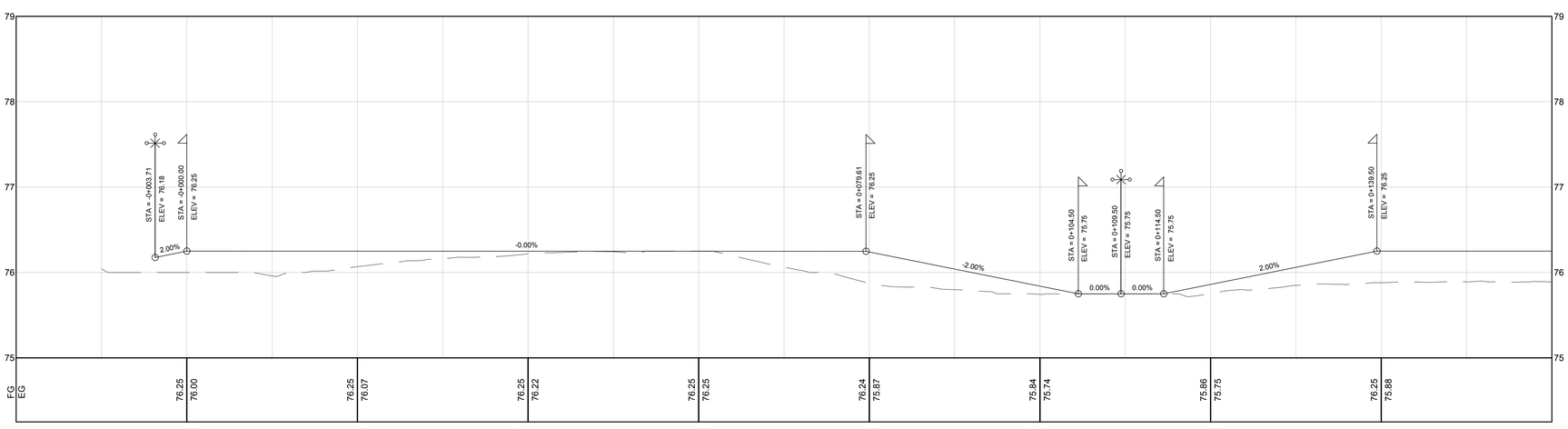
LEGEND

- EXISTING GROUND CONTOUR (76.00)
- PROPOSED 3:1 SLOPE
- EXISTING CENTRELINE
- PROPSED ELEVATION (× 76.25)
- PROPOSED GRADE (2.0%)
- EXISTING STORM SEWER (ST)
- EXISTING SANITARY SEWER (SA)
- EXISTING WATERMAIN (W)
- EXISTING HYDRANT
- EXISTING VALVE BOX
- EXISTING WATER CHAMBER (WC)
- EXISTING LIGHT STANDARD (LS)
- EXISTING HYDRO (H)
- EXISTING BELL UTILITY (B)
- EXISTING UTILITY (U)
- EXISTING GASMAIN (GAS)
- EXISTING ELECTRICAL (EL)

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS, ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS (OPSD & OPSS), THE WATER RESOURCES ACT, AND THE APPLICABLE ENVIRONMENTAL PROTECTION ACTS. WHERE A CITY OR REGION STANDARD EXISTS, IT SHALL BE USED IN PLACE OF THE PROVINCIAL STANDARD. ALL WORK SHALL CONFORM TO THE APPLICABLE HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2. INFORMATION REGARDING ALL EXISTING UNDERGROUND UTILITIES AND SERVICES SHOWN ON THE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS AND/OR AVAILABLE HISTORICAL DRAWINGS. THE ACCURACY OF THIS INFORMATION HAS NOT BEEN CONFIRMED BY KWA SITE DEVELOPMENT CONSULTING AND ALL UNDERGROUND INFORMATION NEEDS TO BE VERIFIED IN THE FIELD PRIOR TO BIDDING AND CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO ACQUIRE ALL UTILITY LOCATES PRIOR TO CONSTRUCTION AND TO NOTIFY THE ENGINEER OF ANY DISCREPANCIES. ANY LOST TIME DUE TO FAILURE TO IDENTIFY DISCREPANCIES OR NOTIFY THE ENGINEER SHALL BE AT THE CONTRACTOR'S EXPENSE.
3. THIS PLAN SHOULD BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANT'S PLANS AND ANY DISCREPANCIES REPORTED TO THE ENGINEER PRIOR TO CONSTRUCTION.
4. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND ANY DISCREPANCIES REPORTED TO THE ENGINEER. INFORMATION REGARDING PRIVATE ROADS, PARKING LOT CURBS, BUILDING LOCATIONS, AND SETBACKS SHALL BE TAKEN FROM THE SITE PLAN.
5. NO SUBSTITUTIONS SHALL BE ALLOWED WITHOUT ENGINEERS APPROVAL.
6. ALL DISTURBED AREAS SHALL BE REPAIRED TO ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE ENGINEER.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING AT THE SAME TIME AS THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES AND PREVENT CONSTRUCTION CONFLICTS.
8. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL PERMITS INCLUDING THIRD PARTY UTILITY COSTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING ALL NECESSARY SIGNALS, SIGNS, DELINEATORS, MARKERS AND BARRIERS. ALL TRAFFIC AND SAFETY MEASURES SHALL CONFORM TO CITY STANDARDS AND THE ONTARIO TRAFFIC MANUAL, BOOK 7 - TEMPORARY CONDITIONS, LATEST EDITION.
10. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED INSPECTIONS WITH THE CITY AND ANY OTHER REGULATORY AGENCIES. ALL WORK ON CITY PROPERTY OR INFRSTRUCTURE (INCLUDING EASEMENTS, SEWER WORK, AND WATERMAIN WORK) SHALL BE INSPECTED BY THE CITY (AS REQUIRED) PRIOR TO BACKFILLING.
11. THE CONTRACTOR IS RESPONSIBLE TO INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROLS AS REQUIRED BY THIS CONTRACT AND CITY AND PROVINCIAL STANDARDS.
12. CONTRACTOR RESPONSIBLE TO SUPPLY AND INSTALL ALL NECESSARY CONSTRUCTION FENCING.
13. CONTRACTOR TO PROVIDE WEEKLY REDLINE LINE AS-BUILT SURVEY TO THE ENGINEER FOR REVIEW. AS-BUILT TO SHOW PIPE INVERT, PIPE SIZE, AND PIPE MATERIAL.
14. CONTRACTOR TO PROVIDE AS-BUILT SURVEY OF COMPLETED SERVICING AND GRADING WORKS; INCLUDING INVERTS, ALL ABOVE GROUND WORKS AND SPOT ELEVATIONS AT MAXIMUM 15M GRID INTERVAL. SURVEY TO BE PREPARED BY LICENSED ONTARIO LAND SURVEYOR.
15. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE SITE-SPECIFIC GEOTECHNICAL REPORT ENTITLED "_____" PREPARED BY GROUNDED ENGINEERING, DATED_____ AND ALL APPLICABLE ADDENDUMS.





REVISION BLOCK

#	DATE	DESCRIPTION
1.	10/01/21	ISSUED DRAFT
2.	11/04/21	ISSUED DRAFT
3.	10/14/22	DRAFT EA ISSUED

DRAFT

KWA SITE DEVELOPMENT CONSULTING INC.
2355 Main Street, Unit 1
Burlington, ON L7L 7A9

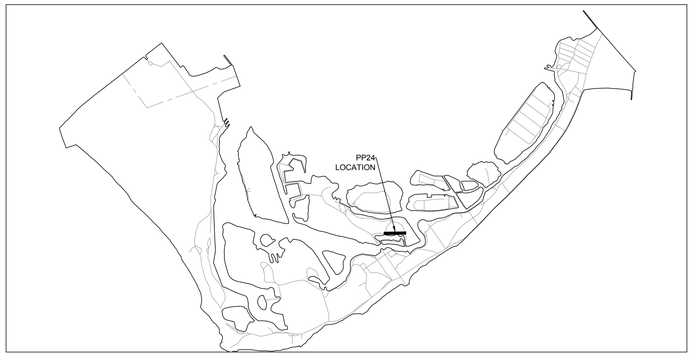
NORTH ARROW

METRIC SCALE
0 2 5 10
HORZ.1:300 VERT.1:30

AVENUE OF THE ISLAND (E/W) STA -0+020 TO 0+160
TORONTO REGION CONSERVATION AUTHORITY
TORONTO ISLAND PARK FLOOD & EROSION MITIGATION
TORONTO, ONTARIO

CHECKED BY: CDB
DRAWN BY: ARV
PROJECT No: 21600

PP-23



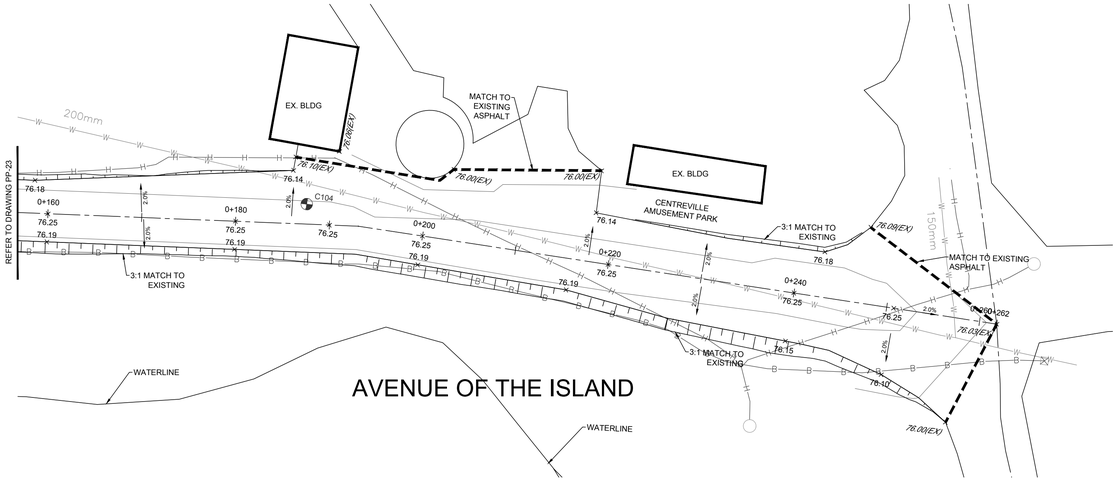
KEYPLAN (N.T.S.)

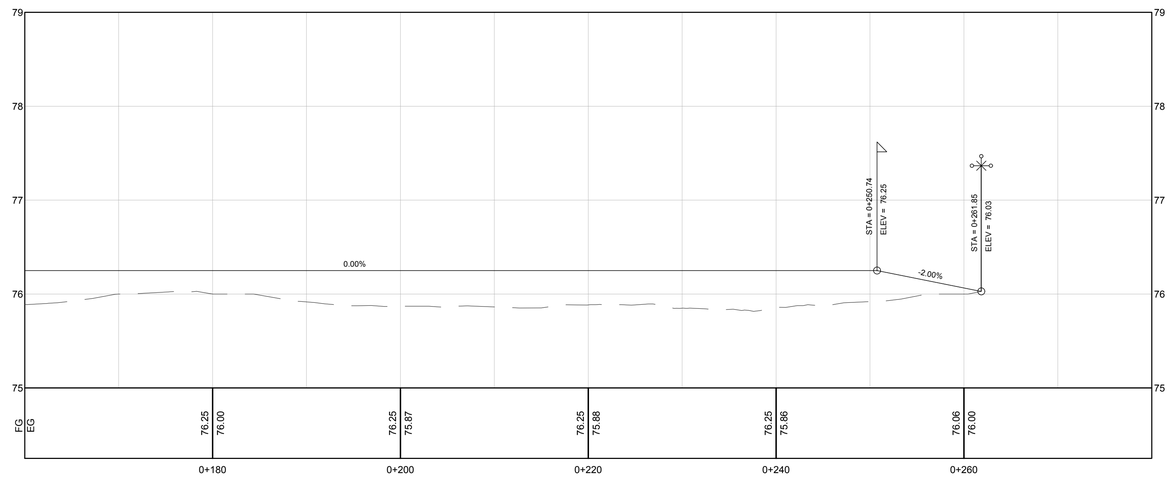
LEGEND

76.00	EXISTING GROUND CONTOUR
	PROPOSED 3:1 SLOPE
	EXISTING CENTRELINE
× 76.25	PROPSED ELEVATION
2.0%	PROPOSED GRADE
ST	EXISTING STORM SEWER
SA	EXISTING SANITARY SEWER
W	EXISTING WATERMAIN
	EXISTING HYDRANT
	EXISTING VALVE BOX
WC	EXISTING WATER CHAMBER
LS	EXISTING LIGHT STANDARD
H	EXISTING HYDRO
B	EXISTING BELL UTILITY
U	EXISTING UTILITY
GAS	EXISTING GASMAIN
EL	EXISTING ELECTRICAL

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS, ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS (OPSD & OPSS), THE WATER RESOURCES ACT, AND THE APPLICABLE ENVIRONMENTAL PROTECTION ACTS. WHERE A CITY OR REGION STANDARD EXISTS, IT SHALL BE USED IN PLACE OF THE PROVINCIAL STANDARD. ALL WORK SHALL CONFORM TO THE APPLICABLE HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2. INFORMATION REGARDING ALL EXISTING UNDERGROUND UTILITIES AND SERVICES SHOWN ON THE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS AND/OR AVAILABLE HISTORICAL DRAWINGS. THE ACCURACY OF THIS INFORMATION HAS NOT BEEN CONFIRMED BY KWA SITE DEVELOPMENT CONSULTING AND ALL UNDERGROUND INFORMATION NEEDS TO BE VERIFIED IN THE FIELD PRIOR TO BIDDING AND CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO ACQUIRE ALL UTILITY LOCATES PRIOR TO CONSTRUCTION AND TO NOTIFY THE ENGINEER OF ANY DISCREPANCIES. ANY LOST TIME DUE TO FAILURE TO IDENTIFY DISCREPANCIES OR NOTIFY THE ENGINEER SHALL BE AT THE CONTRACTOR'S EXPENSE.
3. THIS PLAN SHOULD BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANT'S PLANS AND ANY DISCREPANCIES REPORTED TO THE ENGINEER PRIOR TO CONSTRUCTION.
4. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND ANY DISCREPANCIES REPORTED TO THE ENGINEER. INFORMATION REGARDING PRIVATE ROADS, PARKING LOT CURBS, BUILDING LOCATIONS, AND SETBACKS SHALL BE TAKEN FROM THE SITE PLAN.
5. NO SUBSTITUTIONS SHALL BE ALLOWED WITHOUT ENGINEERS APPROVAL.
6. ALL DISTURBED AREAS SHALL BE REPAIRED TO ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE ENGINEER.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING AT THE SAME TIME AS THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES AND PREVENT CONSTRUCTION CONFLICTS.
8. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL PERMITS INCLUDING THIRD PARTY UTILITY COSTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING ALL NECESSARY SIGNALS, SIGNS, DELINEATORS, MARKERS AND BARRIERS. ALL TRAFFIC AND SAFETY MEASURES SHALL CONFORM TO CITY STANDARDS AND THE ONTARIO TRAFFIC MANUAL, BOOK 7 - TEMPORARY CONDITIONS, LATEST EDITION.
10. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED INSPECTIONS WITH THE CITY AND ANY OTHER REGULATORY AGENCIES. ALL WORK ON CITY PROPERTY OR INFRSTRUCTURE (INCLUDING EASEMENTS, SEWER WORK, AND WATERMAIN WORK) SHALL BE INSPECTED BY THE CITY (AS REQUIRED) PRIOR TO BACKFILLING.
11. THE CONTRACTOR IS RESPONSIBLE TO INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROLS AS REQUIRED BY THIS CONTRACT AND CITY AND PROVINCIAL STANDARDS.
12. CONTRACTOR RESPONSIBLE TO SUPPLY AND INSTALL ALL NECESSARY CONSTRUCTION FENCING.
13. CONTRACTOR TO PROVIDE WEEKLY REDLINE LINE AS-BUILT SURVEY TO THE ENGINEER FOR REVIEW. AS-BUILT TO SHOW PIPE INVERT, PIPE SIZE, AND PIPE MATERIAL.
14. CONTRACTOR TO PROVIDE AS-BUILT SURVEY OF COMPLETED SERVICING AND GRADING WORKS; INCLUDING INVERTS, ALL ABOVE GROUND WORKS AND SPOT ELEVATIONS AT MAXIMUM 15M GRID INTERVAL. SURVEY TO BE PREPARED BY LICENSED ONTARIO LAND SURVEYOR.
15. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE SITE-SPECIFIC GEOTECHNICAL REPORT ENTITLED "_____" PREPARED BY GROUNDED ENGINEERING, DATED_____ AND ALL APPLICABLE ADDENDUMS.





REVISION BLOCK

#	DATE	DESCRIPTION
1.	10/01/21	ISSUED DRAFT
2.	11/04/21	ISSUED DRAFT
3.	10/14/22	DRAFT EA ISSUED

DRAFT

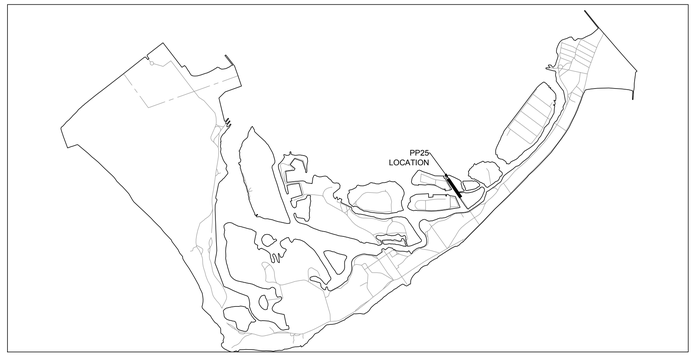
KWA SITE DEVELOPMENT CONSULTING INC.
2355 Main Street, Unit 2
Burlington, ON L7L 7A9

NORTH ARROW

METRIC SCALE
0 2 5 10
HORZ.1:300 VERT.1:30

AVENUE OF THE ISLAND
(E/W) STA 0+160 TO 0+280
TORONTO REGION CONSERVATION AUTHORITY
TORONTO ISLAND PARK FLOOD & EROSION MITIGATION
TORONTO, ONTARIO
PROJECT No: 21600 | DRAWN BY: ARV | CHECKED BY: CDB

PP-24



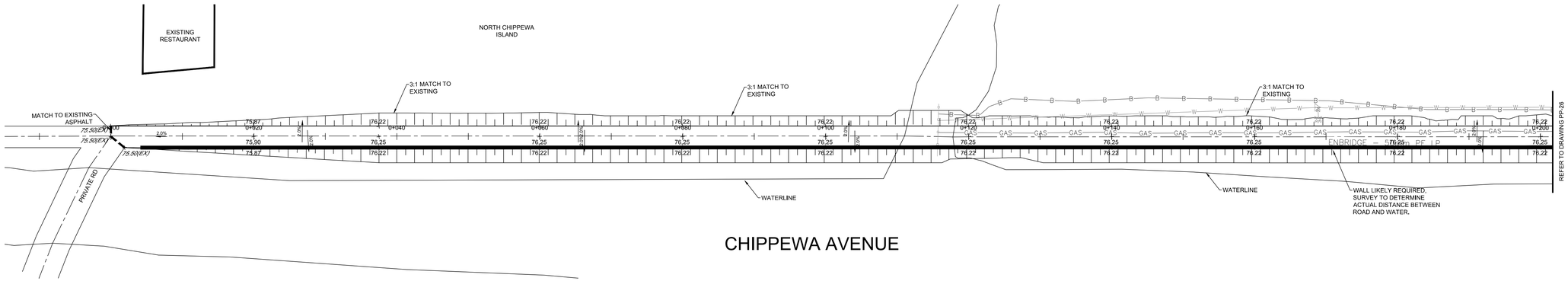
KEYPLAN (N.T.S.)

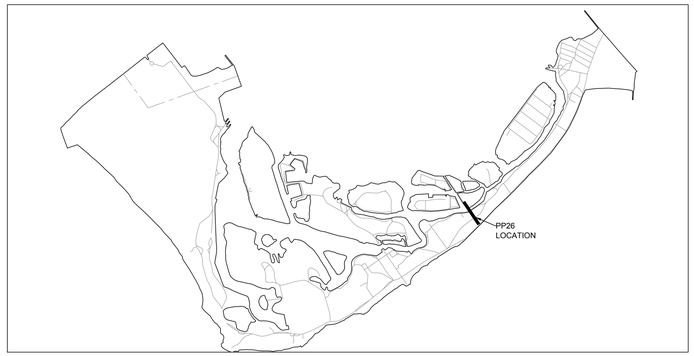
LEGEND

- 76.00 — EXISTING GROUND CONTOUR
- PROPOSED 3:1 SLOPE
- EXISTING CENTRELINE
- × 76.25 — PROPSED ELEVATION
- 2.0% — PROPOSED GRADE
- ST — EXISTING STORM SEWER
- SA — EXISTING SANITARY SEWER
- W — EXISTING WATERMAIN
- EXISTING HYDRANT
- EXISTING VALVE BOX
- WC — EXISTING WATER CHAMBER
- LS — EXISTING LIGHT STANDARD
- H — EXISTING HYDRO
- B — EXISTING BELL UTILITY
- U — EXISTING UTILITY
- GAS — EXISTING GASMAIN
- EL — EXISTING ELECTRICAL

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS, ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS (OPSD & OPSS), THE WATER RESOURCES ACT, AND THE APPLICABLE ENVIRONMENTAL PROTECTION ACTS. WHERE A CITY OR REGION STANDARD EXISTS, IT SHALL BE USED IN PLACE OF THE PROVINCIAL STANDARD. ALL WORK SHALL CONFORM TO THE APPLICABLE HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2. INFORMATION REGARDING ALL EXISTING UNDERGROUND UTILITIES AND SERVICES SHOWN ON THE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS AND/OR AVAILABLE HISTORICAL DRAWINGS. THE ACCURACY OF THIS INFORMATION HAS NOT BEEN CONFIRMED BY KWA SITE DEVELOPMENT CONSULTING AND ALL UNDERGROUND INFORMATION NEEDS TO BE VERIFIED IN THE FIELD PRIOR TO BIDDING AND CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO ACQUIRE ALL UTILITY LOCATES PRIOR TO CONSTRUCTION AND TO NOTIFY THE ENGINEER OF ANY DISCREPANCIES. ANY LOST TIME DUE TO FAILURE TO IDENTIFY DISCREPANCIES OR NOTIFY THE ENGINEER SHALL BE AT THE CONTRACTOR'S EXPENSE.
3. THIS PLAN SHOULD BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANT'S PLANS AND ANY DISCREPANCIES REPORTED TO THE ENGINEER PRIOR TO CONSTRUCTION.
4. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND ANY DISCREPANCIES REPORTED TO THE ENGINEER. INFORMATION REGARDING PRIVATE ROADS, PARKING LOT CURBS, BUILDING LOCATIONS, AND SETBACKS SHALL BE TAKEN FROM THE SITE PLAN.
5. NO SUBSTITUTIONS SHALL BE ALLOWED WITHOUT ENGINEERS APPROVAL.
6. ALL DISTURBED AREAS SHALL BE REPAIRED TO ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE ENGINEER.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING AT THE SAME TIME AS THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES AND PREVENT CONSTRUCTION CONFLICTS.
8. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL PERMITS INCLUDING THIRD PARTY UTILITY COSTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING ALL NECESSARY SIGNALS, SIGNS, DELINEATORS, MARKERS AND BARRIERS. ALL TRAFFIC AND SAFETY MEASURES SHALL CONFORM TO CITY STANDARDS AND THE ONTARIO TRAFFIC MANUAL, BOOK 7 - TEMPORARY CONDITIONS, LATEST EDITION.
10. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED INSPECTIONS WITH THE CITY AND ANY OTHER REGULATORY AGENCIES. ALL WORK ON CITY PROPERTY OR INFRSTRUCTURE (INCLUDING EASEMENTS, SEWER WORK, AND WATERMAIN WORK) SHALL BE INSPECTED BY THE CITY (AS REQUIRED) PRIOR TO BACKFILLING.
11. THE CONTRACTOR IS RESPONSIBLE TO INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROLS AS REQUIRED BY THIS CONTRACT AND CITY AND PROVINCIAL STANDARDS.
12. CONTRACTOR RESPONSIBLE TO SUPPLY AND INSTALL ALL NECESSARY CONSTRUCTION FENCING.
13. CONTRACTOR TO PROVIDE WEEKLY REDLINE LINE AS-BUILT SURVEY TO THE ENGINEER FOR REVIEW. AS-BUILT TO SHOW PIPE INVERT, PIPE SIZE, AND PIPE MATERIAL.
14. CONTRACTOR TO PROVIDE AS-BUILT SURVEY OF COMPLETED SERVICING AND GRADING WORKS; INCLUDING INVERTS, ALL ABOVE GROUND WORKS AND SPOT ELEVATIONS AT MAXIMUM 15M GRID INTERVAL. SURVEY TO BE PREPARED BY LICENSED ONTARIO LAND SURVEYOR.
15. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE SITE-SPECIFIC GEOTECHNICAL REPORT ENTITLED "_____" PREPARED BY GROUNDED ENGINEERING, DATED_____ AND ALL APPLICABLE ADDENDUMS.


EXISTING RESTAURANT
NORTH CHIPPEWA ISLAND
MATCH TO EXISTING ASPHALT
3:1 MATCH TO EXISTING
3:1 MATCH TO EXISTING
75.50(EX)
75.50(EX)
75.50(EX)
2.0%
2.00%
2.00%
2.00



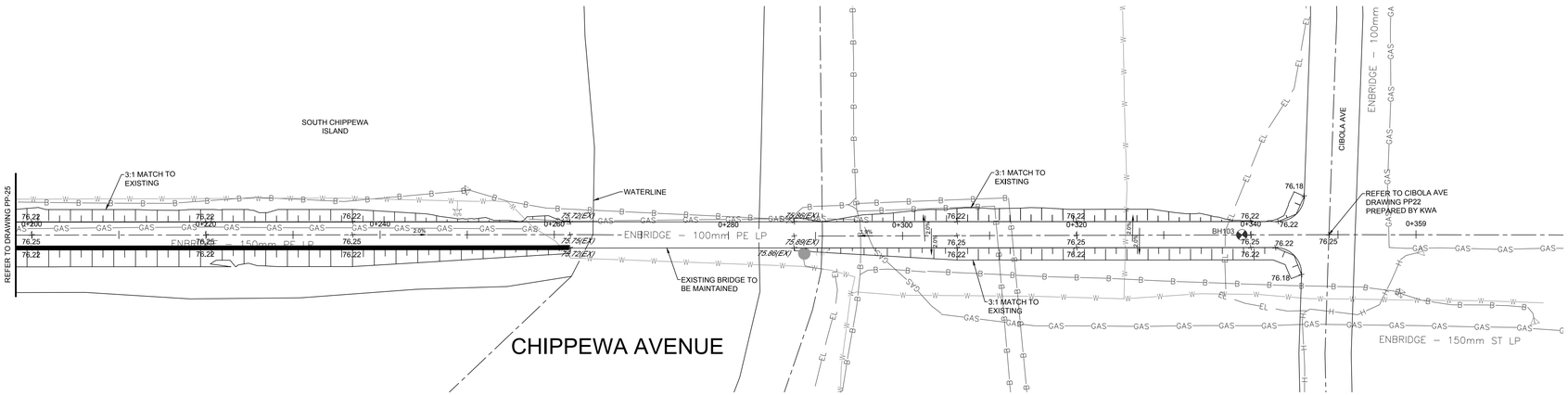
KEYPLAN (N.T.S.)

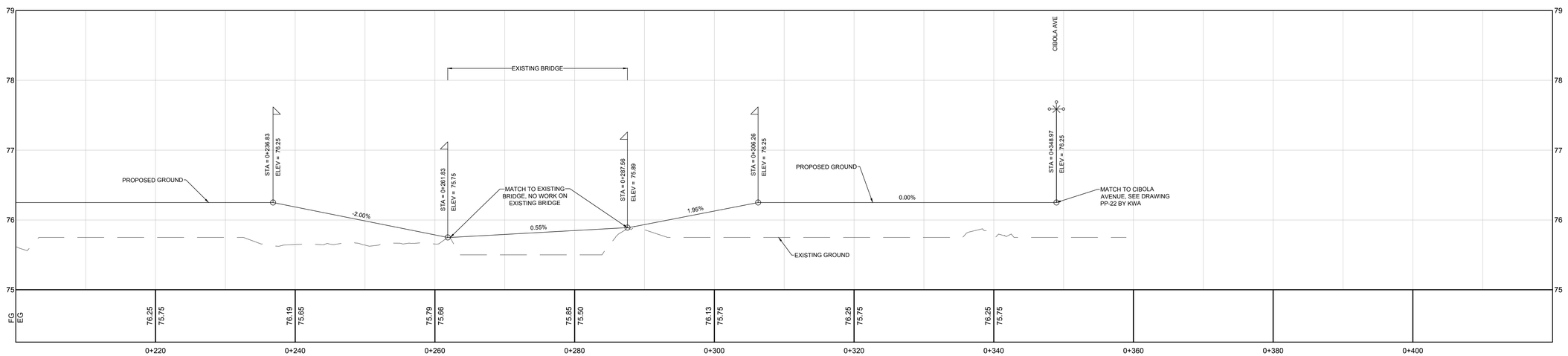
LEGEND

- EXISTING GROUND CONTOUR
- PROPOSED 3:1 SLOPE
- EXISTING CENTRELINE
- PROPSED ELEVATION
- PROPOSED GRADE
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- EXISTING HYDRANT
- EXISTING VALVE BOX
- EXISTING WATER CHAMBER
- EXISTING LIGHT STANDARD
- EXISTING HYDRO
- EXISTING BELL UTILITY
- EXISTING UTILITY
- EXISTING GASMAIN
- EXISTING ELECTRICAL

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS, ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS (OPSD & OPSS), THE WATER RESOURCES ACT, AND THE APPLICABLE ENVIRONMENTAL PROTECTION ACTS. WHERE A CITY OR REGION STANDARD EXISTS, IT SHALL BE USED IN PLACE OF THE PROVINCIAL STANDARD. ALL WORK SHALL CONFORM TO THE APPLICABLE HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2. INFORMATION REGARDING ALL EXISTING UNDERGROUND UTILITIES AND SERVICES SHOWN ON THE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS AND/OR AVAILABLE HISTORICAL DRAWINGS. THE ACCURACY OF THIS INFORMATION HAS NOT BEEN CONFIRMED BY KWA SITE DEVELOPMENT CONSULTING AND ALL UNDERGROUND INFORMATION NEEDS TO BE VERIFIED IN THE FIELD PRIOR TO BIDDING AND CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO ACQUIRE ALL UTILITY LOCATES PRIOR TO CONSTRUCTION AND TO NOTIFY THE ENGINEER OF ANY DISCREPANCIES. ANY LOST TIME DUE TO FAILURE TO IDENTIFY DISCREPANCIES OR NOTIFY THE ENGINEER SHALL BE AT THE CONTRACTOR'S EXPENSE.
3. THIS PLAN SHOULD BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANT'S PLANS AND ANY DISCREPANCIES REPORTED TO THE ENGINEER PRIOR TO CONSTRUCTION.
4. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND ANY DISCREPANCIES REPORTED TO THE ENGINEER. INFORMATION REGARDING PRIVATE ROADS, PARKING LOT CURBS, BUILDING LOCATIONS, AND SETBACKS SHALL BE TAKEN FROM THE SITE PLAN.
5. NO SUBSTITUTIONS SHALL BE ALLOWED WITHOUT ENGINEERS APPROVAL.
6. ALL DISTURBED AREAS SHALL BE REPAIRED TO ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE ENGINEER.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING AT THE SAME TIME AS THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES AND PREVENT CONSTRUCTION CONFLICTS.
8. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL PERMITS INCLUDING THIRD PARTY UTILITY COSTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING ALL NECESSARY SIGNALS, SIGNS, DELINEATORS, MARKERS AND BARRIERS. ALL TRAFFIC AND SAFETY MEASURES SHALL CONFORM TO CITY STANDARDS AND THE ONTARIO TRAFFIC MANUAL, BOOK 7 - TEMPORARY CONDITIONS, LATEST EDITION.
10. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED INSPECTIONS WITH THE CITY AND ANY OTHER REGULATORY AGENCIES. ALL WORK ON CITY PROPERTY OR INFRSTRUCTURE (INCLUDING EASEMENTS, SEWER WORK, AND WATERMAIN WORK) SHALL BE INSPECTED BY THE CITY (AS REQUIRED) PRIOR TO BACKFILLING.
11. THE CONTRACTOR IS RESPONSIBLE TO INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROLS AS REQUIRED BY THIS CONTRACT AND CITY AND PROVINCIAL STANDARDS.
12. CONTRACTOR RESPONSIBLE TO SUPPLY AND INSTALL ALL NECESSARY CONSTRUCTION FENCING.
13. CONTRACTOR TO PROVIDE WEEKLY REDLINE LINE AS-BUILT SURVEY TO THE ENGINEER FOR REVIEW. AS-BUILT TO SHOW PIPE INVERT, PIPE SIZE, AND PIPE MATERIAL.
14. CONTRACTOR TO PROVIDE AS-BUILT SURVEY OF COMPLETED SERVICING AND GRADING WORKS; INCLUDING INVERTS; ALL ABOVE GROUND WORKS AND SPOT ELEVATIONS AT MAXIMUM 15M GRID INTERVAL. SURVEY TO BE PREPARED BY LICENSED ONTARIO LAND SURVEYOR.
15. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE SITE-SPECIFIC GEOTECHNICAL REPORT ENTITLED "_____" PREPARED BY GROUNDED ENGINEERING, DATED_____ AND ALL APPLICABLE ADDENDUMS.





REVISION BLOCK

#	DATE	DESCRIPTION
1.	10/01/21	ISSUED DRAFT
2.	11/04/21	ISSUED DRAFT
3.	10/14/22	DRAFT EA ISSUED

DRAFT

KWA SITE DEVELOPMENT CONSULTING INC.
2055 Appleby Line, Unit 1
Burlington, ON L7L 7A9

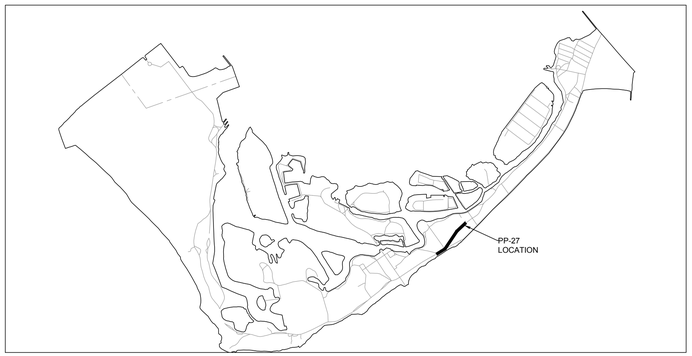
NORTH ARROW

METRIC SCALE
0 2 5 10
HORZ.1:300 VERT.1:30

CHIPPEWA AVE
STA 0+200 TO 0+420
TORONTO REGION CONSERVATION AUTHORITY
TORONTO ISLAND PARK FLOOD & EROSION MITIGATION
TORONTO, ONTARIO

PROJECT No: 21600 | DRAWN BY: ARV | CHECKED BY: CDB

PP-26



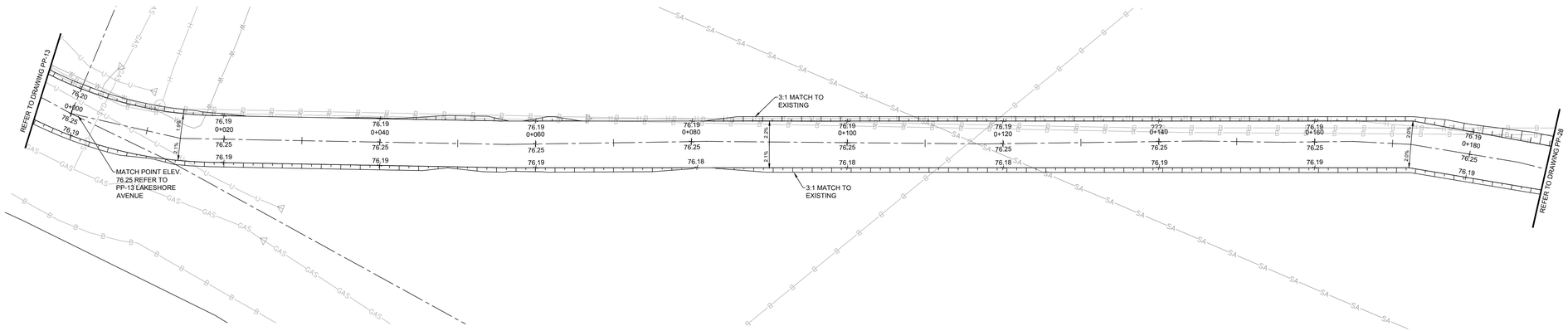
KEYPLAN (N.T.S.)

LEGEND

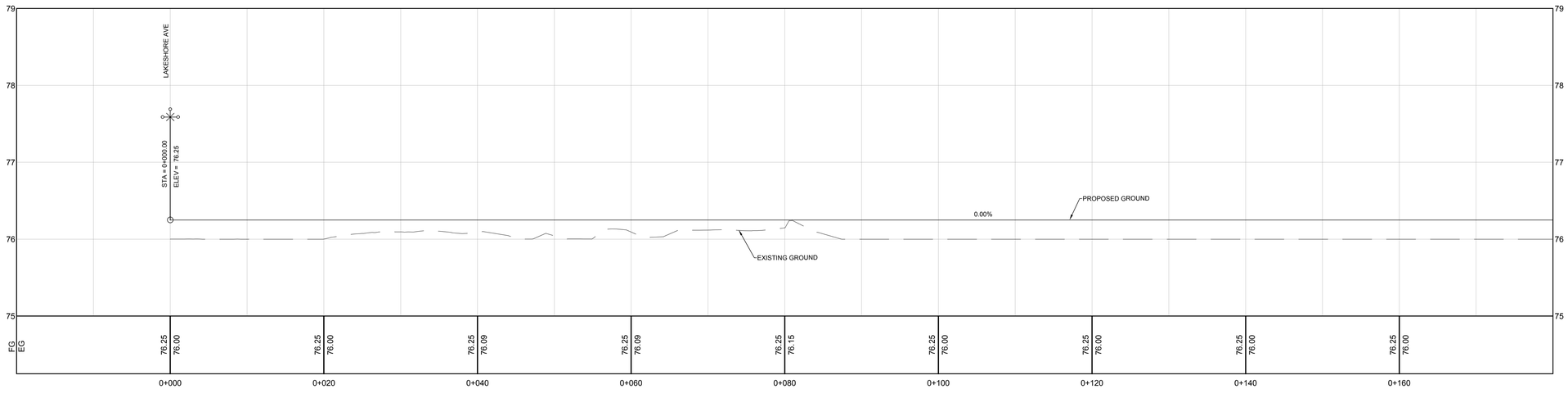
- 76.00 — EXISTING GROUND CONTOUR
- PROPOSED 3:1 SLOPE
- EXISTING CENTRELINE
- × 76.25 — PROPSED ELEVATION
- 2.0% — PROPOSED GRADE
- ST — EXISTING STORM SEWER
- SA — EXISTING SANITARY SEWER
- W — EXISTING WATERMAIN
- EXISTING HYDRANT
- EXISTING VALVE BOX
- EXISTING WATER CHAMBER
- LS — EXISTING LIGHT STANDARD
- H — EXISTING HYDRO
- B — EXISTING BELL UTILITY
- U — EXISTING UTILITY
- GAS — EXISTING GASMAIN
- EL — EXISTING ELECTRICAL
- EXISTING TREE

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS, ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS (OPSD & OPSS), THE WATER RESOURCES ACT, AND THE APPLICABLE ENVIRONMENTAL PROTECTION ACTS. WHERE A CITY OR REGION STANDARD EXISTS, IT SHALL BE USED IN PLACE OF THE PROVINCIAL STANDARD. ALL WORK SHALL CONFORM TO THE APPLICABLE HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2. INFORMATION REGARDING ALL EXISTING UNDERGROUND UTILITIES AND SERVICES SHOWN ON THE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS AND/OR AVAILABLE HISTORICAL DRAWINGS. THE ACCURACY OF THIS INFORMATION HAS NOT BEEN CONFIRMED BY KWA SITE DEVELOPMENT CONSULTING AND ALL UNDERGROUND INFORMATION NEEDS TO BE VERIFIED IN THE FIELD PRIOR TO BIDDING AND CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO ACQUIRE ALL UTILITY LOCATES PRIOR TO CONSTRUCTION AND TO NOTIFY THE ENGINEER OF ANY DISCREPANCIES. ANY LOST TIME DUE TO FAILURE TO IDENTIFY DISCREPANCIES OR NOTIFY THE ENGINEER SHALL BE AT THE CONTRACTOR'S EXPENSE.
3. THIS PLAN SHOULD BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANT'S PLANS AND ANY DISCREPANCIES REPORTED TO THE ENGINEER PRIOR TO CONSTRUCTION.
4. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND ANY DISCREPANCIES REPORTED TO THE ENGINEER. INFORMATION REGARDING PRIVATE ROADS, PARKING LOT CURBS, BUILDING LOCATIONS, AND SETBACKS SHALL BE TAKEN FROM THE SITE PLAN.
5. NO SUBSTITUTIONS SHALL BE ALLOWED WITHOUT ENGINEERS APPROVAL.
6. ALL DISTURBED AREAS SHALL BE REPAIRED TO ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE ENGINEER.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING AT THE SAME TIME AS THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES AND PREVENT CONSTRUCTION CONFLICTS.
8. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL PERMITS INCLUDING THIRD PARTY UTILITY COSTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING ALL NECESSARY SIGNALS, SIGNS, DELINEATORS, MARKERS AND BARRIERS. ALL TRAFFIC AND SAFETY MEASURES SHALL CONFORM TO CITY STANDARDS AND THE ONTARIO TRAFFIC MANUAL, BOOK 7 - TEMPORARY CONDITIONS, LATEST EDITION.
10. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED INSPECTIONS WITH THE CITY AND ANY OTHER REGULATORY AGENCIES. ALL WORK ON CITY PROPERTY OR INFRSTRUCTURE (INCLUDING EASEMENTS, SEWER WORK, AND WATERMAIN WORK) SHALL BE INSPECTED BY THE CITY (AS REQUIRED) PRIOR TO BACKFILLING.
11. THE CONTRACTOR IS RESPONSIBLE TO INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROLS AS REQUIRED BY THIS CONTRACT AND CITY AND PROVINCIAL STANDARDS.
12. CONTRACTOR RESPONSIBLE TO SUPPLY AND INSTALL ALL NECESSARY CONSTRUCTION FENCING.
13. CONTRACTOR TO PROVIDE WEEKLY REDLINE LINE AS-BUILT SURVEY TO THE ENGINEER FOR REVIEW. AS-BUILT TO SHOW PIPE INVERT, PIPE SIZE, AND PIPE MATERIAL.
14. CONTRACTOR TO PROVIDE AS-BUILT SURVEY OF COMPLETED SERVICING AND GRADING WORKS; INCLUDING INVERTS, ALL ABOVE GROUND WORKS AND SPOT ELEVATIONS AT MAXIMUM 15M GRID INTERVAL. SURVEY TO BE PREPARED BY LICENSED ONTARIO LAND SURVEYOR.
15. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE SITE-SPECIFIC GEOTECHNICAL REPORT ENTITLED "_____" PREPARED BY GROUNDED ENGINEERING, DATED_____ AND ALL APPLICABLE ADDENDUMS.



CIBOLA AVENUE



REVISION BLOCK

#	DATE	DESCRIPTION
1.	10/01/21	ISSUED DRAFT
2.	11/04/21	ISSUED DRAFT
3.	10/14/22	DRAFT EA ISSUED

DRAFT

KWA SITE DEVELOPMENT CONSULTING INC.
2355 Mainway Drive
Burlington, ON L7L 7A9

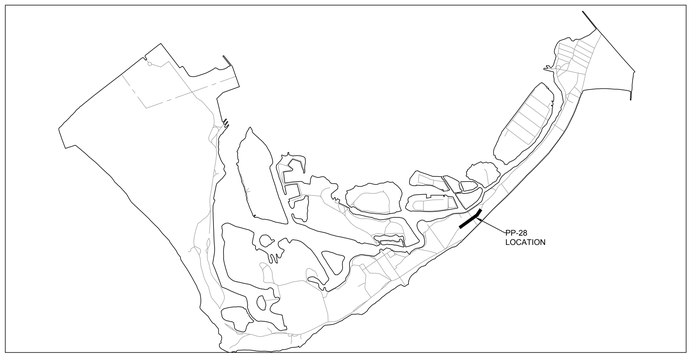
NORTH ARROW

METRIC SCALE
0 2 5 10
HORZ.1:300 VERT.1:30

CIBOLA AVE
STA 0+000 TO 0+180
TORONTO REGION CONSERVATION AUTHORITY
TORONTO ISLAND PARK FLOOD & EROSION MITIGATION
TORONTO, ONTARIO

PROJECT No: 21600 | DRAWN BY: ARV | CHECKED BY: CDB

PP-27



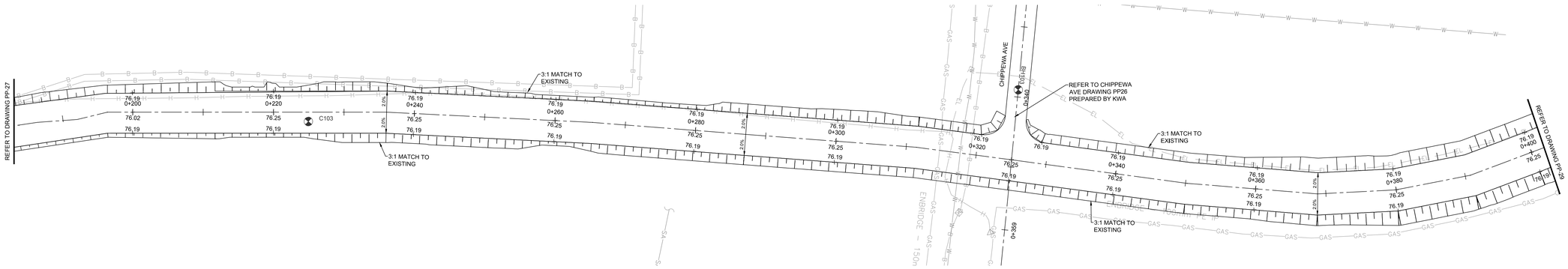
KEYPLAN (N.T.S.)

LEGEND

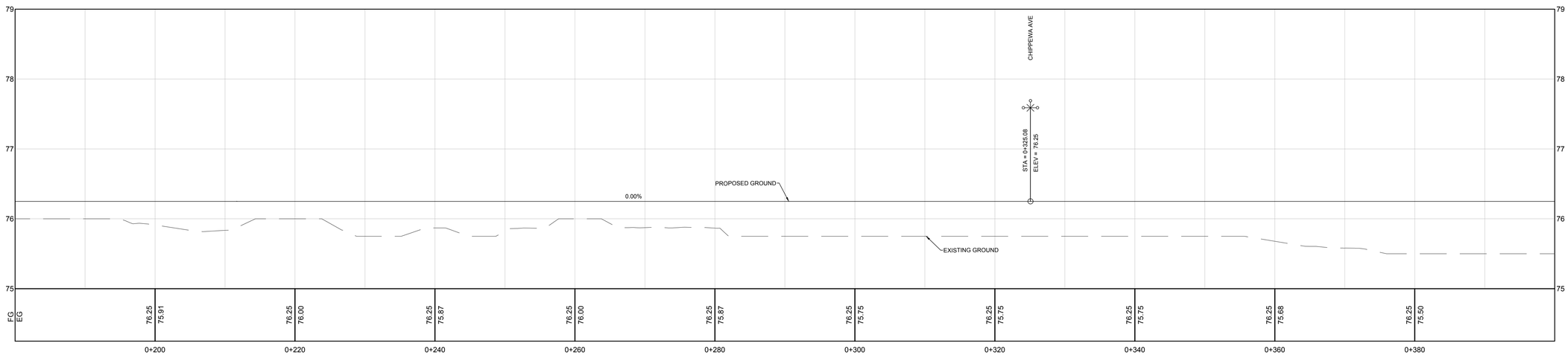
- 76.00 — EXISTING GROUND CONTOUR
- PROPOSED 3:1 SLOPE
- EXISTING CENTRELINE
- × 76.25 — PROPSED ELEVATION
- 2.0% — PROPOSED GRADE
- ST — EXISTING STORM SEWER
- SA — EXISTING SANITARY SEWER
- W — EXISTING WATERMAIN
- EXISTING HYDRANT
- EXISTING VALVE BOX
- WC — EXISTING WATER CHAMBER
- LS — EXISTING LIGHT STANDARD
- H — EXISTING HYDRO
- B — EXISTING BELL UTILITY
- U — EXISTING UTILITY
- GAS — EXISTING GASMAIN
- EL — EXISTING ELECTRICAL
- EXISTING TREE

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS, ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS (OPSD & OPSS), THE WATER RESOURCES ACT, AND THE APPLICABLE ENVIRONMENTAL PROTECTION ACTS. WHERE A CITY OR REGION STANDARD EXISTS, IT SHALL BE USED IN PLACE OF THE PROVINCIAL STANDARD. ALL WORK SHALL CONFORM TO THE APPLICABLE HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2. INFORMATION REGARDING ALL EXISTING UNDERGROUND UTILITIES AND SERVICES SHOWN ON THE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS AND/OR AVAILABLE HISTORICAL DRAWINGS. THE ACCURACY OF THIS INFORMATION HAS NOT BEEN CONFIRMED BY KWA SITE DEVELOPMENT CONSULTING AND ALL UNDERGROUND INFORMATION NEEDS TO BE VERIFIED IN THE FIELD PRIOR TO BIDDING AND CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO ACQUIRE ALL UTILITY LOCATES PRIOR TO CONSTRUCTION AND TO NOTIFY THE ENGINEER OF ANY DISCREPANCIES. ANY LOST TIME DUE TO FAILURE TO IDENTIFY DISCREPANCIES OR NOTIFY THE ENGINEER SHALL BE AT THE CONTRACTOR'S EXPENSE.
3. THIS PLAN SHOULD BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANT'S PLANS AND ANY DISCREPANCIES REPORTED TO THE ENGINEER PRIOR TO CONSTRUCTION.
4. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND ANY DISCREPANCIES REPORTED TO THE ENGINEER. INFORMATION REGARDING PRIVATE ROADS, PARKING LOT CURBS, BUILDING LOCATIONS, AND SETBACKS SHALL BE TAKEN FROM THE SITE PLAN.
5. NO SUBSTITUTIONS SHALL BE ALLOWED WITHOUT ENGINEERS APPROVAL.
6. ALL DISTURBED AREAS SHALL BE REPAIRED TO ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE ENGINEER.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING AT THE SAME TIME AS THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES AND PREVENT CONSTRUCTION CONFLICTS.
8. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL PERMITS INCLUDING THIRD PARTY UTILITY COSTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING ALL NECESSARY SIGNALS, SIGNS, DELINEATORS, MARKERS AND BARRIERS. ALL TRAFFIC AND SAFETY MEASURES SHALL CONFORM TO CITY STANDARDS AND THE ONTARIO TRAFFIC MANUAL, BOOK 7 - TEMPORARY CONDITIONS, LATEST EDITION.
10. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED INSPECTIONS WITH THE CITY AND ANY OTHER REGULATORY AGENCIES. ALL WORK ON CITY PROPERTY OR INFRSTRUCTURE (INCLUDING EASEMENTS, SEWER WORK, AND WATERMAIN WORK) SHALL BE INSPECTED BY THE CITY (AS REQUIRED) PRIOR TO BACKFILLING.
11. THE CONTRACTOR IS RESPONSIBLE TO INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROLS AS REQUIRED BY THIS CONTRACT AND CITY AND PROVINCIAL STANDARDS.
12. CONTRACTOR RESPONSIBLE TO SUPPLY AND INSTALL ALL NECESSARY CONSTRUCTION FENCING.
13. CONTRACTOR TO PROVIDE WEEKLY REDLINE LINE AS-BUILT SURVEY TO THE ENGINEER FOR REVIEW. AS-BUILT TO SHOW PIPE INVERT, PIPE SIZE, AND PIPE MATERIAL.
14. CONTRACTOR TO PROVIDE AS-BUILT SURVEY OF COMPLETED SERVICING AND GRADING WORKS; INCLUDING INVERTS, ALL ABOVE GROUND WORKS AND SPOT ELEVATIONS AT MAXIMUM 15M GRID INTERVAL. SURVEY TO BE PREPARED BY LICENSED ONTARIO LAND SURVEYOR.
15. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE SITE-SPECIFIC GEOTECHNICAL REPORT ENTITLED "_____" PREPARED BY GROUNDED ENGINEERING, DATED_____ AND ALL APPLICABLE ADDENDUMS.



CIBOLA AVENUE



REVISION BLOCK

#	DATE	DESCRIPTION
1.	10/01/21	ISSUED DRAFT
2.	11/04/21	ISSUED DRAFT
3.	10/14/22	DRAFT EA ISSUED

DRAFT

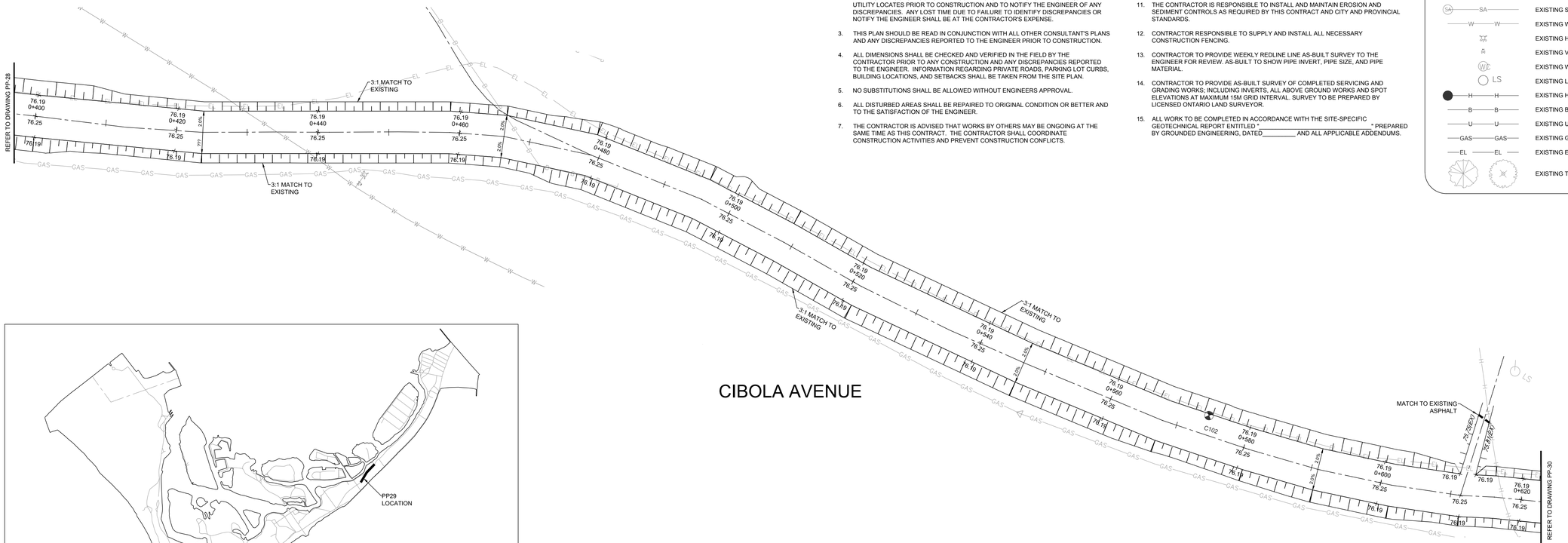
KWA SITE DEVELOPMENT CONSULTING INC.
2055 Mountain Drive
Burlington, ON L7L 7A9

NORTH ARROW

METRIC SCALE
0 2 5 10
HORZ.1:300 VERT.1:30

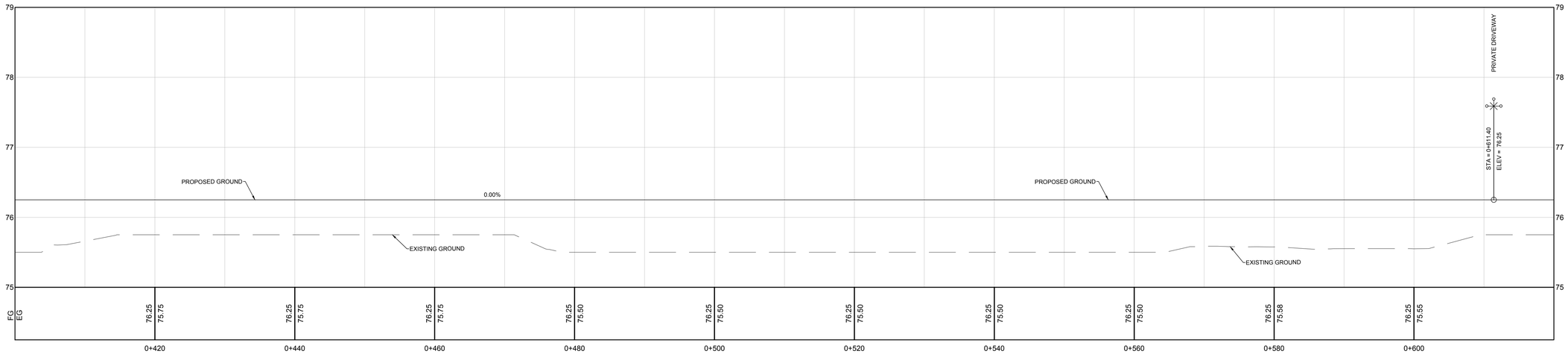
CIBOLA AVE
STA 0+180 TO 0+400
TORONTO REGION CONSERVATION AUTHORITY
TORONTO ISLAND PARK FLOOD & EROSION MITIGATION
TORONTO, ONTARIO
CHECKED BY: GDB
DRAWN BY: ARV
PROJECT No: 21600

PP-28



CIBOLA AVENUE

KEYPLAN (N.T.S.)



GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS, ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS (OPSD & OPSS), THE WATER RESOURCES ACT, AND THE APPLICABLE ENVIRONMENTAL PROTECTION ACTS. WHERE A CITY OR REGION STANDARD EXISTS, IT SHALL BE USED IN PLACE OF THE PROVINCIAL STANDARD. ALL WORK SHALL CONFORM TO THE APPLICABLE HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2. INFORMATION REGARDING ALL EXISTING UNDERGROUND UTILITIES AND SERVICES SHOWN ON THE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS AND/OR AVAILABLE HISTORICAL DRAWINGS. THE ACCURACY OF THIS INFORMATION HAS NOT BEEN CONFIRMED BY KWA SITE DEVELOPMENT CONSULTING AND ALL UNDERGROUND INFORMATION NEEDS TO BE VERIFIED IN THE FIELD PRIOR TO BIDDING AND CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO ACQUIRE ALL UTILITY LOCATES PRIOR TO CONSTRUCTION AND TO NOTIFY THE ENGINEER OF ANY DISCREPANCIES. ANY LOST TIME DUE TO FAILURE TO IDENTIFY DISCREPANCIES OR NOTIFY THE ENGINEER SHALL BE AT THE CONTRACTOR'S EXPENSE.
3. THIS PLAN SHOULD BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANT'S PLANS AND ANY DISCREPANCIES REPORTED TO THE ENGINEER PRIOR TO CONSTRUCTION.
4. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND ANY DISCREPANCIES REPORTED TO THE ENGINEER. INFORMATION REGARDING PRIVATE ROADS, PARKING LOT CURBS, BUILDING LOCATIONS, AND SETBACKS SHALL BE TAKEN FROM THE SITE PLAN.
5. NO SUBSTITUTIONS SHALL BE ALLOWED WITHOUT ENGINEERS APPROVAL.
6. ALL DISTURBED AREAS SHALL BE REPAIRED TO ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE ENGINEER.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING AT THE SAME TIME AS THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES AND PREVENT CONSTRUCTION CONFLICTS.
8. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL PERMITS INCLUDING THIRD PARTY UTILITY COSTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING ALL NECESSARY SIGNALS, SIGNS, DELINEATORS, MARKERS AND BARRIERS. ALL TRAFFIC AND SAFETY MEASURES SHALL CONFORM TO CITY STANDARDS AND THE ONTARIO TRAFFIC MANUAL, BOOK 7 - TEMPORARY CONDITIONS, LATEST EDITION.
10. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED INSPECTIONS WITH THE CITY AND ANY OTHER REGULATORY AGENCIES. ALL WORK ON CITY PROPERTY OR INFRSTRUCTURE (INCLUDING EASEMENTS, SEWER WORK, AND WATERMAIN WORK) SHALL BE INSPECTED BY THE CITY (AS REQUIRED) PRIOR TO BACKFILLING.
11. THE CONTRACTOR IS RESPONSIBLE TO INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROLS AS REQUIRED BY THIS CONTRACT AND CITY AND PROVINCIAL STANDARDS.
12. CONTRACTOR RESPONSIBLE TO SUPPLY AND INSTALL ALL NECESSARY CONSTRUCTION FENCING.
13. CONTRACTOR TO PROVIDE WEEKLY REDLINE LINE AS-BUILT SURVEY TO THE ENGINEER FOR REVIEW. AS-BUILT TO SHOW PIPE INVERT, PIPE SIZE, AND PIPE MATERIAL.
14. CONTRACTOR TO PROVIDE AS-BUILT SURVEY OF COMPLETED SERVICING AND GRADING WORKS; INCLUDING INVERTS, ALL ABOVE GROUND WORKS AND SPOT ELEVATIONS AT MAXIMUM 15M GRID INTERVAL. SURVEY TO BE PREPARED BY LICENSED ONTARIO LAND SURVEYOR.
15. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE SITE-SPECIFIC GEOTECHNICAL REPORT ENTITLED "_____" PREPARED BY GROUNDED ENGINEERING, DATED_____ AND ALL APPLICABLE ADDENDUMS.

LEGEND

76.00	EXISTING GROUND CONTOUR
	PROPOSED 3:1 SLOPE
	EXISTING CENTRELINE
× 76.25	PROPSED ELEVATION
2.0%	PROPOSED GRADE
ST	EXISTING STORM SEWER
SA	EXISTING SANITARY SEWER
W	EXISTING WATERMAIN
	EXISTING HYDRANT
	EXISTING VALVE BOX
WC	EXISTING WATER CHAMBER
LS	EXISTING LIGHT STANDARD
H	EXISTING HYDRO
B	EXISTING BELL UTILITY
U	EXISTING UTILITY
GAS	EXISTING GASMAIN
EL	EXISTING ELECTRICAL
	EXISTING TREE

REVISION BLOCK

#	DATE	DESCRIPTION
1.	10/01/21	ISSUED DRAFT
2.	11/04/21	ISSUED DRAFT
3.	10/14/22	DRAFT EA ISSUED

DRAFT

KWA SITE DEVELOPMENT CONSULTING INC.
2355 Main Street, Unit 1
Burlington, ON L7L 7A9

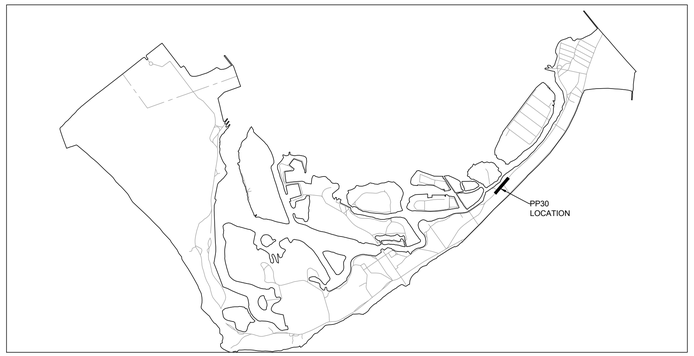
NORTH ARROW

METRIC SCALE
0 2 5 10
HORZ.1:300 VERT.1:30

CIBOLA AVE
STA 0+400 TO 0+620
TORONTO REGION CONSERVATION AUTHORITY
TORONTO ISLAND PARK FLOOD & EROSION MITIGATION
TORONTO, ONTARIO

PROJECT No: 21600 | DRAWN BY: ARV | CHECKED BY: CDB

PP-29



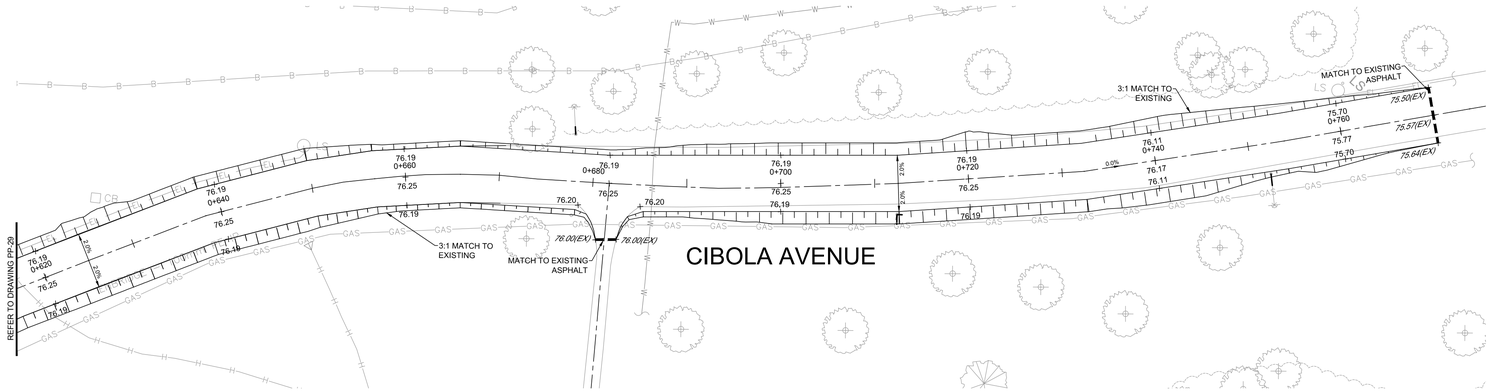
KEYPLAN (N.T.S.)

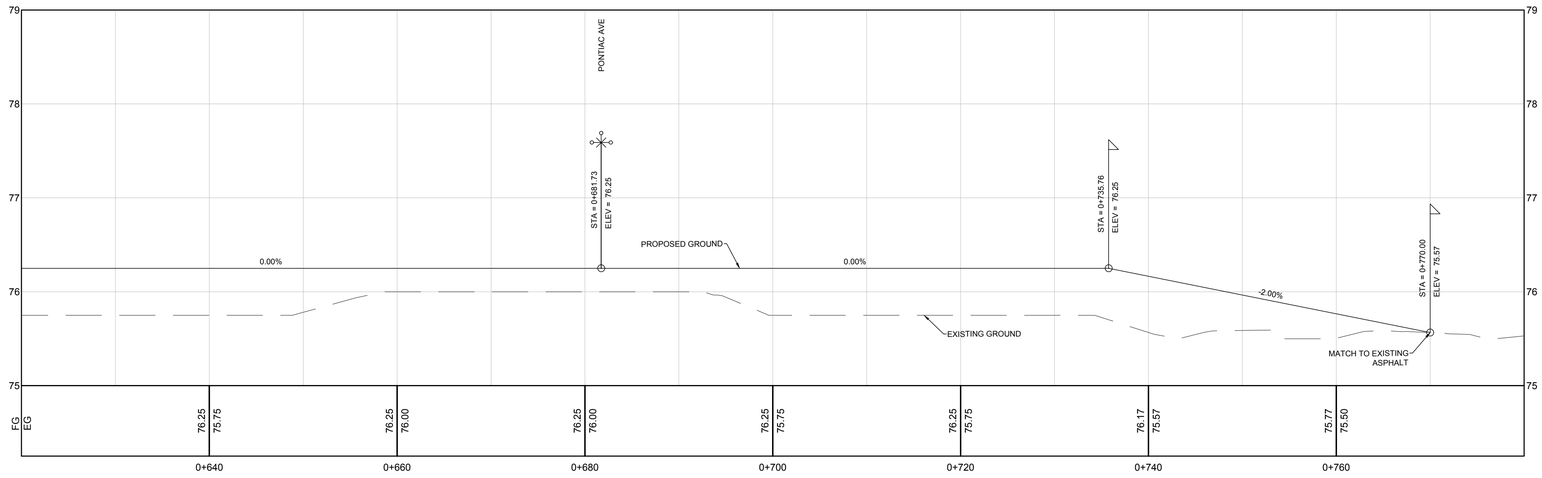
LEGEND

- 76.00 — EXISTING GROUND CONTOUR
- PROPOSED 3:1 SLOPE
- EXISTING CENTRELINE
- × 76.25 — PROPSED ELEVATION
- 2.0% — PROPOSED GRADE
- ST — EXISTING STORM SEWER
- SA — EXISTING SANITARY SEWER
- W — EXISTING WATERMAIN
- EXISTING HYDRANT
- EXISTING VALVE BOX
- EXISTING WATER CHAMBER
- LS — EXISTING LIGHT STANDARD
- H — EXISTING HYDRO
- B — EXISTING BELL UTILITY
- U — EXISTING UTILITY
- GAS — EXISTING GASMAIN
- EL — EXISTING ELECTRICAL
- EXISTING TREE

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS, ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS (OPSD & OPSS), THE WATER RESOURCES ACT, AND THE APPLICABLE ENVIRONMENTAL PROTECTION ACTS. WHERE A CITY OR REGION STANDARD EXISTS, IT SHALL BE USED IN PLACE OF THE PROVINCIAL STANDARD. ALL WORK SHALL CONFORM TO THE APPLICABLE HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2. INFORMATION REGARDING ALL EXISTING UNDERGROUND UTILITIES AND SERVICES SHOWN ON THE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS AND/OR AVAILABLE HISTORICAL DRAWINGS. THE ACCURACY OF THIS INFORMATION HAS NOT BEEN CONFIRMED BY KWA SITE DEVELOPMENT CONSULTING AND ALL UNDERGROUND INFORMATION NEEDS TO BE VERIFIED IN THE FIELD PRIOR TO BIDDING AND CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO ACQUIRE ALL UTILITY LOCATES PRIOR TO CONSTRUCTION AND TO NOTIFY THE ENGINEER OF ANY DISCREPANCIES. ANY LOST TIME DUE TO FAILURE TO IDENTIFY DISCREPANCIES OR NOTIFY THE ENGINEER SHALL BE AT THE CONTRACTOR'S EXPENSE.
3. THIS PLAN SHOULD BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANT'S PLANS AND ANY DISCREPANCIES REPORTED TO THE ENGINEER PRIOR TO CONSTRUCTION.
4. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND ANY DISCREPANCIES REPORTED TO THE ENGINEER. INFORMATION REGARDING PRIVATE ROADS, PARKING LOT CURBS, BUILDING LOCATIONS, AND SETBACKS SHALL BE TAKEN FROM THE SITE PLAN.
5. NO SUBSTITUTIONS SHALL BE ALLOWED WITHOUT ENGINEERS APPROVAL.
6. ALL DISTURBED AREAS SHALL BE REPAIRED TO ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE ENGINEER.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING AT THE SAME TIME AS THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES AND PREVENT CONSTRUCTION CONFLICTS.
8. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL PERMITS INCLUDING THIRD PARTY UTILITY COSTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING ALL NECESSARY SIGNALS, SIGNS, DELINEATORS, MARKERS AND BARRIERS. ALL TRAFFIC AND SAFETY MEASURES SHALL CONFORM TO CITY STANDARDS AND THE ONTARIO TRAFFIC MANUAL, BOOK 7 - TEMPORARY CONDITIONS, LATEST EDITION.
10. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED INSPECTIONS WITH THE CITY AND ANY OTHER REGULATORY AGENCIES. ALL WORK ON CITY PROPERTY OR INFRSTRUCTURE (INCLUDING EASEMENTS, SEWER WORK, AND WATERMAIN WORK) SHALL BE INSPECTED BY THE CITY (AS REQUIRED) PRIOR TO BACKFILLING.
11. THE CONTRACTOR IS RESPONSIBLE TO INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROLS AS REQUIRED BY THIS CONTRACT AND CITY AND PROVINCIAL STANDARDS.
12. CONTRACTOR RESPONSIBLE TO SUPPLY AND INSTALL ALL NECESSARY CONSTRUCTION FENCING.
13. CONTRACTOR TO PROVIDE WEEKLY REDLINE LINE AS-BUILT SURVEY TO THE ENGINEER FOR REVIEW. AS-BUILT TO SHOW PIPE INVERT, PIPE SIZE, AND PIPE MATERIAL.
14. CONTRACTOR TO PROVIDE AS-BUILT SURVEY OF COMPLETED SERVICING AND GRADING WORKS; INCLUDING INVERTS, ALL ABOVE GROUND WORKS AND SPOT ELEVATIONS AT MAXIMUM 15M GRID INTERVAL. SURVEY TO BE PREPARED BY LICENSED ONTARIO LAND SURVEYOR.
15. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE SITE-SPECIFIC GEOTECHNICAL REPORT ENTITLED "_____" PREPARED BY GROUNDED ENGINEERING, DATED_____ AND ALL APPLICABLE ADDENDUMS.





REVISION BLOCK		
#	DATE	DESCRIPTION
1.	10/01/21	ISSUED DRAFT
2.	11/04/21	ISSUED DRAFT
3.	10/14/22	DRAFT EA ISSUED

DRAFT

KWA SITE DEVELOPMENT CONSULTING INC.
2055 Appleby Line
Burlington, ON L7L 7A9

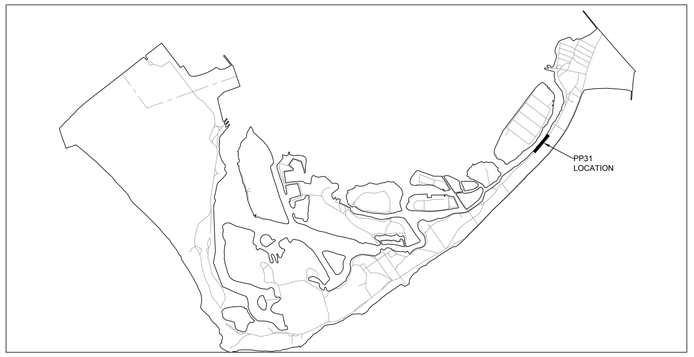
NORTH ARROW

METRIC SCALE
0 2 5 10
HORZ.1:300 VERT.1:30

CIBOLA AVE
STA 0+620 TO 0+780
TORONTO REGION CONSERVATION AUTHORITY
TORONTO ISLAND PARK FLOOD & EROSION MITIGATION
TORONTO, ONTARIO

PROJECT No: 21600 | DRAWN BY: ARV | CHECKED BY: CDB

PP-30



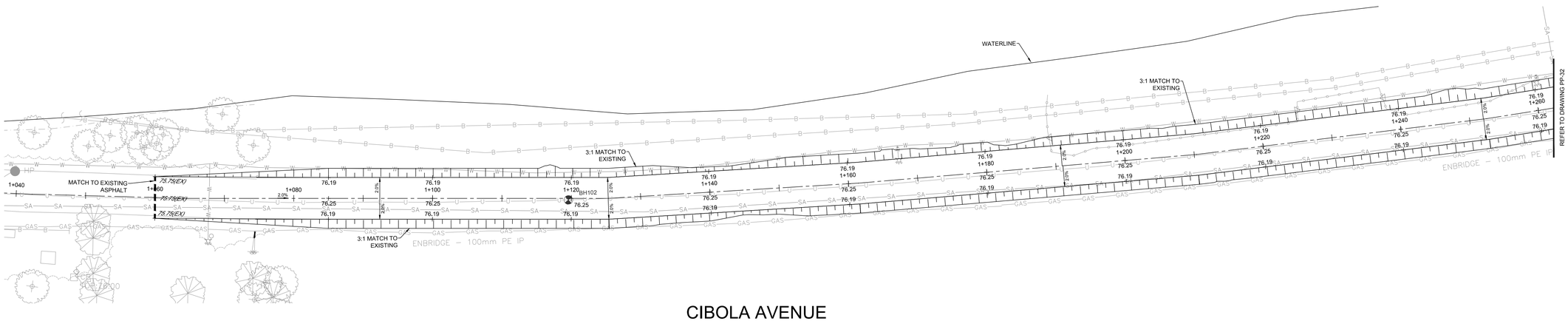
KEYPLAN (N.T.S.)

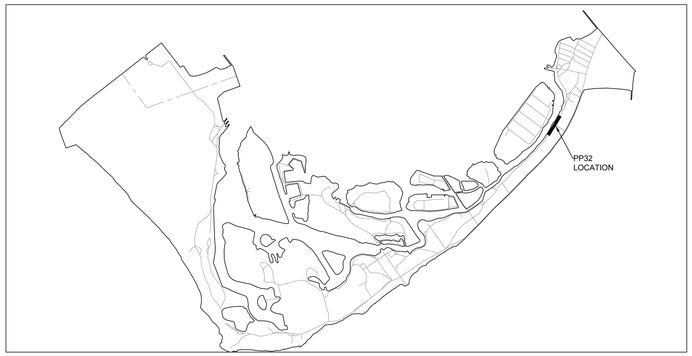
LEGEND

- 76.00 — EXISTING GROUND CONTOUR
- PROPOSED 3:1 SLOPE
- EXISTING CENTRELINE
- × 76.25 — PROPSED ELEVATION
- 2.0% — PROPOSED GRADE
- ST — EXISTING STORM SEWER
- SA — EXISTING SANITARY SEWER
- W — EXISTING WATERMAIN
- EXISTING HYDRANT
- EXISTING VALVE BOX
- EXISTING WATER CHAMBER
- LS — EXISTING LIGHT STANDARD
- H — EXISTING HYDRO
- B — EXISTING BELL UTILITY
- U — EXISTING UTILITY
- GAS — EXISTING GASMAIN
- EL — EXISTING ELECTRICAL
- EXISTING TREE

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS, ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS (OPSD & OPSS), THE WATER RESOURCES ACT, AND THE APPLICABLE ENVIRONMENTAL PROTECTION ACTS. WHERE A CITY OR REGION STANDARD EXISTS, IT SHALL BE USED IN PLACE OF THE PROVINCIAL STANDARD. ALL WORK SHALL CONFORM TO THE APPLICABLE HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2. INFORMATION REGARDING ALL EXISTING UNDERGROUND UTILITIES AND SERVICES SHOWN ON THE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS AND/OR AVAILABLE HISTORICAL DRAWINGS. THE ACCURACY OF THIS INFORMATION HAS NOT BEEN CONFIRMED BY KWA SITE DEVELOPMENT CONSULTING AND ALL UNDERGROUND INFORMATION NEEDS TO BE VERIFIED IN THE FIELD PRIOR TO BIDDING AND CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO ACQUIRE ALL UTILITY LOCATES PRIOR TO CONSTRUCTION AND TO NOTIFY THE ENGINEER OF ANY DISCREPANCIES. ANY LOST TIME DUE TO FAILURE TO IDENTIFY DISCREPANCIES OR NOTIFY THE ENGINEER SHALL BE AT THE CONTRACTOR'S EXPENSE.
3. THIS PLAN SHOULD BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANT'S PLANS AND ANY DISCREPANCIES REPORTED TO THE ENGINEER PRIOR TO CONSTRUCTION.
4. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND ANY DISCREPANCIES REPORTED TO THE ENGINEER. INFORMATION REGARDING PRIVATE ROADS, PARKING LOT CURBS, BUILDING LOCATIONS, AND SETBACKS SHALL BE TAKEN FROM THE SITE PLAN.
5. NO SUBSTITUTIONS SHALL BE ALLOWED WITHOUT ENGINEERS APPROVAL.
6. ALL DISTURBED AREAS SHALL BE REPAIRED TO ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE ENGINEER.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING AT THE SAME TIME AS THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES AND PREVENT CONSTRUCTION CONFLICTS.
8. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL PERMITS INCLUDING THIRD PARTY UTILITY COSTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING ALL NECESSARY SIGNALS, SIGNS, DELINEATORS, MARKERS AND BARRIERS. ALL TRAFFIC AND SAFETY MEASURES SHALL CONFORM TO CITY STANDARDS AND THE ONTARIO TRAFFIC MANUAL, BOOK 7 - TEMPORARY CONDITIONS, LATEST EDITION.
10. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED INSPECTIONS WITH THE CITY AND ANY OTHER REGULATORY AGENCIES. ALL WORK ON CITY PROPERTY OR INFRSTRUCTURE (INCLUDING EASEMENTS, SEWER WORK, AND WATERMAIN WORK) SHALL BE INSPECTED BY THE CITY (AS REQUIRED) PRIOR TO BACKFILLING.
11. THE CONTRACTOR IS RESPONSIBLE TO INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROLS AS REQUIRED BY THIS CONTRACT AND CITY AND PROVINCIAL STANDARDS.
12. CONTRACTOR RESPONSIBLE TO SUPPLY AND INSTALL ALL NECESSARY CONSTRUCTION FENCING.
13. CONTRACTOR TO PROVIDE WEEKLY REDLINE LINE AS-BUILT SURVEY TO THE ENGINEER FOR REVIEW. AS-BUILT TO SHOW PIPE INVERT, PIPE SIZE, AND PIPE MATERIAL.
14. CONTRACTOR TO PROVIDE AS-BUILT SURVEY OF COMPLETED SERVICING AND GRADING WORKS; INCLUDING INVERTS, ALL ABOVE GROUND WORKS AND SPOT ELEVATIONS AT MAXIMUM 15M GRID INTERVAL. SURVEY TO BE PREPARED BY LICENSED ONTARIO LAND SURVEYOR.
15. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE SITE-SPECIFIC GEOTECHNICAL REPORT ENTITLED "_____" PREPARED BY GROUNDED ENGINEERING, DATED_____ AND ALL APPLICABLE ADDENDUMS.


WATERLINE
3:1 MATCH TO EXISTING
MATCH TO EXISTING ASPHALT
3:1 MATCH TO EXISTING
ENBRIDGE – 100mm PE IP
REFER TO DRAWING PP-32
1+040
1+060
1+080
1+100
1+120
1+140
1+160
1+180
1+200
1+220
1+240
1+260
BH102
2.0%
76.19
76.25
75.75
75.75
75.75



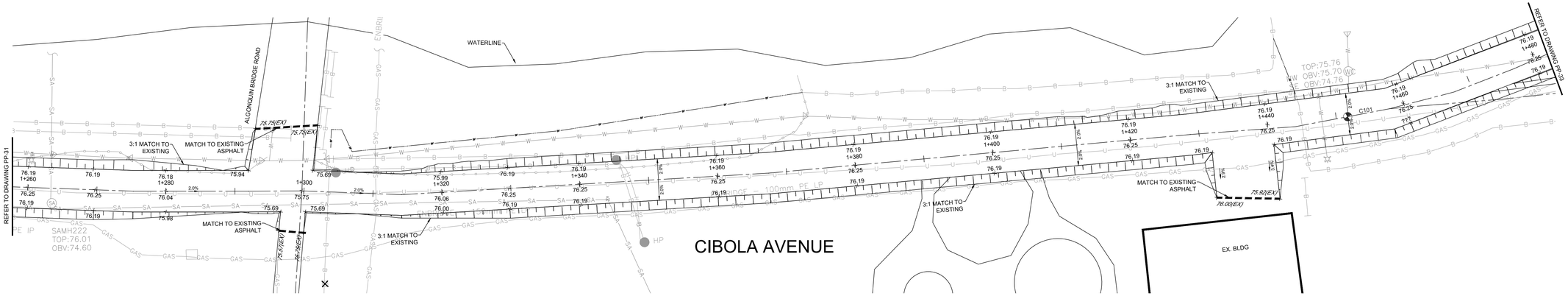
KEYPLAN (N.T.S.)

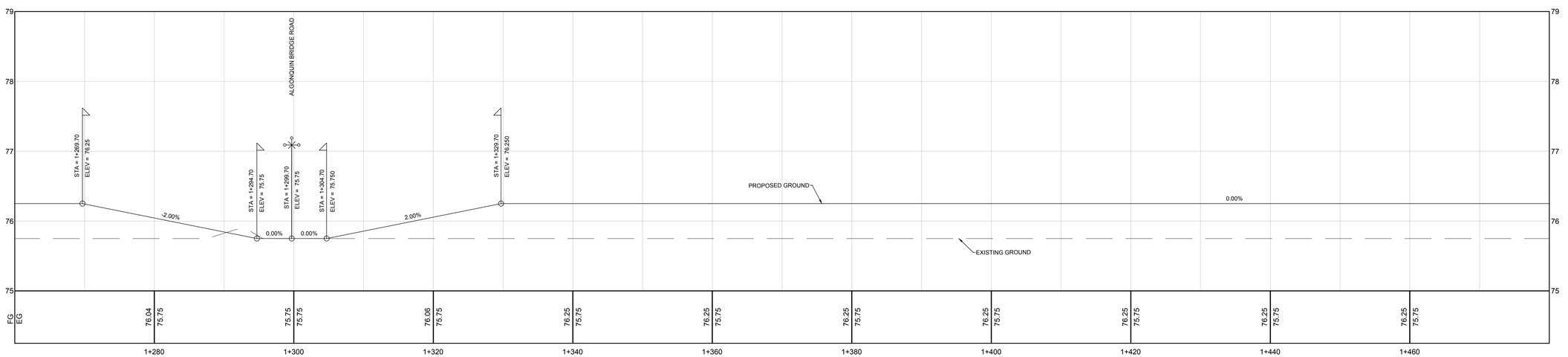
LEGEND

- EXISTING GROUND CONTOUR
- PROPOSED 3:1 SLOPE
- EXISTING CENTRELINE
- PROPSED ELEVATION
- PROPOSED GRADE
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- EXISTING HYDRANT
- EXISTING VALVE BOX
- EXISTING WATER CHAMBER
- EXISTING LIGHT STANDARD
- EXISTING HYDRO
- EXISTING BELL UTILITY
- EXISTING UTILITY
- EXISTING GASMAIN
- EXISTING ELECTRICAL
- EXISTING TREE

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS, ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS (OPSD & OPSS), THE WATER RESOURCES ACT, AND THE APPLICABLE ENVIRONMENTAL PROTECTION ACTS. WHERE A CITY OR REGION STANDARD EXISTS, IT SHALL BE USED IN PLACE OF THE PROVINCIAL STANDARD. ALL WORK SHALL CONFORM TO THE APPLICABLE HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2. INFORMATION REGARDING ALL EXISTING UNDERGROUND UTILITIES AND SERVICES SHOWN ON THE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS AND/OR AVAILABLE HISTORICAL DRAWINGS. THE ACCURACY OF THIS INFORMATION HAS NOT BEEN CONFIRMED BY KWA SITE DEVELOPMENT CONSULTING AND ALL UNDERGROUND INFORMATION NEEDS TO BE VERIFIED IN THE FIELD PRIOR TO BIDDING AND CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO ACQUIRE ALL UTILITY LOCATES PRIOR TO CONSTRUCTION AND TO NOTIFY THE ENGINEER OF ANY DISCREPANCIES. ANY LOST TIME DUE TO FAILURE TO IDENTIFY DISCREPANCIES OR NOTIFY THE ENGINEER SHALL BE AT THE CONTRACTOR'S EXPENSE.
3. THIS PLAN SHOULD BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANT'S PLANS AND ANY DISCREPANCIES REPORTED TO THE ENGINEER PRIOR TO CONSTRUCTION.
4. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND ANY DISCREPANCIES REPORTED TO THE ENGINEER. INFORMATION REGARDING PRIVATE ROADS, PARKING LOT CURBS, BUILDING LOCATIONS, AND SETBACKS SHALL BE TAKEN FROM THE SITE PLAN.
5. NO SUBSTITUTIONS SHALL BE ALLOWED WITHOUT ENGINEERS APPROVAL.
6. ALL DISTURBED AREAS SHALL BE REPAIRED TO ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE ENGINEER.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING AT THE SAME TIME AS THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES AND PREVENT CONSTRUCTION CONFLICTS.
8. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL PERMITS INCLUDING THIRD PARTY UTILITY COSTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING ALL NECESSARY SIGNALS, SIGNS, DELINEATORS, MARKERS AND BARRIERS. ALL TRAFFIC AND SAFETY MEASURES SHALL CONFORM TO CITY STANDARDS AND THE ONTARIO TRAFFIC MANUAL, BOOK 7 - TEMPORARY CONDITIONS, LATEST EDITION.
10. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED INSPECTIONS WITH THE CITY AND ANY OTHER REGULATORY AGENCIES. ALL WORK ON CITY PROPERTY OR INFRSTRUCTURE (INCLUDING EASEMENTS, SEWER WORK, AND WATERMAIN WORK) SHALL BE INSPECTED BY THE CITY (AS REQUIRED) PRIOR TO BACKFILLING.
11. THE CONTRACTOR IS RESPONSIBLE TO INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROLS AS REQUIRED BY THIS CONTRACT AND CITY AND PROVINCIAL STANDARDS.
12. CONTRACTOR RESPONSIBLE TO SUPPLY AND INSTALL ALL NECESSARY CONSTRUCTION FENCING.
13. CONTRACTOR TO PROVIDE WEEKLY REDLINE LINE AS-BUILT SURVEY TO THE ENGINEER FOR REVIEW. AS-BUILT TO SHOW PIPE INVERT, PIPE SIZE, AND PIPE MATERIAL.
14. CONTRACTOR TO PROVIDE AS-BUILT SURVEY OF COMPLETED SERVICING AND GRADING WORKS; INCLUDING INVERTS, ALL ABOVE GROUND WORKS AND SPOT ELEVATIONS AT MAXIMUM 15M GRID INTERVAL. SURVEY TO BE PREPARED BY LICENSED ONTARIO LAND SURVEYOR.
15. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE SITE-SPECIFIC GEOTECHNICAL REPORT ENTITLED "_____" PREPARED BY GROUNDED ENGINEERING, DATED_____ AND ALL APPLICABLE ADDENDUMS.





REVISION BLOCK

#	DATE	DESCRIPTION
1.	10/01/21	ISSUED DRAFT
2.	11/04/21	ISSUED DRAFT
3.	10/14/22	DRAFT EA ISSUED

DRAFT

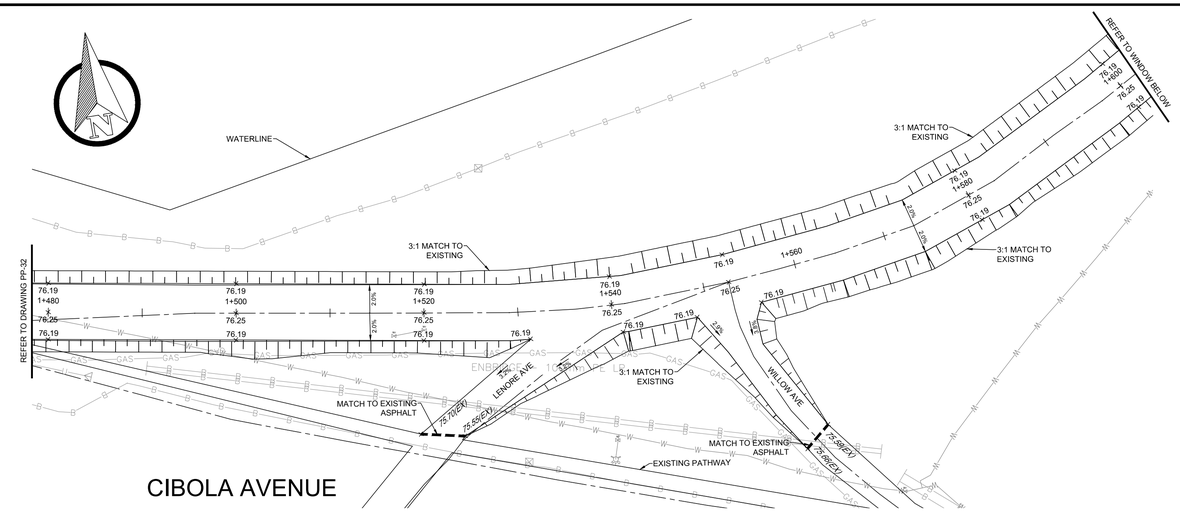
KWA SITE DEVELOPMENT CONSULTING INC.
2265 Mainway Drive
Burlington, ON L7L 7A9

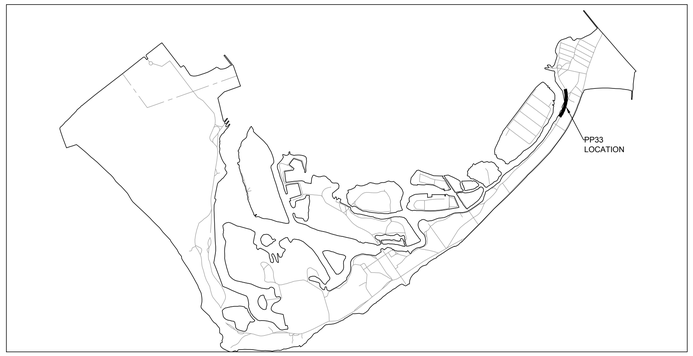
NORTH ARROW

METRIC SCALE
0 2 5 10
HORZ.1:300 VERT.1:30

CIBOLA AVE
STA 1+260 TO 1+480
TORONTO REGION CONSERVATION AUTHORITY
TORONTO ISLAND PARK FLOOD & EROSION MITIGATION
TORONTO, ONTARIO
PROJECT No: 21600 | DRAWN BY: ARV | CHECKED BY: CDB

PP-32





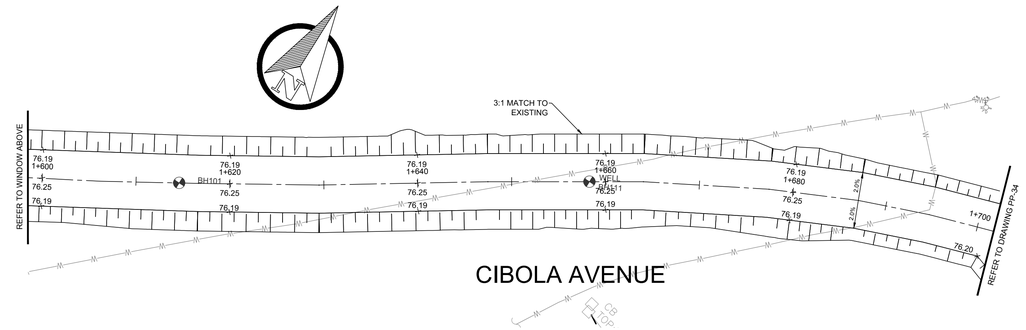
KEYPLAN (N.T.S.)

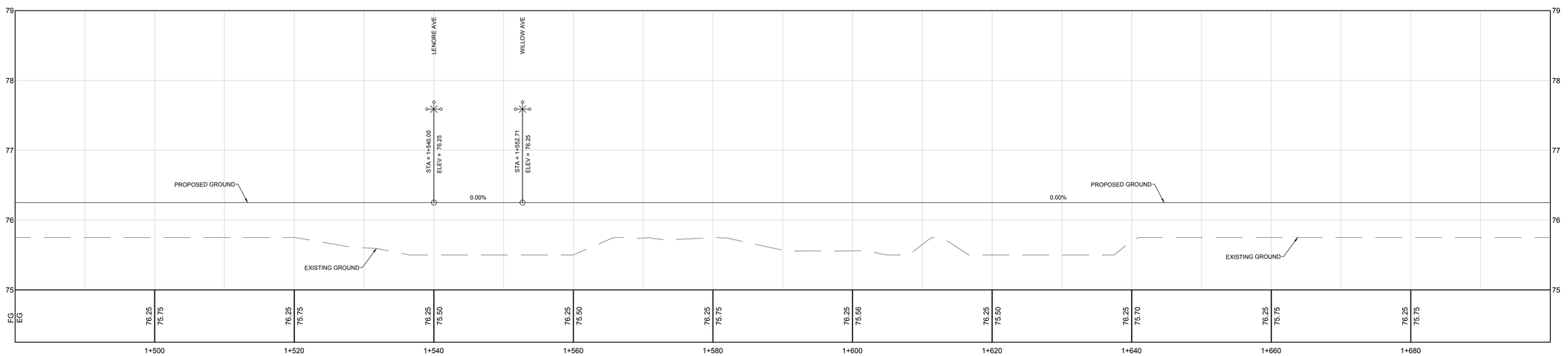
LEGEND

- EXISTING GROUND CONTOUR
- PROPOSED 3:1 SLOPE
- EXISTING CENTRELINE
- PROPSED ELEVATION
- PROPOSED GRADE
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- EXISTING HYDRANT
- EXISTING VALVE BOX
- EXISTING WATER CHAMBER
- EXISTING LIGHT STANDARD
- EXISTING HYDRO
- EXISTING BELL UTILITY
- EXISTING UTILITY
- EXISTING GASMAIN
- EXISTING ELECTRICAL
- EXISTING TREE

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS, ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS (OPSD & OPSS), THE WATER RESOURCES ACT, AND THE APPLICABLE ENVIRONMENTAL PROTECTION ACTS. WHERE A CITY OR REGION STANDARD EXISTS, IT SHALL BE USED IN PLACE OF THE PROVINCIAL STANDARD. ALL WORK SHALL CONFORM TO THE APPLICABLE HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2. INFORMATION REGARDING ALL EXISTING UNDERGROUND UTILITIES AND SERVICES SHOWN ON THE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS AND/OR AVAILABLE HISTORICAL DRAWINGS. THE ACCURACY OF THIS INFORMATION HAS NOT BEEN CONFIRMED BY KWA SITE DEVELOPMENT CONSULTING AND ALL UNDERGROUND INFORMATION NEEDS TO BE VERIFIED IN THE FIELD PRIOR TO BIDDING AND CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO ACQUIRE ALL UTILITY LOCATES PRIOR TO CONSTRUCTION AND TO NOTIFY THE ENGINEER OF ANY DISCREPANCIES. ANY LOST TIME DUE TO FAILURE TO IDENTIFY DISCREPANCIES OR NOTIFY THE ENGINEER SHALL BE AT THE CONTRACTOR'S EXPENSE.
3. THIS PLAN SHOULD BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANT'S PLANS AND ANY DISCREPANCIES REPORTED TO THE ENGINEER PRIOR TO CONSTRUCTION.
4. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND ANY DISCREPANCIES REPORTED TO THE ENGINEER. INFORMATION REGARDING PRIVATE ROADS, PARKING LOT CURBS, BUILDING LOCATIONS, AND SETBACKS SHALL BE TAKEN FROM THE SITE PLAN.
5. NO SUBSTITUTIONS SHALL BE ALLOWED WITHOUT ENGINEERS APPROVAL.
6. ALL DISTURBED AREAS SHALL BE REPAIRED TO ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE ENGINEER.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING AT THE SAME TIME AS THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES AND PREVENT CONSTRUCTION CONFLICTS.
8. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL PERMITS INCLUDING THIRD PARTY UTILITY COSTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING ALL NECESSARY SIGNALS, SIGNS, DELINEATORS, MARKERS AND BARRIERS. ALL TRAFFIC AND SAFETY MEASURES SHALL CONFORM TO CITY STANDARDS AND THE ONTARIO TRAFFIC MANUAL, BOOK 7 - TEMPORARY CONDITIONS, LATEST EDITION.
10. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED INSPECTIONS WITH THE CITY AND ANY OTHER REGULATORY AGENCIES. ALL WORK ON CITY PROPERTY OR INFRSTRUCTURE (INCLUDING EASEMENTS, SEWER WORK, AND WATERMAIN WORK) SHALL BE INSPECTED BY THE CITY (AS REQUIRED) PRIOR TO BACKFILLING.
11. THE CONTRACTOR IS RESPONSIBLE TO INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROLS AS REQUIRED BY THIS CONTRACT AND CITY AND PROVINCIAL STANDARDS.
12. CONTRACTOR RESPONSIBLE TO SUPPLY AND INSTALL ALL NECESSARY CONSTRUCTION FENCING.
13. CONTRACTOR TO PROVIDE WEEKLY REDLINE LINE AS-BUILT SURVEY TO THE ENGINEER FOR REVIEW. AS-BUILT TO SHOW PIPE INVERT, PIPE SIZE, AND PIPE MATERIAL.
14. CONTRACTOR TO PROVIDE AS-BUILT SURVEY OF COMPLETED SERVICING AND GRADING WORKS; INCLUDING INVERTS, ALL ABOVE GROUND WORKS AND SPOT ELEVATIONS AT MAXIMUM 15M GRID INTERVAL. SURVEY TO BE PREPARED BY LICENSED ONTARIO LAND SURVEYOR.
15. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE SITE-SPECIFIC GEOTECHNICAL REPORT ENTITLED "_____" PREPARED BY GROUNDED ENGINEERING, DATED_____ AND ALL APPLICABLE ADDENDUMS.





REVISION BLOCK

#	DATE	DESCRIPTION
1.	10/01/21	ISSUED DRAFT
2.	11/04/21	ISSUED DRAFT
3.	10/14/22	DRAFT EA ISSUED

DRAFT

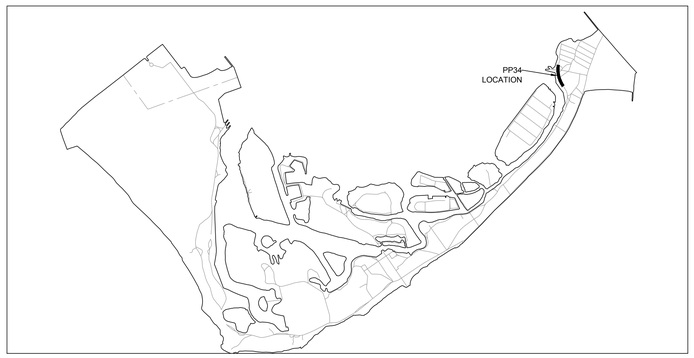
KWA SITE DEVELOPMENT CONSULTING INC.
2355 Main Street, Suite 210
Burlington, ON L7L 7A9

NORTH ARROW

METRIC SCALE
0 2 5 10
HORZ.1:300 VERT.1:30

CIBOLA AVE
STA 1+480 TO 1+700
TORONTO REGION CONSERVATION AUTHORITY
TORONTO ISLAND PARK FLOOD & EROSION MITIGATION
TORONTO, ONTARIO
PROJECT No: 21600 | DRAWN BY: ARV | CHECKED BY: CDB

PP-33



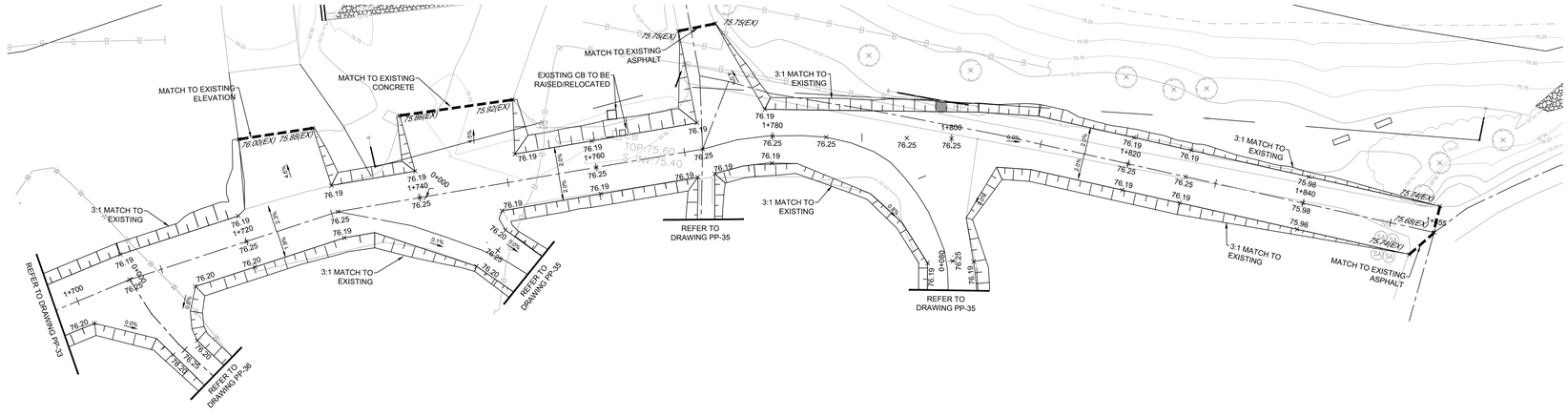
KEYPLAN (N.T.S.)

LEGEND

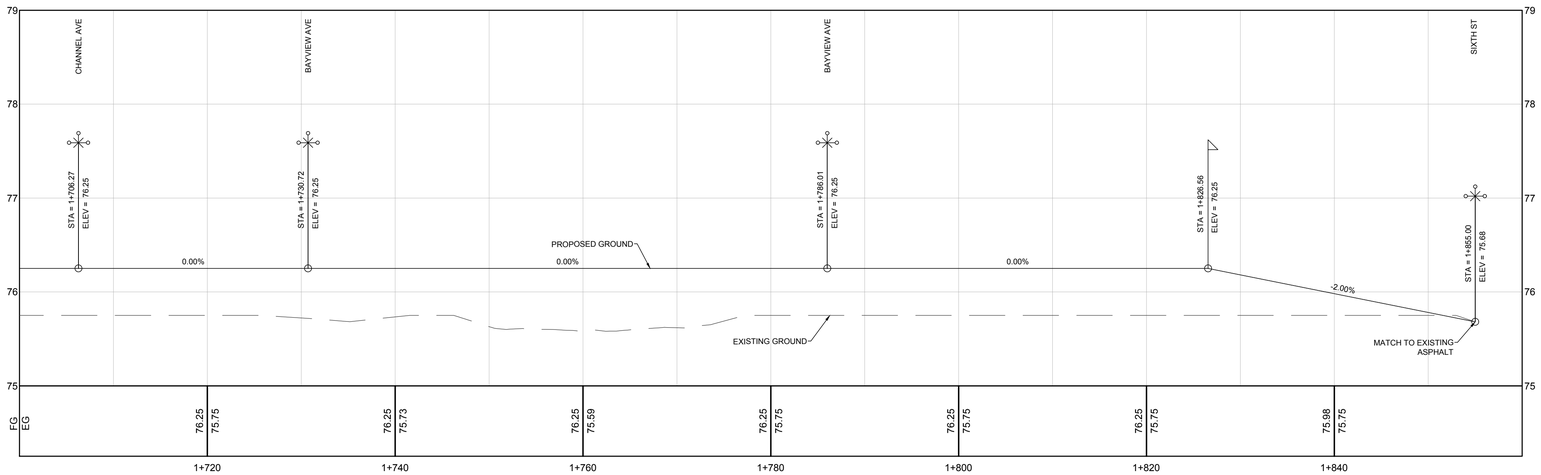
- EXISTING GROUND CONTOUR
- PROPOSED 3:1 SLOPE
- EXISTING CENTRELINE
- PROPSED ELEVATION
- PROPOSED GRADE
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- EXISTING HYDRANT
- EXISTING VALVE BOX
- EXISTING WATER CHAMBER
- EXISTING LIGHT STANDARD
- EXISTING HYDRO
- EXISTING BELL UTILITY
- EXISTING UTILITY
- EXISTING GASMAIN
- EXISTING ELECTRICAL
- EXISTING TREE

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS, ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS (OPSD & OPSS), THE WATER RESOURCES ACT, AND THE APPLICABLE ENVIRONMENTAL PROTECTION ACTS. WHERE A CITY OR REGION STANDARD EXISTS, IT SHALL BE USED IN PLACE OF THE PROVINCIAL STANDARD. ALL WORK SHALL CONFORM TO THE APPLICABLE HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2. INFORMATION REGARDING ALL EXISTING UNDERGROUND UTILITIES AND SERVICES SHOWN ON THE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS AND/OR AVAILABLE HISTORICAL DRAWINGS. THE ACCURACY OF THIS INFORMATION HAS NOT BEEN CONFIRMED BY KWA SITE DEVELOPMENT CONSULTING AND ALL UNDERGROUND INFORMATION NEEDS TO BE VERIFIED IN THE FIELD PRIOR TO BIDDING AND CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO ACQUIRE ALL UTILITY LOCATES PRIOR TO CONSTRUCTION AND TO NOTIFY THE ENGINEER OF ANY DISCREPANCIES. ANY LOST TIME DUE TO FAILURE TO IDENTIFY DISCREPANCIES OR NOTIFY THE ENGINEER SHALL BE AT THE CONTRACTOR'S EXPENSE.
3. THIS PLAN SHOULD BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANT'S PLANS AND ANY DISCREPANCIES REPORTED TO THE ENGINEER PRIOR TO CONSTRUCTION.
4. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND ANY DISCREPANCIES REPORTED TO THE ENGINEER. INFORMATION REGARDING PRIVATE ROADS, PARKING LOT CURBS, BUILDING LOCATIONS, AND SETBACKS SHALL BE TAKEN FROM THE SITE PLAN.
5. NO SUBSTITUTIONS SHALL BE ALLOWED WITHOUT ENGINEERS APPROVAL.
6. ALL DISTURBED AREAS SHALL BE REPAIRED TO ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE ENGINEER.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING AT THE SAME TIME AS THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES AND PREVENT CONSTRUCTION CONFLICTS.
8. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL PERMITS INCLUDING THIRD PARTY UTILITY COSTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING ALL NECESSARY SIGNALS, SIGNS, DELINEATORS, MARKERS AND BARRIERS. ALL TRAFFIC AND SAFETY MEASURES SHALL CONFORM TO CITY STANDARDS AND THE ONTARIO TRAFFIC MANUAL, BOOK 7 - TEMPORARY CONDITIONS, LATEST EDITION.
10. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED INSPECTIONS WITH THE CITY AND ANY OTHER REGULATORY AGENCIES. ALL WORK ON CITY PROPERTY OR INFRSTRUCTURE (INCLUDING EASEMENTS, SEWER WORK, AND WATERMAIN WORK) SHALL BE INSPECTED BY THE CITY (AS REQUIRED) PRIOR TO BACKFILLING.
11. THE CONTRACTOR IS RESPONSIBLE TO INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROLS AS REQUIRED BY THIS CONTRACT AND CITY AND PROVINCIAL STANDARDS.
12. CONTRACTOR RESPONSIBLE TO SUPPLY AND INSTALL ALL NECESSARY CONSTRUCTION FENCING.
13. CONTRACTOR TO PROVIDE WEEKLY REDLINE LINE AS-BUILT SURVEY TO THE ENGINEER FOR REVIEW. AS-BUILT TO SHOW PIPE INVERT, PIPE SIZE, AND PIPE MATERIAL.
14. CONTRACTOR TO PROVIDE AS-BUILT SURVEY OF COMPLETED SERVICING AND GRADING WORKS; INCLUDING INVERTS, ALL ABOVE GROUND WORKS AND SPOT ELEVATIONS AT MAXIMUM 15M GRID INTERVAL. SURVEY TO BE PREPARED BY LICENSED ONTARIO LAND SURVEYOR.
15. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE SITE-SPECIFIC GEOTECHNICAL REPORT ENTITLED "_____" PREPARED BY GROUNDED ENGINEERING, DATED_____ AND ALL APPLICABLE ADDENDUMS.



CIBOLA AVENUE



REVISION BLOCK

#	DATE	DESCRIPTION
1.	10/01/21	ISSUED DRAFT
2.	11/04/21	ISSUED DRAFT
3.	10/14/22	DRAFT EA ISSUED

DRAFT

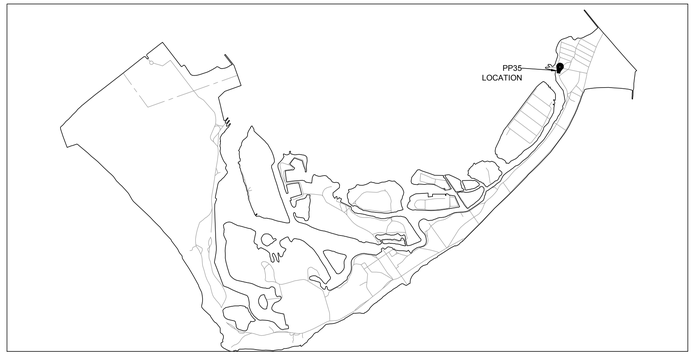
KWA SITE DEVELOPMENT CONSULTING INC.
2355 Main St. Unit 1 Office
Burlington, ON L7L 7A9

NORTH ARROW

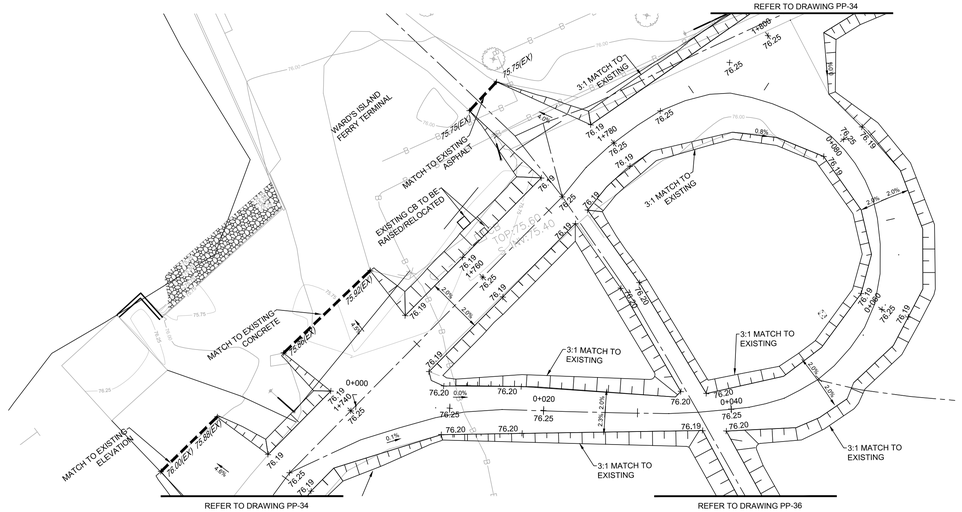
METRIC SCALE
0 2 5 10
HORZ.1:300 VERT.1:30

CIBOLA AVE
STA 1+700 TO 1+855
TORONTO REGION CONSERVATION AUTHORITY
TORONTO ISLAND PARK FLOOD & EROSION MITIGATION
TORONTO, ONTARIO
PROJECT No: 21600 | DRAWN BY: ARV | CHECKED BY: GDB

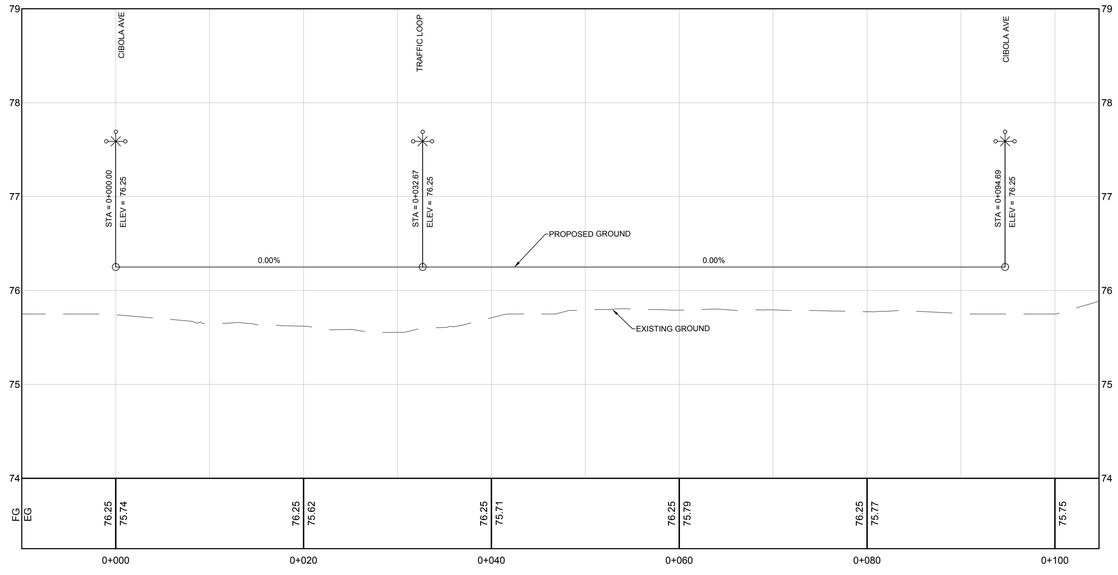
PP-34



KEYPLAN (N.T.S.)



BAYVIEW AVENUE



GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS, ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS (OPSD & OPSS), THE WATER RESOURCES ACT, AND THE APPLICABLE ENVIRONMENTAL PROTECTION ACTS. WHERE A CITY OR REGION STANDARD EXISTS, IT SHALL BE USED IN PLACE OF THE PROVINCIAL STANDARD. ALL WORK SHALL CONFORM TO THE APPLICABLE HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2. INFORMATION REGARDING ALL EXISTING UNDERGROUND UTILITIES AND SERVICES SHOWN ON THE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS AND/OR AVAILABLE HISTORICAL DRAWINGS. THE ACCURACY OF THIS INFORMATION HAS NOT BEEN CONFIRMED BY KWA SITE DEVELOPMENT CONSULTING AND ALL UNDERGROUND INFORMATION NEEDS TO BE VERIFIED IN THE FIELD PRIOR TO BIDDING AND CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO ACQUIRE ALL UTILITY LOCATES PRIOR TO CONSTRUCTION AND TO NOTIFY THE ENGINEER OF ANY DISCREPANCIES. ANY LOST TIME DUE TO FAILURE TO IDENTIFY DISCREPANCIES OR NOTIFY THE ENGINEER SHALL BE AT THE CONTRACTOR'S EXPENSE.
3. THIS PLAN SHOULD BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANT'S PLANS AND ANY DISCREPANCIES REPORTED TO THE ENGINEER PRIOR TO CONSTRUCTION.
4. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND ANY DISCREPANCIES REPORTED TO THE ENGINEER. INFORMATION REGARDING PRIVATE ROADS, PARKING LOT CURBS, BUILDING LOCATIONS, AND SETBACKS SHALL BE TAKEN FROM THE SITE PLAN.
5. NO SUBSTITUTIONS SHALL BE ALLOWED WITHOUT ENGINEERS APPROVAL.
6. ALL DISTURBED AREAS SHALL BE REPAIRED TO ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE ENGINEER.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING AT THE SAME TIME AS THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES AND PREVENT CONSTRUCTION CONFLICTS.
8. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL PERMITS INCLUDING THIRD PARTY UTILITY COSTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING ALL NECESSARY SIGNALS, SIGNS, DELINEATORS, MARKERS AND BARRIERS. ALL TRAFFIC AND SAFETY MEASURES SHALL CONFORM TO CITY STANDARDS AND THE ONTARIO TRAFFIC MANUAL, BOOK 7 - TEMPORARY CONDITIONS, LATEST EDITION.
10. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED INSPECTIONS WITH THE CITY AND ANY OTHER REGULATORY AGENCIES. ALL WORK ON CITY PROPERTY OR INFRSTRUCTURE (INCLUDING EASEMENTS, SEWER WORK, AND WATERMAIN WORK) SHALL BE INSPECTED BY THE CITY (AS REQUIRED) PRIOR TO BACKFILLING.
11. THE CONTRACTOR IS RESPONSIBLE TO INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROLS AS REQUIRED BY THIS CONTRACT AND CITY AND PROVINCIAL STANDARDS.
12. CONTRACTOR RESPONSIBLE TO SUPPLY AND INSTALL ALL NECESSARY CONSTRUCTION FENCING.
13. CONTRACTOR TO PROVIDE WEEKLY REDLINE LINE AS-BUILT SURVEY TO THE ENGINEER FOR REVIEW. AS-BUILT TO SHOW PIPE INVERT, PIPE SIZE, AND PIPE MATERIAL.
14. CONTRACTOR TO PROVIDE AS-BUILT SURVEY OF COMPLETED SERVICING AND GRADING WORKS; INCLUDING INVERTS, ALL ABOVE GROUND WORKS AND SPOT ELEVATIONS AT MAXIMUM 15M GRID INTERVAL. SURVEY TO BE PREPARED BY LICENSED ONTARIO LAND SURVEYOR.
15. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE SITE-SPECIFIC GEOTECHNICAL REPORT ENTITLED "_____" PREPARED BY GROUNDED ENGINEERING, DATED_____ AND ALL APPLICABLE ADDENDUMS.

LEGEND

- 76.00 — EXISTING GROUND CONTOUR
- PROPOSED 3:1 SLOPE
- EXISTING CENTRELINE
- × 76.25 — PROPSED ELEVATION
- 2.0% — PROPOSED GRADE
- ST — EXISTING STORM SEWER
- SA — EXISTING SANITARY SEWER
- W — EXISTING WATERMAIN
- EXISTING HYDRANT
- EXISTING VALVE BOX
- WC — EXISTING WATER CHAMBER
- LS — EXISTING LIGHT STANDARD
- H — EXISTING HYDRO
- B — EXISTING BELL UTILITY
- U — EXISTING UTILITY
- GAS — EXISTING GASMAIN
- EL — EXISTING ELECTRICAL
- EXISTING TREE

REVISION BLOCK

#	DATE	DESCRIPTION
1.	10/01/21	ISSUED DRAFT
2.	11/04/21	ISSUED DRAFT
3.	10/14/22	DRAFT EA ISSUED

DRAFT

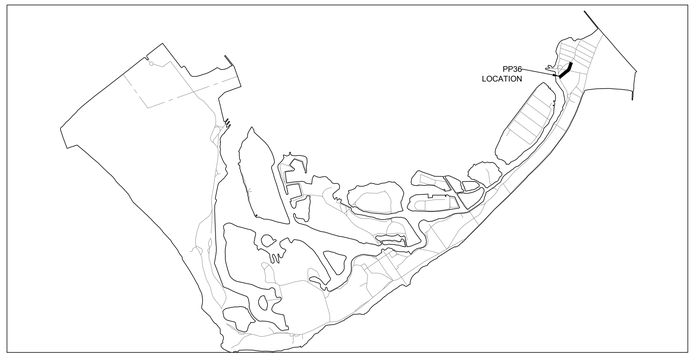
KWA SITE DEVELOPMENT CONSULTING INC.
2355 Main Street, Unit 2
Burlington, ON L7L 7A9

NORTH ARROW

METRIC SCALE
0 2 5 10
HORZ.1:300 VERT.1:30

BAYVIEW AVE
STA 0+000 TO 0+094.69
TORONTO REGION CONSERVATION AUTHORITY
TORONTO ISLAND PARK FLOOD & EROSION MITIGATION
TORONTO, ONTARIO
PROJECT No: 21600 | DRAWN BY: ARV | CHECKED BY: CDB

PP-35



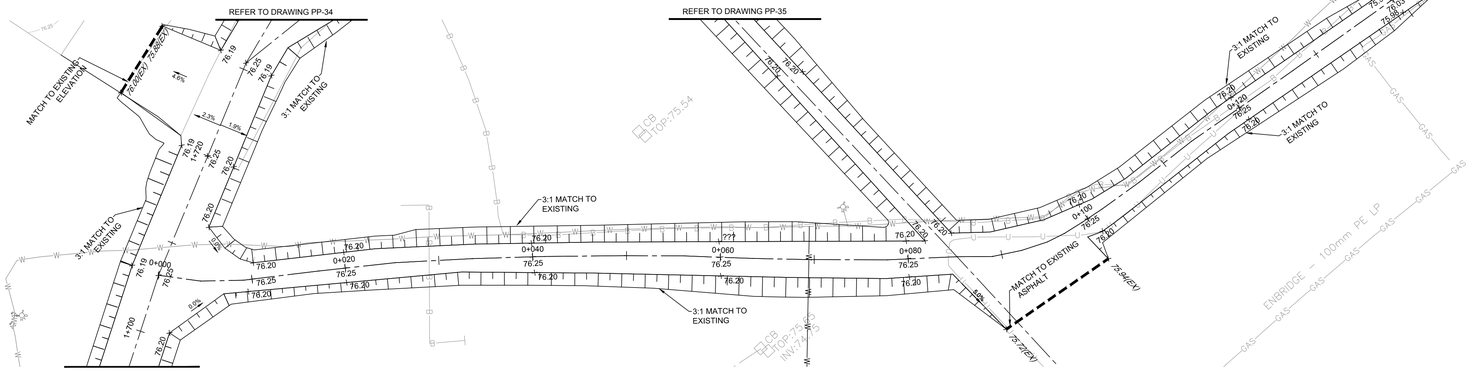
KEYPLAN (N.T.S.)

LEGEND

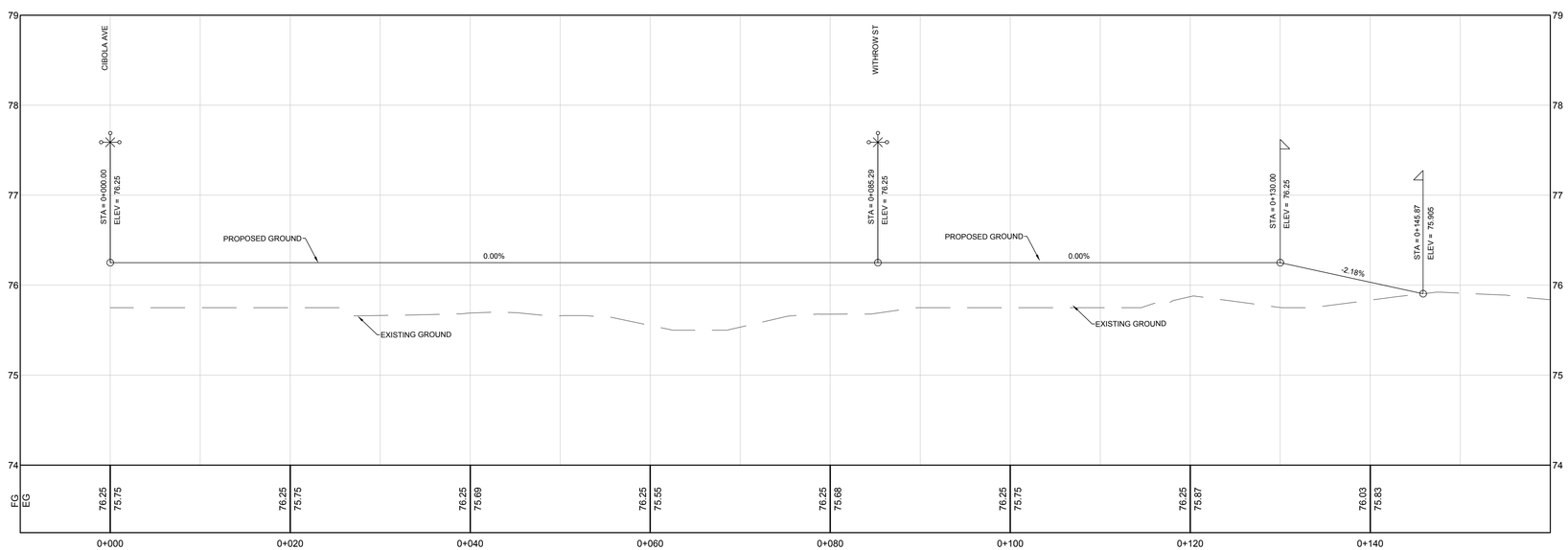
- EXISTING GROUND CONTOUR
- PROPOSED 3:1 SLOPE
- EXISTING CENTRELINE
- PROPSED ELEVATION
- PROPOSED GRADE
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- EXISTING HYDRANT
- EXISTING VALVE BOX
- EXISTING WATER CHAMBER
- EXISTING LIGHT STANDARD
- EXISTING HYDRO
- EXISTING BELL UTILITY
- EXISTING UTILITY
- EXISTING GASMAIN
- EXISTING ELECTRICAL
- EXISTING TREE

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS, ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS (OPSD & OPSS), THE WATER RESOURCES ACT, AND THE APPLICABLE ENVIRONMENTAL PROTECTION ACTS. WHERE A CITY OR REGION STANDARD EXISTS, IT SHALL BE USED IN PLACE OF THE PROVINCIAL STANDARD. ALL WORK SHALL CONFORM TO THE APPLICABLE HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2. INFORMATION REGARDING ALL EXISTING UNDERGROUND UTILITIES AND SERVICES SHOWN ON THE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS AND/OR AVAILABLE HISTORICAL DRAWINGS. THE ACCURACY OF THIS INFORMATION HAS NOT BEEN CONFIRMED BY KWA SITE DEVELOPMENT CONSULTING AND ALL UNDERGROUND INFORMATION NEEDS TO BE VERIFIED IN THE FIELD PRIOR TO BIDDING AND CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO ACQUIRE ALL UTILITY LOCATES PRIOR TO CONSTRUCTION AND TO NOTIFY THE ENGINEER OF ANY DISCREPANCIES. ANY LOST TIME DUE TO FAILURE TO IDENTIFY DISCREPANCIES OR NOTIFY THE ENGINEER SHALL BE AT THE CONTRACTOR'S EXPENSE.
3. THIS PLAN SHOULD BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANT'S PLANS AND ANY DISCREPANCIES REPORTED TO THE ENGINEER PRIOR TO CONSTRUCTION.
4. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND ANY DISCREPANCIES REPORTED TO THE ENGINEER. INFORMATION REGARDING PRIVATE ROADS, PARKING LOT CURBS, BUILDING LOCATIONS, AND SETBACKS SHALL BE TAKEN FROM THE SITE PLAN.
5. NO SUBSTITUTIONS SHALL BE ALLOWED WITHOUT ENGINEERS APPROVAL.
6. ALL DISTURBED AREAS SHALL BE REPAIRED TO ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE ENGINEER.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING AT THE SAME TIME AS THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES AND PREVENT CONSTRUCTION CONFLICTS.
8. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL PERMITS INCLUDING THIRD PARTY UTILITY COSTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING ALL NECESSARY SIGNALS, SIGNS, DELINEATORS, MARKERS AND BARRIERS. ALL TRAFFIC AND SAFETY MEASURES SHALL CONFORM TO CITY STANDARDS AND THE ONTARIO TRAFFIC MANUAL, BOOK 7 - TEMPORARY CONDITIONS, LATEST EDITION.
10. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED INSPECTIONS WITH THE CITY AND ANY OTHER REGULATORY AGENCIES. ALL WORK ON CITY PROPERTY OR INFRSTRUCTURE (INCLUDING EASEMENTS, SEWER WORK, AND WATERMAIN WORK) SHALL BE INSPECTED BY THE CITY (AS REQUIRED) PRIOR TO BACKFILLING.
11. THE CONTRACTOR IS RESPONSIBLE TO INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROLS AS REQUIRED BY THIS CONTRACT AND CITY AND PROVINCIAL STANDARDS.
12. CONTRACTOR RESPONSIBLE TO SUPPLY AND INSTALL ALL NECESSARY CONSTRUCTION FENCING.
13. CONTRACTOR TO PROVIDE WEEKLY REDLINE LINE AS-BUILT SURVEY TO THE ENGINEER FOR REVIEW. AS-BUILT TO SHOW PIPE INVERT, PIPE SIZE, AND PIPE MATERIAL.
14. CONTRACTOR TO PROVIDE AS-BUILT SURVEY OF COMPLETED SERVICING AND GRADING WORKS; INCLUDING INVERTS, ALL ABOVE GROUND WORKS AND SPOT ELEVATIONS AT MAXIMUM 15M GRID INTERVAL. SURVEY TO BE PREPARED BY LICENSED ONTARIO LAND SURVEYOR.
15. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE SITE-SPECIFIC GEOTECHNICAL REPORT ENTITLED "_____" PREPARED BY GROUNDED ENGINEERING, DATED_____ AND ALL APPLICABLE ADDENDUMS.



CHANNEL AVENUE



REVISION BLOCK

#	DATE	DESCRIPTION
1.	10/01/21	ISSUED DRAFT
2.	11/04/21	ISSUED DRAFT
3.	10/14/22	DRAFT EA ISSUED

DRAFT

KWA SITE DEVELOPMENT CONSULTING INC.
2055 Mountain Grove Ave
Burlington, ON L7L 7A9

NORTH ARROW

METRIC SCALE
0 2 5 10
HORZ.1:300 VERT.1:30

CHANNEL AVE
STA 0+000 TO 0+160
TORONTO REGION CONSERVATION AUTHORITY
TORONTO ISLAND PARK FLOOD & EROSION MITIGATION
TORONTO, ONTARIO

CHECKED BY: CDB
DRAWN BY: ARV
PROJECT No: 21600

PP-36

Toronto Islands Park Flood and Erosion Mitigation Project (Contract #10034747)

Conceptual Design Evaluation Report - Part II Detailed Environmental Analysis of the Preferred Alternative Options

October 21, 2024 | 13520.101.R2.Rev1

Baird.
Innovation Engineered.

baird.com

Toronto Islands Park Flood and Erosion Mitigation Project (Contract #10034747)

Conceptual Design Evaluation Report - Part II Detailed Environmental Analysis of the Preferred Alternative Options

Prepared for:

Toronto and Region Conservation Authority
101 Exchange Ave.
Vaughan, ON L4K 5R6

Prepared by:

W.F. Baird & Associates Coastal Engineers Ltd

For further information, please contact
Jennifer Crilly at +1-905-845-5385
jcrilly@baird.com
www.baird.com

13520.101.R2.Rev1

Z:\Shared With Me\QMS\2024\Reports_2024\13520.101.R2.Rev1_Part II Detailed Environmental Analysis.docx

Revision	Date	Status	Comments	Prepared	Reviewed	Approved
A	Nov. 4, 2022	Draft	For TRCA Comment	JJC	CDA	CDA
B	Jul. 5, 2024	Final Draft	For TRCA Comment	JJC/ACF	CDA	CDA
0	Oct. 11, 2024	Final		JJC	CDA	CDA
1	Oct. 21, 2024	Final	Incorporate client comments	JJC	CDA	CDA

© 2024 W.F. Baird & Associates Coastal Engineers Ltd (Baird) All Rights Reserved. Copyright in the whole and every part of this document, including any data sets or outputs that accompany this report, belongs to Baird and may not be used, sold, transferred, copied or reproduced in whole or in part in any manner or form or in or on any media to any person without the prior written consent of Baird.

This document was prepared by W.F. Baird & Associates Coastal Engineers Ltd for Toronto and Region Conservation Authority. The outputs from this document are designated only for application to the intended purpose, as specified in the document, and should not be used for any other site or project. The material in it reflects the judgment of Baird in light of the information available to them at the time of preparation. Any use that a Third Party makes of this document, or any reliance on decisions to be made based on it, are the responsibility of such Third Parties. Baird accepts no responsibility for damages, if any, suffered by any Third Party as a result of decisions made or actions based on this document.

Executive Summary

Part II of the Concept Design Evaluation Package presents an environmental analysis of the preferred concepts for the four study areas in the Toronto Islands Flood and Erosion Mitigation Project. As presented in Part I of the evaluation package, the preferred alternatives for each study area include:

- Ward's Island: Concept 3C: Vegetated Berm, Beach and Groyne
- Algonquin Island, South End: Concept 1C: Vegetated Inland Berm along Wyandot
- Algonquin Island, Northwest Shoreline: Concept 2: Impermeable Berm
- Algonquin Island, Queen City Yacht Club: Concept 4: Land Raising and Raised Walkway
- Centre Island, Toronto Island Marina: Concept 4: Land Raising and Shoreline Flood Berm
- Centre Island, Ferry Terminal: Concept 2: Stacked/Stepped Wall
- Centre Island, Centreville: Concept 2: Naturalized Shoreline and Flood Berm
- Roadways: Concept 1: Clay Cap

Conservation Ontario's guidelines for the Class EA process for Remedial Flood and Erosion Control Projects includes a series of screening criteria to facilitate an assessment of the anticipated short term and long term environmental impacts, both positive and negative, of the preferred concepts. Baird has completed an assessment of the environmental impacts for the preferred concepts and provided a rating and comment for each of the screening criteria. Various screening criteria have been categorized into Physical, Biological, Cultural, Socioeconomical, and Engineering/Technical Impacts. This report discusses the environmental impacts within the Physical and Technical Engineering criteria for use by TRCA in preparation of the Environmental Study Report (ESR) report. The analyses are based on the baseline inventory presented in Part I of this report.

Table of Contents

1. Introduction 1
1.1 Screening Criteria 1
2. Ward's Island 3
2.1 Physical Impacts 5
2.2 Engineering/Technical Impacts 7
3. Algonquin Island 10
3.1 Physical Impacts 12
3.2 Engineering/Technical Impacts 14
4. Centre Island 18
4.1 Physical Impacts 20
4.2 Engineering/Technical Impacts 22
5. Roadways 25
5.1 Physical Impacts 27
5.2 Engineering/Technical Impacts 28
References 31

Appendix A Preferred Concepts
Appendix B Screening Criteria Tables
Appendix C Grounded Engineering Geotechnical Report

Figures

Figure 2.1: Preferred concept for Ward's Island, Concept 3C: Vegetated Berm, Beach and Groyne 4
Figure 2.2: Residual flood depth map for Ward's Island preferred concept for the 100-year flood event 8
Figure 3.1: Preferred concepts for Algonquin Island 11
Figure 3.2: Wind Rose for EC48549 at Toronto City Airport. 12
Figure 3.3: Residual flood depth map for the Algonquin Island preferred concept for the 100-year flood event 16
Figure 4.1: Preferred concepts for Centre Island 19
Figure 4.2: Erosion along the Centreville shoreline. 22
Figure 4.3: Residual flood depth map for the Centre Island preferred concept for the 100-year flood event 23
Figure 5.1: Roadways to be raised within the Roadways Study Area 26
Figure 5.2: Shoreline revetment concept, in plan, along PP-8 and PP-9 30

1. Introduction

Part II of the Concept Design Evaluation Package presents an environmental analysis of the preferred concepts. As presented in Part I of the evaluation package, the preferred alternatives for each study area listed below. Concept drawings are provided in Appendix A.

- Ward's Island: Concept 3C: Vegetated Berm, Beach and Groyne
- Algonquin Island, South End: Concept 1C: Vegetated Inland Berm along Wyandot
- Algonquin Island, Northwest Shoreline: Concept 2: Impermeable Berm
- Algonquin Island, Queen City Yacht Club: Concept 4: Land Raising and Raised Walkway
- Centre Island, Toronto Island Marina: Concept 4: Land Raising and Shoreline Flood Berm
- Centre Island, Ferry Terminal: Concept 2: Stacked/Stepped Wall
- Centre Island, Centreville: Concept 2: Naturalized Shoreline and Flood Berm
- Roadways: Concept 1: Clay Cap

This report summarizes the predicted environmental impacts associated with the implementation of the preferred alternatives based on the results of the environmental study report (ESR). The potential net negative impacts are discussed in detail, including the cause and degree of effect. A discussion on how the potential net negative impacts can be mitigated through the design of each structure is also provided. The analyses are based on the baseline inventory presented in Part I of this report. Additional numerical modelling of the nearshore coastal conditions and a more comprehensive assessment of the existing structures will be required to support detailed design development of the proposed structures.

1.1 Screening Criteria

Conservation Ontario's guidelines for the Class EA process for Remedial Flood and Erosion Control Projects includes a series of screening criteria to facilitate an assessment of the anticipated short term and long term environmental impacts, both positive and negative, of the preferred concepts. Baird has completed an assessment of the environmental impacts for the preferred concepts and provided a rating and comment for each of the screening criteria. The results of this assessment are provided in Appendix B. This report provides further written discussion of the environmental impacts for Physical and Technical Engineering criteria for use by TRCA in preparation of the ESR. The screening criteria are listed below. The criteria discussed in this report are indicated in bold. The remaining criteria, which are scored but not discussed in this report, will be further examined by TRCA:

Physical:

- Unique Landforms
- Existing Mineral/Aggregate Resources Extraction Industries
- Earth Science – Areas of Natural and Scientific Interest
- Specialty Crop Areas/Agricultural Lands or Production
- Environmentally Sensitive/Significant Areas (physical)
- Air Quality
- **Agricultural Tile or Surface Drains**
- Noise Levels and Vibration
- **High/Storm Water Flow Regime**
- **Low/Base Water Flow Regime**
- **Falls within a Vulnerable Area as defined by the Clean Water Act**

- **Existing Surface Drainage/Groundwater Seepage/Groundwater Recharge/Discharge Zones**
- **Littoral Drift/Other Coastal Processes**
- **Water Quality (Nearshore and Groundwater)**
- **Soil/Fill Quality**
- **Contaminated Soils/Sediment/Seeps (Sediment Quality)**
- Existing Transportation Routes
- Constructed Crossings (e.g., Bridges, Culverts)
- **Geomorphology**

Biological:

- Wildlife Habitat
- Habitat Linkages or Corridors
- Significant Vegetation Communities
- Environmentally Sensitive/Significant Areas (biological)
- Fish Habitat
- Species of Concern
- Exotic/Alien and Invasive Species
- Wildlife/Bird Migration Patterns
- Wildlife Population
- Wetlands
- Microclimate
- Unique Habitats
- Life Science – Areas of Natural and Scientific Interest

Cultural

- Traditional Land Uses
- Indigenous Reserve or Community
- Outstanding Native Land Claim or Treaty Rights
- Transboundary Water Management Issues
- Riparian Uses
- Recreational/Tourist Uses of Water Body and/or Adjacent Land
- Aesthetic or Scenic Landscapes or Views
- Archaeological Resources, Built Heritage Resources and Cultural Heritage Landscapes
- Historic Canals
- Federal Property
- Heritage River System

Socioeconomic

- Surrounding Neighbourhood or Community
- Surrounding Land Uses or Growth Pressure
- Existing Infrastructure, Support Services, Facilities
- Pedestrian Traffic Routes
- Property Values or Ownership
- Existing Tourism Operations
- Property/Farm Accessibility

Engineering/Technical:

- **Rate of Erosion in Ecosystem**
- **Sediment Deposition Zones in Ecosystem**
- **Flood Risk in Ecosystem**
- **Hazardous Lands**[1]
- **Hazardous Sites**
- **Slope Stability**
- **Existing Structures**

[1] As per the Provincial Policy Statement (PPS), development is restricted in areas that are subject to hazards associated with erosion, flooding, or dynamic beaches.

2. Ward's Island

The preferred shoreline protection alternative for Ward's Island is Concept 3C: Vegetated Berm, Beach and Groyne. This concept, shown in plan in Figure 2.1, includes expansion of the existing beach north of the ferry terminal, a shoreline flood berm along the north shoreline and an inland flood berm along First Street. The expanded beach, which will be pre-filled to its design capacity with suitable beach fill material, will be retained by the existing ferry wharf to the south and a new stone groyne to the north.



Figure 2.1: Preferred concept for Ward's Island, Concept 3C: Vegetated Berm, Beach and Groyne

2.1 Physical Impacts

High/Storm Water Flow Regime

Due to prevailing westerly winds and discharge from the Don River, currents predominantly flow from north to south along the western shoreline of Ward's Island; however, circulation patterns within the Inner Harbour vary based on prevailing wind and wave conditions. Implementation of a groyne at the north end of the proposed enlarged beach will result in localized impacts on nearshore currents, including the possibility of stronger currents around the end of the groyne (particularly during storms) and eddies with weaker currents.

Low/Base Water Flow Regime

The addition of a groyne at the north end of the proposed enlarged beach may cause a risk of stagnant areas which may lead to water quality issues and/or accumulation of debris. The groyne is not expected to adversely impact the overall water circulation in the Inner Harbour. Both the impacts at high and low water should be investigated through numerical modeling in the detailed design phase.

Existing Surface Drainage/Groundwater Seepage/Groundwater Recharge/Discharge Zones

For Ward's Island, surface runoff appears to flow towards the lake on the south, west and north sides of the island or infiltrates into the ground. The proposed impermeable flood berm will impede surface drainage to the lake along the west and north shorelines and will exacerbate landside flooding from precipitation unless suitable mitigation measures are implemented.

During the geotechnical investigation completed by Grounded in July 2021 (Grounded, 2022), measurements were taken at nine monitoring wells around the park (seven pre-existing wells and two monitoring wells installed for this study). The groundwater level was generally found to be at the same elevation as Lake Ontario. Where the ground is saturated due to high lake levels, precipitation will not infiltrate back into the ground and ponding will occur. The ponded areas will remain wet and saturated until the water evaporates/re-infiltrates or is removed using sump pumps. There are existing sumps across Ward's Island; however, additional sump pumps may be required to drain surface water from precipitation and ground water during high lake levels.

Littoral Drift/ Other Coastal Processes

Implementation of the preferred concept, as shown in Figure 2.1, is not expected to have any significant impacts on coastal processes, as discussed below.

The proposed groyne along the western shoreline will have a small, localized effect on nearshore waves and hydrodynamics due to wave reflections off the new structure as well as the creation of a small shelter zone. The location and size of the shelter zone will vary in response to the prevailing wind/wave direction (i.e., the shelter zone will be on the lee side of the structure).

The addition of beach fill and riprap along the existing shoreline is not expected to result in significant changes in wave reflection, nearshore waves or hydrodynamics.

Presently, there is no meaningful littoral drift (sediment transport) between the Ferry Dock and the Eastern Channel because of the shoreline orientation, a low wave energy environment, and lack of sediment sources. In addition, the beach will be pre-filled to its maximum capacity to limit the risk of trapping of any sediment that

is present in the littoral system. As such, the proposed groyne is not expected to have any significant impacts on littoral drift nor to adversely impact the adjacent shorelines.

Similarly, the addition of riprap along the rest of the Ward's Island shoreline is not expected to have any significant impact on littoral drift processes/patterns along the shoreline.

Of note, the ongoing Don Mouth Naturalization and Port Lands Flood Protection Project, which will naturalize the mouth of the Don River, includes sediment traps that will require maintenance dredging. It is unknown how much sediment will be supplied from the naturalized river mouth, although finer materials (silts and clays in suspension) may be carried by prevailing currents and fall out of suspension in calm areas, potentially within the shelter zone created by the proposed groyne. Accumulation of fine sediment from the Don River plume should be investigated in the detailed design phase.

Water Quality

Grounded completed groundwater testing as part of the geotechnical investigation. The results for the groundwater samples tested at Ward's Island showed exceedances of the Provincial Water Quality Objectives for Sulphide, Total Phosphorous, Total Sulphide, Total Cobalt, Total Iron and Total Lead; detailed results of the groundwater testing are provided in Appendix C. The proposed concepts for Ward's Island are not expected to impact the existing groundwater quality.

Water quality in the nearshore area will be negatively impacted during construction, with in-water construction works likely to result in increased turbidity. These impacts will be temporary; regardless, suitable mitigation measures during construction, such as deployment of silt curtains, limiting in-water works during windy/wavey conditions and in accordance with seasonal restrictions will be employed, as required and regulated by the regulatory agencies (Department of Fisheries and Oceans Canada (DFO), Ministry of Natural Resources (MNR), and TRCA). Use of heavy machinery in and around the water during construction also presents a risk of environmental contamination. Safe fueling practices and cleaning of machinery/materials will also be required to mitigate risk.

Detailed hydrodynamic modelling is required to identify whether construction of the proposed groyne would reduce circulation within the nearshore beach area. Reduced circulation may require review of water quality implications for the public beach.

Soil/Fill Quality

Based on the soil testing results completed by Grounded (Grounded, 2022), the soil tested on Ward's Island was non-hazardous. Fill used to construct the proposed shoreline flood berm will be clean fill and should meet the specifications for OPSS Granular B Type I.

Contaminated Soils/Sediment/Seeps (Sediment Quality)

Chemical testing of soil samples from select boreholes within the study area was conducted during the geotechnical investigation to identify potential soil contamination in accordance with O.Reg 153/04. Select soil samples were analyzed for various Contaminants of Potential Concern (CoPCs) and compared to the applicable Site Condition Standard for the study area (O.Reg. 153/04 – Table 1 Res/Park). The results of the analysis indicate that, overall, borehole samples met the standard for metals, hydride-forming metals, and benzene, toluene, ethylbenzene, xylene (BTEX). Petroleum hydrocarbon (PHC) levels were exceeded in samples from boreholes BH101 and BH111, and Sodium Adsorption Ratio (SAR) levels were exceeded in BH101. These boreholes are located on Ward's Island at Cibola Ave. Additional details are provided in the Geotechnical Report in Appendix C. Some excavation may be required during the construction of the shoreline

and inland flood berms. In general, contaminated soils cannot be reused on site and correlate to a higher price for disposal. Excavated material will need to be tested and disposed of in accordance with applicable regulations. Further sediment testing will be required for detailed design.

Geomorphology

The existing Ward's Island shoreline is hardened, and the beaches are stable. The preferred shoreline design concept will not change the geomorphology of the island other than improving the existing beach conditions. Additional rip rap along the shoreline flood berm will not change the composition of the shoreline along the northwest and north shoreline from existing, and the expanded beach will be stable and retained by the groyne and ferry dock. Therefore, the overall geomorphology of Ward's Island will not be impacted.

Falls within a Vulnerable Area as defined by the Clean Water Act

Not applicable for this area.

Agricultural Tile or Surface Drains

The addition of beaches and groynes concept on Ward's Island will have no effect on surface drainage besides the impacts detailed in the Existing Surface Drainage/Groundwater Seepage/ Groundwater Recharge/ Discharge Zones section.

2.2 Engineering/Technical Impacts

Rate of Erosion in Ecosystem

Based on review of historic aerial photos and site observations, there appears to be little to no erosion along the Ward's Island shoreline since hardening of the shoreline. Some erosion/washout occurred along the back of the beach during the flood events in 2017 and 2019; these were addressed by the emergency works completed by the TRCA in 2020. Construction of the proposed expanded beach, groyne and shoreline revetment and flood berm will increase protection against erosion/washout of the shoreline and backshore areas associated with high lake levels and wave runup and overtopping.

Sediment Deposition Zones in Ecosystem

While construction of a groyne would increase the retention and deposition of any sediment that is moving along the east shoreline of Ward's Island, as previously discussed, there is very little sediment transport within the Inner Harbour and impact is expected to be minimal due to lack of sediment sources in the system. Some finer material transported in prevailing currents may settle out of the water column in calmer areas, such as on the expanded beach. The potential for deposition of fine sediment and their retention on the beach should be investigated during the detailed design phase.

Flood Risk in Ecosystem

The proposed preferred concept for Ward's Island will mitigate the flood risk for the residential section of the island. The shoreline and inland flood berms have a crest elevation above the 100-year flood elevation and wave uprush elevation which protects the inner part of the island from high lake levels along the east and north shoreline. The proposed raising of Bayview Ave. and Cibola Ave. (in the Roadways study area) will form a flood barrier to the southeast for Ward's Island. The residual flood depth map during the 100-year event is presented in Figure 2.2.

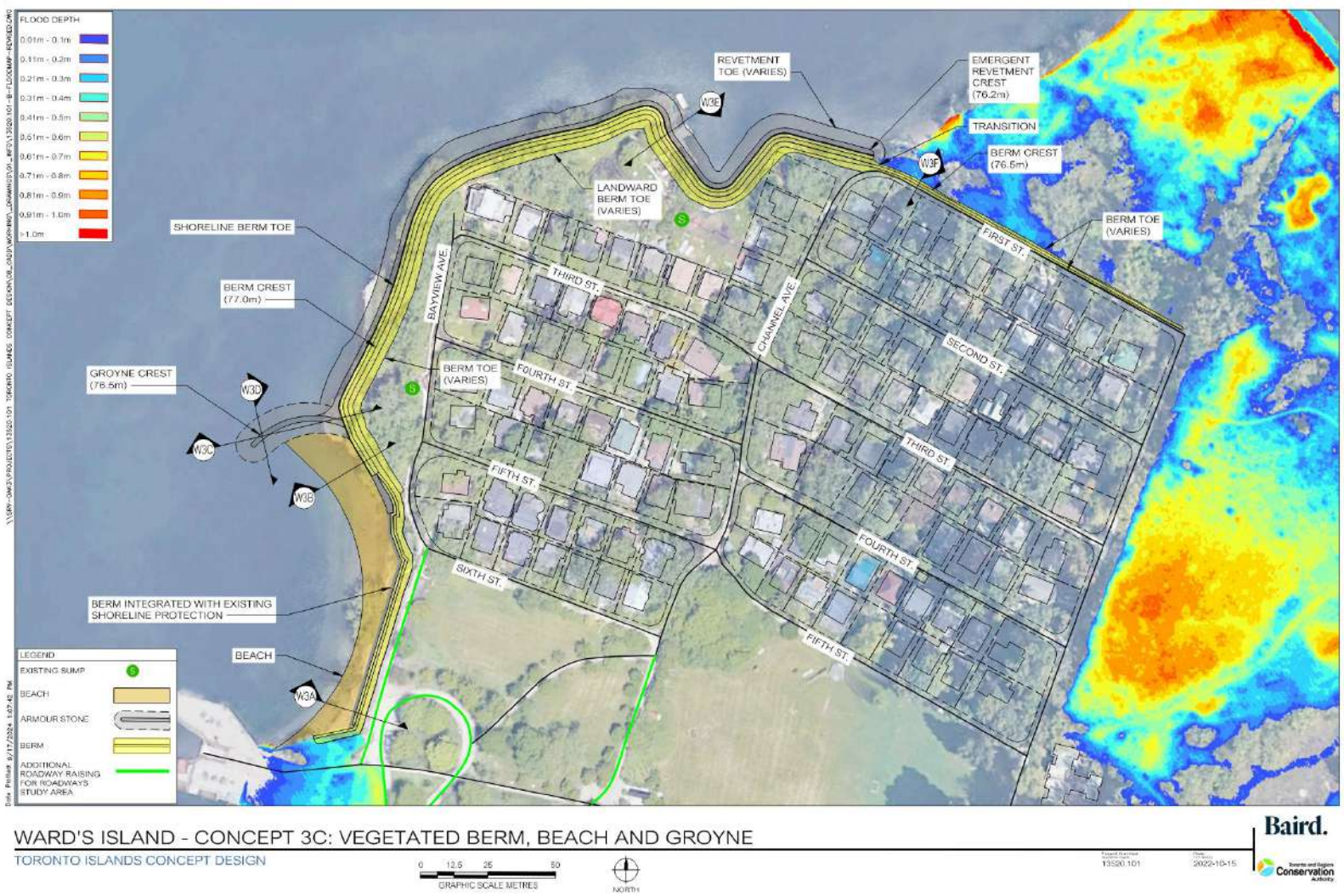


Figure 2.2: Residual flood depth map for Ward's Island preferred concept for the 100-year flood event

Slope Stability

A visual inspection across the Ward's Island study area, completed by Grounded (September 2022), concluded that there were no areas that warranted a slope stability review.

Existing Structures

The existing rip rap revetment and concrete wall around the east and north shoreline will be incorporated into the proposed concept. An additional layer of rip rap will be added to the outside of the existing revetment to repair existing damages and increase the crest height of the revetment. The concrete wall will be removed at ground elevation or buried by the revetment and/or flood berm. This will improve the function of the revetment and aesthetics of the shoreline.

The emergency works completed by TRCA in 2020 included construction of a beach curb and revetment near the Ferry Terminal. These works will be integrated into the proposed concept.

Hazardous Lands

The only lands along the Ward's Island shoreline that have been identified as hazardous for development is the area behind the beach adjacent to the ferry terminal (i.e., this is a dynamic beach). The preferred shoreline protection concept here includes expanding the beach, with the beach fill to be retained by a new groyne. Regardless, the expanded beach will remain dynamic, as the sand will move around within the beach area. Hence, development of the land area behind the expanded beach will remain subject to the constraints defined in the Provincial Policy Statement (PPS).

The flood and erosion hazard lands are mitigated in the residential area by the preferred shoreline protection concept.

Hazardous Sites

The proposed concept will not cause unstable soils or bedrock.

3. Algonquin Island

The preferred shoreline protection concept for Algonquin Island, shown in plan in Figure 3.1, includes an inland flood berm across the south end of the island, a shoreline berm and with a stone buttress along the northwest shoreline, and land raising, raised walkway, and existing flood mitigation measures around the QCYC.

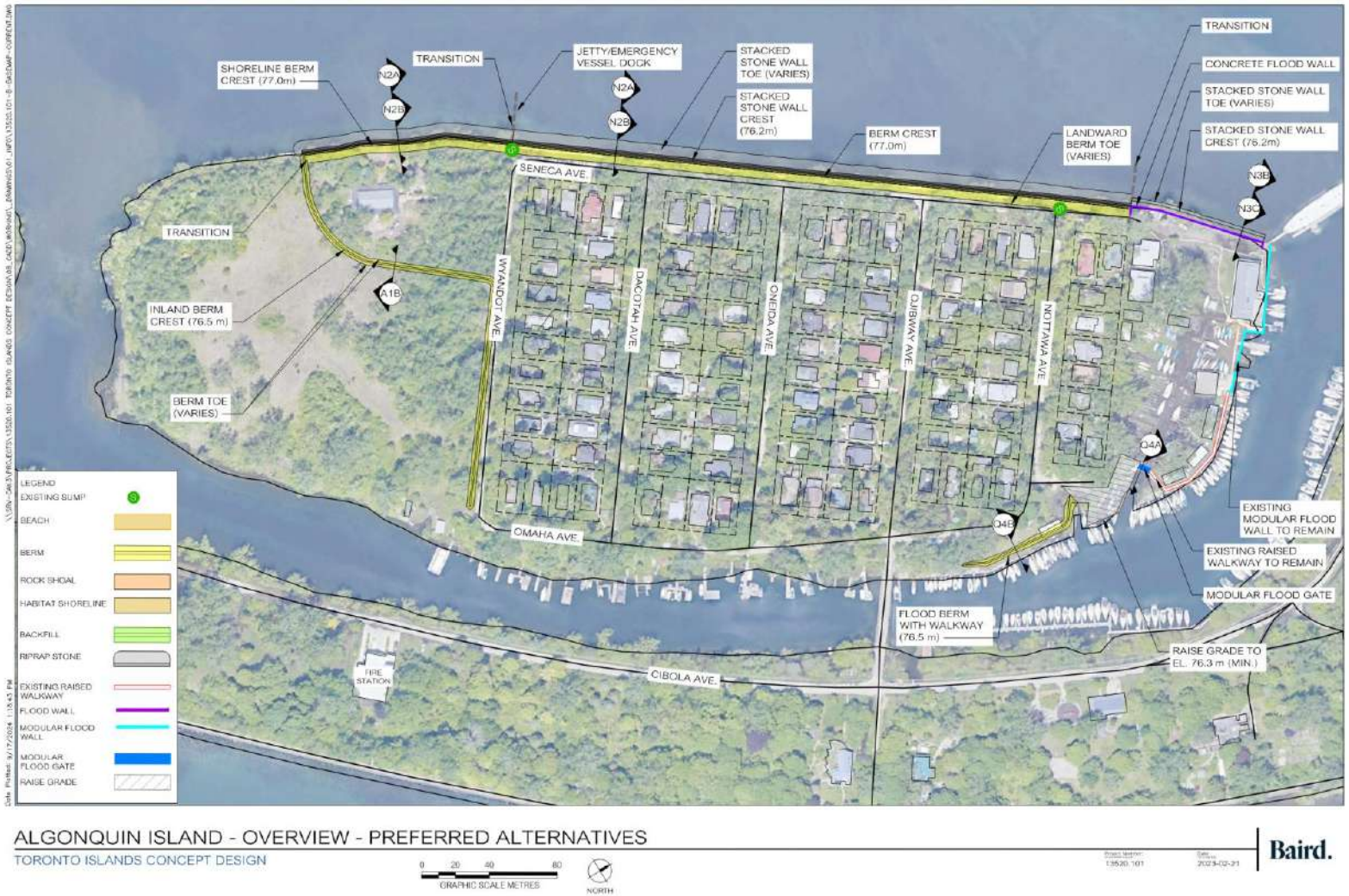


Figure 3.1: Preferred concepts for Algonquin Island

3.1 Physical Impacts

High/Storm Water Flow Regime

As with Ward's Island, the predominant current direction along the northwest shoreline of Algonquin Island is from north to south given the prevailing winds and river discharge into the inner harbour. Wind generated waves and surface currents vary in response to varying wind conditions. Based on the wind rose for the Toronto City Airport, shown in Figure 3.2, winds most commonly blow from the east and west. Winds blowing from the west may induce surface currents travelling from the southwest to the northeast along the northwest shoreline of Algonquin Island. This shoreline is relatively sheltered from winds from the east. A detailed hydrodynamic model study of the nearshore should be completed to understand the local currents in various wind conditions to be able to better predict impacts of stone buttress on nearshore circulation. The Ward's Island Ferry Dock and the ship breakwater, "Rapids Queen", provide some shelter for the QCYC docks from waves generated in the inner harbour; however, waves from the west currently pass through the gap between the "Rapids Queen" and the northwest shoreline. Construction of the proposed stone buttress improvements along the northwest shoreline would close this gap and improve sheltering for the docks in the channel.

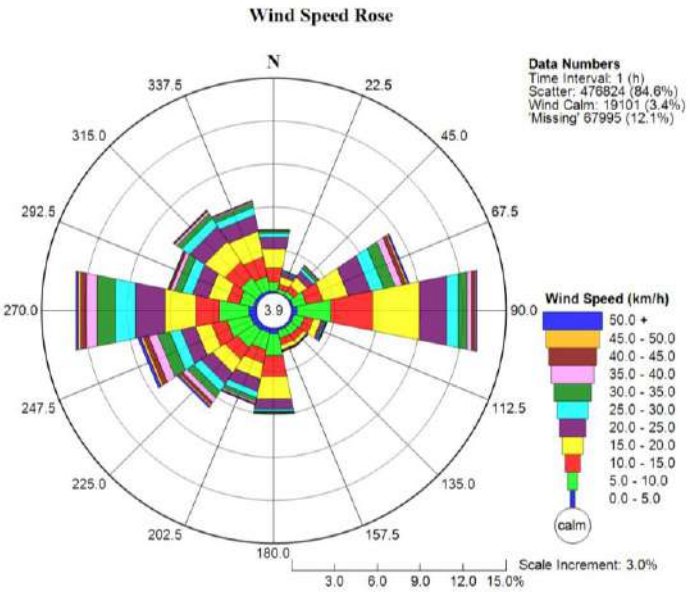


Figure 3.2: Wind Rose for EC48549 at Toronto City Airport.

Low/Base Water Flow Regime

The concepts proposed do not have impacts on the water flow regime in low/base case.

Existing Surface Drainage/Groundwater Seepage/Groundwater Recharge/Discharge Zones

Surface runoff on Algonquin Island appears to flow towards the lake on the south, west and east sides of the island or infiltrates into the ground. Construction of a flood berm across the south end of the island and along the northwest shoreline will impede surface drainage to the lake. Surface drainage at the QCYC will be impeded along the northwest shoreline due to the proposed concrete wall. The existing raised walkway and

proposed raised land area may alter surface drainage pathways; however, surface water is still able to drain towards the lake around the elevated land to the south. The modular flood walls will not impact surface drainage as these are only deployed during extreme flood events.

There are existing sump pumps located on the north and west sides of Algonquin Island. During their investigation in September 2022, Grounded observed catch basins along the roadway that were assumed to direct water to the sumps; however, this is to be confirmed. Additional sumps may be required to remove water trapped landward of the flood berm at the south end and northwest shoreline due to heavy precipitation and/or infiltration associated with high lake levels.

Littoral Drift/Other Coastal Processes

The proposed works along the northwest shoreline include the addition of a stone buttress in front of the existing SSP wall and a new impermeable flood berm along/behind the existing SSP wall. The stone buttress will result in reduced wave reflections and will also provide improved habitat relative to the SSP wall. However, the stone buttress will encroach onto the lakebed beyond the existing shoreline. As the entire northwest shoreline will shift a similar distance into the harbour, we do not expect any significant impact on nearshore waves and hydrodynamics. Also, given the absence of significant littoral drift within the Inner Harbour (as discussed earlier), the proposed improvements along the northwest shoreline are not expected to have a significant impact on sediment transport.

Given the inland location of the proposed flood berm at the south end of Algonquin Island, we do not expect this structure to have any significant impact on coastal processes. Also, given the nature of the proposed improvements along the QCYC shoreline, we do not expect these improvements to have any significant impact to wave reflection, nearshore waves or hydrodynamics.

Water Quality

Grounded completed groundwater testing as part of the geotechnical investigation in September 2022. The results for the groundwater samples tested at Algonquin Island showed exceedances in Sulphide, Total Phosphorous, Total Sulphide, Total Cobalt and Total Iron, in accordance with the Provincial Water Quality Objectives. Detailed results from the groundwater testing are provided in Appendix C. The proposed concepts for Algonquin Island are not expected to impact the existing groundwater quality.

Water quality in the nearshore area will be negatively impacted during construction, with in-water construction works likely to result in increased turbidity. These impacts will be temporary; regardless, suitable mitigation measures during construction, such as deployment of silt curtains, limiting in-water works during windy/wavey conditions and in accordance with seasonal restrictions will be employed, as required and regulated by the regulatory agencies (Department of Fisheries and Oceans Canada (DFO), Ministry of Natural Resources (MNR), and TRCA). Use of heavy machinery in and around the water during construction also presents a risk of environmental contamination. Safe fueling practices and cleaning of machinery/materials will also be required to mitigate risk.

There are no expected long-term impacts on nearshore water quality within all focus areas on Algonquin Island.

Soil/Fill Quality

Based on the soil testing results completed by Grounded (Grounded, 2022), the soil tested on Algonquin Island was non-hazardous. Compacted fill to be used to construct the proposed shoreline structures and to raise the grade at QCYC will be clean fill and should meet the specifications for OPSS Granular B Type I.

Contaminated Soils/Sediment/Seeps (Sediment Quality)

Chemical testing of soil samples from select boreholes within the study area was conducted during the geotechnical investigation to identify potential soil contamination in accordance with O.Reg 153/04. Select soil samples were analyzed for various Contaminants of Potential Concern (CoPCs) and compared to applicable Site Condition Standard for the study area (O.Reg. 153/04 – Table 1 Res/Park). The results of the analysis indicate that the samples from boreholes on Algonquin Island met the standard for metals, hydride-forming metals, ORPs, PHC, and BTEX. Additional details are provided in the Geotechnical Report in Appendix C. Some excavation may be required during the construction of the shoreline and inland flood berms. Excavated material will need to be disposed of or reused on site if permissible in compliance with Ontario Regulation 406/19 Excess Soil Management.

Geomorphology

The existing shoreline around QCYC and the northwest shoreline is presently hardened. The proposed concept will not change the existing hardened east shoreline at QCYC. The proposed stone buttress along the northwest shoreline will be similar to the existing vertical SSP wall. Therefor, the proposed concept on the northwest shoreline will have similar geomorphologic properties. The shoreline around the southern end of the island is currently unprotected and subject to natural geomorphologic processes. The preferred concept in this area does not change this natural shoreline and will have no impact on the geomorphology in this area.

Agricultural Tile or Surface Drain

The addition of inland flood berms and stone buttresses on Algonquin Island will have no effect on surface drainage besides the impacts detailed in the Existing Surface Drainage/Groundwater Seepage/ Groundwater Recharge/ Discharge Zones section. A formal surface drainage analysis can be conducted in the detailed design phase.

Falls within a Vulnerable Area as Defined by the Clean Water Act

Not applicable for this study area.

3.2 Engineering/Technical Impacts

Rate of Erosion in Ecosystem

Based on review of historic aerial photos and site observations, there appears to be little to no erosion along the northwest and QCYC shorelines of Algonquin Island since these shorelines were hardened many years ago. Construction of the proposed stone buttress, revetment, and flood berm along the northwest shoreline south of Wyandot will provide increased protection against shoreline erosion due to high water levels and wave action.

The south end of Algonquin Island is unprotected, and review of available information suggests some areas of shoreline erosion in this area. The preferred concept does not alter the existing shoreline in this area and therefore will not impact the natural processes or severity/rate of erosion along the southern shoreline.

Sediment Deposition Zones in Ecosystem

There will not be impacts to sedimentation and deposition caused by the proposed concept in the ecosystem.

Flood Risk in Ecosystem

The preferred concept for Algonquin Island will mitigate the flood risk for the residential section of the island, the Algonquin Island Association Clubhouse at the south end and the QCYC. The shoreline and inland flood berms have a crest elevation above the 100-year flood plus wave uprush elevation; this will protect the inner part of the island from flooding due to high lake levels and wave overtopping. However, the southernmost section of the island, which is lakeward (south) of the proposed inland berm, will remain vulnerable to flooding; this area is generally in a natural state and undeveloped. The residual flood depth map during the 100-year event is presented in Figure 3.3.

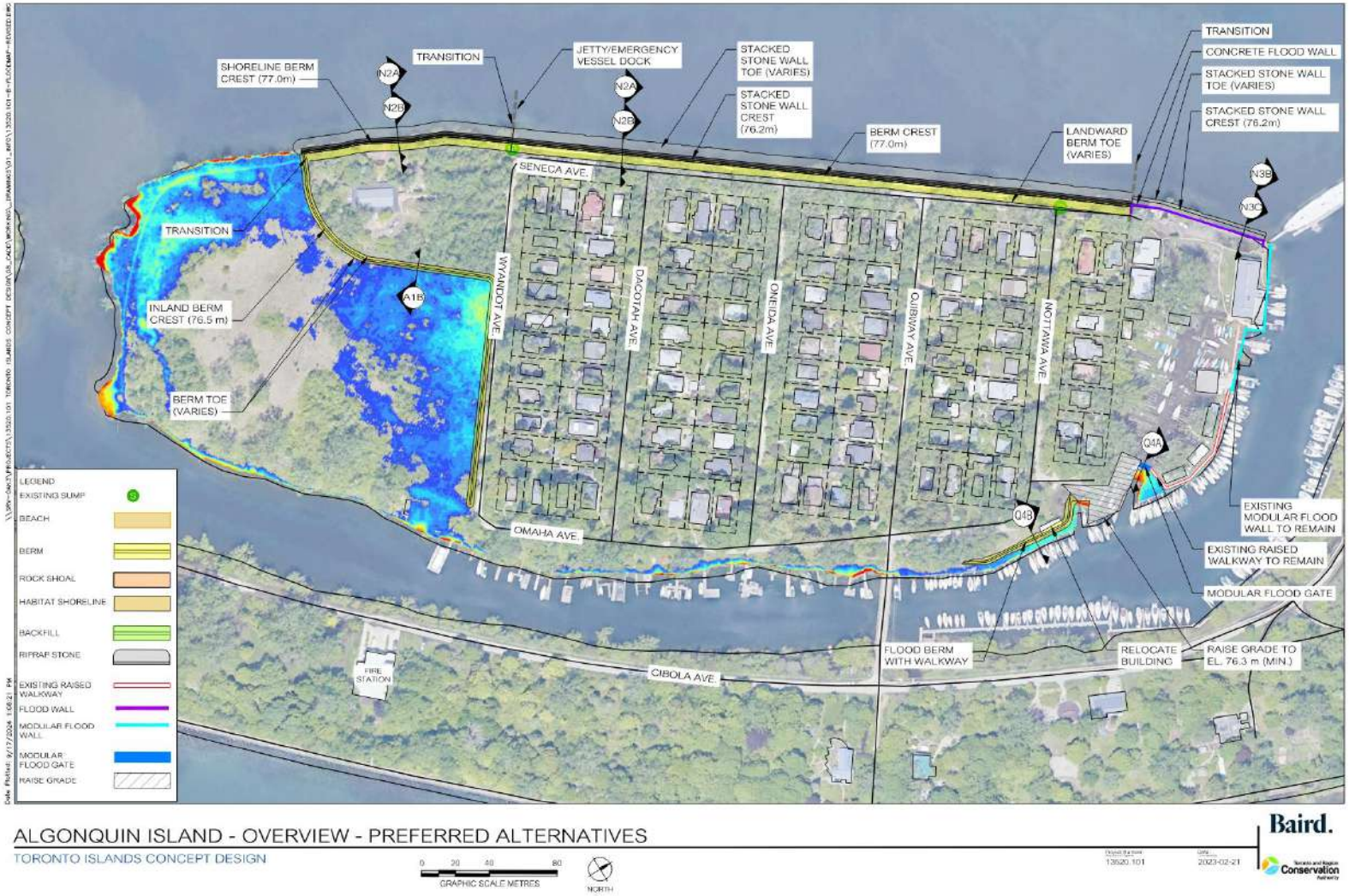


Figure 3.3: Residual flood depth map for the Algonquin Island preferred concept for the 100-year flood event

Slope Stability

A visual inspection across the Algonquin Island study area, completed by Grounded in September 2022, concluded that there were no areas that warranted a slope stability review.

Existing Structures

The addition of fill to raise the grade at the south end of the QCYC may increase loading on the existing SSP shore wall. A detailed inspection and global stability analysis of the existing wall will be required during detailed design to assess the load capacity of the existing wall and its ability to support additional fill. The members of the QCYC have already made modifications to the existing SSP wall around the east side of the club to facilitate temporarily raising the wall in the event of a flood using a modular approach.

The existing SSP wall along the northwest shoreline has been previously assessed by Baird (2020); this assessment concluded that the wall would likely fail due to additional loading if a flood berm was constructed along the top of the wall. The proposed shoreline revetment and stone buttress proposed in front of the existing SSP wall along the northwest shoreline will provide the additional stability required for the existing SSP wall to support the load from the proposed flood berm.

Hazardous Lands

The flood and erosion hazard lands are mitigated in the residential area and at the Clubhouse and QCYC by the preferred shoreline protection concepts. As noted earlier, the southernmost portion of the island remains within the flood and erosion hazard lands and is not suitable for development. There is no dynamic beach hazard on Algonquin Island.

Hazardous Sites

The proposed concepts do not initiate risk of unstable soils or bedrock.

4. Centre Island

The preferred alternative for Centre Island includes raising the west side of the boat storage yard and raising key roadways within the Toronto Island Marina above the 100-year flood elevation, construction of an inland and shoreline flood berm between the marina and the Island BBQ and Beer Co. restaurant (the Restaurant), and construction of a new SSP wall and revetment with an increased crest elevation around the Restaurant shoreline. Moving to the south and east, a new SSP wall with a stepped concrete terrace would extend along the shoreline between the restaurant and the Ferry Dock. Between the Ferry Dock and the west bridge to Olympic Island, a new shoreline flood berm would be supported with a stacked armour stone wall constructed in front of the existing SSP wall. The Centreville shoreline would include a naturalized shoreline and flood berm, as well as road raising on the Duck Island.

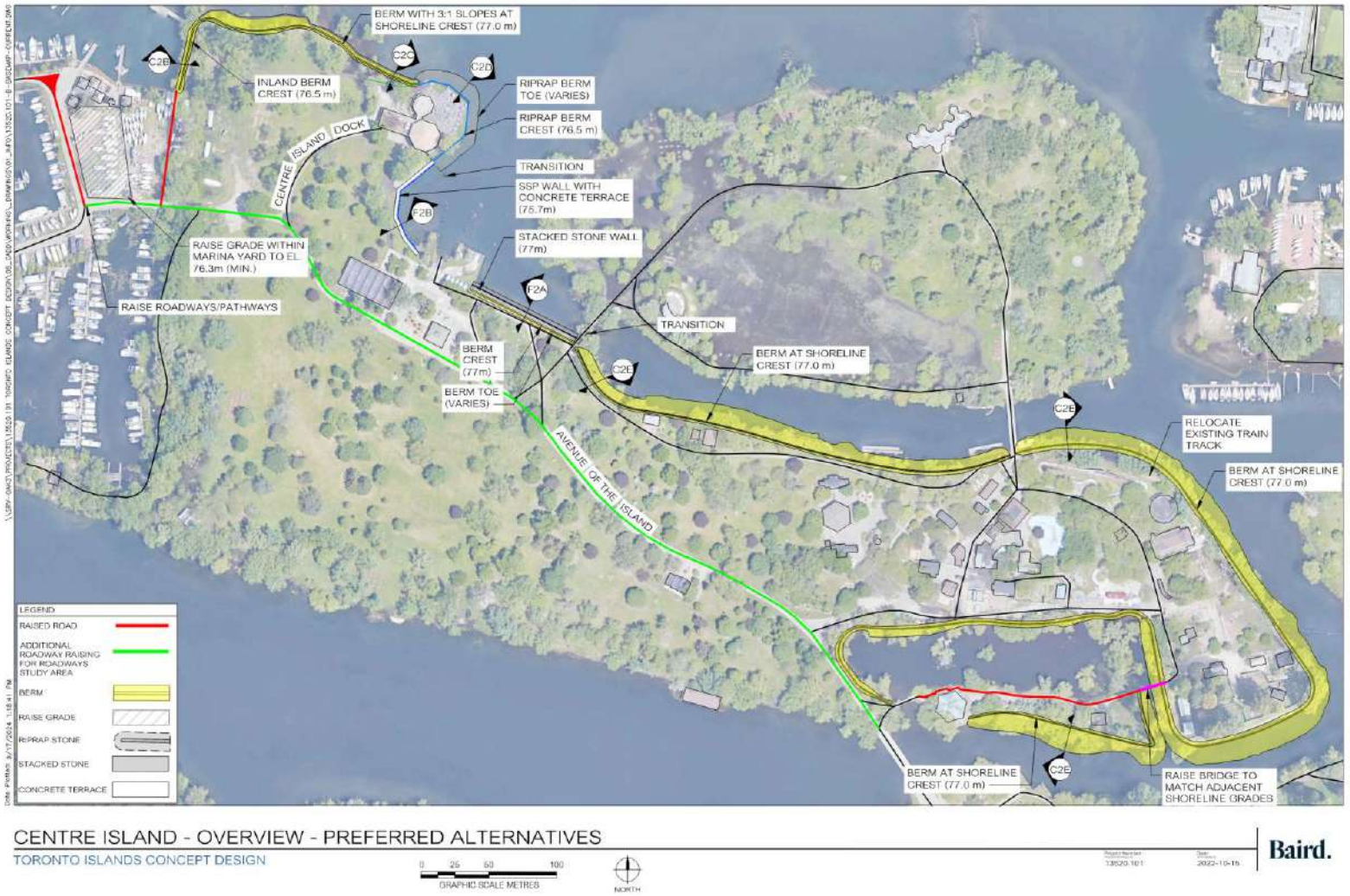


Figure 4.1: Preferred concepts for Centre Island

4.1 Physical Impacts

High/Storm Water Flow Regime

The current patterns along the shoreline of Centre Island between the Toronto Island Marina and the Island BBQ and Beer Co. restaurant is driven by prevailing winds, and may change depending on wind conditions. The preferred concepts in this area and at the Ferry Dock will not impact water flow.

Removing the vertical shore wall around Centreville and naturalizing the shoreline will change the cross-section of the channel. Currents within the channel/along the shoreline may increase or decrease depending on whether cut or fill is required to naturalize the shoreline; this impact should be considered during the design development phase. In addition, higher friction along the shoreline associated with the introduction of vegetation and boulder may slow currents within the channel/along the shoreline. Additional field investigations and numerical modeling are required to determine impacts to channel flow.

Low/Base Water Flow Regime

As discussed, altering the vertical shore wall around Centreville to a naturalized shoreline will change the flow regime within the channel. Additional field investigations and numerical modeling are required to determine impacts to channel flow at high and low flow conditions during detailed design development.

Existing Surface Drainage/Groundwater Seepage/Groundwater Recharge/Discharge Zones

Surface water on Centre Island drains towards the lake and toward Duck Pond at Centreville. Construction of a shoreline flood berm around the perimeter of Centreville and the park land between the Toronto Island Marina and the Restaurant, and the new concrete and SSP shore walls at the Ferry Terminal and around the Restaurant will increase the crest elevation of the shoreline and impede surface drainage to the lake. Sump pumps will be required to drain surface water due to precipitation, snow melt and periods of high lake/groundwater levels.

Littoral Drift/Other Coastal Processes

The proposed improvements along the shorelines of Centre Island are not expected to result in any significant impacts on coastal processes due the sheltered nature of these shorelines and the absence of significant littoral drift within the inner harbour. There may be a small increase in flow velocities in the channel between Duck Island/Centreville and Toronto Island Park due to the reduced cross-section area of the channel caused by the construction of the stacked stone wall near the ferry terminal and the naturalized shoreline further to the east. However, given the very low flows that pass through the channel (due to the lack of a significant driving force), we do not expect this impact to be significant.

Water Quality

Grounded completed groundwater testing as part of the geotechnical investigation in September 2022. The results for the groundwater samples tested at Centre Island showed exceedances in Sulphide, Total Phosphorous, Total Sulphide, Total Cobalt and Total Iron, in accordance with the Provincial Water Quality Objectives. Detailed results of the groundwater testing program are provided in Appendix C. The proposed concepts for Centre Island are not expected to impact the existing groundwater quality.

Water quality in the nearshore area will be negatively impacted during construction, with in-water construction works likely to result in increased turbidity. These impacts will be temporary; regardless, suitable mitigation

measures during construction, such as deployment of silt curtains, limiting in-water works during windy/wavey conditions and in accordance with seasonal restrictions will be employed, as required and regulated by the regulatory agencies (Department of Fisheries and Oceans Canada (DFO), Ministry of Natural Resources (MNR), and TRCA). Use of heavy machinery in and around the water during construction also presents a risk of environmental contamination. Safe fueling practices and cleaning of machinery/materials will also be required to mitigate risk.

There is also a risk of increased suspended sediment in the water column from the naturalized shoreline before vegetation has established; more specifically, although currents and waves within the channels are expected to be low, some disturbance of recently placed (loose) sediments may be caused by boat traffic, with greater disturbance expected from motorized boats. To mitigate these impacts, boat access to these channels could be temporarily restricted following construction for a period of time. Further investigation during the detailed design development phase is required, including specific consideration of sediment characteristics and channel hydrodynamics.

There are no expected long-term impacts on the nearshore water quality around the rest of the Toronto Island Marina shoreline or the Ferry Terminal.

Soil/Fill Quality

Based on the soil testing results completed by Grounded (Grounded, 2022), the soil tested on Centre Island was non-hazardous. Compacted fill to be used to construct the proposed shoreline flood berms and to raise the grade at Toronto Island Marina will be clean fill and should meet the specifications for OPSS Granular B Type I.

Contaminated Soils/Sediment/Seeps (Sediment Quality)

Chemical testing of soil samples from select boreholes within the study area was conducted during the geotechnical investigation to identify potential soil contamination in accordance with O.Reg 153/04. Select soil samples were analyzed for various Contaminants of Potential Concern (CoPCs) and compared to applicable Site Condition Standard for the study area (O.Reg. 153/04 – Table 1 Res/Park). The results of the analysis indicate that the samples from boreholes on Centre Island met the standard for metals, hydride-forming metals, ORPs, PHC and BTEX. Additional details are provided in the Geotechnical Report in Appendix C. Some excavation may be required during the construction of the shoreline and inland flood berms. Excavated material will need to be disposed of or reused on site if permissible in compliance with Ontario Regulation 406/19 Excess Soil Management.

Geomorphology

The shoreline around the Centre Island study area is presently hardened with various structures, including SSP walls, timber walls, and concrete slab protection. Construction of the proposed concepts will not alter the shape of the island; however, naturalizing the shoreline around Centreville will result in a more natural geomorphology in this area.

Agricultural Tile or Surface Drains

There are no adverse drain service impacts other than drainage concerns mentioned in the Existing Surface Drainage/Groundwater Seepage/Groundwater Recharge/Discharge Zones section. Additional surface drainage modelling can be done in the detailed design phase in order to address this.

Falls within a Vulnerable Act as Defined by the Clean Waters Act

This is not applicable for this study area.

4.2 Engineering/Technical Impacts

Rate of Erosion in Ecosystem

Existing areas of erosion have been identified along the shoreline at Centreville, most notably between the bridges connecting to Olympic Island, as shown in Figure 4.2. Construction of a naturalized shoreline and use of boulders/rock shoals in this area will provide shoreline protection and reduce the erosion.

Erosion was also observed along the shoreline running north from the Toronto Island Marina toward the northern side of Centre Island. The concept in this area includes an inland flood berm set back from the shoreline, therefore the rate of erosion in this area will not change.



Figure 4.2: Erosion along the Centreville shoreline.

Sediment Deposition Zones in Ecosystem

There is very little sediment transport within the Inner Harbour and no prominent sediment deposition zones were identified in the Centre Island study area. Changes to flows within the channels around Centreville associated with the preferred shoreline concept may have a localized impact on sediment transport patterns, however any impacts are expected to be minimal given the lack of sediment supply.

Flood Risk in Ecosystem

The preferred concept for Centre Island will mitigate the flood risk for Centreville, the Ferry Dock area, the park land to the west of the Ferry Dock and the main boat storage area at Toronto Island Marina. The proposed shoreline and inland flood berms have a crest elevation above the 100-year flood plus wave uprush elevation and as such will protect the inner part of the island from flooding due to high lake levels and wave overtopping. The raised land and roadways within the central area at Toronto Island Marina will allow the club to remain operational during the 100-year flood event by maintaining access to the central buildings, boat storage yard and fuel dock. The residual flood depth map during the 100-year event is presented in Figure 4.3.

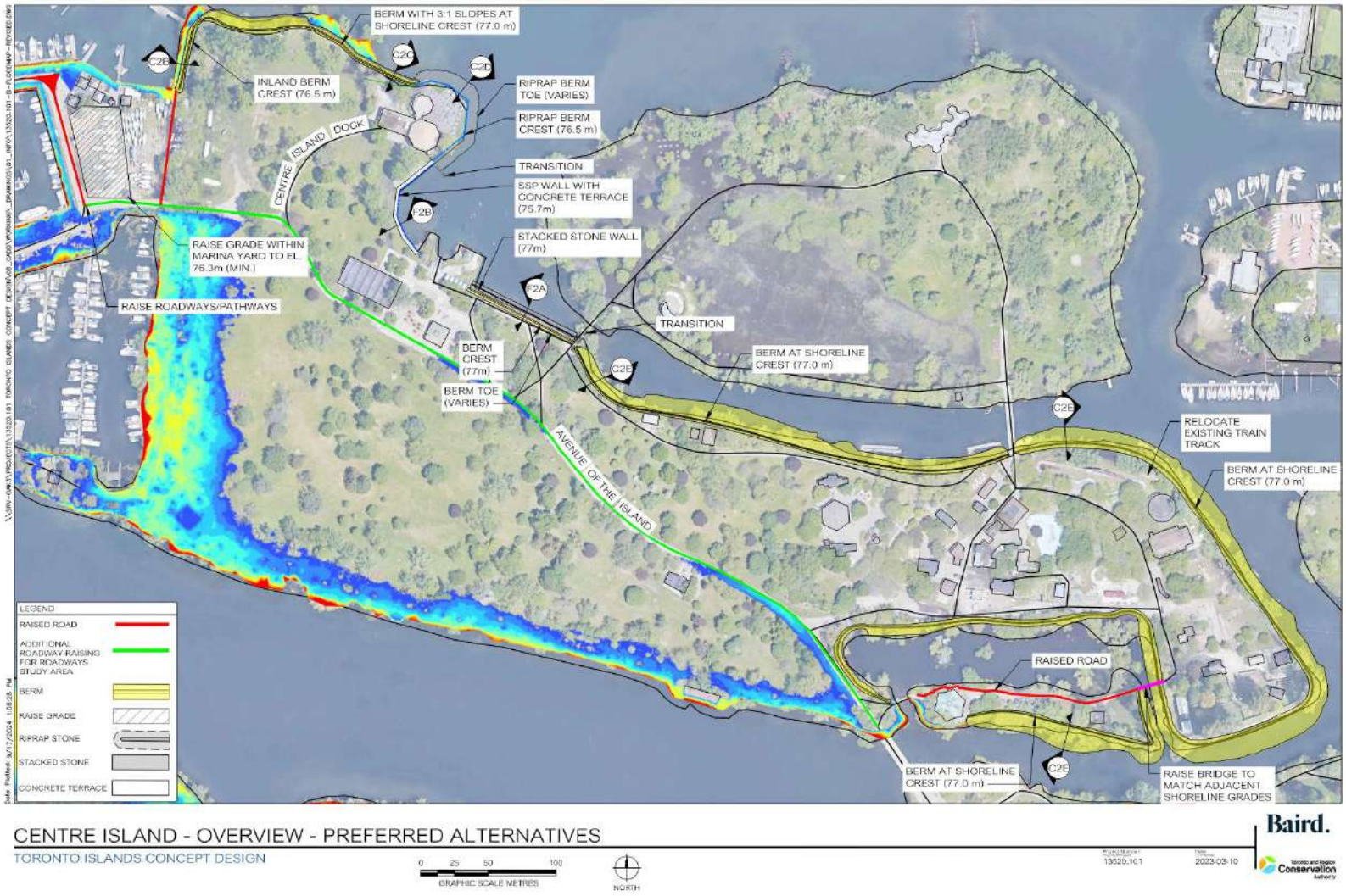


Figure 4.3: Residual flood depth map for the Centre Island preferred concept for the 100-year flood event

Slope Stability

A visual inspection across the Centre Island study area, completed by Grounded, concluded that there were no areas that warranted a slope stability review.

Existing Structures

The existing structures around the Toronto Island Marina shoreline will not be impacted by the preferred concept. The existing shore protection along the shoreline between the Toronto Island Marina and the Island BBQ and Beer Co. restaurant includes stacked concrete bags which will be removed and replaced with the shoreline flood berm and a naturalized shoreline.

The existing SSP wall at the Centre Island Ferry and Restaurant will remain in place, with the proposed shoreline improvements be constructed in front of the existing wall. A detailed assessment of the existing SSP wall will be required to support detailed design. For the purposes of this study, it has been assumed that the existing wall cannot support the additional loading associated with the proposed flood berm; the stacked stone wall and new SSP wall and fill are included in the concept design to provide the required support.

The existing shoreline around Centreville includes a mix of concrete bag protection, SSP walls, and a timber wall. These structures will be removed in order to construct the naturalized shoreline.

Hazardous Lands

The flood and erosion hazard lands are mitigated in Centreville, the Ferry Dock area, park land west of the Ferry Dock by the preferred concept. The shoreline/dock walls around Toronto Island Marina remain within the flood and erosion hazard. There is no dynamic beach hazard on Centre Island.

Hazardous Sites

Similar to the Hazardous Lands criteria, there are no hazardous soils or unstable bedrock associated with this concept.

5. Roadways

The preferred alternative for the Roadways Study area includes raising approximately 6.5 km of roadway throughout the Toronto Islands Park. The selected roadways will be raised above the 100-year flood level to an elevation of 76.25 m to maintain access along the roadways during the 100-year flood event. The preferred concept for roadway raising incorporates an impermeable shoulder by capping the side slopes of the roadway fill with low permeability clay. This concept was previously implemented on the Island Park in the 2020 emergency road raising works. The proposed extent of road raising is presented in Figure 5.1.

In addition to road raising, shore protection may be required on a section of roadway along Lakeshore Ave. (PP-8 and PP-9) just south of the service road by the Water Treatment Plant. A stone revetment is recommended at this location, with the revetment designed to resist extreme storm waves during periods of high lake levels and also to accommodate erosion/scour of the lakebed fronting the structure. There is an existing beach along the shoreline at PP-8; however, the beach would be fully submerged during the 100-year flood event. It is recommended that the revetment design along PP-9 include a partially buried beach curb to protect against wave action during the 100-year flood event and prevent erosion/piping of roadway fill materials and damage to the roadway surface by overland flows associated with wave overtopping.



Figure 5.1: Roadways to be raised within the Roadways Study Area

5.1 Physical Impacts

High/Storm Water Flow Regime

Road raising will not impact the high/storm water flow regime around the Toronto Islands. The shoreline protection will not impact the water flow regime in this study area.

Low/Base Water Flow Regime

Road raising will not impact the low/base water flow regime around the Toronto Islands. The shoreline protection will not impact the water flow regime in this study area.

Existing Surface Drainage/Groundwater Seepage/Groundwater Recharge/Discharge Zones

Precipitation/surface water will run off either side of the raised roadways to the adjacent land areas. In many areas, the adjacent land is vegetated, and/or the land slopes toward the lake. As the shoulder of the raised roadways forms a low permeability barrier, the raised roadways will act as a flood berm and will not allow water to flow across/under the roadway. In these cases, surface water may be trapped on the landward side of the roadways and prevented from draining into the lake. In order to mitigate this issue, improvements to the drainage system will likely be required, potentially including additional sump pumps to drain flooded areas during periods of high precipitation and/or when the groundwater is high due to high lake levels. There are some existing sump pumps; however, a detailed surface water drainage study will be required during the detailed design phase to support the design of an improved drainage system. Shoreline protection will not impact surface water drainage and ground water seepage and recharge in this study area.

Littoral Drift/Other Coastal Processes

Given the inland location of the proposed roadway improvement works, these works will not have any impact on coastal processes. Due to the high exposure, the shoreline protection will not adversely impact wave action on Lakeshore Ave. besides providing protection from overtopping, flooding, and erosion.

Water Quality

Road raising is not expected to impact groundwater or nearshore water quality. The small section of shoreline work will not impact water quality in this study area.

Soil/Fill Quality

Based on the soil testing results completed by Grounded (Grounded, 2022), the soil tested throughout the roadways study area was non-hazardous.

Contaminated Soils/Sediment/Seeps (Sediment Quality)

Chemical testing of soil samples from select boreholes within the study area was conducted during the geotechnical investigation to identify potential soil contamination in accordance with O.Reg 153/04. Select soil samples were analyzed for various Contaminants of Potential Concern (CoPCs) and compared to applicable Site Condition Standard for the study area (O.Reg. 153/04 – Table 1 Res/Park). The results of the analysis indicate that, overall, borehole samples along the roadways study area met the standard for metals, hydride-forming metals, and BTEX. PHC levels were exceeded in samples from boreholes BH101, BH110 and BH111, and SAR levels were exceeded in BH101. Additional details are provided in the Geotechnical Report in

Appendix C. In general, contaminated soils cannot be reused on site and correlate to a higher price for disposal. Excavated material will need to be tested and disposed of in accordance with applicable regulations. Further sediment testing will be required for detailed design.

Geomorphology

Road raising will not impact the geomorphology of the Toronto Islands.

Falls within a Vulnerable Area as defined by the Clean Water Act

Work within the Roadways study area, including the shoreline protection area, is not anticipated to affect the surface water intake protection zones or the highly vulnerable aquifer area. Construction will be carried out with as little disturbance possible to the lakebed.

Agricultural Tile or Surface Drains

There are no adverse drain service impacts other than drainage concerns mentioned in the Existing Surface Drainage/Groundwater Seepage/Groundwater Recharge/Discharge Zones section. Additional surface drainage modelling can be done in the detailed design phase in order to address this.

5.2 Engineering/Technical Impacts

Rate of Erosion in Ecosystem

Road raising will not impact shoreline erosion. The small section of shoreline work will protect Lakeshore Ave. against erosion but will be designed such that it does not cause erosion to the surrounding ecosystem.

Sediment Deposition Zones in Ecosystem

Road raising will not impact sediment deposition. The small section of shoreline revetement will be designed to stay in place during storm events, in turn not causing sediment deposition in the surrounding ecosystem.

Flood Risk in Ecosystem

Road raising of select roads above the 100-year flood elevation will facilitate access along the roadways during the 100-year design flood event. The impermeable shoulder also acts as a flood berm, with this function being incorporated into the Ward's Island and Centre Island preferred concepts to provide flood protection for key areas on these two islands. The shoreline revetment along Lakeshore Ave. will reduce the risk of flooding during extreme events.

Slope Stability

A visual inspection across the Roadway study area, completed by Grounded, concluded that there were no areas that warranted a slope stability review.

Existing Structures

The existing pavement where road raising is proposed would be broken up and removed or used in the subgrade for the proposed roadway improvements.

Existing road-adjacent infrastructure may need to be modified as part of the proposed roadway improvements. Existing utilities, structures or pavements adjacent to the roadways may be sensitive to settlement. This should

be examined during the detailed design phase. There were no stormwater sewers observed within the study area. Raising road elevations may negatively impact lateral pedestrian flow across roadways to adjacent land due to grade change; this will also be an important consideration during the detailed design phase.

Hazardous Lands

The roads included in the roadways study area are located within the flood hazard. The preferred design incorporates an impermeable barrier within the cross-section to prevent flood waters from passing through/under the roadway; thus, the raised roadways will function as a flood berm while also allowing safe pedestrian and vehicular access during a 100-year flood event. The roadway improvement concepts also incorporate features to prevent internal erosion by piping.

The section of roadway along Lakeshore Ave. (PP-8 and PP-9, indicated in Figure 5.2), just south of the service road near the Water Treatment Plant, runs very close to the shoreline. Shore protection along this stretch of shoreline is proposed to mitigate wave run-up and overtopping during the 100-year flood event, and also to mitigate the risk of erosion along this section of shoreline, which is fully exposed to Lake Ontario.

Hazardous Sites

The proposed concepts will not cause unstable soils or bedrock.



Figure 5.2: Shoreline revetment concept, in plan, along PP-8 and PP-9

References

Grounded Engineering Inc., 2022. Geotechnical Investigation Report: The Toronto Islands Park Flood and Erosion Mitigation Project Environmental Assessment. File Number 21-090. Toronto, ON.

Appendix A

Preferred Concepts



Date Plotted: 9/23/2024 11:27:15 AM

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-BASEMAP-CURRENT.DWG

WARD'S ISLAND - CONCEPT 3C: VEGETATED BERM, BEACH AND GROYNE

TORONTO ISLANDS CONCEPT DESIGN

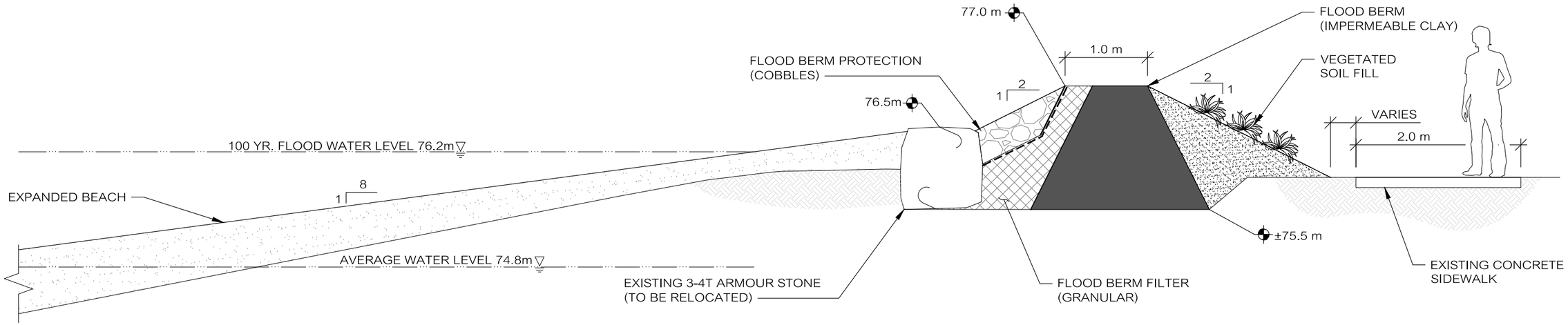
0 12.5 25 50
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.



W3A SECTION - BERM AND EXISTING ARMOUR STONE WITH BEACH

Date Plotted: 9/23/2024 11:27:40 AM
\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG

TYPICAL SECTIONS - WARD'S ISLAND

TORONTO ISLANDS CONCEPT DESIGN

0 0.5 1 2
GRAPHIC SCALE METRES

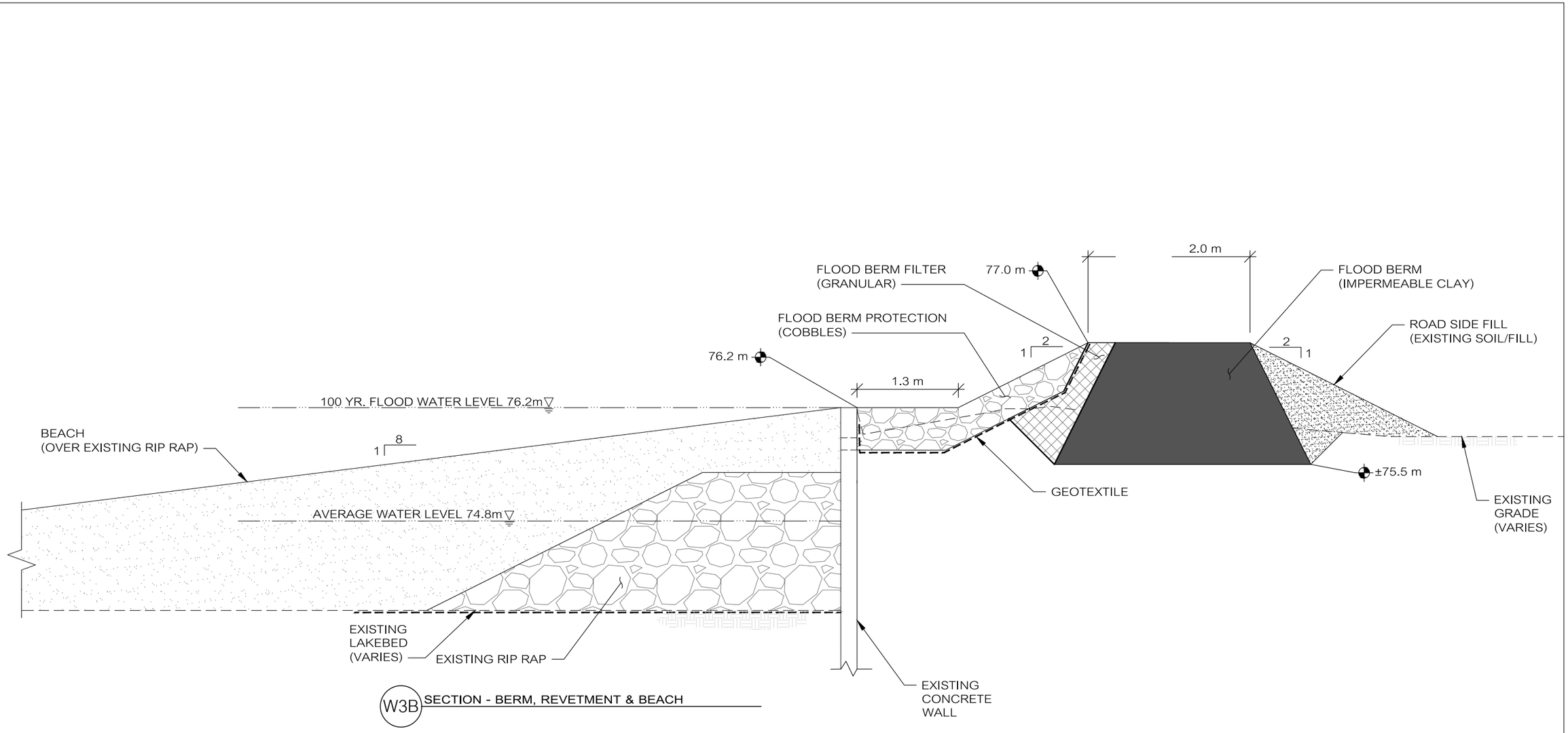
Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG
Date Plotted: 9/23/2024 11:27:57 AM



W3B SECTION - BERM, REVETMENT & BEACH

TYPICAL SECTIONS - WARD'S ISLAND

TORONTO ISLANDS CONCEPT DESIGN

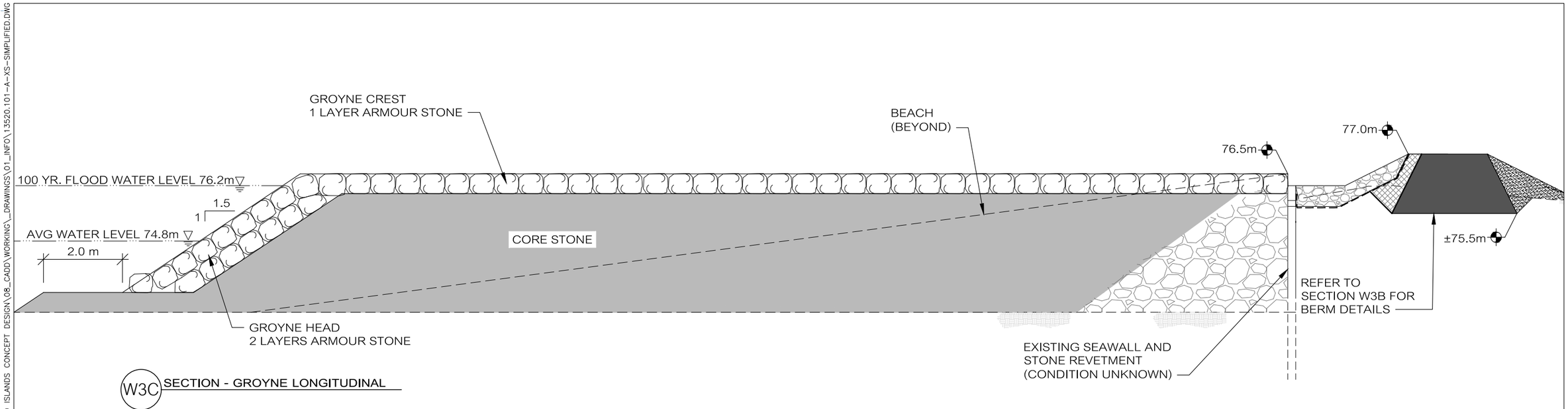
0 .5 1 2
GRAPHIC SCALE METRES

Project Number: 13520.101

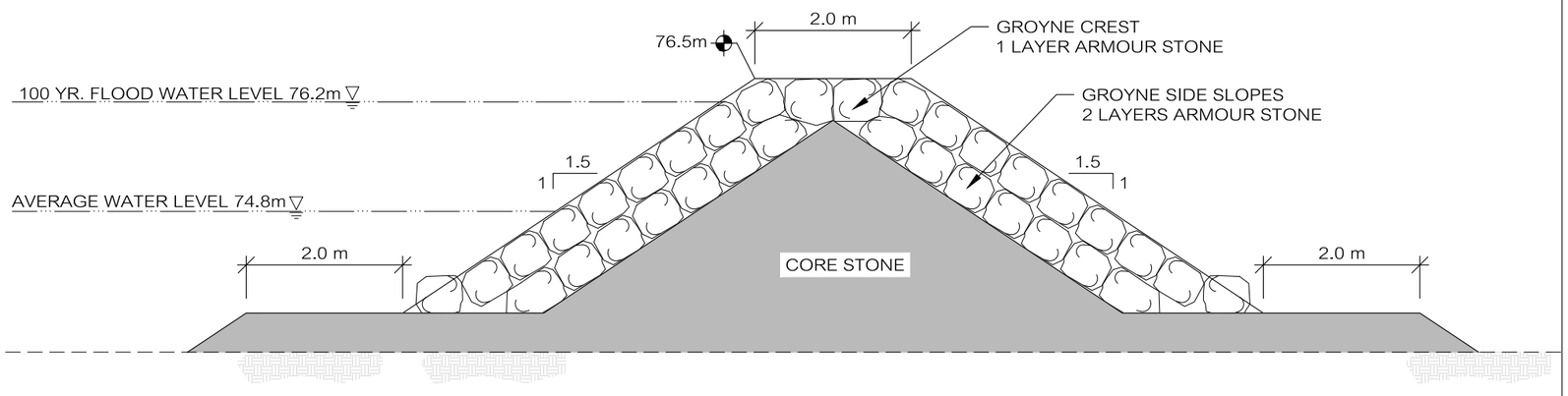
Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



W3C SECTION - GROYNE LONGITUDINAL



W3D SECTION - GROYNE CROSS SECTION

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG

Date Plotted: 9/23/2024 11:28:13 AM

TYPICAL SECTIONS - WARD'S ISLAND

TORONTO ISLANDS CONCEPT DESIGN

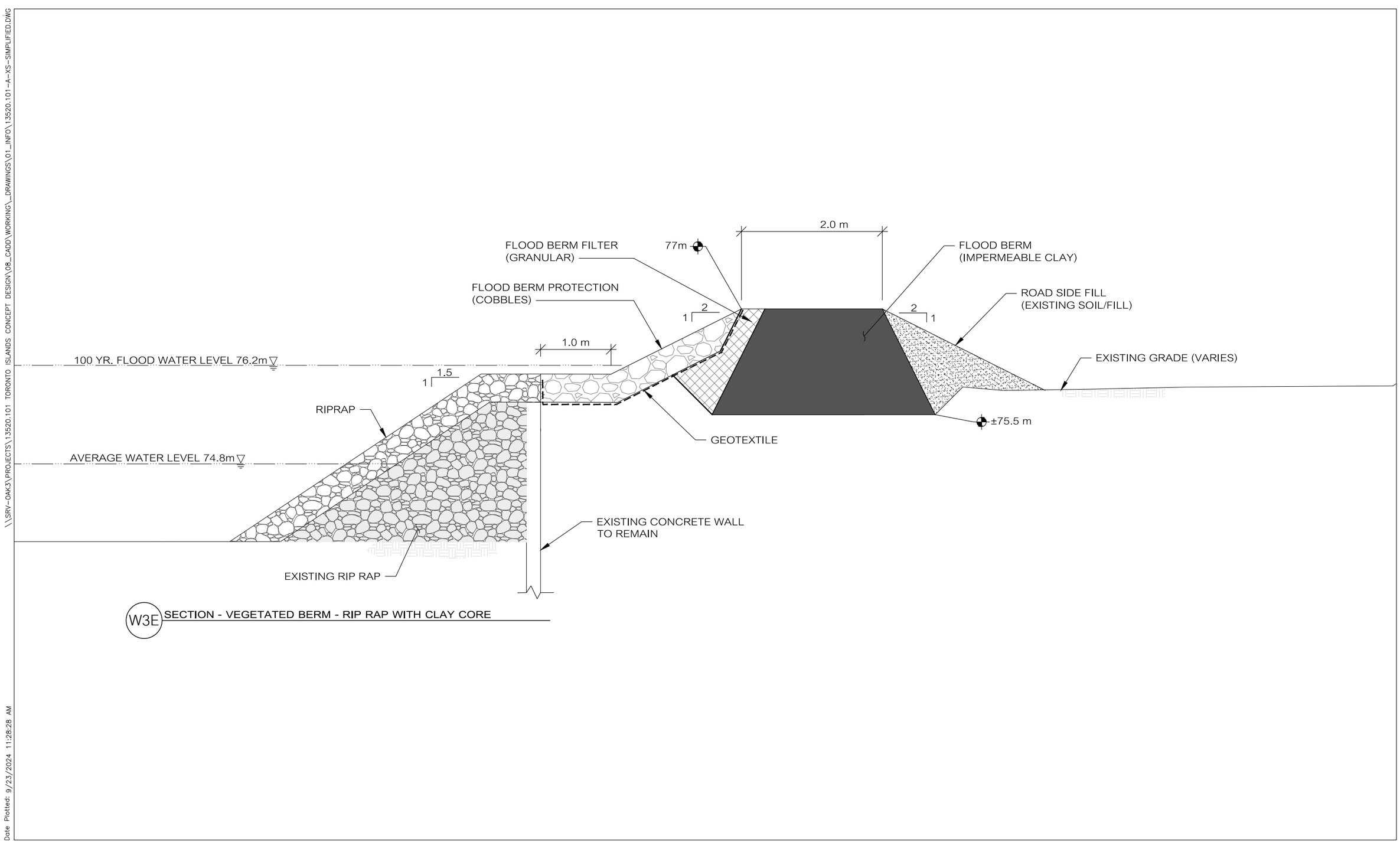
0 1 2 4
GRAPHIC SCALE METRES

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



W3E SECTION - VEGETATED BERM - RIP RAP WITH CLAY CORE

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG

Date Plotted: 9/23/2024 11:28:28 AM

TYPICAL SECTIONS - WARD'S ISLAND

TORONTO ISLANDS CONCEPT DESIGN

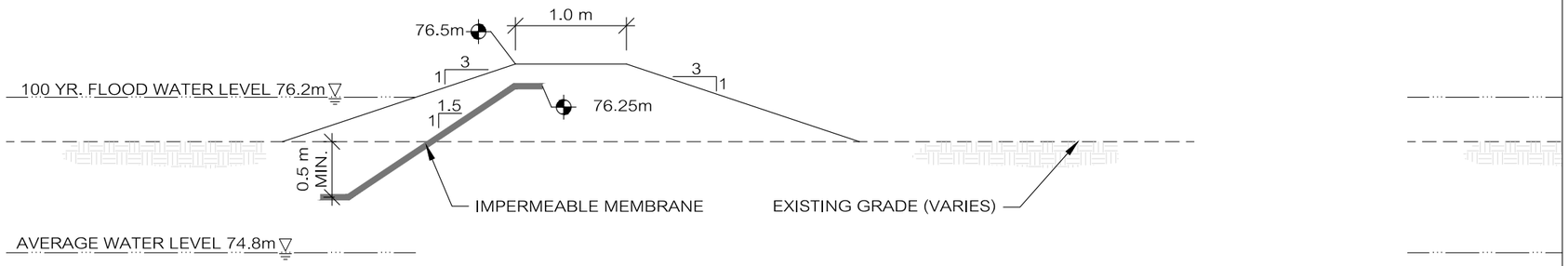
0 .5 1 2
GRAPHIC SCALE METRES

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



W3F SECTION - BERM WITH 3:1 SLOPES

Date Plotted: 9/23/2024 11:28:46 AM
\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG

TYPICAL SECTIONS - WARD'S ISLAND

TORONTO ISLANDS CONCEPT DESIGN

0 0.5 1 2
GRAPHIC SCALE METRES

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-BASEMAP-CURRENT.DWG

Date Plotted: 9/23/2024 11:30:00 AM

ALGONQUIN ISLAND - OVERVIEW - PREFERRED ALTERNATIVES

TORONTO ISLANDS CONCEPT DESIGN

0 20 40 80

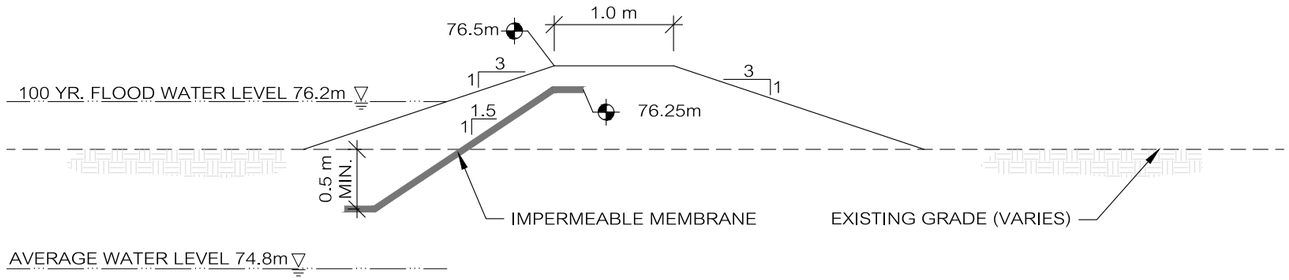
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2023-02-21

Baird.



A1B SECTION - BERM WITH 3:1 SLOPES

TYPICAL SECTIONS - ALGONQUIN ISLAND

TORONTO ISLANDS CONCEPT DESIGN

0 0.5 1 2
GRAPHIC SCALE METRES

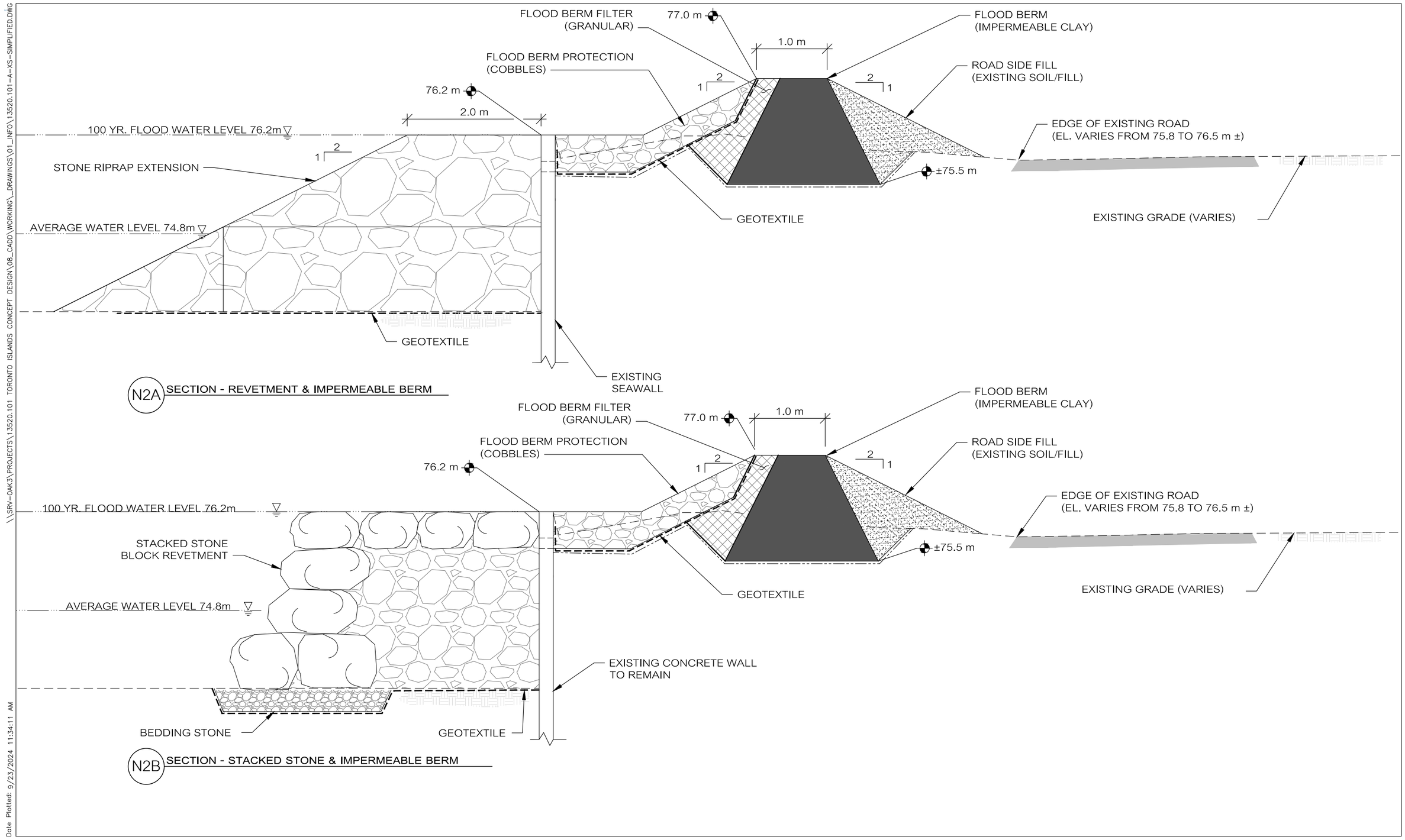
Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority

Date Plotted: 9/23/2024 11:33:24 AM
\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG



\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG

Date Plotted: 9/23/2024 11:34:11 AM

TYPICAL SECTIONS - ALGONQUIN ISLAND

TORONTO ISLANDS CONCEPT DESIGN

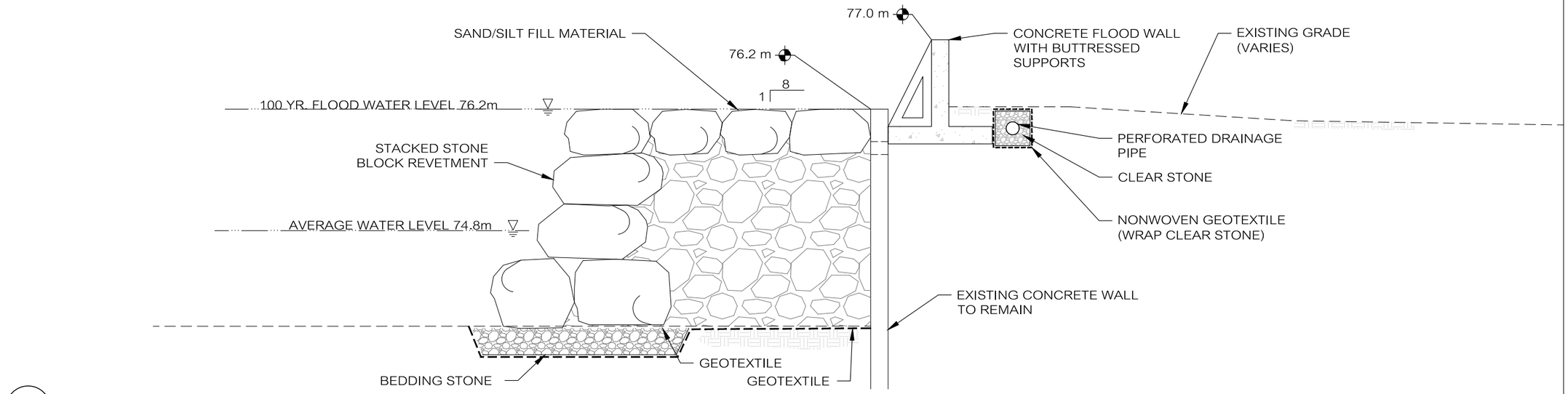
0 0.5 1 2
GRAPHIC SCALE METRES

Project Number: 13520.101

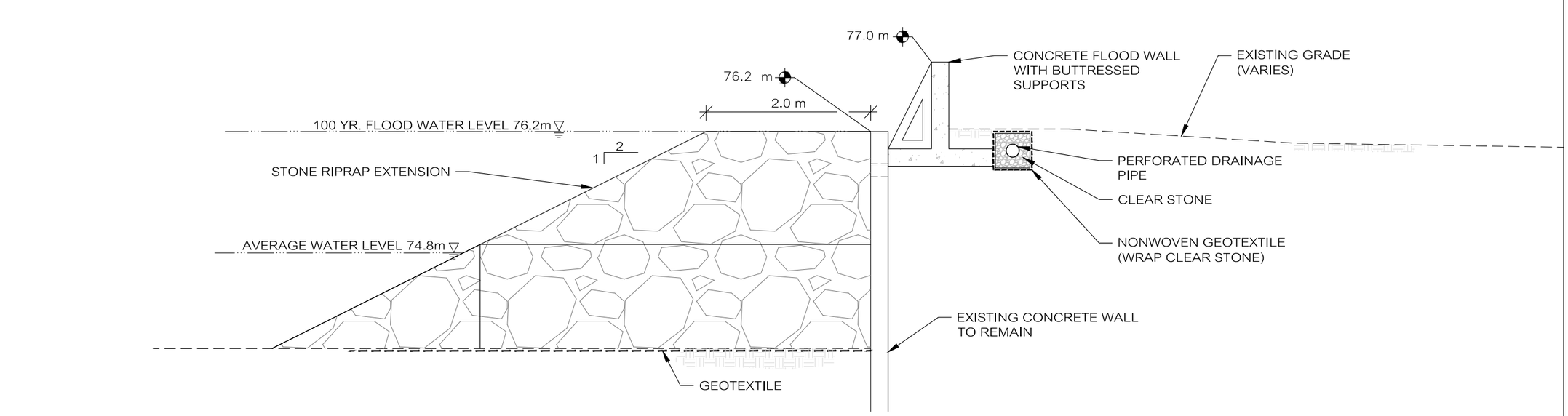
Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



N3B SECTION - BUTTRESSED FLOOD WALL WITH STACKED STONE



N3C SECTION - BUTTRESSED FLOOD WALL WITH ARMOUR STONE REVETMENT

TYPICAL SECTIONS - ALGONQUIN ISLAND

TORONTO ISLANDS CONCEPT DESIGN

0 0.5 1 2
GRAPHIC SCALE METRES

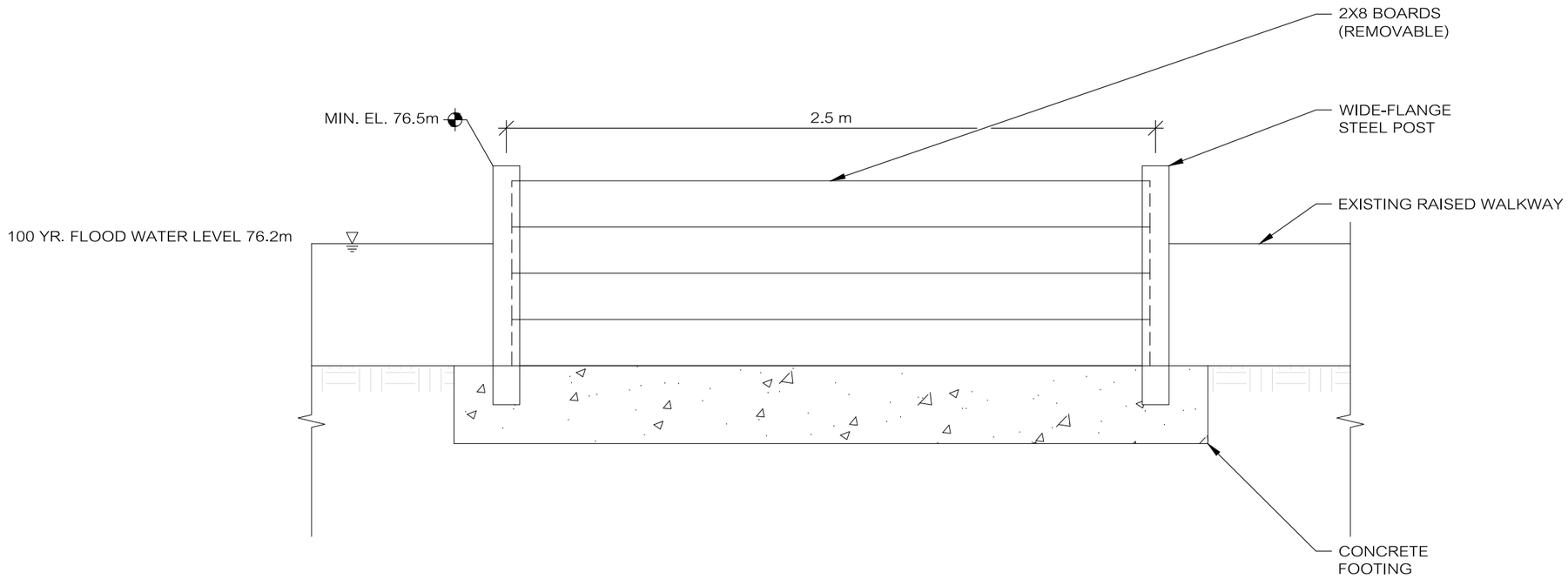
Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG
Date Plotted: 9/23/2024 11:35:11 AM



Q4A SECTION - MODULAR FLOOD GATE

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG
Date Plotted: 9/23/2024 11:36:11 AM

TYPICAL SECTIONS - ALGONQUIN ISLAND QCYC

TORONTO ISLANDS CONCEPT DESIGN

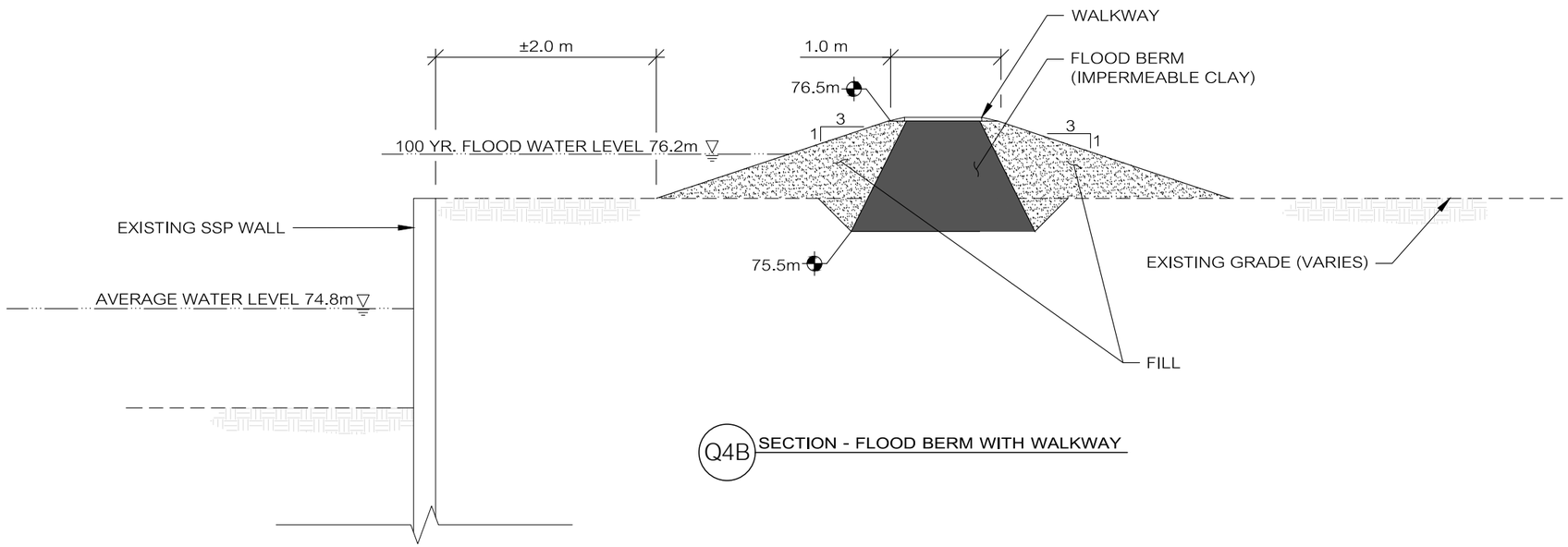
0 0.25 0.5 1
GRAPHIC SCALE METRES

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



Q4B SECTION - FLOOD BERM WITH WALKWAY

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG
Date Plotted: 9/23/2024 11:36:57 AM

TYPICAL SECTIONS - ALGONQUIN ISLAND

TORONTO ISLANDS CONCEPT DESIGN

0 0.5 1 2
GRAPHIC SCALE METRES

Project Number: 13520.101

Date: 2023-02-21

Baird.

Toronto and Region Conservation Authority

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-B-BASEMAP-CURRENT.DWG
Date Plotted: 9/23/2024 11:38:05 AM

BERM WITH 3:1 SLOPES AT SHORELINE CREST (77.0 m)

C2B

C2C

C2D

INLAND BERM CREST (76.5 m)

RIPRAP BERM TOE (VARIES)

RIPRAP BERM CREST (76.5 m)

CENTRE ISLAND DOCK

TRANSITION

SSP WALL WITH CONCRETE TERRACE (75.7m)

F2B

STACKED STONE WALL (77m)

RAISE GRADE WITHIN MARINA YARD TO EL. 76.3m (MIN.)

F2A

RAISE ROADWAYS/PATHWAYS

TRANSITION

BERM CREST (77m)

BERM TOE (VARIES)

C2E

BERM AT SHORELINE CREST (77.0 m)

AVENUE OF THE ISLAND

C2E

RELOCATE EXISTING TRAIN TRACK

BERM AT SHORELINE CREST (77.0 m)

BERM AT SHORELINE CREST (77.0 m)

C2E

RAISE BRIDGE TO MATCH ADJACENT SHORELINE GRADES

LEGEND

- RAISED ROAD
- ADDITIONAL ROADWAY RAISING FOR ROADWAYS STUDY AREA
- BERM
- RAISE GRADE
- RIPRAP STONE
- STACKED STONE
- CONCRETE TERRACE

CENTRE ISLAND - OVERVIEW - PREFERRED ALTERNATIVES

TORONTO ISLANDS CONCEPT DESIGN

0 25 50 100

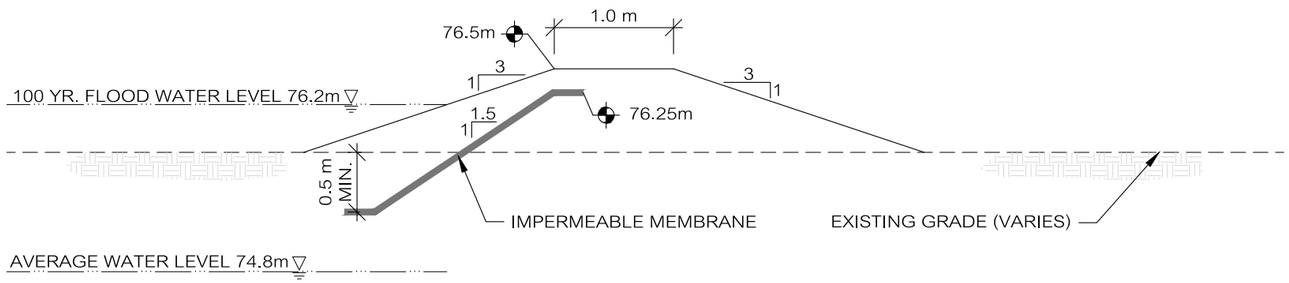
GRAPHIC SCALE METRES

NORTH

Project Number: 13520.101

Date: 2022-10-15

Baird.



C2B SECTION - BERM WITH 3:1 SLOPES

Date Plotted: 9/23/2024 11:38:45 AM
\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG

TYPICAL SECTIONS - CENTRE ISLAND

TORONTO ISLANDS CONCEPT DESIGN

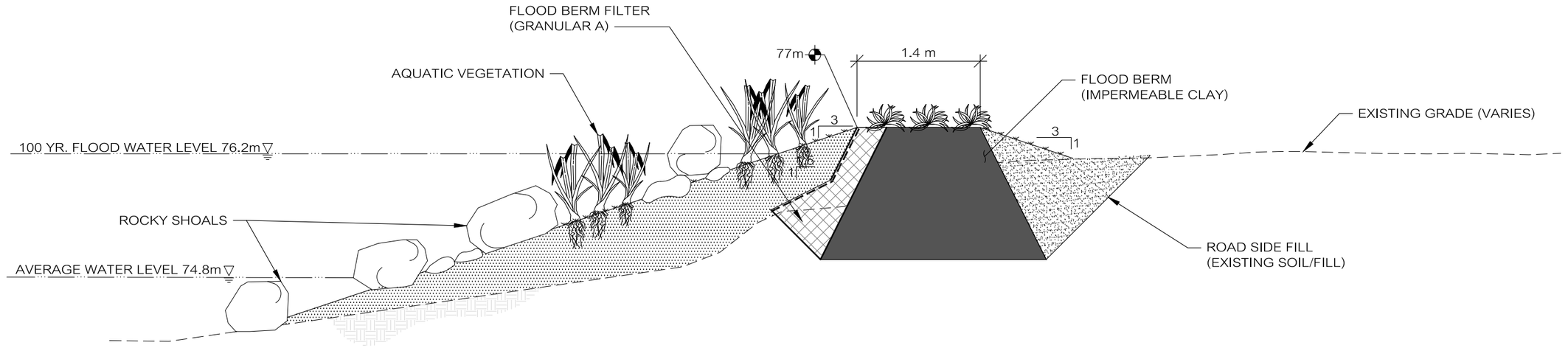
0 0.5 1 2
GRAPHIC SCALE METRES

Project Number: 13520.101

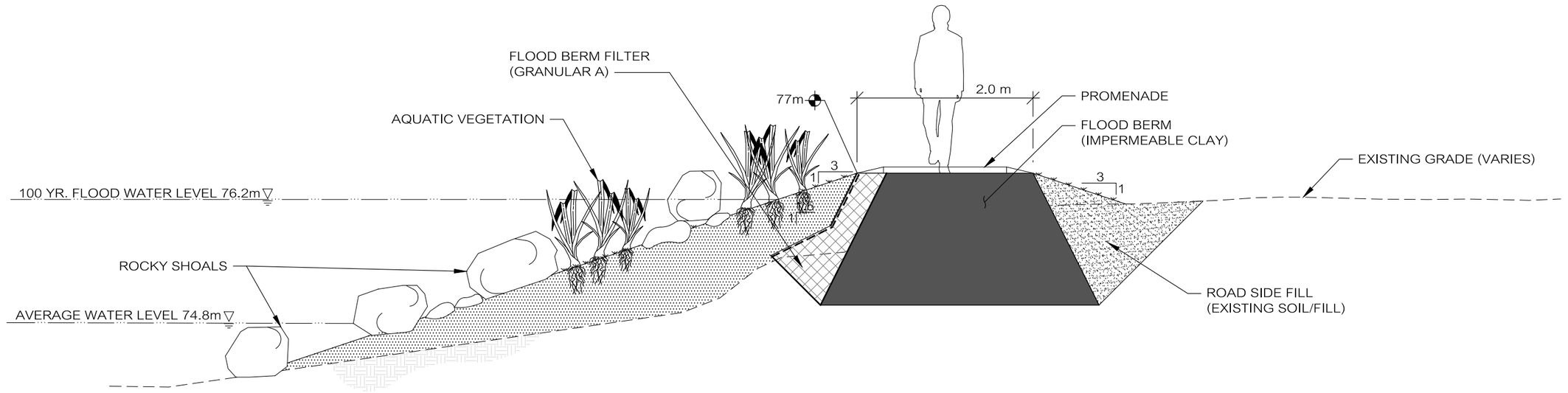
Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



C2C SECTION - VEGETATED BERM WITH 3:1 SLOPES AT SHORELINE



C2C2 SECTION - BERM 3:1 SLOPES AT SHORELINE AND PROMENADE

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG

Date Plotted: 9/23/2024 11:44:33 AM

TYPICAL SECTIONS - CENTRE ISLAND

TORONTO ISLANDS CONCEPT DESIGN

0 .5 1 2
GRAPHIC SCALE METRES

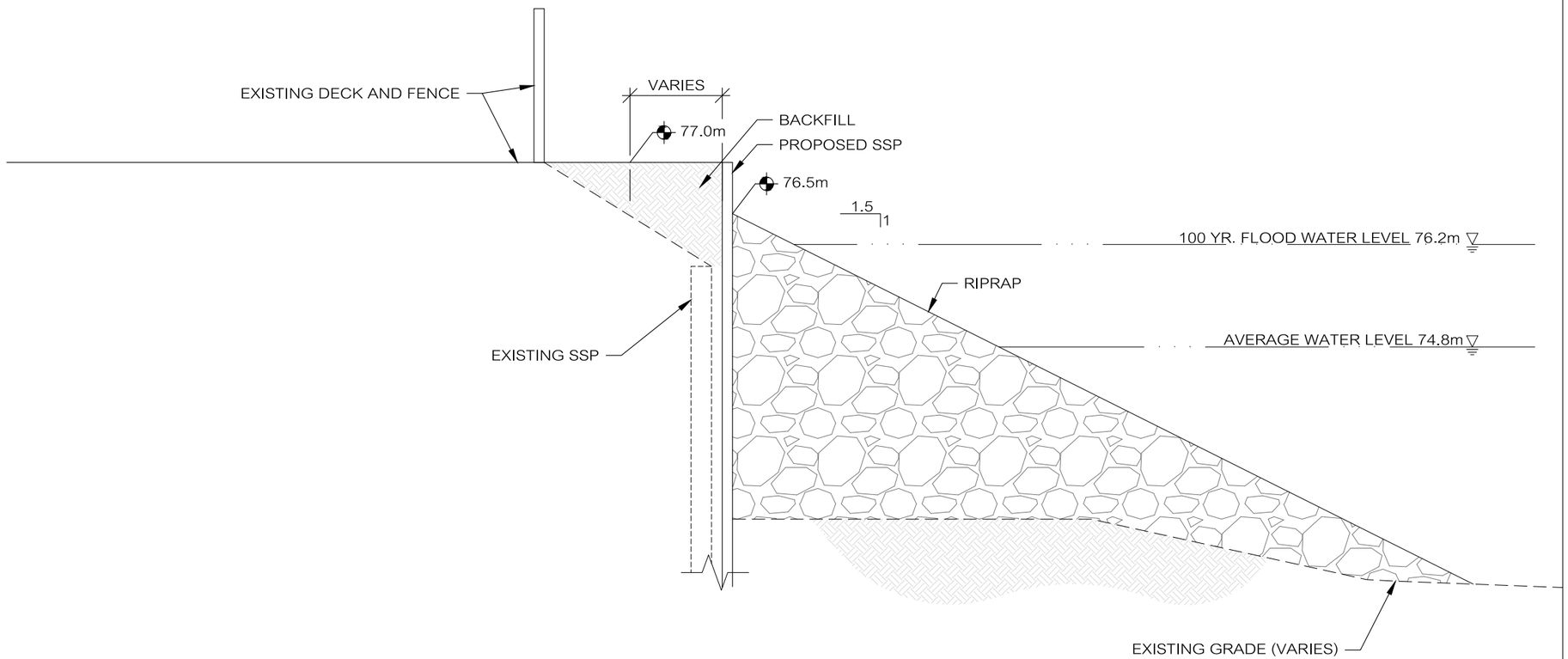
Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority

Date Plotted: 9/23/2024 11:44:47 AM
\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG



C2D SECTION - RIPRAP BERM

TYPICAL SECTIONS - CENTRE ISLAND

TORONTO ISLANDS CONCEPT DESIGN

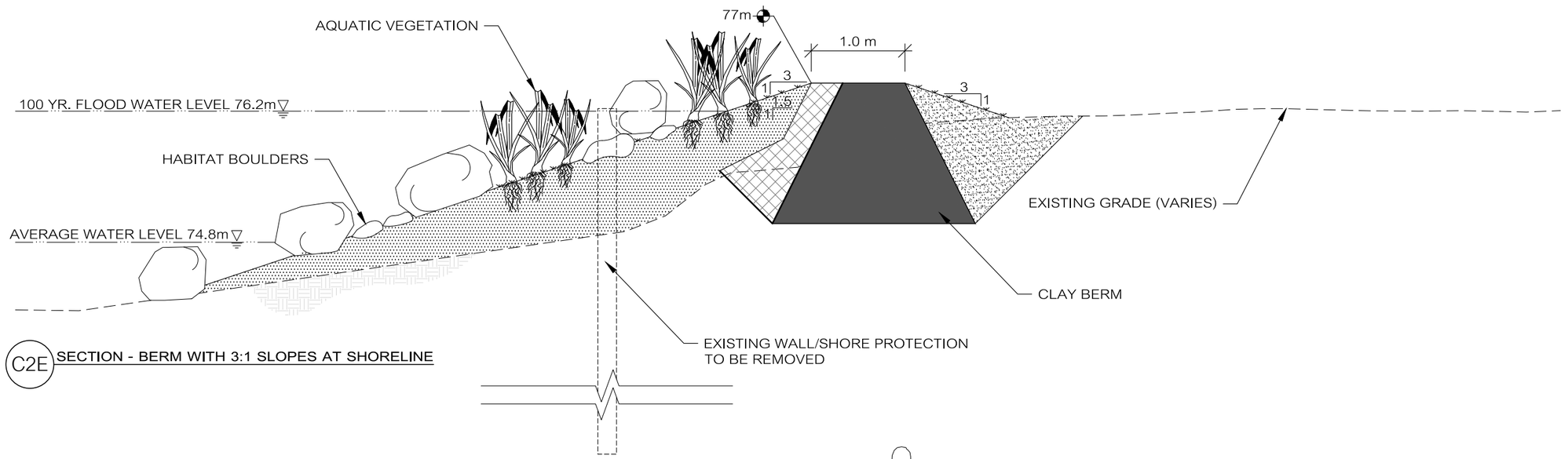
0 0.5 1 2
GRAPHIC SCALE METRES

Project Number: 13520.101

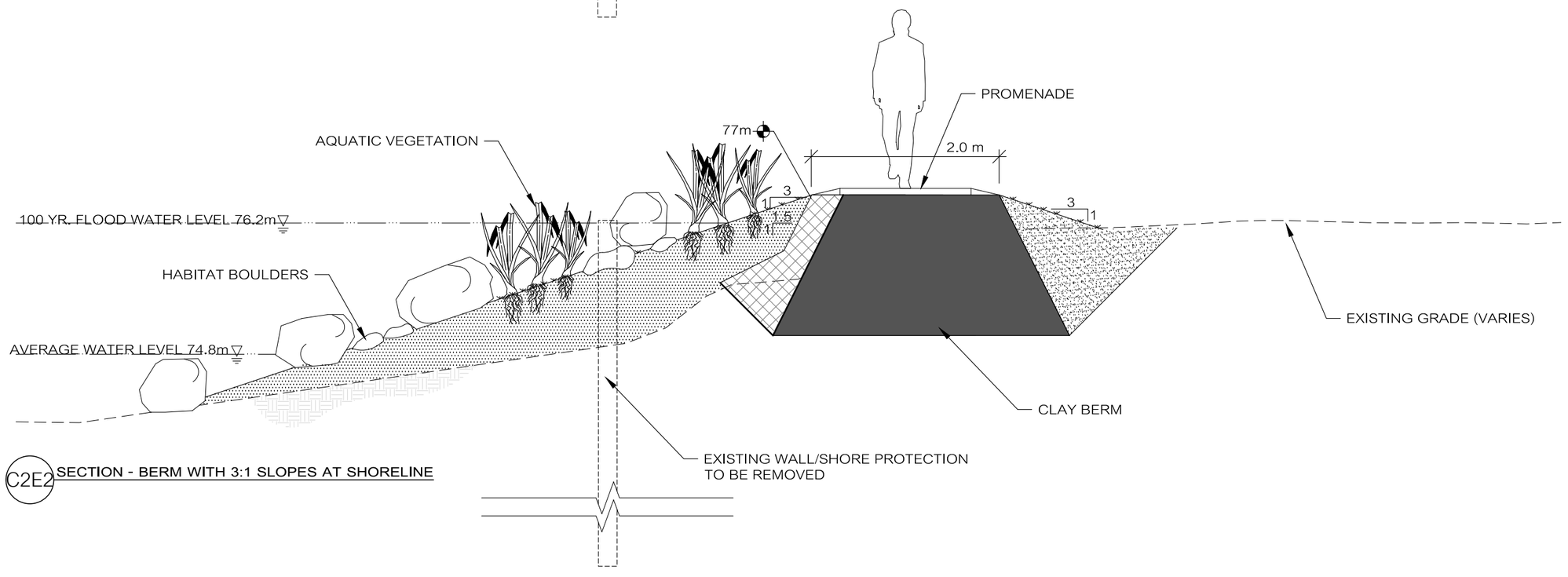
Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



C2E SECTION - BERM WITH 3:1 SLOPES AT SHORELINE



C2E2 SECTION - BERM WITH 3:1 SLOPES AT SHORELINE

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG

Date Plotted: 9/23/2024 11:45:03 AM

TYPICAL SECTIONS - CENTRE ISLAND

TORONTO ISLANDS CONCEPT DESIGN

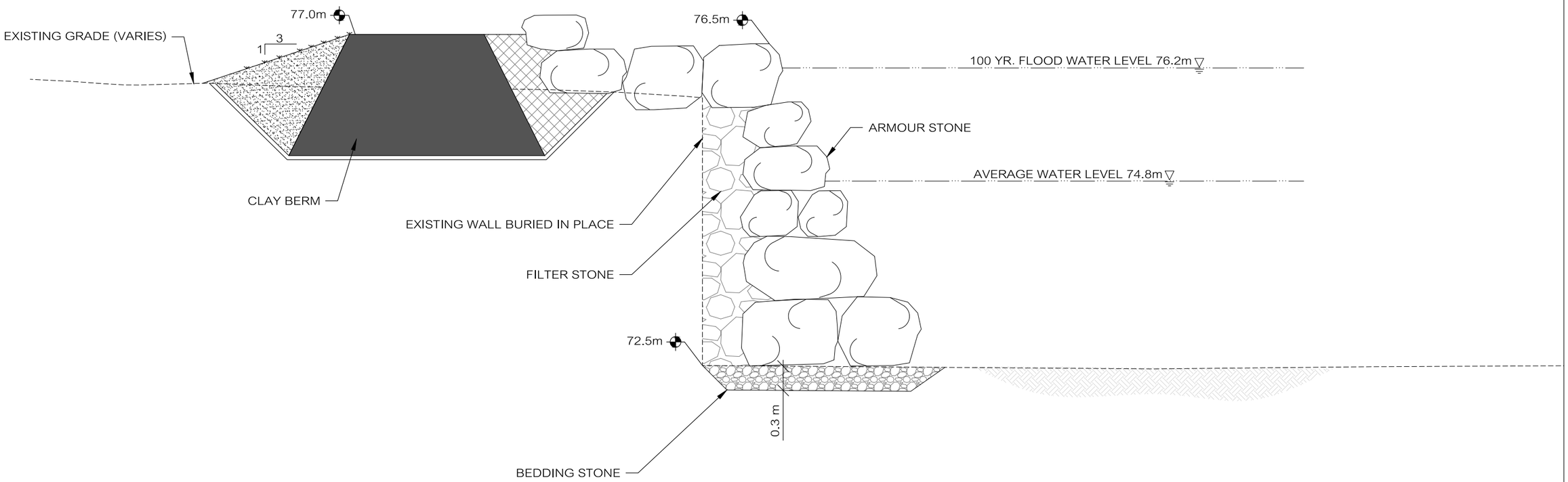
0 .5 1 2
GRAPHIC SCALE METRES

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority



F2A SECTION - STACKED STONE WALL AND INLAND BERM

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG
Date Plotted: 9/23/2024 11:45:31 AM

TYPICAL SECTIONS - CENTRE ISLAND

TORONTO ISLANDS CONCEPT DESIGN

0 0.5 1 2
GRAPHIC SCALE METRES

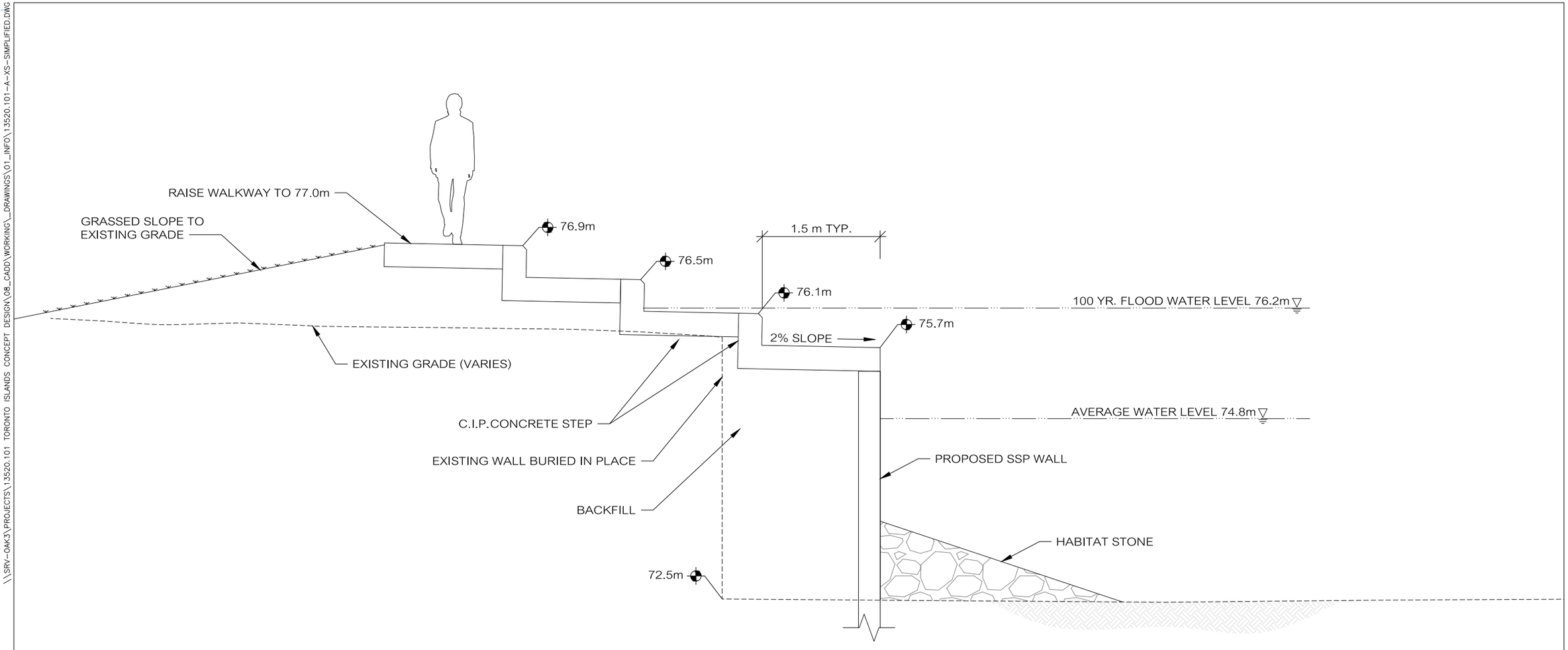
Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority

\\SRV-OAK3\PROJECTS\13520.101 TORONTO ISLANDS CONCEPT DESIGN\08_CADD\WORKING_DRAWINGS\01_INFO\13520.101-A-XS-SIMPLIFIED.DWG
Date Plotted: 9/23/2024 11:45:56 AM



F2B SECTION - STEPPED CONCRETE TERRACE AND SSP WALL

TYPICAL SECTIONS - CENTRE ISLAND

TORONTO ISLANDS CONCEPT DESIGN

0 0.5 1 2
GRAPHIC SCALE METRES

Project Number: 13520.101

Date: 2022-10-15

Baird.

Toronto and Region Conservation Authority

Appendix B

Screening Criteria Tables

B.1 Ward's Island Preferred Concept Screening Results

Table B.1: Ward's Island preferred concept screening criteria results.

	Rating of Potential Effects								
Screening Criteria	**-H**	**-M**	**-L**	**NIL**	**+L**	**+M**	**+H**	**NA**	**Comments**
Physical									
Unique Landforms								X	There are no identified unique landforms in this focus area.
Existing Mineral/Aggregate Resources Extraction Industries								X	Not applicable.
Earth Science - Areas of Natural and Scientific Interest								X	None identified.
Specialty Crop Areas/Agricultural Lands or Production								X	Not applicable.
Niagara Escarpment/Oak Ridges Moraine								X	Not applicable.
Environmentally Sensitive/Significant Areas (physical)				X					No expected impacts.
Air Quality				X					Removal of some trees may be required for construction of the shoreline and inland flood berms, though this is not expected to have a measurable impact on air quality.
Agricultural Tile or Surface Drains								X	None identified.
Noise Levels and Vibration			X						Construction will result in short periods of high noise levels and some vibrations due to heavy machinery.
High/Storm Water Flow Regime				X					Construction of a groyne and expanded beach may change local currents; however this is not expected to have negative impacts.
Low/Base Water Flow Regime				X					Construction of a groyne and expanded beach may change local currents; however this is not expected to have negative impacts.

Rating of Potential Effects

Screening Criteria	-H	-M	-L	NIL	+L	+M	+H	NA	Comments
Existing Surface Drainage/Groundwater Seepage/Groundwater Recharge/Discharge Zones			X						Impermeable flood barriers around the shoreline of the focus area will impede surface drainage to the lake. Additional sump pumps and/or a detailed review of surface drainage will be required.
Falls within a Vulnerable Area as defined by the Clean Water Act								X	Not applicable.
Littoral Drift/Other Coastal Processes					X				There is minimal sediment transport within the Toronto Harbour. The groyne is not expected to significantly impact littoral transport but will retain beach material. The revetment will reduce wave run up and overtopping of the shoreline.
Water Quality				X					There are no expected impacts to Water Quality.
Soil/Fill Quality				X					Beach nourishment material and fill material for use in the berm will be required to be clean and pass applicable standards.
Contaminated Soils/Sediment/Seeps (Sediment Quality)				X					The preferred concept will not introduce contaminated soils or sediments.
Existing Transportation Routes					X				Flood protection measures will maintain access to roadways during a detailed design level event.
Constructed Crossings (e.g. bridges, culverts)								X	There are no constructed crossings identified within the focus area.
Geomorphology				X					The existing shoreline is hardened with engineered structures. The proposed concept will not significantly change the geomorphology of the shoreline from existing conditions.
Biological									
Wildlife Habitat					X				There is a possibility that the new beach and groyne could provide basking and nesting opportunities for any of the three native turtle species which are known to be present in the west end of the archipelago.

Rating of Potential Effects

Screening Criteria	-H	-M	-L	NIL	+L	+M	+H	NA	Comments
Habitat Linkages or Corridors				X					This concept is not expected to alter/impact habitat linkages or corridors from existing conditions.
Significant Vegetation Communities					X				This project may create more habitat for beach-dependent plant communities.
Environmentally Sensitive/Significant Areas (biological)			X						This concept will likely have a slight negative impact on the edge of the Ward's Island ESA.
Fish Habitat					X				Encroachment on the lakebed is expected, however the preferred concept includes aquatic habitat features such as habitat stone to improve fish habitat.
Species of Concern				X					Currently there are no fauna species of concern within this area, however, there is a possibility that the expanded beach and groyne could provide habitat for three listed SAR native turtle species. Although this project may create more habitat for beach habitat dependent plant species, multiple flora species of regional and urban concern are likely to be negatively impacted. The Endangered American Eel have also been found in the general area but are not expected to be impacted by this project.
Exotic/Alien and Invasive Species					X				Most of the existing vegetation in the study area is exotic and its removal and subsequent native replacement plantings will have a benefit (i.e. reduction) in exotic species load in the study area following the proposed works.
Wildlife/Bird Migration Patterns					X				It is possible that expanded beach habitat will provide foraging opportunities for migrating shorebirds.
Wildlife Population				X					Minor positive impacts would likely impact individuals, not populations. Native species plantings may improve local beneficial insect populations.
Wetlands				X					No expected impacts.
Microclimate				X					No expected impacts.

Rating of Potential Effects

Screening Criteria	-H	-M	-L	NIL	+L	+M	+H	NA	Comments
Unique Habitats					X				This project may create more habitat for beach-dependent plant communities. Dynamic beach community establishment and maintenance may be hampered by the proposed groyne and the proposed beach location.
Life Science - Areas of Natural and Scientific Interest			X						The project will likely have a slight negative impact on the edge of the Toronto Islands Candidate ANSI, however, these impacts may be attenuated if native plantings are incorporated after the works are completed.
Cultural									
Traditional Land Uses				X					No impacts expected.
Indigenous Reserve or Community								X	There are no Indigenous reserves or communities within the project limits; therefore, there will be no impact to Indigenous reserves or communities due to these works.
Outstanding Native Land Claim or Treaty Rights				X					No impact expected.
Transboundary Water Management Issues								X	Not applicable.
Riparian Uses				X					No impact expected.
Recreational/Tourism Uses of Water Body and/or Adjacent Land					X				Expanded beach, groyne and the flood berm could have public use features incorporated into them which would provide improved access to, and enjoyment of the shoreline.
Aesthetic or Scenic Landscapes or Views						X			Improved shoreline aesthetics and improved views of the city mainland.
Archaeological Resources, Built Heritage Resources and Cultural Heritage Landscapes				X					There are two plaques near the project area but they will not be impacted by the proposed work.
Historic Canals								X	None identified.
Federal Property								X	Toronto Islands Land owned by the City of Toronto and the Province of Ontario.
Heritage River System								X	Not applicable.

Rating of Potential Effects

Screening Criteria	-H	-M	-L	NIL	+L	+M	+H	NA	Comments
Socioeconomic									
Surrounding Neighbourhood or Community						X			Flood protection will directly benefit the Ward's Island residential community.
Surrounding Land Uses or Growth Pressure				X					No expected impacts.
Existing Infrastructure, Support Services, Facilities			X						Increased tourist traffic to Ward's Island may increase capacity demands on existing infrastructure and facilities.
Pedestrian Traffic Routes					X				Flood protection will allow roadways to remain accessible during a design flood event.
Property Values or Ownership							X		Improvements to the shoreline and implementation of flood and erosion protection will increase property value of Ward's Island.
Existing Tourism Operations							X		Improved opportunity for recreational use and enjoyment of the beach and shoreline.
Property/Farm Accessibility						X			Flood protection will allow roadways to remain accessible during a design flood event.
Engineering/Technical									
Rate of Erosion in Ecosystem						X			The revetment along the shoreline berm and expanded beach and groyne will reduce the rate of the erosion along the Ward's Island shoreline. Additional analysis will be conducted in detailed design to confirm erosion impacts to surrounding ecosystems but at this time none are expected.
Sediment Deposition Zones in Ecosystem						X			The proposed groyne will promote sediment deposition and retention of the beach adjacent to the Ferry Dock.
Flood Risk in Ecosystem							X		The proposed concept will mitigate flood risk during the 100-year flood event. This concept does not cause adverse flooding effects to adjacent shorelines.
Slope Stability								X	No slope stability concerns were identified in the focus area.
Existing Structures							X		The proposed concept will improve on existing structures, both functionally and aesthetically.

Rating of Potential Effects

Screening Criteria	-H	-M	-L	NIL	+L	+M	+H	NA	Comments
Hazardous Lands						X			The implementation of the selected concept will not cause unstable soil or bedrock.
Hazardous Sites				X					The proposed concept addresses unstable soils, no unstable bedrock is expected.

B.2 Algonquin Island Preferred Concept Screening Results

Table B.2: Algonquin Island preferred concept screening criteria results.

	Rating of Potential Effects								
Screening Criteria	**-H**	**-M**	**-L**	**NIL**	**+L**	**+M**	**+H**	**NA**	**Comments**
Physical									
Unique Landforms								X	There are no identified unique landforms in this focus area.
Existing Mineral/Aggregate Resources Extraction Industries								X	Not applicable.
Earth Science - Areas of Natural and Scientific Interest								X	None identified.
Specialty Crop Areas/Agricultural Lands or Production								X	Not applicable.
Niagara Escarpment/Oak Ridges Moraine								X	Not applicable.
Environmentally Sensitive/Significant Areas (physical)			X						Construction of an inland berm in the south end will disrupt and negatively impact Environmentally sensitive/significant areas. There are no impacts expected within the Northwest Shoreline and QCYC focus areas.
Air Quality				X					Preferred concept is not expected to affect air quality.
Agricultural Tile or Surface Drains								X	Not applicable.
Noise Levels and Vibration			X						Construction activities will temporarily create higher noise levels and vibrations from heavy machinery.
High/Storm Water Flow Regime						X			Placement of a stone buttress on the northwest shoreline at QCYC will improve sheltering within the channel for docked boats.

Rating of Potential Effects

Screening Criteria	-H	-M	-L	NIL	+L	+M	+H	NA	Comments
Low/Base Water Flow Regime				X					No impacts expected.
Existing Surface Drainage/Groundwater Seepage/Groundwater Recharge/Discharge Zones			X						Impermeable flood barriers around the shoreline on the South End and Northwest Shoreline will impede surface drainage to the lake. Additional sump pumps and/or a detailed review of surface drainage will be required.
Falls within a Vulnerable Area as defined by the Clean Water Act								X	Not applicable to this study area.
Littoral Drift/Other Coastal Processes					X				Implementation of the proposed stone buttress along the northwest facing shoreline (in all three focus areas) is not expected to significantly impact littoral transport, but will reduce wave reflections, run up and overtopping of the shoreline.
Water Quality				X					There will be no impacts to water quality for the addition of these concepts.
Soil/Fill Quality				X					Fill material for use in the berm will be required to be clean and pass applicable standards.
Contaminated Soils/Sediment/Seeps (Sediment Quality)				X					The preferred concept will not introduce contaminated soils or sediments.
Existing Transportation Routes					X				Flood protection measures will maintain access to study area pathways as well as access to QCYC, including connected water-based transportation routes, during a flood event.
Constructed Crossings (e.g., bridges, culverts)								X	There are no constructed crossings identified within the focus area.
Geomorphology				X					The existing shoreline is hardened with engineered structures. The proposed stone buttress will have similar geomorphologic properties to the existing shoreline.

Rating of Potential Effects

Screening Criteria	-H	-M	-L	NIL	+L	+M	+H	NA	Comments
Biological									
Wildlife Habitat					X				Within the South End, the current forest community has many exotic species and exotic vegetation removal followed by compensation plantings of native species will likely improve wildlife habitat. Vegetation removals must be conducted outside of the bird breeding period and surveys will need to be conducted. For the Northwest Shoreline and QCYC, there will be no change in impact on terrestrial wildlife habitat and the stone buttress along the north shoreline will provide interstitial spaces for aquatic organisms to use as habitat.
Habitat Linkages or Corridors				X					The proposed solution will not create or degrade habitat linkages or corridors within any of the focus areas.
Significant Vegetation Communities		X							The proposed flood berm through the South End focus area will negatively impact significant vegetation communities. Currently no significant vegetation communities are present on the Northwest Shoreline or within QCYC and the proposed solution will not create any.
Environmentally Sensitive/Significant Areas (biological)		X							The entirety of the South End of Algonquin Island is designated as the West Algonquin Island Environmentally Significant Area (ESA) by the City of Toronto and the installation of a berm and potentially sump pumps will impact the ESA. The Northwest Shoreline and QCYC are both outside of the ESA and the proposed works in these areas will not impact the ESA.
Fish Habitat				X					The current shoreline is hardened along the north end of the island, within all focus areas. Though the stone buttress will be an improvement over the

Rating of Potential Effects

Screening Criteria	-H	-M	-L	NIL	+L	+M	+H	NA	Comments
									current shoreline condition, the loss of in-water habitat would result in no net gain. Habitat loss can be mitigated by surcharging with loose rock (cobble, gravel) and interstitial space between the stone where possible.
Species of Concern					X				Several flora species of concern are found in the South End focus area; however, the proposed berm layout will avoid this community so harm to these populations is unlikely to occur. Planting of site-appropriate species of conservation concern into the berms and during site restoration may help to establish new populations and strengthen their presence on the landscape. Flora species of concern are unlikely to occur within the Northwest Shoreline or QCYC focus areas, so impacts are not expected in these sites.
Exotic/Alien and Invasive Species					X				Much of the existing vegetation in the South End focus area is exotic and its removal and the subsequent native replacement plantings will reduce exotic species load in the focus area. Northwest Shoreline and QCYC are also assumed to have largely exotic flora.
Wildlife/Bird Migration Patterns				X					No expected impacts.
Wildlife Population				X					No Impacts expected
Wetlands		X							The installation of a berm and potential use of sump pumps within the South End focus area will negatively impact the provincially significant wetlands in the area. There are no wetlands present in the Northwest Shoreline and QCYC focus areas and the proposed solution will not create any; therefore no impacts are expected in these areas.
Microclimate				X					No impacts expected.

Rating of Potential Effects

Screening Criteria	-H	-M	-L	NIL	+L	+M	+H	NA	Comments
Unique Habitats			X						The most unique habitats on Algonquin Island are within the South End focus area, including the White Birch – Cottonwood Coastal Mineral Deciduous Swamp (L2), that will be negatively affected by the currently proposed works. There are no unique habitats present within the Northwest Shoreline and QCYC focus areas, therefore there are no expected impacts for these two areas.
Life Science - Areas of Natural and Scientific Interest			X						The works scheduled for the South End focus area may have an immediate and long-term negative impact on some vegetation communities in the Toronto Islands ANSI, specifically the White Birch – Cottonwood Coastal Mineral Deciduous Swamp. The works scheduled for the Northwest Shoreline and QCYC focus areas will not occur within the Toronto Islands Candidate ANSI.
Cultural									
Traditional Land Uses				X					No impacts expected
Indigenous Reserve or Community								X	There are no Indigenous reserves or communities within the project limits; therefore, there will be no impact to Indigenous reserves or communities due to these works.
Outstanding Native Land Claim or Treaty Rights				X					No impacts expected
Transboundary Water Management Issues								X	Not applicable.
Riparian Uses				X					The current shoreline on the Northwest Shoreline is a hard shoreline, the stone buttress will be a similar hard shoreline. Much of the shoreline on the South End remains the same.
Recreational/Tourism Uses of Water Body and/or Adjacent Land					X				Public use features could be incorporated into the berm along the Northwest Shoreline to facilitate access to and

Rating of Potential Effects

Screening Criteria	-H	-M	-L	NIL	+L	+M	+H	NA	Comments
									enjoyment of this area. Proposed solutions will maintain access to QCYC amenities and the AIA clubhouse during a flood event, improving recreational use of these facilities during these times.
Aesthetic or Scenic Landscapes or Views						X			Improved shoreline aesthetics.
Archaeological Resources, Built Heritage Resources and Cultural Heritage Landscapes								X	None identified.
Historic Canals								X	None identified.
Federal Property								X	Toronto Islands Land owned by the City of Toronto and the Province of Ontario.
Heritage River System								X	Not applicable.
Socioeconomic									
Surrounding Neighbourhood or Community						X			Flood protection will benefit the Algonquin Island residents and QCYC club members.
Surrounding Land Uses or Growth Pressure				X					No expected impacts.
Existing Infrastructure, Support Services, Facilities				X					Impacts to existing infrastructure (subsurface utilities, trails) expected during construction, but no long-term impacts are expected.
Pedestrian Traffic Routes					X				No impacts expected.
Property Values or Ownership							X		Improvements to the shoreline and implementation of flood and erosion protection will increase property value of Algonquin Island.
Existing Tourism Operations					X				The proposed work will provide improved opportunities for recreational use and enjoyment of the shoreline. Flood protection will also maintain park operations for visiting tourists during high lake levels.
Property/Farm Accessibility							X		Flood protection will allow roadways, QCYC, and the Clubhouse to remain accessible during a design flood event.

Rating of Potential Effects

Screening Criteria	-H	-M	-L	NIL	+L	+M	+H	NA	Comments
Engineering/Technical									
Rate of Erosion in Ecosystem					X				The existing shoreline is hardened around the northwest shoreline and QCYC so rate of erosion will not change. The existing natural shoreline around the South End will not be disturbed, therefore rate of erosion does not change. The proposed solutions will have an increased built height, and therefore provide improved backshore erosion protection. In addition, the new structures will have a longer design life than the existing structures, guaranteeing erosion protection for a longer period of time.
Sediment Deposition Zones in Ecosystem				X					The proposed hardened shorelines for the Northwest Shoreline and the QCYC will have no impact on sediment deposition. The shoreline at the South End will not change.
Flood Risk in Ecosystem							X		The proposed concept will mitigate flood risk during the 100-year flood event.
Slope Stability								X	No slope stability concerns were identified in the focus area.
Existing Structures						X			The proposed concept will improve on existing structures, both functionally and aesthetically along the northwest shoreline.
Hazardous Lands						X			The proposed concept address flooding hazards for the focus area.
Hazardous Sites				X					The proposed concepts do not cause unstable soils or bedrock.

B.3 Centre Island Preferred Concept Screening Results

Table B.3: Centre Island preferred concept screening criteria results.

	Rating of Potential Effects								
Screening Criteria	**-H**	**-M**	**-L**	**NIL**	**+L**	**+M**	**+H**	**NA**	**Comments**
Physical									
Unique Landforms								X	There are no identified unique landforms in this focus area.
Existing Mineral/Aggregate Resources Extraction Industries								X	Not applicable.
Earth Science - Areas of Natural and Scientific Interest								X	None identified.
Specialty Crop Areas/Agricultural Lands or Production								X	Not applicable.
Niagara Escarpment/Oak Ridges Moraine								X	Not applicable.
Environmentally Sensitive/Significant Areas (physical)								X	No environmentally sensitive/significant areas were identified.
Air Quality				X					Removal of some trees will be required for construction of the shoreline berms around Centreville and between the Toronto Island Marina and Island BBQ and Beer Co. restaurant though this is not expected to have a measurable impact on air quality.
Agricultural Tile or Surface Drains								X	None identified.
Noise Levels and Vibration			X						Construction will result in short periods of high noise levels and some vibrations due to heavy machinery in all focus areas.
High/Storm Water Flow Regime				X					There are no expected impacts on water flow regime.
Low/Base Water Flow Regime				X					There are no expected impacts on water flow regime.
Existing Surface Drainage/Groundwater Seepage/Groundwater Recharge/Discharge Zones			X						Impermeable flood barriers around the shoreline of the focus area will impede surface drainage to the lake. Additional sump pumps and/or a detailed review of surface drainage will be required.

Rating of Potential Effects

Screening Criteria	-H	-M	-L	NIL	+L	+M	+H	NA	Comments
Falls within a Vulnerable Area as defined by the Clean Water Act								X	Not applicable to this study area.
Littoral Drift/Other Coastal Processes				X					The preferred concept will not impact littoral drift within the Inner Harbour. There will also be limited impacts on waves due to the sheltered nature of the focus areas.
Water Quality					X				Local water quality may be improved around Centreville due to naturalization of the shoreline and increased aquatic vegetation. There will be limited impacts to water quality in other focus areas.
Soil/Fill Quality				X					Sand nourishment material and fill material for use in the berm will be required to be clean and pass applicable standards.
Contaminated Soils/Sediment/Seeps (Sediment Quality)				X					Sediment quality is not expected to be impacted.
Existing Transportation Routes				X					Encroachment onto the lakebed along the shoreline between the Centre Island Ferry Terminal and the Island BBQ. and Beer Co. restaurant may disrupt water taxi service, however raised roadways and flood protection will improve roadway transportation during design flood events. Net impact is minimal.
Constructed Crossings (e.g., bridges, culverts)	X								Bridges connecting the Duck Island and Olympic Island with Centre Island may need to be lifted/modified to match proposed shoreline and road grades.
Geomorphology				X					The existing shoreline is hardened with engineered structures. The proposed concept will not significantly change the geomorphology of the shoreline from existing conditions.
Biological									
Wildlife Habitat					X				There is currently almost no natural cover within the Toronto Island Marina and Ferry Terminal Focus Areas. The vegetated shoreline berm between the

Rating of Potential Effects

Screening Criteria	-H	-M	-L	NIL	+L	+M	+H	NA	Comments
									marina and restaurant will add a small amount of natural cover that will likely benefit local arthropod populations and provide foraging habitat for birds and mammals. The proposed works will not add or remove any natural cover for the Ferry Terminal. Within Centreville, the provision of nearshore wetland habitat will likely improve foraging opportunities for both migrant and resident birds and provide cover for small mammals.
Habitat Linkages or Corridors					X				There are currently almost no habitat linkages or corridors within all Centre Island focus areas and the proposed works will not be adding or removing any habitat linkages or corridors within the Toronto Island Marina and Ferry Terminal Focus Areas. However, some habitat corridors will be created within the Centreville Focus Area.
Significant Vegetation Communities					X				There are no significant vegetation communities within the project area for all focus areas within Centre Island. The creation of a naturalized shoreline around Centreville may result in the establishment of significant vegetation communities
Environmentally Sensitive/Significant Areas (biological)								X	None identified within the project area.
Fish Habitat					X				The project will add some aquatic habitat within the Centreville and Toronto Island Marina Focus Areas through the addition of a naturalized shoreline. The project will likely have no impact on the Ferry Terminal Focus Area aquatic habitat, as some habitat may be lost due to construction but loss can be mitigated by adding habitat stone where possible.
Species of Concern				X					The project is not expected to impact species of concern within

Rating of Potential Effects

Screening Criteria	-H	-M	-L	NIL	+L	+M	+H	NA	Comments
									any focus areas on Centre Island. The Endangered American Eel has been found in the general study area for all focus areas but they are not expected to be impacted by this project.
Exotic/Alien and Invasive Species				X					Exotic species likely dominate flora in all focus areas. The further establishment of exotic species will be managed.
Wildlife/Bird Migration Patterns				X					No expected impacts.
Wildlife Population				X					No impacts expected.
Wetlands					X				The project may create new wetland habitat within the Toronto Island Marina and Centreville Focus Areas, but not the Ferry Terminal Focus Area.
Microclimate				X					No impacts expected.
Unique Habitats								X	Not applicable.
Life Science - Areas of Natural and Scientific Interest								X	Not applicable.
Cultural									
Traditional Land Uses				X					No impacts expected.
Indigenous Reserve or Community								X	There are no Indigenous reserves or communities within the project limits; therefore, there will be no impact to Indigenous reserves or communities due to these works.
Outstanding Native Land Claim or Treaty Rights				X					No impacts expected.
Transboundary Water Management Issues								X	Not applicable.
Riparian Uses						X			The naturalized shoreline, opportunity to incorporate a promenade along the flood berms, and seating opportunities within the Ferry Terminal focus area improves access to, and enjoyment of the shoreline.
Recreational/Tourism Uses of Water Body and/or Adjacent Land						X			Opportunity to incorporate seating areas within the Ferry Terminal and a promenade along the flood berms improves access to, and enjoyment of, the shoreline along

Rating of Potential Effects

Screening Criteria	-H	-M	-L	NIL	+L	+M	+H	NA	Comments
									Centreville and around the Ferry Dock. The naturalized shoreline in Centreville will also improve a connection to nature.
Aesthetic or Scenic Landscapes or Views							X		Improved shoreline aesthetics.
Archaeological Resources, Built Heritage Resources and Cultural Heritage Landscapes				X					The Morrison Planter is near the project area but it will not be impacted by the proposed work
Historic Canals								X	None identified.
Federal Property								X	Toronto Islands Land owned by the City of Toronto and the Province of Ontario.
Heritage River System								X	Not applicable.
Socioeconomic									
Surrounding Neighbourhood or Community							X		Flood protection will benefit the Toronto Island Marina community and greater Island Park community by maintaining access to the Ferry Dock, Centreville and roadways.
Surrounding Land Uses or Growth Pressure				X					No expected impacts.
Existing Infrastructure, Support Services, Facilities		X							Improvements to the Centre Island shoreline may result in tourist traffic and demand on existing infrastructure and facilities.
Pedestrian Traffic Routes						X			Creation of shoreline promenade incorporated into flood berm will improve accessibility around Centre Island. Flood protection will allow roadways to remain accessible during a design flood event.
Property Values or Ownership							X		Improvements to the shoreline and implementation of flood and erosion protection will increase property value of Centre Island.
Existing Tourism Operations							X		Flood and erosion protection will protect Centre Island Ferry Dock, Centreville, and the Toronto Island Marina and allow them to remain operational during a design flood event.

Rating of Potential Effects

Screening Criteria	-H	-M	-L	NIL	+L	+M	+H	NA	Comments
Property/Farm Accessibility							X		Creation of shoreline promenade incorporated into flood berm will improve accessibility to the shoreline around Centre Island. Flood protection will allow roadways to remain accessible during a design flood event.
Engineering/Technical									
Rate of Erosion in Ecosystem						X			The naturalized shoreline and flood berm will reduce the rate of erosion along the Centre Island shoreline between the Olympic Island bridges and around Centreville.
Sediment Deposition Zones in Ecosystem				X					The proposed concepts are not expected to significantly impact sediment deposition zones.
Flood Risk in Ecosystem							X		The proposed concept will mitigate flood risk during the 100-year flood event.
Slope Stability								X	No slope stability concerns were identified in the focus area.
Existing Structures							X		The proposed concept will improve on existing structures, both functionally and aesthetically.
Hazardous Lands						X			The proposed concept address flooding and erosion hazards for the focus area.
Hazardous Sites				X					The proposed concept does not create any unstable soils or bedrock.

B.4 Roadways Preferred Concept Screening Results

Table B.4: Roadways preferred concept screening criteria results.

	Rating of Potential Effects								
Screening Criteria	**-H**	**-M**	**-L**	**NIL**	**+L**	**+M**	**+H**	**NA**	**Comments**
Physical									
Unique Landforms								X	None identified.
Existing Mineral/Aggregate Resources Extraction Industries								X	Not applicable.
Earth Science - Areas of Natural and Scientific Interest								X	None identified.
Specialty Crop Areas/Agricultural Lands or Production								X	Not applicable.
Niagara Escarpment/Oak Ridges Moraine								X	Not applicable.
Environmentally Sensitive/Significant Areas (physical)				X					No impacts expected.
Air Quality				X					Removal of some trees will be required for construction of the raised roads, though this is not expected to have a measurable impact on air quality.
Agricultural Tile or Surface Drains								X	None identified.
Noise Levels and Vibration			X						Construction will result in short periods of high noise levels and some vibrations due to heavy machinery.
High/Storm Water Flow Regime				X					The shoreline work proposed will have no impacts on the water flow regime.
Low/Base Water Flow Regime				X					The shoreline work proposed will have no impacts on the water flow regime.
Existing Surface Drainage/Groundwater Seepage/Groundwater Recharge/Discharge Zones			X						Raising roadway elevations may impede surface drainage to the lake. Additional sump pumps and/or a detailed review of surface drainage will be required.

Rating of Potential Effects

Screening Criteria	-H	-M	-L	NIL	+L	+M	+H	NA	Comments
Falls within a Vulnerable Area as defined by the Clean Water Act				X					No expected impacts.
Littoral Drift/Other Coastal Processes				X					The shoreline work (revetment) will limit wave overtopping, and erosion. It will also cause decreased wave reflection.
Water Quality				X					The proposed concept will not adversely impact water quality.
Soil/Fill Quality				X					The proposed concept will not adversely impact soil quality.
Contaminated Soils/Sediment/Seeps (Sediment Quality)				X					The shoreline work will not cause contaminated sediments.
Existing Transportation Routes							X		Elevating the proposed roadways above the 100-year flood level will significantly improve existing transportation routes during a flood event.
Constructed Crossings (e.g. bridges, culverts)		X							Elevating roadways will require some modifications to existing constructed crossings.
Geomorphology				X					The proposed shoreline work will decrease erosion and not cause adverse geomorphologic impacts.
Biological									
Wildlife Habitat			X						Most of the road shoulders within the Study Area are manicured and do not provide wildlife habitat. However, road raising will require tree removals, which will likely have a minor negative impact on available wildlife habitat.
Habitat Linkages or Corridors								X	Most of the road shoulders within the Study Area are manicured and do not provide habitat linkages or corridors. Road raising is unlikely to have any impact on habitat linkages or corridors within the Study Area.
Significant Vegetation Communities				X					No impact.
Environmentally Sensitive/Significant Areas (biological)				X					No impact.

Rating of Potential Effects

Screening Criteria	-H	-M	-L	NIL	+L	+M	+H	NA	Comments
Fish Habitat				X					No impact expected.
Species of Concern				X					No impact expected.
Exotic/Alien and Invasive Species			X						Disturbance caused by road raising works may lead to increased colonization of exotic vegetation.
Wildlife/Bird Migration Patterns				X					No impact.
Wildlife Population				X					No impact.
Wetlands				X					No impact.
Microclimate				X					No change to the local microclimate is expected from the completion of the proposed road raising works.
Unique Habitats				X					There are no existing unique habitats that will be affected by the proposed road raising works and no unique habitat features will be created.
Life Science - Areas of Natural and Scientific Interest				X					Several roadways slated for raising works bisect or abut Candidate Areas of Natural and Scientific Interest. However, no impacts are expected for these areas.
Cultural									
Traditional Land Uses				X					No impacts expected.
Indigenous Reserve or Community								X	There are no Indigenous reserves or communities within the project limits; therefore, there will be no impact to Indigenous reserves or communities due to these works.
Outstanding Native Land Claim or Treaty Rights				X					No impacts expected.
Transboundary Water Management Issues								X	Not applicable.
Riparian Uses				X					Shoreline protection is unlikely to impact riparian use in this area.
Recreational/Tourism Uses of Water Body and/or Adjacent Land			X						Raising road elevations may negatively impact lateral flow across roadways to adjacent land due to grade change.

Rating of Potential Effects

Screening Criteria	-H	-M	-L	NIL	+L	+M	+H	NA	Comments
Aesthetic or Scenic Landscapes or Views				X					No impact.
Archaeological Resources, Built Heritage Resources and Cultural Heritage Landscapes				X					No expected impacts.
Historic Canals								X	Not applicable.
Federal Property								X	Toronto Islands Land owned by the City of Toronto and the Province of Ontario.
Heritage River System								X	Not applicable.
Socioeconomic									
Surrounding Neighbourhood or Community							X		Improved roadway access throughout the island park during design flood event is a significant benefit to Island Park communities.
Surrounding Land Uses or Growth Pressure				X					No expected impacts.
Existing Infrastructure, Support Services, Facilities			X						Some existing infrastructure may need to be modified to accommodate increased road elevations.
Pedestrian Traffic Routes							X		Roadway access is maintained during the design flood event.
Property Values or Ownership							X		Increasing road elevations to maintain access during the design flood event will be beneficial to property values and ownership.
Existing Tourism Operations							X		Increasing road elevations to maintain access during the design flood event will be beneficial to existing tourism operations.
Property/Farm Accessibility							X		Roadway access is maintained during the design flood event.
Engineering/Technical									
Rate of Erosion in Ecosystem				X					No impact.
Sediment Deposition Zones in Ecosystem				X					No expected impacts.
Flood Risk in Ecosystem							X		Mitigates flood risk to roadways.
Slope Stability								X	No slope stability concerns were identified in the focus area.
Existing Structures			X						Adjacent structures/infrastructure may be impacted by road raising and

Rating of Potential Effects

Screening Criteria	-H	-M	-L	NIL	+L	+M	+H	NA	Comments
									grade change. Existing structures may be impacted during the construction of the shoreline protection. However, these impacts will be temporary.
Hazardous Lands					X				Elevates proposed roadways above the flood hazard.
Hazardous Sites				X					The implementation of the selected concept will not cause unstable soil or bedrock.

Appendix C

Grounded Engineering Geotechnical Report



GEOTECHNICAL INVESTIGATION REPORT

PREPARED FOR:
Baird & Associates
1267 Cornwall Road,
Oakville ON L6J 7T5

ATTENTION:
Jennifer Crilly

The Toronto Islands Park Flood and Erosion Mitigation Project Environmental Assessment Toronto, Ontario

Grounded Engineering Inc.
File No. 21-090
Issued September 22, 2022

1 Banigan Drive, Toronto ON M4H 1G3 | (647) 264-7909 | groundedeng.ca | Grounded Engineering

TABLE OF CONTENTS

1 INTRODUCTION 5
1.1 Study Areas 6
1.2 Background Information 7
2 BASELINE GEOTECHNICAL CONDITIONS 7
2.1 Soil Stratigraphy 10
2.1.1 Existing Pavements 10
2.1.2 Earth Fill 12
2.1.3 Native Soils 12
2.1.4 Bedrock 12
2.2 Groundwater 13
2.3 Frost Susceptibility 13
2.4 Proctor Test Results 14
2.5 Cone Penetration Testing 14
3 BASELINE HYDROGEOLOGICAL CONDITIONS 14
3.1 Existing Surface Water Drainage 14
3.2 Groundwater Levels and Seepage 18
3.3 Groundwater Recharge and Discharge Zones 18
3.4 Existing Condition of Stormwater Infrastructure 19
4 BASELINE ENVIRONMENTAL CONDITIONS 20
4.1 Water Quality 20
4.2 Soil/Fill Quality 22
4.3 Contaminated Soils 22
4.3.1 Location and Depth of Samples 23
4.3.2 Comparison to Applicable Standards 24
5 BASELINE HAZARDOUS LANDS/SITES 25
5.1 Asbestos 25
5.2 Slope Stability 25
6 GEOTECHNICAL ENGINEERING CONSIDERATIONS 26
6.1 Earth Pressure Design Parameters 26
6.2 Excavations 27
6.3 Short-Term Groundwater Control 28
6.4 Grade Raises 29
7 DEVELOPMENT OF CONCEPTUAL DESIGNS 29
7.1 Road Raises 29
7.1.1 Site Preparation and Sequence 30
7.1.2 Pavement Design 31
7.2 Earth Berms 33
7.3 Gravity Walls 34

7.4 SHEET PILE WALLS 35
8 LIMITATIONS AND RESTRICTIONS 35
8.1 INVESTIGATION PROCEDURES 35
8.2 SITE AND SCOPE CHANGES 36
8.3 REPORT USE 37
9 CLOSURE 38
10 REFERENCES 39

FIGURES

Figure 1 – Site Location Plan
Figure 2 – Borehole Location Plan
Figures 3-7 – Flood Mapping

APPENDICES

Appendix A – Grounded Borehole Logs (2021)
Appendix B – Geotechnical Laboratory Results (2021)
Appendix C – Factual Information by Grounded (2020)
Appendix D – Factual Soil Information by Thurber (2020)
Appendix E – Factual Bedrock Information by Grounded (2020)
Appendix F – CPT Test Results (2020)
Appendix G – Proctor Test Results
Appendix H – Groundwater Levels
Appendix I – Site Photographs
Appendix J – Chemical Analysis, PWQO
Appendix K – Chemical Analysis, TCLP
Appendix L – Chemical Analysis, O.Reg. 153/04 Soil
Appendix M – Chemical Analysis, Asbestos
Appendix N – Berm Typical Section and Seepage Analysis

TABLES AND FIGURES

Table 1.1 – Summary of Study Areas....6
Table 2.1 – Summary of Scope of Work....8
Table 2.2 – Summary of Investigation for Each Study Area....9
Table 2.3 – Summary of Pavement Cores....10
Table 2.4 – Summary of Asphalt Structure encountered in Boreholes....11
Table 2.5 – Summary of Asphalt Structure encountered in each Study Area....11
Table 2.6 – Relationship Between Grain Size and Frost Susceptibility (MTO)....13
Table 2.7 – Summary of Susceptibility to Frost Heave....13
Table 3.1 – Summary of Existing Surface Water Drainage Features in the Study Areas....15
Table 4.1 – Summary of Groundwater Quality from PWQO testing....21
Table 5.1 – Summary of Asbestos Testing....25
Table 6.1 – Earth Pressure Design Parameters....26
Table 6.2 – Safe excavation slopes by soil type (of no more than 3 m in height)....28
Table 7.1 – Design considerations for road raise options....31
Table 7.2 – Proposed pavement design....32

1 Introduction

Baird & Associates ("Baird") has retained Grounded Engineering Inc. ("Grounded") to provide geotechnical engineering, hydrogeological engineering, and environmental advice in support of the Environmental Assessment (EA) for The Toronto Islands Park Flood and Erosion Mitigation Project, in Toronto, Ontario.

Our scope of work is to provide engineering recommendations for the development of conceptual designs for long-term flood mitigation and erosion control of the Toronto Islands Park shoreline, as a part of a Class Environmental Assessment process. The EA is being led by the Toronto and Region Conservation Authority ("TRCA").

Flooding on the Toronto Islands Park in the spring of 2017 and 2019 was caused by record-breaking Lake Ontario high water levels. High lake level events have been increasing in frequency, putting residents, businesses, and public spaces located on the Toronto Islands Park ("Toronto Islands" or the "Islands") at risk. The City of Toronto and TRCA have partnered to provide long-term solutions for increasing the effectiveness and resiliency of the Toronto Islands flood control infrastructure, and to prevent future spring high water levels from impacting the Islands.

Baird provided us with preliminary design concepts for review in preparation of this design brief, including:

- Baird, "Ward's Island – Concept 1, 2, 3, the Toronto Islands Flood and Risk Assessment", Project No. 13520.101, dated October 4, 2021
- Baird, "Algonquin Island – Concept 1, 2, 3, the Toronto Islands Concept Design" Project No. 13520.101, dated September 24, 2021
- Baird, "Centre Island – Concept 1, 2, 3, the Toronto Islands Flood and Risk Assessment", Project No. 13520.101, dated October 4, 2021
- KWA Site Development Consulting Inc., "Toronto Island Park Flood and Erosion Mitigation Project, Toronto, Ontario", Project No. 21600, dated November 2021

A list of engineering reports containing factual information that assisted us in our scope of work is included in Section 10. Grounded has been provided with factual borehole information from previous studies on the Toronto Islands. Those borehole logs are provided in a report signed and sealed by professional engineers (who are also the authors of this report). As such, this borehole information (appended) is taken as factual for present purposes. Unless noted, borehole labels appended with "G-" refer to Grounded's boreholes, and boreholes with "T-" refer to Thurber's boreholes.

Grounded has conducted a visual site inspection and completed a subsurface investigation on the Islands. Grounded's subsurface investigation of the site to date includes nine (9) boreholes (Boreholes 101 to 111, excluding Boreholes 104 and 108) which were advanced from June 16th to 17th, 2021. Nine (9) pavement coreholes (C101 to C109) were also completed from June 16th to 17th, 2021 for the purposes of measuring existing pavement thicknesses and for asbestos sampling.

Based on the existing information and the new investigation, a baseline inventory has been completed for the geotechnical, hydrogeological, environmental, and hazardous conditions on the Islands. Preliminary geotechnical design advice and considerations for construction have been provided in support of the development of conceptual designs for long-term flood mitigation and erosion control of the Toronto Islands Park shoreline.

1.1 Study Areas

Our scope covers five distinct study areas which have been identified as low-lying and vulnerable, which were defined for us by the TRCA in our scope of work. These study areas are summarized in the table below and shown in plan on the appended figures.

Table 1.1 – Summary of Study Areas

ID	Study Area	Location	Description
1	Ward's Island	The eastern-most end of the Toronto Islands	Ward's Island is protected by a concrete seawall on the northeast side and rock berm on portions of the west side. The east side of Ward's Island is occupied by Ward's Island Park, which consists of forested land and Ward's Island Beach. This area is identified as being environmentally sensitive. The west side of Ward's Island is occupied by residential houses, roadways, sewer infrastructure, commercial buildings, and the Ward's Island Ferry Dock.
2	Algonquin Island	East end of the study area, north side of the Toronto Islands	Algonquin Island is protected by the main part of the Toronto Islands on the southeast side, and by a sea wall and sandbags on the northwest side. Two-thirds of Algonquin Island is occupied by residential buildings. The southwest side of Algonquin Island is occupied by Algonquin Island Park, which is forested and is the location of the Clubhouse.
3	Centreville	Centre and north side of The Toronto Islands	No residential buildings are located on Centreville. There are marinas, commercial buildings and the Centreville Island Ferry on the north side of the island. Centreville Amusement Park is present at the southeast end of Centreville.
4	The Toronto Islands Water Treatment Plant	Central portion of the Toronto Islands, between Muggs Island and Gibraltar Point Beach	The area is occupied by the Toronto Islands Water Treatment Plant and associated structures.
5.1	Lakeshore Avenue	Northwest end of The Toronto Islands, east of the Island Airport	Approximately 550 m in length.
5.2	Lakeshore Avenue	Southwest end of the Island, west of Trout Pond	Approximately 100 m in length.
5.3	Lakeshore Avenue	South of the the Toronto Islands Water Treatment Plant	Approximately 700 m in length.
5.4	Centre Island Park (Service) Road	East and north of the Toronto Islands Water Treatment Plant	Approximately 620 m in length.
5.5	Avenue of the Island	Runs through Centreville Island	Approximately 1,000 m in length.
5.6	Chippewa Avenue	Road to the Royal Canadian Yacht Club	Approximately 350 m in length.
5.7	Cibola Avenue	East to west running road that is south of the Royal Canadian Yacht Club	Approximately 400 m in length.
5.8	Cibola Avenue	East end of the Islands, east of Algonquin Island	Approximately 660 m in length.

1.2 Background Information

The Toronto Islands originated as a series of continuously moving sand bars, formed by soils deposited by the eroding Scarborough Bluffs carried westward by the Lake Ontario currents. In the 1800's residents from Toronto began building summer homes on the Islands. High lake levels continuously damaged the Islands' properties following the construction of dwellings and other infrastructure. In 1956, the City of Toronto transferred the responsibility of the Islands to the Municipality of Metropolitan Toronto to be developed into a regional park.

Flooding on the Toronto Islands in the spring of 2017 was caused by record breaking Lake Ontario water levels, which reached as high as Elev. 75.9± m IGLD (International Great Lakes Datum). Emergency efforts including the installation of sandbags, metre bags, and industrial pumps were deployed to combat the flooding. The Islands were closed for the majority of the peak season, disrupting an important source of revenue for the City and local businesses.

Following the flooding in 2017, work to repair the damaged areas was undertaken in 2018. On Ward's Island and Algonquin Island, berms were constructed from metre bags. Twelve (12) sump pits were installed to collect surface water and drain low lying saturated areas using weeping tiles. At that time, Baird was engaged to start their Toronto Islands Flood Characterization and Risk Assessment Project.

Flooding in 2019 surpassed the previous 2017 record, reaching as high as 76.0± m IGLD. The impact of the flooding was greatly reduced due to lessons learned from the 2017 event. Emergency measures including sandbags, Aqua Dams, and pumps were used in critical areas identified as a part of the study completed by Baird. The study continues, with the most recent update issued in June 2019.

The City of Toronto is currently developing a Master Plan for the Toronto Islands Park. Recent pressures on the Islands include increased demand, aging infrastructure, and flooding. The Master Plan is being undertaken concurrently with the Class EA process. The goal of the Master Plan is to improve the park to provide better public and user experiences, allow for greater accessibility, highlight the cultural and natural heritage of the park, and ensure that the park will be sustainable for future generations. The Class EA will be the primary driver for the shoreline protection measures with coordination with the Master Plan to transform the technical solutions into park features and amenities to enhance the user experience, accessibility, and the public realm of the park.

2 Baseline Geotechnical Conditions

Grounded's subsurface investigation of the Islands to date includes nine (9) boreholes and nine (9) pavement coreholes which were advanced on June 16 to 17, 2021. The boreholes completed for this scope of work are outlined in the table below.

Table 2.1 – Summary of Scope of Work

Type	ID	Applicable Study Areas
Borehole	101	**1.** Ward's Island and **5.8** Cibola Ave
Borehole	102	**5.8** Cibola Ave
Borehole	103	**5.7** Cibola Ave
CANCELLED*	104	n/a
Borehole	105	**3.** Centreville Island and **5.5** Avenue of the Island
Borehole + Well	106	**3.** Centreville Island and **5.5** Avenue of the Island
Borehole	107	**4.** The Toronto Islands Water Treatment Plant and **5.4** Centre Island Park (Service) Road
CANCELLED*	108	n/a
Borehole	109	**5.1** Lakeshore Ave
Borehole	110	**5.1** Lakeshore Ave
Borehole + Well	111	**1.** Ward's Island and **5.8** Cibola Ave
Pavement Corehole	C101	**5.8** Cibola Ave
Pavement Corehole	C102	**5.7** Cibola Ave
Pavement Corehole	C103	**5.7** Cibola Ave
Pavement Corehole	C104	**5.5** Avenue of the Island
Pavement Corehole	C105	**5.5** Avenue of the Island
Pavement Corehole	C106	**5.3** Lakeshore Ave
Pavement Corehole	C107	**5.4** Centre Island Park (Service) Road
Pavement Corehole	C108	**5.3** Lakeshore Ave
Pavement Corehole	C109	**5.2** Lakeshore Ave

*Borehole could not be drilled due to the utilities in the area
n/a = Borehole could not be drilled due to the utilities in the area.

Previous studies completed by Grounded on the Islands have been reviewed and incorporated into this scope of work. The previous studies referenced are summarized as follows:

- **Grounded Engineering Inc., "Geotechnical Engineering Report, The Toronto Islands Emergency Road Improvements and Berm Implementation, Toronto, Ontario", File No. 20-026, dated April 22, 2020.** This report provides emergency geotechnical advice for raising the pavements in 3 locations: Seneca Avenue, Cibola Avenue, and Lakeshore Avenue.
- **Grounded Engineering Inc., "Berm Geotechnical Design Brief (Algonquin Island), The Toronto Islands Emergency Road Improvements and Berm Implementation, Toronto, Ontario", File No. 20-026, dated June 5, 2020.** This report provides discussion on creating a berm to be used as flood protection on the north shore of Algonquin island along Seneca Avenue Street.

- **Grounded Engineering Inc., "Bedrock Geotechnical Data Report, Deep Lake Water Cooling (DLWC) Expansion Project, Toronto, Ontario", File No. 19-057, dated June 30, 2020.** This report includes a review of historical borehole information as well as new boreholes advanced for a proposed Enwave expansion tunnel advanced in bedrock from the John Street Pumping Station, through Muggs Island, to the south side of the IFP.
- **Thurber Engineering Ltd., "Final Geotechnical Data Report, Deep Lake Water Cooling Expansion Project, Toronto, Ontario", File No. 27667, dated June 30, 2020.** This report includes a review of historical borehole information as well as new boreholes advanced for a proposed Enwave expansion tunnel advanced in soil beneath the IFP.

A summary of the applicable subsurface investigation for each study area is included in the table below.

Table 2.2 – Summary of Investigation for Each Study Area

Identification	Study Area	Applicable Boreholes, Wells and Pavement Coreholes
1	Ward's Island	BH111, BH101
2	Algonquin Island	B1*, B2*, B3*, B4*
3	Centreville	BH105, BH106
4	The Toronto Islands Water Treatment Plant	BH107, BH G103*, T105*, T104*
5.1	Lakeshore Avenue	BH109, BH110
5.2	Lakeshore Avenue	C109
5.3	Lakeshore Avenue	C108, C106, T 105*
5.4	Centre Island Park (Service) Road	BH107, C107, BH G103*
5.5	Avenue of the Island	BH105, BH106, C104, C105
5.6	Chippewa Avenue	n/a
5.7	Cibola Avenue	BH103, C102, C103
5.8	Cibola Avenue	BH101, BH102, BH111, C101

n/a = Investigation could not be completed due to the utilities in the area.
*Boreholes advanced as a part of a separate investigation.

The borehole results are detailed on the attached borehole logs. Our assessment of the relevant stratigraphic units is intended to highlight the strata as they relate to geotechnical engineering. The ground conditions reported here will vary between and beyond the borehole locations.

These stratigraphic boundary lines represent transitions between soil types and should be regarded as approximate and gradual. They are not exact points of stratigraphic change.

Elevations, where noted, are measured relative to geodetic datum (International Great Lakes Datum 1985). All horizontal coordinates are provided relative to the Universal Transverse

Mercator (UTM NAD83 Zone 17N) geographic coordinate system, except Boreholes G103, T104 and T105, which are provided relative to the Modified Transverse Mercator (MTM NAD27, Zone 10) geographic coordinate system.

Boreholes and pavement coreholes completed during the 2021 site investigation have not yet been surveyed to a geodetic datum. The TRCA will be completing surveys on the Islands which will include surveying the borehole locations. This report must be updated with geodetic elevations when they survey has been completed.

Asphalt and granular thicknesses reported here are observed in individual borehole locations through the top of the open borehole. Thicknesses may vary between and beyond the boreholes.

2.1 Soil Stratigraphy

The following soil stratigraphy summary is based on the borehole results and the geotechnical laboratory testing.

2.1.1 Existing Pavements

Grounded cored the pavement using a Hilti drill. Nine (9) pavement core samples were taken. The findings are summarized in the table below.

Table 2.3 – Summary of Pavement Cores

ID	Study Area Roads	Core ID	Northing	Easting	Surface Composition	Thickness	Granular Thickness
5.8	Cibola Ave	C101	4831846	632562	Asphalt	75 mm	60 mm
5.7	Cibola Ave	C102	4831269	632055	Asphalt	150 mm	50 mm
5.7	Cibola Ave	C103	4831010	631800	Asphalt	125 mm	0 mm
5.5	Avenue of the Island	C104	4830960	631293	Asphalt	75 mm	50 mm
5.5	Avenue of the Island	C105	4831194	630752	Asphalt	100 mm	0 mm
5.3	Lakeshore Ave	C106	4830276	630761	Asphalt	100 mm	50 mm
5.4	Centre Island Park (Service) Road	C107	4830580	630477	Asphalt	100 mm	75 mm
5.3	Lakeshore Ave	C108	4830183	630443	Asphalt	100 mm	25 mm
5.2	Lakeshore Ave	C109	4830371	629934	Asphalt	50 mm	50 mm

Asbestos testing was conducted on the pavement cores. The results are summarized in the section below.

Asphalt observations were also conducted in the augered boreholes advanced on the Islands. The observations are noted on the borehole logs and summarized in the table below.

Table 2.4 – Summary of Asphalt Structure encountered in Boreholes

ID	Study Area Roads	Borehole ID	Surface Composition	Thickness	Granular Thickness
5.8	Cibola Ave	101	Asphalt	50 mm	25 mm
5.8	Cibola Ave	102	Asphalt	75 mm	75 mm
5.7	Cibola Ave	103	Asphalt	75 mm	25 mm
5.5	Avenue of the Island	105	Asphalt	100 mm	25 mm
5.5	Avenue of the Island	106	Asphalt	100 mm	0 mm
5.4	Centre Island Park (Service) Road	107	Asphalt	100 mm	25 mm
5.4	Centre Island Park (Service) Road	G103	Asphalt	90 mm	n/a
5.3	Lakeshore Ave	T105	Asphalt	70 mm	n/a
5.1	Lakeshore Ave	109	Asphalt	75 mm	50 mm
5.1	Lakeshore Ave	110	Asphalt	100 mm	50 mm
5.8	Cibola Ave	111	Asphalt	50 mm	0 mm

The asphalt observations in both the coreholes and augered boreholes advanced on the Islands are summarized by study area below.

Table 2.5 – Summary of Asphalt Structure encountered in each Study Area

ID	Study Area Roads	Surface Composition	Thickness Range	Granular Thickness Range	Applicable boreholes, wells, and coreholes
5.1	Lakeshore Avenue	Asphalt	75 – 100 mm	50 mm	BH109, BH110
5.2	Lakeshore Avenue	Asphalt	50 mm	50 mm	C109
5.3	Lakeshore Avenue	Asphalt	70 – 100 mm	0 – 50 mm	T105*, C106, C108
5.4	Centre Island Park (Service) Road	Asphalt	90 – 100 mm	0 – 75 mm	BH107, G103*, C107
5.5	Avenue of the Island	Asphalt	75 – 100 mm	0 – 50 mm	BH105, BH106, C104, C105
5.6	Chippewa Avenue	Asphalt and Concrete	Unknown	Unknown	n/a
5.7	Cibola Avenue	Asphalt	75 – 150 mm	0 – 50 mm	BH103, C102, C103
5.8	Cibola Avenue	Asphalt	50 – 75 mm	25 – 75 mm	BH101, BH102, C101

n/a = Investigation could not be completed on Chippewa Avenue due to the unknown utilities in this area.

2.1.2 Earth Fill

Underlying the surficial materials, the boreholes (except Boreholes 103, 106, 107, and 111) observed a layer of earth fill that extends to depths of 0.5 to 1.5 metres below grade (Elev. 74.3 to 75.4 m). Boreholes 102 and 105 were terminated in the earth fill. The earth fill varies in composition but generally consists of gravelly sand to sandy silt with trace to some gravel and trace clay. Deleterious material encountered in the earth fill includes trace brick fragments, trace concrete, trace organics and trace rootlets were also encountered in the earth fill. The earth fill is typically brown to dark brown and moist.

Due to the variation and inconsistent placement of the earth fill material, the relative density of the earth fill varies but is generally loose to compact.

2.1.3 Native Soils

Underlying the surficial materials or earth fill, the current boreholes encountered native sands at 0.1 to 0.9 m depth (Elev. 75.1 to 76.4 m), extending to target investigation depth (Elev. 72.8 m). The native sands comprise sand with trace to some silt and trace gravel to gravelly. Trace shell fragments and organics were encountered in Borehole 106. The native sands are generally brown to dark brown and moist to wet. The native soils generally have a loose relative density.

Boreholes T104, T105 and G103 were completed by Thurber and Grounded at the Toronto Islands Water Treatment Plant as a part of a separate investigation in 2020, for an Enwave expansion project. Borehole T104 was terminated in the sands unit at a depth of 18.9 m (Elev. 57.2 m). Borehole G103 encountered cohesionless sands continuing to the bedrock surface a depth of 47.3 m (Elev. 28.7 m). Borehole T105 encountered cohesionless sands extending to a depth of 62.0 m (Elev. 13.8 m). Standard Penetration Test (SPT) results (N-Values) measured in the sands indicate that the sands are generally loose to compact and wet. Dense to very dense sands were encountered in Borehole G103 at 36.6 m depth (Elev. 39.4 m) and in Borehole T105 at 49.8 m (Elev. 26.0 m). Underlying the sands in Borehole T105 silty clay with trace sand to sandy and trace gravel was encountered, extending to the bedrock surface at 68.0 m (Elev. 7.6 m). The clay is grey and moist. The SPT N-values in silty clay indicate a stiff to hard consistency.

2.1.4 Bedrock

Boreholes G103 and T105 were advanced at the Toronto Islands Water Treatment Plant as a part of a separate scope of work on the Islands in 2020. Borehole G103 encountered bedrock at a depth of 47.3 m (Elev. 28.7 m) and T105 encountered bedrock at a depth of 68.0 m (Elev. 7.6 m). The bedrock was confirmed by rock cores recovered in the boreholes.

Detailed core logs are included with the corresponding borehole logs. Photographs of the recovered rock core and a guide of rock core terminology are appended. The rock core terminology sheet defines many of the descriptive terms used below.

The elevation of the bedrock on the Islands decreases from the north to the south and is expected to roughly follow the bathymetry of Lake Ontario. Due to variability in the elevation of bedrock, if bedrock is to be used for any of the conceptual design options, additional boreholes advanced to the bedrock surface are required.

The bedrock beneath the Islands is the Georgian Bay Formation, which comprises thin to medium bedded grey shale and limestone of Ordovician age. The shale is interbedded with calcareous shale, limestone, dolostone, and calcareous sandstone (conventionally grouped together as "limestone") which are typically laterally discontinuous. Per the appended terminology, the Georgian Bay shale is typically classified as "weak" whereas the limestone interbedding is classified as "strong".

2.2 Groundwater

See Section 3.2 below for details on the groundwater.

2.3 Frost Susceptibility

A soil's susceptibility to frost heave is related to the percentage of silt and very fine sand in the soil, as frost heave impacts fine-grained soils with low cohesion and high capillarity. The site soils are classified for susceptibility to frost heave according to their grain size distributions on this basis. Geotechnical laboratory results for this site are appended. Per the Second Edition of the Pavement Design and Rehabilitation Manual by the Ministry of Transportation in Ontario, the following table summarizes the relationship between grain size and frost heave susceptibility:

Table 2.6 – Relationship Between Grain Size and Frost Susceptibility (MTO)

Grain Size Percentage between 5 and 75 µm	Susceptibility to Frost Heaving
0 to 40%	Low
40 to 55%	Moderate
55 to 100%	High

Per the grain size data measured in the site soils, frost heave susceptibility is summarized accordingly:

Table 2.7 – Summary of Susceptibility to Frost Heave

Stratum	Grain Size Percentage between 5 and 75 µm	Susceptibility to Frost Heaving
Earth Fill	Est. 10%	Low
Native Sands	5-13%	Low

2.4 Proctor Test Results

As a part of emergency works, the Toronto Islands Works Yard sand stockpile was tested for potential use as OPSS 1010 Granular A. Two (2) proctor samples (SA1 and SA2) were obtained from the approximately 1500 m^3 stockpile on March 25, 2020. The proctor samples were composed of smaller grab samples, obtained via shovel, from all areas of the stockpile to create the two representative samples. The results of the Proctor Test indicate a Standard Proctor Maximum Dry Density of 16.4 and 16.6 kN/m^3 at an optimum moisture content of 15.5% and 15.0%, respectively. The results are provided in Appendix G.

The results of the grain size analysis testing on the Toronto Islands Works Yard sand stockpile show that it is a fine to medium sand with no gravel. This does not meet the specifications for OPSS 1010 Granular A. However, the sand stockpile generally meets the specifications for OPSS 1010 Granular B Type I and can be used for some minor grade changes between the 200 mm thick Granular A base and the existing prepared road, soft spot remediation, or to provide a smooth base after the existing pavement is pulverized in place. Results of grain size analysis are provided in Appendix G.

2.5 Cone Penetration Testing

A site investigation consisting of three cone penetration tests (CPTu) was advanced across the Toronto Islands in March 2020 by ConeTec Investigations Ltd. (ConeTec) as subcontracted to Grounded, for the Enwave expansion project. The CPTu were advanced using a hydraulically pushed probe (piezocone) into the ground at a rate of about 2 cm/s to measure a continuous profile of tip resistance, sleeve friction, and pore water pressure. No samples are obtained using this method. The CPTu services were provided by a professional CPTu subcontractor. The raw data was processed by the subcontractor's professional engineer, who provided a factual report. The applicable ASTM standards are provided in the CPTu report. The results of the CPTu testing are appended.

3 Baseline Hydrogeological Conditions

The existing surface water and groundwater regime was determined through monitoring wells, topographic maps, and visual site inspection.

3.1 Existing Surface Water Drainage

A site inspection was conducted on July 28, 2021 by Suvish Melanta of Grounded Engineering to assess the presence of surface water features on and bounding the study areas at the Islands. Representative photos of the site features observed during the visual inspection are appended.

Table 3.1 – Summary of Existing Surface Water Drainage Features in the Study Areas

Identification	Study Area	Summary of Surface Water Drainage Features
1	Ward's Island	▪ Generally flat lying area with grassed surface cover on the west portion and sandy beached areas on the east portion along Ward's Island Beach. ▪ Mature trees and dense vegetation present across the study area, including within the residential areas. ▪ Surface runoff is limited on the northwest and northeast sides of Ward's Island, where a concrete seawall or rock berms protect the shoreline. ▪ Phreatophyte vegetation indicating natural ponding/saturated area was observed north of First Street. ▪ Multiple sump pumps are present within the western portion of study area to actively pump ponding water back into the lake. Catch basins observed are expected to direct water to the sump pumps. ▪ Surface runoff appears to flow towards the Lake on the south, west, and north sides of the island or infiltrates into the ground. ▪ Fire hydrants and municipal sewer manholes were observed along Study area.
2	Algonquin Island	▪ Generally flat lying area with grassed surface cover and interlocking/concrete streets or walkways. ▪ Mature trees and dense vegetation present across the study area, including within the residential area. ▪ Surface runoff is limited on the north/west sides of the island, where a seawall protects the shoreline. ▪ Sump pumps are present on the north and west sides of Algonquin Island to actively pump ponding water back into Lake Ontario. Catch basins observed are expected to direct water to the sump pumps. ▪ Surface runoff appears to be towards the Lake on the south, west, and east sides of the island or infiltrates into ground. ▪ Fire hydrants and municipal sewer manholes were observed along study area.
3	Centreville	▪ Generally flat lying area with grassed surface cover and asphalt/concrete streets or walkways. ▪ There are some small hills up to 1.5 m in height north of Duck Island, likely due to past earthworks on Centreville. ▪ Mature trees present across the study area, particularly along the shoreline. Otherwise, vegetation was limited to landscaped parkland. ▪ Surface runoff is limited on the northwest side of the island by the ferry terminal, where a seawall protects the shoreline. ▪ There are no sump pumps located on Centreville. Surface runoff appears to be towards the Duck Pond or the Lake or infiltrates into the ground as no stormwater control (e.g. catchbasins) were observed. ▪ Fire hydrants and municipal sewer manholes were observed along the roadways.

Identification	Study Area	Summary of Surface Water Drainage Features
4	The Toronto Islands Water Treatment Plant	▪ The water treatment plant is built up by approximately 4 to 5 m higher than the surrounding area. ▪ Vegetation primarily consists of landscaped areas within the treatment plant facility. Mature trees and dense vegetation are present along northeastern shoreline. ▪ There are no sump pumps within the study area. Surface runoff flows towards the Lake or infiltrates into the ground as no stormwater control (e.g. catchbasins) were observed. ▪ Fire hydrants and municipal sewer manholes were observed along Study area.
5.1	Lakeshore Avenue	▪ Generally flat asphalt roadway at same grade as surrounding landscaped areas. ▪ Some localized depressed areas on either side of Lakeshore Avenue near the washrooms, likely from historical ponding of stormwater runoff. ▪ Mature trees and dense vegetation present along shoreline. ▪ Surface runoff appears to be towards the Lake located or infiltrates into surrounding landscaped areas. ▪ A sump pump is present within the study area to actively pump ponding water back into the lake. ▪ Fire hydrants and municipal sewer manholes were observed along Study area.
5.2	Lakeshore Avenue	▪ Generally flat asphalt roadway at same grade as surrounding landscaped areas. The grade drops off towards Trout Pond (apparent wetland area) to the east. ▪ Mature trees and dense vegetation present along the roadside and shoreline. ▪ Surface runoff appears to be towards the Lake located 10-15 m away or infiltrates into ground as no stormwater control (e.g. catchbasins) were observed. ▪ Light Phreatophyte vegetation indicating saturated soils was observed on either side of the southern portion of the study area. ▪ On the west side of the road there was construction for the Gibraltar Point Sand Dune Restoration Project.
5.3	Lakeshore Avenue	▪ Generally flat asphalt roadway at same grade as surrounding densely vegetated or beached areas on the south side. The grade gently drops on the north side towards Lighthouse Pond (apparent wetland areas) or the water treatment plant. ▪ Mature trees and dense vegetation are present along shoreline. Heavy Phreatophyte vegetation indicating saturated soils was observed on north side of the study area leading to Lighthouse Pond. ▪ A rock berm wall is present along the southeast portion of the study area along the shoreline. ▪ There are no sump pumps within the study area. Surface runoff appears to be towards the Lake/ponds or infiltrates into the landscaped ground as no stormwater control (e.g. catchbasins) observed. ▪ Fire hydrants and municipal sewer manholes were observed along Study area. ▪ On the southwest side of the road there was construction for the Deep Lake Water Cooling System Expansion Project.

Identification	Study Area	Summary of Surface Water Drainage Features
5.4	Centre Island Park (Service) Road	▪ The road is located at a lower elevation than the water treatment plant. However, generally flat asphalt roadway at same grade as southern landscaped/densely vegetated areas. The grade gently drops off 1-2 m on the north/east side towards Long Pond. ▪ Mature trees and dense vegetation are present to the north/east, and landscaped areas with rolling hills (likely from previous earthworks for the water treatment plant) was present on the southern/western sides. ▪ There are no sump pumps within the study area. Surface runoff appears to be towards the Lake or infiltrates into the ground as no stormwater control (e.g. catchbasins) were observed. ▪ Fire hydrants and municipal sewer manholes were observed along Study area.
5.5	Avenue of the Island	▪ Generally flat concrete and asphalt roadway at same grade as surrounding landscaped areas. The grade gently drops off 1 m on the southeast portion towards Duck Pond. ▪ Along the central portion, the road is located at a lower elevation than adjacent landscaped areas to the east due to the presence of hills (likely from previous earthworks at the island). ▪ Minor ponding was noted along the concrete roadway, near the washrooms. ▪ There are no sump pumps within the study area. Surface runoff appears to be towards the pond/Lake or infiltrates into the ground as no stormwater control (e.g. catchbasins) were observed. ▪ Fire hydrants and municipal sewer manholes were observed along Study area.
5.6	Chippewa Avenue	▪ The road is generally flat. The surrounding grade slopes towards the Lake, located 1 m away on the west side. ▪ The road transitions from concrete block/asphalt to the north, to asphalt walkway to the south. ▪ Mature trees and dense vegetation are present along both sides of the road. ▪ There are no sump pumps within the study area. Surface runoff appears to be towards the Lake or infiltrates into the ground as no stormwater control (e.g. sumps, catchbasins) were observed. ▪ Fire hydrants were observed along Study area.
5.7	Cibola Avenue	▪ The asphalt road is generally flat and at grade with landscaped/ vegetated areas to the south. To the west, the grade drops approx. 0.5-1m to form a natural swale along the northern roadway. The road grade then gradually rises to be at grade with surrounding landscaped areas to the east. ▪ Mature trees and dense vegetation present along the roadside and shoreline. ▪ There are no sump pumps within the study area. Surface runoff towards the Lake or infiltrates into the ground as no stormwater control (e.g. catchbasins) observed. ▪ Fire hydrants and municipal sewer manholes were observed along Study area.

Identification	Study Area	Summary of Surface Water Drainage Features
5.8	Cibola Avenue	▪ The asphalt road is generally flat and is at grade with surrounding landscaped/vegetated areas. The Lake is less than 25 m to the north in some areas. ▪ Mature trees and dense vegetation are present along the roadside and shoreline. ▪ A bioswale was identified at the southwest intersection of Algonquin Bridge Road. ▪ Multiple sump pumps are present within the north portion of the study area to actively pump ponding water back into the Lake. Catch basins observed are expected to direct water to the sump pumps. ▪ Surface runoff towards the Lake or infiltrates into the ground. ▪ Fire hydrants and municipal sewer manholes were observed along Study area.

3.2 Groundwater Levels and Seepage

A total of two (2) monitoring wells were installed during the subsurface investigation. In addition, seven (7) monitoring wells were installed across the Islands as a part of previous investigations. Measurements taken in these wells are included in the appendix.

In general, the groundwater level is approximately at the same elevation as Lake Ontario. Seasonal fluctuations are expected to follow similar trends as in the fluctuations of the Lake levels.

No obvious areas of groundwater seepage were observed within the study areas during the July 2021 site visit. It is noted that Phreatophyte vegetation indicating saturated soils was observed in the following areas:

- Along Lakeshore Avenue near Trout Pond and Lighthouse Pond
- Along Centre Island Park (Service) Road near Long Pond
- North of First Street and on the eastern portion of Ward's Island

3.3 Groundwater Recharge and Discharge Zones

The subsurface across the study areas consistently comprises cohesionless sands that are loose to compact. Lake Ontario surrounds the entirety of the study area and is hydraulically connected to the groundwater table beneath the Islands. When the lake levels rise, the groundwater level also rises.

Precipitation and flood water within the study area may re-infiltrate and recharge where there are permeable surfaces such as bare or vegetated ground, preferentially in low lying areas. However, runoff infiltration within flat lying landscaped areas is expected to be limited and dependent on the available separation between the grade and the seasonal groundwater table/Lake Levels. Infiltration/recharge is expected to be minimal where there are hard surfaces, such as buildings,

asphalt, concrete, etc. Infiltration will also not occur where the ground is saturated such as near wetland areas.

Some evapotranspiration will occur in areas where there is thick vegetation or within wetland systems. Two wetland areas around Duck Pond and Lighthouse Ponds were observed during the July 2021 site inspection. This process is relatively slow and will have limited impact on the recharge and discharge cycle on the Islands.

Where the ground is saturated due to the high lake levels or groundwater levels, precipitation and flood water will not infiltrate back into the ground. When the lake/groundwater level is high or there are structures at the shoreline, minimal groundwater recharge/discharge will occur. Therefore, water will accumulate above the ground surface causing flooding.

Stormwater accumulation and groundwater discharge is currently primarily occurring via overland runoff into the Lake and ponds. Figures 3 to 7 depict the flood depth across the Islands. The flooded areas will remain wet and saturated until the water evaporates/re-infiltrates or is actively removed.

If detailed design requires the infiltration potential of the ground to be determined, Guelph Permeameter testing should be conducted in accordance with TRCA stormwater management guidelines.

3.4 Existing Condition of Stormwater Infrastructure

Shoreline protection i.e. rock berm wall, sea walls, is present across the majority of the study area. The shoreline protection is being assessed by Baird and is outside Grounded's scope of work. The primary purpose of the shoreline protection is to prevent Lake Ontario from eroding the shoreline.

The stormwater infrastructure on the Islands consists of sump pumps installed during the 2018 repair works. The sump pumps collect and discharge water back into the Lake during periods of high water levels and storm events. There are sump pumps located at Ward's Island, Algonquin Island, and Lakeshore Avenue. The location of the sump pumps can be seen in Figures 3 to 7.

There are sanitary sewers only across the Islands. Storm water control (i.e. catch basins) were observed to be minimal throughout the study area during the July 2021 site inspection. Storm water is not collected in sewers due to the large volumes of water. The approximate location of the sanitary sewers can be seen in Figures 3 to 7.

The following was noted during the July 2021 site inspection with respect to the existing stormwater infrastructure:

- The condition of the sump pumps and catch basins could not be assessed due to their location underground. The condition of the sump pumps/catch basins should be assessed regularly to confirm they are still in good condition.

- No obvious storm sewers or stormwater outlets were observed in the Study area, with the exception of a bioswale on the southwest corner of Algonquin Bridge Road and Cibola Avenue and catch basins within Ward's and Algonquin Island.
- Some areas of the concrete walkway/roadway along northern Chippewa Avenue (near a fire hydrant) was noted to be damaged, possibly due to erosion of the western shoreline.
- Some surface spalling of the concrete seawall along the northern shoreline at Ward's Island was observed. Regular assessment of the seawall should be completed to confirm they are still in good condition.

4 Baseline Environmental Conditions

4.1 Water Quality

The water quality of each study area (excluding the roads) was tested in accordance with the Provincial Water Quality Objectives (PWQO). The purpose of this testing is to protect aquatic life and recreation uses of Lake Ontario in the event that water is discharged into the Lake during construction.

A total of four (4) samples of groundwater were collected from groundwater monitoring wells all study areas excluding the roads. The analysis was conducted for the parameters: Metals & Inorganics.

The certificates of analysis are appended and the results are summarized in the table below.

Table 4.1 – Summary of Groundwater Quality from PWQO testing

ID#	Study Area	Sample ID	Depth to base of well (mbgs)	Elev. of base of well (masl)	Exceedances
1	Ward's Island	BH111	2.6	73.1	▪ Sulphide (Result 0.021 mg/L, Criteria 0.002 mg/L, RDL 0.010 mg/L) ▪ Total Phosphorous (Result 0.25 mg/L, Criteria 0.01 mg/L, RDL 0.04 mg/L) ▪ Total Sulphide (Result 0.02 mg/L, Criteria 0.002 mg/L, RDL 0.0090 mg/L) ▪ Total Cobalt (Result 1.2 ug/L, Criteria 0.9 ug/L, RDL 0.50 ug/L) ▪ Total Iron (Result 8600 ug/L, Criteria 300 ug/L, RDL 100 ug/L) ▪ Total Lead (Result 10 ug/L, Criteria 5 ug/L, RDL 0.50 ug/L)
2	Algonquin Island	B3	3.1	73.1	▪ Sulphide (Result 0.087 mg/L, Criteria 0.002 mg/L, RDL 0.0020 mg/L) ▪ Total Phosphorous (Result 0.08 mg/L, Criteria 0.01 mg/L, RDL 0.02 mg/L) ▪ Total Sulphide (Result 0.082 mg/L, Criteria 0.002 mg/L, RDL 0.0018 mg/L) ▪ Total Cobalt (Result 1.4 ug/L, Criteria 0.9 ug/L, RDL 0.50 ug/L) ▪ Total Iron (Result 6000 ug/L, Criteria 300 ug/L, RDL 100 ug/L)
3	Centreville Island	BH106	2.6	73.9	▪ Sulphide (Result 0.019 mg/L, Criteria 0.002 mg/L, RDL 0.010 mg/L) ▪ Total Phosphorous (Result 1.1 mg/L, Criteria 0.01 mg/L, RDL 0.02 mg/L) ▪ Total Sulphide (Result 0.018 mg/L, Criteria 0.002 mg/L, RDL 0.0090 mg/L) ▪ Total Cobalt (Result 1.9 ug/L, Criteria 0.9 ug/L, RDL 0.50 ug/L) ▪ Total Iron (Result 1600 ug/L, Criteria 300 ug/L, RDL 100 ug/L)
4	The Toronto Islands Water Treatment Plant	G103S	13.7	62.3	▪ Sulphide (Result 0.61 mg/L, Criteria 0.002 mg/L, RDL 0.010 mg/L) ▪ Phenols-4AAP (Result 0.0033 mg/L, Criteria 0.001 mg/L, RDL 0.0010 mg/L) ▪ Total Phosphorous (Result 0.40 mg/L, Criteria 0.01 mg/L, RDL 0.02 mg/L) ▪ Total Sulphide (Result 0.58 mg/L, Criteria 0.002 mg/L, RDL 0.0090 mg/L) ▪ Dissolved Aluminum (Result 26 ug/L, Criteria 15 ug/L, RDL 5 ug/L) ▪ Total Copper (Result 5.5 ug/L, Criteria 5 ug/L, RDL 0.90 ug/L) ▪ Total Iron (Result 1600 ug/L, Criteria 300 ug/L, RDL 100 ug/L) ▪ Total Lead (Result 5.5 ug/L, Criteria 5 ug/L, RDL 0.50 ug/L)

4.2 Soil/Fill Quality

Five (5) samples of soil were submitted for analysis of O.Reg. 558 Schedule 4 parameters (TCLP analysis) for waste classification purposes. The analysis was conducted for the following parameters:

- Benzo(a)pyrene
- Metals & Inorganics
- Polychlorinated Biphenyls (PCBs)
- Volatile Organic Compounds (VOCs)

A summary of the samples and the results are summarized in the table below.

Table 4.2 – Summary of Soil/fill Quality from TCLP Testing

ID#	Study Area	Sample ID	Results
1	Ward's Island	BH101	Non-hazardous
5	Roadways	BH102	Non-hazardous
3	Centreville Island	BH105	Non-hazardous
4	The Toronto Islands Water Treatment Plant	BH107	Non-hazardous
5	Roadways	BH108	Non-hazardous

The results of chemical analysis indicate that the soil as sampled is considered **non-hazardous** and should be handled as accordingly.

The laboratory Certificates of Analysis are appended.

4.3 Contaminated Soils

Chemical testing of soil samples collected in boreholes advanced across the study area was conducted in select boreholes to identify potential soil contamination across the study areas. The soil sampling and testing was completed in accordance with O.Reg 153/04.

4.3.1 Location and Depth of Samples

Table 4.3 – Summary of Contaminated Soil testing

Sample ID	Depth		Strata	Metals	H-Metals	ORPs	PHCs/BTEX
	mbgs	masl					
BH101-GS1	0-0.3	75.8-75.5	Fill	X	X	X	
BH101- GS2	0.6-0.8	75.2-75.0	Sand				X
BH102- GS1	0-0.3	75.8-75.5	Fill	X	X	X	
BH102- GS2	0.6-0.8	75.2-75.0	Fill				X
BH103- GS1	0-0.3	75.7-75.4	Sand	X	X	X	
BH103- GS2	0.8-0.9	74.9-74.8	Sand				X
BH105-GS1	0.1-0.3	76.1-75.9	Fill	X	X	X	
BH105-GS3	1.4-1.5	74.8-74.7	Fill				X
BH106-SS1	0.1-0.6	76.4-75.9	Sand	X	X	X	
BH106-SS3	1.5-2.1	75.0-74.4	Sand				X
BH107-GS1	0-0.3	75.9-75.6	Sand	X	X	X	
BH107-GS3	0.9-1.1	75.0-74.8	Sand				X
BH109-GS1	0.1-0.3	75.8-75.6	Fill	X	X	X	
BH109-GS2	0.6-0.8	75.3-75.1	Sand				X
BH110-GS1	0.2-0.3	75.8-75.7	Fill	X	X	X	
BH110-GS2	0.9-1.1	75.1-74.9	Sand				X
BH111-SS1	0.1-0.6	75.6-75.1	Sand	X	X	X	
BH111-SS2	0.8-1.4	74.9-74.3	Sand				X

4.3.2 Comparison to Applicable Standards

Selected soil samples were analyzed for Contaminants of Potential Concern (CoPCs) of the following:

- Metals
- Hydride-Forming Metals
  - Sb, As, Se
- Select ORPs
  - B-HWS
  - CN-
  - EC
  - SAR
  - Cr(VI)
  - Hg
- PHCs
- BTEX

The results of the analysis were compared to the applicable Site Condition Standard for the study area (O.Reg. 153/04 - Table 1 Res/Park). The laboratory certificates of analysis are provided in Appendix K, and the results of the soil chemical analysis are provided in Table 4.3.

Table 4.3 – Summary of parameters analysed and exceedances

Comparison Table (Table 1 Res/Park Standard)		
Parameter Analyzed	**Exceed/Meet**	**Note {BH-Sample}**
Metals	Meet	None
Hydride-forming Metals	Meet	None
ORPs	Exceed	{BH101-GS1} SAR (Result 2.8, Criteria 2.4)
PHC	Exceed	{BH101-GS2} F3 (C16-C34) (Result 250 ug/g, Criteria 240 ug/g, RDL 50 ug/g) F4 (C34-C50) (Result 580 ug/g, Criteria 120 ug/g, RDL 50 ug/g) F4 Gravimetric (Result 2000 ug/g, Criterial 120 ug/g, RDL 100 ug/g) {BH110-GS2} F2 (C10-C16) (Result 14 ug/g, Criteria 10 ug/g, RDL 10 ug/g) {BH111-GS2} F2 (C10-C16) (Result 12 ug/g, Criteria 10 ug/g, RDL 10 ug/g)
BTEX	Meet	None

5 Baseline Hazardous Lands/Sites

5.1 Asbestos

Asbestos fibres were used as a reinforcing agent for the asphalt-cement mixture in the 1960s and 1970s. Asbestos testing was conducted on asphalt cores collected on The Toronto Islands to identify the presence of asbestos in the pavement.

Nine (9) pavement core samples were collected and all cores were analysed for Asbestos. The certificate for analysis are appended and the results are summarized in the table below.

Table 5.1 – Summary of Asbestos Testing

ID	Study Area, Roads	Core #	Composition	Asbestos Detected
5.8	Cibola Ave	C101	Asphalt	None detected
5.7	Cibola Ave	C102	Asphalt	None detected
5.7	Cibola Ave	C103	Asphalt	None detected
5.5	Avenue of the Island	C104	Asphalt	None detected
5.5	Avenue of the Island	C105	Asphalt	None detected
5.3	Lakeshore Ave	C106	Asphalt	None detected
5.4	Centre Island Park (Service) Road	C107	Asphalt	None detected
5.3	Lakeshore Ave	C108	Asphalt	None detected
5.2	Lakeshore Ave	C109	Asphalt	None detected

Based on the results of the tested samples, the asphalt is considered as a “not asbestos containing material” under O.Reg. 278/05.

5.2 Slope Stability

A visual inspection was conducted across the study area on June 15, 2021 by Jory Hunter of Grounded Engineering. Representative photographs of each of the study areas are appended, with photo locations shown on Figures 3 to 7.

The Toronto Islands are relatively flat, with the elevation decreasing towards the shoreline. There are a few areas on Algonquin Island (Study Area 2) and Centreville (Study Area 3) where there are small hills up to 1.5 m in height. Based on the visual inspection, these areas do not warrant a slope stability review.

The Toronto Islands Water Treatment Plant (Study Area 4) is built up at a higher elevation then the surrounding land by approximately 4 to 5 m. The berms surrounding the property are inclined

at an angle of around 3H:1V or flatter and are vegetated with grass. Based on the visual inspection, these areas do not warrant a slope stability review.

Along the shoreline, there is either shoreline protection, beaches, vegetated ground or bare ground. The shoreline protection and beaches do not constitute a slope; therefore, these areas do not warrant a slope stability review. Where the shoreline has no protection and is not a beach, the shoreline is either completely vegetated or has some bare areas, indicating limited to minor coastal erosion. The shoreline is up to approximately 2 m in height and sloped at 2.5H:1V to subvertical. Based on the visual inspection these areas do not warrant a slope stability review.

Coastal protection and/or regrading may be proposed as a conceptual design option. If the proposed coastal protection includes berms or armourstone gravity walls, a global slope stability assessment may be required to support the design.

6 Geotechnical Engineering Considerations

Based on the factual data summarized above, we are providing the following preliminary geotechnical engineering design recommendations for the purposes of supporting the EA. Contractors must review the factual data while bidding or scoping services for this project and must provide their own opinion as to means, methods, and schedule.

This report assumes that the design features relevant to the geotechnical analyses will be in accordance with applicable codes, standards and guidelines of practice. If there are any changes to the site development features, or there is any additional information relevant to the interpretations made of the subsurface information with respect to the geotechnical analyses or other recommendations, then Grounded should be retained to review the implications of these changes with respect to the contents of this report.

6.1 Earth Pressure Design Parameters

At the study areas, the design parameters for structures subject to unbalanced earth pressures such as retaining walls are shown in the table below.

Table 6.1 – Earth Pressure Design Parameters

Stratigraphic Unit	γ	φ	K_a	K_o	K_p
Compact Granular Fill Granular 'B' (OPSS.MUNI 1010)	21	32	0.31	0.47	3.25
Existing Earth Fill	19	29	0.35	0.52	2.88
Sands	19	30	0.33	0.50	3.00

γ	=	soil bulk unit weight (kN/m^3)
φ	=	internal friction angle (degrees)
K_a	=	active earth pressure coefficient (Rankine, dimensionless)
K_o	=	at-rest earth pressure coefficient (Rankine, dimensionless)
K_p	=	passive earth pressure coefficient (Rankine, dimensionless)

These earth pressure parameters assume that grade is horizontal behind the retaining structure. If retained grade is inclined, these parameters do not apply and must be re-evaluated.

The following equation can be used to calculate the unbalanced earth pressure imposed on walls:

$$P = K[\gamma(h - h_w) + \gamma' h_w + q] + \gamma_w h_w$$

P	=	horizontal pressure (kPa) at depth h	γ	=	soil bulk unit weight (kN/m^3)
h	=	the depth at which P is calculated (m)	γ'	=	submerged soil unit weight (γ - 9.8 kN/m^3)
K	=	earth pressure coefficient	q	=	total surcharge load (kPa)
h_w	=	height of groundwater (m) above depth h			

If the wall backfill is drained such that hydrostatic pressures on the wall are effectively eliminated, this equation simplifies to:

$$P = K[\gamma h + q]$$

The soils at this site are hydraulically connected to Lake Ontario. A drained cavity made below the water table would not eliminate the hydrostatic pressure in the existing earth fill and sands, as the flow rate would overcome the drainage board capacity. Therefore, the full height of any retaining walls subjected to unbalanced earth pressures should be waterproofed and designed to withstand horizontal hydrostatic pressure below the design flood level for Lake Ontario.

The possible effects of frost on retaining earth structures must be considered. In frost-susceptible soils, pressures induced by freezing pore water are basically irresistible. Insulation typically addresses this issue. Alternatively, non-frost-susceptible backfill may be specified.

Foundation resistance to sliding is proportional to the friction between the soil subgrade and the base of the footing. The factored geotechnical resistance to friction ($\mathbf{R_f}$) at ULS provided in the following equation:

$$R_f = \Phi N \tan \varphi$$

R_f	=	frictional resistance (kN)
Φ	=	reduction factor per Canadian Foundation Engineering Manual (CFEM) Ed. 4 (0.8)
N	=	normal load at base of footing (kN)
φ	=	internal friction angle (see table above)

6.2 Excavations

Excavations must be carried out in accordance with the *Occupational Health and Safety Act – Regulation 213/91 – Construction Projects (Part III - Excavations, Section 222 through 242).* These regulations designate four (4) broad classifications of soils to stipulate appropriate measures for excavation safety. For practical purposes:

- The subgrade soils are Type 4 soils, or Type 3 soils if dewatered

In accordance with the regulation's requirements, the soil must be suitably sloped and/or braced where workers must enter a trench or excavation deeper than 1.2 m. Safe excavation slopes (of no more than 3 m in height) by soil type are stipulated as follows:

Table 6.2 – Safe excavation slopes by soil type (of no more than 3 m in height)

Soil Type	Base of Slope	Steepest Slope Inclination
1	within 1.2 metres of bottom of trench	1 horizontal to 1 vertical
2	within 1.2 metres of bottom of trench	1 horizontal to 1 vertical
3	from bottom of trench	1 horizontal to 1 vertical
4	from bottom of trench	3 horizontal to 1 vertical

Minimum support system requirements for steeper excavations are stipulated in Sections 235 through 238 and 241 of the Act and Regulations and include provisions for timbering, shoring and moveable trench boxes. Any excavation slopes greater than 3 m in height should be checked by Grounded for global stability issues.

Larger obstructions (e.g. buried concrete debris, other obstructions) not directly observed in the boreholes are likely present in the earth fill. Similarly, larger inclusions (e.g. cobbles and boulders) may be encountered in the native soils. The size and distribution of these obstructions cannot be predicted with boreholes, as the split spoon sampler is not large enough to capture particles of this size. Provision must be made in excavation contracts to allocate risks associated with the time spent and equipment utilized to remove or penetrate such obstructions when encountered.

6.3 Short-Term Groundwater Control

For practical purposes, the water table coincident with the level of Lake Ontario, which at time of investigation in June 2021 was approximately 1.1 to 1.8 metres (Elev. 75± m) below existing grade. Should excavations be made below these depths, it is expected that free-flowing groundwater will be encountered. As the groundwater in the soil subgrade is hydraulically connected to the lake, it will not be possible to dewater excavations that go substantially below the groundwater table without shoring and/or other methods to control groundwater flow.

Minor excavations that do not extend far below the groundwater table may be possible if done quickly, and with sumps. To investigate this, test pits can be advanced down to target excavation depth as part of detailed design, to better observe groundwater seepage volumes and rates and to determine feasibility. If water seepage volumes are low, short-term groundwater could be controlled by a conventional sump pump arrangement.

If deep excavations are required for design, the use of a sheet pile coffer dam, positive dewatering, or both (or other means and methods) may be required to lower the groundwater table will be

required to facilitate construction as well as to maintain the integrity of the subgrade for foundation and slab-on-grade support. Dewatering will take some time to accomplish prior to the start of excavation. The water level must be kept at least 1.2 m below the lowest excavation elevation during construction. Failure to dewater prior to excavation will result in unrecoverable disturbance of the subgrade (e.g. loss of bearing capacity). A dewatering subcontractor should be consulted for excavations extending below the groundwater table.

6.4 Grade Raises

Grade raises are proposed as a part of the conceptual design options for shoreline protection (earth berms) and flood protection (road raises) across the study areas. Where grade raises are proposed there may adjacent pavements, utilities, or adjacent structures that are sensitive to settlement.

Where grade raises are proposed, settlement should be assessed at the detailed design stage. The design team is to assess whether or not the estimated settlements can be tolerated by the existing utilities, pavements, or structures. If the estimated settlements are not tolerable, we can provide advice on mitigating or avoiding damage caused by settlement.

Previously, grade raises of 1.0 m have been found to be feasible on the Toronto Islands per Grounded's previous emergency road raise report. Grounded has also previously completed a settlement analysis for a typical earth berm with a clay core on Algonquin Island. The estimated maximum induced settlement in that location was 20 mm and occurs directly below the center of the proposed grade raise and decreases in a nonlinear fashion with distance towards the edges of the proposed grade raise.

For practical purposes, this settlement is linear, immediate, and non-recoverable. Differential settlement on services will be a function of the distance of the service from the maximum point of grade raise.

7 Development of Conceptual Designs

Baird has provided preliminary conceptual designs for long-term flood mitigation and erosion control of the Toronto Islands Park shoreline. The conceptual designs include protecting low-lying residential areas, elevating low-lying roads, increasing crest elevation of shore protection structures, and directing surface drainage to the sumps that were installed in 2018.

All proposed conceptual designs consider the 500-year stillwater level for Toronto as the design water level (as identified by Baird), at Elev. 76.25 m IGLD85.

7.1 Road Raises

One of the proposed alternatives is to raise the existing roads to Elev. 76.25 m IGLD85, to allow access for emergency vehicles in a flood condition.

7.1.1 Site Preparation and Sequence

The road raises will be accomplished in a similar manner to the emergency pavement works conducted by the TRCA, by breaking up the existing pavement and then raising the grades with the pavement components provided in Section 7.1.2. The raised roads must be protected from water infiltration and to prevent internal erosion by piping (i.e. excessive hydraulic gradient).

Prior to the placement of the aggregate pavement components required to raise the grade, the existing pavement may be broken up and left in place or removed. The broken pavement "subgrade" will then be proof rolled using non-vibratory equipment and inspected by Grounded for obvious loose or disturbed areas as exposed. These areas shall be replaced with Granular A (or reused sand stockpile material) compacted to 98% SPMDD.

The results of the grain size analysis testing on the Toronto Islands Works Yard sand stockpile show that it is a fine to medium sand with no gravel. This does not meet the specifications for OPSS 1010 Granular A. However, the sand stockpile generally meets the specifications for OPSS 1010 Granular B Type I and can be used for some minor grade changes between the aggregate (200 mm thick Granular A) base course and the existing prepared subgrade, soft spot remediation, or to provide a smooth base after the existing pavement is pulverized in place. Results of grain size analysis of the stockpiled material from 2020 are provided in Appendix G.

If the subgrade is pumping and heaving during the proof rolling with non-vibratory equipment, we recommend the use of a biaxial geogrid for use as subgrade reinforcement. If a biaxial geogrid is to be implemented, Terrafix TBX1500 (or equal as approved by Grounded) should be used.

The road must be constructed to resist flooding. The details and construction sequence will be provided on drawings by KWA as part of this EA. There are multiple construction options that may be designed so that the road is resistant to flooding, including:

1. Impermeable shoulder design
    a. Impermeable clay cap, or
    b. Concrete soft curb
2. Low permeability road construction
    a. Constructing the granular base course using OPSS Granular A Crusher Run Limestone (CRL), or
    b. Constructing a lean mix concrete core in the centre of the proposed road

The following design considerations would apply to the road raise.

Table 7.1 – Design considerations for road raise options

Design Option	Design Considerations[1]
Option 1: Clay Cap	1. Prepare the subgrade as described above. 2. Place and compact the granular base course (OPSS Granular A) according to specifications below and in the design drawings. Construct a side slope on the granular base course of no steeper than 1H:1V. 3. Subexcavate a 300 mm deep trench beside the toe of the newly placed granular base with side slope of no steeper than 1H:1V. Place the impermeable membrane against the granular base side slope from the base of trench to top of granular. 4. Place layers of hot mix asphalt as provided below. 5. Place and compact a min. 300 mm thick layer of clay against the impermeable membrane. Compact using hand compaction methods (plate tamper, tamping jack, etc.). 6. Finish the outside of the clay layer with topsoil and coir mat.
Option 2: Concrete Core	1. The road is to be constructed with min. 4 MPa lean mix concrete core surrounded by the granular base course. 2. Place the granular base course (OPSS Granular A) according to specifications below and in the design drawings. Construct a side slope on the granular base course of no steeper than 1H:1V. 3. The lean mix concrete core is to be 1 m wide at the crest of the road, and 2 m wide at the base. The core is to be sloped at a gradient of approximately 63% (2 vertical to 1 horizontal ratio). 4. The concrete core must be keyed into the ground by approximately 150 mm below existing grade. 5. Place layers of hot mix asphalt as provided below and in the design drawings. 7. Finish the outside of the raise road with topsoil and coir mat as provided on the design drawings.
Option 3: Concrete Curb	1. Place and compact the granular base course (OPSS Granular A) according to specifications below and in the design drawings. 2. Place layers of hot mix asphalt as provided below. 3. Construct the concrete soft curb.
Option 4: Crusher Run Limestone (CRL)	1. Place and compact the granular base course (OPSS Granular A CRL) according to specifications below and in the design drawings. In this application, the Granular A must comprise Crusher Run Limestone (CRL) material. Construct a side slope on the granular base course of no steeper than 1H:1V. 2. Place layers of hot mix asphalt as provided below and in the design drawings. 3. Finish the outside of the raise road with topsoil and coir mat as provided on the design drawings.

1. To be read in conjunction with the design drawings prepared by KWA.

7.1.2 Pavement Design

A non-standard asphaltic concrete pavement design loosely conforming to the City of Toronto standard and generally matching the existing pavement is provided. The pavement design recommendations are based on the subgrade support capabilities that will be available from the

prepared subgrade to a minimum 98% SPMDD, or proof-rolled and inspected by Grounded. No traffic data has been provided.

The subgrade for all pavement structures shall be frost tapered at a 3H to 1V slope to match with existing pavement structures, to reduce differential settlements due to frost heave.

The existing pavement has performed well. It comprises about 50 to 150 mm of asphalt, over existing subgrade. Up to 75 mm of granular base materials was observed in select locations. Where no granular base material was encountered, the "fill" material beneath the asphalt is sandy soil acting as aggregate base. On this basis we have assumed that the proposed pavement is consistent with a **Local Residential Road (3% commercial vehicles) on 30 MPa subgrade**. The non-standard asphalt pavement design is as follows:

Table 7.2 – Proposed pavement design

Pavement Structural Layers	Minimum Component Thickness
HMA Surface Course, **TS 1151 SP 12.5**	40 mm
HMA Binder Course, **TS 1151 SP 19.0**	60 mm
Granular Base Course, **OPSS 1010 Granular A**	Varies, min. 200 mm – use this to raise subgrade from existing to underside of asphalt

SP 12.5 and SP 19.0 hot mix asphalt mixes should be designed, produced and placed in conformance with TS 1151 and OPSS 310 requirements and the pertinent City's standards.

Granular base materials should meet the requirements of TS 1010. Granular materials should be compacted to 100 percent SPMDD at ±2 percent of optimum moisture content.

PG 64-28, conforming to TS 1101 is recommended in the HMA surface and binder courses.

Tack coat SS-1 should be applied between hot mix asphalt binder course and surface course.

Control of surface water is a significant factor in achieving good pavement life. Grading adjacent pavement areas must be designed so that water is not allowed to pond adjacent to the outside edges of the pavement or curb. The existing native soils have a low susceptibility to frost heave, and pavement on these materials must be designed accordingly.

The need for adequate subgrade drainage cannot be over-emphasized. The subgrade must be free of depressions and sloped (preferably at a minimum grade of three percent) to provide effective drainage towards the edge of roadway. The completed pavement surface should be provided with a grade of 2 percent towards the edge of roadway. Grading adjacent to the pavement areas should be designed to ensure that water is not allowed to pond adjacent to the outside edges of the pavement or berm side slopes.

7.2 Earth Berms

Earth berms are proposed as one alternative for shoreline protection at Ward's Island, Algonquin Island, and Centreville. Proposed designs for earth berms in each study area are provided by Baird.

Earth berms require an impermeable core to prevent internal erosion by piping (i.e. excessive hydraulic gradient.

The following preliminary design criteria and principles apply to a berm with a clay core design:

- The berm comprises an inner clay core and structural fill slopes, with 150-250 mm cobbles being added to the wet side slope. Both the wet side and the dry side slopes have a slope gradient of approximately 26% (2 horizontal to 1 vertical ratio).
- The compacted sand fill used on both slopes of the berm should essentially meet the specifications for OPSS Granular B Type I. Grounded has inspected and tested the sand stockpile at The Toronto Islands and has approved that material for compacted sand fill. Other material can be approved as needed.
- There is to be a non-woven geotextile with a minimum tensile strength of 1000 N acting as a grade separator between the compacted sand fill and the cobble stones on the wet side of the berm. The opening size for the geotextile must be less than 0.25 mm.
- The clay core is to be min. 1 m wide at the crest of the berm, and 2 m wide at the base. The clay core is to be sloped at a gradient of approximately 63% (2 vertical to 1 horizontal ratio).
- The clay core will be founded on existing earth fill or native soils.
- The berm footprint can be made on prepared subgrade at or below ground surface. The compacted earth fill (if stripped, compacted, and inspected and approved by Grounded) is considered acceptable for support of the berm.
- The berm design recommendations are based on the subgrade support capabilities that will be available from the prepared subgrade compacted to a minimum 98% SPMDD. Prior to the placement of the berm components, the cut subgrade must be stripped of deleterious materials (topsoil, pavements, aggregates, etc.) and inspected for obvious loose or disturbed areas as exposed. These areas shall be replaced with Granular B Type I or approved alternate (such as approved stockpiles sand fill) compacted to 98% SPMDD
- The fill materials must be free of organics and meet the following grading criteria:

Sieve Size	Percent Passing by Weight (%)	
	Clay Core	Compacted Sand Fill (Granular B Type I)
150 mm	100	100
50 mm	100	N/A
26.5 mm	N/A	50-100

Sieve Size	Percent Passing by Weight (%)	
	Clay Core	Compacted Sand Fill (Granular B Type I)
4.75 mm (#4)	85-100	20-100
1.18 mm (#16)	75-100	10-100
0.300 mm (#50)	65-95	2-65
0.075 mm (#200)	50-85	0-8
0.01 mm	30-50	0
0.002 mm	15-30	0

- The berm is to be constructed in max. 200 mm thick lifts and compacted to min. 95% Standard Proctor Maximum Dry Density (SPMDD) under the inspection of Grounded, the geotechnical engineer. The clean soils to be utilized as compacted fill may be acceptable provided that they are not too wet to achieve specified compaction, and do not contain deleterious materials (e.g. topsoil, construction debris, boulders, etc.).
- The berm is not designed to support any structural load. No structure or foundation shall be supported on or within the berm.
- The planting of deep-rooted vegetation (e.g. trees) should be avoided, as this vegetation can damage the compacted landform if it becomes uprooted.

A seepage analysis by finite element modelling (FEM) was previously completed for a typical section on Algonquin Island and has been appended (Grounded, File No. 20-026, dated June 5, 2020). The analysis found that the berm is adequately designed to prevent internal erosion by piping (i.e. excessive hydraulic gradient). A seepage analysis should be conducted along the alignment of proposed earth berms at the detailed design stage.

7.3 Gravity Walls

Gravity walls are not being considered as a conceptual design option for shoreline protection at this time. If gravity walls are considered, armourstone walls are recommended because they have no rebar which can corrode, and they are resistant to coastal erosion caused by wave action. Other options may also be available.

The earth fill or native soils will likely provide adequate support for small gravity walls, either recompacted in place or with some subgrade improvement. Boreholes are needed at detailed design to confirm this. The subgrade should be proof-rolled and inspected under the supervision of Grounded for obvious exposed loose or disturbed areas, or for areas containing excessive deleterious materials or moisture. These areas shall be recompacted in place and retested, or else replaced with Granular B placed as engineered fill (in lifts 150 mm thick or less and compacted to a minimum of 98 percent SPMDD).

If gravity walls are proposed, they must be provided with adequate drainage, and must be checked for internal, external, and global stability at detailed design. Boreholes are needed for gravity wall detailed design.

7.4 Sheet Pile Walls

Multiple sheet pile walls are proposed at Ward's Island, Algonquin Island, and Centreville. The sheet pile walls will be designed by Baird. Earth pressure design parameters have been provided in Section 6.1 and the groundwater table is discussed in Section 3.2 and Appendix H.

At detailed design, the following additional investigation and analysis is required:

- Specific boreholes must be advanced at the location of the proposed sheet pile wall
- Global stability of the sheet pile wall should be checked
- A seepage analysis should be conducted

8 Limitations and Restrictions

This preliminary geotechnical engineering study is intended for EA purposes only. At detailed design, site-specific boreholes, groundwater monitoring wells, and updated detailed geotechnical engineering advice are required. Once completed, the future detailed geotechnical engineering report would then supersede this preliminary report.

8.1 Investigation Procedures

The geotechnical engineering analysis and advice provided here are based *in part* on factual data obtained from investigations at this site conducted by other consultants as described above, as well as the factual borehole information observed and recorded by Grounded. This previous consultant subsurface information is provided in a professional engineer's signed and sealed geotechnical report, and as such this borehole information is taken as factual for present purposes.

The preliminary geotechnical engineering analysis and advice provided are based on the factual borehole information observed and recorded by Grounded and provided for the purposes of the EA. The investigation methodology and engineering analysis methods used to carry out this scope of work are consistent with conventional standard practice by Grounded as well as other geotechnical consultants, working under similar conditions and constraints (time, financial and physical).

Borehole drilling services were provided to Grounded by a specialist professional contractor. The drilling was observed and recorded by Grounded's field supervisor on a full-time basis. Drilling was conducted using conventional drilling rigs equipped with solid stem augers. As drilling proceeded, groundwater observations were made in the boreholes. Based on examination of

recovered borehole samples, our field supervisor made a record of borehole and drilling observations. The field samples were secured in air-tight clean jars and bags and taken to the Grounded soil laboratory where they were each logged and reviewed by the geotechnical engineering team and the senior reviewer.

The Split-Barrel Method technique (ASTM D1586) was used to obtain the soils samples from two boreholes. Otherwise, samples were collected via grab sample using MTO-style pavement drilling methods. The sampling was conducted at conventional intervals or continuously. As such, stratigraphic interpolation between samples is required and stratigraphic boundary lines do not represent exact depths of geological change. They should be taken as gradual transition zones between soil or rock types.

A carefully conducted, fully comprehensive investigation and sampling scope of work carried out under the most stringent level of oversight may still fail to detect certain ground conditions. As such, users of this report must be aware of the risks inherent in using engineered field investigations to observe and record subsurface conditions. As a necessary requirement of working with discrete test locations, Grounded has assumed that the conditions between test locations are the same as the test locations themselves, for the purposes of providing geotechnical engineering advice.

It is not possible to design a field investigation with enough test locations that would provide complete subsurface information, nor is it possible to provide geotechnical engineering advice that completely identifies or quantifies every element that could affect construction, scheduling, or tendering. Contractors undertaking work based on this report (in whole or in part) must make their own determination of how they may be affected by the subsurface conditions, based on their own analysis of the factual information provided and based on their own means and methods. Contractors using this report must be aware of the risks implicit in using factual information at discrete test locations to infer subsurface conditions across the site and are directed to conduct their own investigations as needed.

The results of the chemical analyses are in reference to only the soil and asphalt samples collected from specific locations, and chemistry may vary between and beyond the locations of the analysed samples. The analytical results contained in this report should not be considered a warranty with respect to the soil or asphalt quality. This report provides the factual results of the chemical analysis only for the specific parameters analysed.

8.2 Site and Scope Changes

Natural occurrences, the passage of time, local construction, and other human activity all have the potential to directly or indirectly alter the subsurface conditions at or near the project site. Contractual obligations related to groundwater or stormwater control, disturbed soils, frost protection, etc. must be considered with attention and care as they relate this potential site alteration.

This report provides preliminary geotechnical engineering advice intended for use by the TRCA and their retained design team for EA purposes only. These preliminary interpretations, design parameters, advice, and discussion on construction considerations are not complete. A detailed site-specific geotechnical investigation must be conducted during detailed design to confirm and update the preliminary recommendations provided here.

8.3 Report Use

The authorized users of this report are Baird & Associates and their design team, for whom this report has been prepared. Grounded Engineering Inc. maintains the copyright and ownership of this document. Reproduction of this report in any format or medium requires explicit prior authorization from Grounded Engineering Inc.

Without restriction, the TRCA may allow others to use this Work Product or modified Work Product as it deems necessary. Grounded bears no responsibility for any use of the Work Product by the TRCA not related to the Project or modification of the Work Product by TRCA.

The City of Toronto may also make use of and rely upon this report, subject to the limitations as stated.

9 Closure

If the design team has any questions regarding the discussion and advice provided, please do not hesitate to have them contact our office. We trust that this report meets your requirements at present.

For and on behalf of our team,

GROUNDED ENGINEERING



Jory Hunter, B.Sc.(Eng.), EIT
Project Manager

Suvish Melanta, P.Eng., QP_{ESA}
Associate



Michael Diez de Aux, M.A.Sc., P.Geo., P.Eng.
Associate

Jason Crowder, Ph.D., P.Eng.
Principal

10 References

City of Toronto, “The Toronto Islands History”

Conservation Ontario, “Class Environmental Assessment for Flood and Erosion Control Projects”, amended June 2013.

Baird, “The Toronto Islands Flood Characterization and Risk Assessment Project, Flood Mitigation Alternatives Report”, File No. 13017.101.R3.Rev1_FloodMitigation, dated June 4, 2019

Grounded Engineering Inc., “Geotechnical Engineering Report, The Toronto Islands Emergency Road Improvements and Berm Implementation, Toronto, Ontario”, File No. 20-026, dated April 22, 2020

Grounded Engineering Inc., “Berm Geotechnical Design Brief (Algonquin Island), The Toronto Islands Emergency Road Improvements and Berm Implementation, Toronto, Ontario”, File No. 20-026, dated June 5, 2020

Grounded Engineering Inc., “Bedrock Geotechnical Data Report, Deep Lake Water Cooling (DLWC) Expansion Project, Toronto, Ontario”, File No. 19-057, dated June 30, 2020

Thurber Engineering Ltd., “Final Geotechnical Data Report, Deep Lake Water Cooling Expansion Project, Toronto, Ontario”, File No. 27667, dated June 30, 2020

FIGURES





GROUNDED ENGINEERING

12 Banigan Drive, Toronto, Ont., M4H 1E9
www.groundedeng.ca

LEGEND

- STUDY AREA (ALL)
- STUDY AREA (ISLANDS)
- STUDY AREA (ROADWAYS)

STUDY AREAS:

1	WARD'S ISLAND
2	ALGONQUIN ISLAND
3	CENTREVILLE
4	TORONTO ISLAND WATER TREATMENT PLANT
5.1	LAKESHORE AVENUE
5.2	LAKESHORE AVENUE
5.3	LAKESHORE AVENUE
5.4	CENTRE ISLAND PARK (SERVICE) ROAD
5.5	AVENUE OF THE ISLAND
5.6	CHIPPEWA AVENUE
5.7	CIBOLA AVENUE
5.8	CIBOLA AVENUE

Reference

ARC GIS ONLINE

Project

TORONTO ISLAND PARK FLOOD AND EROSION MITIGATION PROJECT

Figure Title

SITE LOCATION PLAN

North

TRUE PROJECT

Date

JULY 2021

Scale

AS INDICATED

Job No

21-090

Figure No

FIGURE 1



GROUNDED ENGINEERING

12 Banigan Drive, Toronto, Ont., M4H 1E9
www.groundedeng.ca

LEGEND

- STUDY AREA (250 M RADIUS)
- BOREHOLES (2021)
- WELLS (2021)
- CORE HOLES (2021)
- WELLS (2020)
- CPTS (2020)

STUDY AREAS:

1. WARD'S ISLAND
2. ALGONQUIN ISLAND
3. CENTREVILLE
4. TORONTO ISLAND WATER TREATMENT PLANT
5.1. LAKESHORE AVENUE
5.2. LAKESHORE AVENUE
5.3. LAKESHORE AVENUE
5.4. CENTRE ISLAND PARK (SERVICE) ROAD
5.5. AVENUE OF THE ISLAND
5.6. CHIPPEWA AVENUE
5.7. CIBOLA AVENUE
5.8. CIBOLA AVENUE

ARC GIS ONLINE

Project

TORONTO ISLAND PARK FLOOD AND EROSION MITIGATION PROJECT

Figure Title

BOREHOLE LOCATION PLAN

North

TRUE PROJECT

Date

JULY 2021

Scale

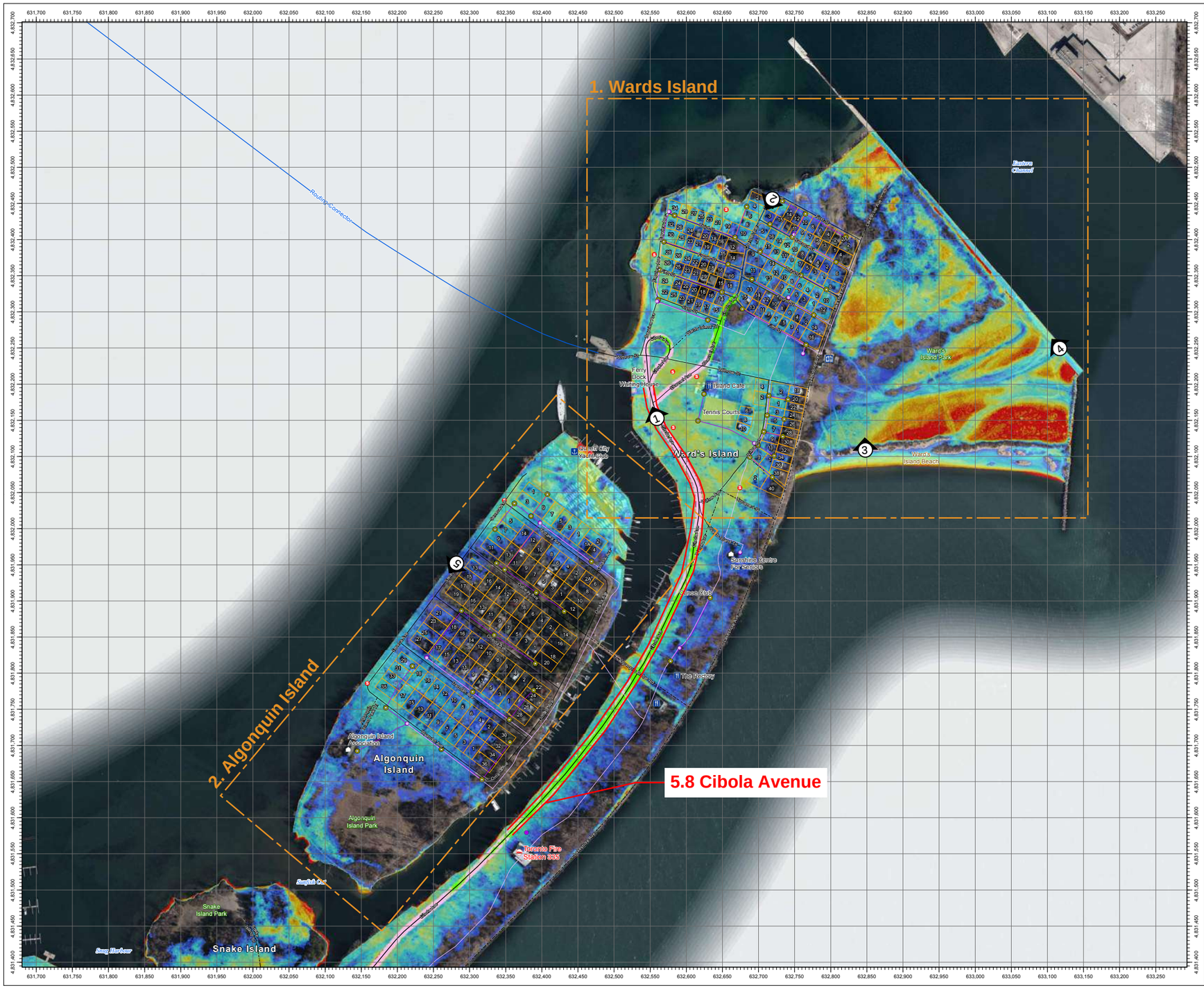
AS INDICATED

Job No

21-090

Figure No

FIGURE 2



Toronto Islands Flood Depth Map

Water Level = 76.2 m IGLD85

Tile 5: Ward's Island and Algonquin Island

Basemap Layers

- Community/Assembly Hall
- Fire Station
- Restaurant
- Restroom
- School
- Water Treatment Plant
- Yacht Club
- Sumps
- Sewer Pumps
- Sewer Pump Stations
- Sewer Manholes
- Sewer Lines - Forced Main
- Sewer Lines - Gravity Line
- Pedestrian Trail/Boardwalk
- Paved Path (2 m min)
- Road (4 m min)
- Ferry Routes
- Residential Property Boundary (2018)

Road Flood Depth (m)

- Dry
- 0.01 - 0.3
- 0.31 - 0.6
- >0.60

Flood Depth (m)

- 0.01 - 0.1
- 0.11 - 0.2
- 0.21 - 0.3
- 0.31 - 0.4
- 0.41 - 0.5
- 0.51 - 0.6
- 0.61 - 0.7
- 0.71 - 0.8
- 0.81 - 0.9
- 0.91 - 1
- > 1

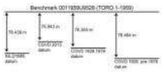
Data Sources

Water depths at Toronto Islands are shown for the specified Lake Ontario water level indicated on this map. Water levels are reported in International Great Lakes Datum 1985 (IGLD85), which is 8.4 cm below Canadian Geodetic Vertical Datum 1928-1978 Ontario Adjusted Version (CGVD 1928:1978), and 49.6 cm below Canadian Geodetic Vertical Datum 2013 (CGVD 2013) at the Canadian Hydrographic Service benchmark 0011959U9526 (also known as 00159U9526, 59U9526, TORO 1-1959). The benchmark is located at the Toronto Harbour Gaugehouse at the south side of Queen's Quay.

Water depths were calculated by subtracting a Digital Elevation Model (DEM) of the land surface from the specified water surface elevation. The DEM was created from LiDAR data flown in April 2014 and April 2015. The vertical accuracy tolerance of the mass point data used to create the DEM is +/- 0.10 m at 95% confidence level. The DEM was adjusted from CGVD 1928:1978 vertical datum to IGLD85 datum by adding 8.4 cm.

To convert between IGLD85 datum and geodetic datum:
IGLD85 = CGVD (1928:1978) + 0.084 m
IGLD85 = CGVD (2013) + 0.496 m

Current water levels for Toronto Harbour are available from Fisheries and Oceans Canada at:
http://www.waterlevels.gc.ca/



Imagery: ESRI Basemap World Imagery. Source: City of Toronto Orthos 2017. Service Layer Credit: ESRI, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

Other Data Layers: Roads, ferry and property boundary are based on City of Toronto's Open Data Catalogue. Place names are based on Open Steet Map and Google Earth.

Notes: Every reasonable effort has been made to ensure the accuracy of this map. However, neither Toronto and Region Conservation Authority or Baird assume any liability arising from its use. This map is provided without warranty of any kind, either expressed or implied.

Map Publication Date: April 2019

Prepared by:
W.F. Baird & Associates Coastal Engineers, Ltd.

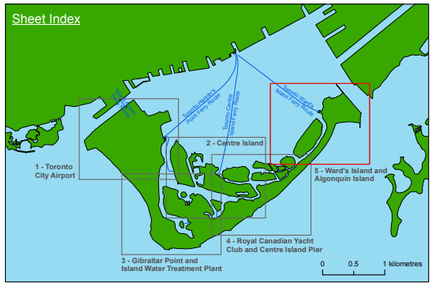
Baird. Innovation Engineered.

Prepared for:
Toronto and Region Conservation Authority

1 cm = 25 m Scale: 1:2,500
0 50 100 metres

Grid Spacing: 50 metres
Coordinate System: Universal Transverse Mercator, Zone 17N, North American Datum 1983

Sheet Index



GROUNDED ENGINEERING
12 Banigan Drive, Toronto, Ont., M4H 1E9
www.groundedeng.ca

LEGEND

- STUDY AREAS (ISLANDS)
- STUDY AREAS (ROADS)

Note

Reference

BAIRD, "TORONTO ISLANDS FLOOD DEPTH MAP", APRIL 2019

Project

TORONTO ISLAND PARK FLOOD AND EROSION MITIGATION PROJECT

Figure Title

FLOOD MAPPING SITES 1, 2, 5.8

North

TRUE PROJECT

Date

JULY 2021

Scale

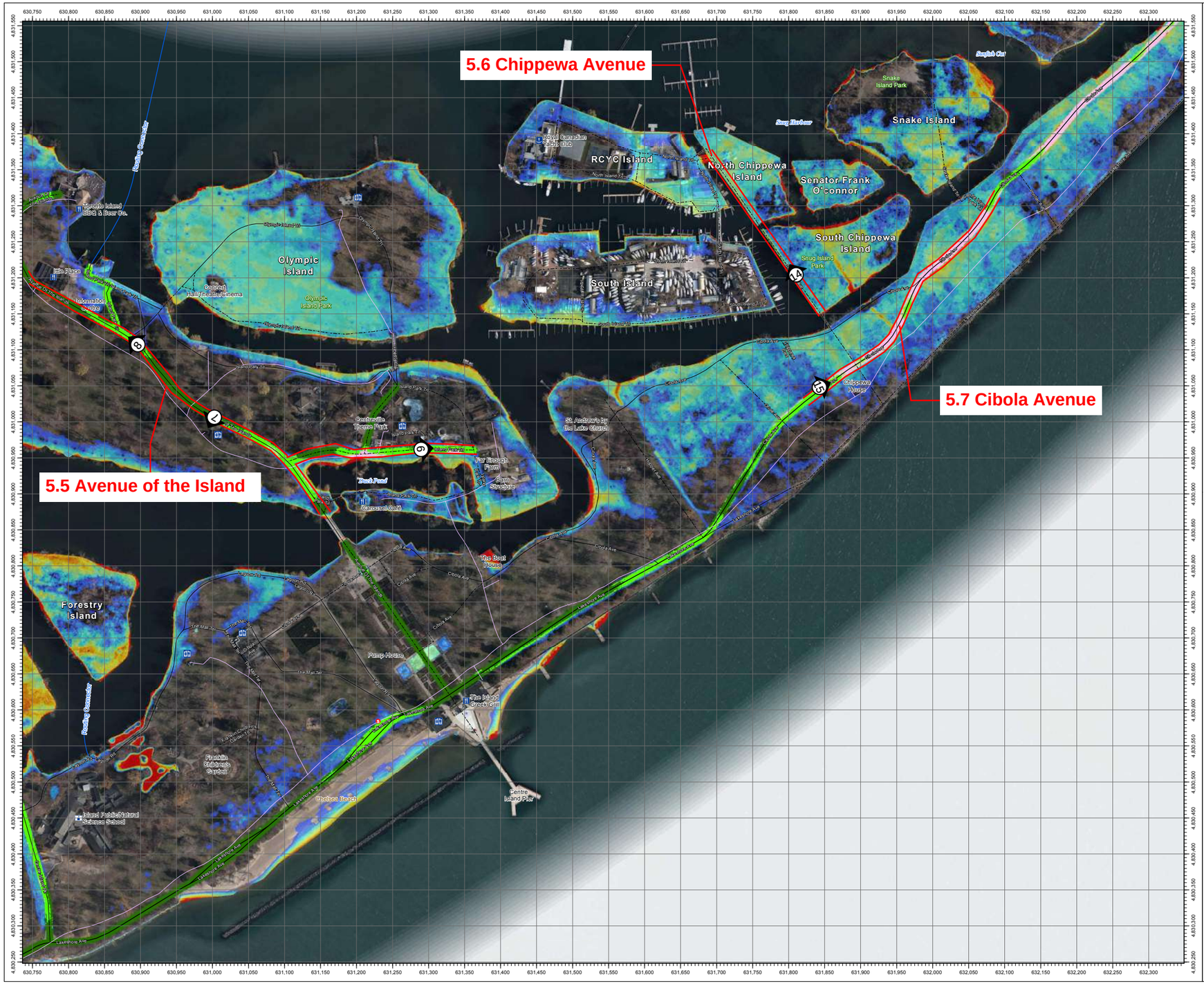
AS INDICATED

Job No

21-090

Figure No

FIGURE 3



Toronto Islands Flood Depth Map

Water Level = 76.2 m IGLD85

Tile 4: Royal Canadian Yacht Club and Centre Island Pier

Basemap Layers

- Community/Assembly Hall
- Fire Station
- Restaurant
- Restroom
- School
- Water Treatment Plant
- Yacht Club
- Sumps
- Sewer Pumps
- Sewer Pump Stations
- Sewer Manholes
- Sewer Lines - Forced Main
- Sewer Lines - Gravity Line
- Pedestrian Trail/Boardwalk
- Paved Path (2 m min)
- Road (4 m min)
- Ferry Routes
- Residential Property Boundary (2018)

Road Flood Depth (m)

- Dry
- 0.01 - 0.3
- 0.31 - 0.6
- >0.60

Flood Depth (m)

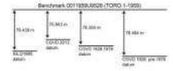
- 0.01 - 0.1
- 0.11 - 0.2
- 0.21 - 0.3
- 0.31 - 0.4
- 0.41 - 0.5
- 0.51 - 0.6
- 0.61 - 0.7
- 0.71 - 0.8
- 0.81 - 0.9
- 0.91 - 1
- > 1

Data Sources

Water depths at Toronto Islands are shown for the specified Lake Ontario water level indicated on this map. Water levels are reported in International Great Lakes Datum 1985 (IGLD85), which is 8.4 cm below Canadian Geodetic Vertical Datum 1928-1978 Ontario Adjusted Version (CGVD 1928:1978), and 49.6 cm below Canadian Geodetic Vertical Datum 2013 (CGVD 2013) at the Canadian Hydrographic Service benchmark 0011959U9526 (also known as 00159U9526, 59U9526, TORO 1-1959). The benchmark is located at the Toronto Harbour Gaugehouse at the south side of Queen's Quay.

Water depths were calculated by subtracting a Digital Elevation Model (DEM) of the land surface from the specified water surface elevation. The DEM was created from LiDAR data flown in April 2014 and April 2015. The vertical accuracy tolerance of the mass point data used to create the DEM is +/- 0.10 m at 95% confidence level. The DEM was adjusted from CGVD 1928:1978 vertical datum to IGLD85 datum by adding 8.4 cm.

To convert between IGLD85 datum and geodetic datum:
IGLD85 = CGVD (1928:1978) + 0.084 m
IGLD85 = CGVD (2013) + 0.496 m



Current water levels for Toronto Harbour are available from Fisheries and Oceans Canada at:
http://www.waterlevels.gc.ca/

Imagery: ESRI Basemap World Imagery. Source: City of Toronto Orthos 2017. Service Layer Credit: ESRI, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

Other Data Layers: Roads, ferry and property boundary are based on City of Toronto's Open Data Catalogue. Place names are based on Open Steet Map and Google Earth.

Notes: Every reasonable effort has been made to ensure the accuracy of this map. However, neither Toronto and Region Conservation Authority or Baird assume any liability arising from its use. This map is provided without warranty of any kind, either expressed or implied.

Map Publication Date: April 2019

Prepared by:
W.F. Baird & Associates Coastal Engineers, Ltd.

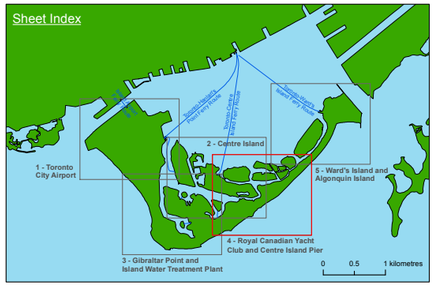
Baird. Innovation Engineered.

Prepared for:
Toronto and Region Conservation Authority

1 cm = 25 m Scale: 1:2,500
0 50 100 metres

Grid Spacing: 50 metres
Coordinate System: Universal Transverse Mercator, Zone 17N, North American Datum 1983

Sheet Index



GROUNDED ENGINEERING
12 Banigan Drive, Toronto, Ont., M4H 1E9
www.groundedeng.ca

LEGEND

- STUDY AREAS (ISLANDS)
- STUDY AREAS (ROADS)

Note

Reference

BAIRD, "TORONTO ISLANDS FLOOD DEPTH MAP", APRIL 2019

Project

TORONTO ISLAND PARK FLOOD AND EROSION MITIGATION PROJECT

Figure Title

FLOOD MAPPING SITES 5.6, 5.7

North



Date

JULY 2021

Scale

AS INDICATED

Job No

21-090

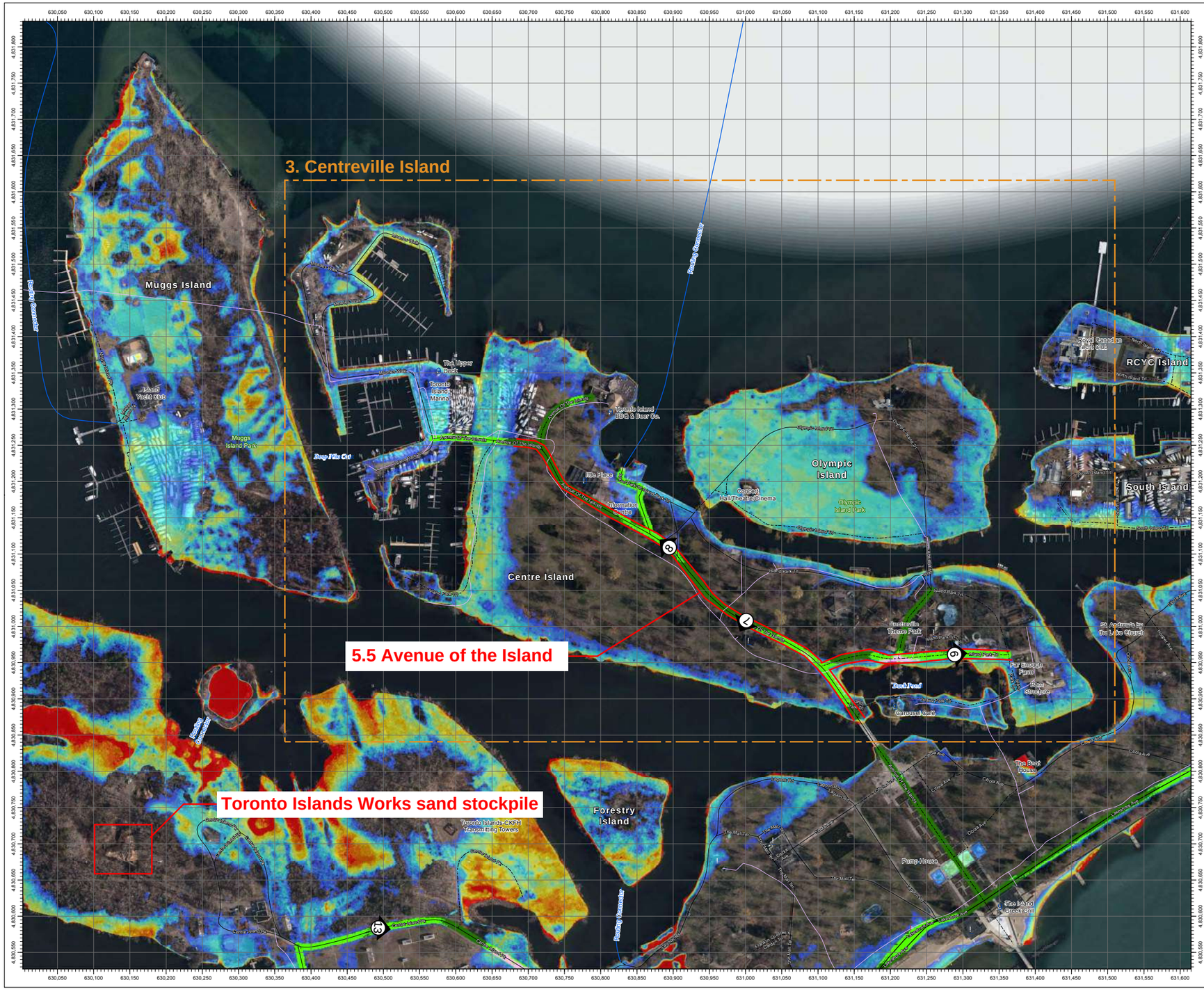
Figure No

FIGURE 4

Toronto Islands Flood Depth Map

Water Level = 76.2 m IGLD85

Tile 2: Centre Island



Basemap Layers

- Community/Assembly Hall
- Fire Station
- Restaurant
- Restroom
- School
- Water Treatment Plant
- Yacht Club
- Sumps
- Sewer Pumps
- Sewer Pump Stations
- Sewer Manholes
- Sewer Lines - Forced Main
- Sewer Lines - Gravity Line
- Pedestrian Trail/Boardwalk
- Paved Path (2 m min)
- Road (4 m min)
- Ferry Routes
- Residential Property Boundary (2018)

Road Flood Depth (m)

- Dry
- 0.01 - 0.3
- 0.31 - 0.6
- >0.60

Flood Depth (m)

- 0.01 - 0.1
- 0.11 - 0.2
- 0.21 - 0.3
- 0.31 - 0.4
- 0.41 - 0.5
- 0.51 - 0.6
- 0.61 - 0.7
- 0.71 - 0.8
- 0.81 - 0.9
- 0.91 - 1
- > 1

Data Sources

Water depths at Toronto Islands are shown for the specified Lake Ontario water level indicated on this map. Water levels are reported in International Great Lakes Datum 1985 (IGLD85), which is 8.4 cm below Canadian Geodetic Vertical Datum 1928:1978 Ontario Adjusted Version (CGVD 1928:1978), and 49.6 cm below Canadian Geodetic Vertical Datum 2013 (CGVD 2013) at the Canadian Hydrographic Service benchmark 0011959U9526 (also known as 00159U9526, 59U9526, TORO 1-1959). The benchmark is located at the Toronto Harbour Gaugehouse at the south side of Queen's Quay.

Water depths were calculated by subtracting a Digital Elevation Model (DEM) of the land surface from the specified water surface elevation. The DEM was created from LiDAR data flown in April 2014 and April 2015. The vertical accuracy tolerance of the mass point data used to create the DEM is +/- 0.10 m at 95% confidence level. The DEM was adjusted from CGVD 1928:1978 vertical datum to IGLD85 datum by adding 8.4 cm.

To convert between IGLD85 datum and geodetic datum:
IGLD85 = CGVD (1928:1978) + 0.084 m
IGLD85 = CGVD (2013) + 0.496 m



Current water levels for Toronto Harbour are available from Fisheries and Oceans Canada at:
http://www.waterlevels.gc.ca/

Imagery: ESRI Basemap World Imagery. Source: City of Toronto Orthos 2017. Service Layer Credit: ESRI, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

Other Data Layers: Roads, ferry and property boundary are based on City of Toronto's Open Data Catalogue. Place names are based on Open Steet Map and Google Earth.

Notes: Every reasonable effort has been made to ensure the accuracy of this map. However, neither Toronto and Region Conservation Authority or Baird assume any liability arising from its use. This map is provided without warranty of any kind, either expressed or implied.

Map Publication Date: April 2019

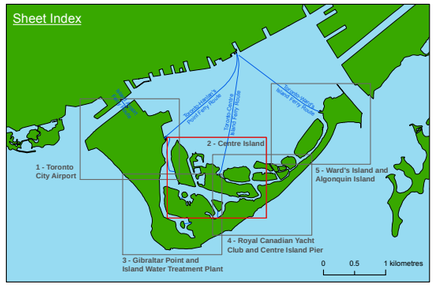
Prepared by:
W.F. Baird & Associates Coastal Engineers, Ltd.

Prepared for:
Toronto and Region Conservation Authority

1 cm = 25 m Scale: 1:2,500
0 50 100 metres

Grid Spacing: 50 metres
Coordinate System: Universal Transverse Mercator, Zone 17N, North American Datum 1983

Sheet Index



GROUNDED ENGINEERING
12 Banigan Drive, Toronto, Ont., M4H 1E9
www.groundedeng.ca

LEGEND

- STUDY AREAS (ISLANDS)
- STUDY AREAS (ROADS)

Note

Reference

BAIRD, "TORONTO ISLANDS FLOOD DEPTH MAP", APRIL 2019

Project

TORONTO ISLAND PARK FLOOD AND EROSION MITIGATION PROJECT

Figure Title

FLOOD MAPPING SITE 3, 5.5

North

TRUE
PROJECT

Date

JULY 2021

Scale

AS INDICATED

Job No

21-090

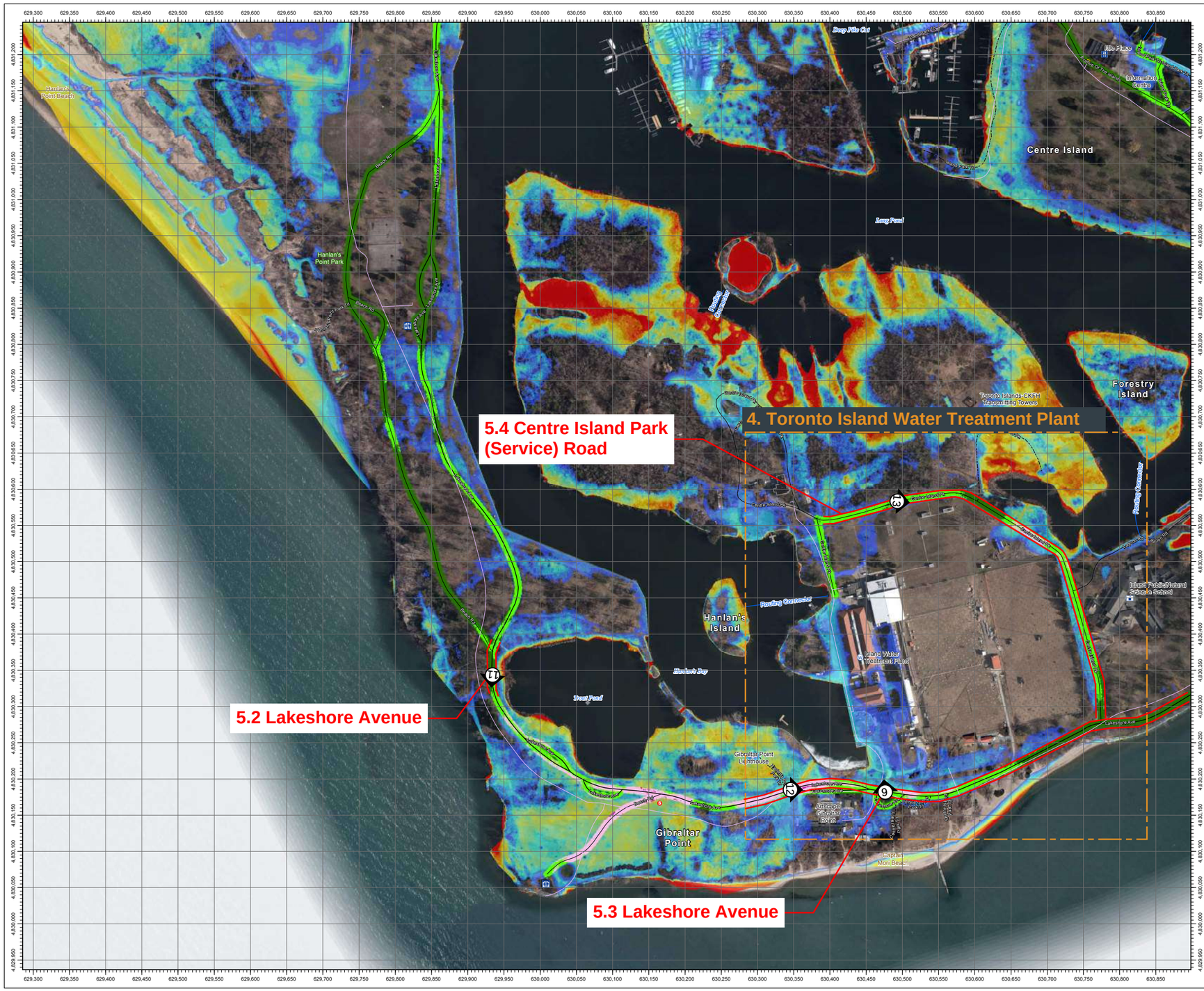
Figure No

FIGURE 5

Toronto Islands Flood Depth Map

Water Level = 76.2 m IGLD85

Tile 3: Gibraltar Point and Island Water Treatment Plant



Basemap Layers

- Community/Assembly Hall
- Fire Station
- Restaurant
- Restroom
- School
- Water Treatment Plant
- Yacht Club
- Sumps
- Sewer Pumps
- Sewer Pump Stations
- Sewer Manholes
- Sewer Lines - Forced Main
- Sewer Lines - Gravity Line
- Pedestrian Trail/Boardwalk
- Paved Path (2 m min)
- Road (4 m min)
- Ferry Routes
- Residential Property Boundary (2018)

Road Flood Depth (m)

- Dry
- 0.01 - 0.3
- 0.31 - 0.6
- >0.60

Flood Depth (m)

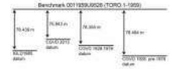
- 0.01 - 0.1
- 0.11 - 0.2
- 0.21 - 0.3
- 0.31 - 0.4
- 0.41 - 0.5
- 0.51 - 0.6
- 0.61 - 0.7
- 0.71 - 0.8
- 0.81 - 0.9
- 0.91 - 1
- > 1

Data Sources

Water depths at Toronto Islands are shown for the specified Lake Ontario water level indicated on this map. Water levels are reported in International Great Lakes Datum 1985 (IGLD85), which is 8.4 cm below Canadian Geodetic Vertical Datum 1928-1978 Ontario Adjusted Version (CGVD 1928:1978), and 49.6 cm below Canadian Geodetic Vertical Datum 2013 (CGVD 2013) at the Canadian Hydrographic Service benchmark 0011959U9526 (also known as 00159U9526, 59U9526, TORO 1-1959). The benchmark is located at the Toronto Harbour Gaugehouse at the south side of Queen's Quay.

Water depths were calculated by subtracting a Digital Elevation Model (DEM) of the land surface from the specified water surface elevation. The DEM was created from LiDAR data flown in April 2014 and April 2015. The vertical accuracy tolerance of the mass point data used to create the DEM is +/- 0.10 m at 95% confidence level. The DEM was adjusted from CGVD 1928:1978 vertical datum to IGLD85 datum by adding 8.4 cm.

To convert between IGLD85 datum and geodetic datum:
IGLD85 = CGVD (1928:1978) + 0.084 m
IGLD85 = CGVD (2013) + 0.496 m



Current water levels for Toronto Harbour are available from Fisheries and Oceans Canada at:
http://www.waterlevels.gc.ca/

Imagery: ESRI Basemap World Imagery. Source: City of Toronto Orthos 2017. Service Layer Credit: ESRI, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

Other Data Layers: Roads, ferry and property boundary are based on City of Toronto's Open Data Catalogue. Place names are based on Open Steet Map and Google Earth.

Notes: Every reasonable effort has been made to ensure the accuracy of this map. However, neither Toronto and Region Conservation Authority or Baird assume any liability arising from its use. This map is provided without warranty of any kind, either expressed or implied.

Map Publication Date: April 2019

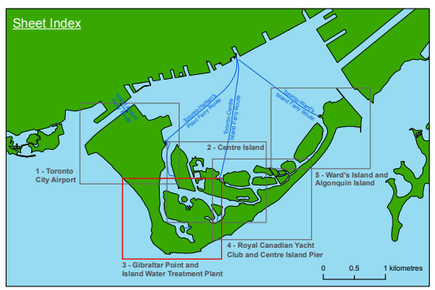
Prepared by:
W.F. Baird & Associates Coastal Engineers, Ltd.

Prepared for:
Toronto and Region Conservation Authority

1 cm = 25 m Scale: 1:2,500
0 50 100 metres

Grid Spacing: 50 metres
Coordinate System: Universal Transverse Mercator, Zone 17N, North American Datum 1983

Sheet Index



GROUNDED ENGINEERING
12 Banigan Drive, Toronto, Ont., M4H 1E9
www.groundedeng.ca

LEGEND

- STUDY AREAS (ISLANDS)
- STUDY AREAS (ROADS)

Note

Reference

BAIRD, "TORONTO ISLANDS FLOOD DEPTH MAP", APRIL 2019

Project

TORONTO ISLAND PARK FLOOD AND EROSION MITIGATION PROJECT

Figure Title

FLOOD MAPPING SITES 4, 5.2, 5.3, 5.4

North

TRUE
PROJECT

Date

JULY 2021

Scale

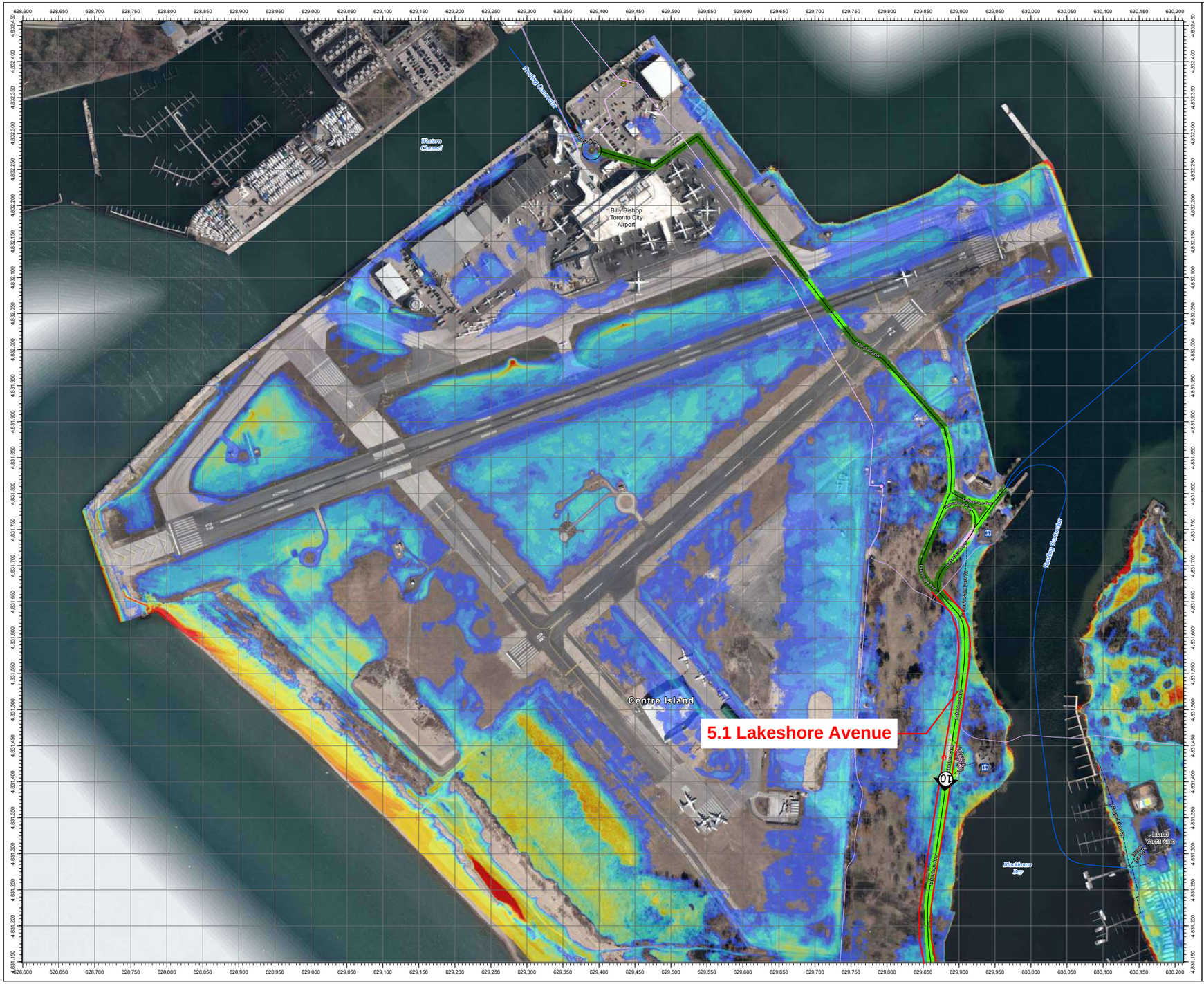
AS INDICATED

Job No

21-090

Figure No

FIGURE 6


Western Channel
Billy Bishop Toronto City Airport
Ferry Docks
Centre Island
5.1 Lakeshore Avenue
Island Yacht Club
Hanlans Point
Lakeshore Ave
Queens Quay
Eireann Quay
Cherry St
Bay St
Yonge St
Spadina Ave
Blue Jays Way
Rees St
Simcoe St
Wellington St
Front St
Bathurst St
Peter St
Duncan St
Richmond St
Adelaide St
King St
Wellington Place
Blue Jays Way
Spadina Ave
Rees St
Simcoe St
Duncan St
Peter St
Bathurst St
Front St
Wellington

APPENDIX A



BOREHOLE LOG TERMINOLOGY

GROUNDED ENGINEERING

SAMPLING/TESTING METHODS

SS: split spoon sample

AS: auger sample

GS: grab sample

FV: shear vane

DP: direct push

PMT: pressuremeter test

ST: shelby tube

CORE: soil coring

RUN: rock coring

SYMBOLS & ABBREVIATIONS

MC: moisture content

LL: liquid limit

PL: plastic limit

PI: plasticity index

γ: soil unit weight (bulk)

G_s: specific gravity

S_u: undrained shear strength

▽ unstabilized water level

▼ 1st water level measurement

▼ 2nd water level measurement most recent

▼ water level measurement

ENVIRONMENTAL SAMPLES

M&I: metals and inorganic parameters

PAH: polycyclic aromatic hydrocarbon

PCB: polychlorinated biphenyl

VOC: volatile organic compound

PHC: petroleum hydrocarbon

BTEX: benzene, toluene, ethylbenzene and xylene

PPM: parts per million

FIELD MOISTURE (based on tactile inspection)

DRY: no observable pore water

MOIST: inferred pore water, not observable (i.e. grey, cool, etc.)

WET: visible pore water

COHESIONLESS

Relative Density	N-Value
Very Loose	<4
Loose	4 - 10
Compact	10 - 30
Dense	30 - 50
Very Dense	>50

COHESIVE

Consistency	N-Value	Su (kPa)
Very Soft	<2	<12
Soft	2 - 4	12 - 25
Firm	4 - 8	25 - 50
Stiff	8 - 15	50 - 100
Very Stiff	15 - 30	100 - 200
Hard	>30	>200

COMPOSITION

Term	% by weight
trace silt	<10
some silt	10 - 20
silt***y***	20 - 35
sand ***and*** silt	>35

ASTM STANDARDS

ASTM D1586 Standard Penetration Test (SPT)
Driving a 51 mm O.D. split-barrel sampler ("split spoon") into soil with a 63.5 kg weight free falling 760 mm. The blows required to drive the split spoon 300 mm ("bpf") after an initial penetration of 150 mm is referred to as the N-Value.

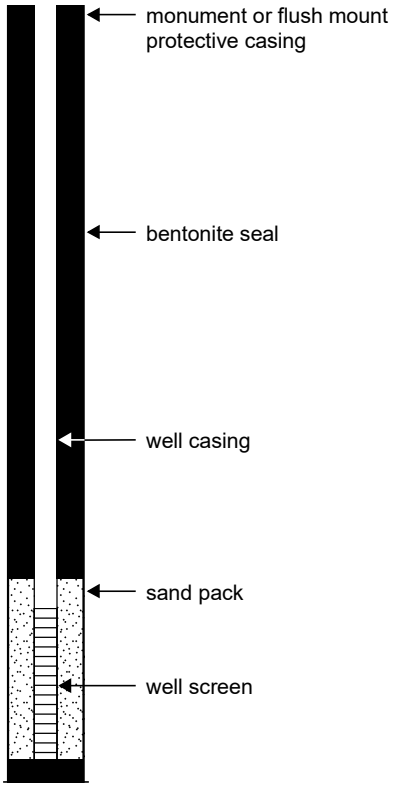
ASTM D3441 Cone Penetration Test (CPT)
Pushing an internal still rod with a outer hollow rod ("sleeve") tipped with a cone with an apex angle of 60° and a cross-sectional area of 1000 mm^2 into soil. The resistance is measured in the sleeve and at the tip to determine the skin friction and the tip resistance.

ASTM D2573 Field Vane Test (FVT)
Pushing a four blade vane into soil and rotating it from the surface to determine the torque required to shear a cylindrical surface with the vane. The torque is converted to the shear strength of the soil using a limit equilibrium analysis.

ASTM D1587 Shelby Tubes (ST)
Pushing a thin-walled metal tube into the in-situ soil at the bottom of a borehole, removing the tube and sealing the ends to prevent soil movement or changes in moisture content for the purposes of extracting a relatively undisturbed sample.

ASTM D4719 Pressuremeter Test (PMT)
Place an inflatable cylindrical probe into a pre-drilled hole and expanding it while measuring the change in volume and pressure in the probe. It is inflated under either equal pressure increments or equal volume increments. This provides the stress-strain response of the soil.

WELL LEGEND



GROUNDED ENGINEERING

Date Started : Jun 16, 2021
Position : E: 632614, N: 4832049 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 101

File No. : 21-090 **Project** : Toronto Island Flood Mitigation, Toronto, ON **Client** : W.F. Baird & Associates Coastal Engineers Ltd.

drill method : *Truck-mounted rig*

solid stem augers OD=150 mm

elev depth (m)	description	graphic log	samples: number	samples: type	samples: SPT N-value
75.8	**GROUND SURFACE**				
	50mm **ASPHALT**				
	25mm **AGGREGATE**		1	GS	
	FILL, sand, some silt, brown, moist				
75.2 / 0.6	**SAND**, trace gravel, trace silt, dark brown, wet		2	GS	
74.3 / 1.5			3	GS	

depth scale (m): 0.0, 0.5, 1.0, 1.5

well details

elevation (m): 75.5, 75.0, 74.5

undrained shear strength (kPa)
○ unconfined ● pocket penetrometer + field vane ■ Lab Vane
40 80 120 160

SPT N-values (bpf)
× dynamic cone
10 20 30 40

headspace vapour (ppm)
× hexane □ isobutylene ⊠ methane
100 200 300

moisture / plasticity
PL MC LL
10 20 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT)
GR SA SI CL
5 89 6 0

GS1: H-Ms, Metals, ORPs

GS2: BTEX, PHCs

END OF BOREHOLE

Unstabilized water level measured at 0.6 m below ground surface; caved to 1.2 m below ground surface upon completion of drilling.

file: 21-090.gpj

Tech : LJ | **PM** : JH | **Rev** : JH

GROUNDED ENGINEERING

Date Started : Jun 16, 2021
Position : E: 632454, N: 4831688 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 102

File No. : 21-090 **Project** : Toronto Island Flood Mitigation, Toronto, ON **Client** : W.F. Baird & Associates Coastal Engineers Ltd.

drill method : *Truck-mounted rig*

solid stem augers OD=150 mm

elev depth (m)	description	graphic log	number	type	SPT N-value
75.8	**GROUND SURFACE**				
	75mm **ASPHALT**				
75.6	75mm **AGGREGATE**		1	GS	
0.2	**FILL**, sand, some silt, brown, moist				
	...at 0.6 m, brown with dark brown, trace organics, trace rootlets		2	GS	
			3	GS	
74.3					
1.5	**END OF BOREHOLE**				

depth scale (m): 0.0, 0.5, 1.0, 1.5

well details

elevation (m): 75.5, 75.0, 74.5

undrained shear strength (kPa)
○ unconfined + field vane
● pocket penetrometer ■ Lab Vane
40 80 120 160

SPT N-values (bpf)
× dynamic cone
10 20 30 40

headspace vapour (ppm)
× hexane □ isobutylene
▣ methane
100 200 300

moisture / plasticity
PL MC LL
10 20 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT)
GR SA SI CL

GS1: H-Ms, Metals, ORPs

GS2: BTEX, PHCs

Unstabilized water level measured at 0.8 m below ground surface; caved to 1.2 m below ground surface upon completion of drilling.

file: 21-090.gpj

Tech : LJ | **PM** : JH | **Rev** : JH

GROUNDED ENGINEERING

Date Started : Jun 16, 2021
Position : E: 631887, N: 4831088 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 103

File No. : 21-090 **Project** : Toronto Island Flood Mitigation, Toronto, ON **Client** : W.F. Baird & Associates Coastal Engineers Ltd.

drill method : *Truck-mounted rig*

solid stem augers OD=150 mm

elev depth (m)	description	graphic log	number	type	SPT N-value
75.7	**GROUND SURFACE**				
75.6	75mm **ASPHALT**				
0.1	25mm **AGGREGATE**				
	SAND, some gravel, trace silt, brown, moist		1	GS	
			2	GS	
	...at 1.4 m, gravelly		3	GS	
74.2	**END OF BOREHOLE**				
1.5					

depth scale (m): 0.0, 0.5, 1.0, 1.5

well details

elevation (m): 75.5, 75.0, 74.5

undrained shear strength (kPa)
○ unconfined + field vane
● pocket penetrometer ■ Lab Vane
40 80 120 160

SPT N-values (bpf)
× dynamic cone
10 20 30 40

headspace vapour (ppm)
× hexane □ isobutylene
▣ methane
100 200 300

moisture / plasticity
PL MC LL
10 20 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT)
GR SA SI CL
20 77 3 0

Unstabilized water level measured at 0.8 m below ground surface; caved to 1.2 m below ground surface upon completion of drilling.

file: 21-090.gpj

Tech : LJ | **PM** : JH | **Rev** : JH

GROUNDED ENGINEERING

Date Started : Jun 16, 2021
Position : E: 631118, N: 4830955 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 105

File No. : 21-090 **Project** : Toronto Island Flood Mitigation, Toronto, ON **Client** : W.F. Baird & Associates Coastal Engineers Ltd.

drill method : *Truck-mounted rig*

elev depth (m)	description	graphic log	sample number	sample type	SPT N-value
76.2	**GROUND SURFACE**				
76.1 / 0.1	100mm **ASPHALT**				
76.1 / 0.1	25mm **AGGREGATE**				
0.1	**FILL**, sandy silt, trace clay, trace gravel, trace brick fragments, trace concrete, dark brown, moist		1	GS	
75.3 / 0.9	**FILL**, sand, some silt, black with dark brown, moist		2	GS	
	...at 1.4 m, some gravel		3	GS	
74.7 / 1.5	**END OF BOREHOLE**				

solid stem augers OD=150 mm

depth scale (m): 0.0, 0.5, 1.0, 1.5

well details

elevation (m): 76.0, 75.5, 75.0

undrained shear strength (kPa): ○ unconfined, + field vane, ● pocket penetrometer, ■ Lab Vane; 40 80 120 160

SPT N-values (bpf): ×dynamic cone; 10 20 30 40

headspace vapour (ppm): × hexane, □ isobutylene, ▣ methane; 100 200 300

moisture / plasticity: PL MC LL; 10 20 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT): GR SA SI CL

GS1: H-Ms, Metals, ORPs

GS3: BTEX, PHCs

Unstabilized water level measured at 1.2 m below ground surface upon completion of drilling.

file: 21-090.gpj

Tech : LJ | **PM** : JH | **Rev** : JH

GROUNDED ENGINEERING

Date Started : Jun 17, 2021
Position : E: 630714, N: 4831254 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 106

File No. : 21-090 **Project** : Toronto Island Flood Mitigation, Toronto, ON **Client** : W.F. Baird & Associates Coastal Engineers Ltd.

drill method : *Truck-mounted rig*

solid stem augers OD=150 mm

elev depth (m)	description	graphic log	number	type	SPT N-value
76.5	**GROUND SURFACE**				
76.4 / 0.1	100mm **ASPHALT**				
	SAND, trace silt, trace gravel, compact, brown, moist		1	SS	18
			2	SS	14
75.0 / 1.5	**SAND**, some silt, trace shell fragments, loose, brown, wet		3	SS	6
	...at 2.1 m, dark brown, trace organics		4	SS	3
73.8 / 2.7					

depth scale (m): 0.0, 0.5, 1.0, 1.5, 2.0, 2.5

elevation (m): 76.0, 75.5, 75.0, 74.5, 74.0

well details

undrained shear strength (kPa)
○ unconfined + field vane
● pocket penetrometer ■ Lab Vane
40 80 120 160

SPT N-values (bpf)
× dynamic cone
10 20 30 40

headspace vapour (ppm)
× hexane □ isobutylene
▣ methane
100 200 300

moisture / plasticity
PL MC LL
10 20 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT)
GR SA SI CL

SS1: H-Ms, Metals, ORPs

3 94 3 0

SS3: BTEX, PHCs

END OF BOREHOLE

Unstabilized water level measured at 1.5 m below ground surface; caved to 2.6 m below ground surface upon completion of drilling.

file: 21-090.gpj

Tech : LJ | **PM** : JH | **Rev** : JH

GROUNDED ENGINEERING

Date Started : Jun 17, 2021
Position : E: 630753, N: 4830411 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 107

File No. : 21-090 **Project** : Toronto Island Flood Mitigation, Toronto, ON **Client** : W.F. Baird & Associates Coastal Engineers Ltd.

drill method : *Truck-mounted rig*

solid stem augers OD=150 mm

elev depth (m)	description	graphic log	sample number	sample type	SPT N-value
75.9	**GROUND SURFACE**				
75.8 / 0.1	100mm **ASPHALT**				
75.8 / 0.1	25mm **AGGREGATE**		1	GS	
	SAND, some silt, trace gravel, brown, moist				
			2	GS	
	...at 0.9 m, wet		3	GS	
			4	GS	
74.4 / 1.5	**END OF BOREHOLE**				

depth scale (m): 0.0, 0.5, 1.0, 1.5

well details

elevation (m): 75.5, 75.0, 74.5

undrained shear strength (kPa): ○ unconfined ● pocket penetrometer + field vane ■ Lab Vane; 40 80 120 160

SPT N-values (bpf): × dynamic cone; 10 20 30 40

headspace vapour (ppm): × hexane □ isobutylene ▪ methane; 100 200 300

moisture / plasticity: PL MC LL; 10 20 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT) GR SA SI CL

GS1: H-Ms, Metals, ORPs

1 90 9 0

GS3: BTEX, PHCs

Unstabilized water level measured at 0.9 m below ground surface; caved to 1.2 m below ground surface upon completion of drilling.

file: 21-090.gpj

Tech : LJ | **PM** : JH | **Rev** : JH

GROUNDED ENGINEERING

Date Started : Jun 17, 2021
Position : E: 629860, N: 4831242 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 109

File No. : 21-090 **Project** : Toronto Island Flood Mitigation, Toronto, ON **Client** : W.F. Baird & Associates Coastal Engineers Ltd.

drill method : *Truck-mounted rig*

solid stem augers OD=150 mm

elev depth (m)	description	graphic log	sample number	sample type	SPT N-value
75.9	**GROUND SURFACE**				
75.8 / 0.1	75mm **ASPHALT**				
	50mm **AGGREGATE**				
	FILL, sand, some silt, trace organics, brown with dark brown, moist		1	GS	
75.4 / 0.5	**SAND**, trace silt, grey, wet		2	GS	
	...at 1.4 m, dark grey, trace organics (lake bed)		3	GS	
74.4 / 1.5	**END OF BOREHOLE**				

depth scale (m): 0.0, 0.5, 1.0, 1.5

well details

elevation (m): 75.5, 75.0, 74.5

undrained shear strength (kPa): unconfined, field vane, pocket penetrometer, Lab Vane; 40, 80, 120, 160

SPT N-values (bpf): dynamic cone; 10, 20, 30, 40

headspace vapour (ppm): hexane, isobutylene, methane; 100, 200, 300

moisture / plasticity: PL, MC, LL; 10, 20, 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT): GR SA SI CL

GS1: H-Ms, Metals, ORPs

0 92 8 0

GS2: BTEX, PHCs

Unstabilized water level measured at 0.6 m below ground surface; caved to 1.2 m below ground surface upon completion of drilling.

file: 21-090.gpj

Tech : LJ | **PM** : JH | **Rev** : JH

GROUNDED ENGINEERING

Date Started : Jun 17, 2021
Position : E: 629901, N: 4831503 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 110

File No. : 21-090 **Project** : Toronto Island Flood Mitigation, Toronto, ON **Client** : W.F. Baird & Associates Coastal Engineers Ltd.

drill method : *Truck-mounted rig*

solid stem augers OD=150 mm

elev depth (m)	description	graphic log	number	type	SPT N-value
76.0	**GROUND SURFACE**				
75.9 / 0.1	100mm **ASPHALT**				
75.8 / 0.2	50mm **AGGREGATE**				
	FILL, gravelly sand, trace silt, brown, moist		1	GS	
75.1 / 0.9	**SAND**, some gravel, trace silt, brown, wet		2	GS	
			3	GS	
74.5 / 1.5	**END OF BOREHOLE**				

depth scale (m): 0.0, 0.5, 1.0, 1.5

well details

elevation (m): 75.5, 75.0, 74.5

undrained shear strength (kPa)
○ unconfined + field vane
● pocket penetrometer ■ Lab Vane
40 80 120 160

SPT N-values (bpf)
× dynamic cone
10 20 30 40

headspace vapour (ppm)
× hexane □ isobutylene
▣ methane
100 200 300

moisture / plasticity
PL MC LL
10 20 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT)
GR SA SI CL

Unstabilized water level measured at 0.9 m below ground surface; caved to 1.4 m below ground surface upon completion of drilling.

file: 21-090.gpj

Tech : LJ | **PM** : JH | **Rev** : JH

GROUNDED ENGINEERING

Date Started : Jun 16, 2021
Position : E: 632586, N: 4832108 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 111

File No. : 21-090 **Project** : Toronto Island Flood Mitigation, Toronto, ON **Client** : W.F. Baird & Associates Coastal Engineers Ltd.

drill method : *Truck-mounted rig*

solid stem augers OD=150 mm

elev depth (m)	description	graphic log	number	type	SPT N-value
75.7	**GROUND SURFACE**				
	50mm **ASPHALT**				
	SAND, some silt, compact, brown, moist		1	SS	19
	...at 0.8 m, some gravel, wet		2	SS	19
			3	SS	11
	...at 2.3 m, gravelly, loose		4	SS	4
72.8					
2.9	**END OF BOREHOLE**				

depth scale (m): 0.0, 0.5, 1.0, 1.5, 2.0, 2.5

well details

elevation (m): 75.5, 75.0, 74.5, 74.0, 73.5, 73.0

undrained shear strength (kPa)
○ unconfined + field vane
● pocket penetrometer ■ Lab Vane
40 80 120 160

SPT N-values (bpf)
× dynamic cone
10 20 30 40

headspace vapour (ppm)
× hexane □ isobutylene
▪ methane
100 200 300

moisture / plasticity
PL MC LL
10 20 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT)
GR SA SI CL

SS1: H-Ms, Metals, ORPs

SS2: BTEX, PHCs

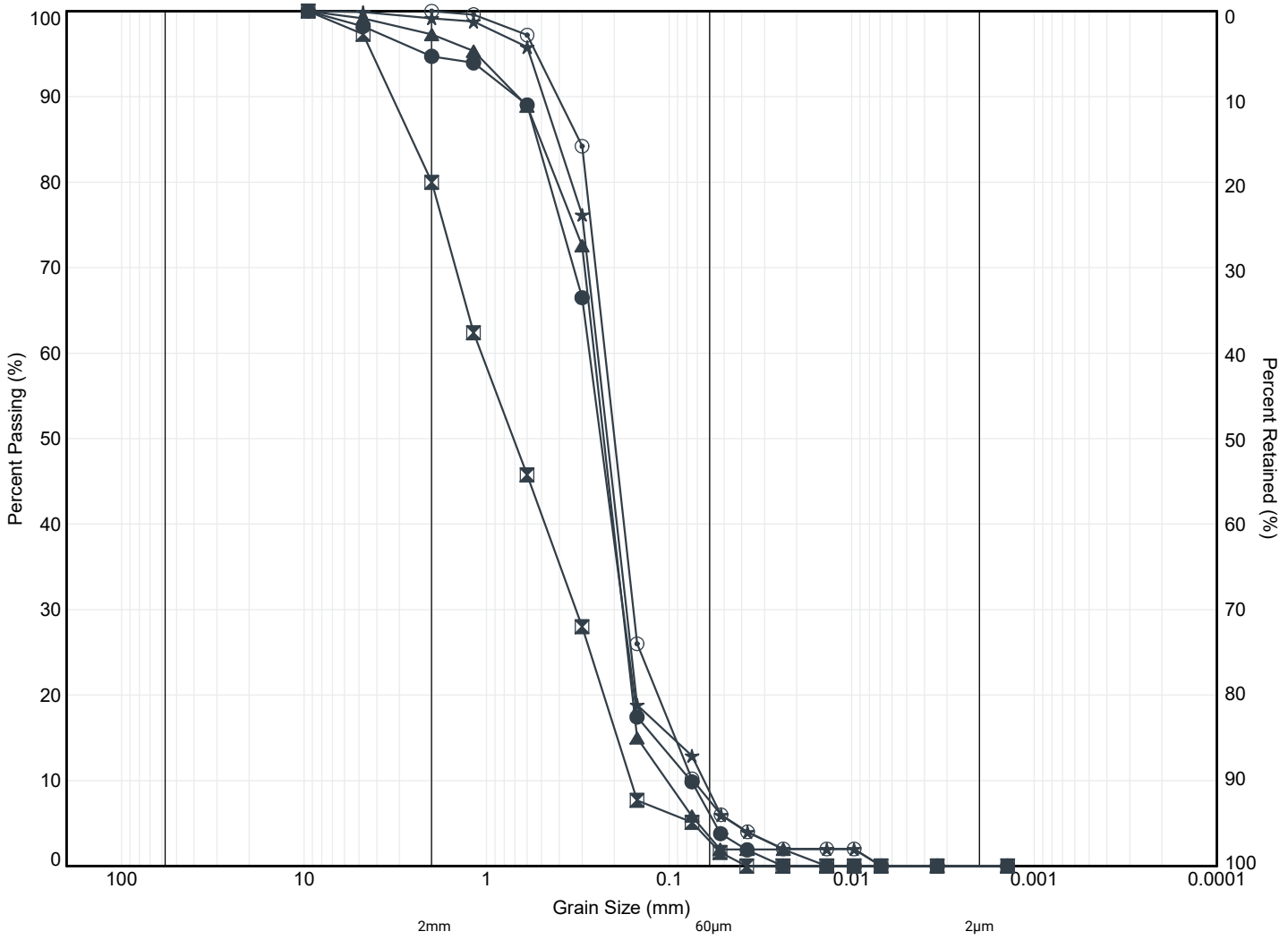
Unstabilized water level measured at 0.8 m below ground surface; caved to 1.5 m below ground surface upon completion of drilling.

file: 21-090.gpj

Tech : LJ | **PM** : JH | **Rev** : JH

APPENDIX B





MIT SYSTEM	COBBLES	GRAVEL			SAND			SILT	CLAY
		COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE		

MIT SYSTEM

	Borehole	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
●	**101**	GS2	0.7	75.1	5	89	6	0
⊠	**103**	GS3	1.4	74.3	20	77	3	0
▲	**106**	SS2	1.1	75.4	3	94	3	0
★	**107**	GS2	0.7	75.2	1	90	9	0
⊙	**109**	GS2	0.7	75.2	0	92	8	0

GROUNDED ENGINEERING

Title: **GRAIN SIZE DISTRIBUTION**

File No.: **21-090**

file: 21-090.gpj

APPENDIX C



BOREHOLE LOG TERMINOLOGY

GROUNDED ENGINEERING

SAMPLING/TESTING METHODS

SS: split spoon sample

AS: auger sample

GS: grab sample

FV: shear vane

DP: direct push

PMT: pressuremeter test

ST: shelby tube

CORE: soil coring

RUN: rock coring

SYMBOLS & ABBREVIATIONS

MC: moisture content

LL: liquid limit

PL: plastic limit

PI: plasticity index

γ: soil unit weight (bulk)

G_s: specific gravity

S_u: undrained shear strength

▽ unstabilized water level

▼ 1st water level measurement

▼ 2nd water level measurement most recent

▼ water level measurement

ENVIRONMENTAL SAMPLES

M&I: metals and inorganic parameters

PAH: polycyclic aromatic hydrocarbon

PCB: polychlorinated biphenyl

VOC: volatile organic compound

PHC: petroleum hydrocarbon

BTEX: benzene, toluene, ethylbenzene and xylene

PPM: parts per million

FIELD MOISTURE (based on tactile inspection)

DRY: no observable pore water

MOIST: inferred pore water, not observable (i.e. grey, cool, etc.)

WET: visible pore water

COHESIONLESS

Relative Density	N-Value
Very Loose	<4
Loose	4 - 10
Compact	10 - 30
Dense	30 - 50
Very Dense	>50

COHESIVE

Consistency	N-Value	Su (kPa)
Very Soft	<2	<12
Soft	2 - 4	12 - 25
Firm	4 - 8	25 - 50
Stiff	8 - 15	50 - 100
Very Stiff	15 - 30	100 - 200
Hard	>30	>200

COMPOSITION

Term	% by weight
trace silt	<10
some silt	10 - 20
silt***y***	20 - 35
sand ***and*** silt	>35

ASTM STANDARDS

ASTM D1586 Standard Penetration Test (SPT)
Driving a 51 mm O.D. split-barrel sampler ("split spoon") into soil with a 63.5 kg weight free falling 760 mm. The blows required to drive the split spoon 300 mm ("bpf") after an initial penetration of 150 mm is referred to as the N-Value.

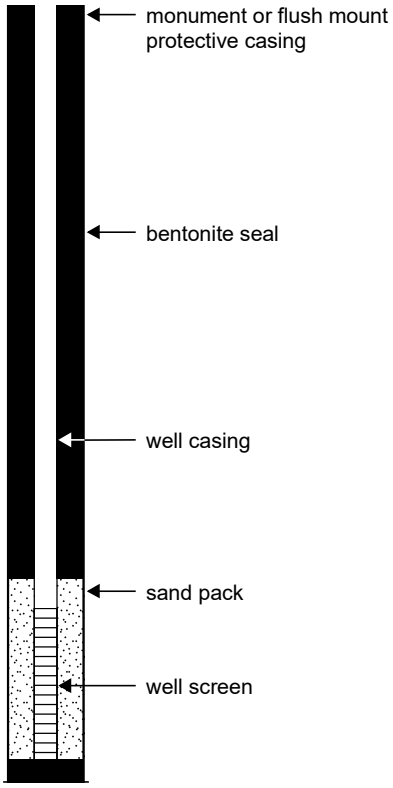
ASTM D3441 Cone Penetration Test (CPT)
Pushing an internal still rod with a outer hollow rod ("sleeve") tipped with a cone with an apex angle of 60° and a cross-sectional area of 1000 mm^2 into soil. The resistance is measured in the sleeve and at the tip to determine the skin friction and the tip resistance.

ASTM D2573 Field Vane Test (FVT)
Pushing a four blade vane into soil and rotating it from the surface to determine the torque required to shear a cylindrical surface with the vane. The torque is converted to the shear strength of the soil using a limit equilibrium analysis.

ASTM D1587 Shelby Tubes (ST)
Pushing a thin-walled metal tube into the in-situ soil at the bottom of a borehole, removing the tube and sealing the ends to prevent soil movement or changes in moisture content for the purposes of extracting a relatively undisturbed sample.

ASTM D4719 Pressuremeter Test (PMT)
Place an inflatable cylindrical probe into a pre-drilled hole and expanding it while measuring the change in volume and pressure in the probe. It is inflated under either equal pressure increments or equal volume increments. This provides the stress-strain response of the soil.

WELL LEGEND



GROUNDED ENGINEERING

Date Started : Mar 19, 2020
Position : E: 632164, N: 4831793 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG B1

File No. : 20-026 **Project** : Toronto Island Flood, Toronto, Ontario **Client** : TRCA

drill method : *Geoprobe*

hollow stem augers (OD = 150 mm)

elev depth (m)	description	graphic log	number	type	SPT N-value
75.8	**GROUND SURFACE**				
75.7 / 0.1	125mm **PC CONCRETE**				
75.6 / 0.2	100mm **AGGREGATE**				
	FILL, sand and gravel, trace silt, trace organics, concrete fragments, loose, brown, wet		1	SS	8
75.0 / 0.8	**SAND**, some silt, trace gravel, loose, brown, wet		2	SS	5
	...at 1.5 m, very loose		3	SS	2
			4	SS	1
	...at 3.0 m, trace silt		5	SS	1
72.3 / 3.5	**END OF BOREHOLE**				

depth scale (m): 0.0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5

well details

elevation (m): 75.5, 75.0, 74.5, 74.0, 73.5, 73.0, 72.5

undrained shear strength (kPa)
○ unconfined + field vane
● pocket penetrometer ■ Lab Vane
40 80 120 160

SPT N-values (bpf)
× dynamic cone
10 20 30 40

headspace vapour (ppm)
× hexane □ isobutylene
100 200 300

moisture / plasticity
PL MC LL
10 20 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT)
GR SA SI CL

Unstabilized water level measured at 0.6 m below ground surface upon completion of drilling.

file: 20-026.gpj

Tech : JN | **PM** : TA | **Rev** : MD

GROUNDED ENGINEERING

Date Started : Mar 19, 2020
Position : E: 632215, N: 4831861 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG B2

File No. : 20-026 **Project** : Toronto Island Flood, Toronto, Ontario **Client** : TRCA

drill method : *Geoprobe*

hollow stem augers (OD = 150 mm)

elev depth (m)	description	graphic log	sample number	sample type	SPT N-value
76.0	**GROUND SURFACE**				
	75mm **BRICK**				
75.8	100mm **AGGREGATE**				
0.2	**FILL**, silty sand, loose, brown with some orange, moist		1	SS	7
75.2					
0.8	**SAND**, some silt, trace gravel, loose, brown, wet		2	SS	8
			3	SS	4
	...at 2.3 m, very loose		4	SS	2
	...at 3.0 m, trace silt, compact		5	SS	14
72.5					
3.5	**END OF BOREHOLE**				

depth scale (m): 0.0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5

well details

elevation (m): 75.5, 75.0, 74.5, 74.0, 73.5, 73.0, 72.5

undrained shear strength (kPa)
○ unconfined + field vane
● pocket penetrometer ■ Lab Vane
40 80 120 160

SPT N-values (bpf)
× dynamic cone
10 20 30 40

headspace vapour (ppm)
× hexane □ isobutylene
100 200 300

moisture / plasticity
PL MC LL
10 20 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT)
GR SA SI CL
2 97 1 0

Water level and cave not measured upon completion of drilling.

50 mm dia. monitoring well installed.
No. 10 screen

GROUNDWATER LEVELS

Date	Water Depth (m)	Elevation (m)
Mar 30, 2020	0.7	75.3

file: 20-026.gpj

Tech : JN | **PM** : TA | **Rev** : MD

GROUNDED ENGINEERING

Date Started : Mar 19, 2020
Position : E: 632272, N: 4831938 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG B3

File No. : 20-026 **Project** : Toronto Island Flood, Toronto, Ontario **Client** : TRCA

drill method : *Geoprobe*

hollow stem augers (OD = 150 mm)

elev depth (m)	description	graphic log	number	type	SPT N-value
76.2	**GROUND SURFACE**				
76.0	150mm **PC CONCRETE**				
0.2					
76.0	75mm **AGGREGATE**				
0.2	**FILL**, silty sand, concrete fragments, dense, brown, moist		1	SS	46
75.4					
0.8	**SAND**, some silt, loose, brown, wet		2	SS	8
	...at 1.5 m, very loose to 3.0 m		3	SS	2
	...at 2.3 m, trace organics		4	SS	1
	...at 3.0 m, greyish brown		5	SS	6
72.7					
3.5	**END OF BOREHOLE**				

depth scale (m): 0.0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5

well details

elevation (m): 76.0, 75.5, 75.0, 74.5, 74.0, 73.5, 73.0

undrained shear strength (kPa)
○ unconfined + field vane
● pocket penetrometer ■ Lab Vane
40 80 120 160

SPT N-values (bpf)
× dynamic cone
10 20 30 40

headspace vapour (ppm)
× hexane □ isobutylene
100 200 300

moisture / plasticity
PL MC LL
10 20 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT)
GR SA SI CL

0.6m: auger grinding

1 89 10 0

Water level and cave not measured upon completion of drilling.

50 mm dia. monitoring well installed.
No. 10 screen

GROUNDWATER LEVELS

Date	Water Depth (m)	Elevation (m)
Mar 30, 2020	0.9	75.3

file: 20-026.gpj

Tech : JN | **PM** : TA | **Rev** : MD

GROUNDED ENGINEERING

Date Started : Mar 19, 2020
Position : E: 632358, N: 4832053 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG B4

File No. : 20-026 **Project** : Toronto Island Flood, Toronto, Ontario **Client** : TRCA

drill method : *Geoprobe*

hollow stem augers (OD = 150 mm)

elev depth (m)	description	graphic log	number	type	SPT N-value
75.7	**GROUND SURFACE**				
75.5 / 0.2	150mm **PC CONCRETE**				
75.5 / 0.2	75mm **AGGREGATE**				
0.2	**SAND**, trace silt, trace gravel, loose, brown, moist		1	SS	9
	...at 0.8 m, some silt ...at 0.8 m, wet to 3.5 m		2	SS	5
	...at 1.5 m, very loose to 3.0 m		3	SS	3
			4	SS	1
	...at 3.0 m, greyish brown		5	SS	6
72.2 / 3.5	**END OF BOREHOLE**				

depth scale (m): 0.0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5

well details

elevation (m): 75.5, 75.0, 74.5, 74.0, 73.5, 73.0, 72.5

undrained shear strength (kPa)
○ unconfined + field vane
● pocket penetrometer ■ Lab Vane
40 80 120 160

SPT N-values (bpf)
× dynamic cone
10 20 30 40

headspace vapour (ppm)
× hexane □ isobutylene
100 200 300

moisture / plasticity
PL MC LL
10 20 30

unstabilized water level

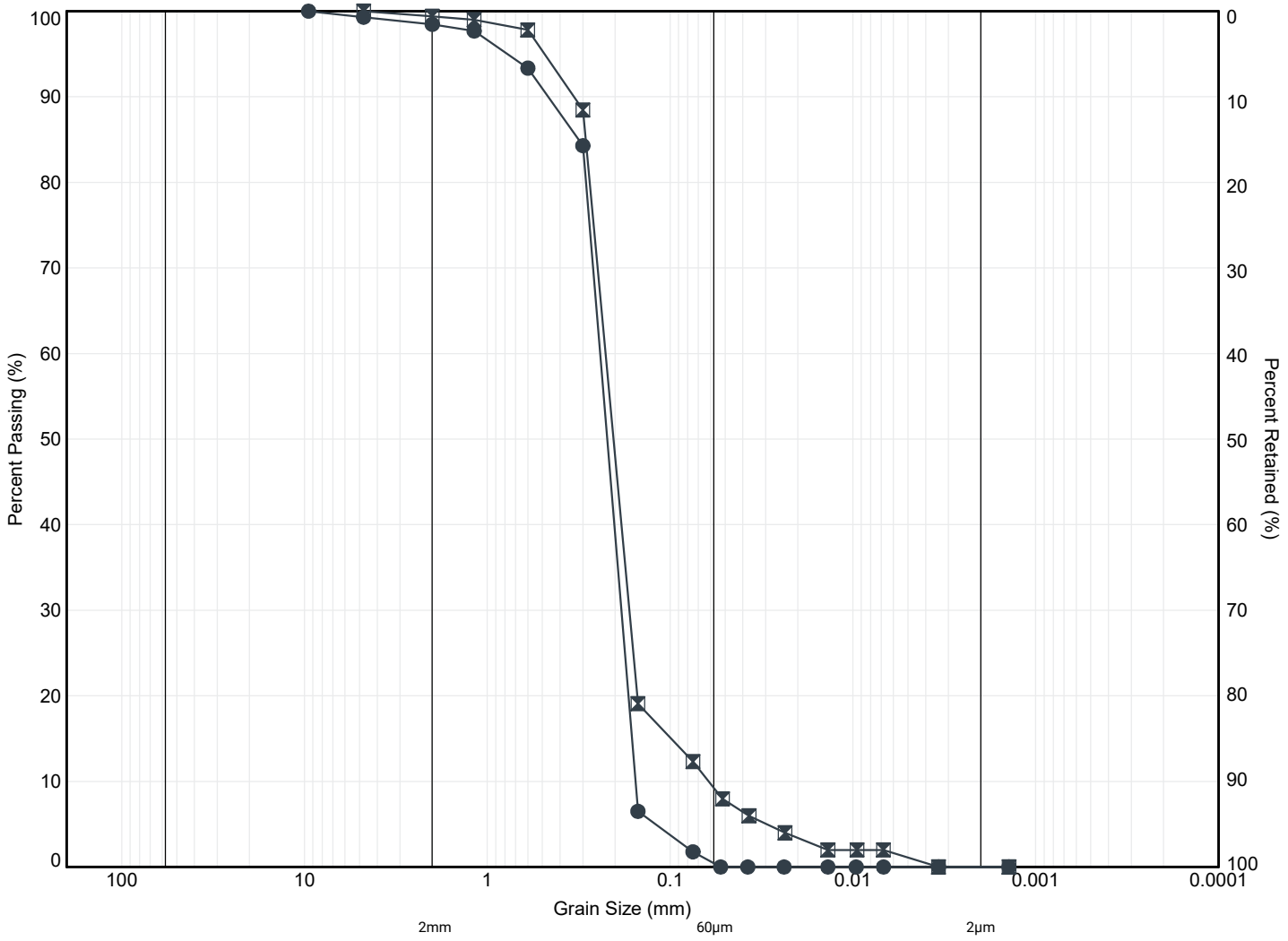
lab data and comments

grain size distribution (%) (MIT)
GR SA SI CL

Unstabilized water level measured at 0.6 m below ground surface upon completion of drilling.

file: 20-026.gpj

Tech : JN | **PM** : TA | **Rev** : MD



MIT SYSTEM	COBBLES	GRAVEL			SAND			SILT	CLAY
		COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE		

MIT SYSTEM

	Borehole	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
●	**B2**	SS5	3.3	72.7	2	97	1	0
⊠	**B3**	SS4	2.5	73.6	1	89	10	0

GROUNDED ENGINEERING

Title:

GRAIN SIZE DISTRIBUTION

File No.:

20-026

APPENDIX D



UNIFIED SOILS CLASSIFICATION

MAJOR DIVISIONS		GROUP SYMBOL	TYPICAL DESCRIPTION
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	GW	Well-graded gravels or gravel-sand mixtures, little or no fines.
		GP	Poorly-graded gravels or gravel-sand mixtures, little or no fines.
		GM	Silty gravels, gravel-sand-silt mixtures.
		GC	Clayey gravels, gravel-sand-clay mixtures.
	SAND AND SANDY SOILS	SW	Well-graded sands or gravelly sands, little or no fines.
		SP	Poorly-graded sands or gravelly sands, little or no fines.
		SM	Silty sands, sand-silt mixtures.
		SC	Clayey sands, sand-clay mixtures.
FINE GRAINED SOILS	SILTS AND CLAYS $W_L < 50\%$	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays. ($W_L < 30\%$).
		CI	Inorganic clays of medium plasticity, silty clays. ($30\% < W_L < 50\%$).
		OL	Organic silts and organic silty-clays of low plasticity.
	SILTS AND CLAYS $W_L > 50\%$	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
		CH	Inorganic clays of high plasticity, fat clays.
		OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS		Pt	Peat and other highly organic soils.
CLAY SHALE			
SANDSTONE			
SILTSTONE			
CLAYSTONE			
COAL			

SYMBOLS, ABBREVIATIONS AND TERMS USED ON RECORDS OF BOREHOLES

1. TEXTURAL CLASSIFICATION OF SOILS

CLASSIFICATION	PARTICLE SIZE	VISUAL IDENTIFICATION
Boulders	Greater than 200mm	same
Cobbles	75 to 200mm	same
Gravel	4.75 to 75mm	5 to 75mm
Sand	0.075 to 4.75mm	Not visible particles to 5mm
Silt	0.002 to 0.075mm	Non-plastic particles, not visible to the naked eye
Clay	Less than 0.002mm	Plastic particles, not visible to the naked eye

2. COARSE GRAIN SOIL DESCRIPTION (50% greater than 0.075mm)

TERMINOLOGY	PROPORTION
Trace or Occasional	Less than 10%
Some	10 to 20%
Adjective (e.g. silty or sandy)	20 to 35%
And (e.g. sand and gravel)	35 to 50%

3. TERMS DESCRIBING CONSISTENCY (COHESIVE SOILS ONLY)

DESCRIPTIVE TERM	UNDRAINED SHEAR STRENGTH (kPa)	APPROXIMATE SPT[(1)] 'N' VALUE
Very Soft	12 or less	Less than 2
Soft	12 to 25	2 to 4
Firm	25 to 50	4 to 8
Stiff	50 to 100	8 to 15
Very Stiff	100 to 200	15 to 30
Hard	Greater than 200	Greater than 30

NOTE: Hierarchy of Soil Strength Prediction

1) Laboratory Triaxial Testing
2) Field Insitu Vane Testing
3) Laboratory Vane Testing
4) SPT value
5) Pocket Penetrometer

4. TERMS DESCRIBING DENSITY (COHESIONLESS SOILS ONLY)

DESCRIPTIVE TERM	SPT "N" VALUE
Very Loose	Less than 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	Greater than 50

5. LEGEND FOR RECORDS OF BOREHOLES

SYMBOLS AND ABBREVIATIONS FOR SAMPLE TYPE	SS Split Spoon Sample	WS Wash Sample	AS Auger (Grab) Sample
	TW Thin Wall Shelby Tube Sample		TP Thin Wall Piston Sample
	PH Sampler Advanced by Hydraulic Pressure		PM Sampler Advanced by Manual Pressure
	WH Sampler Advanced by Self Static Weight	RC Rock Core	SC Soil Core

$$\text{Sensitivity} = \frac{\text{Undisturbed Shear Strength}}{\text{Remoulded Shear Strength}}$$

▼ Water Level

C_{pen} Shear Strength Determination by Pocket Penetrometer

(1) SPT 'N' Value Standard Penetration Test 'N' Value – refers to the number of blows from a 63.5kg hammer free falling a height of 0.76m to advance a standard 50 mm outside diameter split spoon sampler for 0.3 m depth into undisturbed ground.

(2) DCPT Dynamic Cone Penetration Test – Continuous penetration of a 50 mm outside diameter, 60° conical steel point attached to "A" size rods driven by a 63.5 kg hammer free falling a height of 0.76 m. The resistance to cone penetration is the number of hammer blows required for each 0.3 m advance of the conical point into undisturbed ground.

RECORD OF BOREHOLE G103

PROJECT : Enwave Deep Lake Water Cooling Project
LOCATION : Toronto,ON
STARTED : March 24, 2020
COMPLETED : March 25, 2020
N 4 830 520.5 E 314 134.1

Project No. 27667
SHEET 1 OF 3
DATUM Geodetic

DEPTH SCALE (metres)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	COMMENTS
		GROUND SURFACE		76.02				
		ASPHALT (90mm)		0.00 0.09				
		SAND, trace silt to silty, trace rootlets, trace oxidation stains, brown, moist: (FILL)			1	GS		
1	Hydrovac							
					2	GS		
2				73.43				
		SAND, trace silt to silty, trace clay, trace gravel, loose to dense, brown to grey, moist to wet		2.59	3	SS	11	
3								
4								
		trace shell fragments gravel (>25mm) in SS4			4	SS	8	
5								
6					5	SS	25	Grain Size Analysis: Gr 0%/ Sa 88%/ Si 9%/ Cl 3%
7								
8					6	SS	24	
9		No recovery (SS7) Pieces of boulder/cobbles found at the tip of spoon Pushed spoon below the end of the SPT (beyond 9.75m) and recovered 100mm sample used for environmental sampling.			7	SS	34	
10	(CSA) Casing OD=100mm							
11		very thin seams of black organic material throughout SS8 to SS11			8	SS	21	
12								
					9	SS	17	
13								
14					10	SS	18	
				61.24				
15		**SILT**, sandy to **SAND**, silty, trace to some clay, loose to compact/firm to stiff, grey, wet trace shell fragments in SS11		14.78	11	SS	6	Grain Size Analysis: Gr 0%/ Sa 25%/ Si 61%/ Cl 14%
16								
17								
18								
19								

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH: Cu, KPa
nat V - ✚ Q - ✖
rem V - ● Cpen ▲
40 80 120 160

WATER CONTENT, PERCENT
wp w wl
10 20 30 40

ADDITIONAL LAB. TESTING

PIEZOMETER OR STANDPIPE INSTALLATION
Bentonite
Filter Sand
Slotted Screen

GROUNDWATER ELEVATIONS
▽ WATER LEVEL UPON COMPLETION
▼ WATER LEVEL IN WELL/PIEZOMETER
June 15, 2020

LOGGED : JMP
CHECKED : MTB

THURBER

THURBER2S TEL-27667.GPJ 6/30/20

RECORD OF BOREHOLE G103

PROJECT : Enwave Deep Lake Water Cooling Project
LOCATION : Toronto,ON
STARTED : March 24, 2020
COMPLETED : March 25, 2020
N 4 830 520.5 E 314 134.1

Project No. 27667
SHEET 2 OF 3
DATUM Geodetic

DEPTH SCALE (metres)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	COMMENTS: DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)	SHEAR STRENGTH: Cu, KPa (nat V - ✚ Q - ✖ rem V - ● Cpen ▲) 40 80 120 160 / WATER CONTENT, PERCENT (wp w wl) 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
21		**SILT**, sandy to **SAND**, silty, trace to some clay, loose to compact/firm to stiff, grey, wet									
22											
23											
24											
25											
26		trace shell fragments and 50mm silt seams throughout SS12			12	SS	12				
27											
28											
29											
30	(CSA) Casing OD=100mm										
31		**SAND**, silty, trace clay, dense, grey, wet		45.02 31.00							
32											
33											
34											
35											
36											
37		trace shell fragments and 25mm clay seams throughout SS13, becoming dense			13	SS	47	Grain Size Analysis: Gr 0%/ Sa 63%/ Si 31%/ Cl 6%			
38											
39											

GROUNDWATER ELEVATIONS

▽ WATER LEVEL UPON COMPLETION

▼ WATER LEVEL IN WELL/PIEZOMETER
June 15, 2020

LOGGED : JMP
CHECKED : MTB

THURBER

THURBER2S TEL-27667.GPJ 6/30/20

RECORD OF BOREHOLE G103

PROJECT : Enwave Deep Lake Water Cooling Project
LOCATION : Toronto,ON
STARTED : March 24, 2020
COMPLETED : March 25, 2020
N 4 830 520.5 E 314 134.1

Project No. 27667
SHEET 3 OF 3
DATUM Geodetic

DEPTH SCALE (metres)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	COMMENTS: DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)	SHEAR STRENGTH: Cu, KPa (nat V - ✚, rem V - ●, Q - ✖, Cpen ▲) (40 80 120 160) / WATER CONTENT, PERCENT (wp, w, wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
41	(CSA) Casing OD=100mm	**SAND**, silty, trace clay, dense, grey, wet									
42											
43											
44											
45											
46											
47		frequent shale fragments in SS14									
				28.70							
				47.32	14	SS	62/ 0.075				
48		Borehole continued into bedrock using HQ coring methods. Refer to Grounded Engineering's Rock Log G103. NOTE: 1)Shallow Monitoring well installation consists of 50mm diameter Schedule 40 PVC pipe with a 3.05m slotted screen installed at 13.72m 2) Gas readings taken every 1.52m until 15.24m, then every 10.67m to 47.32m. CO=0ppm, CH_4= 0% LEL, H_2S=0.0ppm, and O_2=21.05%									
49											
50											
51		WATER LEVEL READINGS: DATE / DEPTH(m) / ELEV.(m) Apr 20/20 0.75 75.27 May 20/20 0.79 75.23 Jun 15/20 0.76 75.26									
52											
53											
54											
55											
56											
57											
58											
59											

GROUNDWATER ELEVATIONS

▽ WATER LEVEL UPON COMPLETION ▼ WATER LEVEL IN WELL/PIEZOMETER June 15, 2020

LOGGED : JMP
CHECKED : MTB

THURBER

THURBER2S TEL-27667.GPJ 6/30/20

RECORD OF BOREHOLE T104

PROJECT : Enwave Deep Lake Water Cooling Project
LOCATION : Toronto,ON
STARTED : March 9, 2020
COMPLETED : March 11, 2020
N 4 830 357.9 E 314 220.0

Project No. 27667
SHEET 1 OF 2
DATUM Geodetic

DEPTH SCALE (metres)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	COMMENTS
		GROUND SURFACE		76.09				
	Hydrovac	**TOPSOIL** (50mm) and sod		0.05				
		SAND, trace silt, trace gravel, brown, moist: (FILL)			1	GS		
					2	GS		
				73.80				
		SAND, gravelly, trace silt, very loose, brown, moist: (FILL)		2.29	3	SS	3	
				73.04				
		SAND, trace to some silt, trace gravel, very loose to compact, grey, wet		3.05	4	SS	3	Grain Size Analysis: Gr 6%/ Sa 76%/ Si & Cl 18%
					5	SS	13	
					6	SS	20	
					7	SS	24	
					8	SS	24	
	Hollow Stem Augers				9	SS	22	Grain Size Analysis: Gr 0%/ Sa 87%/ Si 9%/ Cl 4%
				64.35				
		SAND, silty, compact, grey, wet		11.73	10	SS	18	
		some gravel in SS11.			11	SS	16	
		very thin seams of black organic material in SS12			12	SS	18	
				59.78				
		SILT, some sand, trace to some clay, loose/firm to stiff, grey, wet trace clay seams throughout SS13 and SS14, becoming loose.		16.31	13	SS	6	Grain Size Analysis: Gr 0%/ Sa 16%/ Si 69%/ Cl 15%
				57.19	14	SS	9	
		END OF BOREHOLE AT 18.90m. NOTE: 1)Monitoring well installation consists of 50mm diameter Schedule 40 PVC pipe with a 3.05m slotted screen.		18.90				

SHEAR STRENGTH: Cu, KPa
nat V - ✚ Q - ✖
rem V - ● Cpen ▲
40 80 120 160

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

WATER CONTENT, PERCENT
wp w wl
10 20 30 40

ADDITIONAL LAB. TESTING

PIEZOMETER OR STANDPIPE INSTALLATION

Bentonite
Filter Sand
Slotted Screen
Bentonite

GROUNDWATER ELEVATIONS

▽ WATER LEVEL UPON COMPLETION ▼ WATER LEVEL IN WELL/PIEZOMETER
April 20, 2020

LOGGED : AF
CHECKED : MTB

THURBER

THURBER2S TEL-27667.GPJ 6/30/20

RECORD OF BOREHOLE T104

PROJECT : Enwave Deep Lake Water Cooling Project
LOCATION : Toronto,ON
STARTED : March 9, 2020
COMPLETED : March 11, 2020
N 4 830 357.9 E 314 220.0

Project No. 27667
SHEET 2 OF 2
DATUM Geodetic

DEPTH SCALE (metres)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	COMMENTS: DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)	SHEAR STRENGTH: Cu, KPa (nat V - ✚, rem V - ●, Q - ✖, Cpen ▲) (40 80 120 160) / WATER CONTENT, PERCENT (wp, w, wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
21		2) Gas readings were taken ever 1.52m until EOB. CO=0ppm, CH_4=0% LEL, H_2S=0.0ppm and 0_2=21.05%.									
22		WATER LEVEL READINGS: DATE DEPTH(m) ELEV.(m) Apr 20/20 1.25 74.84									
23											
24											
25											
26											
27											
28											
29											
30											
31											
32											
33											
34											
35											
36											
37											
38											
39											

GROUNDWATER ELEVATIONS

▽ WATER LEVEL UPON COMPLETION

▼ WATER LEVEL IN WELL/PIEZOMETER
April 20, 2020

LOGGED : AF
CHECKED : MTB

THURBER

RECORD OF BOREHOLE T105

PROJECT : Enwave Deep Lake Water Cooling Project
LOCATION : Toronto,ON
STARTED : March 12, 2020
COMPLETED : March 17, 2020
N 4 830 135.6 E 314 239.8

Project No. 27667
SHEET 1 OF 4
DATUM Geodetic

DEPTH SCALE (metres)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	COMMENTS / DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)	SHEAR STRENGTH: Cu, KPa (nat V - ✚ Q - ✖ rem V - ● Cpen ▲) 40 80 120 160 / WATER CONTENT, PERCENT (wp w wl) 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		75.85							
		ASPHALT (70mm)		0.00 0.07							
		SAND, some silt, trace gravel, brown, wet: (FILL)									▼
1	Hydrovac				1	GS					
2					2	GS					
	I HSA I			73.56							
		SAND, trace to some silt, trace gravel, trace clay, very loose to compact, brown to grey, moist		2.29	3	SS	3				
3					4	SS	12				
4											
		some gravel (>25mm)			5	SS	4				
5											
6		some gravel (>25mm) trace red gravel pieces			6	SS	28				
7											
8					7	SS	23				
9					8	SS	26	Grain Size Analysis: Gr 0%/ Sa 92%/ Si 4%/ Cl 4%			
	(CSA) Casing OD=100mm			65.65							
10		**SAND**, silty to **SILT**, sandy, trace clay, loose to compact, grey, moist to wet		10.20							
11					9	SS	25				
12		trace clay seams (<25mm) throughout SS10.			10	SS	18				
13											
14		thin seams of black organic material throughout SS11 to SS13.			11	SS	10	Grain Size Analysis: Gr 0%/ Sa 49%/ Si 42%/ Cl 9%			
15											
		organic odour noted in SS12 and SS13.			12	SS	10				
16											
17					13	SS	6				
18											
		trace clay seams (<25mm) throughout SS14 and SS15.			14	SS	11				
19											

GROUNDWATER ELEVATIONS

▽ WATER LEVEL UPON COMPLETION

▼ WATER LEVEL IN WELL/PIEZOMETER
June 15, 2020

LOGGED : AF/JMP/SB
CHECKED : MTB

THURBER

THURBER2S TEL-27667.GPJ 6/30/20

RECORD OF BOREHOLE T105

PROJECT : Enwave Deep Lake Water Cooling Project
LOCATION : Toronto,ON
STARTED : March 12, 2020
COMPLETED : March 17, 2020
N 4 830 135.6 E 314 239.8

Project No. 27667
SHEET 2 OF 4
DATUM Geodetic

DEPTH SCALE (metres)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	COMMENTS	SHEAR STRENGTH: Cu, KPa (nat V - ✚, rem V - ●, Q - ✖, Cpen ▲) / WATER CONTENT, PERCENT (wp, w, wl)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
21	(CSA) Casing OD=100mm	**SAND**, silty to **SILT**, sandy, trace clay, loose to compact, grey, wet clay seams (~25mm) throughout SS15, SS16, SS17 and SS18.			15	SS	10	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)	SHEAR STRENGTH: Cu, KPa (40 80 120 160) WATER CONTENT, PERCENT (wp w wl 10 20 30 40)		
22					16	SS	6				
23					17	SS	7				
24											
25		**CLAY**, silty, some sand, some organics, firm to stiff, grey, moist organic odour noted		51.07 24.78	18	SS	8				
26		**SAND**, silty, some clay seams, compact, grey, moist		49.81 26.04	19	SS	13				
27		**SILT**, sandy to **SILT** and **SAND**, some clay, trace organics, sand and clay seams noted throughout, loose to compact/firm to stiff, grey, moist		49.18 26.67	20	SS	7				
28											
29					21	SS	12	Grain Size Analysis: Gr 0%/ Sa 30%/ Si 55%/ Cl 15%			
30											
31					22	SS	11				
32					23	SS	10				
33											
34					24	SS	10				
35					25	SS	9				
36											
37					26	SS	4				
38											
39					27	SS	8				

GROUNDWATER ELEVATIONS

▽ WATER LEVEL UPON COMPLETION

▼ WATER LEVEL IN WELL/PIEZOMETER
June 15, 2020

LOGGED : AF/JMP/SB
CHECKED : MTB

THURBER

THURBER2S TEL-27667.GPJ 6/30/20

RECORD OF BOREHOLE T105

PROJECT : Enwave Deep Lake Water Cooling Project
LOCATION : Toronto,ON
STARTED : March 12, 2020
COMPLETED : March 17, 2020
N 4 830 135.6 E 314 239.8

Project No. 27667
SHEET 3 OF 4
DATUM Geodetic

DEPTH SCALE (metres)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	COMMENTS: DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)	SHEAR STRENGTH: Cu, KPa (nat V - ✚ rem V - ● Q - ✖ Cpen ▲) 40 80 120 160 / WATER CONTENT, PERCENT (wp w wl) 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
41	(CSA) Casing OD=100mm	**SILT**, sandy to **SILT** and **SAND**, some clay, trace organics, sand and clay seams noted throughout, loose to compact/firm to stiff, grey, moist			28	SS	8				
					29	SS	7				
42											
43					30	SS	12				
44											
					31	SS	11	Grain Size Analysis: Gr 0%/ Sa 39%/ Si 50%/ Cl 11%			
45											
46					32	SS	9				
47											
		trace organic material and shell fragments in SS33.			33	SS	12				
48											
49					34	SS	19				
				26.01							
50		**SAND**, silty to **SAND** and **SILT**, trace clay, dense to very dense, grey, moist to wet.		49.83	35	SS	46				
51											
52					36	SS	48				
53											
		compact			37	SS	16				
54											
55					38	SS	103				
56											
					39	SS	75	Grain Size Analysis: Gr 0%/ Sa 56%/ Si 38%/ Cl 6%			
57											
58					40	SS	65				
59											
					41	SS	45				

GROUNDWATER ELEVATIONS

▽ WATER LEVEL UPON COMPLETION ▼ WATER LEVEL IN WELL/PIEZOMETER
June 15, 2020

LOGGED : AF/JMP/SB
CHECKED : MTB

THURBER

THURBER2S TEL-27667.GPJ 6/30/20

RECORD OF BOREHOLE T105

PROJECT : Enwave Deep Lake Water Cooling Project
LOCATION : Toronto,ON
STARTED : March 12, 2020
COMPLETED : March 17, 2020
N 4 830 135.6 E 314 239.8

Project No. 27667
SHEET 4 OF 4
DATUM Geodetic

DEPTH SCALE (metres)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	COMMENTS: DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)	SHEAR STRENGTH: Cu, KPa (nat V - ✚, rem V - ●, Q - ✖, Cpen ▲) (40 80 120 160) / WATER CONTENT, PERCENT (wp w wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
61	(CSA) Casing OD=100mm	**SAND**, silty to **SAND** and **SILT**, trace clay, dense, grey, moist to wet.			42	SS	48				
62				13.82 62.03							
63		**CLAY**, silty, trace sand, stiff, grey, moist			43	SS	12	Grain Size Analysis: Gr 0%/ Sa 2%/ Si 42%/ Cl 56%			
64					44	SS	13				
65				10.47 65.38							
66		**CLAY**, silty, sandy, trace to some gravel, hard, grey, moist: (TILL)			45	SS	38	Grain Size Analysis: Gr 11%/ Sa 28%/ Si 43%/ Cl 18%			
67					46	SS	67				
68				7.85 67.99	47	SS	100/ 0.025				
69		Borehole continued into bedrock using HQ coring methods. Refer to Grounded Engineering's Rock Log T105. NOTE: 1)Shallow Monitoring well installation consists of 50mm diameter Schedule 40 PVC pipe with a 3.05m slotted screen at 16.76m. 2)Gas readings were taken every 1.52m until EOB. CO=0ppm, CH_4=0% LEL, H_2S=0.0ppm and 0_2=21.05%									
70											
71											
72		WATER LEVEL READINGS: DATE DEPTH(m) ELEV.(m) Apr 22/20 0.62 75.23 May 20/20 0.60 75.25 Jun 15/20 0.70 75.15									
73											
74											
75											
76											
77											
78											
79											

GROUNDWATER ELEVATIONS

▽ WATER LEVEL UPON COMPLETION

▼ WATER LEVEL IN WELL/PIEZOMETER
June 15, 2020

LOGGED : AF/JMP/SB
CHECKED : MTB

THURBER

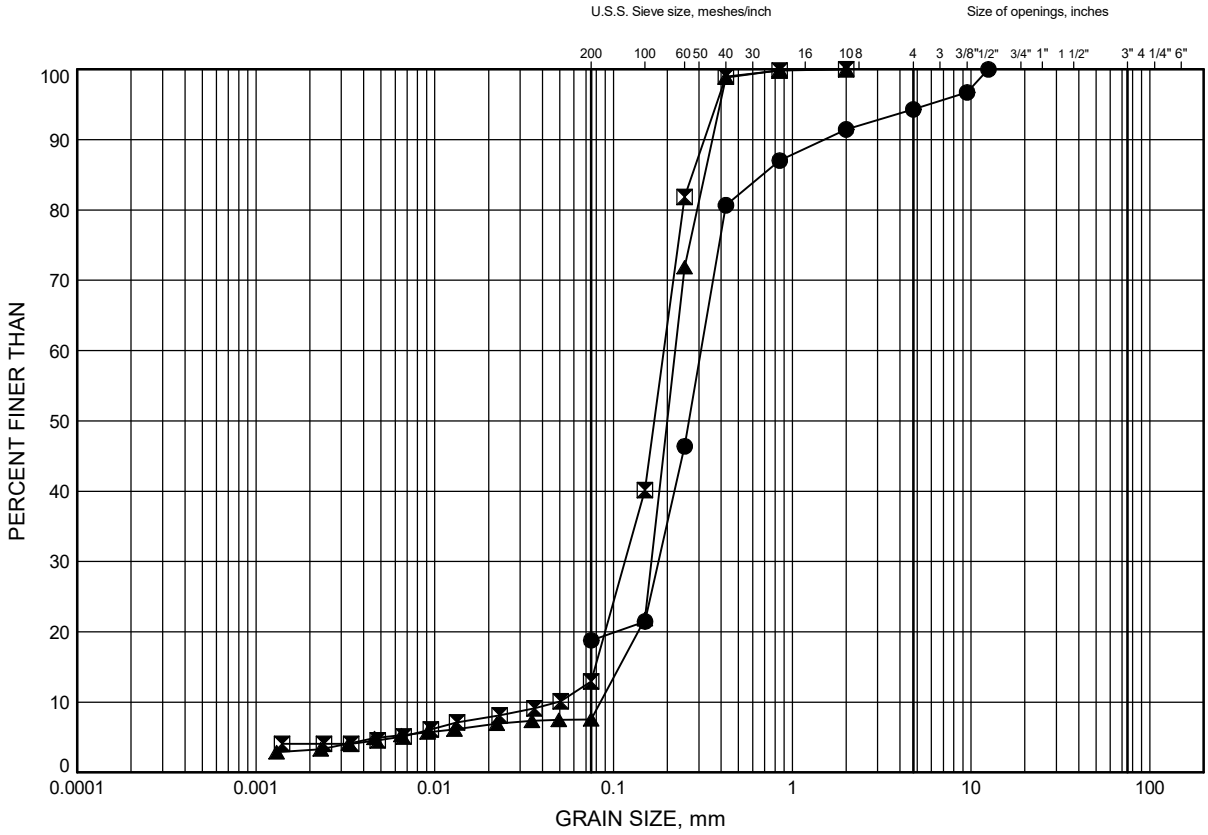
THURBER2S TEL-27667.GPJ 6/30/20

Enwave Deep Lake Water Cooling Project

GRAIN SIZE DISTRIBUTION

FIGURE C1-1

Sand



SILT and CLAY	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE SIZE
FINE GRAINED	SAND			GRAVEL		

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	T104	3.35	72.74
⊠	T104	10.97	65.12
▲	T105	9.45	66.40

Date June 2020

Project 27667

THURBER

Prep'd MFA

Chkd. MTB

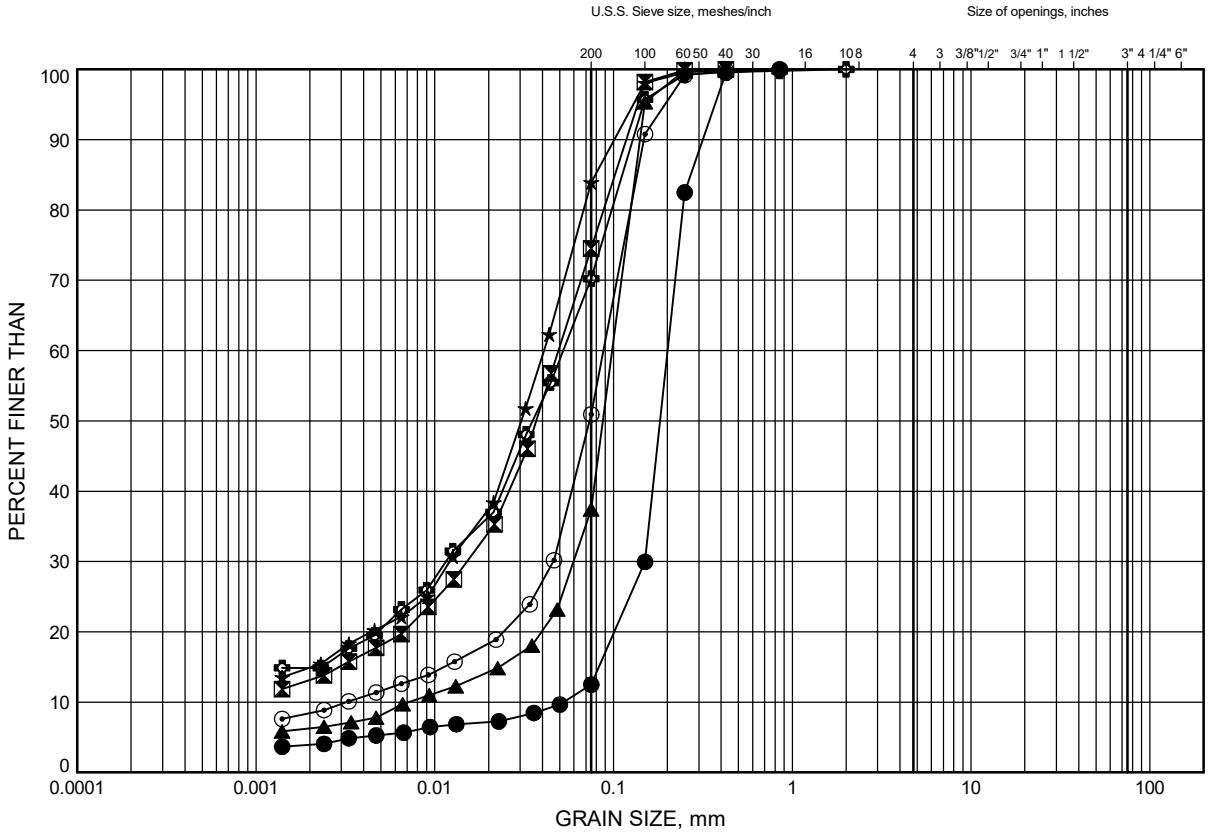
GRAIN SIZE DISTRIBUTION - THURBER TEL-27667.GPJ 6/30/20

Enwave Deep Lake Water Cooling Project

GRAIN SIZE DISTRIBUTION

FIGURE C1-2

Silty Sand to Silt



SILT and CLAY	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE SIZE
FINE GRAINED	SAND			GRAVEL		

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	G103	6.40	69.62
⊠	G103	15.54	60.48
▲	G103	36.88	39.14
★	T104	17.07	59.02
⊙	T105	14.02	61.83
✿	T105	29.26	46.59

Date June 2020

Project 27667

THURBER

Prep'd MFA

Chkd. MTB

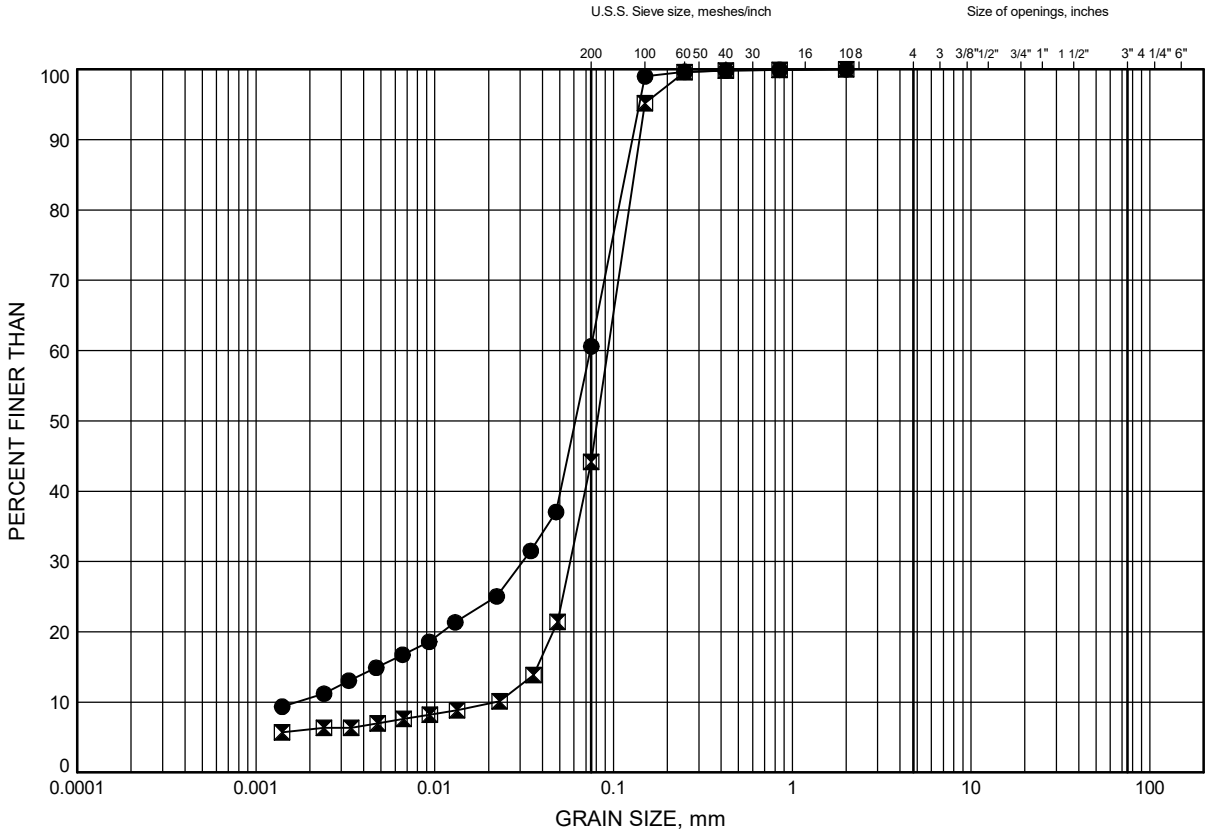
GRAIN SIZE DISTRIBUTION - THURBER TEL-27667.GPJ 6/30/20

Enwave Deep Lake Water Cooling Project

GRAIN SIZE DISTRIBUTION

FIGURE C1-3

Silty Sand to Silt



SILT and CLAY	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE SIZE
FINE GRAINED	SAND			GRAVEL		

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	T105	44.50	31.35
⊠	T105	56.69	19.16

Date June 2020

Project 27667

THURBER

Prep'd MFA

Chkd. MTB

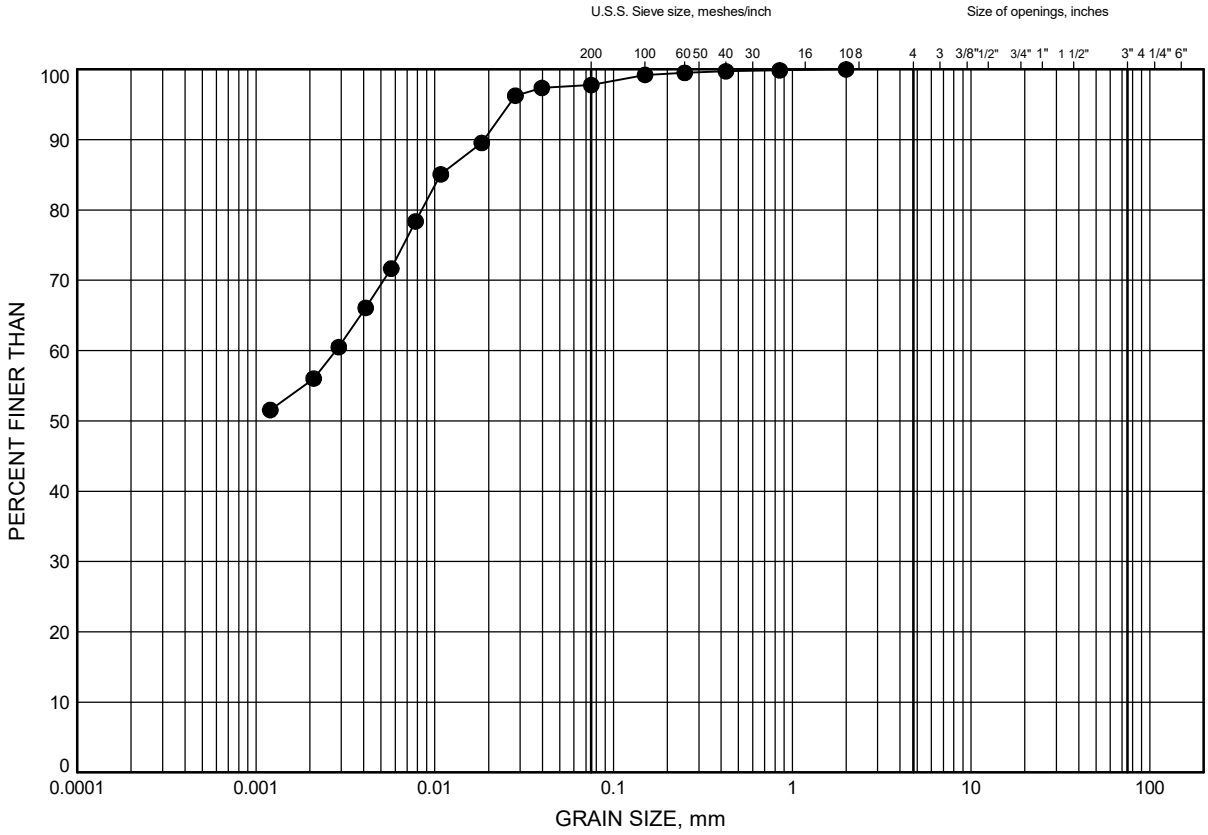
GRAIN SIZE DISTRIBUTION - THURBER TEL-27667.GPJ 6/30/20

Enwave Deep Lake Water Cooling Project

GRAIN SIZE DISTRIBUTION

FIGURE C1-4

Silty Clay



SILT and CLAY	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE SIZE
FINE GRAINED	SAND			GRAVEL		

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	T105	62.79	13.06

Date June 2020

Project 27667

THURBER

Prep'd MFA

Chkd. MTB

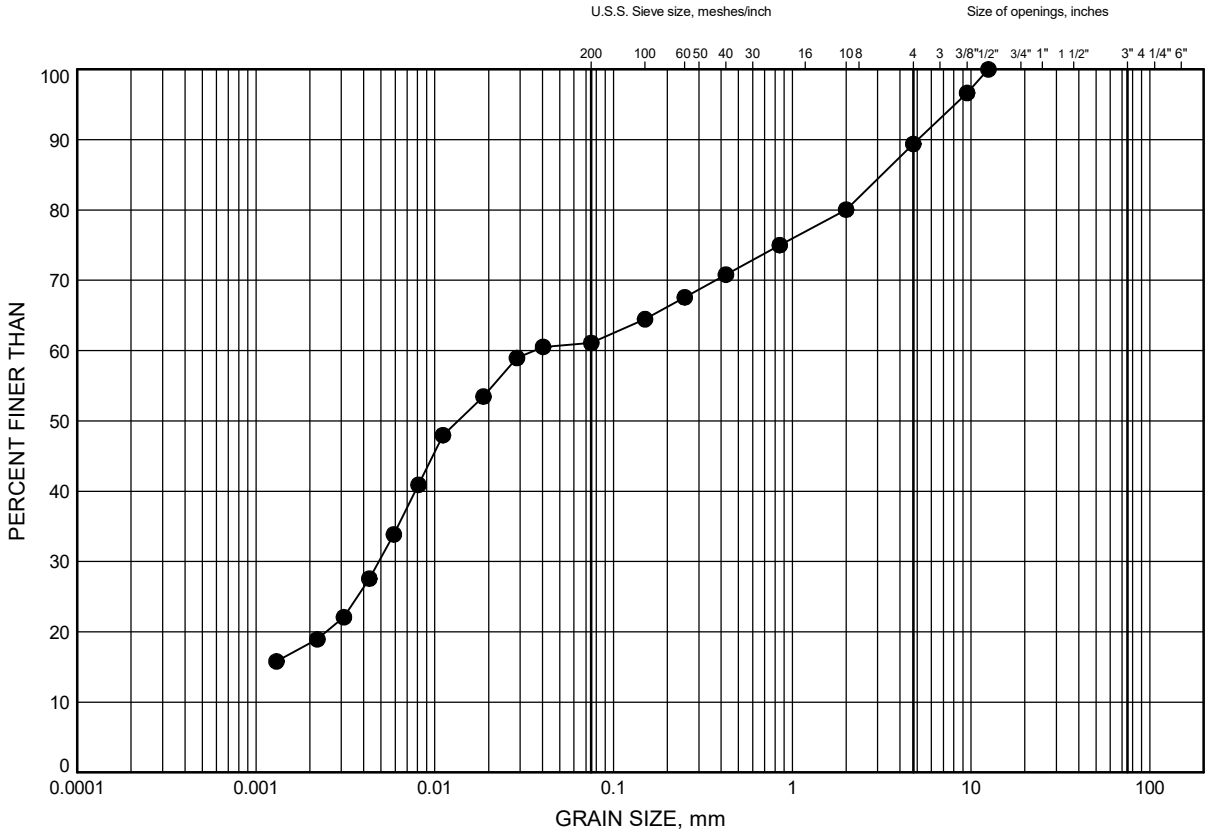
GRAIN SIZE DISTRIBUTION - THURBER TEL-27667.GPJ 6/30/20

Enwave Deep Lake Water Cooling Project

GRAIN SIZE DISTRIBUTION

FIGURE C1-5

Silty Clay Till



SILT and CLAY	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE SIZE
FINE GRAINED	SAND			GRAVEL		

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	T105	66.45	9.40

Date June 2020

Project 27667

THURBER

Prep'd MFA

Chkd. MTB

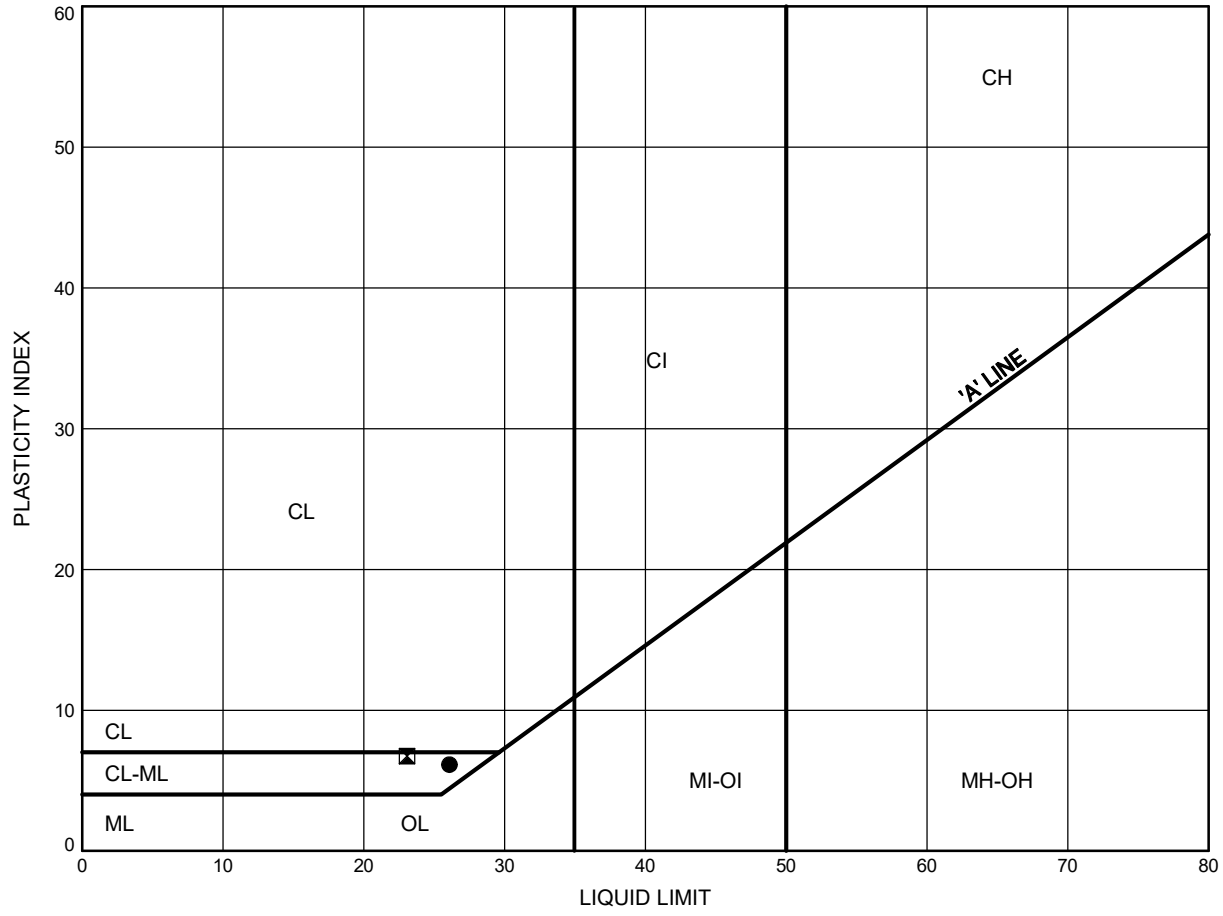
GRAIN SIZE DISTRIBUTION - THURBER TEL-27667.GPJ 6/30/20

Enwave Deep Lake Water Cooling Project

ATTERBERG LIMITS TEST RESULTS

FIGURE C3-1

Silt



LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	T104	17.07	59.02
⊠	T105	29.26	46.59

Date June 2020

Project 27667

THURBER

Prep'd MFA

Chkd. MTB

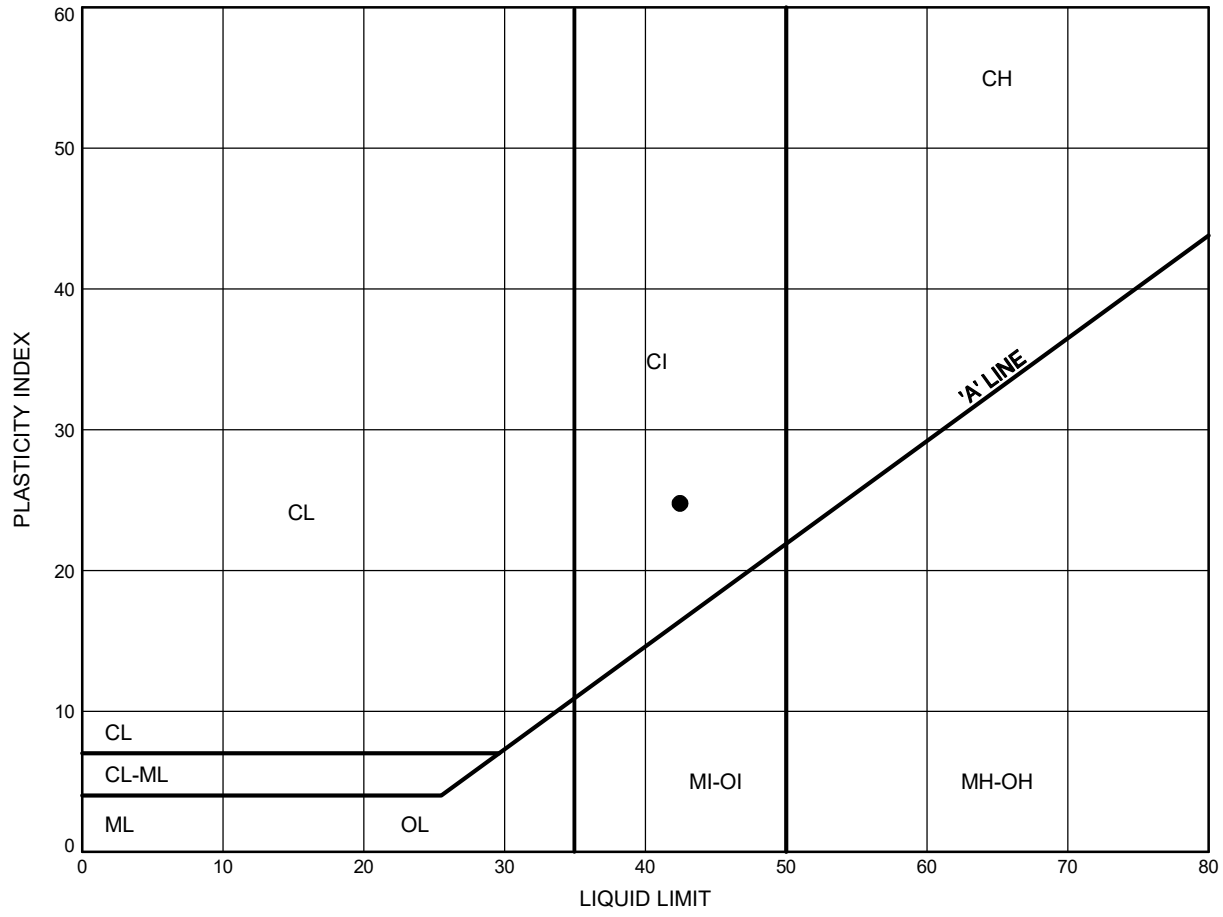
THURBALT TEL-27667.GPJ 6/30/20

Enwave Deep Lake Water Cooling Project

ATTERBERG LIMITS TEST RESULTS

FIGURE C3-2

Silty Clay



LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	T105	62.79	13.06

Date June 2020

Project 27667

THURBER

Prep'd MFA

Chkd. MTB

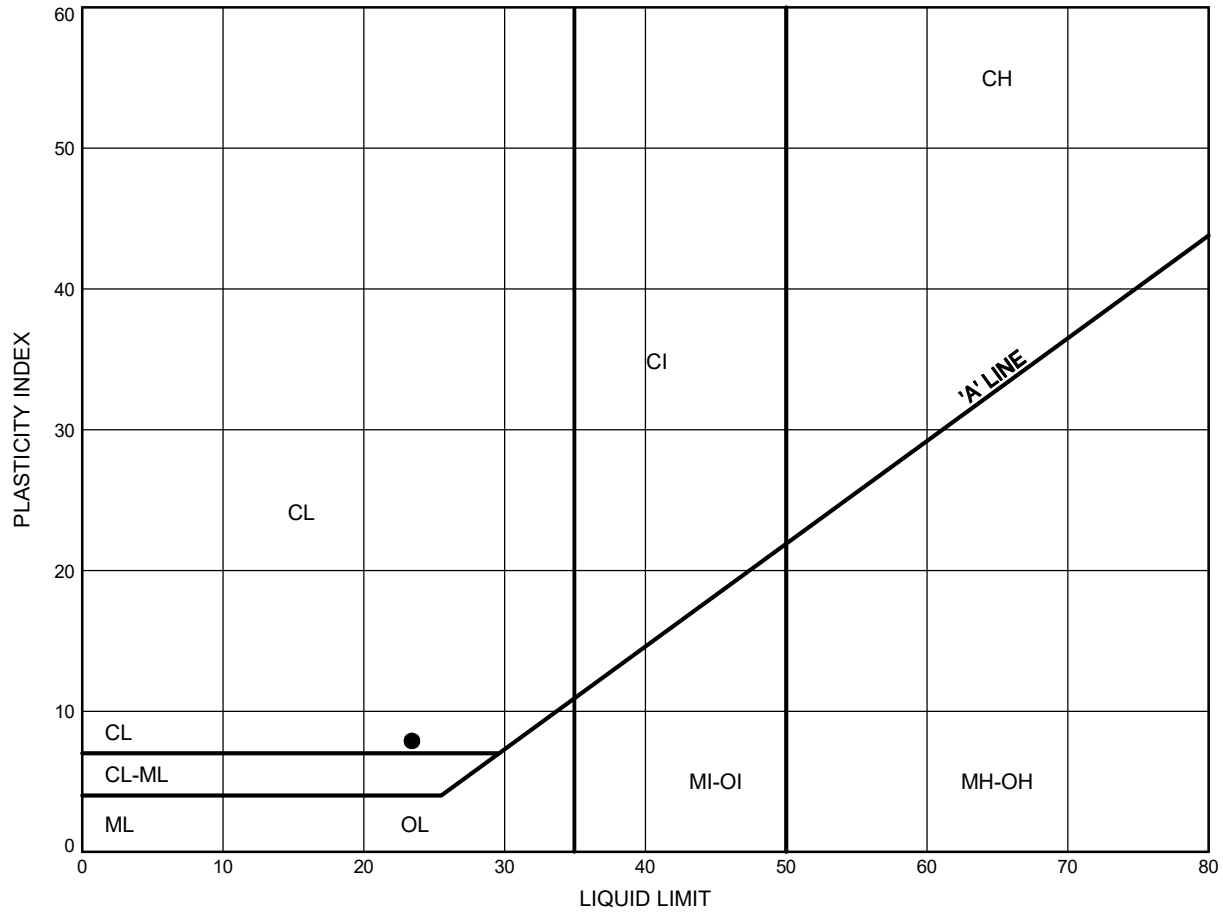
THURBALT TEL-27667.GPJ 6/30/20

Enwave Deep Lake Water Cooling Project

ATTERBERG LIMITS TEST RESULTS

FIGURE C3-3

Silty Clay Till



LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	T105	66.45	9.40

Date June 2020

Project 27667

THURBER

Prep'd MFA

Chkd. MTB

THURBALT TEL-27667.GPJ 6/30/20

APPENDIX E



BOREHOLE LOG TERMINOLOGY

GROUNDED ENGINEERING

SAMPLING/TESTING METHODS

SS: split spoon sample

AS: auger sample

GS: grab sample

FV: shear vane

DP: direct push

PMT: pressuremeter test

ST: shelby tube

CORE: soil coring

RUN: rock coring

SYMBOLS & ABBREVIATIONS

MC: moisture content

LL: liquid limit

PL: plastic limit

PI: plasticity index

γ: soil unit weight (bulk)

G_s: specific gravity

S_u: undrained shear strength

▽ unstabilized water level

▼ 1st water level measurement

▼ 2nd water level measurement most recent

▼ water level measurement

ENVIRONMENTAL SAMPLES

M&I: metals and inorganic parameters

PAH: polycyclic aromatic hydrocarbon

PCB: polychlorinated biphenyl

VOC: volatile organic compound

PHC: petroleum hydrocarbon

BTEX: benzene, toluene, ethylbenzene and xylene

PPM: parts per million

FIELD MOISTURE (based on tactile inspection)

DRY: no observable pore water

MOIST: inferred pore water, not observable (i.e. grey, cool, etc.)

WET: visible pore water

COHESIONLESS

Relative Density	N-Value
Very Loose	<4
Loose	4 - 10
Compact	10 - 30
Dense	30 - 50
Very Dense	>50

COHESIVE

Consistency	N-Value	Su (kPa)
Very Soft	<2	<12
Soft	2 - 4	12 - 25
Firm	4 - 8	25 - 50
Stiff	8 - 15	50 - 100
Very Stiff	15 - 30	100 - 200
Hard	>30	>200

COMPOSITION

Term	% by weight
trace silt	<10
some silt	10 - 20
silt***y***	20 - 35
sand ***and*** silt	>35

ASTM STANDARDS

ASTM D1586 Standard Penetration Test (SPT)
Driving a 51 mm O.D. split-barrel sampler ("split spoon") into soil with a 63.5 kg weight free falling 760 mm. The blows required to drive the split spoon 300 mm ("bpf") after an initial penetration of 150 mm is referred to as the N-Value.

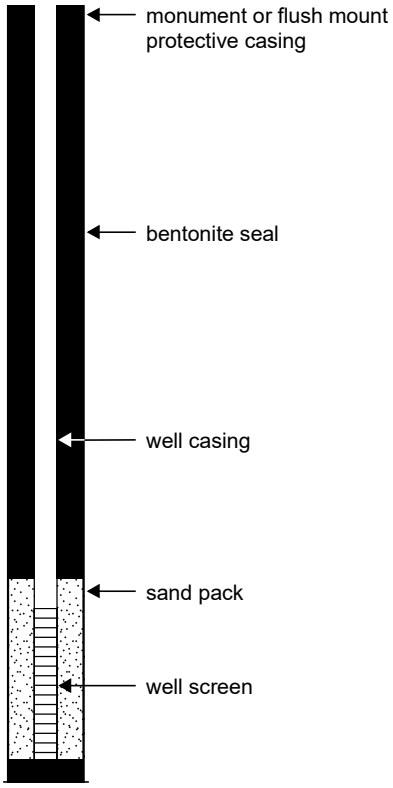
ASTM D3441 Cone Penetration Test (CPT)
Pushing an internal still rod with a outer hollow rod ("sleeve") tipped with a cone with an apex angle of 60° and a cross-sectional area of 1000 mm^2 into soil. The resistance is measured in the sleeve and at the tip to determine the skin friction and the tip resistance.

ASTM D2573 Field Vane Test (FVT)
Pushing a four blade vane into soil and rotating it from the surface to determine the torque required to shear a cylindrical surface with the vane. The torque is converted to the shear strength of the soil using a limit equilibrium analysis.

ASTM D1587 Shelby Tubes (ST)
Pushing a thin-walled metal tube into the in-situ soil at the bottom of a borehole, removing the tube and sealing the ends to prevent soil movement or changes in moisture content for the purposes of extracting a relatively undisturbed sample.

ASTM D4719 Pressuremeter Test (PMT)
Place an inflatable cylindrical probe into a pre-drilled hole and expanding it while measuring the change in volume and pressure in the probe. It is inflated under either equal pressure increments or equal volume increments. This provides the stress-strain response of the soil.

WELL LEGEND



ROCK CORE TERMINOLOGY (ISRM)

TCR **Total Core Recovery** the total length of recovery (soil or rock) per run, as a percentage of the drilled length
SCR **Solid Core Recovery** the total length of sound full-diameter rock core pieces per run, as a percentage of the drilled length
RQD **Rock Quality Designation** the sum of all pieces of sound rock core in a run which are 10 cm or greater in length, as a percentage of the drilled length

Natural Fracture Frequency (typically per 0.3 m) The number of natural discontinuities (joints, faults, etc.) which are present per 0.3m. Ignores mechanical or drill-induced breaks, and closed discontinuities (e.g. bedding planes).

LOGGING DISCONTINUITIES

Discontinuity Type

BP bedding parting
CL cleavage
CS crushed seam
FZ fracture zone
MB mechanical break
IS infilled seam
JT Joint
SS shear surface
SZ shear zone
VN vein
VO void

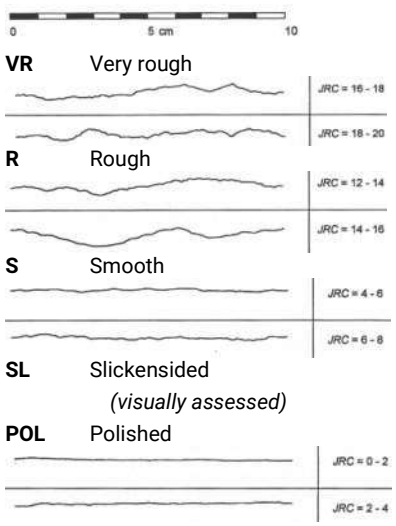
Coating

CN Clean
SN Stained
OX Oxidized
VN Veneer
CT Coating (>1 mm)

Dip Inclination

H	horizontal/flat	0 - 20°
D	dipping	20 - 50°
SV	sub-vertical	50 - 90°
V	vertical	90±°

Roughness (Barton et al.)



VR Very rough
R Rough
S Smooth
SL Slickensided *(visually assessed)*
POL Polished

Spacing in Discontinuity Sets (*ISRM 1981*)

VC	very close	< 60 mm
C	close	60 – 200 mm
M	mod. close	0.2 to 0.6 m
W	wide	0.6 to 2 m
VW	very wide	> 2 m

Aperture Size

T	closed / tight	< 0.5 mm
GA	gapped	0.5 to 10 mm
OP	open	> 10 mm

Planarity

PR	Planar
UN	Undulating
ST	Stepped
IR	Irregular
DIS	Discontinuous
CU	Curved

GENERAL

Weathering Grades (*after ISRM 1981b*)

Grade	Term	Description
I	fresh	no visible sign of rock material weathering; perhaps slight discoloration only
II	slightly weathered	discoloration indicates weathering; rock material may be somewhat weaker than in its fresh condition
III	moderately weathered	less than half of rock is decomposed to soil; fresh rock is present as continuous framework
IV	highly weathered	more than half of rock is decomposed to soil; fresh rock is present as discontinuous framework
V	completely weathered	soil-like matrix only; original mass structure is still largely intact

Strength classification (*after Marinos and Hoek, 2001; ISRM 1981b*)

Grade		UCS (MPa)	Field Estimate (Description)
R6	extremely strong	> 250	can only be chipped by geological hammer
R5	very strong	100 - 250	requires many blows from geological hammer
R4	strong	50 - 100	requires more than one blow from geological hammer
R3	medium strong	25 - 50	can't be scraped, breaks under one blow from geological hammer
R2	weak	5 - 25	can be peeled / scraped with knife with difficulty
R1	very weak	1 - 5	easily scraped / peeled, crumbles under firm blow of geo. hammer
R0	extremely weak	< 1	indented by thumbnail

Bedding Thickness (*Q. J. Eng. Geology, Vol 3, 1970*)

Very thickly bedded	> 2 m
Thickly bedded	0.6 – 2m
Medium bedded	200 – 600mm
Thinly bedded	60 – 200mm
Very thinly bedded	20 – 60mm
Laminated	6 – 20mm
Thinly Laminated	< 6mm

GROUNDED ENGINEERING

Date Started : Mar 26, 2020
Position : E: 314109, N: 4831425 (MTM NAD27, Zone 10)
Elev. Datum : Geodetic

BOREHOLE LOG G102

File No. : 19-057 **Project** : Deep Lake Water Cooling (DLWC) Project, Toronto **Client** : Enwave Energy Corporation

drill method : *CME 55*

stratigraphy			samples			depth scale (m)	well details	elevation (m)	undrained shear strength (kPa) / SPT N-values (bpf)	headspace vapour (ppm) / moisture / plasticity	unstabilized water level	lab data and comments
elev / depth (m)	description	graphic log	number	type	SPT N-value							
76.6	**GROUND SURFACE**											
	Straight advanced (no sampling) to bedrock.											

Tech : KS | **PM** : NN | **Rev** : JC

(continued next page)

file: 19-057 - master v2.gpj

GROUNDED ENGINEERING

Date Started : Mar 26, 2020
Position : E: 314109, N: 4831425 (MTM NAD27, Zone 10)
Elev. Datum : Geodetic

BOREHOLE LOG G102

File No. : 19-057 **Project** : Deep Lake Water Cooling (DLWC) Project, Toronto **Client** : Enwave Energy Corporation

drill method : *CME 55*

elev / depth (m)	description (*continued*)	graphic log	samples: number	samples: type	samples: SPT N-value
52.2					
24.4	**GEORGIAN BAY FORMATION** (See rock core log for details)		1	RUN	
			2	RUN	
			3	RUN	
			4	RUN	
			5	RUN	
			6	RUN	
			7	RUN	
			8	RUN	
			9	RUN	

depth scale (m): 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47

well details

elevation (m): 52 51 50 49 48 47 46 45 44 43 42 41 40 39 38 37 36 35 34 33 32 31 30 29

undrained shear strength (kPa)
○ unconfined + field vane
● pocket penetrometer ■ Lab Vane
40 80 120 160

SPT N-values (bpf)
× dynamic cone
10 20 30 40

headspace vapour (ppm)
× hexane □ isobutylene
100 200 300

moisture / plasticity
PL MC LL
10 20 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT)
GR SA SI CL

26.4m: transition to sound bedrock

Tech : KS | **PM** : NN | **Rev** : JC

(continued next page)

file: 19-057 - master v2.gpj

GROUNDED ENGINEERING

Date Started : Mar 26, 2020
Position : E: 314109, N: 4831425 (MTM NAD27, Zone 10)
Elev. Datum : Geodetic

BOREHOLE LOG G102

File No. : 19-057 **Project** : Deep Lake Water Cooling (DLWC) Project, Toronto **Client** : Enwave Energy Corporation

drill method : *CME 55*

stratigraphy: elev depth (m)	stratigraphy: description	stratigraphy: graphic log	samples: number	samples: type	samples: SPT N-value
	(continued)				
	GEORGIAN BAY FORMATION (See rock core log for details) *(continued)*		9	RUN	
			10	RUN	
			11	RUN	
			12	RUN	
			13	RUN	
			14	RUN	
			15	RUN	
			16	RUN	
			17	RUN	

depth scale (m): 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71

well details

elevation (m): 28, 27, 26, 25, 24, 23, 22, 21, 20, 19, 18, 17, 16, 15, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5

undrained shear strength (kPa)
○ unconfined + field vane
● pocket penetrometer ■ Lab Vane
40 80 120 160

SPT N-values (bpf)
× dynamic cone
10 20 30 40

headspace vapour (ppm)
× hexane □ isobutylene
100 200 300

moisture / plasticity
PL MC LL
10 20 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT)
GR SA SI CL

Tech : KS | **PM** : NN | **Rev** : JC

(continued next page)

file: 19-057 - master v2.gpj

Date Started : Mar 26, 2020
Position : E: 314109, N: 4831425 (MTM NAD27, Zone 10)
Elev. Datum : Geodetic

BOREHOLE LOG G102

File No. : 19-057 **Project** : Deep Lake Water Cooling (DLWC) Project, Toronto **Client** : Enwave Energy Corporation

drill method : *CME 55*

elev depth (m)	description	graphic log	number	type	SPT N-value
	(continued)				
	GEORGIAN BAY FORMATION (See rock core log for details) *(continued)*		17	RUN	
			18	RUN	
			19	RUN	
			20	RUN	
			21	RUN	
			22	RUN	
-12.2 88.8	**END OF BOREHOLE**				

depth scale (m): 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88

well details

elevation (m): 4, 3, 2, 1, 0, -1, -2, -3, -4, -5, -6, -7, -8, -9, -10, -11, -12

undrained shear strength (kPa)
○ unconfined + field vane
● pocket penetrometer ■ Lab Vane
40 80 120 160

SPT N-values (bpf)
× dynamic cone
10 20 30 40

headspace vapour (ppm)
× hexane □ isobutylene
100 200 300

moisture / plasticity
PL MC LL
10 20 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT)
GR SA SI CL

Filled with drill water upon completion of drilling.

50 mm dia. monitoring well installed.
No. 10 screen

GROUNDWATER LEVELS

Date	Water Depth (m)	Elevation (m)
Apr 20, 2020	0.7	75.9

file: 19-057 - master v2.gpj

Tech : KS | **PM** : NN | **Rev** : JC

GROUNDED ENGINEERING

Date Started : Mar 26, 2020
Position : E: 314109, N: 4831425 (MTM NAD27, Zone 10)
Elev. Datum : Geodetic

ROCK CORE LOG G102

File No. : 19-057 **Project** : Deep Lake Water Cooling (DLWC) Project, Toronto **Client** : Enwave Energy Corporation

Rock coring started at 24.5m below grade

GEORGIAN BAY FORMATION
Shale, dark grey, laminated to thinly bedded, weak; joints are horizontal, closed to gapped, unaltered;

interbedded with **limestone**, light grey, laminated to thinly bedded, strong

Overall shale: 93%, limestone: 7%

Run 1 : 0% limestone, 100% shale
Run 2 : 13% limestone, 87% shale
Run 3 : 11% limestone, 89% shale
Run 4 : 3% limestone, 97% shale
Run 5 : 7% limestone, 93% shale
Run 6 : 3% limestone, 97% shale
Run 7 : 0% limestone, 100% shale
Run 8 : 5% limestone, 95% shale

Run	elev depth (m)	recovery
	52.1	
R1	24.5 – 24.8	TCR = **100%** SCR = **42%** RQD = **0%**
R2	24.8 – 48.8	TCR = **100%** SCR = **96%** RQD = **53%**
R3	27.8 – 45.7	TCR = **100%** SCR = **97%** RQD = **75%**
R4	30.9 – 42.7	TCR = **100%** SCR = **100%** RQD = **96%**
R5	33.9 – 39.6	TCR = **100%** SCR = **100%** RQD = **86%**
R6	37.0 – 36.6	TCR = **100%** SCR = **100%** RQD = **100%**
R7	40.0 – 33.5	TCR = **100%** SCR = **98%** RQD = **95%**
R8	43.1	TCR = **100%** SCR = **100%** RQD = **92%**

elevation (m)	natural fracture frequency
52	>10
	7
	>10
51	>10
	>10
	7
	2
50	3
	1
	1
49	1
	3
	6
48	3
	0
	0
47	0
	0
	0
	0
46	0
	3
	2
45	0
	0
	0
44	0
	1
	0
	0
43	0
	3
	1
42	2
	0
	0
41	0
	3
	0
	0
40	1
	0
	0
39	1
	0
	0
38	1
	1
	0
	0
37	0
	0
	0
36	0
	0
	0
	0
35	1
	1
	0
34	0
	2
	0
	0
33	1
	0
	1

24.5 / 52.1m: 75 mm rubblized zone
24.7 / 51.9m: 50 mm rubblized zone
24.8 / 51.8m: 75 mm rubblized zone
24.8 / 51.8m: JT SV PR S T CN
26.1 / 50.5m: JT SV PR S T CN
26.2 / 50.4m: 50 mm rubblized zone
26.4 / 50.2m: transition to sound bedrock
31.0 / 45.6m: JT H PR S GA CT
41.8 / 34.8m: 25 mm rubblized zone
43.0 / 33.6m: 75 mm rubblized zone

(continued next page)
Tech : KS | **PM** : NN | **Rev** : JC

file: 19-057 - master v2.gpj

Date Started : Mar 26, 2020
Position : E: 314109, N: 4831425 (MTM NAD27, Zone 10)
Elev. Datum : Geodetic

ROCK CORE LOG G102

File No. : 19-057 **Project** : Deep Lake Water Cooling (DLWC) Project, Toronto **Client** : Enwave Energy Corporation

depth (m)	stratigraphy	Run	elev depth (m)	recovery	elevation (m)	shale weathering zones	UCS (MPa) / estimated strength	natural fracture frequency	laboratory testing	notes and comments	elevation (m)
	52.1					Z1 Z2 Z3 Z4	5 25 50 100 250 R1 R2 R3 R4 R5 R6				
45	**GEORGIAN BAY FORMATION** **Shale**, dark grey, laminated to thinly bedded, weak; joints are horizontal, closed to gapped, unaltered;	R8	30.5	TCR = **100%** SCR = **100%** RQD = **92%**	32			0 0 0	**44.9m**: TS = 3.0 MPa		32
46	interbedded with **limestone**, light grey, laminated to thinly bedded, strong				31			2 2	**45.6m**: UCS = 30.8 MPa γ = 26.0 kN/m^3 MC = 2.4 %		31
	Overall shale: 93%, limestone: 7%		46.1					0	**46.4m**: UCS = 75 MPa γ = 26.2 kN/m^3 MC = 1.4 %		
47	Run 8 : 5% limestone 95% shale	R9		TCR = **100%** SCR = **100%** RQD = **92%**	30			3 0 0	**46.8m**: UCS = 28.7 MPa γ = 26.2 kN/m^3 MC = 2.8 %		30
48					29			1 1 0			29
49	Run 9 : 7% limestone 93% shale		27.5		28			0 0 0			28
			49.1		27			0 0 1	**50.2m**: PPen = 4.6 kN/mm		27
50		R10		TCR = **100%** SCR = **100%** RQD = **89%**	26			0 0 1	**51.1m**: PPen = 3.8 kN/mm		26
51					25			0 1 1	**51.6m**: PPen = 12.1 kN/mm		25
52	Run 10 : 16% limestone 84% shale		24.4					1 1 1		**51.9 / 24.7 - 52.9 / 23.7m:** JT SV PR S T CN	
			52.2		24			0			24
53		R11		TCR = **100%** SCR = **100%** RQD = **73%**	23			3 0 0	**53.5m**: SD = 91.2 % **53.8m**: UCS = 27.1 MPa γ = 26.1 kN/m^3 MC = 2.3 %		23
54					22			1 0 0	**54.1m**: PPen = 7.1 kN/mm **54.4m**: PPen = 31.9 kN/mm **54.7m**: PPen = 20.6 kN/mm		22
55	Run 11 : 22% limestone 78% shale		21.4					1 0 0	**55.0m**: TS = 7.5 MPa **55.2m**: UCS = 24.5 MPa γ = 26.0 kN/m^3 MC = 2.7 %		
			55.2		21			0	**56.3m**: Cerchar = 0.290		21
56		R12		TCR = **100%** SCR = **100%** RQD = **100%**	20			1 1 0	**56.7m**: **57.1m**: UCS = 27.1 MPa γ = 26.2 kN/m^3 MC = 1.8 %		20
57					19			0 0 0	**57.4m**: UCS = 33.7 MPa γ = 26.0 kN/m^3 MC = 2.4 %		19
58	Run 12 : 0% limestone 100% shale		18.3					0 1 1	**57.6m**: Cerchar = 0.339 **58.8m**: Cerchar = 0.555	**58.4 / 18.2m:** IS CI <10mm	
			58.3		18			1 1 0	**59.0m**: Cerchar = 0.288 **59.3m**:		18
59		R13		TCR = **100%** SCR = **100%** RQD = **92%**	17			1 0 0	**60.2m**: TS = 4.9 MPa	**60.0 / 16.6m:** JT SV CU S GA CN	17
60					16			0 0 1			16
61	Run 13 : 3% limestone 97% shale		15.3					1 1 1	**61.8m**: UCS = 33.7 MPa γ = 26.3 kN/m^3 MC = 2.0 %		
			61.3		15			1 1 0	**62.2m**: UCS = 29.2 MPa γ = 26.1 kN/m^3 MC = 2.8 % **62.6m**: PPen = 5.3 kN/mm		15
62		R14		TCR = **100%** SCR = **100%** RQD = **100%**	14			0 0 0		**62.8 / 13.8m:** JT SV PR S T CN	14
63					13			0 0 0	**63.9m**: PPen = 4.3 kN/mm		13
64	Run 14 : 13% limestone 87% shale		12.2					0	**64.2m**:		

(continued next page)

Tech : KS | **PM** : NN | **Rev** : JC

file: 19-057 - master v2.gpj

GROUNDED ENGINEERING

Date Started : Mar 26, 2020
Position : E: 314109, N: 4831425 (MTM NAD27, Zone 10)
Elev. Datum : Geodetic

ROCK CORE LOG G102

File No. : 19-057 **Project** : Deep Lake Water Cooling (DLWC) Project, Toronto **Client** : Enwave Energy Corporation

depth (m)	stratigraphy	Run / elev / depth (m)	recovery	elevation (m)	shale weathering zones	UCS (MPa) / estimated strength	natural fracture frequency	laboratory testing	notes and comments	elevation (m)
65	**GEORGIAN BAY FORMATION** **Shale**, dark grey, laminated to thinly bedded, weak; joints are horizontal, closed to gapped, unaltered;	52.1 R15		12	Z1 Z2 Z3 Z4	R1 R2 R3 R4 R5 R6	0	PPen = 16.3 kN/mm		12
66	interbedded with **limestone**, light grey, laminated to thinly bedded, strong	R15 64.4	TCR = **100%** SCR = **100%** RQD = **100%**	11			0 0 0 0 0	**65.4m**: PPen = 5.5 kN/mm		11
67	*Overall shale: 93%, limestone: 7%* Run 15 : 8% limestone 92% shale	9.2		10			1 0 0 0	**66.4m**: PPen = 17.6 kN/mm		10
68		67.4		9			0 1 0	**67.6m**: TS = 5.2 MPa **68.3m**: UCS = 24.5 MPa γ = 26.0 kN/m^3 MC = 2.6 %		9
69		R16	TCR = **100%** SCR = **100%** RQD = **100%**	8			1 0 1 1	**68.6m**: PPen = 5.2 kN/mm **68.8m**: UCS = 21.9 MPa γ = 25.9 kN/m^3 MC = 2.6 %		8
70	Run 16 : 9% limestone 91% shale	6.1		7			0 0 0	**70.6m**: UCS = 25.7 MPa γ = 26.0 kN/m^3 MC = 2.4 %		7
71		70.5		6			1 0 0 0			6
72		R17	TCR = **100%** SCR = **100%** RQD = **98%**	5			0 2 0 0			5
73	Run 17 : 7% limestone 93% shale	3.1		4			0 0 0	**73.0m**: TS = 2.9 MPa **73.3m**: PPen = 8.8 kN/mm		4
74		73.5		3			0 1 0	**74.1m**: UCS = 35.3 MPa γ = 26.2 kN/m^3 MC = 2.1 %	**73.9 / 2.7m:** JT SV PR R T CN	3
75		R18	TCR = **100%** SCR = **100%** RQD = **97%**	2			1 0 0	**74.7m**: PPen = 4.4 kN/mm **75.2m**: PPen = 12.3 kN/mm		2
76	Run 18 : 3% limestone 97% shale	0.0		1			0 0 1			1
77		76.6		0			0 1 0	**76.6m**: PPen = 6.7 kN/mm		0
78		R19	TCR = **100%** SCR = **100%** RQD = **98%**	-1			0 0 0 0			-1
79	Run 19 : 9% limestone 91% shale	-3.0		-2			0 0 0	**79.0m**: PPen = 6.7 kN/mm		-2
80		79.6		-3			0 2 3		**79.6 / -3.0m:** JT SV PR S T CN	-3
81		R20	TCR = **100%** SCR = **100%** RQD = **88%**	-4			0 0 0 0	**80.0m**: UCS = 28.3 MPa γ = 26.0 kN/m^3 MC = 2.3 %		-4
82	Run 20 : 5% limestone 95% shale	-6.1		-5			0 0 0 0	**81.6m**: TS = 3.5 MPa **81.8m**: Cerchar = 1.483 **82.2m**: Cerchar = 0.273		-5
83		82.7		-6			0 0 1	**82.7m**: Cerchar = 0.251 **82.9m**: PPen = 7.4 kN/mm		-6
84	Run 21 : 5% limestone 95% shale	R21	TCR = **100%** SCR = **100%** RQD = **100%**	-7			0 0 0 0	**83.1m**: UCS = 27.1 MPa γ = 25.9 kN/m^3 MC = 2.1 % **83.5m**: Cerchar = 0.380 **83.9m**: UCS = 30.4 MPa		-7

(continued next page)
Tech : KS | **PM** : NN | **Rev** : JC

file: 19-057 - master v2.gpj

GROUNDED ENGINEERING

Date Started : Mar 26, 2020
Position : E: 314109, N: 4831425 (MTM NAD27, Zone 10)
Elev. Datum : Geodetic

ROCK CORE LOG G102

File No. : 19-057 **Project** : Deep Lake Water Cooling (DLWC) Project, Toronto **Client** : Enwave Energy Corporation

depth (m)	graphic log	stratigraphy	Run elev depth (m)	recovery	elevation (m)	shale weathering zones Z1 Z2 Z3 Z4	UCS (MPa) 5 25 50 100 250 / estimated strength R1 R2 R3 R4 R5 R6	natural fracture frequency	laboratory testing	notes and comments	elevation (m)
			52.1								
85		**GEORGIAN BAY FORMATION** **Shale**, dark grey, laminated to thinly bedded, weak; joints are horizontal, closed to gapped, unaltered;	R21	TCR = **100**% SCR = **100**% RQD = **100**%	-8			0	▼ = 26.3 kN/m³ MC = 1.7 %		-8
								0	**84.7m**: UCS = 47.8 MPa ▼ = 26.0 kN/m³ MC = 1.5 %		
			-9.1					0	**85.0m**: **85.4m**: TS = 4.8 MPa		
86		interbedded with **limestone**, light grey, laminated to thinly bedded, strong	85.7		-9			1			-9
		Overall shale: 93%, limestone: 7%						0			
								0			
					-10			0			-10
87				TCR = **100**% SCR = **100**% RQD = **100**%				0			
		Run 21 : 5% limestone 95% shale	R22					0	**87.4m**: UCS = 49.9 MPa ▼ = 26.3 kN/m³ MC = 1.9 %		
					-11			0			-11
88								0			
		Run 22 : 0% limestone 100% shale						0			
			-12.2		-12			0			-12
			88.8m								
		END OF COREHOLE									

file: 19-057 - master v2.gpj

Tech : KS | **PM** : NN | **Rev** : JC

GROUNDED ENGINEERING

Date Started : Mar 9, 2020
Position : E: 314134, N: 4830521 (MTM NAD27, Zone 10)
Elev. Datum : Geodetic

BOREHOLE LOG G103

File No. : 19-057 **Project** : Deep Lake Water Cooling (DLWC) Project, Toronto **Client** : Enwave Energy Corporation

drill method : CME 55

mud rotary med OD=125 mm

stratigraphy: elev depth (m)	description	graphic log	samples: number	type	SPT N-value
76.0	**GROUND SURFACE**				
	Refer to Thurber Record of Borehole G103 for soil stratigraphy.				

depth scale (m) 0–23

well details: S D

elevation (m) 76–53

undrained shear strength (kPa): ○ unconfined ● pocket penetrometer + field vane ■ Lab Vane; 40 80 120 160

SPT N-values (bpf): × dynamic cone; 10 20 30 40

headspace vapour (ppm): × hexane □ isobutylene; 100 200 300

moisture / plasticity: PL MC LL; 10 20 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT): GR SA SI CL

file: 19-057 - master v2.gpj

Tech : MG | **PM** : NN | **Rev** : JC

(continued next page)

GROUNDED ENGINEERING

Date Started : Mar 9, 2020
Position : E: 314134, N: 4830521 (MTM NAD27, Zone 10)
Elev. Datum : Geodetic

BOREHOLE LOG G103

File No. : 19-057 **Project** : Deep Lake Water Cooling (DLWC) Project, Toronto **Client** : Enwave Energy Corporation

drill method : CME 55

mud rotary med OD=125 mm

elev depth (m)	description (continued)	graphic log	number	type	SPT N-value
	Refer to Thurber Record of Borehole G103 for soil stratigraphy. *(continued)*				
28.7 47.3	**GEORGIAN BAY FORMATION** (See rock core log for details)		1	RUN	

depth scale (m) / well details (S, D) / elevation (m)

depth scale (m)	elevation (m)
24	52
25	51
26	50
27	49
28	48
29	47
30	46
31	45
32	44
33	43
34	42
35	41
36	40
37	39
38	38
39	37
40	36
41	35
42	34
43	33
44	32
45	31
46	30
47	29

undrained shear strength (kPa)
○ unconfined + field vane
● pocket penetrometer ■ Lab Vane
40 80 120 160

SPT N-values (bpf)
× dynamic cone
10 20 30 40

headspace vapour (ppm)
× hexane □ isobutylene
100 200 300

moisture / plasticity
PL MC LL
10 20 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT)
GR SA SI CL

Tech : MG | **PM** : NN | **Rev** : JC

(continued next page)

file: 19-057 - master v2.gpj

GROUNDED ENGINEERING

Date Started : Mar 9, 2020
Position : E: 314134, N: 4830521 (MTM NAD27, Zone 10)
Elev. Datum : Geodetic

BOREHOLE LOG G103

File No. : 19-057 **Project** : Deep Lake Water Cooling (DLWC) Project, Toronto **Client** : Enwave Energy Corporation

drill method : CME 55
Rock coring (HQ) OD=96 mm

elev depth (m)	description (continued)	graphic log	samples: number	samples: type	samples: SPT N-value
	GEORGIAN BAY FORMATION (See rock core log for details) *(continued)*		1	RUN	
			2	RUN	
			3	RUN	
			4	RUN	
			5	RUN	
			6	RUN	
			7	RUN	
			8	RUN	
			9	RUN	

depth scale (m): 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71

well details: S D

elevation (m): 28, 27, 26, 25, 24, 23, 22, 21, 20, 19, 18, 17, 16, 15, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5

undrained shear strength (kPa)
○ unconfined + field vane
● pocket penetrometer ■ Lab Vane
40 80 120 160

SPT N-values (bpf)
× dynamic cone
10 20 30 40

headspace vapour (ppm)
× hexane □ isobutylene
100 200 300

moisture / plasticity
PL MC LL
10 20 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT)
GR SA SI CL

48.5m: transition to sound bedrock

(continued next page)

GROUNDED ENGINEERING

Date Started : Mar 9, 2020
Position : E: 314134, N: 4830521 (MTM NAD27, Zone 10)
Elev. Datum : Geodetic

BOREHOLE LOG G103

File No. : 19-057 **Project** : Deep Lake Water Cooling (DLWC) Project, Toronto **Client** : Enwave Energy Corporation

drill method : CME 55

Rock coring (HQ) OD=96 mm

elev depth (m)	description	graphic log	number	type	SPT N-value
	(continued)				
	GEORGIAN BAY FORMATION (See rock core log for details) *(continued)*		9	RUN	
			10	RUN	
			11	RUN	
			12	RUN	
			13	RUN	
			14	RUN	
-11.9 87.9	**END OF BOREHOLE**				

depth scale (m) / well details (S, D) / elevation (m)

undrained shear strength (kPa): unconfined, field vane, pocket penetrometer, Lab Vane — 40, 80, 120, 160
SPT N-values (bpf): dynamic cone — 10, 20, 30, 40
headspace vapour (ppm): hexane, isobutylene — 100, 200, 300
moisture / plasticity: PL, MC, LL — 10, 20, 30
unstabilized water level
lab data and comments
grain size distribution (%) (MIT): GR SA SI CL

Filled with drill water upon completion of drilling.

S: 50 mm dia. monitoring well installed.
D: 50 mm dia. monitoring well installed.
No. 10 screen

G103-D GROUNDWATER LEVELS

date	water depth (m)	elevation (m)
Apr 21, 2020	0.3	75.7
May 6, 2020	0.2	75.8
May 20, 2020	1.6	74.4
Jun 15, 2020	2.4	73.7

file: 19-057 - master v2.gpj

Tech : MG | **PM** : NN | **Rev** : JC

ROCK CORE LOG G103

GROUNDED ENGINEERING

Date Started : Mar 9, 2020
Position : E: 314134, N: 4830521 (MTM NAD27, Zone 10)
Elev. Datum : Geodetic

File No. : 19-057 **Project** : Deep Lake Water Cooling (DLWC) Project, Toronto **Client** : Enwave Energy Corporation

Rock coring started at 47.3m below grade

GEORGIAN BAY FORMATION
Shale, dark grey, laminated to thinly bedded, weak; joints are horizontal, closed to gapped, unaltered;

interbedded with **limestone**, light grey, laminated to thinly bedded, strong

Overall shale: 88%, limestone: 12%

Run 1 : 3% limestone, 97% shale
Run 2 : 8% limestone, 92% shale
Run 3 : 10% limestone, 90% shale
Run 4 : 17% limestone, 83% shale
Run 5 : 14% limestone, 86% shale
Run 6 : 29% limestone, 71% shale
Run 7 : 6% limestone, 94% shale

Run	elev. depth (m)	recovery
	28.7	
	47.3	
R1		TCR = **100%** SCR = **96%** RQD = **42%**
	26.8	
	49.2	
R2		TCR = **100%** SCR = **92%** RQD = **61%**
	23.8	
	52.2	
R3		TCR = **100%** SCR = **98%** RQD = **77%**
	20.7	
	55.3	
R4		TCR = **100%** SCR = **98%** RQD = **83%**
	17.7	
	58.3	
R5		TCR = **100%** SCR = **98%** RQD = **55%**
	14.6	
	61.4	
R6		TCR = **98%** SCR = **98%** RQD = **83%**
	11.6	
	64.4	
R7		TCR = **100%** SCR = **100%** RQD = **100%**

UCS (MPa) 5 25 50 100 250

laboratory testing
51.8m: UCS = 14.8 MPa, γ = 25.8 kN/m³, MC = 3.6 %
53.2m: UCS = 16 MPa, E = 1.90 GPa, γ = 25.9 kN/m³, MC = 3.4 %
54.1m: TS = 4.4 MPa
55.6m: Cerchar = 0.300
56.2m: PPen = 3.4 kN/mm
56.4m: Cerchar = 0.600
56.5m: Cerchar = 0.400
56.6m: UCS = 17.4 MPa, γ = 25.9 kN/m³, MC = 2.9 %
56.8m: UCS = 18 MPa, E = 2.70 GPa, γ = 26.0 kN/m³, MC = 3.0 %
57.2m: PPen = 4.8 kN/mm
57.3m: PPen = 2.8 kN/mm
57.5m:
57.8m: PPen = 6.8 kN/mm
58.0m: SD = 66.7 %
58.3m: Cerchar = 0.333
58.4m: Cerchar = 0.299
58.5m: TS = 2.8 MPa
58.8m: UCS = 26.2 MPa, γ = 26.1 kN/m³, MC = 2.7 %
59.1m: UCS = 18.3 MPa, E = 3.20 GPa, γ = 26.0 kN/m³, MC = 2.8 %
62.0m: PPen = 4.0 kN/mm
62.2m: PPen = 3.2 kN/mm
62.5m: PPen = 3.7 kN/mm
63.0m: PPen = 24.1 kN/mm

notes and comments
47.7 / 28.3m: JT SV PR S T CN
48.0 / 28.0m: JT SV PR S T CN
48.3 / 27.7m: 75 mm rubblized zone
48.5 / 27.5m: transition to sound bedrock
49.4 / 26.6m: IS H CI =100mm
49.6 / 26.4m: JT H CU S GA CN
50.0 / 26.0m: JT H UN S GA CN
50.7 / 25.3m: JT SV PR S OP CN
52.6 / 23.4m: JT SV PR S GA CN
54.5 / 21.5m: JT SV PR R GA CN
54.8 / 21.2m: JT SV PR R T CN
54.9 / 21.1m: JT SV PR R T CN
55.2 / 20.8m: JT SV PR R T CN
55.8 / 20.2 - 57.3 / 18.7m: JT SV PR S T CN
59.1 / 16.9 - 60.3 / 15.7m: JT SV PR S T CN
60.4 / 15.6m: JT SV PR S T CN
60.6 / 15.4m: JT D PR S T CN
61.5 / 14.5m: JT SV PR S T CN
61.8 / 14.2m: 50 mm rubblized zone
64.9 / 11.1m: CO SV PR R T CN
66.3 / 9.7m: CO SV PR S T CN

(continued next page)

Tech : MG | **PM** : NN | **Rev** : JC

file: 19-057 - master v2.gpj

Date Started : Mar 9, 2020
Position : E: 314134, N: 4830521 (MTM NAD27, Zone 10)
Elev. Datum : Geodetic

ROCK CORE LOG G103

File No. : 19-057 **Project** : Deep Lake Water Cooling (DLWC) Project, Toronto **Client** : Enwave Energy Corporation

depth (m)	stratigraphy	Run / elev. depth (m)	recovery	elevation (m)	shale weathering zones	UCS (MPa) / estimated strength	natural fracture frequency	laboratory testing	notes and comments	elevation (m)
	GEORGIAN BAY FORMATION	28.7			Z1 Z2 Z3 Z4	R1 R2 R3 R4 R5 R6				
	Shale, dark grey, laminated to thinly bedded, weak; joints are horizontal, closed to gapped, unaltered;	8.5					0			
		67.5					1			
68	interbedded with **limestone**, light grey, laminated to thinly bedded, strong			8			0			8
							0			
							0			
			TCR = **100**%				0			
69		R8	SCR = **100**%	7			0			7
			RQD = **100**%				0			
	Overall shale: 88%, limestone: 12%						0			
							0			
70				6			0			6
	Run 8 : 1% limestone 99% shale						0			
		5.5					0			
		70.5					0			
71				5			0			5
							0			
			TCR = **100**%				0			
72		R9	SCR = **100**%	4			0			4
			RQD = **100**%				0			
							0	**72.7m**: TS = 5.2 MPa		
73	Run 9 : 16% limestone 84% shale			3			0			3
		2.4					0			
		73.6					1			
74				2			0			2
							0			
			TCR = **99**%				1		**74.7 / 1.3m:** 25 mm rubblized zone	
75		R10	SCR = **98**%	1			0			1
			RQD = **98**%				0			
							0			
76				0			0			0
	Run 10 : 4% limestone 96% shale						0			
		-0.6					0			
		76.6					0			
77				-1			0			-1
							0			
			TCR = **99**%				0			
78		R11	SCR = **99**%	-2			1			-2
			RQD = **99**%				0			
							0			
79				-3			0	**78.9m**: UCS = 30.6 MPa γ = 26.2 kN/m^3 MC = 2.6 %		-3
	Run 11 : 7% limestone 93% shale						0	**79.3m**: UCS = 32.1 MPa E = 4.10 GPa γ = 26.2 kN/m^3 MC = 2.6 %		
		-3.7					0			
		79.7					1	**80.0m**: TS = 6.7 MPa		
80				-4			0			-4
							0	**80.7m**: TS = 3.0 MPa		
			TCR = **100**%				0	**80.9m**: Cerchar = 0.343		
81		R12	SCR = **100**%	-5			0	**81.1m**: Cerchar = 1.124		-5
			RQD = **99**%				0	**81.2m**:		
							0	**81.4m**: PPen = 6.0 kN/mm		
82				-6			0	**81.7m**: UCS = 29.8 MPa γ = 26.2 kN/m^3 MC = 2.3 %		-6
	Run 12 : 28% limestone 72% shale						0	**82.0m**: UCS = 26.8 MPa E = 3.60 GPa γ = 26.1 kN/m^3 MC = 2.2 %		
		-6.7					4		**82.8 / -6.8m:** JT SV PR S GA CN	
		82.7					1			
83				-7			0	**82.3m**: PPen = 8.6 kN/mm		-7
							0	**82.5m**: Cerchar = 0.279		
			TCR = **100**%				0	**82.8m**: PPen = 4.7 kN/mm		
84		R13	SCR = **97**%	-8			0	**83.1m**: PPen = 3.8 kN/mm		-8
			RQD = **97**%				0	**83.4m**: PPen = 6.9 kN/mm		
							0	**84.0m**: TS = 3.0 MPa		
85				-9			0	**84.7m**: UCS = 27.1 MPa γ = 26.1 kN/m^3 MC = 2.8 %		-9
	Run 13 : 17% limestone 83% shale						0			
		-9.8					0	**86.2m**: UCS = 32.2 MPa E = 6.20 GPa γ = 26.2 kN/m^3 MC = 2.3 %		
		85.8					0			
86				-10			0			-10
			TCR = **100**%				0			
		R14	SCR = **100**%				0			
			RQD = **100**%				0			
87	Run 14 : 0% limestone 100% shale			-11			0			-11

GROUNDED ENGINEERING

Date Started : Mar 9, 2020
Position : E: 314134, N: 4830521 (MTM NAD27, Zone 10)
Elev. Datum : Geodetic

ROCK CORE LOG G103

File No. : 19-057 **Project** : Deep Lake Water Cooling (DLWC) Project, Toronto **Client** : Enwave Energy Corporation

depth (m)	graphic log	stratigraphy	Run elev / depth (m)	recovery	elevation (m)	shale weathering zones (Z1 Z2 Z3 Z4)	UCS (MPa) 5 25 50 100 250 / estimated strength (R1 R2 R3 R4 R5 R6)	natural fracture frequency	laboratory testing	notes and comments	elevation (m)
			28.7								
			R14 -11.9					**0**			
								0			
			87.9m								

END OF COREHOLE

GROUNDED ENGINEERING

Date Started : Mar 9, 2020
Position : E: 314240, N: 4830136 (MTM NAD27, Zone 10)
Elev. Datum : Geodetic

BOREHOLE LOG T105

File No. : 19-057 **Project** : Deep Lake Water Cooling (DLWC) Project, Toronto **Client** : Enwave Energy Corporation

drill method : *CME 55*

elev depth (m)	description	graphic log	samples: number	samples: type	samples: SPT N-value
75.8	**GROUND SURFACE**				
	Refer to Thurber Record of Borehole T105 for soil stratigraphy.				

hollow stem augers OD=215 mm

mud rotary small OD=100 mm

depth scale (m) | well details (S, D) | elevation (m)

undrained shear strength (kPa)
○ unconfined + field vane
● pocket penetrometer ■ Lab Vane
40 80 120 160

SPT N-values (bpf)
× dynamic cone
10 20 30 40

headspace vapour (ppm)
× hexane □ isobutylene
100 200 300

moisture / plasticity
PL MC LL
10 20 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT)
GR SA SI CL

file: 19-057 - master v2.gpj

Tech : MG | **PM** : NN | **Rev** : JC

(continued next page)

GROUNDED ENGINEERING

Date Started : Mar 9, 2020
Position : E: 314240, N: 4830136 (MTM NAD27, Zone 10)
Elev. Datum : Geodetic

BOREHOLE LOG T105

File No. : 19-057 **Project** : Deep Lake Water Cooling (DLWC) Project, Toronto **Client** : Enwave Energy Corporation

drill method : CME 55
mud rotary small OD=100 mm

elev depth (m)	description	graphic log	samples: number	samples: type	samples: SPT N-value
	(continued)				
	Refer to Thurber Record of Borehole T105 for soil stratigraphy. *(continued)*				

depth scale (m): 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47

well details: S D

elevation (m): 51 50 49 48 47 46 45 44 43 42 41 40 39 38 37 36 35 34 33 32 31 30 29 28

undrained shear strength (kPa): ○ unconfined + field vane ● pocket penetrometer ■ Lab Vane — 40 80 120 160

SPT N-values (bpf): ×dynamic cone — 10 20 30 40

headspace vapour (ppm): × hexane □ isobutylene — 100 200 300

moisture / plasticity: PL MC LL — 10 20 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT): GR SA SI CL

file: 19-057 - master v2.gpj

Tech : MG | **PM** : NN | **Rev** : JC

(continued next page)

GROUNDED ENGINEERING

Date Started : Mar 9, 2020
Position : E: 314240, N: 4830136 (MTM NAD27, Zone 10)
Elev. Datum : Geodetic

BOREHOLE LOG T105

File No. : 19-057 **Project** : Deep Lake Water Cooling (DLWC) Project, Toronto **Client** : Enwave Energy Corporation

drill method : CME 55

mud rotary small OD=100 mm

Rock coring (HQ) OD=96 mm

elev depth (m)	description	graphic log	number	type	SPT N-value
	(continued)				
	Refer to Thurber Record of Borehole T105 for soil stratigraphy. *(continued)*				
7.4					
68.4	**GEORGIAN BAY FORMATION** (See rock core log for details)		1	RUN	
			2	RUN	

depth scale (m): 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71

well details: S D

elevation (m): 27, 26, 25, 24, 23, 22, 21, 20, 19, 18, 17, 16, 15, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5, 4

undrained shear strength (kPa): unconfined, field vane, pocket penetrometer, Lab Vane; 40 80 120 160

SPT N-values (bpf): dynamic cone; 10 20 30 40

headspace vapour (ppm): hexane, isobutylene; 100 200 300

moisture / plasticity: PL MC LL; 10 20 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT): GR SA SI CL

file: 19-057 - master v2.gpj

Tech : MG | **PM** : NN | **Rev** : JC

(continued next page)

GROUNDED ENGINEERING

Date Started : Mar 9, 2020
Position : E: 314240, N: 4830136 (MTM NAD27, Zone 10)
Elev. Datum : Geodetic

BOREHOLE LOG T105

File No. : 19-057 **Project** : Deep Lake Water Cooling (DLWC) Project, Toronto **Client** : Enwave Energy Corporation

drill method : CME 55

Rock coring (HQ) OD=96 mm

elev depth (m)	description	graphic log	number	type	SPT N-value
	(continued)				
	GEORGIAN BAY FORMATION (See rock core log for details) *(continued)*		2	RUN	
			3	RUN	
			4	RUN	
			5	RUN	
			6	RUN	
			7	RUN	
-11.5 87.3					

depth scale (m): 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87

well details: S, D

elevation (m): 3, 2, 1, 0, -1, -2, -3, -4, -5, -6, -7, -8, -9, -10, -11

undrained shear strength (kPa): unconfined, field vane, pocket penetrometer, Lab Vane; 40, 80, 120, 160

SPT N-values (bpf): dynamic cone; 10, 20, 30, 40

headspace vapour (ppm): hexane, isobutylene; 100, 200, 300

moisture / plasticity: PL, MC, LL; 10, 20, 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT): GR SA SI CL

72.3m: transition to sound bedrock

END OF BOREHOLE

Filled with drill water upon completion of drilling.

S: 50 mm dia. monitoring well installed.
D: 50 mm dia. monitoring well installed.
No. 10 screen

T105-D GROUNDWATER LEVELS

date	water depth (m)	elevation (m)
Apr 21, 2020	1.4	74.4
May 4, 2020	0.6	75.2
Jun 15, 2020	4.5	71.3

file: 19-057 - master v2.gpj

Tech : MG | **PM** : NN | **Rev** : JC

GROUNDED ENGINEERING

Date Started : Mar 9, 2020
Position : E: 314240, N: 4830136 (MTM NAD27, Zone 10)
Elev. Datum : Geodetic

ROCK CORE LOG T105

File No. : 19-057 **Project** : Deep Lake Water Cooling (DLWC) Project, Toronto **Client** : Enwave Energy Corporation

Rock coring started at 68.0m below grade

Refer to Thurber Record of Borehole T105 for soil stratigraphy.

GEORGIAN BAY FORMATION
Shale, dark grey, laminated to thinly bedded, weak; joints are horizontal, closed to gapped, unaltered;

interbedded with **limestone**, light grey, laminated to thinly bedded, strong

Overall shale: 90%, limestone: 10%

Run 1 : 5% limestone, 95% shale
Run 2 : 4% limestone, 96% shale
Run 3 : 7% limestone, 93% shale
Run 4 : 0% limestone, 100% shale
Run 5 : 20% limestone, 80% shale
Run 6 : 13% limestone, 87% shale
Run 7 : 35% limestone, 65% shale

Run	elev. depth (m)	recovery
	7.8	
R1	68.0 – 5.3	TCR = **100**% SCR = **83**% RQD = **60**%
R2	70.5 – 2.2	TCR = **100**% SCR = **100**% RQD = **70**%
R3	73.6 – -0.8	TCR = **100**% SCR = **100**% RQD = **88**%
R4	76.6 – -3.9	TCR = **100**% SCR = **100**% RQD = **81**%
R5	79.7 – -6.9	TCR = **100**% SCR = **92**% RQD = **67**%
R6	82.7 – -10.0	TCR = **100**% SCR = **100**% RQD = **99**%
R7	85.8 – -11.5	TCR = **100**% SCR = **100**% RQD = **94**%

87.3m

END OF COREHOLE

shale weathering zones: Z1 Z2 Z3 Z4
UCS (MPa): 5 25 50 100 250
estimated strength: R1 R2 R3 R4 R5 R6
natural fracture frequency

laboratory testing
78.9m: UCS = 12.7 MPa, γ = 27.9 kN/m³, MC = 3.2 %
80.2m:
81.6m: Cerchar = 0.262
81.7m: UCS = 19.5 MPa, E = 4.60 GPa, γ = 26.0 kN/m³, MC = 2.8 %
82.0m: UCS = 18.6 MPa, E = 2.70 GPa, γ = 25.7 kN/m³, MC = 2.8 %
82.3m: Cerchar = 0.311
82.7m: PPen = 2.3 kN/mm
82.9m: PPen = 3.2 kN/mm
83.4m: Cerchar = 0.267
83.6m: PPen = 2.4 kN/mm
83.7m: SD = 71.0 %
84.5m: UCS = 20.5 MPa, E = 2.90 GPa, γ = 25.8 kN/m³, MC = 3.0 %
84.9m: PPen = 4.5 kN/mm
85.6m: UCS = 19 MPa, γ = 26.0 kN/m³, MC = 3.0 %
86.0m: TS = 2.4 MPa
86.7m:
86.9m: PPen = 12.3 kN/mm

notes and comments

68.0 / 7.8 - 68.4 / 7.4m: recovered soil, refer to Thurber Record of Borehole T105
68.4 / 7.4m: encountered weathered bedrock
71.1 / 4.7m: IS H CI <10mm
72.1 / 3.7m: JT H PR R GA CN
72.3 / 3.5m: transition to sound bedrock
74.3 / 1.5m: 25 mm rubblized zone
75.1 / 0.7m: JT H PR R GA CN
76.7 / -0.9m: IS H CI <10mm
78.9 / -3.1m: IS H CI <10mm
79.8 / -4.0m: IS H CI <10mm
80.7 / -4.9m: 325 mm rubblized zone
83.2 / -7.4m: JT H PR R GA CN

file: 19-057 - master v2.gpj

Tech : MG | **PM** : NN | **Rev** : JC

APPENDIX F



PRESENTATION OF SITE INVESTIGATION RESULTS

Toronto Island Filtration Plant

Prepared for:

Thurber Engineering Ltd

ConeTec Job No: 20-05-20620

Project Start Date: 09-Mar-2020
Project End Date: 10-Mar-2020
Report Date: 16-Mar-2020
Revised Date: 22-May-2020



Prepared by:

ConeTec Investigations Ltd.
9033 Leslie Street, Unit 15
Richmond Hill, ON L4B 4K3

Tel: (905) 886-2663
Fax: (905) 886-2664
Toll Free: (800) 504-1116

ConeTecON@conetec.com
www.conetec.com
www.conetecdataservices.com

Introduction

The enclosed report presents the results of the site investigation program conducted by ConeTec Investigations Ltd. for Thurber Engineering Ltd. at Toronto Island Filtration Plant, ON. The program consisted of three cone penetration tests.

Project Information

Project	
Client	Thurber Engineering Ltd.
Project	Toronto Island Filtration Plant
ConeTec project number	20-05-20620

An aerial overview from Google Earth including the CPTu test locations is presented below.



Rig Description	Deployment System	Test Type
CPT truck rig (C3)	30 ton rig cylinder	CPTu

Coordinates		
Test Type	Collection Method	EPSG Number
CPTu	Consumer grade GPS	32617

Cone Penetrometers Used for this Project						
Cone Description	Cone Number	Cross Sectional Area (cm^2)	Sleeve Area (cm^2)	Tip Capacity (bar)	Sleeve Capacity (bar)	Pore Pressure Capacity (psi)
531:T1500F15U500	531	15	225	1500	15	500
Cone 531 was used for all CPT soundings.						

Cone Penetration Test (CPTu)	
Depth reference	Depths are referenced to the existing surface at the time of each test.
Tip and sleeve data offset	0.1 meter This has been accounted for in the CPT data files.
Additional plots	• Advanced plots with Ic, Su, phi and N1(60) • Soil Behaviour Type (SBT) scatter plots

Calculated Geotechnical Parameter Tables	
Additional information	The Normalized Soil Behaviour Type Chart based on Q_{tn} (SBT Q_{tn}) (Robertson, 2009) was used to classify the soil for this project. A detailed set of calculated CPTu parameters have been generated and are provided in Excel format files in the release folder. The CPTu parameter calculations are based on values of corrected tip resistance (q_t) sleeve friction (f_s) and pore pressure (u_2). Effective stresses are calculated based on unit weights that have been assigned to the individual soil behaviour type zones and the assumed equilibrium pore pressure profile. Soils were classified as either drained or undrained based on the Q_{tn} Normalized Soil Behaviour Type Chart (Robertson, 2009). Calculations for both drained and undrained parameters were included for materials that classified as silt mixtures (zone 4).

Limitations

This report has been prepared for the exclusive use of Thurber Engineering Ltd. (Client) for the project titled “Toronto Island Filtration Plant”. The report’s contents may not be relied upon by any other party without the express written permission of ConeTec Investigations Ltd. (ConeTec). ConeTec has provided site investigation services, prepared the factual data reporting and provided geotechnical parameter calculations consistent with current best practices. No other warranty, expressed or implied, is made.

The information presented in the report document and the accompanying data set pertain to the specific project, site conditions and objectives described to ConeTec by the Client. In order to properly understand the factual data, assumptions and calculations, reference must be made to the documents provided and their accompanying data sets, in their entirety.

Cone penetration tests (CPTu) are conducted using an integrated electronic piezocone penetrometer and data acquisition system manufactured by Adara Systems Ltd., a subsidiary of ConeTec.

ConeTec's piezocone penetrometers are compression type designs in which the tip and friction sleeve load cells are independent and have separate load capacities. The piezocones use strain gauged load cells for tip and sleeve friction and a strain gauged diaphragm type transducer for recording pore pressure. The piezocones also have a platinum resistive temperature device (RTD) for monitoring the temperature of the sensors, an accelerometer type dual axis inclinometer and a geophone sensor for recording seismic signals. All signals are amplified down hole within the cone body and the analog signals are sent to the surface through a shielded cable.

ConeTec penetrometers are manufactured with various tip, friction and pore pressure capacities in 5 cm^2, 10 cm^2 and 15 cm^2 tip base area configurations in order to maximize signal resolution for various soil conditions. The specific piezocone used for each test is described in the CPT summary table presented in the first appendix. The 15 cm^2 penetrometers do not require friction reducers as they have a diameter larger than the deployment rods. The 10 cm^2 piezocones use a friction reducer consisting of a rod adapter extension behind the main cone body with an enlarged cross-sectional area (typically forty-four millimeter diameter over a length of thirty-two millimeter with tapered leading and trailing edges) located at a distance of 585 millimeters above the cone tip.

The penetrometers are designed with equal end area friction sleeves, a net end area ratio of 0.8 and cone tips with a sixty-degree apex angle.

All ConeTec piezocones can record pore pressure at various locations. Unless otherwise noted, the pore pressure filter is located directly behind the cone tip in the "u_2" position (ASTM Type 2). The filter is six millimeters thick, made of porous plastic (polyethylene) having an average pore size of 125 microns (90-160 microns). The function of the filter is to allow rapid movements of extremely small volumes of water needed to activate the pressure transducer while preventing soil ingress or blockage.

The piezocone penetrometers are manufactured with dimensions, tolerances and sensor characteristics that are in general accordance with the current ASTM D5778 standard. ConeTec's calibration criteria also meets or exceeds those of the current ASTM D5778 standard. An illustration of the piezocone penetrometer is presented in Figure CPTu.

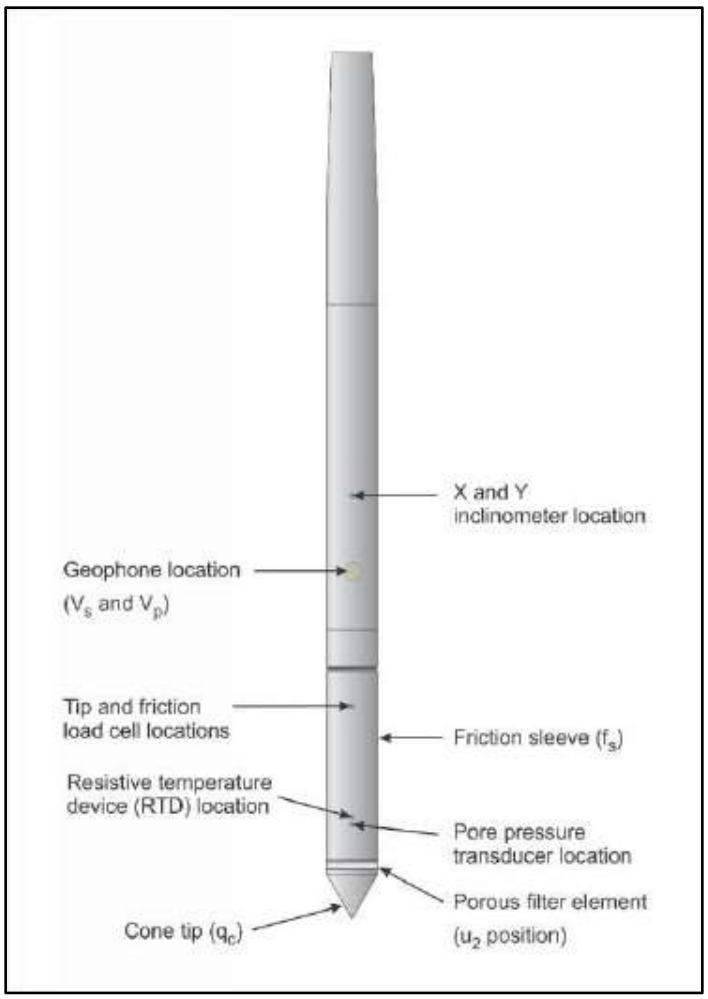


Figure CPTu. Piezocone Penetrometer (15 cm^2)

The ConeTec data acquisition systems consist of a Windows based computer and a signal conditioner and power supply interface box with a sixteen bit (or greater) analog to digital (A/D) converter. The data is recorded at fixed depth increments using a depth wheel attached to the push cylinders or by using a spring loaded rubber depth wheel that is held against the cone rods. The typical recording interval is 2.5 centimeters; custom recording intervals are possible. The system displays the CPTu data in real time and records the following parameters to a storage media during penetration:

- Depth
- Uncorrected tip resistance (q_c)
- Sleeve friction (f_s)
- Dynamic pore pressure (u)
- Additional sensors such as resistivity, passive gamma, ultra violet induced fluorescence, if applicable

All testing is performed in accordance to ConeTec's CPT operating procedures which are in general accordance with the current ASTM D5778 standard.

Prior to the start of a CPTu sounding a suitable cone is selected, the cone and data acquisition system are powered on, the pore pressure system is saturated with silicone oil and the baseline readings are recorded with the cone hanging freely in a vertical position.

The CPTu is conducted at a steady rate of two centimeters per second, within acceptable tolerances. Typically, one-meter length rods with an outer diameter of 38.1 millimeters are added to advance the cone to the sounding termination depth. After cone retraction final baselines are recorded.

Additional information pertaining to ConeTec's cone penetration testing procedures:

- Each filter is saturated in silicone oil under vacuum pressure prior to use
- Recorded baselines are checked with an independent multi-meter
- Baseline readings are compared to previous readings
- Soundings are terminated at the client's target depth or at a depth where an obstruction is encountered, excessive rod flex occurs, excessive inclination occurs, equipment damage is likely to take place, or a dangerous working environment arises
- Differences between initial and final baselines are calculated to ensure zero load offsets have not occurred and to ensure compliance with ASTM standards

The interpretation of piezocone data for this report is based on the corrected tip resistance (q_t), sleeve friction (f_s) and pore water pressure (u). The interpretation of soil type is based on the correlations developed by Robertson et al. (1986) and Robertson (1990, 2009). It should be noted that it is not always possible to accurately identify a soil behaviour type based on these parameters. In these situations, experience, judgment and an assessment of other parameters may be used to infer soil behaviour type.

The recorded tip resistance (q_c) is the total force acting on the piezocone tip divided by its base area. The tip resistance is corrected for pore pressure effects and termed corrected tip resistance (q_t) according to the following expression presented in Robertson et al. (1986):

$$q_t = q_c + (1\text{-}a) \bullet u_2$$

where: q_t is the corrected tip resistance
q_c is the recorded tip resistance
u_2 is the recorded dynamic pore pressure behind the tip (u_2 position)
a is the Net Area Ratio for the piezocone (0.8 for ConeTec probes)

The sleeve friction (f_s) is the frictional force on the sleeve divided by its surface area. As all ConeTec piezocones have equal end area friction sleeves, pore pressure corrections to the sleeve data are not required.

The dynamic pore pressure (u) is a measure of the pore pressures generated during cone penetration. To record equilibrium pore pressure, the penetration must be stopped to allow the dynamic pore pressures to stabilize. The rate at which this occurs is predominantly a function of the permeability of the soil and the diameter of the cone.

The friction ratio (Rf) is a calculated parameter. It is defined as the ratio of sleeve friction to the tip resistance expressed as a percentage. Generally, saturated cohesive soils have low tip resistance, high friction ratios and generate large excess pore water pressures. Cohesionless soils have higher tip resistances, lower friction ratios and do not generate significant excess pore water pressure.

A summary of the CPTu soundings along with test details and individual plots are provided in the appendices. A set of files with calculated geotechnical parameters were generated for each sounding based on published correlations and are provided in Excel format in the data release folder. Information regarding the methods used is also included in the data release folder.

For additional information on CPTu interpretations and calculated geotechnical parameters, refer to Robertson et al. (1986), Lunne et al. (1997), Robertson (2009), Mayne (2013, 2014) and Mayne and Peuchen (2012).

References

ASTM D5778-12, 2012, "Standard Test Method for Performing Electronic Friction Cone and Piezocone Penetration Testing of Soils", ASTM International, West Conshohocken, PA. DOI: 10.1520/D5778-12.

Lunne, T., Robertson, P.K. and Powell, J. J. M., 1997, “Cone Penetration Testing in Geotechnical Practice”, Blackie Academic and Professional.

Mayne, P.W., 2013, “Evaluating yield stress of soils from laboratory consolidation and in-situ cone penetration tests”, Sound Geotechnical Research to Practice (Holtz Volume) GSP 230, ASCE, Reston/VA: 406-420. DOI: 10.1061/9780784412770.027.

Mayne, P.W. and Peuchen, J., 2012, “Unit weight trends with cone resistance in soft to firm clays”, Geotechnical and Geophysical Site Characterization *4,* Vol. 1 (Proc. ISC-4, Pernambuco), CRC Press, London: 903-910.

Mayne, P.W., 2014, “Interpretation of geotechnical parameters from seismic piezocone tests”, CPT’14 Keynote Address, Las Vegas, NV, May 2014.

Robertson, P.K., Campanella, R.G., Gillespie, D. and Greig, J., 1986, “Use of Piezometer Cone Data”, Proceedings of InSitu 86, ASCE Specialty Conference, Blacksburg, Virginia.

Robertson, P.K., 1990, “Soil Classification Using the Cone Penetration Test”, Canadian Geotechnical Journal, Volume 27: 151-158. DOI: 10.1139/T90-014.

Robertson, P.K., 2009, “Interpretation of cone penetration tests – a unified approach”, Canadian Geotechnical Journal, Volume 46: 1337-1355. DOI: 10.1139/T09-065.

The cone penetration test is halted at specific depths to carry out pore pressure dissipation (PPD) tests, shown in Figure PPD-1. For each dissipation test the cone and rods are decoupled from the rig and the data acquisition system measures and records the variation of the pore pressure (u) with time (t).

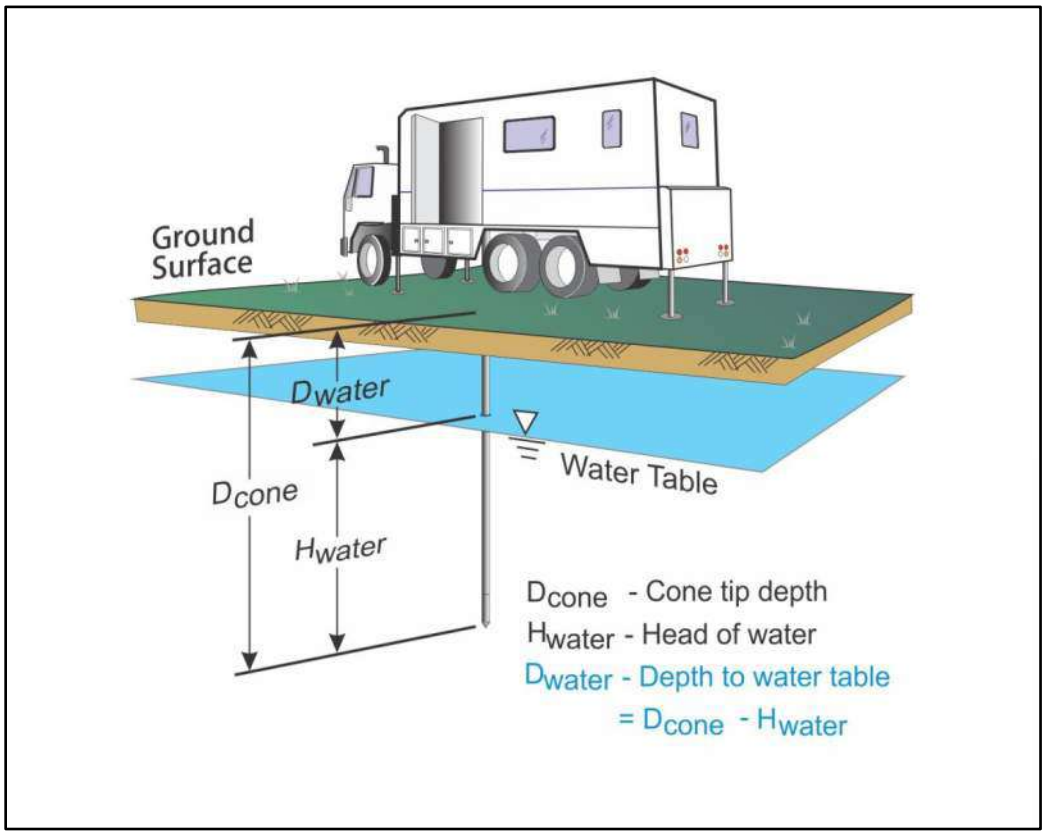


Figure PPD-1. Pore pressure dissipation test setup

Pore pressure dissipation data can be interpreted to provide estimates of ground water conditions, permeability, consolidation characteristics and soil behaviour.

The typical shapes of dissipation curves shown in Figure PPD-2 are very useful in assessing soil type, drainage, in situ pore pressure and soil properties. A flat curve that stabilizes quickly is typical of a freely draining sand. Undrained soils such as clays will typically show positive excess pore pressure and have long dissipation times. Dilative soils will often exhibit dynamic pore pressures below equilibrium that then rise over time. Overconsolidated fine-grained soils will often exhibit an initial dilatory response where there is an initial rise in pore pressure before reaching a peak and dissipating.

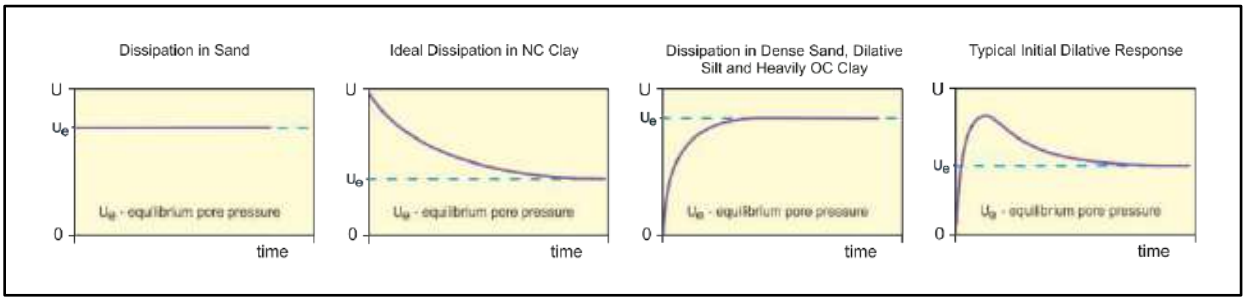


Figure PPD-2. Pore pressure dissipation curve examples

In order to interpret the equilibrium pore pressure (u_{eq}) and the apparent phreatic surface, the pore pressure should be monitored until such time as there is no variation in pore pressure with time as shown for each curve in Figure PPD-2.

In fine grained deposits the point at which 100% of the excess pore pressure has dissipated is known as t_{100}. In some cases this can take an excessive amount of time and it may be impractical to take the dissipation to t_{100}. A theoretical analysis of pore pressure dissipations by Teh and Houlsby (1991) showed that a single curve relating degree of dissipation versus theoretical time factor (T*) may be used to calculate the coefficient of consolidation (c_h) at various degrees of dissipation resulting in the expression for c_h shown below.

$$c_h = \frac{T^* \cdot a^2 \cdot \sqrt{I_r}}{t}$$

Where:

T* is the dimensionless time factor (Table Time Factor)
a is the radius of the cone
I_r is the rigidity index
t is the time at the degree of consolidation

Table Time Factor. T* versus degree of dissipation (Teh and Houlsby (1991))

Degree of Dissipation (%)	20	30	40	50	60	70	80
T* (u_2)	0.038	0.078	0.142	0.245	0.439	0.804	1.60

The coefficient of consolidation is typically analyzed using the time (t_{50}) corresponding to a degree of dissipation of 50% (u_{50}). In order to determine t_{50}, dissipation tests must be taken to a pressure less than u_{50}. The u_{50} value is half way between the initial maximum pore pressure and the equilibrium pore pressure value, known as u_{100}. To estimate u_{50}, both the initial maximum pore pressure and u_{100} must be known or estimated. Other degrees of dissipations may be considered, particularly for extremely long dissipations.

At any specific degree of dissipation the equilibrium pore pressure (u at t_{100}) must be estimated at the depth of interest. The equilibrium value may be determined from one or more sources such as measuring the value directly (u_{100}), estimating it from other dissipations in the same profile, estimating the phreatic surface and assuming hydrostatic conditions, from nearby soundings, from client provided information, from site observations and/or past experience, or from other site instrumentation.

For calculations of c_h (Teh and Houlsby (1991)), t_{50} values are estimated from the corresponding pore pressure dissipation curve and a rigidity index (I_r) is assumed. For curves having an initial dilatory response in which an initial rise in pore pressure occurs before reaching a peak, the relative time from the peak value is used in determining t_{50}. In cases where the time to peak is excessive, t_{50} values are not calculated.

Due to possible inherent uncertainties in estimating I_r, the equilibrium pore pressure and the effect of an initial dilatory response on calculating t_{50}, other methods should be applied to confirm the results for c_h.

Additional published methods for estimating the coefficient of consolidation from a piezocone test are described in Burns and Mayne (1998, 2002), Jones and Van Zyl (1981), Robertson et al. (1992) and Sully et al. (1999).

A summary of the pore pressure dissipation tests and dissipation plots are presented in the relevant appendix.

References

Burns, S.E. and Mayne, P.W., 1998, "Monotonic and dilatory pore pressure decay during piezocone tests", Canadian Geotechnical Journal 26 (4): 1063-1073. DOI: 1063-1073/T98-062.

Burns, S.E. and Mayne, P.W., 2002, "Analytical cavity expansion-critical state model cone dissipation in fine-grained soils", Soils & Foundations, Vol. 42(2): 131-137.

Jones, G.A. and Van Zyl, D.J.A., 1981, "The piezometer probe: a useful investigation tool", Proceedings, 10th International Conference on Soil Mechanics and Foundation Engineering, Vol. 3, Stockholm: 489-495.

Robertson, P.K., Sully, J.P., Woeller, D.J., Lunne, T., Powell, J.J.M. and Gillespie, D.G., 1992, "Estimating coefficient of consolidation from piezocone tests", Canadian Geotechnical Journal, 29(4): 539-550. DOI: 10.1139/T92-061.

Sully, J.P., Robertson, P.K., Campanella, R.G. and Woeller, D.J., 1999, "An approach to evaluation of field CPTU dissipation data in overconsolidated fine-grained soils", Canadian Geotechnical Journal, 36(2): 369-381. DOI: 10.1139/T98-105.

Teh, C.I., and Houlsby, G.T., 1991, "An analytical study of the cone penetration test in clay", Geotechnique, 41(1): 17-34. DOI: 10.1680/geot.1991.41.1.17.

The appendices listed below are included in the report:

- Cone Penetration Test Summary and Standard Cone Penetration Test Plots
- Advanced Cone Penetration Test Plots with Ic, Su(Nkt), Phi and N1(60)Ic
- Soil Behaviour Type (SBT) Scatter Plots
- Pore Pressure Dissipation Summary and Pore Pressure Dissipation Plots

Cone Penetration Test Summary and Standard Cone Penetration Test Plots

CONETEC

Job No:	20-05-20620
Client:	Thurber Engineering Ltd.
Project:	Toronto Island Filtration Plant
Start Date:	09-Mar-2020
End Date:	10-Mar-2020

CONE PENETRATION TEST SUMMARY

Sounding ID	File Name	Date	Cone	Assumed Phreatic Surface[1] (m)	Final Depth (m)	Northing[2] (m)	Easting[2] (m)	Refer to Notation Number
CPT20-G103	20-05-20620_CP103	10-Mar-2020	531:T1500F15U500	0.4	46.700	4830559	630378	
CPT20-T104	20-05-20620_CP104	09-Mar-2020	531:T1500F15U500	0.4	54.425	4830376	630457	3
CPT20-T105	20-05-20620_CP105	10-Mar-2020	531:T1500F15U500	0.5	51.375	4830177	630494	

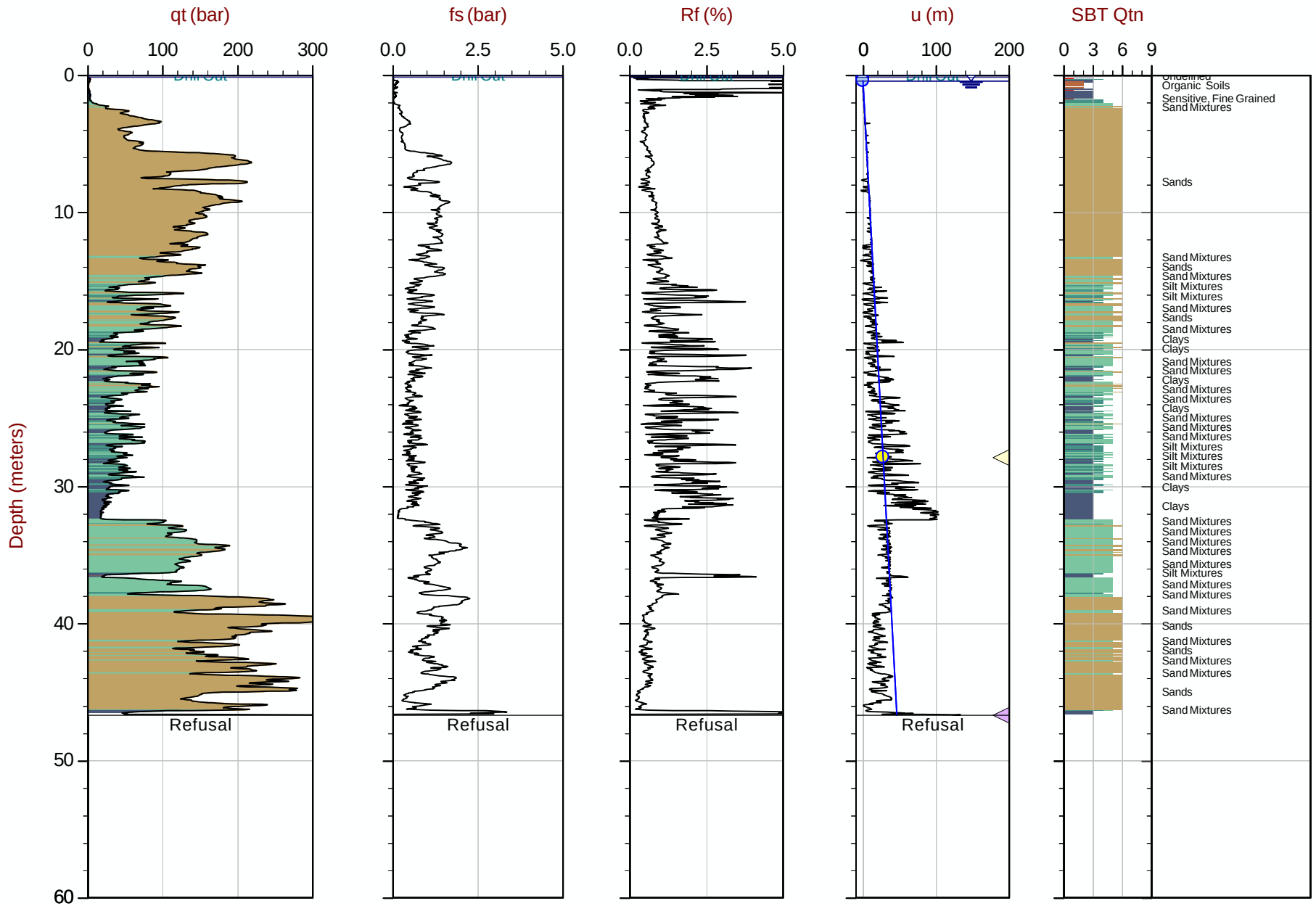
1. The assumed phreatic surface was based on pore pressure dissipation tests unless otherwise noted.
Hydrostatic conditions were assumed for the calculated parameters.
2. Coordinates were acquired using consumer grade GPS equipment in datum WGS84/UTM Zone 17 North.
3. The assumed phreatic surface was based on an nearby CPT.

CONETEC

Thurber Engineering

Job No: 20-05-20620
Date: 2020-03-10 10:24
Site: Toronto Island Water Treatment Plant

Sounding: CPT20-G103
Cone: 531:T1500F15U500



Max Depth: 46.700 m / 153.21 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point
Overplot Item: Ueq, Assumed Ueq, Dissipation, Ueq achieved, Dissipation, Ueq not achieved, Dissipation, Ueq assumed, Hydrostatic Line

File: 20-05-20620_CP103.COR
Unit Wt: SBTQtn (PKR2009)

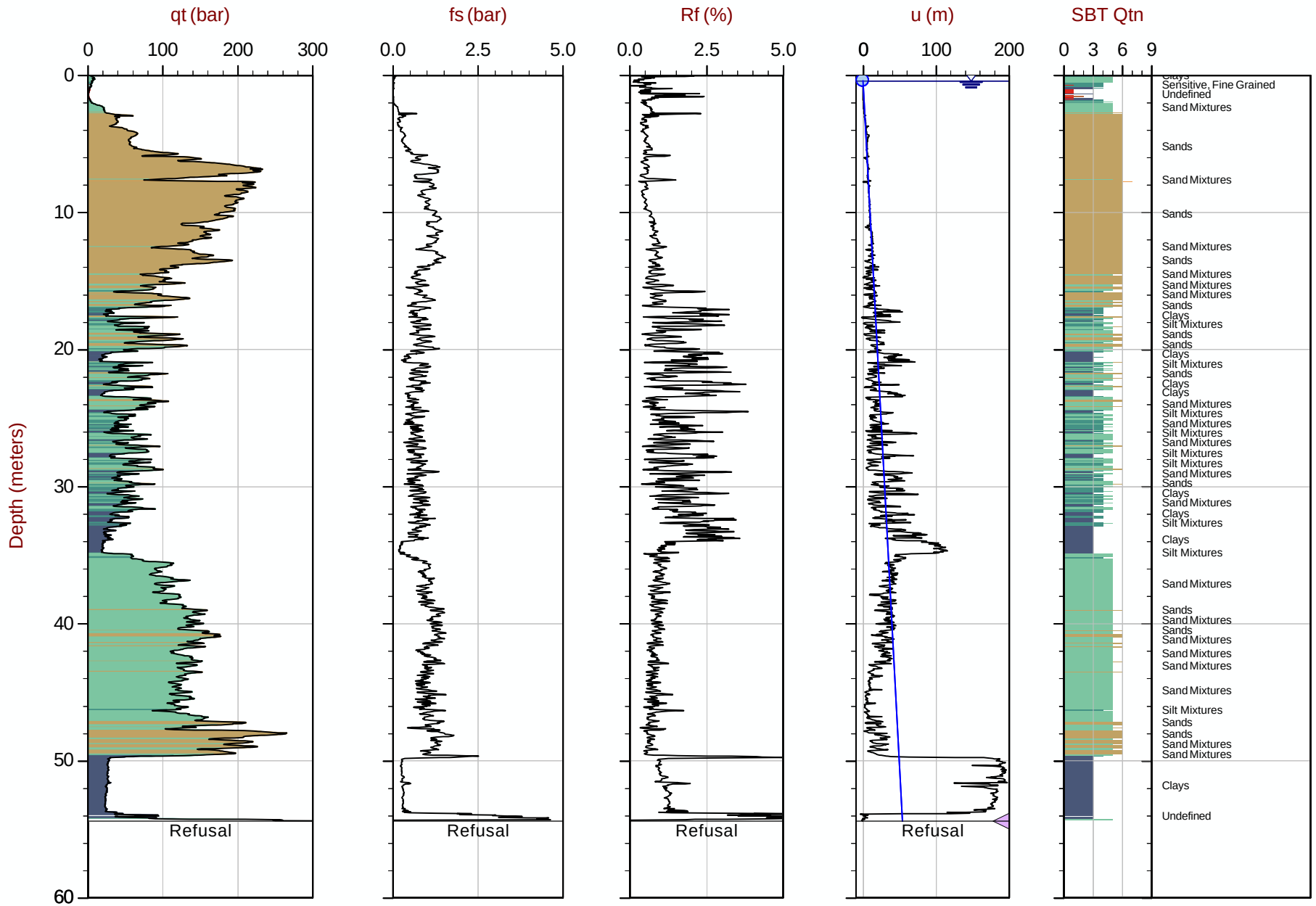
SBT: Robertson, 2009 and 2010
Coords: UTM Zone 17N N: 4830559m E: 630378m
Sheet No: 1 of 1

CONETEC

Thurber Engineering

Job No: 20-05-20620
Date: 2020-03-09 12:58
Site: Toronto Island Water Treatment Plant

Sounding: CPT20-T104
Cone: 531:T1500F15U500



Max Depth: 54.425 m / 178.56 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-05-20620_CP104.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM Zone 17N N: 4830376m E: 630457m
Sheet No: 1 of 1

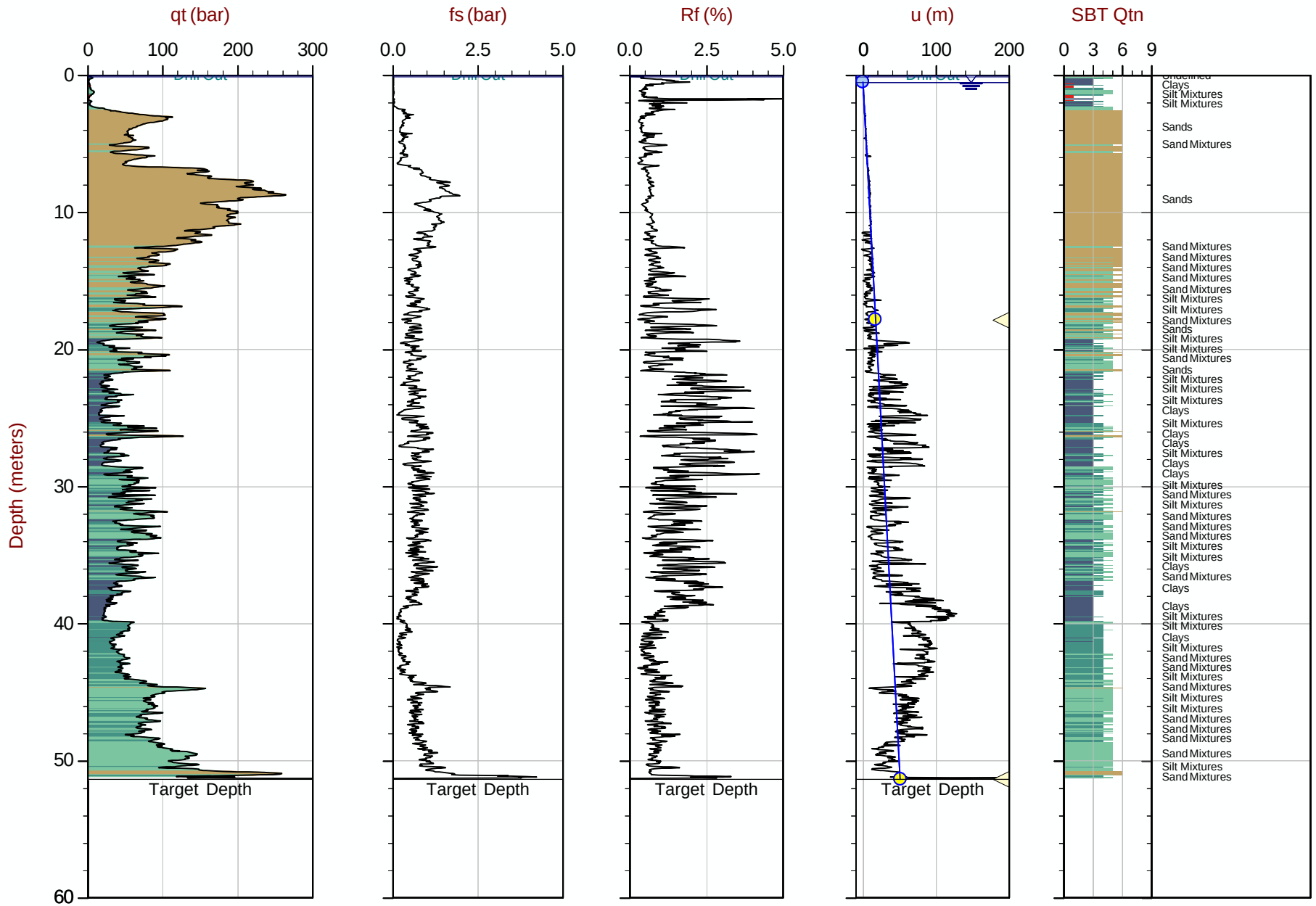
Overplot Item: Ueq | Assumed Ueq | Dissipation, Ueq achieved | Dissipation, Ueq not achieved | Dissipation, Ueq assumed | Hydrostatic Line

CONETEC

Thurber Engineering

Job No: 20-05-20620
Date: 2020-03-10 12:41
Site: Toronto Island Water Treatment Plant

Sounding: CPT20-T105
Cone: 531:T1500F15U500



Max Depth: 51.375 m / 168.55 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-05-20620_CP105.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM Zone 17N N: 4830177m E: 630494m
Sheet No: 1 of 1

Overplot Item: Ueq | Assumed Ueq | Dissipation, Ueq achieved | Dissipation, Ueq not achieved | Dissipation, Ueq assumed | Hydrostatic Line

Advanced Cone Penetration Test Plots with Ic, Su(Nkt), Phi and N1(60)Ic

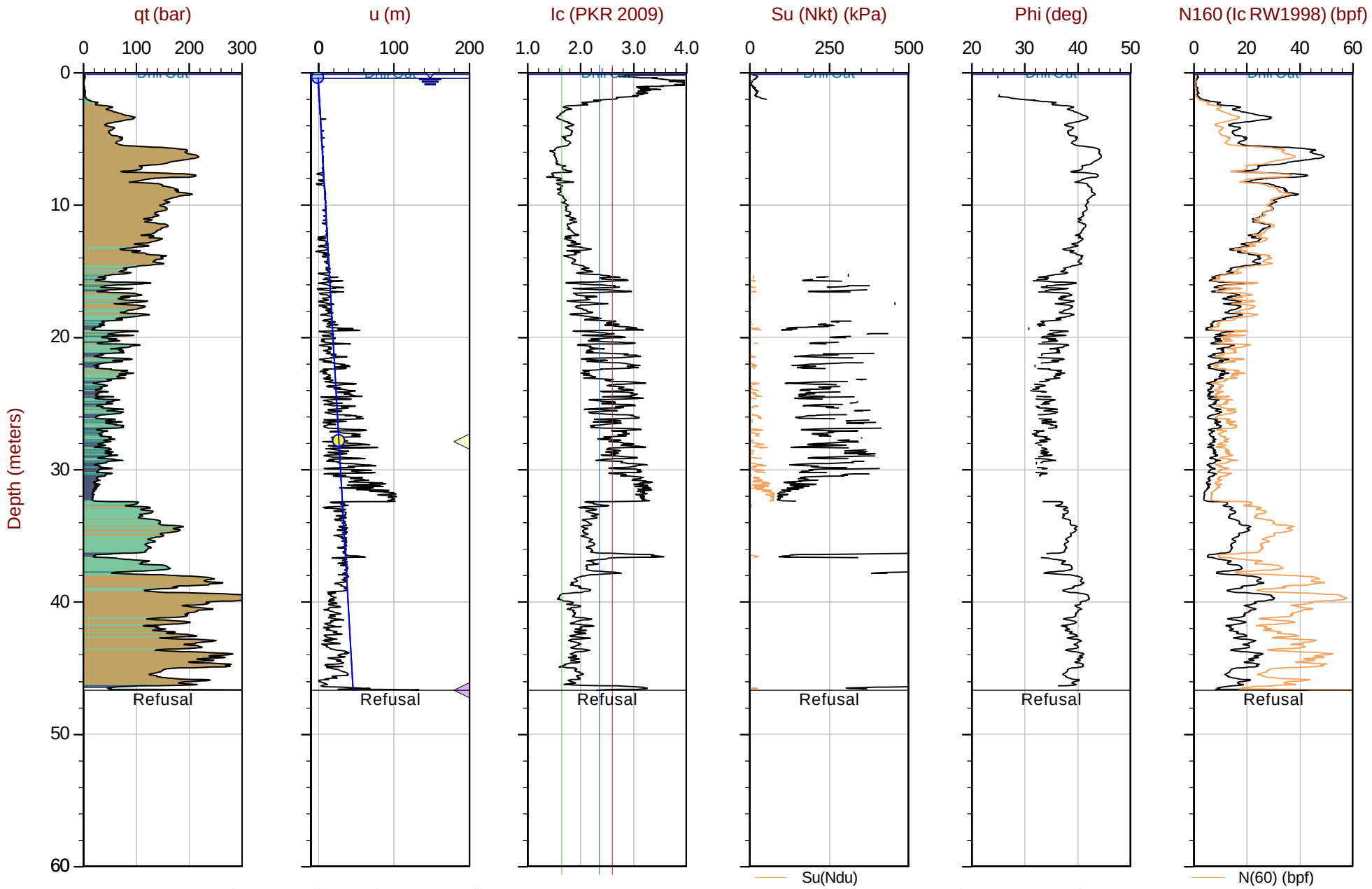


CONETEC

Thurber Engineering

Job No: 20-05-20620
Date: 2020-03-10 10:24
Site: Toronto Island Water Treatment Plant

Sounding: CPT20-G103
Cone: 531:T1500F15U500



Max Depth: 46.700 m / 153.21 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point
Overplot Item: Ueq, Assumed Ueq, Dissipation, Ueq achieved, Dissipation, Ueq not achieved, Dissipation, Ueq assumed, Hydrostatic Line

File: 20-05-20620_CP103.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt/Ndu: 12.0 / 9.0

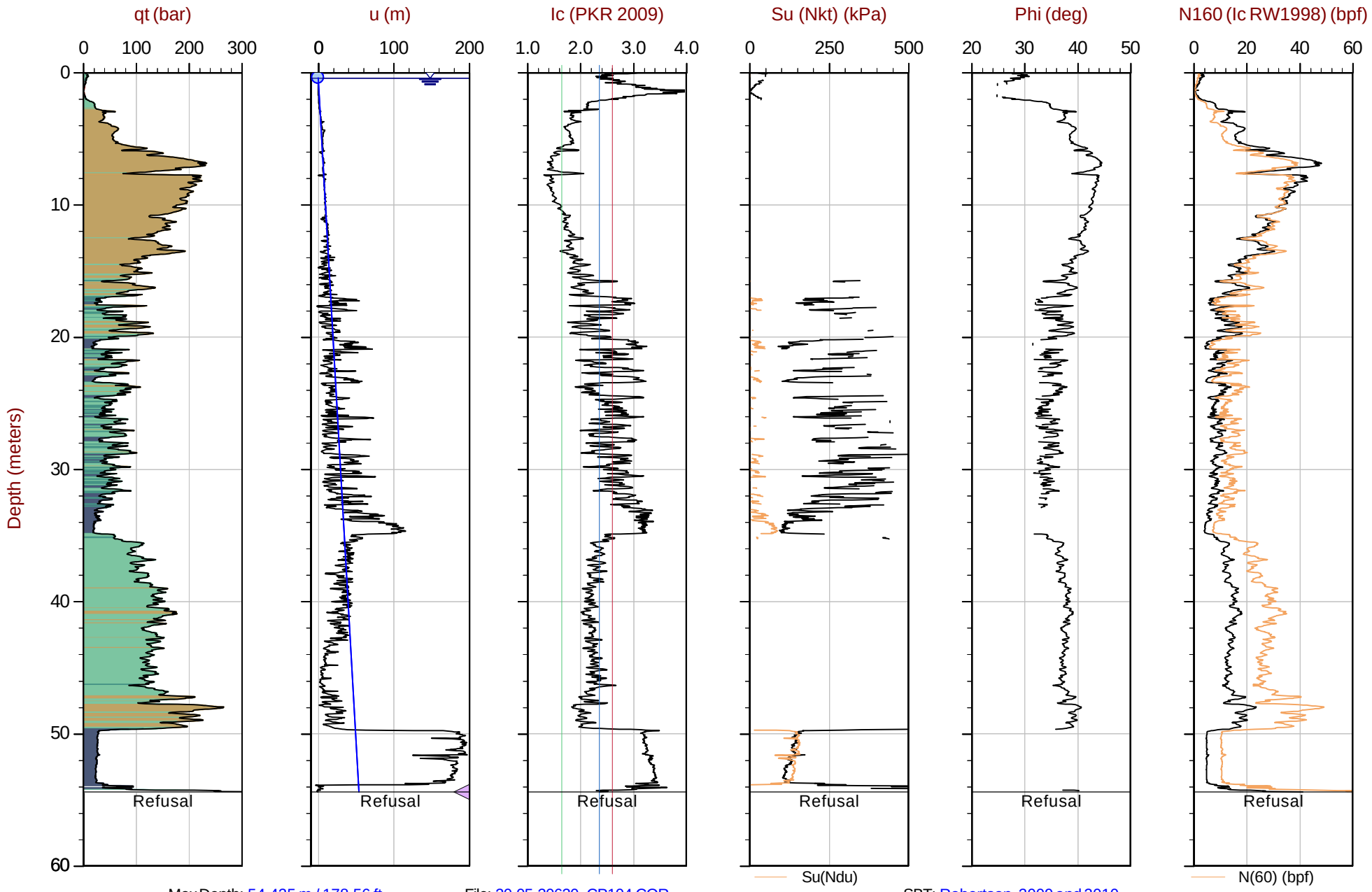
SBT: Robertson, 2009 and 2010
Coords: UTM Zone 17N N: 4830559m E: 630378m
Sheet No: 1 of 1

CONETEC

Thurber Engineering

Job No: 20-05-20620
Date: 2020-03-09 12:58
Site: Toronto Island Water Treatment Plant

Sounding: CPT20-T104
Cone: 531:T1500F15U500



Max Depth: 54.425 m / 178.56 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 20-05-20620_CP104.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt/Ndu: 12.0 / 9.0

SBT: Robertson, 2009 and 2010
Coords: UTM Zone 17N N: 4830376m E: 630457m
Sheet No: 1 of 1

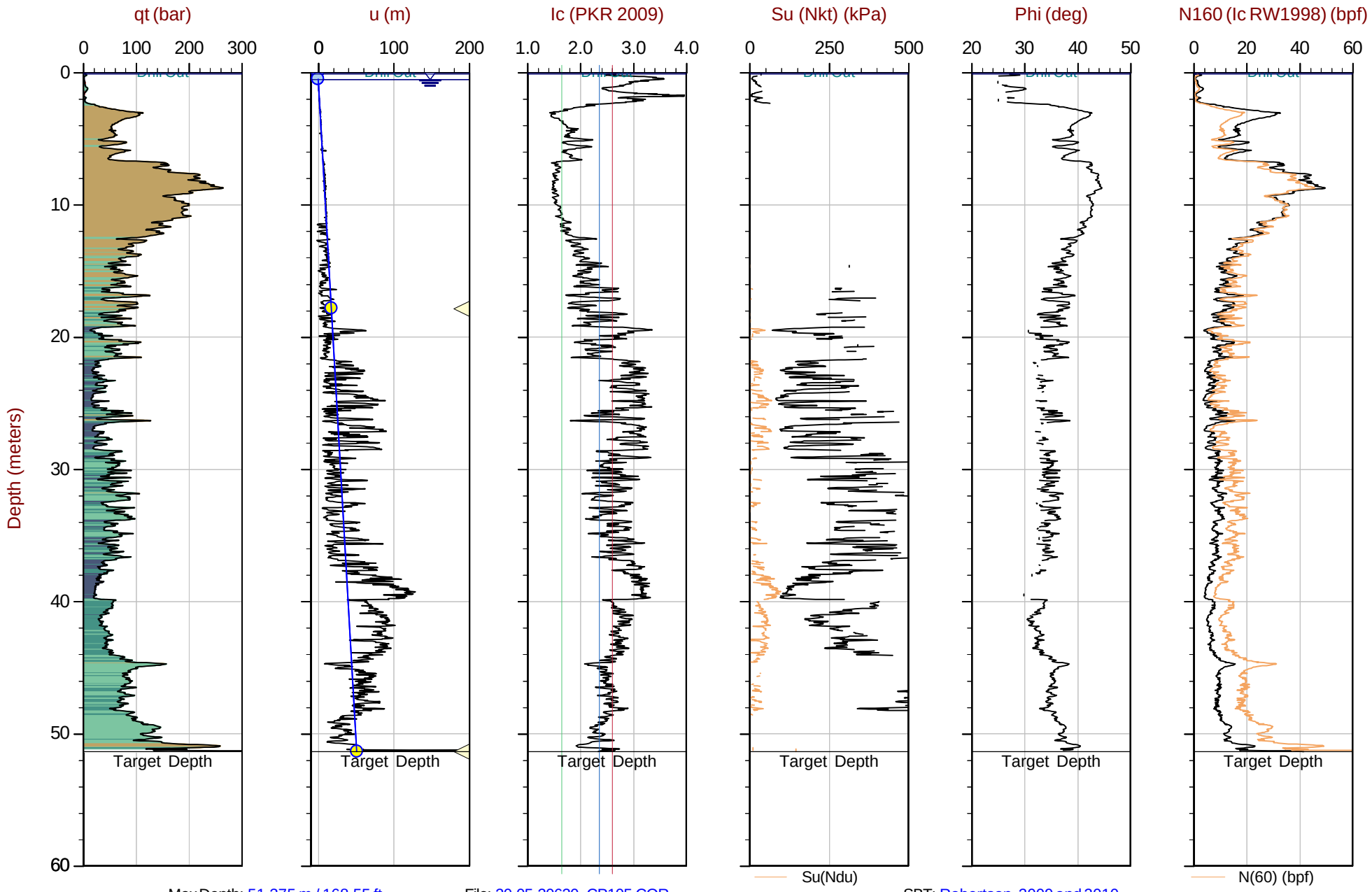
Overplot Item: Ueq | Assumed Ueq | Dissipation, Ueq achieved | Dissipation, Ueq not achieved | Dissipation, Ueq assumed | Hydrostatic Line

CONETEC

Thurber Engineering

Job No: 20-05-20620
Date: 2020-03-10 12:41
Site: Toronto Island Water Treatment Plant

Sounding: CPT20-T105
Cone: 531:T1500F15U500



Max Depth: 51.375 m / 168.55 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point
Overplot Item: Ueq, Assumed Ueq

File: 20-05-20620_CP105.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt/Ndu: 12.0 / 9.0

SBT: Robertson, 2009 and 2010
Coords: UTM Zone 17N N: 4830177m E: 630494m
Sheet No: 1 of 1

Dissipation, Ueq achieved; Dissipation, Ueq not achieved; Dissipation, Ueq assumed; Hydrostatic Line

Soil Behaviour Type (SBT) Scatter Plots

CONETEC

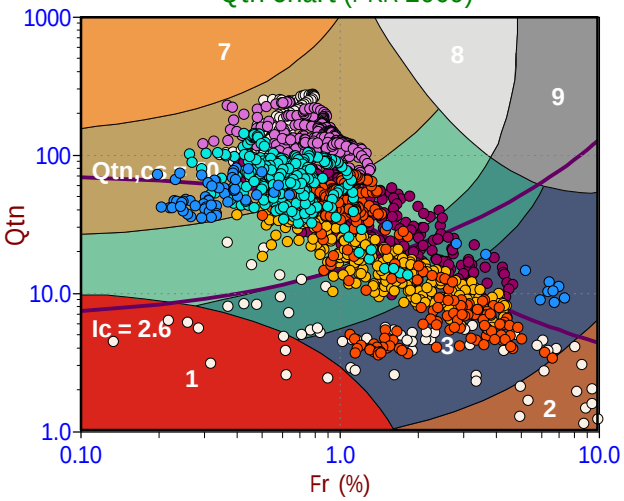
CONETEC

Thurber Engineering

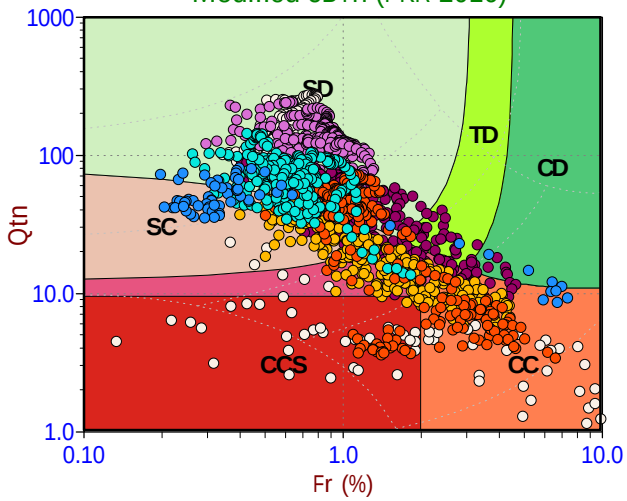
Job No: 20-05-20620
Date: 2020-03-10 10:24
Site: Toronto Island Water Treatment Plant

Sounding: CPT20-G103
Cone: 531:T1500F15U500

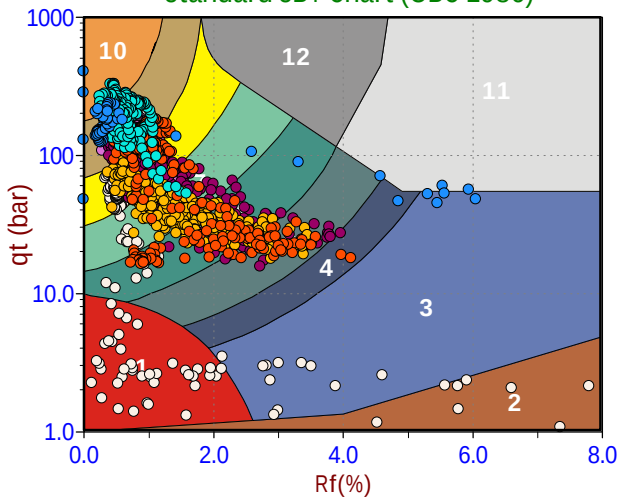
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges

- >0.0 to 7.5 m
- >7.5 to 15.0 m
- >15.0 to 22.5 m
- >22.5 to 30.0 m
- >30.0 to 37.5 m
- >37.5 to 45.0 m
- >45.0 to 52.5 m
- >52.5 to 60.0 m
- >60.0 to 67.5 m
- >67.5 to 75.0 m
- >75.0 m

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

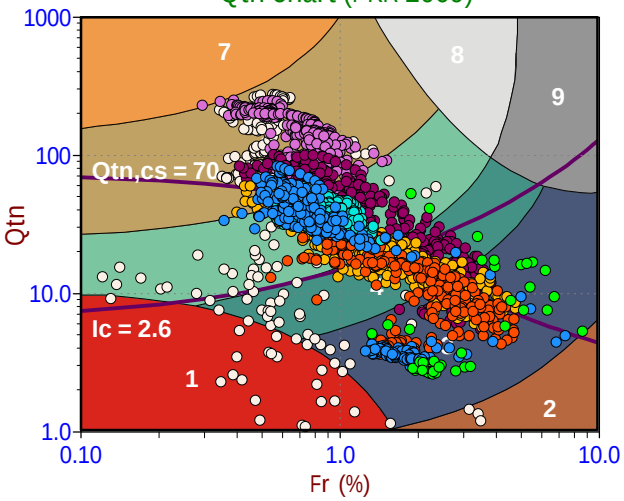
CONETEC

Thurber Engineering

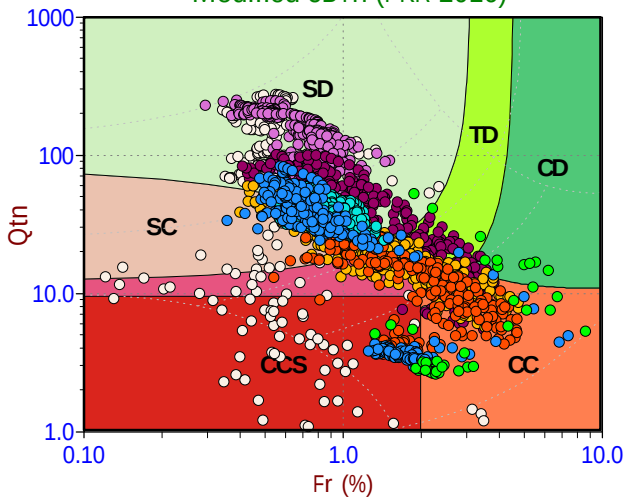
Job No: 20-05-20620
Date: 2020-03-09 12:58
Site: Toronto Island Water Treatment Plant

Sounding: CPT20-T104
Cone: 531:T1500F15U500

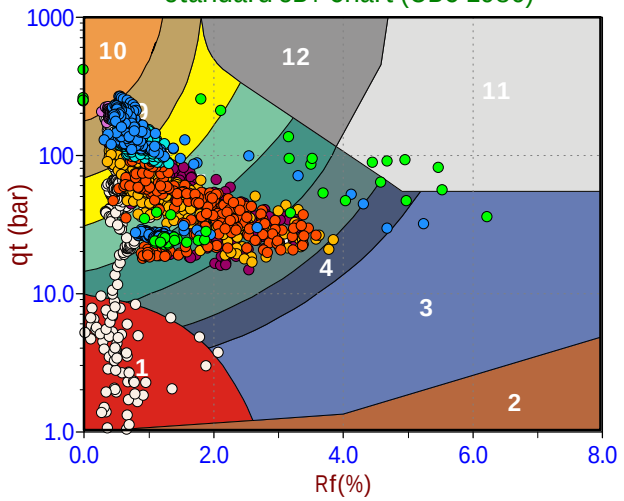
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges

- >0.0 to 7.5 m
- >7.5 to 15.0 m
- >15.0 to 22.5 m
- >22.5 to 30.0 m
- >30.0 to 37.5 m
- >37.5 to 45.0 m
- >45.0 to 52.5 m
- >52.5 to 60.0 m
- >60.0 to 67.5 m
- >67.5 to 75.0 m
- >75.0 m

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

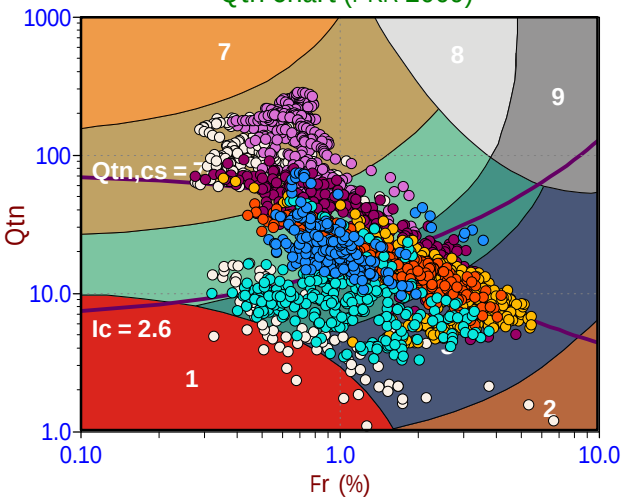
CONETEC

Thurber Engineering

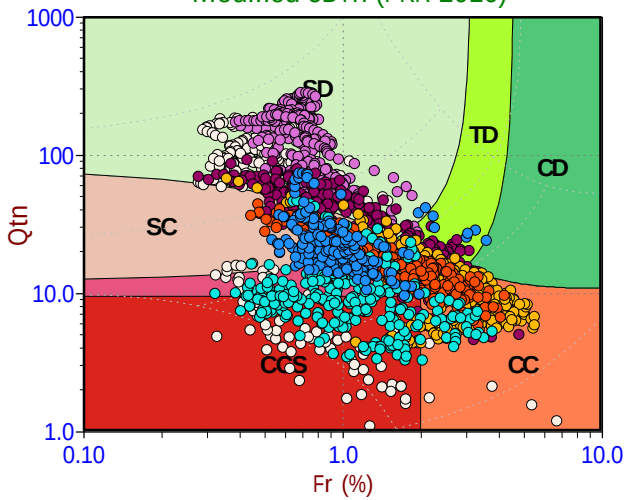
Job No: 20-05-20620
Date: 2020-03-10 12:41
Site: Toronto Island Water Treatment Plant

Sounding: CPT20-T105
Cone: 531:T1500F15U500

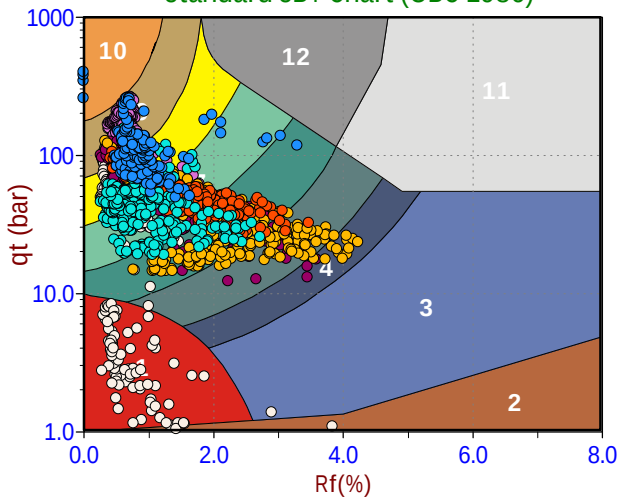
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges

- >0.0 to 7.5 m
- >7.5 to 15.0 m
- >15.0 to 22.5 m
- >22.5 to 30.0 m
- >30.0 to 37.5 m
- >37.5 to 45.0 m
- >45.0 to 52.5 m
- >52.5 to 60.0 m
- >60.0 to 67.5 m
- >67.5 to 75.0 m
- >75.0 m

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

Pore Pressure Dissipation Summary and Pore Pressure Dissipation Plots



Job No:	20-05-20620
Client:	Thurber Engineering Ltd.
Project:	Toronto Island Filtration Plant
Start Date:	09-Mar-2020
End Date:	10-Mar-2020

CPTu PORE PRESSURE DISSIPATION SUMMARY

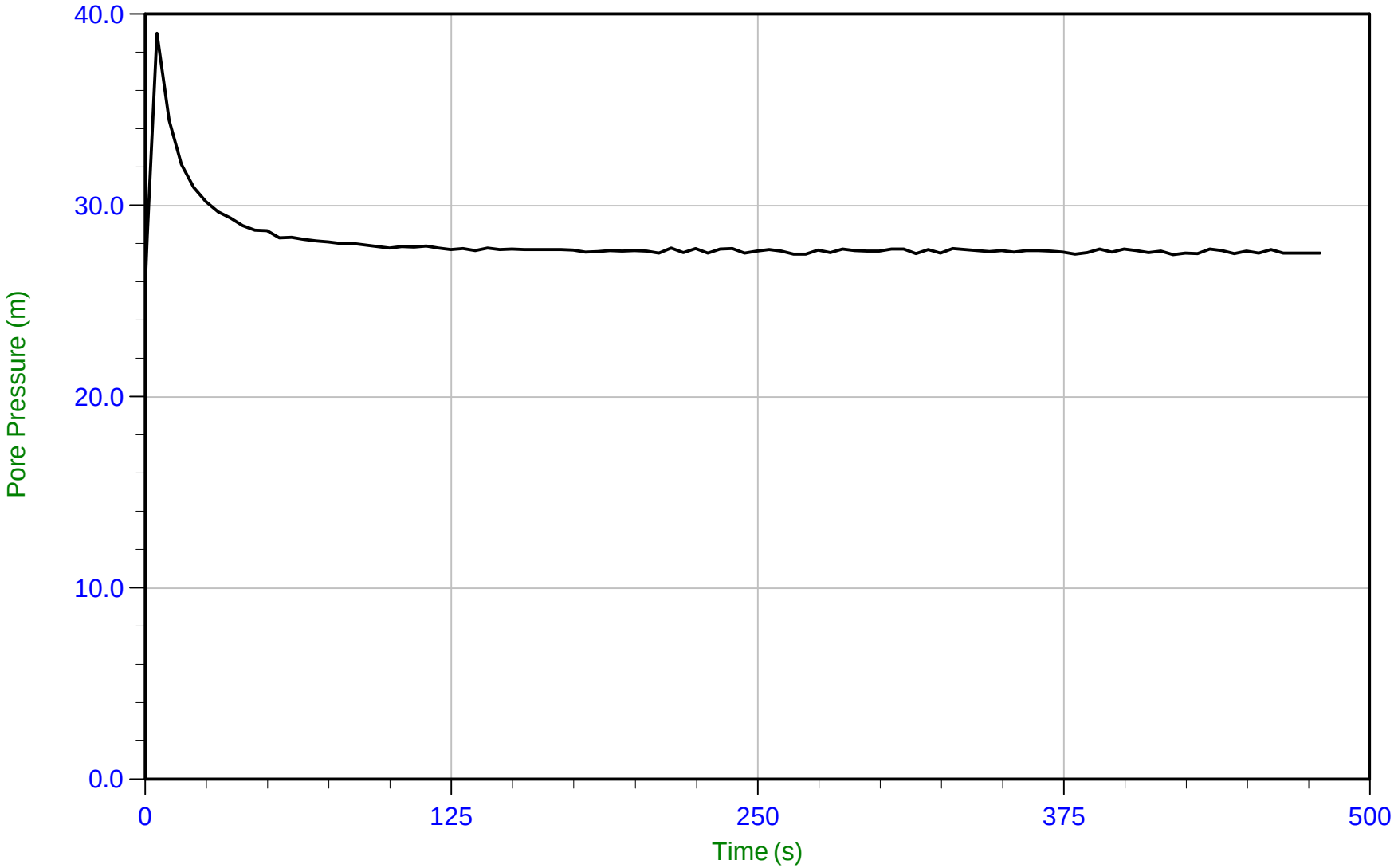
Sounding ID	File Name	Cone Area (cm^2)	Duration (s)	Test Depth (m)	Estimated Equilibrium Pore Pressure U_{eq} (m)	Calculated Phreatic Surface (m)
CPT20-G103	20-05-20620_CP103	15	480	27.875	27.5	0.4
CPT20-G103	20-05-20620_CP103	15	305	46.675		
CPT20-T104	20-05-20620_CP104	15	605	54.400		
CPT20-T105	20-05-20620_CP105	15	310	17.850	17.3	0.5
CPT20-T105	20-05-20620_CP105	15	300	51.375	51.0	0.4

CONETEC

Thurber Engineering

Job No: 20-05-20620
Date: 03/10/2020 10:24
Site: Toronto Island Water Treatment Plant

Sounding: CPT20-G103
Cone: 531:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-05-20620_CP103.PPF
Depth: 27.875 m / 91.452 ft
Duration: 480.0 s

u Min: 25.8 m
u Max: 39.0 m
u Final: 27.5 m

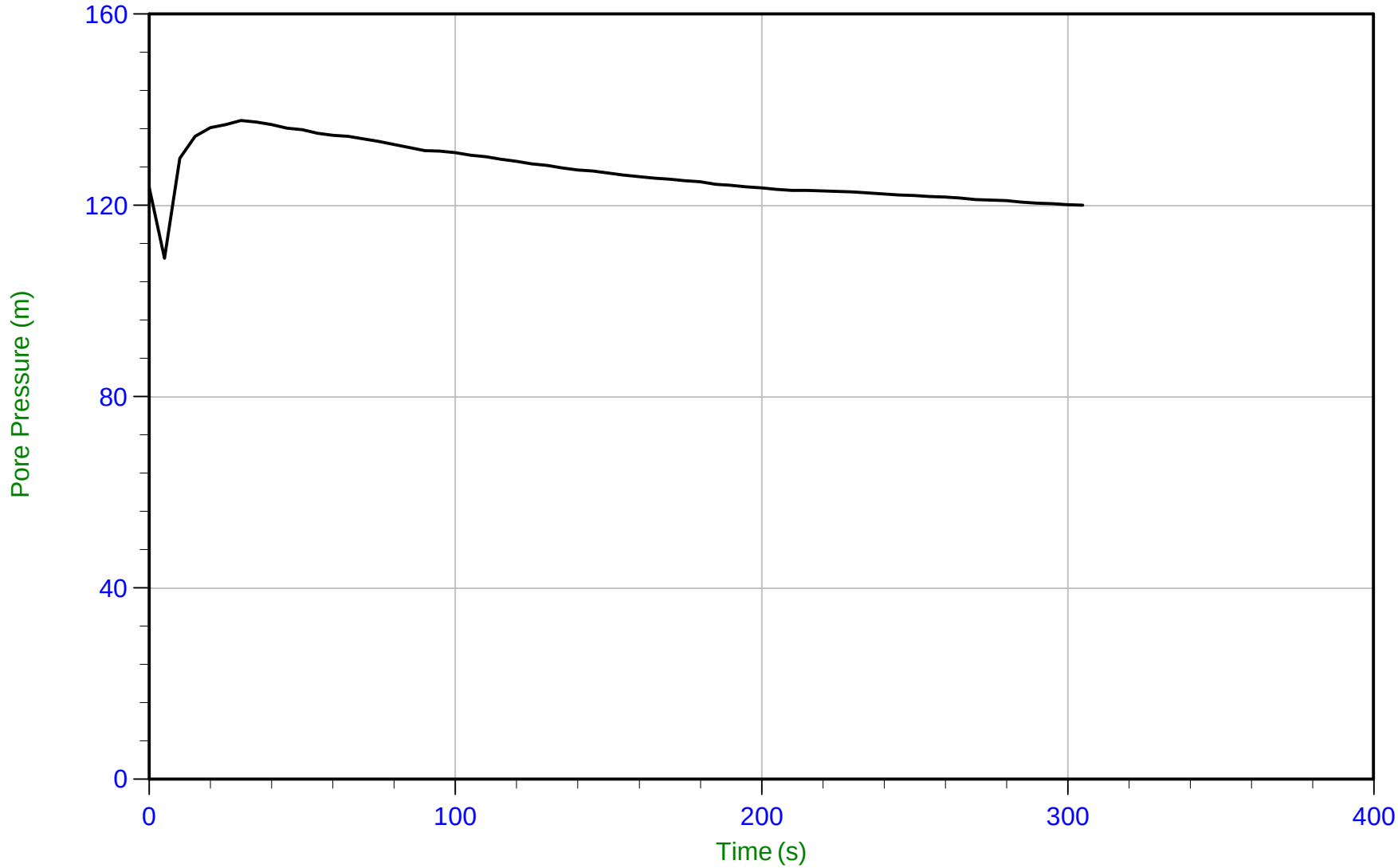
WT: 0.401 m / 1.316 ft
Ueq: 27.5 m

CONETEC

Thurber Engineering

Job No: 20-05-20620
Date: 03/10/2020 10:24
Site: Toronto Island Water Treatment Plant

Sounding: CPT20-G103
Cone: 531:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-05-20620_CP103.PPF
Depth: 46.675 m / 153.131 ft
Duration: 305.0 s

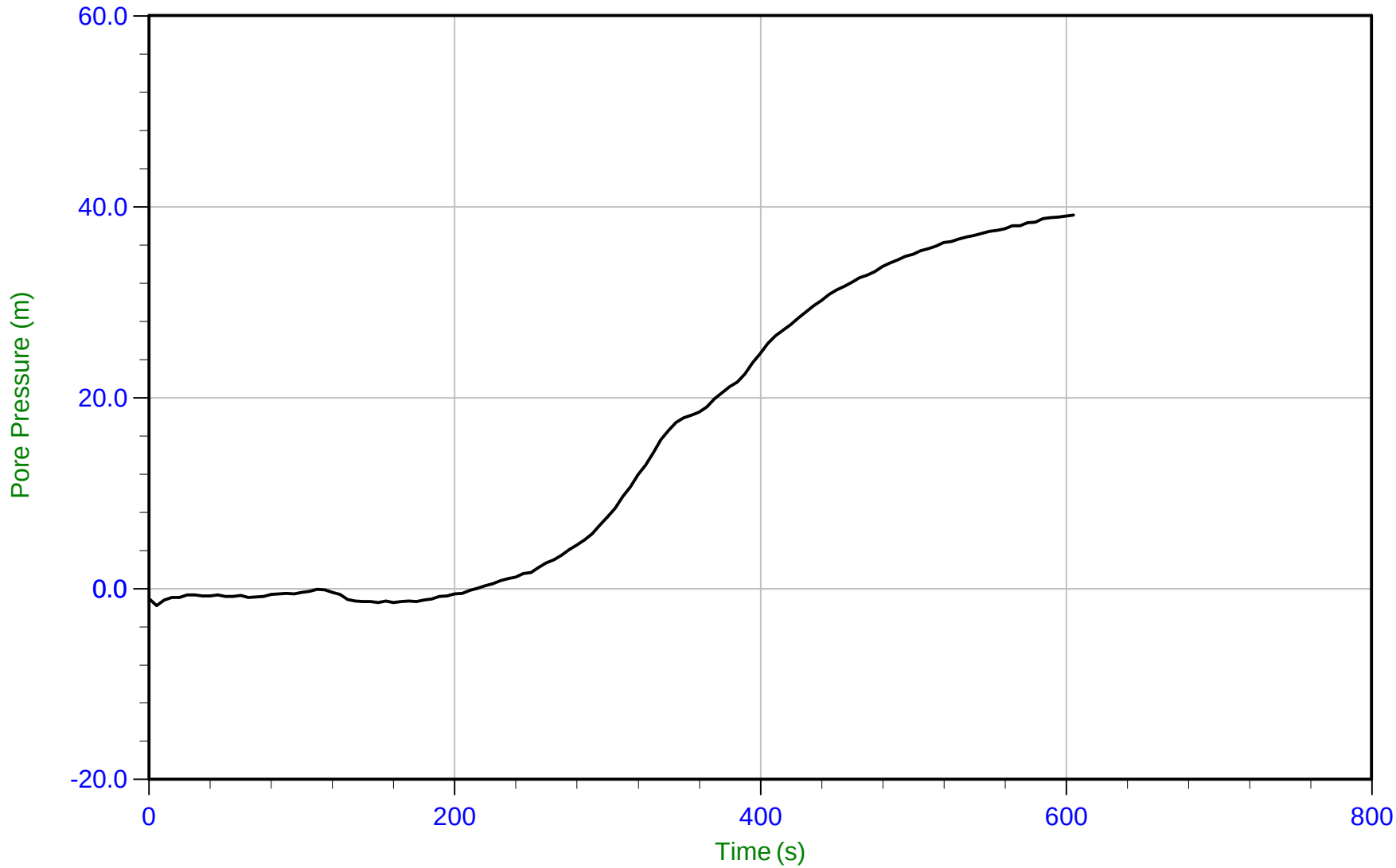
u Min: 109.0 m
u Max: 137.7 m
u Final: 120.0 m

CONETEC

Thurber Engineering

Job No: 20-05-20620
Date: 03/09/2020 12:58
Site: Toronto Island Water Treatment Plant

Sounding: CPT20-T104
Cone: 531:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-05-20620_CP104.PPF
Depth: 54.400 m / 178.476 ft
Duration: 605.0 s

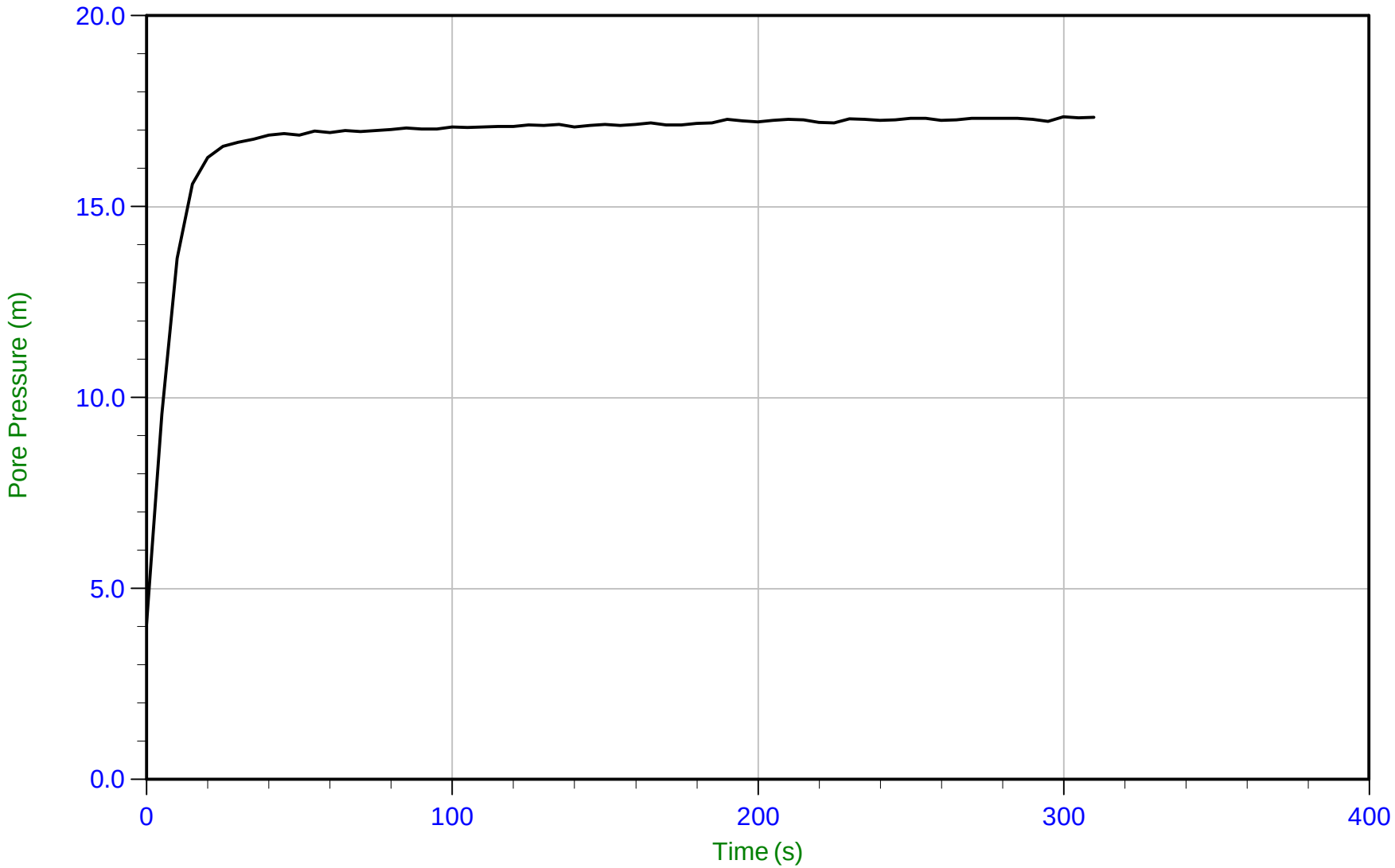
u Min: -1.8 m
u Max: 39.1 m
u Final: 39.1 m

CONETEC

Thurber Engineering

Job No: 20-05-20620
Date: 03/10/2020 12:41
Site: Toronto Island Water Treatment Plant

Sounding: CPT20-T105
Cone: 531:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-05-20620_CP105.PPF
Depth: 17.850 m / 58.562 ft
Duration: 310.0 s

u Min: 4.1 m
u Max: 17.4 m
u Final: 17.3 m

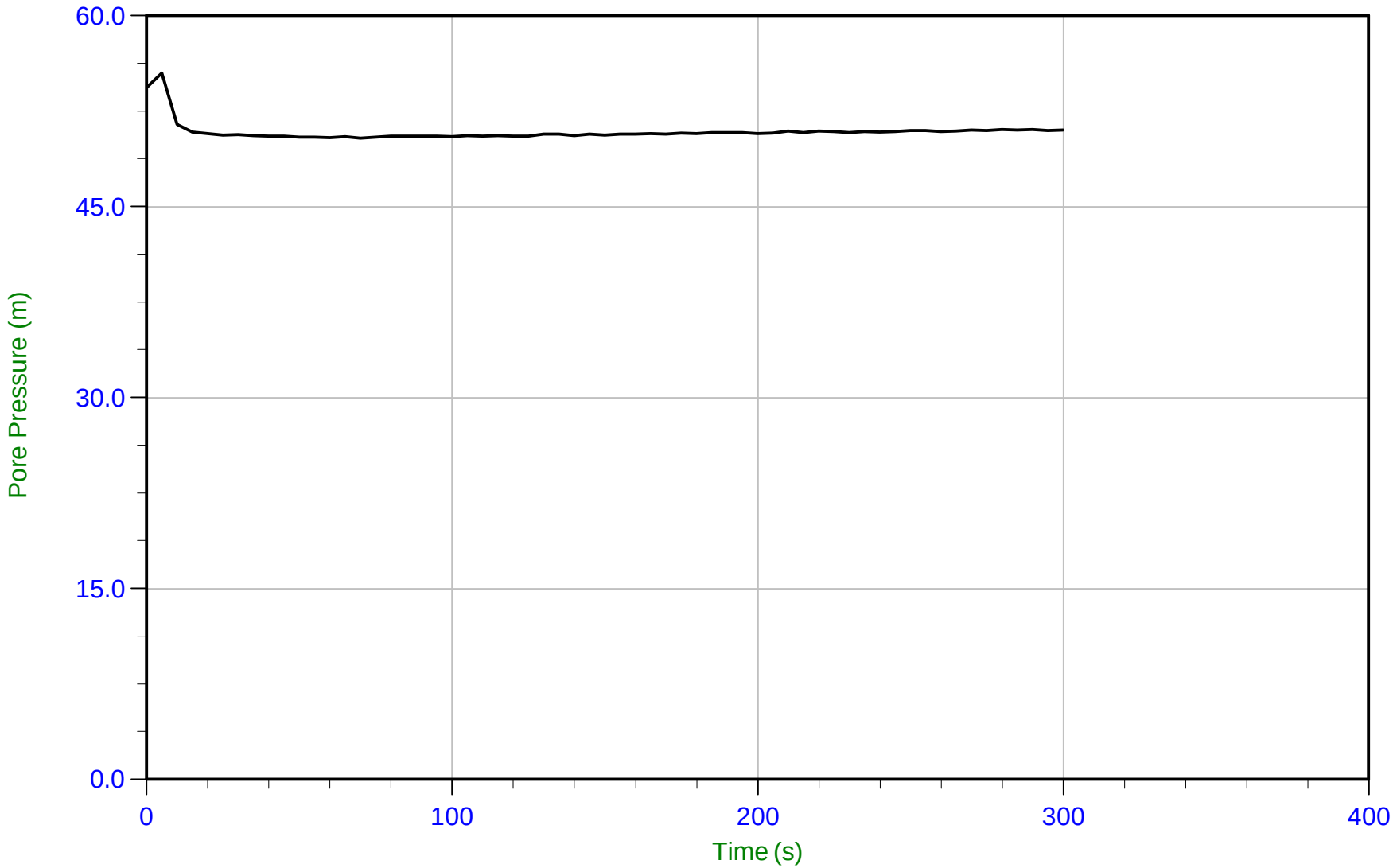
WT: 0.534 m / 1.752 ft
Ueq: 17.3 m

CONETEC

Thurber Engineering

Job No: 20-05-20620
Date: 03/10/2020 12:41
Site: Toronto Island Water Treatment Plant

Sounding: CPT20-T105
Cone: 531:T1500F15U500 Area=15 cm²



Trace Summary:

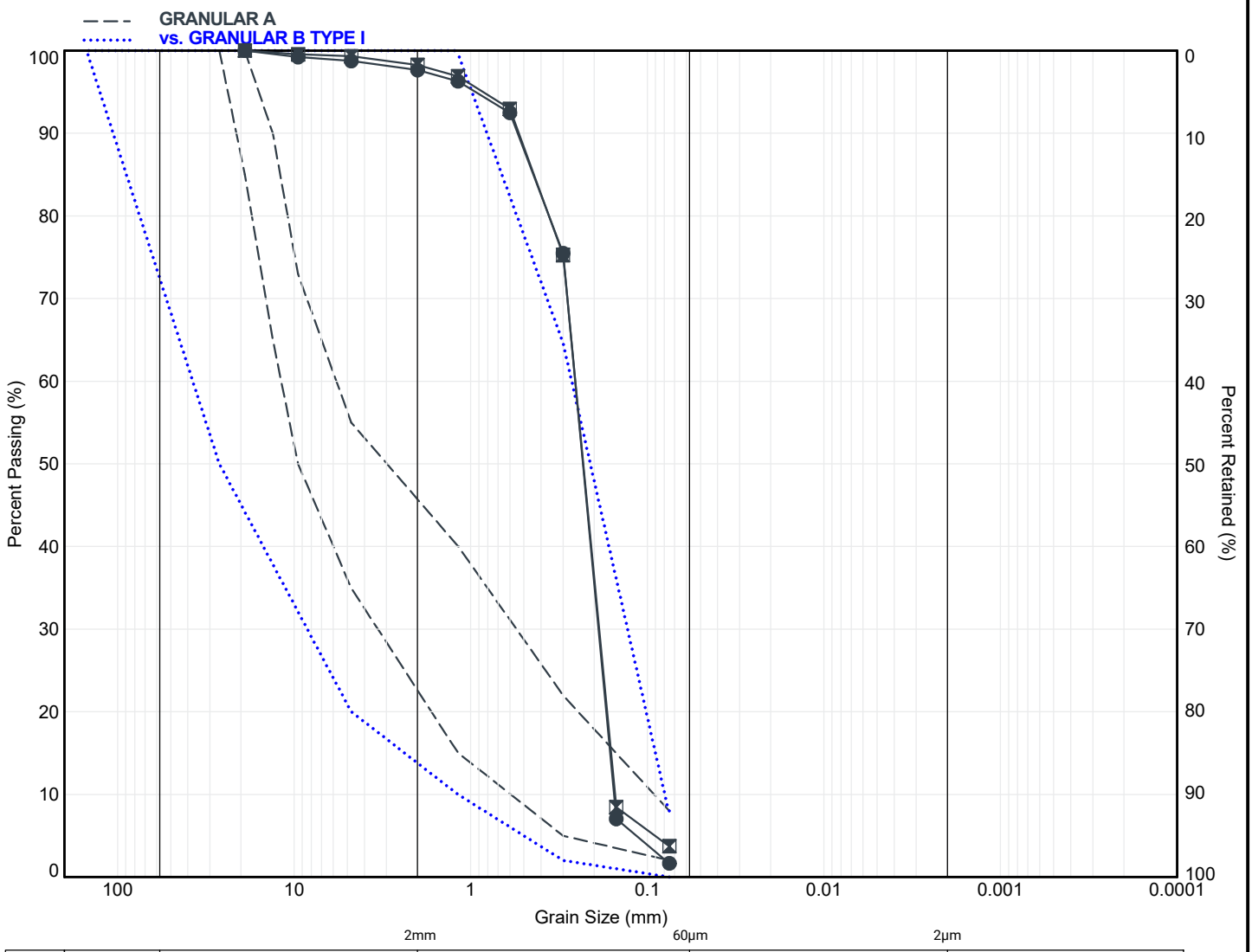
Filename: 20-05-20620_CP105.PPF
Depth: 51.375 m / 168.551 ft
Duration: 300.0 s

u Min: 50.4 m
u Max: 55.5 m
u Final: 51.0 m

WT: 0.375 m / 1.230 ft
Ueq: 51.0 m

APPENDIX G





MIT SYSTEM	COBBLES	GRAVEL			SAND			SILT	CLAY
		COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE		

MIT SYSTEM

	Borehole	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	*(Fines, %)*
●	**SA1**		0.2		2	96			*(2)*
⊠	**SA2**		0.2		2	94			*(4)*

GROUNDED ENGINEERING

Title: **GRAIN SIZE DISTRIBUTION STOCKPILE SAMPLES**

File No.: **20-026**

THURBER ENGINEERING LTD.

MOISTURE DENSITY REPORT

Client: Grounded Engineering

Project Number: 28742

Project: Toronto Island Flood

Date Tested: 03-Apr-20

Date Sampled: 25-Mar-20

Sample Source: 20-026 SA1 - Toronto Island Stockpile.

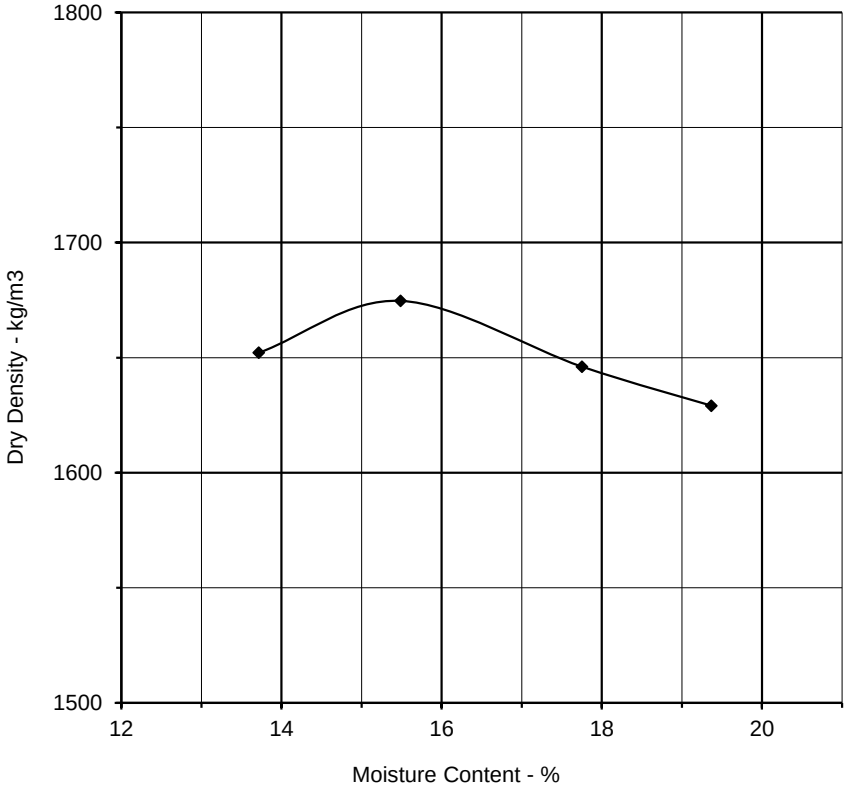
Sample Description: Sand, trace gravel, trace silt, brown, moist.

Oversized material:
1.4% retained on the 4.75 mm sieve

As-Received Moisture Content: 5.2%

Thurber Lab Series #: 1

Wet Density - kg/m³	1879	1934	1938	1945			
Dry Density - kg/m³	1652	1675	1646	1629			
Moisture Content- %	13.7	15.5	17.8	19.4			
Pocket Pen. (kg/cm²)							



Proctor Results

Max. Dry Density: **1675 kg/m³**

Optimum Moisture: **15.5%**

Preparation: Dry

Compaction Std.: ASTM D698

Method: A

Rammer Type: Manual

Sampled By: Grounded Eng.

Tested By: MH

Project Eng.: WM

Zero Air Voids Curve plotted for a Specific Gravity of 2.66

Comments:

Report Checked: BT

Tested in accordance with ASTM Designation D698 unless otherwise noted

THURBER ENGINEERING LTD.

MOISTURE DENSITY REPORT

Client: Grounded Engineering

Project Number: 28742

Project: Toronto Island Flood

Date Tested: 03-Apr-20

Date Sampled: 25-Mar-20

Sample Source: 20-026 SA2 - Toronto Island Stockpile.

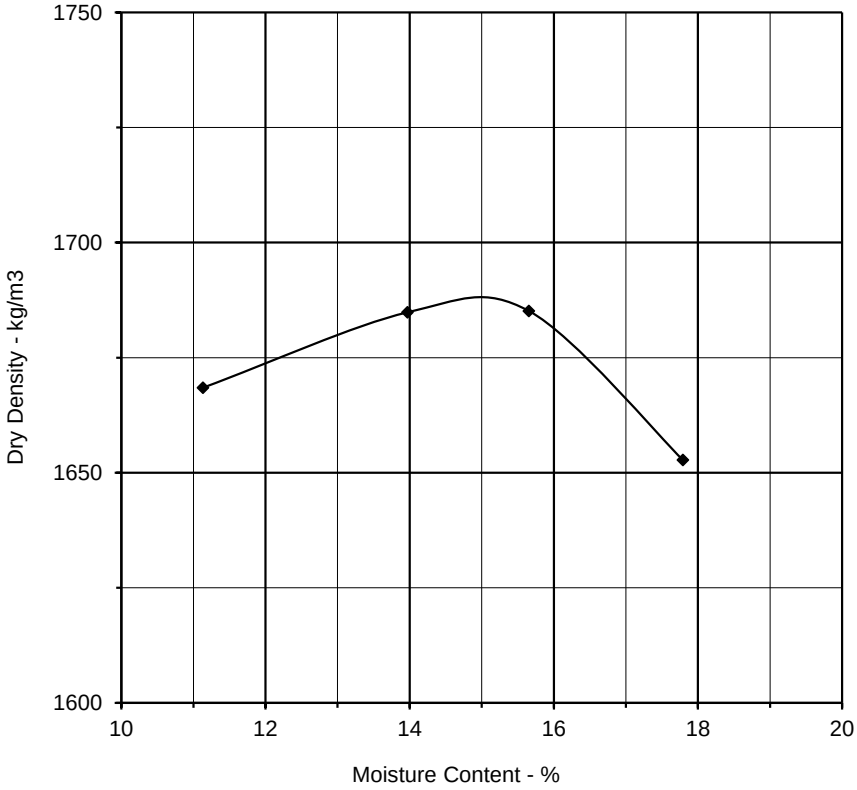
Sample Description: Sand, trace gravel, trace silt, moist, brown.

Oversized material:
2.4% retained on the 4.75 mm sieve

As-Received Moisture Content: 5.5%

Thurber Lab Series #: 2

Wet Density - kg/m³	1854	1920	1949	1947			
Dry Density - kg/m³	1668	1685	1685	1653			
Moisture Content- %	11.1	14.0	15.7	17.8			
Pocket Pen. (kg/cm²)							



Proctor Results

Max. Dry Density: **1688 kg/m³**

Optimum Moisture: **15.0%**

Preparation: Dry

Compaction Std.: ASTM D698

Method: A

Rammer Type: Manual

Sampled By: Grounded Eng.

Tested By: MH

Project Eng.: WM

Zero Air Voids Curve plotted for a Specific Gravity of 2.66

Comments:

Report Checked: BT

Tested in accordance with ASTM Designation D698 unless otherwise noted

APPENDIX H



Borehole No.	Elevation (m)	Upon completion of drilling		Depth to base of Well (m)	Elevation of base of Well (m)	Water Level (m)															
						30-Mar-20		20-Apr-20		21-Apr-20		22-Apr-20		04-May-20		06-May-20		20-May-20		15-Jun-20		18-Jun-21	
		Depth to cave (m)	Unstabilized water level (m)			Depth	Elevation	Depth	Elevation	Depth	Elevation	Depth	Elevation	Depth	Elevation	Depth	Elevation	Depth	Elevation	Depth	Elevation	Depth	Elevation
101	75.8	1.2	0.6	no monitoring well installed																			
102	75.8	1.2	0.8	no monitoring well installed																			
103	75.7	1.2	0.8	no monitoring well installed																			
104	n/a	cancelled																					
105	76.2	n/a[1]	1.2	no monitoring well installed																			
106	76.5	2.6	1.5	2.6	73.9																	1.8	74.7
107	75.9	1.2	0.9	no monitoring well installed																			
108	n/a	cancelled																					
109	75.9	1.2	0.6	no monitoring well installed																			
110	76.0	1.4	0.9	no monitoring well installed																			
111	75.7	1.5	0.8	2.6	73.1																	1.1	74.6
B1	75.8	n/a[1]	0.6	no monitoring well installed																			
B2	76.0	n/a[3]	n/a[2]	3.1	72.9	0.7	75.3																
B3	76.2	n/a[3]	n/a[2]	3.1	73.1	0.9	75.3															1.5	74.7
B4	75.7	n/a[1]	0.6	no monitoring well installed																			
G103S	76.0	n/a[3]	n/a[2]	13.7	62.3			0.8	75.3									0.8	75.2	0.8	75.3	1.4	74.6
G103D	76.0	n/a[3]	n/a[2]	86.6	-10.6					0.3	75.7					0.2	75.8	1.6	74.4	2.4	73.7		
T104	76.4	n/a[3]	n/a[2]	15.2	61.2																		
T105S	75.8	n/a[3]	n/a[2]	16.8	59.0							0.6	75.2					0.6	75.3	0.7	75.2		
T105D	75.8	n/a[3]	n/a[2]	87.3	-11.5					1.4	74.4			0.6	75.2					4.5	71.3		

n/a[1]	depth to cave not measured
n/a[2]	filled with drill fluid
n/a[3]	cased
TBD	elevation of borehole not measured, to be updated with borehole elevation
	not groundwater level information available

GROUNDED ENGINEERING

APPENDIX I



Photograph 1

Study Area:	(1) Ward's Island & (5.8) Cibola Ave
Location:	Southwest side of island
Description:	This area is relatively flat. Landscaped areas with concrete or asphalt paved roads/walkways connect the residential and commercial areas.



Photograph 2

Study Area:	(1) Ward's Island
Location:	Northwest side of island
Description:	This area is occupied by residential homes and concrete streets/walkways throughout the neighbourhood. The properties generally have thick vegetation consisting of grass, gardens and mature trees.



Photograph 3

Study Area:	(1) Ward's Island
Location:	East side of island
Description:	The east side of the island is occupied by Ward's Island Park, which is a protected area. This area is densely vegetated with trees and grass on the west side and Ward's Island beach on the east side (sandy areas).



Photograph 4

Study Area:	(1) Ward's Island
Location:	Northeast edge
Description:	The north edge of the island is protected with a large concrete seawall. There are low lying saturated areas behind the wall, on the west side. Some surficial spalling of the concrete seawall was observed during the site inspection.



Photograph 5

Study Area:	(2) Algonquin Island
Location:	North end
Description:	The north side of the island is protected with sandbags. There are also sump pumps for storm water control. Catch basins were observed with unknown outlets.



Photograph 6

Study Area:	(3) Centreville & (5.5) Avenue of the Island
Location:	South end
Description:	The south end of Centreville is occupied by an asphalt road and landscaped areas, are generally flat. Centreville Theme Park is present on the south side of the island.



Photograph 7

Study Area:	(3) Centreville & (5.5) Avenue of the Island
Location:	Centre portion
Description:	The majority of the islands is occupied by the main road extending from the south to north end. The island is landscaped with grass and a few mature trees. The ground is generally flat but there are some small hills up to 1.5 m in height. Minor ponding of rainwater was observed along the road.



Photograph 8

Study Area:	(3) Centreville & (5.5) Avenue of the Island
Location:	North end
Description:	The road leads to marinas and the Centre Island ferry. The ground is generally landscaped with grass and trees.



Photograph 9

Study Area:	(4) Toronto Island Water Treatment Plant
Location:	South end
Description:	The water treatment plant is occupied by the buildings and infrastructure. The area appears to be built up in the middle and is approximately 4 to 5 m higher than the surrounding Service Road (5.4).



Photograph 10

Study Area:	(5.1) Lakeshore Avenue
Location:	Facing south
Description:	The area is generally flat, with landscaped grass and trees on either side of the road. There is a sump pump in this area.



Photograph 11

Study Area:	(5.2) Lakeshore Avenue
Location:	Facing south
Description:	The area is generally flat, with landscaped grass and trees on either side of the road. The Lake is in close proximity to the road on the east side. There is construction on the west side of the road.



Photograph 12

Study Area:	(5.3) Lakeshore Avenue
Location:	Facing east
Description:	The area is generally flat, with landscaped grass and trees. A building associated with Artscape Gibraltar Point is present on the south side of the road.



Photograph 13

Study Area:	(5.4) Centre Island Park (Service) Road
Location:	Facing west
Description:	There is a built-up berm on the Toronto Island Water Treatment Plant property. There is grass and mature trees on either side of the road. The study area is generally flat.



Photograph 14

Study Area:	(5.6) Chippewa Avenue
Location:	Facing south
Description:	The road is constructed with concrete sidewalk and asphalt. The road is present adjacent east to the Lake, sloped with a height of approximately 1.5 to 2 m and inclined at approximately 2.5H:1V. The shoreline is vegetated with grasses. Some damage to eth concrete walkway, possible from erosion of the shoreline was observed on the central portion.



Photograph 15

Study Area:	(5.7) Cibola Avenue
Location:	Facing east
Description:	The area is generally flat, with landscaped grass and trees on either side of the road.



APPENDIX J



Your Project #: 21-090
Site Location: TORONTO ISLAND
Your C.O.C. #: 165365

Attention: Jory Hunter

Grounded Engineering Inc.
12 Banigan Drive
Toronto, ON
CANADA M4H 1E9

Report Date: 2021/06/29
Report #: R6697814
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1H0720
Received: 2021/06/21, 15:16

Sample Matrix: Water
Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Dissolved Aluminum (0.2 u, clay free)	5	N/A	2021/06/24	CAM SOP-00447	EPA 6020B m
Alkalinity	5	N/A	2021/06/23	CAM SOP-00448	SM 23 2320 B m
Chromium (VI) in Water	5	N/A	2021/06/24	CAM SOP-00436	EPA 7199 m
Free (WAD) Cyanide	5	N/A	2021/06/24	CAM SOP-00457	OMOE E3015 m
Dissolved Oxygen	5	2021/06/22	2021/06/22	CAM SOP-00427	SM 23 4500 O G m
Hardness (calculated as CaCO3)	5	N/A	2021/06/24	CAM SOP 00102/00408/00447	SM 2340 B
Mercury	4	2021/06/24	2021/06/25	CAM SOP-00453	EPA 7470A m
Mercury	1	2021/06/28	2021/06/28	CAM SOP-00453	EPA 7470A m
Total Metals Analysis by ICPMS	5	N/A	2021/06/25	CAM SOP-00447	EPA 6020B m
Total Metals Analysis by ICPMS	1	N/A	2021/06/28	CAM SOP-00447	EPA 6020B m
Sulphide (as H2S) (1)	5	N/A	2021/06/27	AB WI-00065	Auto Calc.
Total Sulphide (1)	5	N/A	2021/06/27	AB SOP-00080	SM 23 4500 S2-A D Fm
Total Ammonia-N	5	N/A	2021/06/24	CAM SOP-00441	USGS I-2522-90 m
pH	5	2021/06/22	2021/06/23	CAM SOP-00413	SM 4500H+ B m
Phenols (4AAP)	5	N/A	2021/06/23	CAM SOP-00444	OMOE E3179 m
Total Phosphorus (Colourimetric)	1	2021/06/23	2021/06/24	CAM SOP-00407	SM 23 4500 P B H m
Total Phosphorus (Colourimetric)	4	2021/06/23	2021/06/25	CAM SOP-00407	SM 23 4500 P B H m
Turbidity	5	N/A	2021/06/22	CAM SOP-00417	SM 23 2130 B m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report.

Your Project #: 21-090
Site Location: TORONTO ISLAND
Your C.O.C. #: 165365

Attention: Jory Hunter

Grounded Engineering Inc.
12 Banigan Drive
Toronto, ON
CANADA M4H 1E9

Report Date: 2021/06/29
Report #: R6697814
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1H0720
Received: 2021/06/21, 15:16

Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Bureau Veritas Calgary via Mississauga

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Marijane Cruz, Senior Project Manager
Email: Marijane.Cruz@bureauveritas.com
Phone# (905)817-5756

==========

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

BV Labs Job #: C1H0720
Report Date: 2021/06/29

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: TORONTO ISLAND

PWQO METALS AND INORGANICS (WATER)

BV Labs ID			PWW960			PWW960			PWW961		
Sampling Date			2021/06/21			2021/06/21			2021/06/21		
COC Number			165365			165365			165365		
	UNITS	Criteria	BH111	RDL	QC Batch	BH111 Lab-Dup	RDL	QC Batch	BH106	RDL	QC Batch
Calculated Parameters											
Hardness (CaCO3)	mg/L	-	470	1.0	7421091				470	1.0	7421091
Sulphide (as H2S)	mg/L	0.002	**0.021**	0.010	7432409				**0.019**	0.010	7432409
Inorganics											
Total Ammonia-N	mg/L	-	0.97	0.050	7422125				1.0	0.050	7422125
Dissolved Oxygen	mg/L	-	8.29		7422004	8.31		7422004	7.48		7422004
pH	pH	6.5:8.5	7.95		7422166				7.78		7422166
Phenols-4AAP	mg/L	0.001	<0.0010	0.0010	7424067	<0.0010	0.0010	7424067	<0.0010	0.0010	7424023
Total Phosphorus	mg/L	0.01	**0.25**	0.04	7425097				**1.1**	0.02	7425097
Total Sulphide	mg/L	0.002	**0.020 (1)**	0.0090	7433930				**0.018 (1)**	0.0090	7433930
Turbidity	NTU	-	36	0.1	7421735				16	0.1	7421735
WAD Cyanide (Free)	ug/L	5	<1	1	7427564	<1	1	7427564	<1	1	7427564
Alkalinity (Total as CaCO3)	mg/L	-	380	1.0	7422156				390	1.0	7422156
Metals											
Dissolved (0.2u) Aluminum (Al)	ug/L	15	<5	5	7425613				<5	5	7425613
Chromium (VI)	ug/L	1	<0.50	0.50	7425632				<0.50	0.50	7425632
Mercury (Hg)	ug/L	0.2	<0.10	0.10	7427736				0.14	0.10	7432717
Total Antimony (Sb)	ug/L	20	<0.50	0.50	7427325				1.1	0.50	7427325
Total Arsenic (As)	ug/L	100	2.9	1.0	7427325				3.8	1.0	7427325
Total Beryllium (Be)	ug/L	11	<0.40	0.40	7427325				<0.40	0.40	7427325
Total Boron (B)	ug/L	200	34	10	7427325				30	10	7427325
Total Cadmium (Cd)	ug/L	0.2	<0.090	0.090	7427325				<0.090	0.090	7427325
Total Chromium (Cr)	ug/L	-	<5.0	5.0	7427325				<5.0	5.0	7427325
Total Cobalt (Co)	ug/L	0.9	**1.2**	0.50	7427325				**1.9**	0.50	7427325
Total Copper (Cu)	ug/L	5	3.6	0.90	7427325				3.4	0.90	7427325
Total Iron (Fe)	ug/L	300	**8600**	100	7427325				**1600**	100	7427325
Total Lead (Pb)	ug/L	5	**10**	0.50	7427325				3.0	0.50	7427325
Total Molybdenum (Mo)	ug/L	40	0.74	0.50	7427325				4.7	0.50	7427325
Total Nickel (Ni)	ug/L	25	2.9	1.0	7427325				2.6	1.0	7427325
Total Selenium (Se)	ug/L	100	<2.0	2.0	7427325				<2.0	2.0	7427325

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999
(1) Detection limits raised due to sample matrix.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

BV Labs Job #: C1H0720
Report Date: 2021/06/29

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: TORONTO ISLAND

PWQO METALS AND INORGANICS (WATER)

BV Labs ID			PWW960			PWW960			PWW961		
Sampling Date			2021/06/21			2021/06/21			2021/06/21		
COC Number			165365			165365			165365		
	UNITS	Criteria	BH111	RDL	QC Batch	BH111 Lab-Dup	RDL	QC Batch	BH106	RDL	QC Batch
Total Silver (Ag)	ug/L	0.1	<0.090	0.090	7427325				<0.090	0.090	7427325
Total Thallium (Tl)	ug/L	0.3	<0.050	0.050	7427325				<0.050	0.050	7427325
Total Tungsten (W)	ug/L	30	<1.0	1.0	7427325				<1.0	1.0	7427325
Total Uranium (U)	ug/L	5	0.12	0.10	7427325				1.1	0.10	7427325
Total Vanadium (V)	ug/L	6	3.9	0.50	7427325				1.6	0.50	7427325
Total Zinc (Zn)	ug/L	30	14	5.0	7427325				6.6	5.0	7427325
Total Zirconium (Zr)	ug/L	4	<1.0	1.0	7427325				<1.0	1.0	7427325

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

BV Labs Job #: C1H0720
Report Date: 2021/06/29

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: TORONTO ISLAND

PWQO METALS AND INORGANICS (WATER)

BV Labs ID			PWW962			PWW963		PWW964		
Sampling Date			2021/06/21			2021/06/21		2021/06/21		
COC Number			165365			165365		165365		
	UNITS	Criteria	B3	RDL	QC Batch	G103	QC Batch	DUP	RDL	QC Batch
Calculated Parameters										
Hardness (CaCO3)	mg/L	-	440	1.0	7421091	110	7421091	110	1.0	7421091
Sulphide (as H2S)	mg/L	0.002	**0.087**	0.0020	7432409	**0.61**	7432409	**0.44**	0.010	7433931
Inorganics										
Total Ammonia-N	mg/L	-	2.1	0.050	7422125	0.54	7422125	1.0	0.050	7422125
Dissolved Oxygen	mg/L	-	8.42		7422004	6.45	7422004	6.15		7422004
pH	pH	6.5:8.5	7.90		7422166	7.76	7422166	7.70		7422166
Phenols-4AAP	mg/L	0.001	<0.0010	0.0010	7424023	**0.0033**	7424023	**0.0034**	0.0010	7424067
Total Phosphorus	mg/L	0.01	**0.08**	0.02	7424830	**0.40**	7425097	**0.40**	0.02	7425097
Total Sulphide	mg/L	0.002	**0.082**	0.0018	7433930	**0.58**	7433930	**0.41**	0.0090	7433930
Turbidity	NTU	-	16	0.1	7421735	17	7421735	16	0.1	7421735
WAD Cyanide (Free)	ug/L	5	<1	1	7427564	<1	7427564	<1	1	7427564
Alkalinity (Total as CaCO3)	mg/L	-	400	1.0	7422156	100	7422156	100	1.0	7422156
Metals										
Dissolved (0.2u) Aluminum (Al)	ug/L	15	<5	5	7425613	**26**	7425613	**28**	5	7425613
Chromium (VI)	ug/L	1	<0.50	0.50	7425632	<0.50	7425632	<0.50	0.50	7425632
Mercury (Hg)	ug/L	0.2	<0.10	0.10	7427736	<0.10	7427736	<0.10	0.10	7427736
Total Antimony (Sb)	ug/L	20	<0.50	0.50	7427325	0.54	7427325	0.59	0.50	7427325
Total Arsenic (As)	ug/L	100	1.3	1.0	7427325	1.4	7427325	1.2	1.0	7427325
Total Beryllium (Be)	ug/L	11	<0.40	0.40	7427325	<0.40	7427325	<0.40	0.40	7427325
Total Boron (B)	ug/L	200	31	10	7427325	17	7427325	18	10	7427325
Total Cadmium (Cd)	ug/L	0.2	<0.090	0.090	7427325	<0.090	7427325	<0.090	0.090	7427325
Total Chromium (Cr)	ug/L	-	<5.0	5.0	7427325	<5.0	7427325	<5.0	5.0	7427325
Total Cobalt (Co)	ug/L	0.9	**1.4**	0.50	7427325	<0.50	7427325	<0.50	0.50	7427325
Total Copper (Cu)	ug/L	5	3.4	0.90	7427325	**5.5**	7427325	**5.5**	0.90	7427325
Total Iron (Fe)	ug/L	300	**6000**	100	7427325	**1600**	7427325	**1500**	100	7427325
Total Lead (Pb)	ug/L	5	3.7	0.50	7427325	**5.5**	7427325	**5.3**	0.50	7427325
Total Molybdenum (Mo)	ug/L	40	<0.50	0.50	7427325	1.3	7427325	1.3	0.50	7427325
Total Nickel (Ni)	ug/L	25	3.3	1.0	7427325	2.5	7427325	2.2	1.0	7427325
Total Selenium (Se)	ug/L	100	<2.0	2.0	7427325	<2.0	7427325	<2.0	2.0	7427325
Total Silver (Ag)	ug/L	0.1	<0.090	0.090	7427325	<0.090	7427325	<0.090	0.090	7427325
Total Thallium (Tl)	ug/L	0.3	<0.050	0.050	7427325	<0.050	7427325	<0.050	0.050	7427325

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

BV Labs Job #: C1H0720
Report Date: 2021/06/29

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: TORONTO ISLAND

PWQO METALS AND INORGANICS (WATER)

BV Labs ID			PWW962			PWW963		PWW964		
Sampling Date			2021/06/21			2021/06/21		2021/06/21		
COC Number			165365			165365		165365		
	UNITS	Criteria	B3	RDL	QC Batch	G103	QC Batch	DUP	RDL	QC Batch
Total Tungsten (W)	ug/L	30	<1.0	1.0	7427325	<1.0	7427325	<1.0	1.0	7427325
Total Uranium (U)	ug/L	5	0.20	0.10	7427325	<0.10	7427325	<0.10	0.10	7427325
Total Vanadium (V)	ug/L	6	3.9	0.50	7427325	4.7	7427325	4.4	0.50	7427325
Total Zinc (Zn)	ug/L	30	11	5.0	7427325	**74**	7427325	**58**	5.0	7427325
Total Zirconium (Zr)	ug/L	4	<1.0	1.0	7427325	<1.0	7427325	<1.0	1.0	7427325

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

BV Labs Job #: C1H0720
Report Date: 2021/06/29

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: TORONTO ISLAND

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

BV Labs ID			PWX652		
Sampling Date			2021/06/21		
COC Number			165365		
	UNITS	Criteria	TRIP BLANK	RDL	QC Batch
Metals					
Total Antimony (Sb)	ug/L	20	<0.50	0.50	7432611
Total Arsenic (As)	ug/L	100	<1.0	1.0	7432611
Total Beryllium (Be)	ug/L	11	<0.40	0.40	7432611
Total Boron (B)	ug/L	200	<10	10	7432611
Total Cadmium (Cd)	ug/L	0.2	<0.090	0.090	7432611
Total Chromium (Cr)	ug/L	-	<5.0	5.0	7432611
Total Cobalt (Co)	ug/L	0.9	<0.50	0.50	7432611
Total Copper (Cu)	ug/L	5	<0.90	0.90	7432611
Total Iron (Fe)	ug/L	300	<100	100	7432611
Total Lead (Pb)	ug/L	5	<0.50	0.50	7432611
Total Molybdenum (Mo)	ug/L	40	<0.50	0.50	7432611
Total Nickel (Ni)	ug/L	25	<1.0	1.0	7432611
Total Selenium (Se)	ug/L	100	<2.0	2.0	7432611
Total Silver (Ag)	ug/L	0.1	<0.090	0.090	7432611
Total Thallium (Tl)	ug/L	0.3	<0.050	0.050	7432611
Total Tungsten (W)	ug/L	30	<1.0	1.0	7432611
Total Uranium (U)	ug/L	5	<0.10	0.10	7432611
Total Vanadium (V)	ug/L	6	<0.50	0.50	7432611
Total Zinc (Zn)	ug/L	30	<5.0	5.0	7432611
Total Zirconium (Zr)	ug/L	4	<1.0	1.0	7432611

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

BV Labs Job #: C1H0720
Report Date: 2021/06/29

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: TORONTO ISLAND

TEST SUMMARY

BV Labs ID: PWW960
Sample ID: BH111
Matrix: Water

Collected: 2021/06/21
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Aluminum (0.2 u, clay free)	ICP/MS	7425613	N/A	2021/06/24	Arefa Dabhad
Alkalinity	AT	7422156	N/A	2021/06/23	Surinder Rai
Chromium (VI) in Water	IC	7425632	N/A	2021/06/24	Lang Le
Free (WAD) Cyanide	SKAL/CN	7427564	N/A	2021/06/24	Aditiben Patel
Dissolved Oxygen	DO	7422004	2021/06/22	2021/06/22	Prakash Piya
Hardness (calculated as CaCO3)		7421091	N/A	2021/06/24	Automated Statchk
Mercury	CV/AA	7427736	2021/06/24	2021/06/25	Medhat Nasr
Total Metals Analysis by ICPMS	ICP/MS	7427325	N/A	2021/06/25	Arefa Dabhad
Sulphide (as H2S)	CALC	7432409	N/A	2021/06/27	Automated Statchk
Total Sulphide	SPEC	7433930	N/A	2021/06/27	Bailey Morrison
Total Ammonia-N	LACH/NH4	7422125	N/A	2021/06/24	Amanpreet Sappal
pH	AT	7422166	2021/06/22	2021/06/23	Surinder Rai
Phenols (4AAP)	TECH/PHEN	7424067	N/A	2021/06/23	Deonarine Ramnarine
Total Phosphorus (Colourimetric)	LACH/P	7425097	2021/06/23	2021/06/25	Shivani Shivani
Turbidity	AT	7421735	N/A	2021/06/22	Khushbu Vijay kumar Patel

BV Labs ID: PWW960 Dup
Sample ID: BH111
Matrix: Water

Collected: 2021/06/21
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Free (WAD) Cyanide	SKAL/CN	7427564	N/A	2021/06/24	Aditiben Patel
Dissolved Oxygen	DO	7422004	2021/06/22	2021/06/22	Prakash Piya
Phenols (4AAP)	TECH/PHEN	7424067	N/A	2021/06/23	Deonarine Ramnarine

BV Labs ID: PWW961
Sample ID: BH106
Matrix: Water

Collected: 2021/06/21
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Aluminum (0.2 u, clay free)	ICP/MS	7425613	N/A	2021/06/24	Arefa Dabhad
Alkalinity	AT	7422156	N/A	2021/06/23	Surinder Rai
Chromium (VI) in Water	IC	7425632	N/A	2021/06/24	Lang Le
Free (WAD) Cyanide	SKAL/CN	7427564	N/A	2021/06/24	Aditiben Patel
Dissolved Oxygen	DO	7422004	2021/06/22	2021/06/22	Prakash Piya
Hardness (calculated as CaCO3)		7421091	N/A	2021/06/24	Automated Statchk
Mercury	CV/AA	7432717	2021/06/28	2021/06/28	Medhat Nasr
Total Metals Analysis by ICPMS	ICP/MS	7427325	N/A	2021/06/25	Arefa Dabhad
Sulphide (as H2S)	CALC	7432409	N/A	2021/06/27	Automated Statchk
Total Sulphide	SPEC	7433930	N/A	2021/06/27	Bailey Morrison
Total Ammonia-N	LACH/NH4	7422125	N/A	2021/06/24	Amanpreet Sappal
pH	AT	7422166	2021/06/22	2021/06/23	Surinder Rai
Phenols (4AAP)	TECH/PHEN	7424023	N/A	2021/06/23	Deonarine Ramnarine
Total Phosphorus (Colourimetric)	LACH/P	7425097	2021/06/23	2021/06/25	Shivani Shivani
Turbidity	AT	7421735	N/A	2021/06/22	Khushbu Vijay kumar Patel

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

BV Labs Job #: C1H0720
Report Date: 2021/06/29

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: TORONTO ISLAND

TEST SUMMARY

BV Labs ID: PWW962
Sample ID: B3
Matrix: Water

Collected: 2021/06/21
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Aluminum (0.2 u, clay free)	ICP/MS	7425613	N/A	2021/06/24	Arefa Dabhad
Alkalinity	AT	7422156	N/A	2021/06/23	Surinder Rai
Chromium (VI) in Water	IC	7425632	N/A	2021/06/24	Lang Le
Free (WAD) Cyanide	SKAL/CN	7427564	N/A	2021/06/24	Aditiben Patel
Dissolved Oxygen	DO	7422004	2021/06/22	2021/06/22	Prakash Piya
Hardness (calculated as CaCO3)		7421091	N/A	2021/06/24	Automated Statchk
Mercury	CV/AA	7427736	2021/06/24	2021/06/25	Medhat Nasr
Total Metals Analysis by ICPMS	ICP/MS	7427325	N/A	2021/06/25	Arefa Dabhad
Sulphide (as H2S)	CALC	7432409	N/A	2021/06/27	Automated Statchk
Total Sulphide	SPEC	7433930	N/A	2021/06/27	Bailey Morrison
Total Ammonia-N	LACH/NH4	7422125	N/A	2021/06/24	Amanpreet Sappal
pH	AT	7422166	2021/06/22	2021/06/23	Surinder Rai
Phenols (4AAP)	TECH/PHEN	7424023	N/A	2021/06/23	Deonarine Ramnarine
Total Phosphorus (Colourimetric)	LACH/P	7424830	2021/06/23	2021/06/24	Shivani Shivani
Turbidity	AT	7421735	N/A	2021/06/22	Khushbu Vijay kumar Patel

BV Labs ID: PWW963
Sample ID: G103
Matrix: Water

Collected: 2021/06/21
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Aluminum (0.2 u, clay free)	ICP/MS	7425613	N/A	2021/06/24	Arefa Dabhad
Alkalinity	AT	7422156	N/A	2021/06/23	Surinder Rai
Chromium (VI) in Water	IC	7425632	N/A	2021/06/24	Lang Le
Free (WAD) Cyanide	SKAL/CN	7427564	N/A	2021/06/24	Aditiben Patel
Dissolved Oxygen	DO	7422004	2021/06/22	2021/06/22	Prakash Piya
Hardness (calculated as CaCO3)		7421091	N/A	2021/06/24	Automated Statchk
Mercury	CV/AA	7427736	2021/06/24	2021/06/25	Medhat Nasr
Total Metals Analysis by ICPMS	ICP/MS	7427325	N/A	2021/06/25	Arefa Dabhad
Sulphide (as H2S)	CALC	7432409	N/A	2021/06/27	Automated Statchk
Total Sulphide	SPEC	7433930	N/A	2021/06/27	Bailey Morrison
Total Ammonia-N	LACH/NH4	7422125	N/A	2021/06/24	Amanpreet Sappal
pH	AT	7422166	2021/06/22	2021/06/23	Surinder Rai
Phenols (4AAP)	TECH/PHEN	7424023	N/A	2021/06/23	Deonarine Ramnarine
Total Phosphorus (Colourimetric)	LACH/P	7425097	2021/06/23	2021/06/25	Shivani Shivani
Turbidity	AT	7421735	N/A	2021/06/22	Khushbu Vijay kumar Patel

BV Labs ID: PWW964
Sample ID: DUP
Matrix: Water

Collected: 2021/06/21
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Aluminum (0.2 u, clay free)	ICP/MS	7425613	N/A	2021/06/24	Arefa Dabhad
Alkalinity	AT	7422156	N/A	2021/06/23	Surinder Rai
Chromium (VI) in Water	IC	7425632	N/A	2021/06/24	Lang Le

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

BV Labs Job #: C1H0720
Report Date: 2021/06/29

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: TORONTO ISLAND

TEST SUMMARY

BV Labs ID: PWW964
Sample ID: DUP
Matrix: Water

Collected: 2021/06/21
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Free (WAD) Cyanide	SKAL/CN	7427564	N/A	2021/06/24	Aditiben Patel
Dissolved Oxygen	DO	7422004	2021/06/22	2021/06/22	Prakash Piya
Hardness (calculated as CaCO3)		7421091	N/A	2021/06/24	Automated Statchk
Mercury	CV/AA	7427736	2021/06/24	2021/06/25	Medhat Nasr
Total Metals Analysis by ICPMS	ICP/MS	7427325	N/A	2021/06/25	Arefa Dabhad
Sulphide (as H2S)	CALC	7433931	N/A	2021/06/27	Automated Statchk
Total Sulphide	SPEC	7433930	N/A	2021/06/27	Bailey Morrison
Total Ammonia-N	LACH/NH4	7422125	N/A	2021/06/24	Amanpreet Sappal
pH	AT	7422166	2021/06/22	2021/06/23	Surinder Rai
Phenols (4AAP)	TECH/PHEN	7424067	N/A	2021/06/23	Deonarine Ramnarine
Total Phosphorus (Colourimetric)	LACH/P	7425097	2021/06/23	2021/06/25	Shivani Shivani
Turbidity	AT	7421735	N/A	2021/06/22	Khushbu Vijay kumar Patel

BV Labs ID: PWX652
Sample ID: TRIP BLANK
Matrix: Water

Collected: 2021/06/21
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Metals Analysis by ICPMS	ICP/MS	7432611	N/A	2021/06/28	Azita Fazaeli

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

GENERAL COMMENTS

Results relate only to the items tested.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

BV Labs Job #: C1H0720
Report Date: 2021/06/29

QUALITY ASSURANCE REPORT

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: TORONTO ISLAND

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7421735	Turbidity	2021/06/22			95	85 - 115	<0.1	NTU	3.6	20		
7422125	Total Ammonia-N	2021/06/24	97	75 - 125	99	80 - 120	<0.050	mg/L	NC	20		
7422156	Alkalinity (Total as CaCO3)	2021/06/23			97	85 - 115	<1.0	mg/L	0.87	20		
7422166	pH	2021/06/23			102	98 - 103			1.1	N/A		
7424023	Phenols-4AAP	2021/06/23	102	80 - 120	100	80 - 120	<0.0010	mg/L	4.4	20		
7424067	Phenols-4AAP	2021/06/23	98	80 - 120	101	80 - 120	<0.0010	mg/L	NC	20		
7424830	Total Phosphorus	2021/06/24	NC	80 - 120	104	80 - 120	<0.004	mg/L	4.7	20	106	80 - 120
7425097	Total Phosphorus	2021/06/25	NC	80 - 120	93	80 - 120	<0.004	mg/L	4.5	20	91	80 - 120
7425613	Dissolved (0.2u) Aluminum (Al)	2021/06/24	105	80 - 120	103	80 - 120	<5	ug/L	NC	20		
7425632	Chromium (VI)	2021/06/24	100	80 - 120	102	80 - 120	<0.50	ug/L	2.1	20		
7427325	Total Antimony (Sb)	2021/06/25	101	80 - 120	101	80 - 120	<0.50	ug/L	NC	20		
7427325	Total Arsenic (As)	2021/06/25	100	80 - 120	99	80 - 120	<1.0	ug/L	NC	20		
7427325	Total Beryllium (Be)	2021/06/25	94	80 - 120	93	80 - 120	<0.40	ug/L	NC	20		
7427325	Total Boron (B)	2021/06/25	90	80 - 120	89	80 - 120	<10	ug/L	2.2	20		
7427325	Total Cadmium (Cd)	2021/06/25	99	80 - 120	101	80 - 120	<0.090	ug/L	NC	20		
7427325	Total Chromium (Cr)	2021/06/25	94	80 - 120	95	80 - 120	<5.0	ug/L	NC	20		
7427325	Total Cobalt (Co)	2021/06/25	101	80 - 120	103	80 - 120	<0.50	ug/L	4.3	20		
7427325	Total Copper (Cu)	2021/06/25	97	80 - 120	97	80 - 120	<0.90	ug/L	0.34	20		
7427325	Total Iron (Fe)	2021/06/25	98	80 - 120	99	80 - 120	<100	ug/L	2.2	20		
7427325	Total Lead (Pb)	2021/06/25	100	80 - 120	98	80 - 120	<0.50	ug/L	NC	20		
7427325	Total Molybdenum (Mo)	2021/06/25	98	80 - 120	96	80 - 120	<0.50	ug/L	9.3	20		
7427325	Total Nickel (Ni)	2021/06/25	97	80 - 120	100	80 - 120	<1.0	ug/L	1.9	20		
7427325	Total Selenium (Se)	2021/06/25	102	80 - 120	103	80 - 120	<2.0	ug/L	NC	20		
7427325	Total Silver (Ag)	2021/06/25	97	80 - 120	99	80 - 120	<0.090	ug/L	NC	20		
7427325	Total Thallium (Tl)	2021/06/25	96	80 - 120	99	80 - 120	<0.050	ug/L	NC	20		
7427325	Total Tungsten (W)	2021/06/25	101	80 - 120	99	80 - 120	<1.0	ug/L	NC	20		
7427325	Total Uranium (U)	2021/06/25	103	80 - 120	98	80 - 120	<0.10	ug/L	NC	20		
7427325	Total Vanadium (V)	2021/06/25	97	80 - 120	98	80 - 120	<0.50	ug/L	NC	20		
7427325	Total Zinc (Zn)	2021/06/25	100	80 - 120	102	80 - 120	<5.0	ug/L	NC	20		
7427325	Total Zirconium (Zr)	2021/06/25	102	80 - 120	100	80 - 120	<1.0	ug/L	NC	20		
7427564	WAD Cyanide (Free)	2021/06/24	94	80 - 120	93	80 - 120	<1	ug/L	NC	20		

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7427736	Mercury (Hg)	2021/06/25	94	75 - 125	95	80 - 120	<0.10	ug/L	NC	20		
7432611	Total Antimony (Sb)	2021/06/28	102	80 - 120	103	80 - 120	<0.50	ug/L	NC	20		
7432611	Total Arsenic (As)	2021/06/28	100	80 - 120	100	80 - 120	<1.0	ug/L	NC	20		
7432611	Total Beryllium (Be)	2021/06/28	97	80 - 120	97	80 - 120	<0.40	ug/L	NC	20		
7432611	Total Boron (B)	2021/06/28	94	80 - 120	95	80 - 120	<10	ug/L	NC	20		
7432611	Total Cadmium (Cd)	2021/06/28	99	80 - 120	102	80 - 120	<0.090	ug/L	NC	20		
7432611	Total Chromium (Cr)	2021/06/28	96	80 - 120	97	80 - 120	<5.0	ug/L	2.2	20		
7432611	Total Cobalt (Co)	2021/06/28	96	80 - 120	97	80 - 120	<0.50	ug/L	0.40	20		
7432611	Total Copper (Cu)	2021/06/28	98	80 - 120	99	80 - 120	<0.90	ug/L	NC	20		
7432611	Total Iron (Fe)	2021/06/28	96	80 - 120	98	80 - 120	<100	ug/L	0.61	20		
7432611	Total Lead (Pb)	2021/06/28	97	80 - 120	97	80 - 120	<0.50	ug/L	NC	20		
7432611	Total Molybdenum (Mo)	2021/06/28	98	80 - 120	100	80 - 120	<0.50	ug/L	NC	20		
7432611	Total Nickel (Ni)	2021/06/28	96	80 - 120	97	80 - 120	<1.0	ug/L	1.3	20		
7432611	Total Selenium (Se)	2021/06/28	104	80 - 120	104	80 - 120	<2.0	ug/L	NC	20		
7432611	Total Silver (Ag)	2021/06/28	98	80 - 120	98	80 - 120	<0.090	ug/L	NC	20		
7432611	Total Thallium (Tl)	2021/06/28	97	80 - 120	97	80 - 120	<0.050	ug/L	NC	20		
7432611	Total Tungsten (W)	2021/06/28	98	80 - 120	98	80 - 120	<1.0	ug/L	NC	20		
7432611	Total Uranium (U)	2021/06/28	100	80 - 120	99	80 - 120	<0.10	ug/L	NC	20		
7432611	Total Vanadium (V)	2021/06/28	96	80 - 120	98	80 - 120	<0.50	ug/L	8.7	20		
7432611	Total Zinc (Zn)	2021/06/28	101	80 - 120	103	80 - 120	<5.0	ug/L	NC	20		
7432611	Total Zirconium (Zr)	2021/06/28	99	80 - 120	101	80 - 120	<1.0	ug/L	NC	20		
7432717	Mercury (Hg)	2021/06/28	90	75 - 125	93	80 - 120	<0.10	ug/L	NC	20		

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7433930	Total Sulphide	2021/06/27	121 (1)	80 - 120	89	80 - 120	<0.0018	mg/L				

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Anastassia Hamanov, Scientific Specialist

Sandy Yuan, M.Sc., QP, Scientific Specialist

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

BUREAU VERITAS

6740 Campobello Road, Mississauga, Ontario L5N 2L8
Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
CAM FCD-01191/6

CHAIN OF CUSTODY RECORD 165365 Page 1 of 1

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: Grounded Engineering	Company Name:	Quotation #:	☑ Regular TAT (5-7 days) Most analyses
Contact Name: Jory Hunter	Contact Name:	P.O. #/ AFE#:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 128 Sunnyside Toronto ON M4H1E9	Address:	Project #: 21-090	Rush TAT (Surcharges will be applied)
Phone: Fax:	Phone: Fax:	Site Location: Toronto Island	☐ 1 Day ☐ 2 Days ☐ 3-4 Days
Email: JHunter@groundedeng.ca	Email:	Site #:	Date Required:
		Site Location Province:	Rush Confirmation #:
		Sampled By:	

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BUREAU VERITAS LABORATORIES' DRINKING WATER CHAIN OF CUSTODY

Regulation 153
☐ Table 1 ☐ Res/Park ☐ Med/ Fine
☐ Table 2 ☐ Ind/Comm ☐ Coarse
☐ Table 3 ☐ Agri/ Other
☐ Table ____
FOR RSC (PLEASE CIRCLE) Y / (N)

Other Regulations
☐ CCME ☐ Sanitary Sewer Bylaw
☐ MISA ☐ Storm Sewer Bylaw
☑ PWQO Region ____
☐ Other (Specify) ____
☐ REG 558 (MIN. 3 DAY TAT REQUIRED)
☐ REG 406 Table ____

Include Criteria on Certificate of Analysis: (Y) / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED (CIRCLE) Metals / Hg / CrVI	BTEX/ PHC F1	PHCs F2 - F4	VOCs	REG 153 METALS & INORGANICS	REG 153 ICPMS METALS	REG 153 METALS (Hg, Cr VI, ICPMS Metals, HWS - B)	PWQO (M+I)	HOLD- DO NOT ANALYZE
1	BH111	2021/06/21	1PM	GW	10	N							✓	
2	BH106	↓	↓		10	↓							✓	
3	B3				10								✓	
4	G103				10								✓	
5	DUP				10								✓	
6														
7														
8														
9														
10														

LABORATORY USE ONLY

CUSTODY SEAL Y / N		COOLER TEMPERATURES
Present	Intact	
N	N	11 / 13/11

COOLING MEDIA PRESENT: (Y) / N

COMMENTS

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)
Richard Johnston	2021/06/21	3:15 PM		2021/06/21	15:16

21-Jun-21 15:16
Marijane Cruz
C1H0720

NPA ENV 070

Unless otherwise agreed to in writing, work submitted on this Chain of Custody is subject to Bureau Veritas Laboratories' standard Terms and Conditions. Signing of this Chain of Custody document is acknowledgment and acceptance of our terms available at http://www.bvlabs.com/terms-and-conditions

COC-1004 (06/19)

White: BV Labs - Yellow: Client

BV Labs Job #: C1H0720
Report Date: 2021/06/29

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: TORONTO ISLAND

Exceedance Summary Table – Prov. Water Quality Obj.

Result Exceedances

Sample ID	BV Labs ID	Parameter	Criteria	Result	DL	UNITS
BH111	PWW960-05	Total Cobalt (Co)	0.9	1.2	0.50	ug/L
BH111	PWW960-05	Total Iron (Fe)	300	8600	100	ug/L
BH111	PWW960-05	Total Lead (Pb)	5	10	0.50	ug/L
BH111	PWW960-07	Total Phosphorus	0.01	0.25	0.04	mg/L
BH111	PWW960-06	Total Sulphide	0.002	0.020	0.0090	mg/L
BH111	PWW960-06	Sulphide (as H2S)	0.002	0.021	0.010	mg/L
BH106	PWW961-05	Total Cobalt (Co)	0.9	1.9	0.50	ug/L
BH106	PWW961-05	Total Iron (Fe)	300	1600	100	ug/L
BH106	PWW961-07	Total Phosphorus	0.01	1.1	0.02	mg/L
BH106	PWW961-06	Total Sulphide	0.002	0.018	0.0090	mg/L
BH106	PWW961-06	Sulphide (as H2S)	0.002	0.019	0.010	mg/L
B3	PWW962-05	Total Cobalt (Co)	0.9	1.4	0.50	ug/L
B3	PWW962-05	Total Iron (Fe)	300	6000	100	ug/L
B3	PWW962-07	Total Phosphorus	0.01	0.08	0.02	mg/L
B3	PWW962-06	Total Sulphide	0.002	0.082	0.0018	mg/L
B3	PWW962-06	Sulphide (as H2S)	0.002	0.087	0.0020	mg/L
G103	PWW963-01	Dissolved (0.2u) Aluminum (Al)	15	26	5	ug/L
G103	PWW963-05	Total Copper (Cu)	5	5.5	0.90	ug/L
G103	PWW963-05	Total Iron (Fe)	300	1600	100	ug/L
G103	PWW963-05	Total Lead (Pb)	5	5.5	0.50	ug/L
G103	PWW963-09	Phenols-4AAP	0.001	0.0033	0.0010	mg/L
G103	PWW963-07	Total Phosphorus	0.01	0.40	0.02	mg/L
G103	PWW963-06	Total Sulphide	0.002	0.58	0.0090	mg/L
G103	PWW963-06	Sulphide (as H2S)	0.002	0.61	0.010	mg/L
G103	PWW963-05	Total Zinc (Zn)	30	74	5.0	ug/L
DUP	PWW964-01	Dissolved (0.2u) Aluminum (Al)	15	28	5	ug/L
DUP	PWW964-05	Total Copper (Cu)	5	5.5	0.90	ug/L
DUP	PWW964-05	Total Iron (Fe)	300	1500	100	ug/L
DUP	PWW964-05	Total Lead (Pb)	5	5.3	0.50	ug/L
DUP	PWW964-09	Phenols-4AAP	0.001	0.0034	0.0010	mg/L
DUP	PWW964-07	Total Phosphorus	0.01	0.40	0.02	mg/L
DUP	PWW964-06	Total Sulphide	0.002	0.41	0.0090	mg/L
DUP	PWW964-06	Sulphide (as H2S)	0.002	0.44	0.010	mg/L
DUP	PWW964-05	Total Zinc (Zn)	30	58	5.0	ug/L

The exceedance summary table is for information purposes only and should not be considered a comprehensive listing or statement of conformance to applicable regulatory guidelines.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

APPENDIX K



Your Project #: 21-090
Site Location: Toronto Island
Your C.O.C. #: 830132-01-01

Attention: Jory Hunter

Grounded Engineering Inc.
12 Banigan Drive
Toronto, ON
CANADA M4H 1E9

Report Date: 2021/06/29
Report #: R6697747
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1H0541
Received: 2021/06/21, 15:14

Sample Matrix: Soil
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Cyanide (WAD) in Leachates	5	N/A	2021/06/28	CAM SOP-00457	OMOE 3015 m
Fluoride by ISE in Leachates	5	2021/06/26	2021/06/28	CAM SOP-00449	SM 23 4500-F- C m
Total Metals in TCLP Leachate by ICPMS	5	2021/06/28	2021/06/28	CAM SOP-00447	EPA 6020B m
Nitrate(NO3) + Nitrite(NO2) in Leachate	5	N/A	2021/06/27	CAM SOP-00440	SM 23 4500-NO3I/NO2B
PAH Compounds in Leachate by GC/MS (SIM)	5	2021/06/28	2021/06/29	CAM SOP-00318	EPA 8270D m
Polychlorinated Biphenyl in Leachate	5	2021/06/26	2021/06/26	CAM SOP-00309	EPA 8082A m
TCLP - % Solids	5	2021/06/25	2021/06/26	CAM SOP-00401	EPA 1311 Update I m
TCLP - Extraction Fluid	5	N/A	2021/06/26	CAM SOP-00401	EPA 1311 Update I m
TCLP - Initial and final pH	5	N/A	2021/06/26	CAM SOP-00401	EPA 1311 Update I m
TCLP Zero Headspace Extraction	5	2021/06/22	2021/06/23	CAM SOP-00430	EPA 1311 m
VOCs in ZHE Leachates	5	2021/06/23	2021/06/23	CAM SOP-00228	EPA 8260C m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.

Your Project #: 21-090
Site Location: Toronto Island
Your C.O.C. #: 830132-01-01

Attention: Jory Hunter

Grounded Engineering Inc.
12 Banigan Drive
Toronto, ON
CANADA M4H 1E9

Report Date: 2021/06/29
Report #: R6697747
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1H0541
Received: 2021/06/21, 15:14

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Marijane Cruz, Senior Project Manager
Email: Marijane.Cruz@bureauveritas.com
Phone# (905)817-5756

==========

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

BV Labs Job #: C1H0541
Report Date: 2021/06/29

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island

O.REG 558 TCLP BENZO(A)PYRENE

BV Labs ID			PWW040	PWW040	PWW041	PWW042	PWW043	PWW044		
Sampling Date			2021/06/17 17:00	2021/06/17 17:00	2021/06/17 17:00	2021/06/17 17:00	2021/06/17 17:00	2021/06/17 17:00		
COC Number			830132-01-01	830132-01-01	830132-01-01	830132-01-01	830132-01-01	830132-01-01		
	UNITS	**347**	**TCLP101**	**TCLP101 Lab-Dup**	**TCLP102**	**TCLP105**	**TCLP107**	**TCLP108**	**RDL**	**QC Batch**
Polyaromatic Hydrocarbons										
Leachable Benzo(a)pyrene	ug/L	1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7434468
Surrogate Recovery (%)										
Leachable D10-Anthracene	%	-	123	117	122	119	118	109		7434468
Leachable D14-Terphenyl (FS)	%	-	102	100	107	102	104	101		7434468
Leachable D8-Acenaphthylene	%	-	95	93	96	91	91	86		7434468

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
347: Ontario Reg. 347/90 Schedule 4 Leachate Quality Criteria (as amended by Reg 558/00)

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

BV Labs Job #: C1H0541
Report Date: 2021/06/29

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island

O.REG 558 TCLP INORGANICS PACKAGE (SOIL)

BV Labs ID			PWW040	PWW041	PWW042	PWW043	PWW044		
Sampling Date			2021/06/17 17:00	2021/06/17 17:00	2021/06/17 17:00	2021/06/17 17:00	2021/06/17 17:00		
COC Number			830132-01-01	830132-01-01	830132-01-01	830132-01-01	830132-01-01		
	UNITS	347	TCLP101	TCLP102	TCLP105	TCLP107	TCLP108	RDL	QC Batch
Inorganics									
Leachable Fluoride (F-)	mg/L	150	0.15	0.16	0.17	0.14	0.22	0.10	7431979
Leachable WAD Cyanide (Free)	mg/L	20	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	7431982
Leachable Nitrite (N)	mg/L	-	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7431977
Leachable Nitrate (N)	mg/L	-	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	7431977
Leachable Nitrate + Nitrite (N)	mg/L	1000	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	7431977
Metals									
Leachable Arsenic (As)	mg/L	2.5	<0.2	<0.2	<0.2	<0.2	<0.2	0.2	7432598
Leachable Barium (Ba)	mg/L	100	<0.2	<0.2	0.3	<0.2	0.2	0.2	7432598
Leachable Boron (B)	mg/L	500	<0.1	0.1	0.1	0.1	0.1	0.1	7432598
Leachable Cadmium (Cd)	mg/L	0.5	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	7432598
Leachable Chromium (Cr)	mg/L	5	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	7432598
Leachable Lead (Pb)	mg/L	5	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	7432598
Leachable Mercury (Hg)	mg/L	0.1	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	7432598
Leachable Selenium (Se)	mg/L	1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	7432598
Leachable Silver (Ag)	mg/L	5	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	7432598
Leachable Uranium (U)	mg/L	10	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	7432598

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
347: Ontario Reg. 347/90 Schedule 4 Leachate Quality Criteria (as amended by Reg 558/00)

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

BV Labs Job #: C1H0541
Report Date: 2021/06/29

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island

TCLP LEACHATE PREPARATION (SOIL)

BV Labs ID		PWW040	PWW041	PWW042	PWW043	PWW044		
Sampling Date		2021/06/17 17:00	2021/06/17 17:00	2021/06/17 17:00	2021/06/17 17:00	2021/06/17 17:00		
COC Number		830132-01-01	830132-01-01	830132-01-01	830132-01-01	830132-01-01		
	UNITS	TCLP101	TCLP102	TCLP105	TCLP107	TCLP108	RDL	QC Batch
Inorganics								
Final pH	pH	6.25	6.21	6.26	6.24	6.31		7430539
Initial pH	pH	9.59	9.30	9.14	9.55	9.59		7430539
TCLP - % Solids	%	100	100	100	100	100	0.2	7430533
TCLP Extraction Fluid	N/A	FLUID 1	FLUID 1	FLUID 1	FLUID 1	FLUID 1		7430537

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

BV Labs Job #: C1H0541
Report Date: 2021/06/29

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island

O.REG 558 TCLP PCBS (SOIL)

BV Labs ID			PWW040	PWW041	PWW042	PWW043	PWW044		
Sampling Date			2021/06/17 17:00	2021/06/17 17:00	2021/06/17 17:00	2021/06/17 17:00	2021/06/17 17:00		
COC Number			830132-01-01	830132-01-01	830132-01-01	830132-01-01	830132-01-01		
	UNITS	347	TCLP101	TCLP102	TCLP105	TCLP107	TCLP108	RDL	QC Batch
PCBs									
Leachable Total PCB	ug/L	300	<3.0	<3.0	<3.0	<3.0	<3.0	3.0	7431813
Surrogate Recovery (%)									
Leachable Decachlorobiphenyl	%	-	106	103	102	99	99		7431813

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
347: Ontario Reg. 347/90 Schedule 4 Leachate Quality Criteria (as amended by Reg 558/00)

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

BV Labs Job #: C1H0541
Report Date: 2021/06/29

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island

O.REG 558 TCLP VOCS BY HS (SOIL)

BV Labs ID			PWW040	PWW041	PWW042	PWW043		
Sampling Date			2021/06/17 17:00	2021/06/17 17:00	2021/06/17 17:00	2021/06/17 17:00		
COC Number			830132-01-01	830132-01-01	830132-01-01	830132-01-01		
	UNITS	347	TCLP101	TCLP102	TCLP105	TCLP107	RDL	QC Batch
Charge/Prep Analysis								
Amount Extracted (Wet Weight) (g)	N/A	-	25	25	23	23	N/A	7422113
Volatile Organics								
Leachable Benzene	mg/L	0.5	<0.020	<0.020	<0.020	<0.020	0.020	7424262
Leachable Carbon Tetrachloride	mg/L	0.5	<0.020	<0.020	<0.020	<0.020	0.020	7424262
Leachable Chlorobenzene	mg/L	8	<0.020	<0.020	<0.020	<0.020	0.020	7424262
Leachable Chloroform	mg/L	10	<0.020	<0.020	<0.020	<0.020	0.020	7424262
Leachable 1,2-Dichlorobenzene	mg/L	20	<0.050	<0.050	<0.050	<0.050	0.050	7424262
Leachable 1,4-Dichlorobenzene	mg/L	0.5	<0.050	<0.050	<0.050	<0.050	0.050	7424262
Leachable 1,2-Dichloroethane	mg/L	0.5	<0.050	<0.050	<0.050	<0.050	0.050	7424262
Leachable 1,1-Dichloroethylene	mg/L	1.4	<0.020	<0.020	<0.020	<0.020	0.020	7424262
Leachable Methylene Chloride(Dichloromethane)	mg/L	5	<0.20	<0.20	<0.20	<0.20	0.20	7424262
Leachable Methyl Ethyl Ketone (2-Butanone)	mg/L	200	<1.0	<1.0	<1.0	<1.0	1.0	7424262
Leachable Tetrachloroethylene	mg/L	3	<0.020	<0.020	<0.020	<0.020	0.020	7424262
Leachable Trichloroethylene	mg/L	5	<0.020	<0.020	<0.020	<0.020	0.020	7424262
Leachable Vinyl Chloride	mg/L	0.2	<0.020	<0.020	<0.020	<0.020	0.020	7424262
Surrogate Recovery (%)								
Leachable 4-Bromofluorobenzene	%	-	98	97	97	97		7424262
Leachable D4-1,2-Dichloroethane	%	-	100	101	100	103		7424262
Leachable D8-Toluene	%	-	97	96	97	96		7424262

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
347: Ontario Reg. 347/90 Schedule 4 Leachate Quality Criteria (as amended by Reg 558/00)
N/A = Not Applicable

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

BV Labs Job #: C1H0541
Report Date: 2021/06/29

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island

O.REG 558 TCLP VOCS BY HS (SOIL)

BV Labs ID			PWW044		
Sampling Date			2021/06/17 17:00		
COC Number			830132-01-01		
	UNITS	347	TCLP108	RDL	QC Batch
Charge/Prep Analysis					
Amount Extracted (Wet Weight) (g)	N/A	-	23	N/A	7422113
Volatile Organics					
Leachable Benzene	mg/L	0.5	<0.020	0.020	7424262
Leachable Carbon Tetrachloride	mg/L	0.5	<0.020	0.020	7424262
Leachable Chlorobenzene	mg/L	8	<0.020	0.020	7424262
Leachable Chloroform	mg/L	10	<0.020	0.020	7424262
Leachable 1,2-Dichlorobenzene	mg/L	20	<0.050	0.050	7424262
Leachable 1,4-Dichlorobenzene	mg/L	0.5	<0.050	0.050	7424262
Leachable 1,2-Dichloroethane	mg/L	0.5	<0.050	0.050	7424262
Leachable 1,1-Dichloroethylene	mg/L	1.4	<0.020	0.020	7424262
Leachable Methylene Chloride(Dichloromethane)	mg/L	5	<0.20	0.20	7424262
Leachable Methyl Ethyl Ketone (2-Butanone)	mg/L	200	<1.0	1.0	7424262
Leachable Tetrachloroethylene	mg/L	3	<0.020	0.020	7424262
Leachable Trichloroethylene	mg/L	5	<0.020	0.020	7424262
Leachable Vinyl Chloride	mg/L	0.2	<0.020	0.020	7424262
Surrogate Recovery (%)					
Leachable 4-Bromofluorobenzene	%	-	97		7424262
Leachable D4-1,2-Dichloroethane	%	-	100		7424262
Leachable D8-Toluene	%	-	96		7424262

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
347: Ontario Reg. 347/90 Schedule 4 Leachate Quality Criteria (as amended by Reg 558/00)
N/A = Not Applicable

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

TEST SUMMARY

BV Labs ID: PWW040
Sample ID: TCLP101
Matrix: Soil

Collected: 2021/06/17
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Cyanide (WAD) in Leachates	SKAL/CN	7431982	N/A	2021/06/28	Aditiben Patel
Fluoride by ISE in Leachates	ISE	7431979	2021/06/26	2021/06/28	Surinder Rai
Total Metals in TCLP Leachate by ICPMS	ICP1/MS	7432598	2021/06/28	2021/06/28	Prempal Bhatti
Nitrate(NO3) + Nitrite(NO2) in Leachate	LACH	7431977	N/A	2021/06/27	Chandra Nandlal
PAH Compounds in Leachate by GC/MS (SIM)	GC/MS	7434468	2021/06/28	2021/06/29	Mitesh Raj
Polychlorinated Biphenyl in Leachate	GC/ECD	7431813	2021/06/26	2021/06/26	Li Peng
TCLP - % Solids	BAL	7430533	2021/06/25	2021/06/26	Jian (Ken) Wang
TCLP - Extraction Fluid		7430537	N/A	2021/06/26	Jian (Ken) Wang
TCLP - Initial and final pH	PH	7430539	N/A	2021/06/26	Jian (Ken) Wang
TCLP Zero Headspace Extraction		7422113	2021/06/22	2021/06/23	Omer Imtiaz Uddin
VOCs in ZHE Leachates	GC/MS	7424262	2021/06/23	2021/06/23	Ancheol Jeong

BV Labs ID: PWW040 Dup
Sample ID: TCLP101
Matrix: Soil

Collected: 2021/06/17
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PAH Compounds in Leachate by GC/MS (SIM)	GC/MS	7434468	2021/06/28	2021/06/29	Mitesh Raj

BV Labs ID: PWW041
Sample ID: TCLP102
Matrix: Soil

Collected: 2021/06/17
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Cyanide (WAD) in Leachates	SKAL/CN	7431982	N/A	2021/06/28	Aditiben Patel
Fluoride by ISE in Leachates	ISE	7431979	2021/06/26	2021/06/28	Surinder Rai
Total Metals in TCLP Leachate by ICPMS	ICP1/MS	7432598	2021/06/28	2021/06/28	Prempal Bhatti
Nitrate(NO3) + Nitrite(NO2) in Leachate	LACH	7431977	N/A	2021/06/27	Chandra Nandlal
PAH Compounds in Leachate by GC/MS (SIM)	GC/MS	7434468	2021/06/28	2021/06/29	Mitesh Raj
Polychlorinated Biphenyl in Leachate	GC/ECD	7431813	2021/06/26	2021/06/26	Li Peng
TCLP - % Solids	BAL	7430533	2021/06/25	2021/06/26	Jian (Ken) Wang
TCLP - Extraction Fluid		7430537	N/A	2021/06/26	Jian (Ken) Wang
TCLP - Initial and final pH	PH	7430539	N/A	2021/06/26	Jian (Ken) Wang
TCLP Zero Headspace Extraction		7422113	2021/06/22	2021/06/23	Omer Imtiaz Uddin
VOCs in ZHE Leachates	GC/MS	7424262	2021/06/23	2021/06/23	Ancheol Jeong

BV Labs ID: PWW042
Sample ID: TCLP105
Matrix: Soil

Collected: 2021/06/17
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Cyanide (WAD) in Leachates	SKAL/CN	7431982	N/A	2021/06/28	Aditiben Patel
Fluoride by ISE in Leachates	ISE	7431979	2021/06/26	2021/06/28	Surinder Rai
Total Metals in TCLP Leachate by ICPMS	ICP1/MS	7432598	2021/06/28	2021/06/28	Prempal Bhatti
Nitrate(NO3) + Nitrite(NO2) in Leachate	LACH	7431977	N/A	2021/06/27	Chandra Nandlal

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

TEST SUMMARY

BV Labs ID: PWW042
Sample ID: TCLP105
Matrix: Soil

Collected: 2021/06/17
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PAH Compounds in Leachate by GC/MS (SIM)	GC/MS	7434468	2021/06/28	2021/06/29	Mitesh Raj
Polychlorinated Biphenyl in Leachate	GC/ECD	7431813	2021/06/26	2021/06/26	Li Peng
TCLP - % Solids	BAL	7430533	2021/06/25	2021/06/26	Jian (Ken) Wang
TCLP - Extraction Fluid		7430537	N/A	2021/06/26	Jian (Ken) Wang
TCLP - Initial and final pH	PH	7430539	N/A	2021/06/26	Jian (Ken) Wang
TCLP Zero Headspace Extraction		7422113	2021/06/22	2021/06/23	Omer Imtiaz Uddin
VOCs in ZHE Leachates	GC/MS	7424262	2021/06/23	2021/06/23	Ancheol Jeong

BV Labs ID: PWW043
Sample ID: TCLP107
Matrix: Soil

Collected: 2021/06/17
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Cyanide (WAD) in Leachates	SKAL/CN	7431982	N/A	2021/06/28	Aditiben Patel
Fluoride by ISE in Leachates	ISE	7431979	2021/06/26	2021/06/28	Surinder Rai
Total Metals in TCLP Leachate by ICPMS	ICP1/MS	7432598	2021/06/28	2021/06/28	Prempal Bhatti
Nitrate(NO3) + Nitrite(NO2) in Leachate	LACH	7431977	N/A	2021/06/27	Chandra Nandlal
PAH Compounds in Leachate by GC/MS (SIM)	GC/MS	7434468	2021/06/28	2021/06/29	Mitesh Raj
Polychlorinated Biphenyl in Leachate	GC/ECD	7431813	2021/06/26	2021/06/26	Li Peng
TCLP - % Solids	BAL	7430533	2021/06/25	2021/06/26	Jian (Ken) Wang
TCLP - Extraction Fluid		7430537	N/A	2021/06/26	Jian (Ken) Wang
TCLP - Initial and final pH	PH	7430539	N/A	2021/06/26	Jian (Ken) Wang
TCLP Zero Headspace Extraction		7422113	2021/06/22	2021/06/23	Omer Imtiaz Uddin
VOCs in ZHE Leachates	GC/MS	7424262	2021/06/23	2021/06/23	Ancheol Jeong

BV Labs ID: PWW044
Sample ID: TCLP108
Matrix: Soil

Collected: 2021/06/17
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Cyanide (WAD) in Leachates	SKAL/CN	7431982	N/A	2021/06/28	Aditiben Patel
Fluoride by ISE in Leachates	ISE	7431979	2021/06/26	2021/06/28	Surinder Rai
Total Metals in TCLP Leachate by ICPMS	ICP1/MS	7432598	2021/06/28	2021/06/28	Prempal Bhatti
Nitrate(NO3) + Nitrite(NO2) in Leachate	LACH	7431977	N/A	2021/06/27	Chandra Nandlal
PAH Compounds in Leachate by GC/MS (SIM)	GC/MS	7434468	2021/06/28	2021/06/29	Mitesh Raj
Polychlorinated Biphenyl in Leachate	GC/ECD	7431813	2021/06/26	2021/06/26	Li Peng
TCLP - % Solids	BAL	7430533	2021/06/25	2021/06/26	Jian (Ken) Wang
TCLP - Extraction Fluid		7430537	N/A	2021/06/26	Jian (Ken) Wang
TCLP - Initial and final pH	PH	7430539	N/A	2021/06/26	Jian (Ken) Wang
TCLP Zero Headspace Extraction		7422113	2021/06/22	2021/06/23	Omer Imtiaz Uddin
VOCs in ZHE Leachates	GC/MS	7424262	2021/06/23	2021/06/23	Ancheol Jeong

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

GENERAL COMMENTS

Results relate only to the items tested.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

QUALITY ASSURANCE REPORT

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		Leachate Blank	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	Value	UNITS
7424262	Leachable 4-Bromofluorobenzene	2021/06/23	101	70 - 130	102	70 - 130	99	%				
7424262	Leachable D4-1,2-Dichloroethane	2021/06/23	98	70 - 130	99	70 - 130	99	%				
7424262	Leachable D8-Toluene	2021/06/23	100	70 - 130	101	70 - 130	97	%				
7431813	Leachable Decachlorobiphenyl	2021/06/26	96	30 - 130	98	30 - 130	110	%				
7434468	Leachable D10-Anthracene	2021/06/29	119	50 - 130	114	50 - 130	121	%				
7434468	Leachable D14-Terphenyl (FS)	2021/06/29	101	50 - 130	106	50 - 130	106	%				
7434468	Leachable D8-Acenaphthylene	2021/06/29	103	50 - 130	97	50 - 130	97	%				
7424262	Leachable 1,1-Dichloroethylene	2021/06/23	95	70 - 130	97	70 - 130	<0.020	mg/L	NC	30		
7424262	Leachable 1,2-Dichlorobenzene	2021/06/23	93	70 - 130	95	70 - 130	<0.050	mg/L	NC	30		
7424262	Leachable 1,2-Dichloroethane	2021/06/23	90	70 - 130	92	70 - 130	<0.050	mg/L	NC	30		
7424262	Leachable 1,4-Dichlorobenzene	2021/06/23	107	70 - 130	109	70 - 130	<0.050	mg/L	NC	30		
7424262	Leachable Benzene	2021/06/23	90	70 - 130	92	70 - 130	<0.020	mg/L	NC	30		
7424262	Leachable Carbon Tetrachloride	2021/06/23	103	70 - 130	104	70 - 130	<0.020	mg/L	NC	30		
7424262	Leachable Chlorobenzene	2021/06/23	94	70 - 130	97	70 - 130	<0.020	mg/L	NC	30		
7424262	Leachable Chloroform	2021/06/23	96	70 - 130	97	70 - 130	<0.020	mg/L	NC	30		
7424262	Leachable Methyl Ethyl Ketone (2-Butanone)	2021/06/23	93	60 - 140	96	60 - 140	<1.0	mg/L	NC	30		
7424262	Leachable Methylene Chloride (Dichloromethane)	2021/06/23	103	70 - 130	104	70 - 130	<0.20	mg/L	NC	30		
7424262	Leachable Tetrachloroethylene	2021/06/23	89	70 - 130	92	70 - 130	<0.020	mg/L	NC	30		
7424262	Leachable Trichloroethylene	2021/06/23	103	70 - 130	105	70 - 130	<0.020	mg/L	NC	30		
7424262	Leachable Vinyl Chloride	2021/06/23	95	70 - 130	96	70 - 130	<0.020	mg/L	NC	30		
7431813	Leachable Total PCB	2021/06/26	93	30 - 130	98	30 - 130	<3.0	ug/L	NC	40		
7431977	Leachable Nitrate (N)	2021/06/27	96	80 - 120	99	80 - 120	<1.0	mg/L	NC	25	<1.0	mg/L
7431977	Leachable Nitrate + Nitrite (N)	2021/06/27	97	80 - 120	100	80 - 120	<1.0	mg/L	NC	25	<1.0	mg/L
7431977	Leachable Nitrite (N)	2021/06/27	103	80 - 120	105	80 - 120	<0.10	mg/L	NC	25	<0.10	mg/L
7431979	Leachable Fluoride (F-)	2021/06/28	106	80 - 120	102	80 - 120	<0.10	mg/L	NC	25	<0.10	mg/L
7431982	Leachable WAD Cyanide (Free)	2021/06/28	91	80 - 120	96	80 - 120	<0.0020	mg/L	NC	20	<0.010	mg/L
7432598	Leachable Arsenic (As)	2021/06/28	107	80 - 120	102	80 - 120	<0.2	mg/L	NC	35	<0.2	mg/L
7432598	Leachable Barium (Ba)	2021/06/28	105	80 - 120	102	80 - 120	<0.2	mg/L	NC	35	<0.2	mg/L
7432598	Leachable Boron (B)	2021/06/28	NC	80 - 120	97	80 - 120	<0.1	mg/L	7.9	35	<0.1	mg/L
7432598	Leachable Cadmium (Cd)	2021/06/28	103	80 - 120	99	80 - 120	<0.05	mg/L	NC	35	<0.05	mg/L

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		Leachate Blank	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	Value	UNITS
7432598	Leachable Chromium (Cr)	2021/06/28	103	80 - 120	99	80 - 120	<0.1	mg/L	NC	35	<0.1	mg/L
7432598	Leachable Lead (Pb)	2021/06/28	96	80 - 120	99	80 - 120	<0.1	mg/L	NC	35	<0.1	mg/L
7432598	Leachable Mercury (Hg)	2021/06/28	100	80 - 120	101	80 - 120	<0.001	mg/L	NC	35	<0.001	mg/L
7432598	Leachable Selenium (Se)	2021/06/28	104	80 - 120	103	80 - 120	<0.1	mg/L	NC	35	<0.1	mg/L
7432598	Leachable Silver (Ag)	2021/06/28	99	80 - 120	100	80 - 120	<0.01	mg/L	NC	35	<0.01	mg/L
7432598	Leachable Uranium (U)	2021/06/28	99	80 - 120	100	80 - 120	<0.01	mg/L	NC	35	<0.01	mg/L
7434468	Leachable Benzo(a)pyrene	2021/06/29	93	50 - 130	90	50 - 130	<0.10	ug/L	NC	40		

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Leachate Blank: A blank matrix containing all reagents used in the leaching procedure. Used to determine any process contamination.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

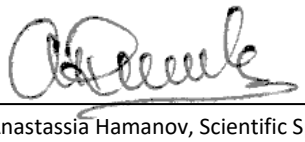
Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

BV Labs Job #: C1H0541
Report Date: 2021/06/29

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:



Anastassia Hamanov, Scientific Specialist

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Laboratories
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel (905) 817-5700 Toll-free 800-563-6266 Fax (905) 817-5777 www.bvlabs.com

21-Jun-21 15:14
Marijane Cruz
C1H0541
KSF ENV-1124

Page 1 of 1

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Only:
Company Name:	#36876 Grounded Engineering Inc.	Company Name:		Quotation #:	C04975	Bottle Order #: 830132
Attention:	Jory Hunter	Attention:	Jory Hunter	P.O. #:		
Address:	12 Banigan Drive, Toronto ON M4H 1E9	Address:		Project:	21-090	COC #: C#830132-01-01
Tel:	Fax:	Tel:	Fax:	Project Name:		Project Manager: Marijane Cruz
Email:	jhunter@groundedeng.ca	Email:	jhunter@groundedeng.ca	Site #:	Toronto Island	
				Sampled By:		

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BV LABS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)
- ☐ Table 1 ☐ Res/Park ☐ Medium/Fine
- ☐ Table 2 ☐ Ind/Comm ☐ Coarse
- ☐ Table 3 ☐ Agri/Other ☐ For RSC
- ☐ Table ___

Other Regulations
- ☐ CCME ☐ Sanitary Sewer Bylaw
- ☒ Reg 558 ☐ Storm Sewer Bylaw
- ☐ MISA Municipality ___
- ☐ PWQO ☐ Reg 406 Table ___
- ☐ Other ___

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? ___

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required
Please provide advance notice for rush projects

Regular (Standard) TAT: ☑
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ___ Time Required: ___ ☐
Rush Confirmation Number: ___ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle) Metals / Hg / Cr VI	O.Reg 153 Metals & Inorganics Pkg (Soil)	O.Reg 153 PHCs, BTEX/F1-F4 (Soil)	O.Reg 558 TCLP Benzo(a)pyrene	O.Reg 558 TCLP Inorganics Package	O.Reg 558 TCLP PCBs	O.Reg 558 TCLP VOCs by HS	TCLP Leachate Preparation	PWQO Metals and Inorganics	Asbestos by PLM - 0.5 ROL	# of Bottles	Comments
1		TCLP101	17/06/21	5PM	Soil		X	X	X	X	X	X	X			2	
2		TCLP102	"	"	"		X	X	X	X	X	X	X			"	
3		TCLP105	"	"	"		X	X	X	X	X	X	X			"	
4		TCLP107	"	"	"		X	X	X	X	X	X	X			"	
5		TCLP108	"	"	"		X	X	✓	✓	✓	✓	✓			"	
6							X	X									
7							X	X									
8							X	X									
9							X	X									
10							X	X									

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Leland Johnston / [illegible]	21/06/17	5PM	[illegible]	21/06/17	15:34	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Recei	Custody Seal	Yes	No
	8 8 7	Present		
		Intact		✓

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVLABS.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

White: BV Labs Yellow: Client

Bureau Veritas Canada (2019) Inc.

Exceedance Summary Table – Regulation 558/00

Result Exceedances

Sample ID	BV Labs ID	Parameter	Criteria	Result	DL	UNITS
No Exceedances						

The exceedance summary table is for information purposes only and should not be considered a comprehensive listing or statement of conformance to applicable regulatory guidelines.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

APPENDIX L



Your Project #: 21-090
Site Location: Toronto Island

Attention: Jory Hunter

Grounded Engineering Inc.
1 Banigan Drive
Toronto, ON
CANADA M4H 1G3

Your C.O.C. #: 830132-01-01, C#830132-05-01, C#830132-04-01

Report Date: 2021/11/11
Report #: R6896688
Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BV LABS JOB #: C1H0487
Received: 2021/06/21, 15:34

Sample Matrix: Soil
Samples Received: 23

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Hot Water Extractable Boron	14	2021/06/23	2021/06/23	CAM SOP-00408	R153 Ana. Prot. 2011
Free (WAD) Cyanide	14	2021/06/23	2021/06/24	CAM SOP-00457	OMOE E3015 m
Conductivity	14	2021/06/24	2021/06/24	CAM SOP-00414	OMOE E3530 v1 m
Hexavalent Chromium in Soil by IC (1)	14	2021/06/23	2021/06/24	CAM SOP-00436	EPA 3060/7199 m
Petroleum Hydro. CCME F1 & BTEX in Soil (2)	14	N/A	2021/06/24	CAM SOP-00315	CCME PHC-CWS m
Petroleum Hydrocarbons F2-F4 in Soil (3)	14	2021/06/23	2021/06/24	CAM SOP-00316	CCME CWS m
F4G (CCME Hydrocarbons Gravimetric)	1	2021/06/25	2021/06/25	CAM SOP-00316	CCME PHC-CWS m
Acid Extractable Metals by ICPMS	13	2021/06/23	2021/06/23	CAM SOP-00447	EPA 6020B m
Acid Extractable Metals by ICPMS	1	2021/06/24	2021/06/24	CAM SOP-00447	EPA 6020B m
Moisture	14	N/A	2021/06/21	CAM SOP-00445	Carter 2nd ed 51.2 m
Moisture	9	N/A	2021/06/22	CAM SOP-00445	Carter 2nd ed 51.2 m
pH CaCl2 EXTRACT	14	2021/06/23	2021/06/23	CAM SOP-00413	EPA 9045 D m
Sodium Adsorption Ratio (SAR)	14	N/A	2021/06/24	CAM SOP-00102	EPA 6010C

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Your Project #: 21-090
Site Location: Toronto Island

Attention: Jory Hunter

Grounded Engineering Inc.
1 Banigan Drive
Toronto, ON
CANADA M4H 1G3

Your C.O.C. #: 830132-01-01, C#830132-05-01, C#830132-04-01

Report Date: 2021/11/11
Report #: R6896688
Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BV LABS JOB #: C1H0487
Received: 2021/06/21, 15:34

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Soils are reported on a dry weight basis unless otherwise specified.
(2) No lab extraction date is given for F1BTEX & VOC samples that are field preserved with methanol. Extraction date is the date sampled unless otherwise stated.
(3) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Bureau Veritas Laboratories conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following "Alberta Environment's Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003". Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Marijane Cruz, Senior Project Manager
Email: Marijane.Cruz@bureauveritas.com
Phone# (905)817-5756

==========

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

O.REG 153 METALS & INORGANICS PKG (SOIL)

Bureau Veritas ID			PWV822		PWV824		PWV826		
Sampling Date			2021/06/16		2021/06/16				
COC Number			C#830132-05-01		C#830132-05-01		C#830132-05-01		
	UNITS	Criteria	BH101 S1	QC Batch	BH102 S1	QC Batch	DUP 2	RDL	QC Batch
Calculated Parameters									
Sodium Adsorption Ratio	N/A	2.4	**2.8**	7419625	1.1	7419625	0.99		7419625
Inorganics									
Conductivity	mS/cm	0.57	0.39	7427053	0.18	7427053	0.17	0.002	7427053
Moisture	%	-	7.8	7421320	4.7	7421320	7.4	1.0	7421320
Available (CaCl2) pH	pH	-	7.91	7424092	7.75	7424092	7.68		7424092
WAD Cyanide (Free)	ug/g	0.051	<0.01	7424039	<0.01	7424039	<0.01	0.01	7424039
Chromium (VI)	ug/g	0.66	<0.18	7424025	<0.18	7424025	<0.18	0.18	7424025
Metals									
Hot Water Ext. Boron (B)	ug/g	-	<0.050	7424833	0.17	7425151	0.13	0.050	7424833
Acid Extractable Antimony (Sb)	ug/g	1.3	<0.20	7424787	<0.20	7424787	<0.20	0.20	7424787
Acid Extractable Arsenic (As)	ug/g	18	<1.0	7424787	<1.0	7424787	<1.0	1.0	7424787
Acid Extractable Barium (Ba)	ug/g	220	12	7424787	5.1	7424787	5.3	0.50	7424787
Acid Extractable Beryllium (Be)	ug/g	2.5	<0.20	7424787	<0.20	7424787	<0.20	0.20	7424787
Acid Extractable Boron (B)	ug/g	36	<5.0	7424787	<5.0	7424787	<5.0	5.0	7424787
Acid Extractable Cadmium (Cd)	ug/g	1.2	<0.10	7424787	<0.10	7424787	<0.10	0.10	7424787
Acid Extractable Chromium (Cr)	ug/g	70	11	7424787	7.6	7424787	7.7	1.0	7424787
Acid Extractable Cobalt (Co)	ug/g	21	2.2	7424787	1.7	7424787	1.4	0.10	7424787
Acid Extractable Copper (Cu)	ug/g	92	3.3	7424787	1.8	7424787	1.4	0.50	7424787
Acid Extractable Lead (Pb)	ug/g	120	8.0	7424787	3.4	7424787	2.9	1.0	7424787
Acid Extractable Molybdenum (Mo)	ug/g	2	<0.50	7424787	<0.50	7424787	<0.50	0.50	7424787
Acid Extractable Nickel (Ni)	ug/g	82	4.4	7424787	2.6	7424787	2.9	0.50	7424787
Acid Extractable Selenium (Se)	ug/g	1.5	<0.50	7424787	<0.50	7424787	<0.50	0.50	7424787
Acid Extractable Silver (Ag)	ug/g	0.5	<0.20	7424787	<0.20	7424787	<0.20	0.20	7424787
Acid Extractable Thallium (Tl)	ug/g	1	<0.050	7424787	<0.050	7424787	<0.050	0.050	7424787
Acid Extractable Uranium (U)	ug/g	2.5	0.40	7424787	0.30	7424787	0.45	0.050	7424787
Acid Extractable Vanadium (V)	ug/g	86	33	7424787	26	7424787	23	5.0	7424787
Acid Extractable Zinc (Zn)	ug/g	290	29	7424787	9.7	7424787	8.5	5.0	7424787
Acid Extractable Mercury (Hg)	ug/g	0.27	<0.050	7424787	<0.050	7424787	<0.050	0.050	7424787

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 1: Full Depth Background Site Condition Standards
Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

O.REG 153 METALS & INORGANICS PKG (SOIL)

Bureau Veritas ID			PWV826			PWV827		
Sampling Date						2021/06/16		
COC Number			C#830132-05-01			C#830132-05-01		
	UNITS	Criteria	DUP 2 Lab-Dup	RDL	QC Batch	BH103 S1	RDL	QC Batch
Calculated Parameters								
Sodium Adsorption Ratio	N/A	2.4				0.44		7419625
Inorganics								
Conductivity	mS/cm	0.57	0.16	0.002	7427053	0.12	0.002	7427053
Moisture	%	-				11	1.0	7421320
Available (CaCl2) pH	pH	-				7.86		7424092
WAD Cyanide (Free)	ug/g	0.051	<0.01	0.01	7424039	<0.01	0.01	7424039
Chromium (VI)	ug/g	0.66	<0.18	0.18	7424025	<0.18	0.18	7424025
Metals								
Hot Water Ext. Boron (B)	ug/g	-				<0.050	0.050	7424833
Acid Extractable Antimony (Sb)	ug/g	1.3				<0.20	0.20	7426787
Acid Extractable Arsenic (As)	ug/g	18				<1.0	1.0	7426787
Acid Extractable Barium (Ba)	ug/g	220				7.5	0.50	7426787
Acid Extractable Beryllium (Be)	ug/g	2.5				<0.20	0.20	7426787
Acid Extractable Boron (B)	ug/g	36				<5.0	5.0	7426787
Acid Extractable Cadmium (Cd)	ug/g	1.2				<0.10	0.10	7426787
Acid Extractable Chromium (Cr)	ug/g	70				9.6	1.0	7426787
Acid Extractable Cobalt (Co)	ug/g	21				1.9	0.10	7426787
Acid Extractable Copper (Cu)	ug/g	92				1.4	0.50	7426787
Acid Extractable Lead (Pb)	ug/g	120				4.5	1.0	7426787
Acid Extractable Molybdenum (Mo)	ug/g	2				<0.50	0.50	7426787
Acid Extractable Nickel (Ni)	ug/g	82				3.0	0.50	7426787
Acid Extractable Selenium (Se)	ug/g	1.5				<0.50	0.50	7426787
Acid Extractable Silver (Ag)	ug/g	0.5				<0.20	0.20	7426787
Acid Extractable Thallium (Tl)	ug/g	1				<0.050	0.050	7426787
Acid Extractable Uranium (U)	ug/g	2.5				0.42	0.050	7426787
Acid Extractable Vanadium (V)	ug/g	86				36	5.0	7426787
Acid Extractable Zinc (Zn)	ug/g	290				12	5.0	7426787

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 1: Full Depth Background Site Condition Standards
Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

O.REG 153 METALS & INORGANICS PKG (SOIL)

Bureau Veritas ID			PWV826			PWV827		
Sampling Date						2021/06/16		
COC Number			C#830132-05-01			C#830132-05-01		
	UNITS	Criteria	DUP 2 Lab-Dup	RDL	QC Batch	BH103 S1	RDL	QC Batch
Acid Extractable Mercury (Hg)	ug/g	0.27				<0.050	0.050	7426787

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 1: Full Depth Background Site Condition Standards
Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

O.REG 153 METALS & INORGANICS PKG (SOIL)

Bureau Veritas ID			PWV827			PWV829	PWV831		
Sampling Date			2021/06/16			2021/06/16	2021/06/17		
COC Number			C#830132-05-01			C#830132-05-01	C#830132-05-01		
	UNITS	Criteria	BH103 S1 Lab-Dup	RDL	QC Batch	BH105 S1	BH106 S1	RDL	QC Batch
Calculated Parameters									
Sodium Adsorption Ratio	N/A	2.4				0.22 (1)	0.34 (1)		7419625
Inorganics									
Conductivity	mS/cm	0.57				0.28	0.091	0.002	7427053
Moisture	%	-				14	5.3	1.0	7421320
Available (CaCl2) pH	pH	-				7.37	7.64		7424092
WAD Cyanide (Free)	ug/g	0.051				<0.01	<0.01	0.01	7424039
Chromium (VI)	ug/g	0.66				<0.18	<0.18	0.18	7424025
Metals									
Hot Water Ext. Boron (B)	ug/g	-				1.2	<0.050	0.050	7424833
Acid Extractable Antimony (Sb)	ug/g	1.3	<0.20	0.20	7426787	0.92	<0.20	0.20	7424787
Acid Extractable Arsenic (As)	ug/g	18	<1.0	1.0	7426787	7.5	<1.0	1.0	7424787
Acid Extractable Barium (Ba)	ug/g	220	7.0	0.50	7426787	81	8.4	0.50	7424787
Acid Extractable Beryllium (Be)	ug/g	2.5	<0.20	0.20	7426787	0.53	<0.20	0.20	7424787
Acid Extractable Boron (B)	ug/g	36	<5.0	5.0	7426787	9.0	<5.0	5.0	7424787
Acid Extractable Cadmium (Cd)	ug/g	1.2	<0.10	0.10	7426787	0.23	<0.10	0.10	7424787
Acid Extractable Chromium (Cr)	ug/g	70	9.9	1.0	7426787	22	4.0	1.0	7424787
Acid Extractable Cobalt (Co)	ug/g	21	1.9	0.10	7426787	6.7	1.5	0.10	7424787
Acid Extractable Copper (Cu)	ug/g	92	1.5	0.50	7426787	22	2.4	0.50	7424787
Acid Extractable Lead (Pb)	ug/g	120	4.5	1.0	7426787	81	6.8	1.0	7424787
Acid Extractable Molybdenum (Mo)	ug/g	2	<0.50	0.50	7426787	0.81	<0.50	0.50	7424787
Acid Extractable Nickel (Ni)	ug/g	82	3.2	0.50	7426787	15	2.9	0.50	7424787
Acid Extractable Selenium (Se)	ug/g	1.5	<0.50	0.50	7426787	0.57	<0.50	0.50	7424787
Acid Extractable Silver (Ag)	ug/g	0.5	<0.20	0.20	7426787	<0.20	<0.20	0.20	7424787
Acid Extractable Thallium (Tl)	ug/g	1	<0.050	0.050	7426787	0.13	<0.050	0.050	7424787
Acid Extractable Uranium (U)	ug/g	2.5	0.44	0.050	7426787	0.44	0.20	0.050	7424787

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 1: Full Depth Background Site Condition Standards
Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use
(1) Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

O.REG 153 METALS & INORGANICS PKG (SOIL)

Bureau Veritas ID			PWV827			PWV829	PWV831		
Sampling Date			2021/06/16			2021/06/16	2021/06/17		
COC Number			C#830132-05-01			C#830132-05-01	C#830132-05-01		
	UNITS	Criteria	BH103 S1 Lab-Dup	RDL	QC Batch	BH105 S1	BH106 S1	RDL	QC Batch
Acid Extractable Vanadium (V)	ug/g	86	40	5.0	7426787	31	10	5.0	7424787
Acid Extractable Zinc (Zn)	ug/g	290	13	5.0	7426787	77	12	5.0	7424787
Acid Extractable Mercury (Hg)	ug/g	0.27	<0.050	0.050	7426787	0.26	<0.050	0.050	7424787

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 1: Full Depth Background Site Condition Standards
Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

O.REG 153 METALS & INORGANICS PKG (SOIL)

Bureau Veritas ID			PWV831		PWV833			PWV833		
Sampling Date			2021/06/17							
COC Number			C#830132-05-01		C#830132-05-01			C#830132-05-01		
	UNITS	Criteria	BH106 S1 Lab-Dup	QC Batch	DUP4	RDL	QC Batch	DUP4 Lab-Dup	RDL	QC Batch
Calculated Parameters										
Sodium Adsorption Ratio	N/A	2.4			0.35 (1)		7419625			
Inorganics										
Conductivity	mS/cm	0.57			0.087	0.002	7427053			
Moisture	%	-			4.8	1.0	7421320	5.1	1.0	7421320
Available (CaCl2) pH	pH	-	7.68	7424092	7.67		7424092			
WAD Cyanide (Free)	ug/g	0.051			<0.01	0.01	7424039			
Chromium (VI)	ug/g	0.66			<0.18	0.18	7424025			
Metals										
Hot Water Ext. Boron (B)	ug/g	-			<0.050	0.050	7424833			
Acid Extractable Antimony (Sb)	ug/g	1.3			<0.20	0.20	7424787			
Acid Extractable Arsenic (As)	ug/g	18			1.4	1.0	7424787			
Acid Extractable Barium (Ba)	ug/g	220			8.5	0.50	7424787			
Acid Extractable Beryllium (Be)	ug/g	2.5			<0.20	0.20	7424787			
Acid Extractable Boron (B)	ug/g	36			<5.0	5.0	7424787			
Acid Extractable Cadmium (Cd)	ug/g	1.2			<0.10	0.10	7424787			
Acid Extractable Chromium (Cr)	ug/g	70			5.8	1.0	7424787			
Acid Extractable Cobalt (Co)	ug/g	21			1.7	0.10	7424787			
Acid Extractable Copper (Cu)	ug/g	92			2.8	0.50	7424787			
Acid Extractable Lead (Pb)	ug/g	120			8.3	1.0	7424787			
Acid Extractable Molybdenum (Mo)	ug/g	2			<0.50	0.50	7424787			
Acid Extractable Nickel (Ni)	ug/g	82			3.4	0.50	7424787			
Acid Extractable Selenium (Se)	ug/g	1.5			<0.50	0.50	7424787			
Acid Extractable Silver (Ag)	ug/g	0.5			<0.20	0.20	7424787			
Acid Extractable Thallium (Tl)	ug/g	1			<0.050	0.050	7424787			
Acid Extractable Uranium (U)	ug/g	2.5			0.31	0.050	7424787			

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 1: Full Depth Background Site Condition Standards
Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use
(1) Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

O.REG 153 METALS & INORGANICS PKG (SOIL)

Bureau Veritas ID			PWV831		PWV833			PWV833		
Sampling Date			2021/06/17							
COC Number			C#830132-05-01		C#830132-05-01			C#830132-05-01		
	UNITS	Criteria	BH106 S1 Lab-Dup	QC Batch	DUP4	RDL	QC Batch	DUP4 Lab-Dup	RDL	QC Batch
Acid Extractable Vanadium (V)	ug/g	86			16	5.0	7424787			
Acid Extractable Zinc (Zn)	ug/g	290			15	5.0	7424787			
Acid Extractable Mercury (Hg)	ug/g	0.27			<0.050	0.050	7424787			

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 1: Full Depth Background Site Condition Standards
Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

O.REG 153 METALS & INORGANICS PKG (SOIL)

Bureau Veritas ID			PWV834	PWV836	PWV837	PWV839		
Sampling Date			2021/06/17		2021/06/17			
COC Number			C#830132-05-01	C#830132-05-01	C#830132-05-01	C#830132-05-01		
	UNITS	Criteria	BH107 S1	DUP3	BH109 S1	DUP5	RDL	QC Batch
Calculated Parameters								
Sodium Adsorption Ratio	N/A	2.4	1.8	1.9	1.5	1.3		7419625
Inorganics								
Conductivity	mS/cm	0.57	0.21	0.20	0.15	0.11	0.002	7427053
Moisture	%	-	3.3	3.7	6.6	3.9	1.0	7421320
Available (CaCl2) pH	pH	-	7.90	7.92	7.75	7.83		7424092
WAD Cyanide (Free)	ug/g	0.051	<0.01	<0.01	<0.01	<0.01	0.01	7424039
Chromium (VI)	ug/g	0.66	<0.18	<0.18	<0.18	<0.18	0.18	7424025
Metals								
Hot Water Ext. Boron (B)	ug/g	-	<0.050	<0.050	0.11	<0.050	0.050	7424833
Acid Extractable Antimony (Sb)	ug/g	1.3	<0.20	<0.20	0.23	<0.20	0.20	7424787
Acid Extractable Arsenic (As)	ug/g	18	<1.0	1.1	2.5	1.4	1.0	7424787
Acid Extractable Barium (Ba)	ug/g	220	5.1	5.1	26	7.8	0.50	7424787
Acid Extractable Beryllium (Be)	ug/g	2.5	<0.20	<0.20	<0.20	<0.20	0.20	7424787
Acid Extractable Boron (B)	ug/g	36	<5.0	<5.0	<5.0	<5.0	5.0	7424787
Acid Extractable Cadmium (Cd)	ug/g	1.2	<0.10	<0.10	<0.10	<0.10	0.10	7424787
Acid Extractable Chromium (Cr)	ug/g	70	4.7	4.3	11	5.2	1.0	7424787
Acid Extractable Cobalt (Co)	ug/g	21	1.1	1.2	2.7	1.5	0.10	7424787
Acid Extractable Copper (Cu)	ug/g	92	1.6	1.7	12	2.6	0.50	7424787
Acid Extractable Lead (Pb)	ug/g	120	3.2	3.5	14	3.3	1.0	7424787
Acid Extractable Molybdenum (Mo)	ug/g	2	<0.50	<0.50	0.54	<0.50	0.50	7424787
Acid Extractable Nickel (Ni)	ug/g	82	2.6	2.8	5.1	2.9	0.50	7424787
Acid Extractable Selenium (Se)	ug/g	1.5	<0.50	<0.50	<0.50	<0.50	0.50	7424787
Acid Extractable Silver (Ag)	ug/g	0.5	<0.20	<0.20	<0.20	<0.20	0.20	7424787
Acid Extractable Thallium (Tl)	ug/g	1	<0.050	<0.050	<0.050	<0.050	0.050	7424787
Acid Extractable Uranium (U)	ug/g	2.5	0.22	0.28	0.28	0.22	0.050	7424787
Acid Extractable Vanadium (V)	ug/g	86	11	9.9	24	14	5.0	7424787
Acid Extractable Zinc (Zn)	ug/g	290	10	11	26	9.1	5.0	7424787
Acid Extractable Mercury (Hg)	ug/g	0.27	<0.050	<0.050	<0.050	<0.050	0.050	7424787

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 1: Full Depth Background Site Condition Standards
Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

O.REG 153 METALS & INORGANICS PKG (SOIL)

Bureau Veritas ID			PWV840		PWV842		PWV844		
Sampling Date			2021/06/17		2021/06/16				
COC Number			C#830132-05-01		C#830132-05-01		C#830132-05-01		
	UNITS	Criteria	BH110 S1	QC Batch	BH111 S1	QC Batch	DUP1	RDL	QC Batch
Calculated Parameters									
Sodium Adsorption Ratio	N/A	2.4	0.96	7419625	1.8	7419625	0.93		7419625
Inorganics									
Conductivity	mS/cm	0.57	0.099	7427053	0.27	7427053	0.23	0.002	7427053
Moisture	%	-	3.2	7421320	4.0	7421320	4.4	1.0	7421320
Available (CaCl2) pH	pH	-	7.94	7424092	7.77	7424092	7.97		7424092
WAD Cyanide (Free)	ug/g	0.051	<0.01	7424039	<0.01	7424039	<0.01	0.01	7424039
Chromium (VI)	ug/g	0.66	<0.18	7424025	<0.18	7424025	<0.18	0.18	7424025
Metals									
Hot Water Ext. Boron (B)	ug/g	-	0.051	7424833	0.11	7425151	0.073	0.050	7424833
Acid Extractable Antimony (Sb)	ug/g	1.3	<0.20	7424787	0.22	7424787	<0.20	0.20	7424787
Acid Extractable Arsenic (As)	ug/g	18	2.6	7424787	5.4	7424787	2.8	1.0	7424787
Acid Extractable Barium (Ba)	ug/g	220	16	7424787	35	7424787	15	0.50	7424787
Acid Extractable Beryllium (Be)	ug/g	2.5	<0.20	7424787	0.22	7424787	<0.20	0.20	7424787
Acid Extractable Boron (B)	ug/g	36	<5.0	7424787	<5.0	7424787	<5.0	5.0	7424787
Acid Extractable Cadmium (Cd)	ug/g	1.2	<0.10	7424787	0.31	7424787	<0.10	0.10	7424787
Acid Extractable Chromium (Cr)	ug/g	70	5.2	7424787	10	7424787	6.5	1.0	7424787
Acid Extractable Cobalt (Co)	ug/g	21	2.0	7424787	3.4	7424787	1.7	0.10	7424787
Acid Extractable Copper (Cu)	ug/g	92	4.0	7424787	10	7424787	4.3	0.50	7424787
Acid Extractable Lead (Pb)	ug/g	120	16	7424787	34	7424787	13	1.0	7424787
Acid Extractable Molybdenum (Mo)	ug/g	2	<0.50	7424787	0.97	7424787	<0.50	0.50	7424787
Acid Extractable Nickel (Ni)	ug/g	82	4.5	7424787	7.8	7424787	3.6	0.50	7424787
Acid Extractable Selenium (Se)	ug/g	1.5	<0.50	7424787	<0.50	7424787	<0.50	0.50	7424787
Acid Extractable Silver (Ag)	ug/g	0.5	<0.20	7424787	<0.20	7424787	<0.20	0.20	7424787
Acid Extractable Thallium (Tl)	ug/g	1	<0.050	7424787	0.065	7424787	<0.050	0.050	7424787
Acid Extractable Uranium (U)	ug/g	2.5	0.32	7424787	0.32	7424787	0.24	0.050	7424787
Acid Extractable Vanadium (V)	ug/g	86	7.7	7424787	22	7424787	20	5.0	7424787
Acid Extractable Zinc (Zn)	ug/g	290	22	7424787	81	7424787	37	5.0	7424787
Acid Extractable Mercury (Hg)	ug/g	0.27	<0.050	7424787	<0.050	7424787	<0.050	0.050	7424787

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 1: Full Depth Background Site Condition Standards
Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

O.REG 153 PHCS, BTEX/F1-F4 (SOIL)

Bureau Veritas ID			PWV823	PWV825			PWV825		
Sampling Date			2021/06/16	2021/06/16			2021/06/16		
COC Number			C#830132-05-01	C#830132-05-01			C#830132-05-01		
	UNITS	Criteria	BH101 S2	BH102 S2	RDL	QC Batch	BH102 S2 Lab-Dup	RDL	QC Batch
Inorganics									
Moisture	%	-	17	18	1.0	7422427			
BTEX & F1 Hydrocarbons									
Benzene	ug/g	0.02	<0.020	<0.020	0.020	7428142	<0.020	0.020	7428142
Toluene	ug/g	0.2	0.032	<0.020	0.020	7428142	<0.020	0.020	7428142
Ethylbenzene	ug/g	0.05	<0.020	<0.020	0.020	7428142	<0.020	0.020	7428142
o-Xylene	ug/g	-	<0.020	<0.020	0.020	7428142	<0.020	0.020	7428142
p+m-Xylene	ug/g	-	<0.040	<0.040	0.040	7428142	<0.040	0.040	7428142
Total Xylenes	ug/g	0.05	<0.040	<0.040	0.040	7428142	<0.040	0.040	7428142
F1 (C6-C10)	ug/g	25	<10	<10	10	7428142	<10	10	7428142
F1 (C6-C10) - BTEX	ug/g	25	<10	<10	10	7428142	<10	10	7428142
F2-F4 Hydrocarbons									
F2 (C10-C16 Hydrocarbons)	ug/g	10	<10	<10	10	7425478			
F3 (C16-C34 Hydrocarbons)	ug/g	240	**250**	<50	50	7425478			
F4 (C34-C50 Hydrocarbons)	ug/g	120	**580**	<50	50	7425478			
Reached Baseline at C50	ug/g	-	No	Yes		7425478			
Surrogate Recovery (%)									
1,4-Difluorobenzene	%	-	100	97		7428142	97		7428142
4-Bromofluorobenzene	%	-	98	104		7428142	101		7428142
D10-o-Xylene	%	-	100	93		7428142	88		7428142
D4-1,2-Dichloroethane	%	-	111	109		7428142	109		7428142
o-Terphenyl	%	-	101	103		7425478			

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 1: Full Depth Background Site Condition Standards
Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

O.REG 153 PHCS, BTEX/F1-F4 (SOIL)

Bureau Veritas ID			PWV826			PWV826			PWV828		
Sampling Date									2021/06/16		
COC Number			C#830132-05-01			C#830132-05-01			C#830132-05-01		
	UNITS	Criteria	DUP 2	RDL	QC Batch	DUP 2 Lab-Dup	RDL	QC Batch	BH103 S2	RDL	QC Batch
Inorganics											
Moisture	%	-							15	1.0	7422427
BTEX & F1 Hydrocarbons											
Benzene	ug/g	0.02	<0.020	0.020	7428142				<0.020	0.020	7428142
Toluene	ug/g	0.2	<0.020	0.020	7428142				<0.020	0.020	7428142
Ethylbenzene	ug/g	0.05	<0.020	0.020	7428142				<0.020	0.020	7428142
o-Xylene	ug/g	-	<0.020	0.020	7428142				<0.020	0.020	7428142
p+m-Xylene	ug/g	-	<0.040	0.040	7428142				<0.040	0.040	7428142
Total Xylenes	ug/g	0.05	<0.040	0.040	7428142				<0.040	0.040	7428142
F1 (C6-C10)	ug/g	25	<10	10	7428142				<10	10	7428142
F1 (C6-C10) - BTEX	ug/g	25	<10	10	7428142				<10	10	7428142
F2-F4 Hydrocarbons											
F2 (C10-C16 Hydrocarbons)	ug/g	10	<10	10	7425478	<10	10	7425478	<10	10	7425478
F3 (C16-C34 Hydrocarbons)	ug/g	240	<50	50	7425478	<50	50	7425478	<50	50	7425478
F4 (C34-C50 Hydrocarbons)	ug/g	120	<50	50	7425478	<50	50	7425478	<50	50	7425478
Reached Baseline at C50	ug/g	-	Yes		7425478	Yes		7425478	Yes		7425478
Surrogate Recovery (%)											
1,4-Difluorobenzene	%	-	100		7428142				101		7428142
4-Bromofluorobenzene	%	-	102		7428142				97		7428142
D10-o-Xylene	%	-	95		7428142				100		7428142
D4-1,2-Dichloroethane	%	-	108		7428142				108		7428142
o-Terphenyl	%	-	99		7425478	106		7425478	110		7425478

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 1: Full Depth Background Site Condition Standards
Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

O.REG 153 PHCS, BTEX/F1-F4 (SOIL)

Bureau Veritas ID			PWV830	PWV832			PWV833		
Sampling Date			2021/06/16	2021/06/17					
COC Number			C#830132-05-01	C#830132-04-01			C#830132-05-01		
	UNITS	Criteria	BH105 S3	BH106 S3	RDL	QC Batch	DUP4	RDL	QC Batch
Inorganics									
Moisture	%	-	13	15	1.0	7422427			
BTEX & F1 Hydrocarbons									
Benzene	ug/g	0.02	<0.020	<0.020	0.020	7428142	<0.020	0.020	7428142
Toluene	ug/g	0.2	<0.020	<0.020	0.020	7428142	<0.020	0.020	7428142
Ethylbenzene	ug/g	0.05	<0.020	<0.020	0.020	7428142	<0.020	0.020	7428142
o-Xylene	ug/g	-	<0.020	<0.020	0.020	7428142	<0.020	0.020	7428142
p+m-Xylene	ug/g	-	<0.040	<0.040	0.040	7428142	<0.040	0.040	7428142
Total Xylenes	ug/g	0.05	<0.040	<0.040	0.040	7428142	<0.040	0.040	7428142
F1 (C6-C10)	ug/g	25	<10	<10	10	7428142	<10	10	7428142
F1 (C6-C10) - BTEX	ug/g	25	<10	<10	10	7428142	<10	10	7428142
F2-F4 Hydrocarbons									
F2 (C10-C16 Hydrocarbons)	ug/g	10	<10	<10	10	7425478	<10	10	7425478
F3 (C16-C34 Hydrocarbons)	ug/g	240	<50	<50	50	7425478	<50	50	7425478
F4 (C34-C50 Hydrocarbons)	ug/g	120	<50	<50	50	7425478	<50	50	7425478
Reached Baseline at C50	ug/g	-	Yes	Yes		7425478	Yes		7425478
Surrogate Recovery (%)									
1,4-Difluorobenzene	%	-	100	98		7428142	105		7428142
4-Bromofluorobenzene	%	-	97	101		7428142	91		7428142
D10-o-Xylene	%	-	90	94		7428142	94		7428142
D4-1,2-Dichloroethane	%	-	104	111		7428142	104		7428142
o-Terphenyl	%	-	105	104		7425478	101		7425478

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 1: Full Depth Background Site Condition Standards
Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

O.REG 153 PHCS, BTEX/F1-F4 (SOIL)

Bureau Veritas ID			PWV835			PWV835			PWV836		
Sampling Date			2021/06/17			2021/06/17					
COC Number			C#830132-04-01			C#830132-04-01			C#830132-05-01		
	UNITS	Criteria	BH107 S3	RDL	QC Batch	BH107 S3 Lab-Dup	RDL	QC Batch	DUP3	RDL	QC Batch
Inorganics											
Moisture	%	-	14	1.0	7422427	15	1.0	7422427			
BTEX & F1 Hydrocarbons											
Benzene	ug/g	0.02	<0.020	0.020	7428142				<0.020	0.020	7428142
Toluene	ug/g	0.2	0.021	0.020	7428142				<0.020	0.020	7428142
Ethylbenzene	ug/g	0.05	<0.020	0.020	7428142				<0.020	0.020	7428142
o-Xylene	ug/g	-	<0.020	0.020	7428142				<0.020	0.020	7428142
p+m-Xylene	ug/g	-	<0.040	0.040	7428142				<0.040	0.040	7428142
Total Xylenes	ug/g	0.05	<0.040	0.040	7428142				<0.040	0.040	7428142
F1 (C6-C10)	ug/g	25	<10	10	7428142				<10	10	7428142
F1 (C6-C10) - BTEX	ug/g	25	<10	10	7428142				<10	10	7428142
F2-F4 Hydrocarbons											
F2 (C10-C16 Hydrocarbons)	ug/g	10	<10	10	7425478				<10	10	7425478
F3 (C16-C34 Hydrocarbons)	ug/g	240	<50	50	7425478				<50	50	7425478
F4 (C34-C50 Hydrocarbons)	ug/g	120	<50	50	7425478				<50	50	7425478
Reached Baseline at C50	ug/g	-	Yes		7425478				Yes		7425478
Surrogate Recovery (%)											
1,4-Difluorobenzene	%	-	99		7428142				100		7428142
4-Bromofluorobenzene	%	-	100		7428142				98		7428142
D10-o-Xylene	%	-	99		7428142				92		7428142
D4-1,2-Dichloroethane	%	-	108		7428142				109		7428142
o-Terphenyl	%	-	102		7425478				108		7425478

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 1: Full Depth Background Site Condition Standards
Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

O.REG 153 PHCS, BTEX/F1-F4 (SOIL)

Bureau Veritas ID			PWV838			PWV839			PWV841		
Sampling Date			2021/06/17						2021/06/17		
COC Number			C#830132-04-01			C#830132-05-01			C#830132-04-01		
	UNITS	Criteria	BH109 S2	RDL	QC Batch	DUP5	RDL	QC Batch	BH110 S2	RDL	QC Batch
Inorganics											
Moisture	%	-	15	1.0	7422427				10	1.0	7422427
BTEX & F1 Hydrocarbons											
Benzene	ug/g	0.02	<0.020	0.020	7428142	<0.020	0.020	7428142	<0.020	0.020	7428142
Toluene	ug/g	0.2	<0.020	0.020	7428142	<0.020	0.020	7428142	<0.020	0.020	7428142
Ethylbenzene	ug/g	0.05	<0.020	0.020	7428142	<0.020	0.020	7428142	<0.020	0.020	7428142
o-Xylene	ug/g	-	<0.020	0.020	7428142	<0.020	0.020	7428142	<0.020	0.020	7428142
p+m-Xylene	ug/g	-	<0.040	0.040	7428142	<0.040	0.040	7428142	<0.040	0.040	7428142
Total Xylenes	ug/g	0.05	<0.040	0.040	7428142	<0.040	0.040	7428142	<0.040	0.040	7428142
F1 (C6-C10)	ug/g	25	<10	10	7428142	<10	10	7428142	<10	10	7428142
F1 (C6-C10) - BTEX	ug/g	25	<10	10	7428142	<10	10	7428142	<10	10	7428142
F2-F4 Hydrocarbons											
F2 (C10-C16 Hydrocarbons)	ug/g	10	<10	10	7425478	<10	10	7425478	**14**	10	7425478
F3 (C16-C34 Hydrocarbons)	ug/g	240	<50	50	7425478	<50	50	7425478	160	50	7425478
F4 (C34-C50 Hydrocarbons)	ug/g	120	<50	50	7425478	<50	50	7425478	<50	50	7425478
Reached Baseline at C50	ug/g	-	Yes		7425478	Yes		7425478	Yes		7425478
Surrogate Recovery (%)											
1,4-Difluorobenzene	%	-	100		7428142	98		7428142	98		7428142
4-Bromofluorobenzene	%	-	97		7428142	98		7428142	101		7428142
D10-o-Xylene	%	-	98		7428142	86		7428142	97		7428142
D4-1,2-Dichloroethane	%	-	106		7428142	107		7428142	107		7428142
o-Terphenyl	%	-	104		7425478	104		7425478	105		7425478

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 1: Full Depth Background Site Condition Standards
Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

O.REG 153 PHCS, BTEX/F1-F4 (SOIL)

Bureau Veritas ID			PWV843			PWV844		
Sampling Date			2021/06/16					
COC Number			C#830132-04-01			C#830132-05-01		
	UNITS	Criteria	BH111 S2	RDL	QC Batch	DUP1	RDL	QC Batch
Inorganics								
Moisture	%	-	9.8	1.0	7422427			
BTEX & F1 Hydrocarbons								
Benzene	ug/g	0.02	<0.020	0.020	7428142	<0.020	0.020	7428142
Toluene	ug/g	0.2	<0.020	0.020	7428142	<0.020	0.020	7428142
Ethylbenzene	ug/g	0.05	<0.020	0.020	7428142	<0.020	0.020	7428142
o-Xylene	ug/g	-	<0.020	0.020	7428142	<0.020	0.020	7428142
p+m-Xylene	ug/g	-	<0.040	0.040	7428142	<0.040	0.040	7428142
Total Xylenes	ug/g	0.05	<0.040	0.040	7428142	<0.040	0.040	7428142
F1 (C6-C10)	ug/g	25	<10	10	7428142	<10	10	7428142
F1 (C6-C10) - BTEX	ug/g	25	<10	10	7428142	<10	10	7428142
F2-F4 Hydrocarbons								
F2 (C10-C16 Hydrocarbons)	ug/g	10	**12**	10	7425478	**11**	10	7425478
F3 (C16-C34 Hydrocarbons)	ug/g	240	96	50	7425478	52	50	7425478
F4 (C34-C50 Hydrocarbons)	ug/g	120	120	50	7425478	77	50	7425478
Reached Baseline at C50	ug/g	-	Yes		7425478	Yes		7425478
Surrogate Recovery (%)								
1,4-Difluorobenzene	%	-	95		7428142	97		7428142
4-Bromofluorobenzene	%	-	100		7428142	95		7428142
D10-o-Xylene	%	-	88		7428142	88		7428142
D4-1,2-Dichloroethane	%	-	105		7428142	104		7428142
o-Terphenyl	%	-	107		7425478	99		7425478

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 1: Full Depth Background Site Condition Standards
Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

PETROLEUM HYDROCARBONS (CCME)

Bureau Veritas ID			PWV823		
Sampling Date			2021/06/16		
COC Number			C#830132-05-01		
	UNITS	Criteria	BH101 S2	RDL	QC Batch
F2-F4 Hydrocarbons					
F4G-sg (Grav. Heavy Hydrocarbons)	ug/g	120	**2000**	100	7429025

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 1: Full Depth Background Site Condition Standards
Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

TEST SUMMARY

Bureau Veritas ID: PWV822
Sample ID: BH101 S1
Matrix: Soil

Collected: 2021/06/16
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	7424833	2021/06/23	2021/06/23	Medhat Nasr
Free (WAD) Cyanide	TECH	7424039	2021/06/23	2021/06/24	Louise Harding
Conductivity	AT	7427053	2021/06/24	2021/06/24	Khushbu Vijay kumar Patel
Hexavalent Chromium in Soil by IC	IC/SPEC	7424025	2021/06/23	2021/06/24	Violeta Porcila
Acid Extractable Metals by ICPMS	ICP/MS	7424787	2021/06/23	2021/06/23	Daniel Teclu
Moisture	BAL	7421320	N/A	2021/06/21	Gurpreet Kaur (ONT)
pH CaCl2 EXTRACT	AT	7424092	2021/06/23	2021/06/23	Neil Dassanayake
Sodium Adsorption Ratio (SAR)	CALC/MET	7419625	N/A	2021/06/24	Automated Statchk

Bureau Veritas ID: PWV823
Sample ID: BH101 S2
Matrix: Soil

Collected: 2021/06/16
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	7428142	N/A	2021/06/24	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	7425478	2021/06/23	2021/06/24	Dennis Ngondu
F4G (CCME Hydrocarbons Gravimetric)	BAL	7429025	2021/06/25	2021/06/25	Rashmi Dubey
Moisture	BAL	7422427	N/A	2021/06/22	Manpreet Kaur

Bureau Veritas ID: PWV824
Sample ID: BH102 S1
Matrix: Soil

Collected: 2021/06/16
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	7425151	2021/06/23	2021/06/23	Medhat Nasr
Free (WAD) Cyanide	TECH	7424039	2021/06/23	2021/06/24	Louise Harding
Conductivity	AT	7427053	2021/06/24	2021/06/24	Khushbu Vijay kumar Patel
Hexavalent Chromium in Soil by IC	IC/SPEC	7424025	2021/06/23	2021/06/24	Violeta Porcila
Acid Extractable Metals by ICPMS	ICP/MS	7424787	2021/06/23	2021/06/23	Daniel Teclu
Moisture	BAL	7421320	N/A	2021/06/21	Gurpreet Kaur (ONT)
pH CaCl2 EXTRACT	AT	7424092	2021/06/23	2021/06/23	Neil Dassanayake
Sodium Adsorption Ratio (SAR)	CALC/MET	7419625	N/A	2021/06/24	Automated Statchk

Bureau Veritas ID: PWV825
Sample ID: BH102 S2
Matrix: Soil

Collected: 2021/06/16
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	7428142	N/A	2021/06/24	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	7425478	2021/06/23	2021/06/24	Dennis Ngondu
Moisture	BAL	7422427	N/A	2021/06/22	Manpreet Kaur

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

TEST SUMMARY

Bureau Veritas ID: PWV825 Dup
Sample ID: BH102 S2
Matrix: Soil

Collected: 2021/06/16
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	7428142	N/A	2021/06/24	Lincoln Ramdahin

Bureau Veritas ID: PWV826
Sample ID: DUP 2
Matrix: Soil

Collected:
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	7424833	2021/06/23	2021/06/23	Medhat Nasr
Free (WAD) Cyanide	TECH	7424039	2021/06/23	2021/06/24	Louise Harding
Conductivity	AT	7427053	2021/06/24	2021/06/24	Khushbu Vijay kumar Patel
Hexavalent Chromium in Soil by IC	IC/SPEC	7424025	2021/06/23	2021/06/24	Violeta Porcila
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	7428142	N/A	2021/06/24	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	7425478	2021/06/23	2021/06/24	Dennis Ngondu
Acid Extractable Metals by ICPMS	ICP/MS	7424787	2021/06/23	2021/06/23	Daniel Teclu
Moisture	BAL	7421320	N/A	2021/06/21	Gurpreet Kaur (ONT)
pH CaCl2 EXTRACT	AT	7424092	2021/06/23	2021/06/23	Neil Dassanayake
Sodium Adsorption Ratio (SAR)	CALC/MET	7419625	N/A	2021/06/24	Automated Statchk

Bureau Veritas ID: PWV826 Dup
Sample ID: DUP 2
Matrix: Soil

Collected:
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Free (WAD) Cyanide	TECH	7424039	2021/06/23	2021/06/24	Louise Harding
Conductivity	AT	7427053	2021/06/24	2021/06/24	Khushbu Vijay kumar Patel
Hexavalent Chromium in Soil by IC	IC/SPEC	7424025	2021/06/23	2021/06/24	Violeta Porcila
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	7425478	2021/06/23	2021/06/24	Dennis Ngondu

Bureau Veritas ID: PWV827
Sample ID: BH103 S1
Matrix: Soil

Collected: 2021/06/16
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	7424833	2021/06/23	2021/06/23	Medhat Nasr
Free (WAD) Cyanide	TECH	7424039	2021/06/23	2021/06/24	Louise Harding
Conductivity	AT	7427053	2021/06/24	2021/06/24	Khushbu Vijay kumar Patel
Hexavalent Chromium in Soil by IC	IC/SPEC	7424025	2021/06/23	2021/06/24	Violeta Porcila
Acid Extractable Metals by ICPMS	ICP/MS	7426787	2021/06/24	2021/06/24	Daniel Teclu
Moisture	BAL	7421320	N/A	2021/06/21	Gurpreet Kaur (ONT)
pH CaCl2 EXTRACT	AT	7424092	2021/06/23	2021/06/23	Neil Dassanayake
Sodium Adsorption Ratio (SAR)	CALC/MET	7419625	N/A	2021/06/24	Automated Statchk

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

TEST SUMMARY

Bureau Veritas ID: PWV827 Dup
Sample ID: BH103 S1
Matrix: Soil

Collected: 2021/06/16
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Acid Extractable Metals by ICPMS	ICP/MS	7426787	2021/06/24	2021/06/24	Daniel Teclu

Bureau Veritas ID: PWV828
Sample ID: BH103 S2
Matrix: Soil

Collected: 2021/06/16
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	7428142	N/A	2021/06/24	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	7425478	2021/06/23	2021/06/24	Dennis Ngondu
Moisture	BAL	7422427	N/A	2021/06/22	Manpreet Kaur

Bureau Veritas ID: PWV829
Sample ID: BH105 S1
Matrix: Soil

Collected: 2021/06/16
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	7424833	2021/06/23	2021/06/23	Medhat Nasr
Free (WAD) Cyanide	TECH	7424039	2021/06/23	2021/06/24	Louise Harding
Conductivity	AT	7427053	2021/06/24	2021/06/24	Khushbu Vijay kumar Patel
Hexavalent Chromium in Soil by IC	IC/SPEC	7424025	2021/06/23	2021/06/24	Violeta Porcila
Acid Extractable Metals by ICPMS	ICP/MS	7424787	2021/06/23	2021/06/23	Daniel Teclu
Moisture	BAL	7421320	N/A	2021/06/21	Gurpreet Kaur (ONT)
pH CaCl2 EXTRACT	AT	7424092	2021/06/23	2021/06/23	Neil Dassanayake
Sodium Adsorption Ratio (SAR)	CALC/MET	7419625	N/A	2021/06/24	Automated Statchk

Bureau Veritas ID: PWV830
Sample ID: BH105 S3
Matrix: Soil

Collected: 2021/06/16
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	7428142	N/A	2021/06/24	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	7425478	2021/06/23	2021/06/24	Dennis Ngondu
Moisture	BAL	7422427	N/A	2021/06/22	Manpreet Kaur

Bureau Veritas ID: PWV831
Sample ID: BH106 S1
Matrix: Soil

Collected: 2021/06/17
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	7424833	2021/06/23	2021/06/23	Medhat Nasr
Free (WAD) Cyanide	TECH	7424039	2021/06/23	2021/06/24	Louise Harding
Conductivity	AT	7427053	2021/06/24	2021/06/24	Khushbu Vijay kumar Patel
Hexavalent Chromium in Soil by IC	IC/SPEC	7424025	2021/06/23	2021/06/24	Violeta Porcila
Acid Extractable Metals by ICPMS	ICP/MS	7424787	2021/06/23	2021/06/23	Daniel Teclu
Moisture	BAL	7421320	N/A	2021/06/21	Gurpreet Kaur (ONT)

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

TEST SUMMARY

Bureau Veritas ID: PWV831 **Collected:** 2021/06/17
Sample ID: BH106 S1 **Shipped:**
Matrix: Soil **Received:** 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
pH CaCl2 EXTRACT	AT	7424092	2021/06/23	2021/06/23	Neil Dassanayake
Sodium Adsorption Ratio (SAR)	CALC/MET	7419625	N/A	2021/06/24	Automated Statchk

Bureau Veritas ID: PWV831 Dup **Collected:** 2021/06/17
Sample ID: BH106 S1 **Shipped:**
Matrix: Soil **Received:** 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
pH CaCl2 EXTRACT	AT	7424092	2021/06/23	2021/06/23	Neil Dassanayake

Bureau Veritas ID: PWV832 **Collected:** 2021/06/17
Sample ID: BH106 S3 **Shipped:**
Matrix: Soil **Received:** 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	7428142	N/A	2021/06/24	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	7425478	2021/06/23	2021/06/24	Dennis Ngondu
Moisture	BAL	7422427	N/A	2021/06/22	Manpreet Kaur

Bureau Veritas ID: PWV833 **Collected:**
Sample ID: DUP4 **Shipped:**
Matrix: Soil **Received:** 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	7424833	2021/06/23	2021/06/23	Medhat Nasr
Free (WAD) Cyanide	TECH	7424039	2021/06/23	2021/06/24	Louise Harding
Conductivity	AT	7427053	2021/06/24	2021/06/24	Khushbu Vijay kumar Patel
Hexavalent Chromium in Soil by IC	IC/SPEC	7424025	2021/06/23	2021/06/24	Violeta Porcila
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	7428142	N/A	2021/06/24	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	7425478	2021/06/23	2021/06/24	Dennis Ngondu
Acid Extractable Metals by ICPMS	ICP/MS	7424787	2021/06/23	2021/06/23	Daniel Teclu
Moisture	BAL	7421320	N/A	2021/06/21	Gurpreet Kaur (ONT)
pH CaCl2 EXTRACT	AT	7424092	2021/06/23	2021/06/23	Neil Dassanayake
Sodium Adsorption Ratio (SAR)	CALC/MET	7419625	N/A	2021/06/24	Automated Statchk

Bureau Veritas ID: PWV833 Dup **Collected:**
Sample ID: DUP4 **Shipped:**
Matrix: Soil **Received:** 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	7421320	N/A	2021/06/21	Gurpreet Kaur (ONT)

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

TEST SUMMARY

Bureau Veritas ID: PWV834
Sample ID: BH107 S1
Matrix: Soil

Collected: 2021/06/17
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	7424833	2021/06/23	2021/06/23	Medhat Nasr
Free (WAD) Cyanide	TECH	7424039	2021/06/23	2021/06/24	Louise Harding
Conductivity	AT	7427053	2021/06/24	2021/06/24	Khushbu Vijay kumar Patel
Hexavalent Chromium in Soil by IC	IC/SPEC	7424025	2021/06/23	2021/06/24	Violeta Porcila
Acid Extractable Metals by ICPMS	ICP/MS	7424787	2021/06/23	2021/06/23	Daniel Teclu
Moisture	BAL	7421320	N/A	2021/06/21	Gurpreet Kaur (ONT)
pH CaCl2 EXTRACT	AT	7424092	2021/06/23	2021/06/23	Neil Dassanayake
Sodium Adsorption Ratio (SAR)	CALC/MET	7419625	N/A	2021/06/24	Automated Statchk

Bureau Veritas ID: PWV835
Sample ID: BH107 S3
Matrix: Soil

Collected: 2021/06/17
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	7428142	N/A	2021/06/24	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	7425478	2021/06/23	2021/06/24	Dennis Ngondu
Moisture	BAL	7422427	N/A	2021/06/22	Manpreet Kaur

Bureau Veritas ID: PWV835 Dup
Sample ID: BH107 S3
Matrix: Soil

Collected: 2021/06/17
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	7422427	N/A	2021/06/22	Manpreet Kaur

Bureau Veritas ID: PWV836
Sample ID: DUP3
Matrix: Soil

Collected:
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	7424833	2021/06/23	2021/06/23	Medhat Nasr
Free (WAD) Cyanide	TECH	7424039	2021/06/23	2021/06/24	Louise Harding
Conductivity	AT	7427053	2021/06/24	2021/06/24	Khushbu Vijay kumar Patel
Hexavalent Chromium in Soil by IC	IC/SPEC	7424025	2021/06/23	2021/06/24	Violeta Porcila
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	7428142	N/A	2021/06/24	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	7425478	2021/06/23	2021/06/24	Dennis Ngondu
Acid Extractable Metals by ICPMS	ICP/MS	7424787	2021/06/23	2021/06/23	Daniel Teclu
Moisture	BAL	7421320	N/A	2021/06/21	Gurpreet Kaur (ONT)
pH CaCl2 EXTRACT	AT	7424092	2021/06/23	2021/06/23	Neil Dassanayake
Sodium Adsorption Ratio (SAR)	CALC/MET	7419625	N/A	2021/06/24	Automated Statchk

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

TEST SUMMARY

Bureau Veritas ID: PWV837 **Collected:** 2021/06/17
Sample ID: BH109 S1 **Shipped:**
Matrix: Soil **Received:** 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	7424833	2021/06/23	2021/06/23	Medhat Nasr
Free (WAD) Cyanide	TECH	7424039	2021/06/23	2021/06/24	Louise Harding
Conductivity	AT	7427053	2021/06/24	2021/06/24	Khushbu Vijay kumar Patel
Hexavalent Chromium in Soil by IC	IC/SPEC	7424025	2021/06/23	2021/06/24	Violeta Porcila
Acid Extractable Metals by ICPMS	ICP/MS	7424787	2021/06/23	2021/06/23	Daniel Teclu
Moisture	BAL	7421320	N/A	2021/06/21	Gurpreet Kaur (ONT)
pH CaCl2 EXTRACT	AT	7424092	2021/06/23	2021/06/23	Neil Dassanayake
Sodium Adsorption Ratio (SAR)	CALC/MET	7419625	N/A	2021/06/24	Automated Statchk

Bureau Veritas ID: PWV838 **Collected:** 2021/06/17
Sample ID: BH109 S2 **Shipped:**
Matrix: Soil **Received:** 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	7428142	N/A	2021/06/24	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	7425478	2021/06/23	2021/06/24	Dennis Ngondu
Moisture	BAL	7422427	N/A	2021/06/22	Manpreet Kaur

Bureau Veritas ID: PWV839 **Collected:**
Sample ID: DUP5 **Shipped:**
Matrix: Soil **Received:** 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	7424833	2021/06/23	2021/06/23	Medhat Nasr
Free (WAD) Cyanide	TECH	7424039	2021/06/23	2021/06/24	Louise Harding
Conductivity	AT	7427053	2021/06/24	2021/06/24	Khushbu Vijay kumar Patel
Hexavalent Chromium in Soil by IC	IC/SPEC	7424025	2021/06/23	2021/06/24	Violeta Porcila
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	7428142	N/A	2021/06/24	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	7425478	2021/06/23	2021/06/24	Dennis Ngondu
Acid Extractable Metals by ICPMS	ICP/MS	7424787	2021/06/23	2021/06/23	Daniel Teclu
Moisture	BAL	7421320	N/A	2021/06/21	Gurpreet Kaur (ONT)
pH CaCl2 EXTRACT	AT	7424092	2021/06/23	2021/06/23	Neil Dassanayake
Sodium Adsorption Ratio (SAR)	CALC/MET	7419625	N/A	2021/06/24	Automated Statchk

Bureau Veritas ID: PWV840 **Collected:** 2021/06/17
Sample ID: BH110 S1 **Shipped:**
Matrix: Soil **Received:** 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	7424833	2021/06/23	2021/06/23	Medhat Nasr
Free (WAD) Cyanide	TECH	7424039	2021/06/23	2021/06/24	Louise Harding
Conductivity	AT	7427053	2021/06/24	2021/06/24	Khushbu Vijay kumar Patel
Hexavalent Chromium in Soil by IC	IC/SPEC	7424025	2021/06/23	2021/06/24	Violeta Porcila
Acid Extractable Metals by ICPMS	ICP/MS	7424787	2021/06/23	2021/06/23	Daniel Teclu

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

TEST SUMMARY

Bureau Veritas ID: PWV840
Sample ID: BH110 S1
Matrix: Soil
Collected: 2021/06/17
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	7421320	N/A	2021/06/21	Gurpreet Kaur (ONT)
pH CaCl2 EXTRACT	AT	7424092	2021/06/23	2021/06/23	Neil Dassanayake
Sodium Adsorption Ratio (SAR)	CALC/MET	7419625	N/A	2021/06/24	Automated Statchk

Bureau Veritas ID: PWV841
Sample ID: BH110 S2
Matrix: Soil
Collected: 2021/06/17
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	7428142	N/A	2021/06/24	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	7425478	2021/06/23	2021/06/24	Dennis Ngondu
Moisture	BAL	7422427	N/A	2021/06/22	Manpreet Kaur

Bureau Veritas ID: PWV842
Sample ID: BH111 S1
Matrix: Soil
Collected: 2021/06/16
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	7425151	2021/06/23	2021/06/23	Medhat Nasr
Free (WAD) Cyanide	TECH	7424039	2021/06/23	2021/06/24	Louise Harding
Conductivity	AT	7427053	2021/06/24	2021/06/24	Khushbu Vijay kumar Patel
Hexavalent Chromium in Soil by IC	IC/SPEC	7424025	2021/06/23	2021/06/24	Violeta Porcila
Acid Extractable Metals by ICPMS	ICP/MS	7424787	2021/06/23	2021/06/23	Daniel Teclu
Moisture	BAL	7421320	N/A	2021/06/21	Gurpreet Kaur (ONT)
pH CaCl2 EXTRACT	AT	7424092	2021/06/23	2021/06/23	Neil Dassanayake
Sodium Adsorption Ratio (SAR)	CALC/MET	7419625	N/A	2021/06/24	Automated Statchk

Bureau Veritas ID: PWV843
Sample ID: BH111 S2
Matrix: Soil
Collected: 2021/06/16
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	7428142	N/A	2021/06/24	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	7425478	2021/06/23	2021/06/24	Dennis Ngondu
Moisture	BAL	7422427	N/A	2021/06/22	Manpreet Kaur

Bureau Veritas ID: PWV844
Sample ID: DUP1
Matrix: Soil
Collected:
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	7424833	2021/06/23	2021/06/23	Medhat Nasr
Free (WAD) Cyanide	TECH	7424039	2021/06/23	2021/06/24	Louise Harding
Conductivity	AT	7427053	2021/06/24	2021/06/24	Khushbu Vijay kumar Patel
Hexavalent Chromium in Soil by IC	IC/SPEC	7424025	2021/06/23	2021/06/24	Violeta Porcila

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

TEST SUMMARY

Bureau Veritas ID: PWV844
Sample ID: DUP1
Matrix: Soil

Collected:
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	7428142	N/A	2021/06/24	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	7425478	2021/06/23	2021/06/24	Dennis Ngondu
Acid Extractable Metals by ICPMS	ICP/MS	7424787	2021/06/23	2021/06/23	Daniel Teclu
Moisture	BAL	7421320	N/A	2021/06/21	Gurpreet Kaur (ONT)
pH CaCl2 EXTRACT	AT	7424092	2021/06/23	2021/06/23	Neil Dassanayake
Sodium Adsorption Ratio (SAR)	CALC/MET	7419625	N/A	2021/06/24	Automated Statchk

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

GENERAL COMMENTS

Revised Report (2021/11/11) : Regulatory criteria amended per client request.

Revised Report (2021/11/10) : Regulatory criteria amended per client request.

Results relate only to the items tested.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

QUALITY ASSURANCE REPORT

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7425478	o-Terphenyl	2021/06/24	99	60 - 130	103	60 - 130	106	%		
7428142	1,4-Difluorobenzene	2021/06/24	93	60 - 140	98	60 - 140	100	%		
7428142	4-Bromofluorobenzene	2021/06/24	104	60 - 140	103	60 - 140	95	%		
7428142	D10-o-Xylene	2021/06/24	95	60 - 140	88	60 - 140	85	%		
7428142	D4-1,2-Dichloroethane	2021/06/24	105	60 - 140	104	60 - 140	111	%		
7421320	Moisture	2021/06/21							6.1	20
7422427	Moisture	2021/06/22							2.7	20
7424025	Chromium (VI)	2021/06/24	50 (1)	70 - 130	93	80 - 120	<0.18	ug/g	NC	35
7424039	WAD Cyanide (Free)	2021/06/24	96	75 - 125	92	80 - 120	<0.01	ug/g	NC	35
7424092	Available (CaCl2) pH	2021/06/23			100	97 - 103			0.52	N/A
7424787	Acid Extractable Antimony (Sb)	2021/06/23	95	75 - 125	98	80 - 120	<0.20	ug/g	NC	30
7424787	Acid Extractable Arsenic (As)	2021/06/23	95	75 - 125	94	80 - 120	<1.0	ug/g	12	30
7424787	Acid Extractable Barium (Ba)	2021/06/23	NC	75 - 125	93	80 - 120	<0.50	ug/g	3.6	30
7424787	Acid Extractable Beryllium (Be)	2021/06/23	95	75 - 125	97	80 - 120	<0.20	ug/g	5.1	30
7424787	Acid Extractable Boron (B)	2021/06/23	91	75 - 125	97	80 - 120	<5.0	ug/g	NC	30
7424787	Acid Extractable Cadmium (Cd)	2021/06/23	96	75 - 125	94	80 - 120	<0.10	ug/g	29	30
7424787	Acid Extractable Chromium (Cr)	2021/06/23	102	75 - 125	94	80 - 120	<1.0	ug/g	0.94	30
7424787	Acid Extractable Cobalt (Co)	2021/06/23	96	75 - 125	93	80 - 120	<0.10	ug/g	4.4	30
7424787	Acid Extractable Copper (Cu)	2021/06/23	99	75 - 125	93	80 - 120	<0.50	ug/g	0.79	30
7424787	Acid Extractable Lead (Pb)	2021/06/23	97	75 - 125	94	80 - 120	<1.0	ug/g	0.42	30
7424787	Acid Extractable Mercury (Hg)	2021/06/23	85	75 - 125	91	80 - 120	<0.050	ug/g		
7424787	Acid Extractable Molybdenum (Mo)	2021/06/23	98	75 - 125	93	80 - 120	<0.50	ug/g	1.9	30
7424787	Acid Extractable Nickel (Ni)	2021/06/23	98	75 - 125	97	80 - 120	<0.50	ug/g	1.1	30
7424787	Acid Extractable Selenium (Se)	2021/06/23	99	75 - 125	97	80 - 120	<0.50	ug/g	NC	30
7424787	Acid Extractable Silver (Ag)	2021/06/23	95	75 - 125	93	80 - 120	<0.20	ug/g	NC	30
7424787	Acid Extractable Thallium (Tl)	2021/06/23	95	75 - 125	93	80 - 120	<0.050	ug/g	1.5	30
7424787	Acid Extractable Uranium (U)	2021/06/23	94	75 - 125	92	80 - 120	<0.050	ug/g	2.5	30
7424787	Acid Extractable Vanadium (V)	2021/06/23	NC	75 - 125	97	80 - 120	<5.0	ug/g	0.60	30
7424787	Acid Extractable Zinc (Zn)	2021/06/23	NC	75 - 125	98	80 - 120	<5.0	ug/g	0.83	30
7424833	Hot Water Ext. Boron (B)	2021/06/23	111	75 - 125	102	75 - 125	<0.050	ug/g	NC	40
7425151	Hot Water Ext. Boron (B)	2021/06/23	111	75 - 125	104	75 - 125	<0.050	ug/g	5.9	40

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7425478	F2 (C10-C16 Hydrocarbons)	2021/06/24	86	50 - 130	88	80 - 120	<10	ug/g	NC	30
7425478	F3 (C16-C34 Hydrocarbons)	2021/06/24	112	50 - 130	108	80 - 120	<50	ug/g	NC	30
7425478	F4 (C34-C50 Hydrocarbons)	2021/06/24	128	50 - 130	119	80 - 120	<50	ug/g	NC	30
7426787	Acid Extractable Antimony (Sb)	2021/06/24	92	75 - 125	97	80 - 120	<0.20	ug/g	NC	30
7426787	Acid Extractable Arsenic (As)	2021/06/24	93	75 - 125	100	80 - 120	<1.0	ug/g	NC	30
7426787	Acid Extractable Barium (Ba)	2021/06/24	90	75 - 125	96	80 - 120	<0.50	ug/g	5.9	30
7426787	Acid Extractable Beryllium (Be)	2021/06/24	95	75 - 125	95	80 - 120	<0.20	ug/g	NC	30
7426787	Acid Extractable Boron (B)	2021/06/24	90	75 - 125	94	80 - 120	<5.0	ug/g	NC	30
7426787	Acid Extractable Cadmium (Cd)	2021/06/24	97	75 - 125	98	80 - 120	<0.10	ug/g	NC	30
7426787	Acid Extractable Chromium (Cr)	2021/06/24	92	75 - 125	99	80 - 120	<1.0	ug/g	3.2	30
7426787	Acid Extractable Cobalt (Co)	2021/06/24	93	75 - 125	99	80 - 120	<0.10	ug/g	1.6	30
7426787	Acid Extractable Copper (Cu)	2021/06/24	90	75 - 125	95	80 - 120	<0.50	ug/g	5.0	30
7426787	Acid Extractable Lead (Pb)	2021/06/24	91	75 - 125	97	80 - 120	<1.0	ug/g	0.11	30
7426787	Acid Extractable Mercury (Hg)	2021/06/24	82	75 - 125	93	80 - 120	<0.050	ug/g	NC	30
7426787	Acid Extractable Molybdenum (Mo)	2021/06/24	96	75 - 125	98	80 - 120	<0.50	ug/g	NC	30
7426787	Acid Extractable Nickel (Ni)	2021/06/24	90	75 - 125	98	80 - 120	<0.50	ug/g	7.4	30
7426787	Acid Extractable Selenium (Se)	2021/06/24	95	75 - 125	104	80 - 120	<0.50	ug/g	NC	30
7426787	Acid Extractable Silver (Ag)	2021/06/24	94	75 - 125	96	80 - 120	<0.20	ug/g	NC	30
7426787	Acid Extractable Thallium (Tl)	2021/06/24	93	75 - 125	97	80 - 120	<0.050	ug/g	NC	30
7426787	Acid Extractable Uranium (U)	2021/06/24	97	75 - 125	101	80 - 120	<0.050	ug/g	4.5	30
7426787	Acid Extractable Vanadium (V)	2021/06/24	NC	75 - 125	97	80 - 120	<5.0	ug/g	9.8	30
7426787	Acid Extractable Zinc (Zn)	2021/06/24	99	75 - 125	97	80 - 120	<5.0	ug/g	3.8	30
7427053	Conductivity	2021/06/24			100	90 - 110	<0.002	mS/cm	2.0	10
7428142	Benzene	2021/06/24	94	50 - 140	88	50 - 140	<0.020	ug/g	NC	50
7428142	Ethylbenzene	2021/06/24	106	50 - 140	97	50 - 140	<0.020	ug/g	NC	50
7428142	F1 (C6-C10) - BTEX	2021/06/24					<10	ug/g	NC	30
7428142	F1 (C6-C10)	2021/06/24	89	60 - 140	81	80 - 120	<10	ug/g	NC	30
7428142	o-Xylene	2021/06/24	103	50 - 140	95	50 - 140	<0.020	ug/g	NC	50
7428142	p+m-Xylene	2021/06/24	102	50 - 140	93	50 - 140	<0.040	ug/g	NC	50
7428142	Toluene	2021/06/24	95	50 - 140	88	50 - 140	<0.020	ug/g	NC	50
7428142	Total Xylenes	2021/06/24					<0.040	ug/g	NC	50

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7429025	F4G-sg (Grav. Heavy Hydrocarbons)	2021/06/25	97	65 - 135	102	65 - 135	<100	ug/g	0	50

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) The matrix spike recovery was below the lower control limit. This may be due in part to the reducing environment of the sample. The matrix spike was reanalyzed to confirm result.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

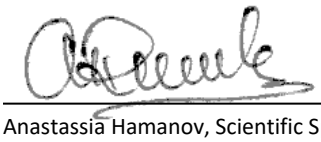
Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:



Anastassia Hamanov, Scientific Specialist

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Laboratories
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel (905) 817-5700 Toll-free 800-563-6266 Fax (905) 817-5777 www.bvlabs.com

CHAIN OF CUSTODY RECORD

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#36876 Grounded Engineering Inc.	Company Name:		Quotation #:	C04975	BV Labs Job #:	Bottle Order #: 830132
Attention:	Jory Hunter	Attention:	Jory Hunter	P.O. #:			
Address:	12 Banigan Drive Toronto ON M4H 1E9	Address:		Project:	21-090	COC #: C#830132-05-01	Project Manager: Marijane Cruz
Tel:	Fax:	Tel:	Fax:	Project Name:			
Email:	jhunter@groundedeng.ca	Email:	jhunter@groundedeng.ca	Site #:	Toronto Island		
				Sampled By:			

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BV LABS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)	Other Regulations	Special Instructions
☐ Table 1 ☑ Res/Park ☐ Medium/Fine ☐ Table 2 ☐ Ind/Comm ☑ Coarse ☑ Table 3 ☐ Agri/Other ☐ For RSC ☐ Table ___	☐ CCME ☐ Sanitary Sewer Bylaw ☐ Reg 558 ☐ Storm Sewer Bylaw ☐ MISA Municipality ___ ☐ PWQO ☐ Reg 406 Table ___ ☐ Other ___	

Include Criteria on Certificate of Analysis (Y/N)? ___

Turnaround Time (TAT) Required
Please provide advance notice for rush projects

Regular (Standard) TAT:
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ___ Time Required: ___
Rush Confirmation Number: ___ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	O.Reg 153 Metals & Inorganics Pkg (Soil)	O.Reg 153 PHCs, BTEX/F1-F4 (Soil)	O.Reg 558 TCLP Benzo(a)pyrene	O.Reg 558 TCLP Inorganics Package	O.Reg 558 TCLP PCBs	O.Reg 558 TCLP VOCs by HS	TCLP Leachate Preparation	PWQO Metals and Inorganics	Asbestos by PLM - 0.5 RDL	# of Bottles	Comments
1		BH101 S1	16/06/21		Soil		✓									1	
2		BH101 S2	16/06/21		Soil			✓								5	
3		BH102 S1	16/06/21		Soil		✓									1	
4		BH102 S2	16/06/21		Soil			✓								5	
5		DUP2			Soil		✓	✓								6	
6		BH103 S1	16/06/21		Soil		✓									1	
7		BH103 S2	16/06/21		Soil			✓								5	
8		BH105 S1	16/06/21		Soil		✓									1	
9		BH105 S3	16/06/21		Soil			✓								5	
10		BH106 S1	17/06/21		Soil		✓									1	

21-Jun-21 15:34
Marijane Cruz
C1H0487
SYK ENV-809

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Leland Johnston	21/06/17	5PM		21/06/21	15:34	
					15:34	

Laboratory Use Only				
Time Sensitive	Temperature (°C) on Recei: 16/9/7	Custody Seal Present	Yes	No
		Intact		

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVLABS.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

White: BV Labs Yellow: Client

Bureau Veritas Canada (2019) Inc.

WH402835

Bureau Veritas Laboratories
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel (905) 817-5700 Toll-free 800-563-6266 Fax (905) 817-5777 www.bvlabs.com

CHAIN OF CUSTODY RECORD

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#36876 Grounded Engineering Inc.	Company Name:		Quotation #:	C04975	BV Labs Job #:	Bottle Order #: 830132
Attention:	Jory Hunter	Attention:	Jory Hunter	P.O. #:			
Address:	12 Banigan Drive Toronto ON M4H 1E9	Address:		Project:	21-090	COC #: C#830132-04-01	Project Manager: Marijane Cruz
Tel:	Fax:	Tel:	Fax:	Project Name:			
Email:	jhunter@groundedeng.ca	Email:	jhunter@groundedeng.ca	Site #:	Toronto Island		
				Sampled By:			

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BV LABS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)	Other Regulations	Special Instructions
☐ Table 1 ☑ Res/Park ☐ Medium/Fine ☐ Table 2 ☐ Ind/Comm ☑ Coarse ☑ Table 3 ☐ Agri/Other ☐ For RSC ☐ Table ___	☐ CCME ☐ Sanitary Sewer Bylaw ☐ Reg 558 ☐ Storm Sewer Bylaw ☐ MISA Municipality ___ ☐ PWQO ☐ Reg 406 Table ___ ☐ Other ___	

Include Criteria on Certificate of Analysis (Y/N)? ___

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: ☑
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ___ Time Required: ___ ☐
Rush Confirmation Number: ___ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	ANALYSIS REQUESTED (PLEASE BE SPECIFIC): O. Reg 153 Metals & Inorganics Pkg (Soil)	O. Reg 153 PHCs, BTEX/F1-F4 (Soil)	O. Reg 558 TCLP Benzo(a)pyrene	O. Reg 558 TCLP Inorganics Package	O. Reg 558 TCLP PCBs	O. Reg 558 TCLP VOCs by HS	TCLP Leachate Preparation	PWQO Metals and Inorganics	Asbestos by PLM - 0.5 RDL		# of Bottles	Comments
1		BH10653	17/06/21		Soil			✓									5	
2		DUP4	17		Soil		✓	✓									6	
3		BH10751	17/06/21		Soil		✓										1	
4		BH10753	17/06/21		Soil			✓									5	
5		DUP3			Soil		✓	✓									6	
6		BH109 S1	17/06/21		Soil		✓										1	
7		BH109 S2	17/06/21		Soil			✓									5	
8		DUP5			Soil		✓	✓									6	
9		BH110 S1	17/06/21		Soil		✓										1	
10		BH110 S2	17/06/21		Soil			✓									5	

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Laboratory Use Only: Time Sensitive	Temperature (°C) on Rece	Custody Seal Present	Yes	No
Leland Johnston	21/06/17	5PM							Intact		

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVLABS.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

White: BV Labs Yellow: Client

Bureau Veritas Canada (2019) Inc.

Bureau Veritas Laboratories
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel (905) 817-5700 Toll-free 800-563-6266 Fax (905) 817-5777 www.bvlabs.com

CHAIN OF CUSTODY RECORD

INVOICE TO:	REPORT TO:	PROJECT INFORMATION:	Laboratory Use Only:
Company Name: #36876 Grounded Engineering Inc.	Company Name:	Quotation #: CQ4975	BV Labs Job #: / Bottle Order #: 830132
Attention: Jory Hunter	Attention: Jory Hunter	P.O. #:	
Address: 12 Banigan Drive, Toronto ON M4H 1E9	Address:	Project: 21-090	COC #: C#830132-08-01 / Project Manager: Manjane Cruz
Tel: Fax:	Tel: Fax:	Project Name:	
Email: jhunter@groundedeng.ca	Email: jhunter@groundedeng.ca	Site #: Toronto Island	
		Sampled By:	

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BV LABS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)	Other Regulations	Special Instructions
☐ Table 1 ☑ Res/Park ☐ Medium/Fine	☐ CCME ☐ Sanitary Sewer Bylaw	
☐ Table 2 ☐ Ind/Comm ☑ Coarse	☐ Reg 558 ☐ Storm Sewer Bylaw	
☑ Table 3 ☐ Agr/Other ☐ For RSC	☐ MISA Municipality	
☐ Table ___	☐ PWQO ☐ Reg 406 Table	
	☐ Other	

Include Criteria on Certificate of Analysis (Y/N)? ____

ANALYSIS REQUESTED (PLEASE BE SPECIFIC):

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	O.Reg 153 Metals & Inorganics Pkg (Soil)	O.Reg 153 PHCs, BTEX/F1-F4 (Soil)	O.Reg 558 TCLP Benzo(a)pyrene	O.Reg 558 TCLP Inorganics Package	O.Reg 558 TCLP PCBs	O.Reg 558 TCLP VOCs by HS	TCLP Leachate Preparation	PWQO Metals and Inorganics	Asbestos by PLM - 0.5 RDL		# of Bottles	Comments
1		BH111 S1	16/06/21		Soil		✓										1	
2		BH111 S2	16/06/21		Soil			✓									5	
3		DUP 1			Soil		✓	✓									6	
4																		
5																		
6																		
7																		
8																		
9																		
10																		

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: ☑
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ____ Time Required: ____ ☐
Rush Confirmation Number: ____ *(call lab for #)*

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time
Leland Johnston	21/06/17	5PM			

jars used and not submitted

Laboratory Use Only: Time Sensitive / Temperature (°C) on Recei / Custody Seal: Present ☐ Yes ☐ No / Intact ☐ ☐

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVLABS.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

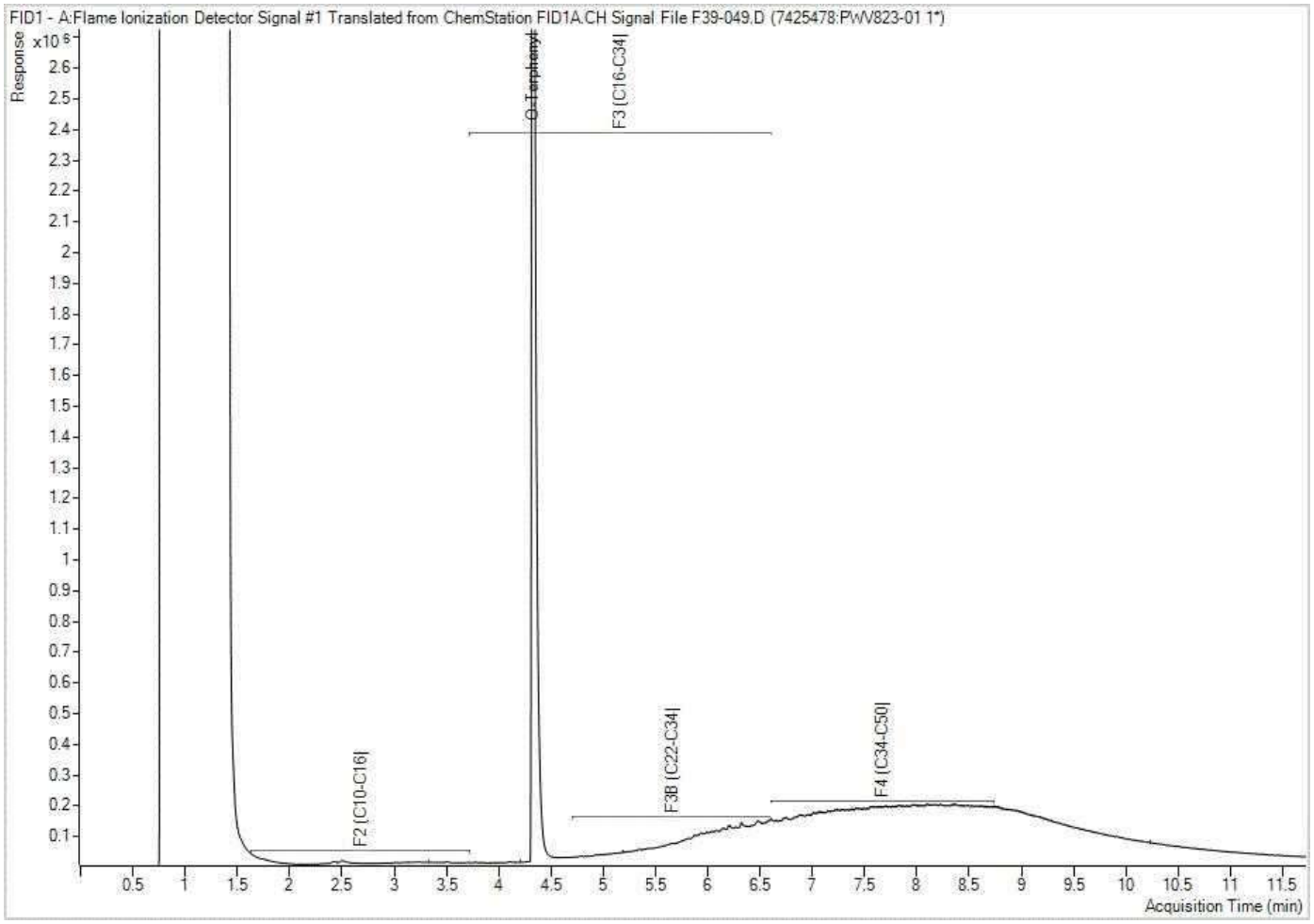
White: BV Labs Yellow: Client

Bureau Veritas Canada (2019) Inc.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11
Bureau Veritas Sample: PWV823

Grounded Engineering Inc.
Client Project #: 21-090
Project name: Toronto Island
Client ID: BH101 S2

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

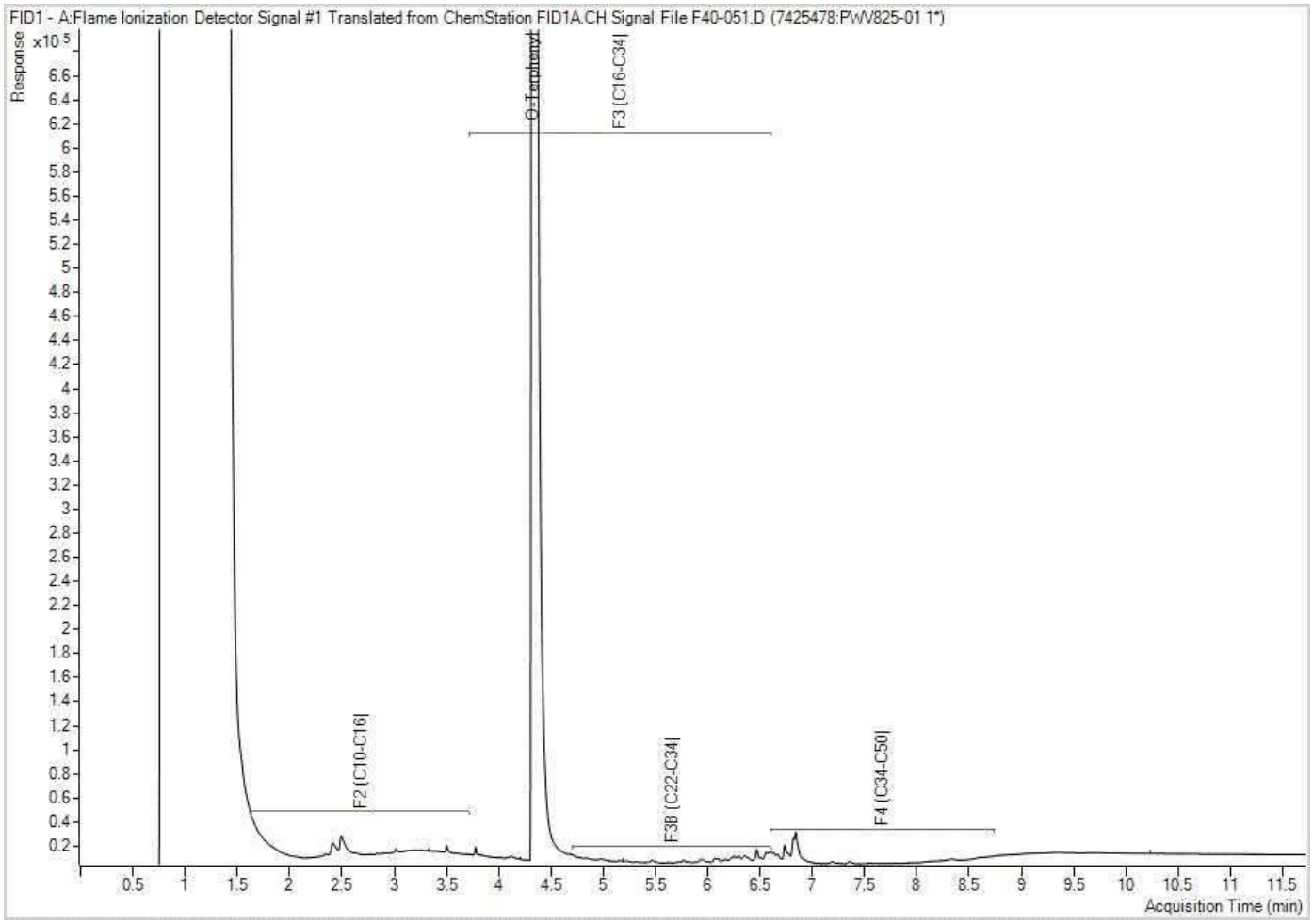


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11
Bureau Veritas Sample: PWV825

Grounded Engineering Inc.
Client Project #: 21-090
Project name: Toronto Island
Client ID: BH102 S2

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

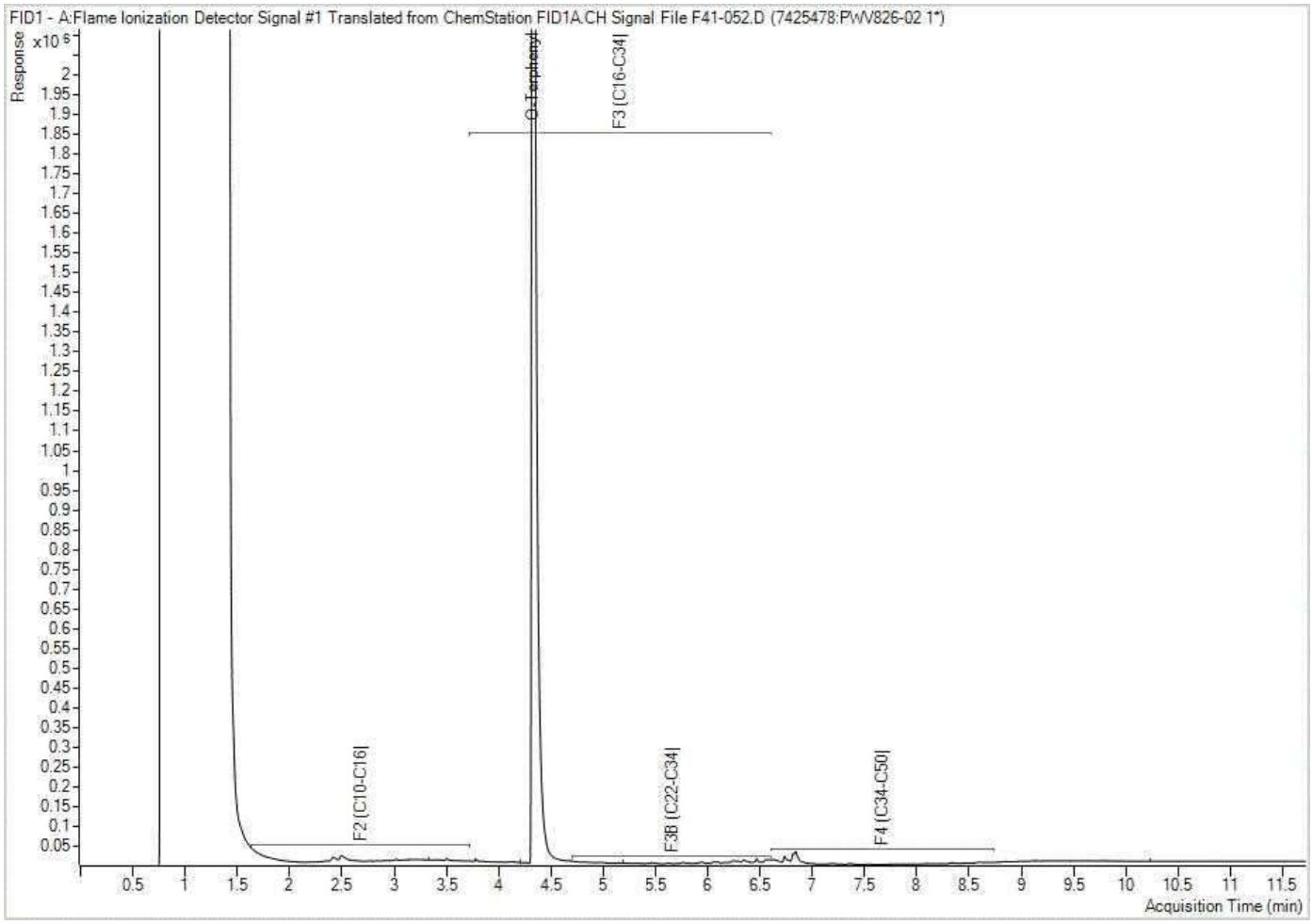


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11
Bureau Veritas Sample: PWV826

Grounded Engineering Inc.
Client Project #: 21-090
Project name: Toronto Island
Client ID: DUP 2

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

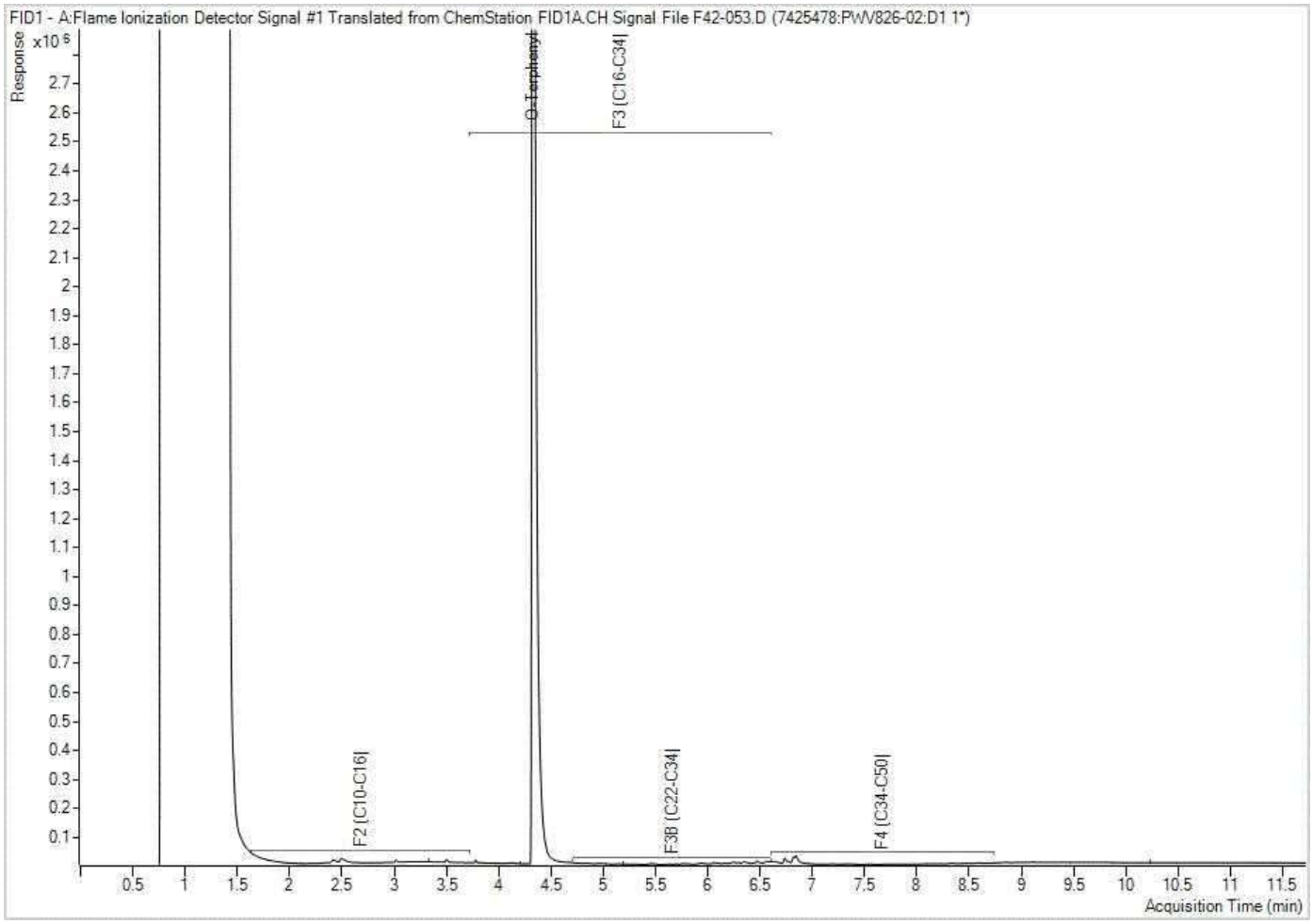


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11
Bureau Veritas Sample: PWV826 Lab-Dup

Grounded Engineering Inc.
Client Project #: 21-090
Project name: Toronto Island
Client ID: DUP 2

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

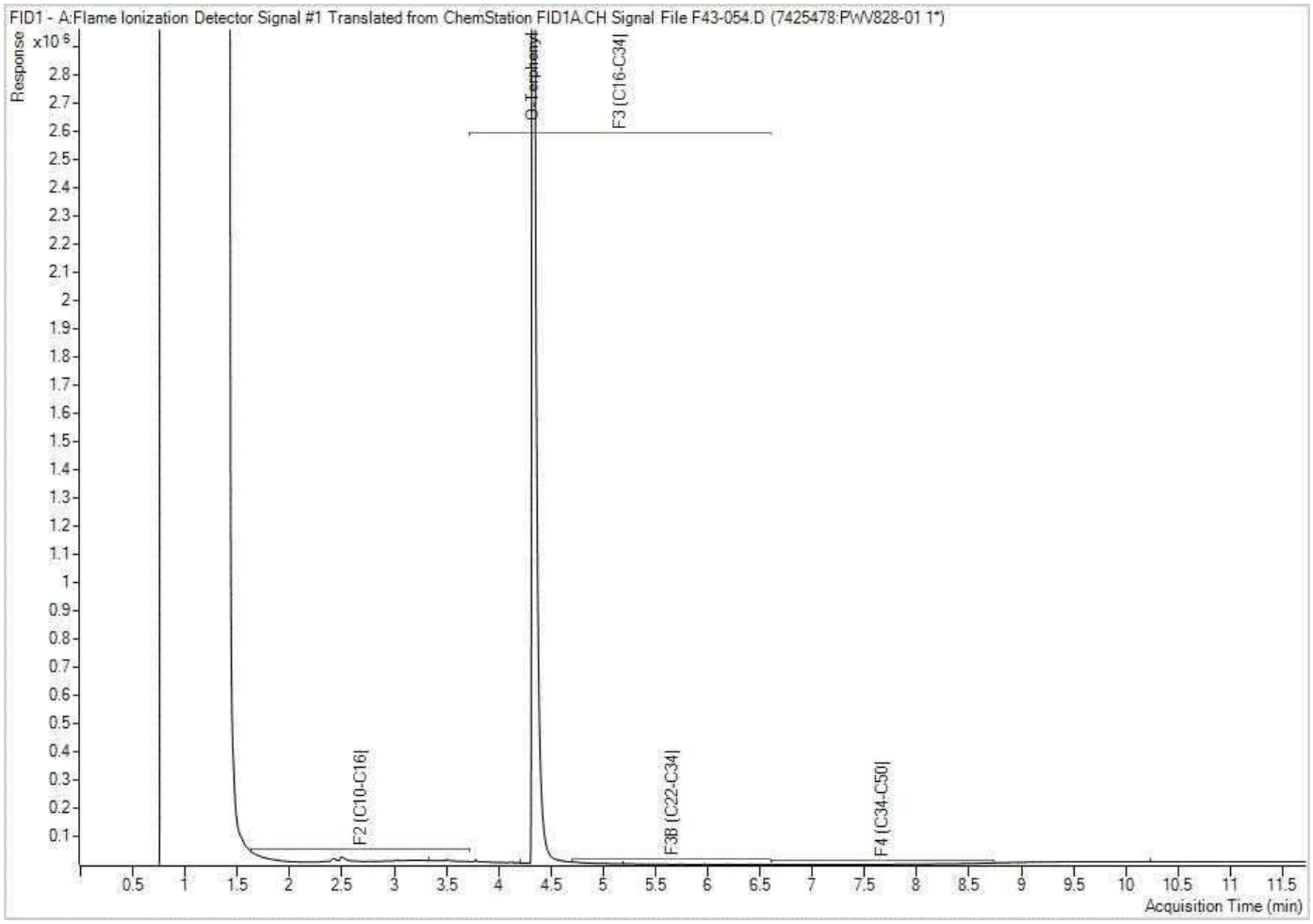


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11
Bureau Veritas Sample: PWV828

Grounded Engineering Inc.
Client Project #: 21-090
Project name: Toronto Island
Client ID: BH103 S2

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

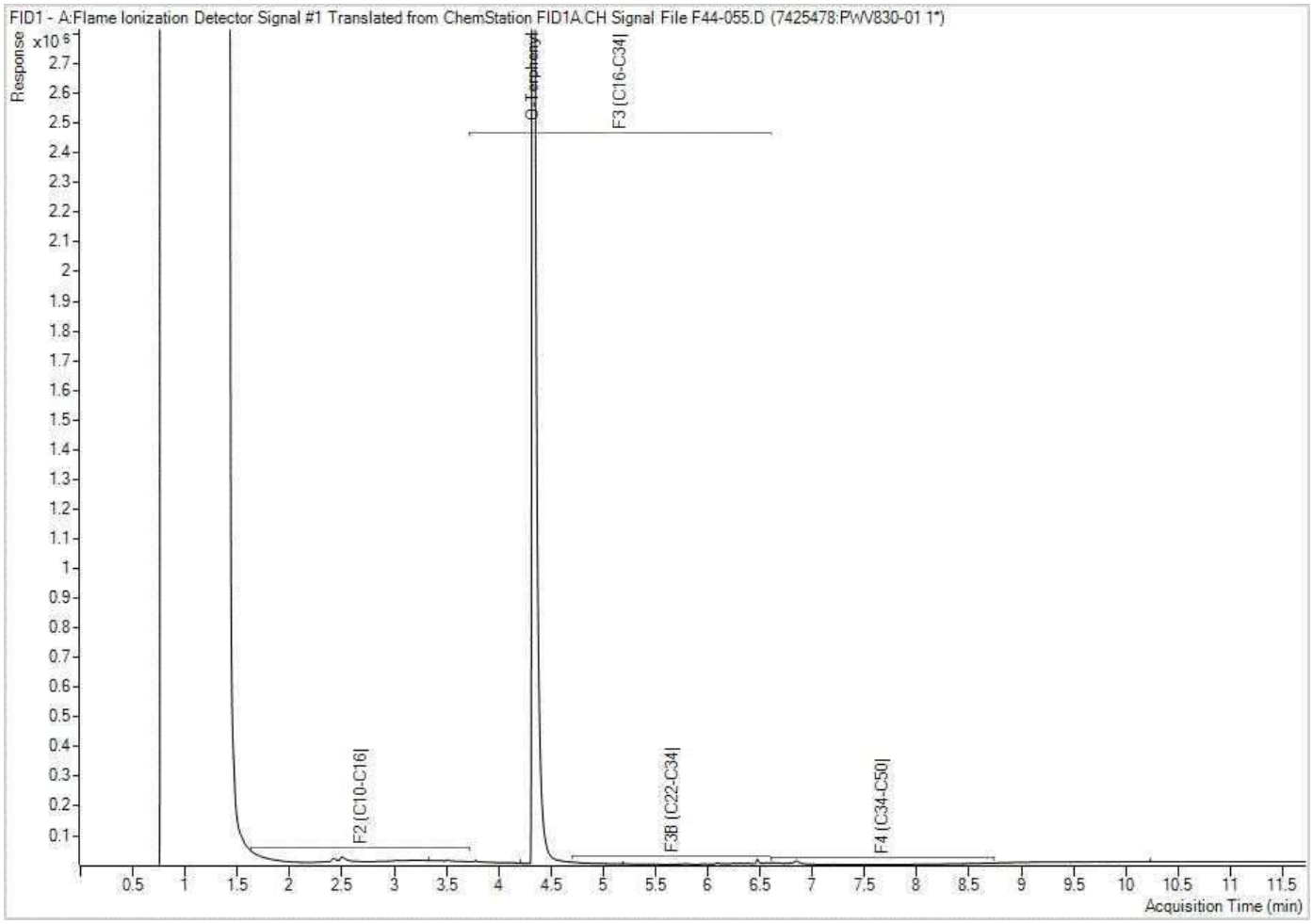


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11
Bureau Veritas Sample: PWV830

Grounded Engineering Inc.
Client Project #: 21-090
Project name: Toronto Island
Client ID: BH105 S3

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

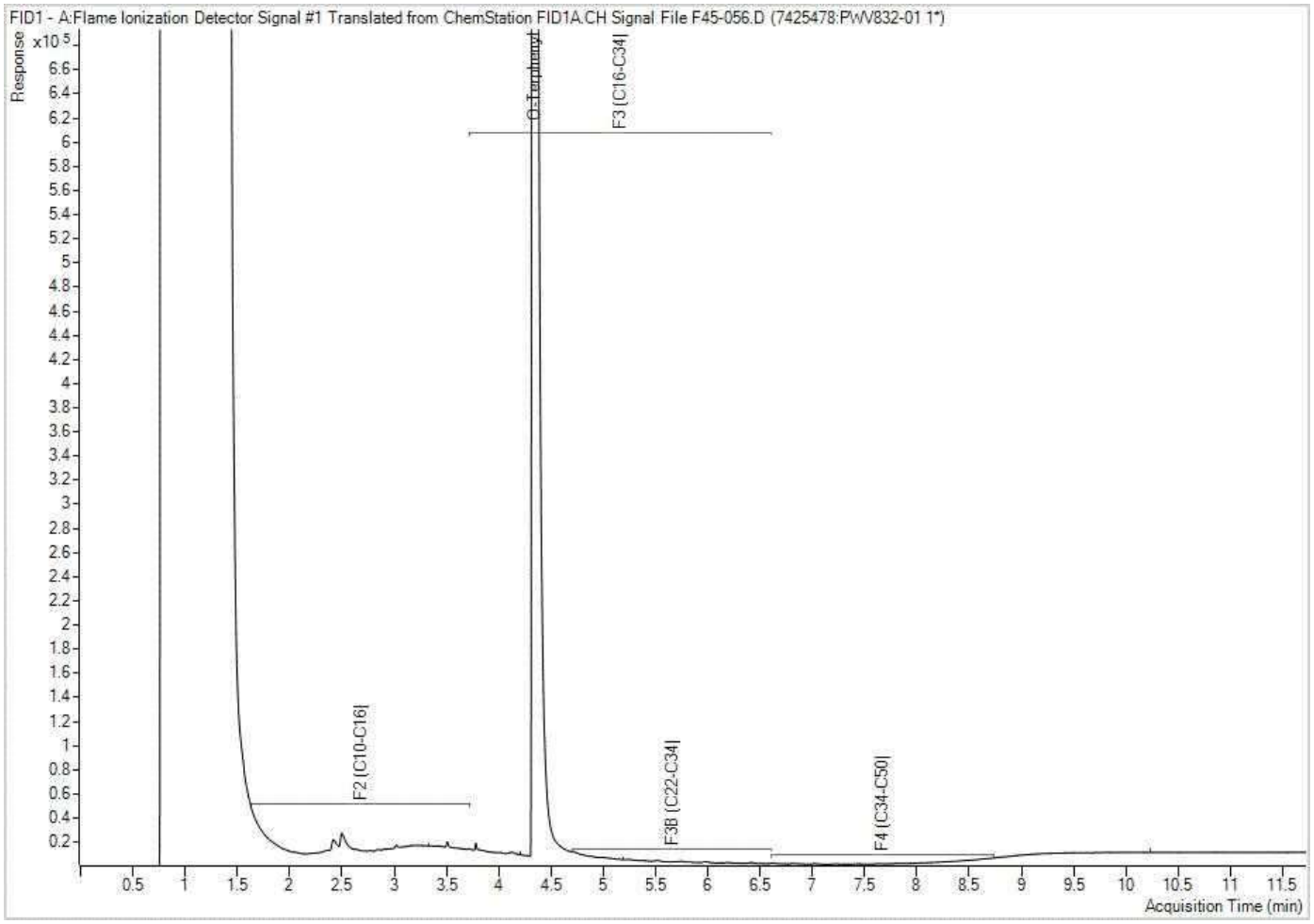


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11
Bureau Veritas Sample: PWV832

Grounded Engineering Inc.
Client Project #: 21-090
Project name: Toronto Island
Client ID: BH106 S3

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

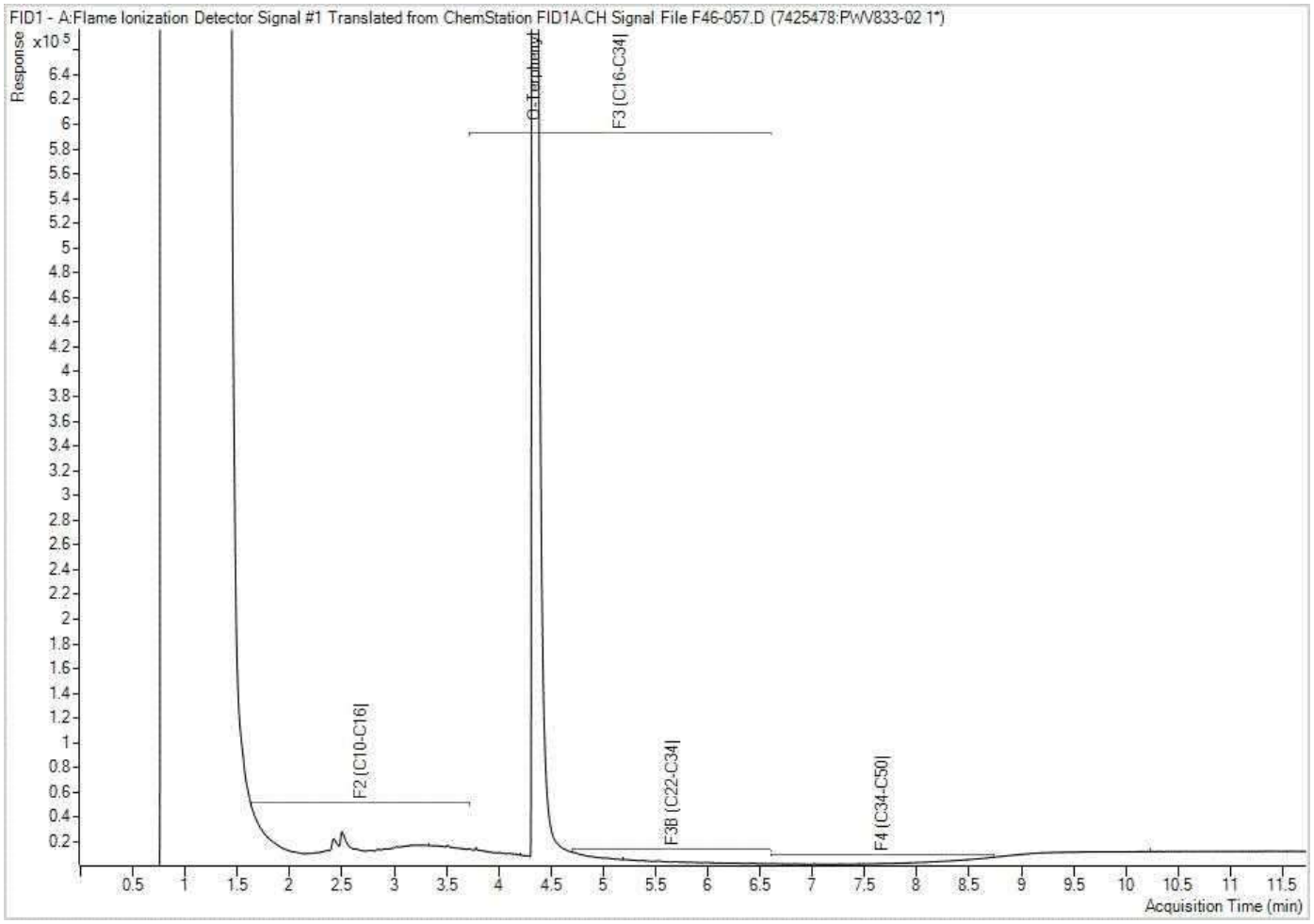


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11
Bureau Veritas Sample: PWV833

Grounded Engineering Inc.
Client Project #: 21-090
Project name: Toronto Island
Client ID: DUP4

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

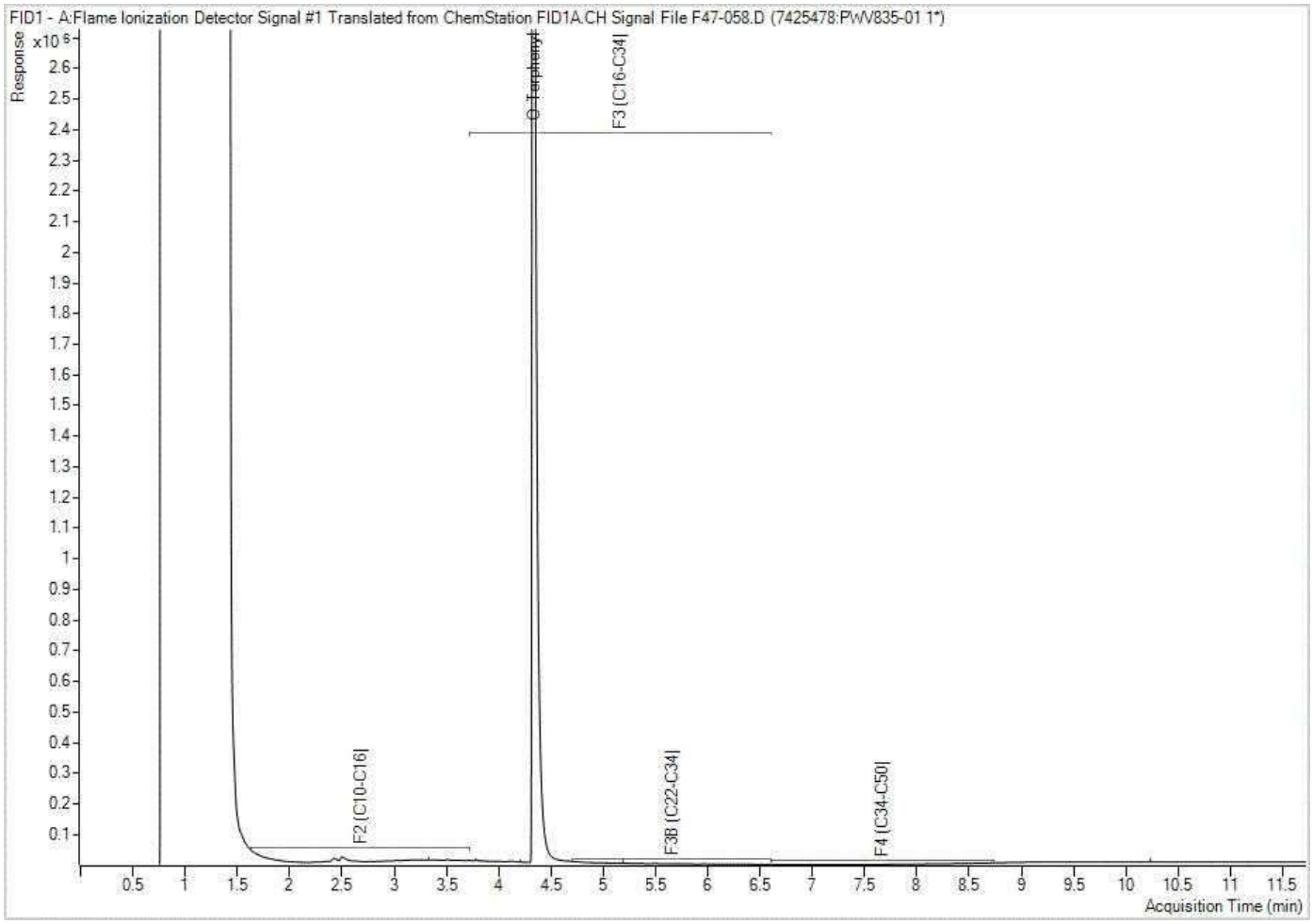


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11
Bureau Veritas Sample: PWV835

Grounded Engineering Inc.
Client Project #: 21-090
Project name: Toronto Island
Client ID: BH107 S3

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

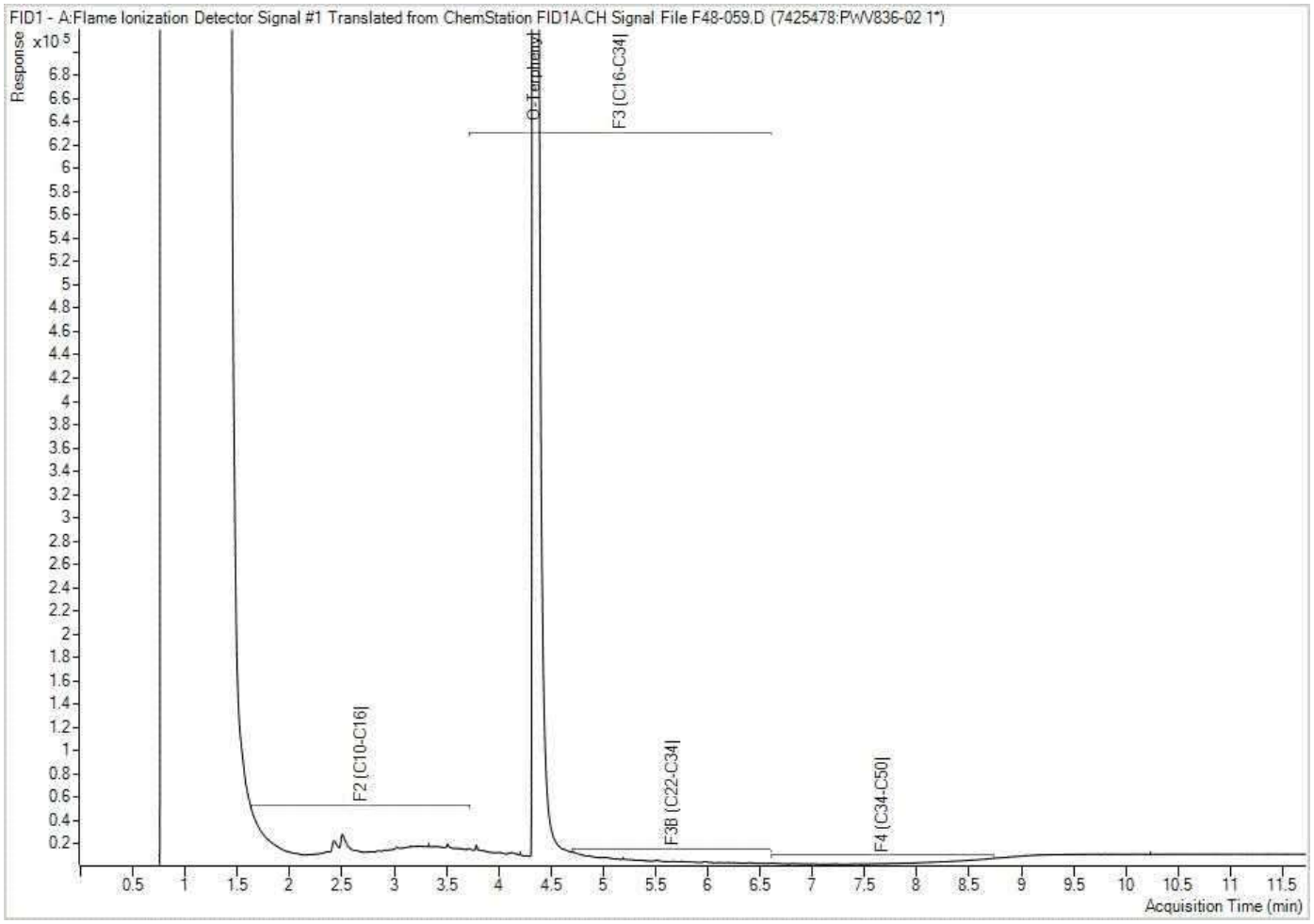


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11
Bureau Veritas Sample: PWV836

Grounded Engineering Inc.
Client Project #: 21-090
Project name: Toronto Island
Client ID: DUP3

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

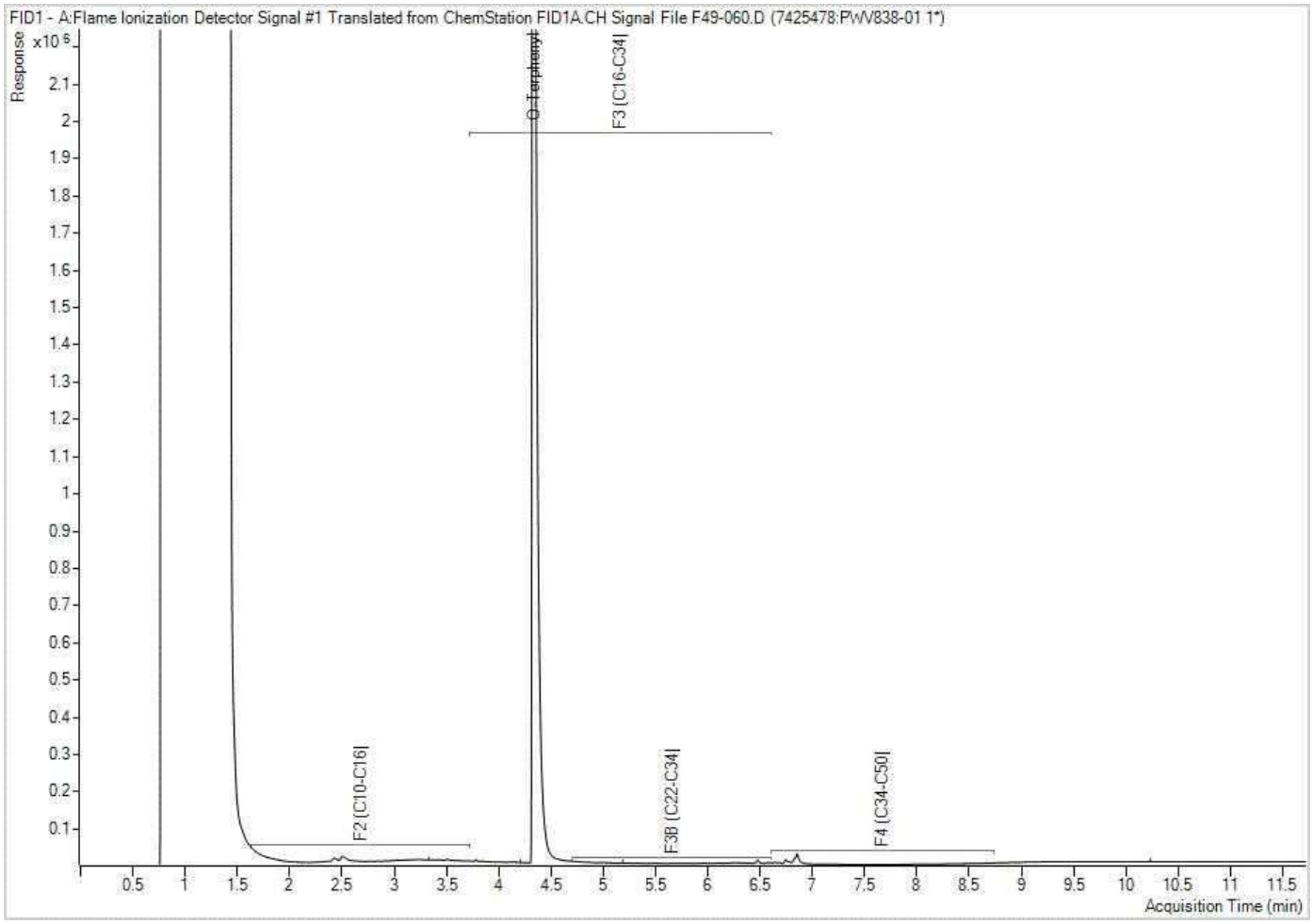


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11
Bureau Veritas Sample: PWV838

Grounded Engineering Inc.
Client Project #: 21-090
Project name: Toronto Island
Client ID: BH109 S2

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

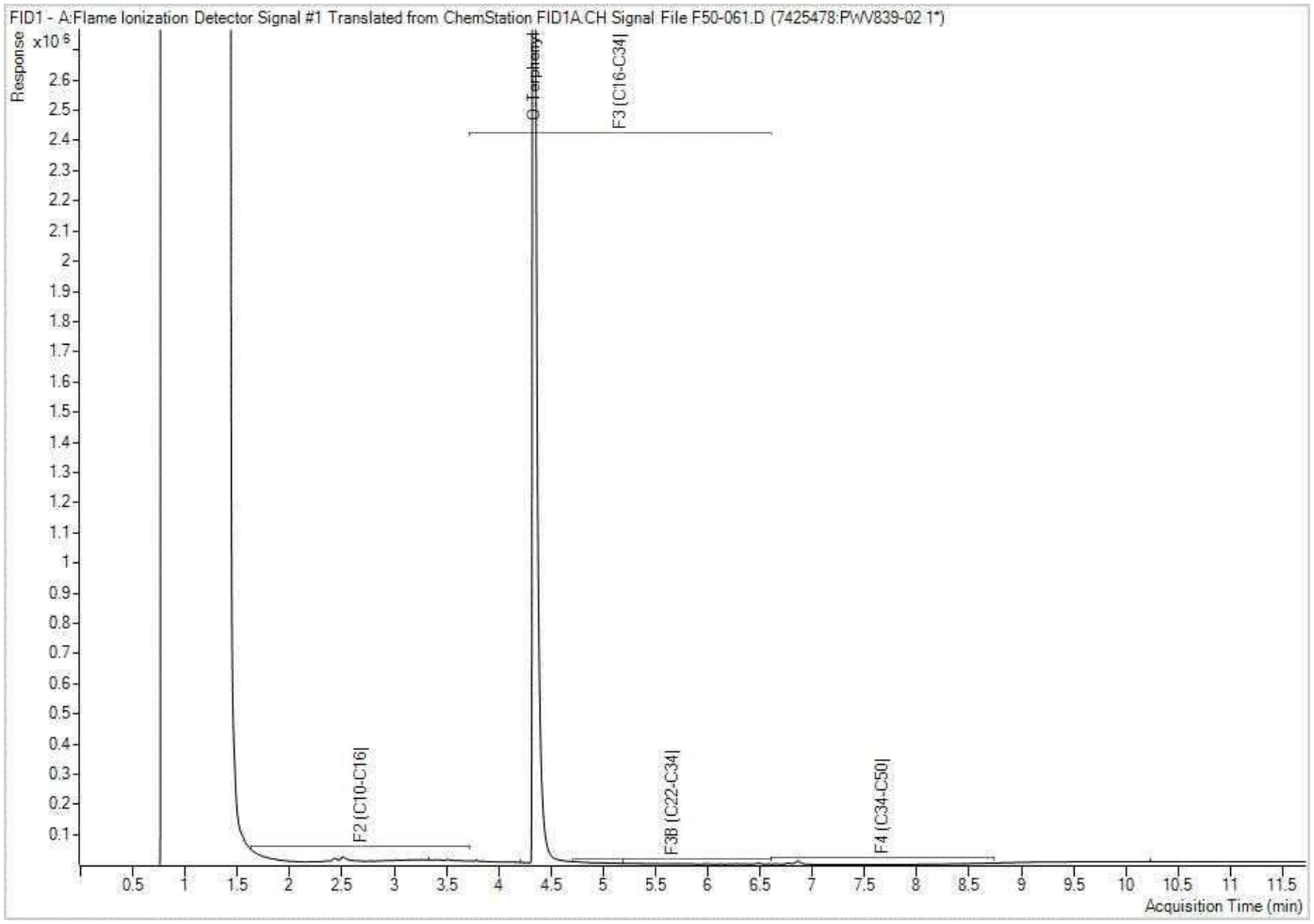


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11
Bureau Veritas Sample: PWV839

Grounded Engineering Inc.
Client Project #: 21-090
Project name: Toronto Island
Client ID: DUP5

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

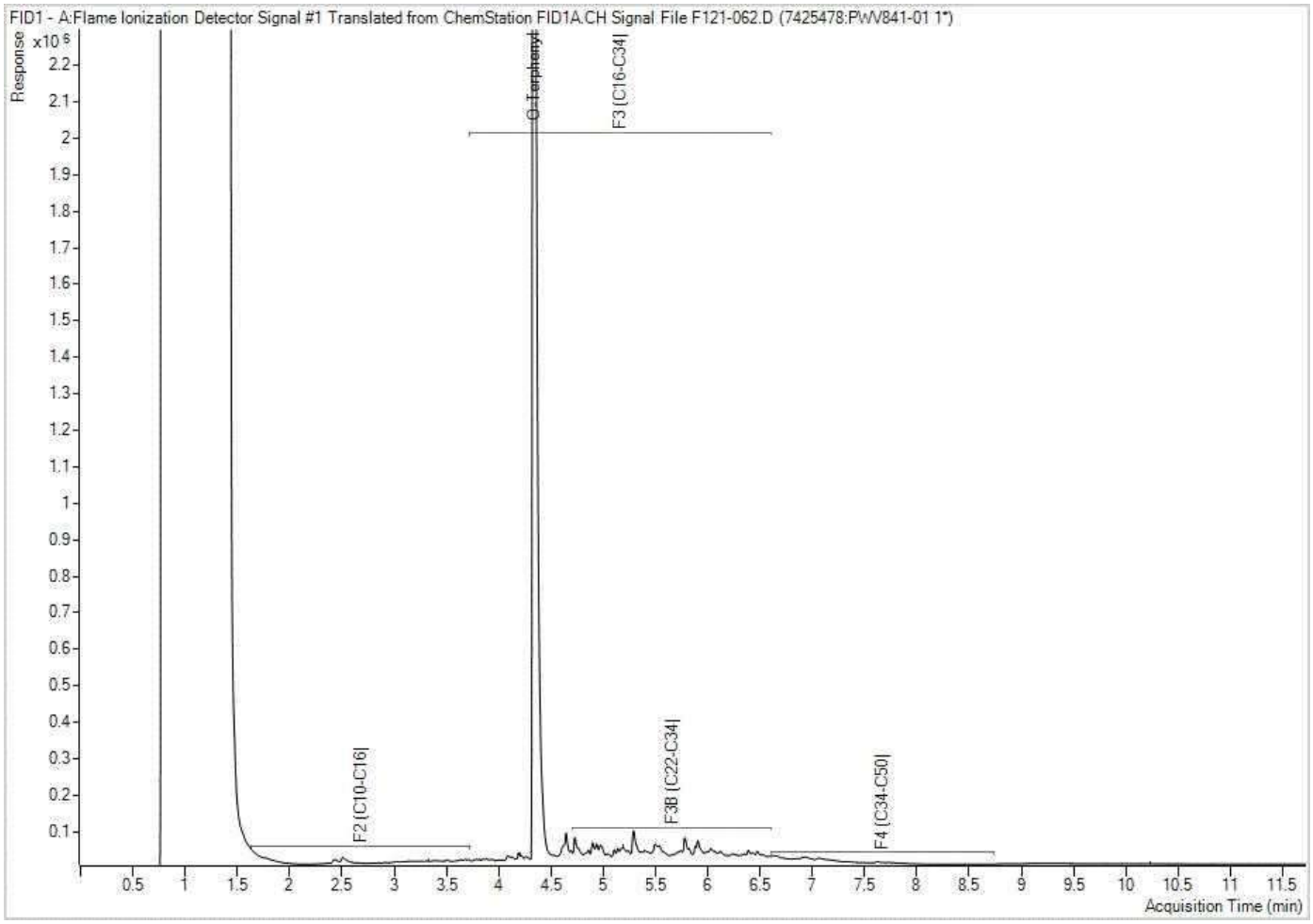


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11
Bureau Veritas Sample: PWV841

Grounded Engineering Inc.
Client Project #: 21-090
Project name: Toronto Island
Client ID: BH110 S2

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

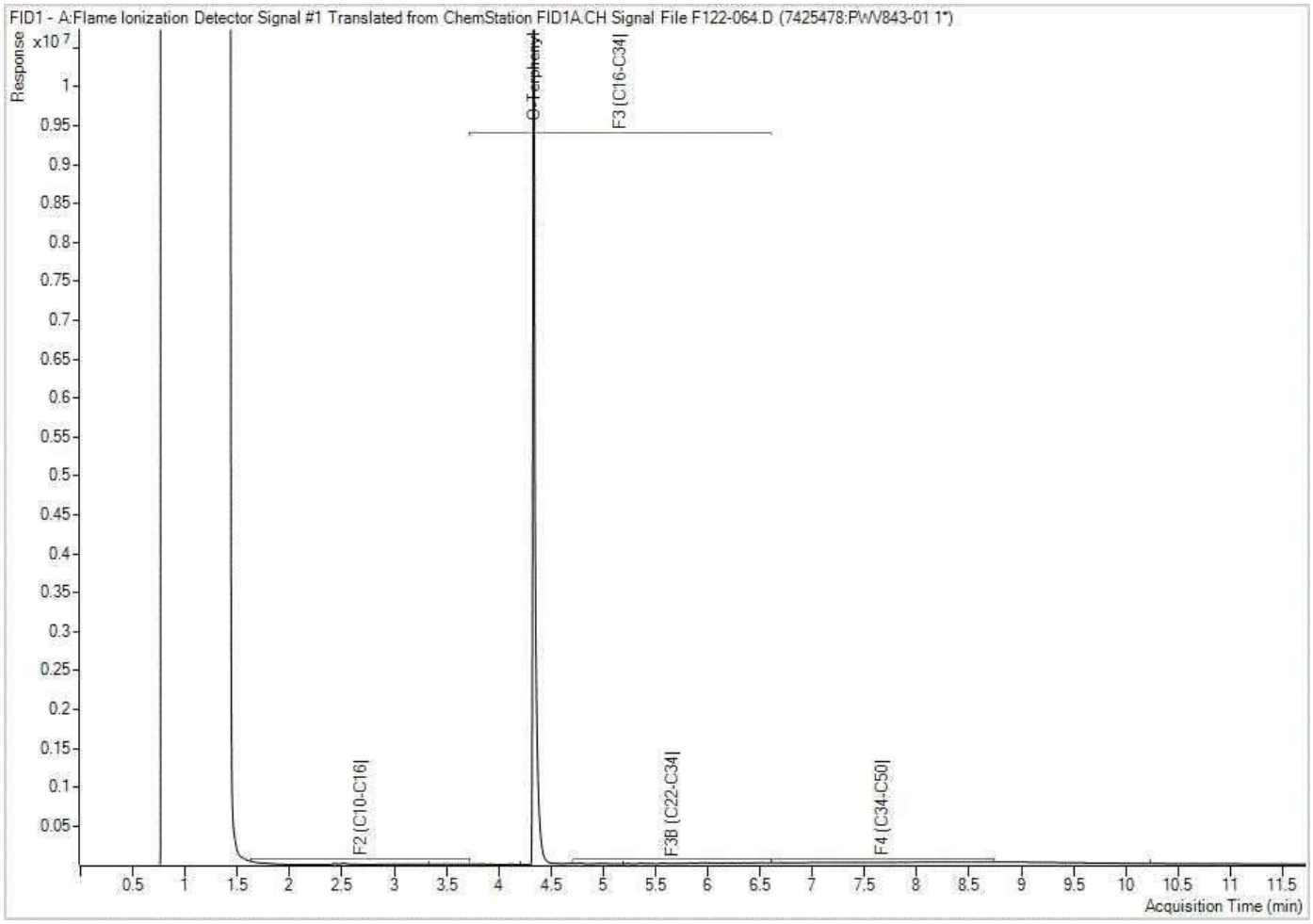


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11
Bureau Veritas Sample: PWV843

Grounded Engineering Inc.
Client Project #: 21-090
Project name: Toronto Island
Client ID: BH111 S2

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

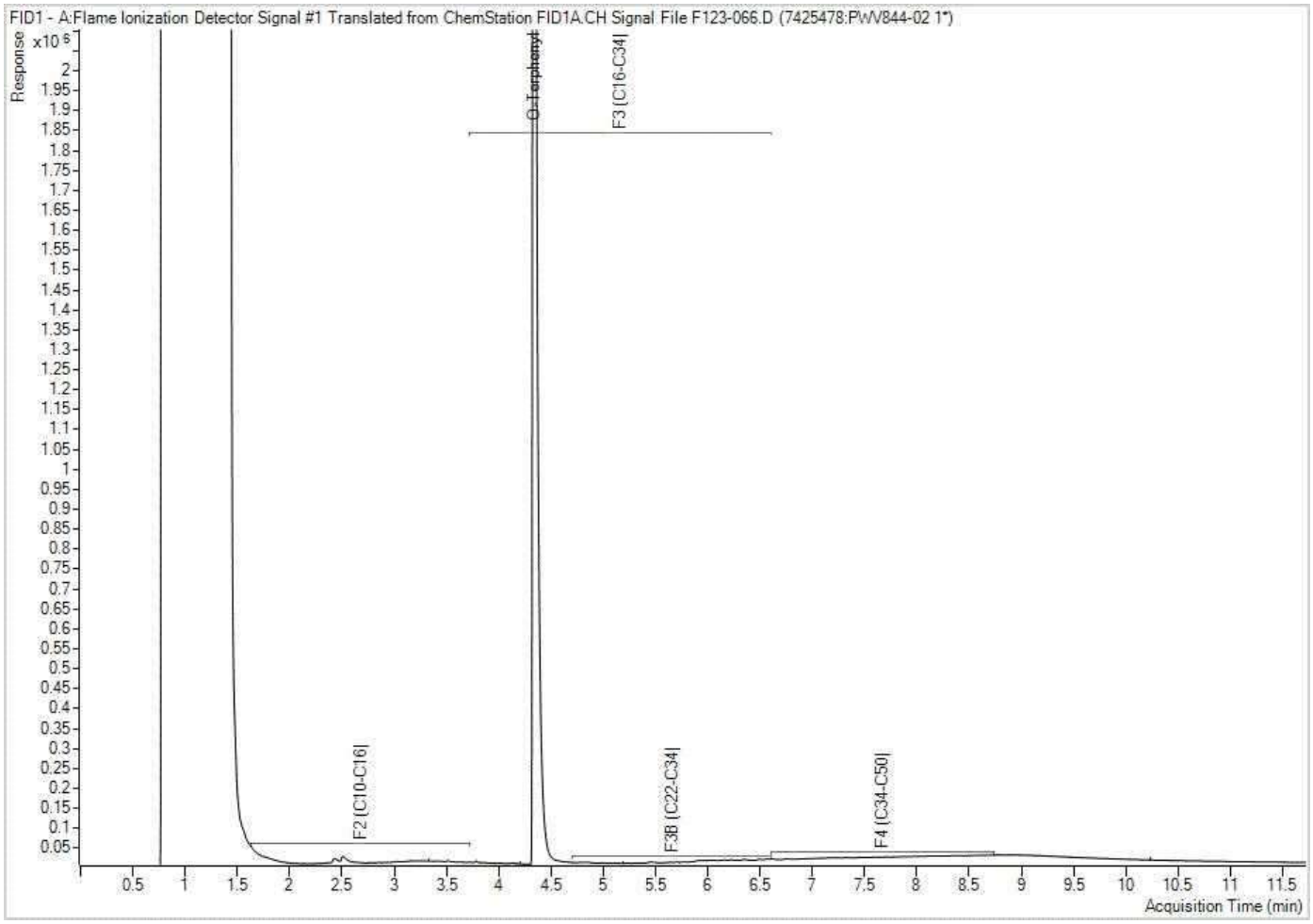


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11
Bureau Veritas Sample: PWV844

Grounded Engineering Inc.
Client Project #: 21-090
Project name: Toronto Island
Client ID: DUP1

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

Exceedance Summary Table – Reg153/04 T1-Soil/Res

Result Exceedances

Sample ID	Bureau Veritas ID	Parameter	Criteria	Result	DL	UNITS
BH101 S1	PWV822-01	Sodium Adsorption Ratio	2.4	2.8		N/A
BH101 S2	PWV823-01	F3 (C16-C34 Hydrocarbons)	240	250	50	ug/g
BH101 S2	PWV823-01	F4 (C34-C50 Hydrocarbons)	120	580	50	ug/g
BH101 S2	PWV823-01	F4G-sg (Grav. Heavy Hydrocarbons)	120	2000	100	ug/g
BH110 S2	PWV841-01	F2 (C10-C16 Hydrocarbons)	10	14	10	ug/g
BH111 S2	PWV843-01	F2 (C10-C16 Hydrocarbons)	10	12	10	ug/g
DUP1	PWV844-02	F2 (C10-C16 Hydrocarbons)	10	11	10	ug/g

The exceedance summary table is for information purposes only and should not be considered a comprehensive listing or statement of conformance to applicable regulatory guidelines.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Your Project #: 21-090
Site Location: Toronto Island

Attention: Jory Hunter

Grounded Engineering Inc.
1 Banigan Drive
Toronto, ON
CANADA M4H 1G3

Your C.O.C. #: 830132-01-01, C#830132-05-01, C#830132-04-01

Report Date: 2021/11/11
Report #: R6896688
Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BV LABS JOB #: C1H0487
Received: 2021/06/21, 15:34

Sample Matrix: Soil
Samples Received: 23

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Hot Water Extractable Boron	14	2021/06/23	2021/06/23	CAM SOP-00408	R153 Ana. Prot. 2011
Free (WAD) Cyanide	14	2021/06/23	2021/06/24	CAM SOP-00457	OMOE E3015 m
Conductivity	14	2021/06/24	2021/06/24	CAM SOP-00414	OMOE E3530 v1 m
Hexavalent Chromium in Soil by IC (1)	14	2021/06/23	2021/06/24	CAM SOP-00436	EPA 3060/7199 m
Petroleum Hydro. CCME F1 & BTEX in Soil (2)	14	N/A	2021/06/24	CAM SOP-00315	CCME PHC-CWS m
Petroleum Hydrocarbons F2-F4 in Soil (3)	14	2021/06/23	2021/06/24	CAM SOP-00316	CCME CWS m
F4G (CCME Hydrocarbons Gravimetric)	1	2021/06/25	2021/06/25	CAM SOP-00316	CCME PHC-CWS m
Acid Extractable Metals by ICPMS	13	2021/06/23	2021/06/23	CAM SOP-00447	EPA 6020B m
Acid Extractable Metals by ICPMS	1	2021/06/24	2021/06/24	CAM SOP-00447	EPA 6020B m
Moisture	14	N/A	2021/06/21	CAM SOP-00445	Carter 2nd ed 51.2 m
Moisture	9	N/A	2021/06/22	CAM SOP-00445	Carter 2nd ed 51.2 m
pH CaCl2 EXTRACT	14	2021/06/23	2021/06/23	CAM SOP-00413	EPA 9045 D m
Sodium Adsorption Ratio (SAR)	14	N/A	2021/06/24	CAM SOP-00102	EPA 6010C

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Your Project #: 21-090
Site Location: Toronto Island

Attention: Jory Hunter

Grounded Engineering Inc.
1 Banigan Drive
Toronto, ON
CANADA M4H 1G3

Your C.O.C. #: 830132-01-01, C#830132-05-01, C#830132-04-01

Report Date: 2021/11/11
Report #: R6896688
Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BV LABS JOB #: C1H0487
Received: 2021/06/21, 15:34

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Soils are reported on a dry weight basis unless otherwise specified.
(2) No lab extraction date is given for F1BTEX & VOC samples that are field preserved with methanol. Extraction date is the date sampled unless otherwise stated.
(3) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Bureau Veritas Laboratories conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following "Alberta Environment's Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003". Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Marijane Cruz, Senior Project Manager
Email: Marijane.Cruz@bureauveritas.com
Phone# (905)817-5756

==========

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

O.REG 153 METALS & INORGANICS PKG (SOIL)

Bureau Veritas ID			PWV822		PWV824		PWV826		
Sampling Date			2021/06/16		2021/06/16				
COC Number			C#830132-05-01		C#830132-05-01		C#830132-05-01		
	UNITS	Criteria	BH101 S1	QC Batch	BH102 S1	QC Batch	DUP 2	RDL	QC Batch
Calculated Parameters									
Sodium Adsorption Ratio	N/A	2.4	**2.8**	7419625	1.1	7419625	0.99		7419625
Inorganics									
Conductivity	mS/cm	0.57	0.39	7427053	0.18	7427053	0.17	0.002	7427053
Moisture	%	-	7.8	7421320	4.7	7421320	7.4	1.0	7421320
Available (CaCl2) pH	pH	-	7.91	7424092	7.75	7424092	7.68		7424092
WAD Cyanide (Free)	ug/g	0.051	<0.01	7424039	<0.01	7424039	<0.01	0.01	7424039
Chromium (VI)	ug/g	0.66	<0.18	7424025	<0.18	7424025	<0.18	0.18	7424025
Metals									
Hot Water Ext. Boron (B)	ug/g	-	<0.050	7424833	0.17	7425151	0.13	0.050	7424833
Acid Extractable Antimony (Sb)	ug/g	1.3	<0.20	7424787	<0.20	7424787	<0.20	0.20	7424787
Acid Extractable Arsenic (As)	ug/g	18	<1.0	7424787	<1.0	7424787	<1.0	1.0	7424787
Acid Extractable Barium (Ba)	ug/g	220	12	7424787	5.1	7424787	5.3	0.50	7424787
Acid Extractable Beryllium (Be)	ug/g	2.5	<0.20	7424787	<0.20	7424787	<0.20	0.20	7424787
Acid Extractable Boron (B)	ug/g	36	<5.0	7424787	<5.0	7424787	<5.0	5.0	7424787
Acid Extractable Cadmium (Cd)	ug/g	1.2	<0.10	7424787	<0.10	7424787	<0.10	0.10	7424787
Acid Extractable Chromium (Cr)	ug/g	70	11	7424787	7.6	7424787	7.7	1.0	7424787
Acid Extractable Cobalt (Co)	ug/g	21	2.2	7424787	1.7	7424787	1.4	0.10	7424787
Acid Extractable Copper (Cu)	ug/g	92	3.3	7424787	1.8	7424787	1.4	0.50	7424787
Acid Extractable Lead (Pb)	ug/g	120	8.0	7424787	3.4	7424787	2.9	1.0	7424787
Acid Extractable Molybdenum (Mo)	ug/g	2	<0.50	7424787	<0.50	7424787	<0.50	0.50	7424787
Acid Extractable Nickel (Ni)	ug/g	82	4.4	7424787	2.6	7424787	2.9	0.50	7424787
Acid Extractable Selenium (Se)	ug/g	1.5	<0.50	7424787	<0.50	7424787	<0.50	0.50	7424787
Acid Extractable Silver (Ag)	ug/g	0.5	<0.20	7424787	<0.20	7424787	<0.20	0.20	7424787
Acid Extractable Thallium (Tl)	ug/g	1	<0.050	7424787	<0.050	7424787	<0.050	0.050	7424787
Acid Extractable Uranium (U)	ug/g	2.5	0.40	7424787	0.30	7424787	0.45	0.050	7424787
Acid Extractable Vanadium (V)	ug/g	86	33	7424787	26	7424787	23	5.0	7424787
Acid Extractable Zinc (Zn)	ug/g	290	29	7424787	9.7	7424787	8.5	5.0	7424787
Acid Extractable Mercury (Hg)	ug/g	0.27	<0.050	7424787	<0.050	7424787	<0.050	0.050	7424787

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 1: Full Depth Background Site Condition Standards
Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

O.REG 153 METALS & INORGANICS PKG (SOIL)

Bureau Veritas ID			PWV826			PWV827		
Sampling Date						2021/06/16		
COC Number			C#830132-05-01			C#830132-05-01		
	UNITS	Criteria	DUP 2 Lab-Dup	RDL	QC Batch	BH103 S1	RDL	QC Batch
Calculated Parameters								
Sodium Adsorption Ratio	N/A	2.4				0.44		7419625
Inorganics								
Conductivity	mS/cm	0.57	0.16	0.002	7427053	0.12	0.002	7427053
Moisture	%	-				11	1.0	7421320
Available (CaCl2) pH	pH	-				7.86		7424092
WAD Cyanide (Free)	ug/g	0.051	<0.01	0.01	7424039	<0.01	0.01	7424039
Chromium (VI)	ug/g	0.66	<0.18	0.18	7424025	<0.18	0.18	7424025
Metals								
Hot Water Ext. Boron (B)	ug/g	-				<0.050	0.050	7424833
Acid Extractable Antimony (Sb)	ug/g	1.3				<0.20	0.20	7426787
Acid Extractable Arsenic (As)	ug/g	18				<1.0	1.0	7426787
Acid Extractable Barium (Ba)	ug/g	220				7.5	0.50	7426787
Acid Extractable Beryllium (Be)	ug/g	2.5				<0.20	0.20	7426787
Acid Extractable Boron (B)	ug/g	36				<5.0	5.0	7426787
Acid Extractable Cadmium (Cd)	ug/g	1.2				<0.10	0.10	7426787
Acid Extractable Chromium (Cr)	ug/g	70				9.6	1.0	7426787
Acid Extractable Cobalt (Co)	ug/g	21				1.9	0.10	7426787
Acid Extractable Copper (Cu)	ug/g	92				1.4	0.50	7426787
Acid Extractable Lead (Pb)	ug/g	120				4.5	1.0	7426787
Acid Extractable Molybdenum (Mo)	ug/g	2				<0.50	0.50	7426787
Acid Extractable Nickel (Ni)	ug/g	82				3.0	0.50	7426787
Acid Extractable Selenium (Se)	ug/g	1.5				<0.50	0.50	7426787
Acid Extractable Silver (Ag)	ug/g	0.5				<0.20	0.20	7426787
Acid Extractable Thallium (Tl)	ug/g	1				<0.050	0.050	7426787
Acid Extractable Uranium (U)	ug/g	2.5				0.42	0.050	7426787
Acid Extractable Vanadium (V)	ug/g	86				36	5.0	7426787
Acid Extractable Zinc (Zn)	ug/g	290				12	5.0	7426787

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 1: Full Depth Background Site Condition Standards
Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

O.REG 153 METALS & INORGANICS PKG (SOIL)

Bureau Veritas ID			PWV826			PWV827		
Sampling Date						2021/06/16		
COC Number			C#830132-05-01			C#830132-05-01		
	UNITS	Criteria	DUP 2 Lab-Dup	RDL	QC Batch	BH103 S1	RDL	QC Batch
Acid Extractable Mercury (Hg)	ug/g	0.27				<0.050	0.050	7426787

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 1: Full Depth Background Site Condition Standards
Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

O.REG 153 METALS & INORGANICS PKG (SOIL)

Bureau Veritas ID			PWV827			PWV829	PWV831		
Sampling Date			2021/06/16			2021/06/16	2021/06/17		
COC Number			C#830132-05-01			C#830132-05-01	C#830132-05-01		
	UNITS	Criteria	BH103 S1 Lab-Dup	RDL	QC Batch	BH105 S1	BH106 S1	RDL	QC Batch
Calculated Parameters									
Sodium Adsorption Ratio	N/A	2.4				0.22 (1)	0.34 (1)		7419625
Inorganics									
Conductivity	mS/cm	0.57				0.28	0.091	0.002	7427053
Moisture	%	-				14	5.3	1.0	7421320
Available (CaCl2) pH	pH	-				7.37	7.64		7424092
WAD Cyanide (Free)	ug/g	0.051				<0.01	<0.01	0.01	7424039
Chromium (VI)	ug/g	0.66				<0.18	<0.18	0.18	7424025
Metals									
Hot Water Ext. Boron (B)	ug/g	-				1.2	<0.050	0.050	7424833
Acid Extractable Antimony (Sb)	ug/g	1.3	<0.20	0.20	7426787	0.92	<0.20	0.20	7424787
Acid Extractable Arsenic (As)	ug/g	18	<1.0	1.0	7426787	7.5	<1.0	1.0	7424787
Acid Extractable Barium (Ba)	ug/g	220	7.0	0.50	7426787	81	8.4	0.50	7424787
Acid Extractable Beryllium (Be)	ug/g	2.5	<0.20	0.20	7426787	0.53	<0.20	0.20	7424787
Acid Extractable Boron (B)	ug/g	36	<5.0	5.0	7426787	9.0	<5.0	5.0	7424787
Acid Extractable Cadmium (Cd)	ug/g	1.2	<0.10	0.10	7426787	0.23	<0.10	0.10	7424787
Acid Extractable Chromium (Cr)	ug/g	70	9.9	1.0	7426787	22	4.0	1.0	7424787
Acid Extractable Cobalt (Co)	ug/g	21	1.9	0.10	7426787	6.7	1.5	0.10	7424787
Acid Extractable Copper (Cu)	ug/g	92	1.5	0.50	7426787	22	2.4	0.50	7424787
Acid Extractable Lead (Pb)	ug/g	120	4.5	1.0	7426787	81	6.8	1.0	7424787
Acid Extractable Molybdenum (Mo)	ug/g	2	<0.50	0.50	7426787	0.81	<0.50	0.50	7424787
Acid Extractable Nickel (Ni)	ug/g	82	3.2	0.50	7426787	15	2.9	0.50	7424787
Acid Extractable Selenium (Se)	ug/g	1.5	<0.50	0.50	7426787	0.57	<0.50	0.50	7424787
Acid Extractable Silver (Ag)	ug/g	0.5	<0.20	0.20	7426787	<0.20	<0.20	0.20	7424787
Acid Extractable Thallium (Tl)	ug/g	1	<0.050	0.050	7426787	0.13	<0.050	0.050	7424787
Acid Extractable Uranium (U)	ug/g	2.5	0.44	0.050	7426787	0.44	0.20	0.050	7424787

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 1: Full Depth Background Site Condition Standards
Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use
(1) Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

O.REG 153 METALS & INORGANICS PKG (SOIL)

Bureau Veritas ID			PWV827			PWV829	PWV831		
Sampling Date			2021/06/16			2021/06/16	2021/06/17		
COC Number			C#830132-05-01			C#830132-05-01	C#830132-05-01		
	UNITS	Criteria	BH103 S1 Lab-Dup	RDL	QC Batch	BH105 S1	BH106 S1	RDL	QC Batch
Acid Extractable Vanadium (V)	ug/g	86	40	5.0	7426787	31	10	5.0	7424787
Acid Extractable Zinc (Zn)	ug/g	290	13	5.0	7426787	77	12	5.0	7424787
Acid Extractable Mercury (Hg)	ug/g	0.27	<0.050	0.050	7426787	0.26	<0.050	0.050	7424787

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 1: Full Depth Background Site Condition Standards
Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

O.REG 153 METALS & INORGANICS PKG (SOIL)

Bureau Veritas ID			PWV831		PWV833			PWV833		
Sampling Date			2021/06/17							
COC Number			C#830132-05-01		C#830132-05-01			C#830132-05-01		
	UNITS	Criteria	BH106 S1 Lab-Dup	QC Batch	DUP4	RDL	QC Batch	DUP4 Lab-Dup	RDL	QC Batch
Calculated Parameters										
Sodium Adsorption Ratio	N/A	2.4			0.35 (1)		7419625			
Inorganics										
Conductivity	mS/cm	0.57			0.087	0.002	7427053			
Moisture	%	-			4.8	1.0	7421320	5.1	1.0	7421320
Available (CaCl2) pH	pH	-	7.68	7424092	7.67		7424092			
WAD Cyanide (Free)	ug/g	0.051			<0.01	0.01	7424039			
Chromium (VI)	ug/g	0.66			<0.18	0.18	7424025			
Metals										
Hot Water Ext. Boron (B)	ug/g	-			<0.050	0.050	7424833			
Acid Extractable Antimony (Sb)	ug/g	1.3			<0.20	0.20	7424787			
Acid Extractable Arsenic (As)	ug/g	18			1.4	1.0	7424787			
Acid Extractable Barium (Ba)	ug/g	220			8.5	0.50	7424787			
Acid Extractable Beryllium (Be)	ug/g	2.5			<0.20	0.20	7424787			
Acid Extractable Boron (B)	ug/g	36			<5.0	5.0	7424787			
Acid Extractable Cadmium (Cd)	ug/g	1.2			<0.10	0.10	7424787			
Acid Extractable Chromium (Cr)	ug/g	70			5.8	1.0	7424787			
Acid Extractable Cobalt (Co)	ug/g	21			1.7	0.10	7424787			
Acid Extractable Copper (Cu)	ug/g	92			2.8	0.50	7424787			
Acid Extractable Lead (Pb)	ug/g	120			8.3	1.0	7424787			
Acid Extractable Molybdenum (Mo)	ug/g	2			<0.50	0.50	7424787			
Acid Extractable Nickel (Ni)	ug/g	82			3.4	0.50	7424787			
Acid Extractable Selenium (Se)	ug/g	1.5			<0.50	0.50	7424787			
Acid Extractable Silver (Ag)	ug/g	0.5			<0.20	0.20	7424787			
Acid Extractable Thallium (Tl)	ug/g	1			<0.050	0.050	7424787			
Acid Extractable Uranium (U)	ug/g	2.5			0.31	0.050	7424787			

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 1: Full Depth Background Site Condition Standards
Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use
(1) Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

O.REG 153 METALS & INORGANICS PKG (SOIL)

Bureau Veritas ID			PWV831		PWV833			PWV833		
Sampling Date			2021/06/17							
COC Number			C#830132-05-01		C#830132-05-01			C#830132-05-01		
	UNITS	Criteria	BH106 S1 Lab-Dup	QC Batch	DUP4	RDL	QC Batch	DUP4 Lab-Dup	RDL	QC Batch
Acid Extractable Vanadium (V)	ug/g	86			16	5.0	7424787			
Acid Extractable Zinc (Zn)	ug/g	290			15	5.0	7424787			
Acid Extractable Mercury (Hg)	ug/g	0.27			<0.050	0.050	7424787			

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 1: Full Depth Background Site Condition Standards
Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

O.REG 153 METALS & INORGANICS PKG (SOIL)

Bureau Veritas ID			PWV834	PWV836	PWV837	PWV839		
Sampling Date			2021/06/17		2021/06/17			
COC Number			C#830132-05-01	C#830132-05-01	C#830132-05-01	C#830132-05-01		
	UNITS	Criteria	BH107 S1	DUP3	BH109 S1	DUP5	RDL	QC Batch
Calculated Parameters								
Sodium Adsorption Ratio	N/A	2.4	1.8	1.9	1.5	1.3		7419625
Inorganics								
Conductivity	mS/cm	0.57	0.21	0.20	0.15	0.11	0.002	7427053
Moisture	%	-	3.3	3.7	6.6	3.9	1.0	7421320
Available (CaCl2) pH	pH	-	7.90	7.92	7.75	7.83		7424092
WAD Cyanide (Free)	ug/g	0.051	<0.01	<0.01	<0.01	<0.01	0.01	7424039
Chromium (VI)	ug/g	0.66	<0.18	<0.18	<0.18	<0.18	0.18	7424025
Metals								
Hot Water Ext. Boron (B)	ug/g	-	<0.050	<0.050	0.11	<0.050	0.050	7424833
Acid Extractable Antimony (Sb)	ug/g	1.3	<0.20	<0.20	0.23	<0.20	0.20	7424787
Acid Extractable Arsenic (As)	ug/g	18	<1.0	1.1	2.5	1.4	1.0	7424787
Acid Extractable Barium (Ba)	ug/g	220	5.1	5.1	26	7.8	0.50	7424787
Acid Extractable Beryllium (Be)	ug/g	2.5	<0.20	<0.20	<0.20	<0.20	0.20	7424787
Acid Extractable Boron (B)	ug/g	36	<5.0	<5.0	<5.0	<5.0	5.0	7424787
Acid Extractable Cadmium (Cd)	ug/g	1.2	<0.10	<0.10	<0.10	<0.10	0.10	7424787
Acid Extractable Chromium (Cr)	ug/g	70	4.7	4.3	11	5.2	1.0	7424787
Acid Extractable Cobalt (Co)	ug/g	21	1.1	1.2	2.7	1.5	0.10	7424787
Acid Extractable Copper (Cu)	ug/g	92	1.6	1.7	12	2.6	0.50	7424787
Acid Extractable Lead (Pb)	ug/g	120	3.2	3.5	14	3.3	1.0	7424787
Acid Extractable Molybdenum (Mo)	ug/g	2	<0.50	<0.50	0.54	<0.50	0.50	7424787
Acid Extractable Nickel (Ni)	ug/g	82	2.6	2.8	5.1	2.9	0.50	7424787
Acid Extractable Selenium (Se)	ug/g	1.5	<0.50	<0.50	<0.50	<0.50	0.50	7424787
Acid Extractable Silver (Ag)	ug/g	0.5	<0.20	<0.20	<0.20	<0.20	0.20	7424787
Acid Extractable Thallium (Tl)	ug/g	1	<0.050	<0.050	<0.050	<0.050	0.050	7424787
Acid Extractable Uranium (U)	ug/g	2.5	0.22	0.28	0.28	0.22	0.050	7424787
Acid Extractable Vanadium (V)	ug/g	86	11	9.9	24	14	5.0	7424787
Acid Extractable Zinc (Zn)	ug/g	290	10	11	26	9.1	5.0	7424787
Acid Extractable Mercury (Hg)	ug/g	0.27	<0.050	<0.050	<0.050	<0.050	0.050	7424787

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 1: Full Depth Background Site Condition Standards
Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

O.REG 153 METALS & INORGANICS PKG (SOIL)

Bureau Veritas ID			PWV840		PWV842		PWV844		
Sampling Date			2021/06/17		2021/06/16				
COC Number			C#830132-05-01		C#830132-05-01		C#830132-05-01		
	UNITS	Criteria	BH110 S1	QC Batch	BH111 S1	QC Batch	DUP1	RDL	QC Batch
Calculated Parameters									
Sodium Adsorption Ratio	N/A	2.4	0.96	7419625	1.8	7419625	0.93		7419625
Inorganics									
Conductivity	mS/cm	0.57	0.099	7427053	0.27	7427053	0.23	0.002	7427053
Moisture	%	-	3.2	7421320	4.0	7421320	4.4	1.0	7421320
Available (CaCl2) pH	pH	-	7.94	7424092	7.77	7424092	7.97		7424092
WAD Cyanide (Free)	ug/g	0.051	<0.01	7424039	<0.01	7424039	<0.01	0.01	7424039
Chromium (VI)	ug/g	0.66	<0.18	7424025	<0.18	7424025	<0.18	0.18	7424025
Metals									
Hot Water Ext. Boron (B)	ug/g	-	0.051	7424833	0.11	7425151	0.073	0.050	7424833
Acid Extractable Antimony (Sb)	ug/g	1.3	<0.20	7424787	0.22	7424787	<0.20	0.20	7424787
Acid Extractable Arsenic (As)	ug/g	18	2.6	7424787	5.4	7424787	2.8	1.0	7424787
Acid Extractable Barium (Ba)	ug/g	220	16	7424787	35	7424787	15	0.50	7424787
Acid Extractable Beryllium (Be)	ug/g	2.5	<0.20	7424787	0.22	7424787	<0.20	0.20	7424787
Acid Extractable Boron (B)	ug/g	36	<5.0	7424787	<5.0	7424787	<5.0	5.0	7424787
Acid Extractable Cadmium (Cd)	ug/g	1.2	<0.10	7424787	0.31	7424787	<0.10	0.10	7424787
Acid Extractable Chromium (Cr)	ug/g	70	5.2	7424787	10	7424787	6.5	1.0	7424787
Acid Extractable Cobalt (Co)	ug/g	21	2.0	7424787	3.4	7424787	1.7	0.10	7424787
Acid Extractable Copper (Cu)	ug/g	92	4.0	7424787	10	7424787	4.3	0.50	7424787
Acid Extractable Lead (Pb)	ug/g	120	16	7424787	34	7424787	13	1.0	7424787
Acid Extractable Molybdenum (Mo)	ug/g	2	<0.50	7424787	0.97	7424787	<0.50	0.50	7424787
Acid Extractable Nickel (Ni)	ug/g	82	4.5	7424787	7.8	7424787	3.6	0.50	7424787
Acid Extractable Selenium (Se)	ug/g	1.5	<0.50	7424787	<0.50	7424787	<0.50	0.50	7424787
Acid Extractable Silver (Ag)	ug/g	0.5	<0.20	7424787	<0.20	7424787	<0.20	0.20	7424787
Acid Extractable Thallium (Tl)	ug/g	1	<0.050	7424787	0.065	7424787	<0.050	0.050	7424787
Acid Extractable Uranium (U)	ug/g	2.5	0.32	7424787	0.32	7424787	0.24	0.050	7424787
Acid Extractable Vanadium (V)	ug/g	86	7.7	7424787	22	7424787	20	5.0	7424787
Acid Extractable Zinc (Zn)	ug/g	290	22	7424787	81	7424787	37	5.0	7424787
Acid Extractable Mercury (Hg)	ug/g	0.27	<0.050	7424787	<0.050	7424787	<0.050	0.050	7424787

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 1: Full Depth Background Site Condition Standards
Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

O.REG 153 PHCS, BTEX/F1-F4 (SOIL)

Bureau Veritas ID			PWV823	PWV825			PWV825		
Sampling Date			2021/06/16	2021/06/16			2021/06/16		
COC Number			C#830132-05-01	C#830132-05-01			C#830132-05-01		
	UNITS	Criteria	BH101 S2	BH102 S2	RDL	QC Batch	BH102 S2 Lab-Dup	RDL	QC Batch
Inorganics									
Moisture	%	-	17	18	1.0	7422427			
BTEX & F1 Hydrocarbons									
Benzene	ug/g	0.02	<0.020	<0.020	0.020	7428142	<0.020	0.020	7428142
Toluene	ug/g	0.2	0.032	<0.020	0.020	7428142	<0.020	0.020	7428142
Ethylbenzene	ug/g	0.05	<0.020	<0.020	0.020	7428142	<0.020	0.020	7428142
o-Xylene	ug/g	-	<0.020	<0.020	0.020	7428142	<0.020	0.020	7428142
p+m-Xylene	ug/g	-	<0.040	<0.040	0.040	7428142	<0.040	0.040	7428142
Total Xylenes	ug/g	0.05	<0.040	<0.040	0.040	7428142	<0.040	0.040	7428142
F1 (C6-C10)	ug/g	25	<10	<10	10	7428142	<10	10	7428142
F1 (C6-C10) - BTEX	ug/g	25	<10	<10	10	7428142	<10	10	7428142
F2-F4 Hydrocarbons									
F2 (C10-C16 Hydrocarbons)	ug/g	10	<10	<10	10	7425478			
F3 (C16-C34 Hydrocarbons)	ug/g	240	**250**	<50	50	7425478			
F4 (C34-C50 Hydrocarbons)	ug/g	120	**580**	<50	50	7425478			
Reached Baseline at C50	ug/g	-	No	Yes		7425478			
Surrogate Recovery (%)									
1,4-Difluorobenzene	%	-	100	97		7428142	97		7428142
4-Bromofluorobenzene	%	-	98	104		7428142	101		7428142
D10-o-Xylene	%	-	100	93		7428142	88		7428142
D4-1,2-Dichloroethane	%	-	111	109		7428142	109		7428142
o-Terphenyl	%	-	101	103		7425478			

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 1: Full Depth Background Site Condition Standards
Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

O.REG 153 PHCS, BTEX/F1-F4 (SOIL)

Bureau Veritas ID			PWV826			PWV826			PWV828		
Sampling Date									2021/06/16		
COC Number			C#830132-05-01			C#830132-05-01			C#830132-05-01		
	UNITS	Criteria	DUP 2	RDL	QC Batch	DUP 2 Lab-Dup	RDL	QC Batch	BH103 S2	RDL	QC Batch
Inorganics											
Moisture	%	-							15	1.0	7422427
BTEX & F1 Hydrocarbons											
Benzene	ug/g	0.02	<0.020	0.020	7428142				<0.020	0.020	7428142
Toluene	ug/g	0.2	<0.020	0.020	7428142				<0.020	0.020	7428142
Ethylbenzene	ug/g	0.05	<0.020	0.020	7428142				<0.020	0.020	7428142
o-Xylene	ug/g	-	<0.020	0.020	7428142				<0.020	0.020	7428142
p+m-Xylene	ug/g	-	<0.040	0.040	7428142				<0.040	0.040	7428142
Total Xylenes	ug/g	0.05	<0.040	0.040	7428142				<0.040	0.040	7428142
F1 (C6-C10)	ug/g	25	<10	10	7428142				<10	10	7428142
F1 (C6-C10) - BTEX	ug/g	25	<10	10	7428142				<10	10	7428142
F2-F4 Hydrocarbons											
F2 (C10-C16 Hydrocarbons)	ug/g	10	<10	10	7425478	<10	10	7425478	<10	10	7425478
F3 (C16-C34 Hydrocarbons)	ug/g	240	<50	50	7425478	<50	50	7425478	<50	50	7425478
F4 (C34-C50 Hydrocarbons)	ug/g	120	<50	50	7425478	<50	50	7425478	<50	50	7425478
Reached Baseline at C50	ug/g	-	Yes		7425478	Yes		7425478	Yes		7425478
Surrogate Recovery (%)											
1,4-Difluorobenzene	%	-	100		7428142				101		7428142
4-Bromofluorobenzene	%	-	102		7428142				97		7428142
D10-o-Xylene	%	-	95		7428142				100		7428142
D4-1,2-Dichloroethane	%	-	108		7428142				108		7428142
o-Terphenyl	%	-	99		7425478	106		7425478	110		7425478

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 1: Full Depth Background Site Condition Standards
Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

O.REG 153 PHCS, BTEX/F1-F4 (SOIL)

Bureau Veritas ID			PWV830	PWV832			PWV833		
Sampling Date			2021/06/16	2021/06/17					
COC Number			C#830132-05-01	C#830132-04-01			C#830132-05-01		
	UNITS	Criteria	BH105 S3	BH106 S3	RDL	QC Batch	DUP4	RDL	QC Batch
Inorganics									
Moisture	%	-	13	15	1.0	7422427			
BTEX & F1 Hydrocarbons									
Benzene	ug/g	0.02	<0.020	<0.020	0.020	7428142	<0.020	0.020	7428142
Toluene	ug/g	0.2	<0.020	<0.020	0.020	7428142	<0.020	0.020	7428142
Ethylbenzene	ug/g	0.05	<0.020	<0.020	0.020	7428142	<0.020	0.020	7428142
o-Xylene	ug/g	-	<0.020	<0.020	0.020	7428142	<0.020	0.020	7428142
p+m-Xylene	ug/g	-	<0.040	<0.040	0.040	7428142	<0.040	0.040	7428142
Total Xylenes	ug/g	0.05	<0.040	<0.040	0.040	7428142	<0.040	0.040	7428142
F1 (C6-C10)	ug/g	25	<10	<10	10	7428142	<10	10	7428142
F1 (C6-C10) - BTEX	ug/g	25	<10	<10	10	7428142	<10	10	7428142
F2-F4 Hydrocarbons									
F2 (C10-C16 Hydrocarbons)	ug/g	10	<10	<10	10	7425478	<10	10	7425478
F3 (C16-C34 Hydrocarbons)	ug/g	240	<50	<50	50	7425478	<50	50	7425478
F4 (C34-C50 Hydrocarbons)	ug/g	120	<50	<50	50	7425478	<50	50	7425478
Reached Baseline at C50	ug/g	-	Yes	Yes		7425478	Yes		7425478
Surrogate Recovery (%)									
1,4-Difluorobenzene	%	-	100	98		7428142	105		7428142
4-Bromofluorobenzene	%	-	97	101		7428142	91		7428142
D10-o-Xylene	%	-	90	94		7428142	94		7428142
D4-1,2-Dichloroethane	%	-	104	111		7428142	104		7428142
o-Terphenyl	%	-	105	104		7425478	101		7425478

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 1: Full Depth Background Site Condition Standards
Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

O.REG 153 PHCS, BTEX/F1-F4 (SOIL)

Bureau Veritas ID			PWV835			PWV835			PWV836		
Sampling Date			2021/06/17			2021/06/17					
COC Number			C#830132-04-01			C#830132-04-01			C#830132-05-01		
	UNITS	Criteria	BH107 S3	RDL	QC Batch	BH107 S3 Lab-Dup	RDL	QC Batch	DUP3	RDL	QC Batch
Inorganics											
Moisture	%	-	14	1.0	7422427	15	1.0	7422427			
BTEX & F1 Hydrocarbons											
Benzene	ug/g	0.02	<0.020	0.020	7428142				<0.020	0.020	7428142
Toluene	ug/g	0.2	0.021	0.020	7428142				<0.020	0.020	7428142
Ethylbenzene	ug/g	0.05	<0.020	0.020	7428142				<0.020	0.020	7428142
o-Xylene	ug/g	-	<0.020	0.020	7428142				<0.020	0.020	7428142
p+m-Xylene	ug/g	-	<0.040	0.040	7428142				<0.040	0.040	7428142
Total Xylenes	ug/g	0.05	<0.040	0.040	7428142				<0.040	0.040	7428142
F1 (C6-C10)	ug/g	25	<10	10	7428142				<10	10	7428142
F1 (C6-C10) - BTEX	ug/g	25	<10	10	7428142				<10	10	7428142
F2-F4 Hydrocarbons											
F2 (C10-C16 Hydrocarbons)	ug/g	10	<10	10	7425478				<10	10	7425478
F3 (C16-C34 Hydrocarbons)	ug/g	240	<50	50	7425478				<50	50	7425478
F4 (C34-C50 Hydrocarbons)	ug/g	120	<50	50	7425478				<50	50	7425478
Reached Baseline at C50	ug/g	-	Yes		7425478				Yes		7425478
Surrogate Recovery (%)											
1,4-Difluorobenzene	%	-	99		7428142				100		7428142
4-Bromofluorobenzene	%	-	100		7428142				98		7428142
D10-o-Xylene	%	-	99		7428142				92		7428142
D4-1,2-Dichloroethane	%	-	108		7428142				109		7428142
o-Terphenyl	%	-	102		7425478				108		7425478

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 1: Full Depth Background Site Condition Standards
Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

O.REG 153 PHCS, BTEX/F1-F4 (SOIL)

Bureau Veritas ID			PWV838			PWV839			PWV841		
Sampling Date			2021/06/17						2021/06/17		
COC Number			C#830132-04-01			C#830132-05-01			C#830132-04-01		
	UNITS	Criteria	BH109 S2	RDL	QC Batch	DUP5	RDL	QC Batch	BH110 S2	RDL	QC Batch
Inorganics											
Moisture	%	-	15	1.0	7422427				10	1.0	7422427
BTEX & F1 Hydrocarbons											
Benzene	ug/g	0.02	<0.020	0.020	7428142	<0.020	0.020	7428142	<0.020	0.020	7428142
Toluene	ug/g	0.2	<0.020	0.020	7428142	<0.020	0.020	7428142	<0.020	0.020	7428142
Ethylbenzene	ug/g	0.05	<0.020	0.020	7428142	<0.020	0.020	7428142	<0.020	0.020	7428142
o-Xylene	ug/g	-	<0.020	0.020	7428142	<0.020	0.020	7428142	<0.020	0.020	7428142
p+m-Xylene	ug/g	-	<0.040	0.040	7428142	<0.040	0.040	7428142	<0.040	0.040	7428142
Total Xylenes	ug/g	0.05	<0.040	0.040	7428142	<0.040	0.040	7428142	<0.040	0.040	7428142
F1 (C6-C10)	ug/g	25	<10	10	7428142	<10	10	7428142	<10	10	7428142
F1 (C6-C10) - BTEX	ug/g	25	<10	10	7428142	<10	10	7428142	<10	10	7428142
F2-F4 Hydrocarbons											
F2 (C10-C16 Hydrocarbons)	ug/g	10	<10	10	7425478	<10	10	7425478	**14**	10	7425478
F3 (C16-C34 Hydrocarbons)	ug/g	240	<50	50	7425478	<50	50	7425478	160	50	7425478
F4 (C34-C50 Hydrocarbons)	ug/g	120	<50	50	7425478	<50	50	7425478	<50	50	7425478
Reached Baseline at C50	ug/g	-	Yes		7425478	Yes		7425478	Yes		7425478
Surrogate Recovery (%)											
1,4-Difluorobenzene	%	-	100		7428142	98		7428142	98		7428142
4-Bromofluorobenzene	%	-	97		7428142	98		7428142	101		7428142
D10-o-Xylene	%	-	98		7428142	86		7428142	97		7428142
D4-1,2-Dichloroethane	%	-	106		7428142	107		7428142	107		7428142
o-Terphenyl	%	-	104		7425478	104		7425478	105		7425478

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 1: Full Depth Background Site Condition Standards
Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

O.REG 153 PHCS, BTEX/F1-F4 (SOIL)

Bureau Veritas ID			PWV843			PWV844		
Sampling Date			2021/06/16					
COC Number			C#830132-04-01			C#830132-05-01		
	UNITS	Criteria	BH111 S2	RDL	QC Batch	DUP1	RDL	QC Batch
Inorganics								
Moisture	%	-	9.8	1.0	7422427			
BTEX & F1 Hydrocarbons								
Benzene	ug/g	0.02	<0.020	0.020	7428142	<0.020	0.020	7428142
Toluene	ug/g	0.2	<0.020	0.020	7428142	<0.020	0.020	7428142
Ethylbenzene	ug/g	0.05	<0.020	0.020	7428142	<0.020	0.020	7428142
o-Xylene	ug/g	-	<0.020	0.020	7428142	<0.020	0.020	7428142
p+m-Xylene	ug/g	-	<0.040	0.040	7428142	<0.040	0.040	7428142
Total Xylenes	ug/g	0.05	<0.040	0.040	7428142	<0.040	0.040	7428142
F1 (C6-C10)	ug/g	25	<10	10	7428142	<10	10	7428142
F1 (C6-C10) - BTEX	ug/g	25	<10	10	7428142	<10	10	7428142
F2-F4 Hydrocarbons								
F2 (C10-C16 Hydrocarbons)	ug/g	10	**12**	10	7425478	**11**	10	7425478
F3 (C16-C34 Hydrocarbons)	ug/g	240	96	50	7425478	52	50	7425478
F4 (C34-C50 Hydrocarbons)	ug/g	120	120	50	7425478	77	50	7425478
Reached Baseline at C50	ug/g	-	Yes		7425478	Yes		7425478
Surrogate Recovery (%)								
1,4-Difluorobenzene	%	-	95		7428142	97		7428142
4-Bromofluorobenzene	%	-	100		7428142	95		7428142
D10-o-Xylene	%	-	88		7428142	88		7428142
D4-1,2-Dichloroethane	%	-	105		7428142	104		7428142
o-Terphenyl	%	-	107		7425478	99		7425478

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 1: Full Depth Background Site Condition Standards
Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

PETROLEUM HYDROCARBONS (CCME)

Bureau Veritas ID			PWV823		
Sampling Date			2021/06/16		
COC Number			C#830132-05-01		
	UNITS	Criteria	BH101 S2	RDL	QC Batch
F2-F4 Hydrocarbons					
F4G-sg (Grav. Heavy Hydrocarbons)	ug/g	120	**2000**	100	7429025

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 1: Full Depth Background Site Condition Standards
Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

TEST SUMMARY

Bureau Veritas ID: PWV822
Sample ID: BH101 S1
Matrix: Soil

Collected: 2021/06/16
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	7424833	2021/06/23	2021/06/23	Medhat Nasr
Free (WAD) Cyanide	TECH	7424039	2021/06/23	2021/06/24	Louise Harding
Conductivity	AT	7427053	2021/06/24	2021/06/24	Khushbu Vijay kumar Patel
Hexavalent Chromium in Soil by IC	IC/SPEC	7424025	2021/06/23	2021/06/24	Violeta Porcila
Acid Extractable Metals by ICPMS	ICP/MS	7424787	2021/06/23	2021/06/23	Daniel Teclu
Moisture	BAL	7421320	N/A	2021/06/21	Gurpreet Kaur (ONT)
pH CaCl2 EXTRACT	AT	7424092	2021/06/23	2021/06/23	Neil Dassanayake
Sodium Adsorption Ratio (SAR)	CALC/MET	7419625	N/A	2021/06/24	Automated Statchk

Bureau Veritas ID: PWV823
Sample ID: BH101 S2
Matrix: Soil

Collected: 2021/06/16
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	7428142	N/A	2021/06/24	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	7425478	2021/06/23	2021/06/24	Dennis Ngondu
F4G (CCME Hydrocarbons Gravimetric)	BAL	7429025	2021/06/25	2021/06/25	Rashmi Dubey
Moisture	BAL	7422427	N/A	2021/06/22	Manpreet Kaur

Bureau Veritas ID: PWV824
Sample ID: BH102 S1
Matrix: Soil

Collected: 2021/06/16
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	7425151	2021/06/23	2021/06/23	Medhat Nasr
Free (WAD) Cyanide	TECH	7424039	2021/06/23	2021/06/24	Louise Harding
Conductivity	AT	7427053	2021/06/24	2021/06/24	Khushbu Vijay kumar Patel
Hexavalent Chromium in Soil by IC	IC/SPEC	7424025	2021/06/23	2021/06/24	Violeta Porcila
Acid Extractable Metals by ICPMS	ICP/MS	7424787	2021/06/23	2021/06/23	Daniel Teclu
Moisture	BAL	7421320	N/A	2021/06/21	Gurpreet Kaur (ONT)
pH CaCl2 EXTRACT	AT	7424092	2021/06/23	2021/06/23	Neil Dassanayake
Sodium Adsorption Ratio (SAR)	CALC/MET	7419625	N/A	2021/06/24	Automated Statchk

Bureau Veritas ID: PWV825
Sample ID: BH102 S2
Matrix: Soil

Collected: 2021/06/16
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	7428142	N/A	2021/06/24	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	7425478	2021/06/23	2021/06/24	Dennis Ngondu
Moisture	BAL	7422427	N/A	2021/06/22	Manpreet Kaur

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

TEST SUMMARY

Bureau Veritas ID: PWV825 Dup
Sample ID: BH102 S2
Matrix: Soil

Collected: 2021/06/16
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	7428142	N/A	2021/06/24	Lincoln Ramdahin

Bureau Veritas ID: PWV826
Sample ID: DUP 2
Matrix: Soil

Collected:
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	7424833	2021/06/23	2021/06/23	Medhat Nasr
Free (WAD) Cyanide	TECH	7424039	2021/06/23	2021/06/24	Louise Harding
Conductivity	AT	7427053	2021/06/24	2021/06/24	Khushbu Vijay kumar Patel
Hexavalent Chromium in Soil by IC	IC/SPEC	7424025	2021/06/23	2021/06/24	Violeta Porcila
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	7428142	N/A	2021/06/24	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	7425478	2021/06/23	2021/06/24	Dennis Ngondu
Acid Extractable Metals by ICPMS	ICP/MS	7424787	2021/06/23	2021/06/23	Daniel Teclu
Moisture	BAL	7421320	N/A	2021/06/21	Gurpreet Kaur (ONT)
pH CaCl2 EXTRACT	AT	7424092	2021/06/23	2021/06/23	Neil Dassanayake
Sodium Adsorption Ratio (SAR)	CALC/MET	7419625	N/A	2021/06/24	Automated Statchk

Bureau Veritas ID: PWV826 Dup
Sample ID: DUP 2
Matrix: Soil

Collected:
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Free (WAD) Cyanide	TECH	7424039	2021/06/23	2021/06/24	Louise Harding
Conductivity	AT	7427053	2021/06/24	2021/06/24	Khushbu Vijay kumar Patel
Hexavalent Chromium in Soil by IC	IC/SPEC	7424025	2021/06/23	2021/06/24	Violeta Porcila
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	7425478	2021/06/23	2021/06/24	Dennis Ngondu

Bureau Veritas ID: PWV827
Sample ID: BH103 S1
Matrix: Soil

Collected: 2021/06/16
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	7424833	2021/06/23	2021/06/23	Medhat Nasr
Free (WAD) Cyanide	TECH	7424039	2021/06/23	2021/06/24	Louise Harding
Conductivity	AT	7427053	2021/06/24	2021/06/24	Khushbu Vijay kumar Patel
Hexavalent Chromium in Soil by IC	IC/SPEC	7424025	2021/06/23	2021/06/24	Violeta Porcila
Acid Extractable Metals by ICPMS	ICP/MS	7426787	2021/06/24	2021/06/24	Daniel Teclu
Moisture	BAL	7421320	N/A	2021/06/21	Gurpreet Kaur (ONT)
pH CaCl2 EXTRACT	AT	7424092	2021/06/23	2021/06/23	Neil Dassanayake
Sodium Adsorption Ratio (SAR)	CALC/MET	7419625	N/A	2021/06/24	Automated Statchk

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

TEST SUMMARY

Bureau Veritas ID: PWV827 Dup
Sample ID: BH103 S1
Matrix: Soil

Collected: 2021/06/16
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Acid Extractable Metals by ICPMS	ICP/MS	7426787	2021/06/24	2021/06/24	Daniel Teclu

Bureau Veritas ID: PWV828
Sample ID: BH103 S2
Matrix: Soil

Collected: 2021/06/16
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	7428142	N/A	2021/06/24	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	7425478	2021/06/23	2021/06/24	Dennis Ngondu
Moisture	BAL	7422427	N/A	2021/06/22	Manpreet Kaur

Bureau Veritas ID: PWV829
Sample ID: BH105 S1
Matrix: Soil

Collected: 2021/06/16
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	7424833	2021/06/23	2021/06/23	Medhat Nasr
Free (WAD) Cyanide	TECH	7424039	2021/06/23	2021/06/24	Louise Harding
Conductivity	AT	7427053	2021/06/24	2021/06/24	Khushbu Vijay kumar Patel
Hexavalent Chromium in Soil by IC	IC/SPEC	7424025	2021/06/23	2021/06/24	Violeta Porcila
Acid Extractable Metals by ICPMS	ICP/MS	7424787	2021/06/23	2021/06/23	Daniel Teclu
Moisture	BAL	7421320	N/A	2021/06/21	Gurpreet Kaur (ONT)
pH CaCl2 EXTRACT	AT	7424092	2021/06/23	2021/06/23	Neil Dassanayake
Sodium Adsorption Ratio (SAR)	CALC/MET	7419625	N/A	2021/06/24	Automated Statchk

Bureau Veritas ID: PWV830
Sample ID: BH105 S3
Matrix: Soil

Collected: 2021/06/16
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	7428142	N/A	2021/06/24	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	7425478	2021/06/23	2021/06/24	Dennis Ngondu
Moisture	BAL	7422427	N/A	2021/06/22	Manpreet Kaur

Bureau Veritas ID: PWV831
Sample ID: BH106 S1
Matrix: Soil

Collected: 2021/06/17
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	7424833	2021/06/23	2021/06/23	Medhat Nasr
Free (WAD) Cyanide	TECH	7424039	2021/06/23	2021/06/24	Louise Harding
Conductivity	AT	7427053	2021/06/24	2021/06/24	Khushbu Vijay kumar Patel
Hexavalent Chromium in Soil by IC	IC/SPEC	7424025	2021/06/23	2021/06/24	Violeta Porcila
Acid Extractable Metals by ICPMS	ICP/MS	7424787	2021/06/23	2021/06/23	Daniel Teclu
Moisture	BAL	7421320	N/A	2021/06/21	Gurpreet Kaur (ONT)

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

TEST SUMMARY

Bureau Veritas ID: PWV831 **Collected:** 2021/06/17
Sample ID: BH106 S1 **Shipped:**
Matrix: Soil **Received:** 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
pH CaCl2 EXTRACT	AT	7424092	2021/06/23	2021/06/23	Neil Dassanayake
Sodium Adsorption Ratio (SAR)	CALC/MET	7419625	N/A	2021/06/24	Automated Statchk

Bureau Veritas ID: PWV831 Dup **Collected:** 2021/06/17
Sample ID: BH106 S1 **Shipped:**
Matrix: Soil **Received:** 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
pH CaCl2 EXTRACT	AT	7424092	2021/06/23	2021/06/23	Neil Dassanayake

Bureau Veritas ID: PWV832 **Collected:** 2021/06/17
Sample ID: BH106 S3 **Shipped:**
Matrix: Soil **Received:** 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	7428142	N/A	2021/06/24	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	7425478	2021/06/23	2021/06/24	Dennis Ngondu
Moisture	BAL	7422427	N/A	2021/06/22	Manpreet Kaur

Bureau Veritas ID: PWV833 **Collected:**
Sample ID: DUP4 **Shipped:**
Matrix: Soil **Received:** 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	7424833	2021/06/23	2021/06/23	Medhat Nasr
Free (WAD) Cyanide	TECH	7424039	2021/06/23	2021/06/24	Louise Harding
Conductivity	AT	7427053	2021/06/24	2021/06/24	Khushbu Vijay kumar Patel
Hexavalent Chromium in Soil by IC	IC/SPEC	7424025	2021/06/23	2021/06/24	Violeta Porcila
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	7428142	N/A	2021/06/24	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	7425478	2021/06/23	2021/06/24	Dennis Ngondu
Acid Extractable Metals by ICPMS	ICP/MS	7424787	2021/06/23	2021/06/23	Daniel Teclu
Moisture	BAL	7421320	N/A	2021/06/21	Gurpreet Kaur (ONT)
pH CaCl2 EXTRACT	AT	7424092	2021/06/23	2021/06/23	Neil Dassanayake
Sodium Adsorption Ratio (SAR)	CALC/MET	7419625	N/A	2021/06/24	Automated Statchk

Bureau Veritas ID: PWV833 Dup **Collected:**
Sample ID: DUP4 **Shipped:**
Matrix: Soil **Received:** 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	7421320	N/A	2021/06/21	Gurpreet Kaur (ONT)

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

TEST SUMMARY

Bureau Veritas ID: PWV834
Sample ID: BH107 S1
Matrix: Soil

Collected: 2021/06/17
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	7424833	2021/06/23	2021/06/23	Medhat Nasr
Free (WAD) Cyanide	TECH	7424039	2021/06/23	2021/06/24	Louise Harding
Conductivity	AT	7427053	2021/06/24	2021/06/24	Khushbu Vijay kumar Patel
Hexavalent Chromium in Soil by IC	IC/SPEC	7424025	2021/06/23	2021/06/24	Violeta Porcila
Acid Extractable Metals by ICPMS	ICP/MS	7424787	2021/06/23	2021/06/23	Daniel Teclu
Moisture	BAL	7421320	N/A	2021/06/21	Gurpreet Kaur (ONT)
pH CaCl2 EXTRACT	AT	7424092	2021/06/23	2021/06/23	Neil Dassanayake
Sodium Adsorption Ratio (SAR)	CALC/MET	7419625	N/A	2021/06/24	Automated Statchk

Bureau Veritas ID: PWV835
Sample ID: BH107 S3
Matrix: Soil

Collected: 2021/06/17
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	7428142	N/A	2021/06/24	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	7425478	2021/06/23	2021/06/24	Dennis Ngondu
Moisture	BAL	7422427	N/A	2021/06/22	Manpreet Kaur

Bureau Veritas ID: PWV835 Dup
Sample ID: BH107 S3
Matrix: Soil

Collected: 2021/06/17
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	7422427	N/A	2021/06/22	Manpreet Kaur

Bureau Veritas ID: PWV836
Sample ID: DUP3
Matrix: Soil

Collected:
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	7424833	2021/06/23	2021/06/23	Medhat Nasr
Free (WAD) Cyanide	TECH	7424039	2021/06/23	2021/06/24	Louise Harding
Conductivity	AT	7427053	2021/06/24	2021/06/24	Khushbu Vijay kumar Patel
Hexavalent Chromium in Soil by IC	IC/SPEC	7424025	2021/06/23	2021/06/24	Violeta Porcila
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	7428142	N/A	2021/06/24	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	7425478	2021/06/23	2021/06/24	Dennis Ngondu
Acid Extractable Metals by ICPMS	ICP/MS	7424787	2021/06/23	2021/06/23	Daniel Teclu
Moisture	BAL	7421320	N/A	2021/06/21	Gurpreet Kaur (ONT)
pH CaCl2 EXTRACT	AT	7424092	2021/06/23	2021/06/23	Neil Dassanayake
Sodium Adsorption Ratio (SAR)	CALC/MET	7419625	N/A	2021/06/24	Automated Statchk

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

TEST SUMMARY

Bureau Veritas ID: PWV837 **Collected:** 2021/06/17
Sample ID: BH109 S1 **Shipped:**
Matrix: Soil **Received:** 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	7424833	2021/06/23	2021/06/23	Medhat Nasr
Free (WAD) Cyanide	TECH	7424039	2021/06/23	2021/06/24	Louise Harding
Conductivity	AT	7427053	2021/06/24	2021/06/24	Khushbu Vijay kumar Patel
Hexavalent Chromium in Soil by IC	IC/SPEC	7424025	2021/06/23	2021/06/24	Violeta Porcila
Acid Extractable Metals by ICPMS	ICP/MS	7424787	2021/06/23	2021/06/23	Daniel Teclu
Moisture	BAL	7421320	N/A	2021/06/21	Gurpreet Kaur (ONT)
pH CaCl2 EXTRACT	AT	7424092	2021/06/23	2021/06/23	Neil Dassanayake
Sodium Adsorption Ratio (SAR)	CALC/MET	7419625	N/A	2021/06/24	Automated Statchk

Bureau Veritas ID: PWV838 **Collected:** 2021/06/17
Sample ID: BH109 S2 **Shipped:**
Matrix: Soil **Received:** 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	7428142	N/A	2021/06/24	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	7425478	2021/06/23	2021/06/24	Dennis Ngondu
Moisture	BAL	7422427	N/A	2021/06/22	Manpreet Kaur

Bureau Veritas ID: PWV839 **Collected:**
Sample ID: DUP5 **Shipped:**
Matrix: Soil **Received:** 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	7424833	2021/06/23	2021/06/23	Medhat Nasr
Free (WAD) Cyanide	TECH	7424039	2021/06/23	2021/06/24	Louise Harding
Conductivity	AT	7427053	2021/06/24	2021/06/24	Khushbu Vijay kumar Patel
Hexavalent Chromium in Soil by IC	IC/SPEC	7424025	2021/06/23	2021/06/24	Violeta Porcila
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	7428142	N/A	2021/06/24	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	7425478	2021/06/23	2021/06/24	Dennis Ngondu
Acid Extractable Metals by ICPMS	ICP/MS	7424787	2021/06/23	2021/06/23	Daniel Teclu
Moisture	BAL	7421320	N/A	2021/06/21	Gurpreet Kaur (ONT)
pH CaCl2 EXTRACT	AT	7424092	2021/06/23	2021/06/23	Neil Dassanayake
Sodium Adsorption Ratio (SAR)	CALC/MET	7419625	N/A	2021/06/24	Automated Statchk

Bureau Veritas ID: PWV840 **Collected:** 2021/06/17
Sample ID: BH110 S1 **Shipped:**
Matrix: Soil **Received:** 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	7424833	2021/06/23	2021/06/23	Medhat Nasr
Free (WAD) Cyanide	TECH	7424039	2021/06/23	2021/06/24	Louise Harding
Conductivity	AT	7427053	2021/06/24	2021/06/24	Khushbu Vijay kumar Patel
Hexavalent Chromium in Soil by IC	IC/SPEC	7424025	2021/06/23	2021/06/24	Violeta Porcila
Acid Extractable Metals by ICPMS	ICP/MS	7424787	2021/06/23	2021/06/23	Daniel Teclu

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

TEST SUMMARY

Bureau Veritas ID: PWV840
Sample ID: BH110 S1
Matrix: Soil
Collected: 2021/06/17
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	7421320	N/A	2021/06/21	Gurpreet Kaur (ONT)
pH CaCl2 EXTRACT	AT	7424092	2021/06/23	2021/06/23	Neil Dassanayake
Sodium Adsorption Ratio (SAR)	CALC/MET	7419625	N/A	2021/06/24	Automated Statchk

Bureau Veritas ID: PWV841
Sample ID: BH110 S2
Matrix: Soil
Collected: 2021/06/17
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	7428142	N/A	2021/06/24	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	7425478	2021/06/23	2021/06/24	Dennis Ngondu
Moisture	BAL	7422427	N/A	2021/06/22	Manpreet Kaur

Bureau Veritas ID: PWV842
Sample ID: BH111 S1
Matrix: Soil
Collected: 2021/06/16
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	7425151	2021/06/23	2021/06/23	Medhat Nasr
Free (WAD) Cyanide	TECH	7424039	2021/06/23	2021/06/24	Louise Harding
Conductivity	AT	7427053	2021/06/24	2021/06/24	Khushbu Vijay kumar Patel
Hexavalent Chromium in Soil by IC	IC/SPEC	7424025	2021/06/23	2021/06/24	Violeta Porcila
Acid Extractable Metals by ICPMS	ICP/MS	7424787	2021/06/23	2021/06/23	Daniel Teclu
Moisture	BAL	7421320	N/A	2021/06/21	Gurpreet Kaur (ONT)
pH CaCl2 EXTRACT	AT	7424092	2021/06/23	2021/06/23	Neil Dassanayake
Sodium Adsorption Ratio (SAR)	CALC/MET	7419625	N/A	2021/06/24	Automated Statchk

Bureau Veritas ID: PWV843
Sample ID: BH111 S2
Matrix: Soil
Collected: 2021/06/16
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	7428142	N/A	2021/06/24	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	7425478	2021/06/23	2021/06/24	Dennis Ngondu
Moisture	BAL	7422427	N/A	2021/06/22	Manpreet Kaur

Bureau Veritas ID: PWV844
Sample ID: DUP1
Matrix: Soil
Collected:
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	7424833	2021/06/23	2021/06/23	Medhat Nasr
Free (WAD) Cyanide	TECH	7424039	2021/06/23	2021/06/24	Louise Harding
Conductivity	AT	7427053	2021/06/24	2021/06/24	Khushbu Vijay kumar Patel
Hexavalent Chromium in Soil by IC	IC/SPEC	7424025	2021/06/23	2021/06/24	Violeta Porcila

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

TEST SUMMARY

Bureau Veritas ID: PWV844
Sample ID: DUP1
Matrix: Soil

Collected:
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	7428142	N/A	2021/06/24	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	7425478	2021/06/23	2021/06/24	Dennis Ngondu
Acid Extractable Metals by ICPMS	ICP/MS	7424787	2021/06/23	2021/06/23	Daniel Teclu
Moisture	BAL	7421320	N/A	2021/06/21	Gurpreet Kaur (ONT)
pH CaCl2 EXTRACT	AT	7424092	2021/06/23	2021/06/23	Neil Dassanayake
Sodium Adsorption Ratio (SAR)	CALC/MET	7419625	N/A	2021/06/24	Automated Statchk

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

GENERAL COMMENTS

Revised Report (2021/11/11) : Regulatory criteria amended per client request.

Revised Report (2021/11/10) : Regulatory criteria amended per client request.

Results relate only to the items tested.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

QUALITY ASSURANCE REPORT

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7425478	o-Terphenyl	2021/06/24	99	60 - 130	103	60 - 130	106	%		
7428142	1,4-Difluorobenzene	2021/06/24	93	60 - 140	98	60 - 140	100	%		
7428142	4-Bromofluorobenzene	2021/06/24	104	60 - 140	103	60 - 140	95	%		
7428142	D10-o-Xylene	2021/06/24	95	60 - 140	88	60 - 140	85	%		
7428142	D4-1,2-Dichloroethane	2021/06/24	105	60 - 140	104	60 - 140	111	%		
7421320	Moisture	2021/06/21							6.1	20
7422427	Moisture	2021/06/22							2.7	20
7424025	Chromium (VI)	2021/06/24	50 (1)	70 - 130	93	80 - 120	<0.18	ug/g	NC	35
7424039	WAD Cyanide (Free)	2021/06/24	96	75 - 125	92	80 - 120	<0.01	ug/g	NC	35
7424092	Available (CaCl2) pH	2021/06/23			100	97 - 103			0.52	N/A
7424787	Acid Extractable Antimony (Sb)	2021/06/23	95	75 - 125	98	80 - 120	<0.20	ug/g	NC	30
7424787	Acid Extractable Arsenic (As)	2021/06/23	95	75 - 125	94	80 - 120	<1.0	ug/g	12	30
7424787	Acid Extractable Barium (Ba)	2021/06/23	NC	75 - 125	93	80 - 120	<0.50	ug/g	3.6	30
7424787	Acid Extractable Beryllium (Be)	2021/06/23	95	75 - 125	97	80 - 120	<0.20	ug/g	5.1	30
7424787	Acid Extractable Boron (B)	2021/06/23	91	75 - 125	97	80 - 120	<5.0	ug/g	NC	30
7424787	Acid Extractable Cadmium (Cd)	2021/06/23	96	75 - 125	94	80 - 120	<0.10	ug/g	29	30
7424787	Acid Extractable Chromium (Cr)	2021/06/23	102	75 - 125	94	80 - 120	<1.0	ug/g	0.94	30
7424787	Acid Extractable Cobalt (Co)	2021/06/23	96	75 - 125	93	80 - 120	<0.10	ug/g	4.4	30
7424787	Acid Extractable Copper (Cu)	2021/06/23	99	75 - 125	93	80 - 120	<0.50	ug/g	0.79	30
7424787	Acid Extractable Lead (Pb)	2021/06/23	97	75 - 125	94	80 - 120	<1.0	ug/g	0.42	30
7424787	Acid Extractable Mercury (Hg)	2021/06/23	85	75 - 125	91	80 - 120	<0.050	ug/g		
7424787	Acid Extractable Molybdenum (Mo)	2021/06/23	98	75 - 125	93	80 - 120	<0.50	ug/g	1.9	30
7424787	Acid Extractable Nickel (Ni)	2021/06/23	98	75 - 125	97	80 - 120	<0.50	ug/g	1.1	30
7424787	Acid Extractable Selenium (Se)	2021/06/23	99	75 - 125	97	80 - 120	<0.50	ug/g	NC	30
7424787	Acid Extractable Silver (Ag)	2021/06/23	95	75 - 125	93	80 - 120	<0.20	ug/g	NC	30
7424787	Acid Extractable Thallium (Tl)	2021/06/23	95	75 - 125	93	80 - 120	<0.050	ug/g	1.5	30
7424787	Acid Extractable Uranium (U)	2021/06/23	94	75 - 125	92	80 - 120	<0.050	ug/g	2.5	30
7424787	Acid Extractable Vanadium (V)	2021/06/23	NC	75 - 125	97	80 - 120	<5.0	ug/g	0.60	30
7424787	Acid Extractable Zinc (Zn)	2021/06/23	NC	75 - 125	98	80 - 120	<5.0	ug/g	0.83	30
7424833	Hot Water Ext. Boron (B)	2021/06/23	111	75 - 125	102	75 - 125	<0.050	ug/g	NC	40
7425151	Hot Water Ext. Boron (B)	2021/06/23	111	75 - 125	104	75 - 125	<0.050	ug/g	5.9	40

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7425478	F2 (C10-C16 Hydrocarbons)	2021/06/24	86	50 - 130	88	80 - 120	<10	ug/g	NC	30
7425478	F3 (C16-C34 Hydrocarbons)	2021/06/24	112	50 - 130	108	80 - 120	<50	ug/g	NC	30
7425478	F4 (C34-C50 Hydrocarbons)	2021/06/24	128	50 - 130	119	80 - 120	<50	ug/g	NC	30
7426787	Acid Extractable Antimony (Sb)	2021/06/24	92	75 - 125	97	80 - 120	<0.20	ug/g	NC	30
7426787	Acid Extractable Arsenic (As)	2021/06/24	93	75 - 125	100	80 - 120	<1.0	ug/g	NC	30
7426787	Acid Extractable Barium (Ba)	2021/06/24	90	75 - 125	96	80 - 120	<0.50	ug/g	5.9	30
7426787	Acid Extractable Beryllium (Be)	2021/06/24	95	75 - 125	95	80 - 120	<0.20	ug/g	NC	30
7426787	Acid Extractable Boron (B)	2021/06/24	90	75 - 125	94	80 - 120	<5.0	ug/g	NC	30
7426787	Acid Extractable Cadmium (Cd)	2021/06/24	97	75 - 125	98	80 - 120	<0.10	ug/g	NC	30
7426787	Acid Extractable Chromium (Cr)	2021/06/24	92	75 - 125	99	80 - 120	<1.0	ug/g	3.2	30
7426787	Acid Extractable Cobalt (Co)	2021/06/24	93	75 - 125	99	80 - 120	<0.10	ug/g	1.6	30
7426787	Acid Extractable Copper (Cu)	2021/06/24	90	75 - 125	95	80 - 120	<0.50	ug/g	5.0	30
7426787	Acid Extractable Lead (Pb)	2021/06/24	91	75 - 125	97	80 - 120	<1.0	ug/g	0.11	30
7426787	Acid Extractable Mercury (Hg)	2021/06/24	82	75 - 125	93	80 - 120	<0.050	ug/g	NC	30
7426787	Acid Extractable Molybdenum (Mo)	2021/06/24	96	75 - 125	98	80 - 120	<0.50	ug/g	NC	30
7426787	Acid Extractable Nickel (Ni)	2021/06/24	90	75 - 125	98	80 - 120	<0.50	ug/g	7.4	30
7426787	Acid Extractable Selenium (Se)	2021/06/24	95	75 - 125	104	80 - 120	<0.50	ug/g	NC	30
7426787	Acid Extractable Silver (Ag)	2021/06/24	94	75 - 125	96	80 - 120	<0.20	ug/g	NC	30
7426787	Acid Extractable Thallium (Tl)	2021/06/24	93	75 - 125	97	80 - 120	<0.050	ug/g	NC	30
7426787	Acid Extractable Uranium (U)	2021/06/24	97	75 - 125	101	80 - 120	<0.050	ug/g	4.5	30
7426787	Acid Extractable Vanadium (V)	2021/06/24	NC	75 - 125	97	80 - 120	<5.0	ug/g	9.8	30
7426787	Acid Extractable Zinc (Zn)	2021/06/24	99	75 - 125	97	80 - 120	<5.0	ug/g	3.8	30
7427053	Conductivity	2021/06/24			100	90 - 110	<0.002	mS/cm	2.0	10
7428142	Benzene	2021/06/24	94	50 - 140	88	50 - 140	<0.020	ug/g	NC	50
7428142	Ethylbenzene	2021/06/24	106	50 - 140	97	50 - 140	<0.020	ug/g	NC	50
7428142	F1 (C6-C10) - BTEX	2021/06/24					<10	ug/g	NC	30
7428142	F1 (C6-C10)	2021/06/24	89	60 - 140	81	80 - 120	<10	ug/g	NC	30
7428142	o-Xylene	2021/06/24	103	50 - 140	95	50 - 140	<0.020	ug/g	NC	50
7428142	p+m-Xylene	2021/06/24	102	50 - 140	93	50 - 140	<0.040	ug/g	NC	50
7428142	Toluene	2021/06/24	95	50 - 140	88	50 - 140	<0.020	ug/g	NC	50
7428142	Total Xylenes	2021/06/24					<0.040	ug/g	NC	50

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7429025	F4G-sg (Grav. Heavy Hydrocarbons)	2021/06/25	97	65 - 135	102	65 - 135	<100	ug/g	0	50

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) The matrix spike recovery was below the lower control limit. This may be due in part to the reducing environment of the sample. The matrix spike was reanalyzed to confirm result.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

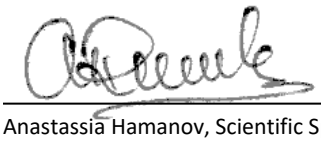
Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:



Anastassia Hamanov, Scientific Specialist

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Laboratories
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel (905) 817-5700 Toll-free 800-563-6266 Fax (905) 817-5777 www.bvlabs.com

CHAIN OF CUSTODY RECORD

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#36876 Grounded Engineering Inc.	Company Name:		Quotation #:	C04975	BV Labs Job #:	Bottle Order #: 830132
Attention:	Jory Hunter	Attention:	Jory Hunter	P.O. #:			
Address:	12 Banigan Drive Toronto ON M4H 1E9	Address:		Project:	21-090	COC #: C#830132-05-01	Project Manager: Marijane Cruz
Tel:	Fax:	Tel:	Fax:	Project Name:			
Email:	jhunter@groundedeng.ca	Email:	jhunter@groundedeng.ca	Site #:	Toronto Island		
				Sampled By:			

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BV LABS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)	Other Regulations	Special Instructions
☐ Table 1 ☑ Res/Park ☐ Medium/Fine ☐ Table 2 ☐ Ind/Comm ☑ Coarse ☑ Table 3 ☐ Agri/Other ☐ For RSC ☐ Table ___	☐ CCME ☐ Sanitary Sewer Bylaw ☐ Reg 558 ☐ Storm Sewer Bylaw ☐ MISA Municipality ___ ☐ PWQO ☐ Reg 406 Table ___ ☐ Other ___	

Include Criteria on Certificate of Analysis (Y/N)? ___

Turnaround Time (TAT) Required
Please provide advance notice for rush projects

Regular (Standard) TAT:
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ___ Time Required: ___
Rush Confirmation Number: ___ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	O.Reg 153 Metals & Inorganics Pkg (Soil)	O.Reg 153 PHCs, BTEX/F1-F4 (Soil)	O.Reg 558 TCLP Benzo(a)pyrene	O.Reg 558 TCLP Inorganics Package	O.Reg 558 TCLP PCBs	O.Reg 558 TCLP VOCs by HS	TCLP Leachate Preparation	PWQO Metals and Inorganics	Asbestos by PLM - 0.5 RDL	# of Bottles	Comments
1		BH101 S1	16/06/21		Soil		✓									1	
2		BH101 S2	16/06/21		Soil			✓								5	
3		BH102 S1	16/06/21		Soil		✓									1	
4		BH102 S2	16/06/21		Soil			✓								5	
5		DUP2			Soil		✓	✓								6	
6		BH103 S1	16/06/21		Soil		✓									1	
7		BH103 S2	16/06/21		Soil			✓								5	
8		BH105 S1	16/06/21		Soil		✓									1	
9		BH105 S3	16/06/21		Soil			✓								5	
10		BH106 S1	17/06/21		Soil		✓									1	

21-Jun-21 15:34
Marijane Cruz
C1H0487
SYK ENV-809

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Leland Johnston	21/06/17	5PM		21/06/21	15:34	
					15:34	

Laboratory Use Only				
Time Sensitive	Temperature (°C) on Recei: 16/9/7	Custody Seal Present	Yes	No
		Intact		

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVLABS.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

White: BV Labs Yellow: Client

Bureau Veritas Canada (2019) Inc.

WH402835

Bureau Veritas Laboratories
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel (905) 817-5700 Toll-free 800-563-6266 Fax (905) 817-5777 www.bvlabs.com

CHAIN OF CUSTODY RECORD

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#36876 Grounded Engineering Inc.	Company Name:		Quotation #:	C04975	BV Labs Job #:	Bottle Order #: 830132
Attention:	Jory Hunter	Attention:	Jory Hunter	P.O. #:			
Address:	12 Banigan Drive Toronto ON M4H 1E9	Address:		Project:	21-090	COC #: C#830132-04-01	Project Manager: Marijane Cruz
Tel:	Fax:	Tel:	Fax:	Project Name:			
Email:	jhunter@groundedeng.ca	Email:	jhunter@groundedeng.ca	Site #:	Toronto Island		
				Sampled By:			

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BV LABS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)	Other Regulations	Special Instructions
☐ Table 1 ☑ Res/Park ☐ Medium/Fine ☐ Table 2 ☐ Ind/Comm ☑ Coarse ☑ Table 3 ☐ Agri/Other ☐ For RSC ☐ Table ___	☐ CCME ☐ Sanitary Sewer Bylaw ☐ Reg 558 ☐ Storm Sewer Bylaw ☐ MISA Municipality ___ ☐ PWQO ☐ Reg 406 Table ___ ☐ Other ___	

Include Criteria on Certificate of Analysis (Y/N)? ___

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: ☑
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ___ Time Required: ___ ☐
Rush Confirmation Number: ___ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	ANALYSIS REQUESTED (PLEASE BE SPECIFIC): O. Reg 153 Metals & Inorganics Pkg (Soil)	O. Reg 153 PHCs, BTEX/F1-F4 (Soil)	O. Reg 558 TCLP Benzo(a)pyrene	O. Reg 558 TCLP Inorganics Package	O. Reg 558 TCLP PCBs	O. Reg 558 TCLP VOCs by HS	TCLP Leachate Preparation	PWQO Metals and Inorganics	Asbestos by PLM - 0.5 RDL		# of Bottles	Comments
1		BH10653	17/06/21		Soil			✓									5	
2		DUP4	17		Soil		✓	✓									6	
3		BH10751	17/06/21		Soil		✓										1	
4		BH10753	17/06/21		Soil			✓									5	
5		DUP3			Soil		✓	✓									6	
6		BH109 S1	17/06/21		Soil		✓										1	
7		BH109 S2	17/06/21		Soil			✓									5	
8		DUP5			Soil		✓	✓									6	
9		BH110 S1	17/06/21		Soil		✓										1	
10		BH110 S2	17/06/21		Soil			✓									5	

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Laboratory Use Only: Time Sensitive	Temperature (°C) on Rece	Custody Seal Present	Yes	No
Leland Johnston	21/06/17	5PM							Intact		

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVLABS.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

White: BV Labs Yellow: Client

Bureau Veritas Canada (2019) Inc.

Bureau Veritas Laboratories
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel (905) 817-5700 Toll-free 800-563-6266 Fax (905) 817-5777 www.bvlabs.com

CHAIN OF CUSTODY RECORD

INVOICE TO:	REPORT TO:	PROJECT INFORMATION:	Laboratory Use Only:
Company Name: #36876 Grounded Engineering Inc.	Company Name:	Quotation #: CQ4975	BV Labs Job #: / Bottle Order #: 830132
Attention: Jory Hunter	Attention: Jory Hunter	P.O. #:	
Address: 12 Banigan Drive, Toronto ON M4H 1E9	Address:	Project: 21-090	COC #: C#830132-08-01 / Project Manager: Manjane Cruz
Tel: Fax:	Tel: Fax:	Project Name:	
Email: jhunter@groundedeng.ca	Email: jhunter@groundedeng.ca	Site #: Toronto Island	
		Sampled By:	

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BV LABS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)	Other Regulations	Special Instructions
☐ Table 1 ☑ Res/Park ☐ Medium/Fine	☐ CCME ☐ Sanitary Sewer Bylaw	
☐ Table 2 ☐ Ind/Comm ☑ Coarse	☐ Reg 558 ☐ Storm Sewer Bylaw	
☑ Table 3 ☐ Agr/Other ☐ For RSC	☐ MISA Municipality	
☐ Table ___	☐ PWQO ☐ Reg 406 Table	
	☐ Other	

Include Criteria on Certificate of Analysis (Y/N)? ____

ANALYSIS REQUESTED (PLEASE BE SPECIFIC):

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	O.Reg 153 Metals & Inorganics Pkg (Soil)	O.Reg 153 PHCs, BTEX/F1-F4 (Soil)	O.Reg 558 TCLP Benzo(a)pyrene	O.Reg 558 TCLP Inorganics Package	O.Reg 558 TCLP PCBs	O.Reg 558 TCLP VOCs by HS	TCLP Leachate Preparation	PWQO Metals and Inorganics	Asbestos by PLM - 0.5 RDL		# of Bottles	Comments
1		BH111 S1	16/06/21		Soil		✓										1	
2		BH111 S2	16/06/21		Soil			✓									5	
3		DUP 1			Soil		✓	✓									6	
4																		
5																		
6																		
7																		
8																		
9																		
10																		

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: ☑
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ____ Time Required: ____ ☐
Rush Confirmation Number: ____ *(call lab for #)*

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time
Leland Johnston	21/06/17	5PM			

jars used and not submitted

Laboratory Use Only: Time Sensitive / Temperature (°C) on Recei / Custody Seal: Present ☐ Yes ☐ No / Intact ☐ ☐

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVLABS.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

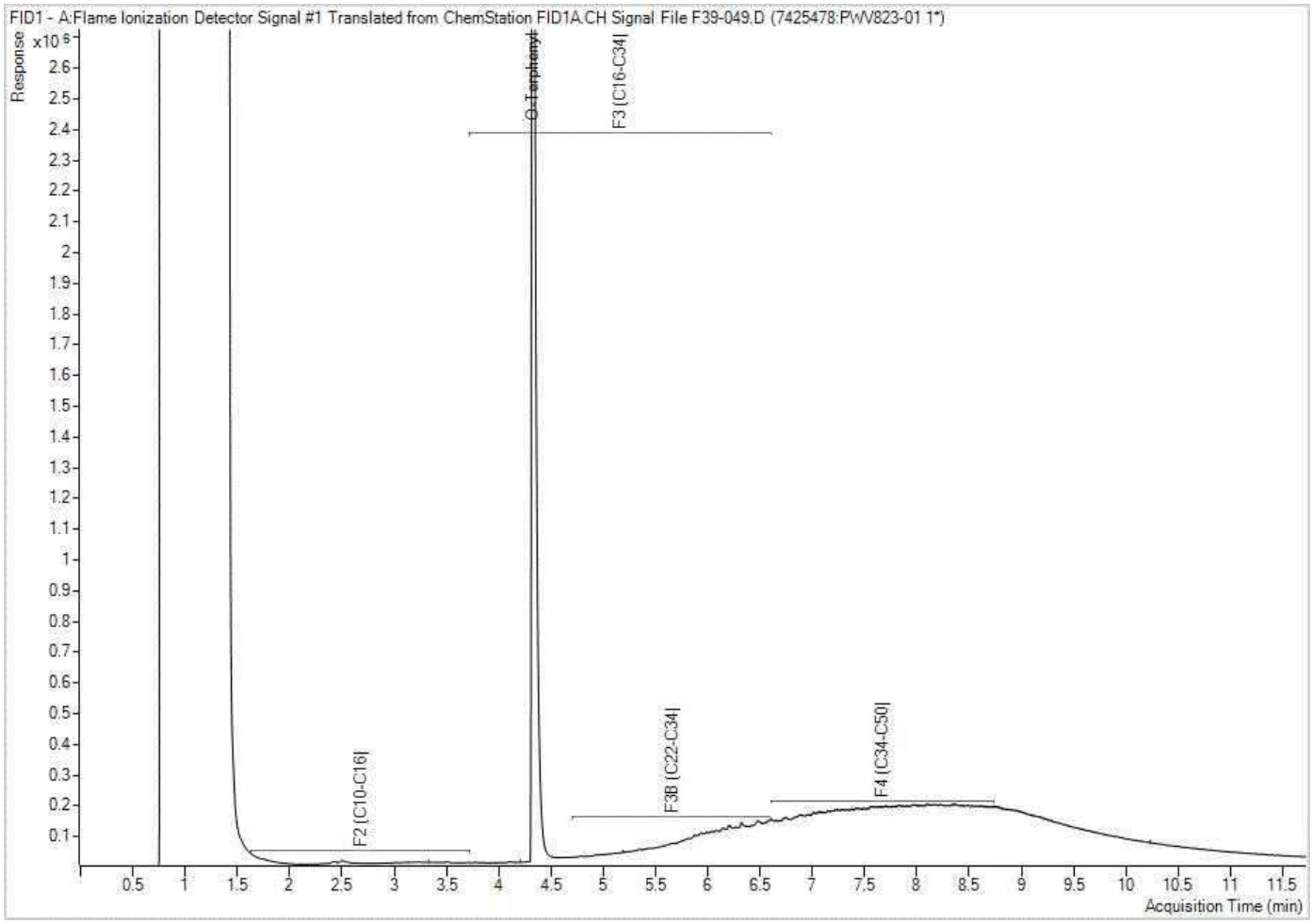
White: BV Labs Yellow: Client

Bureau Veritas Canada (2019) Inc.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11
Bureau Veritas Sample: PWV823

Grounded Engineering Inc.
Client Project #: 21-090
Project name: Toronto Island
Client ID: BH101 S2

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

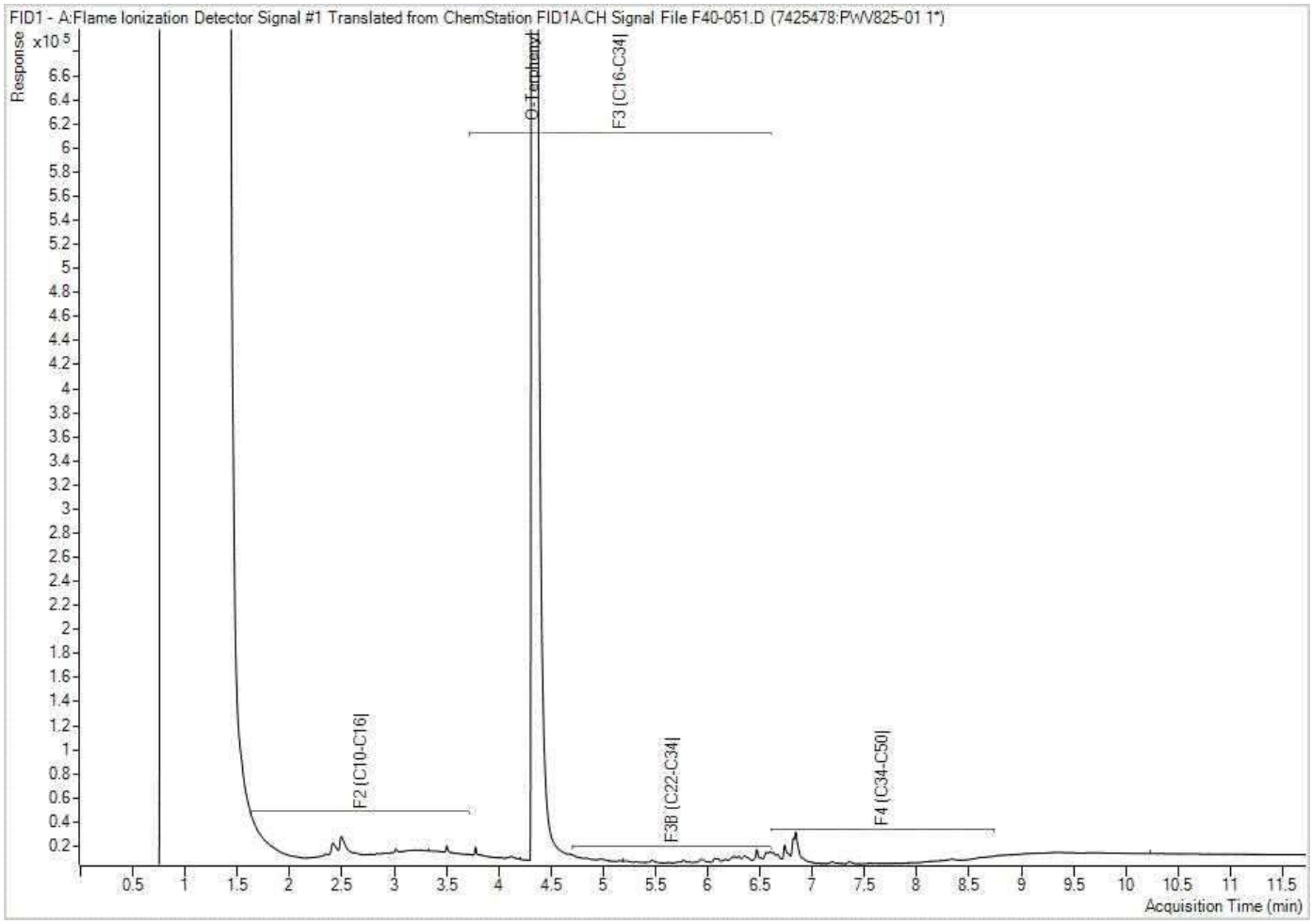


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11
Bureau Veritas Sample: PWV825

Grounded Engineering Inc.
Client Project #: 21-090
Project name: Toronto Island
Client ID: BH102 S2

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

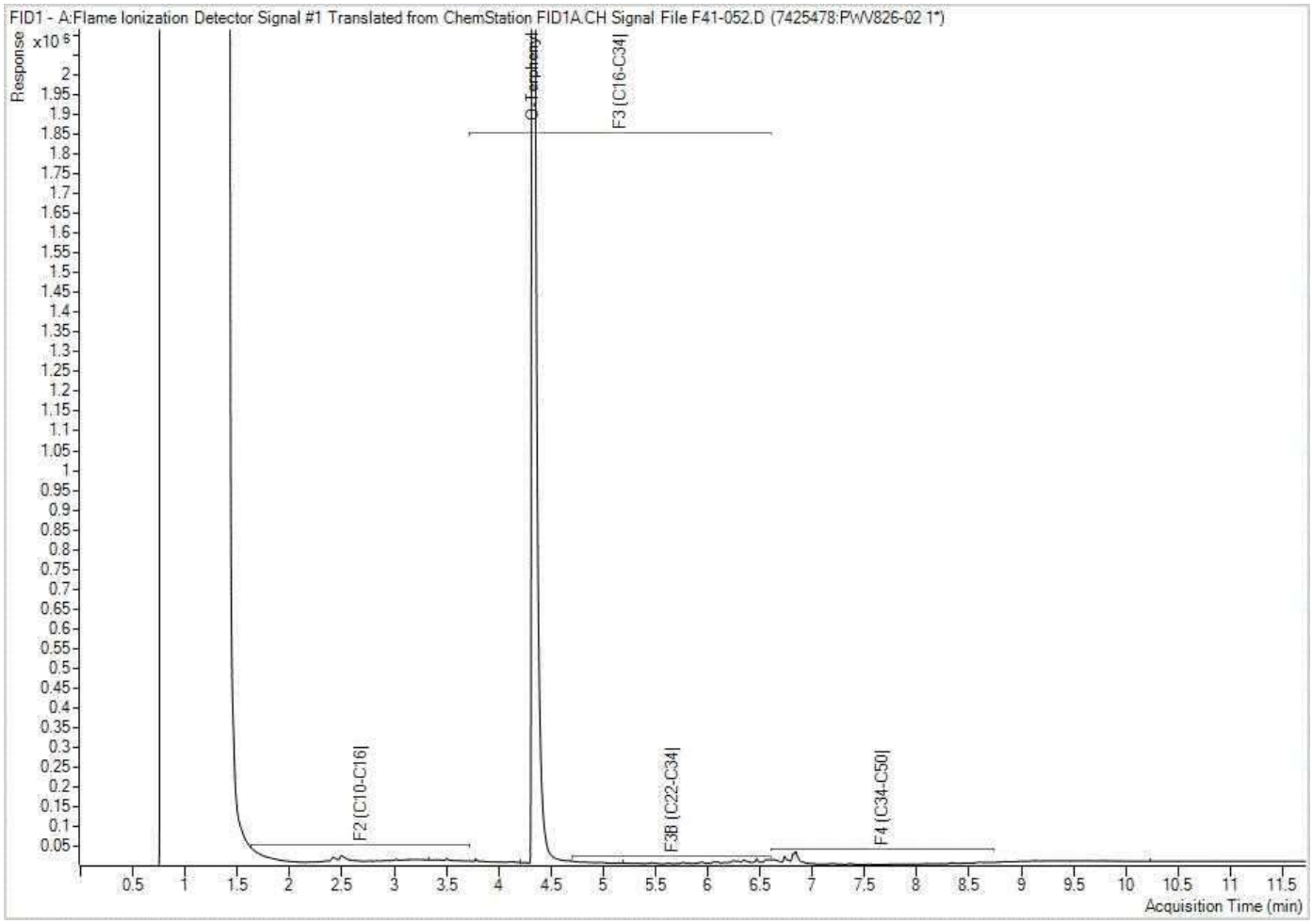


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11
Bureau Veritas Sample: PWV826

Grounded Engineering Inc.
Client Project #: 21-090
Project name: Toronto Island
Client ID: DUP 2

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

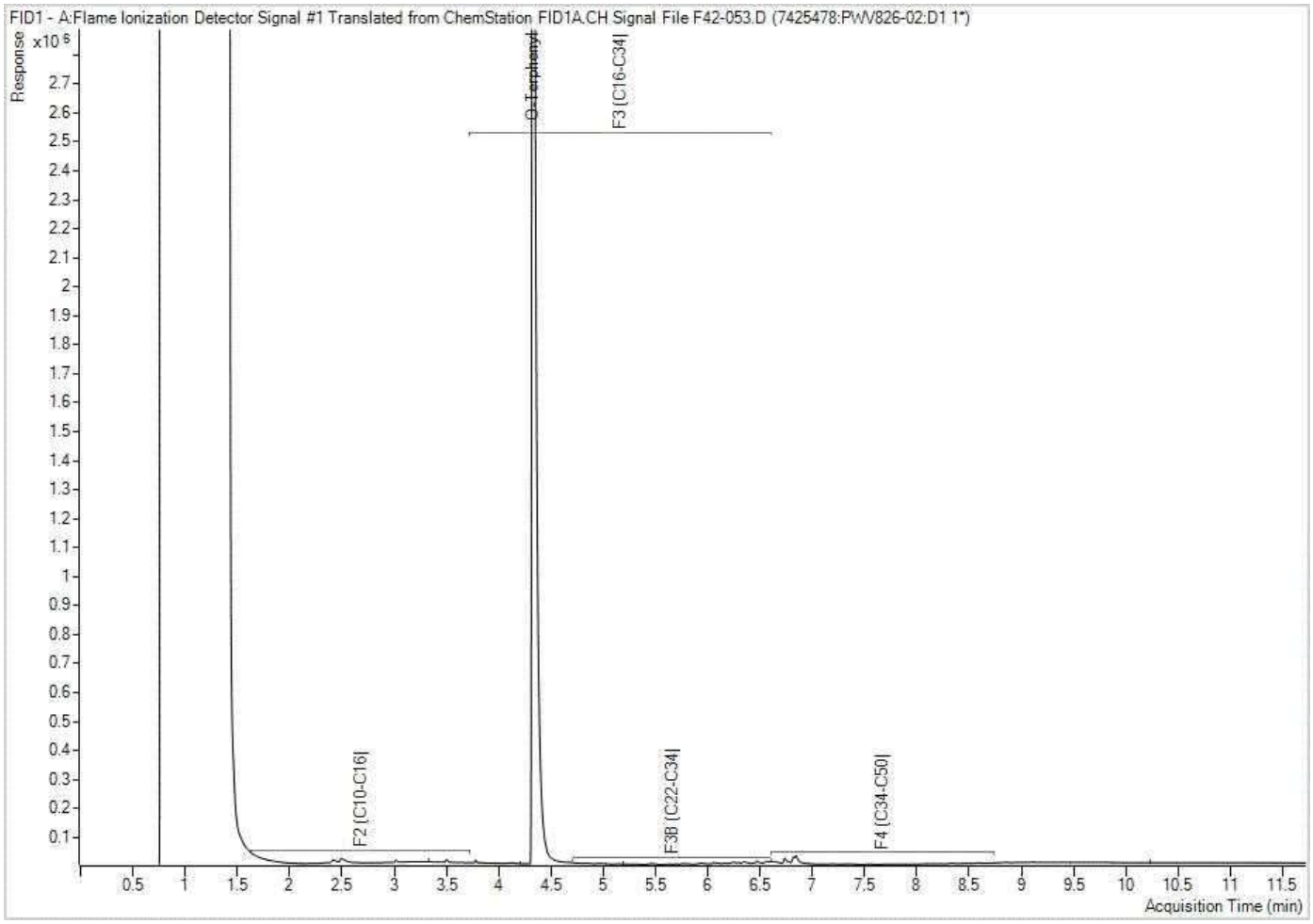


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11
Bureau Veritas Sample: PWV826 Lab-Dup

Grounded Engineering Inc.
Client Project #: 21-090
Project name: Toronto Island
Client ID: DUP 2

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

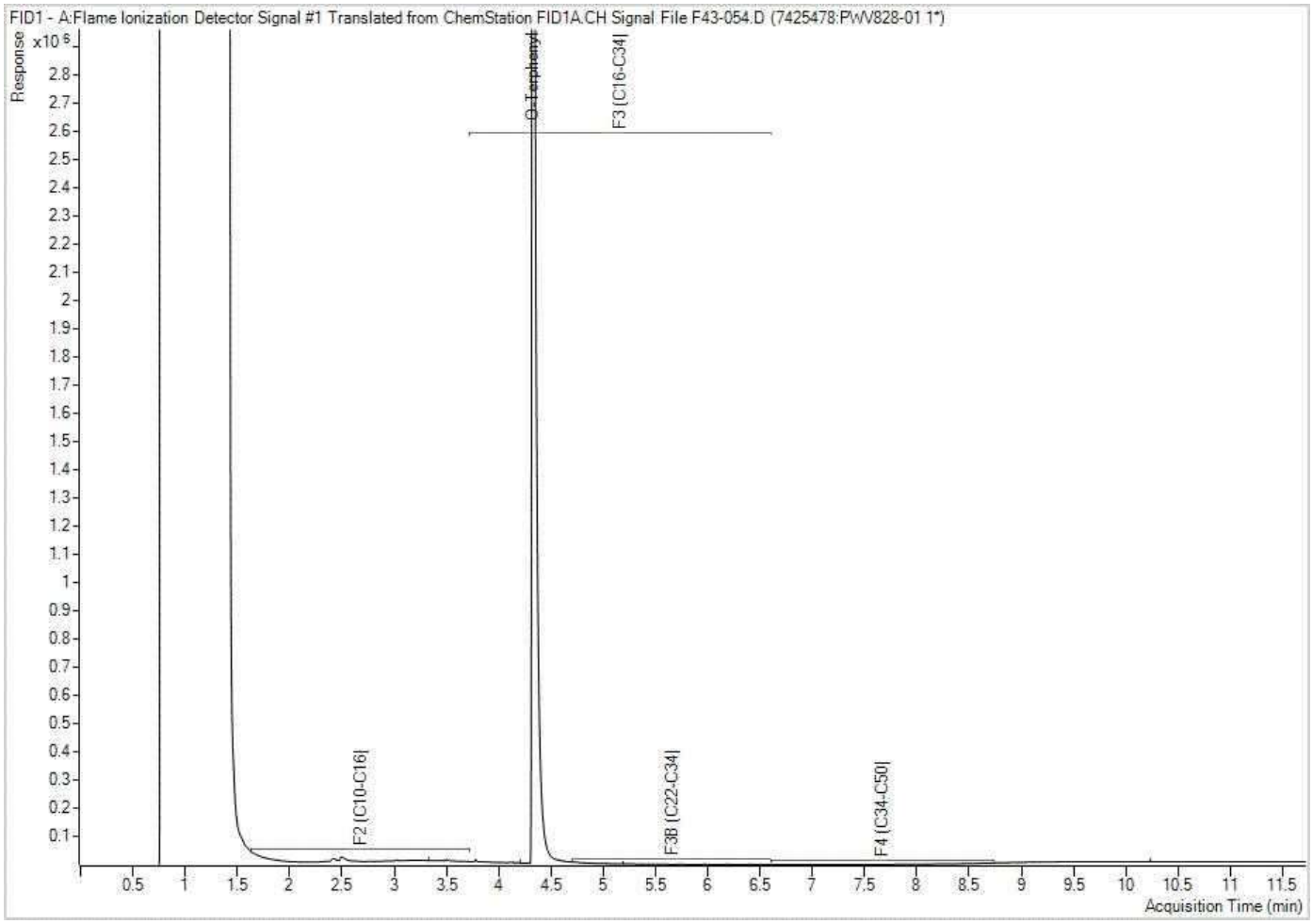


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11
Bureau Veritas Sample: PWV828

Grounded Engineering Inc.
Client Project #: 21-090
Project name: Toronto Island
Client ID: BH103 S2

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

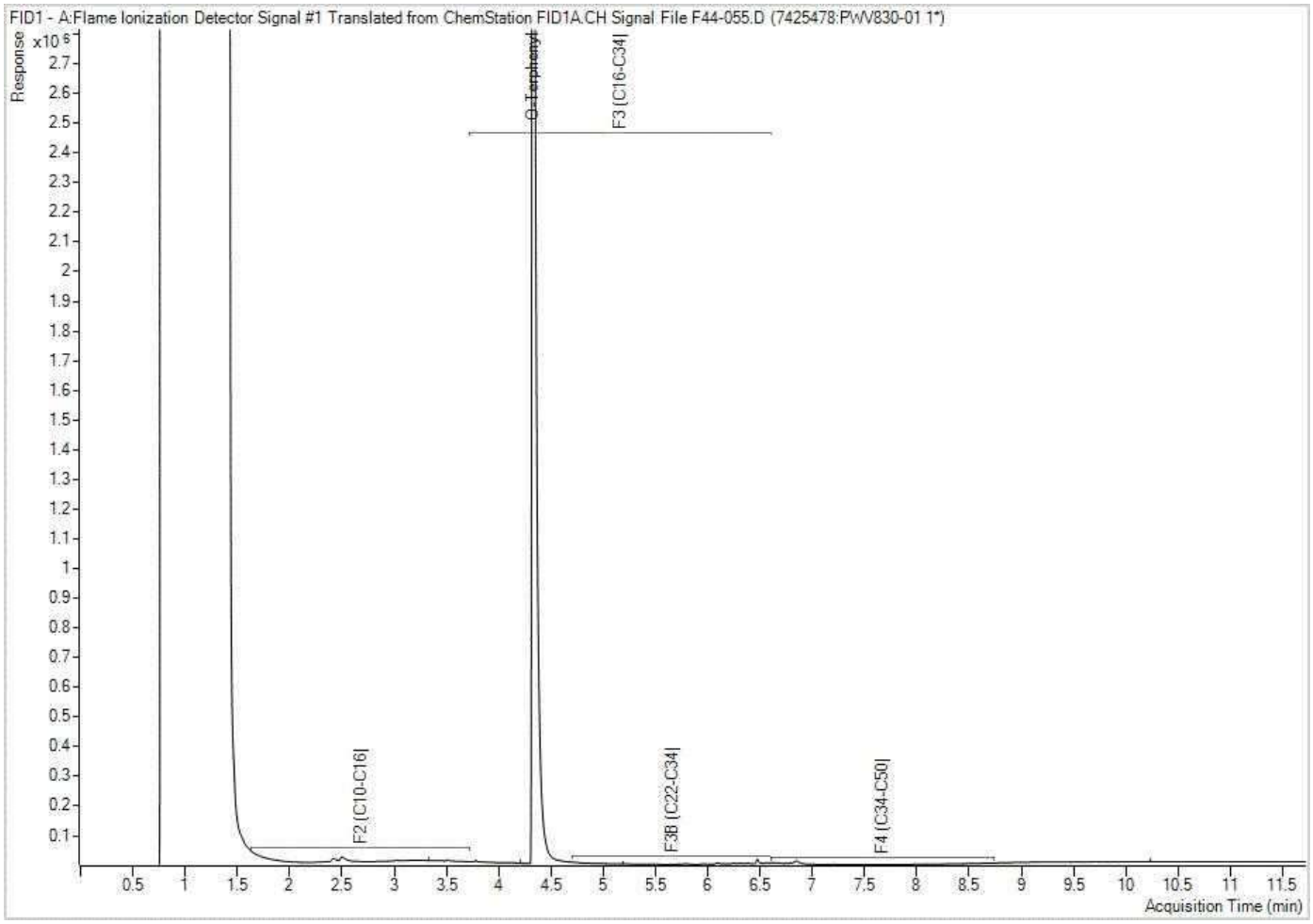


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11
Bureau Veritas Sample: PWV830

Grounded Engineering Inc.
Client Project #: 21-090
Project name: Toronto Island
Client ID: BH105 S3

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

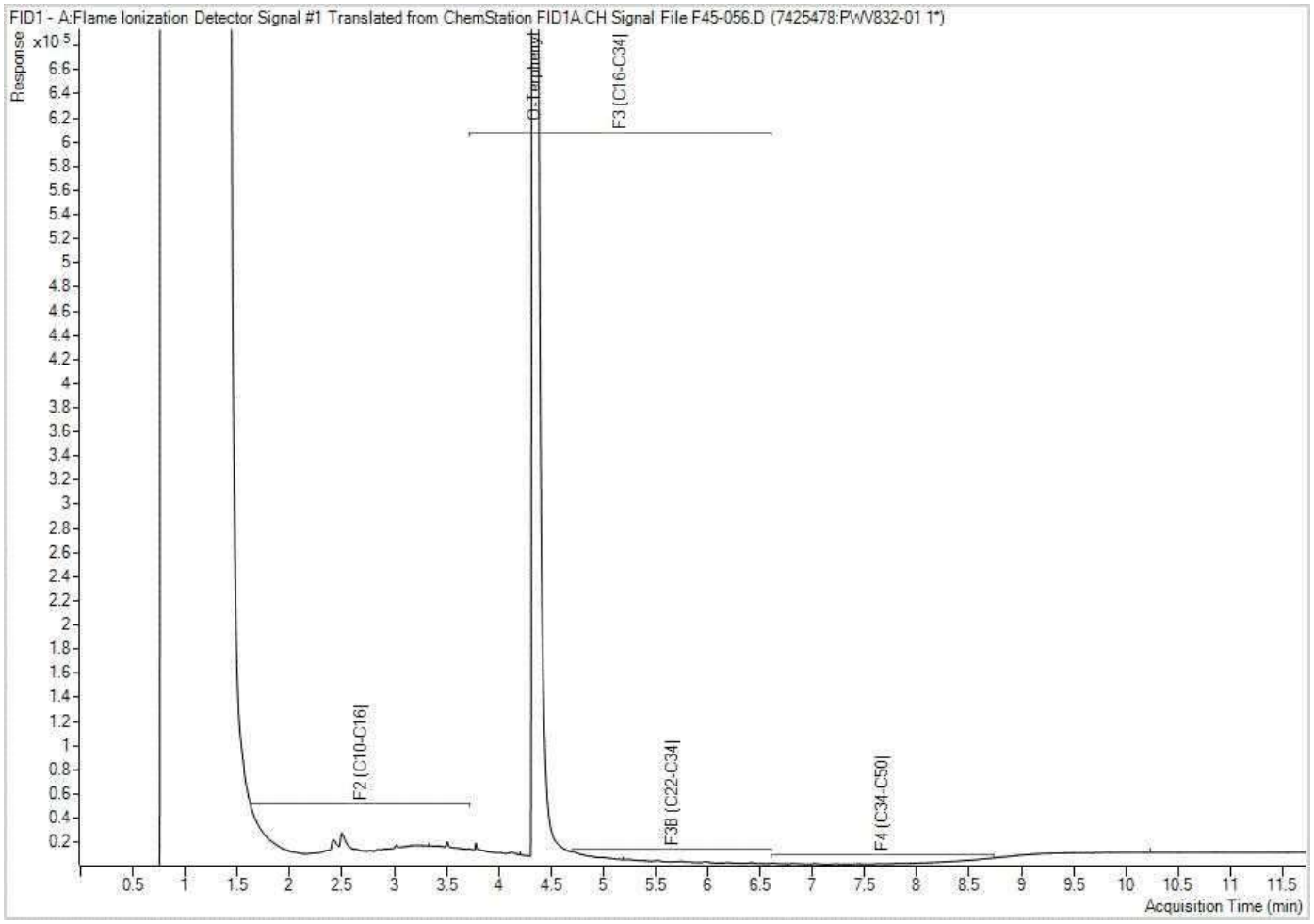


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11
Bureau Veritas Sample: PWV832

Grounded Engineering Inc.
Client Project #: 21-090
Project name: Toronto Island
Client ID: BH106 S3

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

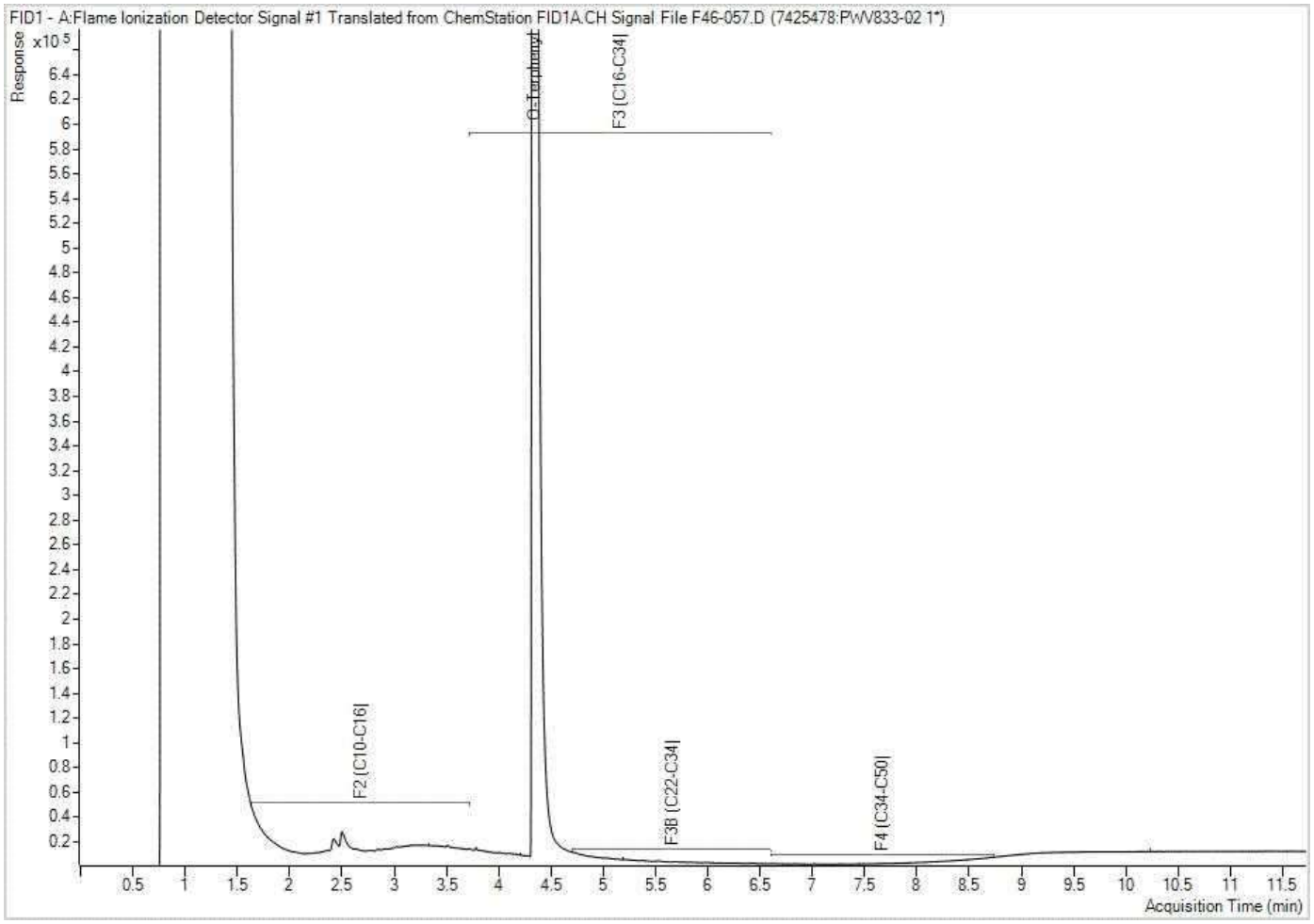


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11
Bureau Veritas Sample: PWV833

Grounded Engineering Inc.
Client Project #: 21-090
Project name: Toronto Island
Client ID: DUP4

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

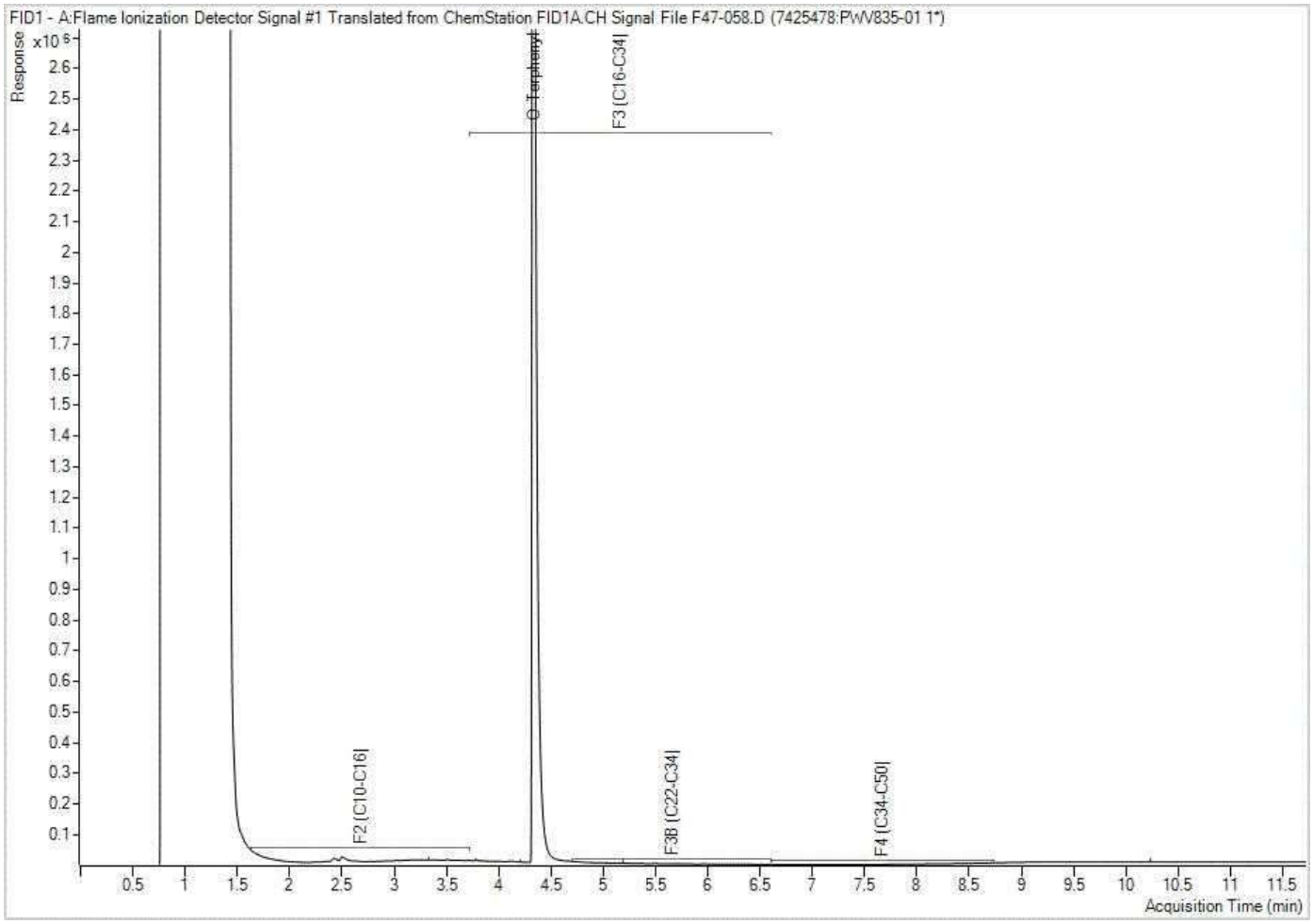


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11
Bureau Veritas Sample: PWV835

Grounded Engineering Inc.
Client Project #: 21-090
Project name: Toronto Island
Client ID: BH107 S3

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

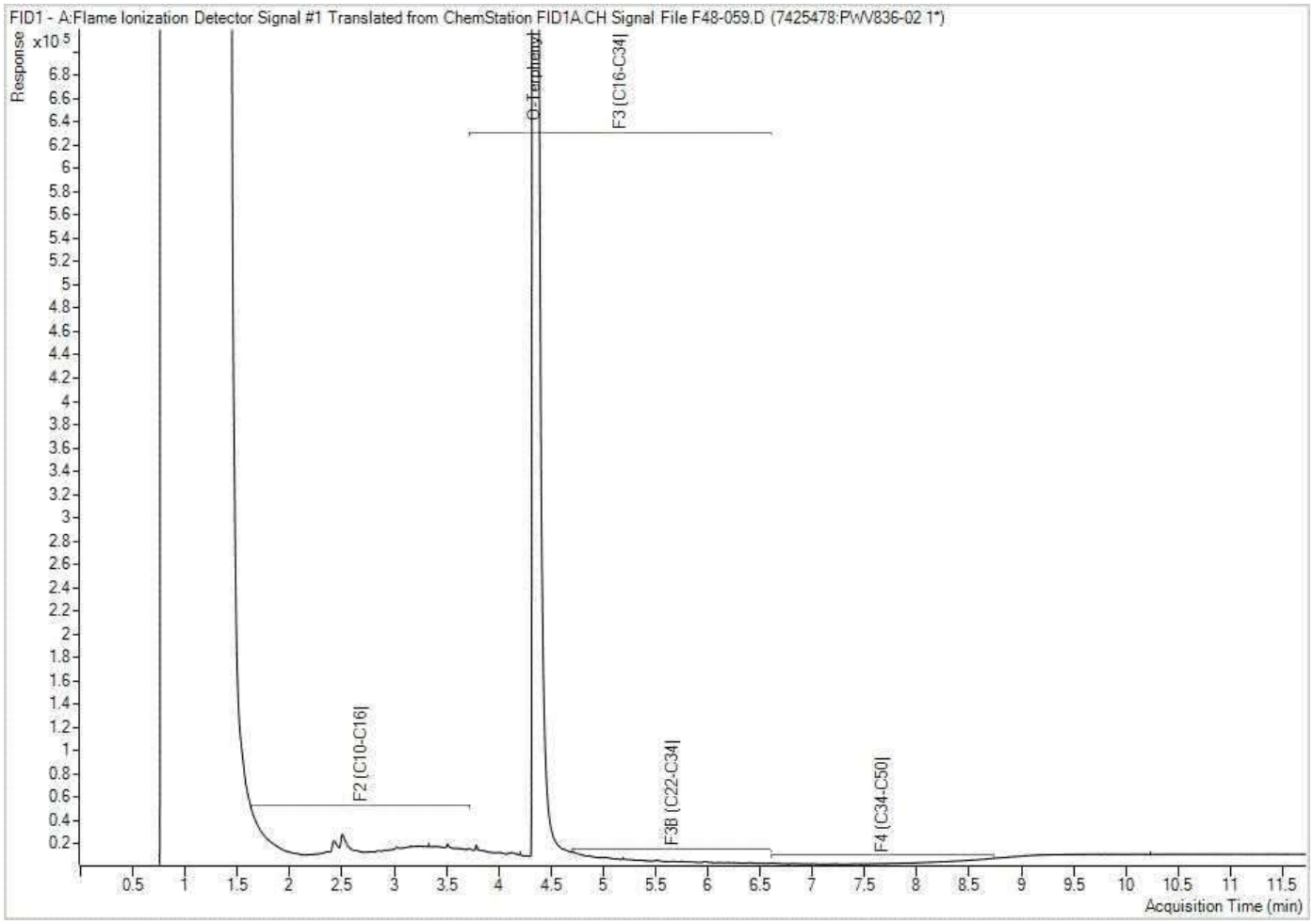


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11
Bureau Veritas Sample: PWV836

Grounded Engineering Inc.
Client Project #: 21-090
Project name: Toronto Island
Client ID: DUP3

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

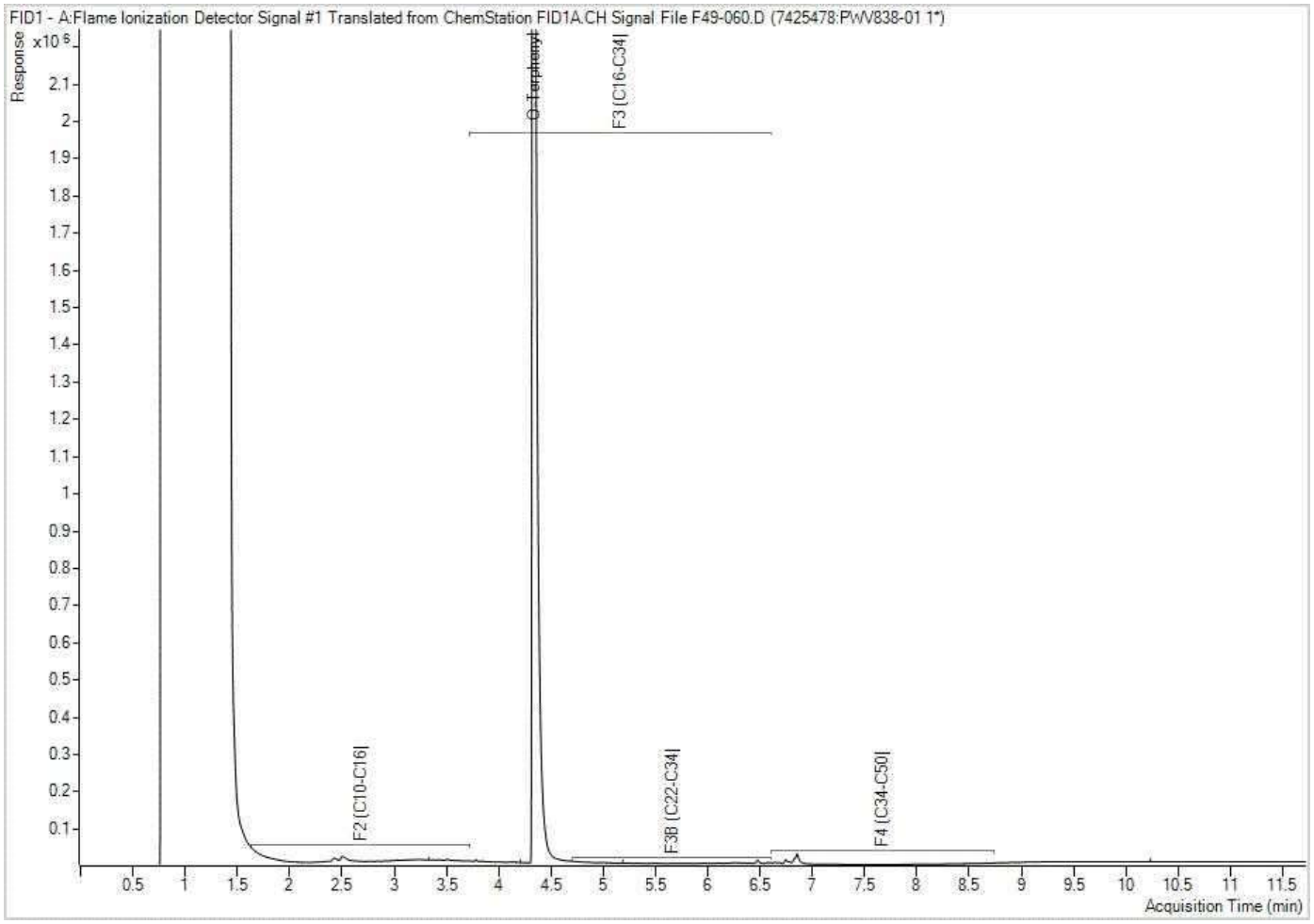


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11
Bureau Veritas Sample: PWV838

Grounded Engineering Inc.
Client Project #: 21-090
Project name: Toronto Island
Client ID: BH109 S2

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

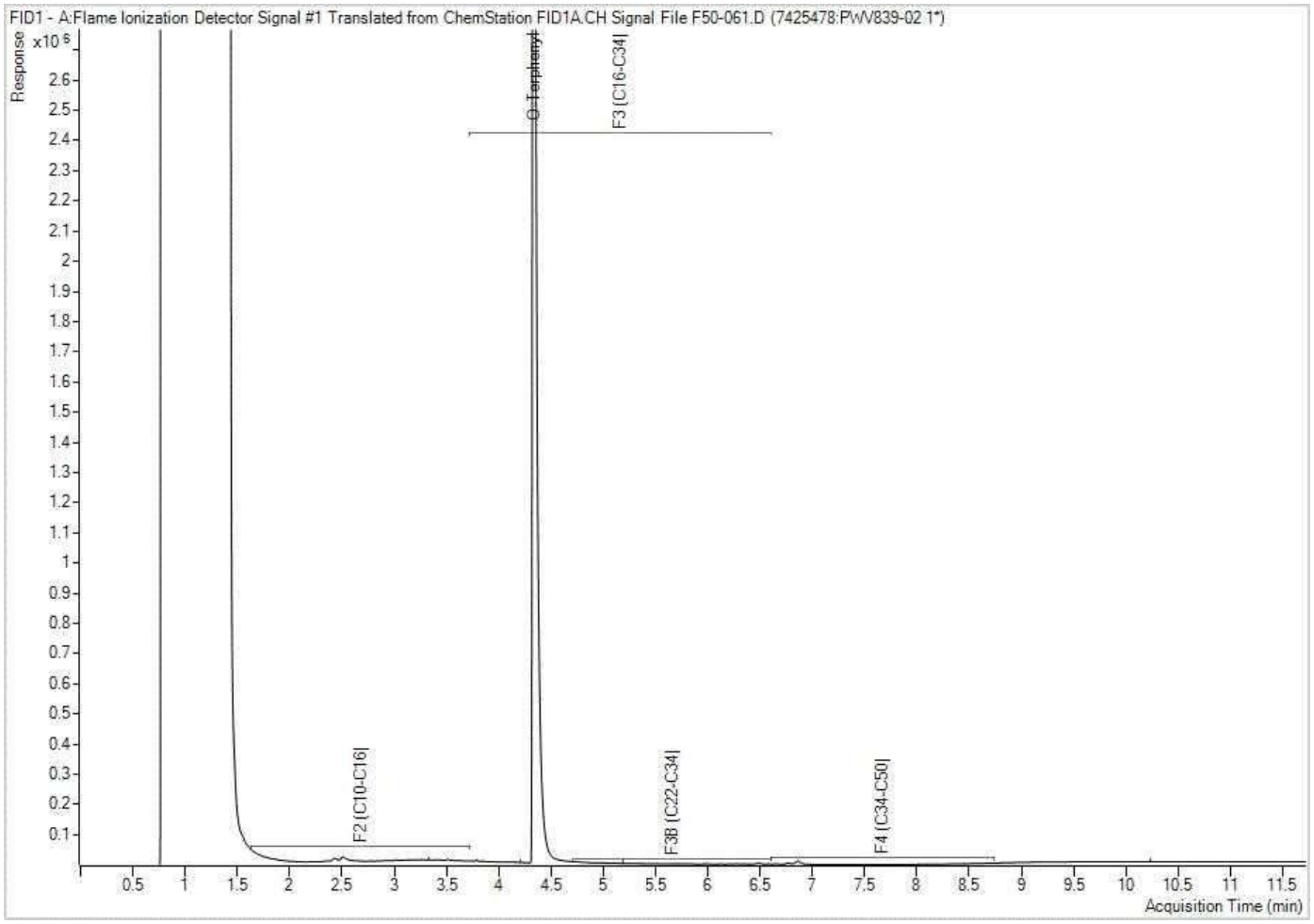


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11
Bureau Veritas Sample: PWV839

Grounded Engineering Inc.
Client Project #: 21-090
Project name: Toronto Island
Client ID: DUP5

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

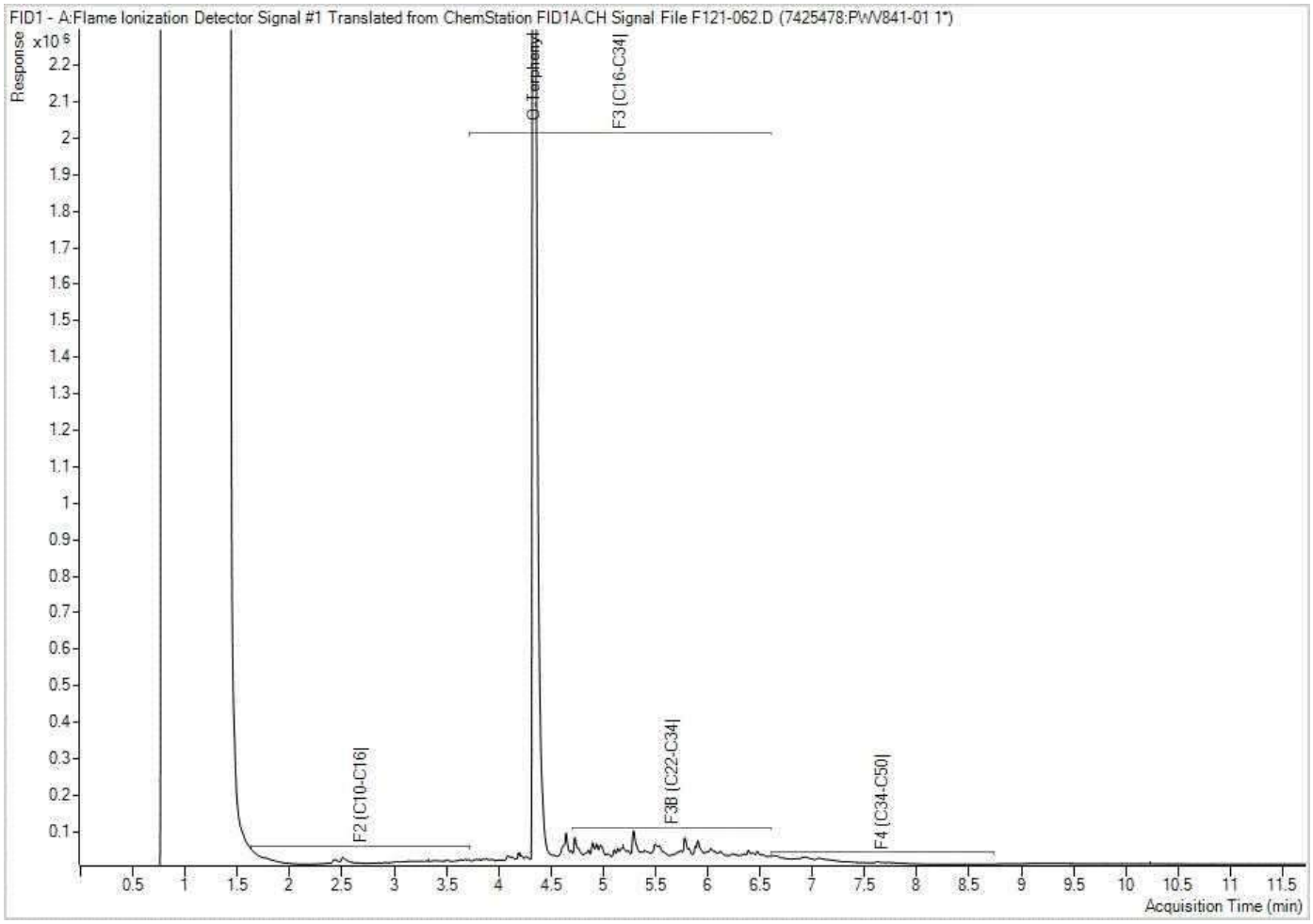


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11
Bureau Veritas Sample: PWV841

Grounded Engineering Inc.
Client Project #: 21-090
Project name: Toronto Island
Client ID: BH110 S2

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

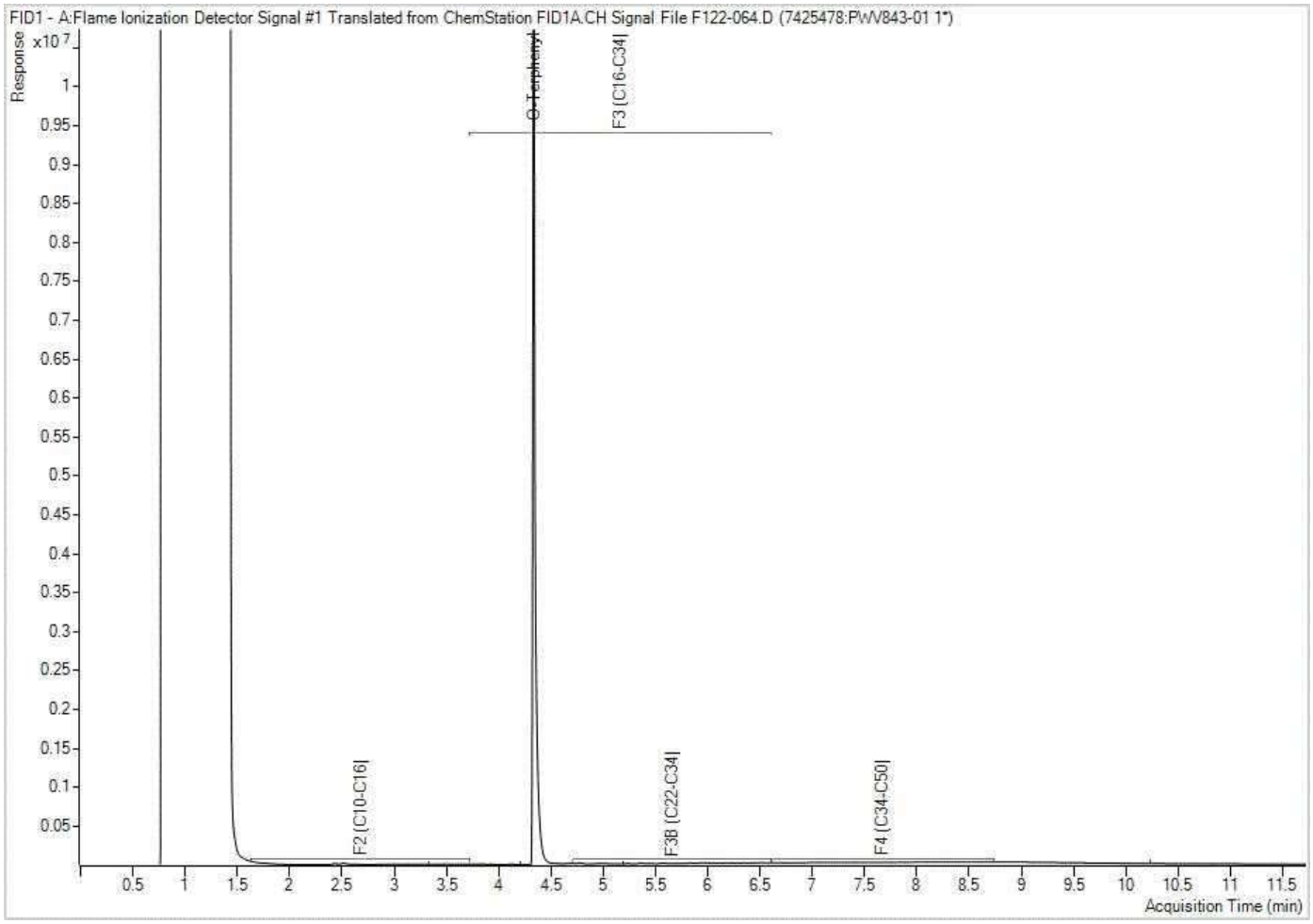


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11
Bureau Veritas Sample: PWV843

Grounded Engineering Inc.
Client Project #: 21-090
Project name: Toronto Island
Client ID: BH111 S2

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

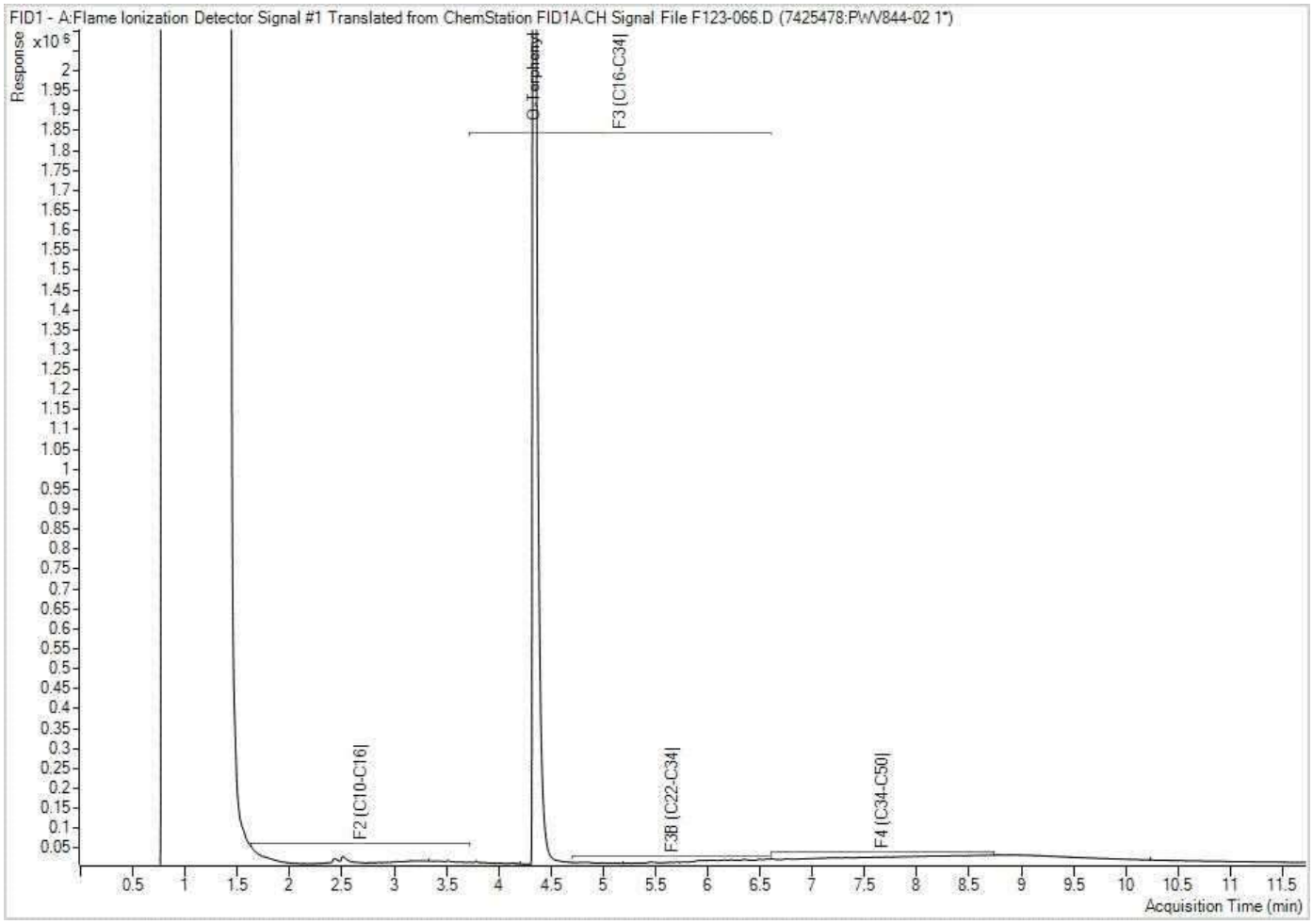


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11
Bureau Veritas Sample: PWV844

Grounded Engineering Inc.
Client Project #: 21-090
Project name: Toronto Island
Client ID: DUP1

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C1H0487
Report Date: 2021/11/11

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

Exceedance Summary Table – Reg153/04 T1-Soil/Res

Result Exceedances

Sample ID	Bureau Veritas ID	Parameter	Criteria	Result	DL	UNITS
BH101 S1	PWV822-01	Sodium Adsorption Ratio	2.4	2.8		N/A
BH101 S2	PWV823-01	F3 (C16-C34 Hydrocarbons)	240	250	50	ug/g
BH101 S2	PWV823-01	F4 (C34-C50 Hydrocarbons)	120	580	50	ug/g
BH101 S2	PWV823-01	F4G-sg (Grav. Heavy Hydrocarbons)	120	2000	100	ug/g
BH110 S2	PWV841-01	F2 (C10-C16 Hydrocarbons)	10	14	10	ug/g
BH111 S2	PWV843-01	F2 (C10-C16 Hydrocarbons)	10	12	10	ug/g
DUP1	PWV844-02	F2 (C10-C16 Hydrocarbons)	10	11	10	ug/g

The exceedance summary table is for information purposes only and should not be considered a comprehensive listing or statement of conformance to applicable regulatory guidelines.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

APPENDIX M



Your Project #: 21-090
Site Location: Toronto Island
Your C.O.C. #: 362920

Attention: Jory Hunter

Grounded Engineering Inc.
12 Banigan Drive
Toronto, ON
CANADA M4H 1E9

Report Date: 2021/06/24
Report #: R6690865
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1H0532
Received: 2021/06/21, 15:14

Sample Matrix: Solid
Samples Received: 9

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Asbestos by PLM - 0.5 RDL (1)	9	N/A	N/A	COR3SOP-00002	EPA 600R-93/116

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Bureau Veritas Laboratories' Asbestos Laboratory is accredited by NVLAP for bulk asbestos analysis by polarized light microscopy, NVLAP Code 600136-0.

This report may not be reproduced, except in full, without the written approval of Bureau Veritas Canada. This report may not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any other agency of the U.S. Government.

Bureau Veritas Laboratories' scope of accreditation includes EPA-600/M4-82-020: "Interim Method for the Determination of Asbestos in Bulk Insulation Samples" and EPA-600/R-93/116: "Method for the Determination of Asbestos in Bulk Building Materials".
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) P.O.B. - Percent of Bulk

When Asbestos data is reported with other data, this report contains data that are not covered by the NVLAP accreditation.

Your Project #: 21-090
Site Location: Toronto Island
Your C.O.C. #: 362920

Attention: Jory Hunter

Grounded Engineering Inc.
12 Banigan Drive
Toronto, ON
CANADA M4H 1E9

Report Date: 2021/06/24
Report #: R6690865
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1H0532
Received: 2021/06/21, 15:14

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Marijane Cruz, Senior Project Manager
Email: Marijane.Cruz@bureauveritas.com
Phone# (905)817-5756

==========

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

BV Labs Job #: C1H0532
Report Date: 2021/06/24

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

Asbestos Analytical Results

EPA/600R-93/116 by Polarized Light Microscopy

C101

BV Labs ID: PWW007 Date Analyzed: 2021/06/24

	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous black asphalt	Not Detected		Non-Fibrous Tar

C102

BV Labs ID: PWW008 Date Analyzed: 2021/06/24

	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous black asphalt	Not Detected		Non-Fibrous Tar

C103

BV Labs ID: PWW009 Date Analyzed: 2021/06/24

	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	45	Homogeneous black asphalt with blue stones	Not Detected		Non-Fibrous Tar
Layer 2	55	Homogeneous black asphalt with white stones	Not Detected		Non-Fibrous Tar

The limit of quantitation is 0.50%, although asbestos may be qualitatively detected at concentrations less than 0.50%. Samples for which asbestos is detected at <0.50% are reported as trace, "<0.50%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

BV Labs Job #: C1H0532
Report Date: 2021/06/24

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

Asbestos Analytical Results

EPA/600R-93/116 by Polarized Light Microscopy

C104

BV Labs ID: PWW010 Date Analyzed: 2021/06/24

	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous black asphalt	Not Detected		Non-Fibrous Tar

C105

BV Labs ID: PWW011 Date Analyzed: 2021/06/24

	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous black asphalt	Not Detected		Non-Fibrous Tar

C106

BV Labs ID: PWW012 Date Analyzed: 2021/06/24

	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	45	Homogeneous black asphalt with big stones	Not Detected		Non-Fibrous Tar
Layer 2	55	Homogeneous black asphalt with small stones	Not Detected		Non-Fibrous Tar

The limit of quantitation is 0.50%, although asbestos may be qualitatively detected at concentrations less than 0.50%. Samples for which asbestos is detected at <0.50% are reported as trace, "<0.50%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

BV Labs Job #: C1H0532
Report Date: 2021/06/24

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

Asbestos Analytical Results

EPA/600R-93/116 by Polarized Light Microscopy

C107

BV Labs ID: PWW013 Date Analyzed: 2021/06/24

	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous black asphalt	Not Detected		Non-Fibrous Tar

C108

BV Labs ID: PWW014 Date Analyzed: 2021/06/24

	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	100	Homogeneous black asphalt	Not Detected		Non-Fibrous Tar

C109

BV Labs ID: PWW015 Date Analyzed: 2021/06/24

	P.O.B	Sample Morphology	Asbestos	Other Fibres	Particulate
Layer 1	30	Homogeneous black asphalt with blue stones	Not Detected		Non-Fibrous Tar
Layer 2	70	Homogeneous black asphalt with white stones	Not Detected		Non-Fibrous Tar

The limit of quantitation is 0.50%, although asbestos may be qualitatively detected at concentrations less than 0.50%. Samples for which asbestos is detected at <0.50% are reported as trace, "<0.50%". "Not Detected" indicates that no asbestos fibres were observed.

Calibrated Visual Estimate (%)
Date Format : yyyy/mm/dd

BV Labs Job #: C1H0532
Report Date: 2021/06/24

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

TEST SUMMARY

BV Labs ID: PWW007 **Collected:** 2021/06/16
Sample ID: C101 **Shipped:**
Matrix: Solid **Received:** 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Asbestos by PLM - 0.5 RDL	MIC	7424303	N/A		Tanvee Kapur

BV Labs ID: PWW007 Dup **Collected:** 2021/06/16
Sample ID: C101 **Shipped:**
Matrix: Solid **Received:** 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Asbestos by PLM - 0.5 RDL	MIC	7424303	N/A		Tanvee Kapur

BV Labs ID: PWW008 **Collected:** 2021/06/16
Sample ID: C102 **Shipped:**
Matrix: Solid **Received:** 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Asbestos by PLM - 0.5 RDL	MIC	7424303	N/A		Tanvee Kapur

BV Labs ID: PWW009 **Collected:** 2021/06/16
Sample ID: C103 **Shipped:**
Matrix: Solid **Received:** 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Asbestos by PLM - 0.5 RDL	MIC	7424303	N/A		Tanvee Kapur

BV Labs ID: PWW010 **Collected:** 2021/06/16
Sample ID: C104 **Shipped:**
Matrix: Solid **Received:** 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Asbestos by PLM - 0.5 RDL	MIC	7424303	N/A		Tanvee Kapur

BV Labs ID: PWW011 **Collected:** 2021/06/16
Sample ID: C105 **Shipped:**
Matrix: Solid **Received:** 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Asbestos by PLM - 0.5 RDL	MIC	7424303	N/A		Tanvee Kapur

BV Labs ID: PWW012 **Collected:** 2021/06/17
Sample ID: C106 **Shipped:**
Matrix: Solid **Received:** 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Asbestos by PLM - 0.5 RDL	MIC	7424303	N/A		Tanvee Kapur

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

BV Labs Job #: C1H0532
Report Date: 2021/06/24

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

TEST SUMMARY

BV Labs ID: PWW013
Sample ID: C107
Matrix: Solid

Collected: 2021/06/17
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Asbestos by PLM - 0.5 RDL	MIC	7424303	N/A		Tanvee Kapur

BV Labs ID: PWW014
Sample ID: C108
Matrix: Solid

Collected: 2021/06/17
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Asbestos by PLM - 0.5 RDL	MIC	7424303	N/A		Tanvee Kapur

BV Labs ID: PWW015
Sample ID: C109
Matrix: Solid

Collected: 2021/06/17
Shipped:
Received: 2021/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Asbestos by PLM - 0.5 RDL	MIC	7424303	N/A		Tanvee Kapur

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

BV Labs Job #: C1H0532
Report Date: 2021/06/24

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

GENERAL COMMENTS

Results relate only to the items tested.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

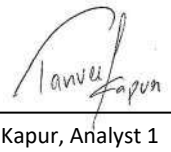
Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

BV Labs Job #: C1H0532
Report Date: 2021/06/24

Grounded Engineering Inc.
Client Project #: 21-090
Site Location: Toronto Island
Sampler Initials: LJ

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:



Tanvee Kapur, Analyst 1

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Custody Tracking Form

T362920

Please use this form for custody tracking when submitting the work instructions via eCOC (electronic Chain of Custody). Please ensure your form has a barcode or a Bureau Veritas eCOC confirmation number in the top right hand side. This number links your electronic submission to your samples. This form should be placed in the cooler with your samples.

First Sample: C101
Last Sample: C109
Sample Count: 9

Relinquished By				Received By			
Jory Hunter		Date	2021/06/18			Date	2021/06/21
		Time (24 HR)	4:30pm			Time (24 HR)	15:14
		Date				Date	
		Time (24 HR)				Time (24 HR)	
		Date				Date	
		Time (24 HR)				Time (24 HR)	

Unless otherwise agreed to, submissions and use of services are governed by Bureau Veritas' standard terms and conditions which can be found at www.bvna.com.

Triage Information

Sampled By (Print): Leland Johnston

# of Coolers/Pkgs: 1

Rush ☐ Immediate Test ☐ Food Residue ☐

Micro ☐ Food Chemistry ☐

*** LABORATORY USE ONLY ***

Received At

Labeled By

Verified By

Lab Comments:

21-Jun-21 15:14
Marijane Cruz
C1H0532
KSF ENV-1124

Custody Seal		Cooling Media	Temperature °C		
Present (Y/N)	Intact (Y/N)	Present (Y/N)	1	2	3
N	N	Y	8	8	9

Drinking Water Metals Preservation Check Done (Circle) YES NO

COR FCD-00383/3

Page 1 of 1

eCOC: T362920

Project Information:	C1H0532
Job Received:	2021/06/21 15:14
Results Required By:	2021/06/25 16:19
Expected Arrival:	2021/06/18 16:19
Submitted By:	Jory Hunter
Submitted To:	Mississauga, ON (Env. Lab)

Invoice Information

Attn: Jory Hunter
Grounded Engineering Inc.
12 Banigan Drive
Toronto , ON , M4H 1E9
Email to:
jhunter@groundedeng.ca

Report Information

Attn: Jory Hunter
Grounded Engineering Inc.
12 Banigan Drive
Toronto , ON , M4H 1E9
Email to:
jhunter@groundedeng.ca

Project Information

Quote #: C10284
PO/AFE#:
Project #: 21-090
Site Location: Toronto Island

Analytical Summary

A: 2021/06/25 16:19

Client Sample ID	Clnt Ref	Sampling Date/Time	Matrix	#Cont	Asbestos by PLM - 0.5 RDL
C101	1	2021/06/16	N/A	1	A
C102	2	2021/06/16	N/A	1	A
C103	3	2021/06/16	N/A	1	A
C104	4	2021/06/16	N/A	1	A
C105	5	2021/06/16	N/A	1	A
C106	6	2021/06/17	N/A	1	A
C107	7	2021/06/17	N/A	1	A
C108	8	2021/06/17	N/A	1	A
C109	9	2021/06/17	N/A	1	A

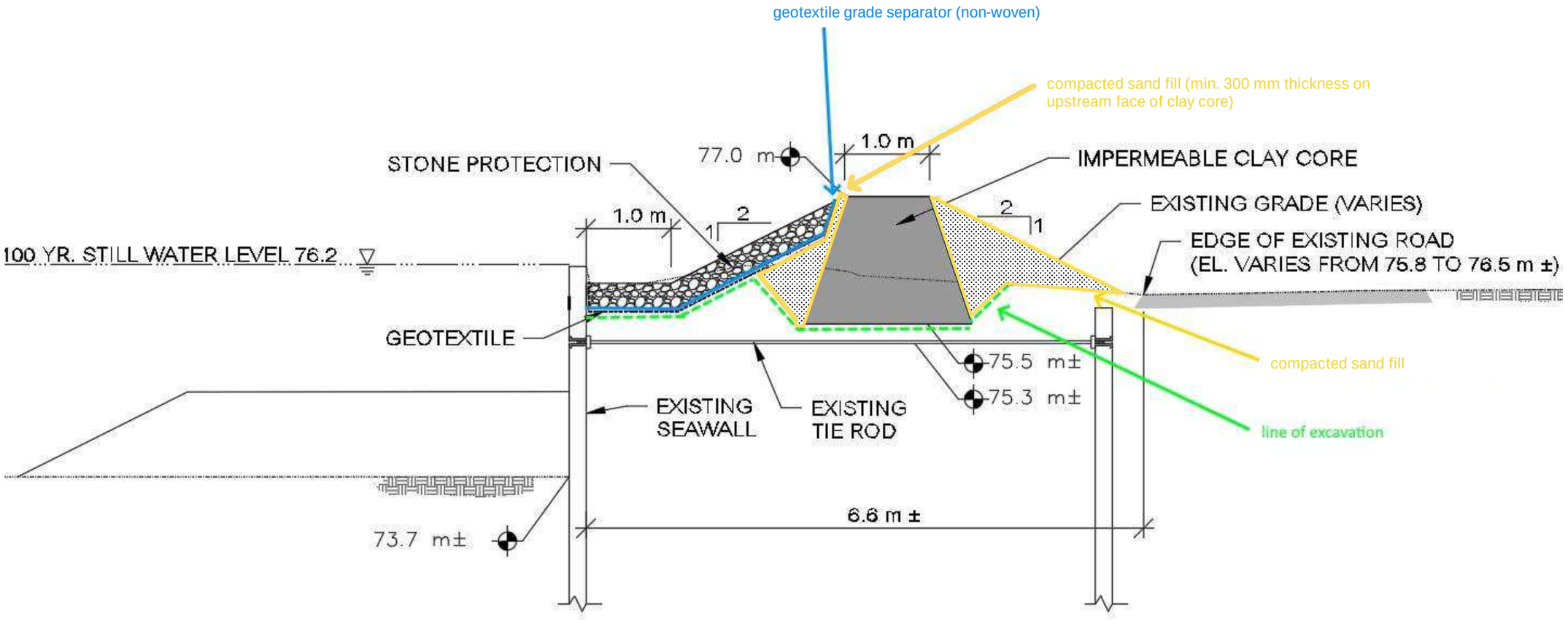
Deadlines are estimates only and are subject to change. Please refer to your Job Confirmation report for final due dates.

Submission Information

# of Samples: 9

Appendix N





GROUNDED ENGINEERING
12 Banigan Drive, Toronto, Ont., M4H 1E9
www.groundedeng.ca

LEGEND

Note

Reference
Drawing 13350.101-B-070
"Typical Section"
Prepared by Baird. May 15, 2020.

Project
TORONTO ISLANDS EMERGENCY BERM IMPLEMENTATION
ALGONQUIN ISLAND, TORONTO, ONTARIO

Figure Title
TYPICAL SECTION SKETCH

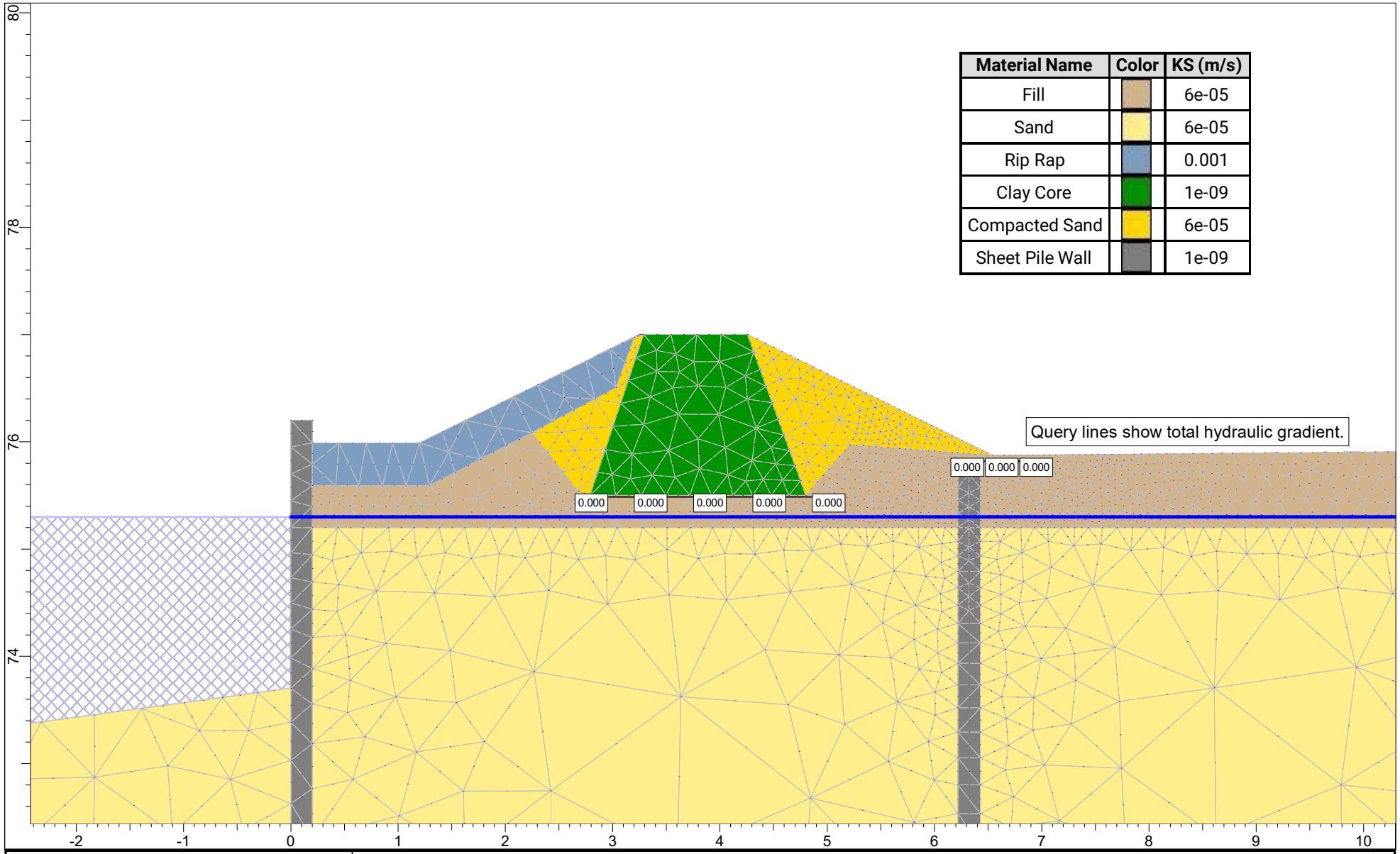
Date
MAY 22, 2020

Scale
AS INDICATED

Job No
20-026

Figure No
FIGURE 3

Material Name	Color	KS (m/s)
Fill		6e-05
Sand		6e-05
Rip Rap		0.001
Clay Core		1e-09
Compacted Sand		6e-05
Sheet Pile Wall		1e-09

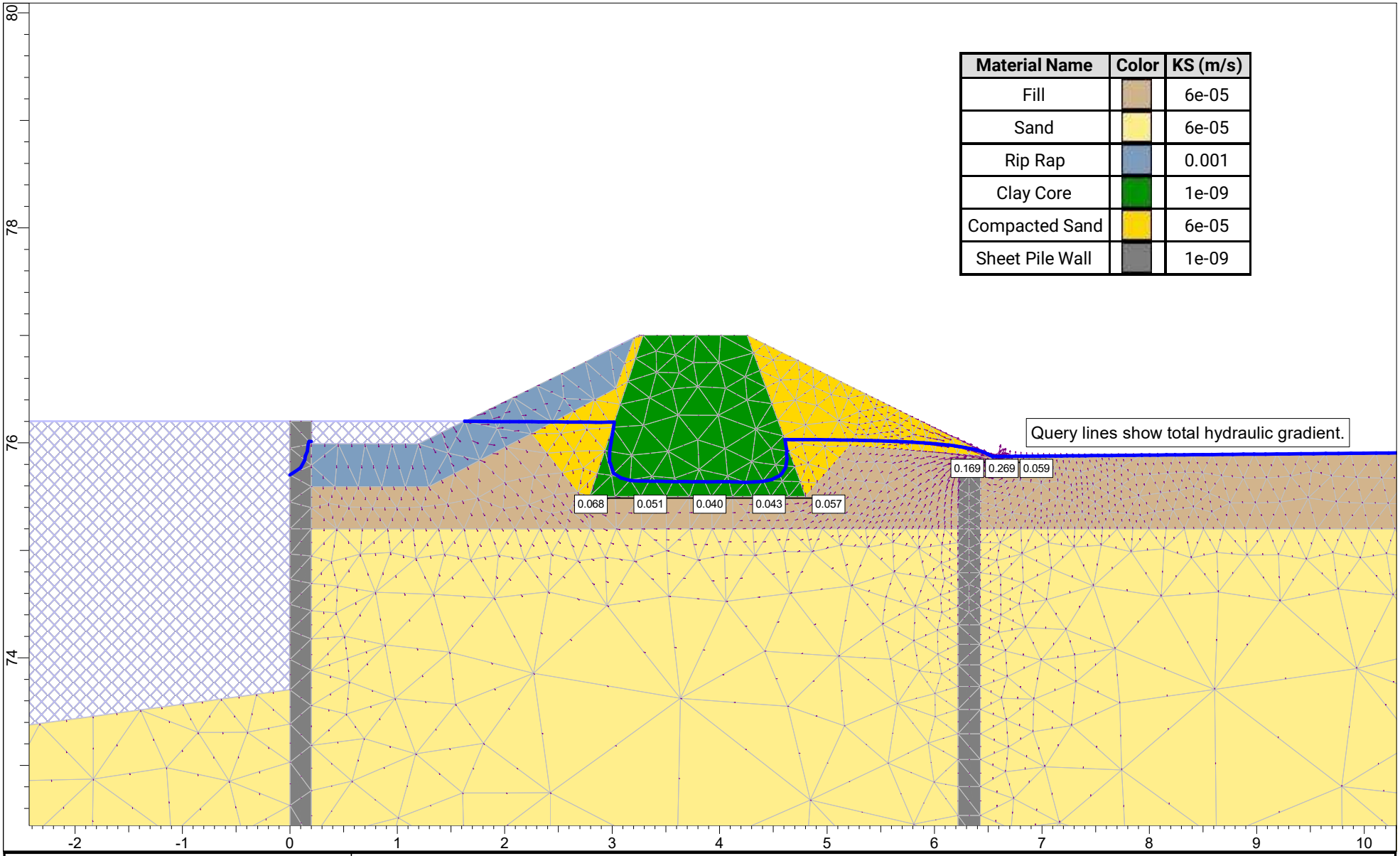


GROUNDED ENGINEERING

Project	20-026 | Algonquin Island Berm - Baird Section		
Analysis Description	Transient Analysis, Flood	*Model*	Transient Flow | Day 0 (Initial)
Drawn By	TA	*Scale* 1:50	*Date* 2020-05-22
Source	Baird Cross Section Sketch, May 2020	*File Name*	20-026 - Berm - Seepage.slmd

SLIDEINTERPRET 9.005

Material Name	Color	KS (m/s)
Fill		6e-05
Sand		6e-05
Rip Rap		0.001
Clay Core		1e-09
Compacted Sand		6e-05
Sheet Pile Wall		1e-09

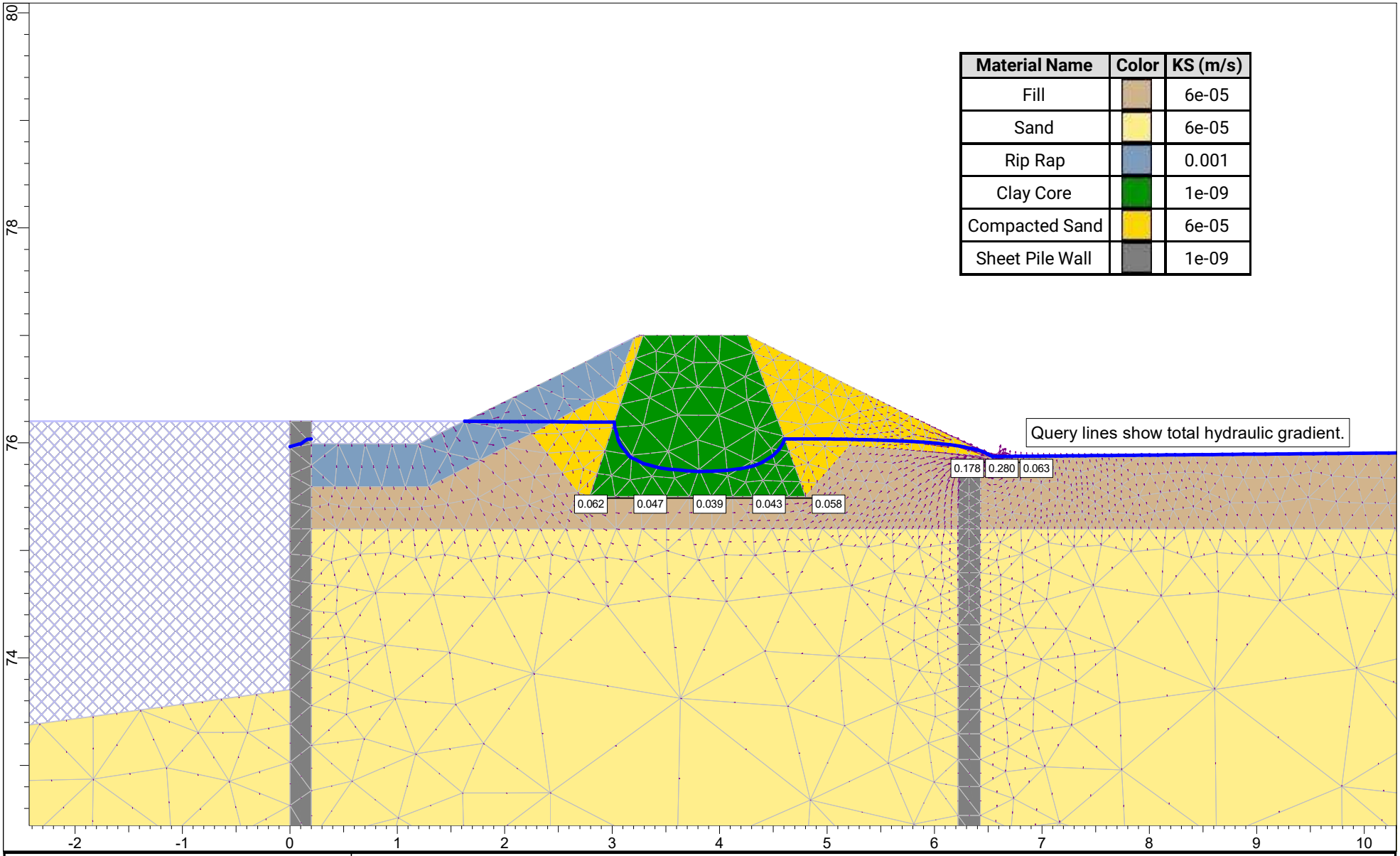


GROUNDED ENGINEERING

Project	20-026 | Algonquin Island Berm - Baird Section		
Analysis Description	Transient Analysis, Flood	Model	Transient Flow | Day 1 (Flood)
Drawn By	TA	Scale 1:50	Date 2020-05-22
Source	Baird Cross Section Sketch, May 2020	File Name	20-026 - Berm - Seepage.slmd

SLIDEINTERPRET 9.005

Material Name	Color	KS (m/s)
Fill		6e-05
Sand		6e-05
Rip Rap		0.001
Clay Core		1e-09
Compacted Sand		6e-05
Sheet Pile Wall		1e-09

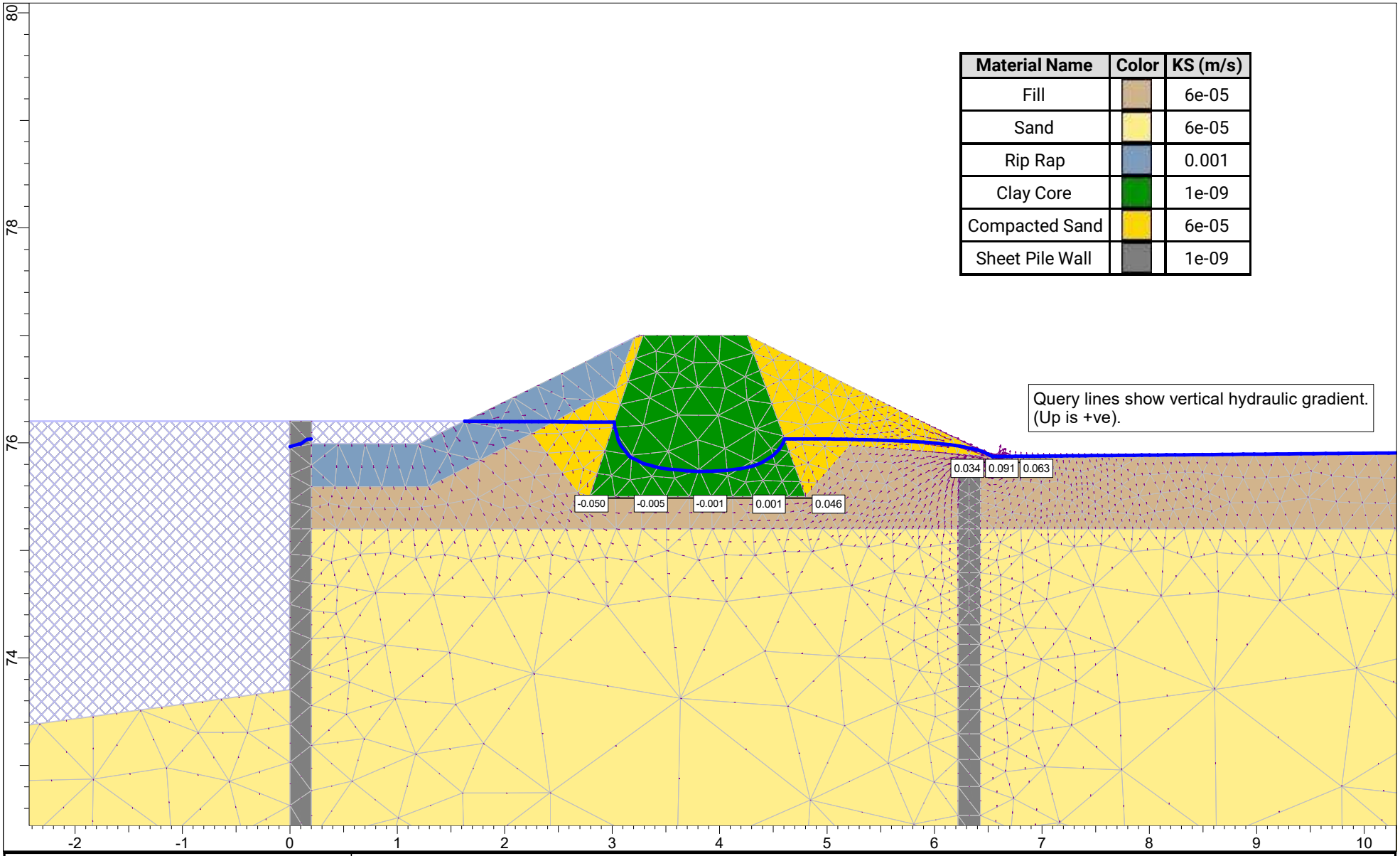


GROUNDED ENGINEERING

SLIDEINTERPRET 9.005

Project	20-026 | Algonquin Island Berm - Baird Section		
Analysis Description	Transient Analysis, Flood	Model	Transient Flow | Day 5
Drawn By	TA	Scale 1:50	Date 2020-05-22
Source	Baird Cross Section Sketch, May 2020	File Name	20-026 - Berm - Seepage.slmd

Material Name	Color	KS (m/s)
Fill		6e-05
Sand		6e-05
Rip Rap		0.001
Clay Core		1e-09
Compacted Sand		6e-05
Sheet Pile Wall		1e-09

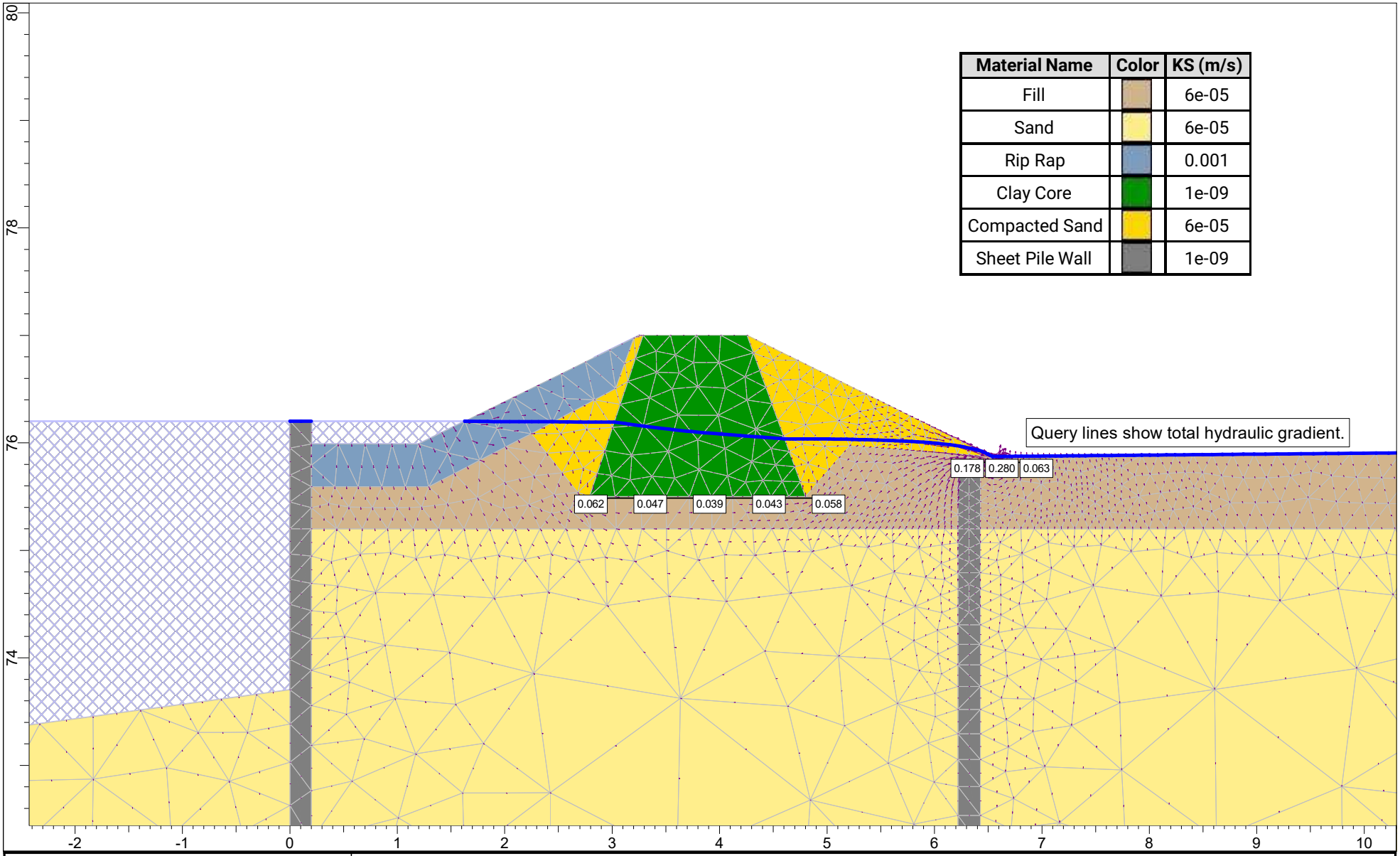


GROUNDED ENGINEERING

SLIDEINTERPRET 9.005

Project	20-026 | Algonquin Island Berm - Baird Section		
Analysis Description	Transient Analysis, Flood	Model	Transient Flow | Day 5 (max vertical hydraulic gradient)
Drawn By	TA	Scale 1:50	Date 2020-05-22
Source	Baird Cross Section Sketch, May 2020	File Name	20-026 - Berm - Seepage.slmd

Material Name	Color	KS (m/s)
Fill		6e-05
Sand		6e-05
Rip Rap		0.001
Clay Core		1e-09
Compacted Sand		6e-05
Sheet Pile Wall		1e-09



GROUNDED ENGINEERING

SLIDEINTERPRET 9.005

Project	20-026 | Algonquin Island Berm - Baird Section		
Analysis Description	Transient Analysis, Flood	Model	Transient Flow | Day 100
Drawn By	TA	Scale 1:50	Date 2020-05-22
Source	Baird Cross Section Sketch, May 2020	File Name	20-026 - Berm - Seepage.slmd