File #:	**1826**
Date:	**April 17, 2023**

Mr. Dave Kenth
Town of Whitchurch-Stouffville
111 Sandiford Drive
Stouffville, Ontario, L4A 0Z8

Dear Mr. Kenth:

Re: **Drainage Assessment**
13501 Highway 48 Site Alteration
W.L.J.C. Investments Inc. – Fairty Site
Town of Whitchurch-Stouffville, ON

This letter summarizes the drainage assessment supporting the above referenced project, and is in support of a permit pursuant to Ontario Regulation 166/06, Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses from the Toronto and Region Conservation Authority.

Background Information

W.L.J.C. Investments Inc. has obtained a site alteration permit (SAP2018-001) for filling a former gravel pit at 13501 Highway 48 in the Town of Whitchurch-Stouffville, for a portion of the property identified as Phase 1. The historic drainage route of runoff from lands tributary to and from the W.L.J.C. Investments Inc. property is through the 13393 Highway 48 property, south of the subject lands. Due to the extraction of aggregate from the subject lands, the site topography now consists of the remains of the extraction pits. Some of the runoff through this drainage route has now been retained on the subject lands, altering the pre-excavation drainage pattern to the downstream property at 13393 Highway 48.

Objective

We have been retained by W.L.J.C. Investments Inc. to provide a drainage solution at the 13501 Highway 48 property (subject lands) in support of Phase 2 to fill the remainder of the former gravel pit as much as possible. The solution is intended to mitigate negative drainage impacts to downstream properties. Through exhaustive discussions with the downstream property owner at 13393 Highway 48, W.L.J.C. Investments Inc. is proposing to retain drainage on the subject lands, rather than discharge runoff to the historic drainage route. The objective of this assessment is to demonstrate that the runoff to the subject lands from up to a 100 year design storm event can be retained on site, while maintaining the upstream drainage pattern.

This assessment has been prepared in support of the site alteration permit from the Town of Whitchurch-Stouffville, a permit pursuant to Ontario Regulation 166/06 from the Toronto and Region Conservation Authority, and renewed Encroachment Permit and Building & Land Use Permit from the Ministry of Transportation.

Proposed Site and Pond Grading

This analysis presents a grading and drainage solution that does not convey runoff downstream of the subject lands during events up to and including the 100 year storm event. As shown on the grading plan (**Drawing GR-1**), it is proposed that the site be filled to match or be less than pre-excavation elevations (**Attachment A**) and gradually slope to the south. The southern portion of the site is proposed to function as a retention pond in order to retain runoff from the upstream contributing areas. The site is proposed to be graded so that all runoff will be captured by the retention pond. As the hydrogeological study (prepared by Golder Associates in November 2018) indicated that the native soil on site consists of sand, it is anticipated that any ponded runoff will have a design infiltration rate of 83.9 mm/hr when applying a safety factor of 2.5 (**Attachment C**), as it does in the existing condition. Per the attached groundwater map in (**Attachment A)**, the groundwater in the south portion of the site will be at least 1.0 m below the bottom of pond elevation, which is proposed to be at 305.90 m.

The pond grading is proposed to be 2.0 m deep with a bottom and top elevation of 305.90 m and 307.90 m respectively. As per the slope stability report prepared by WSP in March 2023(**Attachment A**), the pond will have a side slope of 4:1.

Hydrologic Assessment

Visual OTTHYMO 6.2 (VO6) was used to calculate the runoff rates from the catchment areas. Parameters were determined and supporting documentation and modelling output are included in (**Attachment B)**. The land uses for the external drainage areas were interpreted based on aerial imagery from York Region. The external land uses include low density residential, paved impervious, and crop areas. The drainage boundaries are provided on **Figure 1.0**.

The external drainage area to the subject lands was delineated based on First Base Solutions (FBS) topographic mapping and Highway 48 construction design drawings provided by the Ontario Ministry of Transportation. It was determined that runoff from approximately 25.93 ha (Catchment 1) northwest of the site is captured in a large depression area immediately southeast of the intersection of Highway 48 and Bloomington Road.

Runoff from approximately 141.74 ha (Catchment 2) is conveyed to the subject lands overland and via culverts under Bloomington Road and Highway 48. Runoff from Catchment 1 & 2 was modelled to enter a route reservoir command at the south excavated portion of the subject lands. The stage-storage rating curve for the excavated site area was established based on contours of the proposed retention pond. No piped outlet is proposed from this low area. Instead, infiltration of the ponded stormwater is modelled as the only outflow from the pond. This outflow was calculated based on the infiltration rate provided in the hydrogeological assessment by Golder Associates (relevant excerpts can be found in (**Attachment A**).

The 4-hour Chicago and 12-hour AES design storms were run in the VO6 model. The 12-hour AES 100 year design storm resulted in the greater storage volume required on the subject lands. The required 100 year storage modelled volume was 42,138 m^3. A total pond volume of 42,936 m^3 has been provided in the south portion of the site (refer to **Appendix C**). As a result, it was concluded that the 100 year storm event runoff

from the entire upstream drainage area to the subject lands can be fully contained within the site. Furthermore, it is not anticipated that any runoff will spill onto the 13393 Highway 48 property to the south.

Please contact the undersigned if you have any questions or require any additional information.

Sincerely,

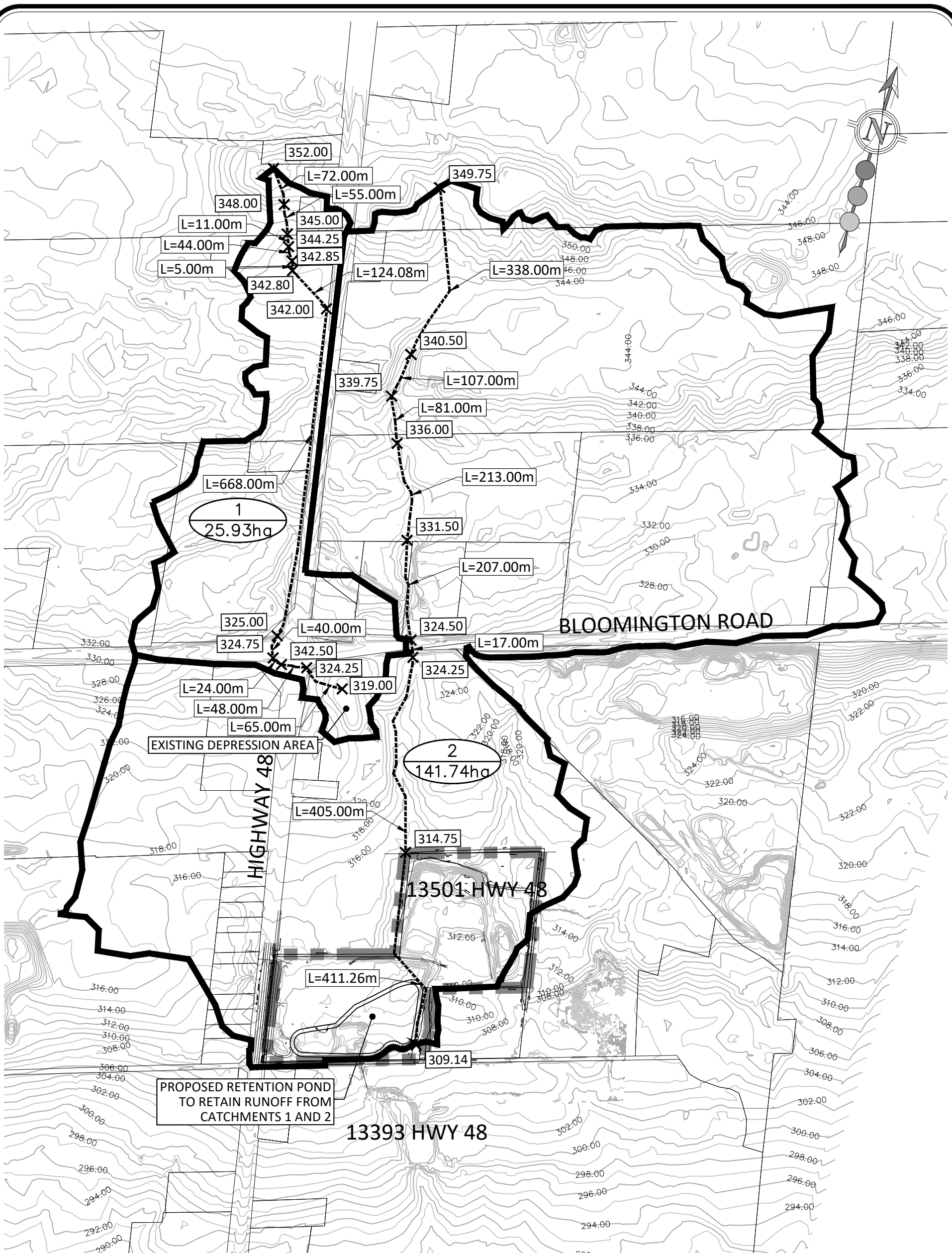
SCS Consulting Group Ltd.

Erich Knechtel, P.Eng.
eknechtel@scsconsultinggroup.com

Attachments: Figure 1.0: External Drainage Plan
Drawing GR-1
Drawing D-1
Drawing ESC-1
Drawing ESC-2
Attachment A: Background Information
Attachment B: Hydrologic Modelling and Modelling Parameters
Attachment C: Retention Pond Sizing

c. Mr. Paul Nunes, Ontario Ministry of Transportation
Mr. Paul Mercer, Town of Whitchurch-Stouffville
Ms. Michelle Bates, Toronto and Region Conservation Authority
Mr. Jim Walls, R. J. Burnside
Mr. Cam Fairty, W.L.J.C. Investments Inc.
Mr. Matt Gauthier, W.L.J.C. Investments Inc.

P:\1826 Fairty Site Alteration Permit\Correspondence\Letters\Town-2023 04(Apr) 14-js-drainage assessment.docx



LEGEND:

- SUBJECT LANDS
- 270.25 — EXISTING CONTOUR
- STORM DRAINAGE BOUNDARY
- 1 / 0.20ha — CATCHMENT ID / DRAINAGE AREA (HECTARES)
- 352.00 × — TIME TO PEAK ELEVATION
- L=11.00m — TIME TO PEAK FLOW PATH AND LENGTH

FAIRGREEN SOD FARMS LTD.	FAIRTY SITE	EXTERNAL DRAINAGE PLAN	
30 CENTURIAN DRIVE, SUITE 100 MARKHAM, ONTARIO L3R 8B8 TEL: (905) 475-1900 FAX: (905) 475-8335	DESIGNED BY: E.T.C.K.	CHECKED BY: S.E.K.	PROJECT No: 1826 / FIGURE No: 1.0
SCS consulting group ltd	SCALE: 1:7500	DATE: APRIL 2023	

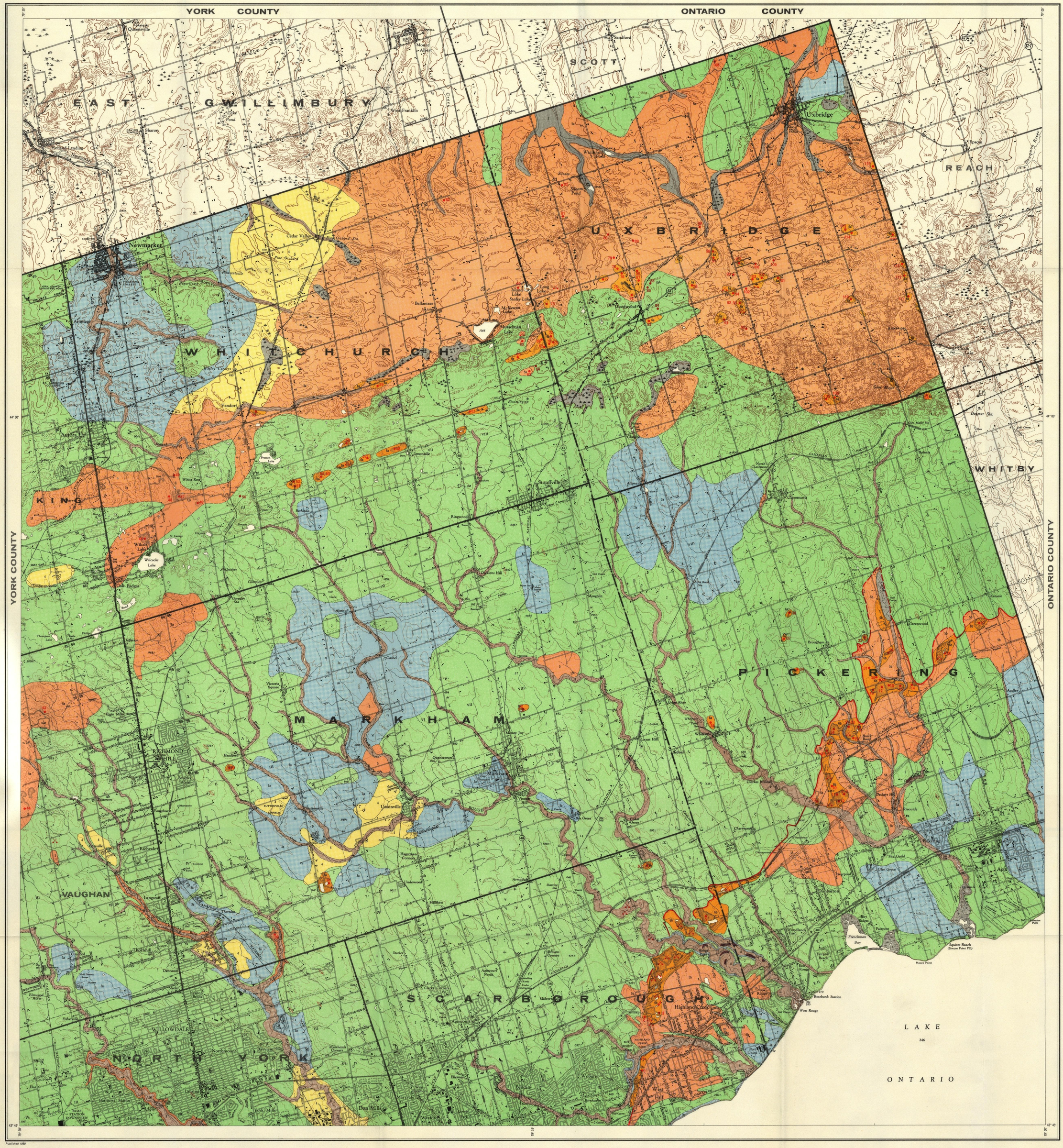
File: P:\1826 Fairty Site Alteration Permit\Drawings\Phase 1\Swm\Report Figures\1826D-SWMN-EXTN-DRNG-AREA-1.0.dwg – Revised by <RCORTEZ> : Thu, Oct 13 2022 – 12:03pm

ATTACTHMENT A

BACKGROUND INFORMATION

ONTARIO
DEPARTMENT OF MINES
HON. ALLAN F. LAWRENCE, *Minister of Mines*
D. P. Douglass, *Deputy Minister* J. E. Thomson, *Director, Geological Branch*

Map 2124
Markham—Newmarket Area
Industrial Mineral Resources Sheet



Scale 1 inch to 50 miles

LEGEND

CENOZOIC

PLEISTOCENE AND RECENT

8 *Alluvium, stream deposits, including some stream gravels and sands.*

Bog and swamp deposits:

7 *Peat and muck.*

Stratified sand and gravel:

6 *6a Kame and kame moraine. 6b Lake Iroquois beach gravel and sand.*

5 *5a Oak Ridges kame moraine. 5b Lake Iroquois sand. 5c Interstadial outwash and deltaic sand.*

Sand and silt:

4 *Glaciolacustrine sand and silt, frequently as a veneer on till.*

Clay and silt:

3 *3a Glaciolacustrine clay and silt. 3b Interglacial clay and silt. 3c Schomberg Lake clay and silt.*

2 *Clay till, sand till, includes some clay veneer on till.*

PALEOZOIC

ORDOVICIAN

COLLINGWOOD FORMATION

1 *Black shale.*

SYMBOLS

County boundary.

Township boundary.

Topographic contours.

Drumlin.

Geological boundary, position interpreted.

Lake Iroquois shoreline; position defined, assumed.

Sand, gravel pit.

22 *Location of property.*

For other conventional signs refer to 1:50,000 National Topographic System.

LIST OF PROPERTIES

SCARBOROUGH TOWNSHIP

1 Highland Creek Sand and Gravel Co. Ltd.
2 Miller Paving Limited
3 J. Blake Sand and Gravel Company Limited
4 Crawford Sand and Gravel Limited
5 Highland Creek Sand and Gravel Co. Ltd.
6 John B. Regan Company Limited
7 Connor Transport Limited

PICKERING TOWNSHIP

8 Miller Paving Limited
9 Miller Paving Limited
10 Highland Creek Sand and Gravel Co. Ltd.
11 Ontario Department of Highways
12 Warnock and Johnson pit
13 K. S. Currey pit
14 Highland Creek Sand and Gravel Co. Ltd.
15 Miller Paving Limited
16 A. H. Rowe and McEwen Estate
17 Forsyth pit
18 Consolidated Sand and Gravel Company
19 Gravand Construction Co. Ltd., McKenzie pit
20 Highland Creek Sand and Gravel Co. Ltd.
21 Gravand Construction Company Limited
22 Miller Paving Limited
23 Highland Creek Sand and Gravel Co. Ltd.
24 Highland Creek Sand and Gravel Co. Ltd.
25 Miller Paving Limited
26 Chandler pit
27 Barclay Transport Limited
28 Cooper, Leder and McLachlan pits
29 Highland Creek Sand and Gravel Co. Ltd.
30 Consolidated Sand and Gravel Company
31 John B. Regan Company Limited
32 Township of Pickering pit
33 Consolidated Sand and Gravel Company
34 Gravand Construction Company Limited
35 Giordano Sand and Gravel Limited
36 Concession VI, lot 21
37 Pearse pit
38 E. R. Schutz pit

MARKHAM TOWNSHIP

39 J. Sabiston Limited
40 Warnock & Johnson, Headford pit
41 Markham Sand and Gravel
42 Warnock & Johnson, Groves pit

VAUGHAN TOWNSHIP

43 Rockmor Products Limited
44 Superior Sand Gravel and Supplies Limited

WHITCHURCH TOWNSHIP

45 Baker Sand and Gravel
46 Markham Sand and Gravel Limited
47 George A. White
48 Miller Paving Limited
49 York Sanitation
50 Warnock and Johnson, Cecci property
51 Pike pit
52 Brillinger pit
53 Van Norstrand property
54 Gormley Sand and Gravel, Atkinson pit
55 Gormley Sand and Gravel, Bolender pit
56 Consolidated Sand and Gravel Company
57 Parkway Sand and Gravel
58 Gormley Sand and Gravel
59 K. J. Beamish pit
60 Commercial Sand and Gravel Limited
61 F. H. Roberts & Sons Limited
62 Willingshofer property
63 Campbellville Gravel Supply Limited
64 Consolidated Sand and Gravel Company
65 Lee Sand and Gravel Limited
66 Consolidated Sand and Gravel Company
67 Commercial Sand and Gravel Limited
68 Aprile Contracting Limited
69 Island Lake pit

UXBRIDGE TOWNSHIP

70 Consolidated Sand and Gravel Company
71 Commercial Sand and Gravel Limited
72 Rossfrank Limited
73 Consolidated Sand and Gravel Co., W. A. Irwin pit
74 Consolidated Sand and Gravel Company
75 General Concrete Limited
76 Consolidated Sand and Gravel Company
77 Campbellville Gravel Supply Limited
78 Hall pit
79 Goodwood Airways
80 Richmond property
81 W. Mantle pit
82 Beach farm
83 Campbellville Gravel Supply Ltd., Bunker pit
84 F. H. Roberts and Sons Limited
85 Gormley Sand and Gravel
86 Consolidated Sand and Gravel Company
87 Consolidated Sand and Gravel Company
88 Reiss pit
89 James pit
90 J. B. Regan Limited
91 Giordano Sand and Gravel Limited
92 Jas. Sabiston Limited
93 Burgin pit
94 Elmer Carter pit
95 Commercial Sand and Gravel Limited
96 Concession IV, Lot 17
97 K. J. Beamish
98 Consolidated Sand and Gravel Co., Home pit
99 Miller Paving Limited
100 Township of Pickering pit
101 Consolidated Sand and Gravel Co., Davis pit
102 Consolidated Sand and Gravel Co., Blake pit
103 Coppins pit
104 Highland Creek Sand and Gravel Co. Ltd.
105 Miller Paving Limited
106 Consolidated Sand and Gravel Company
107 Consolidated Sand and Gravel Company
108 Shillinglaw pit
109 Miller Paving Limited
110 Township of Uxbridge pit
111 Ballard farm, Township of Whitby pit
112 County of Ontario pit
113 Consolidated Sand and Gravel Company
114 Evans pit
115 Miller Paving Limited
116 Miller Paving Limited
117 Giordano Sand and Gravel Limited

List of properties compiled by D. F. Hewitt, 1966

SOURCES OF INFORMATION

Scarborough (Maps 2076, 2077) and Thornhill (P. 244) Pleistocene sheets of P. F. Karrow, Ontario Department of Mines.

Ontario Soil Surveys of York and Ontario Counties.

P. F. Karrow reconnaissance field sheets.

Additional geology by D. F. Hewitt, 1965.

Cartography by D. V. Impey, Ontario Department of Mines, 1968.

Topography directly from maps 30M/14E, 30M/14W, 31D/3E, 31D/3W of the National Topographic System.

Magnetic declination in the area approximately 8°W 1965.

Published 1969

Map 2124

MARKHAM–NEWMARKET AREA

YORK AND ONTARIO COUNTIES

Industrial Mineral Resources Sheet

Scale 1: 63,360 or 1 Inch to 1 Mile

Chains 80 40 0 1 2 3 4 5 Miles
Feet 10,000 0 10,000 20,000 Feet
Metres 1000 0 1 2 3 4 5 6 Kilometres

4.0 SUBSURFACE INVESTIGATION

4.1 Borehole Advancement and Monitoring Well Installation

Borehole drilling and monitoring well installation was completed between March 27 and March 29, 2017. Four boreholes were completed as monitoring wells around the perimeter of the Site (MW1, MW2, MW3 and MW4). Monitoring well locations are presented in Figure 2. Drilling was conducted by Landshark Drilling under Golder's supervision using a track mounted power auger drill rig with 108 mm inner diameter ("ID") hollow stem augers. The boreholes were advanced to depths ranging from 10.7 metres below ground surface ("mbgs") to 12.6 mbgs.

During drilling, soil samples were obtained at regular depth intervals and were logged in the field noting subsurface conditions including soil type, colour and texture, moisture content and visual evidence of contamination (if any). Staining and/or odours were not observed in any of the soil samples obtained. Details of the conditions encountered in the boreholes are presented on the Record of Borehole sheets included in Attachment B.

4.2 Groundwater Monitoring and Sampling

Depth to groundwater was measured at the four newly installed monitoring wells on April 3, April 11 and April 18, 2017 using an electronic water level meter. Horizontal and vertical coordinates for each monitoring well were collected by J.D. Barnes Limited, on April 5, 2017. Elevations were determined relative to a geodetic elevation.

Monitoring wells MW1 through MW4 were developed on March 31, 2017 by purging ten well volumes of water or until the water quality parameters had stabilized. Headspace screening for combustible and organic vapours was completed within each well headspace using an RKI Eagle gas indicator, operated in the methane gas elimination mode and calibrated to hexane and isobutylene gas standards. Headspace readings for combustible vapours within the wells were not detected while organic vapours ranged between non-detect and 1 part per million ("ppm"). Well development was completed using dedicated Waterra® inertial samplers was used to develop, purge and sample the groundwater contained within the wells. Field parameters (temperature, pH and EC) were measured throughout well development.

Monitoring wells MW1 through MW4 were sampled on April 3, 2017, following purging of the wells using the abovementioned Waterra® inertial samplers. Groundwater samples were collected into pre-cleaned laboratory-supplied sample containers. Groundwater samples were stored on ice in a cooler until delivered to the analytical laboratory, Maxxam Analytics ("Maxxam") of Mississauga, for analysis. Groundwater samples were submitted for analysis of benzene, toluene, ethylbenzene and xylenes ("BTEX"), petroleum hydrocarbons ("PHCs"), volatile organic compounds ("VOCs"), metals, hydride-forming metals and other regulated parameters.

4.3 Hydraulic Conductivity

Single-well response tests were carried out at each new monitoring well on April 18, 2017 to estimate the hydraulic conductivity of native soil at the well screens. A description of the test methods is provided in Attachment C.

5.0 SUBSURFACE CONDITIONS

5.1 Generalized Site Subsurface Conditions

Details of the conditions encountered in the boreholes are presented on the Borehole Logs included in Attachment B. It should be noted that subsurface conditions encountered are specific to the borehole locations and will vary between and beyond borehole and sampling locations.

The four perimeter boreholes, completed as monitoring wells, were advanced to depths ranging from 10.7 mbgs to 12.6 mbgs. In general, fill materials were encountered from depths ranging from 2.13 to 5.33 mbgs. Fill materials consisted of silty sand, sandy silt and clayey silt. Underlying the fill materials, the native subsurface soil conditions generally consist of non-cohesive gravelly sand, sandy silt and sand and gravel. Groundwater was encountered in all of the boreholes during drilling.

5.2 Hydrogeology

Groundwater levels observed in the boreholes at the time of drilling and monitoring well installations are shown on the Record of Borehole sheets in Attachment B. Water level data are presented in Table 1 and on Figure 3. Water level elevations were generally consistent between the three monitoring events. The highest elevations were reported at MW3 which ranged between 306.19 and 306.37 meters above sea level ("masl") (7.84 to 7.66 mbgs). The lowest elevations were reported at MW4 which ranged between 302.76 and 302.93 masl (6.94 to 6.77 mbgs). Based on the observed groundwater elevation data, the inferred direction of shallow groundwater flow is southwesterly. The Site does not appear to be within the capture zone of the municipal water supply wells located to the northeast considering that the inferred direction of groundwater flow is to the southwest (i.e., away from production wells 5 and 6). Accordingly, the current conditions pose minimal risk to the quality of the municipal groundwater resource.

Over the monitoring period, groundwater elevations have remained relatively consistent indicating that water levels appear to represent static conditions. The groundwater elevations represent the conditions on the dates they were measured, and seasonal and annual fluctuations should be anticipated.

Table 1: Water Level Measurements

Well ID	Ground Surface (masl)	Top of Pipe (masl)	Top of Screen (masl)	April 3, 2017		April 11, 2018		April 18, 2017	
				Depth to Water (m)	Water Table (masl)	Depth to Water (m)	Water Table (masl)	Depth to Water (m)	Water Table (masl)
MW1	308.92	309.53	299.78	5.28	303.65	5.08	303.84	5.10	303.83
MW2	309.71	310.42	302.09	4.56	305.15	4.41	305.30	4.41	305.30
MW3	314.03	314.85	306.41	7.84	306.19	7.74	306.29	7.66	306.37
MW4	309.70	310.35	300.56	6.94	302.76	6.84	302.86	6.77	302.93

Notes:
Elevations were surveyed by J.D. Barnes Limited, Ontario Land Surveyors on April 5, 2017
Depth to water determined relative to top of well pipe

It is noted that the water table elevations at MW1, MW2, and MW4 were up to four metres above the top of the well screen. Golder notes that the strict requirements of the fill management plan, including the source site review and the on-Site inspection procedures, effectively preclude the possibility that free petroleum hydrocarbon product will be placed at the Site in such a quantity that would allow the formation of free product and the water table . Considering that the Site, during the period of construction, will continue to be a focused recharge zone for the infiltration of groundwater, which will generate vertical gradients at the water table and result in a downwards

component to groundwater flow from the water table, the depth of the wells screens is sufficient for the purpose of identifying potential groundwater impacts that have the potential to degrade the groundwater resource quality.

The analysis of the data collected during single-well hydraulic testing is presented in Attachment C. The reported hydraulic conductivity at each monitoring well is presented in Table 2.

Table 2: Hydraulic Conductivity

Monitoring Well ID	Soil Description	Hydraulic Conductivity (m/s)
MW1	SAND, trace fines, trace gravel	4.58×10^{-4}
MW2	Gravelly SAND, some fines	2.22×10^{-4}
MW3	SAND to SILTY SAND, some fines, trace gravel	3.54×10^{-4}
MW4	Gravelly SAND to SAND and GRAVEL, trace to some fines	9.58×10^{-5}

The reported hydraulic conductivity results are within the reported range of hydraulic conductivity for well-sorted sand materials (HydroSOLVE Inc., 2016), which is consistent with the soil types at each monitoring well screen that were observed during borehole advancement. Using the calculated horizontal gradient at the Site of 0.008 m/m and the geometric mean hydraulic conductivity of 2.23×10^{-4} m/s, the groundwater velocity is 56 m/year at the Site. Accordingly, the existing groundwater monitoring network is suitable for detecting potential groundwater impacts within several years of their occurrence.

Surface water infiltration rates within the fill area will depend upon the nature of fill materials imported and the method(s) by which they are placed. Likewise, the time required for any contaminants introduced by fill importation (should such an event occur) to reach the water table and impact groundwater quality will vary depending upon the nature of the contaminants, degree of impact, permeability of the surrounding fill materials and the location of placement relative to the groundwater table.

The rate of migration of a given contaminant in the subsurface depend, advection, dispersion, adsorption and other natural attenuation processes. Some constituents may migrate at a similar rate to the average linear groundwater velocity, while others will tend to migrate at lower rates. As the fill importation proceeds and further hydrogeological data become available, a groundwater management plan ("GMP") should be developed to ensure that monitoring continues long enough after closure that it can be reasonably established that the filling operation has not resulted in exceedances of the Table 2 Standards for groundwater.

6.0 CHEMICAL ANALYSIS

6.1 Site Condition Standards

The analytical results for the groundwater samples analysed for this baseline groundwater monitoring and sampling program were compared to the Table 2 site condition standards presented in the MECP document "*Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act*", dated April 15, 2011. Based on observed soil conditions at the Site and as a conservative approach, the standards for coarse textured soils were selected.

6.2 Groundwater Analysis

Summaries of the sample analytical results and their respective Table 2 Standards are provided on the Certificates of Analysis in Attachment D. The reported concentrations in groundwater for all parameters were below their respective Table 2 site condition standards.

6.3 Observations during Sampling and Comparison to Non-Numerical Site Condition Standards

In addition to numerical standards, the MOECC sets out non-numerical (aesthetic) standards relating to the presence of free phase product and hydrocarbon sheen. Specifically, a property does not meet the site condition standards if there is evidence of free product, including but not limited to visible petroleum hydrocarbon film or sheen present on groundwater, surface water or in any groundwater or surface water samples.

No evidence of free product was encountered during purging and sampling of the monitoring wells.

7.0 WATER BALANCE

A water balance report considering the impact of the proposed site alteration, along with TRCA concurrence dated October 23, 2018, is presented in Attachment E. At completion, the proposed site alternation will decrease total infiltration by 1,550 m^3/year, equivalent to a total reduction of 7% in comparison of pre-extraction conditions. There is approximately five hectares of the Site that contributes groundwater to the local supply wells which represents less than 1% of the total area contributing infiltration to Stouffville Wells 5 and 6. The 7% reduction in infiltration at the Site is not considered significant. considering uncertainty inherent in the analysis and the benefit of increased run-off to the wetland complex located east of the Site, where further recharge into groundwater is anticipated to occur.

8.0 SUMMARY OF FINDINGS

The following provides a summary of the key findings of this report:

- There are 46 potential water wells located within 500 metres of the Site, including two supply wells at the Site and four municipal wells northeast of the Site;
- The Site is partially located within the WHPA for the Whitchurch-Stouffville Production Wells 5 and 6 reported in the York Region Source Water Protection interactive mapping;
- The inferred direction of groundwater flow is southwesterly (i.e., away from the municipal supply wells), indicating that the Site is not within the capture zone of the municipal water supply wells located to the northeast;
- The hydraulic conductivities of the soil within the screened interval of the monitoring wells range from 9.58 x 10^{-5} to 4.58 x 10^{-4} m/s;
- The calculated groundwater velocity is 56 m/year based on a horizontal gradient of 0.008 m/m and geometric mean hydraulic conductivity of 2.23 x 10^{-4} m/s; and,
- The reported concentrations in all groundwater samples collected as part of the baseline monitoring program were below the Table 2 standards for the contaminants of potential concern.

9.0 LIMITATIONS

This report was prepared for the exclusive use of Fairgreen Sod Ltd. The report is based on data and information collected during the baseline groundwater monitoring and sampling program conducted by Golder Associates Ltd.'s personnel and is based solely on the Site conditions encountered at the time of the fieldwork carried out between March 27, 2017 and April 18, 2017.

In preparing this Site assessment, Golder evaluated only conditions at a limited number of test locations. Only limited chemical analyses of groundwater samples were carried out. It should be noted that the results of an investigation of this nature should, in no way, be construed as a warranty that the Site is free from any and all contamination from past or current practices.

If additional information is obtained during future work at the Site, including excavations, borings, or other studies, and/or if conditions exposed during construction are different from those encountered in this assessment, Golder Associates should be requested to re-evaluate the conclusions presented in this report and provide amendments as required.

This document provides a professional opinion and, therefore, no warranty is either expressed, implied, or made as to the conclusions, advice and recommendations offered in this document. This document does not provide a legal opinion regarding compliance with applicable laws. With respect to regulatory compliance issues, it should be noted that regulatory statutes and the interpretation of regulatory statutes are subject to change.

Further, this report has investigated the current environmental quality of groundwater at the Site only, as per specific parameters set out by the Client. Golder's professional services for this assignment addressed only the geo-environmental (chemical) aspects of the subsurface conditions at a limited number of locations. The potential environmental impact of Site development or local biological, hydrological and hydrogeological functions and the like is not addressed herein. The geotechnical (physical) aspects, including engineering recommendations for the design and construction of building foundations, pavements, underground servicing and the like are outside the terms of reference for this letter report and are addressed under separate cover.

10.0 CLOSURE

We trust this is satisfactory for your current requirements. Should you have any questions or require any additional information, please feel free to contact us.

Yours truly,

GOLDER ASSOCIATES LTD.

Chris Pons, B.Sc.
Environmental Scientist

Eric Hood, Ph.D., P.Eng.
Associate, Senior Engineer

CP/EH/lb

Attachments:
Figure 1 – Key Plan
Figure 2 – Borehole and Monitoring Well Location Plan
Figure 3 – Groundwater Elevation Contours
Attachment A – MECP Water Well Records
Attachment B – Record of Borehole Sheets
Attachment C – Single Well Response Test Analysis
Attachment D – Laboratory Certificates of Analysis
Attachment E – Water Balance Report

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FIGURE 3

Groundwater Elevation Contours

LEGEND

MONITORING

INFERRED GR

GROUNDWATE

WATERCOURS

APPROXIMATE

WATERBODY

(303.84) GROUNDWATE MEASURED AI

0

NOTE(S)

1. M ASL = METRES ABOVE SE
2. MONITORING WELL ELEVA
3. WATER LEVELS WERE MEA

REFERENCE(S)

BASE DATA - MNR LIO, OBTAINE
PRODUCED BY GOLDER ASSOC
RESOURCES, © QUEENS PRINT
BASE IMAGERY © 2017 DIGITAL
2017 MICROSOFT CORPORATIO
PROJECTION: TRANSVERSE ME

CLIENT

FAIRGREEN SOD LT

March 9, 2023 Project No. 19128811

Ms. Marjorie MacDonald
SCS Consulting Group Ltd.
30 Centurian Drive, Suite 100
Markham, ON, L3R 8B8

SLOPE STABILITY DESKTOP STUDY – FAIRTY SITE RETENTION POND, FAIRGREEN SOD FARMS LTD. 13501 HIGHWAY 48, TOWN OF WHITCHURCH-STOUFFVILLE, ONTARIO

Dear Ms. Mcdonald:

WSP Canada Inc (formerly Golder Associates Ltd.), was retained by SCS Consulting Group Ltd. ("SCS") to carry out a geotechnical Desktop Study for the proposed retention pond to satisfy the requirements of the Site Alteration and Fill Management Plan, dated June 2019, for the above noted site.

The scope of work of the Desktop Study comprises the review of the proposed site plans by SCS, dated January 2023 and the existing subsurface information provided in the report entitled "*Factual Geotechnical Report, Fairgreen Sod Ltd., Site Plan Alteration for 13501 Highway 48, town of Whitchurch-Soutffville, Ontario*" prepared by Golder Associated Ltd., dated April 27, 2017. The purpose of the Desktop Study is to provide geotechnical recommendations for the design and construction of the retention pond based on this limited information.

The factual data, interpretations and recommendations contained in this report pertain to a specific project, as described in the report and are not applicable to any other project or site location. If the project is modified in concept, location or elevation, or if the project is not initiated within eighteen months of the date of the report, WSP should be given an opportunity to confirm that the recommendations are still valid. In addition, this report should be read in conjunction with the attached *"Important Information and Limitations of This Report",* following the text of this report. The reader's attention is specifically drawn to this information, as it is essential for the proper use and interpretation of this report.

SITE AND PROJECT DESCRIPTION

The site is located approximately 0.6 kilometers south of the intersection of Highway 48 and Bloomington Road in the Town of Whitchurch-Stouffville, Ontario. The site occupies an area of about 14 hectares and was formerly

used as a sand and gravel pit, with the intention to use on-site or off-site fill material to restore the property to original grade. The proposed retention pond is located at the southeast corner of the property.

Based on the cross sections provided, it is anticipated that the retention pond, with a planned pond bottom grade at Elevation 305.9 m, will be constructed by excavating existing fill and/or native soils and re-using this material, along with imported fill for the construction of the perimeter pond berms. The pond is not a watertight structure and is understood to be designed to infiltrate the retained stormwater through the base and potentially the berms/cut slopes, as evaluated by SCS. The drawings currently show pond side slopes of 3 horizontal to 1 vertical (3H:1V) along the perimeter of the pond. A proposed culvert extending from Highway 48 is planned to be discharge into the southwest corner of the pond, although the details of the culvert are not yet known.

SUBSURFACE CONDITIONS

The subsurface soil and groundwater information was obtained the Golder 2017 report. The location of the referenced boreholes/monitoring wells in the vicinity of the proposed retention pond are shown on the attached plan. Specifically, Boreholes MW-1 (ground surface Elevation 308.9 m), MW-4 (ground surface Elevation 309.7 m) and MW-5 (ground surface Elevation ~310.5 m) were closest to the proposed pond.

In general, the subsurface conditions at the borehole locations consist of variable fill comprised of loose to compact silt and sand to silty sand, very dense sand and gravel and stiff to hard sandy silty clay, overlying native deposits of non-cohesive, loose to compact (occasionally very dense) sand, silty sand to sandy silt and compact to very dense gravelly sand to sand and gravel with occasional layers of stiff clayey silt. In situ moisture contents were variable ranging from 2% to 20%.

The groundwater level measured in Boreholes MW1 and MW4 were between Elevation 302.8 m and 303.8 m in the month of April 2017, which is lower than the proposed pond base of Elevation 305.9 m The groundwater level at the site is expected to fluctuate seasonally in response to changes in precipitation and snow melt events.

DISCUSSION AND RECOMMENDATIONS

Based on our analysis and interpretation of the available subsurface information, site drawings and our understanding of the project requirements, this section of the Desktop Study report provides preliminary geotechnical recommendations for the proposed retention pond. The information in this portion of the report is provided for the guidance of the design engineers. Where comments are made on construction, they are provided only in order to highlight aspects of construction which could affect the design of the project. Contractors bidding on or undertaking any work at the site should examine the factual results of the investigation, satisfy themselves as to the adequacy of the information for construction and make their own interpretation of the factual data as it affects their proposed construction techniques, schedule, equipment capabilities, costs, sequencing, safety and the like.

Proposed Retention Pond

The site plan and three cross sections as provided by SCS are attached to this report. As noted above, the pond is anticipated to be a dry pond and only retain stormwater until it infiltrates into the ground. The design base of the pond is set at Elevation 305.9 m, with a high stormwater level in the pond at Elevation 307.9 m. The prevailing groundwater level measured in the monitoring wells ranges from Elevation 303.6 m to Elevation 302.8 m (i.e. below the pond bottom by about 2.3 m to 3.1 m based on the nearest wells).

Based on the cross sections, the approximate corresponding estimated cut/fill depths to achieve the proposed pond berm configurations are summarized in the table below.

Pond Cross Section	Excavation Depth Relative to Pond Bottom Elevation	Berm Fill Thickness Required Above Existing Ground Elevation
A-A'	3 m to 5 m excavation	1 m to 6 m fill
B-B'	1 m to 7 m excavation	3 m to 7 m fill
C-C'	0 m to 2 m excavation	1 m to 5 m fill

As noted above, the proposed grading to construct the retention pond will require berm fill thickness ranging from 1 m to 7 m above the existing ground surface and cut slopes ranging from 1 m to 7 m below the existing ground surface to reach the design pond bottom elevation. Based on three cross sections of the retention pond provided by SCS, the perimeter slopes are to have side slopes oriented at no steeper than 3H:1V. However, comments received from the Town of Whitchurch-Stouffville have indicated that side slopes of 4H:1V on average or flatter be specified.

We understand that the berms themselves will be constructed with either the existing on-site fill from the cut areas (ranging from silt and sand to silty sand to sand and gravel fill or sandy silty clay fill) or off-site imported fill of unknown and variable composition.

The stability of the pond berm side slopes and cut slopes will be dependant on the following:

- Overall slope height, angle and surcharge;
- Groundwater level;
- Fill composition;
- In situ water content of fill (imported or existing);
- Placement lift thicknesses; and
- Compactive efforts.

Given that the fill composition and water content are unknown and likely to be highly variable and possibly originating from different sites, and that minimal compaction efforts will likely take place, the analyses below are based on imported fill that meet a minimum set of parameters and construction conditions, to be discussed in more detail below.

Global Stability Analyses

Limit equilibrium slope stability analyses for the pond berms and cut slopes were carried out using the commercially available program Slide2 (version 9.0), developed by Rocscience Inc., employing the Morgenstern-Price method of analysis. For all analyses, the Factors of Safety (FoS) of numerous potential failure surfaces were computed for the pond slopes in order to establish the minimum FoS for a deep-seated global failure surface. The FoS is defined as the ratio of the forces tending to resist failure to the driving forces tending to cause failure. A target minimum FoS of 1.5 is considered appropriate for the design of the pond slopes.

The models have considered both the high pond stormwater level of Elevation 307.9 m and under dry pond conditions, the composition of the fill berm and compaction level, and slope inclination. The analyses was completed using very conservative fill material properties assuming that variable fill with only moderate compaction will be used. The following soil parameters were used in the static global stability analyses of the pond slopes, based on limited borehole information and assumed fill types.

Materials	Bulk Unit Weight (kN/m^3)	Friction Angle (°)
Imported Material (variable composition, moderate compaction) including re-use of existing on-site fill	18	25
Existing Silt and Sand Fill	18	28
Existing Sandy Silty Clay Fill	18	27
Native Silty Sand/Sandy Silt	19	31
Native Sand and Gravel to Sand	22	33

The results of the analysis indicate that the cut slopes at 3H:1V in the existing fill material on the east side of the pond have a FoS of greater than 1.5 for a deep-seated global failure surface. The pond berms up to 7.3 m high on the west side constructed out of variable fill over the existing fill or native soils at 3H:1V side slopes have a FoS of greater than 1.5 for a deep-seated global failure surface for the dry pond conditions only. For the high water level, the FoS for a deep-seated failure is about 1.4, which is less than the required FoS of 1.5. Based on this, as well as the potential for rapid draw down conditions, the variable nature of the imported fill, and typical practice for ponds, **we recommend that the pond berms be sloped at no steeper than 4H:1V**.

The results for Section C-C' are pond berm are shown on Figures 1 and 2 for the 3H:1V high water level and the 4H:1V high water level and on Figure 3 for the cut slope at 3H:1V high water level. The results for Sections A-A' and B-B' are similar.

Section	Slope Angle	Berm Height/ Cut Depth	Water Level Condition	Factor of Safety
A-A'	3H:1V	H = 7.3 m (west)	Dry Pond	>1.5
	3H:1V		High Water Level	~1.4*
	4H:1V		High Water Level	>1.5
	3H:1V	C =3.3 m (east)	Dry Pond and High Water Level	>1.5
B-B'	3H:1V	H = 4.2 m (west)	Dry Pond	>1.5
	3H:1V		High Water Level	~1.4*
	4H:1V		High Water Level	>1.5
	3H:1V	C = 3.3 m (east)	Dry Pond and High Water Level	>1.5
C-C'	3H:1V	H = 5.7 m (west)	Dry Pond	>1.5
	3H:1V		High Water Level (see Figure 2)	~1.4*
	4H:1V		High Water Level (see figure 3)	>1.5
	3H:1V	C = 2.9 m (east)	Dry Pond and High Water Level (see Figure 4)	>1.5

*Does not meet minimum criteria.

The analysis assumes the pond bottom and subgrade under the berms has been properly prepared and that the fill composition and compaction level is sufficient to meet the minimum parameters used in the analyses. Further, the side slopes (cut and fill) should have sufficient erosion protection to prevent surficial sloughing/failures and gullies from forming. Details of the construction aspects are discussed below.

Construction Considerations

The analysis above do not take into consideration the shallow surficial slip surfaces (typically less than FoS of 1.5) as these can be mitigated with the use of proper construction techniques and erosion protection to protect the integrity of the berm slope surface.

Subgrade Preparation

- Any existing topsoil or mixed organic soils should be removed prior to berm construction;
- The existing fill or native soils present at the pond bottom should be heavily proof rolled with a sheepsfoot roller or other satisfactory alternate equipment prior to base protection placement;
- Heavy proof rolling should take place on the existing subgrade soils within a 15 m zone adjacent to the pond (as shown on Figure 1); and
- Inspection of the subgrade of the pond bottom and the 15 m zone should be carried out by WSP to ensure an adequate base has been achieved to support the stability models, and to recommend any remedial measures should unfavourable soils be encountered in these areas.

Fill Berms

- The fill within the 15 m zone adjacent to the pond should consist of granular material, provided that suitable erosion control measures are in place otherwise some maintenance would be required. It is preferable that some grain size analyses are carried out to confirm the gradation of the material meets as a minimum OPSS.PROV 1010 (*Aggregates*) Select Subgrade Material (SSM) or other suitable berm material as approved by WSP;
- The fill within this zone adjacent to the pond should be constructed in lifts not greater than 300 mm and compacted to a minimum of 95% standard Proctor maximum dry density (SPMDD);
- Inspection and field density testing in this zone should be carried out by WSP during fill placement operations to ensure that appropriate materials are used and that adequate levels of compaction have been achieved;
- The fill outside this zone can be variable, however we recommend that the filling outside this zone be placed using similar minimum compaction techniques, although testing and inspection is not specifically required;
- It should be noted if imported material is too wet and/or too clayey, it may be difficult to achieve any sort of compaction without drying and/or placing in smaller lifts; and
- New fill should be keyed into existing slopes by benching as per OPSD 208.010 (*Benching of Earth Slopes*).

Cut Slopes

- The cut slopes should be examined for loose, soft or disturbed zones, and locally compacted as necessary, under the direction of WSP; and

- If the exposed slope is too clayey or too loose to achieve the minimum parameters used in the stability model, then removal up to 15 m back from the pond maybe necessary and replacement with granular material (placed and compacted as described above).

Pond Bottom

- It is recommended that a minimum 300 mm thick layer of granular bedding compacted to a minimum of 98% standard Proctor maximum dry density (SPMDD) be placed over the entire bottom of the pond for uniformity as well as to reduce any potential for disturbance/desiccation of the sandy silty clay fill which may be present at the pond bottom in some locations, and for protection of the base during maintenance and removal of sediment. The above-noted protection layer would need to be taken into account when determining the design pond bottom elevation. The granular bedding could consist of OPSS.PROV 1010, Granular 'A' or Granular 'B' or other sandy material available, as approved by WSP.

Erosion Protection

- The pond slopes (fill slopes and cut slopes) above the high water level water level should be vegetated as soon as practical after construction to minimize the potential for erosion due to surface water run-off, either by placement of topsoil as per OPSS 802 (*Topsoil*) plus seeding as per OPSS.PROV 804 (*Seed and Cover*) or pegged sod in accordance with OPSS 803 (*Sodding*). If this slope protection is not in place before winter, then alternate protection measures, such as covering the slope with straw, or gravel sheeting as per OPSS 511 *(Rip Rap, Rock Protection and Granular Sheeting)*, and OPSS.PROV 1004 *(Aggregates – Miscellaneous)* will be required to reduce the potential for erosion and to reduce the potential for the requirement of remedial works on the pond slopes in the spring prior to topsoil dressing and seeding. Maintenance should be expected within the first year until the vegetative root mat has been established;

- The active water line zone (i.e., from the dry pond level to the high water level) should be protected with a minimum of 150 mm thick layer of OPSS.PROV 1004 (*Aggregates*) R-10 rip-rap, constructed in accordance with OPSS 511 (*Rip-Rap, Rock Protection and Granular Sheeting*) and OPSS.PROV 1004 *(Aggregates);* however, this may not be necessary if appropriate vegetation can be established in this zone; and

- Erosion protection measures for the retention pond inlet should be assessed by the hydraulic design engineer, taking into consideration hydraulic elements and erodibility of the subgrade soils. As a minimum, rip-rap treatment for the inlet of the storm sewer pipes and/or ditches/channels should be consistent with the standard presented in OPSD 810.010 (*General Rip-Rap Layout for Sewer and Culverts outlets*) Rip-Rap Treatment Type A, with the rip-rap placed above the pipe obvert. Rip-rap should be provided over the full extent of the side slopes and base grade below and adjacent to the inlet / outlet locations and consist of OPSS.PROV 1004 (*Aggregates*) R-10 rip-rap.

CLOSURE

We trust that this report provides sufficient information to facilitate the pond design. The recommendations provided above are based on a limited number of boreholes and assumptions on the type of imported fill and compactive effort, as well as the drainage/infiltration conditions at the base being sufficiently permeable for the functionality of the retention pond (i.e. high water level is as provided). Should these assumptions change,

additional borehole drilling and laboratory testing and/or field inspection and testing would need to be considered if more refinement of the stability models is deemed necessary.

If you have any questions regarding the contents of this report or require additional information, please do not hesitate to contact the undersigned.

Yours truly,

WSP Canada Inc.

Sara M. Poot, P.Eng.
Geotechnical Engineer, Associate

SMP/ll

Attachments: Important Information and Limitations of This Report
Figures 1 to 4

https://golderassociates.sharepoint.com/sites/113967/project files/6 deliverables/slope stability report/19128811 (4000)-r-rev0-fairgreen retention pond 2023'03'09.docx

ATTACHMENTS

Important Information and Limitations of This Report Figures 1 to 4

IMPORTANT INFORMATION AND LIMITATIONS OF THIS REPORT

Standard of Care: WSP Canada Inc. (WSP) has prepared this report in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering and science professions currently practising under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this report. No other warranty, expressed or implied is made.

Basis and Use of the Report: This report has been prepared for the specific site, design objective, development and purpose described to WSP by the Client. The factual data, interpretations and recommendations pertain to a specific project as described in this report and are not applicable to any other project or site location. Any change of site conditions, purpose, development plans or if the project is not initiated within eighteen months of the date of the report may alter the validity of the report. WSP cannot be responsible for use of this report, or portions thereof, unless WSP is requested to review and, if necessary, revise the report.

The information, recommendations and opinions expressed in this report are for the sole benefit of the Client. No other party may use or rely on this report or any portion thereof without Golder's express written consent. If the report was prepared to be included for a specific permit application process, then upon the reasonable request of the client, WSP may authorize in writing the use of this report by the regulatory agency as an Approved User for the specific and identified purpose of the applicable permit review process. Any other use of this report by others is prohibited and is without responsibility to WSP. The report, all plans, data, drawings and other documents as well as all electronic media prepared by WSP are considered its professional work product and shall remain the copyright property of WSP, who authorizes only the Client and Approved Users to make copies of the report, but only in such quantities as are reasonably necessary for the use of the report by those parties. The Client and Approved Users may not give, lend, sell, or otherwise make available the report or any portion thereof to any other party without the express written permission of WSP. The Client acknowledges that electronic media is susceptible to unauthorized modification, deterioration and incompatibility and therefore the Client can not rely upon the electronic media versions of Golder's report or other work products.

The report is of a summary nature and is not intended to stand alone without reference to the instructions given to WSP by the Client, communications between WSP and the Client, and to any other reports prepared by WSP for the Client relative to the specific site described in the report. In order to properly understand the suggestions, recommendations and opinions expressed in this report, reference must be made to the whole of the report. WSP can not be responsible for use of portions of the report without reference to the entire report.

Unless otherwise stated, the suggestions, recommendations and opinions given in this report are intended only for the guidance of the Client in the design of the specific project. The extent and detail of investigations, including the number of test holes, necessary to determine all of the relevant conditions which may affect construction costs would normally be greater than has been carried out for design purposes. Contractors bidding on, or undertaking the work, should rely on their own investigations, as well as their own interpretations of the factual data presented in the report, as to how subsurface conditions may affect their work, including but not limited to proposed construction techniques, schedule, safety and equipment capabilities.

Soil, Rock and Ground Water Conditions: Classification and identification of soils, rocks, and geologic units have been based on commonly accepted methods employed in the practice of geotechnical engineering and related disciplines. Classification and identification of the type and condition of these materials or units involves judgment, and boundaries between different soil, rock or geologic types or units may be transitional rather than abrupt. Accordingly, WSP does not warrant or guarantee the exactness of the descriptions.

Special risks occur whenever engineering or related disciplines are applied to identify subsurface conditions and even a comprehensive investigation, sampling and testing program may fail to detect all or certain subsurface conditions. The environmental, geologic, geotechnical, geochemical and hydrogeologic conditions that WSP interprets to exist between and beyond sampling points may differ from those that actually exist. In addition to soil variability, fill of variable physical and chemical composition can be present over portions of the site or on adjacent properties. The professional services retained for this project include only the geotechnical aspects of the subsurface conditions at the site, unless otherwise specifically stated and identified in the report. The presence or implication(s) of possible surface and/or subsurface contamination resulting from previous activities or uses of the site and/or resulting from the introduction onto the site of materials from off-site sources are outside the terms of reference for this project and have not been investigated or addressed.

Soil and groundwater conditions shown in the factual data and described in the report are the observed conditions at the time of their determination or measurement. Unless otherwise noted, those conditions form the basis of the recommendations in the report. Groundwater conditions may vary between and beyond reported locations and can be affected by annual, seasonal and meteorological conditions. The condition of the soil, rock and groundwater may be significantly altered by construction activities (traffic, excavation, groundwater level lowering, pile driving, blasting, etc.) on the site or on adjacent sites. Excavation may expose the soils to changes due to wetting, drying or frost. Unless otherwise indicated the soil must be protected from these changes during construction.

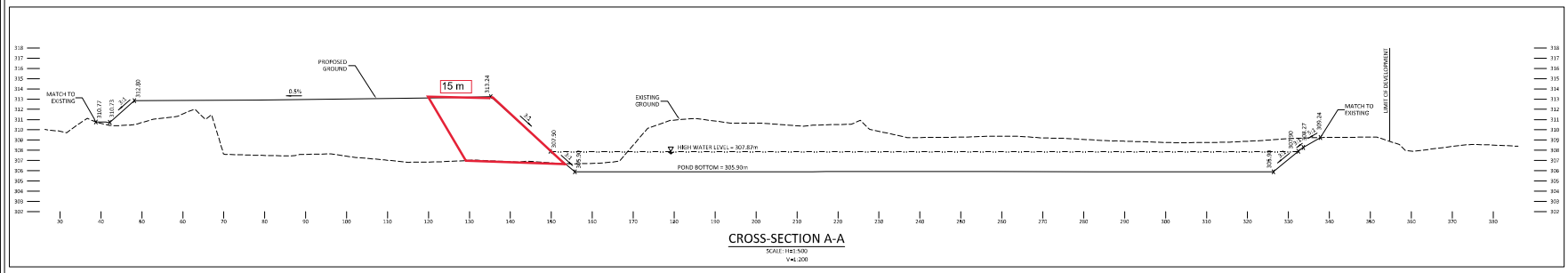
Sample Disposal: WSP will dispose of all uncontaminated soil and/or rock samples 90 days following issue of this report or, upon written request of the Client, will store uncontaminated samples and materials at the Client's expense. In the event that actual contaminated soils, fills or groundwater are encountered or are inferred to be present, all contaminated samples shall remain the property and responsibility of the Client for proper disposal.

Follow-Up and Construction Services: All details of the design were not known at the time of submission of Golder's report. WSP should be retained to review the final design, project plans and documents prior to construction, to confirm that they are consistent with the intent of Golder's report.

During construction, WSP should be retained to perform sufficient and timely observations of encountered conditions to confirm and document that the subsurface conditions do not materially differ from those interpreted conditions considered in the preparation of Golder's report and to confirm and document that construction activities do not adversely affect the suggestions, recommendations and opinions contained in Golder's report. Adequate field review, observation and testing during construction are necessary for WSP to be able to provide letters of assurance, in accordance with the requirements of many regulatory authorities. In cases where this recommendation is not followed, Golder's responsibility is limited to interpreting accurately the information encountered at the borehole locations, at the time of their initial determination or measurement during the preparation of the Report.

Changed Conditions and Drainage: Where conditions encountered at the site differ significantly from those anticipated in this report, either due to natural variability of subsurface conditions or construction activities, it is a condition of this report that WSP be notified of any changes and be provided with an opportunity to review or revise the recommendations within this report. Recognition of changed soil and rock conditions requires experience and it is recommended that WSP be employed to visit the site with sufficient frequency to detect if conditions have changed significantly.

Drainage of subsurface water is commonly required either for temporary or permanent installations for the project. Improper design or construction of drainage or dewatering can have serious consequences. WSP takes no responsibility for the effects of drainage unless specifically involved in the detailed design and construction monitoring of the system.



CROSS-SECTION A-A

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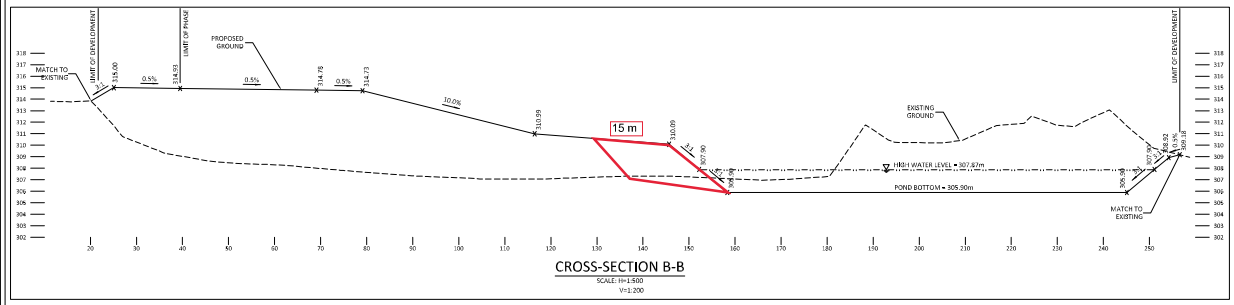
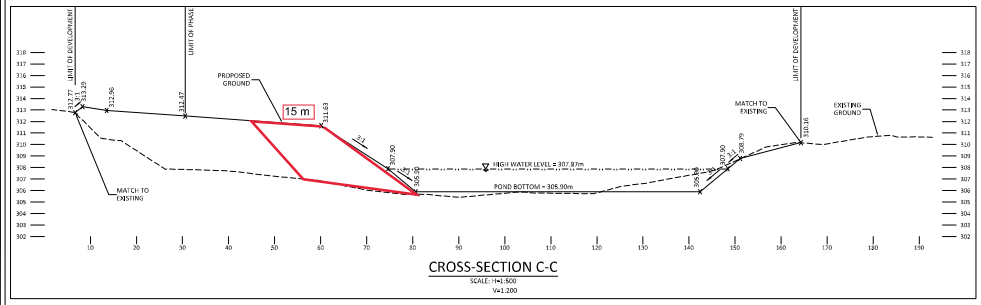
V=1:200



CROSS-SECTION B-B

SCALE: H=1:500
V=1:200

Figure 1



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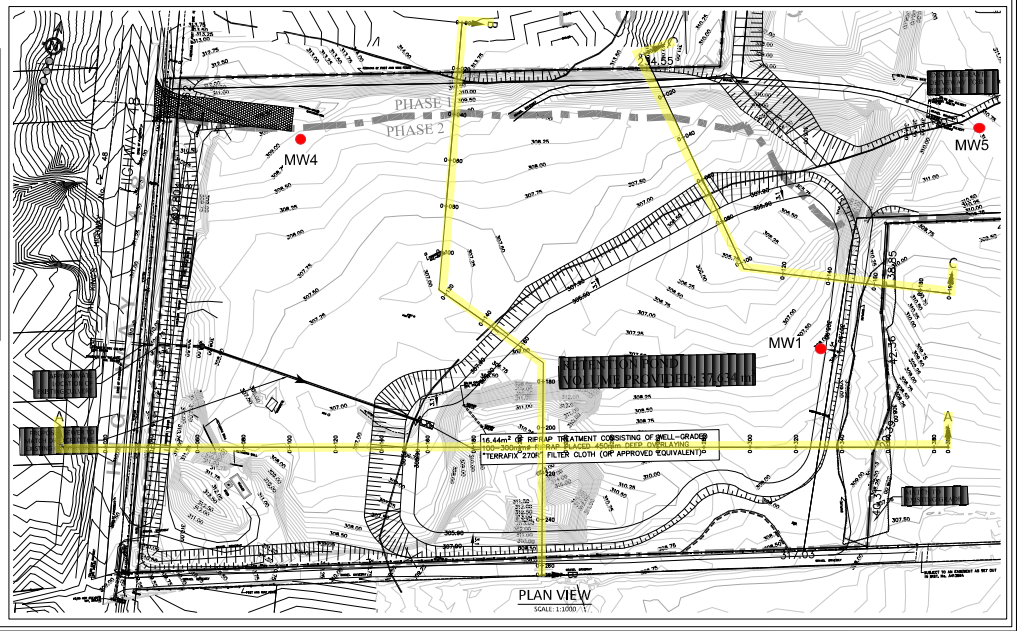


PLAN VIEW

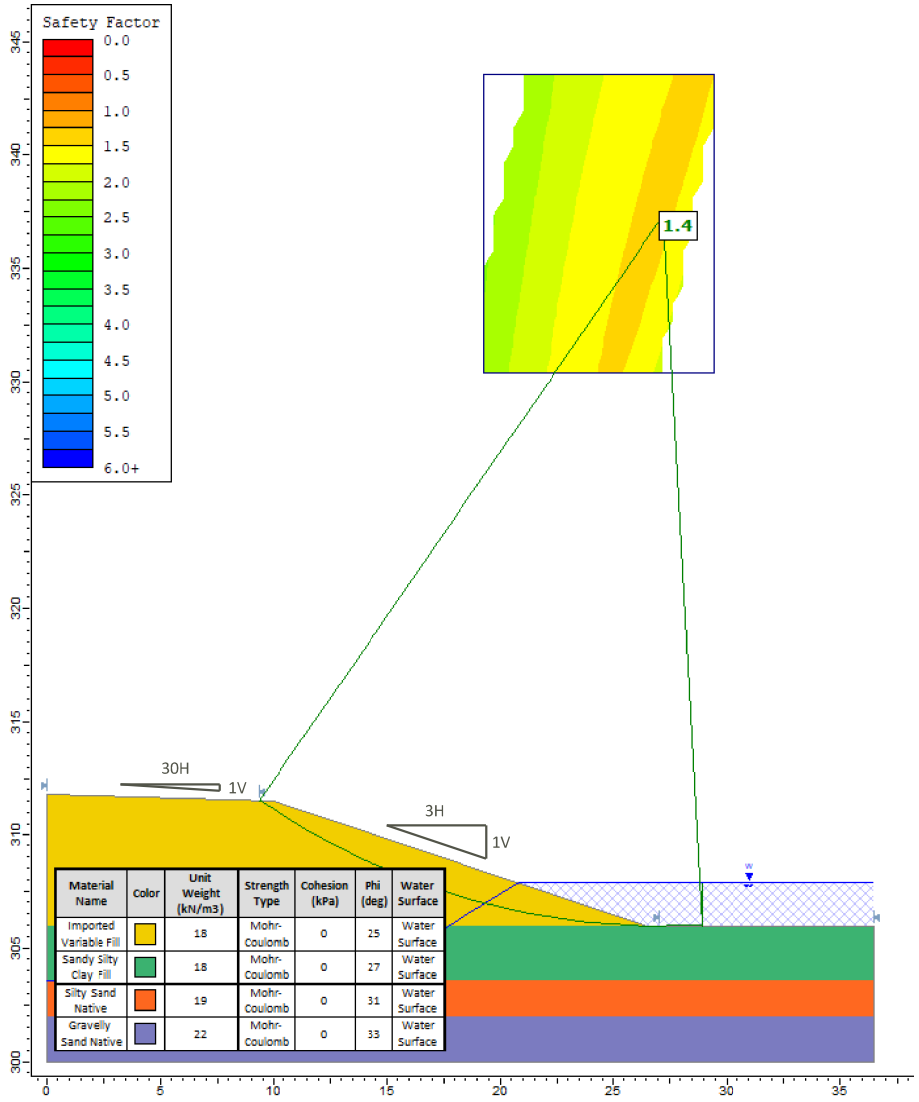
SCALE: 1:1000

Approximate BH/MW Location

Slope Stability Analysis

Section C-C', West Slope
High Water Level 307.90 m
3H:1V Slope

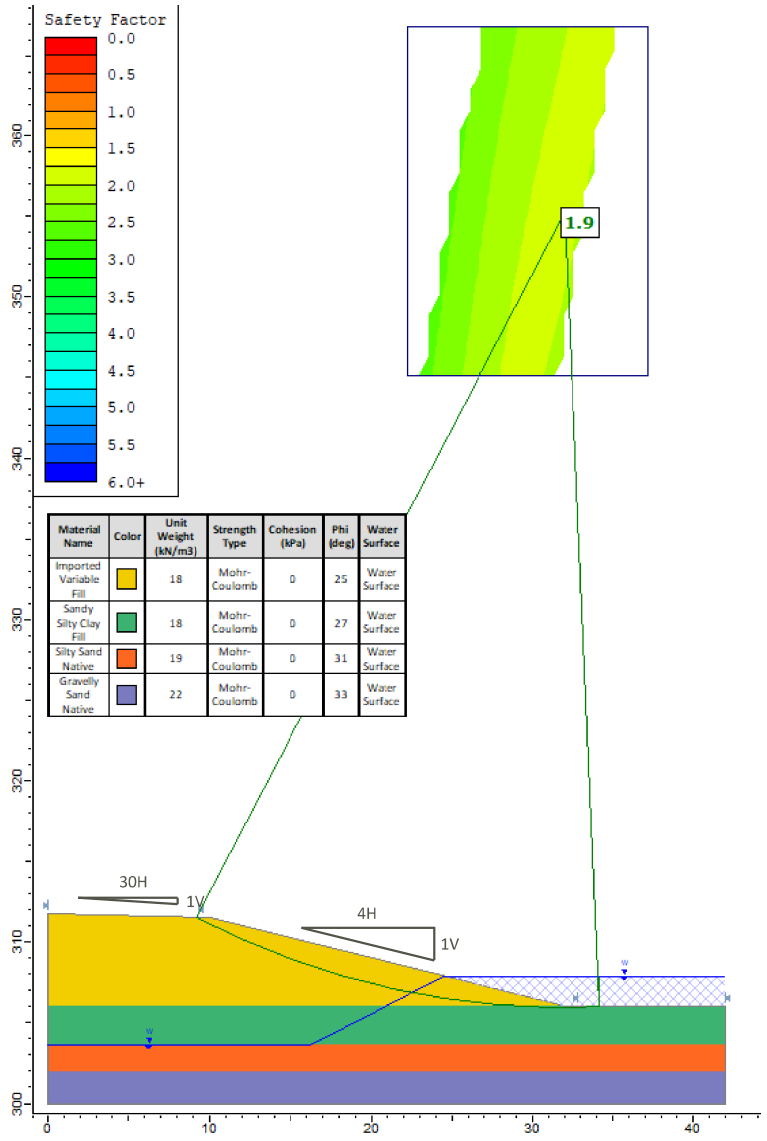
Figure 2



Slope Stability Analysis

Section C-C', West Slope
High Water Level 307.90 m
4H:1V Slope

Figure 3

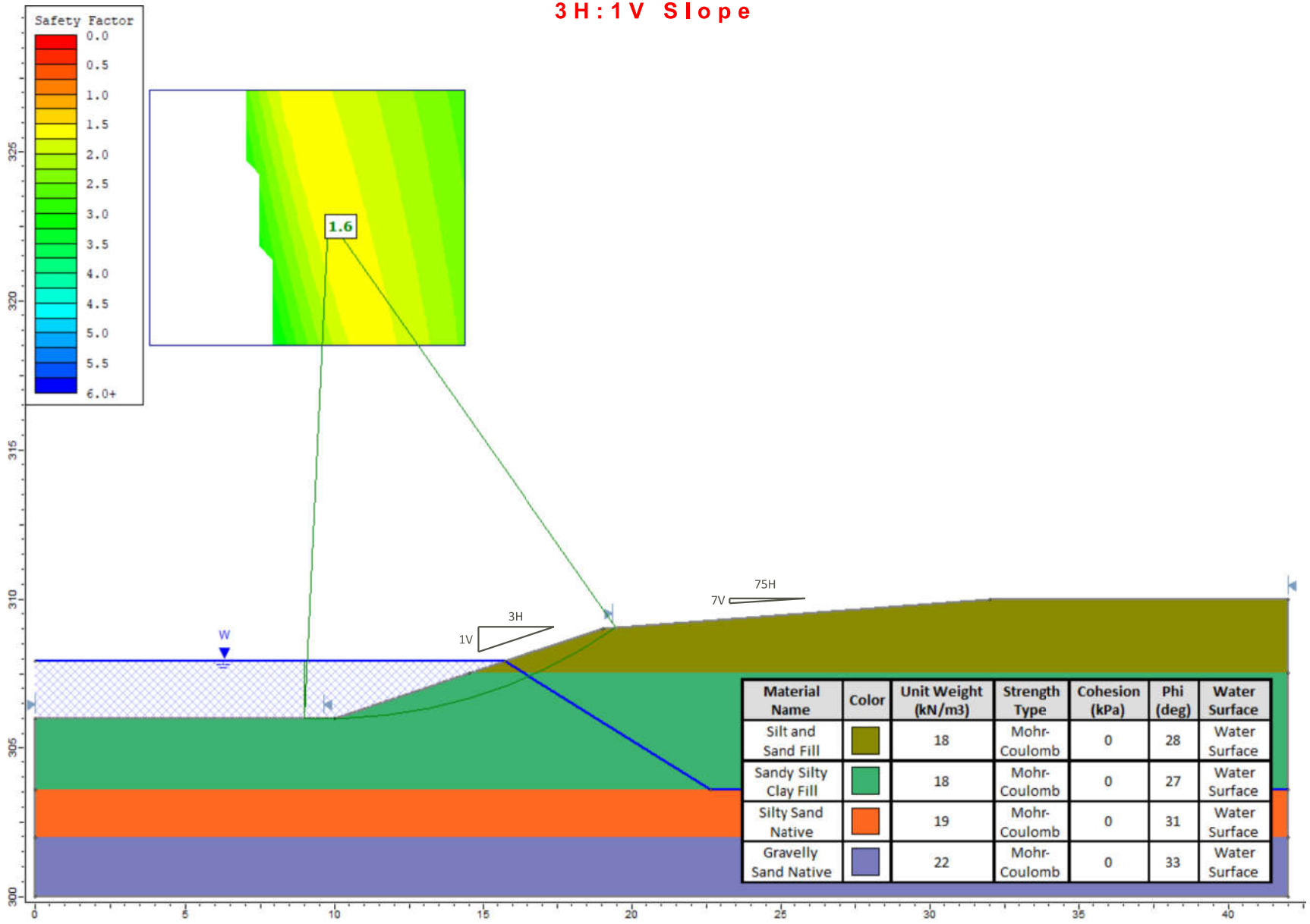


Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface
Imported Variable Fill		18	Mohr-Coulomb	0	25	Water Surface
Sandy Silty Clay Fill		18	Mohr-Coulomb	0	27	Water Surface
Silty Sand Native		19	Mohr-Coulomb	0	31	Water Surface
Gravelly Sand Native		22	Mohr-Coulomb	0	33	Water Surface

Slope Stability Analysis

Section C-C', East Slope
High Water Level 307.90 m
3H:1V Slope

Figure 4



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface
Silt and Sand Fill		18	Mohr-Coulomb	0	28	Water Surface
Sandy Silty Clay Fill		18	Mohr-Coulomb	0	27	Water Surface
Silty Sand Native		19	Mohr-Coulomb	0	31	Water Surface
Gravelly Sand Native		22	Mohr-Coulomb	0	33	Water Surface

ATTACTHMENT B

VO6 MODEL AND HYDROLOGY PARAMETERS

A copy of the VO hydrology model is available for download at the following secure link.

https://filesafecloud.scsconsultinggroup.com/url/etmaiswfcsegw6qg

VO6 Parameter Summary

Fairty Retention Pond
Project Number: 1826
Date: April 2023
Designer Initials: J.S.

NASHYD

Number	101	102
Description		
DT(min)	20	20
Area (ha)	25.93	141.74
CN*	77.0	69.0
IA(mm)	6.5	6.8
TP Method	Airport	Airport
TP (hr)	1.69	0.84

CN Calculations

Fairty Retention Pond
Project Number: 1826
Date: April 2023
Designer Initials: J.S.

Existing Conditions

Site Soils: (per York County Soils Mapping)

Soil Type	Hydrologic Soil Group
Woburn loam	B

TABLE OF CURVE NUMBERS (CN's)**									
Land Use		Hydrologic Soil Type							Manning's	Source
		A	AB	B	BC	C	CD	D	'n'	
Meadow	"Good"	30	44	58	64.5	71	74.5	78	0.40	MTO
Woodlot	"Fair"	36	48	60	66.5	73	76	79	0.40	MTO
Gravel		76	80.5	85	87	89	90	91	0.30	USDA
Lawns	"Good"	39	50	61	67.5	74	77	80	0.25	USDA
Pasture/Range		58	61.5	65	70.5	76	78.5	81	0.17	MTO
Crop		66	70	74	78	82	84	86	0.13	MTO
Fallow (Bare)		77	82	86	89	91	93	94	0.05	MTO
Low Density Residences		57	64.5	72	76.5	81	83.5	86	0.25	USDA
Streets, paved		98	98	98	98	98	98	98	0.01	USDA

1. MTO Drainage Manual (1997), Design Chart 1.09-Soil/Land Use Curve Numbers

HYDROLOGIC SOIL TYPE (%) - Existing Conditions								
Catchment	Hydrologic Soil Type							TOTAL
	A	AB	B	BC	C	CD	D	
101			100					100
102			100					100

LAND USE (%) - Existing Conditions										
Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Total
101		0.3	0.2		6.6	67.6		13.9	11.4	100.0
102		3.4		9.0	35.8	35.8		12.2	3.8	100.0

Note: Where STANDHYD command used (shaded), impervious fraction is not considered in CN determination, since %Imp directly input in STANDHYD command

CURVE NUMBER (CN) - Existing Conditions										
Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Weighted CN
101	0.0	0.2	0.2	0.0	4.3	50.0	0.0	10.0	11.2	76
102	0.0	2.1	0.0	5.5	23.2	26.5	0.0	8.8	3.8	70

** AMC II assumed

CN Calculations

Fairty Retention Pond
Project Number: 1826
Date: April 2023
Designer Initials: J.S.

Step	Input Values			
	Subcatchment:		101	102
1	**CN (AMC II):**		**76**	**70**
2	CN (AMC III) =		89	85
3	100 Year Precipitation, P =	mm	87.49	87.49

$$Q = \frac{(P - Ia)^2}{(P - Ia) + S}$$

Q = rainfall excess or runoff, mm
S = potential maximum retention or available storage, mm

$$CN = \frac{25400}{S + 254}$$

CN* = modified SCS curve # that better reflects Ia conditions in Ontario

	Output Values			
	Subcatchment:		101	102
	S_{III} =	mm	31.39	44.82
	SCS Assumption of 0.2 S = Ia =	mm	6.28	8.96
4	Q_{III} =	mm	58.57	49.99
	Preferred Initial Abstraction, Ia =	mm	6.7	6.7
5	S^*_{III} =	mm	30.64	49.77
6	CN^*_{III} =	mm	89.24	83.62
	CN^*_{III}=	Rounded	**89**	**84**
7	**CN^*_{II}=**	convert	**77**	**69**

IA Calculations

Fairty Retention Pond
Project Number: 1826
Date: April 2023
Designer Initials: J.S.

Existing Conditions

LAND USE (%) - Existing Conditions										
Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Total
101		0.3	0.2		6.6	67.6		13.9	11.4	100.0
102		3.4		9.0	35.8	35.8		12.2	3.8	100.0

IA VALUES (mm) - Existing Conditions										
Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Total
IA (mm)	8	10	2	5	8	8	3	2	2	
101		0.0	0.0		0.5	5.4		0.3	0.2	6.5
102		0.3		0.4	2.9	2.9		0.2	0.1	6.8

* IA values based on LSRCA guidelines

TTP Airport Calculations

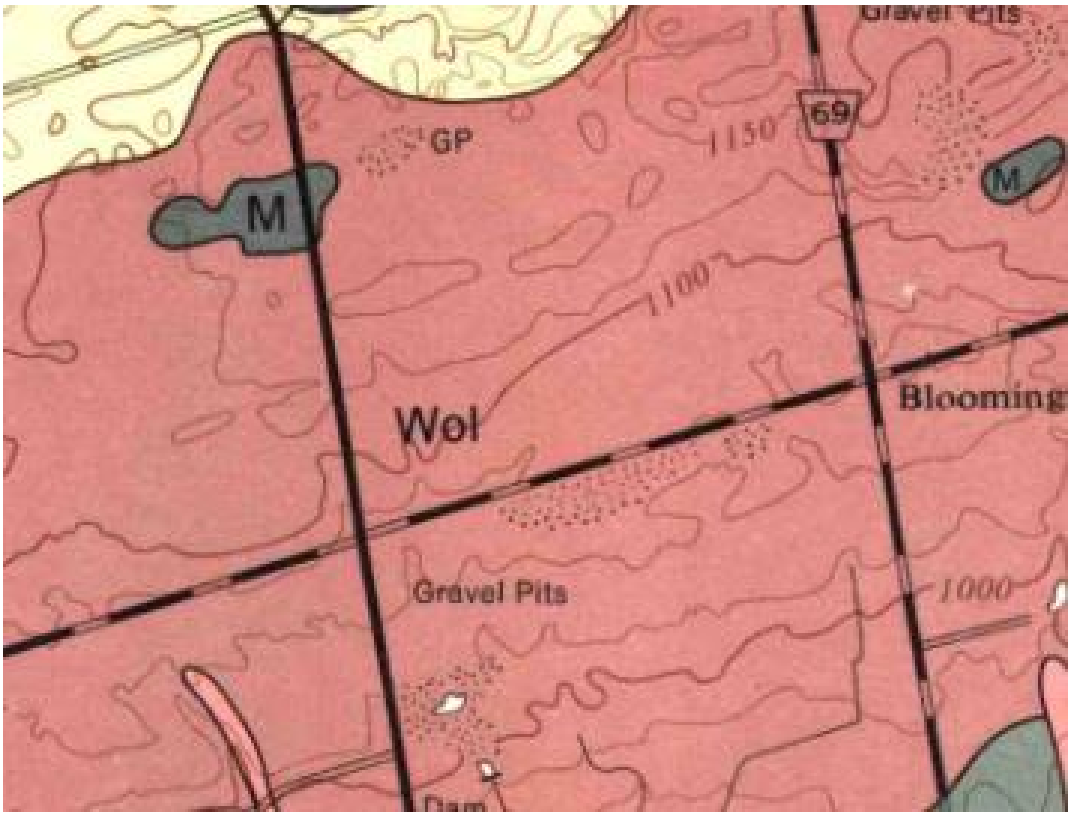
Airport Method: (used for all catchments with a runoff coefficient of less than 0.4)

Catchment ID	High Elevation	Low Elevation	Length (m)	Slope (%)	Runoff Coefficient	Time of Concentration (minutes)	Time of Concentration (hr)	Time to Peak (hr)
101a	352.00	348.00	72	5.59	0.65	7.04	0.12	0.08
101b	348.00	345.00	55	5.46	0.35	10.35	0.17	0.12
101c	345.00	344.25	11	6.82	0.30	4.59	0.08	0.05
101d	344.25	342.85	44	3.16	0.28	12.18	0.20	0.14
101e	342.85	342.80	5	1.02	0.90	1.44	0.02	0.02
101f	342.80	342.00	124	0.65	0.35	31.45	0.52	0.35
101g	342.00	325.00	668	2.54	0.25	52.63	0.88	0.59
101h	325.00	324.75	40	0.63	0.90	4.79	0.08	0.05
101i	324.75	324.50	24	1.05	0.28	12.88	0.21	0.14
101j	324.50	324.25	48	0.52	0.90	5.59	0.09	0.06
101k	324.25	319.00	65	8.13	0.45	8.53	0.14	0.10
101								**1.69**
102a	349.75	340.50	338	2.74	0.28	35.27	0.59	0.39
102b	340.50	339.75	107	0.70	0.25	32.29	0.54	0.36
102c	339.75	336.00	81	4.62	0.65	7.97	0.13	0.09
102d	336.00	331.50	213	2.12	0.28	30.42	0.51	0.34
102e	331.50	324.50	207	3.38	0.65	14.11	0.24	0.16
102f	324.50	324.25	17	1.51	0.90	2.32	0.04	0.03
102g	324.25	314.75	405	2.35	0.35	37.14	0.62	0.41
102h	314.75	309.14	411	1.36	0.25	50.72	0.85	0.57
102								**0.84**

Note: Tp = 0.67 x Tc

Refer to Figure No. 1a located in Appendix B for time to peak supporting information.

1826 – Fairty Site Alteration Soil Type



Wol	WOBURN loam	Grey-Brown Podzolic	Good	Smooth steeply sloping. Few stones	Slightly acid	Medium textured brown shaly calcareous till

Woburn	s 1	A
"	1	B*

ATTACTHMENT C

RETENTION POND SIZING CALCULATION

SCS consulting group ltd

TABLE C1: APPROXIMATE RELATIONSHIPS BETWEEN HYDRAULIC CONDUCTIVITY, PERCOLATION TIME AND INFILTRATION RATE

(FROM LOW IMPACT DEVELOPMENT STORMWATER MANAGEMENT PLANNING AND DESIGN GUIDE - 2010)

Hydraulic Conductivity, K_{fs} (centimeters/second)	Percolation Time, T (minutes/centimetre)	Infiltration Rate, 1/T (millimetres/hour)
0.1	2	300
0.01	3	150
0.001	4	75
0.0001	12	50
0.00001	20	30
0.000001	50	12

Monitoring Well 1

Hydraulic Conductivity (K_{fs})	0.0458	centimetres/second	See Attachment A
Hydraulic Conductivity Upper Limit (K_{fsu})	0.1	centimetres/second	
Hydraulic Conductivity Lower Limit (K_{fsl})	0.01	centimetres/second	
Percolation Time Upper Limit (T_u)	2	minutes/centimetre	
Percolation Time Lower Limit (T_l)	3	minutes/centimetre	
Infiltration Rate Upper Limit ($1/T_u$)	300	millimetres/hour	
Infiltration Rate Lower Limit ($1/T_l$)	150	millimetres/hour	
Interpolated Infiltration Rate (1/T)	**209.67**	millimetres/hour	
Saftey Factor	**2.5**	(Per TRCA/CVC 2010 LID SWM Planning and Design Guide, Appendix C)	
Design Infiltration Rate	**83.87**	millimetres/hour	

$$y = y_0 + (x - x_0)\frac{y_1 - y_0}{x_1 - x_0}$$

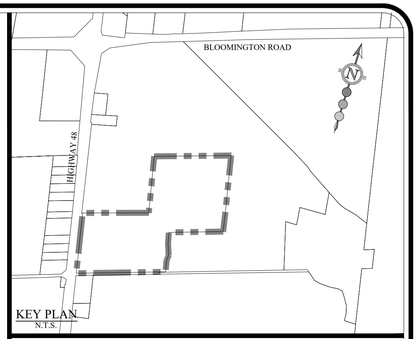
Stage-Storage Rating Table

Fairty Site Alteration Permit
Project Number: 1826
Date: April 2023
Designer Initials: J.S.

Hydraulic conductivity of soils = 4.58×10^{-4} m/s (per Golder Hydrogeological study, November 30, 2018)
Infiltration rate = 83.87 mm/hr (per TRCA/CVC 2010 LID SWM Planning and Design Guide, Appendix C)

Elevation (m)	Area (m^2)	Area (m^2)	H (m)	Vol (m^3)	Volume (m^3)	Storage (m^3)	Depth (m)	Infiltration Rate (m3/s)
305.9	18769.678				0		0	**0.437**
		21468	2	42936.04		42936		
307.9	24166.357				42936		2	**0.563**

Volume Required = 42138 m^3 (Per VO Model, Appendix B)
Volume Provided = 42936 m^3



BENCHMARK ELEV. 344.617m

BENCHMARK LOCATED ON FRAME BARN (OWNED BY DI-ADAMO HOLDINGS LTD) ON EAST SIDE OF HIGHWAY 48, 3.2 KM SOUTH OF THE JUNCTION OF HIGHWAY 48 AND YORK REGIONAL ROAD 15, 1.1 KM SOUTH OF VANDORF RD, 1.1 KM NORTH OF BLOOMINGTON RD AND 170.7 METRES EAST OF CENTERLINE OF HIGHWAY 48. TABLET IS SET HORIZONTALLY IN THE WEST FACE OF CONCRETE FOUNDATION, 87 CM NORTH OF SOUTHWEST CORNER, 73 CM BELOW FRAME-WORK AND 37 CM ABOVE GROUND LEVEL.

LEGEND:

- LIMIT OF PROPERTY
- LIMIT OF PHASE
- LIMIT OF GRADING
- LIMIT OF TRCA REGULATED AREA
- 14m OFFSET FROM MTO PROPERTY
- 305.90 — PROPOSED RETENTION POND CONTOUR AND ELEVATION
- 300.00 — EXISTING CURRENT CONTOUR
- ×264.53 — PROPOSED GROUND ELEVATION
- ×264.53 — EXISTING ELEVATION (POST-EXCAVATION)
- ×311.58SW — PROPOSED SWALE ELEVATION
- PROPOSED EMBANKMENT (MAX. 3:1 UNLESS OTHERWISE NOTED)
- TEMPORARY ACCESS ROAD (SEE DETAIL ON DRAWING ESC-1)
- 315.00 — ORIGINAL (PRE-DEVELOPMENT/ PRE-EXCAVATION) GROUND ELEVATION (1968, MAP 2124 INDUSTRIAL MINERAL RESOURCES SHEET, ONTARIO DEPARTMENT OF MINES)
- 314.80 — PHASE 1 PROPOSED CONTOUR AND ELEVATION (NOVEMBER 2020 & MARCH 2023, AS-BUILT PLUS 0.30m TOPSOIL RESTORATION)
- A A — SWALE CROSS SECTION (SEE DWG D-1 FOR DETAILS)

TOPOGRAPHIC SURVEY PROVIDED BY RPE SURVEYING LTD. (SEPTEMBER 5, 2017)

GENERAL NOTES

1. THE OWNER IS RESPONSIBLE FOR OBTAINING ALL NECESSARY APPROVALS FROM THE MUNICIPALITY AND EXTERNAL AGENCIES PRIOR TO ANY SITE ALTERATION ACTIVITY.
2. PRIOR TO COMMENCEMENT OF ANY ON-SITE WORK/TOPSOIL STRIPPING, EROSION & SEDIMENT CONTROL (ESC) MEASURES, AS PER APPROVED SITE ALTERATION PLAN, MUST BE INSTALLED AND APPROVED BY THE DIRECTOR OF ENGINEERING. ADDITIONAL ESC MEASURES, IF REQUIRED, SHALL BE INSTALLED AS DIRECTED BY THE DIRECTOR OF ENGINEERING. THE ESC MEASURES SHALL REMAIN IN PLACE UNTIL DIRECTED BY THE DIRECTOR OF ENGINEERING FOR THEIR REMOVAL.
3. NO CONSTRUCTION ACTIVITY OR MACHINERY SHALL BE ALLOWED BEYOND THE SILT/SNOW FENCE OR PROPERTY BOUNDARY.
4. THE CONTRACTOR IS RESPONSIBLE TO IMPLEMENT DUST CONTROL MEASURES AND CONSTRUCTION PRACTICE GUIDELINES AS APPROVED BY THE MUNICIPALITY.
5. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ALL ESC MEASURES IN WORKING CONDITIONS AT ALL TIMES TO THE SATISFACTION OF THE DIRECTOR OF ENGINEERING. THE CONTRACTOR SHALL ROUTINELY INSPECT ALL ESC DEVICES.
6. THE EROSION & SEDIMENT CONTROL STRATEGIES OUTLINED ON THIS PLAN ARE NOT STATIC AND MAY NEED TO BE UPGRADED/AMENDED AS SITE CONDITIONS CHANGE TO PREVENT SEDIMENT RELEASES TO THE NATURAL ENVIRONMENT.

REVISIONS

No.	DESCRIPTION	DATE	BY	APPROVED

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

TOWN OF WHITCHURCH-STOUFFVILLE
Country Close to the City

FAIRGREEN SOD FARMS LTD.
13501 HIGHWAY 48
TOWN OF WHITCHURCH-STOUFFVILLE

FAIRTY SITE

PHASE 2 GRADING PLAN

LICENCED PROFESSIONAL ENGINEER
Apr.17/2023
E.T.C. KNECHTEL
100157433
PROVINCE OF ONTARIO

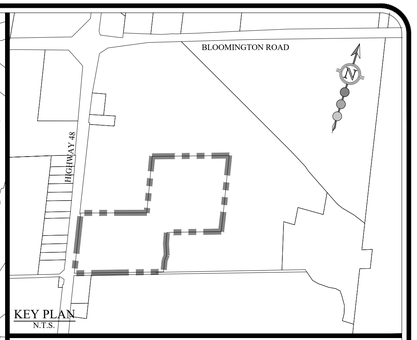
DATE:	APRIL 2023	DESIGNED BY:	J.M.	CHECKED BY:	M.R.C.
SCALE:	1:1000	DRAWN BY:	L.K.N.	CHECKED BY:	B.A.S./J.L.R.

TOWN REVIEWED

PROJECT No: 1826

DRAWING No: GR-1

Town of Whitchurch-Stouffville Date



KEY PLAN
N.T.S.

BENCHMARK ELEV. 344.617m

BENCHMARK LOCATED ON FRAME BARN (OWNED BY DI-ADAMO HOLDINGS LTD) ON EAST SIDE OF HIGHWAY 48, 3.2 KM SOUTH OF THE JUNCTION OF HIGHWAY 48 AND YORK REGIONAL ROAD 15, 1.1 KM SOUTH OF VANDORF RD, 1.1 KM NORTH OF BLOOMINGTON RD AND 170.7 METRES EAST OF CENTERLINE OF HIGHWAY 48. TABLET IS SET HORIZONTALLY IN THE WEST FACE OF CONCRETE FOUNDATION, 87 CM NORTH OF SOUTHWEST CORNER, 73 CM BELOW FRAME-WORK AND 37 CM ABOVE GROUND LEVEL.

LEGEND:

- LIMIT OF PROPERTY
- LIMIT OF PHASE
- LIMIT OF TRCA REGULATED AREA
- EROSION AND SEDIMENTATION CONTROL FENCE
- DOUBLE EROSION AND SEDIMENTATION CONTROL FENCE
- TREE PRESERVATION FENCE
- 305.90 — PROPOSED RETENTION POND CONTOUR AND ELEVATION
- 315.00 — ORIGINAL (PRE-DEVELOPMENT/ PRE-EXCAVATION) GROUND ELEVATION (1968, MAP 2124 INDUSTRIAL MINERAL RESOURCES SHEET, ONTARIO DEPARTMENT OF MINES)
- 314.80 — PHASE 1 PROPOSED CONTOUR AND ELEVATION (NOVEMBER 2020 & MARCH, 2023, AS-BUILT PLUS 0.30m TOPSOIL RESTORATION)
- 300.00 — EXISTING CURRENT CONTOUR
- EXISTING TREE
- EXISTING TREED AREA
- TEMPORARY ACCESS ROAD (SEE DETAIL ON THIS DRAWING)

TOPOGRAPHIC SURVEY PROVIDED BY RJ McKIBBON LIMITED (AUGUST 20, 2012)

GENERAL NOTES

1. THE OWNER IS RESPONSIBLE FOR OBTAINING ALL NECESSARY APPROVALS FROM THE MUNICIPALITY AND EXTERNAL AGENCIES PRIOR TO ANY SITE ALTERATION ACTIVITY.
2. PRIOR TO COMMENCEMENT OF ANY ON-SITE RESTORATION, EROSION & SEDIMENT CONTROL (ESC) MEASURES, AS PER APPROVED EROSION AND SEDIMENT CONTROL PLAN, MUST BE INSTALLED AND APPROVED BY THE DIRECTOR OF ENGINEERING. ADDITIONAL ESC MEASURES, IF REQUIRED, SHALL BE INSTALLED AS DIRECTED BY THE DIRECTOR OF ENGINEERING. THE ESC MEASURES SHALL REMAIN IN PLACE UNTIL DIRECTED BY THE DIRECTOR OF ENGINEERING FOR THEIR REMOVAL.
3. NO CONSTRUCTION ACTIVITY OR MACHINERY SHALL BE ALLOWED BEYOND THE SILT/SNOW FENCE OR PROPERTY BOUNDARY.
4. THE CONTRACTOR IS RESPONSIBLE TO IMPLEMENT DUST CONTROL MEASURES AND CONSTRUCTION PRACTICE GUIDELINES AS APPROVED BY THE MUNICIPALITY.
5. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ALL ESC MEASURES IN WORKING CONDITIONS AT ALL TIMES TO THE SATISFACTION OF THE DIRECTOR OF ENGINEERING. THE CONTRACTOR SHALL ROUTINELY INSPECT ALL ESC DEVICES.
6. THE EROSION & SEDIMENT CONTROL STRATEGIES OUTLINED ON THIS PLAN ARE NOT STATIC AND MAY NEED TO BE UPGRADED/AMENDED AS SITE CONDITIONS CHANGE TO PREVENT SEDIMENT RELEASES TO THE NATURAL ENVIRONMENT.

PROGRESSIVE ESC SILT FENCE:
THE TRIGGER POINT FOR WHEN THE PROGRESSIVE ESC SILT FENCE IS TO BE INSTALLED IS WHEN THE INTERNAL ELEVATIONS ARE MATCHING WITH THE BOUNDARY GRADING. THIS MAINTAINED SEDIMENT FENCE IS TO REMAIN UNTIL SUCH TIME THAT THE SITE IS RESTORED AS PER THE SITE CLOSURE PLAN.

ESC INSPECTIONS:
IN ADDITION TO THE REFERENCED EROSION AND SEDIMENT CONTROLS BEING IMPLEMENTED AS PER THIS PLAN (DRAWING ESC-1), THE OWNER IS TO CONSIDER AND IMPLEMENT THE RECOMMENDATIONS AS OUTLINED THROUGH THE ESC REVIEWS UNDERTAKEN BY THE CISEC CERTIFIED ENGINEERING CONSULTANT.

REVISIONS

No.	DESCRIPTION	DATE	BY	APPROVED

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

TOWN OF WHITCHURCH-STOUFFVILLE
Country Close to the City

FAIRGREEN SOD FARMS LTD.
13501 HIGHWAY 48
TOWN OF WHITCHURCH-STOUFFVILLE

FAIRTY SITE
PHASE 2

EROSION AND SEDIMENT CONTROL PLAN

LICENSED PROFESSIONAL ENGINEER
Apr.17/2023
E.T.C. KNECHTEL
100157433
PROVINCE OF ONTARIO

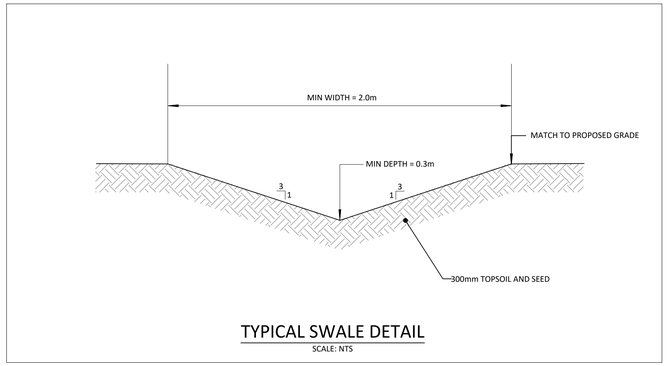
DATE:	APRIL 2023	DESIGNED BY:	M.J.C./V.Y.
SCALE:	1:1000	DRAWN BY:	L.K.N./V.Y.
		CHECKED BY:	M.R.C.
		CHECKED BY:	B.A.S./J.L.R.

TOWN REVIEWED

Town of Whitchurch-Stouffville Date

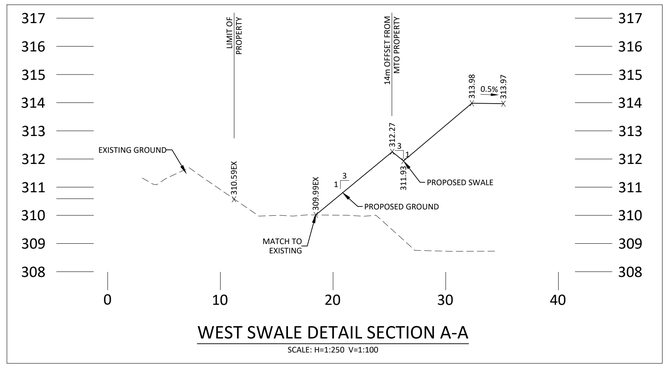
PROJECT No: 1826

DRAWING No: ESC-1



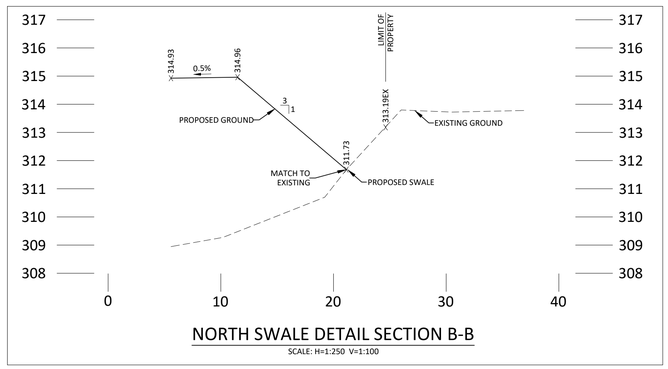
TYPICAL SWALE DETAIL

SCALE: NTS



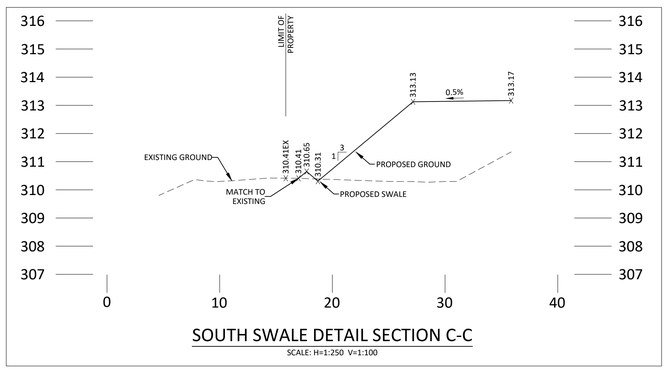
WEST SWALE DETAIL SECTION A-A

SCALE: H=1:250 V=1:100



NORTH SWALE DETAIL SECTION B-B

SCALE: H=1:250 V=1:100



SOUTH SWALE DETAIL SECTION C-C

SCALE: H=1:250 V=1:100

REVISIONS

No.	DESCRIPTION	DATE	BY	APPROVED

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
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TOWN OF WHITCHURCH-STOUFFVILLE

FAIRTY SITE

DETAILS

LICENSED PROFESSIONAL ENGINEER
Apr. 17/2023
F.T.C. KNECHTEL
100157433
PROVINCE OF ONTARIO

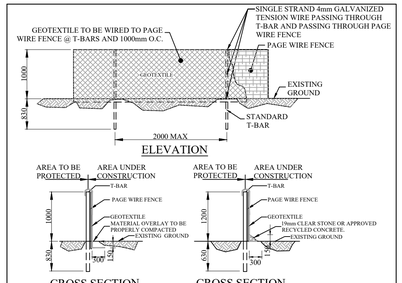
DATE:	APRIL 2023	DESIGNED BY:	J.S.
SCALE:	N.T.S.	DRAWN BY:	T.J.M.
		CHECKED BY:	M.R.C.
		CHECKED BY:	B.A.S./J.L.R.

APPROVED AS TO FORM IN RELIANCE UPON THE PROFESSIONAL SKILL AND ABILITY OF SCS CONSULTING GROUP LTD. CONSULTING ENGINEERS AS TO DESIGN AND SPECIFICATION.

Town of Whitchurch-Stouffville — Date

PROJECT No: 1826

DRAWING No: D-1

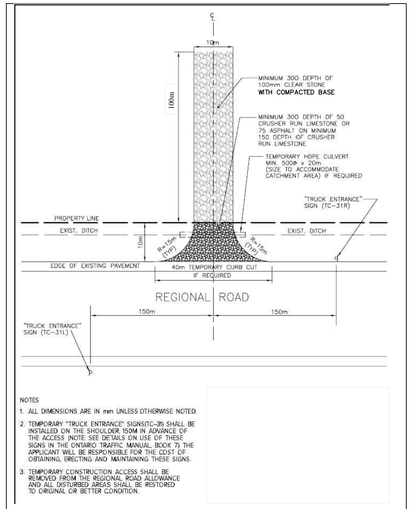


NOTES:
1. GEOTEXTILE TO BE WOVEN WITH A MINIMUM EQUIVALENT OPENING SIZE OF 0.15mm AND A MAXIMUM EQUIVALENT OPENING SIZE OF 0.25mm.
2. GEOTEXTILE TO HAVE A HORIZONTAL OVERLAY OF 1000mm AT JOINTS.
3. PAGE WIRE FENCE OR APPROVED EQUIVALENT.
4. MINIMUM SPACING 2.0m FOR DOUBLE ROW FENCES.

ALL DIMENSIONS ARE SHOWN IN MILLIMETRES UNLESS OTHERWISE SHOWN

TEMPORARY SINGLE ROW SEDIMENT CONTROL FENCE

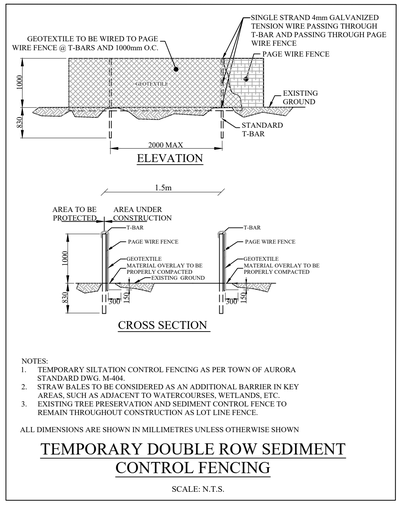
SCALE: N.T.S.



NOTES
1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE NOTED.
2. TEMPORARY "TRUCK ENTRANCE" SIGN(TC-31) SHALL BE INSTALLED ON THE SHOULDER 150M IN ADVANCE OF THE ACCESS (NOTE SEE DETAILS ON USE OF THESE SIGNS IN THE ONTARIO TRAFFIC MANUAL, BOOK 7) THE APPLICANT WILL BE RESPONSIBLE FOR THE COST OF OBTAINING, ERECTING AND MAINTAINING THESE SIGNS.
3. TEMPORARY CONSTRUCTION ACCESS SHALL BE REMOVED FROM THE REGIONAL ROAD ALLOWANCE AND ALL DISTURBED AREAS SHALL BE RESTORED TO ORIGINAL OR BETTER CONDITION.

MODIFIED MUD MAT FOR TEMPORARY CONSTRUCTION ACCESS

SCALE: N.T.S.

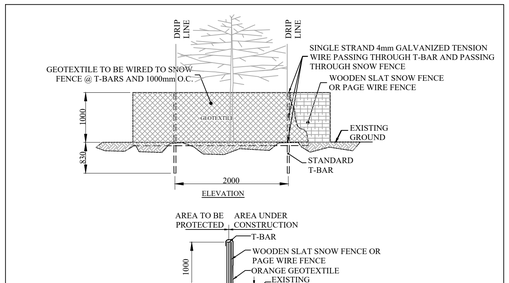


NOTES:
1. TEMPORARY SILTATION CONTROL FENCING AS PER TOWN OF AURORA STANDARD DWG. M-404.
2. STRAW BALES TO BE CONSIDERED AS AN ADDITIONAL BARRIER IN KEY AREAS, SUCH AS ADJACENT TO WATERCOURSES, WETLANDS, ETC.
3. EXISTING TREE PRESERVATION AND SEDIMENT CONTROL FENCE TO REMAIN THROUGHOUT CONSTRUCTION AS LOT LINE FENCE.

ALL DIMENSIONS ARE SHOWN IN MILLIMETRES UNLESS OTHERWISE SHOWN

TEMPORARY DOUBLE ROW SEDIMENT CONTROL FENCING

SCALE: N.T.S.



NOTES:
1. ORANGE GEOTEXTILE TO HAVE A HORIZONTAL OVERLAY OF 1000mm AT JOINTS.
2. SNOW FENCE TO BE WOODEN.
3. ALL EXISTING TREES WHICH ARE TO REMAIN, SHALL BE FULLY PROTECTED WITH THE FENCING BEYOND THEIR "DRIP-LINE", TO THE SATISFACTION OF THE TOWN'S LANDSCAPE ARCHITECT. GROUPS OF TREES AND OTHER EXISTING PLANTINGS TO BE PROTECTED, SHALL BE DONE IN A LIKE MANNER WITH FENCING AROUND THE ENTIRE GROUP(S).
4. THE AREA WITHIN THE PROTECTIVE FENCING SHALL REMAIN UNDISTURBED AND SURPLUS SOIL, EQUIPMENT, DEBRIS OR BUILDING MATERIALS SHALL NOT BE PLACED OVER ROOT SYSTEMS OF THE TREES WITHIN THE PROTECTIVE FENCING. NO CONTAMINENTS WILL BE DUMPED OR FLUSHED WHERE FEEDER ROOTS OF TREES EXIST.
5. THE DEVELOPER OR HIS AGENTS SHALL TAKE EVERY PRECAUTION NECESSARY TO PREVENT DAMAGE TO TREES OR SHRUBS TO BE RETAINED. NO RIGGING CABLES SHALL BE WRAPPED AROUND OR INSTALLED IN TREES.
6. WHERE ROOT SYSTEMS OF PROTECTED TREES ARE EXPOSED DIRECTLY ADJACENT TO, OR DAMAGED BY CONSTRUCTION WORK, THEY SHALL BE TRIMMED NEATLY AND THE AREA BACK-FILLED WITH APPROPRIATE MATERIAL TO PREVENT DESICCATION.
7. WHERE LIMBS OR PORTIONS OF TREES ARE REMOVED TO ACCOMMODATE CONSTRUCTION WORK, THEY SHALL BE REMOVED CAREFULLY. EXPOSED WOOD OVER 25mm TO BE TREATED WITH AN APPROVED TREE WOUND DRESSING.
8. WHERE NECESSARY, THE TREES SHALL BE GIVEN AN OVERALL PRUNING TO RESTORE THE BALANCE BETWEEN ROOTS AND TOP GROWTH, OR TO RESTORE THE APPEARANCE OF THE TREE. PRUNE BRANCHES BY I-IF REQUIRED TO REMOVE DAMAGED OR OBJECTIONABLE BRANCHES. DO NOT PRUNE LEADERS.
9. TREES THAT HAVE DIED OR HAVE BEEN DAMAGED BEYOND REPAIR SHALL BE REPLACED BY THE DEVELOPER AT HIS OWN EXPENSE WITH TREES OF A SIZE AND SPECIES AS APPROVED BY THE TOWN'S LANDSCAPE ARCHITECT.
10. IF GRADES AROUND TREES TO BE PROTECTED ARE LIKELY TO CHANGE THE DEVELOPER SHALL BE REQUIRED TO TAKE SUCH PRECAUTIONS AS FRYWELLING AND ROOT-FEEDING TO THE SATISFACTION OF THE TOWN'S LANDSCAPE ARCHITECT.

TREE PRESERVATION FENCE

SCALE: N.T.S.

REVISIONS

No.	DESCRIPTION	DATE	BY	APPROVED

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

TOWN OF WHITCHURCH-STOUFFVILLE
Country Close to the City

FAIRGREEN SOD FARMS LTD.
13501 HIGHWAY 48
TOWN OF WHITCHURCH-STOUFFVILLE

FAIRTY SITE
PHASE 2

EROSION AND SEDIMENT CONTROL DETAILS

LICENCED PROFESSIONAL ENGINEER — Apr.17/2023 — E.T.C. KNECHTEL 100157433 — PROVINCE OF ONTARIO

DATE: APRIL 2023	DESIGNED BY:	M.J.C./V.Y.	CHECKED BY: M.R.C.
SCALE: N.T.S.	DRAWN BY:	L.K.N./V.Y.	CHECKED BY: B.A.S./I.L.R.

APPROVED AS TO FORM IN RELIANCE UPON THE PROFESSIONAL SKILL AND ABILITY OF SCS CONSULTING GROUP LTD. CONSULTING ENGINEERS AS TO DESIGN AND SPECIFICATION.

Town of Whitchurch-Stouffville — Date

PROJECT No: 1826

DRAWING No: ESC-2

File: P:\1826 Fairty Site Alteration Permit\Drawings\Phase 1\Esc\1826D-EROS-ESC-2.dwg — Revised by <TMCNEIL> : Tue, Apr 04 2023 — 4:04pm