FISHER ENVIRONMENTAL LTD.

ENGINEERING

Professional Engineers Ontario

LABORATORY

CALA Canadian Association for Laboratory Accreditation Inc.

PRELIMINARY GEOTECHNICAL INVESTIGATION

1000 MCGARRY TERRACE

OTTAWA, ONTARIO

400 Esna Park Drive, Unit 15
Markham, ON
L3R 3K2

Tel: (905) 475-7755
Fax: (905) 475-7718

www.fisherenvironmental.com

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Project No. FE-P 18-8637Geo

February 12, 2018

Issued to:	Dymon Group of Companies
Contact:	Bliss Edwards 2-1830 Walkley Road Ottawa, ON K1H 8K3
Project Name:	Preliminary Geotechnical Investigation
Project Address:	Proposed Commercial Redevelopment at 1000 McGarry Terrace, Ottawa, Ontario
Project Number:	FE-P 18-8637Geo
Issued on:	February 12, 2018

Project Manager:
(Primary Contact)

Sean Fisher, M.Sc. Eng., Project Manager
sean@fisherenvironmental.com

REPORT PREPARED BY:

Frank Fan, P. Eng.,Geotechnical Engineer
frank@fisherenvironmental.com

REVIEWER:

Dave Fisher, C. Chem., P. Eng., President
dave@fisherenvironmental.com

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1.0 INTRODUCTION

Fisher Environmental Limited (Fisher) was commissioned by the Dymon Group of Companies to conduct a Geotechnical Investigation for the proposed development for the property at 1000 McGarry Terrace, Ottawa, hereinafter referred to as the 'Site'.

The purpose of this investigation was to assess the subsurface soil and groundwater conditions at the Site and to outline geotechnical parameters and make recommendations for the design of the proposed redevelopment.

Discussion of the findings and results of the geotechnical investigation is in accordance with the general terms of reference. This report was prepared specifically and solely for the purpose of assessing geotechnical conditions as they relate to the development of the site with respect to the proposed structures as detailed to Fisher at the time of the investigation.

2.0 SITE AND PROJECT DESCRIPTIONS

The Site is located on the southeastern corner of the intersection of McGarry Terrace and Strandherd Drive and covers an area of approximately 6,027m^2. The Site is bounded by a residential development to the north and east, commercial developments to the west and vacant lands to the immediate south.

At the time of the investigation, the Site was vacant with occasional trees and snow cover. Some small mounds of soil / construction debris were noted to be scattered over the north portions of the site.

The Site topography is generally flat with a gentle slope from west to east with corresponding relative elevation changes of approximately 1.55m as measured between boreholes BH2 (99.75m) and BH5 (98.20m). A small parcel of lower lying land was noted in the northeast corner of the Site with an estimated relative elevation of approximately 97.0m.

Prior to the initiation of Site works Fisher was provided with a copy of the proposed development Site Plan prepared by Nicholas Caragianis Architect and dated November 2017. The plan detailed a new 2,786m^2 footprint Site building comprised of a retail area, self-storage, reception and an interior loading and parking area. Exterior parking areas and drives were located to the west of the proposed building.

As the final detailed structural design plan and Finished Floor Elevations (FFE) were unverified at this time, the findings and recommendations presented in this report should be considered preliminary.

3.0 FIELD AND LABORATARY WORK

Site drilling work for the geotechnical investigation was carried out on February 6, 2018 and consisted of five (5) boreholes (BH1 to BH5). The boreholes were drilled at approximate locations as detailed on the attached Site Plan - Appendix A. Boreholes drilled at this time were advanced to varying depths of between 1.50m (5.0') to 4.05m (13.5'), with corresponding relative elevations ranging from 96.70m to 95.45m, at which time auger refusal was encountered.

A Bombardier CME-55 Truck mounted drilling rig equipped with hollow stem augers was used for the drilling work. Soil samples were taken at regular intervals using a split–spoon sampler advanced by means of the Standard Penetration Test (SPT) and was conducted in general accordance with ASTM specification D1586. Upon completion of drilling, the boreholes were backfilled with Bentonite.

All recovered soil samples were placed in clear, sealed plastic bags in the field and were transported to Fisher laboratories for further examination, characterization and laboratory analyses.

Fisher personnel surveyed the ground surface elevations of each borehole relative to a temporary benchmark (TBM). as. The TBM, was 'the top of fire hydrant' located on the east of McGarry Terrace, with an assigned arbitrary elevation of 100m.

The soil samples recovered during the investigation will be stored in our laboratory for a period of 30 days after submitting this report and will be discarded thereafter unless otherwise instructed by the client.

4.0 SUBSOIL CONDITIONS

Through the borehole investigation it was noted that the soil profile generally consists of near surface fill/ topsoil underlain by silty sand till with occasional silt sand deposits which extended to termination depths at all borehole locations. Subsoil encountered at borehole locations are shown

on the Borehole Log Sheets, which are attached in Appendix B, and can be summarized as follows:

- **FILL / TOPSOIL** – Fill was encountered at the surface of all boreholes. The fill generally consisted of silt with some to trace of organics, traces of gravel, sand, clay pockets, rootlets and brick pieces (BH4). In BH3, the fill contained sand and gravel with some asphalt pieces. In BH1, black organic topsoil was detected below the fill and extended to a depth of about 0.9m. The dark brown to black fill layer was moist and in very loose to compact condition. Frost was generally noted within the top 0.3-0.6m of the encountered fill.

  It should be noted that the fill conditions across the site could vary significantly between and beyond the borehole locations. For purposes of fully characterizing the extent, depth, and type of fill it would be recommended that further test pitting investigations be undertaken prior to initiation of site construction works.

Table 1: Summary of Depth and Elevation of Fill

Borehole No.	BH1	BH2	BH3	BH4	BH5
BH Ground Elevation (m)	99.50	99.75	99.30	98.50	98.25
Depth of Borehole (m)	4.05	3.60	2.00	2.60	1.50
Elev. at Bottom of BH (m)	95.45	96.15	97.30	95.90	96.75
Depth of Fill / Topsoil (m)	0.90	1.05	0.75	0.75	0.90
Elev. at Bottom of Fill (m)	98.60	98.70	98.55	97.75	97.35

- **SILTY SAND TILL** – A layer of silty sand till with traces of gravel was encountered in all boreholes and extended to termination depths. In BH1 and BH3, reddish brown, loose silty sand with traces of rootlets was found within the top 0.3m of the till. The light brown to brown silty sand till was moist and in a compact to very dense compact condition, but was generally of a dense compactness.
- **POSSIBLE BEDROCK** – All borehole drilling was terminated at auger refusal conditions. SPT testing on the encountered refusal layer showed high values with blow counts greater than 50 for less than 2.5cm penetration. No samples of this refusal layer were recoverable during the site drilling works.

With reference to the Ontario Geological Survey 2011. 1:250 000 scale bedrock geology of Ontario; Ontario Geological Survey, Miscellaneous Release---Data 126-Revision 1, bedrock formations in the area of the site include Beekmantown Group consisting of Dolostone, sandstone, and the Shadow Lake Formation consisting of limestone. For purposes of further characterizing the Sites underlying bedrock conditions on–site rock coring works or test pitting investigations be undertaken prior to initiation of site construction works.

5.0 GROUNDWATER CONDITIONS

Groundwater measurements were conducted in all boreholes upon completion. All boreholes remained open and no groundwater was observed within the explored depths.

It should be noted, however, that the groundwater levels at the Site are subject to seasonal fluctuations and to major weather events. Consequently, definitive information on the long-term groundwater levels could not be obtained at the time of the investigation.

6.0 FOUNDATION CONSIDERATIONS

Based on the Site Plan provided to Fisher, it is understood that the proposed development will consist of a five (5) storey building with no basement. The roughly square shaped building would cover most of the Site.

Detailed structure designs especially regarding the type of construction, design loads, finished floor/ grades were unverified at the time of this investigation, consequently, our investigation and recommendations presented herein should be considered preliminary. Upon review of the finalized building Site/Foundation Plans, revisions to the recommendations presented herein, with further additional boreholes investigation may be required.

Given the encountered soil conditions and the proposed building structure with five (5) storeys and no basement, the following types of footings and soil bearing capacity may be considered:

6.1 Spread/ Strip Footing Found on Native Soils

Recommended approximate founding depths / elevations and corresponding bearing resistance for limit states (SLS and ULS) are presented in the Table 3.

Table 3: Foundation Design for Conventional Footings

Building/Borehole			Elev. of BH Ground (m)	Approx. Depth of Footings at or below (m)	Approx. Elevation of Footings at or below (m)	Bearing Resistance at SLS (KPa)	Bearing Resistance at ULS (KPa)
Proposed Commercial Structures	BH1	No Basement	99.50	1.50	98.00	350	525
	BH2		99.75	1.50	98.25	350	525
	BH3		99.30	1.50	97.80	350	525
	BH4		98.50	1.50	97.00	350	525
	BH5		98.25	1.50	96.75	350	525

Footings designed to the above specified bearing pressure values are expected to settle less than 25 mm total and 19mm differential.

6.2 General Comments about Footing Construction

- For protection against frost action, all perimeter footings and interior footings placed on soil or fill located within 1m distance from the exterior walls will require a minimum frost protection equivalent to a soil cover of 1.5m. Footings in unheated areas or exterior footings must have a minimum frost protection equivalent to a soil cover of at least 1.8m.
- Adjacent footings founded at different elevations should be stepped at 10 horizontals to 7 verticals.
- It should be noted that the as-built vertical/horizontal alignment and conditions of the existing underground services/footings should be established prior to the design/construction stage, especially in the areas covered by BH1.
- In the area of the existing structure footings/service trenches, the proposed footings should be established below the existing footings and inverts of the service in native undisturbed soils, or alternatively could potentially be bridged over the trench backfill (subject to review by a structural engineer).

- The recommended bearing resistance and foundation elevations have been calculated from the limited borehole information and are intended for design purposes only.
- More specific information with respect to soil conditions between and beyond the boreholes will be available when the proposed construction is underway. Therefore, the encountered soil/foundation conditions must be verified in field, and all footings must be inspected and approved by our office prior to placement of concrete.

As the final detailed structure design plan and Finished Floor Elevation (FFE) is unverified at this time, the findings and recommendations presented in this report should be considered preliminary. Upon review of the finalized building Site / Foundation Plans, revisions to the recommendations presented herein, with further additional boreholes investigation may be required.

7.0 EARTHQUAKE CONDITIONS

The building must be designed to resist a minimum earthquake force. The Ontario Building Code (2012) specifies that the building be designed to withstand a minimum lateral seismic force v, which is assumed to act non-currently in any direction on the building as per the following expression:

$$\boldsymbol{V = S(Ta)MvIEW/(RdRo)}$$

Where S (Ta) should be calculated by Sa(Ta)Fa or Sa(Ta)Fv, depending on fundamental lateral period Ta. The term, which is relevant to the geotechnical conditions at the Site, are acceleration-based Site Coefficient Fa and velocity –based Site coefficient Fv.

For the subject Site, the Site Classification for Seismic Site Response is determined using penetration resistance test (SPT) as set out in Table 4.1.8.4A of the OBC. Boreholes drilled at this time were advanced to a maximum depth of 4.05m. Blow counts recorded in Standard Penetration Test (SPT) in all the boreholes ranged from 28 to over 100 blows/300mm in overborn native soils, with generally greater than 100 blows/300mm below 2.25m.

For seismic design purposes, at current investigation stage with absence of further bedrock depth information, the subject Site may be designated as **"Class C"** for Section 6 recommended Conventional Shallow Foundation/footings. On site seismic shear wave testing is recommended to be conducted for purposes of evaluating the suitability of utilizing a potential "Class A or B" site classification.

8.0 EXCAVATION AND BACKFILL

No major problems should be encountered for the anticipated depths of excavation for the footings / underground utilities. The excavations for footings or underground services must be carried out in accordance with the latest edition of the Occupational Health and Safety Act (OHSA). Specifically, if the excavation is deeper than 1.2m, the excavation sides should be sloped in accordance with the requirements of OHSA. If this condition cannot be met, a temporary shoring system/ trench box should be utilized.

In accordance with O. Reg. 213/91, S.226 (1), the Site subsoils within anticipated excavation depths mainly consist of dense to very dense silty sand till. After removal of the topsoil / fill, the site soils can be designated as Type 1 to 2. Therefore, for open excavation, the bank slopes should be maintained at a 3/4 :1 to 1:1 inclination condition from a depth of 1.2m above excavation bottom.

No groundwater expects to be encountered during the footing and underground utilities excavations within the designed depths. Occasional water seepage, if any, into the excavations from the more permeable seams/lenses or surface run-off can be handled by conventional pumping methods

The material to be used for backfill in service trenches should be suitable for compaction, i.e. free of organics and with moisture content within ±3 percent of the optimum moisture value. The backfill material should be compacted in lifts of no more than 200mm in thickness and to at least 98 percent of the Standard Proctor Maximum Dry Density (SPMDD) in the upper 1.0m from road subgrade or in settlement sensitive areas. Beyond these zones, a 95% SPMDD compaction criterion is considered acceptable.

Additionally, on site excavated native soils and selective fill materials can be used as backfill in service trenches, provided that the excavated materials are free of organic soils (topsoil / construction) debris and are of suitable moisture content.

It is recommended that Granular Class ‘B’ aggregates be used for backfill against the subsurface walls and footings. Granular materials excavated on-site may be acceptable subject to further site inspection.

9.0 SLAB ON GRADE AND PERMANENT DRAINAGE

For construction of the proposed building with no basement / underground parking, the finished floor slab can be constructed as slab on grade supported by competent native undisturbed silty sand/ silty sand till or an engineered fill pad (subject to design grade).

If engineered fill is required to raise subgrade for slab construction, the engineered fill must be placed on a thoroughly proof-rolled exposed base. Organic soil / topsoil/ fill / construction debris /underside utilities must be removed and the base approved, by engineering staff from our office, prior to placing the engineered fill. Any soft spots observed during proof rolling must be sub- excavated and back filled with suitable granular materials compacted to 98% SPMDD.

Onsite excavated native soils and selected fill materials can be used as engineered fill provide they contain suitable moisture content. The use of granular Class 'B' aggregates is however preferred for subgrade construction for slab on grade, especially during the winter time or wet season.

Similarly, it is recommended that granular Class 'B' aggregates be used for backfill against subsurface walls. However, subject to further site inspection, suitable onsite granular materials may be used.

Upon completion of foundation work, the floor slab should rest on a well compacted bed of size 19 mm clear stone of at least 200 mm thick. The stone bed would act as a barrier and prevent capillary rise of moisture from the subgrade to the floor slab.

If the proposed building slab is 200mm higher than the exterior grade, a permanent perimeter drainage may not be required. Otherwise, the permanent perimeter drainage system for open excavation / foundation walls should be provided as shown in the drainage design recommendation at Appendix C. The drains should be connected to a frost-free outlet.

10.0 UNDERGROUND UTILITIES

Pipe bedding and backfill materials specifications and compaction criteria for water and sewer services should be in accordance with the pipe designer's recommendations and/or local municipal requirements.

If the excavation is deeper than 1.2m, the excavation sides should be sloped in accordance with requirements of OHSA. If this condition cannot be met, a temporary shoring system or trench box should be introduced.

For the subject site, it is expected that the underground services will be founded above the water table and situated in a dense to very dense silty sand till. Granular Class 'B' aggregate is considered well suited to be used as bedding material. However, it should be noted, that the recommended type of bedding is to be placed on undisturbed subgrade. If the construction methods will disturb the subgrade i.e. piping, existing footing, boulder removal etc. or existence of excess hydrostatic pressure, then higher-class bedding combined with a geotextile may have to be used.

Onsite excavated fill materials / native soils are considered suitable for re-use in trench backfilling, provided that organics (topsoil) / construction debris are removed and that materials are not allowed to be wet and the moisture content is within ±3% of the optimum moisture content.

In normal sewer construction practice, the problem of road / pavement settlement largely occurs adjacent to manholes, catch basins and service crossings. In these areas, granular materials are generally required for backfill and compaction.

The underground services should be located below the depth of frost penetration of 1.8m and in accordance with City of Ottawa specifications. The City of Ottawa specifies watermains require a soil cover above of 2.4m. Where the available soil cover is less than the required 2.4m, an equivalent thermal rigid insulation should be applied for frost protection.

11.0 PAVEMENT

It is expected that the associated pavement for driveways and parking areas will be developed on the site. Pavement structures can be constructed on the native soils or engineered fill, subject to design grade and further onsite inspection.

Prior to asphalt pavement construction, topsoil/organic soil/ construction debris should be removed. The exposed subgrade should be proof rolled and supervised / approved by our office. Any soft / spongy spots detected during proof-rolling should be sub-excavated and replaced with suitable materials and compact to 98% of SPMDD. Engineered fill construction, if any, should be supervised and inspected by engineering staff from our office.

The finished subgrade must be contoured / graded and finally proof-rolled and approved by our office before placing upper granular materials.

Granular materials will be used in construction of asphalt pavement bases. Compaction for granular bases should reach 100 % of Standard Proctor Maximum Dry Density.

Perforated drains connected to sewer MHs/ CBs should be provided under the entire length of curb and constructed in accordance with required local regulations. Typical flexible pavement designs are shown in Table 4.

Table 4: Typical flexible pavement design

	Heavy Duty	**Medium Duty**	**Light Duty**
Asphaltic Concrete	40 mm HL3	40 mm HL3	50 mm HL3
	65 mm HL8	50 mm HL8	
19 mm Crushed Limestone	150 mm	150 mm	200 mm
Granular B Sub-base	300 mm	200 mm	

The pavement thickness should also meet the minimum local region Pavement Design Standards.

The asphalt material should meet the requirements of OPSS 310 for specified grade and be compacted to at least 92.0% of their Maximum Relative Density (MRD).

12.0 GENERAL COMMENTS

This report is limited in scope to those items specifically referenced in the text. The discussions and recommendations presented herein are intended only as guidance for the client named and design engineers. The information on which these recommendations are based is subject to confirmation by engineering personnel at the time of construction.

It should also be noted that localized variations in subsoil conditions may be present between and beyond the boreholes investigated and should be verified during construction. As more specific subsurface information becomes available during excavations on the Site, this report should be updated.

Contractors bidding on or undertaking the work should decide on their own investigations, as well as their own interpretations of the factual borehole results. This concern specifically applies to the classification of the subsurface soil and the potential reuse of these soils on/off site. The contractors must draw their own conclusions as to how the near surface and subsurface conditions may affect them.

APPENDIX A – SITE PLAN

Fisher Environmental Ltd.

400 Esna Park Dr., #15
Markham, Ontario
L3R 3K2

Tel: 905 475-7755
Fax: 905 475-7718

KEY PLAN

N

LEGEND

BOREHOLE

PROJECT NAME AND ADDRESS

PRELIMINARY GEOTECHNICAL INVESTIGATION

1000 McGARRY TERRACE
NEPEAN, ON

PROJECT NO. FE-P 18-8637 GEO	FIGURE 1: Site Location Map with Borehole Locations	SHEET NO. 1
DATE 08 FEBRUARY 2018		
SCALE AS SHOWN		

APPENDIX B – LOG OF BOREHOLES

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LOG OF BOREHOLE NO. 1 SHEET. 1 of 5

PROJECT NO.: FE-P 18-8637

PROJECT NAME: 1000 McGarry Terrace, Nepean, ON

LOCATION: 1000 McGarry Terrace, Nepean, ON

DRILLING METHOD: Hollow Stem

DRILLING DATE: 6 February 2018

DEPTH (feet)	DEPTH (metres)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUE	PENETRATION TESTING (SPT) ▲ / SHEAR STRENGTH (Kpa) ✚	VAPOUR READING (ppm) □ / MOISTURE CONTENT (%) ○	PIEZOMETER OR WELL CONSTRUCTION
								10 20 30 40 / 40 80 120 160	20 40 60 80 / 10 20 30 40	
		GROUND SURFACE (m asl)		99.50m						
0	0	FILL: Silt, some Sand, trace Gravel, organics, rootlets, straw pieces, dark brown, moist, compact some organics @ 2.5' black			1	SS	17			
				98.59m						
2	1	SILTY SAND TILL: Trace Gravel, brown, moist, dense to very dense			2	SS	4			
4										
6	2				3	SS	42			
8		Dark Brown, silty sand at upper 1' slightly wet			4	SS	100+			
10	3									
12					5	SS	100+			
	4	Auger Refusal at 13.5'		95.39m						
14		End of Borehole 4.11m								
16	5									
18										
20	6									
22										
24	7									
26										
28	8									
30	9									
32										
	10									

Groundwater Depth (m): On Completion: Dry.

LOGGED: ZV

CHECKED: FF

FISHER ENVIRONMENTAL LTD.

LOG OF BOREHOLE NO. 2 SHEET. 2 of 5

PROJECT NO.: FE-P 18-8637

PROJECT NAME:1000 McGarry Terrace, Nepean, ON

LOCATION: 1000 McGarry Terrace, Nepean, ON

DRILLING METHOD: Hollow Stem

DRILLING DATE: 6 February 2018

SOIL PROFILE			SAMPLES			PENETRATION TESTING (SPT) ▲ 10 20 30 40 / SHEAR STRENGTH (Kpa) ✚ 40 80 120 160	VAPOUR READING (ppm) □ 20 40 60 80 / MOISTURE CONTENT (%) ○ 10 20 30 40	PIEZOMETER OR WELL CONSTRUCTION
DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	"N" VALUE			
GROUND SURFACE (m asl)		99.75m						
FILL: Silt, some organics, trace Sand pockets, rootlets, dark brown, moist, loose to compact			1	SS	16			
			2	SS	5			
		98.68m			43			
SILTY SAND TILL: Trace Gravel, brown, moist, dense to very dense.			3	SS	90			
			4	SS	100+			
			5	SS	100+			
		96.09m						
End of Borehole 3.66m								

DEPTH (feet) 0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32

DEPTH (metres) 0 1 2 3 4 5 6 7 8 9 10

Groundwater Depth (m): On Completion: Dry.

LOGGED: ZV

CHECKED: FF

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LOG OF BOREHOLE NO. 3 SHEET. 3 of 5

PROJECT NO.: FE-P 18-8637

PROJECT NAME: 1000 McGarry Terrace, Nepean, ON

LOCATION: 1000 McGarry Terrace, Nepean, ON

DRILLING METHOD: Hollow Stem

DRILLING DATE: 6 February 2018

DEPTH (feet)	DEPTH (metres)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	"N" VALUE	PENETRATION TESTING (SPT) ▲ 10 20 30 40 / SHEAR STRENGTH (Kpa) ✚ 40 80 120 160	VAPOUR READING (ppm) □ 20 40 60 80 / MOISTURE CONTENT (%) ○ 10 20 30 40	PIEZOMETER OR WELL CONSTRUCTION
		GROUND SURFACE (m asl)		99.30m						
0	0	FILL: Sand and Gravel, some Asphalt, trace Clay pockets, dark Brown, moist, compact			1	SS	22			
2				98.54m						
4	1	SILTY SAND TILL: Reddish Brown at the upper 1' Trace Gravel, brown, moist, dense to very dense.			2	SS	47			
6	2			97.32m	3	SS	100+			
8		Auger Refusal at 6.5' End of Borehole 1.98m								
10	3									
12										
14	4									
16	5									
18										
20	6									
22										
24	7									
26	8									
28										
30	9									
32	10									

Groundwater Depth (m): On Completion: Dry.

LOGGED: ZV

CHECKED: FF

FISHER ENVIRONMENTAL LTD.

LOG OF BOREHOLE NO. 4 SHEET. 4 of 5

PROJECT NO.: FE-P 18-8637

PROJECT NAME:1000 McGarry Terrace, Nepean, ON

LOCATION: 1000 McGarry Terrace, Nepean, ON

DRILLING METHOD: Hollow Stem

DRILLING DATE: 6 February 2018

DEPTH (feet)	DEPTH (metres)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUE	PENETRATION TESTING (SPT) ▲ 10 20 30 40 / SHEAR STRENGTH (Kpa) ✚ 40 80 120 160	VAPOUR READING (ppm) □ 20 40 60 80 / MOISTURE CONTENT (%) ○ 10 20 30 40	PIEZOMETER OR WELL CONSTRUCTION
		GROUND SURFACE (m asl)		98.50m						
0	0	FILL: Silt, some organics, trace Sand, brick, rootlets, dark brown, moist, loose			1	SS	4	▲		
2				97.74m						
4	1	SILTY SAND TILL: Trace Gravel, brown, moist, very dense.			2	SS	60		▲	
6	2				3	SS	100+		▲	
8		Auger Refusal at 8.5'		95.91m	4	SS	100+		▲	
		End of Borehole 2.59m								
10	3									
12										
14	4									
16										
18	5									
20										
22	6									
24										
26	7									
28										
30	8									
32										
	9									
	10									

Groundwater Depth (m): On Completion: Dry.

LOGGED: ZV

CHECKED: FF

FISHER ENVIRONMENTAL LTD.

LOG OF BOREHOLE NO. 5 SHEET. 5 of 5

PROJECT NO.: FE-P 18-8637

PROJECT NAME:1000 McGarry Terrace, Nepean, ON

LOCATION: 1000 McGarry Terrace, Nepean, ON

DRILLING METHOD: Hollow Stem

DRILLING DATE: 6 February 2018

DEPTH (feet)	DEPTH (metres)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUE	PENETRATION TESTING (SPT) ▲ 10 20 30 40 / SHEAR STRENGTH (Kpa) ✚ 40 80 120 160	VAPOUR READING (ppm) □ 20 40 60 80 / MOISTURE CONTENT (%) ○ 10 20 30 40	PIEZOMETER OR WELL CONSTRUCTION
		GROUND SURFACE (m asl)		98.25m						
0	0	FILL: Silt, some Sand, trace Gravel, organics, rootlets, dark Brown, moist			1	SS	12			
2										
4	1	SILTY SAND TILL: Trace Gravel, brown, moist, compact. Auger Refusal at 5'		97.34m	2	SS	28			
6	2	End of Borehole 1.52m		96.73m						
8										
10	3									
12										
14	4									
16	5									
18										
20	6									
22										
24	7									
26	8									
28										
30	9									
32										
	10									

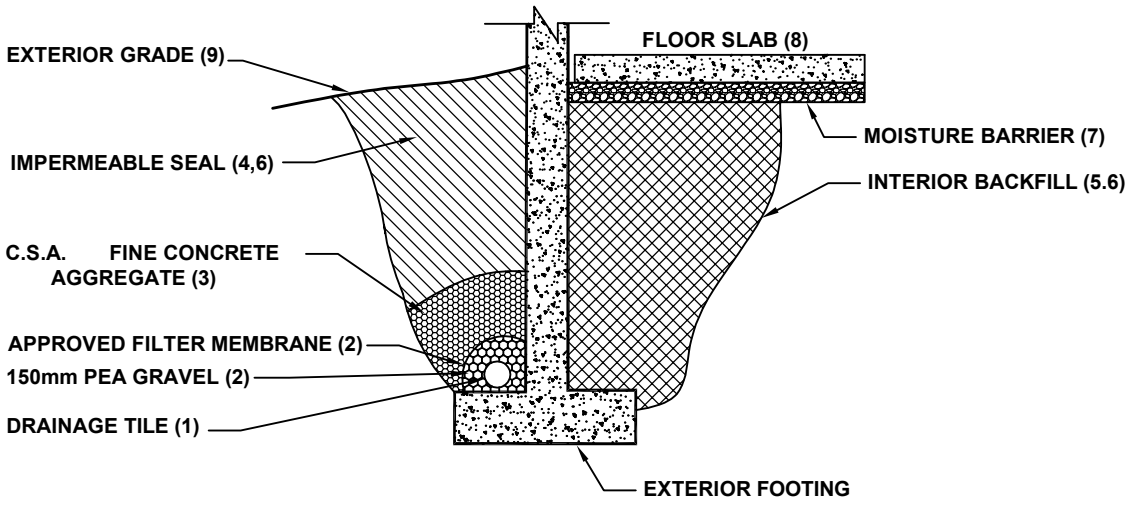
Groundwater Depth (m): On Completion: Dry.

LOGGED: ZV

CHECKED: FF

APPENDIX C– DRAINAGE AND BACKFILL RECOMMENDATIONS

FISHER ENVIRONMENTAL LTD.



NOTES:

(1) DRAINAGE TILE TO CONSIST OF 100mm (4") DIAMETER WEEPING TILE OR EQUIVALENT PERFORATED PIPE LEADING TO A POSITIVE SUMP OR OUTLET. INVERT TO BE A MINIMUM OF 150MM (6") BELOW UNDERSIDE OF FLOOR SLAB.

(2) PEA GRAVEL-150mm (6") TOP AND SIDE OF DRAIN. IF DRAIN IS NOT ON FOOTING, PLACE 100mm (4") OF PEA GRAVEL BELOW DRAIN. 20mm (3/4") CLEAR STONE IS AN ALTERNATIVE PROVIDED IT IS SURROUNDED BY AN APPROVED FILTER FABRIC (TERRAFIX 270R OR EQUIVALENT).

(3) C.S.A. FINE CONCRETE AGGREGATE TO ACT AS FILTER MATERIAL. MINIMUM 300mm (12") TOP AND SIDE OF TILE DRAIN. THIS MAY BE REPLACED BY AN APPROVED FILTER FABRIC AS INDICATED IN (2).

(4) IMPERMEABLE BACKFILL SEAL - COMPACTED CLAY, CLAYEY SILT OR EQUIVALENT. IF ORIGINAL SOIL IS FREE-DRAINING, SEAL MAY BE OMITTED.

(5) THE ENTIRE FILL MAY BE ANY CLEAN NON-ORGANIC SOIL WHICH CAN BE COMPACTED TO THE SPECIFIED IN THIS CONFINED SPACE.

(6) DO NOT USE HEAVY COMPACTION EQUIPMENT WITHIN 450mm (18") OF THE WALL. DO NOT FILL OR COMPACT WITHIN 1.8m(6') OF THE WALL UNLESS FILL IS PLACED ON BOTH SIDES SIMULTANEOUSLY.

(7) MOISTURE BARRIER TO BE AT LEAST 200mm (8") OF COMPACTED CLEAR 20mm (3/4") STONE.

(8) SLAB ON GRADE SHOULD NOT BE STRUCTURALLY CONNECTED TO THE WALL OR FOOTING.

(9) EXTERIOR GRADE TO SLOPE AWAY FROM BUILDING.

(10) THIS SYSTEM IS NOT NORMALLY REQUIRED IF THE FLOOR SLAB IS AT LEAST 300mm (1') ABOVE THE EXTERIOR GRADE.

DRAINAGE AND BACKFILL RECOMMENDATIONS

FOR SLAB ON GRADE CONSTRUCTION
(NOT TO SCALE)