100 Lusk Street - Servicing and Stormwater Management Report

Stantec

Prepared for:
100 Lusk Street Inc.

Prepared by:
Warren Johnson

Date:
April 29, 2026

Project/File:
160402108

Stantec Consulting Ltd.

Revision Record

Revision	Description	Author	Date	Quality Check	Date	Independent Review	Date

Disclaimer

The conclusions in the Report titled 100 Lusk Street - Servicing and Stormwater Management Report are Stantec's professional opinion, as of the time of the Report, and concerning the scope described in the Report. The opinions in the document are based on conditions and information existing at the time the scope of work was conducted and do not take into account any subsequent changes. The Report relates solely to the specific project for which Stantec was retained and the stated purpose for which the Report was prepared. The Report is not to be used or relied on for any variation or extension of the project, or for any other project or purpose, and any unauthorized use or reliance is at the recipient's own risk.

Stantec has assumed all information received from 100 Lusk Street Inc. (the "Client") and third parties in the preparation of the Report to be correct. While Stantec has exercised a customary level of judgment or due diligence in the use of such information, Stantec assumes no responsibility for the consequences of any error or omission contained therein.

This Report is intended solely for use by the Client in accordance with Stantec's contract with the Client. While the Report may be provided by the Client to applicable authorities having jurisdiction and to other third parties in connection with the project, Stantec disclaims any legal duty based upon warranty, reliance or any other theory to any third party, and will not be liable to such third party for any damages or losses of any kind that may result.

Prepared/Approved by:

Warren Johnson, L.E.T., C.E.T.

Reviewed by:

Kris Kilborn

Professional Engineers Ontario

Licensed Engineering Technologist

Name: W. A. JOHNSON
Number: 100646440 2026-04-29
Limitations: Design analysis, drawings, and reports for municipal and private water distribution systems, gravity storm and sanitary sewers, stormwater management, roadways, grading and erosion control.
Association of Professional Engineers of Ontario

Table of Contents

1 Introduction 1.1
2 Background 2.2
3 Water Supply Servicing 3.3
3.1 Background 3.3
3.2 Water Demands 3.3
3.3 Proposed Servicing 3.3
3.4 Summary of Findings 3.4
4 Wastewater Servicing 4.5
4.1 Background 4.5
4.2 Design Criteria 4.5
4.3 Proposed Servicing 4.5
5 Stormwater Management 5.1
5.1 Objectives 5.1
5.2 SWM Criteria and Constraints 5.1
5.3 Stormwater Management 5.2
5.3.1 Allowable Release Rate 5.2
5.3.2 Storage Requirements 5.2
5.3.3 Results 5.4
6 Grading and Drainage 6.5
7 Utilities 7.1
8 Approvals 8.1
9 Erosion Control During Construction 9.1
10 Geotechnical Investigation and Environmental Assessment 1
11 Conclusions 2
11.1 Water Servicing 2
11.2 Sanitary Servicing 2
11.3 Stormwater Servicing 2
11.4 Grading 2
11.5 Utilities 2
11.6 Approvals/Permits 2

List of Tables

Table 1: Target Release Rates 5.2
Table 2: Roof Control Area (BLDG) 5.3
Table 3: Surface Storage Areas (L101A, L101B, L101C) 5.3
Table 4: Surface Storage Areas (L101C) ..... **Error! Bookmark not defined.**
Table 5: Uncontrolled Non-Tributary Area (UNC-1) 5.4
Table 6: Summary of Total 2 and 100 Year Event Release Rates 5.4
Table 7: Recommended Pavement Structure – Car Only Parking Areas 1

List of Figures

Figure 1: Location Plan 1.1

List of Appendices

Appendix A Water Supply Servicing
A.1 Boundary Conditions
A.2 Domestic Water Demand Estimate
A.3 Architectural Confirmations

A.4 Fire Flow Requirements
Appendix B Wastewater Servicing
B.1 Sanitary Sewer Design Sheet
Appendix C Stormwater Management
C.1 Storm Sewer Design Sheet
C.2 Rational Method Calculations
Appendix D Geotechnical Investigation

1 Introduction

Stantec Consulting Ltd. has been commissioned by 100 Lusk Street Inc. to prepare a servicing study in support of Site Plan Control submission of the proposed development located at 100 Lusk Street. The site is situated southwest of Lusk Street and O'Keefe Court intersection within the City of Ottawa. The proposed development would replace vacant land with a new one-storey childcare building and associated surface parking. The site location is shown as **Figure 1** below. The 0.40 ha site is presently zoned IP (Business Park Industrial Zone), which permits the proposed development plan. The intent of this report is to provide a servicing scenario for the site that is free of conflicts, provides on-site servicing in accordance with City of Ottawa design guidelines, and utilizes the existing local infrastructure in accordance with the guidelines outlined per consultation with City of Ottawa staff.

Figure 1: Location Plan

2 Background

Documents referenced in preparation of the design for the 100 Lusk Street development include:

- Geotechnical Investigation, Proposed Commercial Development, 100 Lusk Street - Paterson Group Inc. - January 2021
- Ottawa, Ontario Design Brief – O'Keefe Court – 416 Lands, IBI Group, January 2018.
- Water Distribution Design Guidelines – City of Ottawa, Water Distribution, Infrastructure Services Department, Second Edition, December 2025
- Sewer Design Guidelines, Fourth Ed., City of Ottawa, Infrastructure Services Department December 2025

3 Water Supply Servicing

3.1 Background

The proposed development comprises one one-storey childcare building, complete with associated infrastructure and parking. The site is located on the southwest side of the Lusk Street and O'Keefe Court intersection. The site will be serviced via a 75 mm building service connection to the existing 200 mm dia. stub within the subject property which connects to the existing 300 mm dia. watermain within the Lusk Street ROW at the southern boundary of the site. The property is located within the City's Pressure Zone BARR. Average ground elevations of the site are approximately 104.2m.

Boundary conditions were provided by the City of Ottawa in June 2020 as part of a previous application for the subject property. Since there is minimal increase in the proposed domestic water demands and a reduction in the required fire flow from the previous application the 2020 boundary conditions were still deemed to be relevant. Under normal operating conditions, hydraulic grade lines provided in these boundary conditions vary from approximately 147.4m to 151.7m (see **Appendix A.1**).

3.2 Water Demands

Water demands for the development were estimated using the Ministry of Environment's Design Guidelines for Drinking Water Systems (2008) and the Ottawa Design Guidelines. A rate of 75 L/person/day was used for staff (various places of employment) and 30 L/person/day for children (day school without cafeteria) as per the City of Ottawa Sewer Design Guideline (2025) Appendix 4a. See **Appendix A.2** for detailed domestic water demand estimates.

The average day demand (AVDY) for the entire site was determined to be 0.07 L/s. The maximum daily demand (MXDY) is 1.5 times the AVDY for institutional areas, which sums to 0.10 L/s. The peak hour demand (PKHR) is 1.8 times the MXDY for institutional areas totaling 0.18 L/s.

Fire Underwriters Survey (FUS) methodology was used to determine the fire flow required for the proposed building. The building is considered to be of non-combustible construction without a sprinkler system. Vertical openings are assumed to be unprotected, and the occupancy and contents factor has been considered for limited combustible materials. Refer to **Appendix A.3** for confirmation from the architect regarding the assumptions made. Based on calculations per the FUS guidelines (see **Appendix A.4),** the minimum required fire flows for this development are 83.3 L/s (5,000L/min).

3.3 Proposed Servicing

Domestic water supply pressures are required to range within the guidelines of 50-80 psi specified in the City of Ottawa Design Guidelines for Water Distribution. Maximum day demands rates must generate a residual pressure above the required minimum 140 kPa (20 psi).

Based on boundary conditions provided by the City of Ottawa and an approximate elevation of 104.2m, adequate domestic water supply is available for the subject site with pressures ranging from 43.5m (61.9psi) to 47.5m (67.5psi). This pressure range is within the guidelines of 50-80 psi specified in the City of Ottawa Design Guidelines for Water Distribution.

The boundary conditions provided for the proposed development under maximum day demands demonstrate that a maximum flowrate of 150 L/s is available in order to have a residual pressure above the required minimum 20 psi. This demonstrates that sufficient fire flow is available for the proposed development.

The closest hydrants are located on Lusk ROW at the southern and eastern boundaries of the subject property and is within 90m of the proposed building as per City of Ottawa Water Distribution Design Guidelines.

3.4 Summary of Findings

The proposed development is serviced by the City of Ottawa's water distribution system. The available water supply is sufficient to meet both domestic and fire protection requirements.

4 Wastewater Servicing

4.1 Background

The site will be serviced via an existing 250 mm diameter sanitary sewer situated within the Lusk Street ROW at the southern boundary of the site (see **Drawing SSP-1**). It is proposed to connect a 100 mm diameter sanitary service lateral directly to the existing sanitary maintenance hole located at the southeastern boundary to service the proposed site.

4.2 Design Criteria

As outlined in the City of Ottawa Sewer Design Guidelines and the MECP Design Guidelines for Sewage Works, the following criteria were used to calculate estimated wastewater flow rates and to size the sanitary sewers:

- Minimum Velocity – 0.6 m/s (0.8 m/s for upstream sections)
- Maximum Velocity – 3.0 m/s
- Manning roughness coefficient for all smooth wall pipes – 0.013
- Sewer main minimum size – 250mm for commercial/institutional areas
- Average Wastewater Generation (Sewer Design Guideline Appendix 4a):
  - Staff: Various places of employment = 75 l/person/day
  - Children: Day school without cafeteria = 30 l/person/day
- Peak Factor – 1.5 (Commercial/Institutional)
- Extraneous Flow Allowance – 0.33 l/s/ha (conservative value)
- Manhole Spacing – 120 m
- Minimum Cover – 2.5m

4.3 Proposed Servicing

The proposed site will be serviced by gravity sewers which will direct the wastewater flows (approx. 0.23 L/s with allowance for infiltration) to the existing 250 mm diameter sanitary sewer. A sanitary sewer design sheet for the proposed service lateral is included in **Appendix B**. Full port backwater valves are to be installed on all sanitary services within the site to prevent any surcharge from the downstream sewer main from impacting the proposed property.

5 Stormwater Management

5.1 Objectives

The objective of this stormwater management plan is to determine the measures necessary to control the quantity/quality of stormwater released from the proposed development to criteria established during the pre-consultation/zoning process, and to provide sufficient detail for approval and construction.

5.2 SWM Criteria and Constraints

Criteria were established by combining current design practices outlined by the City of Ottawa Design Guidelines (2025), and through consultation with City of Ottawa staff. The following summarizes the criteria, with the source of each criterion indicated in brackets:

General

- Use of the dual drainage principle (City of Ottawa).
- Wherever feasible and practical, site-level measures should be used to reduce and control the volume and rate of runoff. (City of Ottawa)
- Assess impact of 100-year event outlined in the City of Ottawa Sewer Design Guidelines on major & minor drainage system (City of Ottawa)
- The proposed site is not subject to quality control criteria as it is captured downstream at the pond in Block 4 (City of Ottawa).

Storm Sewer & Inlet Controls

- Size storm sewers to convey 2-year storm events under free-flow conditions using City of Ottawa I-D-F parameters (City of Ottawa).
- Site discharge rates for each storm event to be restricted to 2-year storm event of 69 L/s based on rates calculated in the O'Keefe Court 416 Lands Design Brief by IBI Group.
- Proposed site to discharge the existing 600mm diameter storm sewer within the Lusk Street ROW at the boundary of the subject site (City of Ottawa).
- 100-year Storm HGL to be a minimum of 0.30 m below building foundation footing (City of Ottawa).

Surface Storage & Overland Flow

- Building openings to be a minimum of 0.30m above the 100-year water level (City of Ottawa)
- Rooftop and parking lot storage to be maximized where possible.
- Maximum depth of flow under either static or dynamic conditions shall be less than 0.35m (City of Ottawa)
- Provide adequate emergency overflow conveyance off-site (City of Ottawa)

5.3 Stormwater Management

The Modified Rational Method was employed to assess the rate and volume of runoff generated during post-development conditions. The site was subdivided into subcatchments (subareas) tributary to stormwater controls as defined by the location of inlet control devices. A summary of subareas and runoff coefficients is provided in **Appendix C** and **Drawing SD-1** indicates the stormwater management subcatchments.

5.3.1 Allowable Release Rate

The overall approach for the storm servicing and stormwater management for the proposed site is outlined in the O'Keefe Court 416 Lands Design Brief by IBI Group, January 2018. The target release rate has been summarized based on results from subcatchment B12 in the overall O'Keefe Court 416 Lands Design Brief.

Based on the background report, the peak post-development discharge from the subject site is to be limited to that of the 2-year event and runoff volume from the proposed site up to the 100-year storm event is to be captured and stored on site. Minor and major system flows from the site are directed towards the stormwater management facility located at Block 4. The pond discharges to O'Keefe Drain and ultimately to the Jock River. The target release rate for the site is summarized in **Table 1** below:

Table 1: Target Release Rates

Design Storm	Target Flow Rate (L/s)
All Events	69.0

5.3.2 Storage Requirements

The site requires quantity control measures to meet the restrictive stormwater release criteria. It is proposed that rooftop storage via restricted roof release in combination with surface parking storage with inlet control devices (ICD's) will be used to reduce site peak outflow to target rates.

5.3.2.1 Rooftop Storage

It is proposed to retain stormwater on the building rooftop by installing restricted flow roof drains. The following calculations assume the roof will be equipped with standard Watts Model R1100 Accutrol Roof Drains.

Watts Drainage "Accutrol" roof drain weir data has been used to calculate a practical roof release rate and detention storage volume for the rooftops. It should be noted that the "Accutrol" weir has been used as an example only, and that other products may be specified for use, provided that the total roof drain release rate is restricted to match the maximum rate of release indicated in **Table 2**, and that sufficient roof storage is provided to meet (or exceed) the resulting volume of detained stormwater. Proposed drain

release rates have been calculated based on the Accutrol weir setting at 50% open. Storage volume and controlled release rate are summarized in **Table 2**:

Table 2: Roof Control Area (BLDG)

Design Storm	Depth (mm)	Discharge (L/s)	Volume Stored (m^3)
2-Year	99	2.83	9.34
100-Year	149	3.76	31.38

Drainage from the roof will directly discharge to the surface to the proposed swale along the western boundary of the site and ultimately to the Lusk Street ROW where it will be collected into the existing stormwater system.

5.3.2.2 Surface Storage

Per the modified rational method calculations included as part of **Appendix C.2**, the remainder of the site is to be directed towards three catch basins (CB101A-1, CB101B-1, and CB101C-1) complete with an IPEX Tempest HF or LMF Orifice ICD to meet the target peak discharge rate for the during the 100-year event.

In order to control peak discharge from the subject site to within target levels, available surface storage in the amount of approximately 47.4 m^3 was provided. Storage volumes and controlled release rates are summarized in **Table 3.**

Table 3: Surface Storage Areas (L101A, L101B, L101C)

Tributary Area	Design Storm	Design Head (m)	Discharge (L/s)	Orifice Type	$V_{required}$ (m^3)	$V_{available}$ (m^3)
L101A	2-Year	1.38	17.17	IPEX Tempest HF 83mm Orifice	0.00	8.90
	100-Year	1.53	18.08		4.04	
L101B	2-Year	1.38	7.79	IPEX Tempest LMF 100	0.00	11.10
	100-Year	1.58	11.22		6.86	
L101C	2-Year	1.80	7.22	IPEX Tempest LMF 105	0.00	27.40
	100-Year	2.10	14.19		4.07	

As per City of Ottawa criteria, no surface ponding is anticipated during the 2-year event.

5.3.2.3 Uncontrolled Areas

Due to grading restrictions, one subcatchment area has been designed without a storage component. The catchment area discharges off-site uncontrolled to the adjacent Lusk Street and O'Keefe Court. Peak discharges from uncontrolled areas have been considered in the overall SWM plan and have been balanced through overcontrolling proposed site discharge rates to meet target levels.

Table 4: Uncontrolled Non-Tributary Area (UNC-1)

Design Storm	Discharge (L/s)
2-Year	7.47
100-Year	21.72

5.3.3 Results

Table 6 demonstrates the proposed stormwater management plan and demonstrates adherence to target peak outflow rates for the site.

Table 5: Summary of Total 2- and 100-Year Event Release Rates

	2-Year Peak Discharge (L/s)	100-Year Peak Discharge (L/s)
Uncontrolled – Surface	7.47	21.72
Controlled – Surface	32.18	43.50
Controlled – Roof	2.83	3.76
Total	**42.48**	**68.98**
Target	**69.00**	**69.00**

6 Grading and Drainage

The proposed development site measures approximately 0.40ha in area. The topography across the site is relatively flat and currently drains to both the northwest and southeastern boundary, with overland flow generally being directed to the adjacent Lusk Street ROW. A detailed grading plan (see **Drawing GP-1**) has been provided to satisfy the stormwater management requirements, adhere to any geotechnical restrictions (see **Section 10**) for the site, and provide for minimum cover requirements for storm and sanitary sewers where possible. Site grading has been established to provide emergency overland flow routes required for stormwater management in accordance with City of Ottawa requirements.

The subject site is graded to provide an emergency overland flow route to Lusk Street for storm flows exceeding those generated by the 100-year design storm.

7 Utilities

Hydro, Bell, Gas and Cable servicing for the proposed development should be readily available within subsurface plant and adjacent overhead utility lines within the Lusk Street ROW. Exact size, location and routing of utilities, along with determination of any off-site works required for redevelopment, will be finalized after design circulation.

8 Approvals

Pre-consultation with Ontario Ministry of Environment, Conservation and Parks (MECP) staff concerning Environmental Compliance Approvals (ECAs, formerly Certificates of Approval (CofA)) under the Ontario Water Resources Act is not expected to be a requirement for the development.

Requirement for a MECP Permit to Take Water (PTTW) for sewer construction dewatering and building footing excavation will be confirmed by the geotechnical consultant.

9 Erosion Control During Construction

Erosion and sediment controls must be in place during construction. The following recommendations to the contractor will be included in contract documents.

1. Implement best management practices to provide appropriate protection of the existing and proposed drainage system and the receiving water course(s).
2. Limit extent of exposed soils at any given time.
3. Re-vegetate exposed areas as soon as possible.
4. Minimize the area to be cleared and grubbed.
5. Protect exposed slopes with plastic or synthetic mulches.
6. Provide sediment traps and basins during dewatering.
7. Install sediment traps (such as SiltSack® by Terrafix) between catch basins and frames.
8. Plan construction at the proper time to avoid flooding.

The contractor will, at every rainfall, complete inspections and guarantee proper performance. The inspection is to include:

9. Verification that water is not flowing under silt barriers.
10. Clean and change silt traps at catch basins.

Refer to **Drawing ECDS-1** for the proposed location of silt fences and other erosion control structures.

10 Geotechnical Investigation

A geotechnical review was prepared by Paterson Group Inc. on January 4, 2021. The report summarizes the geotechnical design parameters and construction recommendations prior to completion of full geotechnical investigation. For details which are not summarized below, please see the original Paterson Group Inc report.

Subsurface soil conditions were based on a site investigation including boreholes in December 2020. The subsurface profile for the proposed development is expected to consist of fill underlain by glacial till. It is anticipated that the existing fill within the proposed building footprints, free of deleterious material and significant amounts of organics, can be left in place below the proposed building footprints outside of lateral support zones for the footings. However, it is recommended that the existing fill layer be proof-rolled several times and approved by the geotechnical consultant at the time of construction. Any poor performing areas noted during the proof-rolling operation should be removed and replaced with an approved fill.

Bedrock is anticipated to range from 3 to 10 m below grade. Groundwater was measured at a depth of 2.8 m below grade, however, it is anticipated that the long-term groundwater level will be approximately 4 to 5m below grade.

Table 6: Recommended Pavement Structure – Car Only Parking Areas

Thickness (mm)	Material Description
50	Wear Course - HL-3 or Superpave 12.5 Asphaltic Concrete
150	BASE - OPSS Granular A Crushed Stone
300	SUBBASE - OPSS Granular B Type II

Table 7: Recommended Pavement Structure – Access Lanes and Heavy Duty Truck Parking Areas

Thickness (mm)	Material Description
40	Wear Course - HL-3 or Superpave 12.5 Asphaltic Concrete
50	Binder Course - HL-8 or Superpave 19.0 Asphaltic Concrete
150	BASE - OPSS Granular A Crushed Stone
450	SUBBASE - OPSS Granular B Type II

11 Conclusions

11.1 Water Servicing

Based on the supplied boundary conditions from the City for existing watermains and estimated domestic and fire flow demands for the subject site, it is anticipated that the proposed servicing in this development will provide sufficient capacity to sustain both the required domestic demands and emergency fire flow demands of the proposed site.

11.2 Sanitary Servicing

The proposed sanitary sewer network is sufficiently sized to provide gravity drainage of the site. The proposed site will be serviced by a gravity sewer service lateral which will direct wastewater flows to the existing 250 mm diameter sanitary sewer within the Lusk Street ROW at the southern boundary of the property. The proposed drainage outlet has sufficient capacity to receive sanitary discharge from the site based on pre-consultation through City of Ottawa staff.

11.3 Stormwater Servicing

The proposed stormwater management plan is in compliance with the goals specified through consultation with the City of Ottawa. Rooftop and surface storage discharged at controlled release rates are proposed to limit peak storm sewer inflows to downstream storm sewers to predevelopment levels as determined by City of Ottawa staff. The storm flows from the site will be controlled to less than the 5-year storm event. The downstream receiving sewer has sufficient capacity to receive runoff volumes from the site based on pre-consultation through City of Ottawa staff.

11.4 Grading

Grading for the site has been designed to provide an emergency overland flow route as per City requirements and reflects the recommendations in the Geotechnical Review prepared by Paterson Group. Erosion and sediment control measures will be implemented during construction to reduce the impact on existing facilities.

11.5 Utilities

Utility infrastructure exists within overhead lines and subsurface plant within the Lusk Street ROW at the southern boundary of the proposed site. It is anticipated that existing infrastructure will be sufficient to provide a means of distribution for the proposed site. Exact size, location and routing of utilities will be finalized after design circulation.

11.6 Approvals/Permits

An MECP Environmental Compliance Approval is not expected to be required for the subject site. Requirements for a Permit to Take Water (PTTW) are not anticipated. Need for a PTTW for sewer

construction dewatering and building footing excavation will be confirmed by the geotechnical consultant. No other approval requirements from other regulatory agencies are anticipated.

Appendix

Appendix A Water Supply Servicing

A.1 Boundary Conditions

From:	Rathnasooriya, Thakshika
To:	Johnson, Warren
Subject:	FW: Boundary Conditions - 100 Lusk St
Date:	Wednesday, June 10, 2020 8:29:44 AM
Attachments:	100 Lusk St_Boundary Conditions_28May2020.docx

Shika Rathnasooriya , P.Eng.

Direct: 613 724-4081
Thakshika.Rathnasooriya@stantec.com

Stantec
400 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

From: Baker, Adam <adam.baker@ottawa.ca>
Sent: Wednesday, June 03, 2020 2:05 PM
To: Rathnasooriya, Thakshika <Thakshika.Rathnasooriya@stantec.com>
Subject: RE: Boundary Conditions - 100 Lusk St

Hi Shika,

Please find attached the water boundary conditions for this property. If there are new private watermains or hydrants that will be proposed as part of this development, we will need to circle back and get the FUS calculations to determine required fire flow at the property.

Thank you,
Adam

Adam Baker, EIT
Engineering Intern
Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique
Development Review - South Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 26552, Adam.Baker@ottawa.ca

From: Rathnasooriya, Thakshika <Thakshika.Rathnasooriya@stantec.com>
Sent: May 28, 2020 11:51 AM
To: Baker, Adam <adam.baker@ottawa.ca>
Subject: FW: Boundary Conditions - 100 Lusk St

Hi Adam,

Is it possible to get a statues update on the boundary condition request?

Thanks,

Shika Rathnasooriya , P.Eng.

Direct: 613 724-4081
Thakshika.Rathnasooriya@stantec.com

Stantec
400 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

From: Hodgins, Cameron <cameron.hodgins@ottawa.ca>
Sent: Wednesday, May 13, 2020 3:22 PM
To: Baker, Adam <adam.baker@ottawa.ca>
Cc: Kilborn, Kris <kris.kilborn@stantec.com>; Rathnasooriya, Thakshika <Thakshika.Rathnasooriya@stantec.com>
Subject: RE: Boundary Conditions - 100 Lusk St

Hi Adam,

This is related to the Pre-consult held for 100 Lusk Street a few months ago. When you can, can you please take a look at the email below and provide the requested information if possible. Thank you!

Sincerely,

Cameron Hodgins
Planner I
Development Review (South Services) | Examen des projets d'aménagement (services sud)
Planning, Infrastructure and Economic Development | Services de planification, d'infrastructure et de développement économique

City of Ottawa | Ville d'Ottawa
☎ 613.580.2424 ext./poste 15788

From: Rathnasooriya, Thakshika <Thakshika.Rathnasooriya@stantec.com>
Sent: May 13, 2020 2:50 PM
To: Hodgins, Cameron <cameron.hodgins@ottawa.ca>
Cc: Baker, Adam <adam.baker@ottawa.ca>; Kilborn, Kris <kris.kilborn@stantec.com>
Subject: Boundary Conditions - 100 Lusk St

Hi Cameron,

I am looking for watermain hydraulic boundary conditions for 100 Lusk Street. The proposed commercial site consists of one three storey building . We anticipate connecting to the existing 300mm diameter watermain on Lusk Street. (please see attached figure).

Please send the revised estimated domestic demands and fire flow requirements for the site as mentioned below:
Average Day Demand – 0.06 L/s
Max Day Demand - 0.09 L/s
Peak Hour Demand - 0.17 L/s
Fire Flow Requirement per OBC for townhome and back-to-back units - 150 L/s (9,000 L/min)

Thank you,

Shika Rathnasooriya , P.Eng.

Direct: 613 724-4081
Thakshika.Rathnasooriya@stantec.com

Stantec
400 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

une personne autre que son destinataire prévu est interdite. Je vous remercie de votre collaboration.

'

'

'

Boundary Conditions
100 Lusk St.

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	3.6	0.06
Maximum Daily Demand	5.4	0.09
Peak Hour	10.2	0.17
Fire Flow Demand	9000	150

Location

Connection 1 – Lusk St.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	151.7	67.4
Peak Hour	147.4	61.2
Max Day plus Fire	144.3	56.8

[1] Ground Elevation = 104.4 m

Notes:

Disclaimer

The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.

A.2 Domestic Water Demand Estimate

Dolphin Tale Childcare - 100 Lusk Street: Domestic Water Demand Estimates

- Based on Atelier 292 Architect Inc. Site Plan dated April 10, 2026

Demand factors as per City of Ottawa Sewer Design Guidelines Appendix 4a:

Staff	75	L/person/day	(Employees - Various Locations)
Children	30	L/person/day	(Day School without Cafeteria)

Building ID	Area (m^2)	Population	Avg Day Demand		Max Day Demand [1]		Peak Hour Demand [2]	
			(L/min)	(L/s)	(L/min)	(L/s)	(L/min)	(L/s)
Proposed 1-Storey Building	780	-						
Staff	-	23	1.20	0.02	1.8	0.03	3.2	0.05
Children	-	131	2.73	0.05	4.1	0.07	7.4	0.12
Total Site :			**3.93**	**0.07**	**5.9**	**0.10**	**10.6**	**0.18**

For the purpose of this study it is predicted that facilities will be operated 12 hours per day.

Water demand criteria used to estimate peak demand rates for institutional areas are as follows:

1 maximum day demand rate = 1.5 x average day demand rate

2 peak hour demand rate = 1.8 x maximum day demand rate

A.3 Architectural Confirmations

From: Gaetan de Ville
To: Johnson, Warren
Cc: Kilborn, Kris; Pawel Fiett | Atelier 292 Architect Inc.; Gino Aiello; Mahamed Zahra
Subject: Re: 100 LUSK SPC submission
Date: Tuesday, April 21, 2026 11:47:28 AM

Hi Warren,

Please see responses below:

FUS Occupancy Classification: The proposed construction type is non-combustible. Building contents are typical of an institutional daycare program — furniture, children's materials, and equipment. The FUS classification would be your determination based on that program.

Roof Drains: 3 roof drains is still applicable. Final locations TBD pending mechanical design.

Floor Plan and Schedule: These will be included in the forthcoming drawing set.

Survey: Agreed — an updated topo can be coordinated after submission.

Regards,

> On Apr 21, 2026, at 11:30 AM, Johnson, Warren <Warren.Johnson@stantec.com> wrote:
>
> Hi Gaetan,
>
> Thanks for confirming the staff and student count. The latest architectural set provided did not include floor plans or a floor plan schedule. If available, can you please provide these?
>
> For the occupancy classification we are referring to the FUS definition of the building contents. See below screenshot from the FUS guidelines with the definitions of the various classifications. Typically for this type of development, it would be limited combustible. Can you please confirm?
>
> For the roof drains the City often requires the roof drain and scupper locations confirmed during the SPA process. However, for our stormwater calculations we only need to know the number of roof drains proposed. Previously we had assumed 3 roof drains, is that still applicable?
>
> The City may request the updated survey, however, if they don't it would still be best practice to have the survey updated prior to construction through the boulevard to confirm tie in elevations at the curb and property line and to ensure existing trees are not impacted so there are no conflicts that arise during construction. This could be coordinated after the submission.
>
> <image001.png>
> **Warren Johnson,** L.E.T., C.E.T.
> Licensed Engineering Technologist
>
> Direct: (613) 784-2272
> warren.johnson@stantec.com
>
> <image002.png>
>
>
>
> ---
>
> **From:** Gaetan de Ville <gdv@atelier292.com>
> **Sent:** Tuesday, April 21, 2026 11:12 AM
> **To:** Kilborn, Kris <kris.kilborn@stantec.com>
> **Cc:** Pawel Fiett | Atelier 292 Architect Inc. <pfiett@atelier292.com>; Gino Aiello <Gino@gjala.com>; Johnson, Warren <Warren.Johnson@stantec.com>; Mahamed Zahra <zahradolphintale@gmail.com>
> **Subject:** Re: 100 LUSK SPC submission
>
> Hi Kris,
>
> A few responses to your questions:
>
> Occupancy / Building Classification: Group A, Division 2 — Assembly, 1 storey. OBC permits either combustible or non-combustible construction for this occupancy and building height. The proposed construction type is non-combustible.
>
> Children and Staff: 135 children and 26 staff, as shown on the floor plan schedule.
>
> Roof Drains and Scuppers: The building footprint is unchanged from the previous application. Final drain and scupper locations are pending mechanical design and have not been confirmed at this stage.
>
> Survey: At this point in the process, the timeline does not permit commissioning an updated topo survey prior to submission. If the City requires one, it will be addressed by Zahra as a condition following submission.
>
> Regards,
>
> > On Apr 21, 2026, at 10:31 AM, Kilborn, Kris <kris.kilborn@stantec.com> wrote:
> >
> > er locations on the buildings.

Gaetan de Ville, Architect
ATELIER 292 ARCHITECT Inc.
292 Main Street
Ottawa ON K1S 1E1

T (613) 231-2245 x,154
C (613) 286-1988
F (613) 234-3176
E gdv@atelier292.com

Gaetan de Ville, Architect
ATELIER 292 ARCHITECT Inc.
292 Main Street

A.4 Fire Flow Requirements

FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

Stantec Project #: 160402108
Project Name: Dolphin Tale Childcare - 100 Lusk Street
Date: 4/24/2026
Fire Flow Calculation #: 1
Description: One-storey OBC Group A, Division 2, Assembly building with non-combustible construction. Not sprinklered.

Notes: Based on Atelier 292 Architect Inc. Site Plan dated April 10, 2026

Step	Task	Notes										Value Used	Req'd Fire Flow (L/min)
1	Determine Type of Construction	Type II - Noncombustible Construction / Type IV-A - Mass Timber Construction										0.8	-
2	Determine Effective Floor Area	Sum of Two Largest Floors + 50% of Eight Additional Floors					Vertical Openings Protected?					NO	-
		780										780	-
3	Determine Required Fire Flow	($F = 220 \times C \times A^{1/2}$). Round to nearest 1000 L/min										-	5000
4	Determine Occupancy Charge	Limited Combustible										-15%	4250
5	Determine Sprinkler Reduction	None										0%	0
		Non-Standard Water Supply or N/A										0%	
		Not Fully Supervised or N/A										0%	
		% Coverage of Sprinkler System										0%	
6	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	Firewall / Sprinklered ?				-	-
		North	> 30	22	1	21-49	Type V	NO				0%	680
		East	> 30	39	1	21-49	Type V	NO				0%	
		South	> 30	22	1	21-49	Type V	NO				0%	
		West	3.1 to 10	39	1	21-49	Type V	NO				16%	
7	Determine Final Required Fire Flow	Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min											5000
		Total Required Fire Flow in L/s											83.3
		Required Duration of Fire Flow (hrs)											1.75
		Required Volume of Fire Flow (m^3)											525

Appendix B Wastewater Servicing

B.1 Sanitary Sewer Design Sheet

Stantec

SUBDIVISION:

Dolphin Tale Childcare

100 Lusk Street

DATE: 4/28/2026
REVISION: 1
DESIGNED BY: WAJ
CHECKED BY: KJK

SANITARY SEWER DESIGN SHEET
(City of Ottawa)

FILE NUMBER: 160402108

DESIGN PARAMETERS

MAX PEAK FACTOR (RES.)=	4.0	AVG. DAILY FLOW / PERSON	280 l/p/day	MINIMUM VELOCITY	0.60 m/s
MIN PEAK FACTOR (RES.)=	2.0	COMMERCIAL	28,000 l/ha/day	MAXIMUM VELOCITY	3.00 m/s
PEAKING FACTOR (INDUSTRIAL):	2.4	INDUSTRIAL (HEAVY)	55,000 l/ha/day	MANNINGS n	0.013
PEAKING FACTOR (ICI >20%):	1.5	INDUSTRIAL (LIGHT)	35,000 l/ha/day	BEDDING CLASS	B
STAFF FLOW RATE (l/person/day)	75	INSTITUTIONAL	28,000 l/ha/day	MINIMUM COVER	2.50 m
CHILDREN FLOW RATE (l/person/day)	30	INFILTRATION	0.33 l/s/Ha	HARMON CORRECTION FACTOR	0.8

LOCATION			AREA AND POPULATION					COMMERCIAL		INDUSTRIAL (L)		INDUSTRIAL (H)		INSTITUTIONAL		GREEN / UNUSED		C+I+I	INFILTRATION			TOTAL	PIPE								
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA (ha)	CHILDREN	STAFF	PEAK FACT.	PEAK FLOW (l/s)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	PEAK FLOW (l/s)	TOTAL AREA (ha)	ACCU. AREA (ha)	INFILT. FLOW (l/s)	FLOW (l/s)	LENGTH (m)	DIA (mm)	MATERIAL	CLASS	SLOPE (%)	CAP. (FULL) (l/s)	CAP. V PEAK FLOW (%)	VEL. (FULL) (m/s)	VEL. (ACT.) (m/s)
C1A	BLDG	EX SAN	0.40	131	23	1.50	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.40	0.40	0.13	0.23	7.0	100	PVC	DR 28	1.00	5.3	**4.32%**	0.67	0.27
	EX SAN	EX SAN	0.00	0	0	1.50	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.40	0.13	0.23	11.7	250	PVC	SDR 35	0.25	30.3	**0.76%**	0.61	0.15
																								250							

Notes:

1. Staff and children flow rates as per City of Ottawa sewer design guideline Appendix 4a (Employees - Various Locations and Day School without Cafeteria).

Appendix C Stormwater Management

C.1 Storm Sewer Design Sheet

Stantec

Dolphin Tale Childcare
100 Lusk Street

DATE: 2026-04-24
REVISION: 1
DESIGNED BY: WAJ
CHECKED BY: KJK

FILE NUMBER: 160402108

STORM SEWER DESIGN SHEET
(City of Ottawa)

DESIGN PARAMETERS

$I = a / (t+b)^c$ (As per City of Ottawa Guidelines, 2012)

	1:2 yr	1:5 yr	1:10 yr	1:100 yr
a =	732.951	998.071	1174.184	1735.688
b =	6.199	6.053	6.014	6.014
c =	0.810	0.814	0.816	0.820

MANNING'S n = 0.013 BEDDING CLASS = B
MINIMUM COVER: 2.00 m
TIME OF ENTRY 10 min

LOCATION			DRAINAGE AREA																						PIPE SELECTION											
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA (2-YEAR) (ha)	AREA (5-YEAR) (ha)	AREA (10-YEAR) (ha)	AREA (100-YEAR) (ha)	AREA (ROOF) (ha)	C (2-YEAR) (-)	C (5-YEAR) (-)	C (10-YEAR) (-)	C (100-YEAR) (-)	A x C (2-YEAR) (ha)	ACCUM AxC (2YR) (ha)	A x C (5-YEAR) (ha)	ACCUM. AxC (5YR) (ha)	A x C (10-YEAR) (ha)	ACCUM. AxC (10YR) (ha)	A x C (100-YEAR) (ha)	ACCUM. AxC (100YR) (ha)	T of C (min)	$I_{2\text{-YEAR}}$ (mm/h)	$I_{5\text{-YEAR}}$ (mm/h)	$I_{10\text{-YEAR}}$ (mm/h)	$I_{100\text{-YEAR}}$ (mm/h)	$Q_{CONTROL}$ (L/s)	ACCUM. $Q_{CONTROL}$ (L/s)	Q_{ACT} (CIA/360) (L/s)	LENGTH (m)	PIPE WIDTH OR DIAMETEI (mm)	PIPE HEIGHT (mm)	PIPE SHAPE (-)	MATERIAL (-)	CLASS (-)	SLOPE %	Q_{CAP} (FULL) (L/s)	% FULL (-)	VEL. (FULL) (m/s)	VEL. (ACT) (m/s)	TIME OF FLOW (min)
L101A, L101B, L101C	101	100	0.23	0.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.115	0.115	0.000	0.000	0.000	0.000	0.000	0.000	10.00	76.81	104.19	122.14	178.56	0.0	0.0	24.6	30.2	300	300	CIRCULAR	PVC	SDR 35	0.40	60.8	**40.45%**	0.86	0.70	0.72
																				10.72																			
Foundation Drain	BLDG	100	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.00	76.81	104.19	122.14	178.56	0.0	0.0	0.0	8.4	200	200	CIRCULAR	PVC	DR 28	1.00	33.3	**0.00%**	1.05	0.00	0.00
																				10.00																			
	100	EX STM	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.115	0.000	0.000	0.000	0.000	0.000	0.000	10.72	74.13	100.52	117.81	172.20	0.0	0.0	23.7	13.3	300	300	CIRCULAR	PVC	SDR 35	0.40	60.8	**39.04%**	0.86	0.69	0.32
	EX STM	EX STM	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.115	0.000	0.000	0.000	0.000	0.000	0.000	11.05	73.01	98.97	115.99	169.53	0.0	0.0	23.4	14.2	375	375	CIRCULAR	PVC	SDR 35	0.25	82.4	**28.37%**	0.78	0.56	0.42
																				11.47									375	375								

C.2 Rational Method Calculations

Stormwater Management Calculations

File No: **160402108**
Project: **Dolphin Tale Childcare**
Date: **22-Apr-26**

SWM Approach:
Post-development flows as per O'Keefe Court - 416 Lands Design Brief prepared by IBI dated January 2018

Post-Development Site Conditions:

Overall Runoff Coefficient for Site and Sub-Catchment Areas

Runoff Coefficient Table

Catchment Type	Sub-catchment Area ID / Description		Area (ha) "A"		Runoff Coefficient "C"	"A x C"		Overall Runoff Coefficient
Roof	BLDG	Hard	0.080		0.9	0.072		
		Soft	0.000		0.2	0.000		
	Subtotal			0.08			0.072	0.900
Controlled - Tributary	L101C	Hard	0.011		0.9	0.010		
		Soft	0.119		0.2	0.024		
	Subtotal			0.13			0.0338	0.260
Controlled - Tributary	L101B	Hard	0.038		0.9	0.034		
		Soft	0.012		0.2	0.002		
	Subtotal			0.05			0.0365	0.730
Controlled - Tributary	L101A	Hard	0.050		0.9	0.045		
		Soft	0.000		0.2	0.000		
	Subtotal			0.05			0.045	0.900
Uncontrolled - Non-Tributary	UNC-1	Hard	0.021		0.9	0.019		
		Soft	0.079		0.2	0.016		
	Subtotal			0.10			0.035	0.350
Total				**0.410**			**0.222**	
Overall Runoff Coefficient= C:								**0.54**

Total Roof Areas	**0.080 ha**
Total Tributary Surface Areas (Controlled and Uncontrolled)	**0.230 ha**
Total Tributary Area to Outlet	**0.310 ha**
Total Uncontrolled Areas (Non-Tributary)	**0.100 ha**
Total Site	**0.410 ha**

Project #160402108, Dolphin Tale Childcare
Roof Drain Design Sheet, Area BLDG
Standard Watts Model R1100 Accutrol Roof Drain

Rating Curve				Volume Estimation				
Elevation (m)	Discharge Rate (cu.m/s)	Outlet Discharge (cu.m/s)	Storage (cu. m)	Elevation (m)	Area (sq. m)	Volume (cu. m) Increment	Volume (cu. m) Accumulated	Water Depth (m)
0.000	0.0000	0.0000	0	0.000	0	0	0	0.000
0.025	0.0003	0.0009	0	0.025	18	0	0	0.025
0.050	0.0006	0.0019	1	0.050	71	1	1	0.050
0.075	0.0008	0.0024	4	0.075	160	3	4	0.075
0.100	0.0009	0.0028	9	0.100	284	5	9	0.100
0.125	0.0011	0.0033	19	0.125	444	9	19	0.125
0.150	0.0013	0.0038	32	0.150	640	13	32	0.150

Drawdown Estimate			
Total Volume (cu.m)	Total Time (sec)	Vol (cu.m)	Detention Time (hr)
0.0	0.0	0.0	0
1.0	547.9	1.0	0.1522
3.9	1189.8	2.8	0.48268
9.3	1930.7	5.5	1.019
18.4	2728.4	9.0	1.77688
31.9	3561.4	13.5	2.76617

Rooftop Storage Summary

Total Building Area (sq.m)		800
Assume Available Roof Area (sq.	80%	640
Roof Imperviousness		0.99
Roof Drain Requirement (sq.m/Notch)		232
Number of Roof Notches*		3
Max. Allowable Depth of Roof Ponding (m)		0.15
Max. Allowable Storage (cu.m)		32
Estimated 100 Year Drawdown Time (h)		2.7

* As per Ontario Building Code section OBC 7.4.10.4.(2)(c).

From Watts Drain Catalogue

Head (m)	L/s Open	75%	**50%**	25%	Closed
0.025	0.3155	0.31545	**0.31545**	0.31545	0.31545
0.050	0.6309	0.6309	**0.6309**	0.6309	0.6309
0.075	0.9464	0.86749	**0.78863**	0.70976	0.6309
0.100	1.2618	1.10408	**0.94635**	0.78863	0.6309
0.125	1.5773	1.34067	**1.10408**	0.86749	0.6309
0.150	1.8927	1.57726	**1.2618**	0.94635	0.6309

* Note: Number of drains can be reduced if multiple-notch drain used.

Calculation Results	5yr	100yr	Available
Qresult (cu.m/s)	0.003	0.004	-
Depth (m)	0.099	0.149	0.150
Volume (cu.m)	9.3	31.4	32.0
Draintime (hrs)	1.0	2.7	

Stormwater Management Calculations

Project #160402108, Dolphin Tale Childcare
Modified Rational Method Calculatons for Storage

2 yr Intensity
City of Ottawa

$I = a/(t + b)^c$

a =	732.951
b =	6.199
c =	0.81

t (min)	I (mm/hr)
10	76.81
20	52.03
30	40.04
40	32.86
50	28.04
60	24.56
70	21.91
80	19.83
90	18.14
100	16.75
110	15.57
120	14.56

2 YEAR Predevelopment Target Release from Portion of Site

Subdrainage Area: Tributary Area to Outlet
Area (ha): 0.4100
C: 0.80

Typical Time of Concentration

tc (min)	I (2 yr) (mm/hr)	Qtarget (L/s)
10	76.81	**70.03**

2 Year Release Rate Based on O'Keefe Court 416 Lands Design Brief by IBI Group, January 2018	= 69.0 L/s

2 YEAR Modified Rational Method for Entire Site

Subdrainage Area: BLDG — Roof
Area (ha): 0.08 — Maximum Storage Depth: 150 mm
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Depth (mm)	
10	76.81	15.37	2.68	12.70	7.62	91.5	0.00
20	52.03	10.41	2.81	7.61	9.13	98.4	0.00
30	40.04	8.02	2.83	5.19	**9.34**	99.4	0.00
40	32.86	6.58	2.80	3.78	9.06	98.1	0.00
50	28.04	5.61	2.76	2.85	8.56	95.8	0.00
60	24.56	4.92	2.71	2.21	7.95	93.0	0.00
70	21.91	4.39	2.65	1.74	7.29	90.0	0.00
80	19.83	3.97	2.59	1.38	6.61	86.9	0.00
90	18.14	3.63	2.53	1.10	5.93	83.8	0.00
100	16.75	3.35	2.47	0.88	5.26	80.8	0.00
110	15.57	3.12	2.42	0.70	4.61	77.8	0.00
120	14.56	2.91	2.36	0.55	3.98	74.8	0.00

Storage: Roof Storage

	Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
5-year Water Level	99.35	0.10	2.83	9.34	32.00	0.00

Subdrainage Area: L101C — Controlled - Tributary
Area (ha): 0.13
C: 0.26

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	7.22	7.22	0.00	**0.00**
20	52.03	4.89	4.89	0.00	**0.00**
30	40.04	3.76	3.76	0.00	**0.00**
40	32.86	3.09	3.09	0.00	**0.00**
50	28.04	2.63	2.63	0.00	**0.00**
60	24.56	2.31	2.31	0.00	**0.00**
70	21.91	2.06	2.06	0.00	**0.00**
80	19.83	1.86	1.86	0.00	**0.00**
90	18.14	1.70	1.70	0.00	**0.00**
100	16.75	1.57	1.57	0.00	**0.00**
110	15.57	1.46	1.46	0.00	**0.00**
120	14.56	1.37	1.37	0.00	**0.00**

Storage: Surface Storage Above CB

Orifice Size: LMF105 mm
Invert Elevation 101.84 m
T/G Elevation 103.64 m
Max Ponding Depth 0.00 m
Downstream W/L 101.62 m

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
5-year Water Level	103.64	1.80	7.22	0.00	27.40	OK

Subdrainage Area: L101B — Controlled - Tributary
Area (ha): 0.05
C: 0.73

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	7.79	7.79	0.00	**0.00**
20	52.03	5.28	5.28	0.00	**0.00**
30	40.04	4.06	4.06	0.00	**0.00**
40	32.86	3.33	3.33	0.00	**0.00**
50	28.04	2.85	2.85	0.00	**0.00**
60	24.56	2.49	2.49	0.00	**0.00**
70	21.91	2.22	2.22	0.00	**0.00**
80	19.83	2.01	2.01	0.00	**0.00**
90	18.14	1.84	1.84	0.00	**0.00**
100	16.75	1.70	1.70	0.00	**0.00**
110	15.57	1.58	1.58	0.00	**0.00**
120	14.56	1.48	1.48	0.00	**0.00**

Storage: Surface Storage Above CB

Orifice Size: LMF100
Invert Elevation 102.35 m
T/G Elevation 103.73 m
Max Ponding Depth 0.00 m
Downstream W/L 101.48 m

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
5-year Water Level	103.73	1.38	7.79	0.00	11.10	OK

Project #160402108, Dolphin Tale Childcare
Modified Rational Method Calculatons for Storage

100 yr Intensity
City of Ottawa

$I = a/(t + b)^c$

a =	1735.688
b =	6.014
c =	0.820

t (min)	I (mm/hr)
10	178.56
20	119.95
30	91.87
40	75.15
50	63.95
60	55.89
70	49.79
80	44.99
90	41.11
100	37.90
110	35.20
120	32.89

100 Year Target Release Rate = 69.0 L/s

100 YEAR Modified Rational Method for Entire Site

Subdrainage Area: BLDG — Roof
Area (ha): 0.08 — Maximum Storage Depth: 150 mm
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Depth (mm)	
10	178.56	39.71	3.43	36.29	21.77	131.0	0.00
20	119.95	26.68	3.63	23.04	27.65	141.9	0.00
30	91.87	20.43	3.72	16.71	30.08	146.4	0.00
40	75.15	16.71	3.75	12.96	31.10	148.3	0.00
50	63.95	14.22	3.76	10.46	**31.38**	148.8	0.00
60	55.89	12.43	3.76	8.67	31.22	148.6	0.00
70	49.79	11.07	3.74	7.33	30.79	147.8	0.00
80	44.99	10.01	3.72	6.28	30.17	146.6	0.00
90	41.11	9.14	3.69	5.45	29.42	145.2	0.00
100	37.90	8.43	3.67	4.76	28.58	143.7	0.00
110	35.20	7.83	3.63	4.19	27.69	142.0	0.00
120	32.89	7.32	3.60	3.71	26.75	140.3	0.00

Storage: Roof Storage

	Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
100-year Water Level	148.85	0.15	3.76	31.38	32.00	0.00

Subdrainage Area: L101C — Controlled - Tributary
Area (ha): 0.13
C: 0.33

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	20.97	14.19	6.78	**4.07**
20	119.95	14.09	14.09	0.00	0.00
30	91.87	10.79	10.79	0.00	0.00
40	75.15	8.83	8.83	0.00	0.00
50	63.95	7.51	7.51	0.00	0.00
60	55.89	6.57	6.57	0.00	0.00
70	49.79	5.85	5.85	0.00	0.00
80	44.99	5.28	5.28	0.00	0.00
90	41.11	4.83	4.83	0.00	0.00
100	37.90	4.45	4.45	0.00	0.00
110	35.20	4.13	4.13	0.00	0.00
120	32.89	3.86	3.86	0.00	0.00

Storage: Surface Storage Above CB

Orifice Size: LMF105 mm
Invert Elevation 101.84 m
T/G Elevation 103.64 m
Max Ponding Depth 0.30 m
Downstream W/L 101.62 m

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
100-year Water Level	103.94	2.10	14.19	4.07	27.40	OK
					23.33	

Subdrainage Area: L101B — Controlled - Tributary
Area (ha): 0.05
C: 0.91

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	22.65	11.22	11.43	**6.86**
20	119.95	15.21	11.22	3.99	4.79
30	91.87	11.65	11.22	0.43	0.77
40	75.15	9.53	9.53	0.00	0.00
50	63.95	8.11	8.11	0.00	0.00
60	55.89	7.09	7.09	0.00	0.00
70	49.79	6.32	6.32	0.00	0.00
80	44.99	5.71	5.71	0.00	0.00
90	41.11	5.21	5.21	0.00	0.00
100	37.90	4.81	4.81	0.00	0.00
110	35.20	4.46	4.46	0.00	0.00
120	32.89	4.17	4.17	0.00	0.00

Storage: Surface Storage Above CB

Orifice Size: LMF100
Invert Elevation 102.35 m
T/G Elevation 103.73 m
Max Ponding Depth 0.20 m
Downstream W/L 101.48 m

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
100-year Water Level	103.93	1.58	11.22	6.86	11.10	OK
					4.24	

Stormwater Management Calculations

Project #160402108, Dolphin Tale Childcare
Modified Rational Method Calculatons for Storage

Subdrainage Area: L101A — Controlled - Tributary
Area (ha): 0.05
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	9.61	9.61	0.00	**0.00**
20	52.03	6.51	6.51	0.00	**0.00**
30	40.04	5.01	5.01	0.00	**0.00**
40	32.86	4.11	4.11	0.00	**0.00**
50	28.04	3.51	3.51	0.00	**0.00**
60	24.56	3.07	3.07	0.00	**0.00**
70	21.91	2.74	2.74	0.00	**0.00**
80	19.83	2.48	2.48	0.00	**0.00**
90	18.14	2.27	2.27	0.00	**0.00**
100	16.75	2.09	2.09	0.00	**0.00**
110	15.57	1.95	1.95	0.00	**0.00**
120	14.56	1.82	1.82	0.00	**0.00**

Storage: Surface Storage Above CB

Orifice Equation: Q = CdA(2gh)^0.5 — Where C = 0.61
Orifice Diameter: 83.00 mm
Invert Elevation 102.38 m
T/G Elevation 103.76 m
Max Ponding Depth 0.00 m
Downstream W/L 101.48 m

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
5-year Water Level	103.76	1.38	17.17	0.00	8.90	OK

Subdrainage Area: UNC-1 — Uncontrolled - Non-Tributary
Area (ha): 0.10
C: 0.35

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	7.47	7.47		
20	52.03	5.06	5.06		
30	40.04	3.90	3.90		
40	32.86	3.20	3.20		
50	28.04	2.73	2.73		
60	24.56	2.39	2.39		
70	21.91	2.13	2.13		
80	19.83	1.93	1.93		
90	18.14	1.77	1.77		
100	16.75	1.63	1.63		
110	15.57	1.51	1.51		
120	14.56	1.42	1.42		

SUMMARY TO OUTLET

Tributary Area	0.310	ha
Total 2yr Flow to Sewer	35.01	L/s
Non-Tributary Area	0.100	ha
Total 2yr Flow Uncontrolled	7.47	L/s
Total Area	0.410	ha
Total 2yr Flow	42.48	L/s
Target	69.00	L/s

Project #160402108, Dolphin Tale Childcare
Modified Rational Method Calculatons for Storage

Subdrainage Area: L101A — Controlled - Tributary
Area (ha): 0.05
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	24.82	18.08	6.74	**4.04**
20	119.95	16.67	16.67	0.00	0.00
30	91.87	12.77	12.77	0.00	0.00
40	75.15	10.45	10.45	0.00	0.00
50	63.95	8.89	8.89	0.00	0.00
60	55.89	7.77	7.77	0.00	0.00
70	49.79	6.92	6.92	0.00	0.00
80	44.99	6.25	6.25	0.00	0.00
90	41.11	5.71	5.71	0.00	0.00
100	37.90	5.27	5.27	0.00	0.00
110	35.20	4.89	4.89	0.00	0.00
120	32.89	4.57	4.57	0.00	0.00

Storage: Surface Storage Above CB

Orifice Equation: Q = CdA(2gh)^0.5 — Where C = 0.61
Orifice Diameter: 83.00 mm
Invert Elevation 102.38 m
T/G Elevation 103.76 m
Max Ponding Depth 0.15 m
Downstream W/L 101.48 m

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
100-year Water Level	103.91	1.53	18.08	4.04	8.90	OK
					4.86	

Subdrainage Area: UNC-1 — Uncontrolled - Non-Tributary
Area (ha): 0.10
C: 0.44

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	21.72	21.72		
20	119.95	14.59	14.59		
30	91.87	11.17	11.17		
40	75.15	9.14	9.14		
50	63.95	7.78	7.78		
60	55.89	6.80	6.80		
70	49.79	6.06	6.06		
80	44.99	5.47	5.47		
90	41.11	5.00	5.00		
100	37.90	4.61	4.61		
110	35.20	4.28	4.28		
120	32.89	4.00	4.00		

SUMMARY TO OUTLET

Tributary Area	0.310	ha
Total 100yr Flow to Sewer	47.26	L/s
Non-Tributary Area	0.100	ha
Total 100yr Flow Uncontrolled	21.72	L/s
Total Area	0.410	ha
Total 100yr Flow	68.98	L/s
Target	69.00	L/s

Appendix D Geotechnical Investigation

Geotechnical Engineering

Environmental Engineering

Hydrogeology

Geological Engineering

Materials Testing

Building Science

Archaeological Services

Paterson Group Inc.
Consulting Engineers
154 Colonnade Road
Ottawa (Nepean), Ontario
Canada K2E 7J5

Tel: (613) 226-7381
Fax: (613) 226-6344
www.patersongroup.ca

patersongroup

Geotechnical Investigation

Proposed Commercial Development
100 Lusk Street
Ottawa, Ontario

Prepared For

Blue Sky Medical

January 4, 2021

Report PG5098-1

Table of Contents

Page

1.0 Introduction 1

2.0 Proposed Development 1

3.0 Method of Investigation
3.1 Field Investigation 2
3.2 Field Survey 3
3.3 Laboratory Testing 3
3.4 Analytical Testing 3

4.0 Observations
4.1 Surface Conditions 4
4.2 Subsurface Profile 4
4.3 Groundwater 5

5.0 Discussion
5.1 Geotechnical Assessment 6
5.2 Site Grading and Preparation 6
5.3 Foundation Design 7
5.4 Design for Earthquakes 7
5.5 Slab-on-Grade Construction 8
5.6 Pavement Structure 8

6.0 Design and Construction Precautions
6.1 Foundation Drainage and Backfill 10
6.2 Protection of Footings Against Frost Action 10
6.3 Excavation Side Slopes 11
6.4 Pipe Bedding and Backfill 11
6.5 Groundwater Control 12
6.6 Winter Construction 12
6.7 Corrosion Potential and Sulphate 13

7.0 Recommendations 14

8.0 Statement of Limitations 15

Appendices

Appendix 1 Soil Profile and Test Data Sheets
Symbols and Terms
Analytical Testing Results

Appendix 2 Figure 1 - Key Plan
Drawing PG5098 - Test Hole Location Plan

1.0 Introduction

Paterson Group (Paterson) was commissioned by Blue Sky Medical to conduct a geotechnical investigation for the proposed commercial development to be located at 100 Lusk Street in the City of Ottawa, Ontario (refer to Figure 1 - Key Plan in Appendix 2 of this report).

The objectives of the geotechnical investigation were to:

- ❑ Determine the subsoil and groundwater conditions at this site by means of boreholes.
- ❑ Provide geotechnical recommendations for the design of the proposed development including construction considerations which may affect the design.

The following report has been prepared specifically and solely for the aforementioned project which is described herein. It contains our findings and includes geotechnical recommendations pertaining to the design and construction of the subject development as they are understood at the time of writing this report.

2.0 Proposed Development

Based on the available drawings, it is understood that the proposed commercial development will consist of a three-storey structure consisting of slab-on-grade construction. It is also anticipated is anticipated that the proposed building will be municipally serviced and have associated at grade parking areas, access lanes and landscaped areas.

3.0 Method of Investigation

3.1 Field Investigation

Field Program

The field program for the geotechnical investigation was carried out on December 16, 2020. At that time, eight (8) boreholes were advanced to a maximum depth of 3.8 m. The borehole locations were distributed in a manner to provide general coverage of the subject site. The approximate locations of the boreholes are shown on Drawing PG5098-1 - Test Hole Location Plan included in Appendix 2.

All boreholes were advanced using a track-mounted auger drill rig, which was operated by a two-person crew. All fieldwork was conducted under the full-time supervision of our personnel under the direction of a senior engineer. The drilling procedure consisted of augering to the required depths at the selected locations, sampling and testing the overburden.

Sampling and In Situ Testing

Soil samples were collected from the boreholes using two different techniques, namely, sampled directly from the auger flights (AU) or collected using a 50 mm diameter split-spoon (SS) sampler. All samples were visually inspected and initially classified on site and subsequently placed in sealed plastic bags. All samples were transported to our laboratory for further examination and classification. The depths at which the auger and split spoon samples were recovered from the boreholes are shown as AU and SS, respectively, on the Soil Profile and Test Data sheets presented in Appendix 1.

A Standard Penetration Test (SPT) was conducted in conjunction with the recovery of the split spoon samples. The SPT results are recorded as "N" values on the Soil Profile and Test Data sheets. The "N" value is the number of blows required to drive the split spoon sampler 300 mm into the soil after a 150 mm initial penetration using a 63.5 kg hammer falling from a height of 760 mm.

The subsurface conditions observed in the test holes were recorded in detail in the field. The soil profiles are presented on the Soil Profile and Test Data sheets in Appendix 1 of this report.

3.2 Field Survey

The test hole locations and ground surface elevation at each borehole location were surveyed by Paterson. The test hole locations are referenced to a geodetic datum and were surveyed in the field by Paterson personnel. The borehole locations and ground surface elevation at the boreholes are presented on Drawing PG5098-1 - Test Hole Location Plan in Appendix 2.

3.3 Laboratory Testing

Soil samples were recovered from the subject site and visually examined in our laboratory to review the results of the field logging. Soil samples will be stored for a period of one month after this report is completed, unless otherwise directed.

3.4 Analytical Testing

One (1) soil sample was submitted for analytical testing to assess the potential for exposed ferrous metals and the sulphate potential against subsurface concrete structures. The results are discussed further in Subsection 6.7.

4.0 Observations

4.1 Surface Conditions

The subject site is currently vacant and has been cleared of trees. The ground surface throughout the subject site is relatively flat and at grade with Lusk Street. The subject site is bordered by O'Keefe Court to the north, an undeveloped vacant property to west and Lusk Street to the east and south.

4.2 Subsurface Profile

Overburden

Generally, the subsurface profile at the test hole locations consisted of fill underlain by a deposit of glacial till.

The fill layer was noted to consist of silty sand with trace amounts of crushed stone.

A glacial till deposit was encountered below the fill layer at all test hole locations. The glacial till layer was generally observed to consist of a compact to very dense brown silty sand with some gravel, cobbles and boulders.

Practical refusal to augering was encountered in all test holes at depths ranging from 0.9 m to 3.9 m.

Bedrock

Based on available geological mapping, the bedrock in the area consists of interbedded sandstone and dolomite of the March formation with a drift thickness of 3 to 10 m.

4.3 Groundwater

Groundwater levels were measured in the piezometers at the borehole locations on December 24, 2020. The measured groundwater level (GWL) readings are presented in Table 1 below.

Table 1 - Groundwater Readings Summary

Test Hole Number	Ground Elevation (m)	Groundwater Levels (m)	
		Depth	Elevation
BH 1	103.78	-	-
BH 2	103.76	-	-
BH 3	103.55	-	-
BH 4	103.27	-	-
BH 5	103.22	2.80	100.42

Note: The ground surface elevations at the borehole locations are referenced to a geodetic datum.

The groundwater table was not generally observed in the boreholes due to relatively shallow refusals nor encountered throughout the depth of the investigations. However, based on our knowledge of the area, the long-term groundwater table can be expected at approximately 4 to 5 m below ground surface. It should also be noted that groundwater levels are subject to seasonal fluctuations and could vary at the time of construction.

5.0 Discussion

5.1 Geotechnical Assessment

From a geotechnical perspective, the subject site is suitable for the proposed development. It is expected that the proposed buildings will be founded on conventional shallow footings bearing on an undisturbed, compact to very dense glacial till bearing surface.

5.2 Site Grading and Preparation

Stripping Depth

Topsoil and fill, such as those containing organic or deleterious materials, should be stripped from under any buildings and other settlement sensitive structures. It is anticipated that the existing fill within the proposed building footprints, free of deleterious material and significant amounts of organics, can be left in place below the proposed building footprints outside of lateral support zones for the footings. However, it is recommended that the existing fill layer be proof-rolled several times and approved by the geotechnical consultant at the time of construction. Any poor performing areas noted during the proof-rolling operation should be removed and replaced with an approved fill.

Fill Placement

Fill used for grading beneath the proposed building should consist of clean imported granular fill, such as Ontario Provincial Standard Specifications (OPSS) Granular A or Granular B Type II. This material should be tested and approved prior to delivery to the site. The fill should be placed in lifts no greater than 300 mm thick and compacted using suitable compaction equipment for the lift thickness. Fill placed beneath the building and paved areas should be compacted to at least 98% of the material's standard Proctor maximum dry density (SPMDD).

Non-specified existing fill, along with site-excavated soil, can be used as general landscaping fill where settlement of the ground surface is of minor concern. This material should be spread in thin lifts and at least compacted by the tracks of the spreading equipment to minimize voids. If this material is to be used to build up the subgrade level for areas to be paved, it should be compacted in thin lifts to at least 95% of the material's SPMDD. Non-specified existing fill and site-excavated soils are not suitable for placement as backfill against foundation walls unless a composite drainage blanket connected to a perimeter drainage system is provided.

5.3 Foundation Design

Bearing Resistance Values

Conventional spread footings, placed on an undisturbed, compact to very dense glacial till bearing surface can be designed using a bearing resistance value at serviceability limit states (SLS) of **150 kPa** and a factored bearing resistance value at ultimate limit states (ULS) of **225 kPa**. A geotechnical resistance factor of 0.5 was applied to the bearing resistance value at ULS.

An undisturbed soil bearing surface consists of a surface from which topsoil and deleterious materials, such as loose, frozen or disturbed soil, whether in situ or not, have been removed, in the dry, prior to the placement of concrete for footings.

Settlement

Footings designed using the bearing resistance value at SLS provided herein will be subjected to potential post-construction total and differential settlements of 25 and 20 mm, respectively.

Lateral Support

The bearing medium under footing-supported structures is required to be provided with adequate lateral support with respect to excavations and different foundation levels. Adequate lateral support is provided to a glacial till bearing medium when a plane extending down and out from the bottom edge of the footing at a minimum of 1.5H:1V, passes only through in situ soil or engineered fill of the same or higher capacity as the soil.

5.4 Design for Earthquakes

A seismic site response **Class C** should be used for the design of the proposed building at the subject site according to the OBC 2012. Soils underlying the subject site are not susceptible to liquefaction. Reference should be made to the latest revision of the OBC 2012 for a full discussion of the earthquake design requirements.

5.5 Slab-on-Grade Construction

With the removal of all topsoil and deleterious fill from within the footprint of the proposed building, the native soil surface or approved fill surface will be considered to be an acceptable subgrade on which to commence backfilling for floor slab construction.

In areas where existing fill, free of deleterious materials and significant amounts of organics, are present at the slab subgrade, it is expected that the fill can remain provided that Paterson approves the fill at the time of construction.

The existing fill should be proof-rolled using a suitably sized vibratory roller making several passes under dry conditions and above freezing temperatures. Any poor performing areas should be removed and reinstated with a compacted engineered fill.

The upper 300 mm of sub-slab fill should consist of an OPSS Granular A material for slab-on-grade construction. All backfill material within the proposed building footprint should be placed in maximum 300 mm loose lifts and compacted to a minimum of 98% of the SPMDD.

Any soft areas should be removed and backfilled with appropriate backfill material prior to placing any fill. OPSS Granular B Type II, with a maximum particle size of 50 mm, are recommended for backfilling below the floor slab.

5.6 Pavement Structure

For design purposes, the pavement structure presented in the following tables could be used for the design of the pavement structure for the at-grade parking areas and access lanes.

Table 2 - Recommended Flexible Pavement Structure - Car Only Parking Areas

Thickness (mm)	Material Description
50	**Wear Course -** HL-3 or Superpave 12.5 Asphaltic Concrete
150	**BASE** - OPSS Granular A Crushed Stone
300	**SUBBASE** - OPSS Granular B Type II
SUBGRADE - Either fill, in situ soil, or OPSS Granular B Type I or II material placed over in situ soil.	

Table 3 - Recommended Flexible Pavement Structure - Access Lanes and Heavy Truck Parking Areas	
Thickness (mm)	**Material Description**
40	**Wear Course -** HL-3 or Superpave 12.5 Asphaltic Concrete
50	**Binder Course -** HL-8 or Superpave 19.0 Asphaltic Concrete
150	**BASE** - OPSS Granular A Crushed Stone
450	**SUBBASE** - OPSS Granular B Type II
SUBGRADE - Either fill, in situ soil, or OPSS Granular B Type I or II material placed over in situ soil.	

Minimum Performance Graded (PG) 58-34 asphalt cement should be used for this project.

If soft spots develop in the subgrade during compaction or due to construction traffic, the affected areas should be excavated and replaced with OPSS Granular B Type II material. The pavement granular base and subbase should be placed in maximum 300 mm thick lifts and compacted to a minimum of 100% of the material's SPMDD using suitable vibratory equipment.

Weak subgrade conditions may be experienced throughout the existing fill layer encountered and services trenches to be located throughout the subject site. The fill subgrade layer should e proof-rolled using a suitably sized vibratory roller and reviewed by Paterson personnel at the time of construction. Should subgrade conditions be deemed inadequate upon completion of proof-rolling, the fill subgrade may require the use of a woven geotextile such as Terrafix 200W, thicker subbase, or other measures that can be recommended at the time of construction as part of the field observation program.

6.0 Design and Construction Precautions

6.1 Foundation Drainage and Backfill

Foundation Drainage

A perimeter foundation drainage system is recommended to be provided for the proposed structure. The system should consist of a 100 to 150 mm diameter perforated corrugated plastic pipe, surrounded on all sides by 150 mm of 19 mm clear crushed stone, placed at the footing level around the exterior perimeter of the structure. The clear stone should be wrapped in a non-woven geotextile. The pipe should have a positive outlet, such as a gravity connection to the storm sewer.

Foundation Backfill

Backfill against the exterior sides of the foundation walls should consist of free-draining non frost susceptible granular materials. The greater part of the site excavated materials will be frost susceptible and, as such, are not recommended for re-use as backfill against the foundation walls, unless used in conjunction with a composite drainage system, such as Delta Drain 6000 or Miradrain G100N. Imported granular materials, such as clean sand or OPSS Granular B Type I granular material, should otherwise be used for this purpose.

6.2 Protection of Footings Against Frost Action

Perimeter footings of heated structures are required to be insulated against the deleterious effects of frost action. Generally, a minimum of 1.5 m thick soil cover (or an equivalent combination of soil cover and foundation insulation) should be provided in this regard.

Exterior unheated footings are more prone to deleterious movement associated with frost action than the exterior walls of the structure proper and require additional protection, such as soil cover of 2.1 m or a combination of soil cover and foundation insulation.

6.3 Excavation Side Slopes

The side slopes of excavations in the soil and fill overburden materials should either be cut back at acceptable slopes or should be retained by shoring systems from the start of the excavation until the structure is backfilled. It is expected that sufficient room will be available for the greater part of the excavation to be undertaken by open-cut methods (i.e. unsupported excavations)

The excavations for the proposed development will be through fill and native glacial till material. The subsurface soil is considered to be mainly a Type 2 or 3 soil according to the Occupational Health and Safety Act and Regulations for Construction Projects. For excavations to depths of approximately 3 m, above the groundwater level, the excavation side slopes should be stable in the short term at 1H:1V. Shallower slopes should be provided for deeper excavations or for excavation below the groundwater level. Where such side slopes are not permissible or practical, temporary shoring should be installed.

The slope cross-sections recommended above are for temporary slopes. Excavated soil should not be stockpiled directly at the top of excavations and heavy equipment should be maintain safe working distance from the excavation sides.

Slopes in excess of 3 m in height should be periodically inspected by the geotechnical consultant in order to detect if the slopes are exhibiting signs of distress.

A trench box is recommended to be installed at all times to protect personnel working in trenches with steep or vertical sides. Services are expected to be installed by "cut and cover" methods and excavations should not remain open for extended periods of time.

6.4 Pipe Bedding and Backfill

Bedding and backfill materials should be in accordance with the most recent Material Specifications & Standard Detail Drawings from the Department of Public Works and Services, Infrastructure Services Branch of the City of Ottawa.

A minimum of a 150 mm layer of OPSS Granular A crushed stone should be placed for pipe bedding for sewer and water pipes for a soil subgrade. The bedding should extend to the spring line of the pipe. Cover material, from the spring line to at least 300 mm above the obvert of the pipe should consist of OPSS Granular A. The bedding and cover materials should be placed in maximum 300 mm thick lifts compacted to a minimum of 99% of the SPMDD.

The site excavated material may be placed above cover material if the excavation operations are completed in dry weather conditions and the site excavated material is approved by the geotechnical consultant. All cobbles greater than 200 mm in the longest dimension should be removed prior to the site materials being reused.

Where hard surface areas are considered above the trench backfill, the trench backfill material within the frost zone (about 1.8 m below finished grade) should match the soils exposed at the trench walls to reduce differential frost heaving. The trench backfill should be placed in maximum 225 mm thick loose lifts and compacted to a minimum of 95% of the SPMDD. Within the frost zone (1.8 m below finished grade), non frost susceptible materials should be used when backfilling trenches below the original bedrock level.

6.5 Groundwater Control

It is anticipated that groundwater infiltration into the excavations should be controllable using open sumps. Pumping from open sumps should be sufficient to control the groundwater influx through the sides of shallow excavations. The contractor should be prepared to direct water away from all bearing surfaces and subgrades, regardless of the source, to prevent disturbance to the founding medium.

A temporary Ministry of Environment, Conservation and Parks (MECP) permit to take water (PTTW) may be required if more than 400,000 L/day of ground and/or surface water are to be pumped during the construction phase. At least 4 to 5 months should be allowed for completion of the application and issuance of the permit by the MECP.

For typical ground or surface water volumes being pumped during the construction phase, typically between 50,000 to 400,000 L/day, it is required to register on the Environmental Activity and Sector Registry (EASR). A minimum of two to four weeks should be allotted for completion of the EASR registration and the Water Taking and Discharge Plan to be prepared by a Qualified Person as stipulated under O.Reg. 63/16. If a project qualifies for a PTTW based upon anticipated conditions, an EASR will not be allowed as a temporary dewatering measure while awaiting the MECP review of the PTTW application.

6.6 Winter Construction

Precautions should be considered if construction occurs during the winter. The subsurface soil conditions consist of frost susceptible materials. In the presence of water and freezing conditions, ice could form within the soil mass. Heaving and settlement upon thawing could occur.

In the event of construction during below zero temperatures, the founding stratum should be protected from freezing temperatures by the use of straw, propane heaters and tarpaulins or other suitable means. The base of the excavations should be insulated from sub-zero temperatures immediately upon exposure and until heat is adequately supplied to the building and the footings are protected with sufficient soil cover to prevent freezing at founding level.

Trench excavations and pavement construction are difficult activities to complete during winter without introducing frost in the excavation subgrade base or walls. Precautions should be considered if such activities are to be completed during sub-zero temperatures.

6.7 Corrosion Potential and Sulphate

One (1) sample was submitted for testing. The analytical test results of the soil sample indicate that the sulphate content is less than 0.1%. These results along with the chloride and pH value are indicative that Type 10 Portland cement (Type GU) would be appropriate for this site. The chloride content and the pH of the sample indicate they are not significant factors in creating a corrosive environment for exposed ferrous metals at this site, whereas the resistivity is indicative of a low to moderate corrosive environment.

7.0 Recommendations

A materials testing and observation services program is a requirement for the provided foundation design data to be applicable. The following aspects of the program should be performed by the geotechnical consultant:

- ❑ Review detailed grading plan(s) from a geotechnical perspective.
- ❑ Observation of all bearing surfaces prior to the placement of concrete.
- ❑ Sampling and testing of the concrete and fill materials used.
- ❑ Periodic observation of the condition of unsupported excavation side slopes in excess of 3 m in height, if applicable.
- ❑ Observation of all subgrades prior to backfilling.
- ❑ Field density tests to determine the level of compaction achieved.
- ❑ Sampling and testing of the bituminous concrete including mix design reviews.

A report confirming that the construction work has been conducted in general accordance with the above recommendations could be issued, upon request, following the completion of a satisfactory materials testing and observation program by the geotechnical consultant.

8.0 Statement of Limitations

The recommendations provided in this report are in accordance with our present understanding of the project. We request permission to review our recommendations when the drawings and specifications are completed.

A geotechnical investigation is a limited sampling of a site. Should any conditions at the site be encountered which differ from those at the test locations, we request immediate notification to permit reassessment of our recommendations.

The recommendations provided herein should only be used by the design professionals associated with this project. They are not intended for contractors bidding on or undertaking the work. The latter should evaluate the factual information provided in this report and determine its suitability and completeness for their intended construction schedule and methods. Additional testing may be required for their purposes.

The present report applies only to the project described in this document. Use of this report for purposes other than those described herein or by person(s) other Blue Sky Medical or their agents is not authorized without review by Paterson for the applicability of our recommendations to the altered use of the report.

Paterson Group Inc.

Vincent Duquette, EIT

David J. Gilbert, P.Eng

Report Distribution

- ❑ Blue Sky Medical (1 digital copy)
- ❑ Paterson Group (1 digital copy)

APPENDIX 1

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

ANALYTICAL TESTING RESULTS

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Commercial Development - 100 Lusk Street
Ottawa, Ontario

DATUM Geodetic

FILE NO. PG5098

REMARKS

HOLE NO. BH 1 - 20

BORINGS BY CME-55 Low Clearance Drill **DATE** 2020 December 16

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	103.78
FILL: Brown silty sand trace crushed stone		AU	1				
0.91						1	102.78
GLACIAL TILL: Dense to very dense brown silty sand, trace gravel, cobbles and boulders		SS	2	75	37		
1.65		SS	3	13	50+		
End of Borehole							
Practical refusal to augering @ 1.65 m depth							

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone
○ Water Content %
20 40 60 80

Piezometer Construction

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Commercial Development - 100 Lusk Street
Ottawa, Ontario

DATUM Geodetic

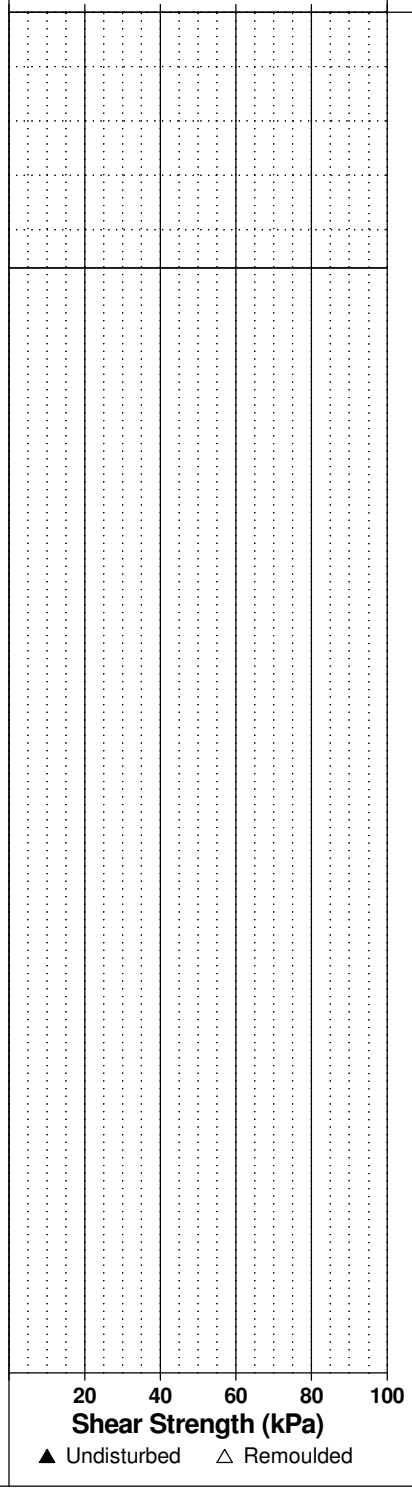
FILE NO. PG5098

REMARKS

HOLE NO. BH 1A - 20

BORINGS BY CME-55 Low Clearance Drill **DATE** 2020 December 16

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	103.78		
FILL: Brown silty sand, trace crushed stone									
0.94									
End of Borehole									
Practical refusal to augering @ 0.94 m depth									



patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Commercial Development - 100 Lusk Street
Ottawa, Ontario

DATUM Geodetic

FILE NO. PG5098

REMARKS

HOLE NO. BH 1B - 20

BORINGS BY CME-55 Low Clearance Drill **DATE** 2020 December 16

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	103.78
FILL: Brown silty sand, trace crushed stone							
0.91							
GLACIAL TILL: Very dense brown silty sand, trace gravel, cobbles and boulders.		SS	1	25	50+	1	102.78
		SS	2	41	50+	2	101.78
2.46							
End of Borehole							
Practical refusal to augering @ 2.46 m depth							
(Piezometer dry/blocked - Dec 24, 2020)							

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone
○ Water Content %
20 40 60 80

Piezometer Construction

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Commercial Development - 100 Lusk Street
Ottawa, Ontario

DATUM Geodetic

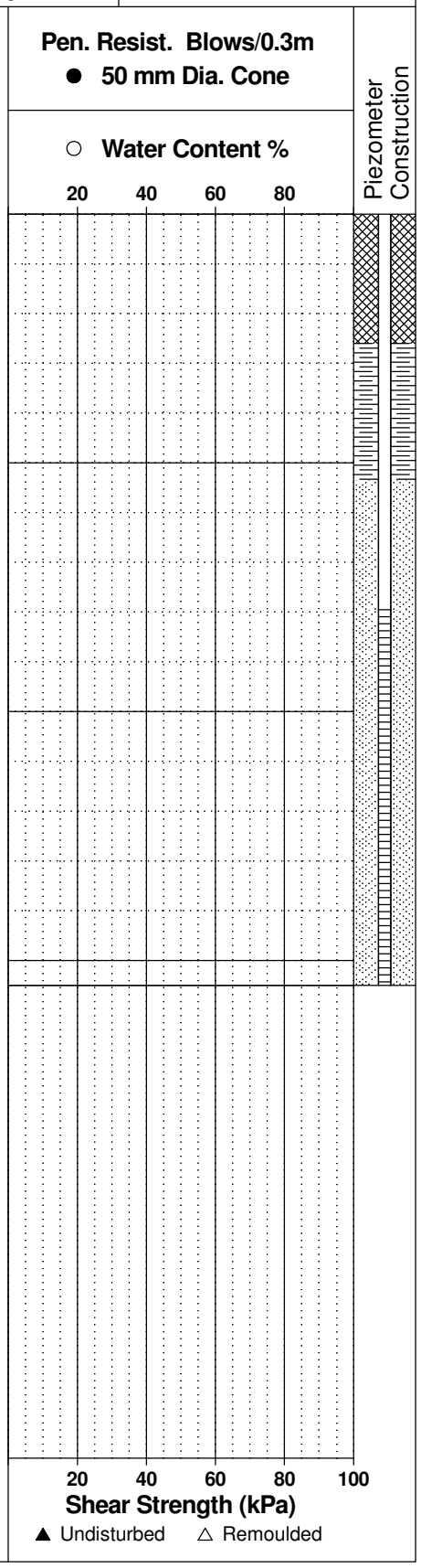
FILE NO. PG5098

REMARKS

HOLE NO. BH 2 - 20

BORINGS BY CME-55 Low Clearance Drill **DATE** 2020 December 16

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	103.76
FILL: Brown silty sand, trace crushed stone		AU	1				
		SS	2	50	28	1	102.76
1.22							
GLACIAL TILL: Very dense brown silty sand, trace gravel, cobbles and boulders		SS	3	33	50+	2	101.76
		SS	4	75	26		
3.10		SS	5	16	50+	3	100.76
End of Borehole							
Practical refusal to augering @ 3.10 m depth							
(Piezometer dry/blocked - Dec 24, 2020)							



patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Commercial Development - 100 Lusk Street
Ottawa, Ontario

DATUM Geodetic

FILE NO. PG5098

REMARKS

HOLE NO. BH 3 - 20

BORINGS BY CME-55 Low Clearance Drill **DATE** 2020 December 16

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	103.55
FILL: Brown silty sand, trace crushed stone		AU	1				
0.97						1	102.55
GLACIAL TILL: Dense brown silty sand, some gravel, cobbles and boulders		SS	2	75	9		
		SS	3	75	36	2	101.55
2.31		SS	4	8	50+		
End of Borehole							
Practical refusal to augering @ 2.31 m depth							
(Piezometer dry/blocked - Dec 24, 2020)							

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone
○ Water Content %

20 40 60 80

Piezometer Construction

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Commercial Development - 100 Lusk Street
Ottawa, Ontario

DATUM Geodetic

FILE NO. PG5098

REMARKS

HOLE NO. BH 4 - 20

BORINGS BY CME-55 Low Clearance Drill **DATE** 2020 December 16

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	103.27		
FILL: Brown silty sand, trace crushed stone		AU	1						
		SS	2	75	6	1	102.27		
						1.37			
GLACIAL TILL: Brown silty sand, trace gravel, cobbles and boulders						1.65			
End of Borehole									
Practical refusal to augering @ 1.65 m depth									

Pen. Resist. Blows/0.3m: 20 40 60 80

Shear Strength (kPa): 20 40 60 80 100

▲ Undisturbed △ Remoulded

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Commercial Development - 100 Lusk Street
Ottawa, Ontario

DATUM Geodetic

FILE NO. PG5098

REMARKS

HOLE NO. BH 4A - 20

BORINGS BY CME-55 Low Clearance Drill **DATE** 2020 December 16

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	103.27
FILL: Brown silty sand, trace crushed stone							
1.37						1	102.27
GLACIAL TILL: Compact brown silty sand, trace gravel, cobbles and boulders		SS	1	83	21		
2.13						2	101.27
End of Borehole Practical refusal to augering @ 2.13 m depth (Piezometer dry/blocked - Dec 24, 2020)							

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone
○ Water Content %
20 40 60 80

Piezometer Construction

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Commercial Development - 100 Lusk Street
Ottawa, Ontario

DATUM Geodetic

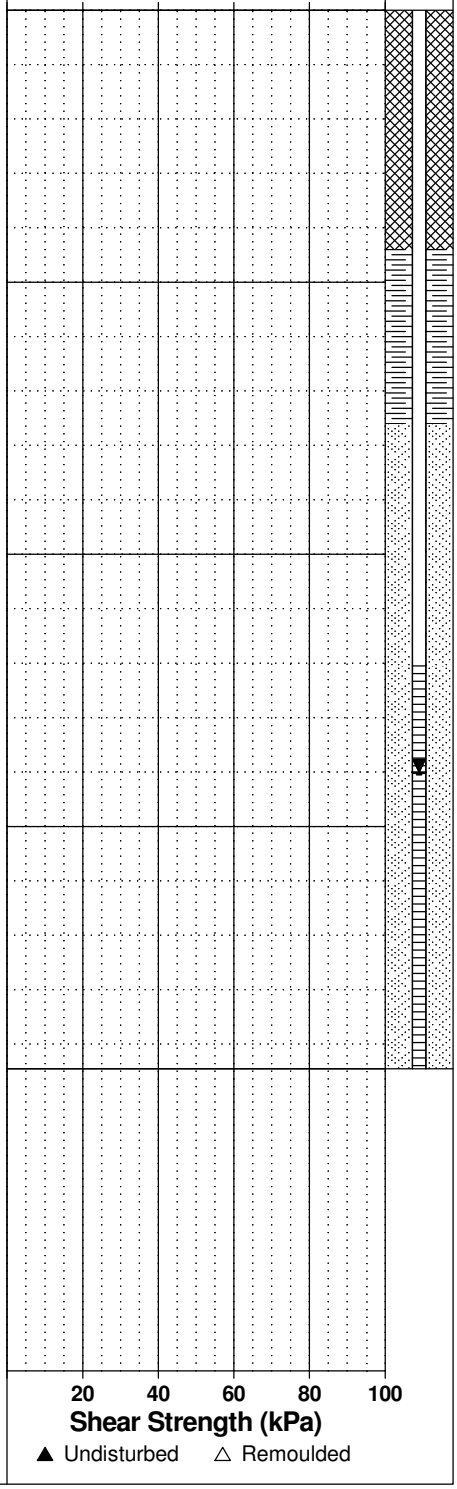
FILE NO. PG5098

REMARKS

HOLE NO. BH 5 - 20

BORINGS BY CME-55 Low Clearance Drill **DATE** 2020 December 16

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	103.22
FILL: Brown silty sand		AU	1				
0.76							
GLACIAL TILL: Compact to very dense brown silty sand, some gravel, cobbles and boulders		SS	2	66	14	1	102.22
		SS	3	83	40	2	101.22
		SS	4	100	34		
		SS	5	58	30	3	100.22
		SS	6	8	50+		
3.89							
End of Borehole Practical refusal to augering @ 3.89 m depth (GWL @ 2.80 m depth - December 24, 2020)							



SYMBOLS AND TERMS

SOIL DESCRIPTION

Behavioural properties, such as structure and strength, take precedence over particle gradation in describing soils. Terminology describing soil structure are as follows:

Desiccated	-	having visible signs of weathering by oxidation of clay minerals, shrinkage cracks, etc.
Fissured	-	having cracks, and hence a blocky structure.
Varved	-	composed of regular alternating layers of silt and clay.
Stratified	-	composed of alternating layers of different soil types, e.g. silt and sand or silt and clay.
Well-Graded	-	Having wide range in grain sizes and substantial amounts of all intermediate particle sizes (see Grain Size Distribution).
Uniformly-Graded	-	Predominantly of one grain size (see Grain Size Distribution).

The standard terminology to describe the relative strength of cohesionless soils is the compactness condition, usually inferred from the results of the Standard Penetration Test (SPT) 'N' value. The SPT N value is the number of blows of a 63.5 kg hammer, falling 760 mm, required to drive a 51 mm O.D. split spoon sampler 300 mm into the soil after an initial penetration of 150 mm. An SPT N value of "P" denotes that the split-spoon sampler was pushed 300 mm into the soil without the use of a falling hammer.

Compactness Condition	'N' Value	Relative Density %
Very Loose	<4	<15
Loose	4-10	15-35
Compact	10-30	35-65
Dense	30-50	65-85
Very Dense	>50	>85

The standard terminology to describe the strength of cohesive soils is the consistency, which is based on the undisturbed undrained shear strength as measured by the in situ or laboratory shear vane tests, unconfined compression tests, or occasionally by the Standard Penetration Test (SPT). Note that the typical correlations of undrained shear strength to SPT N value (tabulated below) tend to underestimate the consistency for sensitive silty clays, so Paterson reviews the applicable split spoon samples in the laboratory to provide a more representative consistency value based on tactile examination.

Consistency	Undrained Shear Strength (kPa)	'N' Value
Very Soft	<12	<2
Soft	12-25	2-4
Firm	25-50	4-8
Stiff	50-100	8-15
Very Stiff	100-200	15-30
Hard	>200	>30

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

Cohesive soils can also be classified according to their "sensitivity". The sensitivity, S_t, is the ratio between the undisturbed undrained shear strength and the remoulded undrained shear strength of the soil. The classes of sensitivity may be defined as follows:

Low Sensitivity:	$S_t < 2$
Medium Sensitivity:	$2 < S_t < 4$
Sensitive:	$4 < S_t < 8$
Extra Sensitive:	$8 < S_t < 16$
Quick Clay:	$S_t > 16$

ROCK DESCRIPTION

The structural description of the bedrock mass is based on the Rock Quality Designation (RQD).

The RQD classification is based on a modified core recovery percentage in which all pieces of sound core over 100 mm long are counted as recovery. The smaller pieces are considered to be a result of closely-spaced discontinuities (resulting from shearing, jointing, faulting, or weathering) in the rock mass and are not counted. RQD is ideally determined from NQ or larger size core. However, it can be used on smaller core sizes, such as BQ, if the bulk of the fractures caused by drilling stresses (called "mechanical breaks") are easily distinguishable from the normal in situ fractures.

RQD %	**ROCK QUALITY**
90-100	Excellent, intact, very sound
75-90	Good, massive, moderately jointed or sound
50-75	Fair, blocky and seamy, fractured
25-50	Poor, shattered and very seamy or blocky, severely fractured
0-25	Very poor, crushed, very severely fractured

SAMPLE TYPES

SS	-	Split spoon sample (obtained in conjunction with the performing of the Standard Penetration Test (SPT))
TW	-	Thin wall tube or Shelby tube, generally recovered using a piston sampler
G	-	"Grab" sample from test pit or surface materials
AU	-	Auger sample or bulk sample
WS	-	Wash sample
RC	-	Rock core sample (Core bit size BQ, NQ, HQ, etc.). Rock core samples are obtained with the use of standard diamond drilling bits.

SYMBOLS AND TERMS (continued)

PLASTICITY LIMITS AND GRAIN SIZE DISTRIBUTION

WC%	-	Natural water content or water content of sample, %
LL	-	Liquid Limit, % (water content above which soil behaves as a liquid)
PL	-	Plastic Limit, % (water content above which soil behaves plastically)
PI	-	Plasticity Index, % (difference between LL and PL)
Dxx	-	Grain size at which xx% of the soil, by weight, is of finer grain sizes These grain size descriptions are not used below 0.075 mm grain size
D10	-	Grain size at which 10% of the soil is finer (effective grain size)
D60	-	Grain size at which 60% of the soil is finer
Cc	-	Concavity coefficient = $(D30)^2$ / (D10 x D60)
Cu	-	Uniformity coefficient = D60 / D10

Cc and Cu are used to assess the grading of sands and gravels:
Well-graded gravels have: $1 < Cc < 3$ and $Cu > 4$
Well-graded sands have: $1 < Cc < 3$ and $Cu > 6$
Sands and gravels not meeting the above requirements are poorly-graded or uniformly-graded.
Cc and Cu are not applicable for the description of soils with more than 10% silt and clay
(more than 10% finer than 0.075 mm or the #200 sieve)

CONSOLIDATION TEST

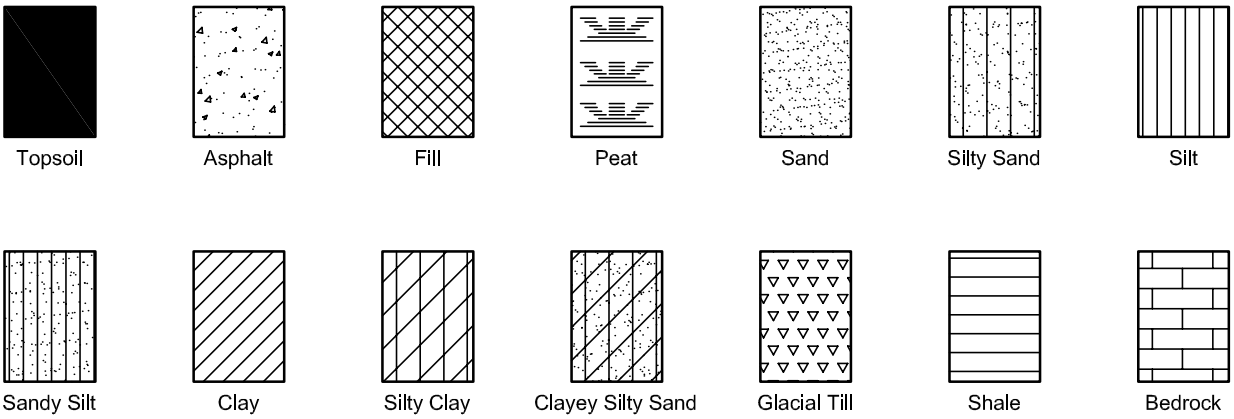
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void Ratio		Initial sample void ratio = volume of voids / volume of solids
Wo	-	Initial water content (at start of consolidation test)

PERMEABILITY TEST

k	-	Coefficient of permeability or hydraulic conductivity is a measure of the ability of water to flow through the sample. The value of k is measured at a specified unit weight for (remoulded) cohesionless soil samples, because its value will vary with the unit weight or density of the sample during the test.

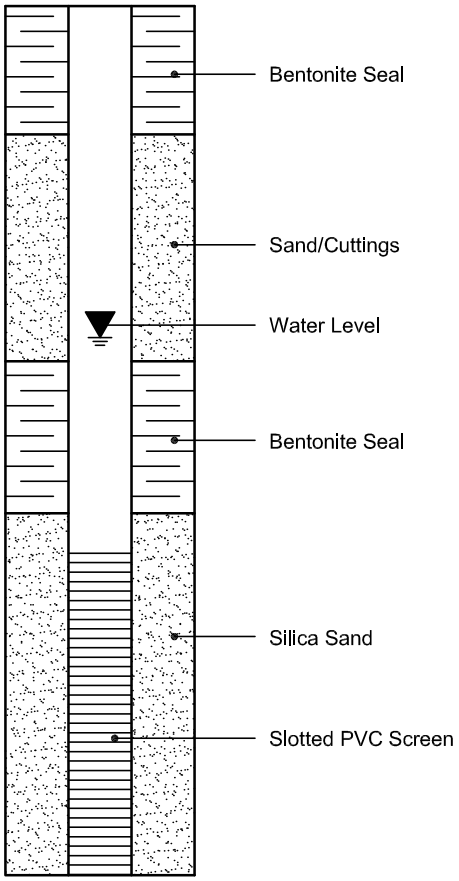
SYMBOLS AND TERMS (continued)

STRATA PLOT

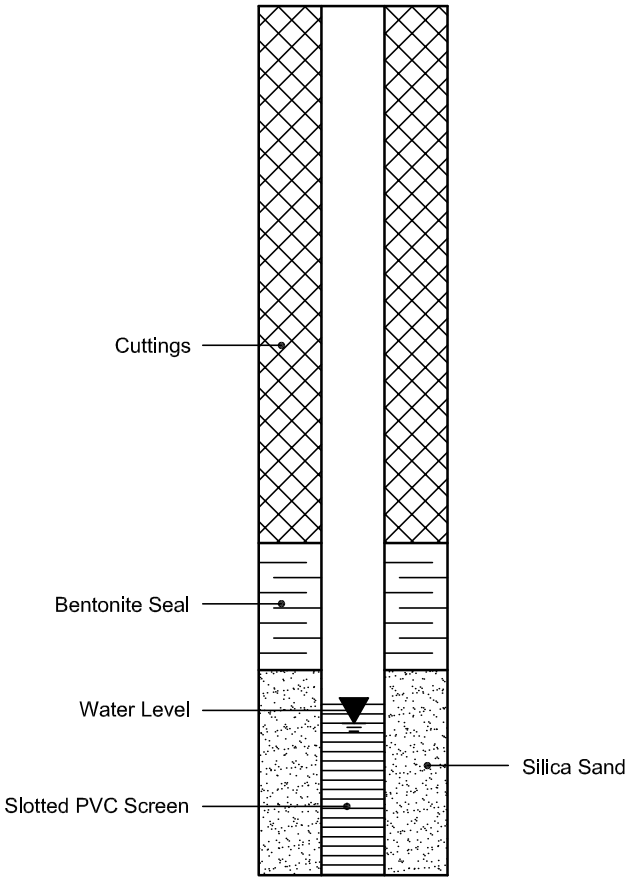


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



Certificate of Analysis

Report Date: 22-Dec-2020

Client: Paterson Group Consulting Engineers

Order Date: 18-Dec-2020

Client PO: 31607

Project Description: PG5098

	Client ID:	BH4-20, SS3	-	-	-
	Sample Date:	17-Dec-20 09:00	-	-	-
	Sample ID:	2051542-01	-	-	-
	MDL/Units	Soil	-	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	87.2	-	-	-
General Inorganics					
pH	0.05 pH Units	7.59	-	-	-
Resistivity	0.10 Ohm.m	87.8	-	-	-
Anions					
Chloride	5 ug/g dry	8	-	-	-
Sulphate	5 ug/g dry	5	-	-	-

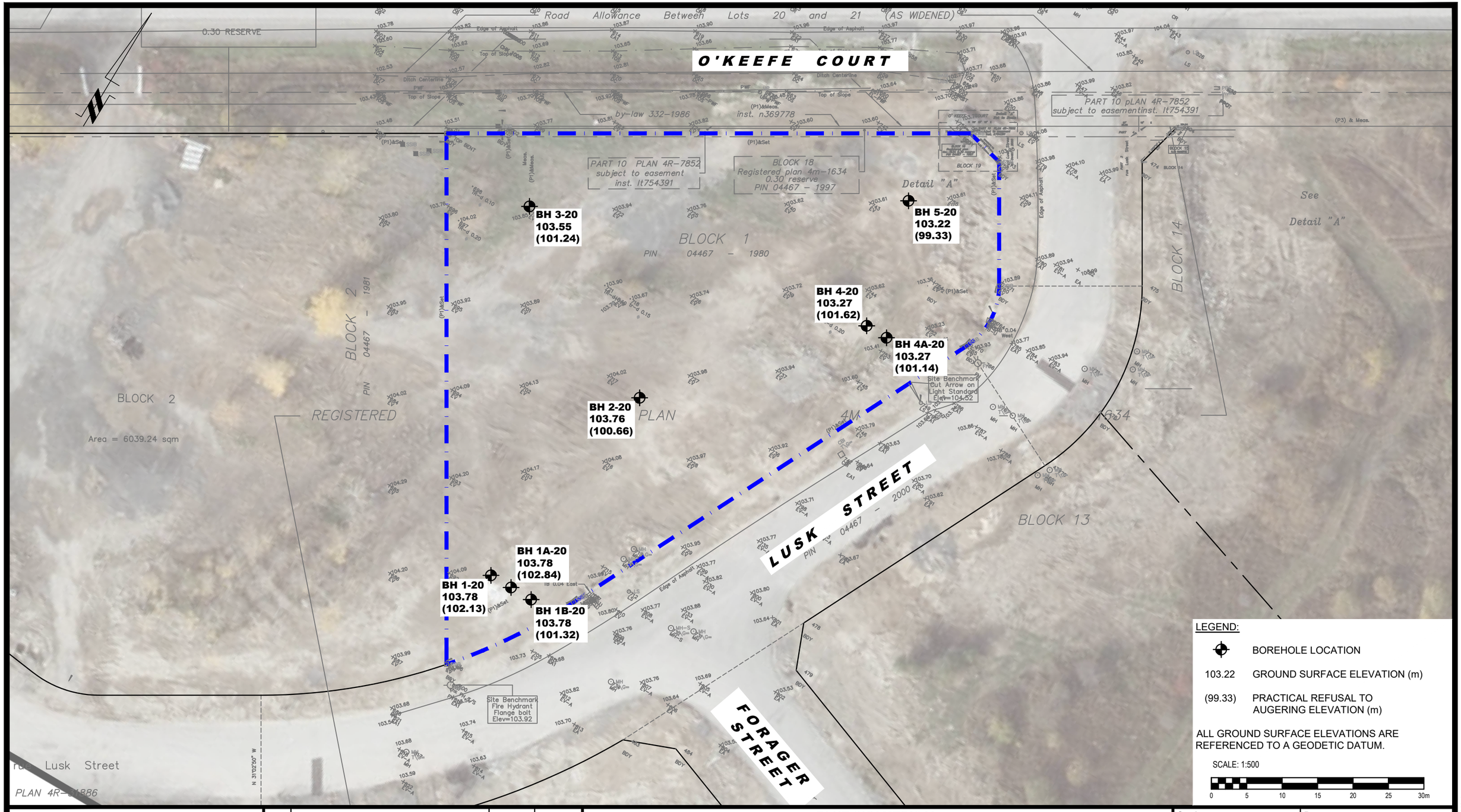
APPENDIX 2

FIGURE 1 - KEY PLAN

DRAWING PG5098-1 - TEST HOLE LOCATION PLAN

FIGURE 1

KEY PLAN



LEGEND:

- BOREHOLE LOCATION
- 103.22 GROUND SURFACE ELEVATION (m)
- (99.33) PRACTICAL REFUSAL TO AUGERING ELEVATION (m)

ALL GROUND SURFACE ELEVATIONS ARE REFERENCED TO A GEODETIC DATUM.

SCALE: 1:500

0 5 10 15 20 25 30m

patersongroup
consulting engineers

154 Colonnade Road South
Ottawa, Ontario K2E 7J5
Tel: (613) 226-7381 Fax: (613) 226-6344

NO.	REVISIONS	DATE	INITIAL

BLUE SKY MEDICAL

GEOTECHNICAL INVESTIGATION
PROPOSED COMMERCIAL DEVELOPMENT - 100 LUSK STREET
OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:500	Date: 12/2020
Drawn by: NFRV	Report No.: PG5098-1
Checked by: VD	Dwg. No.: PG5098-1
Approved by: DJG	Revision No.:

c:\users\nicholasv\desktop\5098\pg5098-1 thlp.dwg

With every community, we redefine what's possible.

Stantec is a global leader in sustainable engineering, architecture, and environmental consulting. The diverse perspectives of our partners and interested parties drive us to think beyond what's previously been done on critical issues like climate change, digital transformation, and future-proofing our cities and infrastructure. We innovate at the intersection of community, creativity, and client relationships to advance communities everywhere, so that together we can redefine what's possible.

Stantec Consulting Ltd.
300 - 1331 Clyde Avenue
Ottawa ON K2C 3G4
stantec.com