HFW Holdings Limited

Submission to Norfolk County for Site Plan Application

Project #22-013

May 17, 2024

vallee

Consulting Engineers, Architects & Planners

vallee

Consulting Engineers,
Architects & Planners

May 17, 2024

Norfolk County
Clerks and By-Law
50 Colborne Street South
Simcoe, Ontario N3Y 4H3

Norfolk County
Community Development Division
185 Robinson Street
Simcoe, Ontario N3Y 5L6

Attention: **Genevieve Scharback, County Clerk**
Mohammad Alam, Supervisor of Development Planning

Reference: **HFW Holdings Limited**
Site Plan Application
395-411 Queensway West, Simcoe (Northern Parcel)
Our File 22-013

Please accept this package as our formal application for the following planning applications:

- Site Plan Application

We kindly ask that a pre-submission meeting be scheduled at your earliest convenience to review the following submission documents:

1. This cover letter.
2. Summary notes for pre-submission meeting to be scheduled by Norfolk County staff.
3. Pre-consultation minutes issued January 24, 2023 from the August 3, 2022 pre-consultation meeting, signed by Lesley Hutton-Rhora on behalf of G. Douglas Vallee Limited and the proponent.
4. Completed and executed Norfolk County Planning Department Development Application Form.
5. Articles of incorporation for HFW Holdings Limited.
6. Conceptual site plan for the proposed development prepared by G. Douglas Vallee Limited.
7. Environmental Impact Study prepared by Pinchin Limited.
   *** to be provided prior to the pre-submission meeting*
8. Stage 1 & 2 Archaeological Assessment and documentation of registration in the Public Register.
9. Elevations prepared by G. Douglas Vallee Limited, including:
   a) Typical 6-unit 1.5 storey townhouse block
   b) Typical 4-unit 3 storey townhouse block
10. Photometrics Plan(s) prepared by Seguin Engineering Inc.
    *** to be provided prior to the pre-submission meeting*
11. Phase I & II Environmental Site Assessment.
12. Complete civil design set prepared by G. Douglas Vallee Limited, including:
    a) Servicing Plan
    b) Grading Plan (including base topographical data)

c) Erosion & Sediment Control Plan
d) Plan & Profile Drawings
e) Sanitary Drainage Areas
f) Storm Drainage Areas
g) Fire Separation Distances

13. Functional Servicing Report prepared by G. Douglas Vallee Limited.
14. SWM Report prepared by G. Douglas Vallee Limited.
15. Geotechnical & hydrogeological reports prepared by GeoPro Consulting Limited.
    *** stamped copies to be provided prior to the pre-submission meeting*
16. Traffic Impact Study prepared by Paradigm Transportation Solutions.
17. Securities estimate.
18. Appraisal prepared by Antec Appraisal Group.
19. Reference Plan, supplied in place of a PIN printout given that final adjustments to the lot reconfiguration related to the severance (BNPL2023366) are ongoing at the Land Registry Office.

In addition, we kindly request that the **holding provision on the subject lands be lifted** on the strength of and concurrent to the review and approval of the enclosed site plan application.

The submission has been made electronically on May 17, 2024 via Norfolk County's CityView portal.

Please feel free to reach out should you have any questions or comments. Thank you in advance for your support of this project.

Respectfully submitted,

Lesley Hutton-Rhora

Lesley Hutton-Rhora
G. DOUGLAS VALLEE LIMITED
Consulting Engineers, Architect and Planners

c. Herbert Chiu, HFW Holdings Limited
Gary Brasenell, HFW Holdings Limited
Denton Choo, HFW Holdings Limited
John Vallee, P.Eng, G. Douglas Vallee Limited
John Iezzi, P.Eng, G. Douglas Vallee Limited
Natalie Ongena, P.Eng, G. Douglas Vallee Limited
Scott Puillandre, G. Douglas Vallee Limited
H:\Projects\2022\22-013 HFW Holdings Hunt St Residential\Agency\Norfolk County\SPA\Northern Parcel\First Submission\Working Files\1. DRAFT Cover Letter.docx

MEETING MINUTES

Project #: 22-013 (County file SPPL2024XXX)
Project: HFW Simcoe Mixed Use (Northern Parcel SPA)

Date: (to be scheduled)
Category: Pre-Submission Meeting with County Staff for Site Plan Application
Organizer: Norfolk County Planning Department
Attendees:

Agenda: Confirm submission requirements for Site Plan application.

Notes:

Required:	Provided:	Comments:
Confirmation of Submission Requirements	A pre-submission meeting will be scheduled by Norfolk County staff. These notes will be updated and circulated as a follow-up to the pending meeting.	
Pre-Consultation Minutes	A copy of the minutes from County staff received January 24, 2023 for the pre-consultation meeting held on August 3, 2022 is included in the submission package.	
Development Application Form	A development application form has been completed, signed & commissioned by the applicant and is included in the submission package.	
Proposed Site Plan / Drawing	A proposed site plan drawing prepared by G. Douglas Vallee Limited is included in the submission package.	
Environmental Impact Study	An Environmental Impact Study prepared by Pinchin Limited will be provided prior to the pre-submission meeting.	
Archaeological Assessment	A Stage 1 & 2 Archaeological Assessment prepared by Archaeological Consultants Canada is included in the submission package, complete with confirmation of being entered into the public register.	
Topographical Survey	Topographical base data is included on the proposed grading plan enclosed within the detailed civil drawings.	

Landscaping Plan	The Environmental Impact Study prepared by Pinchin speaks to restoration plantings required as a result of the minor encroachment into the protected woodland at the northwest corner of the property. We kindly ask that the requirement for a landscaping plan be deferred until preliminary comments are received from the County's planning team regarding the restoration concept so that the landscape design can be prepared in accordance with County input.	
Elevation Plan	Elevation plans for the proposed building(s) prepared by G. Douglas Vallee Limited are included in the submission package.	
Photometrics Plan(s)	A photometrics plan prepared by Seguin Electrical Engineering Inc. will be provided prior to the pre-submission meeting.	
Phase I & II Environmental Site Assessment & RSC	A Phase I & II Environmental Site Assessment prepared by G2S Consulting Inc. will be provided prior to the pre-submission meeting. Filing of the RSC is pending and is anticipated to be a condition of the site plan approval.	
Detailed Civil Design	The following detailed design plans prepared by G. Douglas Vallee Limited are included with the submission package: - Servicing Plan - Grading Plan - Erosion Control Plan - Plan & Profile Drawings - Sanitary Drainage Plan - Storm Drainage Plans - Fire Separation Plan	
Utility Plan	The preparation of the Utility Plan is dependent on finalization of the general plan of services and related civil engineering design. We kindly ask that the requirement for a utility plan be deferred until preliminary comments are received from the County's development engineering team so that the utility plan can be prepared in accordance with County input.	

Functional Servicing Report	A Functional Servicing Report (FSR) prepared by G. Douglas Vallee Limited is included in the submission package.	
Watermain Looping	The proposed servicing design does not include watermain looping.	
Disconnection of Water & Sanitary Services	The detailed civil drawings include notation that all existing water & sanitary services will be disconnected as part of the pending demolition of the existing structures, prior to the installation of new services.	
Water & Sanitary Modelling	Water & sanitary modelling is underway by the County's third party consultant. County staff are kindly asked to provide an update on the status of this work.	
Backflow Preventer	A backflow preventer has been included, as shown on the servicing plan.	
Water Allocation	As part of this application, the proponent kindly requests confirmation of capacity and water allocation by County staff.	
Sanitary Design & Extension of Sanitary Mainline	The sanitary service has been designed assuming that the planned extension of the sanitary sewer along Hunt Street proposed by the adjacent development under SPPL2021021 occurs in the interim.	
Pumping Station Design	The proposed development does not require a private pumping station.	
Property Line Inspection Maintenance Hole	A maintenance hole has been included as shown on the servicing plan.	
Stormwater Management Report & Confirmation of Legal & Adequate Outlet	A Stormwater Management Report prepared by G. Douglas Vallee Limited is included in the submission package.	

Geotechnical Report	A geotechnical report prepared by GeoPro Consulting Limited will be provided prior to the pre-submission meeting.	
Traffic Impact Study	A traffic impact study prepared by Paradigm Transportation Solutions Inc. is included with the submission.	
Street Signage/Traffic Control Plan	Street signage is included on the concept site plan.	
Securities Estimate	An estimate of securities required has been prepared by G. Douglas Vallee Ltd. and is included in the submission package.	
Appraisal	An appraisal prepared by Antec Appraisal Group is included with the submission.	

Pre-Submission Consultation Meeting Minutes

Date: August 3, 2022

Description of Proposal: To create an 87-dwelling condominium in the form of 33 group townhouses and 45 apartment dwelling within the upper 3-storeys of the mid-rise and ground floor commercial uses.

Property Location: 395, 401, 403, 405, and 411 Queensway West

Roll Number: 40302501100, 40302501000, 40302500900, 40302500800, 40302500700

As a result of the information shared at the pre-consultation meeting dated August 3, 2022, the following applications and qualified professional documents / reports are required as part of the development review process.

Please note that various fees are associated with each application and there are also costs for qualified professionals retained to complete various documents / reports. All requirements identified are minimum and determined as of the date of the pre-consultation meeting with the information available at that time. As the proposal proceeds and more information is made available, additional applications, studies, reports, etc. may be required.

This summary including checklists, comments and requests are applicable for a period of one (1) year from the date of meeting. If an application is not received within that time frame, a subsequent pre-consultation meeting may be required due to changes in policies and technical requirements.

Before you submit your application, please contact the assigned Planner to confirm submission requirements and the applicable fee

---

Lesley Hutton-Rhora

Signed on behalf of G. Douglas Vallee Limited & HFW Holdings Limited on May 17, 2024

Attendance List

Proponent	HFW Holdings Limited
Community Development – Planning and Agreement	Tricia Givens, Director, Planning (Chair) Mohammad Alam, Senior Planner Fabian Serra, Planner Nicole Goodbrand, Senior Planner Annette Helmig, Agreement and Development Coordinator
Community Development – Building and Zoning	Scott Northcott, Senior Building Inspector Devon Staley, Building Inspector Roxanne Lambrecht, Zoning Administrator Hayley Stobbe, Zoning Administrator
Environment & Infrastructure Services – Development Engineering	Tim Dickhout, Project Manager, Development Stephen Gradish, Development Technologist Zeel Joshi, Junior Development Technologist
Community Services – Fire	Katie Ballantyne, Community Safety Officer
Community Development – Economic Development	Chris Garwood, Economic Development Supervisor
Paramedic Services	Stuart Burnett, Deputy Chief
Operations – Forestry	Adam Biddle, Supervisor of Forestry
Operations – Parks and Facilities	Todd Shoemaker, Director, Parks
Corporate Support Services – Realty Services	Lydia Harrison, Specialist, Realty Services Kelly Darbishire, Specialist, Realty Services
Corporate Support Services – Accessibility	Sam McFarlane, Manager, Accessibility and Special Projects
Haldimand Norfolk Health Unit	Emily Kichler, Community Health Dietician
Long Point Regional Conservation Authority	Leigh-Anne Mauthe, Supervisor of Planning Services Isabel Johnson, Resource Planner
Community Development – Heritage and Culture	Melissa Collver, Director Heritage and Culture
Community Development – Recreation	Nikki Slote, Director Recreation

Table of Contents

Contents

Proposal Summary

The proposal is to create an 87-dwelling condominium in the form of 33 group townhouses and 45 dwelling within the upper 3-storeys of the mid-rise. The proposed concept design would achieve 31uph while providing 12,600 sq feet of commercial space. The proposed midrise building would provide an updated office space for the Canadian Mental Health Association, a current tenant of 401 Queensway West.

List of Application Requirements

Planning Department

Planning application(s) required to proceed	**Required**
Official Plan Amendment Application	X
Zoning By-law Amendment Application	X
Site Plan Application	X
Draft Plan of Subdivision Application	
Draft Plan of Condominium Application	X
Part Lot Control Application	
Consent / Severance Application	
Minor Variance Application	
Removal of Holding Application	
Temporary Use By-Law Application	
Other - Click here to enter text.	

Planning requirements for a complete application The items below are to be submitted as part of the identified Planning Application(s). ** electronic/PDF copies of all plans, studies and reports are required**	**Required at OPA/ Zoning Stage**	**Required at Site Plan Stage**
Proposed Site Plan / Drawing	X	X
Planning Impact Analysis Report / Justification Report	X	
Environmental Impact Study	X	X
Neighbourhood Plan (TOR must be approved by the County)		
Agricultural Impact Assessment Report		
Archaeological Assessment	X	X
Heritage Impact Assessment		
Market Impact Analysis		
Dust, Noise and/or Vibration Study		
MOE D-Series Guidelines Analysis		
Landscaping Plan		X
Elevation Plan		X
Photometrics (Lighting) Plan		X
Shadow Analysis Report		
Record of Site Condition		X
Contaminated Site Study		

Minimum Distance Separation Schedule		
Parking Assessment		
Hydrogeological Study		
Restricted Land Use Screening Form		
Topographical Survey Drawing		X
Additional Planning requirements		**Required**
Development Agreement		X
Parkland Dedication/Cash-in-lieu of Parkland		X

*the list of requirements is based on the information submitted and as presented for this specific pre-consultation meeting. Any changes to a proposal may necessitate changes to Planning Department submission requirements.

*Community Development fees, applications, and helpful resources can be found can be found by visiting https://www.norfolkcounty.ca/government/planning/

Planning Comments

Official Plan: The subject lands are designated Commercial in the Official Plan. As per section 7.11.1 the permitted uses include:

e) Residential uses, provided that the uses do not negatively impact the planned function of the Commercial areas subject to the following provisions:

i) in a building of commercial character, residential uses shall only be permitted above the ground floor; and

ii) in a building of residential character, either single detached or multiple dwelling, residential and/or commercial uses shall be permitted, provided the residential character of the building is maintained.

The proposal includes a mixed-use development which may be permitted subject to 7.11.1 e) i). An official plan amendment may not be required for that portion of lands.

The other portion of land proposes group townhouse development which will require an Official Plan Amendment.

It is point worthy to note that in such case where an official plan amendment will not be required, the zone will remain ‘Commercial’ and the commercial character of the proposal needs to be maintained. Staff would recommend larger commercial GFA on ground floor compare to what is proposed to maximize the use of commercial zone.

The subject lands are also within ‘Queensway Corridor Special Policy Area’ which include auto-oriented commercial activities.

Zoning By-Law: The current Zoning of the subject lands are 'Service Commercial (CS). A zoning by-law amendment will be required to permit both the townhouse development and the mixed-use development. Staff recommends R4 zone for the townhouses and a site-specific Service Commercial for the mixed-use portion of the lands.

Site Plan Control:
The subject property is located within a site plan control area. As per Site Plan Control By-Law 2014-97, the proposed development will require a site plan approval.

Site Statistics: A basic site statistics including zoning information should be included with the site plan.

Drawing Requirements:
- All measurements must be in metric
- All drawings must be to a standard scale to suit project requirements:
- Surveyed property limits (including bearings and dimensions)
- Location and extent of any road widening, easements and road reserves (if any)
- location of existing tree cover (if any)
- Existing topography of the land
- Indicate existing land uses along property lines.

Title Block Information
- Key plan (showing location of subject lands and surroundings)
- North arrow
- Consultant's name and contact information (address, telephone, email)
- Professional stamp, signed and dated
- Date of plan preparation, Revision column (numbered and dated)
- Project name

Site Features
- Label materials on the plan and/or provide legend (i.e. paving, curbing, sidewalks, depressed curbs, retaining walls, acoustic structures, fencing, signage signs, landscape areas, snow storage areas, etc.)
- Location and details of existing and proposed fencing;
- Location of garbage collection areas
- Location of on-site snow storage areas

Utilities
- Location of fire hydrants and transformers (if any)
- Location of hydro & gas meters (if any)
- Location of all proposed signs

Streetscape
- Location of sidewalks (external and internal)

- Existing and proposed trees, SOD areas
- Location of external lighting facilities

Vehicular Network

- Location of proposed curbing. Provide Ontario Provincial Standard Drawing (OPSD) curb detail
- Location and dimension of designated fire routes (indicate centre-line, road width and centre- line turning radii)
- Location of garbage collection area
- Location of driveways and parking space with dimensions and materials
- “No parking/fire route” and “accessible parking signs”

Accessibility

- Location of accessible spaces complete with signage for each space
- Location of depressed curbs for each accessible space/ group of accessible spaces as appropriate and required
- Accessible routes to accommodate barrier-free paths of travel to main access of the building including tactile warning surface.

Design Consideration:

Queensway West is an arterial road with planned function of service commercial and Shopping Centre Commercial Designation. Staff recommend that the land frontage should be a dynamic place with active frontage and pedestrian friendly environment. Staff highly recommend that the building face is closed to the public road and parking space exposure is minimized as much as possible. Staff recommends the following site design considerations:

i) Extended building faces close to the public road with enhanced landscaping and pedestrian features such as internal and externa sidewalk extensions and plaza; appropriate lighting, street furniture and accessible measures.
ii) One – two Storey commercial uses with large window treatment along Queensway West;
iii) Relocating parking space at the back of the building with enhanced landscaping to hide any exposed parking areas;
iv) Separate access for townhouse and mixed-use development;
v) Continuous sidewalks at least at one side of the private roads of the townhouse development;
vi) An amenity feature such as parkette or children’s playground for the residents would be highly recommended.

Endangered and threatened species and their habitat are protected under the provinces Endangered Species Act, 2007 (ESA), O. Reg. 242/08 & O. Reg. 830/21. The Act prohibits development or site alteration within areas of significant habitat for endangered or threatened species without demonstrating that no negative impacts will occur. The Ministry of Environment, Conservation and Parks provides the service of responding to

species at risk information requests and project screenings. The proponent is responsible for discussing the proposed activity and having their project screened with MECP.

Please be advised that it is owner's responsibility to be aware of and comply with all relevant federal or provincial legislation, municipal by-laws or other agency approvals.

Note: It is owner's responsibility to find out any historical contamination of the site or any leeching of contamination from neighboring properties to the subject lands. A Record of Site Condition will be required in case any site contamination is identified prior to a site plan agreement and building permit.

Note: The County has adopted a phased approach which will first address the water servicing priorities based on approved and pending development applications. Allocation of water will only be confirmed upon available capacity at the time of site plan registration.

Assigned Planner:

Mohammad Alam
Principal Planner
Extension 1828
Mohammad.Alam@norfolkcounty.ca

Agreements

A recommended condition of your planning application approval will be to enter into a development agreement with the County that will be registered on title to the subject lands, at the Owner's expense. The additional requirements for a development agreement could include, but are not limited to the following:

- Engineering drawing review
- Engineer's schedule of costs for the works
- Clearance letter and supporting documentation to support condition clearance
- User fees and performance securities
- Current property identification number (PIN printout) (can be obtained by visiting https://help.onland.ca/en/home/)
- Owner's commercial general liability insurance to be obtained and kept in force during the terms of the agreement
- Postponement of interest. If there are mortgagees / charges on your property identifier, your legal representative will be required to obtain a postponement from your bank or financial institution to the terms outlined in your development agreement
- Transfers and / or transfer easements along with registered reference plan

The County does not provide construction, maintenance or delivery of services on private property. These are considered internal as the property is under private ownership and will be maintained by the condominium corporation. It is the owner's and/or condominium corporation's responsibility to engage competent and qualified professionals to construct, maintain and deliver such services. That being said, I have also attached the guidelines for the condominium waste collection services for your information. If the condominium meets the technical guidelines the condominium board may apply to through a separate application to have waste collection services performed by Environmental and Infrastructure Services.
Please note, as part of the subsequent condominium exemption application, the County will also provide information that needs to be included in the condominium declaration as the approval authority.

Annette Helmig
Agreement and Development Coordinator
Extension 8053
Annette.Helmig@norfolkcounty.ca

Development Engineering

Development Engineering comments are pending, and once they are ready, Norfolk County's Planning Department will provide an updated and final version of the Pre-consultation Notes. Future development planning applications will only be accepted once Development Engineering comments are provided. Applications include all required items outlined in the final version of the Pre-consultation Meeting Notes and per any additional discussions with the Planning Department.

Zeel Joshi
Junior Development Technologist
Extension 8122
Zeel.Joshi@norfolkcounty.ca

Stephen Gradish
Development Technologist
Extension 1702
Stephen.Gradish@norfolkcounty.ca

Tim Dickhout
Project Manager, Development
Extension 1700
Tim.Dickhout@norfolkcounty.ca

Conservation Authority

Long Point Regional Conservation Authority

Conservation Authority requirements to proceed	May be Required	Required
Conservation Authority Permit		X
Slope Stability Analysis / Erosion Analysis		
Coastal Engineers Report		
Environmental Impact Study		X
Subwatershed Plan/Study		
Master Drainage Study		
Stormwater Management Report/Brief		X
Other	X	

Site Characteristics

The subject property is subject to flooding and erosion hazards from Paterson Creek. The property is also adjacent to a Provincially Significant Wetland.

Provincial Policy Statement, 2020, Section 3.1 Natural Hazards

Conservation Authorities have been delegated responsibilities from the Minister of Natural Resources and Forestry to represent the provincial interests regarding natural hazards encompassed by Section 3.1 of the Provincial Policy Statement, 2020 (PPS). The overall intent of Section 3.0 - Protecting Public Health and Safety of the PPS is to reduce the potential public cost or risk to Ontario's residents from natural or human-made hazards. As such, the PPS states "development shall be directed away from areas of natural or human-made hazards where there is an unacceptable risk to public health or safety or of property damage, and not create new or aggravate existing hazards."

The application is subject to the following subsections of section 3.1 of the Provincial Policy Statement:

3.1.1 Development shall generally be directed, in accordance with guidance developed by the Province (as amended from time to time), to areas outside of:

b) hazardous lands adjacent to river, stream and small inland lake systems which are impacted by flooding hazards and/or erosion hazards; and

I can advise that staff have no objection to the concept of site development. However, as proposed, the stormwater management pond is within the erosion setback of Paterson Creek. Staff could not support a pond within the erosion setbacks. These setbacks need to be consistent with the MNRF Natural Hazards Tech Guides. All development including grading are required to be outside the setbacks.

Ontario Regulation 178/06

The subject lands are regulated by Long Point Region Conservation Authority under Ontario Regulation 178/06. Permission from this office is required prior to any development within the regulated area.
Development is defined as:

- the construction, reconstruction, erection or placing of a building or structure of any kind,
- any change to a building or structure that would have the effect of altering the use or potential use of the building or structure, increasing the size of the building or structure or increasing the number of dwelling units in the building or structure,
- site grading, or the temporary or permanent placing, dumping or removal of any material, originating on the site or elsewhere (Conservation Authorities Act, R.S.O. 1990, c. 27, s. 28 (25))

The regulated area extends 120 metres from the Provincially Significant Wetland situated at the creek. LPRCA staff are requesting an Environmental Impact Study due to the proximity to a wetland. The study must address potential hydrological and/or ecological impacts and make recommendations to mitigate and/or eliminate impacts. Please circulate LPRCA on the terms or reference.

LPRCA and Norfolk County's Memorandum of Understanding for Plan Review Services

Based on LPRCA and Norfolk County's Memorandum of Understanding for Plan Review Services, LPRCA staff can provide the following comments with regard to Stormwater Management:

Stormwater Management

LPRCA will review the final stormwater management design using the 2003 MECP Stormwater Management Planning and Design Manual, MTO Drainage Manual, LID Stormwater Management Manual, the sustainable technologies STEP website https://sustainabletechnologies.ca/, and the Municipal SWM guidelines.
Based on the site and receiving watercourse, an **enhanced** level of treatment as per the 2003 MECP Stormwater Management Planning and Design Manual is required for the proposed development.

LPRCA requires the following be included and addressed in the design of stormwater management:

- Minimize, or, where possible, prevent increases in contaminant loads.
- Minimize, erosion and changes in water balance, and prepare for the impacts of a changing climate through the effective management of stormwater, including the use of green infrastructure.
- Mitigate risks to human health, safety, property and the environment.
- Maximize the extent and function of vegetative and pervious surfaces.
- Implement stormwater management best practices, including stormwater attenuation and re-use, water conservation and efficiency, and low impact

development, for end of pipe facilities 24-48hr drawdown times to be targeted in all case.
- Provide adequate and legal outlet for major, minor, and all flow conditions from the site be provided.

In addition to the above requirements, the following must be clearly shown on the submitted design drawings:

- Major flow systems are delineated on the drawing. Overland flow paths and depths from surcharged storm sewer systems and the stormwater treatment facility during a 100-year storm must not increase the flood risk to life, property and the environment.
- Minor overland flow systems and paths are to be delineated and shown on the drawings.
- Erosion and sedimentation control during construction.
- Adequate erosion control on inlets and outlets.

Current Planning Application Fees (2022)
Pre-consultation Fee - $339
Draft Plan of Subdivision/ Condominium including associated OPA and ZBA- $1,380.00 + $100/lot + HST (Max $15,000.00 +HST)
Combined Official Plan/Zoning By-Law Amendment- $813.60
Zoning By-Law Amendment- $514.15*
Consent (severance)- $514.15*
Variance- $514.15*
Site Plan Control- $514.15*
* Accompanied by 1 technical report- $813.60, Accompanied by 2 technical reports- $1,615.90

LPRCA fees, applications, and helpful resources can be found can be found by visiting https://lprca.on.ca/planning-permits/planning-fees/

Isabel Johnson
Resource Planner
519-842-4242 ext. 229.
ijohnson@lprca.on.ca

*LPRCA fees, applications, and helpful resources can be found can be found by visiting https://lprca.on.ca/planning-permits/planning-fees/

Leigh-Anne Mauthe, BES
Supervisor of Planning Services
519-842-4242 or 1-888-231-5408 ext.229
lmauthe@lprca.on.ca

Bonnie Bravener
Resource Technician
519-842-4242 extension 233
bbravener@lprca.on.ca

County Departmental Comments & Requirements

Corporate Support Services – Realty Services

The County will require a postponement of any charge(s)/mortgage(s) on title to the County's Site Plan Agreement. We recommend that you connect with your lender(s) and/or solicitor as early in the process as possible to avoid any delays.

Realty Services notes that there are two (2) PINs involved in the development lands. These parcels will require a merger in title as they are currently under separate ownership. The Owner/Developer should contact their solicitor with regards to this requirement including investigating the estate/qualifier for PIN 50188-0003 (R), being a Registry parcel.

Kelly Darbishire
Specialist, Realty Services
Extension 8117
Kelly.Darbishire@norfolkcounty.ca

Building

The proposed construction is considered a Group C and a Group D(offices)and/or Group E for a mercantile occupancy as defined by the Ontario Building Code (OBC). You will need to retain the services of an Architect and/or a Professional Engineer to complete the design documentation for this application. The row houses will be considered a Group C occupancy and if over 600sqm in building area will require the services of an Architect to complete the design.

Items for Site Plan

Site plan drawings need to have enough detail, to determine compliance with the code references listed. ADJUST AS NEEDED

1. Indicate location of access route and access route design [OBC 3.2.5.4 to 3.2.5.6]
2. Revised fire water pond design and calculations. [OBC 3.2.5.7]
1. Indicate location of existing and new fire department connections. Dimensions between hydrants and building entrances is required.

[OBC 3.2.5.16]

3. Location and specifications of exterior lighting. Lighting to be included in SB-10 report – energy efficiency
4. Indicate barrier free path of travel from parking area to building entrance. Construction of curb cuts and location of tactile attention indicators is required. [OBC 3.8.1.3, & 3.8.3.2]
5. Location of revised septic system (if required)
6. Provide building elevations and cross section, showing building massing, location of proposed entrances and exits, barrier free controls, exterior lighting locations, and exterior signage. [Planning Act 41(4).2]

Items for Building Permit
"-Industrial Commercial Institutional (ICI)" Step by Step Guide Building Permit Package has been attached to the minutes herein, this contains information on drawing requirements, designers, forms, contact information for Building Department etc.
If you have any questions on the building permit process or plans required, please contact permits@norfolkcounty.ca or 519-426-5870 ext. 6016

Jonathan Weir
Building Official III
Extension 1832
Jonathan.weir@norfolkcounty.ca

Development Engineering – 395-411 Queensway - Hunt Street Condos

Development Engineering requirements to proceed The below requirements are to be submitted as part of the Formal Development Planning application.	**Required at OPA/ Zoning Stage**	**Required at Site Plan Stage**	**Potentially Required (See Notes Section)**
General Requirements			
Concept Plan	X	X	
Lot Grading Plan		X[19]	
Siltation and Erosion Control Plan		X[19]	
General Plan of Services	X[10]	X[19]	
Plan and Profile Drawings		X[20]	
Utility Plan		X[21]	
Geotechnical Report			X[37]
Functional Servicing Report	X[9]	X	
Water Servicing Requirements– Section 10.0 Norfolk County Design Criteria and ISMP Section 4.0			
Water main Looping		X[22]	
Disconnection of Water Service(s) to Property Line		X[23]	
Disconnection of Water Service(s) to Main		X[24]	
Water Modelling (County Consultant)	X[10]	X	
Backflow Preventer (RPZ)		X[25]	
Water Allocation	X[8]	X[8]	
Sanitary Servicing Requirements – Section 9.0 Norfolk County Design Criteria and ISMP Section 4.0			
Sanitary Drainage Plan		X[29]	
Sanitary Design Sheet		X[29]	

Pumping Station Design			X[38]
Extension of Sanitary Mainline		X[29]	
Disconnection of Sanitary Service(s) to Property Line		X[23]	
Disconnection of Sanitary Service(s) to Main		X[27]	
Sanitary Modelling (County Consultant)	X[10]	X	
Property Line Inspection Maintenance Hole		X[28]	
Storm Water Servicing Requirements – Section 7.0 and Section 8 Norfolk County Design Criteria and ISMP Section 4.0			
Storm Water Management Design Report (including calculations)	X[11, 13]	X[30, 32]	
Storm Water Drainage Plan		X	
Storm Sewer Design Sheet		X[31]	
Establish/Confirm Legal and Adequate Outlet	X[12]	X	
Anticipated Flow/Analysis to Receiving Collection System		X	
Transportation Requirements – Section 6.0 Norfolk County Design Criteria, ISMP Section 5.0, Section 6.0 and Appendix J			
Traffic Impact Study	X[14]	X	
Street Signage/Traffic Control Plan		X	
Improvements to Existing Roads & Sidewalk (urbanization, pavement structure, widening sidewalk replacement, upgrades, extension, and accessibility)	X[15, 16]	X[35, 36]	

General Notes:

1. Securities will be required in the form of a schedule. Any works completed within the Municipal Right-of-Way (R.O.W.) is to be shown as 100% security. Any works completed within private property is to be shown as 10% security. This can be submitted at time of Site Plan.
2. All reports and plans are to be signed and stamped by a Professional Engineer (P.Eng.).
3. All reports are to be completed in reference to Norfolk County's Design Criteria and Integrated Sustainable Master Plan (ISMP).
4. Recommendations from all reports / modelling must be incorporated into the design and is to adhere to Norfolk County's Design Criteria. A copy of this criteria is available upon request.
5. Recommendations from all reports (FSR, SWM, TIB, Modelling, etc.) must be incorporated into the design and be constructed at the developer's expense.
6. All applicable permits and inspections to be issued by Public Works.
7. If Municipal Waste Collection Services are required, the development must adhere to Norfolk County's Technical Guidelines for Waste Collection Services for Condominium Corporations. These guidelines are available upon request. Please note application for waste collection can be made after the development is completed. It must also be noted that in the guidelines it identifies that no reversing of garbage collection vehicles is permitted.
8. Water allocation will not be issued as part of the Official Plan Amendment or Zoning By-law Amendment. Applicant is to confirm capacities at the time of Site Plan application. At the time registration of agreement\approval allocation will be provided for the development, if available

Required at Official Plan Amendment and Zoning By-Law Amendment Stage:

9. The following reports/studies will be required at time of Official Plan Amendment and Zoning By-law Amendment Submission:
    a. Concept Plan;
    b. Functional Servicing Report (per Norfolk County Design Criteria Section 3);
    c. Water Wastewater modelling.
    d. Storm Water Management Report (as per Norfolk County Design Criteria Section 7 and Section 8.);
    e. Traffic Impact Study (as per ISMP Appendix J – TIS Guidelines);
10. Water and Wastewater modelling will be required. This is to be completed by Norfolk County's third-party consultant. The cost to complete the modelling and any recommendations from reports are to be implemented into the design at the applicant's expense. The following information will be required to receive a quote and complete the modelling.
    a. General Plan of Services

b. Functional Servicing Report;
    i. Total Wastewater Design Flows shown in Sanitary Design Sheets;
    ii. Total Domestic Water and Fire Flows as per Norfolk County Design Criteria Section 10.1.1

Norfolk County recommends that the Functional Servicing Report must include water /sanitary servicing and fire flow calculations for all potential phases of the development.

Once the quote has been received, approval from the applicant will be required before proceeding

11. Stormwater Management Report is to be completed as per Norfolk County Design Criteria Section 7 and Section 8.
12. Confirmation of Legal and Adequate outlet will be required prior to Official Plan Amendment and Zoning By-Law Amendment approval.
13. According to Norfolk County records the subject property in part falls in the LPRCA Erosion Hazard Limits which may affect location of SWM pond or proposed residences.
14. As per Norfolk County's Integrated Sustainable Master Plan (ISMP) Appendix J – Traffic Impact Study (TIS) Guidelines, a full Traffic Impact Study will be required.
    As there was no submission of Traffic information for this pre con. Once additional information is provided Development Engineering will work with the applicant to determine the scope of this requirement.
15. With respect to the 2nd submission of information and questions (received Sept 28th) a question was proposed for on street parallel parking on Queensway and Hunt St. Development Engineering has the following comments:
    a. On street parallel parking will not be permitted on Queensway. As a current arterial road and major throughfare Norfolk County will not permit stopping in any lane to perform maneuvers associated with Parallel parking.
    b. Hunt Street - The new concept plan for on street parallel parking on Hunt Street would need to be justified in the Traffic Impact Study. Furthermore the configuration of the parking stalls would need to meet all applicable standards including TAC manual. It is unclear if there is adequate space on the Municipal ROW to provide this parking area and provide a municipal sidewalk. All on street parking, Curb & Gutter and Sidewalk are to be located within the ROW.
    c. Development Engineering does not recommend that any on street parking be counted towards the total number of required parking spots.
16. The subject property is not within MTO Permit Control Areas (Entrances, building locations) however any reconfiguration of the travel portion of the road may be subject to MTO review.

Required at Site Plan Stage Notes:

At the time of pre consultation there were very few details with respect to the design of the future site plan. The following list was created as a preliminary list of items based on

historical developments like this proposal. Additional requirements may be necessary once a more detailed concept is received.

17. All Site Plan submissions are to comply with Section 16 of the Norfolk County Design Criteria in addition to the comments below.
18. Concept Plan
19. Lot Grading Plan, Siltation and Erosion Control Plan, and General Plan of Services drawing can be shown on one engineering plan as long as it's legible for review.
20. Plan and Profile drawings will be required as per NCDC Section 16.4.4
21. A Utility Plan is required as per Section 4.4.07 of Norfolk County Design Criteria for all utilities to be installed in the Municipal ROW. An Electrical Services Plan as per Section 16.5.6 shall also be included with the Utility Plan
22. While there are no watermains shown on the concept drawing it does make mention of a looped watermain in the pre consultation request letter. If the ultimate proposal is a multi-unit Condominium, then Watermain looping will NOT be permitted. Norfolk County does not allow watermain looping through private property. As per Norfolk County By-law 2013-65, only one domestic water service pipe shall be installed per condominium corporation.
23. All existing water and Sanitary servicing on the Existing property must be disconnected and removed at the time of demolition of existing buildings.
24. Disconnection of all existing water services within the ROW that are not being connected will be required prior to installation of a new water service. Permits are required prior to any work being completed.
25. Depending on eventual design of proposed water service and the proposed usage within the development a Backflow Preventer (RPZ) may be required. Approval from the Manager of Environmental Services must be obtained as per Norfolk County Design criteria. A Testable DCVA Backflow device may be required in a watertight chamber at property line.
26. Norfolk County Environmental Services Department has noted; "Dead end water service in condo needs a hydrant for flushing maintenance of water main." While Fire hydrants are not shown on the concept plans it was assumed private hydrants will be required.
27. Confirmation of size and condition of existing Sanitary laterals within the ROW will be required. Removal of all existing Sanitary laterals that are proposed to be abandoned is required. Permits are required prior to any work being completed.
28. A Sanitary Inspection manhole will be required on Property line.
29. As noted, there is currently no Gravity sewer along Hunt Street. If the proposed Sanitary connection is to be installed along Hunt street then Plan and Profile drawings will be required and a Submission through the Consolidate Linear Infrastructure ECA process for Norfolk County will also be required. Appropriate Design Sheets and Drawings will be required.
30. Stormwater Management Report is to be completed as per Norfolk County Design Criteria.
31. A Storm Drainage area plan will be required as per Norfolk County Design Criteria and must identify any external overland flows tributary to this site.
32. As the site is being completely redeveloped with a new concept towards handling Storm water, Development Engineering is recommending that the Pre Development rate shall be accessed as Open space when designing the SWM pond.

33. As per Norfolk County's Integrated Sustainable Master Plan (ISMP) – Appendix J: Traffic Impact Study (TIS) Guidelines, a Traffic Impact Study will be required.
34. According to Norfolk County By-law 2016-32 Norfolk County Entrance By-law, the maximum number of driveways to a Commercial property is 2. Seeing that the proposal is showing 3 entrances this must be adequately supported in the Traffic Impact Study or other supporting documents.
35. All existing driveway cuts that are not required in the future are to be replaced with full barrier curb and matching new Sidewalks.
36. Sidewalks will be required as per the latest version of Norfolk County's Sidewalk Installation policy.

Potentially Required Notes:

37. A Geotechnical report must be submitted if Storm water management practices involving infiltration are proposed.
38. According to County records it is unclear if there is adequate depth in local Sanitary sewers to convey the entire site through Gravity. If a Pumping station is required, it shall be designed to meet all applicable standards. Any future Pumping station will be the ownership of the developer and must be installed on Private property. Norfolk County will not be responsible for the ownership OR maintenance of any private pumping stations.

Zoning Administrator: 411 queensway (Vallee Group)

Properties zoned CS

- Mulit use mix proposed of residential and commercial
- Phases to change part of property to R4 zone and possibly R5, CS zone does not permit apartments.
- Initial site sketch looks to meet zoning setbacks and parking
- A zoning table for each zone or phase will need to be provided, please include decks or balconies on the site plan to prevent issues in future.
- How will the townhouse be sold? They indicated that the entire site will be treated as one lot
- They indicated that 3 separate condo developments because of the phases, then merged into one at the end only dealing with on site plan approval
- Alterations to be made to this site sketch, comments will be provided on a more accurate site sketch or site plan

Roxanne Lambrecht
Zoning Administrator
Extension 1839
Roxanne.Lambrecht@norfolkcounty.ca

Hayley Stobbe
Zoning Administrator
Extension 1853
hayley.stobbe@norfolkcounty.ca

Fire Department

Norfolk Fire has the following comments in regard to this proposal:

- Ensure adequate water supply is provided

- Ensure adequate access for fire department apparatus
- Fire access route to be provided through the site- all roads to be designed as fire access routes

Katie Ballantyne
Community Safety Officer
Extension 2423
Katie.ballantyne@norfolkcounty.ca

Appendix A: Summary of Applicable Planning Legislation, Policy and Zoning

Following is a summary of key items related to the proposal as presented; noting these documents are meant to be read in their entirety with relevant policies to be applied in each situation. This is not an exhaustive list and only in response to the information submitted for the pre-consultation. This feedback is subject to change pending full submission of a development application and any changes or additional information provided therein.

Provincial Policy Statement, 2020

https://www.ontario.ca/page/provincial-policy-statement-2020

Norfolk County Official Plan
https://www.norfolkcounty.ca/government/planning/official-plan/

Section 9.6.1 outlines requirements in relation to requests to amend the Official Plan.

Section 9.6.2 outlines requirements in relation to requests to amend the Zoning By-law.

It is the responsibility of the proponent to review and ensure relevant Official Plan policies are addressed in any future development application.

Norfolk County Zoning By-Law 1-Z-2014
https://www.norfolkcounty.ca/government/planning/new-zoning-by-law/

The provisions of the Norfolk County Zoning By-Law shall apply to all lands within the boundaries of Norfolk County. No land, building or structure shall be used, erected or altered in whole or in part except in conformity with the provisions of this By-Law. No land, building or structure shall be used or occupied except for uses that are specifically identified in the By-Law as permitted uses by the relevant zoning category.

It is the responsibility of the proponent to review and ensure relevant Zoning By-law provisions are addressed in any future development application.

Lesley Hutton-Rhora

From: Mohammad Alam <Mohammad.Alam@norfolkcounty.ca>
Sent: Thursday, December 15, 2022 10:33 AM
To: Lesley Hutton-Rhora
Cc: John Vallee; John Iezzi; Scott Puillandre; CHIU; Gary Brasenell
Subject: RE: 22-013 HFW Mixed Use Development - 395, 401, 403, 405 and 411 Queensway West

Follow Up Flag: Follow up
Flag Status: Flagged

Good morning Lesley,
Stage 1 would be fine as part of the submission. If stage 2 is required, we will put that in the Holding and will be required during the Site plan control.
I am following up with the Engineering on pending comments and will get back to you ASAP.

Sincerely,
Mohammad

Mohammad Alam, MPL, MUD, RPP, MCIP
Principal Planner
Planning
Community Development Division
185 Robinson Street, Simcoe, Ontario, Canada, N3Y 5L6
519-426-5870 x. 8060

Working together with our community

From: Lesley Hutton-Rhora <lesleyhuttonrhora@gdvallee.ca>
Sent: Thursday, December 15, 2022 9:45 AM
To: Mohammad Alam <Mohammad.Alam@norfolkcounty.ca>
Cc: John Vallee <Johnvallee@gdvallee.ca>; John Iezzi <johniezzi@gdvallee.ca>; Scott Puillandre <Scottpuillandre@gdvallee.ca>; CHIU <herbertchiu@rogers.com>; Gary Brasenell <gbrasene@gmail.com>
Subject: 22-013 HFW Mixed Use Development - 395, 401, 403, 405 and 411 Queensway West

Good Morning Mohammad,

We continue to work with our Client at the proposed development reviewed at the pre-consultation meeting on August 3 for 395, 401, 403, 405 and 411 Queensway West, and are aiming to submit an application for an OPA/ZBA in the coming months.

We are hoping for your assistance and clarification on a few items.

Based on the pre-consultation minutes, we have identified the requirements for a complete OPA/ZBA application in this case as noted below (kindly provide comment on item in red):

- Proposed Site Plan / Drawing
- Planning Impact Analysis / Justification Report
- Environmental Impact Study
- Archaeological Assessment
    - **will County staff accept results of a Stage 1 archeological assessment for the purposes of the OPA/ZBA, with Stage 2 (if deemed required by Stage 1) being a condition of SPA?**
- Traffic Study
    - we are presuming that development engineering will require a traffic study for the OPA/ZBA application

We are eager to receive complete comments from Development Engineering to keep this file moving forward. Are you able to confirm when we could expect these comments?

Thanks and have a great day,

Lesley Hutton-Rhora
G. DOUGLAS VALLEE LIMITED
Consulting Engineers, Architects and Planners
2 Talbot Street North Simcoe Ontario N3Y 3W4
Phone: 519.426.6270 Fax: 519.426.6277
www.gdvallee.ca

Planning Department Development Application Form

Complete Application

A complete development application consists of the following:

1. A completed, signed, and notarized application form
2. Supporting information adequate to illustrate your proposal as indicated in **Section H** of this application form
3. Written authorization from the registered owner of the subject lands where the applicant is not the owner as per Section N
4. Cash, debit, credit or cheque payable to Norfolk County in the amount set out in the user fees By-Law that will be accepted and deposited once the application has been deemed complete.

Pre-Submission Consultation:

Norfolk County requires a Pre-Consultation Meeting for all applications; however, minor applications may be exempted depending on the nature of the proposal. The purpose of a Pre-Consultation Meeting is to provide the applicant with an opportunity to present the proposed application, discuss potential issues, and for the Norfolk County and Agency staff to identify the application requirements. Application requirements, as detailed in the Pre-Consultation Meeting Comments, are valid for one year after the meeting date.

Development Application Process

Once an application has been deemed complete by a Planner, Norfolk County staff will circulate the application to adjacent landowners, public agencies, and internal departments for comment. The time involved in application processing varies depending on its complexity, acceptability to the other agencies, and statutory Planning Act decision time-frames.

Payment is required once your application is deemed complete. Pre-payments will not be accepted.

Norfolk County collects personal information submitted through this form under the Municipal Freedom of Information and Protection Act's authority. Norfolk County will use this information for the purposes indicated or implied by this form. You can direct questions about collecting personal information to Norfolk GIS Services at NorfolkGIS@norfolkcounty.ca.

Additional studies required for the complete application shall be at the applicant's sole expense. Sometimes, peer reviews may be necessary to review particular studies at the applicant's expense. In these caseds, Norfolk County staff will select the company to complete the peer review.

Norfolk County will refund the original fee if applicants withdraw their applications before circulation. If Norfolk County must recirculate your drawings, there will be an additional fee. If Norfolk County must do more than three reviews of engineering drawings due to revisions by the owner or failure to revise engineering drawings as requested, Norfolk County will charge an additional fee. Full refunds are only available before Norfolk County has circulated the application.

Notification Sign Requirements

For public notification, Norfolk County will provide you with a sign to indicate the intent and purpose of your development application. It is your responsibility to:

1. Post one sign per frontage in a conspicuous location on the subject lands.
2. Ensure one sign is posted at the front of the subject lands at least three feet above ground level and not on a tree.
3. Notify the Planner when the sign is in place.
4. Maintain the sign until the development application is finalized and, after that, remove it.

Contact Us

For additional information or assistance completing this application, please contact a Planner at 519-426-5870 or 519-875-4485 extension 1842 or planning@norfolkcounty.ca. Please submit the completed application and fees to the attention of the Planning Department at 185 Robinson Street, Suite 200, Simcoe, ON N3Y 5L6.

For Office Use Only:

File Number	_____	Public Notice Sign	_____
Related File Number	_____	Application Fee	_____
Pre-consultation Meeting	_____	Conservation Authority Fee	_____
Application Submitted	_____	Well & Septic Info Provided	_____
Complete Application	_____	Planner	_____

Check the type of planning application(s) you are submitting.

- ☐ Official Plan Amendment
- ☐ Zoning By-Law Amendment
- ☐ Temporary Use By-law
- ☐ Draft Plan of Subdivision/Vacant Land Condominium
- ☐ Condominium Exemption
- ☒ Site Plan Application
- ☐ Extension of a Temporary Use By-law
- ☐ Part Lot Control
- ☐ Cash-in-Lieu of Parking
- ☐ Renewable Energy Project or Radio Communication Tower

Please summarize the desired result of this application (for example, a special zoning provision on the subject lands to include additional use(s), changing the zone or official plan designation of the subject lands, creating a certain number of lots, or similar)

Site plan approval for the proposed development.

Property Assessment Roll Number: 40302500700 & 40302501000 (to be updated following finalization of severance)

A. Applicant Information

Name of Owner HFW Holdings Limited (c/o Director Herbert H Chiu)

Address 3 Fernwood Court

Town and Postal Code Richmond Hill, Ontario, L4B 3C2

Phone Number 416-919-9768

Cell Number

Email herbertchiu@rogers.com

Name of Applicant HFW Holdings Limited (c/o Director Herbert H. Chiu)

Address (same as above)

Town and Postal Code (same as above)

Phone Number (same as above)

Cell Number

Email (same as above)

Name of Agent G. Douglas Vallee Limited c/o Lesley Hutton-Rhora

Address 2 Talbot St. North

Town and Postal Code Simcoe, ON N3Y 3W4

Phone Number 519-426-6270

Cell Number 519-207-0485

Email lesleyhuttonrhora@gdvallee.ca

Unless otherwise directed, Norfolk County will forward all correspondence and notices regarding this application to both owner and agent noted above.

▣ Owner ▣ Agent ▣ Applicant

Names and addresses of any holder of any mortgagees, charges or other encumbrances on the subject lands:

None

B. Location, Legal Description and Property Information

1. Legal Description (include Geographic Township, Concession Number, Lot Number, Block Number and Urban Area or Hamlet):
   Parts 1, 2 & 3 on Reference Plan 37R-11733

   Municipal Civic Address: To Be Assigned

   Present Official Plan Designation(s): Urban Residential

   Present Zoning: Urban Residential (R4-H)

2. Is there a special provision or site specific zone on the subject lands?

   ■ Yes ☐ No If yes, please specify corresponding number:
   14.1039

3. Present use of the subject lands:
   Wilson Truck and Trailer Repair and Storage Yard & single detached dwelling

4. Please describe **all existing** buildings or structures on the subject lands and whether they will be retained, demolished or removed. If retaining the buildings or structures, please describe the type of buildings or structures, and illustrate the setback, in metric units, from the front, rear and side lot lines, ground floor area, gross floor area, lot coverage, number of storeys, width, length, and height on your attached sketch which must be included with your application:
   All existing buildings are to be demolished and removed following issuance of future building and demolition permits. The existing uses and structures are intended to remain (in operation) until that time.

5. If an addition to an existing building is being proposed, please explain what it will be used for (for example: bedroom, kitchen, or bathroom). If new fixtures are proposed, please describe.
   N/A

6. Please describe **all proposed** buildings or structures/additions on the subject lands. Describe the type of buildings or structures/additions, and illustrate the setback, in metric units, from front, rear and side lot lines, ground floor area, gross floor area, lot coverage, number of storeys, width, length, and height on your attached sketch which must be included with your application:
   44 low-rise condominium townhouses

7. Are any existing buildings on the subject lands designated under the *Ontario Heritage Act* as being architecturally and/or historically significant? Yes ☐ No ▣

   If yes, identify and provide details of the building:

   N/A

8. If known, the length of time the existing uses have continued on the subject lands:

   Not known

9. Existing use of abutting properties:

   Veterinary Hospital (West); Single Detached Dwellings (North)

10. Are there any easements or restrictive covenants affecting the subject lands?

    ▣ Yes ☐ No If yes, describe the easement or restrictive covenant and its effect:

    NR291629 re. hydro service to existing single detached dwelling to North

C. Purpose of Development Application

Note: Please complete all that apply.

1. Please explain what you propose to do on the subject lands/premises which makes this development application necessary:

   Property is under site plan control.

2. Please explain why it is not possible to comply with the provision(s) of the Zoning By-law/and or Official Plan:

   N/A

3. Does the requested amendment alter all or any part of the boundary of an area of settlement in the municipality or implement a new area of settlement in the municipality? ☐ Yes ▣ No If yes, describe its effect:

4. Does the requested amendment remove the subject land from an area of employment? ☐ Yes ▣ No If yes, describe its effect:

5. Does the requested amendment alter, replace, or delete a policy of the Official Plan? ☐ Yes ■ No If yes, identify the policy, and also include a proposed text of the policy amendment (if additional space is required, please attach a separate sheet):

   _____

   _____

   _____

6. Description of land intended to be severed in metric units:
   Frontage: _____
   Depth: _____
   Width: _____
   Lot Area: _____
   Present Use: _____
   Proposed Use: _____
   Proposed final lot size (if boundary adjustment): _____
   If a boundary adjustment, identify the assessment roll number and property owner of the lands to which the parcel will be added: _____

   _____

   Description of land intended to be retained in metric units:
   Frontage: _____
   Depth: _____
   Width: _____
   Lot Area: _____
   Present Use: _____
   Proposed Use: _____
   Buildings on retained land: _____
7. Description of proposed right-of-way/easement:
   Frontage: _____
   Depth: _____
   Width: _____
   Area: _____
   Proposed use: _____
8. Name of person(s), if known, to whom lands or interest in lands to be transferred, leased or charged (if known):

   _____

9. **Site Information**	**Zoning**	**Proposed**
Please indicate unit of measurement, for example: m, m^2 or %		
Lot frontage	30m	101.2m
Lot depth		140.7m
Lot width		101.2m
Lot area	195 sq m	16,966 sq m
Lot coverage		
Front yard	6m	6m min.
Rear yard	3m	4.3m min.
Left Interior side yard	3m	9.8m
Right Interior side yard	3m	19.6m
Exterior side yard (corner lot)		
Landscaped open space		
Entrance access width		
Exit access width		
Size of fencing or screening		
Type of fencing		

10. Building Size

Number of storeys		
Building height		
Total ground floor area		
Total gross floor area		
Total useable floor area		

11. Off Street Parking and Loading Facilities

Number of off street parking spaces	88	88
Number of visitor parking spaces	15	15
Number of accessible parking spaces	1	1
Number of off street loading facilities		

12. Residential (if applicable)

Number of buildings existing: 0

Number of buildings proposed: 10 blocks (44 units)

Is this a conversion or addition to an existing building? ☐ Yes ▣ No

If yes, describe: _____

Type	Number of Units	Floor Area per Unit in m2
Single Detached		
Semi-Detached		
Duplex		
Triplex		
Four-plex		
Group Townhouse	44	170 (3-storey) / 121 (1-storey) / 162 (1.5-storey)
Stacked Townhouse		
Apartment - Bachelor		
Apartment - One bedroom		
Apartment - Two bedroom		
Apartment - Three bedroom		

Other facilities provided (for example: play facilities, underground parking, games room, or swimming pool):

13. Commercial/Industrial Uses (if applicable)

Number of buildings existing: _____

Number of buildings proposed: _____

Is this a conversion or addition to an existing building? ☐ Yes ▣ No

If yes, describe:

_____

Indicate the gross floor area by the type of use (for example: office, retail, or storage):

_____

_____

_____

Seating Capacity (for assembly halls or similar): _____

Total number of fixed seats: _____

Describe the type of business(es) proposed: _____

Total number of staff proposed initially: _____

Total number of staff proposed in five years: _____

Maximum number of staff on the largest shift: _____

Is open storage required: ☐ Yes ▣ No

Is a residential use proposed as part of, or accessory to commercial/industrial use?

☐ Yes ☐ No If yes please describe:

_____

_____

14. Institutional (if applicable)

Describe the type of use proposed: _____

Seating capacity (if applicable): _____

Number of beds (if applicable): _____

Total number of staff proposed initially: _____

Total number of staff proposed in five years: _____

Maximum number of staff on the largest shift: _____

Indicate the gross floor area by the type of use (for example: office, retail, or storage):

_____

_____

_____

15. Describe Recreational or Other Use(s) (if applicable)

_____

_____

_____

_____

_____

D. Previous Use of the Property

1. Has there been an industrial or commercial use on the subject lands or adjacent lands? ■ Yes ☐ No ☐ Unknown

   If yes, specify the uses (for example: gas station or petroleum storage):

   Vehicle repair shop

2. Is there reason to believe the subject lands may have been contaminated by former uses on the site or adjacent sites? ☐ Yes ■ No ☐ Unknown
3. Provide the information you used to determine the answers to the above questions:

   Phase I & II environmental site assessment has been prepared, indicating that the subject lands comply with required environmental standards.

4. If you answered yes to any of the above questions in Section D, a previous use inventory showing all known former uses of the subject lands, or if appropriate, the adjacent lands, is needed. Is the previous use inventory attached? ■ Yes ☐ No

E. Provincial Policy

1. Is the requested amendment consistent with the provincial policy statements issued under subsection 3(1) of the *Planning Act, R.S.O. 1990, c. P. 13*? ■ Yes ☐ No

   If no, please explain:

2. It is owner's responsibility to be aware of and comply with all relevant federal or provincial legislation, municipal by-laws or other agency approvals, including the Endangered Species Act, 2007. Have the subject lands been screened to ensure that development or site alteration will not have any impact on the habitat for endangered or threatened species further to the provincial policy statement subsection 2.1.7? ■ Yes ☐ No

   If no, please explain:

3. Have the subject lands been screened to ensure that development or site alteration will not have any impact on source water protection? ■ Yes ☐ No

   If no, please explain:

   _____

   _____

   Note: If in an area of source water Wellhead Protection Area (WHPA) A, B or C please attach relevant information and approved mitigation measures from the Risk Manager Official.

4. Are any of the following uses or features on the subject lands or within 500 metres of the subject lands, unless otherwise specified? Please check boxes, if applicable.

   Livestock facility or stockyard (submit MDS Calculation with application)

   ☐ On the subject lands or ☐ within 500 meters – distance _____

   Wooded area

   ■ On the subject lands or ☐ within 500 meters – distance _____

   Municipal Landfill

   ☐ On the subject lands or ☐ within 500 meters – distance _____

   Sewage treatment plant or waste stabilization plant

   ☐ On the subject lands or ☐ within 500 meters – distance see D-series analysis

   Provincially significant wetland (class 1, 2 or 3) or other environmental feature

   ☐ On the subject lands or ■ within 500 meters – distance _____

   Floodplain

   ■ On the subject lands or ☐ within 500 meters – distance _____

   Rehabilitated mine site

   ☐ On the subject lands or ☐ within 500 meters – distance _____

   Non-operating mine site within one kilometre

   ☐ On the subject lands or ☐ within 500 meters – distance _____

   Active mine site within one kilometre

   ☐ On the subject lands or ☐ within 500 meters – distance _____

   Industrial or commercial use (specify the use(s))

   ■ On the subject lands or ☐ within 500 meters – distance _____

   Active railway line

   ☐ On the subject lands or ☐ within 500 meters – distance _____

   Seasonal wetness of lands

   ☐ On the subject lands or ☐ within 500 meters – distance _____

   Erosion

   ☐ On the subject lands or ☐ within 500 meters – distance _____

   Abandoned gas wells

   ☐ On the subject lands or ☐ within 500 meters – distance _____

F. Servicing and Access

1. Indicate what services are available or proposed:

Water Supply

- ☒ Municipal piped water
- ☐ Communal wells
- ☐ Individual wells
- ☐ Other (describe below)

_____

Sewage Treatment

- ☒ Municipal sewers
- ☐ Communal system
- ☐ Septic tank and tile bed in good working order
- ☐ Other (describe below)

_____

Storm Drainage

- ☒ Storm sewers
- ☐ Open ditches
- ☐ Other (describe below)

_____

2. Existing or proposed access to subject lands:

- ☒ Municipal road
- ☐ Provincial highway
- ☐ Unopened road
- ☐ Other (describe below)

Name of road/street: Hunt Street North & Queensway West

G. Other Information

1. Does the application involve a local business? ☒ Yes ☐ No

   If yes, how many people are employed on the subject lands?

   Unknown

2. Is there any other information that you think may be useful in the review of this application? If so, explain below or attach on a separate page.

_____

_____

_____

_____

H. Supporting Material to be submitted by Applicant

In order for your application to be considered complete, **folded** hard copies (number of paper copies as directed by the planner) and an **electronic version (PDF) of the properly named site plan drawings, additional plans, studies and reports** will be required, including but not limited to the following details:

1. Concept/Layout Plan
2. All measurements in metric
3. Key map
4. Scale, legend and north arrow
5. Legal description and municipal address
6. Development name
7. Drawing title, number, original date and revision dates
8. Owner's name, address and telephone number
9. Engineer's name, address and telephone number
10. Professional engineer's stamp
11. Existing and proposed easements and right of ways
12. Zoning compliance table – required versus proposed
13. Parking space totals – required and proposed
14. All entrances to parking areas marked with directional arrows
15. Loading spaces, facilities and routes (for commercial developments)
16. All dimensions of the subject lands
17. Dimensions and setbacks of all buildings and structures
18. Location and setbacks of septic system and well from all existing and proposed lot lines, and all existing and proposed structures
19. Gross, ground and useable floor area
20. Lot coverage
21. Floor area ratio
22. Building entrances, building type, height, grades and extent of overhangs
23. Names, dimensions and location of adjacent streets including daylighting triangles
24. Driveways, curbs, drop curbs, pavement markings, widths, radii and traffic directional signs
25. All exterior stairways and ramps with dimensions and setbacks
26. Retaining walls including materials proposed
27. Fire access and routes
28. Location, dimensions and number of parking spaces (including visitor and accessible) and drive aisles
29. Location of mechanical room, and other building services (e.g. A/C, HRV)
30. Refuse disposal and storage areas including any related screening (if indoors, need notation on site plan)
31. Winter snow storage location

32. Landscape areas with dimensions
33. Natural features, watercourses and trees
34. Fire hydrants and utilities location
35. Fencing, screening and buffering – size, type and location
36. All hard surface materials
37. Light standards and wall mounted lights (plus a note on the site plan that all outdoor lighting is to be dark sky compliant)
38. Business signs (make sure they are not in sight lines)
39. Sidewalks and walkways with dimensions
40. Pedestrian access routes into site and around site
41. Bicycle parking
42. Architectural elevations of all building sides
43. All other requirements as per the pre-consultation meeting

In addition, the following additional plans, studies and reports, including but not limited to, **may** also be required as part of the complete application submission:

☐ Zoning Deficiency Form

☐ On-Site Sewage Disposal System Evaluation Form (to verify location and condition)

▣ Architectural Plan

▣ Buildings Elevation Plan

☐ Cut and Fill Plan

▣ Erosion and Sediment Control Plan

▣ Grading and Drainage Control Plan (around perimeter and within site) (existing and proposed)

☐ Landscape Plan

▣ Photometric (Lighting) Plan

▣ Plan and Profile Drawings

▣ Site Servicing Plan

▣ Storm water Management Plan

▣ Street Sign and Traffic Plan

☐ Street Tree Planting Plan

☐ Tree Preservation Plan

▣ Archaeological Assessment

▣ Environmental Impact Study

- ▣ Functional Servicing Report
- ▣ Geotechnical Study / Hydrogeological Review
- ☐ Minimum Distance Separation Schedule
- ☐ Noise or Vibration Study
- ☐ Record of Site Condition
- ▣ Storm water Management Report
- ▣ Traffic Impact Study – please contact the Planner to verify the scope required

Site Plan applications will require the following supporting materials:

1. Two (2) complete sets of the site plan drawings folded to 8½ x 11 and an electronic version in PDF format
2. Letter requesting that the Holding be removed (if applicable)
3. A cost estimate prepared by the applicant's engineer
4. An estimate for Parkland dedication by a certified land appraiser
5. Property Identification Number (PIN) printout

Standard condominium exemptions will require the following supporting materials:

- ☐ Plan of standard condominium (2 paper copies and 1 electronic copy)
- ☐ Draft condominium declaration
- ☐ Property Identification Number (PIN) printout

Your development approval might also be dependent on other relevant federal or provincial legislation, municipal by-laws or other agency approvals.

All final plans must include the owner's signature as well as the engineer's signature and seal.

I. Development Agreements

A development agreement may be required prior to site plan approval, subdivision and condominium applications. Should this be necessary for your development, you will be contacted by the agreement administrator with further details of the requirements including but not limited to insurance coverage, professional liability for your engineer, additional fees and securities.

J. Transfers, Easements and Postponement of Interest

The owner acknowledges and agrees that if required it is their solicitor's responsibility on behalf of the owner for the registration of all transfer(s) of land to the County, and/or transfer(s) of easement in favour of the County and/or utilities. Also, the owner further acknowledges and agrees that it is their solicitor's responsibility on behalf of the owner for the registration of postponements of any charges in favour of the County.

K. Permission to Enter Subject Lands

Permission is hereby granted to Norfolk County officers, employees or agents, to enter the premises subject to this application for the purposes of making inspections associated with this application, during normal and reasonable working hours.

L. Freedom of Information

For the purposes of the *Municipal Freedom of Information and Protection of Privacy Act*, I authorize and consent to the use by or the disclosure to any person or public body any information that is collected under the authority of the *Planning Act, R.S.O. 1990, c. P. 13* for the purposes of processing this application.

HFW Holdings Limited
per: _____ May 17, 2024
Herbert H Chiu, director

Owner/Applicant Signature | Date

M. Owner's Authorization

If the applicant/agent is not the registered owner of the lands that is the subject of this application, the owner(s) must complete the authorization set out below.

I/We HFW Holdings Limited (c/o Director Herbert Chiu) am/are the registered owner(s) of the lands that is the subject of this application.

I/We authorize G. Douglas Vallee Limited to make this application on my/our behalf and to provide any of my/our personal information necessary for the processing of this application. Moreover, this shall be your good and sufficient authorization for so doing.

HFW Holdings Limited
per: _____ May 17, 2024
Herbert H Chiu, director

Owner | Date

_____ _____

Owner | Date

N. Declaration

I, Herbert H Chiu, director of HFW Holdings Limited of the City of Richmond Hill of the Regional Municipality of York

solemnly declare that:

all of the above statements and the statements contained in all of the exhibits transmitted herewith are true and I make this solemn declaration conscientiously believing it to be true and knowing that it is of the same force and effect as if made under oath and by virtue of *The Canada Evidence Act*.

Declared before me at:

the City of Markham

Herbert H Chiu
Owner/Applicant Signature

In the Regional Municipality of York

This 17th day of May

A.D., 20 24

A Commissioner, etc.
KIN-BUN NG
Barrister, Solicitor & Notary Public
Ontario

For Ministry Use Only
À l'usage exclusif du ministère

Ministry of Government Services
Ontario

Ministère des Services gouvernementaux

Ontario Corporation Number
Numéro de la société en Ontario

1861330

CERTIFICATE
This is to certify that these articles are effective on

CERTIFICAT
Ceci certifie que les présents statuts entrent en vigueur le

NOVEMBER 0 1 NOVEMBRE 2011

Director / Directrice
Business Corporations Act / Loi sur les sociétés par actions

Form 1
Business Corporations Act

Formule 1
Loi sur les sociétés par actions

ARTICLES OF INCORPORATION
STATUTS CONSTITUTIFS

1. The name of the corporation is: (Set out in BLOCK CAPITAL LETTERS)
Dénomination sociale de la société : (Écrire en LETTRES MAJUSCULES SEULEMENT)

HFW HOLDINGS LIMITED

2. The address of the registered office is:
Adresse du siège social :

3 FERNWOOD COURT
(Street & Number or R.R. Number & if Multi-Office Building give Room No.)
(Rue et numéro ou numéro de la R.R. et, s'il s'agit d'un édifice à bureaux, numéro du bureau)

RICHMOND HILL — ONTARIO — L4B3C2
(Name of Municipality or Post Office) / (Postal Code)
(Nom de la municipalité ou du bureau de poste) / *(Code postal)*

3. Number of directors is/are:
Nombre d'administrateurs :

Fixed number / *Nombre fixe* [ ]
OR / ***OU*** minimum and maximum / *minimum et maximum* — ONE — TEN

4. The first director(s) is/are:
Premier(s) administrateur(s) :

First name, middle names and surname *Prénom, autres Prénoms et nom de famille*	Address for service, giving Street & No. or R.R. No., Municipality, Province, Country and Postal Code *Domicile élu, y compris la rue et le numéro, le numéro de la R.R. ou le nom de la municipalité, la province, le pays et le code postal*	Resident Canadian? Yes or No *Résident canadien? Oui/Non*
Herbert Chiu	3 Fernwood Court Richmond Hill ON L4B 3C2	Yes
Fidelia W Louie	3 Fernwood Court Richmond Hill ON L4B 3C2	Yes
Tiffany W Chiu	3 Fernwood Court Richmond Hill ON L4B 3C2	Yes

10. The names and addresses of the incorporators are:
Noms et adresses des fondateurs :

First name, middle names and surname or corporate name *Prénom, autres prénoms et nom de famille ou dénomination sociale*	Full address for service or if a corporation, the address of the registered or head office giving street & No. or R.R. No., municipality, province, country and postal code *Domicile élu au complet ou, dans le cas d'une société, adresse du siège social ou adresse de l'établissement principal, y compris la rue et le numéro ou le numéro de la R.R., la municipalité, la province, le pays et le code postal*
Herbert H Chiu	3 Fernwood Court Richmond Hill ON L4B 3C2
Fidelia W Louie	3 Fernwood Court Richmond Hill ON L4B 3C2
Tiffany W Chiu	3 Fernwood Court Richmond Hill ON L4B 3C2

These articles are signed in duplicate.
Les présents statuts sont signés en double exemplaire.

Full name(s) and signature(s) of incorporator(s). In the case of a corporation set out the name of the corporation and the name and office of the person signing on behalf of the corporation
Nom(s) au complet et signature(s) du ou des fondateurs. Si le fondateur est une société, indiquer la dénomination sociale et le nom et le titre de la personne signant au nom de la société

Signature / signature	Herbert H Chiu Name of incorporator (or corporation name & signatories name and office) *Nom du fondateur (ou dénomination sociale et nom et titre du signataire)*
Signature / signature	Fidelia W Louie Name of incorporator (or corporation name & signatories name and office) *Nom du fondateur (ou dénomination sociale et nom et titre du signataire)*
Signature / signature	Tiffany W Chiu Name of incorporator (or corporation name & signatories name and office) *Nom du fondateur (ou dénomination sociale et nom et titre du signataire)*
Signature / signature	Name of incorporator (or corporation name & signatories name and office) *Nom du fondateur (ou dénomination sociale et nom et titre du signataire)*

DRAWING LIST SPA

ARCHITECTURAL

A100	COVER SHEET SPA
A101	SITE PLAN
A102	SITE PLAN DETAILS & CANADA POST
A103	EXISTING SITE SURVEY

CONSULTANT LIST

ARCHITECTURAL / STRUCTURAL / CIVIL

vallee
Consulting Engineers, Architects & Planners

CONTACTS:

ARCHITECTURE:
LESLEY HUTTON-RHORA
BRODI MARTIN, B.ARCH.SC.

CIVIL ENGINEERING:
JOHN IEZZI, P.ENG.
NATALIE ORSENA, P.ENG.

ELECTRICAL

SEI Electrical Engineering
12 ARGYLE ST. N.,
CALEDONIA, ON N3W 1B6
TEL. (289)284-0954

CONTACTS:

KEITH SEGUIN, P. ENG., LEED® AP
JAKUB RUDY, B.A

MECHANICAL

G2S Consulting Inc.
652 CONSULTING INC.
4361 HARVESTER RD. SUITE 12,
BURLINGTON, ON L7L 5M4
TEL.: (905) 331-3735

CONTACT:

STEPHEN CAMPBELL, P.GEO
GEOFF BELL, P.GEO

ABBREVIATIONS & SHORT FORMS

GENERAL ABBREVIATIONS

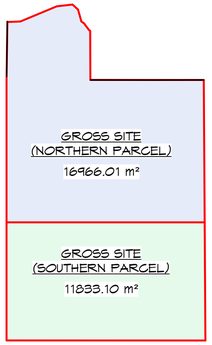
A/F/F & AFF - ABOVE FINISHED FLOOR
AF - ABOVE FINISHED
ADJ. - ADJUSTABLE
ALT. - ALTERNATE
APP - APPLICATION
ARCH. - ARCHITECTURAL
AODA - ACCESSIBILITY FOR ONTARIANS W/ DISABILITIES ACT
BD - BOARD
BF - BARRIER FREE
BFP - BACK FLOW PREVENTER
B/N/C & BNC - BULL NOSE CORNER
BOL. - BOLLARD
BP - BEARING POCKET
BPP - BEARING PLATE POCKET
BR - BICYCLE RACK
CANT. - CANTILEVERED
CBS - CALL BUTTON STATION
CCJ - COMPARTMENT CONTROL JOINT
CHB - CHALK BOARD
CH.TBL. - CHANGE TABLE
CI - CONTINUOUS INSULATION
CJ - CONTROL JOINT
CM - CONTROL MODULE
CH / CCH - COAT HOOK
CMD - CARBON MONOXIDE DETECTOR
COMP. - COMPRESSIBLE / COMPRESSOR
CONT. - CONTINUOUS
CONN. - CONNECTION
CP - CONTROL PANEL
CU - CONDENSING UNIT
CV - CONTROL VALVE
CV - CENTRAL VAC
CVP - CENTRAL VAC PORT
C/W - COMPLETE WITH
DBL. - DOUBLE
DC - DROPPED CURB
DF - DRINKING FOUNTAIN
DW - DISH WASHER
DWG. - DRAWING
DIST. - DISTANCE
DISP. - DISPLAY CASE
DSR - DESIGNATED SUBSTANCE REPORT
EA - EACH
ECS - EMERGENCY CALL SWITCH
E.F. - EACH FACE
ELEV. - ELEVATION
ENG.D - ENGINEERED
ENG - ENGINEER
EPB - EMERGENCY PUSH BUTTON
EW - EYE WASH STATION
EW - EACH WAY
EX. - EXISTING
EXP. - EXPOSED
FB - FIRE BLOCK
FD - FLOOR DRAIN
FDTN. - FOUNDATION
FEC - FIRE EXTINGUISHER CABINET
FE - FIRE EXTINGUISHER
FDG - FOLD DOWN GRAB BAR
FLEX. - FLEXIBLE
FLR. - FLOOR
FLRING. - FLOORING
FR - REFRIDGERATOR
FRZE - FREEZER
F/R/R & FRR - FIRE RESISTANCE RATING
FS - FIRE STOP
FSS - FOLD DOWN SHOWER SEAT
FTG.'S - FOOTINGS
F.V - FIELD VERIFY
FN - FOUNDATION WALL
GALV. - GALVANIZED
GAZ. - GAZEBO
GB & GBH - GRAB BAR
GD - GARBAGE DISPOSAL
GEN. - GENERATOR
GL - GRID LINE
GM - GAS METER
HB - HOSE BIB
HD - HAND DRYER
H/D - HEAVY DUTY
HO - HOLD OPEN
HORIZ. - HORIZONTAL
HWH - HOT WATER HEATER
INSUL. - INSULATION
ICB - INTEGRAL COVE BASE
KP - KEY PAD
L - LOCK
M / MIRR. - MIRROR
MANUF. - MANUFACTURED
MAX. - MAXIMUM
MECH. - MECHANICAL
MIN. - MINIMUM
M.O/L & MOL - MINISTRY OF LABOUR
M.O/T & MOT - MINISTRY OF TRANSPORTATION
MS - MOP SINK
MTD. - MOUNTED
MW - MICROWAVE
NADG - NORFOLK ACCESSIBILITY DESIGN GUIDELINES
N.I.C & NIC - NOT IN CONTRACT
NO. - NUMBER
NTS - NOT TO SCALE
OBC - ONTARIO BUILDING CODE
O/D - OUTSIDE DIAMETER
O/H - OVERHEAD
O/W - ONE WAY
PER.'S - PERIMETER / PERIMETERS PER.('S)
PB - POWER OPERATOR PUSH BUTTON
PDC - POWER DOOR CONTROL BUTTON
PDO - POWER DOOR OPERATOR
POS - PROTECTION OF SOFFITS
PTD/D - PAPER TOWEL DISPENSER/DISPOSAL
P.I/P & PIP - POURED IN PLACE
PRE-FIN. - PRE-FINISHED
PROF. ENG. - PROFESSIONAL ENGINEER
P.T - PRESERVATIVE TREATED
RCH - RECESSED CABINET HEATER
REQ.'D - REQUIRED
RCP - REFLECTED CEILING PLAN
REIN. - REINFORCED
REINF.'G - REINFORCING
REF. - REFERENCE
REF - REFRIDGERATOR
REL. - RELOCATED
RD - ROOF DRAIN
RM. - ROOM
R/O - ROUGH OPENING
RW - RAIN WATER LEADER
SA - SMOKE ALARM
SC - SAN CUT
SCD - TOILET SEAT COVER DISPENSER
SCH.'S - SCHEDULES
SD - SCUPPER DRAIN
SD - SOAP DISPENSER
SH - SOAP HOLDER
SHH - SHOWER HEAD & MIXING VALVE / WAND
SHF - SHELF
SND - SANITARY NAPKIN DISPOSAL
SNV - SANITARY NAPKIN VENDING DISPENSER
S.O.G'S & SOG'S - SLAB ON GRADE
SP - SOAP DISPENSER
SP - SUMP PUMP
SPEC.'D - SPECIFIED
SPMDD - STD. PROCTOR MAX. DRY DENSITY
SR - SHOWER ROD
ST. - STOVE
STRUCT. - STRUCTURAL
TB - TACK BOARD
TBD - TO BE DETERMINED
TC - TEACHER'S CABINET/CLOSET
TH. - THERMOSTAT
THERM. - THERMAL
TM - TILTED MIRROR
TOB - TOWEL BAR
TPD - TOILET PAPER DISPENSER
TWF - THRU WALL FLASHING
TYP. - TYPICAL
ULC - UNDERWRITERS LABORATORIES OF CANADA
U/C - UNDER CUT
U/S - UNDER SIDE
U/N/O - UNO - UNLESS NOTED OTHERWISE
VAP. - VAPOUR
VAR. - VARIES
VERT. - VERTICAL
W/ - WITH
WB - WHITE BOARD/MARKER BOARD
WBF - WATER BOTTLE FILL UP STATION
WC - WATER COOLER
WM - WATER METER
WR - WASTE RECEPTACLE
WS - WATER SOFTENER
% - PERCENT
@ - AT
O/C - ON CENTER

MATERIAL ABBREVIATIONS

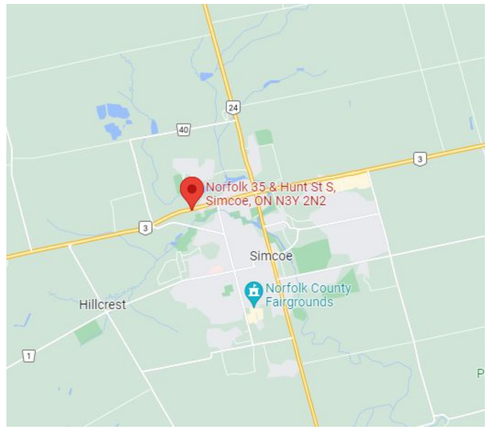
AB - ARCHITECTURAL BLOCK
ACT - ACOUSTIC CEILING TILE
ASPH. - ASPHALT
AWP - ACOUSTIC WALL PANEL
AT - ACOUSTIC TILE
AL - ALUMINUM
AN - ANODIZED
AN(C) - ANODIZED COLOURED
B - BRICK
B4B - BOARD & BATTEN
BPG - BACK PTD. GLASS
CAR - CARPET
CPT - CARPET TILE
CB - CONCRETE BLOCK
CEM - CEMENT BOARD
CT - CERAMIC TILE
CONC - CONCRETE
C(S) - CONC. SEALED
CTF - CORK TILE FLOORING
EM - EXPANDED METAL
EP - EPOXY PAINT & PRIMER
ESF - EPOXY SEALED FLOORING
ET - EPOXY TERRAZZO
F - FIRELITE GLAZING
FG - FIBREGLASS
FT - FLOCKED TILE (CARPETING)
GB / GBD. / GYP.BD. - GYPSUM BOARD
GLB - GLASS BLOCK
GLBL - GLAZED BLOCK
GL - GLAZING / GLASS
GWG - GEORGIAN WIRE GLAZING
GM - GYM MAT
GMT - GLASS MOSAIC TILE
HM - HOLLOW METAL
HARDWD. - HARDWOOD
H/D/G - HDG - HOT DIPPED GALV.
IMP - INSULATED METAL PANELS
LCC - LEAD COATED COPPER
LINO - LINOLEUM
LSG - LAMINATED SAFETY GLAZING
LVT - LUXURY VINYL TILE
LVP - LUXURY VINYL PLANK
LXG - LEXAN GLAZING
MAR - MARMOLEUM
MAS - MASONITE
MS - METAL SIDING
MTL - METAL
MW - MOVEABLE WALL SYSTEM
NAT. - NATURAL
PB - PARTICLE BOARD
PC - PRECAST CONC.
P / PTD. - PAINTED
PF / PRE.FIN. - PREFINISHED
PL - PLASTER
PLAM - PLASTIC LAMINATE
PLYWD. - PLYWOOD
PMF - PREFORMED METAL PANEL
PSP - PIERCED STEEL PLANKING
PT - PORCELAIN TILE
PQF - PARQUET FLOORING
QT - QUARRY TILE
QVT - QUARTZ VINYLTILE
R - RUBBER
RB - RUBBER BASE
RSF - RESILIENT SHEET FLOORING
S - STONE
SAFF - SAFETY FLOORING
SC - SPECIAL COATING
SF - SPORTS FLOORING
SG - LAMINATED SAFETY GLASS
SGL - SPANDREL GLAZING
SHV - SHEET VINYL FLOORING
S.S. - SOLID SURFACE
ST - STUCCO
ST / STL - STEEL
S/S - STAINLESS STEEL
S&V - STAINED & VARNISHED
SWC - SOLID WOOD CORE
T - TEMPERED GLAZING / GLASS
TDG - TEMPERED DOUBLE GLAZING / GLASS
TMB - TILE BACKER BOARD
TECTUM - TECTUM ACOUSTIC PANEL
TERR - TERRAZZO
TURF - ARTIFICIAL TURF
U - POLYURETHANE
V - VINYL
VCGB - VINYL COATED GYPSUM BOARD
VCP - VENEER CORE PLYWOOD
VCT - VINYL COMPOSITE TILE
VPF - VINYL PLANK FLOORING
VR - VENTED RUBBER BASE
WD. - WOOD
WP - WATER PROOFING

RM. NAMES

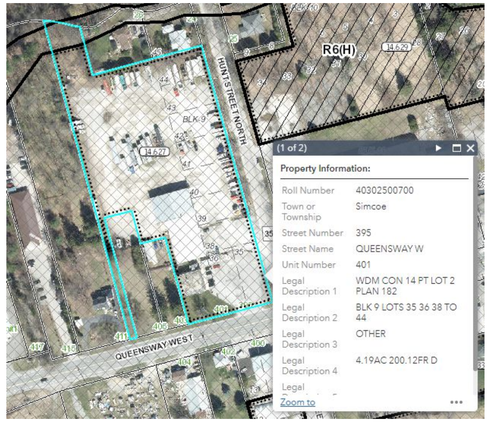
AL. - AIR LOCK
CL. - CLOSET
CLASSRM. - CLASSROOM
COMM. - COMMUNICATION
CONF. - CONFERENCE
CORR. - CORRIDOR
ELEC. - ELECTRICAL
ELEV. - ELEVATOR
INST. - INSTRUCTOR
LAB - LABORATORY
LAU. - LAUNDRY
PR. - POWDER ROOM
PRINC. - PRINCIPAL
REC. - RECEPTION
RECEIV. - RECEIVING
RM. - ROOM
SHWR. - SHOWER
STOR. - STORAGE
ST. - STATION
SUR. - SURGERY
VEST. - VESTIBULE
VP - VICE PRINCIPAL
WR. - WASHROOM



1 / A100 GROSS SITE
SCALE 1 : 2000



KEY MAP
SCALE 1 : 100



SITE MAP
SCALE 1 : 100

SITE STATISTIC & ZONING REQ.'S

PROPERTY LEGAL DESCRIPTION:
395, 401, 402, 405, 411 QUEENSWAY WEST IN THE TOWN OF NORTH SIMCOE, IN THE DISTRICT OF NORFOLK COUNTY

ZONING:
IN ACCORDANCE TO THE TOWN OF SIMCOE, ZONING BY-LAW 1-Z-2014 NORFOLK COUNTY - JANUARY-2021-CONSOLIDATION

PROVISION	***LAND USE: PROPOSED (NORTHERN PORTION)***
5.0 5.4 5.4.1	***ZONING AMENDMENT:*** RESIDENTIAL ZONES URBAN RESIDENTIAL TYPE 4 ZONE (R4) PERMITTED USES *In an R4 Zone, no land, building or structure* shall be used except in accordance with the following uses: *a) group townhouse* *c) street townhouse* *d) semi-detached, duplex, tri-plex and four-plex dwellings* provided they are located on the same *lot* with, and in accordance with the *Zone* provisions of, *group townhouse*

PROVISION	***SETBACKS (m - METERS):***	***REQ'D (s) Street Townhouse (per unit)***	***REQ'D (s) Group Townhouse Stacked Townhouse***	***PROVIDED (m)***
5.4.2a)	MIN. LOT AREA: *i)* ATTACHED GARAGE *ii)* CORNER LOT *iii)* DETACHED GARAGE	156m² 264m² 162m²	185m² 195m² 215m²	16,966m² - -
5.4.2b)	MIN. LOT FRONTAGE: *i)* INTERIOR LOT *ii)* CORNER LOT *iii)* CORNER LOT ACCESSED BY A REAR LANE	6.5 11 6.5	30 30	101.2 - -
5.4.2c)	MIN. FRONT YARD : *i)* ATTACHED GARAGE *ii)* DETACHED GARAGE OR REAR YARD PARKING	6 1.5	6 1.5	MIN. 6 -
5.4.2d)	MIN. EXTERIOR SIDE YARD: *i)* W/ A 6m FRONT YARD *ii)* W/ A 1.5m FRONT YARD	6 1.5	6 1.5	- -
5.4.2e)	MIN. INTERIOR SIDE YARD	1.2	3	MIN. 6.8
14.1038	MIN. REAR YARD : *i)* ATTACHED GARAGE	3	3	4.3
5.4.2g)	MIN. SEPARATION BETWEEN TOWNHOUSE DWELLINGS	2	2	3
14.1038	MAX. BLDG. HEIGHT	13	13	MAX. 13
5.4.3	*Setback from Mutual Side Lot Line.* Notwithstanding the *required side yard*, on a mutual *side lot line* separating two *(2) attached townhouse* units, no *interior side yard* is required where the walls are joined, where the walls are not joined, a 1.2 metre *side yard* shall be *required*.	1.2	1.2	MIN. 1.2
5.4.4	*Maximum Units in a Townhouse Dwelling* No more than eight *(8) dwelling units* shall be located in a *townhouse dwelling*.	8 UNITS	8 UNITS	6 UNITS

COORD. W/ ZONING BY-LAW FOR ALL OTHER ZONING REQ.'S

PARKING REQ.'D RESIDENTIAL (R4)

PROVISION	***NUMBER OF PARKING SPACES***	***REQUIRED***	***PROVIDED***
4.9a)	SINGLE DETACHED, SEMI-DETACHED, DUPLEX, TRI-PLEX, FOUR-PLEX, TOWNHOUSE DWELLINGS & VACATION HOME (2-Z-2011): **2** SPACES / DWELLING UNIT **2** SPACES x **44** DWELLING UNITS = **88**	**88** SPACE(S)	**88** SPACE(S)

PARKING REQ.'D RESIDENTIAL - VISITOR:

4.9f)	VISITOR PARKING: 1 SPACE / 3 DWELLING UNITS 1 SPACE x (**44** / **3**) = **15**	**15** SPACE(S)	**15** SPACE(S)

PARKING REQ.'D RESIDENTIAL - TOTAL:

	TOTAL		
		103 SPACE(S)	**103** SPACE(S)

PARKING REQ.'D RESIDENTIAL - BARRIER FREE: (PART OF REQ.'D PARKING)

4.3.3	BARRIER FREE PARKING REQ.'D: **1-25** PARKING SPACES =		
	TYPE 'A' (3.4m WIDE) PLUS 1.5m AISLE	1 SPACE(S)	1 SPACE(S)
	TYPE 'B' (2.4m WIDE) PLUS 1.5m AISLE	0 SPACE(S)	0 SPACE(S)

4.0 OFF STREET PARKING
PARKING SPACE DIMENSIONS

4.1 4.1.3a)	PARKING SPACE DIMENSIONS WIDTH OF PARKING SPACE: FOR VEHICLES PARKED SIDE BY SIDE FOR VEHICLES PARKED WITH WALL OR FENCE ADJ.	3 MIN. 3.3 MIN.	3 3.3
4.1.3b)	DEPTH OF PARKING SPACE: FOR 90 DEGREE PARKING FOR PARALLEL PARKING	5.8 MIN. 7 MIN.	5.8 7
4.1.4 4.1.4b)	PARKING AISLE REQ.'S TWO-WAY TRAFFIC	7.3 MIN.	7.3 MIN.

4.2 LOCATION OF PARKING ON A LOT

4.2.3	**4.2.3 Residential Parking Area** For Urban Residential Type 1 to 4 *Zones* (R1 to R4), the following shall apply: *a)* within a *front yard* or *exterior side yard*, *motor vehicles* shall only be parked on a *driveway*, in a *parking space* or private garage *[1-Z-2015]*; *b)* not more than one *(1) required parking space* may be located within the *required front yard* or *required exterior side yard [1-Z-2015]*; *c) vehicles* shall not be parked within any *landscape area [1-Z-2015]*;
4.2.4	**4.2.4 Other Provisions** *a)* For tri-plex *dwellings*, duplex *dwellings*, four-plex *dwellings*, street *townhouses*, stacked *townhouses*, and boarding or lodging houses, required parking spaces shall be prohibited within the required front yard or required exterior side yard; except where a dwelling unit has a private garage in which case the driveway leading to the private garage may be used as a parking space subject to the size requirements herein; *b)* For *group townhouses* and *apartment dwellings*, no *parking lot* shall be located closer than 3 metres from any *dwelling* on the *lot* or of any *interior lot line* abutting another residential *Zone*; *c)* For *group townhouses* and *apartment dwellings*, no parking lot or *parking space* shall be located between a *dwelling* and the *street line*, except for individual or tandem *parking spaces* leading directly to each *townhouse dwelling unit*; *d)* For commercial or industrial properties, no *parking lot* shall be located closer than 4.5 metres from any *interior lot line* abutting a residential *Zone*; *e)* For accessory residential *dwelling units*, notwithstanding the foregoing, one *(1) parking space* dedicated for the use of the *accessory residential dwelling unit*, may be *permitted* in the *front yard* provided a minimum of 50 percent of the *required front yard* shall be maintained as landscaped open space notwithstanding such dedicated *parking space*.

LANDSCAPED AREA

2.81	**"LANDSCAPE AREA"** shall mean an area of land comprised of trees, shrubs, flowers, grass or other horticultural elements. Landscaping may include pervious paths, patios, walkways, or elements designed to enhance the visual amenity of a property but does not include open storage display areas, parking or loading areas, or areas covered by *driveways. [3-Z-2015]*
4.2.5	**4.2.5 Parking and *Landscape Area* *[1-Z-2015]*** Within Urban Residential Type 1 to 4 *Zones* (R1 to R4), the following shall apply: *a)* A minimum of 50 percent of the *front yard* shall be maintained as *landscape area*. *b)* In the case of a *corner lot*, a minimum of 50 percent of each of the *front yard* and *exterior side yard* shall be maintained as *landscape area*.

LOT COVERAGE:	***PROVIDED (m²)***	
BLDG. (GROSS / FOOTPRINT)	5188.6m²	30%
ASPHALT PARKING, PLAY & DRIVEWAY	3198.1m²	19%
SIDEWALKS & HARD SURFACE AREAS	850.2m²	6%
LANDSCAPED OPEN SPACE	7620.3m²	45%

BLDG. & OBC CLASSIFICATION:
GROUP C: RESIDENTIAL

NO.	DATE	ISSUANCE
1	2024.05.17	ISSUED FOR SPA

NO.	DATE	ISSUANCE

PROPERTY LEGAL DESCRIPTION:
PARTS 1, 2, & 3 ON PLAN 37R 11733

APPLICANT:
WFH HOLDINGS LIMITED
HERBERT CHU
3 FERNWOOD COURT,
RICHMOND HILL, ONTARIO
L4B 3G2
1.416.919.9768

DO NOT SCALE DRAWINGS, CALL FOR ANY CLARIFICATIONS THAT ARE REQUIRED, FIELD VERIFY AT ALL BUILT CONDITIONS

ALL DWG.'S ARE TO BE READ IN COLOUR

ORIGINAL PAGE SIZE ARCH 'D' - 24" x 36"

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE ONTARIO N3Y 3W4
(519) 426-6270

LICENSED PROFESSIONAL ENGINEER
22-013
2024.05.16
N. L. ONGENA
100539190
PROVINCE OF ONTARIO

PROJECT TITLE:
HUNT ST. N. RESIDENTIAL
HUNT STREET NORTH,
SIMCOE, ON N3Y 2M9

DRAWING TITLE:
COVER SHEET SPA

CHECKED BY:	DRAWN BY:
JI/LHR	BM
DRAWING SCALE: As indicated	DRAWING NO.: A100
PROJECT NO.: 22-013	

DATE PLOTTED: 5/17/2024 8:22:39 AM PROJECT NUMBER & NAME: 22-013 HUNT ST. N. RESIDENTIAL FILE PATH: H:\Projects\2022\22-013 HFW Holdings Hunt St Residential\Drawings\Arch\22-013 Hunt St Residential - Site.rvt

BLDG. HEIGHT - NORFOLK COUNTY:
shall mean the vertical distance between the average *finished grade* of the ground at the front wall of a *building* and:
a) in the case of a flat roof or a mansard roof, the highest point of the roof surface;
b) in the case of any other roof, the highest point of the ridge. *[8-2-2017]*

DISCLAIMER:
ALL EXISTING SITE INFORMATION WAS PROVIDED BY JEWITT AND DIXON ONTARIO LAND SURVEYORS IN THE FORM OF AN ELECTRONIC FILE PLAN FILE No. 23-3563 DATED 2023.11.02 CONSISTING OF THE LEGAL SURVEY PLAN

REFERENCE NOTE:
FOR OTHER SITE CONDITIONS, EXISTING TO REMAIN OR NEW TO BE PROVIDED, THIS DWG. IS TO BE READ IN CONJUNCTION W/ ALL OTHER DWG.'S LISTED ON A100 DWG. LIST

LIGHTING NOTE:
LIGHTING MUST BE DIRECTED ON SITE AND MUST NOT SPILL OVER TO / ONTO ADJACENT PROPERTIES OR STREETS. PROVIDE "HOUSE SHIELDS" WHERE NEEDED, TO COMPLETELY ELIMINATE SPILL / GLARE TO ADJACENT PROPERTIES, DARK SKY COMPLIANT (COORD. W/ ELEC. PHOTOMETRIC SITE PLAN)

BEFORE STARTING WORK

- THE ***AUTHORITY HAVING JURISDICTION*** IS NORFOLK COUNTY
- THE CONTRACTOR SHALL NOTIFY THE ***AUTHORITY HAVING JURISDICTION***, ARCHITECT & CONSULTANTS AT LEAST 48 HOURS PRIOR TO COMMENCING ANY CONST. OR DEMOLITION.
- THE POSITION OF THE POLE LINES, CONDUITS, WATER MAINS, SEWERS, & OTHER UTILITIES & STRUCTURES ARE NOT NECESSARILY SHOWN ON THE CONTRACT DWG.'S. WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES & STRUCTURES IS NOT GUARANTEED & ARE TO BE VERFIED ON SITE.
- ALL POSITIONS OF THE EX. UNDERGROUND UTILITIES WITHIN THE LIMITS OF CONST. SHALL BE LOCATED, MARKED & PROTECTED BY THE CONTRACTOR. ANY UTILITIES DAMAGED OR DISTURBED DURING CONST. SHALL BE REPAIRED OR REPLACED TO THE SATISFACTION OF THE ENGINEER, AT THE CONTRACTOR'S EXPENSE.
- PRIOR TO THE COMMENCEMENT OF CONST., ALL BENCHMARKS, ELEVATIONS, DIMENSIONS, & GRADES MUST BE CHECKED BY THE CONTRACTOR & ANY DISCREPANCIES REPORTED TO THE ENGINEER / ARCHITECT

BENCHMARKS
TWO DIFFERENT BENCHMARKS MUST BE REFERRED TO @ ALL TIMES; REFER TO CIVIL DRAWING SET.

SITE PLAN NOTES

- ALL WORK INVOLVED IN THE CONST., RELOCATION, REPAIR OF MUNICIPAL SERVICES FOR THE PROJECT SHALL BE TO THE SATISFACTION OF THE ***AUTHORITY HAVING JURISDICTION***
- FIRE ROUTE SIGNS & 3-WAY FIRE HYDRANTS SHALL BE ESTABLISHED TO THE SATISFACTION OF THE LOCAL FIRE DEPARTMENT & AT THE EXPENSE OF THE OWNER.
- MAIN DRIVEWAY DIMENSIONS AT THE PROPERTY LINE BOUNDARIES ARE PLUS OR MINUS 7.5m UNO.
- THE APPROVAL OF THIS PLAN DOES NOT EXEMPT THE CONTRACTOR FROM THE REQ.'S TO OBTAIN THE VARIOUS PERMITS/APPROVALS AS MAY BE REQUIRED, SUCH AS, BUT NOT LIMITED TO:

- BUILDING PERMIT
- SANITARY / STORM & WATER PERMITS
- ROAD CUT PERMITS
- RELOCATION OF SERVICES
- APPROACH APPROVAL PERMITS
- ENCROACHMENT AGREEMENTS (IF REQ.'D)
- COMMITTEE OF ADJUSTMENT
- ROAD OCCUPANCY PERMIT
- SITE ALTERATION

GENERAL NOTES:

- FIRE ACCESS ROUTE TO BE POSTED & DESIGNATED UNDER MUNICIPAL BY-LAW (FIRE ACCESS ROUTE TO BE MIN. 6 m WIDE W/ A MIN. 12 m CENTER LINE TURNING RADIUS & MAX. 6% SLOPE)
- COORD. W/ MECH. & ELEC. SITE PLANS FOR ALL EX. & NEW LOCATIONS OF SERVICES & ENTRY OF SERVICES INTO THE BLDG. ENVELOPE. (ALL MECH. & ELEC. INFORMATION INDICATED ON ARCH. SITE DWG. A101 IS FOR GENERAL REFERENCE & COORD. ONLY)
- COORD. W/ SITE GRADING PLAN FOR PROPOSED FINAL FINISH GRADE ELEV.'S & DRAINAGE SLOPES
- COORD. W/ LANDSCAPE SITE PLAN FOR LOCATIONS OF SEEDING, SODDING, PLANTING & PAVING & OTHER HARD SURFACING. COORD. W/ ARCH. SITE PLAN
- TYP. DRIVEWAY & PARKING LOT CONC. CURBS AS INDICATED ON DRAWING. COORD. W/ OPSD DETAILS & SPEC'S. FOR TYPICAL CURB TYPES. SITE DIMENSIONS ARE TO THE FACE OF CURBS
- THE SUB-GRADE SOILS EXPOSED AFTER EXCAVATION SHALL BE INSPECTED & CERTIFIED BY A QUALIFIED REGISTERED PROFESSIONAL SOILS ENGINEER & A COPY OF THE REPORT SHALL BE FORWARDED TO THE ***AUTHORITY HAVING JURISDICTION*** BUILDING DIVISION. WHERE THE FOOTING WILL BE SITUATED ON FILL MATERIAL, THE FOOTINGS SHALL BE DESIGNED & APPROVED BY QUALIFIED REGISTERED PROFESSIONAL ENGINEER
- ALL FILL PLACED ON THE SITE SHALL BE COMPACTED TO A MIN.OF 98% STANDARD PROCTOR DENSITY. A SUFFICIENT NUMBER OF TESTS SHALL BE TAKEN AT VARIOUS LEVELS SATISFACTORY TO THE ENGINEER. TEST RESULTS SHALL BE SENT TO THE ***AUTHORITY HAVING JURISDICTION*** W/ A LETTER, SIGNED & STAMPED BY THE SOILS ENGINEER, STATING THAT A SUFFICIENT NUMBER OF TESTS HAVE BEEN TAKEN & THE MIN. COMPACTION HAS BEEN REACHED
- APPROVAL OF THIS DWG. IS FOR MATERIAL ACCEPTABILITY & COMPLIANCE W/ MUNICIPAL & PROVINCIAL SPEC.'S & STANDARDS ONLY. APPROVAL & INSPECTION BY THE MUNICIPALITY OF THE WORKS DOES NOT CERTIFY THE LINE & GRADE OF THE WORKS & IT IS THE OWNER'S RESPONSIBILITY TO HAVE THEIR ENGINEER CERTIFY THIS ACCORDINGLY
- PROVIDE CONST. GATES / FENCES / BOUNDARIES AS SHOWN / REQ.'D TO THE ***AUTHORITY HAVING JURISDICTION*** REQ.'S. (SUBMIT SHOP DWG.'S FOR LOCATIONS & EXTENTS). A 2.4m HIGH CHAIN LINK FENCE C/W SUPPORTS AS REQ.'D, @ WORK BOUNDARIES TO BE ERECTED BY THE CONTRACTOR PRIOR TO THE COMMENCEMENT OF THE DEMOLITION PROCESS & SHALL REMAIN & BE MAINTAINED IN POSITION INDEFINITELY UNTIL COMPLETION OF NEW CONST. WORK
- CONTRACTOR IS RESPONSIBLE FOR PLANTINGS, SOD, WATERING & MAINTENANCE UNTIL SUBSTANTIAL PERFORMANCE IS ACHIEVED. THE WARRANTY PERIOD WILL COMMENCE UPON SUBSTANTIAL PERFORMANCE OF THIS WORK
- ALL CONCRETE CURBS TO BE 150mm

NOTE:
THIS SITE PLAN APPLICATION APPLIES TO THE NORTHERN PARCEL ONLY (PARTS 1, 2, & 3 ON PLAN 37R-11733).
A SEPERATE AND SUBSEQUENT SITE PLAN APPLICATION WILL BE SUBMITTED FOR THE SOUTHERN PORTION AT A LATER DATE.
(THE INTENDED LAYOUT OF THE SOUTHERN PORTION IS SHOWN FOR COORDINATION PURPOSES ONLY.)

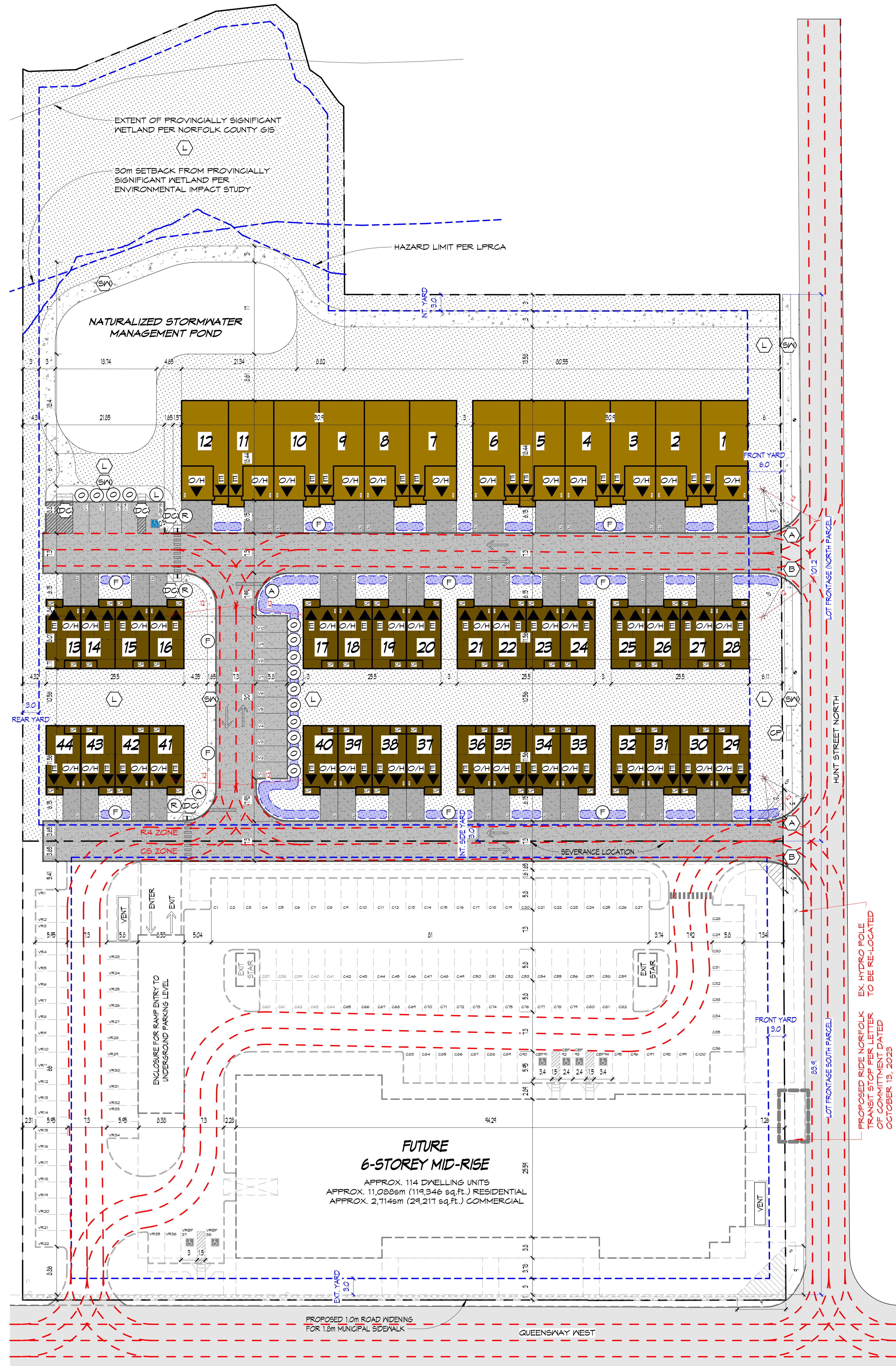
GENERAL NOTES:

- (A) GENERAL CONTRACTOR TO COORDINATE ALL WORK WITHIN THE BOULEVARD W/ THE ***AUTHORITY HAVING JURISDICTION*** & OBTAIN ALL NECESSARY PERMITS & APPROVALS FROM LOCAL AUTHORITIES. EXECUTE ALL WORK AS PER THE MUNICIPAL REQUIREMENTS.
- (B) GENERAL CONTRACTOR TO EXECUTE WORK TO DRIVEWAY ENTRANCE UNDER SUPERVISION OF THE ***AUTHORITY HAVING JURISDICTION***. REFER TO ENTRANCE PERMIT REQUIREMENTS WHERE EXIST. DRIVEWAY ENTRANCE TO BE MODIFIED OR INSTALLATION OF NEW ENTRANCE AS PER MUNICIPAL REQUIREMENTS. PROVIDE NEW CONC. ENTRANCE CURBS TO MATCH EXISTING WHERE INDICATED.
- (L) PLANTING BEDS, TREE PLANTINGS, LANDSCAPE FEATURES & SODDED AREAS
- (SW) CONCRETE SIDEWALK
- (DC) CONCRETE SIDEWALK DROP CURB
- (CP) CANADA POST (COORD. W/ *A103*)

SIGN LEGEND

- (A) STOP SIGN
- (F) NO PARKING - FIRE ROUTE
- (L) NO PARKING, BY PERMIT ONLY, BARRIER-FREE PARKING, VAN ACCESSIBLE - TYPE 'A'
- (O) VISITOR PARKING ONLY
- (R) PEDESTRIAN CROSSING SIGN

NOTE:
CONFIRM LOCATIONS & CONTENT OF ALL SIGNAGE W/ THE OWNER & ***AUTHORITY HAVING JURISDICTION*** PRIOR TO FABRICATION & ERECTION. PROPOSED SITE SIGNAGE TO COMPLY W/ SIGNAGE BY-LAWS
NOTE:
ALL SIGNS TO BE CENTERED ON POSTS TYP.



1 / A101 SITE PLAN
SCALE 1 : 500

SITE PLAN LEGEND

E	ENTRANCE / EXIT DOOR
O/H	ENTRANCE / EXIT DOOR (OVERHEAD DOOR W/ OPERATOR)
	PROPERTY BOUNDARY LINE(S)
	SETBACKS
	SNOW STORAGE (ALL ADDITIONAL SNOW TO BE TAKEN AWAY BY OWNER) (ALL ADDITIONAL SNOW TO BE PILED IN AREAS SHOWN ON SITE PLAN)
	FIRE ROUTE (6m WIDE / 12m CENTER RADIUS)
CP	COVERED PORCH
	PAINTED GRAPHICS ON ASPHALT / CONC.: (COORD. W/ ***THE CITY / TOWN HAVING JURISDICTION*** GUIDELINES)
	• ACCESSIBLE SIGN ON ASPHALT / CONC. (WHITE & BLUE COLOUR)
	• DIRECTIONAL SIGNS ON ASPHALT / CONC. (WHITE COLOUR)
	• CROSSWALK / CROSSING (WHITE COLOUR)
V#	• VEHICULAR STALL MARKINGS (YELLOW COLOUR) VBF# - BARRIER FREE / ACCESSIBLE V# - VISITOR S# - SPARE A1 - ONE REQ.'D DWELLING PARKING A2 - TWO REQ.'D DWELLING PARKING (LETTER REPRESENTS UNIT TYPE)
	• DIAGONAL MARKINGS (WHITE / YELLOW COLOUR)
600	• STOP SIGN VEHICULAR MARKINGS (WHITE COLOUR)
	SIGN (COORD. W/ SIGN LEGEND)
NADS / OPSD	DROP CURB
5000	LOCATED ON THE PROPERTY LINES TYP. VISIBILITY TRIANGLES / SIGHT / DAYLIGHT TO BE MAINTAINED (REMAIN CLEAR) @ BOTH SIDES OF ALL LANEWAY / DRIVEWAYS & INTERSECTIONS. THE MAX. HEIGHT OF ANY OBJECT OR MATURE VEGETATION WITHIN THE VISIBILITY TRIANGLE IS NOT TO EXCEED REQ.'D HEIGHT ABOVE THE CENTRELINE OF THE CORRESPONDING ADJACENT STREET. NORFOLK COUNTY: 5m X 5m LANEWAY, 1m HEIGHT, NO PARKING ALLOWED
VARIES	TACTILE WARNING SURFACE INDICATORS (600mmxLENGTH - TILE) (FOR SITE CONDITIONS ONLY) (COORD. W/ OPSD 310.39) ON SITE • KINESIK ARMOR-TILE CAST IN PLACE IN NEW SURFACES (COLOUR TO BE VERIFIED BY ARCHITECT) MUNICIPAL SIDEWALK LOCATIONS • KINESIK ADVANTAGE CAST IRON CAST IN PLACE IN NEW SURFACES (UNCOATED NATURAL PATINA) (COLOUR TO BE VERIFIED BY ARCHITECT)

HATCH IDENTIFICATION LEGEND

	CONC. SIDEWALK / PAD / CROSSWALK / SIDEWALK / LANEWAY / STAIRS / ETC.
	AREA OF NEW SOD ON 150mm TOPSOIL (COORD. W/ CONST. FOR EXTENTS)
	2-STOREY, 1 GARAGE (8.4m W x 18.4m D)
	3-STOREY, 1 GARAGE (6.4m W x 11.6m D)

GENERAL NOTES:
- SHOP DWG.'S ARE TO BE DIMENSIONED IN METRIC UNITS (IMPERIAL & METRIC BOTH SHOWN IS ACCEPTABLE)
- COORD. W/ EX. SURVEY DWG. FOR LINE WEIGHTS & TYPES AS REVIT IS NOT COMPATIBLE WITH AUTOCAD LINE WEIGHTS & TYPES

NO.	DATE	ISSUANCE
1	2024.05.17	ISSUED FOR SPA

PROPERTY LEGAL DESCRIPTION:
PARTS 1, 2, & 3 ON PLAN 37R 11733

APPLICANT:
WFH HOLDINGS LIMITED
HERBERT CHIU
3 FERNWOOD COURT,
RICHMOND HILL, ONTARIO
L4B 3C2
1.416.919.9768

CN / TN

DO NOT SCALE DRAWINGS, CALL FOR ANY CLARIFICATIONS THAT ARE REQUIRED, FIELD VERIFY AT ALL BUILT CONDITIONS
ALL DWG.'S ARE TO BE READ IN COLOUR
ORIGINAL PAGE SIZE ARCH 'D' - 24" x 36"

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE ONTARIO N3Y 3W4
(519) 426-6270

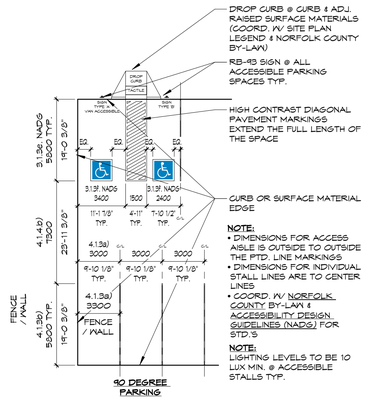
LICENSED PROFESSIONAL ENGINEER
22-013
2024.05.16
N. L. ONGENA
100553190
PROVINCE OF ONTARIO

PROJECT TITLE:
HUNT ST. N. RESIDENTIAL
HUNT STREET NORTH,
SIMCOE, ON N3Y 2M9

DRAWING TITLE:
SITE PLAN

CHECKED BY:	DRAWN BY:
JI/LHR	LHR/BM
DRAWING SCALE: As indicated	DRAWING NO.: A101
PROJECT NO.: 22-013	

DATE PLOTTED 5/17/2024 8:22:33 AM PROJECT NUMBER & NAME: 22-013 HUNT ST. N. RESIDENTIAL FILE PATH: H:\Projects\2022\22-013 HFW Holdings Hunt St Residential\Drawings\Arch\22-013 Hunt St.Residential - Site.rvt



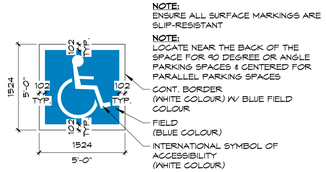
PARKING STALL GUIDELINES - NORFOLK COUNTY

1 / A102 SCALE 1 : 200

• ALL SIGNS TO BE 1.6mm (0.064") THICK ALUM. MIN.

SIGNS - FACE ELEVATIONS

4 / A102 SCALE 1 : 50



NOTE:
ENSURE ALL SURFACE MARKINGS ARE SLIP-RESISTANT

NOTE:
LOCATE NEAR THE BACK OF THE SPACE FOR 90 DEGREE OR ANGLE PARKING SPACES & CENTERED FOR PARALLEL PARKING SPACES

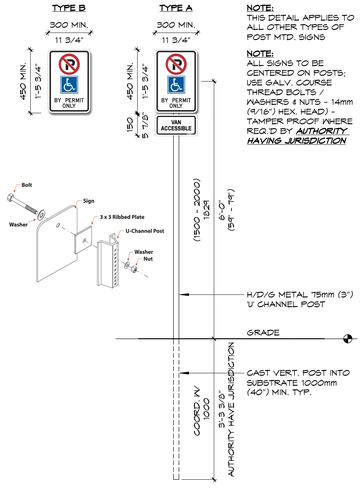
CONT. BORDER (WHITE COLOUR) W/ BLUE FIELD COLOUR

FIELD (BLUE COLOUR)

INTERNATIONAL SYMBOL OF ACCESSIBILITY (WHITE COLOUR)

ACCESSIBLE PARKING PAVEMENT MARKING

2 / A102 SCALE 1 : 50



NOTE:
THIS DETAIL APPLIES TO ALL OTHER TYPES OF POST MTD. SIGNS

NOTE:
ALL SIGNS TO BE CENTERED ON POSTS; USE GALV. COURSE THREAD BOLTS / WASHERS & NUTS - 14mm (9/16") HEX. HEAD) - TAMPER PROOF WHERE REQ.'D BY *AUTHORITY HAVING JURISDICTION*

ACCESSIBLE PARKING VERT. SIGNAGE - NORFOLK

3 / A102 SCALE 1 : 20

NO.	DATE	ISSUANCE
1	2024.05.17	ISSUED FOR SPA
NO.	DATE	ISSUANCE

PROPERTY LEGAL DESCRIPTION:
PARTS 1, 2, & 3 ON PLAN 51R 11733

APPLICANT:
WFH HOLDINGS LIMITED
HERBERT CHU
3 FERNWOOD COURT,
RICHMOND HILL, ONTARIO
L4B 3G2
1.416.919.9768

DO NOT SCALE DRAWINGS, CALL FOR ANY CLARIFICATIONS THAT ARE REQUIRED, FIELD VERIFY AT ALL BUILT CONDITIONS

ALL DWG.'S ARE TO BE READ IN COLOUR

ORIGINAL PAGE SIZE ARCH 'D' - 24" x 36"

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE ONTARIO N3Y 3W4
(519) 426-6270

LICENSED PROFESSIONAL ENGINEER
22-013
2024.05.16
N. L. ONGENA
100533190
PROVINCE OF ONTARIO

PROJECT TITLE:
HUNT ST. N. RESIDENTIAL
HUNT STREET NORTH,
SIMCOE, ON N3Y 2M9

DRAWING TITLE:
SITE PLAN DETAILS & CANADA POST

CHECKED BY:	DRAWN BY:
JI/LHR	BM
DRAWING SCALE: As indicated	DRAWING NO.: A102
PROJECT NO.: 22-013	

DATE PLOTTED: 5/17/2024 8:23:33 AM PROJECT NUMBER & NAME: 22-013 HUNT ST. N. RESIDENTIAL FILE PATH: H:\Projects\2022\22-013 HFW Holdings Hunt St Residential\Drawings\Arch\22-013 Hunt St Residential - Site.rvt

I REQUIRE THIS PLAN TO BE DEPOSITED UNDER THE LAND TITLES ACT.

DATED MARCH 21, 2024

R. C. DIXON
ONTARIO LAND SURVEYOR

PLAN 37R-11733

RECEIVED AND DEPOSITED

DATED 2024/05/01

REPRESENTATIVE FOR THE LAND REGISTRAR FOR THE LAND TITLES DIVISION OF NORFOLK (No. 37)

SCHEDULE

PART	LOT/BLOCK	CONCESSION/ PLAN	PIN	AREA (SQ.M.)
1	PART LOT 2 PART LOTS 39 & 44 BLOCK 9 AND ALL OF LOTS 40, 41, 42 & 43, BLOCK 9	CONCESSION 14 REGISTERED PLAN 182	PART OF PIN 50188-0237 (LT)	14523.686 sq.m
2	PART LOT 2 PART LOT 44 BLOCK 9	CONCESSION 14 REGISTERED PLAN 182	PART OF PIN 50188-0237 (LT)	250.631 sq.m
3	PART LOT 2	CONCESSION 14	PART OF PIN 50188-0237 (LT)	2192.068 sq.m
4	PART LOT 2 PART LOT 39 BLOCK 9	CONCESSION 14 REGISTERED PLAN 182	PART OF PIN 50188-0237 (LT)	644.514 sq.m
5	PART LOT 2 PART LOT 39 BLOCK 9 ALL OF LOTS 35, 36 & 37 BLOCK 9	CONCESSION 14 REGISTERED PLAN 182	PART OF PIN 50188-0237 (LT)	1130.325 sq.m

PARTS 1, 2, 3, 4 & 5 COMPRISE ALL OF PIN 50188-0237 (LT)
PART 2 IS SUBJECT TO AN EASEMENT AS IN INSTRUMENT No. NR582776

PLAN OF SURVEY

OF ALL OF

LOT 35, 36, 38, 39, 40, 41, 42, 43 & 44
BLOCK 9
REGISTERED PLAN 182
(TOWN OF SIMCOE)

AND PART OF

LOT 2
CONCESSION 14

IN THE GEOGRAPHIC
TOWNSHIP OF WINDHAM
IN
NORFOLK COUNTY

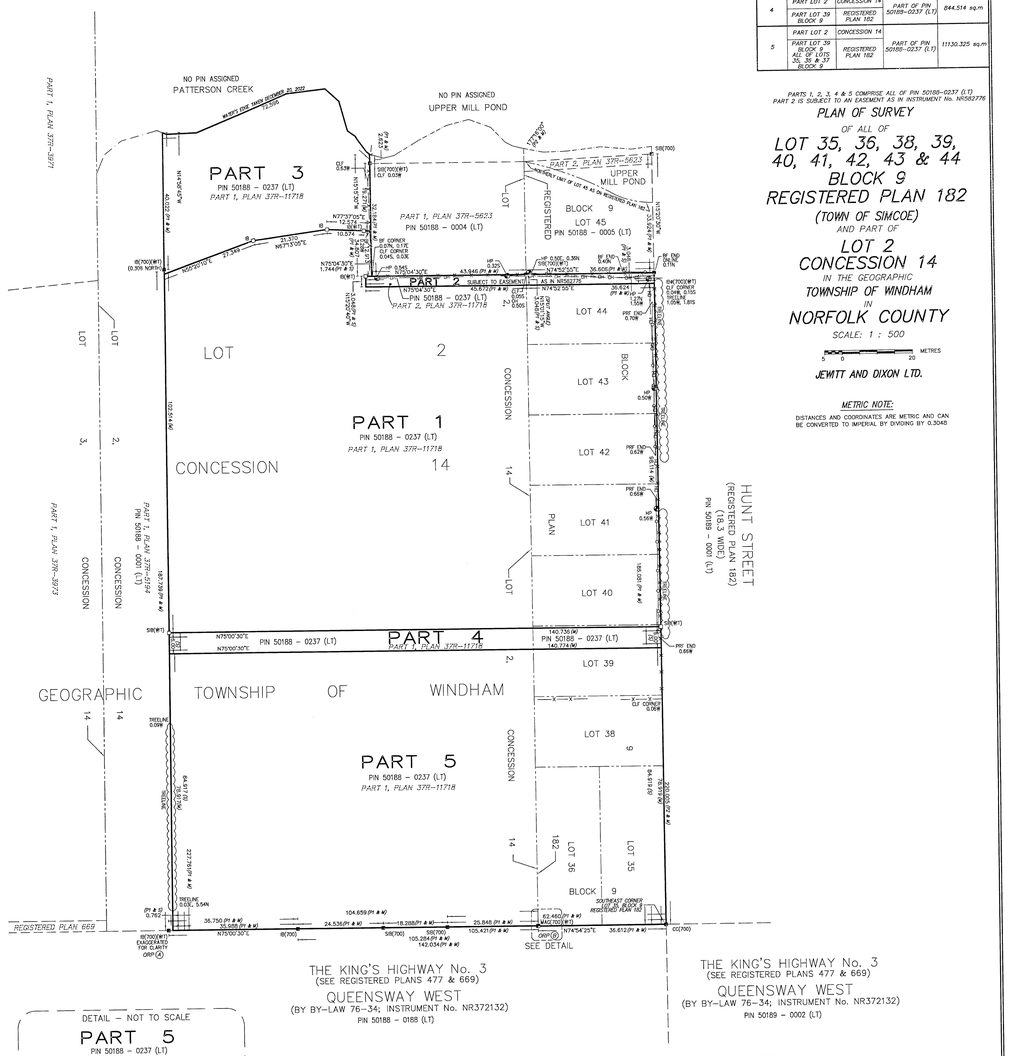
SCALE: 1 : 500

METRES 5 0 10 20

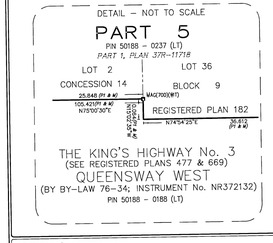
JEWITT AND DIXON LTD.

METRIC NOTE:

DISTANCES AND COORDINATES ARE METRIC AND CAN BE CONVERTED TO IMPERIAL BY DIVIDING BY 0.3048



DETAIL – NOT TO SCALE



NOTE:

BEARINGS ARE GRID AND WERE DERIVED FROM SIMULTANEOUS GPS OBSERVATIONS ON MONUMENT A TO B, SHOWN HEREON HAVING A BEARING OF N75°00'30"E (UTM ZONE 17, (81° WEST LONGITUDE) NAD83 (CSRS) (2010))

TO CONVERT (Pt) BEARINGS TO GRID BEARINGS
– ADD 0°23'00" TO THE NORTHWEST BEARINGS
– SUBTRACT 00°23'00" FROM THE NORTHEAST BEARINGS

DISTANCES SHOWN ON THIS PLAN ARE GROUND DISTANCES AND CAN BE CONVERTED TO GRID DISTANCES BY MULTIPLYING BY 0.999686969

OBSERVED REFERENCE POINTS (ORPs) DERIVED FROM GPS OBSERVATIONS USING THE CAN-NET NETWORK, UTM ZONE 17 (81° WEST LONGITUDE) NAD83 (CSRS) HTv2.0 (2010) COORDINATES ARE TO AN URBAN ACCURACY AS PER SEC. 14 (2) OF O.REG. 216/10

POINT ID	NORTHING	EASTING
ORP A	4743671.652	555466.833
ORP B	4743698.814	555568.734

COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT, AND THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON THE 20TH DAY OF MARCH, 2024

DATED: MARCH 21, 2024

R. C. DIXON, O.L.S.
FOR JEWITT & DIXON LTD.

THIS PLAN OF SURVEY RELATES TO AOLS PLAN SUBMISSION FORM NUMBER V-73115

LEGEND

2.5cm X 2.5cm X 1.2m STANDARD IRON BARS
1.6cm X 1.6cm X 0.6m IRON BARS
1.6cm ROUND X 0.6m IRON BARS
LOT LINES SHOWN
DEED LINES SHOWN
ROAD LINES SHOWN
OVERHEAD WIRES SHOWN — OH — OH — OH — OH —
CHAIN LINK FENCE (CLF) SHOWN —X—X—X—X—X—
BOARD FENCE (BF)/ POST & RAIL FENCE (PRF) SHOWN —o—o—o—

SHOWN ◁ SIB
SHOWN ◁ IB
SHOWN ◁ IB ø

FOUND IRON BARS
PLANTED IRON BARS
JEWITT AND DIXON LTD.
PLAN 37R-11718
BELL BOX
HYDRO POLE
WITNESS MONUMENT
MAGNETIC NAIL

SHOWN ⊕
SHOWN ○
SHOWN (7100)
SHOWN (P1)
SHOWN BBX
SHOWN (WIT)
SHOWN MAG

JEWITT AND DIXON LTD.
ONTARIO LAND SURVEYORS
650 IRELAND ROAD, SIMCOE, ON, N3Y 4K2
PHONE: (519) 426-0842
E-mail: info@jewittdixon.com

F.W. – J.R.
BOOK – LL-FILE
CALC. – JL.M.
PLAN – JL.M.
CHECK – K.H.
CLIENT – BRASENELL

22-3563-RP3

NO.	DATE	ISSUANCE
1	2024.05.17	ISSUED FOR SPA
NO.	DATE	ISSUANCE

PROPERTY LEGAL DESCRIPTION:
PARTS 1, 2, & 3 ON PLAN 37R 11733

APPLICANT:
WFH HOLDINGS LIMITED
HERBERT CHU
3 FERNWOOD COURT,
RICHMOND HILL, ONTARIO
L4B 3G2
1.416.919.9768

DO NOT SCALE DRAWINGS, CALL FOR ANY CLARIFICATIONS THAT ARE REQUIRED, FIELD VERIFY AT ALL BUILT CONDITIONS

ALL DWG.'S ARE TO BE READ IN COLOUR

ORIGINAL PAGE SIZE ARCH 'D' - 24" x 36"

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE ONTARIO N3Y 3W4
(519) 426-6270

LICENSED PROFESSIONAL ENGINEER
22-013
2024.05.16
N. L. ONGENA
100533190
PROVINCE OF ONTARIO

PROJECT TITLE:
HUNT ST. N. RESIDENTIAL
HUNT STREET NORTH,
SIMCOE, ON N3Y 2M9

DRAWING TITLE:
EXISTING SITE SURVEY

CHECKED BY:	DRAWN BY:
JI/LHR	BM
DRAWING SCALE:	DRAWING NO.:
PROJECT NO.: 22-013	A103

DATE PLOTTED: 5/17/2024 8:22:47 AM PROJECT NUMBER & NAME: 22-013 HUNT ST. N. RESIDENTIAL FILE PATH: H:\Projects\2022\22-013 HFW Holdings Hunt St Residential\Drawings\Arch\22-013 Hunt St Residential - Site.rvt

ACC

ARCHAEOLOGICAL
CONSULTANTS CANADA

Stage 1 & 2 Archaeological Assessment

Proposed Zoning Amendment

395, 401, 402, 405 & 411 Queensway West, All of Lot 35, 36, 38, 39, 40, 1, 42, 43, & 44, Block 9, Registered Plan 182, Town of Simcoe, and Part of Lot 2 Concession 14, Geographic Township of Windham, Norfolk County, Ontario

Original Report

Prepared for:

Ontario Ministry of Citizenship and Multiculturalism

Prepared by:

Archaeological Licensee: Matthew Muttart, M.A., P1208
Archaeological Consultants Canada
PO Box 81045 Ancaster, RPO Fiddlers Green
Hamilton, ON L9G 4X1

PIF#: P1208-0406-2023
Project No. 354-12-23
9 January 2024

EXECUTIVE SUMMARY

Archaeological Consultants Canada ("ACC") was contracted by the Proponent to conduct a Stage 1 & 2 archaeological assessment as part of a zoning amendment for a proposed development. The development includes residential and commercial development, underground parking, and a stormwater management pond. The assessment was conducted in the pre-construction phase and was required under the *Planning Act, R.S.O. 1990.* The area of assessment, or the "subject property", is located at municipal addresses 395, 401, 402, 405 & 411 Queensway West in the Town of Simcoe (Figure 1). Legally the property is described as all of Lot 35, 36, 38, 39, 40, 1, 42, 43, & 44, Block 9, Registered Plan 182, Town of Simcoe, and Part of Lot 2 Concession 14, Geographic Township of Windham, Norfolk County, Ontario. The subject property measures 2.88 hectares ("ha") in size. MCM assigned Project Information Form ("PIF") number P1208-0406-2023 to this project. The property was accessed on December 18, 2023.

Stage 1 background research indicated that the subject property has general archaeological potential due to the following factors:

- The subject property is partially located within the historic limits of the town of Simcoe in historical mapping (Tremaine, 1856; H. R. Page, 1877).
- The subject property is adjacent to Queensway West, an early historical transportation route (Tremaine, 1856; H. R. Page, 1877).
- Patterson Creek is located directly north of the subject property.
- Two archaeological sites have been registered within 1 km of the subject property.

Earthworks Archaeological Services Inc. has previously conducted a Stage 1 assessment of the subject property. Their assessment concluded that the entire subject property retained archaeological potential and required Stage 2 assessment by test pit survey at 5 m intervals (EAS, 2023:8). No visual inspection was conducted as part of EAS's Stage 1 research.

ACC conducted a Stage 1 visual property inspection and determined that areas of low to no archaeological potential include 1.78 ha of land that had been previously disturbed. The remainder of the subject property, 1.10 ha, was determined to retain archaeological potential and require Stage 2 assessment. As these lands consisted of woodlot and landscaped lawn within an urban area, the Stage 2 assessment was conducted by test pit survey at 5 m intervals. No artifacts or other archaeological resources were identified during the Stage 2 property assessment.

The following recommendation is provided for consideration by the Proponent and by the MCM:

1. No artifacts or other archaeological resources were identified during the Stage 2 archaeological assessment. The subject property has now been fully assessed according to the Ontario Ministry of Citizenship and Multiculturalism's 2011 *Standards and Guidelines for Consultant Archaeologists*. No further archaeological assessment of the property is required.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

PROJECT PERSONNEL

Project Manager:	Matthew Muttart, M.A., P1208
Professional License:	Matthew Muttart, M.A., P1208
Field Director:	Matthew Muttart, M.A., P1208
Field Technicians:	Kristy O'Neal, M.A., P066 Robert Schmidt
Report Preparation:	Kristy O'Neal, M.A., P066
Graphics:	Kristy O'Neal, M.A., P066

Stage 1 & 2 Archaeological Assessment

Proposed Zoning Amendment

395, 401, 402, 405 & 411 Queensway West, All of Lot 35, 36, 38, 39, 40, 1, 42, 43, & 44, Block 9, Registered Plan 182, Town of Simcoe, and Part of Lot 2 Concession 14, Geographic Township of Windham, Norfolk County, Ontario

1.0 PROJECT CONTEXT

1.1 Development Context

Archaeological Consultants Canada ("ACC") was contracted by the Proponent to conduct a Stage 1 & 2 archaeological assessment as part of a zoning amendment for a proposed development. The development includes residential and commercial development, underground parking, and a stormwater management pond. The assessment was conducted in the pre-construction phase and was required under the *Planning Act, R.S.O. 1990.* The area of assessment, or the "subject property", is located at municipal addresses 395, 401, 402, 405 & 411 Queensway West in the Town of Simcoe (Figure 1). Legally the property is described as all of Lot 35, 36, 38, 39, 40, 1, 42, 43, & 44, Block 9, Registered Plan 182, Town of Simcoe, and Part of Lot 2 Concession 14, Geographic Township of Windham, Norfolk County, Ontario. The subject property measures 2.88 hectares ("ha") in size. The Proponent verified the limits of the subject property as defined in this report and provided a plan of survey (Figure 2) and a Concept Plan (Figure 3) for the project.

The objective of a Stage 1 background study is to provide information about the subject property's geography, history, previous archaeological fieldwork, and current land conditions. A Stage 1 study evaluates the subject property's archaeological potential in order to recommend appropriate strategies for the Stage 2 survey.

The objective of a Stage 2 property assessment is to document all archaeological resources present on the property and to make a determination about whether these resources, if present, have cultural heritage value or interest. Archaeological resources consist of artifacts (Indigenous stone tools, pottery and subsistence remains as well as Euro-Canadian objects), subsurface settlement patterns and cultural features (post moulds, trash pits, privies, and wells), and sites (temporary camps and special purpose activity areas, plus more permanent settlements such as villages, homesteads, grist mills and industrial structures). If any archaeological resources are present that exhibit Cultural Heritage Value or Interest, a Stage 2 survey will determine whether these resources require further assessment and, if necessary, recommend appropriate Stage 3 strategies for identified archaeological sites.

The Stage 1 & 2 assessment was conducted under Professional Archaeological License P1208, held by Matthew Muttart, who also directed the fieldwork. The Ontario Ministry of Citizenship

and Multiculturalism ("MCM") assigned Project Information Form ("PIF") number P1208-0406-2023 (Stage 1 & 2) to this project. The licensee of ACC received permission from the Proponent to access the property and to conduct all required archaeological fieldwork activities including the removal of artifacts, as necessary. The property was accessed on December 18, 2023.

All fieldwork and reporting were completed using MCM's 2011 *Standards and Guidelines for Consultant Archaeologists.* This report documents the research, the field methods and results, and the conclusions and recommendations based on the Stage 1 & 2 archaeological assessment. All documents and records related to this project will be curated at the offices of ACC, in accordance with subsection 66(1) of the *Ontario Heritage Act.*

1.2 Historical Context

1.2.1 Background Research

Stage 1 background research was conducted to determine the potential for finding and identifying archaeological resources including sites within the current subject property and to determine the necessity of conducting a Stage 2 survey. This is done by reviewing geographic, archaeological, and historical data for the property and the surrounding area. The background research was conducted to:

- amass all the readily available information on any previous archaeological surveys in the area.
- determine the locations of any registered and unregistered sites within and around the subject property.
- develop an historical framework for assigning levels of potential significance to any new sites discovered during fieldwork.

1.2.2 A Cultural Chronology for Southern Ontario

Over their thousands of years of occupation in the general region, Indigenous peoples have left behind, to a greater or lesser degree, physical evidence of their lifeway activities and settlements at many locations. Based upon a published synthesis of Indigenous cultural occupations (Wright, 1968). Table 1 is a general outline of the cultural history of southern Ontario that is applicable to the subject property. Ellis and Ferris (1990) provide greater detail of the distinctive characteristics of each time period and cultural group.

It is likely that Ontario was occupied soon after the retreat of the Ice Age glaciers. The earliest known human occupation in the area was during the Paleoindian period (between 12,000 and 9,500 years ago) wherein small groups of nomadic peoples hunted big game such as caribou in a cool sub-arctic climate. Sites are typically found near glacial features such as the shorelines of glacial lakes or kettle ponds which would have allowed access to the low-lying environments that were favoured by the caribou and other wildlife. These people were few and their small, temporary campsites are relatively rare. Paleoindian sites are recognized by the presence of distinctive artifacts such as fluted projectile points, beaked scrapers, and gravers and by the

preference for light colored cherts, such as Collingwood chert. The Paleoindian Period is divided into two sub-periods, Early Paleoindian, and Late Paleoindian.

Table 1: General Cultural Chronology for Southern Ontario

PERIOD	SUBDIVISION I	SUBDIVISION II	YEARS BEFORE PRESENT	COMMENTS
PALEOINDIAN	Early Paleoindian	Fluted Point Horizon	12,000-10,500	big game hunters
	Late Paleoindian	Holcombe & Hi-Lo Horizons	10,500-9,500	small nomadic groups
ARCHAIC	Early Archaic	Side Notched Horizon	10,000-9,700	nomadic hunters and gatherers
		Corner-Notched Horizon	9,700-8,900	
		Bifurcate Horizon	8,900-8,000	
	Middle Archaic	Middle Archaic I/Stemmed Horizon	8,000-5,500	territorial settlements
		Middle Archaic II	5,500-4,500	polished ground stone tools
	Late Archaic	Narrow Point Horizon	4,500-3,500	
		Broad Point Horizon	4,000-3,500	
		Small Point Horizon (including Haldimand and Glacial Kame Complexes)	3,500-2,800	burial ceremonialism
WOODLAND	Early Woodland	Meadowood Complex	2,900-2,400	introduction of pottery
		Middlesex Complex	2,500-2,000	
	Middle Woodland	SW Ontario: Saugeen	2,300-1,500	long distance trade networks
		Western Basin: Couture	2,300-1,500	
	Transitional Woodland	SW Ontario:		
		Princess Point	1,500/1,400-1,200	incipient agriculture
		Western Basin:		
		Riviere au Vase	1500/1400-1200/1100	
	Late Woodland: Ontario Iroquois Tradition	Early: Glen Meyer	1200/100-750/700	transition to village life
		Middle I: Uren	720/700-710/670	large villages with palisades
		Middle II: Middleport	710/670-670/600	wide distribution of ceramic styles
		Late: Neutral	600-450	
	Late Woodland: Western Basin Tradition	Younge Phase	1200/1100-800	
		Springwells Phase	800-600	
		Wolf Phase	600-450	
HISTORIC	SW Ontario Iroquois	Historic Neutral	450-350	tribal warfare
	European Contact	Initial Contact	380-300	tribal displacement
		European Settlement	200 >	European settlement
		First Nations Resettlement	200 >	

(Compiled from Adams, 1994, Ellis *et al.*, 1990, Wright, 1968)

People during the Archaic period (*circa* 10,00 to 500 years ago) were still primarily nomadic hunters, but they adapted to a more temperate climate. Groups were dispersed during winter months and converged around watercourses from the spring to fall in large fishing campsites. The Archaic period is characterized by the appearance of ground stone tools, notched, or stemmed projectile points. The Archaic Period is divided into three sub-periods, Early, Middle,

and Late Archaic. During the Archaic Period, groups began to establish territorial settlements and introduce burial ceremonialism. There is a marked increase in the number and size of sites, especially during the Late Archaic period.

The Woodland period is distinguished by the introduction of pottery vessels for storage and cooking. Sites of the Woodland period (*circa* 3000 to 400 years ago) are usually the most numerous because the population levels in southern Ontario had significantly increased, especially along the shores of Lakes Erie and Ontario. The Woodland Period is also marked by the establishment of complex long distance trading networks. The Woodland Period is divided into three sub-periods, Early, Middle and Late Woodland. During the Late Woodland Period, there is increasing sedentarism and the establishment of horticulture, a reliance on tribal warfare, and the introduction of semi-permanent villages with large protective palisades. The Late Woodland period also envelops the emergence of Iroquoian tribes and confederacies.

The historic period (from A.D. 1650 to 1900) begins with the arrival of Euro-Canadian groups. While North America had been visited by Europeans on an increasing scale since the end of the fifteenth century, it was not until the voyages of Jacques Cartier in the 1530s that Europeans visited Ontario Iroquoians in their home territories. Sites of this period document European exploration, trade, and the displacement and devastation of native groups caused by warfare and infectious disease. The most common sites of this period include Euro-Canadian homesteads, industries, churches, schools, and cemeteries.

During pre-contact and early contact times, the vicinity of the subject property would have contained a mixture of deciduous trees, coniferous trees, and open areas. In the early nineteenth century, Euro-Canadian settlers arrived via easily accessible colonization routes from York and began to clear the forests for agricultural purposes. In the nineteenth and early twentieth centuries, the subject property and surrounding land were primarily used for agricultural purposes, Mixed farming was common, with wheat crops and beef cattle dominating the landscape (Chapman and Putnam, 1984:177).

The subject property was historically located within Part of Lot 2 Concession 14, in the Geographic Township of Windham, Norfolk County. The first European to venture into what would become southern Ontario was Étienne Brûlé who was sent by Samuel de Champlain in the summer of 1610 to consolidate an emerging friendship between the French and the First Nations, and to learn their languages and customs. Other Europeans would subsequently be sent by the French to train as interpreters. These men played an essential role in communications with the First Nations (Gervais, 2004:182).

The late 17th and early 18th centuries saw the growth and spread of the fur trade, with the establishment and maintenance of trading posts along the Great Lakes. In 1754, hostilities over trade and the territorial ambitions of the French and the British led to the Seven Years' War, which ended when the French surrendered in 1760 (Smith, 1987:22). In addition to cementing British control over the Province of Quebec, the British victory over the French also proved pivotal in catalyzing the Euro-Canadian settlement process.

In 1791, the provinces of Lower Canada and Upper Canada were created from the former province of Quebec by a British parliamentary act. Colonel John Graves Simcoe was appointed as the Lieutenant Governor of Upper Canada and was tasked with governing and directing its settlement, as well as establishing a constitutional government based on Britain's model (Coyne et al, 1895:33).

European settlement in Norfolk County began as early as 1790 when settlers began to move into the area as they awaited official surveys and granting of land patents around Long Point (Tasker 1900:46). Lieutenant Governor Simcoe wished to build a military base at Long Point in 1794, but the plan was rejected by Lord Dorchester, the Governor of Upper and Lower Canada. In response, Simcoe halted land grants to the area, banned settlement in the area and evicted settlers who were already established in Long Point Pay (Tasker, 1900:45). By 1795, the land grants were reopened, and a number of grist mills and sawmills were constructed.

Norfolk County was first settled in 1789 by United Empire Loyalists emigrating from the United States after the American Revolutionary War (Carter, 1984). The county itself was created in 1792 by Lieutenant-Governor John Graves Simcoe, who named it after Norfolk County, England (Mika & Mika, 1984). The population of Norfolk County was 9,626 in 1841. Early settlers in the county were primarily of Dutch, British and German descent, who settled in the county to take advantage of the rich soils (Mutrie, 2004). By 1844, a total of 56,899 acres were being cultivated, and there were 50 sawmills and 10 grist mills in operation (Smith 1846:186).

Windham Township was settled very early, especially near the vicinity of the village of Colborne. H.R. Page & Co. provides a list of settlers on concession 9 in 1825. These early settlers include "John Kline, William Force, -- Vale, John Odgen, Jacob Powell, Samuel Wood and Caleb Wood" (Page, 1877:8). Windham Centre, a station for the Canada Southern Railway, was the historic municipal centre of the township (Page, 1877).

The hamlet of Simcoe, named after Lieutenant Governor Simcoe, was partially destroyed by fire during the War of 1812 (MacDonald, 2012a). The settlers soon rebuilt, and Simcoe was incorporated as a village in 1851 and a town in 1878 (MacDonald, 2012b).

The patent for Lot 2, Concession 14, Township of Windham was awarded by the Crown to Gideon Cooley in 1796. John Davis purchased the 200-acre lot in 1801 and sold the southwestern 30 acres to James Derickson in 1813. In 1827 James Derickson sold the land to William Wilson. By 1836 the southwestern portion of Lot 2 was sectioned off into 10-acre parcels that were owned by James Derrickson. In 1847 upon William Wilson's death, the land was broken into 1-to-5-acre parcels. In the 1850s, Henry Sebring, a mechanic from the United States, is listed as owning 3 acres and living in a one storey half frame house on the property.

After this time, as Simcoe began to expand rapidly, numerous land transactions took place within Lot 2, as the southern portion of the lot continued to be divided. Occupants in the southern portion of Lot 2 in the 1860s include farmers John Davis and Henry Clark, plough maker Henry H. Dell, carpenter Charles Garner, and labourer Robert More. All the listed occupants have either a one storey or one and a half storey frame homes on the land. Occupation continued into the

1870s and 1880s as more people immigrate into the area, including German farmers Henry Fishback and C. Ross, and Henry Sebren from Nova Scotia.

Historical records and mapping were examined for evidence of early Euro-Canadian occupation within and near the subject property. Figures 4 and 5 represent the Euro-Canadian settlement in and around the current subject property in the late 19th century. Tremaine's 1856 *Map of the County of Norfolk, Canada West* does not list an owner for the subject property at that time. The subject property is located within the historic limits of the town of Simcoe, with Queensway west having been previously established and Upper Mill Pond shown to the north (Figure 4).

H. R. Page & Co.'s 1877 *Illustrated Historical Atlas of the County of Norfolk* indicates that a "D.C." is the owner of the western portion of Lot 2, Concession 14 at that time. The eastern portion of the subject property is shown within the historic limits of the town of Simcoe. Upper Mill Pond is again illustrated to the north of the subject property (Figure 5). Queensway West is directly to the south of the subject property.

While there are no structures illustrated within the subject property on the historical atlas mapping, this does not necessarily mean that one or more additional structures were not present at that time, earlier or later. Not all features of interest were mapped systematically on the Ontario series of historical maps and atlases, given that they were financed by subscription, and subscribers were given preference regarding the level of detail provided on the maps (Caston, 1977:100). Given that the subject property fronts a historic road and is located within the historic limits of the town of Simcoe there is the potential for 19th century buildings to be present, depending on the level of disturbance.

1.3 Archaeological Context

1.3.1 Natural Environment

The subject property is located within the Norfolk Sand Plain physiographic region. This wedge-shaped area has a curved base along the coast of Lake Erie and tapers to a point at Brantford. The region is made up of sand deposited from meltwater of the Grand River that formed a delta of glacial Lakes Whittlesey and Warren. It is made up of light textured soils left behind by retreating glaciers that is best used for tobacco crops. The dominant physiographic landform within the subject property is sand plain (MDNM, 2007).

The *Soils of the Regional Municipality of Haldimand-Norfolk* (Presant and Acton, 1984) indicates that there are two dominant surface soil types within the subject property (Figure 6). The northwestern portion of the subject property consists of Walsher soil. This soil consists of sandy textures over lacustrine silt loam. This soil drains well and has smooth basin to level topography. The remainder of the subject property consists of Plainfield soil. This soil is an Eolian fine sand that has been formed into dunes. The soil has rapid drainage and irregular gently sloping topography.

Water has been identified as the major determinant of site selection and the presence of potable water is the single most important resource necessary for any extended human occupation or settlement. Primary water sources include, among others, lakes, rivers, creeks, and streams.

Secondary water sources include intermittent streams, creeks, springs, marshes, and swamps. Past water sources, such as raised beach ridges, relic water channels, and glacial shorelines are also considered to have archaeological potential. Swamps and marshes are also important as resource extraction areas, and any resource areas are considered to have archaeological potential. The nearest water source is Patterson Creek, located along the northern boundary of the subject property. Upper Mill Pond, which connects to Patterson Creek, is located 70 m to the northeast of the subject property.

1.3.2 Current Land Use

Figure 7 shows the current land use of the subject property. The western portion of the subject property consists of a residential property with a treed backyard extending to Patterson Creek to the north. The eastern portion of the subject property consists of commercial buildings, with a gravel and asphalt parking lot. The subject property is located within a residential and commercial area within the town of Simcoe. Hunt Street is located directly to the east, and Queensway is located directly to the south.

Fieldwork for the project was completed on December 18, 2023.

1.3.3 Previous Archaeological Investigations

1.3.3.1 Registered Archaeological Sites

Previously registered archaeological sites can be used to indicate archaeological potential. To determine if any previous assessments have yielded archaeological sites, either within or surrounding the current subject property, two main sources were consulted. These include the *Ontario Archaeological Sites Database* ("OASD") and the *Public Register of Archaeological Reports*, both of which are maintained by MCM.

The OASD contains archaeological sites registered within the Borden system (Borden, 1952). The Borden system divides Canada into 13 km by 18.5 km blocks based on longitude and latitude. Each Borden block is designated with a four-letter label and sites identified within the block are numbered sequentially as they are registered. The subject property is located within the *AfHb* Borden block.

According to the OASD, no archaeological sites have been registered within the subject property, however, two sites have been registered within 1 km of the subject property (MCM, 2023a). The nearest of these sites is 965 m from the subject property. Site AfHb-1 consists of a single ceramic fragment and AfHb-135 consists of an isolated Middle Archaic projectile point interpreted as a hunting loss (MCM, 2023a). The absence of registered sites may reflect a lack of systematic survey in the area rather than an indication of cultural occupation.

Table 2 lists the sites within 1 km along with the current Cultural Heritage Value or Interest ("CHVI") for each site. CHVI is a term used by MCM and consultant archaeologists to describe archaeological resources that meet one or more criteria that recommend further fieldwork in MCM's *Standards and Guidelines for Consultant Archaeologists*. Under the *Ontario Heritage Act* and its regulations, archaeological resources that have been determined to possess CHVI are

protected as archaeological sites under Section 48 of the act. Information in Table 2 is provided by MCM through the OASD (MCM, 2023a).

Table 2: Registered Archaeological Sites within 1 km of the Subject Property

REG. #	NAME	TIME PERIOD	CULTURAL AFFILIATION	SITE TYPE	STATUS
AfHb-1	Cayuga Quarry	unknown	unknown	findspot	No further CHVI
AfHb-135	-	Middle Archaic	Indigenous	hunting loss	No further CHVI

Information concerning specific site locations is protected by provincial policy and is not fully subject to the *Freedom of Information Act.* The release of such information in the past has led to looting or various forms of illegally conducted site destruction. Confidentiality extends to all media capable of conveying location, including maps, drawings, or textual descriptions of a site location. MCM will provide information concerning site location to the party or an agent of the party holding title to a property, or to a licensed archaeologist with relevant cultural resource management interests.

1.3.3.2 Previous Archaeological Reports

A review of archaeological reports within the *Public Register of Archaeological Reports* indicated that there is one archaeological report detailing previous archaeological fieldwork within the subject property. There were no additional reports detailing fieldwork within 50 m of the subject property filed with the MCM at the time this report was written. Reports were searched based on registered site information, historic lots and concessions, and nearby streets.

> ***Stage 1 Archaeological Assessment 394-411 Queensway West, Part of Lot 2, Concession 14, Geographic Township of Windham, County of Norfolk.*** **Earthworks Archaeological Services Inc., report dated November 6, 2023. PIF P1033-0018-2023.**

In 2023, Earthworks Archaeological Services Inc. ("EAS") conducted a Stage 1 assessment of the current subject property. EAS determined that the subject property retained archaeological potential due to the subject property being adjacent to Queensway West, an early historical transportation route, and the proximity to Patterson Creek (EAS, 2023:7). No property inspection was conducted as part of this assessment. The entirety of the subject property was recommended for Stage 2 assessment by test pit survey (EAS, 2023:8). Figure 8 of this report shows the results of EAS's Stage 1 assessment (EAS, 2023).

1.3.4 Potential for Archaeological Resources

Archaeological potential is defined as the likelihood of finding archaeological sites within a subject area. For planning purposes, determining archaeological potential provides a preliminary indication that significant sites might be found within the subject area, and consequently, that it may be necessary to allocate time and resources for archaeological survey and mitigation.

The framework for assigning levels of potential archaeological significance is drawn from provincial guidelines found in the *Standards and Guidelines for Consultant Archaeologists*

(MCM, 2011: Sections 1.3.1 and 1.3.2). The following are features or characteristics that can indicate archaeological potential:

- previously identified archaeological sites
- water sources (It is important to distinguish types of water and shoreline, and to distinguish natural from artificial water sources, as these features affect site locations and types to varying degrees.).
    - primary water sources (e.g., lakes, rivers, streams, creeks)
    - secondary water sources (e.g., intermittent streams and creeks, springs, marshes, swamps)
    - features indicating past water sources (e.g., glacial lake shorelines indicated by the presence of raised sand or gravel beach ridges, relic river or stream channels indicated by clear dip or swale in the topography, shorelines of drained lakes or marshes, cobble beaches)
    - accessible or inaccessible shoreline (e.g., high bluffs, swamp or marsh fields by the edge of a lake, sandbars stretching into marsh)
- elevated topography (e.g., eskers, drumlins, large knolls, plateaus)
- pockets of well-drained sandy soil, especially near areas of heavy soil or rocky ground
- distinctive land formation that might have been special or spiritual places, such as waterfalls, rock outcrops, caverns, mounds, and promontories and their bases. There may be physical indicators of their use, such as burials, structures, offerings, rock paintings or carvings.
- resource areas, including:
    - food or medicinal plants (e.g., migratory routes, spawning areas, prairie)
    - scarce raw materials (e.g., quartz, copper, ochre or outcrops of chert)
    - early Euro-Canadian industry (e.g., fur trade, logging, prospecting, mining)
- areas of early Euro-Canadian settlement. These include places of early military or pioneer settlement (e.g., pioneer homesteads, isolated cabins, farmstead complexes), early wharf or dock complexes, pioneer churches and cemeteries. There may be commemorative markers of their history, such as local provincial, or federal monuments or heritage parks
- early historical transportation routes (e.g., trails, passes, roads, railways, portages)
- property listed on a municipal register or designated under the *Ontario Heritage Act* or that is in a federal, provincial, or municipal historic landmark site

- property that local histories or informants have identified with possible archaeological sites, historical events, activities, or occupations

Archaeological potential can be determined not to be present for either the entire property or parts of it when the area under consideration has been subject to extensive and deep land alterations that have severely damaged the integrity of any archaeological resources. This is commonly referred to as "disturbed" or "disturbance" and may include:

- quarrying
- major landscaping involving grading below topsoil
- building footprints
- sewage and infrastructure development
- activities such as agricultural cultivation, gardening, minor grading, and landscaping do not necessarily affect archaeological potential.

Several factors can be used to assess the potential for recovery of Euro-Canadian archaeological resources on a property. The subject property is comprised of land that is suitable for human habitation and agriculture. According to 1856 and 1877 historical maps the subject property fronted Queensway west, an early historical transportation route. The same maps also indicate that the subject property was partially within the historic limits of the town of Simcoe at those times.

Several factors can be used to assess the potential for recovery of Indigenous archaeological resources on a property. The subject property is comprised of land that is suitable for human habitation. Patterson Creek is located directly north of the subject property. There is one registered site of Indigenous cultural affiliation located within 1 km of the subject property.

Given the above, background archival research indicates that the subject property exhibits general archaeological potential for the discovery of Euro-Canadian and Indigenous archaeological resources and, therefore, Stage 2 archaeological assessment is recommended for the subject property.

2.0 FIELD METHODS

The subject property measures 2.88 ha. A Stage 1 visual inspection and Stage 2 property assessment were conducted concurrently on December 18, 2023, with advance permission to enter the subject property obtained from the Proponent. Weather conditions during the assessment consisted of overcast skies with a maximum daily temperature of 3 degrees Celsius. The ground was not snow covered and soil was not frozen or saturated during the assessment, and there were no adverse conditions created by conducting winter survey (MCM, 2013:3).

While the property had been subject to a Stage 1 assessment by EAS, which recommended the entirety of the subject property be subject to Stage 2 test pit assessment (EAS, 2023:8), their assessment did not include an on-site visual property inspection. Therefore, ACC's assessment of the subject property began with an on-site property inspection to gain first-hand knowledge of the geography, topography, and current condition of the property. The entirety of the subject property was accessible and was inspected. Appropriate photographic documentation was taken during the visual inspection. Coverage of the property was sufficient to identify the presence or absence of features of archaeological potential, meeting the requirements of Section 1.2 Standard 1 of the *Standards and Guidelines for Consultant Archaeologists.*

Areas of low to no archaeological potential include lands that have been previously disturbed, lands that have steeply sloping topography, and lands that are low-lying and permanently wet. No areas of low-lying and permanently wet or steeply sloping topography were observed. 1.78 ha, 62% of the subject property, has been previously disturbed by intensive and extensive modern soil alterations, including for construction of a residential home with outbuildings and a driveway, as well as for commercial buildings that were largely surrounded by graded asphalt and gravel parking areas.

The remainder of the subject property, 1.10 ha, 38% of the subject property, was determined to archaeological potential and require Stage 2 archaeological assessment. As the subject property is greenspace and forest located in an urban area with existing buildings and infrastructure, the subject property lands could not be ploughed. Therefore, Stage 2 archaeological assessment was conducted by test pit survey at 5 m intervals in accordance with Section 2.1.2 of the *Standards and Guidelines for Consultant Archaeologists.* Each test pit was dug by hand and was 30 centimetres ("cm") in diameter and was dug to at least five cm into the subsoil. Test pits were examined for stratigraphy, cultural features, or evidence of fill. All soil was screened through 6-millimetre ("mm") mesh to maximize the potential for artifact recovery.

The test pit survey was conducted to within 1 m of all disturbances. Some soil disturbance was observed in the lawn area to the east of the existing residence; however, 5 m survey intervals were maintained throughout the assessment. Appropriate photographic documentation was taken, and all test pits were backfilled upon completion. As no artifacts were observed during the test pit assessment no intensified survey was conducted.

There were no weather, ground, or lighting conditions detrimental to the recovery of artifacts. As such, it is confirmed that the assessment met Section 1.2 Standard 2 and Section 2.1 Standard 3 of the *Standards and Guidelines for Consultant Archaeologists* regarding weather and lighting.

The entirety of the subject property was assessed. The results of Stage 1 & 2 assessment are shown in Figures 9 and 10. Images of the assessment are shown in Section 8.0.

3.0 RECORD OF FINDS

3.1 Soils

Test pits contained approximately 20 to 50 cm of dark brown sandy loam topsoil above yellow to light brown sandy loam subsoil. Some soil disturbance was observed in test pits excavated to the east of the existing residence; however, test pit survey was still conducted at 5 m intervals to ensure full survey coverage.

3.2 Archaeological Resources

No artifacts or other archaeological resources were observed during the Stage 1 & 2 assessment of the subject property.

3.3 Documentary Record

All fieldwork-related activities were documented and kept, including field notes and observations and detailed maps. Appropriate photographic records were kept of the assessment and all image descriptions were recorded in a photo log.

A detailed list of field records is presented in Table 3. All digital items have been duplicated and all paper items have been scanned and stored as digital documents. All items are housed in the corporate offices of ACC.

Under Section 6 of Regulation 881 of the *Ontario Heritage Act*, ACC will keep in safekeeping all objects of archaeological significance that are found under the authority of the license and all field records that are made in the course of the work authorized by the license, except where the objects and records are donated to His Majesty the King in right of Ontario or are directed to be deposited in a public institution under subsection 66 (1) of the Act.

Table 3: Inventory of Documentary and Material Records

PROJECT INFORMATION		
ACC project number	354 -12-23	
Licensee	Matthew Muttart	
MCM PIF number	P1208-0406 -2023	
DOCUMENT/MATERIAL	**NUMBER**	**DESCRIPTION**
field notes & photo logs	4	pages (paper, with digital copies)
maps	1 1 1 1	sketch map of the subject property aerial imagery of the subject property concept plan plan of survey
photos	24	digital format

4.0 ANALYSIS AND CONCLUSIONS

Stage 1 background research indicated that the subject property has general archaeological potential due to the following factors:

- The subject property is partially located within the historic limits of the town of Simcoe in historical mapping (Tremaine, 1856; H. R. Page, 1877).
- The subject property is adjacent to Queensway West, an early historical transportation route (Tremaine, 1856; H. R. Page, 1877).
- Patterson Creek is located directly north of the subject property.
- Two archaeological sites have been registered within 1 km of the subject property.

EAS has previously conducted a Stage 1 assessment of the subject property. Their assessment concluded that the entire subject property retained archaeological potential and required Stage 2 assessment by test pit survey at 5 m intervals (EAS, 2023:8). No visual inspection was conducted as part of EAS's Stage 1 research.

ACC conducted a Stage 1 visual property inspection and determined that areas of low to no archaeological potential include 1.78 ha of land that had been previously disturbed during construction of structures, laneways and parking areas. \

The remainder of the subject property, 1.10 ha, was determined to retain archaeological potential and require Stage 2 assessment. As these lands consisted of woodlot and landscaped lawn within an urban area, the Stage 2 assessment was conducted by test pit survey at 5 m intervals.

No artifacts or other archaeological resources were identified during the Stage 2 property assessment. According to the *Standards and Guidelines for Consultant Archaeologists* (MCM, 2011), the subject property has now been completely assessed and does not require any additional fieldwork.

5.0 RECOMMENDATIONS

Subject to acceptance of the results and approval of the recommendations, MCM is requested to deem this report compliant with ministry requirements for archaeological fieldwork and reporting and to issue a letter accepting this report into the *Ontario Public Register of Archaeological Reports.*

The following recommendation is provided for consideration by the Proponent and by the MCM:

1. No artifacts or other archaeological resources were identified during the Stage 2 archaeological assessment. The subject property has now been fully assessed according to the Ontario Ministry of Citizenship and Multiculturalism's 2011 *Standards and Guidelines for Consultant Archaeologists*. No further archaeological assessment of the property is required.

6.0 ADVICE ON COMPLIANCE WITH LEGISLATION

The following advice on compliance with current legislation is provided for consideration:

a. This report is submitted to the Minister of Citizenship and Multiculturalism as a condition of licensing in accordance with Part IV of the *Ontario Heritage Act*, R.S.O. 2005, c O.18. The report is reviewed to ensure that it complies with the standards and guidelines that are issued by the Minister, and that the archaeological fieldwork and report recommendations ensure the conservation, protection, and preservation of the cultural heritage of Ontario. When all matters relating to archaeological sites within the project area of a development proposal have been addressed to the satisfaction of the Ministry of Citizenship and Multiculturalism, a letter will be issued by the ministry stating that there are no further concerns with regard to alterations to archaeological sites by the proposed development.

b. It is an offence under Sections 48 and 69 of the *Ontario Heritage Act* for any party other than a licensed archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such a time as a licensed archaeologist has completed archaeological fieldwork on the site, submitted a report to the Minister stating that the site has no further cultural heritage value or interest, and the report has been filed in the Ontario Public Register of Archaeological Reports referred to in Section 65.1 of the *Ontario Heritage Act.*

c. Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48 (1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48 (1) of the *Ontario Heritage Act*.

d. The *Funeral, Burial and Cremation Services Act*, 2002, S.O. 2002, c.33 requires that any person discovering human remains must notify the local police or coroner and the Registrar, Burials Unit, at the Ministry of Public and Business Service Delivery.

e. It is an offence to destroy or alter an archaeological site without approval from the Ministry of Citizenship and Multiculturalism. Archaeological sites recommended for further archaeological fieldwork or protection remain subject to Section 48(1) of the *Ontario Heritage Act* and may not be altered, or have artifacts removed from them, except by a person holding an archaeological license.

7.0 BIBLIOGRAPHY AND SOURCES

Adams, Nick
1994 *Field Manual for Avocational Archaeologists in Ontario*. Publication No.16, Ontario Archaeological Society Inc.

Borden, Charles E.
1952 A Uniform Site Designation Scheme for Canada. *Anthropology in British Columbia*, No. 3, 44-48.

Carter, Floreen Ellen
1984 *Place Names of Ontario, Volume 1*. Phelps Publishing, London.

Caston, Wayne
1997 Evolution in the Mapping of Southern Ontario and Welling ton County. *Wellington County History*. 10:91-106.

Chapman, Lyman John and Donald F. Putnam
1984 The Physiography of Southern Ontario (Third Edition). *Ontario Geological Survey Special Volume 2*. Ontario Ministry of Natural Resources, Toronto.

Coyne, James, C. O. Ermatinger, K. W. McKay
1895 *Historical Sketches of the County of Elgin.* Elgin Historical and Scientific Institute, St. Thomas.

Ellis, Chris & Neal Ferris
1990 *The Archaeology of Southern Ontario to A.D. 1650.* Occasional Publication No. 5. London Chapter, Ontario Archaeological Society Inc.

G. Douglas Vallee Limited
2023 *Hunt Street N. Residential, Site Plan Pre-Con/Zoning Amendment.* Drawing No. PC/Z100.

Jewitt and Dixon Ltd.
2023 *Plan of Survey of All of Lot 35, 36, 38, 39, 40, 1, 42, 43, & 44, Block 9, Registered Plan 182, Town of Simcoe, and Part of Lot 2 Concession 14, Geographic Township of Windham, Norfolk County, Ontario.*

MacDonald, Cheryl
2012a *Norfolk County. The Canadian Encyclopedia.*
https://www.thecanadianencyclopedia.ca/en/article/norfolk-county
[Accessed January 8, 2024]

2012b *Simcoe. The Canadian Encyclopedia.*
https://www.thecanadianencyclopedia.ca/en/article/simcoe
[Accessed January 8, 2024]

Mika, Nick and Helma Mika
1983 *Places in Ontario: Their Name Origins and History. Part I, A-E.* Mika Publishing Company, Belleville.

Ministry of Citizenship and Multiculturalism ("MCM")
2005 *The Heritage Act, R.S.O. 2005.* Queen's Printer, Toronto.
2011 *Standards and Guidelines for Consultant Archaeologists.* Toronto.
2013 *Winter Archaeology. A Technical Bulletin for Consultant Archaeologists in Ontario.*
2023a Sites within a one km radius of the subject property. Provided from the *Ontario Archaeological Sites Database*.
2023b Archaeological assessments completed within the subject property or within 50 m of the subject property. Provided from the Ontario *Public Register of Archaeological Reports.*

Ministry of Natural Resources and Forestry
2024 Topographic Map, Land Information Ontario
https://www.lioapplications.lrc.gov.on.ca/MakeATopographicMap/index.html?viewer=Make_A_Topographic_Map.MATM&locale=en-CA
[Accessed January 8, 2024]

Ministry of Northern Development and Mines ("MNDM")
2007 Physiography of Southern Ontario. Chapman, L.J. and D.F. Putnam, authors. GIS map data layer distributed by the Ontario Geological Survey as Miscellaneous Release – Data (MRD) 228. Queen's Printer for Ontario.
http://www.mndm.gov.on.ca/en/mines-and-minerals/applications/ogsearth
[Accessed January 8, 2024]

Mutrie, R.R.
2004 Norfolk History.
http://www.rootsweb.ancestry.com/~onnorfol/history.htm
[Accessed January 8, 2024]

Natural Resources Canada
1996 *Map 40-I/16, Simcoe.* 1:50,000 scale National Topographic System map.

Ontario Ministry of Agriculture, Food and Rural Affairs ("OMAFRA")
2012 *GIS Layers for Soils and Physiography in the Province of Ontario.*
http://sis.agr.gc.ca/cansis/publications/surveys/on/index.html
[Accessed January 8, 2024]

Page, H. R. & Co.
1877 *Illustrated Historical Atlas of Norfolk County, Ontario*. Toronto.

Presant, E.W. & C.J. Acton
1984 *Soils of the Regional Municipality of Haldimand-Norfolk.* Report No. 57 of the Ontario Institute of Pedology. Research Branch, Agriculture Canada, Soil and Water Management Branch, Ontario Ministry of Agriculture and Food, Department of Land Resource Science, University of Guelph.

Smith, William Henry1846 *Smith's Canadian gazetteer comprising statistical and general information respecting all parts of the Upper Province, or Canada West*. Toronto: H. & W. Rowsell.

Smith, D. B.
1987 *Sacred Feathers: The Reverend Peter Jones (Kahkewaquonaby) and the Mississauga Indians*. Toronto: University of Toronto Press.

Tasker, L.H.
1900 *The United Empire Loyalist Settlement at Long Point, Lake Erie Vol. II.* Ontario Historical Society, Papers and Records. William Briggs, Toronto.

Tremaine, George R
1856 *Tremaine's Map of the County of Norfolk, Canada West.* George C. Tremaine, Publisher.

Wright James V.
1968 *Ontario Prehistory: an eleven thousand-year archaeological outline*. Archaeological Survey of Canada, National Museums of Canada, Ottawa.

8.0 IMAGES


Image 1: Laneway and house, facing northeast.


Image 2: Shed, facing northeast.


Image 3: Asphalt parking lot and commercial buildings, facing west.


Image 4: Asphalt parking lot and commercial buildings, facing southwest.


Image 5: Asphalt and gravel parking lot and commercial building, facing northwest.


Image 6: Gravel parking lot and commercial building, facing southwest.

Image 7: Gravel parking lot and commercial building, facing northeast.

Image 8: Lawn conditions, facing northeast.

Image 9: Forest conditions, facing west.

Image 10: Forest conditions, facing northwest.

Image 11: Crew at work, test pit survey at 5 m intervals, lawn area, facing northwest.

Image 12: Crew at work, test pit survey at 5 m intervals, forest, facing southwest.

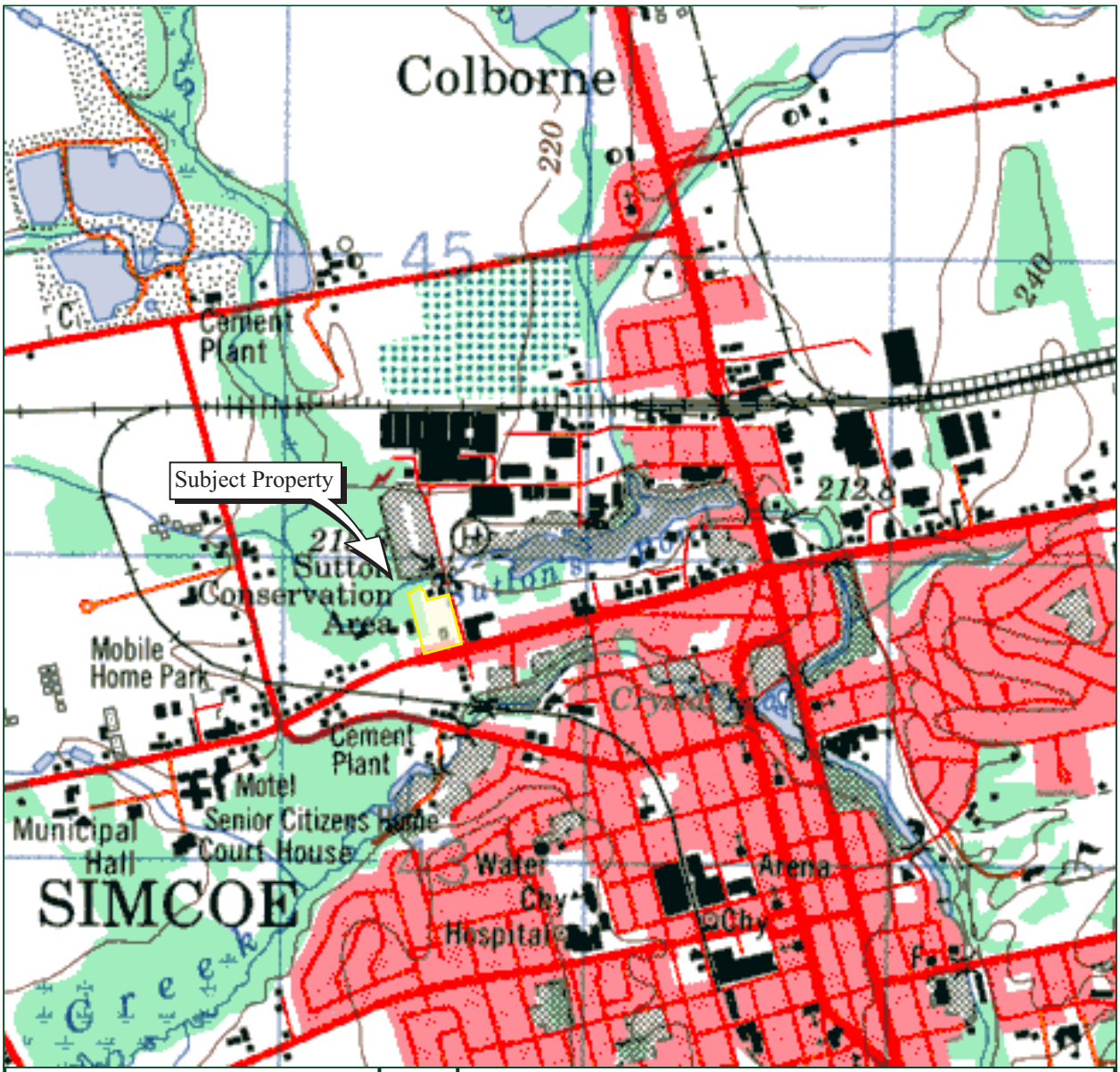
Image 13: Crew at work, test pit survey at 5 m intervals, forest, facing southeast.

Image 14: Typical undisturbed test pit.

Image 15: Typical disturbed test pit.

9.0 FIGURES

Figure 1: Location of the Subject Property on a 1:50,000 Scale Topographic Map



Scale:

0 500

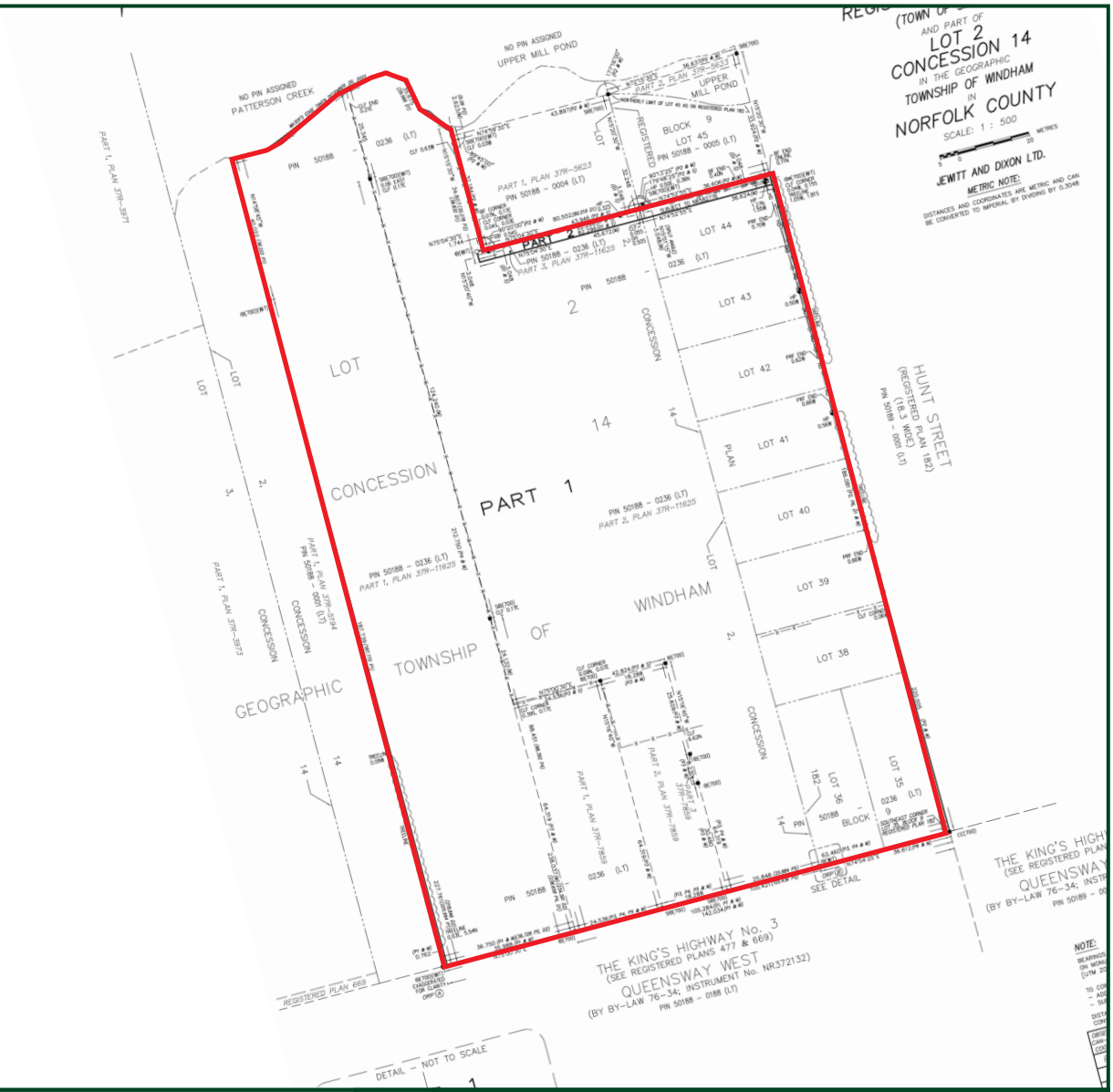
metres

Reference:
Natural Resources Canada, 1996

Legend:

subject property

Figure 2: Plan of Survey of the Subject Property



Scale:

0 40

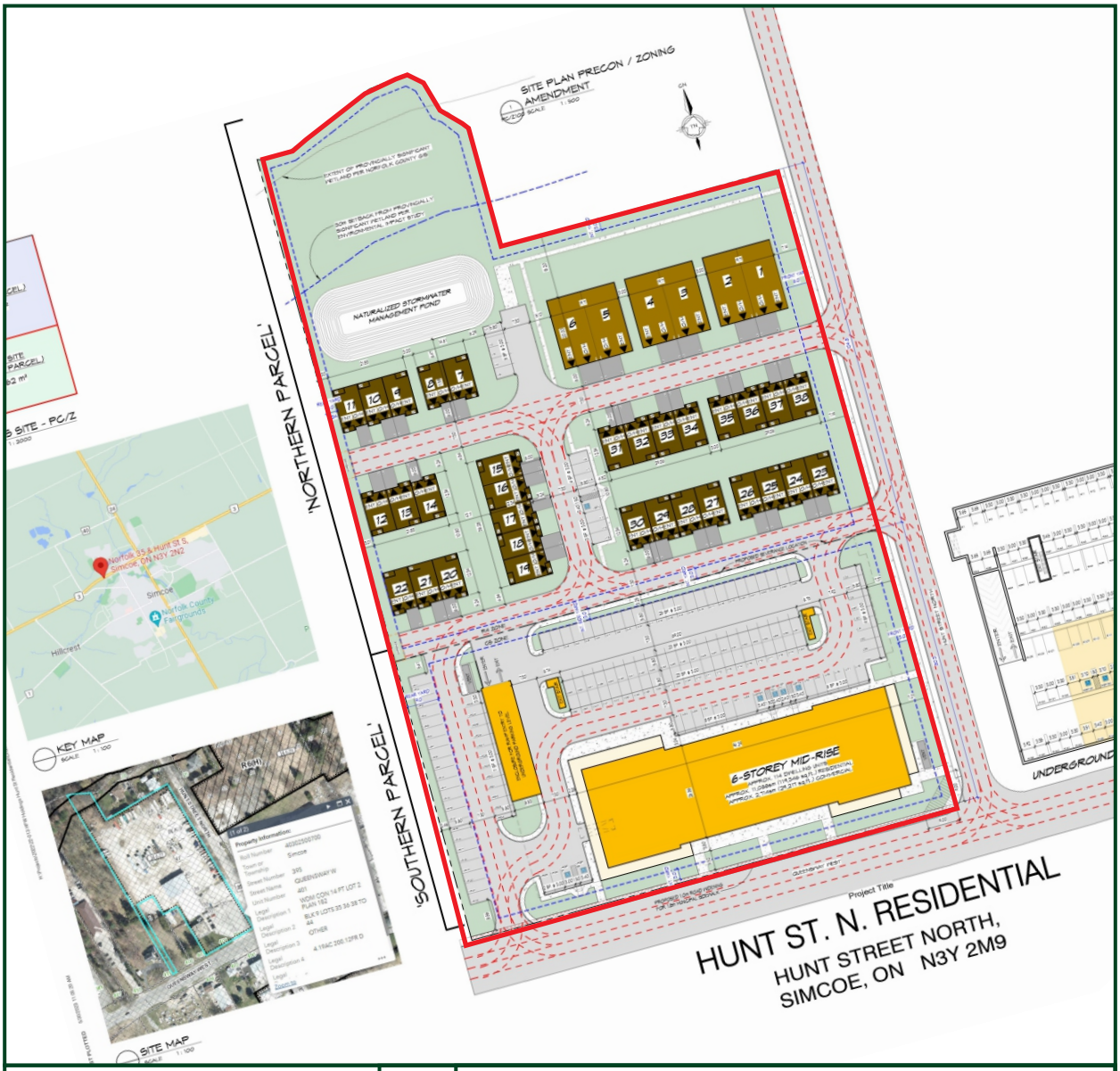
metres

Reference:
Jewitt and Dixon Ltd., 2023

Legend:

subject property

Figure 3: Concept Plan of the Subject Property



Scale:

0 40

metres

Reference:
G. Douglas Vallee Limited, 2023

Legend:

subject property

Figure 4: Location of the Subject Property on Tremaine's 1856 Map of the County of Norfolk, Canada West

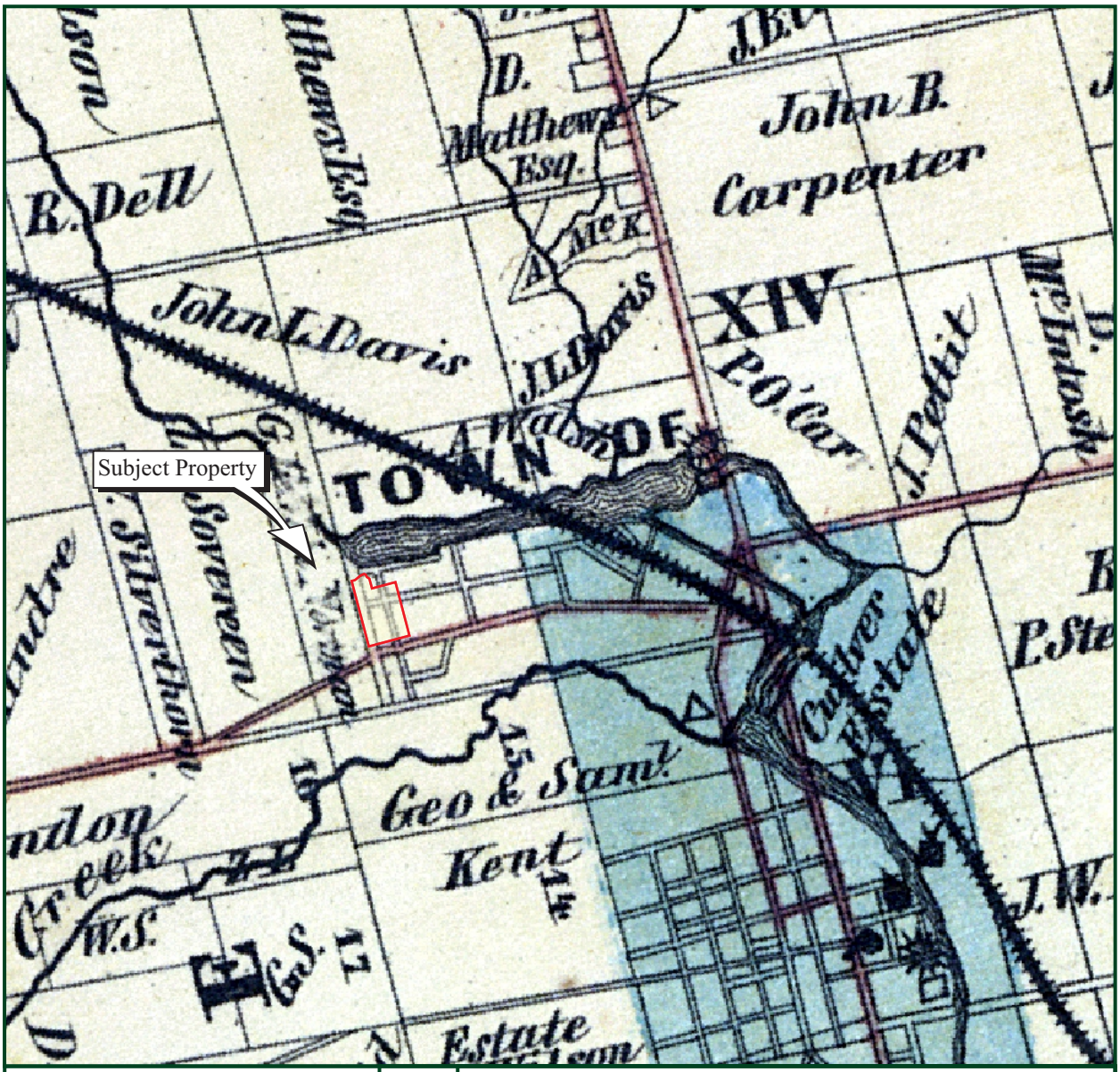


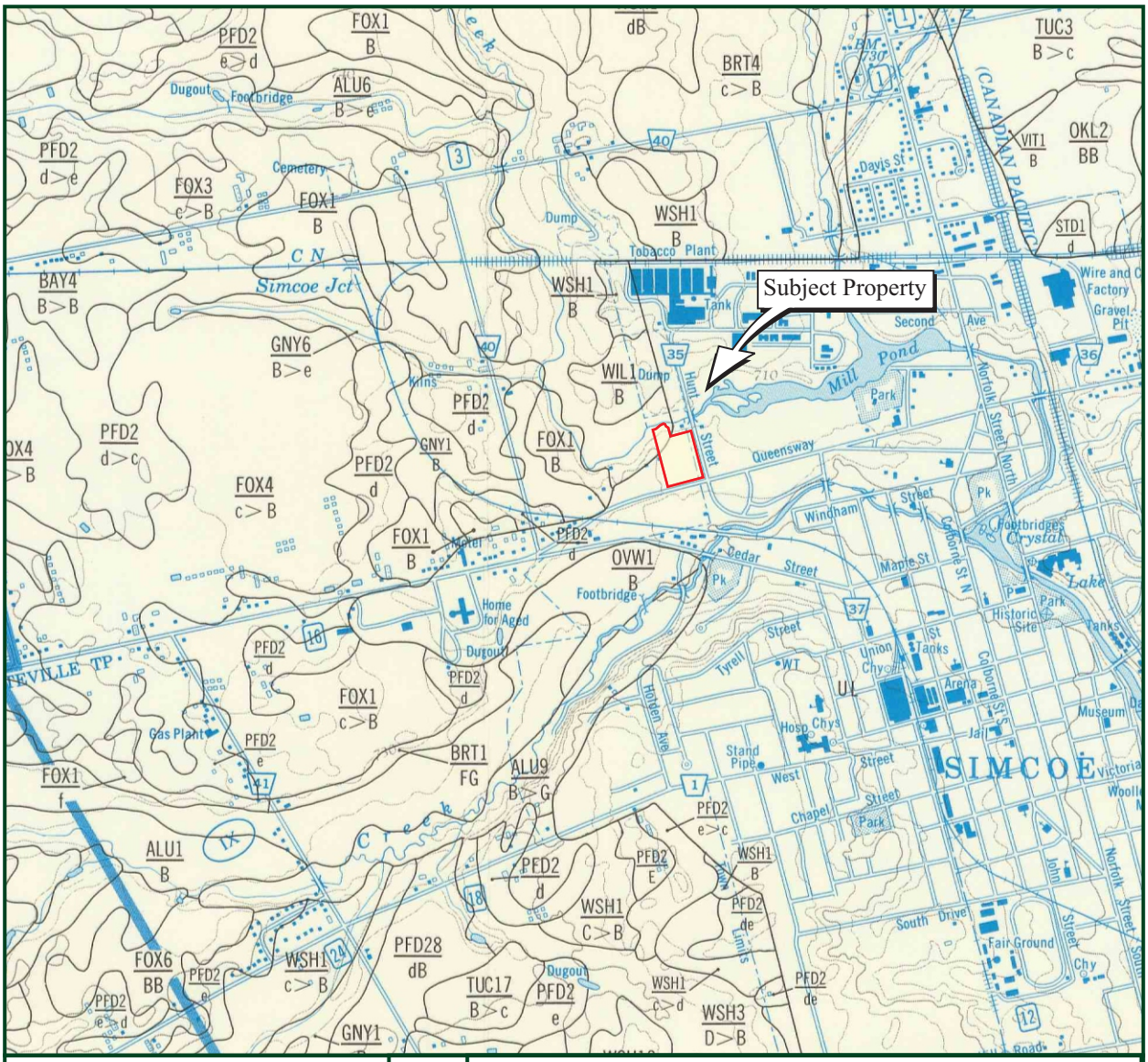
Figure 5: Location of the Subject Property on H. R. Page & Co.'s 1877 Illustrated Historical Atlas Map of Windham Township, Norfolk County

Scale:
0 1
kilometres

Reference:
H. R. Page & Co., 1877

Legend:
- subject property
- farmstead
- orchard

Figure 6: Location of the Subject Property on a Map of the Soils of Haldimand-Norfolk Regional Municipality



Scale:

0 1

kilometres

Reference:
OMAFRA, 2012

Legend:

subject property

PFD2 d Plainfield Eolian fine sand formed into dunes, irregular gently sloping topography

WSH1 B Walsher sand over lacustrine silt loam, smooth basin to level topography

Figure 7: Current Land Use of the Subject Property

Scale:

0 40

metres

Reference:
Ministry of Natural Resources and Forestry, 2024

Legend:

subject property

Figure 8: Aerial Imagery Showing the Results of Earthworks Archaeological Services Inc.'s Stage 1 Archaeological Assessment of the Subject Property

Scale:

0 40

metres

References:
Earthworks Archaeological Services Inc., 2023: Map 8;
Ministry of Natural Resources and Forestry, 2024

Legend:

subject property

area of archaeological potential requiring Stage 2 assessment as shown in Stage 1 assessment, Earthworks Archaeological Services Inc., 2023, PIF P1033-0018-2023

Figure 9: Aerial Imagery Showing the Results of the Stage 1 & 2 Archaeological Assessment of the Subject Property, with Image Locations and Directions

Scale:
0 40
metres

Reference:
Ministry of Natural Resources and Forestry, 2023

Legend:
- subject property
- photo location and direction
- Stage 2 test pit survey at 5 m intervals completed
- previously disturbed

Figure 10: Plan of Survey Showing the Results of the Stage 1 & 2 Archaeological Assessment of the Subject Property

Scale:

0 40

metres

Reference:
Jewitt and Dixon Ltd., 2023

Legend:

- subject property
- Stage 2 test pit survey at 5 m intervals completed
- previously disturbed

Ministry of Citizenship and Multiculturalism (MCM)

Archaeology Program Unit
Heritage Branch
Citizenship, Inclusion and Heritage Division
5th Floor, 400 University Ave.
Toronto ON M7A 2R9
Tel.: (705) 571-0035
Email: Teresa.Tremblay@ontario.ca

Ministère des Affaires civiques et du Multiculturalisme (MCM)

Unité des programme d'archéologie
Direction du patrimoine
Division de la citoyenneté, de l'inclusion et du patrimoine
5e étage, 400 ave. University
Toronto ON M7A 2R9
Tél. : (705) 571-0035
Email: Teresa.Tremblay@ontario.ca

Jan 25, 2024

Matthew Muttart (P1208)
Archaeological Consultants Canada
711 - 135 James Hamilton ON L8P 2Z6

RE: Entry into the Ontario Public Register of Archaeological Reports: Archaeological Assessment Report Entitled, "Stage 1 &2 Archaeological Assessment Proposed Zoning Amendment 395, 401, 402, 405 &411 Queensway West, All of Lot 35, 36, 38, 39, 40, 1, 42, 43, &44, Block 9, Registered Plan 182, Town of Simcoe, and Part of Lot 2 Concession 14, Geographic Township of Windham, Norfolk County, Ontario", Dated Jan 9, 2024, Filed with MCM Toronto Office on N/A, MCM Project Information Form Number P1208-0406-2023, MCM File Number 0019362

Dear Mr. Muttart:

The above-mentioned report, which has been submitted to this ministry as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18, has been entered into the Ontario Public Register of Archaeological Reports without technical review.[1]

Please note that the ministry makes no representation or warranty as to the completeness, accuracy or quality of reports in the register.

Should you require further information, please do not hesitate to send your inquiry to Archaeology@Ontario.ca

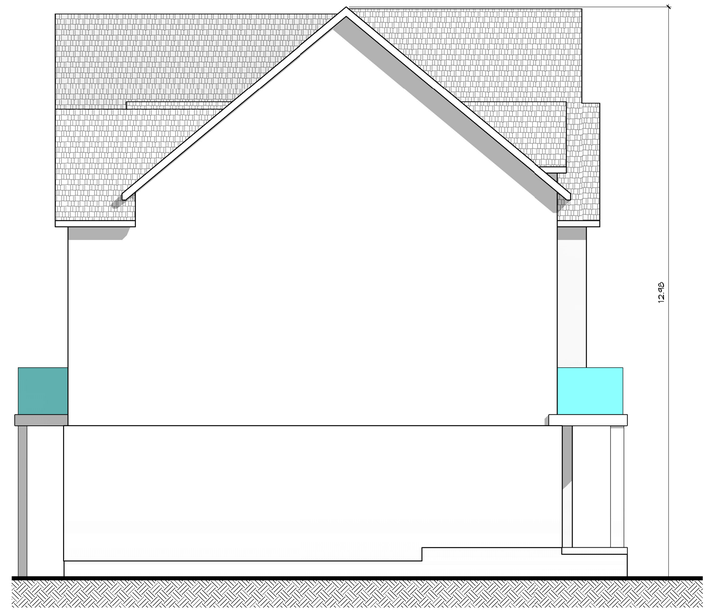
cc. Archaeology Licensing Officer
Gary Brasenell,HFW Holdings Limited
Andrew Wallace,Norfolk County

1*In no way will the ministry be liable for any harm, damages, costs, expenses, losses, claims or actions that may result: (a) if the Report(s) or its recommendations are discovered to be inaccurate, incomplete, misleading or fraudulent; or (b) from the issuance of this letter. Further measures may need to be taken in the event that additional artifacts or archaeological sites are identified or the Report(s) is otherwise found to be inaccurate, incomplete, misleading or fraudulent.*

vallee
Consulting Engineers,
Architects & Planners

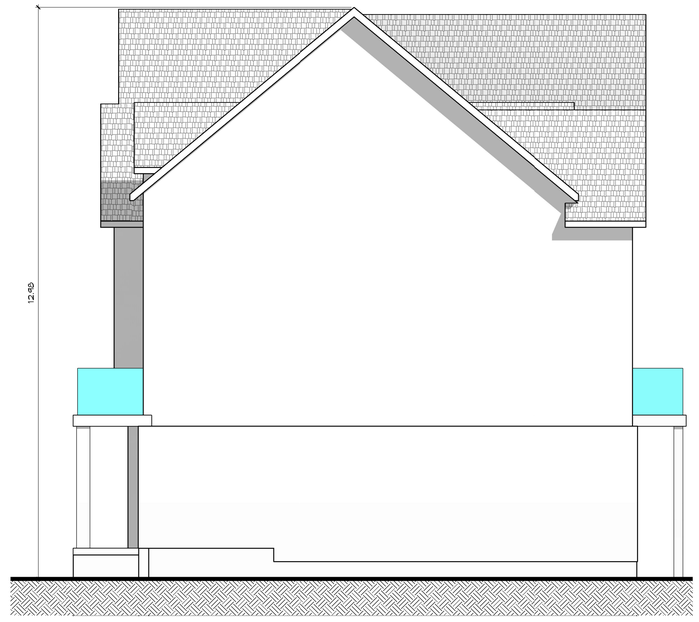
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

1 P301 FRONT ELEVATION
SCALE 3/16" = 1'-0"



3 P301 LEFT ELEVATION
SCALE 3/16" = 1'-0"

2 P301 REAR ELEVATION
SCALE 3/16" = 1'-0"



4 P301 RIGHT ELEVATION
SCALE 3/16" = 1'-0"

PROJECT TITLE:
HFW MIXED USE
395-411 QUEENSWAY WEST
SIMCOE, ONTARIO

DRAWING TITLE:
PRESENTATION ELEVATIONS

DRAWING SCALE:
3/16" = 1'-0"

DATE ISSUED:
2024.05.16

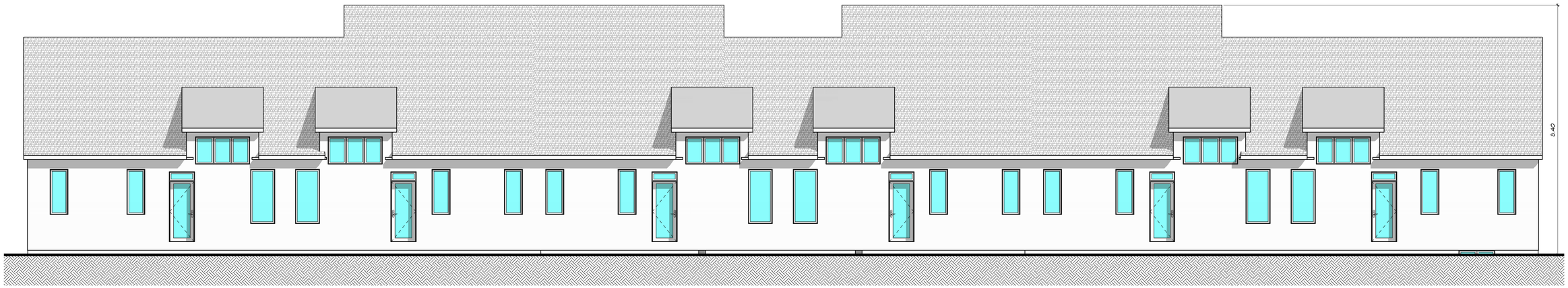
DRAWING NO.:
P301

PROJECT NO.:
22-013

vallee
Consulting Engineers,
Architects & Planners

G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE ONTARIO N3Y 3W4
(519) 426-6270

1 / P301 FRONT ELEVATION
SCALE 3/16" = 1'-0"



2 / P301 REAR ELEVATION
SCALE 3/16" = 1'-0"

PROJECT TITLE:
HFW MIXED USE
395-411 QUEENSWAY WEST
SIMCOE, ONTARIO

DRAWING TITLE:
PRESENTATION ELEVATIONS

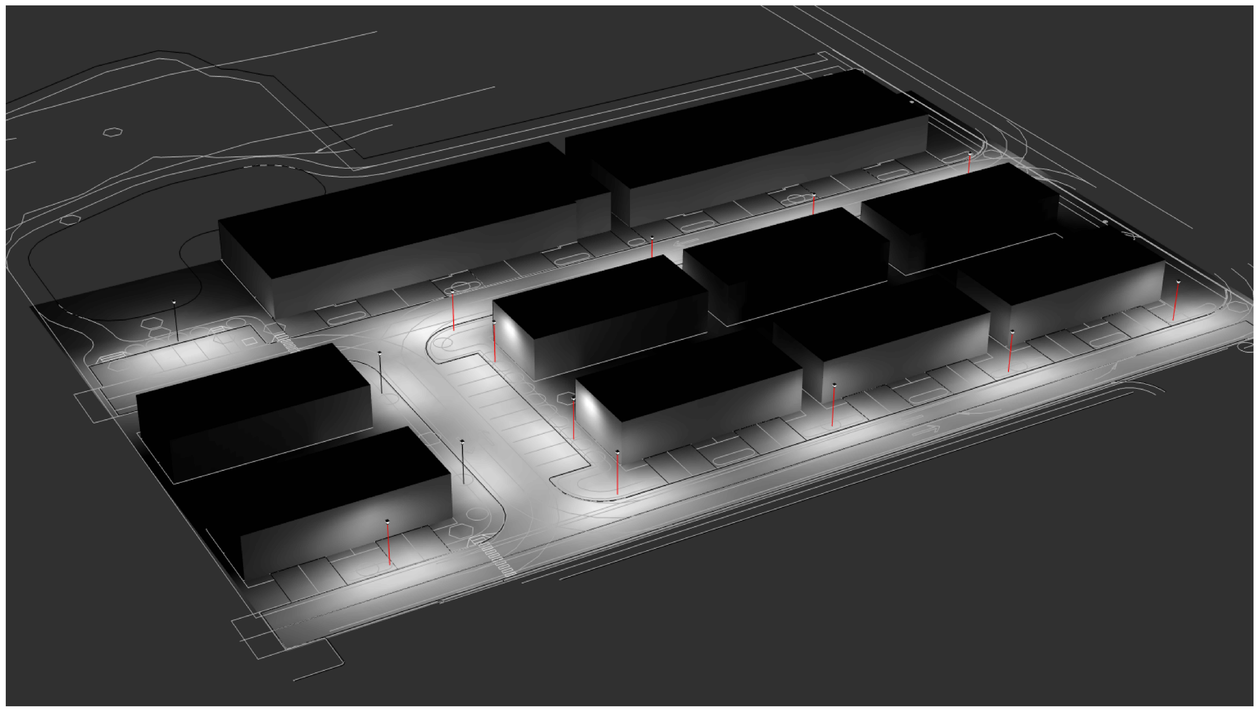
DRAWING SCALE:
3/16" = 1'-0"

DATE ISSUED:
2024.05.16

DRAWING NO.:
P301

PROJECT NO.:
22-013

TYPICAL POST TOP MOUNTED AREA LIGHT FIXTURE



LEGEND

THIS LEGEND REPRESENTS THE SYMBOLS COMMONLY USED. NOT ALL SYMBOLS MAY APPEAR ON THE DRAWINGS. SHOULD A SYMBOL BE FOUND ON THE DRAWING AND NOT APPEARING ON THE LEGEND, THE CONTRACTOR SHALL SUBMIT A QUESTION TO HAVE THE SYMBOL CLARIFIED IN AN ADDENDUM PRIOR TO SUBMITTING A BID.

ABBREVIATIONS

AE	APPROVED EQUAL
AFF	ABOVE FINISHED FLOOR
CB	CIRCUIT BREAKER
ER	EXISTING TO BE RELOCATED
EX	EXISTING TO REMAIN
JB	JUNCTION BOX
REL	RELOCATED ITEM IN NEW LOCATION
REM	EXISTING TO BE REMOVED IN IT'S ENTIRETY
UNO	UNLESS NOTED OTHERWISE

LIGHTING FIXTURES

	SINGLE POLE MOUNTED LIGHT FIXTURE
	TWIN POLE MOUNTED LIGHT FIXTURES TYPES AS PER DRAWINGS
	TRIPLE POLE MOUNTED LIGHT FIXTURE TYPES AND ORIENTATION AS PER DRAWINGS
	QUAD POLE MOUNTED LIGHT FIXTURES REFER TO DRAWINGS FOR TYPES
	POST TOP MOUNTED AREA LIGHT FIXTURES. LETTER DENOTES TYPE.
	WALL OR COLUMN MOUNTED LIGHTING FIXTURES. LETTER DENOTES TYPE.
B-1-2	LIGHTING CIRCUITING NOTE. B-PANELBOARD I.D., 1-BRANCH CIRCUIT, 2-LOCAL (SWITCH) CIRCUIT.

SITE STATISTICS - PHASE 1 ROADWAY

AVERAGE	MINIMUM	MAXIMUM	MAX/AVG	AVG/MIN	MAX/MIN
0.92fc	0.2fc	2.9fc	3.15	4.60	14.50

SITE STATISTICS - NORTH PARKING AREA

AVERAGE	MINIMUM	MAXIMUM	MAX/AVG	AVG/MIN	MAX/MIN
1.44fc	0.7fc	2.2fc	1.53	2.06	3.14

SITE STATISTICS - CENTRAL PARKING AREA

AVERAGE	MINIMUM	MAXIMUM	MAX/AVG	AVG/MIN	MAX/MIN
1.6fc	1.2fc	2.2fc	1.38	1.33	1.83

THE PHOTOMETRIC DATA USED AS INPUT FOR THESE CALCULATIONS IS BASED ON ESTABLISHED IES PROCEDURES AND PUBLISHED FIXTURE RATINGS. FIELD PERFORMANCE WILL DEPEND ON ACTUAL LAMP, BALLAST, ELECTRICAL AND SITE CHARACTERISTICS.

FULL CUTOFF PERFORMANCE - FULL CUTOFF PERFORMANCE MEANS A LUMINAIRE DISTRIBUTION WHERE ZERO CANDELA INTENSITY OCCURS AT AN **ANGLE AT OR ABOVE 90° ABOVE NADIR. ADDITIONALLY, THE CANDELA PER** 1000 LAMP LUMENS DOES NOT NUMERICALLY EXCEED 10% (100 LUMENS) AT **A VERTICAL ANGLE OF 80° ABOVE NADIR. THIS APPLIES TO ALL LATERAL** ANGLES AROUND THE LUMINAIRE.

CUTOFF PERFORMANCE - CUTOFF PERFORMANCE MEANS A LUMINAIRE DISTRIBUTION WHERE THE CANDELA PER 1000 LAMP LUMENS DOES NOT **NUMERICALLY EXCEED 2.5% (25 LUMENS) AT AN ANGLE ABOVE 90° ABOVE NADIR, AND 10% (100 LUMENS) AT A VERTICAL ANGLE 80° ABOVE NADIR.** THIS APPLIES TO ALL LATERAL ANGLES AROUND THE LUMINAIRE.

DRAWING LIST

SITE LIGHTING FIXTURE SCHEDULE

1.	THE LIGHTING FIXTURES, BALLASTS AND LAMPS FOR THIS PROJECT HAVE BEEN SPECIFIED TO ENSURE THAT SPECIFIC AESTHETIC AND PERFORMANCE REQUIREMENTS WILL BE SATISFIED.
2.	THE SPECIFIED LIGHTING FIXTURES ARE IDA APPROVED DARK-SKY FRIENDLY FIXTURES AND CONSISTENT WITH LEED GOALS & GREEN GLOBES CRITERIA FOR LIGHT POLLUTION REDUCTION. DIRECT GLARE WILL NOT BE OBSERVABLE (OUTSIDE THE ORIGINATING PROPERTY LIMITS) AT AN ANGLE **GREATER THAN 85° FROM NADIR OF THE VERTICAL AXIS OF THE LIGHT** SOURCE.
3.	ALL ALTERNATE FIXTURES TO THE PROPOSED FIXTURES SHALL HAVE IES FILES FOR FIXTURES FROM A REPUTABLE LAB WITH IES LAB CERTIFICATION. SHOULD A PROPOSED FIXTURE PERFORMANCE FAIL TO MEET THE MINIMUM REQUIREMENTS, THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLING ANY ADDITIONAL EQUIPMENT TO BRING THE LIGHTING LEVELS UP TO THE REQUIRED VALUES.
4.	INSTALLATION OF LIGHT FIXTURES SHALL BE ACCORDING TO MANUFACTURERS RECOMMENDATION AND ACCORDING TO CODE REQUIREMENTS.
5.	POLES LISTED BELOW ARE BASED ON STRESSCRETE DECORATIVE DIRECT BURIED POLES (THE TRADITIONAL - NON-FLUTED) FOR EXAMPLE PURPOSES. POLES SHALL BE SUBMITTED FOR ENGINEERS REVIEW C/W ENGINEERS STAMP. ALL POLES SHALL BE MOUNTED ON CONCRETE BASES AS NOTED IN SCHEDULE BELOW.

TYPE	DESCRIPTION	LAMP/ WATTAGE	VOLTAGE
PT-T2-35	SINGLE, POST TOP MOUNTED, FULL CUT-OFF, LED AREA LIGHT, TYPE II DISTRIBUTION PATTERN OPTICS. 0-10V ELECTRONIC DIMMING DRIVER STANDARD. DRIVER MOUNTED TO DIE-CAST ALUMINUM **BACK HOUSING SUITABLE FOR -40°C TO 40°C ENVIRONMENTS. CONSTRUCTED OF** HINGED DIE-CAST ALUMINUM. PRECISE OPTICS FOR EFFICIENT LIGHT OUTPUT. FIXTURE TO BE MOUNTED ON 18'-0", 4" DIRECT BURIED ROUND POLE FOR A TOTAL MOUNTING HEIGHT OF 18'-0" (5.5m) A.F.G. FIXTURE B.U.G. RATING TO BE B1-U0-G1 OR BETTER. FIXTURE TO BE SELECTED BY OWNER/ARCHITECT. BASE OF DESIGN; SIGNIFY LIGHTING LUMEC URBANSCAPE CAT. No.: MPTC 35W32LED 3K G3 LE2 UNV DMG RC PHB xx OR APPROVED EQUAL	3,900 NOMINAL LUMEN OUTPUT 36W INPUT 3000K	**120V (FIXTURE VOLTAGE TO BE SELECTED DURING BUILDING DESIGN AND SERVICING STAGE)
PT-T3-55	SINGLE, POST TOP MOUNTED, FULL CUT-OFF, LED AREA LIGHT, TYPE III DISTRIBUTION PATTERN OPTICS. 0-10V ELECTRONIC DIMMING DRIVER STANDARD. DRIVER MOUNTED TO DIE-CAST ALUMINUM **BACK HOUSING SUITABLE FOR -40°C TO 40°C ENVIRONMENTS. CONSTRUCTED OF** HINGED DIE-CAST ALUMINUM. PRECISE OPTICS FOR EFFICIENT LIGHT OUTPUT. FIXTURE TO BE MOUNTED ON 18'-0", 4" DIRECT BURIED ROUND POLE FOR A TOTAL MOUNTING HEIGHT OF 18'-0" (5.5m) A.F.G. FIXTURE B.U.G. RATING TO BE B1-U0-G1 OR BETTER. FIXTURE TO BE SELECTED BY OWNER/ARCHITECT. BASE OF DESIGN; SIGNIFY LIGHTING LUMEC URBANSCAPE CAT. No.: MPTC 55W32LED 3K G3 LE3 UNV DMG RC PHB xx OR APPROVED EQUAL	5,600 NOMINAL LUMEN OUTPUT 54W INPUT 3000K	**120V (FIXTURE VOLTAGE TO BE SELECTED DURING BUILDING DESIGN AND SERVICING STAGE)
PT-T4-72	SINGLE, POST TOP MOUNTED, FULL CUT-OFF, LED AREA LIGHT, TYPE IV DISTRIBUTION PATTERN OPTICS. 0-10V ELECTRONIC DIMMING DRIVER STANDARD. DRIVER MOUNTED TO DIE-CAST ALUMINUM **BACK HOUSING SUITABLE FOR -40°C TO 40°C ENVIRONMENTS. CONSTRUCTED OF** HINGED DIE-CAST ALUMINUM. PRECISE OPTICS FOR EFFICIENT LIGHT OUTPUT. FIXTURE TO BE MOUNTED ON 18'-0", 4" DIRECT BURIED ROUND POLE FOR A TOTAL MOUNTING HEIGHT OF 18'-0" (5.5m) A.F.G. FIXTURE B.U.G. RATING TO BE B1-U0-G2 OR BETTER. FIXTURE TO BE SELECTED BY OWNER/ARCHITECT. BASE OF DESIGN; SIGNIFY LIGHTING LUMEC URBANSCAPE CAT. No.: MPTC 72W32LED 3K G3 LE4 UNV DMG RC PHB xx OR APPROVED EQUAL	7,000 NOMINAL LUMEN OUTPUT 68W INPUT 3000K	**120V (FIXTURE VOLTAGE TO BE SELECTED DURING BUILDING DESIGN AND SERVICING STAGE)

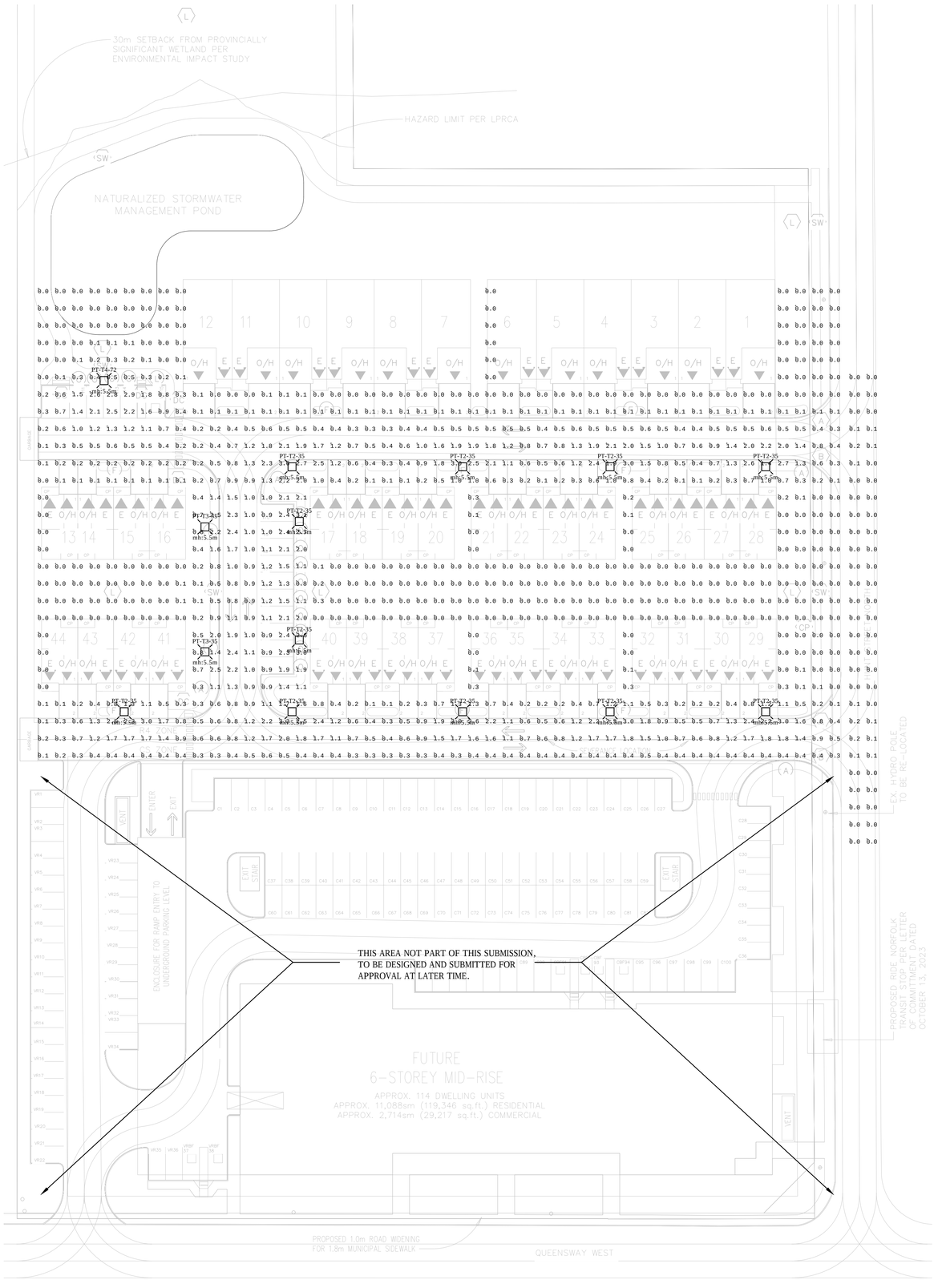
1	ISSUED FOR SPA	2024.05.23	K.S.

Electrical Engineering
12 Argyle Street N., Caledonia, ON, N3W 1B6
www.sei-ee.com

LICENSED PROFESSIONAL ENGINEER
K. SEGUIN
PROVINCE OF ONTARIO

ORIGINAL SHEET - ARCH D

File: C:\Users\jmdy\appdata\local\temp\AcPublish_18180\24-092 HPW - elec SPA.dwg
May 23, 2024 - 09:57am Plotted by: jmdy



1 EP100 ELECTRICAL SITE PLAN - PHOTOMETRIC DRAWING
SCALE: 1:400

1	ISSUED FOR SPA	2024.05.23	K.S.

Electrical Engineering
12 Argyle Street N., Caledonia, ON, N3W 1B6
www.sei-ee.com

LICENSED PROFESSIONAL ENGINEER
K. SEGUIN
May 23/24
PROVINCE OF ONTARIO

ORIGINAL SHEET - ARCH D

File: C:\Users\jrudy\appdata\local\temp\AcPublish_18188\24-092 HFW - elec SPA.dwg
May 23, 2024 - 09:57am Plotted by: jrudy

HFW HUNT STREET
RESIDENTIAL DEVELOPMENT

SIMCOE

NORFOLK COUNTY

Norfolk COUNTY

DRAWING LIST

G. DOUGLAS VALLEE LIMITED

22-013-COV	COVER PAGE
22-013-C100	SERVICING PLAN
22-013-C101	GRADING PLAN
22-013-C102	EROSION AND SEDIMENT CONTROL PLAN
22-013-C103	PLAN & PROFILE STREET A AND B
22-013-C104	PLAN & PROFILE STREET C AND D
22-013-C105	PLAN & PROFILE SWM POND AND OUTLET
22-013-GN1	GENERAL NOTES & DETAILS 1
22-013-GN2	GENERAL NOTES & DETAILS 2
22-013-SAN	SANITARY DRAINAGE AREAS
22-013-STM	STORM DRAINAGE AREAS

SITE BENCHMARKS:

1. SPIKE IN FACE OF WOOD HYDRO POLE AT NORTHWEST CORNER OF QUEENSWAY WEST AND HUNT STREET.
   ELEVATION 217.99m
2. TOP OF LARGE PUMPER NOZZLE OF FIRE HYDRANT AT NORTHWEST CORNER OF QUEENSWAY WEST AND HUNT STREET.
   ELEVATION 218.16m

REV. No.	DATE	REVISION
0	05/15/2024	ISSUED FOR SPA

NOTE:
THE CONTRACTOR IS CAUTIONED THAT ALL OF THE EXISTING UTILITIES ARE NOT INDICATED ON THIS DRAWING. THE CONTRACTOR MUST ARRANGE FOR LOCATES FROM EACH AREA UTILITY COMPANY PRIOR TO ANY CONSTRUCTION OR EXCAVATION. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE PROTECTION OF ALL UTILITIES INCLUDING THOSE NOT INDICATED ON THIS DRAWING. G. DOUGLAS VALLEE LTD. CANNOT ACCEPT RESPONSIBILITY FOR DAMAGE TO ANY EXISTING UTILITY WHICH MAY OR MAY NOT BE INDICATED ON THIS DRAWING.

ALL WORK, MATERIALS AND PROCESSES TO ABIDE TO NORFOLK COUNTY STANDARDS AND SPECIFICATIONS

LEGAL DESCRIPTION

LOT 35, 36,38,39,40,41,42,43 & 44, BLOCK 9 REGISTERED PLAN 182, TOWN OF SIMCOE AND PART OF LOT 2 CONCESSION 14, TOWNSHIP OF WINDHAM IN NORFOLK COUNTY.

APPLICANT INFORMATION

APPLICANT: HFW HOLDINGS LIMITED
TELEPHONE: 416-919-9768
ADDRESS: 3 FERNWOOD COURT, RICHMOND HILL, ONTARIO, L4B 3C2

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

Stamp

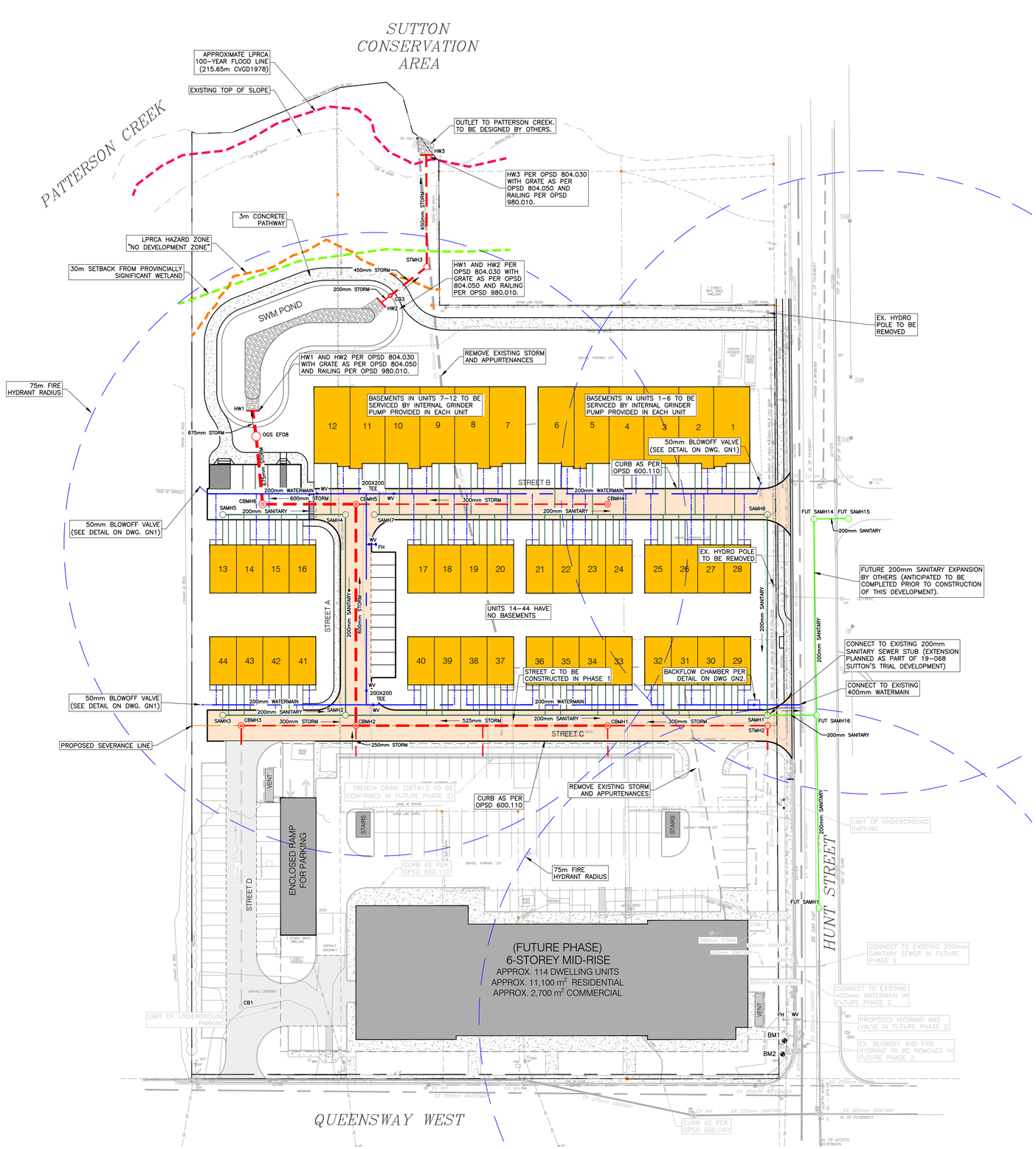
LICENSED PROFESSIONAL ENGINEER
22-013
2024.05.16
N. L. ONDENA
100553190
PROVINCE OF ONTARIO

Project Title
HFW HUNT STREET
RESIDENTIAL DEVELOPMENT
SIMCOE - NORFOLK COUNTY

Drawing Title
COVER PAGE

Designed by : NLO	Drawn By : NLO/NBN
Checked by : JTI	Date Started : JAN 2023
Drawing Scale : AS NOTED	Drawing No. COV
Project No. 22-013	

DATE PLOTTED: 5/17/2024 9:16 AM
PROJECT NUMBER & NAME: 22-013 - HFW HUNT STREET
FILE PATH: H:\PROJECTS\2022\22-013 HFW HOLDINGS HUNT ST RESIDENTIAL\DRAWINGS\CIVIL\PRODUCTION DRAWINGS\22-013 COV COVER PAGE.DWG



NOTES:

1. ALL EXISTING WATER AND SANITARY SERVICES TO THE SUBJECT PROPERTY ARE TO BE DISCONNECTED AND REMOVED AT THE START OF CONSTRUCTION.
2. PARKING AND AISLE PAVEMENT TO ADHERE TO PAVEMENT DESIGNS CONTAINED WITHIN THE GEOTECHNICAL REPORT BY GEO-PRO, DATED OCTOBER 20, 2022 AND NORFOLK COUNTY DESIGN CRITERIA:

   LIGHT DUTY:

   40mm HL3
   50mm HL8
   150mm GRANULAR A
   300mm GRANULAR B

   HEAVY DUTY:

   40mm HL3
   80mm HL8
   150mm GRANULAR A
   300mm GRANULAR B
3. GENERAL CONTRACTOR TO COORDINATE ALL WORK WITHIN THE SITE WITH THE COUNTY AND OBTAIN ALL NECESSARY PERMITS AND APPROVALS FROM LOCAL AUTHORITIES. EXECUTE ALL WORK AS PER NORFOLK COUNTY REQUIREMENTS.
4. GENERAL CONTRACTOR TO EXECUTE WORK TO CONSTRUCTION SITE ACCESS UNDER SUPERVISION OF THE ENGINEER. REFER TO ENTRANCE PERMIT REQUIREMENTS WHERE APPLICABLE. DRIVEWAY ENTRANCE TO BE MODIFIED OR INSTALLATION OF NEW ENTRANCE AS PER NORFOLK COUNTY REQUIREMENTS. PROVIDE NEW CONC. ENTRANCE CURBS TO MATCH EXISTING AS REQUIRED.
5. PRIOR TO THE COMMENCEMENT OF CONSTRUCTION, ALL BENCHMARKS, ELEVATIONS, DIMENSIONS AND GRADES MUST BE CHECKED BY THE CONTRACTOR AND ANY DISCREPANCIES REPORTED TO THE ENGINEER.
6. AT LEAST TWO DIFFERENT BENCHMARKS MUST BE REFERRED TO AT ALL TIMES.
7. COORDINATE WITH SITE GRADING PLAN FOR PROPOSED FINAL FINISH GRADE ELEVATIONS AND DRAINAGE SLOPES.
8. TRAFFIC CONTROL SHALL BE IMPLEMENTED BY THE CONTRACTOR IN ACCORDANCE WITH OTM TEMPORARY CONDITIONS BOOK 7. APPROVAL FOR THE TRAFFIC CONTROL WILL BE SOUGHT FROM THE MUNICIPALITY BY THE CONTRACTOR.

NOTES:

1. PROPOSED SEWERS TO ADHERE TO THE FOLLOWING OPSD:

1200mm MAINTENANCE HOLE STRUCTURE	OPSD 701.010
1200mm CATCH BASIN MAINTENANCE HOLE GRATE	OPSD 400.010

   ALL COMPONENTS OF THE PROPOSED STORM SEWERS ARE TO ADHERE TO DIVISION 700 OF THE OPSD.
2. RESTORE EXISTING COUNTY INFRASTRUCTURE TO COUNTY STANDARDS:
   - REFER TO TRENCHING RESTORATION DETAIL ON DRAWING GN.
   - CONCRETE CURB TO MATCH EXISTING.
   - CONCRETE SIDEWALK TO MATCH EXISTING WIDTH.
   - CONSTRUCTION PER OPSS AND OPSD.
4. ALL WATERMAIN TO BE RESTRAINED AT ALL BENDS, TEES, REDUCERS, DEAD-ENDS, AND VALVES AS PER DETAILS ON DWG. GN.

LEGEND

- PROPOSED STORM MANHOLE & SEWER
- PROPOSED SANITARY MANHOLE & SEWER
- FUTURE HUNT STREET SANITARY EXTENSION MANHOLE & SEWER (DONE BY OTHERS)
- PROPOSED SANITARY SERVICE
- PROPOSED WATERMAIN
- PROPOSED WATER SERVICE
- FUTURE PROPOSED STORM MANHOLE & SEWER
- FUTURE PROPOSED SANITARY MANHOLE & SEWER
- FUTURE PROPOSED SANITARY SERVICE
- FUTURE PROPOSED WATERMAIN
- FUTURE PROPOSED WATER SERVICE
- PROPERTY LINE
- HEAVY DUTY ASPHALT
- FUTURE HEAVY DUTY ASPHALT

REV. No.	DATE	REVISION
0	05/15/2024	ISSUED FOR SPA

NOTE:
THE CONTRACTOR IS CAUTIONED THAT ALL OF THE EXISTING UTILITIES ARE NOT INDICATED ON THIS DRAWING. THE CONTRACTOR MUST ARRANGE FOR LOCATES FROM EACH AREA UTILITY COMPANY PRIOR TO ANY CONSTRUCTION OR EXCAVATION. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE PROTECTION OF ALL UTILITIES INCLUDING THOSE NOT INDICATED ON THIS DRAWING. G. DOUGLAS VALLEE LTD. CANNOT ACCEPT RESPONSIBILITY FOR DAMAGE TO ANY EXISTING UTILITY WHICH MAY OR MAY NOT BE INDICATED ON THIS DRAWING.

ALL WORK, MATERIALS AND PROCESSES TO ABIDE TO NORFOLK COUNTY STANDARDS AND SPECIFICATIONS

LEGAL DESCRIPTION

LOT 35, 36,38,39,40,41,42,43 & 44, BLOCK 9 REGISTERED PLAN 182, TOWN OF SIMCOE AND PART OF LOT 2 CONCESSION 14, TOWNSHIP OF WINDHAM IN NORFOLK COUNTY.

APPLICANT INFORMATION

APPLICANT: HFW HOLDINGS LIMITED
TELEPHONE: 416-919-9768
ADDRESS: 3 FERNWOOD COURT, RICHMOND HILL, ONTARIO, L4B 3C2

BENCHMARKS

BM #1: SPIKE IN FACE OF WOOD HYDRO POLE AT NORTHWEST CORNER OF QUEENSWAY WEST AND HUNT STREET.
ELEV. 217.99m

BM #2: TOP OF LARGE PUMPER NOZZLE OF FIRE HYDRANT AT NORTHWEST CORNER OF QUEENSWAY WEST AND HUNT STREET.
ELEV. 218.16m

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

DRAWING LIST

G. DOUGLAS VALLEE LIMITED DRAWINGS

22-013 COV - COVER PAGE
22-013 C100 - SERVICING PLAN
22-013 C101 - GRADING PLAN
22-013 C102 - EROSION AND SEDIMENT CONTROL PLAN
22-013 C103 - PLAN & PROFILE STREET A AND B
22-013 C104 - PLAN & PROFILE STREET C AND D
22-013 C105 - PLAN & PROFILE SWM POND AND OUTLET
22-013 GN1 - GENERAL NOTES & DETAILS 1
22-013 GN2 - GENERAL NOTES & DETAILS 2
22-013 SAN - SANITARY DRAINAGE AREAS
22-013 STM - STORM DRAINAGE AREAS

SCALE:
10 20
HORIZONTAL : 1:500

DO NOT SCALE DRAWINGS, CALL FOR ANY CLARIFICATIONS THAT ARE REQUIRED, FIELD VERIFY AT ALL BUILT CONDITIONS

ALL DRAWINGS ARE TO BE READ IN COLOUR
ORIGINAL PAGE SIZE ARCH 'D' - 24" x 36"

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

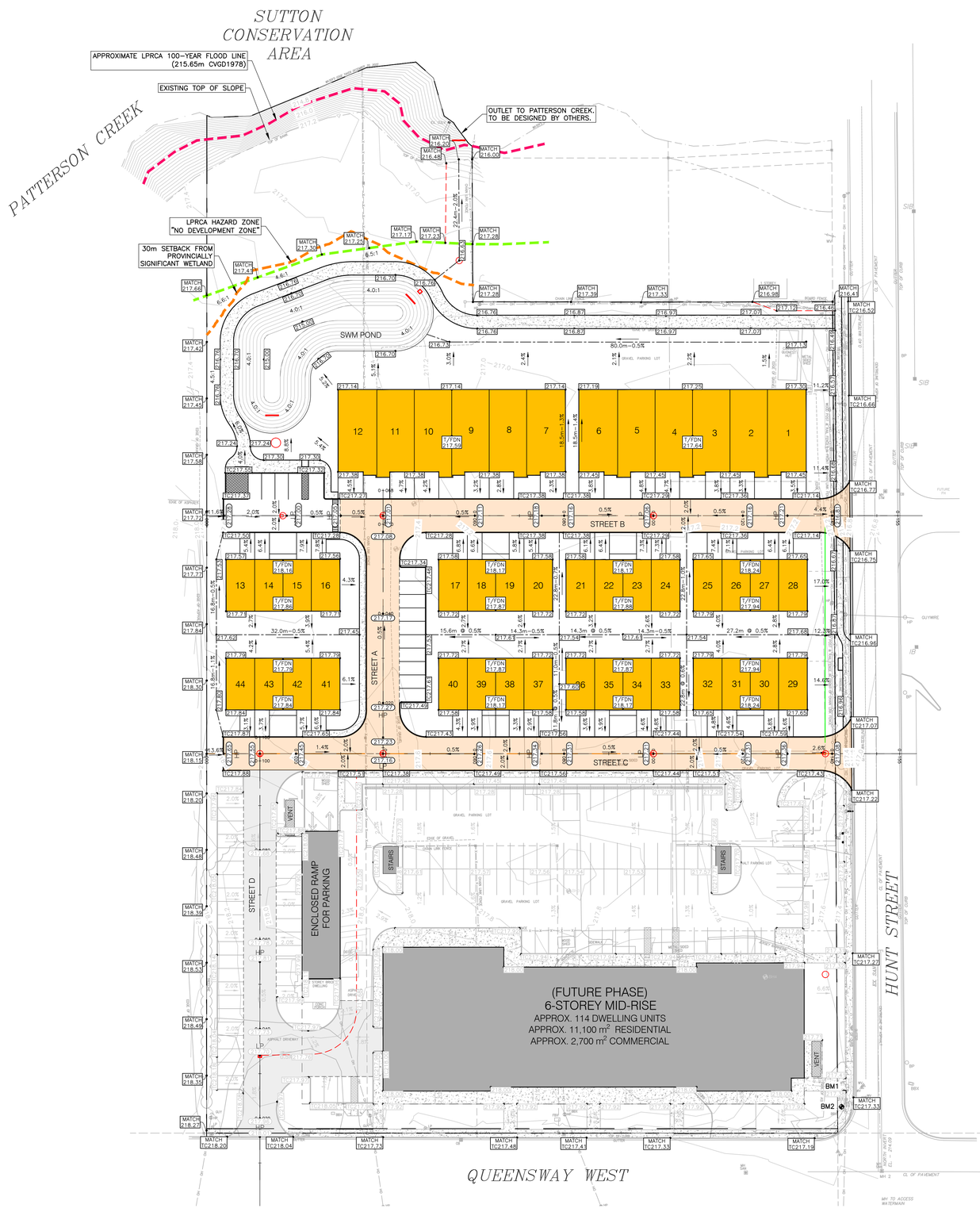
Stamp
LICENSED PROFESSIONAL ENGINEER
22-013
2024.05.16
N. L. ONGENA
100533190
PROVINCE OF ONTARIO

Project Title
HFW HUNT STREET
RESIDENTIAL DEVELOPMENT
SIMCOE - NORFOLK COUNTY

Drawing Title
SERVICING PLAN

Designed by : NLO	Drawn By : NLO
Checked by : JI	Date Started : JAN 2023
Drawing Scale : 1:500	Drawing No. C100
Project No. 22-013	

DATE PLOTTED 5/17/2024 9:16 AM | PROJECT NUMBER & NAME 22-013 - HFW HUNT STREET | FILE PATH H:\PROJECTS\2022\22-013 HFW HOLDINGS\HUNT ST RESIDENTIAL\DRAWINGS\CIVIL\PRODUCTION DRAWINGS\22-013 C100 SERVICING PLAN.DWG



N

LEGEND

- PROPOSED SPOT ELEVATION (247.20)
- EMERGENCY OVERLAND FLOW DIRECTION
- TOP OF SLOPE
- EXISTING GROUND CONTOUR (246.00)
- ROAD C/L ELEVATION (235.18)
- FLOW DIRECTION WITH GRADE (2.0%)
- PROPOSED GRADE BREAK
- PROPOSED SWALE
- PROPOSED PROPERTY LINE
- PROPOSED BUILDING
- HEAVY DUTY ASPHALT

REV. No.	DATE	REVISION
0	05/15/2024	ISSUED FOR SPA

NOTE:
THE CONTRACTOR IS CAUTIONED THAT ALL OF THE EXISTING UTILITIES ARE NOT INDICATED ON THIS DRAWING. THE CONTRACTOR MUST ARRANGE FOR LOCATES FROM EACH AREA UTILITY COMPANY PRIOR TO ANY CONSTRUCTION OR EXCAVATION. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE PROTECTION OF ALL UTILITIES INCLUDING THOSE NOT INDICATED ON THIS DRAWING. G. DOUGLAS VALLEE LTD. CANNOT ACCEPT RESPONSIBILITY FOR DAMAGE TO ANY EXISTING UTILITY WHICH MAY OR MAY NOT BE INDICATED ON THIS DRAWING.

ALL WORK, MATERIALS AND PROCESSES TO ABIDE TO NORFOLK COUNTY STANDARDS AND SPECIFICATIONS

LEGAL DESCRIPTION

LOT 35, 36,38,39,40,41,42,43 & 44, BLOCK 9 REGISTERED PLAN 182, TOWN OF SIMCOE AND PART OF LOT 2 CONCESSION 14, TOWNSHIP OF WINDHAM IN NORFOLK COUNTY.

APPLICANT INFORMATION

APPLICANT: HFW HOLDINGS LIMITED
TELEPHONE: 416-919-9768
ADDRESS: 3 FERNWOOD COURT, RICHMOND HILL, ONTARIO, L4B 3C2

BENCHMARKS

BM #1: SPIKE IN FACE OF WOOD HYDRO POLE AT NORTHWEST CORNER OF QUEENSWAY WEST AND HUNT STREET.
ELEV. 217.99m

BM #2: TOP OF LARGE PUMPER NOZZLE OF FIRE HYDRANT AT NORTHWEST CORNER OF QUEENSWAY WEST AND HUNT STREET.
ELEV. 218.16m

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

DRAWING LIST
G. DOUGLAS VALLEE LIMITED DRAWINGS

SCALE:
10 20
HORIZONTAL : 1:500

DO NOT SCALE DRAWINGS, CALL FOR ANY CLARIFICATIONS THAT ARE REQUIRED, FIELD VERIFY AT ALL BUILT CONDITIONS

ALL DRAWINGS ARE TO BE READ IN COLOUR ORIGINAL PAGE SIZE ARCH 'D' - 24" x 36"

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

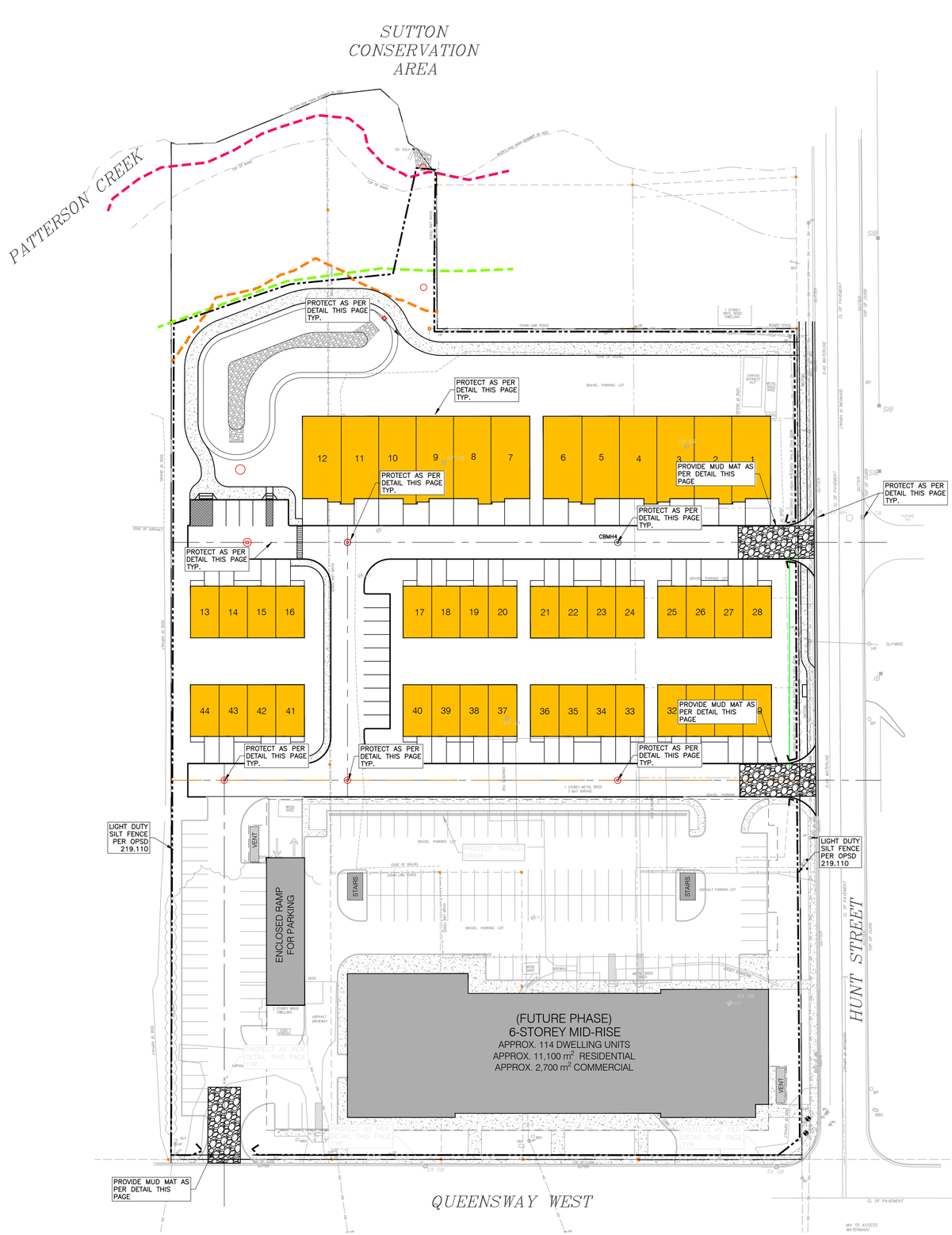
Stamp
LICENSED PROFESSIONAL ENGINEER
22-013
2024.05.16
N. L. ONGENA
100533190
PROVINCE OF ONTARIO

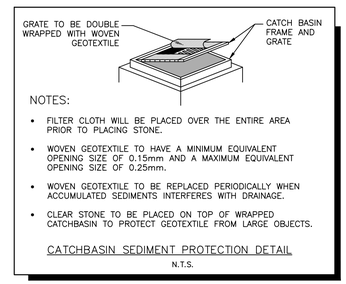
Project Title
HFW HUNT STREET
RESIDENTIAL DEVELOPMENT
SIMCOE - NORFOLK COUNTY

Drawing Title
GRADING PLAN

Designed by : NLO	Drawn By : NLO/NBN
Checked by : JTI	Date Started : JAN 2023
Drawing Scale : 1:500	Drawing No. C101
Project No. 22-013	

DATE PLOTTED: 5/17/2024 9:16 AM
PROJECT NUMBER & NAME: 22-013 - HFW HUNT STREET
FILE PATH: H:\PROJECTS\2022\22-013 HFW HOLDINGS\CIVIL\PRODUCTION DRAWINGS\22-013 C102 GRADING PLAN.DWG



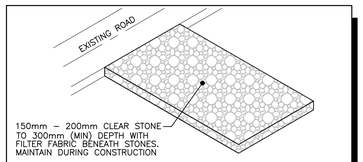


NOTES:

- FILTER CLOTH WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING STONE.
- WOVEN GEOTEXTILE TO HAVE A MINIMUM EQUIVALENT OPENING SIZE OF 0.15mm AND A MAXIMUM EQUIVALENT OPENING SIZE OF 0.25mm.
- WOVEN GEOTEXTILE TO BE REPLACED PERIODICALLY WHEN ACCUMULATED SEDIMENTS INTERFERES WITH DRAINAGE.
- CLEAR STONE TO BE PLACED ON TOP OF WRAPPED CATCHBASIN TO PROTECT GEOTEXTILE FROM LARGE OBJECTS.

CATCHBASIN SEDIMENT PROTECTION DETAIL

N.T.S.



MUD MAT – CONSTRUCTION ACCESS

N.T.S.

LEGEND

- EXISTING GROUND CONTOUR
- PROPOSED SWALE
- PROPOSED LIGHT DUTY SILT FENCE AS PER OPSD 219.110
- PROPOSED GRADING MATCH LINE
- PROPOSED CATCHBASIN
- PROPOSED CATCHBASIN MANHOLE

EROSION CONTROL NOTES

1. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR DESIGN AND PROVISION OF ALL SEDIMENT CONTROL MEASURES AS MAY BE REQUIRED TO PROTECT THE WORK SITE OR THE ADJACENT LANDS, REGARDLESS OF THE SOURCE OR ORIGIN OF EROSION OR SEDIMENTS. IF THE ENGINEER IS NOT SATISFIED WITH THE EXTENT OF THE MEASURES TAKEN, THE ENGINEER MAY DIRECT THAT ADDITIONAL CONTROLS BE PUT IN PLACE.

   THE ENGINEERS REQUIREMENTS FOR SEDIMENT AND EROSION CONTROL SHALL BE CONSIDERED ABSOLUTE MINIMUMS. THE ULTIMATE RESPONSIBILITY TO ENSURE THAT THE MEASURES ARE ADEQUATE SHALL LIE SOLELY ON THE CONTRACTOR. ANY DAMAGE RESULTING FROM FAILURE OF THESE MEASURES SHALL BE REPAIRED AT THE CONTRACTORS EXPENSE.
2. PROTECT ALL EXPOSED SURFACES AND CONTROL ALL RUNOFF DURING CONSTRUCTION.
3. ALL EROSION CONTROL MEASURES TO BE IN PLACE UNTIL RESTORATION IS COMPLETE.
4. MAINTAIN EROSION CONTROL MEASURES DURING CONSTRUCTION.
5. ALL COLLECTED SEDIMENT TO BE DISPOSED OF AT AN APPROVED LOCATION.
6. MINIMIZE AREA DISTURBED DURING CONSTRUCTION.
7. ALL DEWATERING TO BE DISPOSED OF IN AN APPROVED SEDIMENTATION BASIN.
8. PROTECT ALL CATCH BASINS, MANHOLES AND PIPE ENDS FROM SEDIMENT INTRUSION WITH GEOTEXTILE AND MAINTAIN IN FREE FLOWING STATE (TERRAFIX 270R OR APPROVED EQUIVALENT). REFER TO DETAIL THIS PAGE.
9. KEEP ALL SUMPS CLEAN DURING CONSTRUCTION INCLUDING OIL GRIT SEPARATOR.
10. PREVENT WIND-BLOWN DUST.
11. CONTRACTOR TO PROVIDE MUD MAT AT ALL CONSTRUCTION ENTRANCES.

REV. No.	DATE	REVISION
0	05/15/2024	ISSUED FOR SPA

NOTE:
THE CONTRACTOR IS CAUTIONED THAT ALL OF THE EXISTING UTILITIES ARE NOT INDICATED ON THIS DRAWING. THE CONTRACTOR MUST ARRANGE FOR LOCATES FROM EACH AREA UTILITY COMPANY PRIOR TO ANY CONSTRUCTION OR EXCAVATION. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE PROTECTION OF ALL UTILITIES INCLUDING THOSE NOT INDICATED ON THIS DRAWING. G. DOUGLAS VALLEE LTD. CANNOT ACCEPT RESPONSIBILITY FOR DAMAGE TO ANY EXISTING UTILITY WHICH MAY OR MAY NOT BE INDICATED ON THIS DRAWING.

ALL WORK, MATERIALS AND PROCESSES TO ABIDE TO NORFOLK COUNTY STANDARDS AND SPECIFICATIONS

LEGAL DESCRIPTION

LOT 35, 36,38,39,40,41,42,43 & 44, BLOCK 9 REGISTERED PLAN 182, TOWN OF SIMCOE AND PART OF LOT 2 CONCESSION 14, TOWNSHIP OF WINDHAM IN NORFOLK COUNTY.

APPLICANT INFORMATION

APPLICANT: HFW HOLDINGS LIMITED
TELEPHONE: 416-919-9768
ADDRESS: 3 FERNWOOD COURT, RICHMOND HILL, ONTARIO, L4B 3C2

BENCHMARKS

BM #1: SPIKE IN FACE OF WOOD HYDRO POLE AT NORTHWEST CORNER OF QUEENSWAY WEST AND HUNT STREET.
ELEV. 217.99m

BM #2: TOP OF LARGE PUMPER NOZZLE OF FIRE HYDRANT AT NORTHWEST CORNER OF QUEENSWAY WEST AND HUNT STREET.
ELEV. 218.16m

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

DRAWING LIST

G. DOUGLAS VALLEE LIMITED DRAWINGS

SCALE:
HORIZONTAL : 1:500
10 20

DO NOT SCALE DRAWINGS, CALL FOR ANY CLARIFICATIONS THAT ARE REQUIRED, FIELD VERIFY AT ALL BUILT CONDITIONS

ALL DRAWINGS ARE TO BE READ IN COLOUR ORIGINAL PAGE SIZE ARCH "D" - 24" x 36"

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

Stamp

LICENSED PROFESSIONAL ENGINEER
22-013
2024.05.16
N. L. ONGENA
100533190
PROVINCE OF ONTARIO

Project Title
HFW HUNT STREET
RESIDENTIAL DEVELOPMENT
SIMCOE - NORFOLK COUNTY

Drawing Title
EROSION AND SEDIMENT CONTROL PLAN

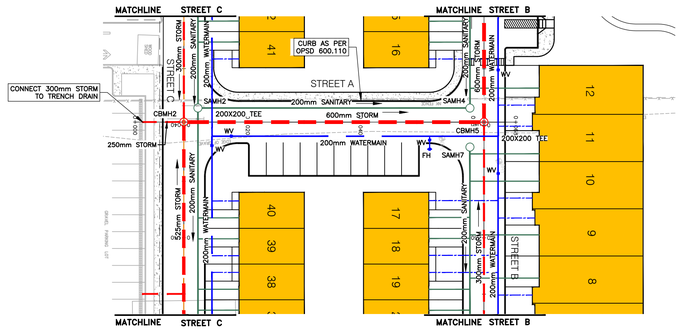
Designed by : NLO	Drawn By : NLO/NBN
Checked by : JTI	Date Started : JAN 2023
Drawing Scale : 1:500	Drawing No. C102
Project No. 22-013	

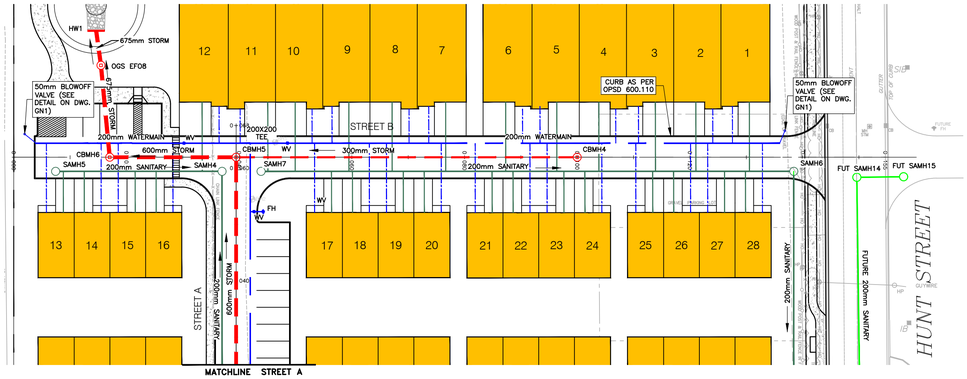
DATE PLOTTED: 5/17/2024 9:17 AM PROJECT NUMBER & NAME: 22-013 - HFW HUNT STREET FILE PATH: H:\PROJECTS\2022\22-013 HFW HOLDINGS HUNT ST RESIDENTIAL\DRAWINGS\CIVIL\PRODUCTION DRAWINGS\22-013 C103 EROSION AND SEDIMENT CONTROL PLAN.DWG

ALL WATERMAIN TO BE RESTRAINED PER WATERMAIN RESTRAINT TABLE ON GENERAL CONSTRUCTION NOTES DRAWING.

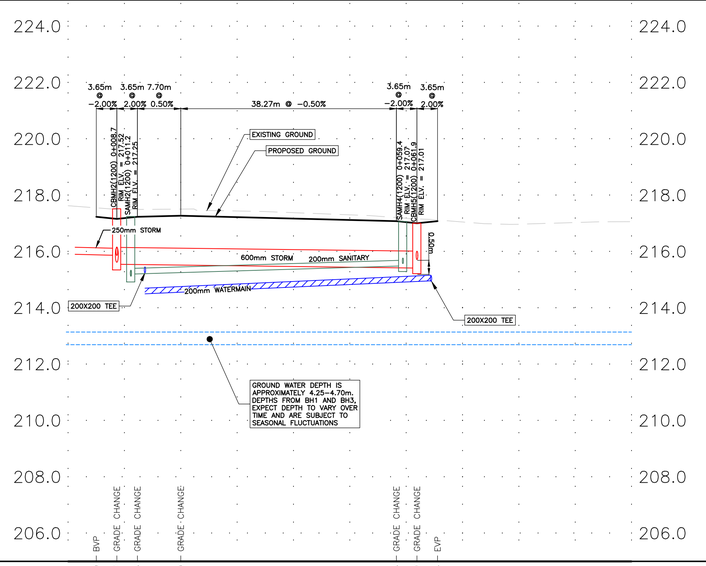
LEGEND

- PROPOSED STORM MANHOLE
- PROPOSED SANITARY MANHOLE
- PROPOSED WATER VALVE
- PROPOSED FIRE HYDRANT
- PROPOSED WATERMAIN
- PROPERTY LINES
- FUT SAMH3 — FUTURE HUNT STREET SANITARY EXTENSION MANHOLE & SEWER (DONE BY OTHERS)
- FUTURE PROPOSED STORM MANHOLE & SEWER
- FUTURE PROPOSED SANITARY MANHOLE & SEWER
- FUTURE PROPOSED SANITARY SERVICE
- FUTURE PROPOSED WATERMAIN
- FUTURE PROPOSED WATER SERVICE
- PROPERTY LINE
- PROPOSED LIGHT STANDARD
- PROPOSED LIGHTING PEDESTAL
- PROPOSED HYDRO TRANSFORMER
- PROPOSED TREE PLANTING
- PROPOSED BELL "GRADE LEVEL BOX"
- PROPOSED BELL PEDESTAL
- PROPOSED CATV PEDESTAL
- BOREHOLE LOCATION

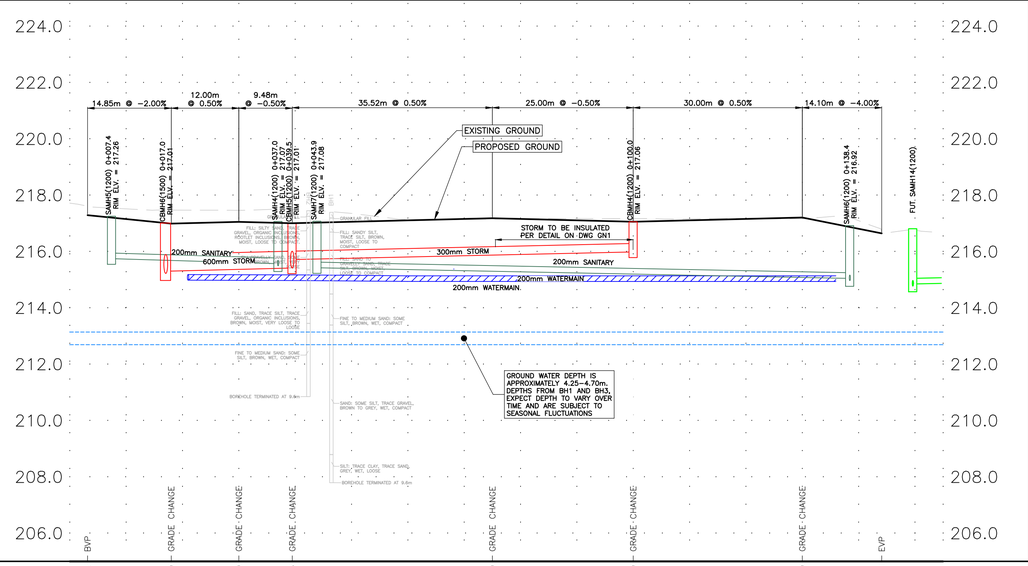




STREET A



STREET B



CHAINAGE	0+000	0+005.0	0+008.7	0+010	0+012.3	0+020.0	0+030	0+040	0+050	0+058.3	0+060	0+061.9	0+065.6	0+070	0+080	0+090	0+100
		BVP	GRADE CHANGE	GRADE CHANGE	GRADE CHANGE	GRADE CHANGE				GRADE CHANGE	GRADE CHANGE	GRADE CHANGE	EVP				
FINAL CENTRE LINE ROAD ELEVATIONS		217.23	217.16	217.19	217.23	217.27	217.22	217.17	217.12	217.08	217.04	217.01	217.08				
STORM SEWER	7.4m OF 250mm CONCRETE STORM WITH CLASS B BEDDING @ 0.50%	215.89W	215.82E	215.86S	215.55N	53.3m OF 600mm CONCRETE STORM WITH CLASS B BEDDING @ 0.25%				215.41S	215.41E	215.41W					
SANITARY SEWER					215.14W	48.3m OF 200mm PVC SDR 35 SANITARY WITH CLASS B BEDDING @ −0.60%				215.57W	215.57E	215.50N					

CHAINAGE	0+000	0+003.2	0+010	0+018.0	0+020	0+030.0	0+038.5	0+050	0+060	0+070	0+075.0	0+080	0+090	0+100.0	0+110	0+120	0+130.0	0+140	0+144.1	0+150	0+155
		BVP	GRADE CHANGE	GRADE CHANGE	GRADE CHANGE	GRADE CHANGE	GRADE CHANGE		GRADE CHANGE	GRADE CHANGE	GRADE CHANGE	GRADE CHANGE		GRADE CHANGE			GRADE CHANGE		EVP		
FINAL CENTRE LINE ROAD ELEVATIONS		217.29	217.15	216.99	217.00	217.05	217.01	217.06	217.11	217.16	217.18	217.16	217.11	217.06	217.11	217.16	217.21	216.81	216.64		
STORM SEWER				215.22N	215.30E	22.4m OF 600mm ULTRA RIB STORM CLASS B BEDDING @ 0.50%				215.41S	215.41E	215.41W	60.5m OF 300mm ULTRA RIB STORM CLASS B BEDDING @ 0.45%						215.99W		
SANITARY SEWER				215.75E	29.5m OF 200mm PVC SDR 35 SANITARY WITH CLASS B BEDDING @ 0.60%					215.78W	215.49S		215.43E	94.6m OF 200mm PVC SDR 35 SANITARY WITH CLASS B BEDDING @ 0.40%					215.05W	214.97S		

DATE LAST PLOTTED :

REV. No.	DATE	REVISION
0	05/15/2024	ISSUED FOR SPA

NOTE:
THE CONTRACTOR IS CAUTIONED THAT ALL OF THE EXISTING UTILITIES ARE NOT INDICATED ON THIS DRAWING. THE CONTRACTOR MUST ARRANGE FOR LOCATES FROM EACH AREA UTILITY COMPANY PRIOR TO ANY CONSTRUCTION OR EXCAVATION. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE PROTECTION OF ALL UTILITIES INCLUDING THOSE NOT INDICATED ON THIS DRAWING. G. DOUGLAS VALLEE LTD. CANNOT ACCEPT RESPONSIBILITY FOR DAMAGE TO ANY EXISTING UTILITY WHICH MAY OR MAY NOT BE INDICATED ON THIS DRAWING.

ALL WORK, MATERIALS AND PROCESSES TO ABIDE TO NORFOLK COUNTY STANDARDS AND SPECIFICATIONS

LEGAL DESCRIPTION

LOT 35, 36,38,39,40,41,42,43 & 44, BLOCK 9 REGISTERED PLAN 182, TOWN OF SIMCOE AND PART OF LOT 2 CONCESSION 14, TOWNSHIP OF WINDHAM IN NORFOLK COUNTY.

APPLICANT INFORMATION

APPLICANT: HFW HOLDINGS LIMITED
TELEPHONE: 416-919-9768
ADDRESS: 3 FERNWOOD COURT, RICHMOND HILL, ONTARIO, L4B 3C2

BENCHMARKS

BM #1: SPIKE IN FACE OF WOOD HYDRO POLE AT NORTHWEST CORNER OF QUEENSWAY WEST AND HUNT STREET.
ELEV. 217.99m

BM #2: TOP OF LARGE PUMPER NOZZLE OF FIRE HYDRANT AT NORTHWEST CORNER OF QUEENSWAY WEST AND HUNT STREET.
ELEV. 218.16m

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

DRAWING LIST

G. DOUGLAS VALLEE LIMITED DRAWINGS

22-013 COV - COVER PAGE
22-013 C100 - SERVICING PLAN
22-013 C101 - GRADING PLAN
22-013 C102 - EROSION AND SEDIMENT CONTROL PLAN
22-013 C103 - PLAN & PROFILE STREET A AND B
22-013 C104 - PLAN & PROFILE STREET C AND D
22-013 C105 - PLAN & PROFILE SWM POND AND OUTLET
22-013 GN1 - GENERAL NOTES & DETAILS 1
22-013 GN2 - GENERAL NOTES & DETAILS 2
22-013 SAN - SANITARY DRAINAGE AREAS
22-013 STM - STORM DRAINAGE AREAS

SCALE:
HORIZONTAL : 1 : 500 (5, 15, 25)
VERTICAL : 1 : 100 (1, 2, 3, 4, 5)

DO NOT SCALE DRAWINGS. CALL FOR ANY CLARIFICATIONS THAT ARE REQUIRED. FIELD VERIFY AT ALL BUILT CONDITIONS

ALL DRAWINGS ARE TO BE READ IN COLOUR ORIGINAL PAGE SIZE ARCH 'D' - 24" x 36"

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

Stamp
LICENSED PROFESSIONAL ENGINEER
22-013
2024.05.16
N. L. ONGENA
100533190
PROVINCE OF ONTARIO

Project Title
HFW HUNT STREET
RESIDENTIAL DEVELOPMENT
SIMCOE - NORFOLK COUNTY

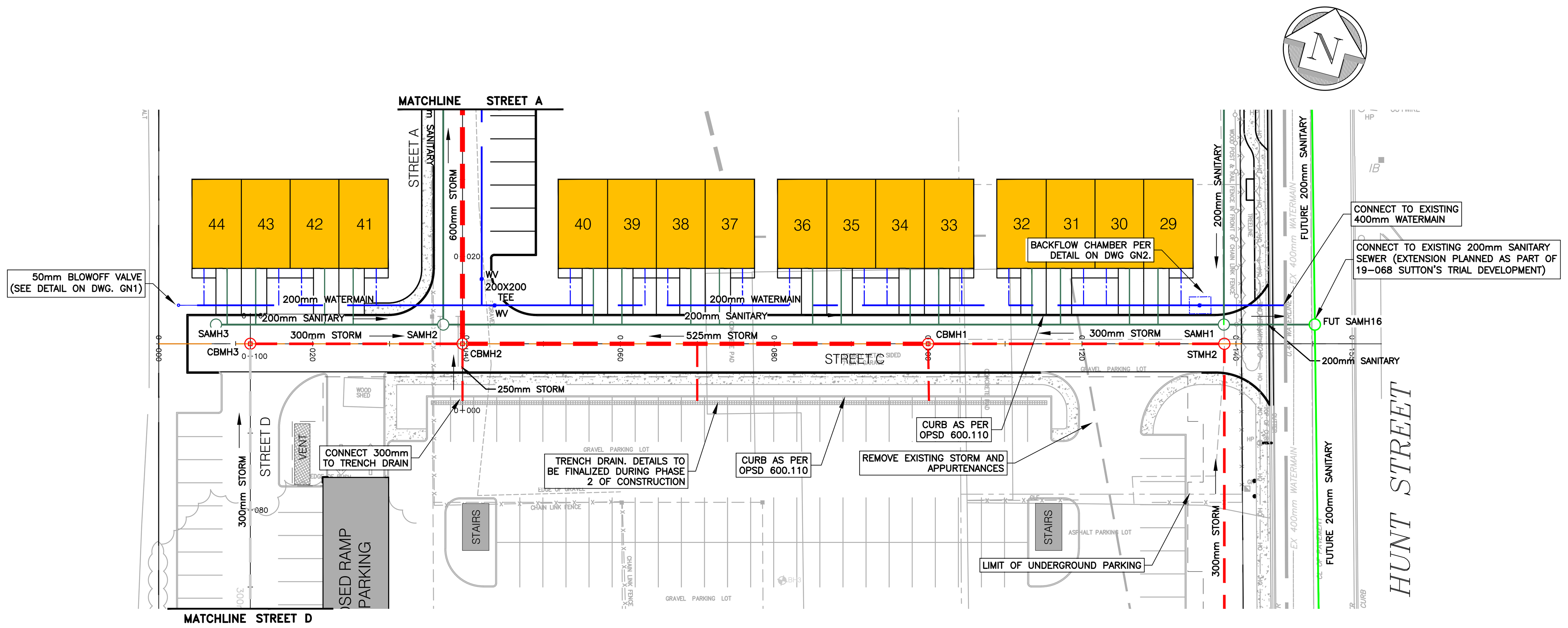
Drawing Title
PLAN & PROFILE STREET A AND B

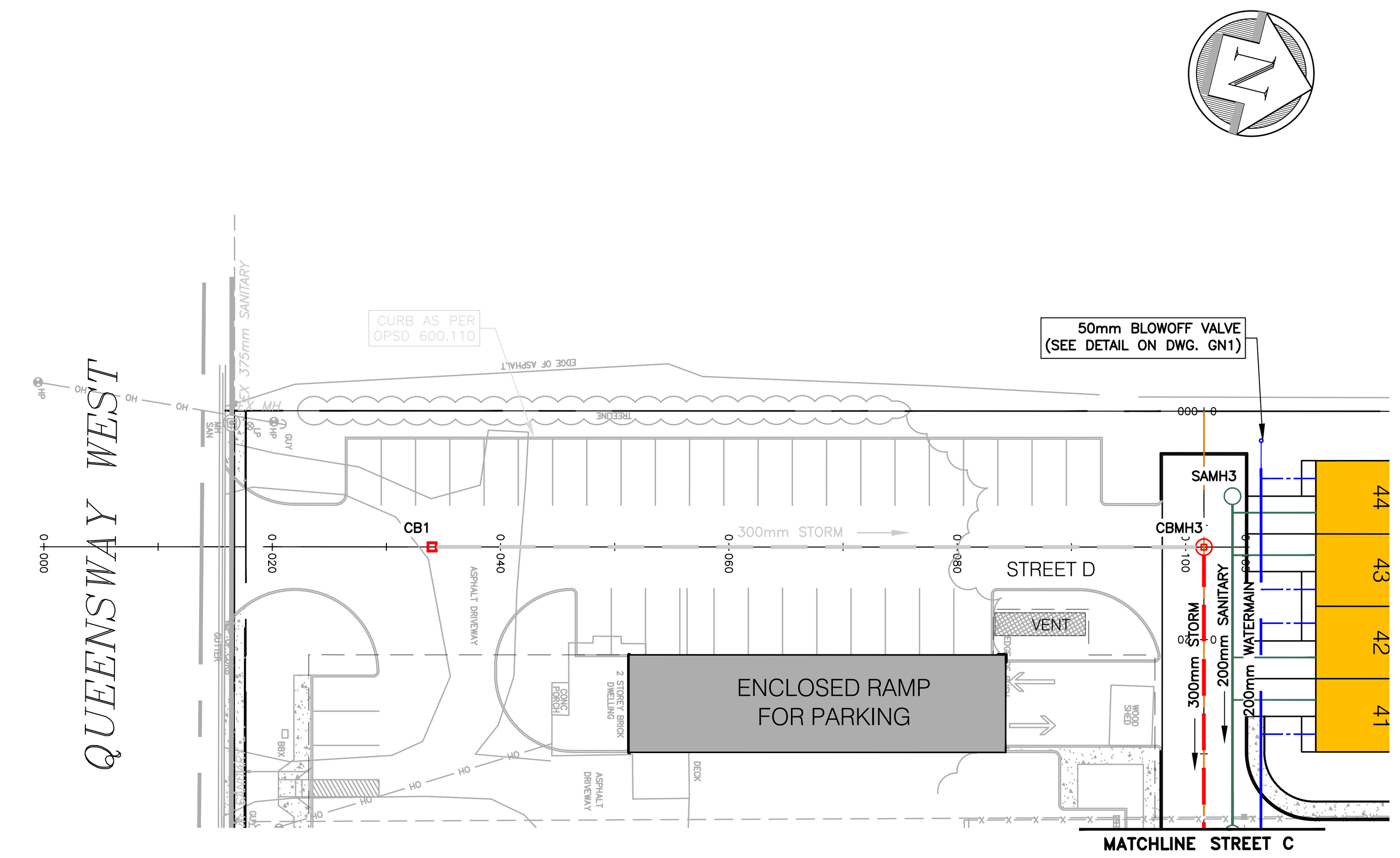
Designed by :	Drawn By :
NLO	NLO/NBN
Checked by :	Date Started :
JTI	JAN 2023
Drawing Scale : 1:500	Drawing No. C103
Project No. 22-013	

LEGEND

PROPOSED STORM MANHOLE (STMH5)	FUTURE PROPOSED STORM MANHOLE & SEWER (STMH5)	PROPOSED LIGHT STANDARD (LS)
PROPOSED SANITARY MANHOLE (SAMH3)	FUTURE PROPOSED SANITARY MANHOLE & SEWER (SAMH3)	PROPOSED LIGHTING PEDESTAL (P)
PROPOSED WATER VALVE (WV)	FUTURE PROPOSED SANITARY SERVICE	PROPOSED HYDRO TRANSFORMER (T)
PROPOSED FIRE HYDRANT (FH)	FUTURE PROPOSED WATERMAIN	PROPOSED TREE PLANTING
PROPOSED WATERMAIN	FUTURE PROPOSED WATER SERVICE	PROPOSED BELL 'GRADE LEVEL BOX' (GLB)
PROPERTY LINES	PROPERTY LINE	PROPOSED BELL PEDESTAL
FUTURE HUNT STREET SANITARY EXTENSION MANHOLE & SEWER (DONE BY OTHERS) (FUT SAMH3)		PROPOSED CATV PEDESTAL
		BOREHOLE LOCATION

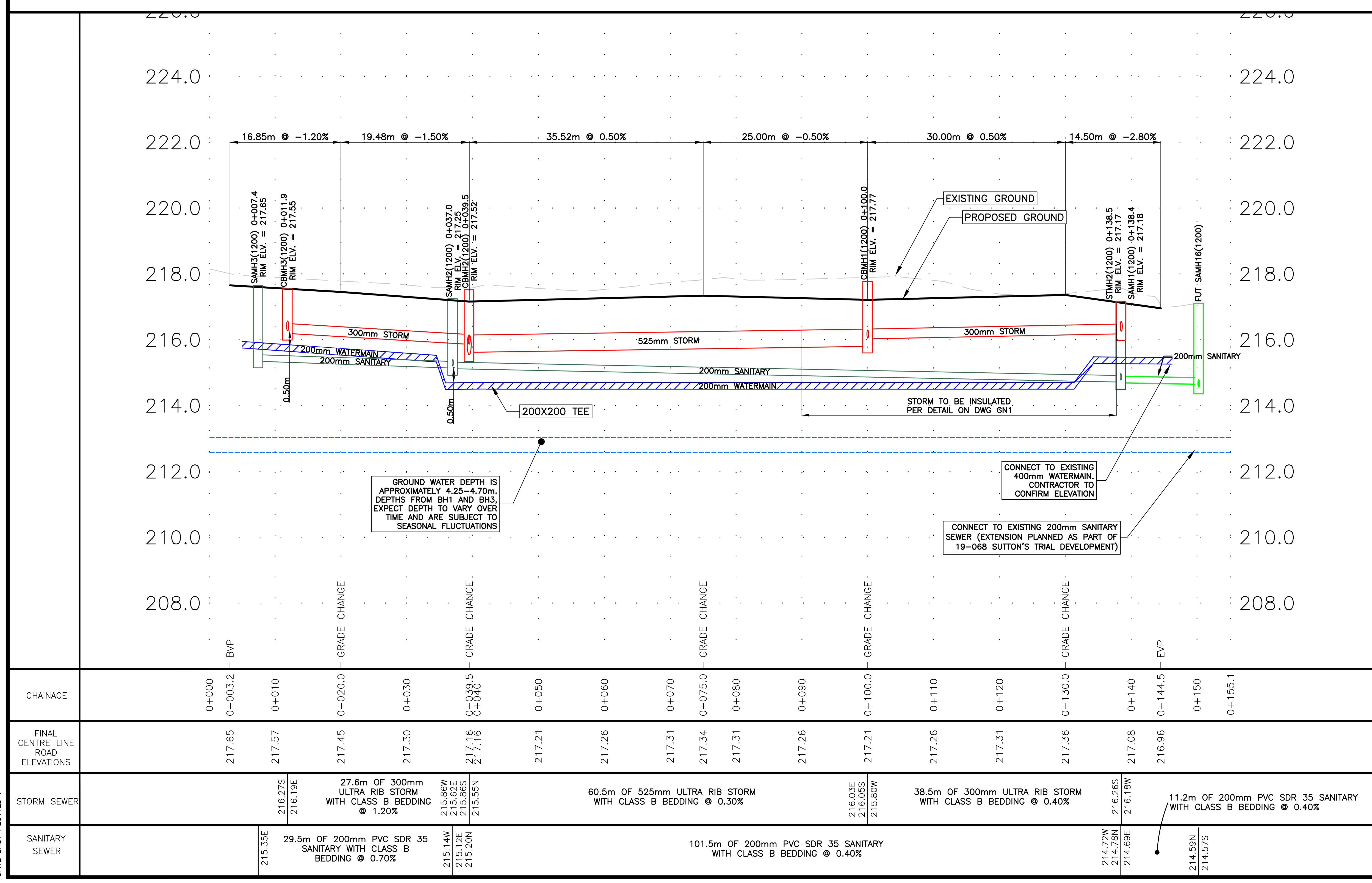
ALL WATERMAIN TO BE RESTRAINED PER WATERMAIN RESTRAINT TABLE ON GENERAL CONSTRUCTION NOTES DRAWING.

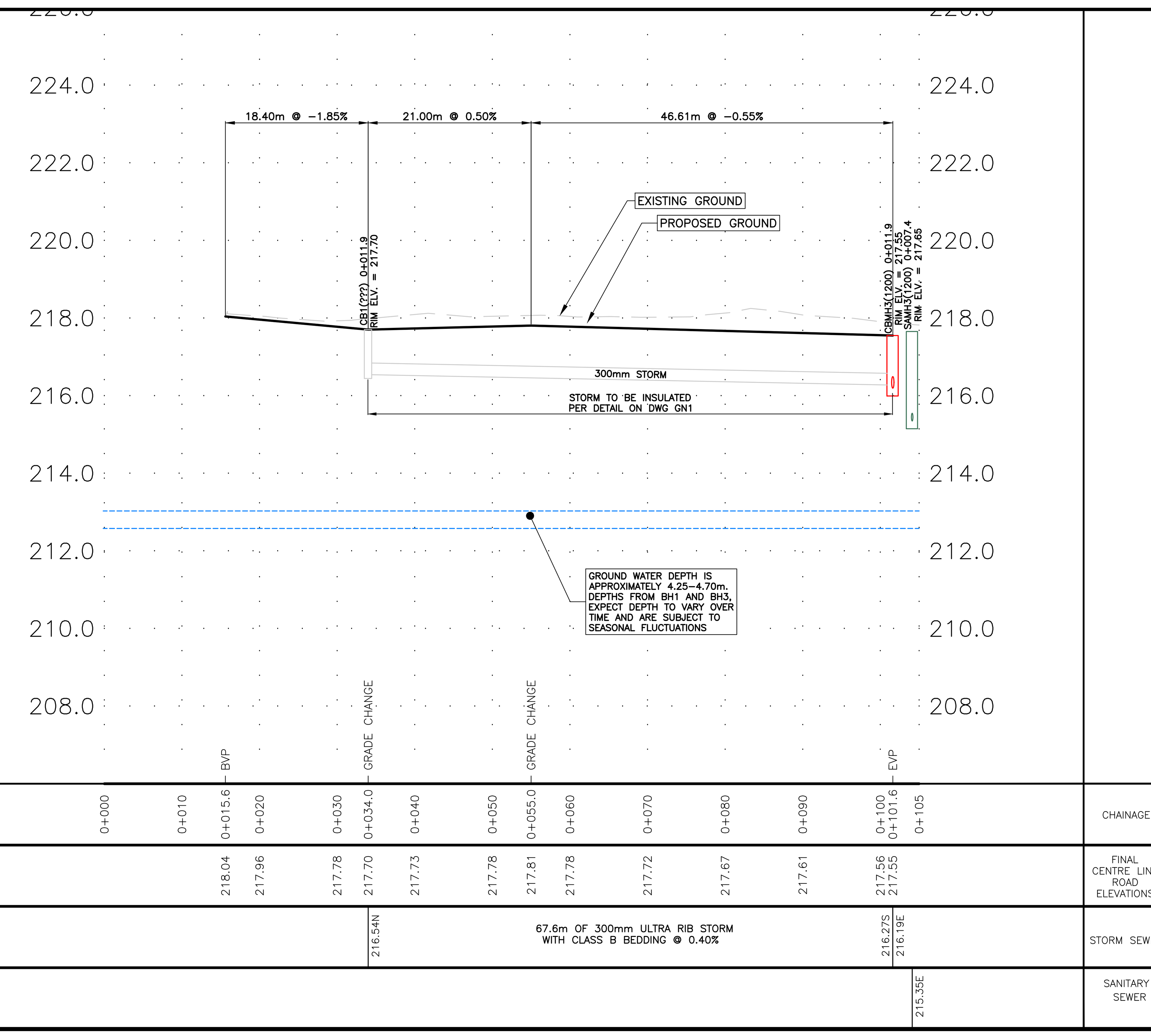




STREET C

STREET D





DATE LAST PLOTTED :

REV. No.	DATE	REVISION
0	05/15/2024	ISSUED FOR SPA

NOTE:
THE CONTRACTOR IS CAUTIONED THAT ALL OF THE EXISTING UTILITIES ARE NOT INDICATED ON THIS DRAWING. THE CONTRACTOR MUST ARRANGE FOR LOCATES FROM EACH AREA UTILITY COMPANY PRIOR TO ANY CONSTRUCTION OR EXCAVATION. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE PROTECTION OF ALL UTILITIES INCLUDING THOSE NOT INDICATED ON THIS DRAWING. G. DOUGLAS VALLEE LTD. CANNOT ACCEPT RESPONSIBILITY FOR DAMAGE TO ANY EXISTING UTILITY WHICH MAY OR MAY NOT BE INDICATED ON THIS DRAWING.

ALL WORK, MATERIALS AND PROCESSES TO ABIDE TO NORFOLK COUNTY STANDARDS AND SPECIFICATIONS

LEGAL DESCRIPTION

LOT 35, 36,38,39,40,41,42,43 & 44, BLOCK 9 REGISTERED PLAN 182, TOWN OF SIMCOE AND PART OF LOT 2 CONCESSION 14, TOWNSHIP OF WINDHAM IN NORFOLK COUNTY.

APPLICANT INFORMATION

APPLICANT: HFW HOLDINGS LIMITED
TELEPHONE: 416-919-9768
ADDRESS: 3 FERNWOOD COURT, RICHMOND HILL, ONTARIO, L4B 3C2

BENCHMARKS

BM #1: SPIKE IN FACE OF WOOD HYDRO POLE AT NORTHWEST CORNER OF QUEENSWAY WEST AND HUNT STREET.
ELEV. 217.99m

BM #2: TOP OF LARGE PUMPER NOZZLE OF FIRE HYDRANT AT NORTHWEST CORNER OF QUEENSWAY WEST AND HUNT STREET.
ELEV. 218.16m

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

DRAWING LIST

G. DOUGLAS VALLEE LIMITED DRAWINGS

SCALE:
HORIZONTAL : 1 : 500 (5, 15, 25)
VERTICAL : 1 : 100 (1, 2, 3, 4, 5)

DO NOT SCALE DRAWINGS, CALL FOR ANY CLARIFICATIONS THAT ARE REQUIRED, FIELD VERIFY AT ALL BUILT CONDITIONS

ALL DRAWINGS ARE TO BE READ IN COLOUR
ORIGINAL PAGE SIZE ARCH 'D' - 24" x 36"

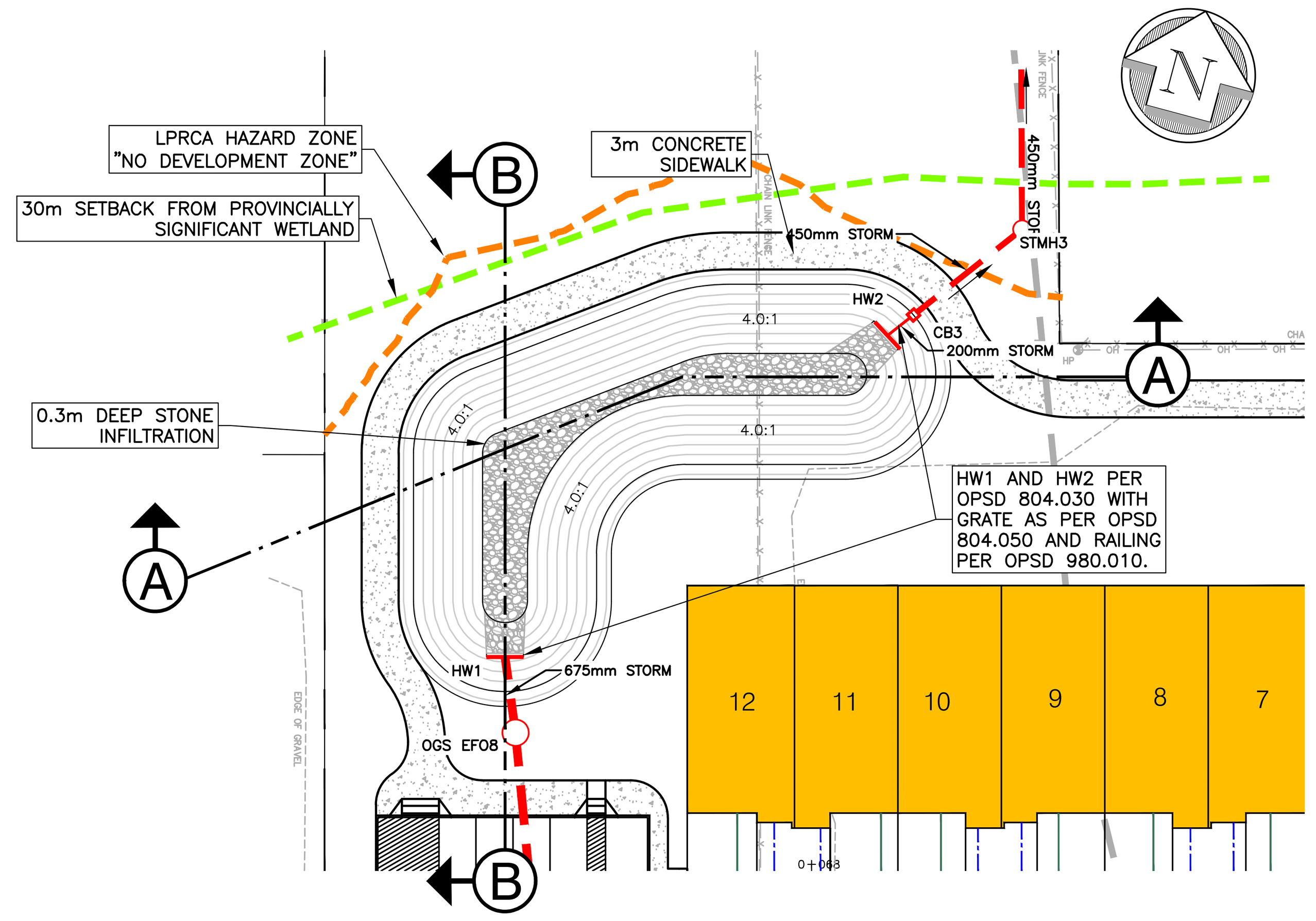
vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

Stamp
LICENSED PROFESSIONAL ENGINEER
22-013
2024.05.16
N. L. ONGENA
100553190
PROVINCE OF ONTARIO

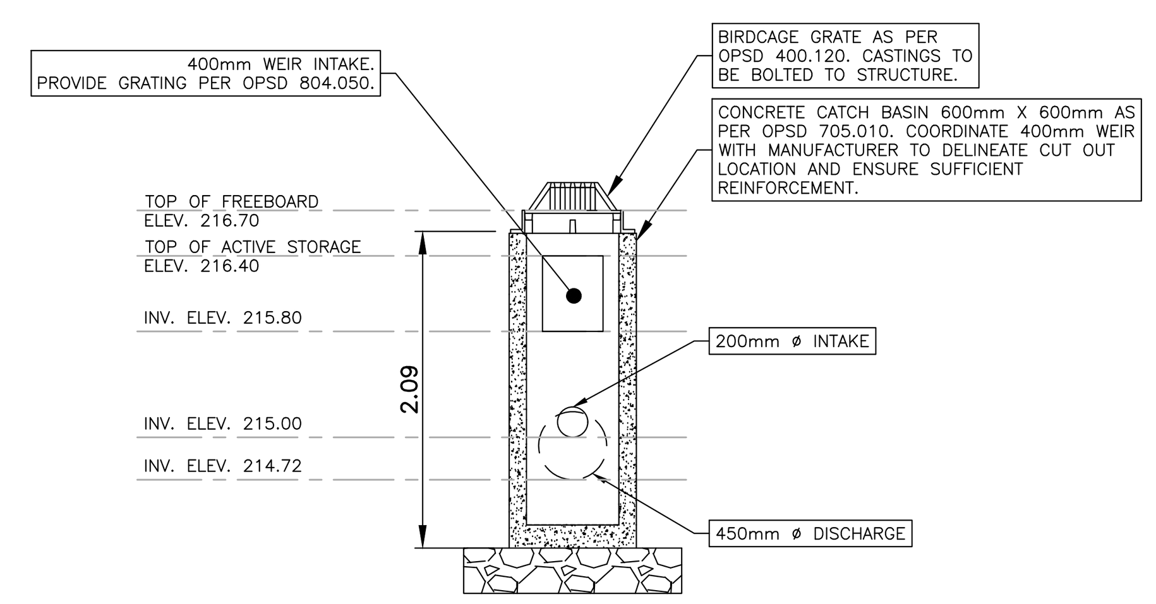
Project Title
HFW HUNT STREET
RESIDENTIAL DEVELOPMENT
SIMCOE - NORFOLK COUNTY

Drawing Title
PLAN & PROFILE STREET C AND D

Designed by : NLO	Drawn By : NLO/NBN
Checked by : JTI	Date Started : JAN 2023
Drawing Scale : 1:500	Drawing No. C104
Project No. 22-013	



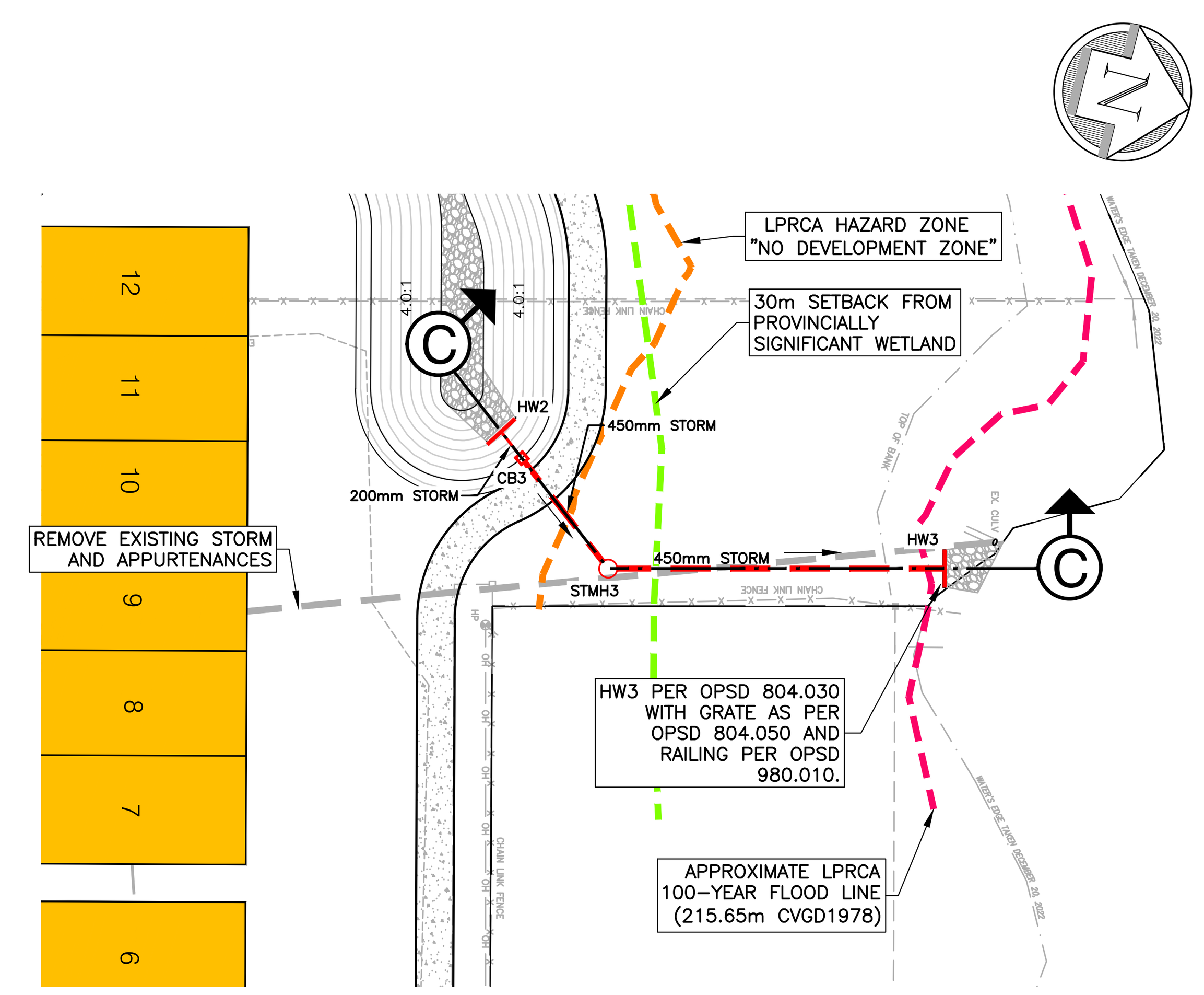
SWM POND



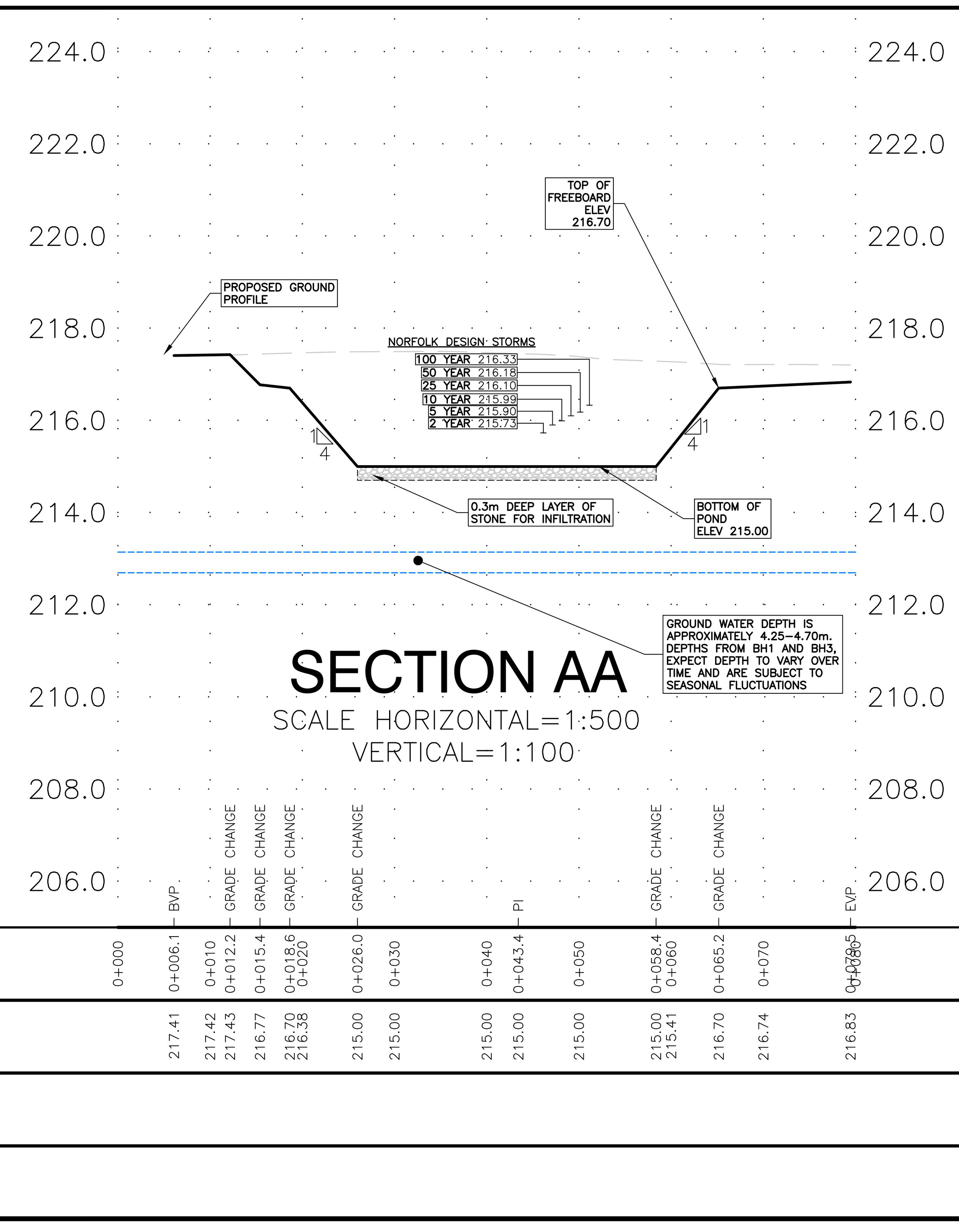
CB3 OUTLET DETAIL
SCALE 1:50

LEGEND

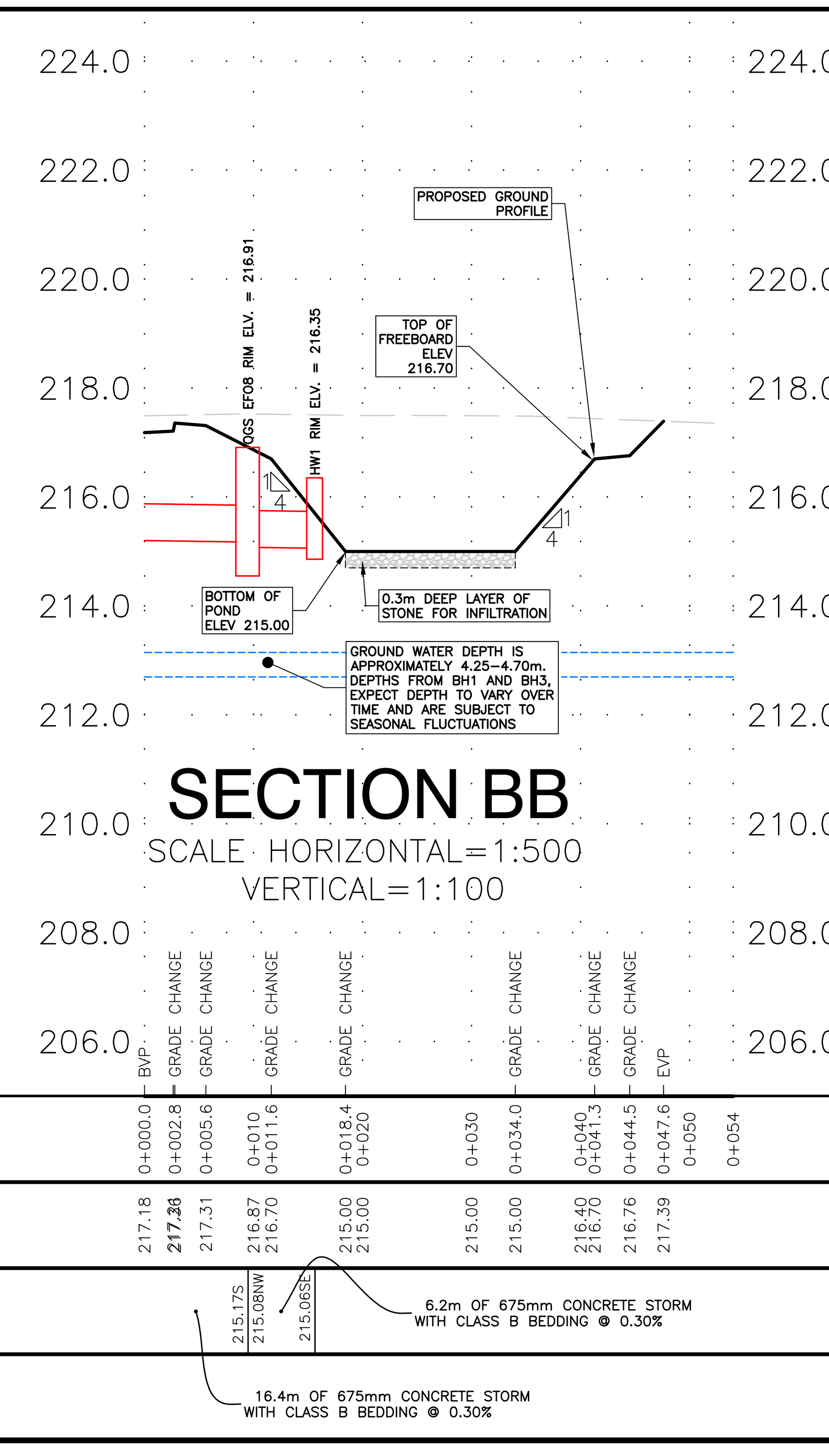
- PROPOSED STORM MANHOLE (STMH5)
- PROPOSED SANITARY MANHOLE (SAMH3)
- PROPOSED WATER VALVE (WV)
- PROPOSED FIRE HYDRANT (FH)
- PROPOSED WATERMAIN
- PROPERTY LINES
- FUTURE PROPOSED STORM MANHOLE & SEWER
- FUTURE PROPOSED SANITARY MANHOLE & SEWER
- FUTURE PROPOSED SANITARY SERVICE
- FUTURE PROPOSED WATERMAIN
- FUTURE PROPOSED WATER SERVICE
- PROPERTY LINE
- LS PROPOSED LIGHT STANDARD
- P PROPOSED LIGHTING PEDESTAL
- T PROPOSED HYDRO TRANSFORMER
- PROPOSED TREE PLANTING
- GLB PROPOSED BELL 'GRADE LEVEL BOX'
- PROPOSED BELL PEDESTAL
- PROPOSED CATV PEDESTAL
- BOREHOLE LOCATION



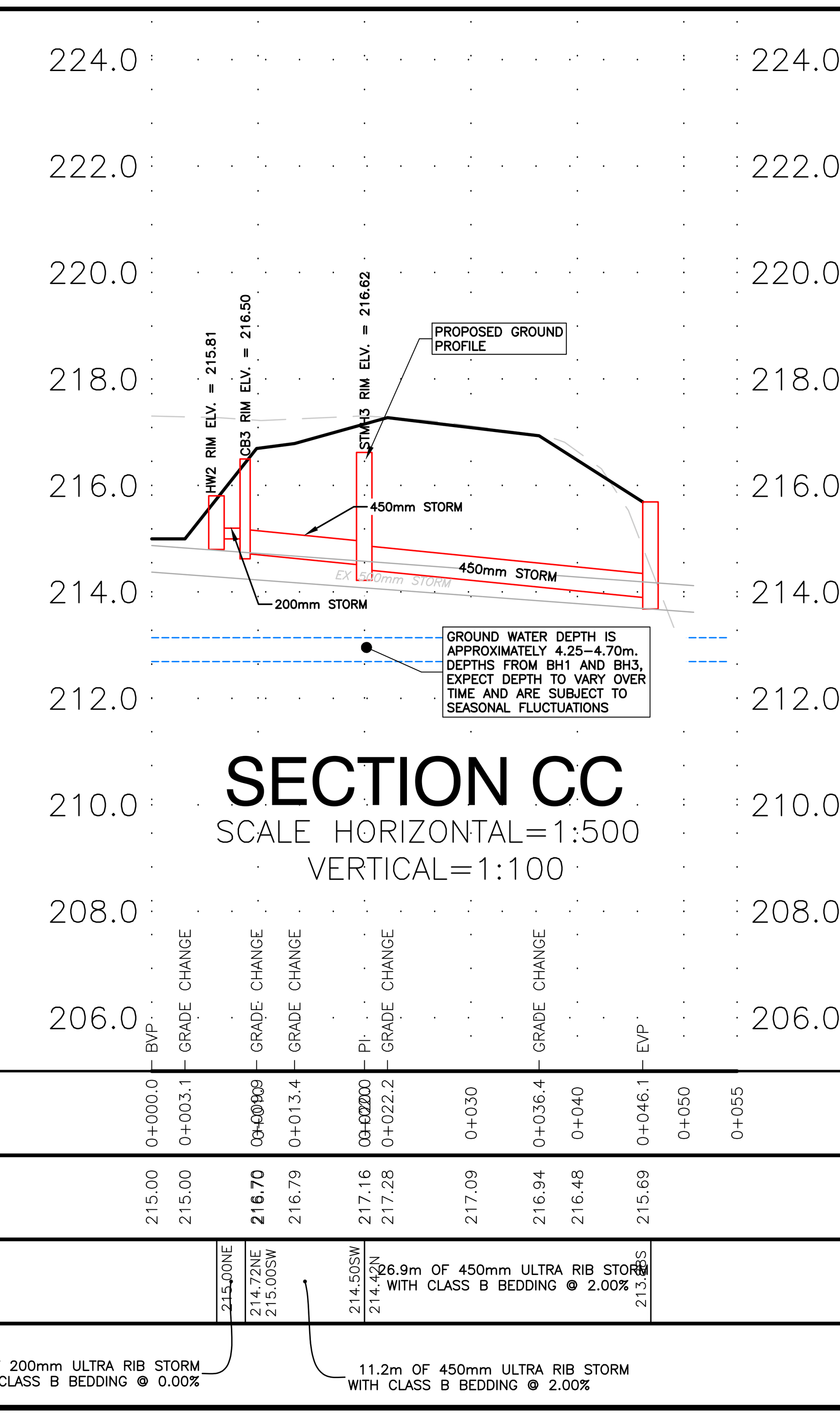
SWM OUTLET



SECTION AA
SCALE HORIZONTAL=1:500
VERTICAL=1:100



SECTION BB
SCALE HORIZONTAL=1:500
VERTICAL=1:100



SECTION CC
SCALE HORIZONTAL=1:500
VERTICAL=1:100

DATE LAST PLOTTED :

REV. No.	DATE	REVISION
0	05/15/2024	ISSUED FOR SPA

NOTE:
THE CONTRACTOR IS CAUTIONED THAT ALL OF THE EXISTING UTILITIES ARE NOT INDICATED ON THIS DRAWING. THE CONTRACTOR MUST ARRANGE FOR LOCATES FROM EACH AREA UTILITY COMPANY PRIOR TO ANY CONSTRUCTION OR EXCAVATION. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE PROTECTION OF ALL UTILITIES INCLUDING THOSE NOT INDICATED ON THIS DRAWING. G. DOUGLAS VALLEE LTD. CANNOT ACCEPT RESPONSIBILITY FOR DAMAGE TO ANY EXISTING UTILITY WHICH MAY OR MAY NOT BE INDICATED ON THIS DRAWING.

ALL WORK, MATERIALS AND PROCESSES TO ABIDE TO NORFOLK COUNTY STANDARDS AND SPECIFICATIONS

LEGAL DESCRIPTION
LOT 35, 36,38,39,40,41,42,43 & 44, BLOCK 9 REGISTERED PLAN 182, TOWN OF SIMCOE AND PART OF LOT 2 CONCESSION 14, TOWNSHIP OF WINDHAM IN NORFOLK COUNTY.

APPLICANT INFORMATION
APPLICANT: HFW HOLDINGS LIMITED
TELEPHONE: 416-919-9768
ADDRESS: 3 FERNWOOD COURT, RICHMOND HILL, ONTARIO, L4B 3C2

BENCHMARKS
BM #1: SPIKE IN FACE OF WOOD HYDRO POLE AT NORTHWEST CORNER OF QUEENSWAY WEST AND HUNT STREET.
ELEV. 217.99m

BM #2: TOP OF LARGE PUMPER NOZZLE OF FIRE HYDRANT AT NORTHWEST CORNER OF QUEENSWAY WEST AND HUNT STREET.
ELEV. 218.16m

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

DRAWING LIST
G. DOUGLAS VALLEE LIMITED DRAWINGS

SCALE:
5 15 25
HORIZONTAL : 1 : 500
1 2 3 4 5
VERTICAL : 1 : 100

DO NOT SCALE DRAWINGS, CALL FOR ANY CLARIFICATIONS THAT ARE REQUIRED, FIELD VERIFY AT ALL BUILT CONDITIONS

ALL DRAWINGS ARE TO BE READ IN COLOUR ORIGINAL PAGE SIZE ARCH 'D' - 24" x 36"

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

Stamp
LICENSED PROFESSIONAL ENGINEER
22-013
2024.05.16
N. L. ONGENA
100553190
PROVINCE OF ONTARIO

Project Title
HFW HUNT STREET
RESIDENTIAL DEVELOPMENT
SIMCOE - NORFOLK COUNTY

Drawing Title
PLAN & PROFILE SWM POND AND OUTLET

Designed by : NLO	Drawn By : NLO/NBN
Checked by : JTI	Date Started : JAN 2023
Drawing Scale : 1:500	Drawing No. C105
Project No. 22-013	

GENERAL NOTES

1. PRIOR TO CLOSING ANY STREET, THE CONTRACTOR SHALL OBTAIN CLEARANCE BY FILLING OUT THE COUNTY'S NOTICE OF ROAD CLOSURE FORM AND NOTIFY SCHOOL BUS OPERATORS OF STREETS USED FOR DETOUR AND THE DURATION OF THE DETOUR. THE CONTRACTOR MUST SUPPLY AND MAINTAIN ADEQUATE LOCAL DETOUR SIGNS AND LIGHTS. THE CONTRACTOR MUST MAINTAIN MAXIMUM ACCESS TO ALL PROPERTIES AS DIRECTED BY THE ENGINEER.
2. THE CONTRACTOR SHALL CONSTRUCT TEMPORARY MEASURES TO CONTROL SILT ENTERING THE STORM DRAINAGE SYSTEM TO THE SPECIFICATIONS OUTLINED IN THE GUIDELINES ON EROSION AND SEDIMENT CONTROL FOR URBAN CONSTRUCTION SITES PREPARED BY THE MINISTRY OF NATURAL RESOURCES. THESE MEASURES ARE TO BE INSTALLED PRIOR TO COMMENCING ANY CONSTRUCTION FOR THIS STREET AND ARE TO REMAIN IN PLACE UNTIL CONSTRUCTION HAS BEEN COMPLETED TO THE SPECIFICATIONS OF THE ENGINEER.
3. THE CONTRACTOR IS TO MEET ALL THE REQUIREMENTS OF THE OWNERS OF THE UTILITIES ON THIS PLAN, AND MUST MAKE SATISFACTORY ARRANGEMENTS WITH THE UTILITY COMPANIES FOR CROSSING THEIR INSTALLATIONS AND FOR PROVIDING ADEQUATE PROTECTION DURING CONSTRUCTION.
4. PRIOR TO COMMENCING ANY CONSTRUCTION, ALL EXISTING UNDERGROUND UTILITIES SHALL BE LOCATED AND MARKED. ANY UTILITIES DAMAGED OR DISTURBED DURING CONSTRUCTION SHALL BE REPAIRED OR REPLACED TO THE SATISFACTION OF THE OWNER AT THE CONTRACTORS EXPENSE.
5. ALL ORGANIC, SUITABLE OR UNSUITABLE MATERIALS BENEATH THE ROAD ALLOWANCES MUST BE REMOVED AND THESE AREAS BACKFILLED WITH AN APPROVED FILL MATERIAL, ALL TO THE SATISFACTION OF THE ENGINEER.
6. PRIOR TO COMMENCING ANY CONSTRUCTION, ALL EXISTING SEWER OUTLET INFORMATION, BENCHMARKS, DIMENSIONS, ELEVATIONS AND GRADES MUST BE CHECKED AND VERIFIED AND ANY DISCREPANCIES REPORTED TO THE ENGINEER IMMEDIATELY.
7. PDC's SHALL BE 125mmø PVC SDR28 WITH CLASS 'B' BEDDING. PDC's SHALL BE LAID AT A 2% (min) GRADE c/w 22.5° OR 45° LONG RADIUS BENDS AS REQUIRED. PDC's SHALL BE EXRENDED TO THE PROPERTY LINE AND CAPPED WITH A WATERTIGHT CAP. THE CONTRACTOR SHALL USE 22.5° OR 45° LONG RADIUS BENDS AND A MINIMUM 2% GRADE TO AVOID CONFLICTS WITH EXISTING SEWERS, WATERMAINS AND UTILITIES.
8. ALL CATCH BASIN LEADS FOR SINGLE CATCH BASINS SHALL BE 250mm ø PVC SDR35 WITH CLASS 'B' BEDDING. ALL CATCH BASIN LEADS FOR TWIN INLET CATCH BASINS SHALL BE 300mm ø PVC SDR35 WITH CLASS 'B' BEDDING.
9. ALL PVC WATERMAIN SHALL HAVE TWU 10 COPPER TRACING WIRE LAID ALONG ENTIRE LENGTH. WATERMAIN SHALL HAVE 1.7m TO 1.9m COVER WITH CLASS 'B' BEDDING.
10. ALL NEW WATERSERVICES SHALL BE TYPE 25mm PEX
11. WATERMAIN FITTINGS SHALL BE MECHANICAL JOINT OR PUSH-ON JOINT INSTALLED WITH APPROVED MECHANICAL THRUST RESTRAINTS.
12. ALL MECHANICAL THRUST RESTRAINTS SHALL CONFORM TO CONTRACT DOCUMENT SPECIFICATIONS.

LEGEND

- EX. STORM SEWER
- PROPOSED STORM SEWER
- EX. SANITARY SEWER
- PROPOSED SANITARY SEWER
- PROPOSED STORM MANHOLE
- PROPOSED SANITARY MANHOLE
- EX. MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED TWIN INLET CATCHBASIN
- PROPOSED CATCHBASIN MANHOLE
- EX. CATCHBASIN
- PROPOSED WATERMAIN
- EX. WATERMAIN
- PROPOSED 3-WAY FIRE HYDRANT C/W STORZ CONNECTION
- EX. FIRE HYDRANT
- PROPOSED WATERVALVE
- EX. WATERVALVE
- EX. BURIED GAS LINE
- EX. BURIED BELL LINE
- EX. BURIED CABLE LINE
- EX. UNDERGROUND HYDRO LINE

GENERAL SEDIMENT CONTROL MEASURES

1. PROTECT ALL EXPOSED SURFACES AND CONTROL ALL RUNOFF DURING CONSTRUCTION
2. ALL EROSION CONTROL MEASURES TO BE IN PLACE BEFORE STARTING CONSTRUCTION AND REMAIN IN PLACE UNTIL RESTORATION IS COMPLETE
3. MAINTAIN EROSION CONTROL MEASURES DURING CONSTRUCTION
4. ALL COLLECTED SEDIMENT TO BE DISPOSED OF AT AN APPROVED LOCATION
5. MINIMIZE AREA DISTURBED DURING CONSTRUCTION
6. ALL DEWATERING TO BE DISPOSED OF IN AN APPROVED SEDIMENTATION BASIN
7. PROTECT ALL CATCHBASINS, MANHOLES AND PIPE ENDS FROM SEDIMENT INTRUSION WITH GEOTEXTILE (TERRAFIX 270R OR APPROVED EQUIVALENT)
8. KEEP ALL SUMPS CLEAN DURING CONSTRUCTION
9. PREVENT WIND-BLOWN DUST
10. STRAW BALES TO BE USED IN LOCALIZED AREAS AS SHOWN AND AS DIRECTED BY THE ENGINEER DURING CONSTRUCTION

ROAD & BOULEVARD RESTORATION

ALL DISTURBED AREAS SHALL BE RESTORED AS FOLLOWS:

i. ALL ROAD CUTS SHALL BE RESTORED WITH
- 40mm HL3 SURFACE ASPHALT (97% MARSHALL)
- 50mm HL8 MASE ASPHALT (97% MARSHALL)
- 150mm GRANULAR "A" BASE (100% SPMDD)
- 300mm GRANULAR "B" TYPE 2 SUBBASE (100% SPMDD)

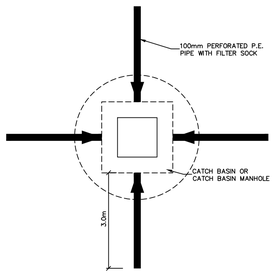
GRANULAR "B" TO BE EXTENDED 0.3m BEHIND EDGE OF THE PAVEMENT

ii. BOULEVARDS SHALL BE RESTORED WITH SOD OVER 100mm TOPSOIL (min) UNLESS OTHERWISE NOTED

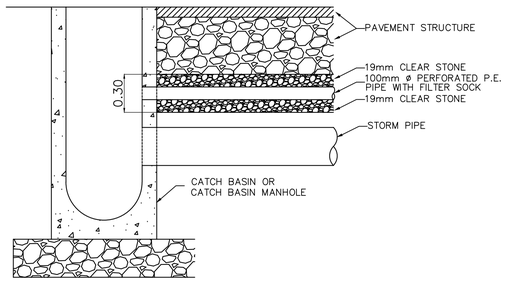
iii. ASPHALT DRIVEWAYS SHALL BE RESTORED WITH 150mm OF GRANULAR "A" (100% SPMDD) WITH 50mm OF HL3A ASPHALT (97% MARSHALL)

iv. GRAVEL DRIVEWAYS SHALL BE RESTORED WITH 150mm OF GRANULAR "A" (100% SPMDD)

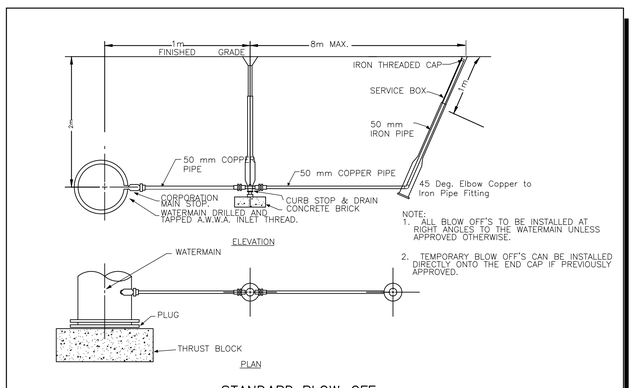
v. CONCRETE DRIVEWAYS SHALL BE RESTORED WITH 150mm OF GRANULAR "A" (100% SPMDD) WITH 150mm OF CONCRETE (OPSS MIX. 30MPa MINIMUM)



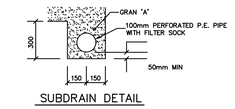
SUBDRAIN PLAN DETAIL
N.T.S.



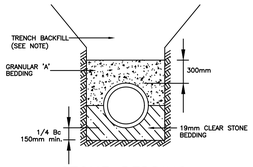
SUBDRAIN SECTION DETAIL
N.T.S.



STANDARD BLOW-OFF N.T.S.

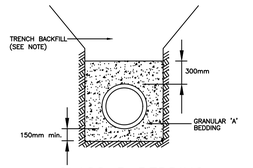


SUBDRAIN DETAIL



STONE BEDDING

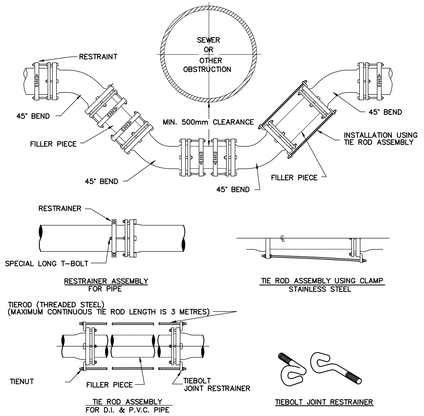
NOTES:
1. 19mm CLEAR STONE STONE BEDDING SHALL BE USED IN PLACE OF THE STANDARD BEDDING WHERE HIGH HYDRAULIC GRADIENT CONDITIONS ARE ENCOUNTERED DURING CONSTRUCTION.



CLASS B BEDDING

NOTES:
1. PIPE BEDDING AS SPECIFIED ON PLAN AND PROFILE DRAWINGS COMPACTED TO 95% SPMDD IN LAYERS NOT EXCEEDING 150mm, TO 300mm ABOVE TOP OF PIPE.
2. TRENCH BACKFILL FROM TOP OF PIPE BEDDING TO UNDERSIDE OF GRANULAR "B" SUBBASE SHALL CONSIST OF APPROVED NATIVE MATERIALS COMPACTED TO 95% SPMDD IN LAYERS NOT EXCEEDING 300mm.
3. PRIOR TO PLACING THE GRANULAR SUBBASE MATERIAL, ALL TOPSOIL, SOFT OR OTHERWISE COMPRESSIBLE MATERIAL MUST BE REMOVED FROM THE SUBGRADE AREA, AND THE SUBGRADE SHALL BE PROOF-ROLLED TO COMPACT ANY LOOSE SURFACE ZONES. ALL EXCAVATED AREAS MUST BE BACKFILLED WITH APPROVED ON-SITE NATIVE MATERIALS OR IMPORTED

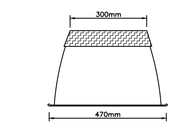
TYPICAL LOT SERVICING
SCALE 1:400



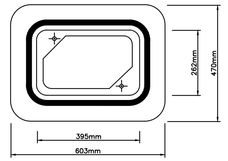
WATERMAIN DEFLECTION DETAIL

WATERMAIN RESTRAINTS TABLE						
DIAMETER (mm)	MINIMUM LENGTH TO BE RESTRAINED ON EACH SIDE OF FITTINGS (m)					
	11-1/4°	22-1/2°	45°	90° BENDS AND TEES	REDUCER (IN DIRECTION OF LARGER PIPE)	DEAD END AND VALVES
100	N/A			N/A	N/A	N/A
150	1.0			5	N/A	10
200	2.0			6	6	14

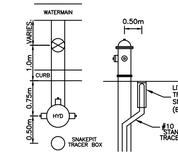
NOTES:
1. ALL JOINTS WITHIN DISTANCES SHOWN SHALL BE RESTRAINED WITH A MEG-A-LUG JOINT RESTRAINT.
2. ALL TEES SHALL HAVE A MINIMUM OF 1.0m SOLID PIPE OUT EACH SIDE OF THE MAIN RUN OF THE TEE.
3. ALL DISTANCES TO BE CONFIRMED TO THE MANUFACTURERS STANDARDS FOR ALTERNATE RESTRAINTS TO MEGALUG.



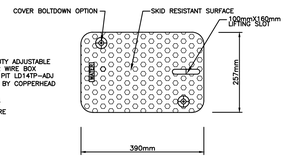
END VIEW



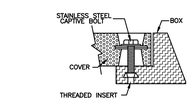
PLAN VIEW



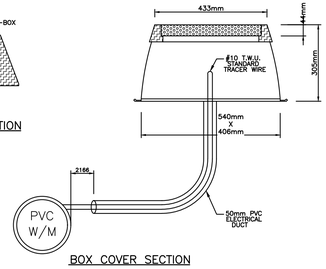
PLAN - BOX LOCATION SECTION



BOX COVER

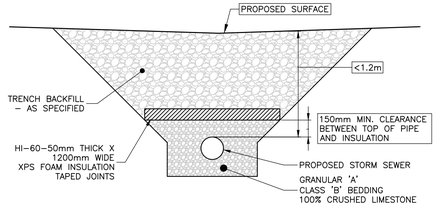


COVER BOLTDOWN OPTION

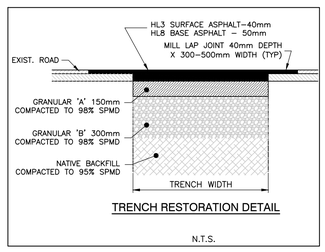


BOX COVER SECTION

TRACER WIRE HAND HOLE DETAIL
N.T.S.



TYPICAL STORM INSULATION FOR STORM WITH <1.2m COVER
N.T.S.



TRENCH RESTORATION DETAIL
N.T.S.

REV. No.	DATE	REVISION
0	05/15/2024	ISSUED FOR SPA

NOTE:
THE CONTRACTOR IS CAUTIONED THAT ALL OF THE EXISTING UTILITIES ARE NOT INDICATED ON THIS DRAWING. THE CONTRACTOR MUST ARRANGE FOR LOCATES FROM EACH AREA UTILITY COMPANY PRIOR TO ANY CONSTRUCTION OR EXCAVATION. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE PROTECTION OF ALL UTILITIES INCLUDING THOSE NOT INDICATED ON THIS DRAWING. G. DOUGLAS VALLEE LTD. CANNOT ACCEPT RESPONSIBILITY FOR DAMAGE TO ANY EXISTING UTILITY WHICH MAY OR MAY NOT BE INDICATED ON THIS DRAWING.

ALL WORK, MATERIALS AND PROCESSES TO ABIDE TO NORFOLK COUNTY STANDARDS AND SPECIFICATIONS

LEGAL DESCRIPTION

LOT 35, 36,38,39,40,41,42,43 & 44, BLOCK 9 REGISTERED PLAN 182, TOWN OF SIMCOE AND PART OF LOT 2 CONCESSION 14, TOWNSHIP OF WINDHAM IN NORFOLK COUNTY.

APPLICANT INFORMATION

APPLICANT: HFW HOLDINGS LIMITED
TELEPHONE: 416-919-9768
ADDRESS: 3 FERNWOOD COURT, RICHMOND HILL, ONTARIO, L4B 3C2

BENCHMARKS

BM #1: SPIKE IN FACE OF WOOD HYDRO POLE AT NORTHWEST CORNER OF QUEENSWAY WEST AND HUNT STREET.
ELEV. 217.99m

BM #2: TOP OF LARGE PUMPER NOZZLE OF FIRE HYDRANT AT NORTHWEST CORNER OF QUEENSWAY WEST AND HUNT STREET.
ELEV. 218.16m

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

DRAWING LIST
G. DOUGLAS VALLEE LIMITED DRAWINGS

22-013 COV	COVER PAGE
22-013 C100	SERVICING PLAN
22-013 C101	GRADING PLAN
22-013 C102	EROSION & SEDIMENT CONTROL PLAN
22-013 C103	PLAN & PROFILE STREET A
22-013 C104	PLAN & PROFILE STREET B
22-013 C105	PLAN & PROFILE STREET C
22-013 C106	PLAN & PROFILE STREET D
22-013 C107	PLAN & PROFILE SWM POND
22-013 C108	PLAN & PROFILE SWM OUTLET
22-013 GN	GENERAL NOTES AND DETAILS
22-013 SAN	SANITARY DRAINAGE AREAS PLAN
22-013 STM	STORM DRAINAGE AREAS PLAN

SCALE:
10 20
HORIZONTAL : 1:500

DO NOT SCALE DRAWINGS, CALL FOR ANY CLARIFICATIONS THAT ARE REQUIRED, FIELD VERIFY AT ALL BUILT CONDITIONS

ALL DRAWINGS ARE TO BE READ IN COLOUR ORIGINAL PAGE SIZE ARCH 'D' - 24" x 36"

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

Stamp
LICENSED PROFESSIONAL ENGINEER
22-013
2024.05.16
N. L. ONGENA
100533190
PROVINCE OF ONTARIO

Project Title
HFW HUNT STREET
RESIDENTIAL DEVELOPMENT
SIMCOE - NORFOLK COUNTY

Drawing Title
GENERAL NOTES & DETAILS 1

Designed by : NLO	Drawn By : NLO/NBN
Checked by : JTI	Date Started : JAN 2023
Drawing Scale : 1:500	Drawing No. GN1
Project No. 22-013	

DATE LAST PLOTTED :

NOTES:

1. ALL MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE NATIONAL BUILDING CODE. ABIDE BY LOCAL MUNICIPAL BY-LAWS AND REGULATORY AGENCIES THAT MAY AFFECT THE WORK.

2. THE CONTRACTOR SHALL REVIEW THE SITE CONDITIONS AND ASSUME RESPONSIBILITY FOR EXISTING SERVICES (WATER, POWER, SEWAGE, GAS ETC.) THAT EXIST AT THE SITE.

3. CONCRETE SLAB TO HAVE A MINIMUM THICKNESS OF 150 mm.

4. CONCRETE SLAB SHALL BE PLACED ON 150 mm MINIMUM THICK BASE OF GRANULAR MATERIAL (OPSS GRANULAR 'A' OR EQUIVALENT) COMPACTED TO 95% STANDARD PROCTOR MAXIMUM DRY DENSITY.

5. GRANULAR BASE SHALL BE PLACED ON SOIL CAPABLE OF SAFELY SUSTAINING A BEARING PRESSURE OF NOT LESS THAN 30 kPa.

6. CONCRETE CONSTRUCTION SHALL CONFORM TO CSA A23.1.

7. CONCRETE TESTING SHALL BE CARRIED OUT IN ACCORDANCE WITH CSA A23.1 AND CSA 23.2.

8. CSA A23.1 CONCRETE EXPOSURE CLASSIFICATION TO BE C-1 WITH THE FOLLOWING PROPERTIES:

- MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS: 35 MPA
- MINIMUM WATER TO CEMENTING MATERIALS RATIO: 0.40
- MAXIMUM COARSE AGGREGATE SIZE: 20 mm
- MAXIMUM SLUMP: 90 mm
- AIR CONTENT: 5% TO 8%

9. SURFACE OF SLAB TO BE SLOPED 2% -0/+4 % TO THE NEAREST PLUVIAL DRAIN.

10. TOP OF SLAB TO HAVE A TEXTURED BROOM FINISH TO CSA A23.1. EDGES OF SLAB TO HAVE A SMOOTH TOOLED FINISH.

11. SLAB REINFORCEMENT TO BE 152mm X 152mm, MW 25.8 X MW 25.8 WELDED WIRE FABRIC CONFORMING TO ASTM 1064M. REINFORCEMENT TO BE PLACED AT MID-DEPTH OF SLAB OR APPROVED EQUIVALENT.

12. APPLY PIGMENTED CURING COMPOUND TO SURFACE OR REBAR OF SLAB IN ACCORDANCE WITH ASTM C309 TYPE 2 (WHITE COLOUR), CLASS B (RESIN).

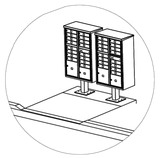
13. PROVIDE A MINIMUM SETBACK DISTANCE OF 2000 mm FROM ANY EDGE OF MAILBOX TO NEAREST EDGE OF TRAVELLED ROADWAY.

14. IF THERE IS A VERTICAL CURB, SETBACK DISTANCE IS 1800mm FROM CMB TO EDGE OF CURB. THIS DISTANCE CAN BE REDUCED DOWN TO 1200mm ONLY IF ROAD IS NOT USED AS A THRU ROAD OR THERE IS A BARRIER PROTECTING THE TRAVELLED SIDE.
*IN THIS CASE THE PAD TOTAL DEPTH CAN BE 1700mm AND CAN BE REDUCED DOWN TO 1100mm IF ROAD IS NOT A THRU ROAD OR THERE IS A BARRIER PROTECTING THE TRAVELLED SIDE.

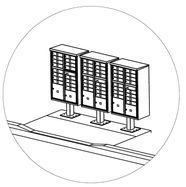
15.- ALL SITE LOCATIONS REQUIRE CPC AND MUNICIPAL APPROVAL.

16.- IF SITE CONDITIONS LIMIT PLACEMENT, CONTACT CPC FOR ASSISTANCE.

17.- LARGER PADS AND NUMBER OF BOXES PERMITTED WITH CPC INPUT.

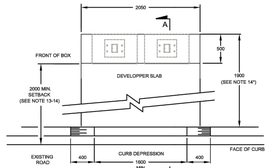


COMMUNITY MAILBOX SHOWN WITH PEDESTAL INSTALALTION.
PRECAST CONCRETE BASE COULD ALSO BE USED.

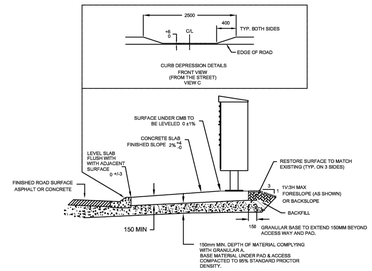


* EQUIPEMENT FLOORPRINT SHOWN FOR REFERENCE ONLY.

1 OR 2 MODULES

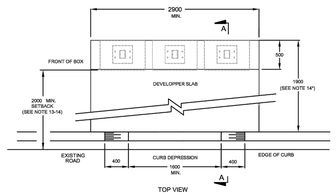


TOP VIEW



SECTION A-A

3 MODULES



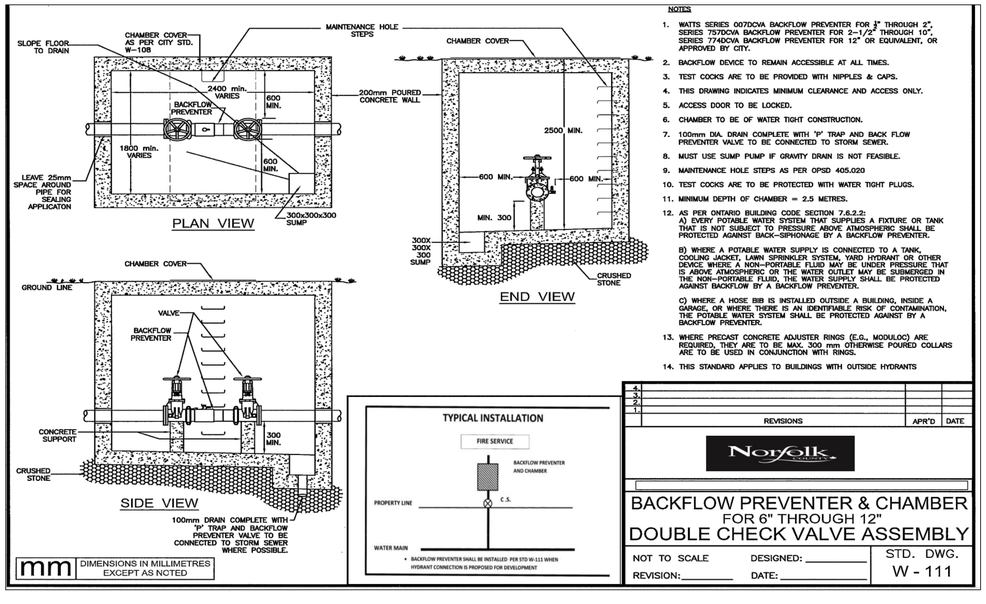
TOP VIEW

ROAD FACING

REV # / # REV	DATE	BY / PAR	CHKD / VER	EA / RIQ	DCC / CCD
	DESCRIPTION				

CANADA POST / POSTES CANADA

ENGINEERING SERVICES / SERVICES D'INGÉNIERIE		DATE DD-MM-YYYY JJ-MM-AAAA
CREATED BY / CRÉÉ PAR	M. ALLARD	20-06-2014
CHECKED BY / VÉRIFIÉ PAR	P. BENOIT	20-06-2014
ENGINEERING AUTH. / RESP. DU GÉNIE	T. MACGILLIVRAY	20-06-2014
PROJECT / PROJET		
CPC ID	E10X-ENG-06	



NOTES

1. WATTS SERIES 007DCVA BACKFLOW PREVENTER FOR 3/4" THROUGH 2", SERIES 757DCVA BACKFLOW PREVENTER FOR 2-1/2" THROUGH 10", SERIES 774DCVA BACKFLOW PREVENTER FOR 12" OR EQUIVALENT, OR APPROVED BY CITY.
2. BACKFLOW DEVICE TO REMAIN ACCESSIBLE AT ALL TIMES.
3. TEST COCKS ARE TO BE PROVIDED WITH NIPPLES & CAPS.
4. THIS DRAWING INDICATES MINIMUM CLEARANCE AND ACCESS ONLY.
5. ACCESS DOOR TO BE LOCKED.
6. CHAMBER TO BE OF WATER TIGHT CONSTRUCTION.
7. 100mm DIA. DRAIN COMPLETE WITH "P" TRAP AND BACK FLOW PREVENTER VALVE TO BE CONNECTED TO STORM SEWER.
8. MUST USE SUMP PUMP IF GRAVITY DRAIN IS NOT FEASIBLE.
9. MAINTENANCE HOLE STEPS AS PER OPSD 405.020
10. TEST COCKS ARE TO BE PROTECTED WITH WATER TIGHT PLUGS.
11. MINIMUM DEPTH OF CHAMBER = 2.5 METRES.
12. AS PER ONTARIO BUILDING CODE SECTION 7.6.2.2:
A) EVERY POTABLE WATER SYSTEM THAT SUPPLIES A FIXTURE OR TANK THAT IS NOT SUBJECT TO PRESSURE ABOVE ATMOSPHERIC SHALL BE PROTECTED AGAINST BACK-SIPHONAGE BY A BACKFLOW PREVENTER.
B) WHERE A POTABLE WATER SUPPLY IS CONNECTED TO A TANK, COOLING JACKET, LAWN SPRINKLER SYSTEM, YARD HYDRANT OR OTHER DEVICE WHERE A NON-PORTABLE FLUID MAY BE UNDER PRESSURE THAT IS ABOVE ATMOSPHERIC OR THE WATER OUTLET MAY BE SUBMERGED IN THE NON-PORTABLE FLUID, THE WATER SUPPLY SHALL BE PROTECTED AGAINST BACKFLOW BY A BACKFLOW PREVENTER.
C) WHERE A HOSE BIB IS INSTALLED OUTSIDE A BUILDING, INSIDE A GARAGE, OR WHERE THERE IS AN IDENTIFIABLE RISK OF CONTAMINATION, THE POTABLE WATER SYSTEM SHALL BE PROTECTED AGAINST BY A BACKFLOW PREVENTER.
13. WHERE PRECAST CONCRETE ADJUSTER RINGS (E.G., MODULOC) ARE REQUIRED, THEY ARE TO BE MAX. 300 mm OTHERWISE POURED COLLARS ARE TO BE USED IN CONJUNCTION WITH RINGS.
14. THIS STANDARD APPLIES TO BUILDINGS WITH OUTSIDE HYDRANTS

	REVISIONS	APR'D	DATE
4			
3			
2			
1			

Norfolk

BACKFLOW PREVENTER & CHAMBER
FOR 6" THROUGH 12"
DOUBLE CHECK VALVE ASSEMBLY

NOT TO SCALE
DESIGNED: _____
REVISION: _____
DATE: _____
STD. DWG. W - 111

REV. No.	DATE	REVISION
0	05/15/2024	ISSUED FOR SPA

NOTE:
THE CONTRACTOR IS CAUTIONED THAT ALL OF THE EXISTING UTILITIES ARE NOT INDICATED ON THIS DRAWING. THE CONTRACTOR MUST ARRANGE FOR LOCATES FROM EACH AREA UTILITY COMPANY PRIOR TO ANY CONSTRUCTION OR EXCAVATION. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE PROTECTION OF ALL UTILITIES INCLUDING THOSE NOT INDICATED ON THIS DRAWING. G. DOUGLAS VALLEE LTD. CANNOT ACCEPT RESPONSIBILITY FOR DAMAGE TO ANY EXISTING UTILITY WHICH MAY OR MAY NOT BE INDICATED ON THIS DRAWING.

ALL WORK, MATERIALS AND PROCESSES TO ABIDE TO NORFOLK COUNTY STANDARDS AND SPECIFICATIONS

LEGAL DESCRIPTION

LOT 33, 36,38,39,40,41,42,43 & 44, BLOCK 9 REGISTERED PLAN 182, TOWN OF SIMCOE AND PART OF LOT 2 CONCESSION 14, TOWNSHIP OF WINDHAM IN NORFOLK COUNTY.

APPLICANT INFORMATION

APPLICANT: HFW HOLDINGS LIMITED
TELEPHONE: 416-919-9768
ADDRESS: 3 FERNWOOD COURT, RICHMOND HILL, ONTARIO, L4B 3C2

BENCHMARKS

BM #1: SPIKE IN FACE OF WOOD HYDRO POLE AT NORTHWEST CORNER OF QUEENSWAY WEST AND HUNT STREET.
ELEV. 217.99m

BM #2: TOP OF LARGE PUMPER NOZZLE OF FIRE HYDRANT AT NORTHWEST CORNER OF QUEENSWAY WEST AND HUNT STREET.
ELEV. 218.16m

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

DRAWING LIST

G. DOUGLAS VALLEE LIMITED DRAWINGS

SCALE:
10 20
HORIZONTAL : 1:500

DO NOT SCALE DRAWINGS, CALL FOR ANY CLARIFICATIONS THAT ARE REQUIRED, FIELD VERIFY AT ALL BUILT CONDITIONS

ALL DRAWINGS ARE TO BE READ IN COLOUR
ORIGINAL PAGE SIZE ARCH 'D' - 24" x 36"

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

Stamp

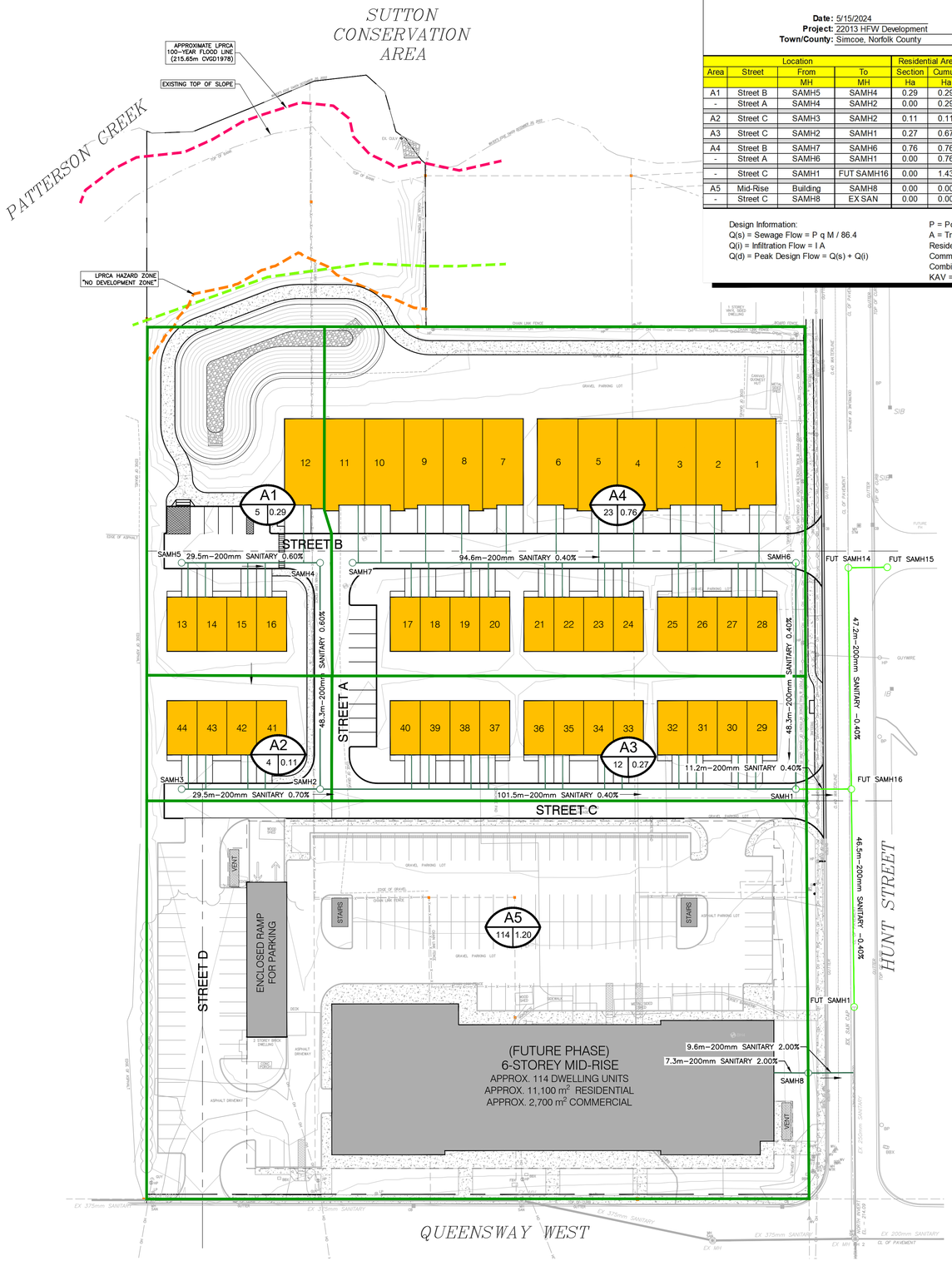
LICENSED PROFESSIONAL ENGINEER
22-013
2024.05.15
N. L. ONGENA
100533190
PROVINCE OF ONTARIO

Project Title
HFW HUNT STREET
RESIDENTIAL DEVELOPMENT
SIMCOE - NORFOLK COUNTY

Drawing Title
GENERAL NOTES & DETAILS 2

Designed by : NLO	Drawn By : NLO/NBN
Checked by : JTI	Date Started : JAN 2023
Drawing Scale : 1:500	Drawing No. GN2
Project No. 22-013	

DATE LAST PLOTTED :



SANITARY SEWER DESIGN SHEET

Date: 5/15/2024
Project: 22013 HFW Development
Town/County: Simcoe, Norfolk County

Pipe Material: PVC
N 0.013

Designed by: NLO
Checked by: JTI
Sheet: 1 of 1

Location				Residential Area		Commercial Area		Total	Residential Services		Population			Flow			Sewer Design								
Area	Street	From	To	Section	Cumul.	Section	Cumul.	Area	Section	Cumul.	Cumul.	KAV	M=Peak	Q(i)	Q(s)	Q(d)	Material	Size	Length	N	Slope	Cap	Q(d)/Cap	Full V
		MH	MH	Ha	Ha	Ha	Ha	Ha	Services	Services	Pop.	Factor	Factor	L/s	L/s	L/s		mm	m		%	L/s	%	m/s
A1	Street B	SAMH5	SAMH4	0.29	0.29	0.00	0.00	0.290	5	5	14	1.000	4.400	0.08	0.32	0.40	PVC	200	29.5	0.013	0.60%	25.4	1.6%	0.81
-	Street A	SAMH4	SAMH2	0.00	0.29	0.00	0.00	0.290	0	5	14	1.000	4.400	0.08	0.32	0.40	PVC	200	48.3	0.013	0.60%	25.4	1.6%	0.81
A2	Street C	SAMH3	SAMH2	0.11	0.11	0.00	0.00	0.110	4	4	11	1.000	4.411	0.03	0.25	0.28	PVC	200	29.5	0.013	0.70%	27.4	1.0%	0.87
A3	Street C	SAMH2	SAMH1	0.27	0.67	0.00	0.00	0.670	12	21	58	1.000	4.302	0.19	1.29	1.48	PVC	200	101.5	0.013	0.40%	20.7	7.1%	0.66
A4	Street B	SAMH7	SAMH6	0.76	0.76	0.00	0.00	0.760	23	23	63	1.000	4.293	0.21	1.41	1.63	PVC	200	94.6	0.013	0.40%	20.7	7.8%	0.66
-	Street A	SAMH6	SAMH1	0.00	0.76	0.00	0.00	0.760	0	23	63	1.000	4.293	0.21	1.41	1.63	PVC	200	48.3	0.013	0.40%	20.7	7.8%	0.66
-	Street C	SAMH1	FUT SAMH16	0.00	1.43	0.00	0.00	1.430	0	44	121	1.000	4.220	0.40	2.66	3.06	PVC	200	11.2	0.013	0.40%	20.7	14.8%	0.66
A5	Mid-Rise	Building	SAMH8	0.00	0.00	1.20	1.20	1.200	114	114	422	0.949	3.806	0.34	8.35	8.69	PVC	200	7.3	0.013	2.00%	46.4	18.7%	1.48
-	Street C	SAMH8	EX SAN	0.00	0.00	0.00	1.20	1.200	0	114	422	0.949	3.806	0.34	8.35	8.69	PVC	200	9.6	0.013	2.00%	46.4	18.7%	1.48

Design Information:
Q(s) = Sewage Flow = P q M / 86.4
Q(i) = Infiltration Flow = I A
Q(d) = Peak Design Flow = Q(s) + Q(i)

P = Population in thousands
A = Tributary Area
Residential M = Peaking Factor = 1 + 14 / (4 + P^.5)
Commercial M = Peaking Factor = 0.8 (1 + 14 / (4 + P^.5)
Combined M = KAV (1 + 14 / (4 + P^.5)
KAV = (AR + (0.8*AC))/(AR+AC)

Residential q = Per Capita Flow= **450** L/cap/d
Commercial q = Per Capita Flow= **40000** L/ha/d
I = Peak Extraneous Flow = **0.28** L/s/ha
Residential Population Density = **2.75** persons /unit
Commercial Population Density = **90** persons /ha

LEGEND

EX4 | 5 | 1.28
- SANITARY DRAINAGE AREA NUMBER
- NUMBER OF UNITS
- AREA (ha)
- SANITARY SEWER FLOW
- SAMH5 — PROPOSED STORM MANHOLE
- SANITARY DRAINAGE BOUNDARY

REV. No.	DATE	REVISION
0	05/15/2024	ISSUED FOR SPA

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

SCALE:
10 20
HORIZONTAL : 1:500

DO NOT SCALE DRAWINGS, CALL FOR ANY CLARIFICATIONS THAT ARE REQUIRED, FIELD VERIFY AT ALL BUILT CONDITIONS

ALL DRAWINGS ARE TO BE READ IN COLOUR ORIGINAL PAGE SIZE ARCH 'D' - 24" x 36"

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

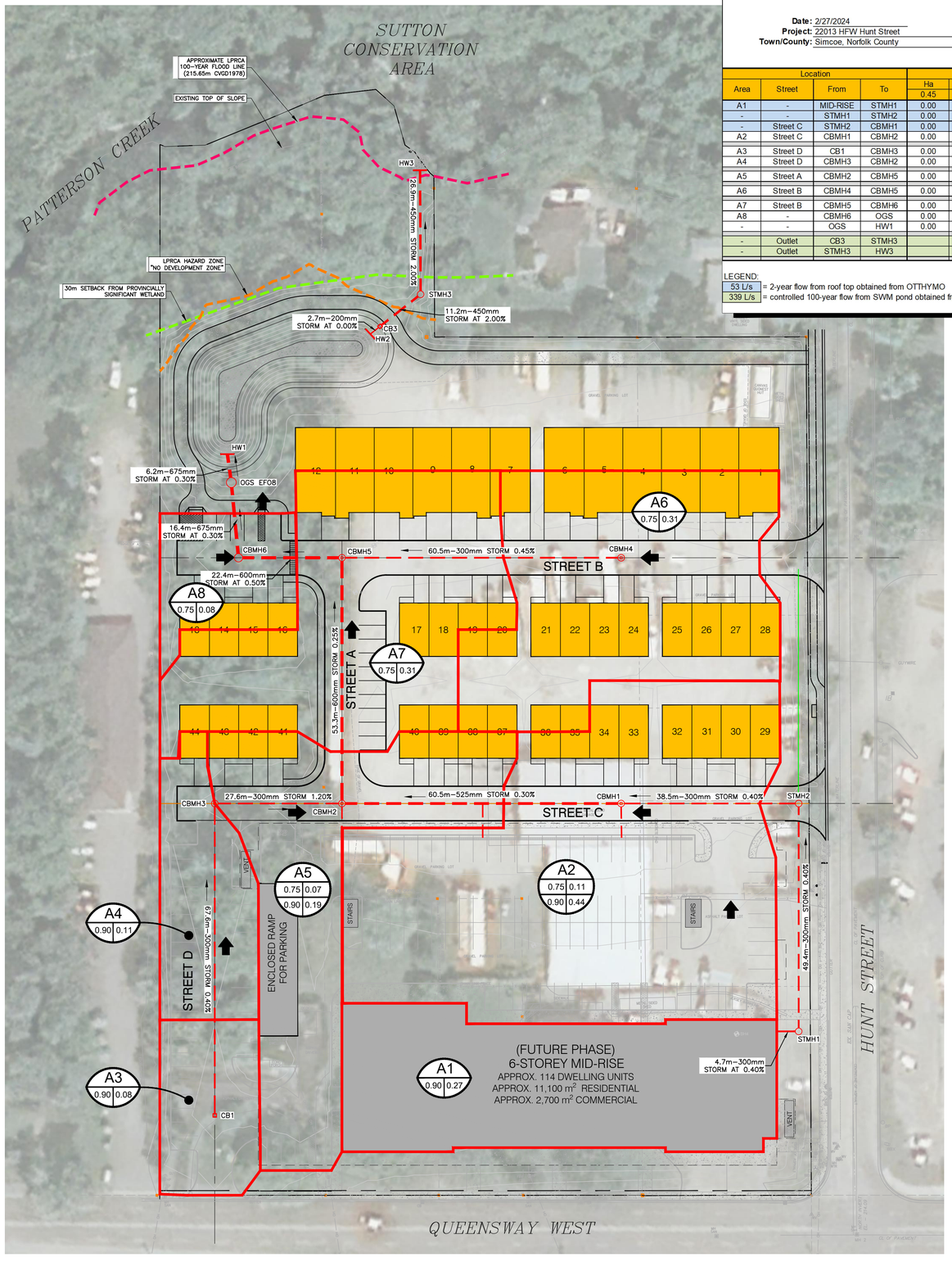
Stamp
LICENSED PROFESSIONAL ENGINEER
22-013
2024.05.16
N. L. ONGENA
100533190
PROVINCE OF ONTARIO

Project Title
HFW HUNT STREET
RESIDENTIAL DEVELOPMENT
SIMCOE - NORFOLK COUNTY

Drawing Title
SANITARY DRAINAGE AREAS

Designed by : NLO	Drawn By : NLO
Checked by : JI	Date Started : JAN 2023
Drawing Scale : 1:500	Drawing No. SAN
Project No. 22-013	

DATE PLOTTED: 5/17/2024 9:18 AM | PROJECT NUMBER & NAME: 22-013 - HFW HUNT STREET | FILE PATH: H:\PROJECTS\2022\22-013 HFW HOLDINGS HUNT ST RESIDENTIAL\DRAWINGS\CIVIL\PRODUCTION DRAWINGS\22-013 SAN SANITARY DRAINAGE AREAS.DWG



STORM SEWER DESIGN SHEET

Date: 2/27/2024
Project: 22013 HFW Hunt Street
Town/County: Simcoe, Norfolk County

Return: 5-year
A 583.017
B 3.007
C 0.703

Pipe Material: PVC<=450, Concrete >450
n 0.013

Designed by: NLO
Checked by: JTI

Sheet: 1 of 1

Location				Area			Total	Individual	Cumulative	Time of	Rainfall	Flow	Sewer Design					
				Ha	Ha	Ha	Area	C*A	C*A	Concentration	mm/hr	2.78*I*A*C	Size	Slope	Capacity (Full)	Vel (Full)	Length	Time	Cap
Area	Street	From	To	0.45	0.75	0.90	Ha			min		L/s	mm	%	L/s	m/s	m	min	%
A1	-	MID-RISE	STMH1	0.00	0.00	0.27	0.27					53.0	300	0.40%	61.2	0.87	4.7	0.09	✓ 87%
-	-	STMH1	STMH2	0.00	0.00	0.00	0.00					53.0	300	0.40%	61.2	0.87	49.4	0.95	✓ 87%
-	Street C	STMH2	CBMH1	0.00	0.00	0.00	0.00					53.0	300	0.40%	61.2	0.87	38.5	0.74	✓ 87%
A2	Street C	CBMH1	CBMH2	0.00	0.11	0.44	0.55	0.48	0.48	10.00	96.03	180.7	525	0.30%	235.6	1.09	60.5	0.93	✓ 77%
A3	Street D	CB1	CBMH3	0.00	0.00	0.11	0.11	0.10	0.10	10.00	96.03	26.4	300	0.40%	61.2	0.87	67.6	1.30	✓ 43%
A4	Street D	CBMH3	CBMH2	0.00	0.00	0.11	0.11	0.10	0.20	11.30	89.80	49.4	300	1.20%	105.9	1.50	27.6	0.31	✓ 47%
A5	Street A	CBMH2	CBMH5	0.00	0.07	0.19	0.26	0.22	0.90	11.61	88.47	274.4	600	0.25%	307.0	1.09	53.3	0.82	✓ 89%
A6	Street B	CBMH4	CBMH5	0.00	0.31	0.00	0.31	0.23	0.23	10.00	96.03	62.1	300	0.45%	64.9	0.92	60.5	1.10	✓ 96%
A7	Street B	CBMH5	CBMH6	0.00	0.31	0.00	0.31	0.23	1.37	11.10	90.71	397.2	600	0.50%	434.2	1.54	22.4	0.24	✓ 91%
A8	-	CBMH6	OGS	0.00	0.08	0.00	0.08	0.06	1.43	11.34	89.63	408.1	675	0.30%	460.4	1.29	16.4	0.21	✓ 89%
-	-	OGS	HW1	0.00	0.00	0.00	0.00	0.00	1.43	11.55	88.71	404.4	675	0.30%	460.4	1.29	6.2	0.08	✓ 88%
-	Outlet	CB3	STMH3									339.0	450	2.00%	403.2	2.54	11.2	0.07	✓ 84%
-	Outlet	STMH3	HW3									339.0	450	2.00%	403.2	2.54	26.9	0.18	✓ 84%

LEGEND:
53 L/s = 2-year flow from roof top obtained from OTTHYMO
339 L/s = controlled 100-year flow from SWM pond obtained from OTTHYMO

LEGEND

- EX4 (0.45 | 1.28) — STORM DRAINAGE AREA NUMBER; RUN-OFF COEFFICIENT; AREA (ha)
- OVERLAND FLOW (MAJOR)
- STORM SEWER FLOW (MINOR)
- STMH5 — PROPOSED STORM MANHOLE
- PROPOSED SINGLE CATCH BASIN
- PROPOSED DOUBLE CATCH BASIN
- PROPOSED SINGLE CATCH BASIN MH
- PROPOSED DOUBLE CATCH BASIN MH
- STORM DRAINAGE BOUNDARY

REV. No.	DATE	REVISION
0	05/15/2024	ISSUED FOR SPA

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

SCALE:
HORIZONTAL : 1:500 (10 20)

DO NOT SCALE DRAWINGS, CALL FOR ANY CLARIFICATIONS THAT ARE REQUIRED, FIELD VERIFY AT ALL BUILT CONDITIONS

ALL DRAWINGS ARE TO BE READ IN COLOUR ORIGINAL PAGE SIZE ARCH 'D' - 24" x 36"

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

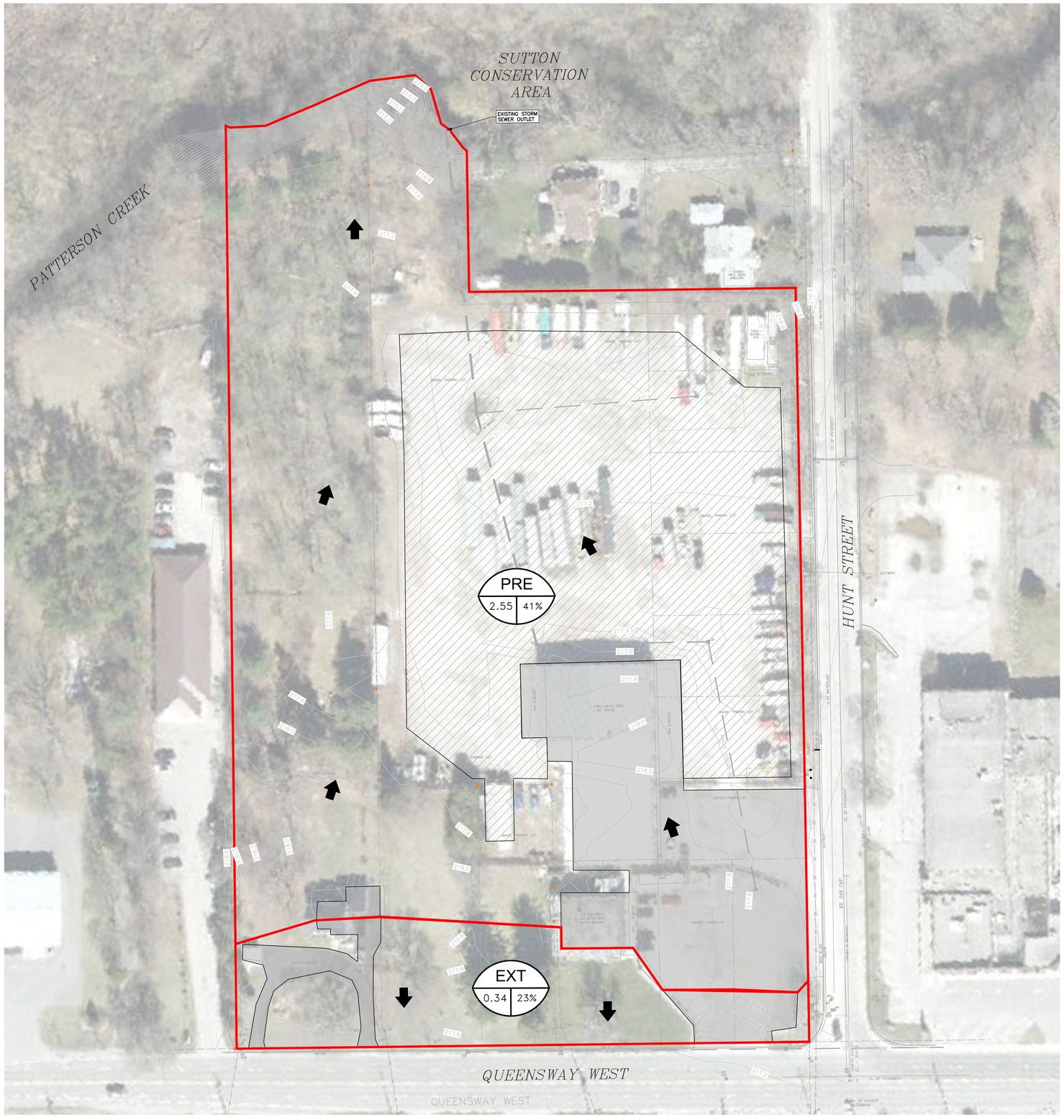
Stamp
LICENSED PROFESSIONAL ENGINEER
22-013
2024.05.16
N. L. ONGENA
100153190
PROVINCE OF ONTARIO

Project Title
HFW HUNT STREET
RESIDENTIAL DEVELOPMENT
SIMCOE - NORFOLK COUNTY

Drawing Title
STORM DRAINAGE AREAS

Designed by : NLO	Drawn By : NLO
Checked by : JI	Date Started : JAN 2023
Drawing Scale : 1:500	Drawing No. STM
Project No. 22-013	

DATE PLOTTED: 5/17/2024 9:18 AM
PROJECT NUMBER & NAME: 22-013 - HFW HUNT STREET
FILE PATH: H:\PROJECTS\2022\22-013 HFW HOLDINGS HUNT ST RESIDENTIAL\DRAWINGS\CIVIL\PRODUCTION DRAWINGS\22-013 STM STORM DRAINAGE AREAS.DWG



N

LEGEND

- OVERLAND FLOW (MAJOR)
- PROPERTY/CATCHMENT BOUNDARY
- IMPERVIOUS AREA – GRAVEL
- IMPERVIOUS AREA – ASPHALT/CONCRETE
- SWM — SWM DRAINAGE AREA
  - 0.99 — AREA (ha)
  - 35.0% — TOTAL IMPERVIOUS PERCENTAGE (%)

REV. No.	DATE	REVISION

SCALE:
10 20
HORIZONTAL : 1:500

DO NOT SCALE DRAWINGS, CALL FOR ANY CLARIFICATIONS THAT ARE REQUIRED, FIELD VERIFY AT ALL BUILT CONDITIONS

ALL DRAWINGS ARE TO BE READ IN COLOUR ORIGINAL PAGE SIZE ARCH 'D' - 24" x 36"

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

Stamp

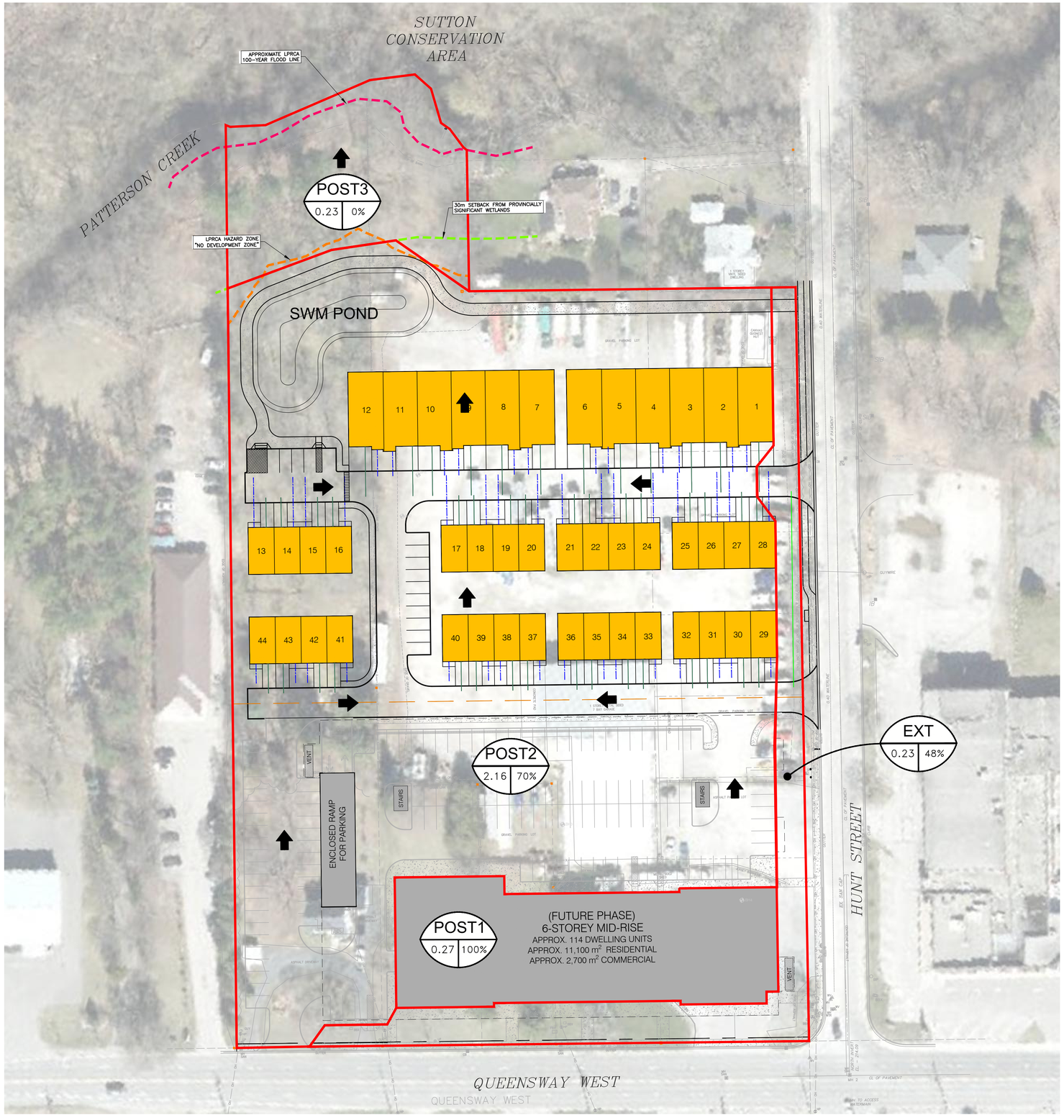
PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Project Title
HFW HUNT STREET
RESIDENTIAL DEVELOPMENT
SIMCOE - NORFOLK COUNTY

Drawing Title
PRE-DEVELOPMENT SWM AREAS

Designed by : NLB	Drawn By : NLB
Checked by : JI	Date Started : JAN 2023
Drawing Scale : 1:500	Drawing No. PRE
Project No. 22-013	

DATE PLOTTED: 5/17/2024 9:19 AM
PROJECT NUMBER & NAME: 22-013 - HFW HUNT STREET
FILE PATH: H:\PROJECTS\2022\22-013 HFW HOLDINGS HUNT ST RESIDENTIAL\DRAWINGS\CIVIL\PRODUCTION DRAWINGS\22-013 PRE SWM AREAS.DWG



N

LEGEND

- OVERLAND FLOW (MAJOR)
- PROPERTY/CATCHMENT BOUNDARY
- SWM – SWM DRAINAGE AREA
- 0.99 | 35.0% – TOTAL IMPERVIOUS PERCENTAGE (%)
- AREA (ha)

REV. No.	DATE	REVISION

SCALE:

HORIZONTAL : 1:500 (10 20)

DO NOT SCALE DRAWINGS, CALL FOR ANY CLARIFICATIONS THAT ARE REQUIRED, FIELD VERIFY AT ALL BUILT CONDITIONS

ALL DRAWINGS ARE TO BE READ IN COLOUR ORIGINAL PAGE SIZE ARCH 'D' - 24" x 36"

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

Stamp

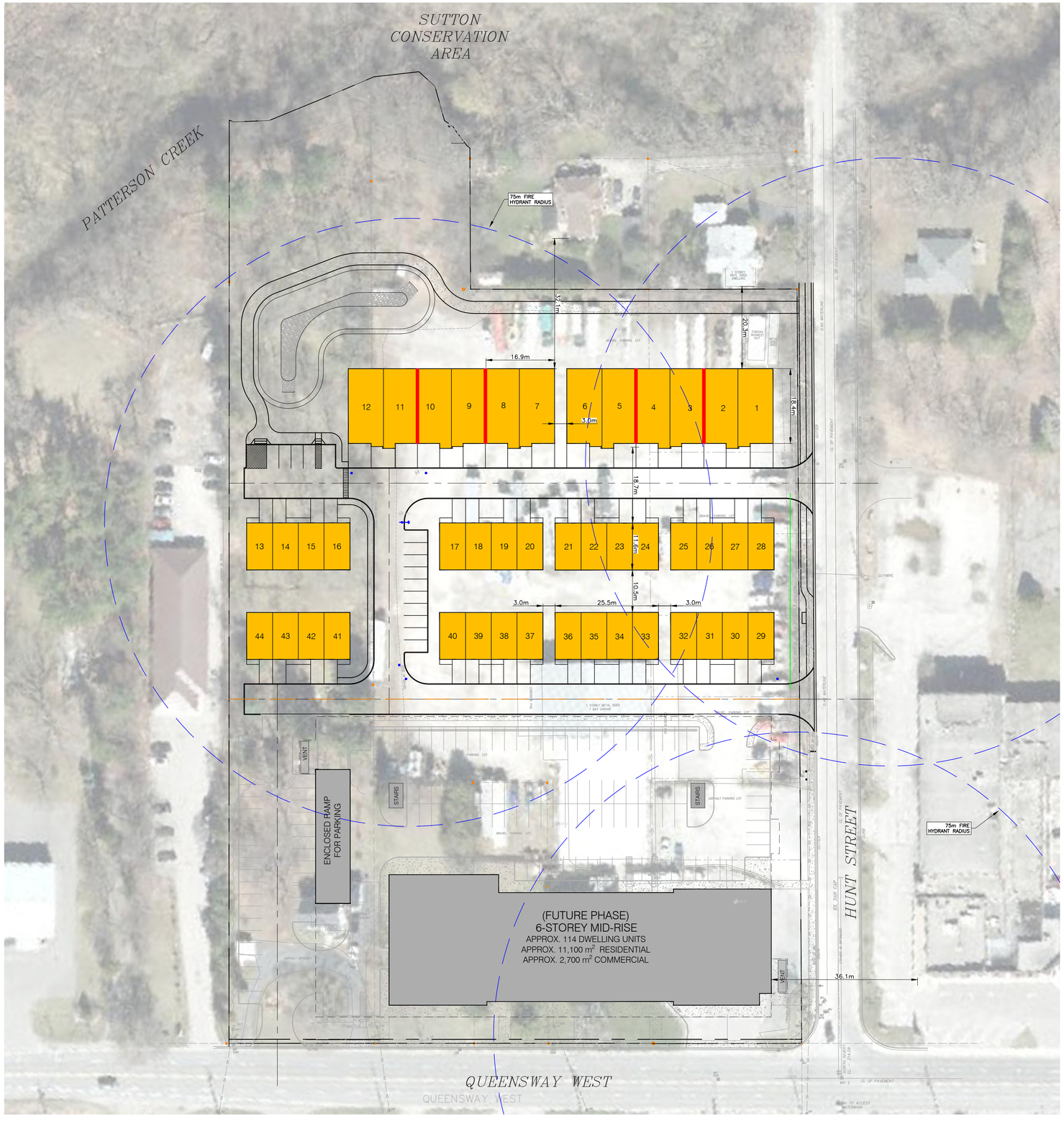
PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Project Title
HFW HUNT STREET
RESIDENTIAL DEVELOPMENT
SIMCOE - NORFOLK COUNTY

Drawing Title
POST-DEVELOPMENT SWM AREAS

Designed by : NLB	Drawn By : NLB
Checked by : JI	Date Started : JAN 2023
Drawing Scale : 1:500	Drawing No. POST
Project No. 22-013	

DATE PLOTTED: 5/17/2024 9:19 AM
PROJECT NUMBER & NAME: 22-013 - HFW HUNT STREET
FILE PATH: H:\PROJECTS\2022\22-013 HFW HOLDINGS HUNT ST RESIDENTIAL\DRAWINGS\CIVIL\PRODUCTION DRAWINGS\22-013 POST SWM AREAS.DWG



LEGEND

PROPOSED FIREWALL

PROPERTY LINE

REV. No.	DATE	REVISION

SCALE:

HORIZONTAL : 1:500 (10 20)

DO NOT SCALE DRAWINGS, CALL FOR ANY CLARIFICATIONS THAT ARE REQUIRED, FIELD VERIFY AT ALL BUILT CONDITIONS

ALL DRAWINGS ARE TO BE READ IN COLOUR ORIGINAL PAGE SIZE ARCH 'D' - 24" x 36"

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

Stamp

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Project Title

HFW HUNT STREET
RESIDENTIAL DEVELOPMENT
SIMCOE - NORFOLK COUNTY

Drawing Title

FIRE SEPARATION DISTANCES

Designed by : NLB	Drawn By : NLB
Checked by : JI	Date Started : JAN 2023
Drawing Scale : 1:500	Drawing No. FIRE
Project No. 22-013	

DATE PLOTTED: 5/17/2024 9:19 AM
PROJECT NUMBER & NAME: 22-013 - HFW HUNT STREET
FILE PATH: H:\PROJECTS\2022\22-013 HFW HOLDINGS HUNT ST RESIDENTIAL\DRAWINGS\22-013 FIRE FIRE SEPARTION DISTANCES.DWG

vallee

Consulting Engineers,
Architects & Planners

May 14, 2024

HFW Holdings Limited
3 Fernwood Court
Richmond Hill, Ontario
L4B 3C2

Attention: **Mr. Herbert Chiu**

Reference: **Functional Servicing Report**
HFW Hunt Street Residential Development
Simcoe, Norfolk County
Project #22-013

Introduction

This functional servicing report has been prepared on behalf of HFW Holdings Ltd, in support of the site plan application for the proposed HFW Hunt Street Residential Development located at the northwest corner of Queensway West and Hunt Street in Simcoe – Norfolk County. The site is an assembly of parcels known municipally as 395, 401, 403, 405 and 411 Queensway West. The proposed development will be constructed in two phases, with Phase 1 including a 44-unit condominium development, and Phase 2 including a 6-storey, 114-unit residential mid-rise building with main floor commercial units. This report presents the functional servicing for the proposed development, including sanitary, storm and domestic and fire water servicing.

The 2.89 ha development site is currently occupied by various buildings, including a single detached dwelling and storage/maintenance buildings and gravel yard for Wilson Truck and Trailer. The lands are bound by Hunt Street to the east, Queensway West to the south, Patterson Creek and the Sutton Conservation Area to the north, and the Queensway Veterinary Hospital to the west. Refer to Figure 1 below.

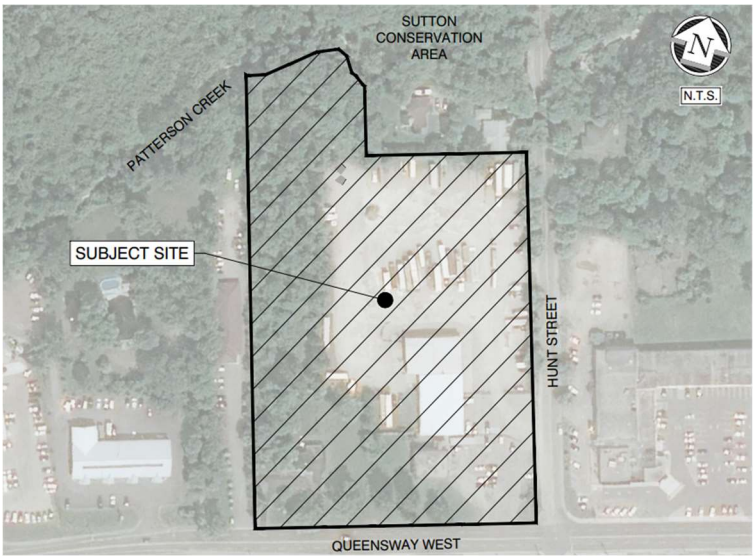


Figure 1 – Site Location

Land Use and Design Assumptions

The proposed development will consist of the following construction:

Phase 1:

- 12 – 1-storey townhouse residential dwelling units
- 32 – 3-storey townhouse residential dwelling units
- Water, storm and sanitary infrastructure to support the proposed construction
- Stormwater management facility for the entire development
- Curbs, sidewalks and other miscellaneous items to support the proposed construction

Phase 2:

- 6-storey residential/commercial mid-rise building with approximately 114 residential dwelling units and main floor commercial space
- Underground parking structure and ground-level parking lot
- Water, storm and sanitary infrastructure to support the proposed construction
- Curbs, sidewalks and other miscellaneous items to support the proposed construction

The following table outlines the mix of land use and calculates the anticipated population based on a residential dwelling density of 2.75 people per unit (ppu) and a commercial density of 90 people per hectare as utilized in the Norfolk County Design Criteria.

Table 1
Subject Lands – Estimate of Population

Phase	Land Use	Number of Units	Population	
Phase 1	12 townhouse units 32 townhouse units	44 units @ 2.75 ppu	121 people	
Phase 2	114 apartment units	114 units @ 2.75 ppu	314 people	422 people
	Commercial Area	1.20 ha @ 90 pph	108 people	
Total			543 people	

Sanitary Servicing

Norfolk County GIS mapping and record drawings indicate an existing 375mm diameter sanitary sewer on Queensway West, and a 250mm diameter sanitary sewer stub on Hunt Street. It is proposed that sanitary flows from units 1-44 be discharged to the existing Hunt Street sanitary sewer. As part of the Sutton's Trail Condo Development (Vallee project #19-068), the Hunt Street sanitary sewer is going to be extended northwards, making connection the proposed connection feasible. Sanitary flows from the mid-rise building will also be directed to the existing Hunt Street sanitary sewer with a separate service connection. Refer to drawing C100 – Servicing Plan.

Sanitary design flows for the proposed development were calculated using the Norfolk County Design Criteria. Table 2 presents the flow information associated with each of the proposed development zones. In summary, the proposed development is anticipated to generate a total additional sanitary flow of approximately 11.75 L/s to the existing sanitary sewer on Hunt Street after the construction of Phase 1 and Phase 2. Detailed calculations are outlined in Appendix A.

Table 2 Sanitary Design Flows		
	Phase 1	**Phase 2**
Total Number of Units	44	114
Development Area (ha)	1.42 ha	1.20 ha
Population	121	314
Per Capita Flow	450 L/person/day	
Peak Extraneous Flow	0.28 L/sec/ha	
Infiltration Flow	0.40 L/s	0.34 L/s
Sewage Flow	0.63 L/s	2.20 L/s
Peaking Factor	4.22	3.81
Peak Design Flow	3.06 L/s	8.69 L/s
Total Peak Design Flow	11.75 L/s	

To confirm the calculations presented, Vallee requests that sanitary hydraulic modelling be completed by Norfolk County's consultant to determine if the existing County infrastructure provides adequate capacity to accommodate the estimated sanitary design flows from the proposed development further downstream.

Stormwater Management

Under existing conditions, the subject site features several commercial buildings, gravel and asphalt parking lots, an existing residential dwelling, and wooded areas. During major storm events, runoff from the majority of the site generally flows uncontrolled, overland in a northerly direction towards Patterson Creek and the Sutton Conservation Area. Existing catch basins within asphalt and gravel parking lots collect minor storm event flows and convey them northwards to an existing outlet via a storm sewer network. Minor flows from a small southern portion of the site along Queensway West drain in a southerly direction towards Queensway West where it is collected by the existing storm sewer system. Major flows from this portion of the site flow overland down Queensway West to Hunt Street, then northwards down Hunt Street and ultimately discharge to Patterson Creek.

The overall SWM strategy is to utilize site grading and a storm sewer system to convey flows from the 2-year through the 100-year storm events to the proposed stormwater management (SWM) pond at the north side of the development. In addition, rooftop storage on the mid-rise building will also be utilized to detain runoff. Ultimately, runoff from the SWM Pond will be released to Patterson Creek as it is under pre-development conditions. The proposed SWM system will have two primary functions:

1. Reduce or control the post-development peak flow rates from the site to levels that do not exceed the 2-year pre-development flow rate, for all storm events up to and including the 100-year storm event.
2. Treat stormwater to an Enhanced Protection Level as defined in the Ministry of the Environment's *Stormwater Management Practices Planning and Design Manual* (March 2003).

Complete details of the SWM design are provided in the HFW Hunt Street Residential Development Stormwater Management Report dated May 14, 2024.

Water Servicing

Record drawings indicate an existing 300mm diameter watermain on Queensway West, and a 400mm diameter watermain on Hunt Street. It is proposed that the existing watermain along Hunt Street will be utilized to service both the mid-rise building and the condo development, with separate service connections. Refer to drawing C100 – Servicing Plan.

Norfolk County's design criteria stipulates the following requirements for system pressures, and the system shall be designed to meet the greater of either of the following requirements;

- Fire flow conditions– not less than 140 kPa
- Normal operating conditions – not less than 280 kPa

Domestic Water Demand

Table 3 presents the domestic water flow information for the proposed development:

Table 3
Domestic Water Demands

	Phase 1	Phase 2	
		Residential	Commercial
Population	121	314	108
Average Daily Demand (L/person/day)	450		
Maximum Day Demand Factor	2.25		
Maximum Day Demand (L/s)	1.42	3.68	1.27
Peak Hourly Demand Factor	4	4	2
Peak Hourly Demand (L/s)	2.52	6.54	1.13

In summary, the proposed development is anticipated to have a total maximum daily demand of 6.36 L/s and a maximum hourly demand of 10.19 L/s. Refer to Appendix B for detailed calculations.

Fire Water Service

According to the County GIS online mapping, there is a single fire hydrant at the corner of Queensway West and Hunt Street. However, a majority of the site is located outside of the 90m fire hydrant radius, therefore, two fire hydrants will be installed on-site to adequately service the proposed development, and the hydrant at the corner of Queensway West and Hunt Street will be replaced to accommodate the proposed sidewalk.

Typically, available fire flow during the maximum day demand is the critical criteria when evaluating a watermain distribution system's ability to service a residential subdivision. Using the recommendations of the Fire Underwriters Survey – 2020 (FUS), the estimated fire flow required for the proposed development was determined to be 250 L/s. Refer to the complete calculations in Appendix B.

It should be noted that the FUS method is generally conservative. Norfolk County is currently revising their fire flow criteria to a hybrid approach between the FUS and OBC methods. As such, the required flow will be re-evaluated when the updated approach is confirmed.

Information obtained from Norfolk County ISMP indicates that the existing municipal watermain along Hunt Street has an available fire flow rate between greater than 159 L/s and less than 57 L/s, as shown in Appendix C. However, due to the diameter of the existing watermain it is expected that the flow is likely greater than 159 L/s. Consequently, Vallee requests that an analysis of the hydraulic modelling be conducted by the County's consultant to determine if the existing water system has adequate system flows and pressure ensure the aforementioned fire flow demands.

Conclusions and Recommendations

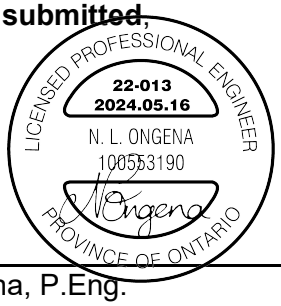
The functional servicing design for the proposed development can be summarized as follows:

- A peak sanitary design flow of approximately 11.75 L/s is anticipated from the proposed development.
- Modelling from Norfolk County's consultant has been requested to determine if existing County infrastructure provides adequate capacity to accommodate the estimated sanitary design flow.
- Overland flow during major storm events, and internal storm sewers during minor storm events will convey stormwater to the proposed SWM facility, which will ultimately be released to Patterson Creek via a storm sewer.
- Rooftop storage on the mid-rise building will also be used to reduce the required storage volume.
- Under all storm events, peak flows associated with the post-development site are controlled to less than or equal to the pre-development peak flows under all storm events.
- Stormwater will be treated to an enhanced level of water quality protection.
- The domestic maximum day demand and peak hourly demand were found to be 6.36 L/s and 10.19 L/s, respectively.
- The required fire flow demand for the proposed development was found to be 250 L/s using the FUS criteria.
- An analysis of the hydraulic modelling by the County consultants has been requested to determine the water servicing capacity and constraints on the existing water system to ensure adequate system flows and pressure for the aforementioned domestic and fire demands.
- The fire flow capacity will be re-evaluated when the revised fire flow requirements are confirmed by Norfolk County.

It is recommended that this report be provided to Norfolk County and the Long Point Region Conservation Authority in support of the site plan application proposed development.

We trust that this information is complete and sufficient for submission. Should you have any questions or require further information please do not hesitate to contact us.

Respectfully submitted,



Natalie Ongena, P.Eng.
G. DOUGLAS VALLEE LIMITED
Consulting Engineers, Architects and Planners

Appendix A
– 22-013 Sanitary Flow Calculations

Appendix B
– 22-013 Domestic Water Demand Calculations
– 22-013 FUS Fire Flow Calculations
– 22-013 DWG FIRE – Fire Separation Distances
– Norfolk County ISMP Available Fire Flow

APPENDIX A

22-013 Sanitary Flow Calculation

vallee
Consulting Engineers, Architects & Planners

Subject:	HFW Hunt Street Development		
Date:	4/16/2024	By:	NLO
Project #:	22-013	Page:	1
Description:	Phase 1		

Norfolk County Design Criteria Section 9.2 - Sanitary Sewage Flow

9.2.01 Tributary Population

Residential Development:	2.75	persons/unit
Units:	44	Units
Number of Persons:	121	persons
Site Area	1.42	ha

9.2.02 Sewage Flow

Per Capita Flow:	0.45	m^3/person/day
Average Sewage Flow:	0.630	L/s

9.2.03 Peak Sanitary Flow Factor

Residential Peaking Factor Formula:

M = 1 + (14/(4+ [14 / { 4 + P^(0.5)}])

P =	0.121
M =	4.220

9.2.04 Infiltration Allowance

Infiltration Allowance:	0.28	L/s/ha
Infiltration Allowance:	0.398	L/s

9.2.05 Design Flow

Design Flow:

Design Flow = (Average Sewage Flow * Peak Sanitary Flow Factor) + Infil. Allowance

Design Flow =	3.06	L/s

Norfolk County Design Criteria Section 9.2 - Sanitary Sewage Flow

9.2.01 Tributary Population

Residential:

Residential Development:	2.75	persons/unit
Units:	114	Units
Number of Persons:	314	persons

Commercial:

Commercial Development:	90	persons/ha
Site Area:	1.20	ha
Number of Persons:	108	persons

Total Population:	422	persons

9.2.02 Sewage Flow

Per Capita Flow:	0.45	m^3/person/day
Average Sewage Flow:	2.195	L/s

9.2.03 Peak Sanitary Flow Factor

Combined Peaking Factor Formula:
Combined M = KAV(1+(14/(4+(Pe^0.5))))
KAV = (PR + (0.8PC))/P

KAV=	0.949
Pe=	0.4215
M =	3.806

9.2.04 Infiltration Allowance

Infiltration Allowance:	0.28	L/s/ha
Infiltration Allowance:	0.336	L/s

9.2.05 Design Flow

Design Flow:
Design Flow = (Average Sewage Flow * Peak Sanitary Flow Factor) + Infil. Allowance

Design Flow =	8.69	L/s

Summary of Design Flows

Phase 1: 3.06 L/s

Phase 2: 8.69 L/s

Total Design Flow:	**11.75 L/s**

APPENDIX B

22-013 Domestic Water Demand Calculations
22-013 FUS Fire Flow Calculations
22-013 DWG FIRE – Fire Separation Distances
Norfolk County ISMP Available Fire Flow

vallee
Consulting Engineers, Architects & Planners

Subject:	HFW Hunt Street Development		
Date:	4/17/2024	By:	NLO
Project #:	22-013	Page:	1
Description:	Phase 1		

Maximum Daily Demand

Total Number of Units	44	units
Zoning of Land	Residential	
Equiv. Population Density	2.75	ppl/unit
Equiv. Population	121	
Av. Daily Demand Per Capita	0.45	m^3/capita/day
Maximum Daily Demand Peaking Factor	2.25	
Maximum Daily Demand	122.51	m^3/day
	1.42	l/s

Maximum Hourly Demand

Total Number of Units	44	units
Zoning of Land	Residential	
Equiv. Population Density	2.75	ppl/ha
Equiv. Population	121	
Av. Daily Demand Per Capita	0.45	m^3/capita/day
Maximum Hourly Demand Peaking Factor	4	
Maximum Hourly Demand	9.08	m^3/hour
	2.52	l/s

Maximum Daily Demand

Total Number of Units	114	units
Zoning of Land	Residential	
Equiv. Population Density	2.75	ppl/unit
Equiv. Population	314	
Av. Daily Demand Per Capita	0.45	m^3/capita/day
Maximum Daily Demand Peaking Factor	2.25	
Maximum Daily Demand	317.93	m^3/day
	3.68	l/s

Maximum Hourly Demand

Total Number of Units	114	units
Zoning of Land	Residential	
Equiv. Population Density	2.75	ppl/ha
Equiv. Population	314	
Av. Daily Demand Per Capita	0.45	m^3/capita/day
Maximum Hourly Demand Peaking Factor	4	
Maximum Hourly Demand	23.55	m^3/hour
	6.54	l/s

Maximum Daily Demand

Area	1.20	ha
Zoning of Land	Commercial	
Equiv. Population Density	90	ppl/ha
Equiv. Population	108	
Av. Daily Demand Per Capita	0.45	m^3/capita/day
Maximum Daily Demand Peaking Factor	2.25	
Maximum Daily Demand	109.35	m^3/day
	1.27	l/s

Maximum Hourly Demand

Area	1.20	ha
Zoning of Land	Commercial	
Equiv. Population Density	90	ppl/ha
Equiv. Population	108	
Av. Daily Demand Per Capita	0.45	m^3/capita/day
Maximum Hourly Demand Peaking Factor	2	
Maximum Hourly Demand	4.05	m^3/hour
	1.13	l/s

Summary of Maximum Daily Demand

Phase 1:	1.42 L/s
Phase 2 Residential:	3.68 L/s
Phase 2 Commercial:	1.27 L/s
Total Maximum Daily Demand:	**6.36 L/s**

Summary of Maximum Hourly Demand

Phase 1:	2.52 L/s
Phase 2 Residential:	6.54 L/s
Phase 2 Commercial:	1.13 L/s
Total Maximum Hourly Demand:	**10.19 L/s**

vallee
Consulting Engineers, Architects & Planners

Subject:	HFW Hunt Street Development		
Date:	4/17/2024	By:	NLO
Project #:	22-013	Page:	1

UNITS 1 & 2

1) Fire Flow Requirement

$F_1=220C(A^{1/2})$ (L/min)

C= 1.5 Construction coefficient for wood frame construction

Length= 18.4 m
Width= 16.9 m
A= 311 Floor Area m^2 = Main Floor Area
= 466 Fire Area m^2 = 1.5 Floors

F_1= 7127 L/min
F_1= 7000 L/min (Round to the nearest 1,000 l/min)

2) Occupancy

Occupancy Type: Residential Occupancy
Reduction: 15%
Surcharge: 0%

$F_2=F_1+(F_1*Reduction/Surcharge)$ (L/min)
F_2= 5950 L/min

3) Sprinkler System

Sprikler System: Not Applicable (assumed no sprinkler system in service)
Reduction: 0%

$F_3=F_2*Reduction$ (L/min)
F_3= 0 L/min

4) Seperation

Direction	Distance (m	Surcharge
South	18.7	15%
East	>30	0%
West	Firewall	0%
North	20	10%
	Total:	25%

Separation Surcharges

0 to 3m	25%
3.1m to 10m	20%
10.1m to 20m	15%
20.1 to 30m	10%
Greater than 30m	0%

F4=(TOTAL)*F2 (L/min)
F_4= 1488 L/min

Total Fire Flow

$F=F_2-F_3+F_4$ = 7438 L/min
= 7000 L/min (Round to the nearest 1,000 l/min)
= **116.7 L/s**

Notes: *1) All calculations and factors from Part 2 "Water Supply for Public Fire Protection" by the Fire Underwriters Survey, 2020*

UNIT 7 & 8

1) Fire Flow Requirement

$F_1=220C(A^{1/2})$ (L/min)

C= 1.5 Construction coefficient for wood frame construction

Length= 18.4 m
Width= 16.9 m
A= 311 Floor Area m^2 = Main Floor Area
= 466 Fire Area m^2 = 1.5 Floors

F_1= 7127 L/min
F_1= 7000 L/min (Round to the nearest 1,000 l/min)

2) Occupancy

Occupancy Type: Residential Occupancy
Reduction: 15%
Surcharge: 0%

$F_2=F_1+(F_1*Reduction/Surcharge)$ (L/min)
F_2= 5950 L/min

3) Sprinkler System

Sprikler System: Not Applicable (assumed no sprinkler system in service)
Reduction: 0%

$F_3=F_2*Reduction$ (L/min)
F_3= 0 L/min

4) Seperation

Direction	Distance (m	Surcharge
South	18.7	15%
East	3.0	25%
West	Firewall	0%
North	>30	0%
	Total:	40%

Separation Surcharges	
0 to 3m	25%
3.1m to 10m	20%
10.1m to 20m	15%
20.1 to 30m	10%
Greater than 30m	0%

F4=(TOTAL)*F2 (L/min)
F_4= 2380 L/min

Total Fire Flow

$F=F_2-F_3+F_4$ = 8330 L/min
= 8000 L/min (Round to the nearest 1,000 l/min)
= **133.3 L/s**

Notes: *1) All calculations and factors from Part 2 "Water Supply for Public Fire Protection" by the Fire Underwriters Survey, 2020*

UNIT 21-24

1) Fire Flow Requirement

$F_1=220C(A^{1/2})$ (L/min)

C=	1.5	Construction coefficient for wood frame construction	
Length=	25.5	m	
Width=	11.6	m	
A=	296	Floor Area m^2	= Main Floor Area
=	887	Fire Area m^2	= 3 Floors
F_1=	9830	L/min	
F_1=	**10000**	**L/min**	(Round to the nearest 1,000 l/min)

2) Occupancy

Occupancy Type: Residential Occupancy
Reduction: 15%
Surcharge: 0%

$F_2=F_1+(F_1*Reduction/Surcharge)$ (L/min)

F_2= 8500 L/min

3) Sprinkler System

Sprikler System: Not Applicable (assumed no sprinkler system in service)
Reduction: 0%

$F_3=F_2*Reduction$ (L/min)

F_3= 0 L/min

4) Seperation

Direction	Distance (m	Surcharge
East	3.0	25%
North	18.7	15%
South	10.5	15%
West	3.0	25%
	Total:	80%

Separation Surcharges	
0 to 3m	25%
3.1m to 10m	20%
10.1m to 20m	15%
20.1 to 30m	10%
Greater than 30m	0%

F4=(TOTAL)*F2 (L/min)

F_4= 6800 L/min

Total Fire Flow

$F=F_2-F_3+F_4$	=	15300 L/min	
	=	15000 L/min	(Round to the nearest 1,000 l/min)
	=	**250.0 L/s**	

Notes: *1) All calculations and factors from Part 2 "Water Supply for Public Fire Protection" by the Fire Underwriters Survey, 2020*

6-Storey Mid-Rise Building

1) Fire Flow Requirement

$F_1=220C(A^{1/2})$ (L/min)

C= 0.8 Non Combustible Construction

Af= 2700 m^2 = main floor area

2700 m^2 = second floor area

A= 10800 Fire Area m^2 = two adjoining floor areas plus 50% of all floors immediately above them

F_1= 18290 L/min

F_1= 18000 L/min (Round to the nearest 1,000 l/min)

2) Occupancy

Occupancy Type: Residential Occupancy

Reduction: 15%

Surcharge: 0%

$F_2=F_1+(F_1*Reduction/Surcharge)$ (L/min)

F_2= 15300 L/min

3) Sprinkler System

Sprikler System: Applicable (Assumes the building is protected by a complete automatic sprinkler system, conforming to NFPA 13 and other standards)

Reduction: 50%

$F_3=F_2*Reduction$ (L/min)

F_3= 7650 L/min

4) Seperation

Direction	Distance (n	Surcharge
North	> 30m	0%
East	> 30m	0%
West	> 30m	0%
South	> 30m	0%
	Total:	0%

Separation Surcharges	
0 to 3m	25%
3.1m to 10m	20%
10.1m to 20m	15%
20.1 to 30m	10%
Greater than 30m	0%

F4=(TOTAL)*F2 (L/min)

F_4= 0 L/min

Total Fire Flow

$F=F_2-F_3+F_4$ = 7650 L/min

= 8000 L/min (Round to the nearest 1,000 l/min)

= **133.3 L/s**

Notes: *1) All calculations and factors from Part 2 "Water Supply for Public Fire Protection" by the Fire Underwriters Survey, 2020*

Water Supply for Public Fire Protection - Fire Underwriters Survey 2020
Tables & Figures

Method for Determining Required Fire Flows

Fire Underwriters Survey defines **Required Fire Flow** as the amount and rate of water application required in firefighting to confine and control the fires possible in a building or group of buildings which comprise essentially the same fire area by virtue of immediate exposure. This may include as much as a city block.

To determine the estimated amount of water required to confine and control a fire in a building or group of buildings, Fire Underwriters Survey uses the following base formula:

$$RFF = 220C\sqrt{A}$$

Where:

RFF = the Required Fire Flow in litres per minutes (LPM)
C = the Construction Coefficient is related to the type of construction of the building
A = the Total Effective Floor Area (effective building area) in square metres of the building

Construction Coefficient (C)

Note that the construction typology used by the insurance industry and public fire protection differs from the terms of reference in the National Building Code of Canada (NBC).

The following Construction Types and Coefficients are used in the required fire flow formula:

C = 1.5 for **Type V** Wood Frame Construction
= 0.8 for **Type IV-A** Mass Timber Construction
= 0.9 for **Type IV-B** Mass Timber Construction
= 1.0 for **Type IV-C** Mass Timber Construction
= 1.5 for **Type IV-D** Mass Timber Construction
= 1.0 for **Type III** Ordinary Construction
= 0.8 for **Type II** Noncombustible Construction
= 0.6 for **Type I** Fire Resistive Construction

Occupancy and Contents Adjustment Factor

The required fire flow may be reduced by as much as -25% for occupancies having contents with a very low fire hazard or may be increased by up to 25% for occupancies having contents with a high fire hazard. The Occupancy and Contents Adjustment Factor should not be made at greater than 25% or less than -25%.

- *Noncombustible Contents* *-25%*
  - Includes merchandise or materials, including stock, or equipment, which in permissible quantities does not in themselves constitute an active fuel for the spread of fire.
  - May include limited or controlled amounts of combustible material, not exceeding 5% of the Total Effective Area of the occupancy. Combustible components of construction (ex. interior walls, finishes, etc.) should be included in the limit on combustible materials.
- *Limited Combustible Contents* *-15%*
  - Includes merchandise or materials, including furniture, stock, or equipment, of low combustibility, with limited concentrations of combustible materials.
- Combustible Contents 0% no adjustment
  - Includes merchandise or materials, including furniture, stock, or equipment, of moderate combustibility.
- *Free Burning Contents* *+15%*
  - Includes merchandise or materials, including furniture, stock, or equipment, which burn freely, constituting an active fuel.
- *Rapid Burning Contents* *+25%*
  - Includes merchandise or materials, including furniture, stock, or equipment, which either
    - Burn with great intensity
    - spontaneously ignite and are difficult to extinguish
    - give off flammable or explosive vapors at ordinary temperatures
    - as a result of an industrial processing, produce large quantities of dust or other finely divided debris subject to flash fire or explosion

Table 3 Recommended Occupancy/Contents Charges by Major Occupancy Examples[1]

Group	Division	Description of Major Occupancies	Occupancy and Contents	Adjustment Factor
A	1	***Assembly** occupancies* intended for the production and viewing of the performing arts	Combustible	0%
A	2	***Assembly** occupancies* not elsewhere classified in Group A	Limited to Combustible	-15% to 0%
A	3	***Assembly** occupancies* of the arena type	Limited to Combustible	-15% to 0%
A	4	***Assembly** occupancies* in which occupants are gathered in the open air	Limited to Combustible	-15% to 0%
B	1	**Detention** occupancies	Noncombustible to Limited	-25% to -15%
B	2	**Care** and treatment occupancies	Noncombustible to Limited	-25% to -15%
B	3	**Care** occupancies	Limited	-15%
C	---	**Residential** occupancies	Limited	-15%
D	---	**Business** and personal services occupancies		
D	---	• *Police stations without detention quarters*	Non-combustible	-20%
D	---	• *Banks, Barber and hairdressing shops, Beauty parlours, Dental offices, Laundries (self-service), Medical offices, Offices, Radio stations*	Limited	-15%
D	---	• *Dry cleaning establishments (self-service, not using flammable or explosive solvents or cleaners), Small tool and appliance rental and service establishments*	Combustible	0%
E	---	**Mercantile** occupancies		
E	---	• *Exhibition halls*	Limited	-15%
E	---	• *Supermarkets*	Limited	-15%
E	---	• *Shops/Stores*	Limited to Combustible	-15% to 0%
E	---	• *Markets*	Combustible	0
E	---	• *Department stores*	Free Burning	15%
F	1	**High hazard industrial** occupancies	Rapid Burning	+25%
F	2	**Medium hazard industrial** occupancies		
F	2	• *Television studios not admitting a viewing audience*	Limited	-15%
F	2	• *Cold storage plants*	Combustible	0%
F	2	• *Electrical substations*	Combustible	0%
F	2	• *Helicopter landing areas on roofs*	Limited	-15%

[1] *The values presented in this table are intended as a guideline and the occupancy/contents adjustment should be based on the actual severity of conditions within the risk structure.*

Total Effective Area (A)

To determine a required fire flow for an individual building, the Total Effective Area that would be affected during the design fire must be determined. The Total Effective Area is the largest Floor Area (in square metres) plus the following percentages of the total area of the other floors:

1) For a building classified with a Construction Coefficient from 1.0 to 1.5:
   a) 100% of all Floor Areas are considered in determining the Total Effective Area to be used in the formula.
2) For a building classified with a Construction Coefficient below 1.0:
   a) if any vertical openings in the building (ex. interconnected floor spaces, atria, elevators, escalators, etc.) are unprotected, consider the two largest adjoining floor areas plus 50% of all floors immediately above them up to a maximum of eight; or
   b) if all vertical openings and exterior vertical communications are properly protected in accordance with the National Building Code, consider only the single largest Floor Area plus 25% of each of the two immediately adjoining floors.

Automatic Sprinkler Protection

The required fire flow may be reduced by up to 50 percent for complete Automatic Sprinkler Protection depending upon adequacy of the system. Where only part of a building is protected by Automatic Sprinkler Protection, credit should be interpolated by determining the percentage of the Total Floor Area being protected by the automatic sprinkler system.

To be able to apply the full 50 percent reduction, the following areas should be reviewed to determine the appropriate level of credit for having Automatic Sprinkler Protection as per the table below:

Table 4 Sprinkler Credits

Automatic Sprinkler System Design	Credit	
	With complete building coverage	With partial building coverage of X%
Automatic sprinkler protection designed and installed in accordance with NFPA 13	30%	30% × Percentage of Total Floor Area Serviced by Sprinkler System
Water supply is standard for both the system and Fire Department hose lines	10%	10% × Percentage of Total Floor Area Serviced by Sprinkler System
Fully supervised system	10%	10% × Percentage of Total Floor Area Serviced by Sprinkler System

Exposure Adjustment Charge

A percentage of water for the exposures should be added to the required fire flow for the subject building to provide adequate flow rates for hose streams used to reduce the spreading of fire from the subject building to exposed risks (ex. structures, stored materials, forest, etc.). The required fire flow of a subject building may be increased depending on the severity of exposed risks to the subject building and the distance between the exposed risks and the subject building. This charge considers the usage of water supplies to prevent exposed risks from igniting or being damaged during a major fire incident in the subject building.

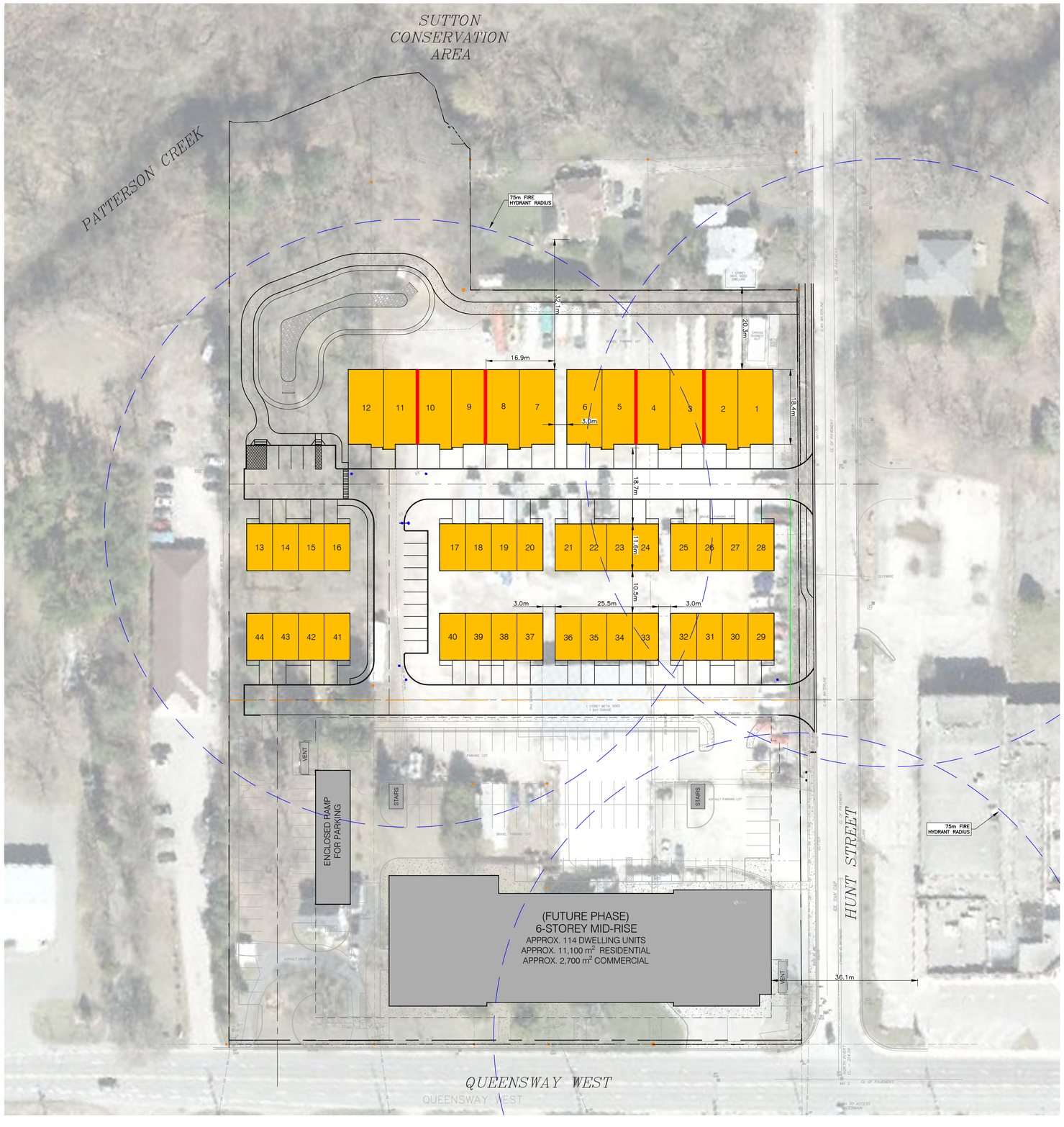
The maximum Exposure Adjustment Charge to be applied to a subject building is 75% when summing the percentages for all sides of the building. Table 5 outlines the maximum Exposure Adjustment Charge to apply for any one side of the subject building based on the following separation distances between the subject building and the exposed risk (aka. exposure):

Table 5 Exposure Charges

Separation Distance	Maximum Exposure Adjustment Charge
0 m to 3 m	25%
3.1 m to 10 m	20%
10.1 m to 20 m	15%
20.1 m to 30 m	10%
Greater than 30	0%

Table 6 Exposure Adjustment Charges for Subject Building considering Construction type of Exposed Building Face

Distance (m) to the Exposure	Length-height factor of exposing building face	Type V	Type III-IV[2]	Type III-IV[3]	Type I-II[2]	Type I-II[3]
0 to 3	0-20	20%	15%	5%	10%	0%
	21-40	21%	16%	6%	11%	1%
	41-60	22%	17%	7%	12%	2%
	61-80	23%	18%	8%	13%	3%
	81-100	24%	19%	9%	14%	4%
	Over 100	25%	20%	10%	15%	5%
3.1 to 10	0-20	15%	10%	3%	6%	0%
	21-40	16%	11%	4%	7%	0%
	41-60	17%	12%	5%	8%	1%
	61-80	18%	13%	6%	9%	2%
	81-100	19%	14%	7%	10%	3%
	Over 100	20%	15%	8%	11%	4%
10.1 to 20	0-20	10%	5%	0%	3%	0%
	21-40	11%	6%	1%	4%	0%
	41-60	12%	7%	2%	5%	0%
	61-80	13%	8%	3%	6%	1%
	81-100	14%	9%	4%	7%	2%
	Over 100	15%	10%	5%	8%	3%
20.1 to 30	0-20	0%	0%	0%	0%	0%
	21-40	2%	1%	0%	0%	0%
	41-60	4%	2%	0%	1%	0%
	61-80	6%	3%	1%	2%	0%
	81-100	8%	4%	2%	3%	0%
	Over 100	10%	5%	3%	4%	0%
Over 30 m	all sizes	0%	0%	0%	0%	0%



LEGEND

PROPOSED FIREWALL

PROPERTY LINE

REV. No.	DATE	REVISION

SCALE:

HORIZONTAL : 1:500 (10 20)

DO NOT SCALE DRAWINGS, CALL FOR ANY CLARIFICATIONS THAT ARE REQUIRED, FIELD VERIFY AT ALL BUILT CONDITIONS

ALL DRAWINGS ARE TO BE READ IN COLOUR ORIGINAL PAGE SIZE ARCH 'D' - 24" x 36"

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

Stamp

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Project Title

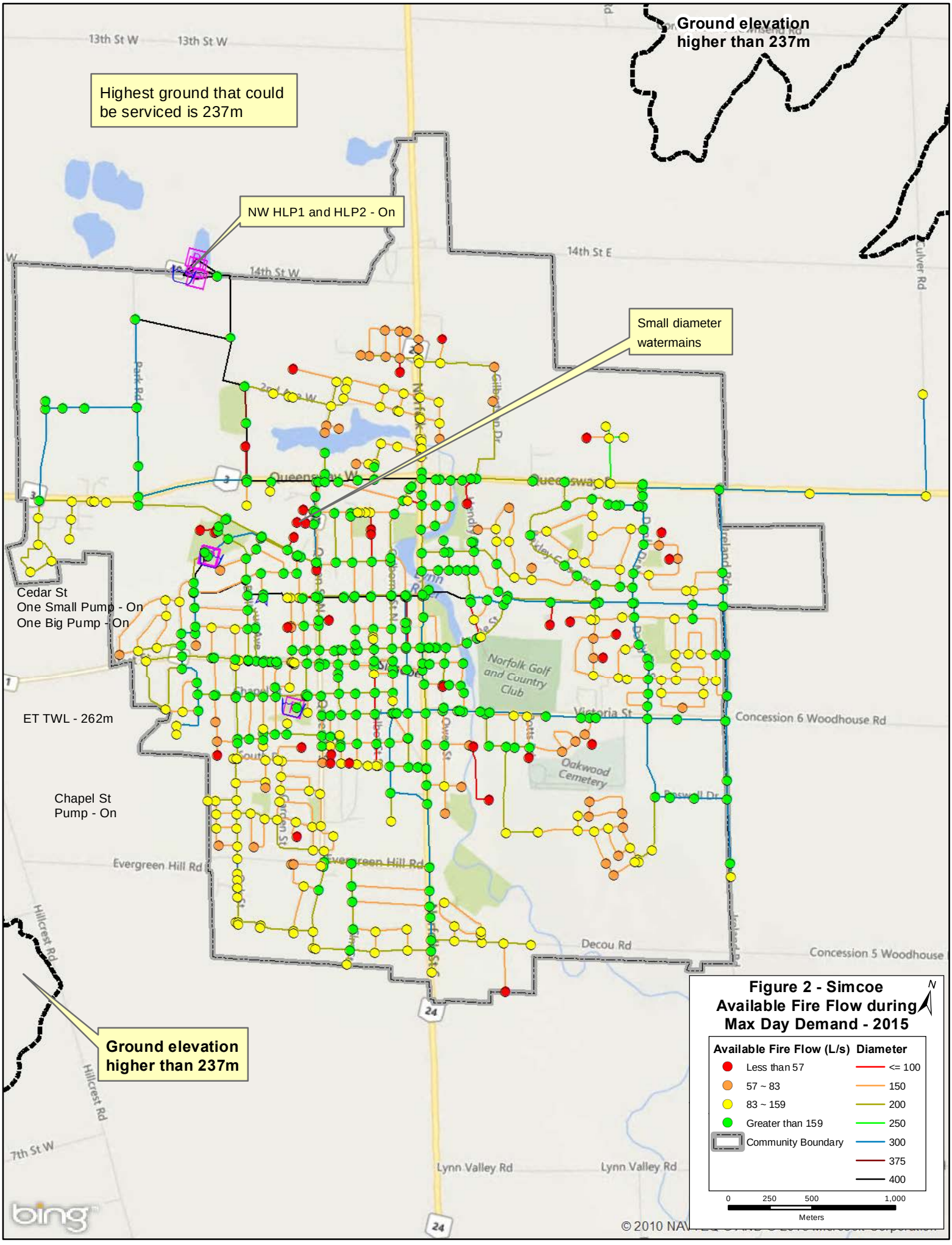
HFW HUNT STREET
RESIDENTIAL DEVELOPMENT
SIMCOE - NORFOLK COUNTY

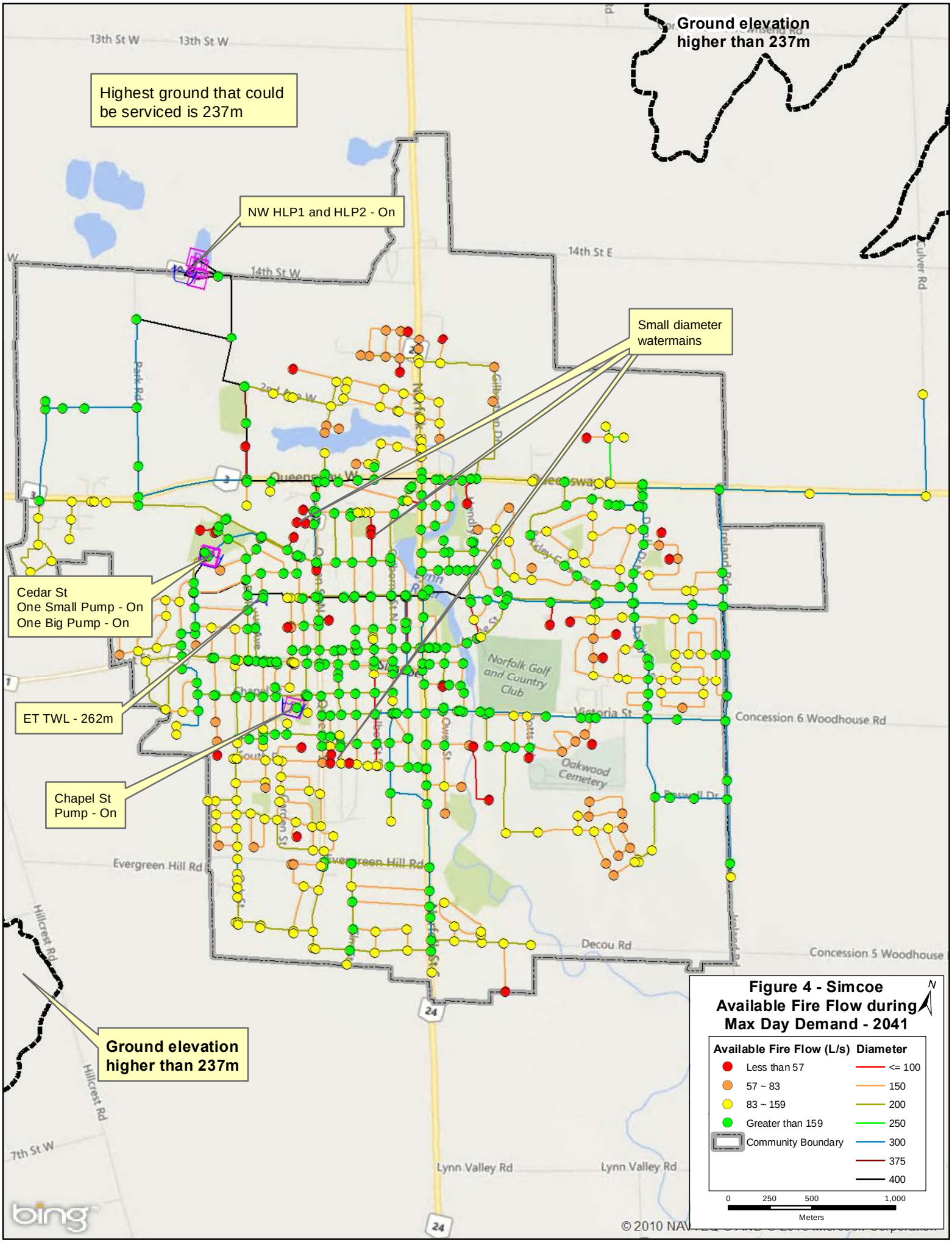
Drawing Title

FIRE SEPARATION DISTANCES

Designed by : NLB	Drawn By : NLB
Checked by : JI	Date Started : JAN 2023
Drawing Scale : 1:500	Drawing No. FIRE
Project No. 22-013	

DATE PLOTTED: 5/16/2024 2:41 PM
PROJECT NUMBER & NAME: 22-013 - HFW HUNT STREET
FILE PATH: H:\PROJECTS\2022\22-013 HFW HOLDINGS HUNT ST RESIDENTIAL\DRAWINGS\CIVIL\PRODUCTION DRAWINGS\22-013 FIRE FIRE SEPARTION DISTANCES.DWG


Ground elevation higher than 237m
Highest ground that could be serviced is 237m
NW HLP1 and HLP2 - On
Small diameter watermains
Cedar St
One Small Pump - On
One Big Pump - On
ET TWL - 262m
Chapel St
Pump - On
Ground elevation higher than 237m
13th St W
14th St W
14th St E
Queensway W
Norfolk Golf and Country Club
Oakwood Cemetery
Concession 6 Woodhouse Rd
Concession 5 Woodhouse
Evergreen Hill Rd
Decou Rd
Lynn Valley Rd
Hillcrest Rd
7th St W
Park Rd
Ireland Rd
Culver Rd
Figure 2 - Simcoe Available Fire Flow during Max Day Demand - 2015
Available Fire Flow (L/s)
Less than 57
57 ~ 83
83 ~ 159
Greater than 159
Community Boundary
Diameter
<= 100
150
200
250
300
375
400
0 250 500 1,000
Meters
N
bing
© 2010 NAV


Ground elevation higher than 237m
Highest ground that could be serviced is 237m
NW HLP1 and HLP2 - On
Small diameter watermains
Cedar St
One Small Pump - On
One Big Pump - On
ET TWL - 262m
Chapel St
Pump - On
Ground elevation higher than 237m
13th St W
14th St W
14th St E
Queensway W
Norfolk Golf and Country Club
Oakwood Cemetery
Victoria St
Concession 6 Woodhouse Rd
Concession 5 Woodhouse
Evergreen Hill Rd
Decou Rd
Lynn Valley Rd
7th St W
Hillcrest Rd
Park Rd
Ireland Rd
Culver Rd
Figure 4 - Simcoe Available Fire Flow during Max Day Demand - 2041
N
Available Fire Flow (L/s)
Less than 57
57 ~ 83
83 ~ 159
Greater than 159
Community Boundary
Diameter
<= 100
150
200
250
300
375
400
0 250 500 1,000
Meters
bing
© 2010 NAV

vallee

Consulting Engineers,
Architects & Planners

May 14, 2024

HFW Holdings Limited
3 Fernwood Court
Richmond Hill, Ontario
L4B 3C2

Attention: **Mr. Herbert Chiu**

Reference: **Stormwater Management Report**
HFW Hunt Street Residential Development
Simcoe, Norfolk County
Project #22-013

Introduction

This Stormwater Management Report (SWM) has been prepared on behalf of HFW Holdings Ltd, in support of the site plan application for the proposed HFW Hunt Street Residential Development located at the northwest corner of Queensway West and Hunt Street in Simcoe – Norfolk County. This report outlines the detailed stormwater design for the proposed development. It is the intention to submit this report to Norfolk County and the Long Point Region Conservation Authority (LPRCA) for review and approval.

The proposed development will be constructed in two phases, with Phase 1 including a 44-unit condominium development, and Phase 2 including a 6-storey, 114-unit residential mid-rise building with main floor commercial units. The 2.89 ha development site is bound by Hunt Street to the east, Queensway West to the south, Patterson Creek and the Sutton Conservation Area to the north, and the Queensway Veterinary Hospital to the west. Refer to Figure 1 below.

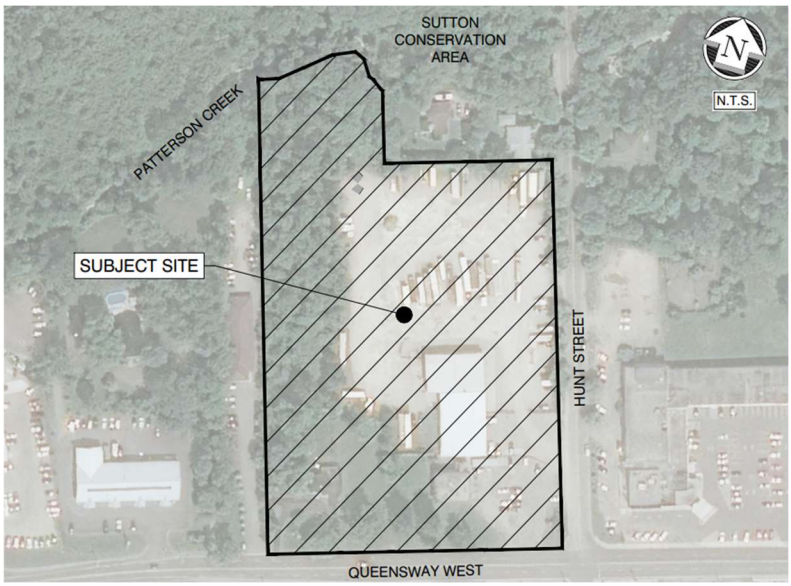


Figure 1 - Site Location

Stormwater Management Design Criteria

The design criteria for the proposed development are as follows:

- Quantity Control: Reduce or control the post-development peak flow rates from the site to levels that do not exceed the 2-year pre-development flow rate, for all storm events up to and including the 100-year storm event.
- Quality Control: Stormwater to be treated to the Enhanced Protection Level as defined in the Ministry of the Environment's *Stormwater Management Practices Planning and Design Manual* (March 2003).

A Visual Otthymo computer model has been used to simulate the drainage areas under pre-development conditions and post-development conditions. The simulations were conducted using the 4-hour Chicago Distribution design storm of the 2-year, 5-year, 10-year, 25-year, 50-year and 100-year storm events. The Norfolk County rainfall IDF curve data has been used for the storm analysis using the parameters in Table 1 below.

Table 1
Norfolk County Rainfall IDF Parameters

Event	A	B	C
2-year	529.711	4.501	0.745
5-year	583.017	3.007	0.703
10-year	670.324	3.007	0.698
25-year	721.533	2.253	0.679
50-year	766.038	1.898	0.668
100-year	801.041	1.501	0.657

Pre-Development

Under pre-development conditions, the subject site features several commercial buildings, gravel and asphalt parking lots, an existing residential dwelling, and wooded areas. During major storm events, runoff from the majority of the site (Area PRE) generally flows uncontrolled, overland in a northerly direction towards Patterson Creek and the Sutton Conservation Area. Existing catch basins within asphalt and gravel parking lots collect minor storm event flows and convey them northwards to an existing culvert outlet to Patterson Creek. Minor flows from a small southern portion of the site (Area PRE-EXT) along Queensway West drain in a southerly direction towards Queensway West where it is collected by the existing storm sewer system. Major flows from this portion of the site flow overland down Queensway West to Hunt Street, then northwards down Hunt Street and ultimately discharge to Patterson Creek.

The two aforementioned pre-development catchments encompass a total area of 2.89 ha, as shown on Drawing PRE – Pre-Development Drainage Areas in Appendix E. A Visual Otthymo computer model was used to simulate pre-development conditions for this area. The model uses a modified SCS procedure to estimate losses that occur naturally during a rainfall event such as evaporation and infiltration. Table 2 summarizes the input parameters with complete details included in Appendix A.

Table 2 Visual Otthymo Model Input – Pre-Development		
Parameter	**PRE**	**PRE-EXT**
Description	Drains to Patterson Creek via an existing storm outlet	Drains to Queensway West & Hunt Street
Area	2.55 ha	0.34 ha
Soil Type	Sandy Textures over Silt Loam	
Hydrologic Soil Group	AB	
SCS Curve Number	Woodlot & Grass/Improved Land - 62	
Initial Abstraction	13.6 mm ($IA/S_{0.05}$ = 0.05, with $S_{0.05}$ = 1.33 * $S_{0.20}$^1.15 in inches and $S_{0.20}$ = 1000/CN-10 in inches)	
Impervious Percentage (%)	41%	23%
Directly Connected Impervious Percentage (%)	27%	19%

Table 3 summarizes the pre-development peak runoff from the development site based on the pre-development drainage patterns identified above.

Table 3 Peak Pre-Development Runoff	
Event	**Pre-Dev Peak Flows (m^3/s)**
2-year	0.146
5-year	0.200
10-year	0.241
25-year	0.302
50-year	0.351
100-year	0.399

Post-Development

The overall stormwater management (SWM) strategy is to reduce post-development peak flow rates from the site to less than or equal to pre-development flow rates for all storm events up to and including the 100-year storm event. To meet this quantity control target, runoff from the proposed development will be detained in a stormwater management pond at the northern edge of the site and released at a rate such that the pre-development flow rates are not exceeded. In addition, an infiltration basin at the bottom of the SWM pond will be constructed to promote groundwater infiltration. Minor storm events (2 & 5-year storm) will be conveyed via the proposed storm sewer system, and major storm events will flow overland along the roadways to the proposed SWM system. Runoff released from the proposed SWM pond will be conveyed to Patterson Creek via a new storm sewer.

The post-development drainage areas are shown in Drawing POST- Post-Development Drainage Areas in Appendix E, and can generally be described as follows:

- Area POST 1: Approximately 0.27 ha of the development site. This area encompasses the rooftop of the proposed mid-rise building. Flows from this area are conveyed to the SWM pond via the proposed storm sewer and overland flow.
- Area POST 2: Approximately 2.16 ha of the development site. This area encompasses the majority of the development site. Flows from this area are conveyed to the SWM pond via the proposed storm sewer and overland flow.
- Area POST 3: Approximately 0.23 ha of the development site. This area encompasses the portion of the site within the Long Point Region Conservation Authority (LPRCA) no-development zone. Flows from this area will flow uncontrolled, overland towards Patterson Creek as they do under pre-development conditions.
- Area POST-EXT: Approximately 0.23 ha of the development site. This area encompasses the frontage along Queensway West and Hunt Street. Flows from this area will flow uncontrolled, overland down Queensway West and Hunt Street, ultimately releasing to the Sutton Conservation Area.

Table 4 summarizes the post-development input parameters for the Visual OTTHYMO computer model with complete details included in Appendix A. The model uses a modified SCS procedure to estimate losses that occur naturally during a rainfall event such as evaporation and infiltration.

Table 4
Visual Otthymo Model Input – Post-Development

Parameter	POST1	POST2	POST3	POST-EXT
Area	0.27 ha	2.16 ha	0.23 ha	0.23 ha
Soil Type	Sandy Textures over Silt Loam			
Hydrologic Soil Group	AB			
SCS Curve Number	Grass/Improved Land - 70		Woodlot & Grass/ Improved Land - 62	Grass/Improved Land - 70
Initial Abstraction	9.0 mm		13.6 mm	9.0mm
Impervious Percentage	100%	71%	0%	48%
Directly Connected Impervious Percentage	100%	49%	0%	35%

Infiltration Basin

An infiltration basin will be installed at the bottom of the proposed SWM pond to reduce the required storage volume. In addition, the infiltration basin will provide water quality benefits by promoting infiltration and natural groundwater recharge. The depth of an infiltration basin is governed by the native soil infiltration rate, porosity of the aggregate material used in the stone reservoir and the targeted time period to achieve complete drainage between storm events. As presented in the preliminary hydrogeological assessment completed by GeoPro Consulting Limited (refer to Appendix B), the geometric mean hydraulic conductivity of the native soil in the area of the proposed infiltration basin was found to be 2.5 x 10^{-3} cm/s, resulting in an infiltration rate of 100 mm/hr. Applying a safety factor of 2.5, the design infiltration rate was taken as 40mm/hr. Therefore, the maximum allowable stone depth was determined to be 4.80m based on the design infiltration rate of 40 mm/hr, a void ratio of 0.4 and a drainage time of 96 hours, as defined in the Norfolk County Design Criteria (2019). A depth of 0.3m has been used for the proposed infiltration basin. Refer to the complete design calculations in Appendix A.

Stormwater Management Pond

A dry pond facility is proposed for the HFW Hunt Street Residential Development. Due to the close proximity of the stormwater management pond to Patterson Creek, the discharge from the pond is limited during flood events. Runoff from the stormwater management pond can only be released when the ponding level exceeds the flood elevation, or as the flood level begins to recede. For example, during the 100-year storm event, the flood elevation of the creek reaches 215.65m, and as such, runoff from the stormwater management pond will only be released when the ponding level exceeds 215.65m. Correspondingly, the stormwater management facility needs to provide sufficient volume to store runoff when it cannot be released to the creek during flood events. Table 5 presents the flood elevations provided by the Long Point Region Conservation Authority (LPRCA) as well as the flood elevations that have been adjusted to the datum utilized throughout this report (CGVD-1978).

Table 5
Patterson Creek Flood Elevations

Event	LPRA Flood Elevation (m) (CGVD-2013)	Adjusted Flood Elevation (m) (CGVD-1978)
2-year	213.39	213.83
5-year	213.93	214.37
10-year	214.14	214.58
25-year	214.48	214.92
50-year	214.72	215.16
100-year	215.21	215.65

To determine the storage volume required in the proposed dry pond, the relationship between the storage volume of the pond and the discharge is defined by a pond-rating curve. This rating curve is determined by calculating the volume of the proposed pond facility up to a proposed contour elevation and then calculating the expected discharge from the facility based on the water level at this contour elevation and the proposed outlet control configuration. The bottom of the proposed infiltration basin and the bottom of the pond are at an elevation of 214.70m and 215.00m respectively. During the 25, 50 and 100-year flood events, no infiltration has been accounted for as the floodplain elevations are higher than the bottom of the infiltration basin. In addition, for the 50-year and 100-year storm events, modified rating curves have been developed to take the flood elevations of Patterson Creek displayed in Table 5 into consideration.

Generally, orifices or weirs can control discharge from SWM facilities. Each of these control methods can be used by the singular control or they can be used in combination depending on the discharge characteristics desired. For this facility both an orifice and weir are proposed with the following equations used to estimate discharge:

Sharp-Crested Circular Orifice

$$Q = C * A * \sqrt{2 * g * h}$$

where: Q = Discharge in cms
C = constant, 0.63
A = orifice area in m^2
g = gravitational constant, 9.81 m/s^2
h = height above orifice, m

Weir

$$Q = 1.67 * w * h^{3/2}$$

where: Q = Discharge in cms
w = width of the weir, m
h = height above weir, m

For this facility, a 200mm orifice at an elevation of 215.00m and a 0.30m wide weir at an elevation of 215.80m will be used for flow control. The maximum active storage of the proposed facility is 609m^3 at an elevation of 216.20m and the total maximum storage of this facility is 887m^3 at freeboard elevation 216.50m. The complete discharge-to-storage rating curve is appended to this report as part of Appendix A.

Table 6 summarizes the peak post-development flow rates from the proposed SWM pond, and the total post-development site and compares them to the allowable pre-development flow rates for each storm event. The utilized pond storage volumes and corresponding ponding depths for each storm event are also presented in Table 6.

Table 6
Pre to Post-Development Release Rates, Storage Volumes & Ponding Depths

Event	Pre (cms)	Post (cms)		Net Change	Utilized Storage Volume (m^3)	Ponding Elevation (m)
		From Pond	Total			
2-year	0.146	0.070	0.076	-0.070	210	215.73
5-year	0.200	0.130	0.143	-0.057	291	215.90
10-year	0.241	0.177	0.195	-0.046	336	215.99
25-year	0.302	0.236	0.261	-0.041	398	216.10
50-year	0.351	0.281	0.312	-0.039	452	216.18
100-year	0.399	0.339	0.339	-0.021	554	216.33

As shown in Table 6, the peak post-development flow rates are attenuated to less than or equal to the pre-development peak flow rates for all design storm events. Complete details of all SWM calculations and the results from the Visual OTTHYMO analysis are outlined in Appendix A and E, respectively.

Quality Control

The Ministry of the Environment's *Stormwater Management Practices Planning and Design Manual* (March 2003) was used in conjunction with requirements of the Norfolk County to determine the quality control design for the proposed SWM facility. For the proposed development, stormwater shall be treated to the Enhanced Protection Level, corresponding to a removal of 80% of total suspended solids.

Oil-Grit Separator

An EFO8 Stormcepter, or approved oil-grit separator equivalent, shall be provided after the outlet of the stormwater management facility to provide the required level of water quality control. The Stormceptor Sizing Report can be found in Appendix C.

Inspection and maintenance are fundamental to the long-term performance of any stormwater quality treatment device. Imbrium Stormwater Systems recommends that a Stormceptor be inspected every six months for the first year to determine the pollutant accumulation rate. In subsequent years, inspections can be based on observations or local requirements. The unit should be inspected immediately after an oil, fuel or chemical spill, and a licensed waste management company should remove oil and sediment for proper disposal.

Minimum Orifice Size
A minimum orifice of 75mm is recommended as per the MOE guidelines. For this facility, a 200m orifice is proposed.

Active Storage Depth
The MOE guidelines and Norfolk Design Criteria recommend a maximum active storage depth of 2.0m. The active storage depth ranges between 0.73m +/- during the 2yr event and 1.33m +/- during the 100yr event.

Maintenance Access
Maintenance access to the proposed SWM facility is provided from Street A. As per Norfolk County Design Criteria, a minimum 3.0 wide access route is provided, and the slope of the maintenance access route does not exceed 10:1.

Slopes
The Norfolk Design Criteria and MOE guidelines specify a maximum side slope of 5:1 and 4:1, respectively in a dry pond facility. A side slope of 4:1 shall be utilized in the proposed SWM facility.

Erosion and Sediment Control
During construction, the contractor is required to protect the worksite and all adjacent lands from sediment and erosion regardless of the source, to the satisfaction of all applicable parties. The measures installed by the contractor are to remain in place until such time as there is no further threat of damage and all vegetation is established. Measures that are to be put into place as an absolute minimum include silt fences, mud mats, and filter cloths over catch basins onsite.

Proposed SWM Facility Summary

The following summarizes the proposed SWM Facility for the HFW Hunt Street Residential Development:

- A 0.3m deep infiltration basin at the bottom of the stormwater management pond will be used to reduce the required pond storage and promote infiltration.
- A dry pond facility with a pond bottom elevation of 215.00, and a top of freeboard elevation of 215.70m will provide an active storage volume of 603 m^3 and a total storage volume of 852 m^3.
- An active storage depth of 1.4m with a minimum 0.3m freeboard depth is provided.
- The required storage ranges between 210m^3 to 554m^3 for the 2-year and 100-year storm event, respectively.
- Discharge from the proposed facility is controlled by a 200mm diameter orifice at an elevation of 215.00m and a 0.3m wide weir at an elevation of 215.80m.
- During events greater than the 100-year storm, runoff from the site will overtop the stormwater management facility, and flow overland to Patterson Creek.
- An EFO8 Stormcepter unit, or approved equal, shall be utilized to achieve an enhanced level of water quality protection.

Water Balance

As requested in the zoning amendment comments from Norfolk County, G. Douglas Vallee Ltd. has completed a water balance investigation for the pre-development and post-development site. A water balance is used to describe the hydrological cycle and provides an accounting of water across the system's boundaries over a specified time period. A continuous Visual OTTHYMO simulation was used to model the pre-development and post-development water balance for the subject site over a six-year period. Historical climate data for Simcoe, Ontario for the years 1981-1986 was obtained from the Government of Canada. This data includes daily precipitation (rainfall and/or snowfall) and daily minimum and maximum temperatures. In addition, Table 7 presents the average monthly evapotranspiration for Buffalo, New York, utilized in the OTTHYMO model.

Table 7
Average Monthly Evapotranspiration

Month	(mm)
January	6.1
February	10.2
March	25.1
April	48.8
May	82.8
June	95.0
July	102.9
August	87.1
September	56.6
October	30.0
November	11.9
December	6.1

To offset the differences between inflows and outflows of the pre to post-development systems, the infiltration basin at the bottom of the proposed stormwater management pond will provide additional post-development infiltration. Table 8 presents the total average annual volume of precipitation (rainfall and/or snowfall), evapotranspiration, infiltration and runoff from the pre-development and post-development catchment areas found using Visual OTTHYMO.

Table 8
Average Annual Water Balance Volumes

Hydrologic Cycle Component	Pre-Dev (m^3)	Post-Dev (m^3)	Δ Volume (m^3)	% Change in Volume (m^3)
Precipitation	29073	29075	0	0%
Evapotranspiration	7485	4911	-2774	-37%
Infiltration	12080	13382	1301	11%
Runoff	11589	12139	500	5%

As described above, as a result of the proposed infiltration basin, there is an 11% increase in infiltration from the pre-development to post-development condition.

Conclusions and Recommendations

Based on the review presented by this Stormwater Management Report, it is concluded that:

- Post-development flows from the development site have been controlled to less than pre-development levels for all storm events up to and including the 100-year storm event.
- The proposed SWM design meets the design guidelines outlined by the MOE's *Stormwater Management Practices Planning and Design Manual* (March 2003) for enhanced water quality protection.

It is recommended that this report be provided to Norfolk County and the Long Point Region Conservation Authority in support of the application for site plan approval of the proposed development.

We trust that this information is complete and sufficient for submission. Should you have any questions or require further information please do not hesitate to contact us.

Respectfully submitted,

Natalie Ongena, P.Eng
G. DOUGLAS VALLEE LIMITED
Consulting Engineers, Architects and Planners

\\vallee-nas1\data\Projects\2022\22-013 HFW Holdings Hunt St Residential\Design\Civil\SWM Report\22013 SWM Report.docx

List of Appendices

Appendix A
– LPRCA Flood Plain Elevations
– Soil & Pre-Development Parameters
– Post-Development Parameters
– Rating Curves
– Pre to post Flows & Utilized Storage
– Water Balance

Appendix B
– Soil Parameters
– Preliminary Geotechnical Investigation *(GeoPro Consulting Limited dated October 20, 2022)*
– Preliminary Hydrogeological Assessment *(GeoPro Consulting Limited dated February 1, 2024)*

Appendix C
– Stormceptor Sizing Report

Appendix D
– Visual OTTHYMO Outputs

Appendix E
– DWG PRE – Pre-Development Drainage Areas
– DWG POST – Post-Development Drainage Areas

APPENDIX A

LPRCA Flood Plain Elevations
Soil & Pre-Development Parameters
Post-Development Parameters
Rating Curves
Pre to post Flows & Utilized Storage
Water Balance

vallee
Consulting Engineers, Architects & Planners

Subject: LPRCA Flood Plain Elevations
Date: Feb-24 By: NLO
Project #: 22013 Page 1

FLOOD PLAIN ELEVATIONS

Flood Hazard Map Lynn River Black Creek Sheet 19 of 23
Cross Section Number: 910.98

Design Storm	LPRCA Flood Elevation (m)
	CGVD-2013
2	213.39
5	213.93
10	214.14
25	214.48
50	214.72
100	215.21

SOIL PARAMETERS

Soil Parameters	PRE-DEV	POST-DEV
Soil Type	Sandy Textures over Silt Loam (Woodlot & Grass/Improved Land)	Sandy Textures over Silt Loam (Grass/Improved Land)
Soil Group	AB	AB
CN (-)	62	70
Initial Abstraction (mm)	13.6	9.0

INFILTRATION PARAMETERS

Hydrualic Conductivity	2.50E-03	cm/sec
Infiltration Rate (i)	100	mm/hr
Safety Factor	2.5	
Design Infiltration Rate	40	mm/hr
Design Infiltration Rate	0.040	m/hr
Void Ratio (Vr)	0.4	
Drainage Time (ts)	48	hr
Max allowable stone depth (drmax)	4.80	m

**Hydraulic Conductivity obtained from Preliminary Hydrogeological Assessment by GeoPro Consulting Limited (December 14, 2022)*

PRE-DEVELOPMENT AREA PARAMETERS:

Area Description	Runoff Coeff.	Area (ha)	
		PRE	EXTERNAL
Grass Area	0.25	1.26	0.27
Gravel	0.70	0.91	0.00
Asphalt/Concrete	0.95	0.22	0.07
Roofs	0.95	0.17	0.01

$$C = 0.9\ (\%\ imperv) + 0.25\ (1 - \%\ Imperv)$$

$$\%\ Imperv = \frac{C - 0.25}{0.65} \times 100$$

Drainage Area	Total Area (ha)	Composite Runoff Coeff.	TIMP (%)	XIMP (%)
PRE	2.55	0.52	41%	27%
PRE EXTERNAL	0.34	0.40	23%	19%
TOTAL	2.89	0.50	39%	

TOTAL PRE-DEVELOPMENT FLOW RATES

Design Storm	Q (m3/s)
2	0.146
5	0.200
10	0.241
25	0.302
50	0.351
100	0.399

vallee
Consulting Engineers, Architects & Planners

Subject:	Post-Development Parameters		
Date:	Feb-24	By:	NLO
Project #:	22013	Page	3

POST-DEVELOPMENT AREA PARAMETERS:

Area Description	Impervious Area (ha)
7-Storey Mid Rise	0.27
Units & Structures	0.47
Roads/Parking	0.83
Driveways	0.10
Sidewalks	0.24

Drainage Area	Description	Control?	Total Area (ha)	Impervious Area (ha)	TIMP (%)	Dir. Conn. Imperv. Area (ha)	XIMP (%)
POST1	Mid-Rise Roof	SWM Pond	0.27	0.27	100%	0.27	100%
POST2	Development Site	SWM Pond	2.16	1.53	71%	1.06	49%
POST3	Back of Property	Uncontrolled to Patterson Creek	0.23	0.00	0%	0.00	0%
POST EXTERNAL	Frontage on Queensway & Hunt	Uncontrolled to Queensway & Hunt	0.23	0.11	48%	0.08	35%
		Total Site	2.89	1.91	66%	1.41	49%

FLOOD PLAIN ELEVATIONS

Flood Hazard Map Lynn River Black Creek Sheet 19 of 23
Cross Section Number: 910.98

Design Storm	LPRCA Flood Elevation (m)	Adjusted Flood Elevation (m)
	CGVD-2013	CGVD-1978
2	213.39	213.83
5	213.93	214.37
10	214.14	214.58
25	214.48	214.92
50	214.72	215.16
100	215.21	215.65

POND PARAMETERS

Bottom of Pond	215.00	m
Active Storage Depth	1.3	m
Top of Active Storage	216.30	m
Top of Freeboard	216.60	m
Bottom of Stone	214.70	m
Stone Depth	0.30	m
Bottom Area of Pond	142.0	m2

ORIFICE PARAMETERS

Orifice	Diameter	0.200	m
	Area	0.0314	m2
	Inv. Elev.	215.00	m
	CL Elev.	215.10	m
Weir	Length	0.300	m
	Elev.	215.80	m

$$Q = CA\sqrt{2gh}$$

C = 0.63

$$Q = CLH^{1.5}$$

C =1.67

STAGE-STORAGE-DSICHARGE (2, 5,10 & 25-Year Events)

Description	Elevation (m)	Stage (m)	Volume (m3)	Volume (ha.m)	2, 5, 10 and 25-Year Q (m3/s)		
					Orifice	Weir	Total
Bottom of Pond/Orifice	215.00	0.00	0	0.000	0.000	0.000	0.000
	215.10	0.10	16	0.002	0.000	0.000	0.000
	215.20	0.20	36	0.004	0.028	0.000	0.028
	215.30	0.30	60	0.006	0.039	0.000	0.039
	215.40	0.40	87	0.009	0.048	0.000	0.048
	215.50	0.50	119	0.012	0.055	0.000	0.055
	215.60	0.60	155	0.016	0.062	0.000	0.062
	215.70	0.70	195	0.020	0.068	0.000	0.068
Weir	215.80	0.80	240	0.024	0.073	0.000	0.073
	215.90	0.90	289	0.029	0.078	0.050	0.129
	216.00	1.00	342	0.034	0.083	0.100	0.183
	216.10	1.10	400	0.040	0.088	0.150	0.238
	216.20	1.20	463	0.046	0.092	0.200	0.292
	216.30	1.30	531	0.053	0.096	0.251	0.347
Top of Active Storage	216.40	1.40	603	0.060	0.100	0.301	0.401
	216.50	1.50	681	0.068	0.104	0.351	0.454
	216.60	1.60	764	0.076	0.107	0.401	0.508
Top of Freeboard	216.70	1.70	852	0.085	0.111	0.451	0.562

**Storage volumes obtained from AutoCAD Civil 3D*

STAGE-STORAGE-DSICHARGE (50 & 100-Year Events)

NOTE: Discharge does not occur until the ponding level exceeds the flood plain elevation.

Description	Elevation (m)	Stage (m)	50-Year Q (m3/s)			100-Year Q (m3/s)		
			Orifice	Weir	Total	Orifice	Weir	Total
Bottom of Pond/Orifice	215.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000
	215.10	0.10	0.000	0.000	0.000	0.000	0.000	0.000
	215.20	0.20	0.018	0.000	0.018	0.000	0.000	0.000
	215.30	0.30	0.033	0.000	0.033	0.000	0.000	0.000
	215.40	0.40	0.043	0.000	0.043	0.000	0.000	0.000
	215.50	0.50	0.051	0.000	0.051	0.000	0.000	0.000
	215.60	0.60	0.058	0.000	0.058	0.000	0.000	0.000
	215.70	0.70	0.064	0.000	0.064	0.020	0.000	0.020
Weir	215.80	0.80	0.070	0.000	0.070	0.034	0.000	0.034
	215.90	0.90	0.075	0.050	0.126	0.044	0.050	0.094
	216.00	1.00	0.080	0.100	0.181	0.052	0.100	0.152
	216.10	1.10	0.085	0.150	0.235	0.059	0.150	0.209
	216.20	1.20	0.089	0.200	0.290	0.065	0.200	0.265
	216.30	1.30	0.094	0.251	0.344	0.071	0.251	0.321
Top of Active Storage	216.40	1.40	0.098	0.301	0.398	0.076	0.301	0.377
	216.50	1.50	0.101	0.351	0.452	0.081	0.351	0.432
	216.60	1.60	0.105	0.401	0.506	0.085	0.401	0.486
Top of Freeboard	216.70	1.70	0.109	0.451	0.560	0.090	0.451	0.541

PRE TO POST FLOWS

Return Period	Q (m3/s)				Check
	Pre	From Pond	Total Post	Net	
2	0.146	0.070	0.076	-0.070	✓
5	0.200	0.130	0.143	-0.057	✓
10	0.241	0.177	0.195	-0.046	✓
25	0.302	0.236	0.261	-0.041	✓
50	0.351	0.281	0.312	-0.039	✓
100	0.399	0.339	0.378	-0.021	✓

STAGE-STORAGE-DISCHARGE

Description	Elevation (m)	Stage Depth (m)	Volume (m^3)	Total Q (m3/s) From Pond		
				2-25 YR	50 YR	10 YR
Bottom of Pond/Orifice	215.00	0.00	0	0.000	0.000	0.000
	215.10	0.10	16	0.000	0.000	0.000
	215.20	0.20	36	0.028	0.018	0.000
	215.30	0.30	60	0.039	0.033	0.000
	215.40	0.40	87	0.048	0.043	0.000
	215.50	0.50	119	0.055	0.051	0.000
	215.60	0.60	155	0.062	0.058	0.000
	215.70	0.70	195	0.068	0.064	0.020
Weir	215.80	0.80	240	0.073	0.070	0.034
	215.90	0.90	289	0.129	0.126	0.094
	216.00	1.00	342	0.183	0.181	0.152
	216.10	1.10	400	0.238	0.235	0.209
	216.20	1.20	463	0.292	0.290	0.265
	216.30	1.30	531	0.347	0.344	0.321
Top of Active Storage	216.40	1.40	603	0.401	0.398	0.377
	216.50	1.50	681	0.454	0.452	0.432
	216.60	1.60	764	0.508	0.506	0.486
Top of Freeboard	216.70	1.70	852	0.562	0.560	0.541

*Storage volumes obtained from AutoCAD Civil 3D

APPROXIMATE STORAGE & PONDING DEPTHS

Return Period	Q (m^3/s) From Pond	Storage (m)	Depth (m)	Elev. (m)
2	0.070	210	0.73	215.73
5	0.130	291	0.90	215.90
10	0.177	336	0.99	215.99
25	0.236	398	1.10	216.10
50	0.281	452	1.18	216.18
100	0.339	554	1.33	216.33

Storage volumes obtained from OTTHYMO

Average Annual Pre-Development Water Balance Volumes

	Pre-Development		
	Area (ha.)	Vol. (mm)	Vol. (m3)
Precipatation	2.89	1006	29073
Evapotranspiration		259	7485
Infiltration		418	12080
Runoff		401	11589

Average Annual Post-Development Water Balance Volume

	Post-Development		
	Area (ha.)	Vol. (mm)	Vol. (m3)
Precipatation	2.89	1006	29075
Evapotranspiration		163	4711
Infiltration		463	13382
Runoff		420	12139

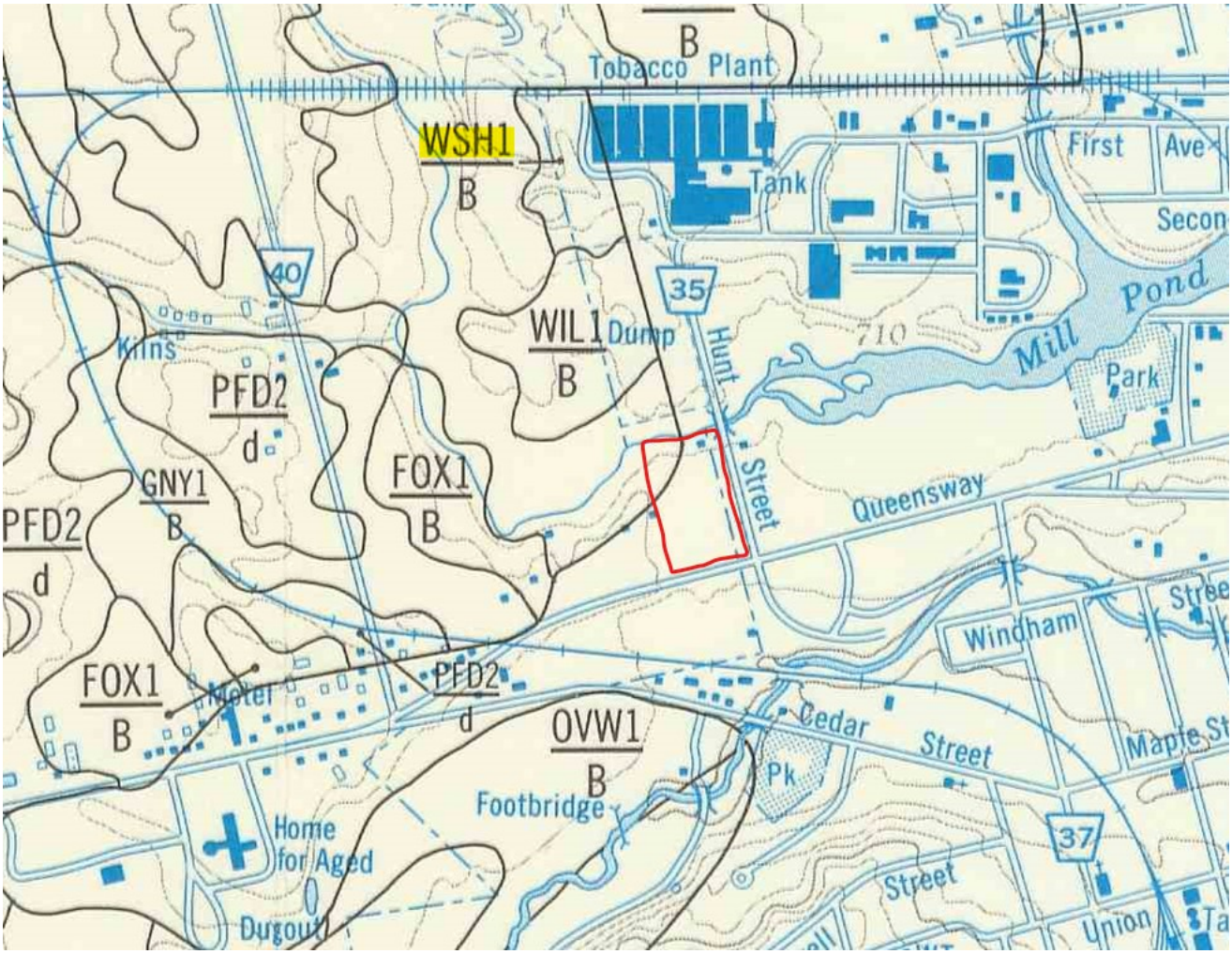
Pre to Post Change in Volume

	Δ Volume	
	(m3)	% Change
Precipatation	2	0%
Evapotranspiration	-2774	-37%
Infiltration	1301	11%
Runoff	550	5%

APPENDIX B

Soil Parameters
Preliminary Geotechnical Investigation
(GeoPro Consulting Limited dated October 20, 2022)
Preliminary Hydrogeological Assessment
(GeoPro Consulting Limited dated February 1, 2024)

22-013 Soil Mapping



WSH - Walsher				
WSH 1	WSH	None	40-100 cm sandy textures over lacustrine silt loam	Well

CHART C2-2 - HYDROLOGIC SOIL GROUPS FOR GENERAL SOIL TYPES

Sands, sandy loams, and gravels	
- overlying sand, gravel or limestone bedrock, very well drained	A
- ditto, imperfectly drained	AB
- Shallow, overlying precambrian bedrock or clay subsoil	B
Coarse loams	
- overlying sand, gravel or limestone, well drained	AB
- shallow, overlying precambrian bedrock or clay subsoil	B
Medium textured loams	
- shallow, overlying limestone bedrock	B
- overlying medium textured subsoil	BC
Silt loams, some loams	
- with good internal drainage	BC
- with slow internal drainage and good external drainage	C
Clays, clay loams, silty clay loams	
- with good internal drainage	C
- with imperfect or poor external drainage	C
- with slow internal drainage and good external drainage	D

Note: Soils are classified on the basis of bare soil having maximum swelling at the end of a long storm whose rainfall exceeds infiltration into soil. Classifications shown are subject to modification as experience dictates.

Classifications are based on S.C.S. definitions (9) modified to suit Ontario conditions.

CHART C2-8 - SOIL/LAND USE CURVE NUMBERS

Land Use	Hydrologic Soil Group						
	A	AB	B	BC	C	CD	D
Fallow (special cases only)	77	82	86	89	91	93	94
Crop and other improved land	66*	70	74	78	82	84	86
Pasture & other unimproved land	58*	62*	65	71	76	79	81
Woodlots and forest	50*	54*	58	65	71	74	77
Impervious areas (paved)		98					
Bare rock draining directly to stream		98					
Bare rock draining indirectly to stream		70					
Water surfaces		100	(use in special cases only)				

Notes

1. Figures are based on average antecedent moisture condition (AMC II) except those marked *, which are initially wet (AMC III) or an intermediate condition. For definition of AMC's see Chart C2-10.
2. Table is not applicable to frozen soils or to periods in which snowmelt contributes to runoff.
3. For detailed values in urban areas see Table 2.2 of ref. 14.
4. Source: SCS Handbook of Hydrology, Chapter 9 (9), with modifications.

CHART C2-9 - PERCENT IMPERVIOUSNESS OF URBAN AREAS

Urban Land Use	% Imperviousness
Business - Commercial	40 - 90
Industrial - Light	45 - 65
Industrial - Heavy	50 - 70
Residential - Low density	20 - 30
Residential - Medium density	25 - 35
Residential - High density	30 - 40

Source: SCS Handbook of Hydrology, Chapter 15 (9)

GeoPro Consulting Limited

Geotechnical-Hydrogeology-Environmental-Materials-Inspection

Preliminary Geotechnical Investigation

Proposed Residential Development

395-411 Queensway West, Simcoe, Ontario

Prepared For:

T. Harris Environmental Management

GeoPro Project No.: 22-4078GH

Report Date: October 20, 2022

GeoPro Consulting Limited (905) 237-8336 office@geoproconsulting.ca

Units 57, 40 Vogell Road, Richmond Hill, Ontario L4B 3N6

GeoPro CONSULTING LIMITED

Table of Contents

1. INTRODUCTION

GeoPro Consulting Limited (GeoPro) was retained by T. Harris Environmental Management (the Client) to conduct a preliminary geotechnical investigation to support the preliminary design and planning of the proposed residential development consisting of 3-storey townhouses with one level of basement and an 8-storey commercial/residential building with one level of underground parking located at 395 - 411 Queensway West, Simcoe, Ontario.

The purpose of this preliminary geotechnical investigation was to obtain preliminary information on the existing subsurface conditions by means of a limited number of boreholes, in-situ tests and laboratory tests of soil samples to provide required preliminary geotechnical design information. Based on GeoPro's interpretation of the data obtained, preliminary geotechnical comments and recommendations related to the general planning and project concept design purposes are provided.

The report is prepared with the condition that the planning and preliminary designs will be in accordance with all applicable standards and codes, regulations of authorities having jurisdiction, and good engineering practice. Further, the preliminary recommendations and opinions in this report are applicable only to the proposed project as described above. On-going liaison and communication with GeoPro prior to and during the planning and preliminary design stage of the project is strongly recommended to confirm that the preliminary recommendations in this report are applicable and/or correctly interpreted and implemented. Also, any queries concerning the geotechnical aspects of the proposed project shall be directed to GeoPro for further elaboration and/or clarification.

This report is provided on the basis of the terms of reference presented in our approved proposal prepared based on our understanding of the project. If there are any changes in the preliminary design and planning features relevant to the geotechnical analyses, or if any questions arise concerning the geotechnical aspects of the codes and standards, this office should be contacted to review the design. It may then be necessary to carry out additional borings and reporting before the preliminary recommendations of this report can be relied upon.

This report deals with geotechnical issues only. The geo-environmental (chemical) aspects of the subsurface conditions, including the consequences of possible surface and/or subsurface contamination resulting from previous activities or uses of the site and/or resulting from the introduction onto the site of materials from off-site sources, were not investigated and were beyond the scope of this assignment.

The site investigation and recommendations follow generally accepted practice for geotechnical and geo-environmental consultants in Ontario. Laboratory testing follows ASTM or CSA Standards or modifications of these standards that have become standard practice in Ontario.

This report has been prepared for the Client only. Third party use of this report without GeoPro's consent is prohibited. The limitations to the report presented in this report form an integral part of the report and they must be considered in conjunction with this report.

2. INVESTIGATION PROCEDURE

The field work for the preliminary geotechnical investigation was carried out on August 31 and September 1, 2022, during which time four (4) boreholes (Boreholes BH1, BH2, BH3 and BH5) were advanced at the locations shown on the Borehole Location Plan, Drawing 1. The boreholes were drilled to depths ranging from about 6.6 m to 9.6 m below the existing ground surface.

The requested borehole locations were provided by the Client. The boreholes were located and staked in the field by the Client; the borehole locations in the field were adjusted according to the drill rig accessibility and the underground utility conditions. The field work for this investigation was monitored by the Client and a member of our engineering staff who logged the boreholes and cared for the recovered samples.

The boreholes were advanced using a continuous flight auger drilling equipment supplied by a drilling specialist subcontracted to the Client. Samples were retrieved with a 51 mm (2 inches) O.D. split-barrel (split spoon) sampler driven with a hammer weighing 624 N and dropping 760 mm (30 inches) in accordance with the Standard Penetration Test (SPT) method.

Groundwater condition observations were made in the boreholes during drilling and upon completion of drilling. A monitoring well (51 mm in diameter) was installed in Boreholes BH1 and BH3 to measure the groundwater table as well as to facilitate the in-situ hydrogeological testing. The remaining borehole(s) were backfilled and sealed upon completion of drilling.

All soil samples obtained during this investigation were brought to our laboratory for further examination. These soil samples will be stored for a period of three (3) months after the day of issuing draft report, after which time they will be discarded unless we are advised otherwise in writing. Geotechnical classification testing (including water content, grain size distribution and Atterberg Limits, when applicable) was carried out on selected soil samples. The laboratory test results are provided in attached Figures.

The ground surface elevations at the as drilled borehole locations were not available at the time of preparing this report. Therefore, the stratigraphy at each borehole location has been referenced to the current grade level. Contractors performing the work should confirm the elevations prior to construction. The borehole locations plotted on Borehole Location Plan were based on the measurements of the site features and should be considered to be approximate.

3. SUBSURFACE CONDITIONS

Notes on sample descriptions are presented in Enclosure 1A. Explanation of terms used in the borehole logs is presented in Enclosure 1B. The subsurface conditions in the boreholes are

presented in the individual borehole logs. Detailed descriptions of the major soil strata encountered in the boreholes advanced at the site are provided as follows.

3.1 Soil Conditions

Topsoil

Topsoil with a thickness of about 150 mm was encountered surficially in Borehole BH3. In general, the topsoil consists of high contents of organics with trace to some rootlets. It should be noted that the thickness of the topsoil explored at the borehole locations may not be representative for the site and should not be relied on to calculate the amount of topsoil at the site.

Portland Cement Concrete

Portland cement concrete with a thickness of about 340 mm was encountered surficially in Borehole BH5.

Granular Fill

Granular fill with thicknesses ranging from about 220 mm to 250 mm were encountered surficially in Boreholes BH1 and BH2. Due to the generally silty/sandy nature of the subgrade soils, the exact depth of granular fill was difficult to distinguish.

Fill Materials

Fill materials consisting of silt, sandy silt, silty sand, sand, and gravelly sand were encountered below the topsoil, Portland cement concrete or granular fill in all boreholes, and extended to depths ranging from about 1.0 m to 4.0 m below the existing ground surface. SPT N values ranging from 2 to 23 blows per 300 mm penetration indicated a very loose to compact compactness. The in-situ moisture content measured in the soil samples ranged from approximately 2% to 33%.

Upper Silt

Upper silt deposit was encountered below the fill materials in Boreholes BH3 and BH5, and extended to depths ranging from about 2.9 m to 5.6 m below the existing ground surface. SPT N values ranging from 1 to 11 blows per 300 mm penetration indicated a very loose to compact compactness. The natural moisture content measured in the soil samples ranged from approximately 23% to 32%.

Lower Silt

Lower silt deposit was encountered below the sand deposit in Borehole BH1, and extended to a depth of about 9.6 m below the existing ground surface. Borehole BH1 was terminated in this deposit. An SPT N value of 6 blows per 300 mm penetration indicated a loose compactness. The natural moisture content measured in the soil sample was approximately 22%.

Fine To Medium Sand

Fine to medium sand deposit was encountered below the upper silt deposit and/or fill materials in Boreholes BH1 and BH3, and extended to a depth of about 4.0 m below the existing ground surface. SPT N values ranging from 23 to 29 blows per 300 mm penetration indicated a compact compactness. The natural moisture content measured in the soil samples ranged from approximately 4% to 16%.

Sand

Sand deposit was encountered below the upper silt, fine to medium sand deposits and/or fill materials in all boreholes, and extended to depths ranging from about 6.6 m to 8.6 m below the existing ground surface. Boreholes BH2, BH3 and BH5 were terminated in these deposits. SPT N values ranging from 9 to 23 blows per 300 mm penetration indicated a loose to compact compactness. The natural moisture content measured in the soil samples ranged from approximately 13% to 22%.

3.2 Groundwater Conditions

Groundwater condition observations made in the boreholes during and immediately upon completion of drilling are shown in the borehole logs and are also summarized in the following table.

Borehole No.	BH Depth (m)	Depth of Water Encountered during Drilling (mBGS)	Water Level upon Completion of Drilling (mBGS)	Cave-in Depth upon Completion of Drilling (mBGS)
BH1	9.6	4.6	4.7	5.5
BH2	6.6	4.6	4.4	4.6
BH3	6.6	0.7	4.8	5.2
BH5	8.1	1.5	4.6	4.6

Note: mBGS = meters below ground surface

The monitoring well construction details and measured groundwater level are shown in the borehole log and also summarized in the following table.

Monitoring ID	Screen Interval (mBGS)	Water Level (mBGS)
		September 14, 2022
BH1	3.1 - 6.1	4.65
BH3	3.1 - 6.1	4.73

Note: mBGS = meters below ground surface

It should be noted that groundwater levels can vary and are subject to seasonal fluctuations in response to weather events.

4. PRELIMINARY GEOTECHNICAL INFORMATION

This report contains the findings of GeoPro's preliminary geotechnical investigation, together with the preliminary geotechnical engineering recommendations and comments. These preliminary recommendations and comments are based on factual information and are intended only for use by the design engineers. The number of boreholes is not sufficient for the detailed design and are not sufficient to determine all the factors that may affect construction methods and costs. Once the actual development plans are available, the information in this report should be reviewed by the geotechnical engineer from GeoPro and an additional detailed geotechnical investigation shall be carried out, compatible with the actual proposed development plans for the site.

Based on the results of this preliminary geotechnical investigation, the native soils encountered at the site are generally considered to be suitable for supporting the proposed development. The following preliminary geotechnical information is provided for the planning and preliminary design of the proposed developments. The preliminary geotechnical recommendations provided in this report are not sufficient for detailed design or construction purposes.

4.1 Preliminary Foundation Consideration

4.1.1 Shallow Spread and/or Continuous Strip Footings

Fill materials were encountered below the topsoil, granular fill or Portland cement concrete in all boreholes, and extended to depths ranging from about 1.0 m to 4.0 m below the existing ground surface. The existing fill materials are considered to be unsuitable for supporting the proposed development and any other settlement sensitive structures. The existing fill materials are also considered to be unsuitable for supporting the engineered fill.

Based on the results of this investigation, the proposed building may be founded on conventional shallow spread and/or continuous strip footings bearing in the native, undisturbed, competent native soil deposits. The soil bearing resistances at Serviceability Limit States (SLS) and a factored bearing resistance at Ultimate Limit States (ULS) together with the corresponding founding depths at the borehole locations are provided in the following table.

Proposed Townhouse (Boreholes BH1 and BH2)

BH No.	Bearing Resistance at SLS (kPa)	Factored Geotechnical Resistance at ULS (kPa)	Minimum Founding Depths (m)	Expected Soil Condition
BH1	100	150	3.2	Compact Fine to Medium Sand

BH No.	Bearing Resistance at SLS (kPa)	Factored Geotechnical Resistance at ULS (kPa)	Minimum Founding Depths (m)	Expected Soil Condition
BH2	100	150	4.5	Compact Sand

Note: the bearing resistances provided in above table are based on the condition that groundwater level will be lowered to at least 1 m below the excavation base prior to and during the construction.

Footings founded on approved engineered fill, if utilized at the site, may be designed using a preliminary allowable bearing pressure of 100 kPa.

Due to the limited number of boreholes and anticipated soil variation, additional boreholes with monitoring wells shall be carried out during the detailed design stage.

Proposed 8-Storey Commercial/Residential Building (Boreholes BH3 and BH5)

BH No.	Bearing Resistance at SLS (kPa)	Factored Geotechnical Resistance at ULS (kPa)	Minimum Founding Depths (m)	Expected Soil Condition
BH3	100	150	2.5	Loose to Compact Silt
BH5	75	112	1.6	Loose to Compact Silt
	100	150	6.0	Compact Sand

Note: the bearing resistances provided in above table are based on the condition that groundwater level will be lowered to at least 1 m below the excavation base prior to and during the construction; should higher bearing resistance be required, consideration may be given to deep foundation system such as continuous flight auger (CFA) piles to support the proposed building. A detailed geotechnical investigation consisting of additional boreholes shall be carried out and the geotechnical recommendations for CFA will be provided in the detailed geotechnical report.

Due to the limited number of boreholes and anticipated soil variation, additional boreholes with monitoring wells shall be carried out during the detailed design stage.

4.1.2 General Foundation Design Consideration

All exterior footings and footings in unheated areas should be protected with a minimum of 1.2 m of earth cover for frost protection.

Where it is necessary to place foundations at different levels, the upper foundation must be founded below an imaginary 7 vertical to 10 horizontal (7V:10H) line drawn up from the base of the lower foundation. The lower footing must be installed first to help minimize the risk of undermining the upper footing.

All foundation bases must be inspected by GeoPro to confirm design bearing values prior to pouring concrete.

Due to the great variation of soil conditions encountered in the boreholes carried out, a sufficient number of boreholes shall be considered in the detailed geotechnical investigation.

The anticipated founding soils to be exposed at the founding/subgrade level are susceptible to disturbance from construction traffic and ponded water, leading to degradation of the founding soils. To limit this detrimental condition, a working mat consisting of at least 100 mm lean concrete (i.e. 15 MPa) should be placed on the subgrade as soon as possible after the base of excavation has been inspected and approved by the geotechnical engineer from GeoPro, unless the foundation concrete is to be placed immediately after inspection.

In the event of construction during freezing temperatures, the foundation stratum should be protected from freezing by the use of loose straw, tarpaulins, propane heaters or other suitable means. In this regard, the base of the excavation should be insulated from sub-zero temperatures immediately upon exposure and until such time the footings are protected with sufficient soil cover to prevent freezing at the foundation level.

It should be noted that the recommended foundation type, founding depths, and bearing resistances were based on the borehole information only. The geotechnical recommendations and comments are necessarily on-going as new information of the underground conditions becomes available. For example, more specific information is available with respect to the subsurface conditions between and beyond the boreholes when foundation construction is underway. The interpretation between and beyond the boreholes and the recommendations of this report **must** therefore be checked through field inspections provided by a qualified geotechnical engineer from GeoPro to validate the information for use during the construction stage. Due to the anticipated variation of the subsurface conditions at this specific site, the geotechnical engineer who carried out the geotechnical investigation shall be retained during the construction stage to avoid the potential misinterpretation of the soil information presented in the report.

4.2 Uplift Consideration

Raft and Bath Tubbing

Should a water tight foundation system (i.e. raft foundation in conjunction with waterproof) be considered, the uplift forces resulting from the hydrostatic pressures for the water tight foundation system must be considered in the structural design due to the relatively high groundwater tables.

Due to the fluctuating nature of the groundwater table, the groundwater level considered for the uplifting resistances can be assumed to be at least 2.0 m above the highest groundwater table at the site in consideration of the storm events, or as an alternative, groundwater level at the ground surface can be assumed for the uplifting resistance analysis by the structural engineer. A sufficient factor of safety should be considered for the design of the uplifting resistance by the structural engineer.

Spread Footings and No Bath Tubbing

It is understood that one level of underground parking and basement are considered for the proposed commercial/residential building and townhouse, respectively. Although the groundwater was measured below the slab elevation, the slab on grade might be subject to an uplift pressure due to the pressure of a hydrostatic head (i.e. after heavy storm). Therefore, as a precaution, providing pressure relief valves/cores in the slab may be considered. Unless waterproofing in conjunction with raft foundation is considered, a layer of granular bedding with a sufficient thickness and a sufficient number of weeping tiles below the floor slabs may alternatively be considered to sufficiently intercept and collect the groundwater, which can be discharged prior to rising to the floor slabs.

A detailed hydrogeological study and long-term groundwater level monitoring should be carried out in the detail design stage to evaluate the potential uplift forces resulting from the hydrostatic pressures from the sandy/silty deposits and establish the stable groundwater table to facilitate the detailed designs.

4.3 Excavation, Backfill and Groundwater Control

- The fill materials and native silty/sandy deposits are extremely easy to be disturbed by construction activities and foot traffic, especially below the prevailing groundwater tables. Positive dewatering consisting of well points or eductors may be required to drawn down the groundwater table to at least 1 m below the excavation base elevation prior to excavation in conjunction with conventional sump pump. A 100 mm thick of concrete skim coat on the founding subgrade immediately after its approval may be required, to prevent its disturbance by construction activities.

- Based on the results of this preliminary geotechnical investigation, perched groundwater may be expected in the fill materials and native silty/sandy soils above the groundwater tables at various depths. Groundwater control during excavation within the fill materials and native silty/sandy soils above the groundwater tables at the site can be handled, as required, by pumping from properly constructed and filtered sumps located within the excavations. However, more significant groundwater seepage should be expected from the fill materials and cohesionless silty/sandy deposits below the prevailing groundwater tables. The groundwater level should be lowered to at least 1 m below the excavation base prior to excavations.

  It should be noted that any construction dewatering or water taking in Ontario is governed by Ontario Regulation 387/04 - Water Taking and Transfer, made under the Ontario Water Resources Act (OWRA), and/or Ontario Regulation 63/16 – Registrations under Part II.2 of the Act – Water Taking, made under Environmental Protection Act. Based on these regulations, water taking of more than 400,000 L/day is subject to a Permit to Take Water (PTTW), while water taking of 50,000 L/day to 400,000 L/day is to be registered through the Environmental Activity and Sector Registry (EASR).

In this regard, further investigation of the native soil types and stabilized groundwater levels should be carried out as part of the follow-up, site specific geotechnical investigation at the site. The need for and the type of groundwater control measures can be reviewed by the engineer as part of the detailed geotechnical and hydrogeological investigations including long-term groundwater level monitoring, which would be required to support the detailed designs of the proposed development.

- It is anticipated that the trench excavations for underground servicing would consist of conventional temporary open cuts with side slopes not steeper than 1.5 horizontal to 1 vertical above the groundwater table. However, some local flattening of side slopes may be required in some areas in looser soil zones or where significant water seepage is encountered. Conventional bedding thicknesses are anticipated for underground services founded within the native competent subsoils at the site. Additional bedding thicknesses may be required for services founded in wet sandy/silty soils, depending upon the excavation depths and success of the contractor's groundwater control measures. It should be noted that cobbles and boulders may be encountered throughout the soils at the site.

- Some of the subsoils above the local water table are generally near their estimated optimum water contents for compaction and may be suitable for reuse as trench backfill, provided they are free of significant amounts of topsoil, organics and other deleterious materials. Some of the cohesionless soils above groundwater levels are generally drier than their estimated laboratory optimum water contents for compaction. These materials will likely require some adjustments in their water content (wetting) prior to placement and compaction. Excavated subsoils from below the local water table (i.e. for deeper excavations, if required) would likely require some drying prior to placement. It should also be noted that due to the existing fine-grained, silty/fine sandy nature of the majority of the existing native soils, some difficulty would be expected in achieving adequate compaction during wet weather.

- Where the backfill against the exterior walls is to support settlement sensitive structures, such as concrete slabs, pavements or walkways, it should be uniformly compacted to at least 98% of SPMDD.

- Complete removal of the existing septic systems, wells, old foundations and underground utility pipes, etc. would likely to be required as part of the site redevelopment.

- Should the structure footprint be extending to the property lines, it is anticipated that the proposed excavations will be supported by a temporary shoring system consisting of timber lagging/soldier piles and/or continuous caisson walls and tie back anchors. Unsupported open cut excavation may be utilized at the areas where the sufficient space is available.

The shoring system must be designed in accordance with the 4th Edition of the Canadian Foundation Engineering Manual.

The soldier piles should be installed in pre-augered holes filled with concrete below the excavation level. The concrete strength must be specified by the shoring designer. Temporary liners may be required in order to help prevent the silty/sandy/gravelly soils from caving-in during installation.

In order to install the shoring system, dewatering might be required in the areas where sandy/silty soils are encountered.

Soil anchors should be required to support the shoring. Casing may be required during the construction of the tiebacks to prevent caving of soils. The anchors must be of a length that meets the recommendation of the 4th Edition of Canadian Foundation Engineering Manual.

Movement of the shoring system is inevitable. Vertical movements will result from the vertical load on the soldier piles resulting from the inclined tiebacks and inward horizontal movement results from earth and water pressures. The magnitude of this movement can be controlled by sound construction practices, and it is anticipated that the horizontal movement will be in the range of 0.1 to 0.25%H.

To ensure that movements of the shoring are within an acceptable range, monitoring must be carried out. Vertical and horizontal targets on the soldier piles must be located and surveyed before excavation begins. Weekly readings during excavation should show that the movements will be within those predicted; if not, the monitoring results will enable directions to be given to improve the shoring.

4.4 Grading and Engineered Fills

- Depending upon the final site grading scheme and proposed final grade elevations, the areas may need to be brought up to the underside of the footings, as required, using engineered fill. The materials proposed for use as engineered fill should be approved by qualified geotechnical personnel from GeoPro at the source, prior to hauling to the site. Portion of the native soils at the site may be suitable for reuse as engineered fill subject to the environmental quality of the soils. Difficulties may be expected for using the native soils for engineered fill due to the fine grained silty/fine sandy soils. Imported materials meeting the requirements of OPSS Select Subgrade Material (SSM) would also be suitable for use as engineered fill, which may be required. Details regarding placement and compaction requirements for engineered fill, if utilized at the site, can be provided once the actual development plans are available, as part of the detailed geotechnical recommendations for the project.

4.5 Floor Slabs and Drainage System

Proposed Townhouse

- The type of foundation drainage system required (perimeter drains and/or under slab drains; damp-proofing or water-proofing) depends upon the proposed founding elevations, soil types in the area and actual stabilized groundwater levels. Based on the results of this preliminary investigation, it is anticipated that conventional foundation drainage (i.e. perimeter drains and damp-proofing) would be adequate for basement above the groundwater tables. Basements founded in sandy/silty soils below the groundwater level (if any) may require water-proofing and/or under slab drains. In any event, the type of foundation drainage should be confirmed by the geotechnical engineer once the site grading plans are available, as part of final design process. The drainage tiles consisting of 100 mm diameter perforated pipes with filter fabric, should discharge into a positive frost-free outlet, as shown on illustrative concepts of the Drainage and Backfill Recommendations, schematic Drawing 2 or, alternatively, the drainage tiles can be connected to sump wells/pits.

Proposed 8-Storey Commercial/Residential Building

- The floor slab may be supported on grade provided all fill materials, very loose native soils and surficially softened native soils are removed and the base thoroughly proof rolled. The fill required to raise the grade can consist of inorganic soil, placed in shallow lifts not exceeding 200 mm and compacted to 98 % of Standard Proctor Maximum Dry Density (SPMDD).

  It should be noted that for the underground parking level floor slabs within the silty/sandy deposits below the prevailing groundwater tables, a permanent under-slab drainage system shall be considered.

  A moisture barrier consisting of at least 200 mm of 19 mm clear crushed stone should be installed under the floor slab. However, for the floor slabs in the sandy/silty soils, a thicker drainage layer may be required. The thickness of the drainage layer will have to be determined by a hydrogeological study.

  Where the exposed subgrade is cohesionless soil consisting of silt, sand or a mixture of the two, the subgrade and all openings should be covered or wrapped with filter fabric. Typically, a Class II non-woven geotextile with a filtration opening size (F.O.S.) of 50 to 100 µm can be used.

  Special care should be taken to ensure compaction around columns and adjacent to foundation walls. The floor slabs should be structurally separated from the foundation walls and columns. Sawcut control joints should be provided at regular intervals and

along column lines to minimize shrinkage cracking and to allow for differential settlement of the floor slabs.

For floor slabs above the prevailing groundwater tables, the placement of underfloor drainage should also be considered to collect the perched groundwater.

A perimeter drainage system will also be required. The illustrative concepts of the drainage systems are presented on the schematic Drawings 2 to 7.

For floor slabs below the prevailing groundwater tables and depending on the volume of the groundwater seepage into the building drainage system (i.e. exceeding 50,000L/day or not), a raft foundation in conjunction with water proof of the entire building foundation (i.e. bathtub) may be considered unless a permanent Permit To Take Water (PTTW) is allowed at this site.

Where a raft foundation is used, a moisture barrier consisting of a 200 mm thick layer of 19 mm clear crushed stone and subdrains should be installed between the top of the raft and the underside of the floor slab in case minor water seepage may migrate through the water proof system.

4.6 Pavement Designs

- The recommended pavement structures provided in the following table are based upon an estimate of the subgrade soil properties determined from visual examination and textural classification of the soil samples. The values may need to be adjusted based on the city/regional standards. Consequently, the recommended pavement structures should be considered for preliminary design purposes only. A functional design life of eight to ten years has been used to establish the pavement recommendations. This represents the number of years to the first rehabilitation, assuming regular maintenance is carried out. If required, a more refined pavement structure design can be performed based on specific traffic data and design life requirements and will involve specific laboratory tests to determine frost susceptibility and strength characteristics of the subgrade soils, as well as specific data input from the client.

Recommended Pavement Structure Thickness

Pavement Layer	Compaction Requirements	Light Duty Parking (Cars)	Heavy Duty Parking (Delivery Trucks)
Asphaltic Concrete	92.0 to 96.5% Maximum Relative Density (MRD)	40 mm HL 3	40 mm HL 3
		50 mm HL 8	80 mm HL 8
OPSS Granular A Base (or 19 mm Crusher Run Limestone)	100% SPMDD*	150 mm	150 mm

Granular B Type I Subbase	100% SPMDD*	200 mm	300 mm

Pavement Layer	Compaction Requirements	Local Residential Road	Collector Road
Asphaltic Concrete	92.0 to 96.5% Maximum Relative Density (MRD)	40 mm HL 3 (1 lift)	40 mm HL 3 (1 lift)
		60 mm HL 8 (1 lift)	80 mm HL 8 (1 lift)
OPSS Granular A Base (or 19 mm Crusher Run Limestone)	100% SPMDD*	150 mm	150 mm
Granular B Type I Subbase	100% SPMDD*	300 mm	400 mm

* Denotes Standard Proctor Maximum Dry Density, ASTM-D698
The subgrade must be compacted to 98% SPMDD for at least the upper 300 mm unless accepted by GeoPro.

The long term performance of the pavement structure is highly dependent upon the subgrade support conditions. Stringent construction control procedures should be maintained to ensure that uniform subgrade moisture and density conditions are achieved. In addition, the need for adequate drainage cannot be over-emphasized. The finished pavement surface and underlying subgrade should be free of depressions and should be sloped (preferably at a minimum grade of 2%) to provide effective surface drainage toward catch basins. Surface water should not be allowed to pond adjacent to the outside edges of pavement areas. Subdrains should be installed to intercept excess subsurface moisture and prevent subgrade softening. This is particularly important in heavy-duty pavement areas.

Prior to placing the granular subbase material, the exposed soil subgrade should be heavily proof-rolled in conjunction with inspection by qualified geotechnical personnel. Deleterious, organic, softened or loosened native subsoils or any fills will require subexcavation and replacement with approved material (i.e. controlled fill), as directed by geotechnical personnel.

5. CLOSURE

The preliminary geotechnical recommendations provided in this report are not sufficient for final design or construction purposes. Once the actual development plans are available, the information in this report should be reviewed by the geotechnical engineer and an additional detailed geotechnical and hydrogeological investigation compatible with the actual proposed

development plans for the site shall be carried out. In this regard, GeoPro would be pleased to provide further geotechnical and hydrogeological services if site development plans proceed forward.

We appreciate the opportunity to be of service to you and trust that this report provides sufficient preliminary geotechnical engineering information to facilitate the planning and preliminary concept design of this project. We look forward to providing you with continuing service during the detailed design stage. Please do not hesitate to contact our office should you wish to discuss, in further detail, any aspects of this project.

Yours very truly

GEOPRO CONSULTING LIMITED

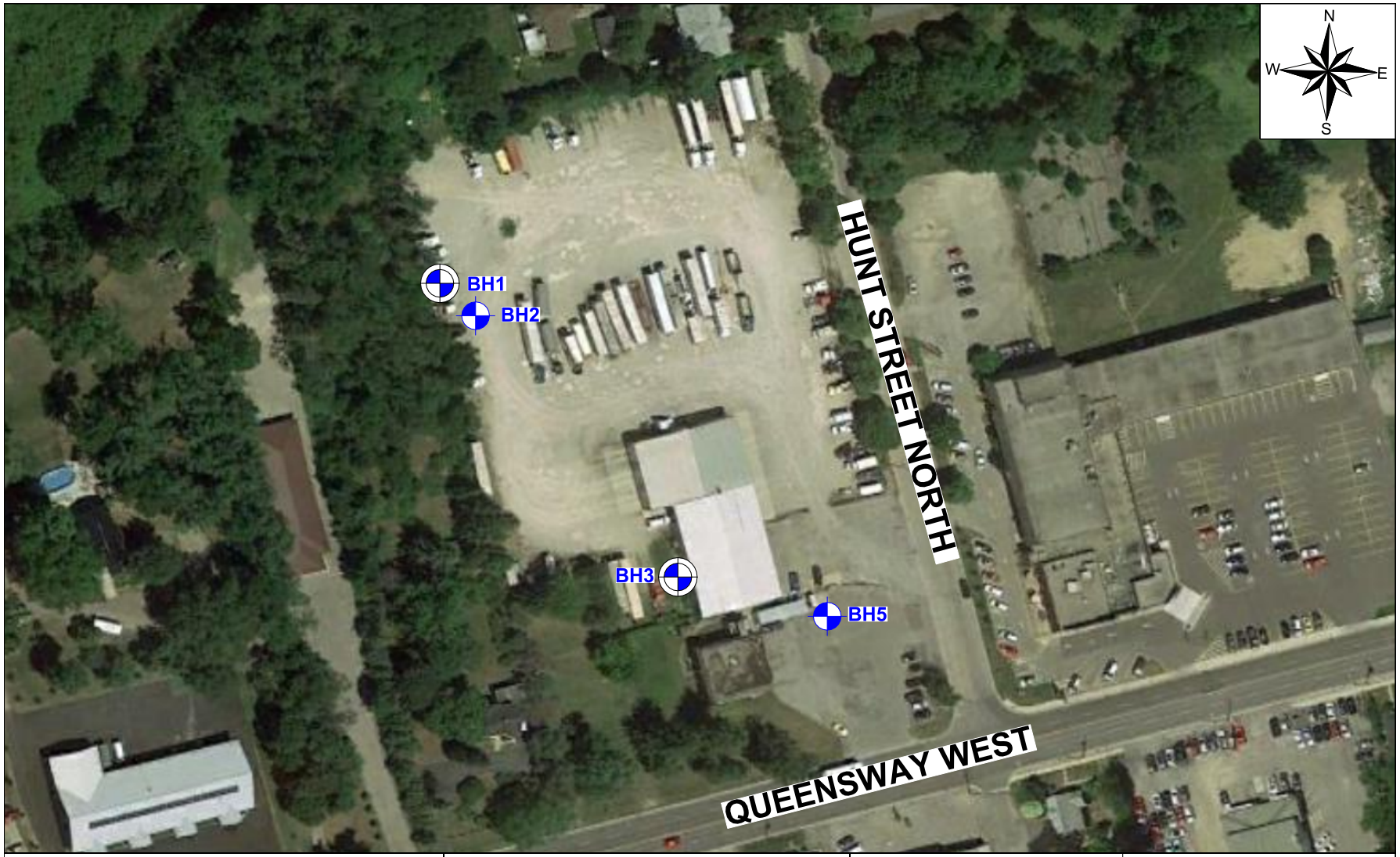
DRAFT

Dylan Q. Xiao, M.A.Sc., P.Eng.
Geotechnical Group

DRAFT

David B. Liu, P.Eng., Principal

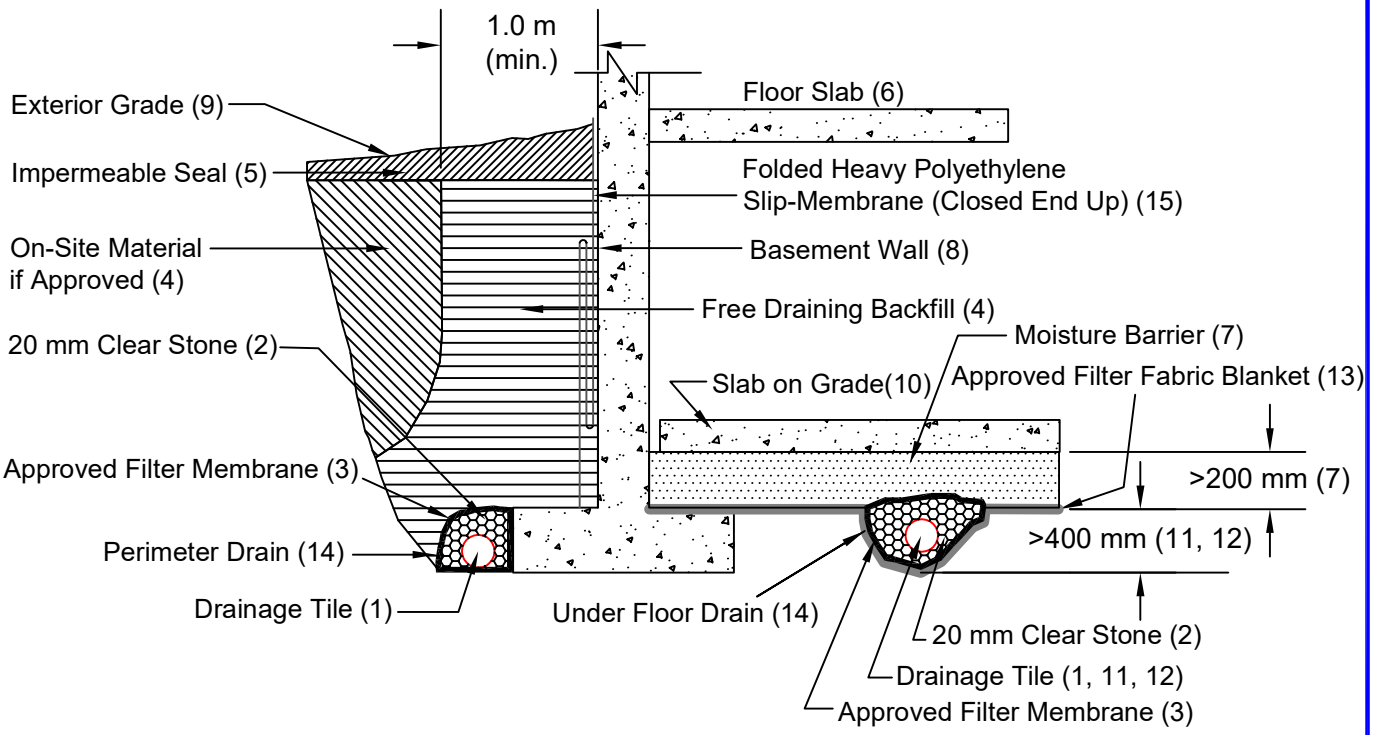
DRAWINGS



Legend:

- Borehole Location
- Monitoring Well

Client: T. Harris Environmental Management		Project No.: 22-4078GH	Drawing No.: 1
Drawn: DL	Approved: DL	Title: Borehole Location Plan	
Date: September 2022	Scale: N.T.S.	Project: Geotechnical Investigation Proposed Development 395-411 Queensway West, Simcoe, Ontario	
Original Size: Letter	Rev: DX	GeoPro Consulting Limited	

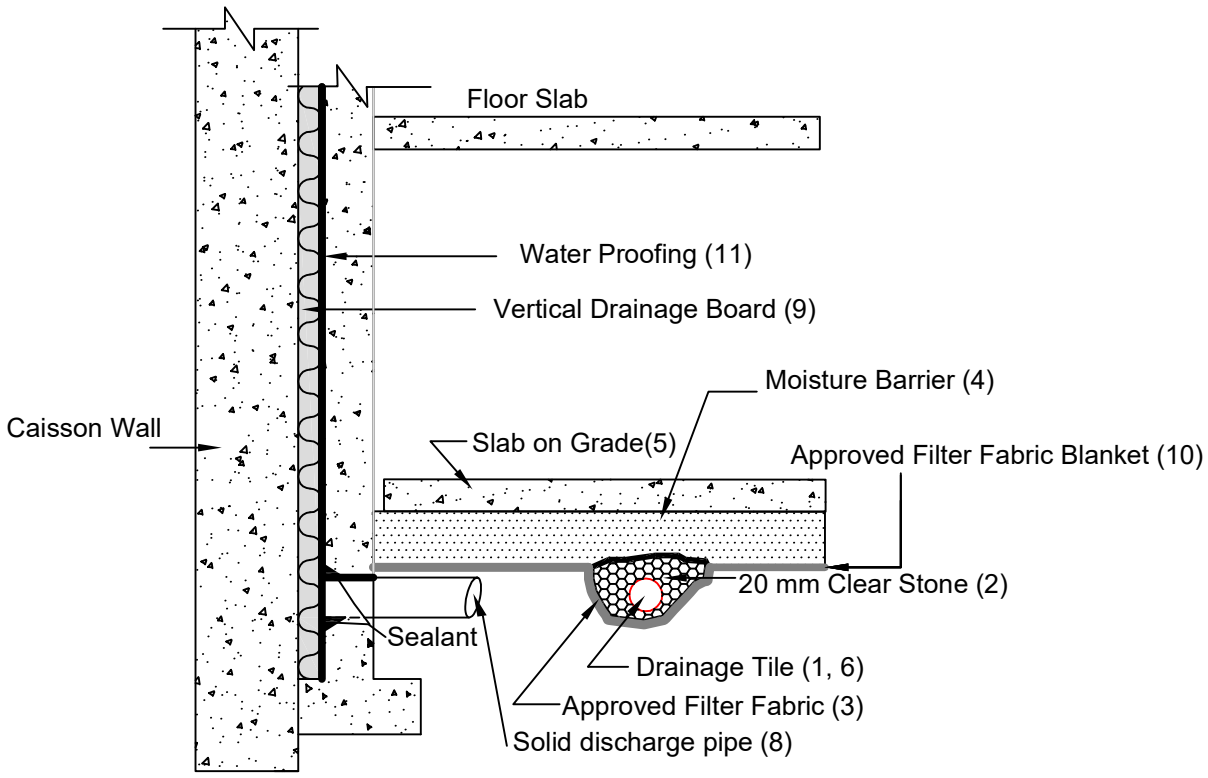


EXTERIOR FOOTING

Notes

1. Drainage tile to consist of 100 mm (4") diameter weeping tile or equivalent perforated pipe leading to a positive sump or outlet.
2. 20 mm (3/4") clear stone - 150 mm (6") top and side of drain. If drain is not on footing, place100 mm (4 inches) of stone below drain .
3. Wrap the clear stone with an approved filter membrane (Terrafix 270R or equivalent).
4. Free Draining backfill - OPSS Granular B or equivalent compacted to the specified density. Do not use heavy compaction equipment within 450 mm (18") of the wall. Use hand controlled light compaction equipment within 1.8 m (6') of wall. The minimum width of the Granular 'B' backfill must be 1.0 m.
5. Impermeable backfill seal - compacted clay, clayey silt or equivalent. If original soil is free-draining, seal may be omitted. Maximum thickness of seal to be 0.5 m.
6. Do not backfill until wall is supported by basement and floor slabs or adequate bracing.
7. Moisture barrier to be at least 200 mm (8") of compacted clear 20 mm (3/4") stone or equivalent free draining material. A vapour barrier may be required for specialty floors.
8. Basement wall to be damp proofed /water proofed.
9. Exterior grade to slope away from building.
10. Slab on grade should not be structurally connected to the wall or footing.
11. Underfloor drain invert to be at least 300 mm (12") below underside of floor slab.
12. Drainage tile placed in parallel rows 2 to 6 m (7' to 20') centers one way. Place drain on 100 mm (4") clear stone with 150 mm (6") of clear stone on top and sides. Enclose stone with filter fabric as noted in (3).
13. The entire subgrade to be sealed with approved filter fabric (Terrafix 270R or equivalent) if non-cohesive (sandy) soils below ground water table encountered.
14. Do not connect the underfloor drains to perimeter drains.
15. Externally Applied Folded Heavy Polyethylene Drainage Membrane.
16. Review the geotechnical report for specific details.

DRAINAGE AND BACKFILL RECOMMENDATIONS
Basement with Underfloor Drainage
(not to scale)

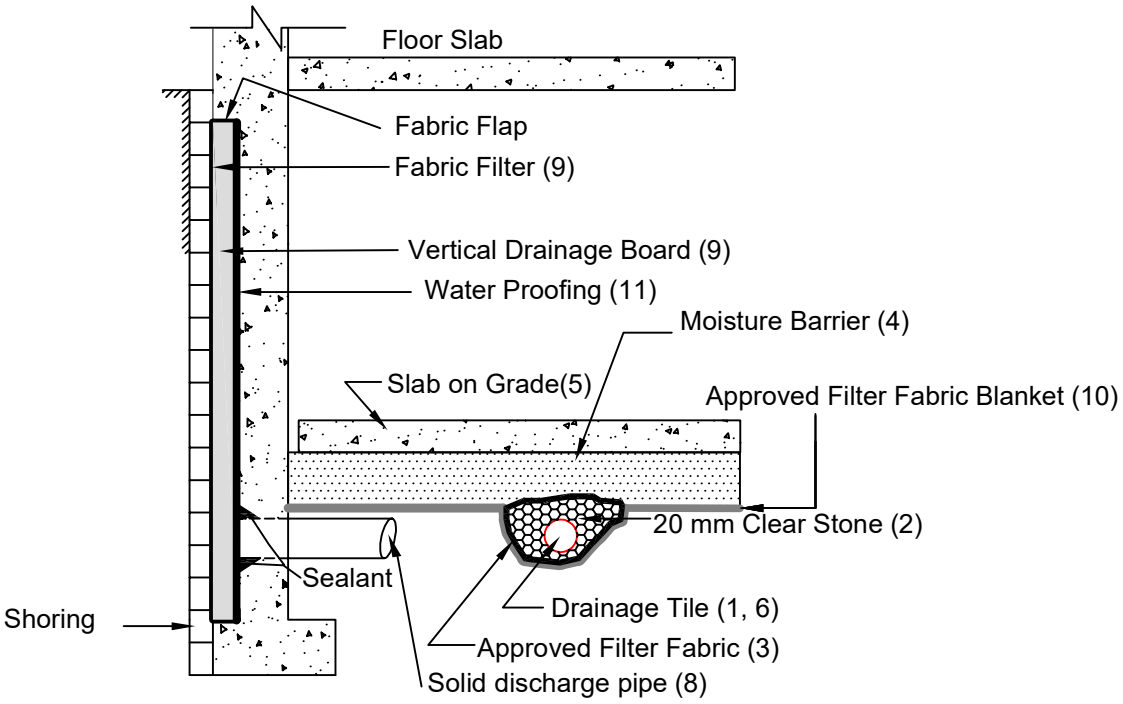


EXTERIOR FOOTING

Notes

1. Drainage tile to consist of 100 mm (4") diameter weeping tile or equivalent perforated pipe leading to a positive sump or outlet, spaced between columns.
2. 20 mm (3/4") clear stone - 150 mm (6") top and side of drain. If drain is not on footing, place100 mm (4 inches) of stone below drain .
3. Wrap the clear stone with an approved filter membrane (Terrafix 270R or equivalent).
4. Moisture barrier to be at least 200 mm (8") of compacted clear 20 mm (3/4") stone or equivalent free draining material. A vapour barrier may be required for specialty floors.
5. Slab on grade should not be structurally connected to the wall or footing.
6. Underfloor drain invert to be at least 300 mm (12") below underside of floor slab. Drainage tile placed in parallel rows 2 to 6 m (7' to 20') centers one way. Place drain on 100 mm (4") clear stone with 150 mm (6") of clear stone on top and sides. Enclose stone with filter fabric as noted in (3).
7. Do not connect the underfloor drains to perimeter drains.
8. Solid discharge pipe located at the middle of each bay between the solider piles, approximate spacing 2.5 m, outletting into a solid pipe leading to a sump.
9. Vertical drainage board mira-drain 6000 or eqivalent with filter cloth should be continous from bottom to 1.2 m below exterior finished grade.
10. The entire subgrade to be sealed with approved filter fabric (Terrafix 270R or equivalent) if non-cohesive (sandy) soils below ground water table encountered.
11. The basement walls must be water proofed using bentonite or equivalent water-proofing system.
12. Review the geotechnical report for specific details. Final detail must be approved before system is considered acceptable.

DRAINAGE RECOMMENDATIONS
Shored Basement wall with Underfloor Drainage System
(not to scale)



EXTERIOR FOOTING

Notes

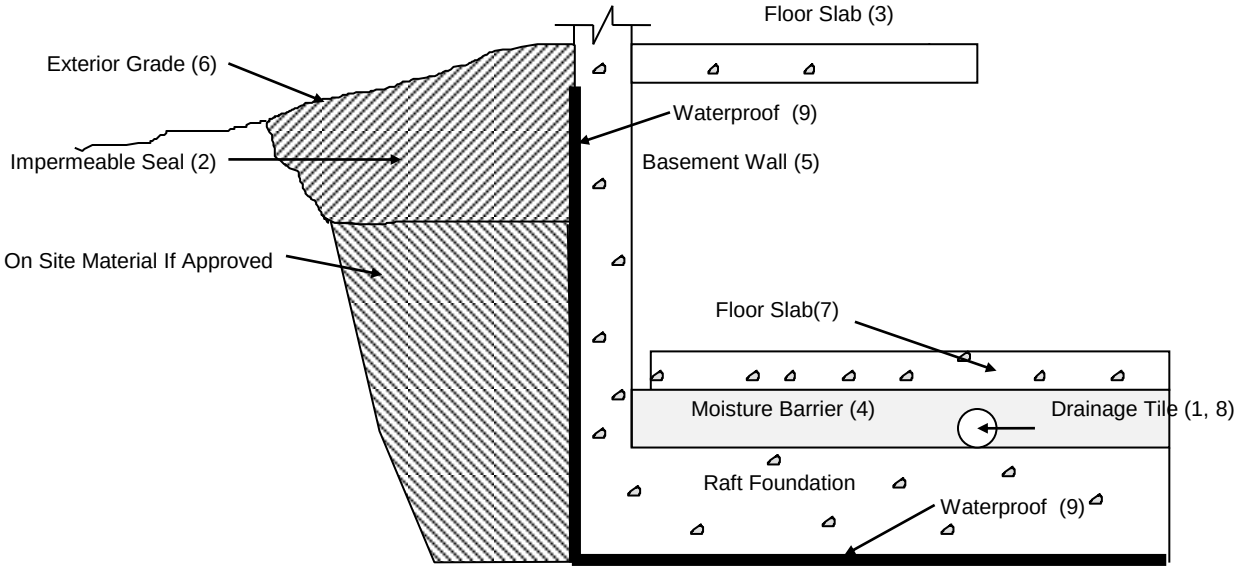
1. Drainage tile to consist of 100 mm (4") diameter weeping tile or equivalent perforated pipe leading to a positive sump or outlet, spaced between columns.
2. 20 mm (3/4") clear stone - 150 mm (6") top and side of drain. If drain is not on footing, place100 mm (4 inches) of stone below drain .
3. Wrap the clear stone with an approved filter membrane (Terrafix 270R or equivalent).
4. Moisture barrier to be at least 200 mm (8") of compacted clear 20 mm (3/4") stone or equivalent free draining material. A vapour barrier may be required for specialty floors.
5. Slab on grade should not be structurally connected to the wall or footing.
6. Underfloor drain invert to be at least 300 mm (12") below underside of floor slab. Drainage tile placed in parallel rows 2 to 6 m (7' to 20') centers one way. Place drain on 100 mm (4") clear stone with 150 mm (6") of clear stone on top and sides. Enclose stone with filter fabric as noted in (3).
7. Do not connect the underfloor drains to perimeter drains.
8. Solid discharge pipe located at the middle of each bay between the solider piles, approximate spacing 2.5 m, outletting into a solid pipe leading to a sump.
9. Vertical drainage board with filter cloth should be kept a minium of 1.2 m below exterior finished grade.
10. The entire subgrade to be sealed with approved filter fabric (Terrafix 270R or equivalent) if non-cohesive (sandy) soils below ground water table encountered.
11. The basement walls should be water proofed using bentonite or equivalent water-proofing system.
12. Review the geotechnical report for specific details. Final detail must be approved before system is considered acceptable.

DRAINAGE RECOMMENDATIONS

Shored Underground Parking/Basement wall with Underfloor Drainage System

(not to scale)

Project: 22-4078GH **Drawing No. 5**



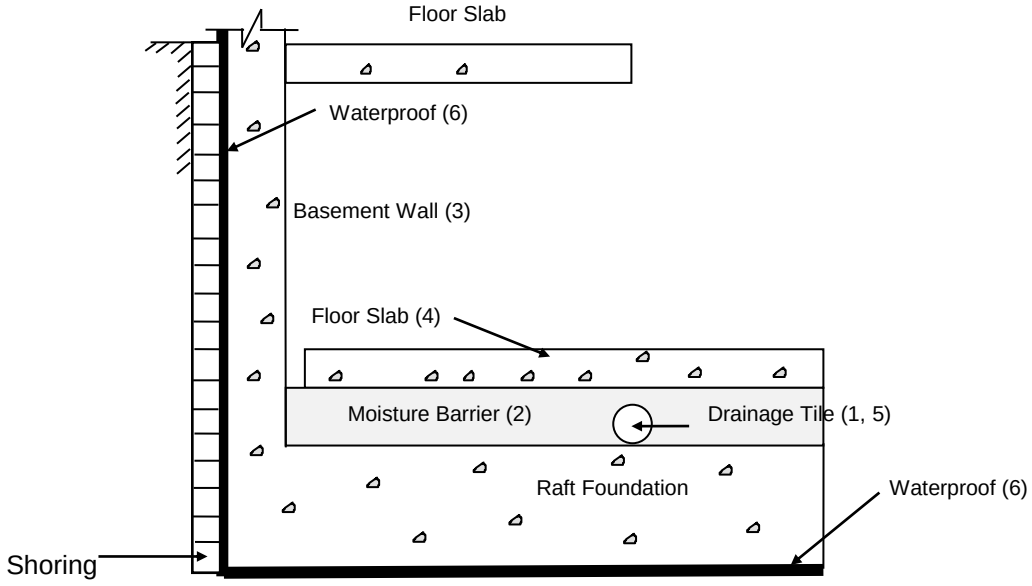
Notes

1. Drainage tile to consist of 100 mm (4") diameter weeping tile or equivalent perforated pipe leading to a positive sump or outlet. Invert to be a minimum of 150 mm (6") below underside of floor slab.
2. Impermeable backfill seal - compacted clay, clayey silt or equivalent. If original soil is free-draining, seal may be omitted.
3. Do not backfill until wall is supported by basement and floor slabs or adequate bracing.
4. Moisture barrier to be at least 200 mm (8") of compacted clear 20 mm (3/4") stone or equivalent free draining material.
5. Basement wall to be water-proofed and the wall has to be designed in consideration of the hydrostatic water pressure.
6. Exterior grade to slope away from building.
7. Slab on grade should not be structurally connected to the wall or footing.
8. Underfloor drain invert to be placed on raft foundation slab. Drainage tile placed in parallel rows 6 to 8 m (20 to 25') centres one way.
9. The waterproof should be at least 1 m above the highest groundwater tables. The water-proofing must be approved by engineer.

DRAINAGE AND BACKFILL RECOMMENDATIONS

Waterproofed Underground Parking Structure/Basement with Underfloor Drainage System (raft foundations) (not to scale)

Project: 22-4078GH **Drawing No. 6**



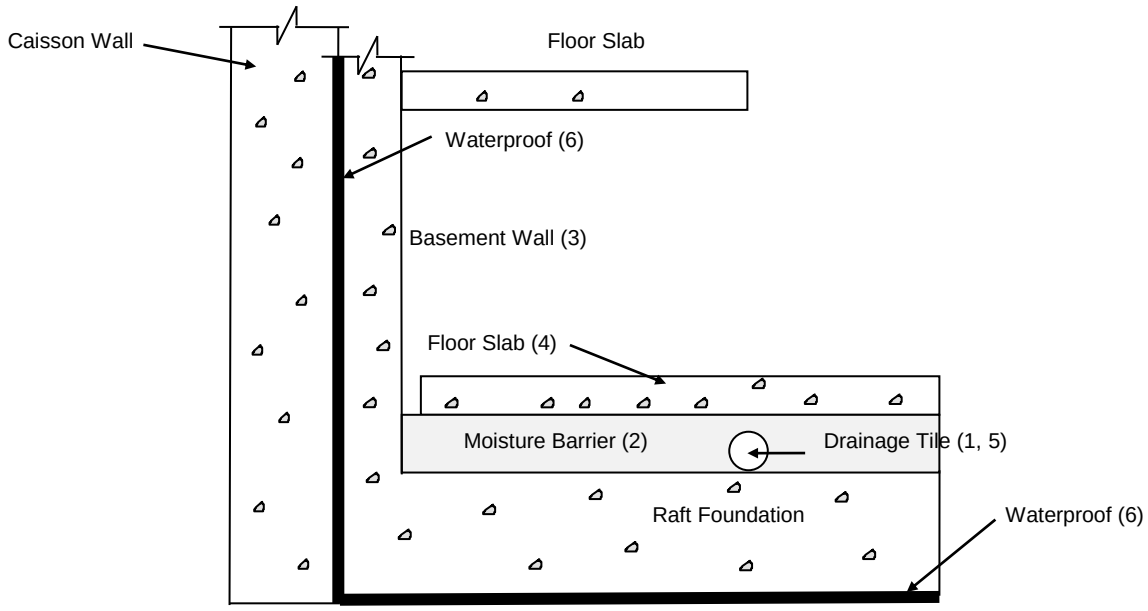
Notes

1. Drainage tile to consist of 100 mm (4") diameter weeping tile or equivalent perforated pipe leading to a positive sump or outlet. Invert to be a minimum of 150 mm (6") below underside of floor slab.
2. Moisture barrier to be at least 200 mm (8") of compacted clear 20 mm (3/4") stone or equivalent free draining material.
3. Basement wall to be water-proofed and the wall has to be designed in consideration of the hydrostatic water pressure.
4. Slab on grade should not be structurally connected to the wall or footing.
5. Underfloor drain invert to be placed on raft foundation slab. Drainage tile placed in parallel rows 6 to 8 m (20 to 25') centres one way.
6. The waterproof should be at least 1 m above the highest groundwater tables. The water-proofing system must be approved by engineer.

DRAINAGE RECOMMENDATIONS

Waterproofed Underground Parking Structure/Basement with Underfloor Drainage System (raft foundations) (not to scale)

Project: 22-4078GH **Drawing No. 7**



Notes

1. Drainage tile to consist of 100 mm (4") diameter weeping tile or equivalent perforated pipe leading to a positive sump or outlet. Invert to be a minimum of 150 mm (6") below underside of floor slab.
2. Moisture barrier to be at least 200 mm (8") of compacted clear 20 mm (3/4") stone or equivalent free draining material.
3. Basement wall to be water-proofed and the wall has to be designed in consideration of the hydrostatic water pressure.
4. Slab on grade should not be structurally connected to the wall or footing.
5. Underfloor drain invert to be placed on raft foundation slab. Drainage tile placed in parallel rows 6 to 8 m (20 to 25') centres one way.
6. The waterproof should be at least 1 m above the highest groundwater tables. The water-proofing system must be approved by engineer.

DRAINAGE RECOMMENDATIONS

Waterproofed Underground Parking Structure/Basement with Underfloor Drainage System (raft foundations) (not to scale)

ENCLOSURES

Enclosure 1A: Notes on Sample Descriptions

1. Each soil stratum is described according to the *Modified Unified Soil Classification System*. The compactness condition of cohesionless soils (SPT) and the consistency of cohesive soils (undrained shear strength) are defined according to Canadian Foundation Engineering Manual, 4th Edition. Different soil classification systems may be used by others. Please note that a description of the soil stratums is based on visual and tactile examination of the samples augmented with field and laboratory test results, such as a grain size analysis and/or Atterberg Limits testing. Visual classification is not sufficiently accurate to provide exact grain sizing or precise differentiation between size classification systems.

2. Fill: Where fill is designated on the borehole log it is defined as indicated by the sample recovered during the boring process. The reader is cautioned that fills are heterogeneous in nature and variable in density or degree of compaction. The borehole description may therefore not be applicable as a general description of site fill materials. All fills should be expected to contain obstruction such as wood, large concrete pieces or subsurface basements, floors, tanks, etc., none of these may have been encountered in the boreholes. Since boreholes cannot accurately define the contents of the fill, test pits are recommended to provide supplementary information. Despite the use of test pits, the heterogeneous nature of fill will leave some ambiguity as to the exact composition of the fill. Most fills contain pockets, seams, or layers of organically contaminated soil. This organic material can result in the generation of methane gas and/or significant ongoing and future settlements. Fill at this site may have been monitored for the presence of methane gas and, if so, the results are given on the borehole logs. The monitoring process does not indicate the volume of gas that can be potentially generated nor does it pinpoint the source of the gas. These readings are to advise of the presence of gas only, and a detailed study is recommended for sites where any explosive gas/methane is detected. Some fill material may be contaminated by toxic/hazardous waste that renders it unacceptable for deposition in any but designated land fill sites; unless specifically stated the fill on this site has not been tested for contaminants that may be considered toxic or hazardous. This testing and a potential hazard study can be undertaken if requested. In most residential/commercial areas undergoing reconstruction, buried oil tanks are common and are generally not detected in a conventional preliminary geotechnical site investigation.

3. Till: The term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Because of this geological process the till must be considered heterogeneous in composition and as such may contain pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (75 to 300 mm) or boulders (over 300 mm). Contractors may therefore encounter cobbles and boulders during excavation, even if they are not indicated by the borings. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Because of the horizontal and vertical variability of till, the sample description may be applicable to a very limited zone; caution is therefore essential when dealing with sensitive excavations or dewatering programs in till materials.

Enclosure 1B: Explanation of Terms Used in the Record of Boreholes

Sample Type

AS	Auger sample
BS	Block sample
CS	Chunk sample
DO	Drive open
DS	Dimension type sample
FS	Foil sample
NR	No recovery
RC	Rock core
SC	Soil core
SS	Spoon sample
SH	Shelby tube Sample
ST	Slotted tube
TO	Thin-walled, open
TP	Thin-walled, piston
WS	Wash sample

Penetration Resistance

Standard Penetration Resistance (SPT), N:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in) required to drive a 50 mm (2 in) drive open sampler for a distance of 300 mm (12 in).

PM – Samples advanced by manual pressure
WR – Samples advanced by weight of sampler and rod
WH – Samples advanced by static weight of hammer

Dynamic Cone Penetration Resistance, N_d:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in) to drive uncased a 50 mm (2 in) diameter, 60° cone attached to "A" size drill rods for a distance of 300 mm (12 in).

Piezo-Cone Penetration Test (CPT):

An electronic cone penetrometer with a 60 degree conical tip and a projected end area of 10 cm² pushed through ground at a penetration rate of 2 cm/s. Measurement of tip resistance (Q_t), porewater pressure (PWP) and friction along a sleeve are recorded electronically at 25 mm penetration intervals.

Textural Classification of Soils (ASTM D2487)

Classification	Particle Size
Boulders	> 300 mm
Cobbles	75 mm - 300 mm
Gravel	4.75 mm - 75 mm
Sand	0.075 mm – 4.75 mm
Silt	0.002 mm-0.075 mm
Clay	<0.002 mm(*)

(*) Canadian Foundation Engineering Manual (4th Edition)

Coarse Grain Soil Description (50% greater than 0.075 mm)

Terminology	Proportion
Trace	0-10%
Some	10-20%
Adjective (e.g. silty or sandy)	20-35%
And (e.g. sand and gravel)	> 35%

Soil Description

a) Cohesive Soils (*)

Consistency	Undrained Shear Strength (kPa)	SPT "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

(*) Hierarchy of Shear Strength prediction

1. Lab triaxial test
2. Field vane shear test
3. Lab. vane shear test
4. SPT "N" value
5. Pocket penetrometer

b) Cohesionless Soils (*)

Compactness Condition (Formerly Relative Density)	SPT "N" Value
Very loose	0-4
Loose	4-10
Compact	10-30
Dense	30-50
Very dense	>50

Soil Tests

w	Water content
w_p	Plastic limit
w_l	Liquid limit
C	Consolidation (oedometer) test
CID	Consolidated isotropically drained triaxial test
CIU	consolidated isotropically undrained triaxial test with porewater pressure measurement
D_R	Relative density (specific gravity, Gs)
DS	Direct shear test
ENV	Environmental/ chemical analysis
M	Sieve analysis for particle size
MH	Combined sieve and hydrometer (H) analysis
MPC	Modified proctor compaction test
SPC	Standard proctor compaction test
OC	Organic content test
U	Unconsolidated Undrained Triaxial Test
V	Field vane (LV-laboratory vane test)
γ	Unit weight

LOG OF BOREHOLE BH1

PROJECT: Preliminary Geotechnical Investigation for Proposed Residential Development

CLIENT: T. Harris Environmental Management

PROJECT LOCATION: 395-411 Queensway West, Simcoe, Ontario

DATUM: N/A

BH LOCATION: See Borehole Location Plan

DRILLING DATA

METHOD: Continuous Flight Auger - Auto Hammer | DIAMETER: 155 mm

FIELD ENGINEER: DG/SN | DATE: 2022-08-31

SAMPLE REVIEW: IG | REF. NO.: 22-4078GH

CHECKED: DX | ENCL. NO.: 2

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	"N" BLOWS/0.3m	GROUND WATER	ELEVATION
0.0	**GRANULAR FILL:** (220 mm)	1A	SS		Concrete	
0.2	**FILL:** sandy silt, trace silt, trace gravel, organic inclusions, rootlet inclusions, brown, moist, compact	1B	SS	19		
0.7	**FILL:** sand to gravelly sand, trace silt, brown, moist, loose to compact	2	SS	10	Bentonite	
		3	SS	21		
		4	SS	23		
2.9	**FINE TO MEDIUM SAND:** some silt, brown, wet, compact	5	SS	23		
4.0	**SAND:** some silt, trace gravel, brown to grey, wet, compact				Sand	
					Screen 4.7mBGS Sep 14	
		6	SS	17		
	--- grey	7	SS	18		
		8	SS	21	Natural Pack	
8.6	**SILT:** trace clay, trace sand, grey, wet, loose	9	SS	6		
9.6	**END OF BOREHOLE**					

DYNAMIC PENETRATION TEST: SPT / Cone, blows/0.3m; SHEAR STRENGTH (kPa): Unconfined, Quick Triaxial, Field Vane & Sensitivity, Penetrometer, Lab Vane

Natural Moisture Content: Plastic Limit (w_P), w, Liquid Limit (w_L); WATER CONTENT (%)

UNIT WT (kN/m^3)

REMARKS AND GRAIN SIZE DISTRIBUTION (%): GR SA SI CL

Notes:

Continued Next Page

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ▲ε=3% Strain at Failure

LOG OF BOREHOLE BH1

PROJECT: Preliminary Geotechnical Investigation for Proposed Residential Development

CLIENT: T. Harris Environmental Management

PROJECT LOCATION: 395-411 Queensway West, Simcoe, Ontario

DATUM: N/A

BH LOCATION: See Borehole Location Plan

DRILLING DATA

METHOD: Continuous Flight Auger - Auto Hammer

FIELD ENGINEER: DG/SN

SAMPLE REVIEW: IG

CHECKED: DX

DIAMETER: 155 mm

DATE: 2022-08-31

REF. NO.: 22-4078GH

ENCL. NO.: 2

ELEV / DEPTH (m)	DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" BLOWS/0.3m	GROUND WATER	ELEVATION	DYNAMIC PENETRATION TEST (○ SPT, ≈ Cone, blows/0.3m; 20 40 60 80) / SHEAR STRENGTH (kPa) (● Unconfined, ▲ Quick Triaxial, ✕ Field Vane & Sensitivity, ⊠ Penetrometer, + Lab Vane; 20 40 60 80)	Plastic Limit / Natural Moisture Content / Liquid Limit (w_P, w, w_L) WATER CONTENT (%) (10 20 30 40)	UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	1) Water encountered at a depth of 4.6 m below ground surface (mBGS) during drilling. 2) Water was at a depth of 4.7 mBGS upon completion of drilling. 3) Borehole caved at a depth of 5.5 mBGS upon completion of drilling. 4) 51 mm dia. monitoring well was installed in borehole upon completion of drilling. Water Level Readings Date W.L.Depth(mBGS) Sep. 14, 2022 4.65										

GROUNDWATER ELEVATIONS

Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES: +³, ×³: Numbers refer to Sensitivity; ▲ ε=3% Strain at Failure

LOG OF BOREHOLE BH2

PROJECT: Preliminary Geotechnical Investigation for Proposed Residential Development

CLIENT: T. Harris Environmental Management

PROJECT LOCATION: 395-411 Queensway West, Simcoe, Ontario

DATUM: N/A

BH LOCATION: See Borehole Location Plan

DRILLING DATA

METHOD: Continuous Flight Auger - Auto Hammer | DIAMETER: 155 mm

FIELD ENGINEER: DG/SN | DATE: 2022-08-31

SAMPLE REVIEW: IG | REF. NO.: 22-4078GH

CHECKED: DX | ENCL. NO.: 3

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	"N" BLOWS/0.3m
0.0	**GRANULAR FILL:** (250 mm)	1A	SS	
0.3	**FILL:** silty sand, trace gravel, organic inclusions, rootlet inclusions, brown, moist, loose to compact	1B	SS	22
		2	SS	5
1.4	**FILL:** gravelly sand, some silt, brown, moist, very loose	3	SS	2
2.1	**FILL:** sand, trace silt, trace gravel, organic inclusions, brown, moist, very loose to loose --- rootlet inclusions	4	SS	2
		5	SS	5
4.0	**SAND:** trace silt, trace gravel, brown, wet, compact	6	SS	13
		7	SS	16
6.6	**END OF BOREHOLE**			

Notes:

1) Water encountered at a depth of 4.6 m below ground surface (mBGS) during drilling.
2) Water was at a depth of 4.4 mBGS upon completion of drilling.
3) Borehole caved at a depth of 4.6 mBGS upon completion of drilling.

DYNAMIC PENETRATION TEST: ○ SPT, ≈ Cone, blows/0.3m; 20, 40, 60, 80

SHEAR STRENGTH (kPa): ● Unconfined, ✕ Field Vane & Sensitivity, ▲ Quick Triaxial, ⊠ Penetrometer, + Lab Vane; 20, 40, 60, 80

Plastic Limit (w_P) | Natural Moisture Content (w) | Liquid Limit (w_L)

WATER CONTENT (%): 10, 20, 30, 40

UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)

GR	SA	SI	CL
9	84	6	

GROUNDWATER ELEVATIONS

Measurement: 1st, 2nd, 3rd, 4th

GRAPH NOTES: +³, ×³: Numbers refer to Sensitivity; ▲ ε=3% Strain at Failure

LOG OF BOREHOLE BH3

PROJECT: Preliminary Geotechnical Investigation for Proposed Residential Development

CLIENT: T. Harris Environmental Management

PROJECT LOCATION: 395-411 Queensway West, Simcoe, Ontario

DATUM: N/A

BH LOCATION: See Borehole Location Plan

DRILLING DATA

METHOD: Continuous Flight Auger - Auto Hammer | DIAMETER: 155 mm

FIELD ENGINEER: DG/SN | DATE: 2022-09-01

SAMPLE REVIEW: IG | REF. NO.: 22-4078GH

CHECKED: DX | ENCL. NO.: 4

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	"N" BLOWS/0.3m
0.0	**TOPSOIL:** (150 mm)			
0.2	**FILL:** silty sand, trace gravel, organic inclusions, rootlet inclusions, brown, moist, very loose	1	SS	3
0.7	**FILL:** silt, trace to some clay, trace sand, organic inclusions, rootlet inclusions, layers of clayey silt, brown, wet, very loose	2A	SS	2
1.0	**SILT:** trace clay, trace sand, layers of clayey silt, brown, wet, very loose to compact	2B	SS	
		3	SS	1
		4	SS	10
2.9	**FINE TO MEDIUM SAND:** some silt, trace gravel, brown, moist, compact	5	SS	29
4.0	**SAND:** trace to some silt, trace gravel, brown, wet, loose to compact	6	SS	9
		7	SS	17
6.6	**END OF BOREHOLE**			

Notes:

1) Water encountered at a depth of 0.7 m below ground surface (mBGS) during drilling.
2) Water was at a depth of 4.8 mBGS upon completion of drilling.
3) Borehole caved at a depth of 5.2 mBGS upon completion of drilling.
4) 51 mm dia. monitoring well was installed in borehole upon completion of drilling.

Water Level Readings

Date	W.L.Depth(mBGS)
Sep. 14, 2022	4.73

GROUND WATER: Concrete; Bentonite; Sand; Screen; 4.7mBGS Sep 14; Natural Pack

DYNAMIC PENETRATION TEST: SPT / Cone, blows/0.3m (20, 40, 60, 80)

SHEAR STRENGTH (kPa): Unconfined; Quick Triaxial; Field Vane & Sensitivity; Penetrometer; Lab Vane (20, 40, 60, 80)

Plastic Limit (w_P) | Natural Moisture Content (w) | Liquid Limit (w_L)

WATER CONTENT (%) (10, 20, 30, 40)

UNIT WT (kN/m^3)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)

GR	SA	SI	CL
0	0	93	7

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ▲ε=3% Strain at Failure

LOG OF BOREHOLE BH5

PROJECT: Preliminary Geotechnical Investigation for Proposed Residential Development

CLIENT: T. Harris Environmental Management

PROJECT LOCATION: 395-411 Queensway West, Simcoe, Ontario

DATUM: N/A

BH LOCATION: See Borehole Location Plan

DRILLING DATA

METHOD: Continuous Flight Auger - Auto Hammer | DIAMETER: 155 mm

FIELD ENGINEER: DG/SN | DATE: 2022-09-01

SAMPLE REVIEW: IG | REF. NO.: 22-4078GH

CHECKED: DX | ENCL. NO.: 5

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	"N" BLOWS/0.3m
0.0	**PORTLAND CEMENT CONCRETE:** (340 mm)			
0.3	**FILL:** silty sand, trace gravel, organic inclusions, rootlet inclusions, brown, moist	1	AS	
0.8	**FILL:** sand, some silt, trace gravel, pockets/layers of silt, brown, moist, loose	2	SS	6
1.4	**SILT:** trace to some clay, trace gravel, layers of clayey silt, pockets of sand, brown to grey, wet, loose to compact	3	SS	7
		4	SS	9
		5	SS	11
	--- grey	6	SS	5
5.6	**SAND:** trace silt, trace gravel, wet, brown, compact	7	SS	12
		8	SS	23
8.1	**END OF BOREHOLE**			

Notes:

1) Water encountered at a depth of 1.5 m below ground surface (mBGS) during drilling.
2) Water was at a depth of 4.6 mBGS upon completion of drilling.
3) Borehole caved at a depth of 4.6 mBGS upon completion of drilling.

GROUND WATER ELEVATION

DYNAMIC PENETRATION TEST
○ SPT ≈ Cone blows/0.3m
20 40 60 80

SHEAR STRENGTH (kPa)
● Unconfined ✕ Field Vane & Sensitivity
▲ Quick Triaxial ⊠ Penetrometer + Lab Vane
20 40 60 80

Plastic Limit | Natural Moisture Content | Liquid Limit
w_P w w_L
WATER CONTENT (%)
10 20 30 40

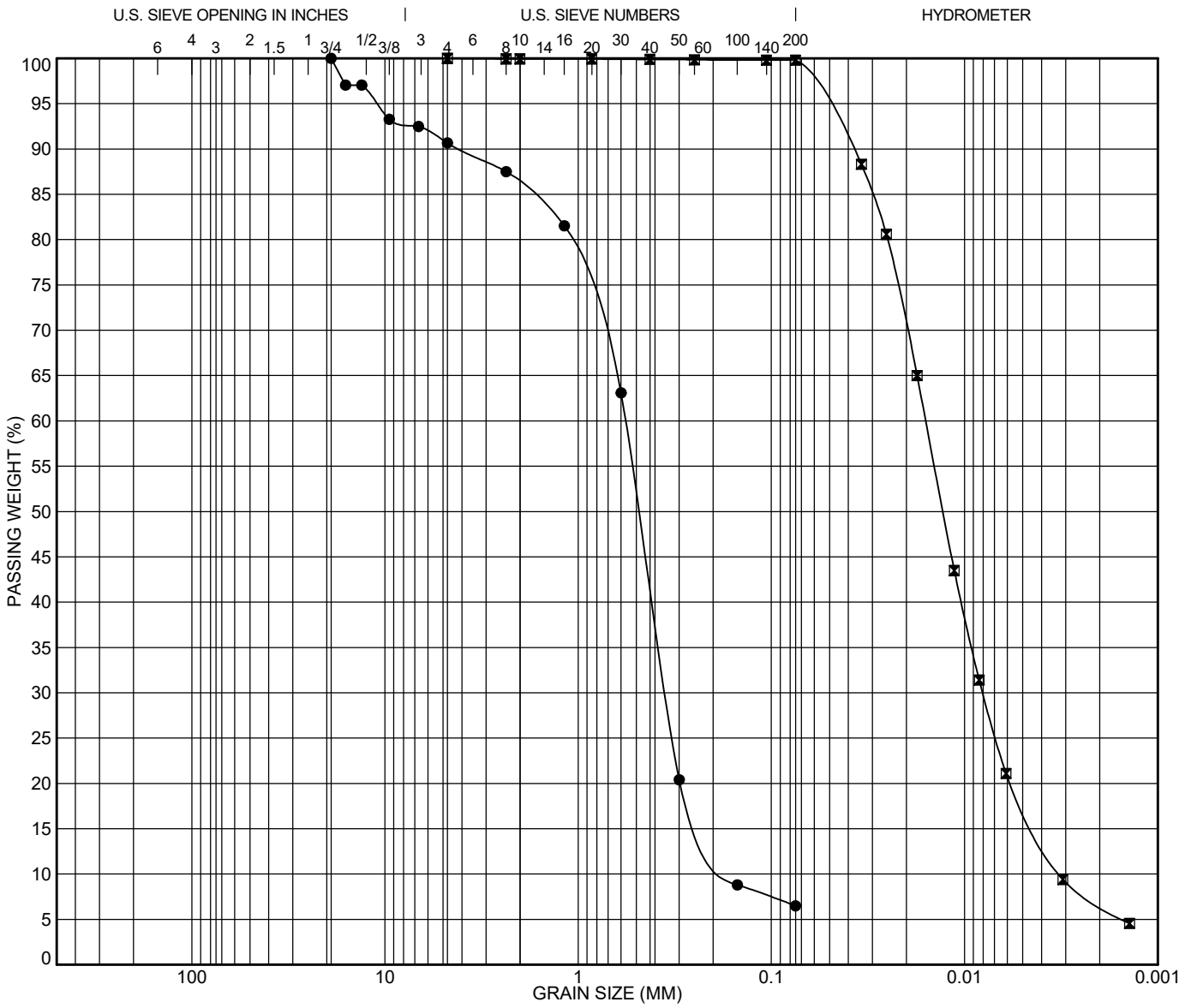
UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
▲ε=3% Strain at Failure

FIGURES



COBBLES	GRAVEL		SAND			SILT	CLAY
	coarse	fine	coarse	medium	fine		

Specimen Identification				Classification	LL	PL	PI	Cc	Cu
●	**BH2**	**SS6**	**4.57**					**1.34**	**3.54**
⊠	**BH3**	**SS4**	**2.29**					**1.27**	**4.95**

Specimen Identification				D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**BH2**	**SS6**	**4.57**	**19**	**0.571**	**0.351**	**0.161**	**9.3**	**84.2**	**6.5**	
⊠	**BH3**	**SS4**	**2.29**	**4.75**	**0.016**	**0.008**	**0.003**	**0.0**	**0.2**	**93.1**	**6.7**

GeoPro CONSULTING LIMITED
Unit 57, 40 Vogell Road, Richmond Hill, Ontario L4B 3N6
Tel: 905-237-8336 Fax: 905-248-3699
office@geoproconsulting.ca www.geoproconsulting.ca

GRAIN SIZE DISTRIBUTION

PROJECT: Preliminary Geotechnical Investigation for Proposed Residential Development

LOCATION: 395-411 Queensway West, Simcoe, Ontario

PROJECT NO.: 22-4078GH | SAMPLED ON: 2022-09-01

FIGURE NO.: 1 | TESTED ON: 2022-09-22

LIMITATIONS TO THE REPORT

This report is intended solely for the Client named. The report is prepared based on the work has been undertaken in accordance with normally accepted geotechnical engineering practices in Ontario.

The comments and recommendations given in this report are based on information determined at the limited number of the test hole and test pit locations. The boundaries between the various strata as shown on the borehole logs are based on non-continuous sampling and represent an inferred transition between the various strata and their lateral continuation rather than a precise plane of geological change. Subsurface and groundwater conditions between and beyond the test holes and test pits may differ significantly from those encountered at the test hole and test pit locations. The benchmark and elevations used in this report are primarily to establish relative elevation differences between the test hole and test pit locations and should not be used for other purposes, such as grading, excavating, planning, development, etc.

It should be noted that the results of the designated substance and chemical analysis refer only to the sample analyzed which was obtained from specific sampling location and sampling depth, and the presence of designated substance and soil chemistry may vary between and beyond the location and depth of the sample taken. Please note that the level of chemical testing outlined herein is meant to provide a broad indication of soil quality based on the limited soil samples tested. The analytical results contained in this report should not be considered a warranty with respect to the soil quality or the use of the soil for any specific purpose or the acceptability of the soils for any excess soil receiving sites.

The report reflects our best judgment based on the information available to GeoPro Consulting Limited at the time of preparation. Unless otherwise agreed in writing by GeoPro Consulting Limited, it shall not be used to express or imply warranty as to any other purposes. No portion of this report shall be used as a separate entity, it is written to be read in its entirety. The information contained herein in no way reflects on the environment aspects of the project, unless otherwise stated.

The design recommendations given in this report are applicable only to the project designed and constructed completely in accordance with the details stated in this report. Otherwise, our responsibility is limited to interpreting the subsurface information at the borehole or test pit locations.

Should any comments and recommendations provided in this report be made on any construction related issues, they are intended only for the guidance of the designers. The number of test holes and test pits may not be sufficient to determine all the factors that may affect construction activities, methods and costs. Such as, the thickness of surficial topsoil or fill layers may vary significantly and unpredictably; the amount of the cobbles and boulders may vary significantly than what described in the report; unexpected water bearing zones/layers with various thickness and extent may be encountered in the fill and native soils. The contractors bidding on this project or undertaking the construction should, therefore, make their own interpretation of the factual information presented and make their own conclusions as to how the subsurface conditions may affect their work and determine the proper construction methods.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. GeoPro Consulting Limited accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

We accept no responsibility for any decisions made or actions taken as a result of this report unless we are specifically advised of and participate in such action, in which case our responsibility will be as agreed to at that time.

GeoPro Consulting Limited

Geotechnical-Hydrogeology-Environmental-Materials-Inspection

Preliminary Hydrogeological Assessment

Proposed Residential Development

395-411 Queensway West, Simcoe, Ontario

Prepared For:

HFW Holdings Limited

GeoPro Project No.: 22-4078H

Report Date: February 1, 2024

GeoPro Consulting Limited Tel. (905) 237-8336

Unit 57, 40 Vogell Road, Richmond Hill, Ontario L4B 3N6

GeoPro CONSULTING LIMITED

Table of Contents

1.0 INTRODUCTION

GeoPro Consulting Limited ("GeoPro") was retained by HFW Holdimgs Limited (the "Client") to conduct a preliminary hydrogeological assessment for the proposed Hunt Street Residential development at 395-411 Queensway West, Simcoe, Ontario (the "Site"). The approximate site location is shown on Drawing No. 1.

It should be noted that the hydrogeological report was prepared based on the preliminary design information provided at the time of preparing the report. In the event the design information is modified or updated, this report should be reviewed by GeoPro and further recommendations will be provided as needed.

1.1 Purposes

The purposes of this preliminary hydrogeological assessment are to characterize the subsurface soil and groundwater conditions in the limited number of boreholes at the Site and to assess temporary dewatering and groundwater control needs (if any) in order to facilitate the design of the Project.

It should be noted that the preliminary hydrogeological assessment was completed concurrently with a geotechnical investigation carried out by GeoPro at the Site. The results of the geotechnical investigation were summarized in a separate report.

1.2 Scope of Work

In conjunction with the geotechnical investigation, the preliminary hydrogeological assessment comprised the following tasks:

1) Conducting a search and review of the available geology and hydrogeology data resources, including Ministry of the Environment, Conservation and Parks ("MECP") Water Well Records ("WWR"), Ontario Geological Survey ("OGS") and Ontario Source Water Protection Program;
2) Completing groundwater level monitoring and in-situ hydraulic conductivity testing (slug testing); and
3) Data analyses, interpretation, and report preparation.

This report has been prepared for the Client. Third party use of this report without GeoPro's consent is prohibited. The limitation conditions presented in this report form an integral part of the report and they must be considered in conjunction with this report.

1.3 Previous and Concurrent Investigations and Reports

1.3.1 Geotechnical Investigations by GeoPro

A geotechnical investigation was carried out concurrently by GeoPro, which consisted of the advancement of four (4) boreholes (BH1, BH2, BH3 and BH5) drilled to the depths ranging from 6.6 to 9.6 mBGS, and the installation of two (2) monitoring wells in each of the advanced boreholes BH1 and BH3.

The information and data obtained from GeoPro's geotechnical investigation report has been incorporated in this preliminary hydrogeological assessment report. The approximate borehole and monitoring well locations are shown on Drawing No. 2, and the Borehole Logs are included in Appendix A.

In addition, one (1) borehole (BHMW5) was drilled adjacent to the BH5 location by T. Harris Environmental Management, and a monitoring well was installed in the advanced borehole.

2.0 SITE CONDITIONS

2.1 Site Feature Observations

A site visit was conducted on September 22, 2022 to observe the general site features and sources of potential contamination and/or environmental concern.

The Site is currently occupied by residential and commercial properties on the north side of Queensway West between Hunt Street North and Park Road and generally surrounded by vacant lands, parkland , residential and commercial properties.

Catch basins and/or manholes were observed along the roadway near the Site.

Patterson Creek was observed approximately 5 m north of the Site.

Kent Creek was observed approximately 190 m south of the Site.

Auto garages (auto service shops) were noted in the area within a 500 m radius from the Site based on Google Maps and are summarized below:

- Scott´s Auto Body Repair (at 6 Hunt Street South) is approximately 95 m south of the site.
- Future Auto Service & Sales (at 10 Hunt Street South) is approximately 135 m south of the site.
- Demeyere´s Simcoe Honda (at 443 Queensway West) is approximately 225 m west of the Site
- Honda Service (At 456 Queensway West) is approximately 320 m west of the Site
- Cardial Muffler Centre (at 335 Queensway West) is approximately 160 m east of the site.
- NAPA AUTOPRO (at 10 Hunt Street South) is approximately 130 m south of the site.
- Koncir Automotive (at 425 Queensway West) is approximately 130 m West of the site.
- UniglassPlus/Ziebart (at 321 Queensway West) is approximately 180 m East of the site.

2.2 Physiography and Drainage

The Site is located within the Norfolk Sand Plain physiographical region in an area comprised of Sand Plains according to the "Physiography Map of South Central Portion of Southern Ontario" prepared by the Ontario Department of Mines and Northern Affairs, and based on the Ontario Geological Survey ("OGS") database.

The Site is located in the Lynn Creek Subwatershed, part of the Long Point Region Watershed, under the jurisdiction of the Long Point Region Conservation Authority (LPRCA). Patterson Creek, located approximately 5 m north of the site, flows easterly and drain into Crystal Lake approximately 2.1 km east to southeast of the site, then flows southerly toward Spring Creek approximately 3.0 km southeast of the Site. and eventually drains into Lake Erie approximately 14.3 km southeast of the site. Kent Creek, located approximately 190 m south of the Site, flows easterly to Crystal Lake Proximately 1.0 km southeast of the site, then flows southerly toward Spring Creek approximately 3.0 km southeast of the Site, and drains into Lake Erie approximately 14.3 km southeast of the Site.

2.3 Geology

2.3.1 Bedrock Geology

The bedrock beneath the Site consists of Middle Devonian Limestone, dolostone and shale, at the depths ranging from approximately 32 to 41 mBGS, according to the "Bedrock Geology of Southern Ontario" prepared by the Ontario Ministry of Northern Development and Mines and based on the OGS database.

2.3.2 Surficial Geology

As shown on Drawing No. 3, the Site and its surrounding area are located in an area covered with fine-course textured glaciolacustrine deposits and older alluvial deposits, according to the "Surficial Geology of Southern Ontario" database maintained by the OGS.

2.3.3 Site Stratigraphy

As indicated in the appended Borehole Logs the soil stratigraphy at the Site generally consists of fill materials below pavement structure or topsoil, underlain by cohesionless silty/sandy soils. No bedrock was encountered at the maximum drilled depth of approximately 9.6 mBGS.

Detailed descriptions of soil strata encountered in the boreholes drilled at the Site are provided on the Borehole Logs in Appendix A.

2.4 Hydrogeology

The hydrogeological conditions at the Site were evaluated based on the information obtained from the Ministry of Natural Resources and Forestry and the Ontario Source Protection Information Atlas, the water well data collected from the MECP database, the information obtained during the geotechnical investigation, and the data collected from the additional work conducted at the Site.

2.4.1 Highly Vulnerable Aquifer ("HVA")

Based on the Ontario Source Protection Information Atlas, the Site is located in an area with a Highly Vulnerable Aquifer ("HVA"). HVAs are delineated according to Technical Rules under the Clean Water Act. In general, an HVA will consist of source granular aquifer materials or fractured rock that have a high permeability and are exposed near the ground surface with a relatively shallow water table.

An aquifer is indicated as vulnerable if possible contaminants could quickly flow into it and impact water quality. In addition, a plume of the possible contaminants would migrate quickly within an HVA.

2.4.2 MECP WWR

A search of the MECP WWR database was conducted focusing on a 500 m radius from the Site. The locations of the MECP water wells are shown on Drawing No. 4. A summary of water well records is included in Appendix B and presented in the following table.

Types of Well Record	Number of Records
Commercial	1
Domestic	3
Industrial	3
Municipal	1
Monitoring	11
Monitoring and Test Hole	7
Not Used	7
Unknown	25
Total	**58**

Eight (8) well records are identified in the MECP WWR database as water supply wells. No bedrock was encountered at the maximum recorded depth of 42.4 mBGS, and water was reported at recorded depths ranging from 1.5 to 15.5 mBGS in overburden deposits.

As the MECP WWR coordinate data is unreliable, the wells plotted on the drawing should be considered as reference only. If more accurate information is needed for the wells, a door-to-door well survey may be considered.

2.4.3 Wellhead Protection Area ("WHPA")

Based on the Ontario Source Protection Information Atlas, southwest portion of the Site is located within municipal Wellhead Protection Areas WHPA-B and WHPA-C, where water (and pollutants) moves through the aquifer toward the municipal well in 2 to 5 years. The nearest municipal well is approximately 450 m southwest of the Site.

2.4.4 Intake Protection Zone ("IPZ")

Based on the information obtained from the Ontario Source Protection Information Atlas, the Site and its neighboring properties are not located within a municipal surface water intake protection zone ("IPZ").

2.4.5 Provincially Significant Wetland ("PSW")

Based on the information obtained from the Ministry of Natural Resources and Forestry, northwest corner of the Site is located within a PSW.

2.4.6 Groundwater Levels

Groundwater conditions were observed in the advanced boreholes during and immediately upon completion of drilling. The observations are included on the Borehole Logs in Appendix A.

Groundwater levels were measured between September 14, 2022 and December 13, 2023 in all GeoPro's monitoring wells (BH1 and BH3).

The monitoring well construction details and the measured groundwater levels are recorded on the appended Borehole Logs and summarized in the following table.

Monitoring Well ID	Screen Interval (mBGS)	Groundwater Level (mBGS)				
		September 14, 2022	March 23, 2023	June 16, 2023	September 13, 2023	December 13, 2023
BH1	3.1 ~ 6.1	4.65	4.25	4.44	4.60	4.51
BH3	3.0 ~ 6.0	4.73	4.36	4.51	4.70	4.66

As shown in the above table, groundwater levels ranged from 4.25 to 4.73 mBGS during the monitoring period.

Groundwater is expected to flow northwards towards Patterson Creek; however, the extensive underground infrastructure in this urban setting may influence local groundwater flow patterns.

It should be noted that the groundwater levels can be expected to vary over time and are subject to seasonal fluctuations.

2.4.7 Groundwater Quality

Groundwater sampling was conducted on September 20, 2022 by GeoPro from Monitoring Well BHMW5. The groundwater samples were collected in appropriate laboratory-supplied containers, placed in a cooler, and submitted to ALS Environmental ("ALS") in Waterloo, Ontario for analysis of selected physical and chemical parameters as specified in the Norfolk Sanitary Sewer Use Bylaw ("the Local Sewer-Bylaw"). The analytical results are provided in Appendix C.

The results were compared with the respective criteria specified in the Local Sewer Bylaw. Based on the comparison, exceedances of the sanitary criteria were measured for Total Suspended Solids ("TSS"), iron,

manganese in the analyzed groundwater samples. Exceedances of PWQO were measured for phosphorus, aluminum, arsenic, cadmium, cobalt, copper, iron, lead, nickel, silver, vanadium, zinc in the analyzed groundwater samples. A summary of the exceedances is presented in the following table.

Sample ID	Parameter	Total Concentration	Sanitary	PWQO	Unit
BHMW5	TSS	16300	350	-	mg/L
	Iron	**90.9**	50	0.3	mg/L
	Manganese	10.4	5	-	mg/L
	Phosphorus	**0.618**	10	0.01	mg/L
	Aluminum	**41.4**	50	0.015	mg/L
	Arsenic	**0.0240**	1	0.005	mg/L
	Cadmium	**0.000659**	0.1	0.0001	mg/L
	Cobalt	**0.0366**	5	0.0009	mg/L
	Copper	**0.131**	2	0.001	mg/L
	Lead	**0.0523**	3	0.001	mg/L
	Nickel	**0.0798**	3	0.025	mg/L
	Silver	**0.000194**	5	0.0001	mg/L
	Vanadium	**0.0895**	5	0.006	mg/L
	Zinc	**0.252**	2	0.02	mg/L

Notes: **41.4** = sample concentration exceeds the PWQO criteria
16300 = sample concentration exceeds the sanitary criteria

3.0 ESTIMATED HYDRAULIC CONDUCTIVITY

Hydraulic conductivity (K-value) of the soils was estimated based on the results obtained from grain size analysis of selected soil samples.

3.1 Grain Size Distribution Method

Grain size analysis (sieve and hydrometer) was conducted on two (2) soil samples collected from boreholes BH2 and BH3. The grain size analyses results are presented in Figure No. 1.

The hydraulic conductivity of the selected soil samples was estimated using applicable empirical equations based on the particle size gradations. It should be noted that where effective particle size was not observed during grain size analysis testing, the value was approximated for the empirical hydraulic conductivity calculations.

The hydraulic conductivity of the selected soil samples was estimated using applicable empirical equations based on the particle size gradation details. As shown in the table below, the estimated K value for the tested soil ranged from 2.4 x 10^{-8} cm/s to 2.5 x 10^{-2} cm/s.

Borehole ID	Sample #	Soil sample Depth (mBGS)	Soil Type	K Value (cm/s)
BH2	SS6	4.6 – 5.0	Sand	2.5 x 10^{-2}
BH3	SS4	2.3 – 2.7	Silt	2.4 x 10^{-8}

4.0 TEMPORARY DEWATERING REQUIREMENTS

Temporary dewatering is intended to lower the groundwater table within the excavation area in order to provide a "dry" working condition during excavation and installation operations.

The temporary dewatering flow rate generally depends on the design specifications of the proposed structures (such as invert elevation, length, depth, size, etc.), the site hydrogeological conditions (such as existing groundwater levels and flow regime), and the drawdown levels required for maintaining dry working conditions and stable excavation bases and slopes.

4.1 The Project Concept

Based on the concept site plan and design information provided by the Client dated June 14, 2022, the proposed development consists of townhouse blocks and 4-storey mid-rise building with excavation depth of 4 mBGS.

A copy of the concept site plan is provided in Appendix D.

4.2 Excavation and Temporary Dewatering Requirements

Groundwater levels measured in the on-site monitoring wells range from 4.25 to 4.73 mBGS during the monitoring period. Considering seasonal fluctuations, the initial water level for dewatering is assumed to be 0.5 m higher than the highest measured groundwater level (e.g., 3.75 mBGS). As a result, the excavations for the project are anticipated to occur below the groundwater table, and temporary dewatering or groundwater control is anticipated to lower the water level to at least 1 m below the excavation base to achieve dry work conditions for the excavation and installation.

Dewatering involves controlling groundwater by pumping, to locally lower groundwater levels in the vicinity of the excavation. Sump pumping is the simplest form of dewatering, by which groundwater is allowed to enter the excavation, and is then collected in a sump and pumped away by robust solids-handling pumps. Sump pumping can be effective in many circumstances, but continual seepage into the excavation may create the risk of instability and other problems.

To prevent significant groundwater seepage into the excavation and ensure stability of the excavation base and side slopes, it may be necessary to lower groundwater levels prior to excavation, which is known as 'pre-drainage'. The pre-drainage methods may include deep wells, wellpoints, eductors (ejectors), vacuum wells, horizontal wells, etc.

Excavations for the Project are anticipated to cut through fill materials and cohesionless silty/sandy soils. Considering the nature of the cohesionless soils, pre-drainage groundwater control measures using wells and/or well points should be considered in conjunction with conventional sump pumping.

4.3 Temporary Dewatering Estimation

The following assumptions are considered in estimating the temporary dewatering requirements:

- An initial groundwater level at 3.75 mBGS;
- A target water level 1 m below the excavation bottom;
- Excavation width to be 2 m plus the proposed estimated width;
- Excavation length to be 2 m plus the proposed estimated length;
- The geometric mean of the hydraulic conductivity values obtained from grain size (2.5×10^{-3} cm/s or 2.5×10^{-5} m/s) was used for the dewatering rate estimation, which was assumed for all water bearing soils encountered by the excavation.

The following Dupuit-Thiem equation was used to calculate radial flow to an open excavation from an unconfined aquifer under steady-state condition:

$$Q = [\pi \times K \times (H^2 - h_W^2)]/Ln(R_o/r_e)$$

Where:

Q = Flow Rate [m^3/s]

H = Initial Water Level [m]

h_w = Target water Level [m]

K = Hydraulic Conductivity [m/s]

r_e = effective radius [m], r_e = (excavation area/ $\pi)^{0.5}$ [m]

$R_o = 3000*(H-h_w)*K^{1/2}$ [m]

Based on the calculations shown above, the estimated steady-state groundwater inflow rate for the Project is summarized in the following table:

Type	Steady-State Dewatering Rate (L/day)
Entire Site	2,887,876

It should be noted that the dewatering requirement is expected to be highest at the beginning of the dewatering process, when the volume of groundwater stored within the pore space of the soil matrix must be removed. The additional pumping rates to be considered to allow removal of the overburden storage within 30 days for the Project are summarized in the following table:

Type	Removal of Overburden Storage (L/day)
Entire Site	449,596

During and after storm events, significantly higher dewatering flow rates are anticipated to account for direct precipitation and runoff into the excavation. The highest recorded daily rainfall at a nearby Environment Canada station (DELHI CDA) is 138.8 mm (based on data from Environmental Canada).

Assuming removal of a 138.8 mm storm event within 24 hours, the additional pumping capacities for the Project are summarized in the following table:

Type	Removal of Precipitation (L/day)
Entire Site	4,941,211

Based on the conservative assumptions described above, a total maximum daily dewatering flow rates for the Project were summarized in the following table:

Type	Estimated Total Dewatering Rate (L/day)
Entire Site	8,278,682

Based on the conservative assumptions described above, the total maximum daily dewatering flow rate for the Project would be more than 400,000 L/day, with consideration of removal of the aquifer storage within a 30-day period and storm events. The maximum estimated zone of influence for dewatering the entire site area would be 19 m from the edge of the excavation.

It should be noted that the assumed excavation depths and areas for the dewatering volume estimation are based on our understanding of the proposed development and the preliminary information provided by the Client. Should there be any modifications of the design or the assumed depths and areas, or if dewatering of the project is proposed to take place in phases, this office should be further consulted, and the dewatering estimation will need to be revised accordingly.

It is known that the subsurface soil conditions may change significantly between and beyond the on-site boreholes. As the information obtained and assumptions made in this investigation report are based on the results obtained from a limited number of investigated locations, unexpected water bearing zones with a hydraulic conductivity higher than that used in these calculations may be present. In addition, the above estimated dewatering volumes are based on the estimated hydraulic conductivities (K-value) from a limited number of grain size analysis.

Please note that it is the responsibility of the contractor to ensure dry conditions are maintained within the excavation at all times and at all costs.

4.4 Preliminary Long-term Dewatering or Under-slab Drainage

Considering the groundwater levels to the proposed basement level, unless all foundations are designed to be waterproof and resist hydrostatic uplift a sub-slab drainage system or foundation drainage/weeping tile system in conjunction with a perimeter drainage system should be installed for long-term control of the groundwater level to avoid wet conditions in the basement. The drainage system should be connected to a storm sewer system to provide a positive drainage, or alternatively, the water seepage collected from the drainage system can be discharged to a LID facility installed at the Site.

The basement slab elevations are not known at the time of preparing this preliminary hydrogeological assessment report. Should the basement level be sufficiently above the prevailing ground water tables, long-term groundwater control may not be anticipated.

4.5 Permit-to-Take-Water/Regulatory Registration

According to O. Reg. 387/04, any water taking over 50,000 litres per day requires a Permit to Take Water ("PTTW"), which shall be obtained in accordance with the MECP's PTTW Manual, dated April 2005.

According to O. Reg. 63/16, a PTTW will not be required for temporary dewatering at a construction site in an amount less than 400,000 L/day. However, the dewatering at a construction site in an amount between 50,000 L/day and 400,000 L/day shall be registered through the Environmental Activity and Sector Registry ("EASR").

According to the dewatering rate estimations, the total temporary dewatering rate of the proposed development would more than 400,000 L/day, for which a Category 3 PTTW will be required.

The basement slab elevations and long-term stable groundwater tables are not known at the time of preparing this preliminary hydrogeological assessment report. However, subject to the final designed basement slab and the stable groundwater tables, the long-term drainage rate may exceed the limit of 50,000 L/day; should this be the case, a long term PTTW will be required for the permanent drainage.

It is important to consider the permanent drainage would require a Sewer Use permit from the local municipality to allow discharge to the municipal storm or sanitary sewer. As noted below, temporary dewatering will either require a Sewer Use permit, or haulage and disposal of discharge effluent from the Site.

5.0 POTENTIAL TEMPORARY DEWATERING IMPACTS

5.1 Potential Sources of Contamination

As exceedances of the local Sewer Use By-Law were measured in the on-site groundwater sample, and roadways and commercial/industrial properties are present adjacent to the site and within the study area, treatment of pumped water prior to discharge may be required to satisfy the local Sewer Use By-Law should be considered when designing a dewatering system.

Please note that the level of environmental issues outlined herein is meant to provide a broad indication of environmental concerns. The input contained in this report should not be considered a warranty with respect to environmental evaluation or assessment of the subject site for any specific purpose. Furthermore, it must be noted that our scope of work was limited to the preliminary opinion of potential environmental concerns; the scope of work did not include any environmental evaluation or assessment of the subject site (such as a Phase One or Phase Two Environmental Site Assessment).

5.2 Highly Vulnerable Aquifer ("HVA")

As discussed previously, the Site is located in an area with a HVA present beneath the Site, which indicates that contaminants could potentially affect the aquifer if contamination occurs at the Site.

Any drinking water quality threat activities may pose a risk to a municipal or domestic drinking water supply. Frequent monitoring of the excavation and installation activities should be carried out during the project. Any products considered flammable, corrosive, hazardous, or which may contain chemicals that could contaminate a drinking water source should be stored, used, and disposed of properly following a Spill Management Plan for the project. Waste which contains pathogens that can run into storm sewers during a rainstorm should be properly managed and disposed of following a Spill Management Plan for the project. Preventative measures (such as the implementation of safe equipment fueling practices) should be in place during excavation and installation, and spill management equipment should be readily available on-site during the project.

5.3 Intake Protection Zone

As discussed previously, the Site and its neighboring properties are not located within an Intake Protection Zone. Therefore, impact on a surface water intake source due to the temporary dewatering activities should not be anticipated.

5.4 Water Supply Wells near the Site Area

Based on the MECP water well records, no water supply wells are located within the estimated zone of influence. Therefore, the impact on the water supply wells due to the temporary dewatering activities may not be anticipated. The data in the MECP WWR may not be up to date and may not be accurate, as such, a door-to-door well survey to confirm the existence of water supply wells in the neighboring properties may be considered.

5.5 Wellhead Protection Sensitivity Area

As discussed previously, the Site and its neighboring properties are located within a wellhead protection area WHPA-B and WHPA-C. Therefore, impact on the municipal supply wells due to the temporary dewatering activities should be anticipated and mitigated following the guidelines outlined previously in Section 5.2.

5.6 Surface Water

As discussed previously, PSW and Patterson Creek are located within the estimated zone of influence. Therefore, impact on PSW and Patterson Creek due to the temporary dewatering activities should be anticipated.

5.7 Ground Subsidence in Adjacent Structures

Under certain conditions, dewatering activities can cause ground settlement or subsidence. When groundwater levels are lowered in the soil deposits, effective stresses will be increased, and consolidation and subsequent settlement may occur.

During the site visit, catch basins, manholes, and residential and commercial properties were noted along the roadways on or near the Site within the preliminarily calculated radius of influence of dewatering. Therefore, potential impacts associated with the temporary dewatering should be considered for the buildings, structures, roadways, and underground utilities which are located within the estimated zone of influence.

6.0 RECOMMENDATIONS

6.1 PTTW Application

- Based on the preliminary dewatering calculations presented above, the total temporary dewatering rate is more than 400,000 L/day, for which a Category 3 PTTW will be required. In addition, subject to the final designed basement slab and the stable groundwater tables, the long-term drainage rate may exceed the limit of 50,000 L/day; should this be the case, and a separate Category 3 PTTW for long-term drainage will be required.
- The PTTW application should be conducted in accordance with the Permit to Take Water Manual, dated April 2005, issued by Ministry of the Environment and Climate Change.
- The PTTW application process will generally take a minimum of three (3) months.

6.2 Municipal Sewer Use Permit

- Should discharge of temporary dewatering effluent to the municipal sewers be desired, a Sewer Use permit would be required for temporary construction dewatering.
- The process of obtaining a Sewer Use permit can take six to twelve months or more, depending on the review and turnaround time at the City. We would recommend that the application be started as soon as practical.

6.3 Point of Discharge

As discussed, catch basins and manholes were noted along the roadway on or near the Site during the site visit. Prior to the start-up of dewatering operations, samples of groundwater shall be obtained from the dewatering system and submitted for analysis of the appropriate Sewer Use By-Law parameters. It should be noted that filtration and/or settlement of the pumped water prior to discharge would be expected to improve the water quality.

Installation of an appropriate water filtration/treatment system designed to address any measured exceedances will be necessary prior to the start-up of dewatering. Should the treated water meet the Local Sewer Bylaw criteria, the water generated could be discharged into the local municipal sewer system

provided a Municipal Sewer Use Permit is in place. In addition, during discharge, the water quality must be in compliance with the requirements set up in the Local Sewer Use By-Law.

As an option, the water generated could be hauled and disposed off-site in a licensed water treatment facility; however, a cost analysis would need to be performed to compare treatment and discharge costs to haulage costs.

6.4 Discharge Permit

Should discharge into the local sewer system be selected, prior to temporary dewatering consultations with the local municipality should be conducted to obtain a permit to use the selected sewer system for the water generated during the excavation and installation.

It should be noted that in support of applying for a discharge permit, a temporary dewatering plan may be required by the local municipality.

6.5 Temporary Dewatering Plan

Prior to the dewatering activities, a temporary dewatering plan shall be prepared by the selected contractor for GeoPro's review.

It should be noted that the design and installation of a temporary dewatering system is the responsibility of the construction contractor, including selection of a sump pump, wellpoint system or well system. The extent and details of the dewatering scheme (well size, spacing, pump level, screen size, wick gradation, etc.) are left solely to the contractor's discretion to achieve the performance objectives for stable slopes and dry conditions and will be based on their own interpretation and analysis of the site conditions, equipment, experience and system efficiency.

Once the pumping system, header pipes and a decanter tank/holding tank are installed, a trial dewatering for a short period of time should be conducted to obtain a representative groundwater sample from the decanting tank for chemical analysis to confirm the water quality.

6.6 Building/Structure Settlement Monitoring

As discussed above, structures located within the zone of influence may be susceptible to potential settlement or subsidence due to the temporary dewatering. Therefore, the following monitoring and mitigative measures are recommended to be carried out before and during the temporary dewatering:

- Complete a pre-excavation condition survey and install settlement monitoring monuments for the existing buildings and roadways within the estimated zone of influence.

- The settlement monitoring monuments should be surveyed prior to the dewatering to establish a baseline and surveyed on a daily basis during the dewatering. The survey results will be provided to the geotechnical engineer of GeoPro for evaluation. The estimated potential and actual

settlements should also be reviewed by a structural engineer to assess the potential damage to the existing structures.

- If the settlement monitoring indicates an undesirable deformation, the dewatering will have to be reduced to a lower rate or ceased temporarily, and alternative measures may be considered for the excavation, which should be approved by the geotechnical engineer and project team.

6.7 Surface Water Monitoring and Contingency/Mitigation Measures

As discussed above, PSW and Patterson Creek may be impacted due to the temporary dewatering activities because of their proximity to the excavation site. Therefore, monitoring of the creeks and PSW may be necessary.

6.7.1 Baseline Study

A baseline study of the river and tributaries within the estimated zone of influence should be conducted to establish the pre-dewatering water level, baseflow and water quality conditions, which may include chemical testing of surface water samples for general metals and inorganics or other parameters per recommendations from the local Conservation Authority.

6.7.2 Surface Water Level and Baseflow Monitoring

The monitoring of the water levels of the creek and PSW at the staff gages installed at the upstream and downstream locations will be conducted daily during the dewatering activities. Should adverse impact be observed during the dewatering, the dewatering volume should be reviewed and modified appropriately. If required, water with acceptable water quality which meets the Provincial Water Quality Objectives ("PWQO") standards may be introduced to the Creek and PSW to maintain the baseflow in the Creek and PSW.

6.7.3 Surface Water Quality Monitoring

As the pumped water is not expected to be discharged to the Creek and PSW, the surface water quality impacts are not anticipated. However, if significant water level changes occur during temporary dewatering, water sampling and chemical testing may be required to assess any change in surface water quality. Should adverse impact be observed during the temporary dewatering, the dewatering volume may need to be modified. If required, water with acceptable water quality which meets the Provincial Water Quality Objectives ("PWQO") standards may be introduced to the Creek and PSW to maintain the baseflow in the Creek and PSW.

6.8 Groundwater Monitoring and Contingency/Mitigation Measures for Temporary Dewatering

Prior to commencement of the temporary dewatering, water level measurements shall be obtained from all on-site monitoring wells to verify the assumed water levels used in the calculations. If significant variation occurs, the dewatering volume calculations may be reviewed and updated.

6.8.1 Total Dewatering Volume

- The pumping rate and discharged volume shall be measured daily using a flow measuring device to ensure that the dewatering rate/volume does not exceed the approved or accepted limits.

- If the measured daily volume exceeds the approved limit, either the dewatering methodology or the construction methodology will need to be altered to ensure the maximum permitted rate is not exceeded.

- The contractor on behalf of the Client shall maintain a record of all water takings, including the dates and durations of water takings, and the rates and total measured volumes of water pumped per day for each day that water is taken under the permit.

6.8.2 Water Quality

Depending on the selected point of discharge, water quality should be regularly monitored during the temporary dewatering to ensure that discharge meets the relevant Local Sewer Use By-Law quality criteria.

As TSS is an important parameter which may directly reflect the water quality, a treatment facility should be considered to reduce the concentration of suspended solids in the pumped water.

Prior to discharge of the treated water, a representative water sample should be collected and analyzed for the parameters specified in the applicable standards or criteria. During the temporary dewatering, daily field monitoring of the TSS and turbidity in the water to be discharged should be carried out at the first week of dewatering to establish the approximate correlation of the TSS and turbidity, which can be used for daily monitoring; a confirmatory testing of TSS should be considered on a weekly basis if required.

In addition, groundwater quality shall be monitored via chemical testing for parameters as specified in the local Sewer Use By-Law weekly for the first month. If the results demonstrate that groundwater quality consistently meets the applicable standards, the monitoring frequency can be reduced to once each month afterwards.

6.9 Groundwater Monitoring and Contingency/Mitigation Measures for Long-Term Drainage

If basements are not designed to be waterproof and resist to hydrostatic uplift, and long-term under slab drainage is used to control groundwater levels beneath the foundations, long-term monitoring and mitigation measures may need to be implemented as part of a long-term Sewer Use agreement with the local municipality. Consultation with the local municipality may be required to understand the scope of the required monitoring and mitigation program.

6.10 Monitoring Well Decommissioning

According to Ontario Regulation 903 (“O. Reg. 903”), when the monitoring wells are no longer used, they should be decommissioned by a licensed water well contractor.

7.0 CLOSURE

We trust that the information contained in this report is complete within our terms of reference. If you have any questions or require further information, please do not hesitate to contact our office.

Sincerely,

GeoPro Consulting Limited

Geotechnical - Hydrogeology - Environmental - Materials Testing – Inspection

Draft

Nick Lan

Draft

David B. Liu, P.Eng., Principal

DRAWINGS

Prepared by: DP	Rev: NL	Approved: DL	Scale: As Shown	Project No.: 22-4078H	Drawing No.: 1	Original Size: Letter
Date: August 2022	Client: HFW Holdings Limited	Title: Site Location Plan	Project: Prliminary Hydrogeological Assessment Proposed Residential Development 395-411 Queensway West, Simcoe, Ontario		GeoPro Consulting Limited	

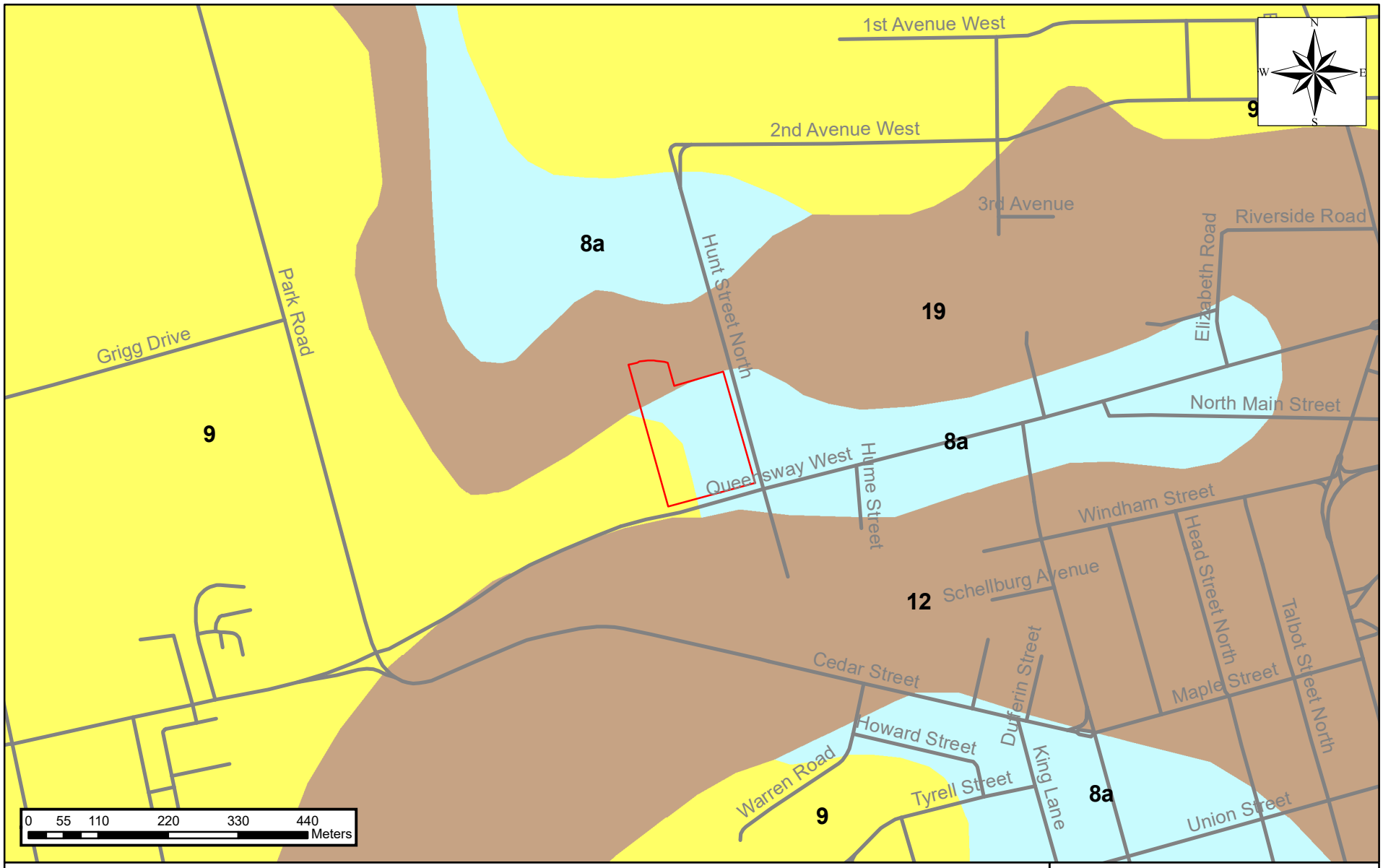
Legend

Site Location

Borehole Location

Monitoring Well Location

Client: **HFW Holdings Limited**		Project No.: **22-4078H**	Drawing No.: **2**
Prepared by: **BN**	Approved: **DL**	Title:	**Borehole/Monitoring Well Location Plan**
Date: **Nov 2022**	Scale: **As Shown**	Project:	**Prliminary Hydrogeological Assessment Proposed Residential Development 395-411 Queensway West, Simcoe, Ontario**
Original Size: **Letter**	Rev: **NL**		*GeoPro* Consulting Limited

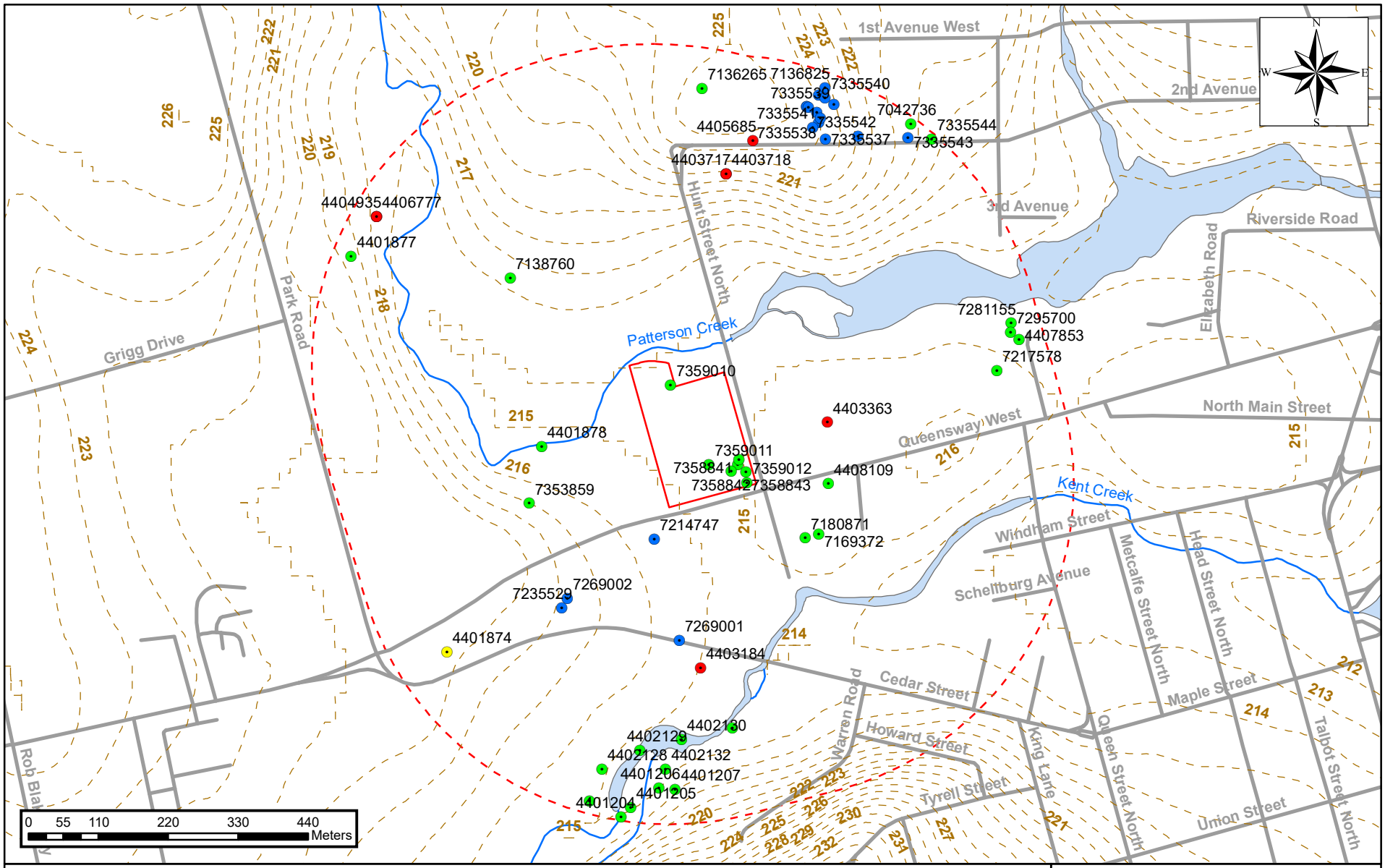


Legend

- Site Location
- 8a: Fine-textured glaciolacustrine deposits. Silt and clay, minor sand and gravel. Massive-well laminated
- 9: Coarse-textured glaciolacustrine deposits: sand, gravel, minor, silt and clay
- 12: Older alluvial deposits: clay, silt, sand, gravel, may contain organic remains

Map Sources:
1. Surficial Geology of Southern Ontario
2. Natural Resources Canada

Prepared by: DP	Rev: NL	Approved: DL	Scale: As Shown	Project No.: 22-4078H	Drawing No.: 3	Original Size: Letter
Date: August 2022	Client: HFW Holdings Limited	Title: Surficial Geology	Project: Preliminary Hydrogeological Assessment Proposed Residential Development 395-411 Queensway West, Simcoe, Ontario		GeoPro Consulting Limited	



Legend

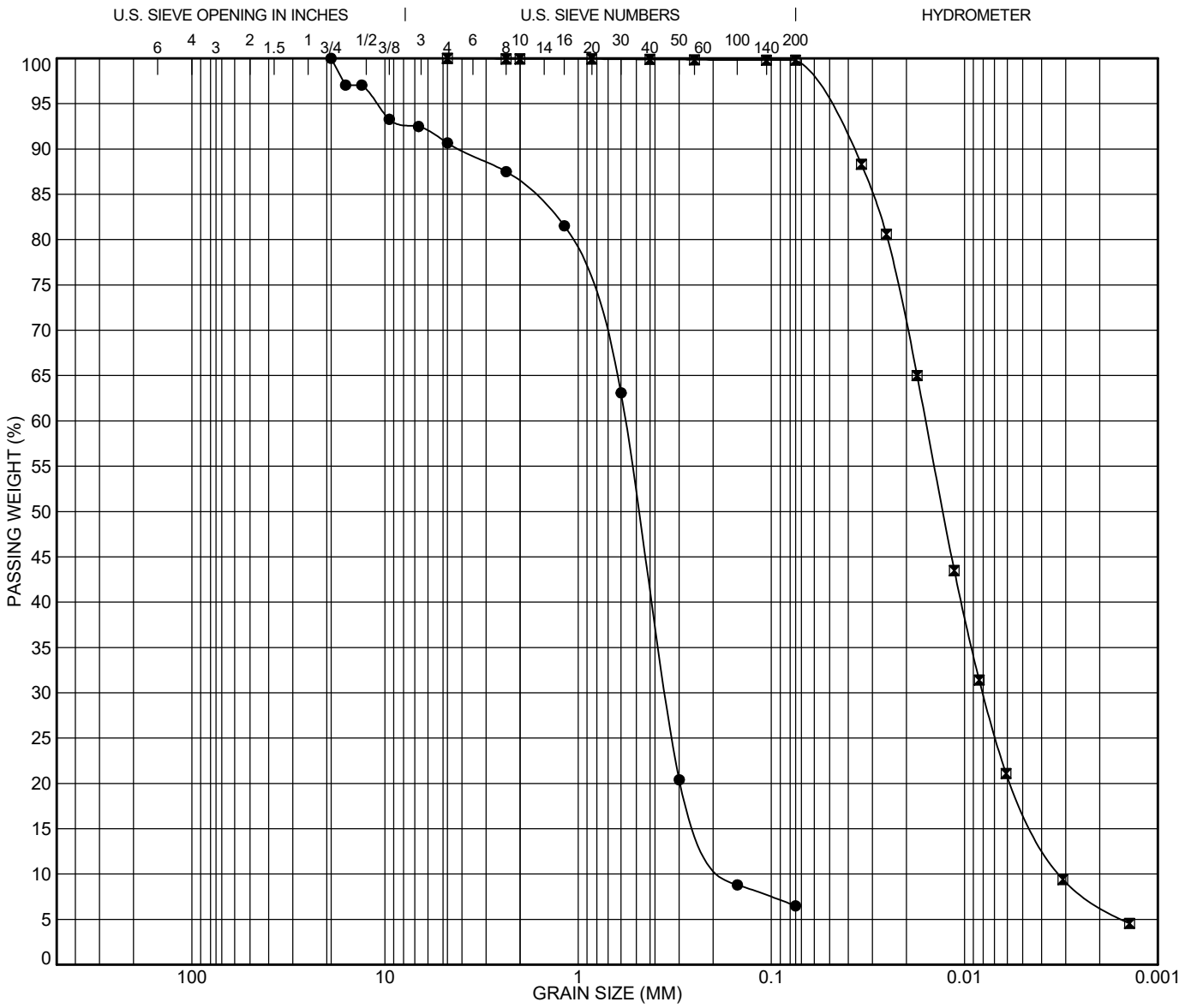
- Site Location
- 500 m Study Area
- Waterbody
- Watercourse
- Surface contour
- Road
- Railway
- Commercial / Domestic / Industrial
- Monitoring / Monitoring and Test Hole
- Municipal
- Not Used / Unknown

Map Sources:
1. Altas Canada - Toporama
2. MECP Water Well Database
3. Resources Canada

Prepared by: DP	Rev: NL	Approved: DL	Scale: As Shown	Project No.: 22-4078H	Drawing No.: 4	Original Size: Letter
Date: August 2022	Client: HFW Holdings Limited	Title: MECP Well Location Plan	Project: Preliminary Hydrogeological Assessment Proposed Residential Development 395-411 Queensway West, Simcoe, Ontario		GeoPro Consulting Limited	

Note: the MECP WWR coordinate data may not be accurate based on our previous experiences, as such, the wells plotted on the drawing should be considered as reference only.
If more accurate information of the wells is required, a door-to-door well survey should be considered.

FIGURES



COBBLES	GRAVEL		SAND			SILT	CLAY
	coarse	fine	coarse	medium	fine		

Specimen Identification				Classification	LL	PL	PI	Cc	Cu
●	**BH2**	**SS6**	**4.57**					**1.34**	**3.54**
⊠	**BH3**	**SS4**	**2.29**					**1.27**	**4.95**

Specimen Identification				D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**BH2**	**SS6**	**4.57**	**19**	**0.571**	**0.351**	**0.161**	**9.3**	**84.2**	**6.5**	
⊠	**BH3**	**SS4**	**2.29**	**4.75**	**0.016**	**0.008**	**0.003**	**0.0**	**0.2**	**93.1**	**6.7**

GeoPro CONSULTING LIMITED
Unit 57, 40 Vogell Road, Richmond Hill, Ontario L4B 3N6
Tel: 905-237-8336 Fax: 905-248-3699
office@geoproconsulting.ca www.geoproconsulting.ca

GRAIN SIZE DISTRIBUTION

PROJECT: Preliminary Geotechnical Investigation for Proposed Residential Development

LOCATION: 395-411 Queensway West, Simcoe, Ontario

PROJECT NO.: 22-4078GH | SAMPLED ON: 2022-09-01

FIGURE NO.: 1 | TESTED ON: 2022-09-22

APPENDIX A

ENCLOSURES

Enclosure 1A: Notes on Sample Descriptions

1. Each soil stratum is described according to the *Modified Unified Soil Classification System*. The compactness condition of cohesionless soils (SPT) and the consistency of cohesive soils (undrained shear strength) are defined according to Canadian Foundation Engineering Manual, 4th Edition. Different soil classification systems may be used by others. Please note that a description of the soil stratums is based on visual and tactile examination of the samples augmented with field and laboratory test results, such as a grain size analysis and/or Atterberg Limits testing. Visual classification is not sufficiently accurate to provide exact grain sizing or precise differentiation between size classification systems.

2. Fill: Where fill is designated on the borehole log it is defined as indicated by the sample recovered during the boring process. The reader is cautioned that fills are heterogeneous in nature and variable in density or degree of compaction. The borehole description may therefore not be applicable as a general description of site fill materials. All fills should be expected to contain obstruction such as wood, large concrete pieces or subsurface basements, floors, tanks, etc., none of these may have been encountered in the boreholes. Since boreholes cannot accurately define the contents of the fill, test pits are recommended to provide supplementary information. Despite the use of test pits, the heterogeneous nature of fill will leave some ambiguity as to the exact composition of the fill. Most fills contain pockets, seams, or layers of organically contaminated soil. This organic material can result in the generation of methane gas and/or significant ongoing and future settlements. Fill at this site may have been monitored for the presence of methane gas and, if so, the results are given on the borehole logs. The monitoring process does not indicate the volume of gas that can be potentially generated nor does it pinpoint the source of the gas. These readings are to advise of the presence of gas only, and a detailed study is recommended for sites where any explosive gas/methane is detected. Some fill material may be contaminated by toxic/hazardous waste that renders it unacceptable for deposition in any but designated land fill sites; unless specifically stated the fill on this site has not been tested for contaminants that may be considered toxic or hazardous. This testing and a potential hazard study can be undertaken if requested. In most residential/commercial areas undergoing reconstruction, buried oil tanks are common and are generally not detected in a conventional preliminary geotechnical site investigation.

3. Till: The term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Because of this geological process the till must be considered heterogeneous in composition and as such may contain pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (60 to 200 mm) or boulders (over 200 mm). Contractors may therefore encounter cobbles and boulders during excavation, even if they are not indicated by the borings. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Because of the horizontal and vertical variability of till, the sample description may be applicable to a very limited zone; caution is therefore essential when dealing with sensitive excavations or dewatering programs in till materials.

GeoPro Consulting Limited

Geotechnical-Hydrogeology-Environmental-Materials-Inspection

Enclosure 1B: Explanation of Terms Used in the Record of Boreholes

Sample Type

AS	Auger sample
BS	Block sample
CS	Chunk sample
DO	Drive open
DS	Dimension type sample
FS	Foil sample
NR	No recovery
RC	Rock core
SC	Soil core
SS	Spoon sample
SH	Shelby tube Sample
ST	Slotted tube
TO	Thin-walled, open
TP	Thin-walled, piston
WS	Wash sample

Penetration Resistance

Standard Penetration Resistance (SPT), N:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in) required to drive a 50 mm (2 in) drive open sampler for a distance of 300 mm (12 in).

PM – Samples advanced by manual pressure
WR – Samples advanced by weight of sampler and rod
WH – Samples advanced by static weight of hammer

Dynamic Cone Penetration Resistance, N_d:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in) to drive uncased a 50 mm (2 in) diameter, 60° cone attached to "A" size drill rods for a distance of 300 mm (12 in).

Piezo-Cone Penetration Test (CPT):

An electronic cone penetrometer with a 60 degree conical tip and a projected end area of 10 cm² pushed through ground at a penetration rate of 2 cm/s. Measurement of tip resistance (Q_t), porewater pressure (PWP) and friction along a sleeve are recorded electronically at 25 mm penetration intervals.

Textural Classification of Soils (ASTM D2487)

Classification	Particle Size
Boulders	> 300 mm
Cobbles	75 mm - 300 mm
Gravel	4.75 mm - 75 mm
Sand	0.075 mm – 4.75 mm
Silt	0.002 mm-0.075 mm
Clay	<0.002 mm(*)

(*) Canadian Foundation Engineering Manual (4th Edition)

Coarse Grain Soil Description (50% greater than 0.075 mm)

Terminology	Proportion
Trace	0-10%
Some	10-20%
Adjective (e.g. silty or sandy)	20-35%
And (e.g. sand and gravel)	> 35%

Soil Description

a) Cohesive Soils(*)

Consistency Value	Undrained Shear Strength (kPa)	SPT "N"
Very soft	<12	0-2
Soft	12-25	2-4
Firm	25-50	4-8
Stiff	50-100	8-15
Very stiff	100-200	15-30
Hard	>200	>30

(*) Hierarchy of Shear Strength prediction

1. Lab triaxial test
2. Field vane shear test
3. Lab. vane shear test
4. SPT "N" value
5. Pocket penetrometer

b) Cohesionless Soils

Density Index (Relative Density)	SPT "N" Value
Very loose	<4
Loose	4-10
Compact	10-30
Dense	30-50
Very dense	>50

Soil Tests

w	Water content
w_p	Plastic limit
w_l	Liquid limit
C	Consolidation (oedometer) test
CID	Consolidated isotropically drained triaxial test
CIU	consolidated isotropically undrained triaxial test with porewater pressure measurement
D_R	Relative density (specific gravity, Gs)
DS	Direct shear test
ENV	Environmental/ chemical analysis
M	Sieve analysis for particle size
MH	Combined sieve and hydrometer (H) analysis
MPC	Modified proctor compaction test
SPC	Standard proctor compaction test
OC	Organic content test
U	Unconsolidated Undrained Triaxial Test
V	Field vane (LV-laboratory vane test)
γ	Unit weight

LOG OF BOREHOLE BH1

PROJECT: Preliminary Geotechnical Investigation for Proposed Residential Development

CLIENT: HFW Holdings Limited

PROJECT LOCATION: 395-411 Queensway West, Simcoe, Ontario

DATUM: N/A

BH LOCATION: See Borehole Location Plan

DRILLING DATA

METHOD: Continuous Flight Auger - Auto Hammer | DIAMETER: 155 mm

FIELD ENGINEER: DG/SN | DATE: 2022-08-31

SAMPLE REVIEW: IG | REF. NO.: 22-4078GH

CHECKED: DX | ENCL. NO.: 2

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	"N" BLOWS/0.3m	ELEVATION
0.0	**GRANULAR FILL:** (220 mm)	1A	SS		Concrete
0.2	**FILL:** sandy silt, trace silt, trace gravel, organic inclusions, rootlet inclusions, brown, moist, compact	1B	SS	19	
0.7	**FILL:** sand to gravelly sand, trace silt, brown, moist, loose to compact	2	SS	10	
		3	SS	21	Bentonite
		4	SS	23	
2.9	**FINE TO MEDIUM SAND:** some silt, brown, wet, compact	5	SS	23	
4.0	**SAND:** some silt, trace gravel, brown to grey, wet, compact	6	SS	17	Sand Screen 4.7mBGS Sep 14
	--- grey	7	SS	18	
		8	SS	21	Natural Pack
8.6	**SILT:** trace clay, trace sand, grey, wet, loose	9	SS	6	
9.6	**END OF BOREHOLE**				

DYNAMIC PENETRATION TEST: ○ SPT, ~ Cone, blows/0.3m; 20 40 60 80

SHEAR STRENGTH (kPa): ● Unconfined, ▲ Quick Triaxial, × Field Vane & Sensitivity, ⊠ Penetrometer, + Lab Vane; 20 40 60 80

Plastic Limit (w_P) | Natural Moisture Content (w) | Liquid Limit (w_L)

WATER CONTENT (%): 10 20 30 40

UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)

GR SA SI CL

Notes:

Continued Next Page

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +³, ×³: Numbers refer to Sensitivity; ▲ ε=3% Strain at Failure

LOG OF BOREHOLE BH1

PROJECT: Preliminary Geotechnical Investigation for Proposed Residential Development

CLIENT: HFW Holdings Limited

PROJECT LOCATION: 395-411 Queensway West, Simcoe, Ontario

DATUM: N/A

BH LOCATION: See Borehole Location Plan

DRILLING DATA

METHOD: Continuous Flight Auger - Auto Hammer

FIELD ENGINEER: DG/SN

SAMPLE REVIEW: IG

CHECKED: DX

DIAMETER: 155 mm

DATE: 2022-08-31

REF. NO.: 22-4078GH

ENCL. NO.: 2

ELEV / DEPTH (m)	DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" BLOWS/0.3m	GROUND WATER	ELEVATION	DYNAMIC PENETRATION TEST: ○ SPT ⌇ Cone blows/0.3m (20 40 60 80); SHEAR STRENGTH (kPa): ● Unconfined ✕ Field Vane & Sensitivity ▲ Quick Triaxial ⊠ Penetrometer + Lab Vane (20 40 60 80)	Plastic Limit / Natural Moisture Content / Liquid Limit (w_P w w_L); WATER CONTENT (%) (10 20 30 40)	UNIT WT (kN/m^3)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	1) Water encountered at a depth of 4.6 m below ground surface (mBGS) during drilling. 2) Water was at a depth of 4.7 mBGS upon completion of drilling. 3) Borehole caved at a depth of 5.5 mBGS upon completion of drilling. 4) 51 mm dia. monitoring well was installed in borehole upon completion of drilling. Water Level Readings Date W.L.Depth(mBGS) Sep. 14, 2022 4.65										

GROUNDWATER ELEVATIONS

Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ▲ ε=3% Strain at Failure

LOG OF BOREHOLE BH2

PROJECT: Preliminary Geotechnical Investigation for Proposed Residential Development

CLIENT: HFW Holdings Limited

PROJECT LOCATION: 395-411 Queensway West, Simcoe, Ontario

DATUM: N/A

BH LOCATION: See Borehole Location Plan

DRILLING DATA

METHOD: Continuous Flight Auger - Auto Hammer | DIAMETER: 155 mm

FIELD ENGINEER: DG/SN | DATE: 2022-08-31

SAMPLE REVIEW: IG | REF. NO.: 22-4078GH

CHECKED: DX | ENCL. NO.: 3

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	"N" BLOWS/0.3m
0.0	**GRANULAR FILL:** (250 mm)	1A	SS	
0.3	**FILL:** silty sand, trace gravel, organic inclusions, rootlet inclusions, brown, moist, loose to compact	1B	SS	22
		2	SS	5
1.4	**FILL:** gravelly sand, some silt, brown, moist, very loose	3	SS	2
2.1	**FILL:** sand, trace silt, trace gravel, organic inclusions, brown, moist, very loose to loose --- rootlet inclusions	4	SS	2
		5	SS	5
4.0	**SAND:** trace silt, trace gravel, brown, wet, compact	6	SS	13
		7	SS	16
6.6	**END OF BOREHOLE**			

Notes:

1) Water encountered at a depth of 4.6 m below ground surface (mBGS) during drilling.
2) Water was at a depth of 4.4 mBGS upon completion of drilling.
3) Borehole caved at a depth of 4.6 mBGS upon completion of drilling.

GROUND WATER ELEVATION

DYNAMIC PENETRATION TEST: ○ SPT, ≈ Cone, blows/0.3m; 20, 40, 60, 80

SHEAR STRENGTH (kPa): ● Unconfined, ✕ Field Vane & Sensitivity, ▲ Quick Triaxial, ⊠ Penetrometer, + Lab Vane; 20, 40, 60, 80

Plastic Limit (w_P) | Natural Moisture Content (w) | Liquid Limit (w_L)

WATER CONTENT (%): 10, 20, 30, 40

UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)

GR	SA	SI	CL
9	84	6	

GROUNDWATER ELEVATIONS

Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES: +³, ×³: Numbers refer to Sensitivity; ▲ ε=3% Strain at Failure

LOG OF BOREHOLE BH3

PROJECT: Preliminary Geotechnical Investigation for Proposed Residential Development

CLIENT: HFW Holdings Limited

PROJECT LOCATION: 395-411 Queensway West, Simcoe, Ontario

DATUM: N/A

BH LOCATION: See Borehole Location Plan

DRILLING DATA

METHOD: Continuous Flight Auger - Auto Hammer | DIAMETER: 155 mm

FIELD ENGINEER: DG/SN | DATE: 2022-09-01

SAMPLE REVIEW: IG | REF. NO.: 22-4078GH

CHECKED: DX | ENCL. NO.: 4

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	"N" BLOWS/0.3m	GROUND WATER / ELEVATION
0.0	**TOPSOIL:** (150 mm)				Concrete
0.2	**FILL:** silty sand, trace gravel, organic inclusions, rootlet inclusions, brown, moist, very loose	1	SS	3	
0.7	**FILL:** silt, trace to some clay, trace sand, organic inclusions, rootlet inclusions, layers of clayey silt, brown, wet, very loose	2A	SS	2	
1.0	**SILT:** trace clay, trace sand, layers of clayey silt, brown, wet, very loose to compact	2B	SS		Bentonite
		3	SS	1	
		4	SS	10	
2.9	**FINE TO MEDIUM SAND:** some silt, trace gravel, brown, moist, compact	5	SS	29	
4.0	**SAND:** trace to some silt, trace gravel, brown, wet, loose to compact				Sand / Screen / 4.7mBGS Sep 14
		6	SS	9	
		7	SS	17	Natural Pack
6.6	**END OF BOREHOLE**				

DYNAMIC PENETRATION TEST: ○ SPT, ≈ Cone, blows/0.3m; 20 40 60 80

SHEAR STRENGTH (kPa): ● Unconfined ✕ Field Vane & Sensitivity ▲ Quick Triaxial ⊠ Penetrometer + Lab Vane; 20 40 60 80

Plastic Limit / Natural Moisture Content / Liquid Limit; w_P w w_L

WATER CONTENT (%): 10 20 30 40

UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)

GR	SA	SI	CL
0	0	93	7

Notes:

1) Water encountered at a depth of 0.7 m below ground surface (mBGS) during drilling.
2) Water was at a depth of 4.8 mBGS upon completion of drilling.
3) Borehole caved at a depth of 5.2 mBGS upon completion of drilling.
4) 51 mm dia. monitoring well was installed in borehole upon completion of drilling.

Water Level Readings

Date	W.L.Depth(mBGS)
Sep. 14, 2022	4.73

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +³, ×³: Numbers refer to Sensitivity; ▲ ε=3% Strain at Failure

LOG OF BOREHOLE BH5

PROJECT: Preliminary Geotechnical Investigation for Proposed Residential Development

CLIENT: HFW Holdings Limited

PROJECT LOCATION: 395-411 Queensway West, Simcoe, Ontario

DATUM: N/A

BH LOCATION: See Borehole Location Plan

DRILLING DATA

METHOD: Continuous Flight Auger - Auto Hammer | DIAMETER: 155 mm

FIELD ENGINEER: DG/SN | DATE: 2022-09-01

SAMPLE REVIEW: IG | REF. NO.: 22-4078GH

CHECKED: DX | ENCL. NO.: 5

ELEV / DEPTH (m)	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" BLOWS/0.3m	GROUND WATER ELEVATION	DYNAMIC PENETRATION TEST (SPT / Cone, blows/0.3m) & SHEAR STRENGTH (kPa)	Plastic Limit / Natural Moisture Content / Liquid Limit; WATER CONTENT (%)	UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**PORTLAND CEMENT CONCRETE:** (340 mm)									
0.3	**FILL:** silty sand, trace gravel, organic inclusions, rootlet inclusions, brown, moist		1	AS						
0.8	**FILL:** sand, some silt, trace gravel, pockets/layers of silt, brown, moist, loose		2	SS	6					
1.4	**SILT:** trace to some clay, trace gravel, layers of clayey silt, pockets of sand, brown to grey, wet, loose to compact		3	SS	7					
			4	SS	9					
			5	SS	11					
	--- grey		6	SS	5					
5.6	**SAND:** trace silt, trace gravel, wet, brown, compact		7	SS	12					
			8	SS	23					
8.1	**END OF BOREHOLE**									

Notes:

1) Water encountered at a depth of 1.5 m below ground surface (mBGS) during drilling.
2) Water was at a depth of 4.6 mBGS upon completion of drilling.
3) Borehole caved at a depth of 4.6 mBGS upon completion of drilling.

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +³, ×³: Numbers refer to Sensitivity; ▲ ε=3% Strain at Failure

APPENDIX B

22-4078H

Well ID	East	North	Use Type
4403363	555714	4743810	Commercial
Total: 1			
4404935	555003	4744134	Domestic
4405685	555596	4744254	Domestic
4406777	555003	4744134	Domestic
Total: 3			
4403184	555514	4743422	Industrial
4403717	555554	4744202	Industrial
4403718	555554	4744202	Industrial
Total: 3			
4401874	555114	4743447	Municipal
Total: 1			
7136825	555681	4744307	Monitoring
7136825	555700	4744326	Monitoring
7136825	555710	4744338	Monitoring
7136825	555681	4744308	Monitoring
7136825	555697	4744299	Monitoring
7136825	555700	4744282	Monitoring
7214747	555441	4743626	Monitoring
7235529	555295	4743516	Monitoring
7269001	555480	4743465	Monitoring
7269002	555304	4743532	Monitoring
7348133	555724	4744311	Monitoring
Total: 11			
7335537	555711	4744256	Monitoring and Test Hole
7335538	555703	4744289	Monitoring and Test Hole
7335539	555684	4744306	Monitoring and Test Hole
7335540	555710	4744322	Monitoring and Test Hole
7335541	555690	4744275	Monitoring and Test Hole
7335542	555762	4744261	Monitoring and Test Hole
7335543	555841	4744258	Monitoring and Test Hole
Total: 7			
4401877	554964	4744072	Not Used
4402128	555359	4743262	Not Used
4402129	555419	4743292	Not Used
4402132	555459	4743262	Not Used
4407853	556015	4743940	Not Used
7042736	555845	4744281	Not Used
7136265	555516	4744336	Not Used
Total: 7			
4401188	555339	4743212	Unknown
4401189	555564	4743327	Unknown
4401204	555389	4743187	Unknown
4401205	555404	4743202	Unknown

4401206	555449	4743232	Unknown
4401207	555474	4743230	Unknown
4401878	555264	4743772	Unknown
4402130	555484	4743309	Unknown
4408109	555715	4743713	Unknown
7138760	555214	4744037	Unknown
7169372	555700	4743633	Unknown
7180871	555679	4743627	Unknown
7217578	555980	4743892	Unknown
7281155	556003	4743966	Unknown
7295700	556002	4743952	Unknown
7335544	555878	4744256	Unknown
7353859	555244	4743682	Unknown
7358616	555572	4743743	Unknown
7358841	555574	4743751	Unknown
7358842	555562	4743733	Unknown
7358843	555585	4743731	Unknown
7359010	555467	4743868	Unknown
7359011	555527	4743743	Unknown
7359012	555587	4743715	Unknown
7389906	555819	4744013	Unknown
Total: 25			

Summary of Well Types within 500 m Radius from the Site			
Well Types	Number of Record		Total
Commercial	1	7	58
Domestic	3		
Industrial	3		
Municipal	1	1	
Monitoring	11	18	
Monitoring and Test Hole	7		
Not Used	7	32	
Unknown	25		

Water Well Records

miércoles, 24 de agosto de 2022

2:10:39 p. m.

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
SIMCOE TOWN	17 555389 4743187 W	1963/08 2801	5					4401204 ()	BLCK LOAM 0001 MSND CLAY GRVL 0005 MSND GRVL 0019 SILT 0021
SIMCOE TOWN	17 555474 4743230 W	1963/08 2801	5					4401207 ()	LOAM 0001 CLAY MSND 0004 SILT 0023
SIMCOE TOWN	17 555404 4743202 W	1963/08 2801	5					4401205 ()	BLCK LOAM 0001 MSND GRVL CLAY 0003 MSND GRVL 0011 MSND CLAY GRVL 0019 CLAY SILT 0021
SIMCOE TOWN	17 555564 4743327 W	1959/11 2801	2					4401189 ()	BLCK MUCK 0005 BLCK MUCK MSND 0011 CLAY 0025 CLAY 0078 CLAY GRVL 0085 ROCK 0086
SIMCOE TOWN	17 556003 4743966 W	2016/10 7464						7281155 (C35013) A208349 P	
SIMCOE TOWN	17 555480 4743465 W	2015/10 6607	2,00			MO	0020 5	7269001 (Z219995) A192807	BRWN SAND GRVL FILL 0004 BLCK PEAT SAND SOFT 0006 BRWN SAND FSND 0012 GREY SILT SAND SOFT 0025
SIMCOE TOWN	17 555714 4743810 W	1974/09 3310	1	FR 0027	15//25/1:0	CO	0030 4	4403363 ()	BRWN SAND 0004 YLLW CLAY 0009 BLUE CLAY 0027 GREY CSND 0037
SIMCOE TOWN	17 556002 4743952 W	2017/08 7464						7295700 (C39126) P	
SIMCOE TOWN	17 555715 4743713 W	2004/04 7190	1,97	UK 0011			0005 10	4408109 (Z06383) A006787	BRWN GRVL SAND LOOS 0005 BRWN SAND SILT LOOS 0015
SIMCOE TOWN	17 555554 4744202 W	1976/10 5201	5	FR 0038	28/28/30/2:0	IN	0050 5	4403718 ()	YLLW FILL 0010 YLLW CLAY 0023 BLUE CLAY 0044 GREY CSND 0055
SIMCOE TOWN	17 555554 4744202 W	1976/10 5201	5	FR 0036	30/30/30/2:0	IN	0052 5	4403717 ()	YLLW FILL 0010 YLLW CLAY 0030 BLUE CLAY 0048 GREY CSND 0057
SIMCOE TOWN	17 555449 4743232 W	1963/08 2801	5					4401206 ()	BLCK LOAM 0001 MSND CLAY GRVL 0004 MSND 0010 SILT 0017
SIMCOE TOWN	17 555214 4744037 W	2009/01 7193						7138760 (Z76986) A072114 A	
SIMCOE TOWN	17 555339 4743212 W	1959/11 2801	2					4401188 ()	LOAM 0001 FSND MSND 0017 CLAY SILT 0020 SILT MSND 0040 CLAY 0077 CLAY SILT 0087 CLAY GRVL 0100 ROCK 0101
SIMCOE TOWN	17 555711 4744256 W	2019/01 7241	2		///:	MT	0045 5	7335537 (Z305000) A263186	BRWN SILT SAND CLAY 0014 GREY SILT SAND WBRG 0025 GREY SILT SAND CLAY 0043 BRWN CSND WBRG 0050
SIMCOE TOWN	17 555703 4744289 W	2019/01 7241	2		///:	MT	0025 5	7335538 (Z305329) A263192	GREY GRVL 0001 BRWN FILL 0005 BRWN SAND SILT 0022 GREY SAND SILT 0030

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
SIMCOE TOWN	17 555684 4744306 W	2019/01 7241	2		///:	MT	0025 5	7335539 (Z305327) A263193	GREY GRVL 0001 BRWN FILL 0005 BRWN SAND SILT 0022 GREY SAND SILT 0030
SIMCOE TOWN	17 555514 4743422 W	1973/11 5201	4	FR 0013	13/20/45/2:0	IN	0021 5	4403184 ()	GREY LOAM CMTD 0001 GREY GRVL 0003 BLCK PEAT 0013 GREY SAND 0026 BLUE CLAY 0031
SIMCOE TOWN	17 555710 4744322 W	2019/01 7241	2		///:	MT	0025 5	7335540 (Z305326) A263194	GREY GRVL 0001 BRWN FILL 0005 BRWN SAND SILT 0022 GREY SAND SILT 0030
SIMCOE TOWN	17 555690 4744275 W	2019/01 7241	2		///:	MT	0020 5	7335541 (Z305325) A263195	GREY GRVL 0001 BRWN FILL 0005 BRWN SAND SILT 0018 GREY SAND SILT 0025
SIMCOE TOWN	17 555762 4744261 W	2019/01 7241	2		///:	MT	0015 5	7335542 (Z305324) A263196	BRWN LOAM 0002 BRWN FILL 0004 BRWN SAND SILT 0016 GREY SAND SILT 0020
SIMCOE TOWN	17 555841 4744258 W	2019/01 7241	2		///:	MT	0015 5	7335543 (Z290286) A263142	GREY ---- 0001 BRWN FILL 0003 BRWN SILT SAND 0020
SIMCOE TOWN	17 555878 4744256 W	2019/01 7241	2		///:		0034 5	7335544 (Z305267) A263346	BLCK ---- 0003 BRWN SILT 0035 BRWN SAND 0039
SIMCOE TOWN	17 555572 4743743 W	2020/03 7241						7358616 (Z334575) A291898 P	
WINDHAM TOWNSHIP	17 555700 4743633 W	2011/09 7464						7169372 (M10996) A121616 P	
WINDHAM TOWNSHIP	17 555574 4743751 W	2020/04 7241						7358841 (Z337871) A288970 P	
WINDHAM TOWNSHIP	17 555980 4743892 W	2014/02 7147						7217578 (C25002) A149643 P	
WINDHAM TOWNSHIP	17 555724 4744311 W	2019/10 7241	2		///:	MO	0010 10	7348133 (Z323481) A281669	BRWN SAND SILT WBRG 0007 BRWN SILT SAND WBRG 0018 GREY SILT CLAY 0020
WINDHAM TOWNSHIP	17 555587 4743715 W	2020/03 7241						7359012 (Z334571) A291897 P	
WINDHAM TOWNSHIP	17 555527 4743743 W	2020/03 7241						7359011 (Z334572) A291896 P	

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
WINDHAM TOWNSHIP	17 555467 4743868 W	2020/03 7241						7359010 (Z334573) A291895 P	
WINDHAM TOWNSHIP	17 555679 4743627 W	2011/12 7464						7180871 (Z137853) A	
WINDHAM TOWNSHIP	17 555295 4743516 W	2014/09 7472	0,75			MO	0015 10	7235529 (Z200687) A168472	BRWN SILT FSND PCKD 0010 GREY SILT FSND PCKD 0025
WINDHAM TOWNSHIP	17 555562 4743733 W	2020/04 7241						7358842 (Z337869) A265739 P	
WINDHAM TOWNSHIP	17 555441 4743626 W	2013/11 7190	2			MO	0018 10	7214747 (Z180391) A146236	BRWN SAND GRVL LOOS 0002 BRWN SAND SILT LOOS 0028
WINDHAM TOWNSHIP	17 555304 4743532 W	2015/10 6607	2,00			MO	0010 5	7269002 (Z219996) A192835	BRWN SAND SILT SOFT 0007 BRWN SAND SOFT 0015
WINDHAM TOWNSHIP	17 555585 4743731 W	2020/04 7241						7358843 (Z337870) A265738 P	
WINDHAM TOWNSHIP 14 002	17 555845 4744281 W	2007/03 7282	1,97 1,97	FR 0012		NU	0027 5 0015 10	7042736 (Z66007) A048068	BLCK 0000 BLUE GRVL 0001 BRWN CSND 0005 BRWN FSND SILT 0020 BRWN SILT CLAY 0025 GREY MSND 0032 0044
WINDHAM TOWNSHIP CON 14	17 555244 4743682 W	2019/11 7190						7353859 (C44966) A281409 P	
WINDHAM TOWNSHIP CON 14 001	17 556015 4743940 W	2002/07 2801				NU		4407853 (249780) A	
WINDHAM TOWNSHIP CON 14 002	17 555516 4744336 W	2009/12 7147	1,25	FR 0008		NU MO	0005 10	7136265 (Z097824) A093031	BRWN FILL 0006 BRWN CLAY SILT TILL 0015
WINDHAM TOWNSHIP CON 14 002	17 555596 4744254 L	1990/06 5201	5	FR 0024	19/19/25/1:0	DO	0030 5	4405685 (78379)	BRWN LOAM 0002 BRWN CLAY 0017 BLUE CLAY 0024 GREY CSND 0035
WINDHAM TOWNSHIP CON 14 002	17 555681 4744307 W	2009/11 7238	2,00	UK 0051		MO		7136825 (M04691) A090716	BRWN SILT SAND 0049 BRWN SAND 0062
WINDHAM TOWNSHIP CON 14 003	17 555264 4743772 W	1960/11 2801	5					4401878 ()	BLCK CLAY MSND 0015 BLUE CLAY 0038 CLAY SILT 0050 SILT 0078 SILT CLAY 0090 CLAY 0138 ROCK 0139
WINDHAM TOWNSHIP CON 14 003	17 555114 4743447 W	1958/07 2608	2	FR 0005	//50/1:0	MN		4401874 ()	BLCK MUCK 0005 FSND 0011 CSND 0016
WINDHAM TOWNSHIP CON 14 003	17 554964 4744072 W	1960/10 2801	5	UK		NU		4401877 ()	FILL 0003 BLCK MUCK 0009 MSND GRVL 0011 CLAY 0021 FSND 0026 CLAY SILT 0077 CLAY 0124 CLAY BLDR 0133 ROCK 0134

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
WINDHAM TOWNSHIP CON 14 003	17 555003 4744134 L	1996/03 5201	1	UK 0015	15//10/2:30	DO	0022 4	4406777 (168582)	BLCK LOAM 0002 BRWN CSND 0015 GREY CSND 0026
WINDHAM TOWNSHIP CON 14 003	17 555003 4744134 L	1985/06 5201	4	FR 0023	23/23/10/1:30	DO	0048 4	4404935 ()	BLCK LOAM 0002 BRWN CLAY 0015 BRWN SAND 0023 BRWN SAND 0035 GREY CSND WBRG 0052
WOODHOUSE TOWNSHIP GORE 016	17 555359 4743262 W	1962/09 2801	2	FR	1///:	NU	0015 10	4402128 ()	GRVL MSND 0001 MSND SILT CLAY 0005 MSND SILT GRVL 0011 FSND CSND CLAY 0025 CLAY 0028
WOODHOUSE TOWNSHIP GORE 016	17 555459 4743262 W	1962/10 2801	2	FR	4///:	NU	0021 5	4402132 ()	MSND CLAY 0004 MSND 0025 MSND GRVL 0026 MSND SILT CLAY 0039
WOODHOUSE TOWNSHIP GORE 016	17 555484 4743309 W	1962/09 2801	5					4402130 ()	MSND GRVL 0001 BLCK MUCK 0003 MSND GRVL 0005 CLAY SILT 0051
WOODHOUSE TOWNSHIP GORE 016	17 555419 4743292 W	1962/09 2801	2	FR	0///:	NU	0019 5	4402129 ()	LOAM 0001 MSND 0003 FSND CSND CLAY 0024 CLAY 0027

Notes:
UTM: UTM in Zone, Easting, Northing and Datum is NAD83; L: UTM estimated from Centroid of Lot; W: UTM not from Lot Centroid
DATE CNTR: Date Work Completedand Well Contractor Licence Number
CASING DIA: .Casing diameter in inches
WATER: Unit of Depth in Fee. See Table 4 for Meaning of Code

PUMP TEST: Static Water Level in Feet / Water Level After Pumping in Feet / Pump Test Rate in GPM / Pump Test Duration in Hour : Minutes
WELL USE: See Table 3 for Meaning of Code
SCREEN: Screen Depth and Length in feet
WELL: WEL (AUDIT #) Well Tag . A: Abandonment; P: Partial Data Entry Only
FORMATION: See Table 1 and 2 for Meaning of Code

1. Core Material and Descriptive terms

Code	Description	Code	Description	Code	Description	Code	Description	Code	Description
BLDR	BOULDERS	FCRD	FRACTURED	IRFM	IRON FORMATION	PORS	POROUS	SOFT	SOFT
BSLT	BASALT	FGRD	FINE-GRAINED	LIMY	LIMY	PRDG	PREVIOUSLY DUG	SPST	SOAPSTONE
CGRD	COARSE-GRAINED	FGVL	FINE GRAVEL	LMSN	LIMESTONE	PRDR	PREV. DRILLED	STKY	STICKY
CGVL	COARSE GRAVEL	FILL	FILL	LOAM	TOPSOIL	QRTZ	QUARTZITE	STNS	STONES
CHRT	CHERT	FLDS	FELDSPAR	LOOS	LOOSE	QSND	QUICKSAND	STNY	STONEY
CLAY	CLAY	FLNT	FLINT	LTCL	LIGHT-COLOURED	QTZ	QUARTZ	THIK	THICK
CLN	CLEAN	FOSS	FOSILIFEROUS	LYRD	LAYERED	ROCK	ROCK	THIN	THIN
CLYY	CLAYEY	FSND	FINE SAND	MARL	MARL	SAND	SAND	TILL	TILL
CMTD	CEMENTED	GNIS	GNEISS	MGRD	MEDIUM-GRAINED	SHLE	SHALE	UNKN	UNKNOWN TYPE
CONG	CONGLOMERATE	GRNT	GRANITE	MGVL	MEDIUM GRAVEL	SHLY	SHALY	VERY	VERY
CRYS	CRYSTALLINE	GRSN	GREENSTONE	MRBL	MARBLE	SHRP	SHARP	WBRG	WATER-BEARING
CSND	COARSE SAND	GRVL	GRAVEL	MSND	MEDIUM SAND	SHST	SCHIST	WDFR	WOOD FRAGMENTS
DKCL	DARK-COLOURED	GRWK	GREYWACKE	MUCK	MUCK	SILT	SILT	WTHD	WEATHERED
DLMT	DOLOMITE	GVLY	GRAVELLY	OBDN	OVERBURDEN	SLTE	SLATE		
DNSE	DENSE	GYPS	GYPSUM	PCKD	PACKED	SLTY	SILTY		
DRTY	DIRTY	HARD	HARD	PEAT	PEAT	SNDS	SANDSTONE		
DRY	DRY	HPAN	HARDPAN	PGVL	PEA GRAVEL	SNDY	SANDYOAPSTONE		

2. Core Color

Code	Description
WHIT	WHITE
GREY	GREY
BLUE	BLUE
GREN	GREEN
YLLW	YELLOW
BRWN	BROWN
RED	RED
BLCK	BLACK
BLGY	BLUE-GREY

3. Well Use

Code	Description	Code	Description
DO	Domestic	OT	Other
ST	Livestock	TH	Test Hole
IR	Irrigation	DE	Dewatering
IN	Industrial	MO	Monitoring
CO	Commercial	MT	Monitoring TestHole
MN	Municipal		
PS	Public		
AC	Cooling And A/C		
NU	Not Used		

4. Water Detail

Code	Description	Code	Description
FR	Fresh	GS	Gas
SA	Salty	IR	Iron
SU	Sulphur		
MN	Mineral		
UK	Unknown		

APPENDIX C

CERTIFICATE OF ANALYSIS (GUIDELINE EVALUATION)

Work Order	: **WT2215075**	Page	: 1 of 7
Client	: **GeoPro Consulting Limited**	Laboratory	: Waterloo - Environmental
Contact	: Elab	Account Manager	: Costas Farassoglou
Address	: 40 Vogell Road Unit 57 Richmond Hill ON Canada L4B 3N6	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: 416 209 5668	Telephone	: 613 225 8279
Project	: 22-4078 (NORFOLK SEWER USE)	Date Samples Received	: 21-Sep-2022 17:15
PO	: ----	Date Analysis Commenced	: 22-Sep-2022
C-O-C number	: ----	Issue Date	: 29-Sep-2022 13:48
Sampler	: ----		
Site	: ----		
Quote number	: GEOPRO 2022 Standing Offer		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Guideline Comparison

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Caitlin Macey	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Greg Pokocky	Supervisor - Inorganic	Inorganics, Waterloo, Ontario
Greg Pokocky	Supervisor - Inorganic	Metals, Waterloo, Ontario
Jocelyn Kennedy	Department Manager - Semi-Volatile Organics	Organics, Waterloo, Ontario
Jon Fisher	Department Manager - Inorganics	Inorganics, Waterloo, Ontario
Walt Kippenhuck	Team Leader - Inorganics	Inorganics, Waterloo, Ontario

Summary of Guideline Breaches by Sample

SampleID/Client ID	Matrix	Analyte	Analyte Summary	Guideline	Category	Result	Limit
BH5	Water	solids, total suspended [TSS]		NORSAN	SAN	16300 mg/L	350 mg/L
	Water	iron, total		NORSAN	SAN	90.9 mg/L	50 mg/L
	Water	manganese, total		NORSAN	SAN	10.4 mg/L	5 mg/L
	Water	phosphorus, total		ONPWQO	PWQO	0.618 mg/L	0.01 mg/L
	Water	aluminum, total		ONPWQO	PWQO	41.4 mg/L	0.015 mg/L
	Water	arsenic, total		ONPWQO	PWQO	0.0240 mg/L	0.005 mg/L
	Water	cadmium, total		ONPWQO	PWQO	0.000659 mg/L	0.0001 mg/L
	Water	cobalt, total		ONPWQO	PWQO	0.0366 mg/L	0.0009 mg/L
	Water	copper, total		ONPWQO	PWQO	0.131 mg/L	0.001 mg/L
	Water	iron, total		ONPWQO	PWQO	90.9 mg/L	0.3 mg/L
	Water	lead, total		ONPWQO	PWQO	0.0523 mg/L	0.001 mg/L
	Water	nickel, total		ONPWQO	PWQO	0.0798 mg/L	0.025 mg/L
	Water	silver, total		ONPWQO	PWQO	0.000194 mg/L	0.0001 mg/L
	Water	vanadium, total		ONPWQO	PWQO	0.0895 mg/L	0.006 mg/L
	Water	zinc, total		ONPWQO	PWQO	0.252 mg/L	0.02 mg/L
	Water	phenols, total (4AAP)		ONPWQO	PWQO	0.0012 mg/L	0.001 mg/L

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.
Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guidelines are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.

Key : LOR: Limit of Reporting (detection limit).

Unit	*Description*
mg/L	milligrams per litre
pH units	pH units

>: greater than.
<: less than.
Red shading is applied where the result is greater than the Guideline Upper Limit or the result is lower than the Guideline Lower Limit.
For drinking water samples, Red shading is applied where the result for E.coli, fecal or total coliforms is greater than or equal to the Guideline Upper Limit.

Qualifiers

Qualifier	*Description*
BODL	*Limit of Reporting for BOD was increased to account for the largest volume of sample tested.*
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*
DLHC	*Detection Limit Raised: Dilution required due to high concentration of test analyte(s).*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*

Analytical Results Evaluation

Matrix: **Water**

Analyte	CAS Number	Unit	Client sample ID: BH5	----	----	----	----	----	----
			Sampling date/time: 20-Sep-2022	----	----	----	----	----	----
			Sub-Matrix: Water	----	----	----	----	----	----
			WT2215075-001	--------	--------	--------	--------	--------	--------
Physical Tests									
pH	----	pH units	7.34	----	----	----	----	----	----
solids, total suspended [TSS]	----	mg/L	16300 DLHC	----	----	----	----	----	----
Anions and Nutrients									
chloride	16887-00-6	mg/L	237 DLDS	----	----	----	----	----	----
fluoride	16984-48-8	mg/L	<0.100 DLDS	----	----	----	----	----	----
Kjeldahl nitrogen, total [TKN]	----	mg/L	<0.500 DLM	----	----	----	----	----	----
phosphorus, total	7723-14-0	mg/L	0.618	----	----	----	----	----	----
sulfate (as SO4)	14808-79-8	mg/L	35.3 DLDS	----	----	----	----	----	----
Cyanides									
cyanide, strong acid dissociable (total)	----	mg/L	<0.0020	----	----	----	----	----	----
Total Sulfides									
sulfide, total (as H2S)	7783-06-4	mg/L	<0.011	----	----	----	----	----	----
sulfide, total (as S)	18496-25-8	mg/L	<0.010	----	----	----	----	----	----
Total Metals									
aluminum, total	7429-90-5	mg/L	41.4 DLHC	----	----	----	----	----	----
antimony, total	7440-36-0	mg/L	<0.00100 DLHC	----	----	----	----	----	----
arsenic, total	7440-38-2	mg/L	0.0240 DLHC	----	----	----	----	----	----
barium, total	7440-39-3	mg/L	0.207 DLHC	----	----	----	----	----	----
bismuth, total	7440-69-9	mg/L	0.000570 DLHC	----	----	----	----	----	----
cadmium, total	7440-43-9	mg/L	0.000659 DLHC	----	----	----	----	----	----
chromium, total	7440-47-3	mg/L	0.0647 DLHC	----	----	----	----	----	----
cobalt, total	7440-48-4	mg/L	0.0366 DLHC	----	----	----	----	----	----
copper, total	7440-50-8	mg/L	0.131 DLHC	----	----	----	----	----	----
iron, total	7439-89-6	mg/L	90.9 DLHC	----	----	----	----	----	----
lead, total	7439-92-1	mg/L	0.0523 DLHC	----	----	----	----	----	----
manganese, total	7439-96-5	mg/L	10.4 DLHC	----	----	----	----	----	----
mercury, total	7439-97-6	mg/L	0.0000115	----	----	----	----	----	----
molybdenum, total	7439-98-7	mg/L	0.000978 DLHC	----	----	----	----	----	----

Analytical Results Evaluation

Matrix: **Water**

Analyte	CAS Number	Unit	Client sample ID	----	----	----	----	----	----
			BH5	**----**	**----**	**----**	**----**	**----**	**----**
			Sampling date/time	20-Sep-2022	----	----	----	----	----	----
			Sub-Matrix	Water	----	----	----	----	----	----
			WT2215075-001	--------	--------	--------	--------	--------	--------
Total Metals										
nickel, total	7440-02-0	mg/L	0.0798 DLHC	----	----	----	----	----	----
selenium, total	7782-49-2	mg/L	<0.000500 DLHC	----	----	----	----	----	----
silver, total	7440-22-4	mg/L	0.000194 DLHC	----	----	----	----	----	----
tin, total	7440-31-5	mg/L	0.00406 DLHC	----	----	----	----	----	----
titanium, total	7440-32-6	mg/L	0.795 DLHC	----	----	----	----	----	----
vanadium, total	7440-62-2	mg/L	0.0895 DLHC	----	----	----	----	----	----
zinc, total	7440-66-6	mg/L	0.252 DLHC	----	----	----	----	----	----
Aggregate Organics										
biochemical oxygen demand [BOD]	----	mg/L	<3.0 BODL	----	----	----	----	----	----
carbonaceous biochemical oxygen demand [CBOD]	----	mg/L	<3.0 BODL	----	----	----	----	----	----
chemical oxygen demand [COD]	----	mg/L	26	----	----	----	----	----	----
oil & grease (gravimetric)	----	mg/L	<5.0	----	----	----	----	----	----
oil & grease, animal/vegetable (gravimetric)	----	mg/L	<5.0	----	----	----	----	----	----
oil & grease, mineral (gravimetric)	----	mg/L	<5.0	----	----	----	----	----	----
phenols, total (4AAP)	----	mg/L	0.0012	----	----	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

Summary of Guideline Limits

Analyte	CAS Number	Unit	NORSAN SAN	ONPWQO PWQO					
Physical Tests									
pH	----	pH units	**6 - 9.5 pH units**	**6.5 - 8.5 pH units**					
solids, total suspended [TSS]	----	mg/L	**350 mg/L**						
Anions and Nutrients									
chloride	16887-00-6	mg/L	**1500 mg/L**						
fluoride	16984-48-8	mg/L	**10 mg/L**						
Kjeldahl nitrogen, total [TKN]	----	mg/L	**100 mg/L**						
phosphorus, total	7723-14-0	mg/L	**10 mg/L**	**0.01 mg/L**					
sulfate (as SO4)	14808-79-8	mg/L							
Cyanides									
cyanide, strong acid dissociable (total)	----	mg/L		**0.005 mg/L**					
Total Sulfides									
sulfide, total (as H2S)	7783-06-4	mg/L							
sulfide, total (as S)	18496-25-8	mg/L	**2 mg/L**						
Total Metals									
aluminum, total	7429-90-5	mg/L	**50 mg/L**	**0.015 mg/L**					
antimony, total	7440-36-0	mg/L	**5 mg/L**	**0.02 mg/L**					
arsenic, total	7440-38-2	mg/L	**1 mg/L**	**0.005 mg/L**					
barium, total	7440-39-3	mg/L	**5 mg/L**						
bismuth, total	7440-69-9	mg/L	**5 mg/L**						
cadmium, total	7440-43-9	mg/L	**0.1 mg/L**	**0.0001 mg/L**					
chromium, total	7440-47-3	mg/L	**1 mg/L**						
cobalt, total	7440-48-4	mg/L	**5 mg/L**	**0.0009 mg/L**					
copper, total	7440-50-8	mg/L	**2 mg/L**	**0.001 mg/L**					
iron, total	7439-89-6	mg/L	**50 mg/L**	**0.3 mg/L**					
lead, total	7439-92-1	mg/L	**3 mg/L**	**0.001 mg/L**					
manganese, total	7439-96-5	mg/L	**5 mg/L**						
mercury, total	7439-97-6	mg/L	**0.1 mg/L**	**0.0002 mg/L**					
molybdenum, total	7439-98-7	mg/L	**5 mg/L**	**0.04 mg/L**					
nickel, total	7440-02-0	mg/L	**3 mg/L**	**0.025 mg/L**					
selenium, total	7782-49-2	mg/L	**1 mg/L**	**0.1 mg/L**					
silver, total	7440-22-4	mg/L	**5 mg/L**	**0.0001 mg/L**					
tin, total	7440-31-5	mg/L	**5 mg/L**						
titanium, total	7440-32-6	mg/L	**5 mg/L**						
vanadium, total	7440-62-2	mg/L	**5 mg/L**	**0.006 mg/L**					
zinc, total	7440-66-6	mg/L	**2 mg/L**	**0.02 mg/L**					
Aggregate Organics									

Analyte	CAS Number	Unit	NORSAN SAN	ONPWQO PWQO					
Aggregate Organics - Continued									
biochemical oxygen demand [BOD]	----	mg/L							
carbonaceous biochemical oxygen demand [CBOD]	----	mg/L	**300 mg/L**						
chemical oxygen demand [COD]	----	mg/L	**1000 mg/L**						
oil & grease (gravimetric)	----	mg/L							
oil & grease, animal/vegetable (gravimetric)	----	mg/L	**100 mg/L**						
oil & grease, mineral (gravimetric)	----	mg/L	**15 mg/L**						
phenols, total (4AAP)	----	mg/L	**1 mg/L**	**0.001 mg/L**					

Please refer to the General Comments section for an explanation of any qualifiers detected.

Key:

NORSAN	Ontario Norfolk Sanitary Sewer Use By-Law (2022-10-1)
SAN	Norfolk Sanitary Sewer By-Law (2022-10-1)
ONPWQO	Ontario PWQO (Provincial Water Quality Objectives, JULY, 1994)
PWQO	Surface Water PWQO

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **WT2215075**	Page	: 1 of 10
Client	: **GeoPro Consulting Limited**	Laboratory	: Waterloo - Environmental
Contact	: Elab	Account Manager	: Costas Farassoglou
Address	: 40 Vogell Road Unit 57 Richmond Hill ON Canada L4B 3N6	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: 416 209 5668	Telephone	: 613 225 8279
Project	: 22-4078 (NORFOLK SEWER USE)	Date Samples Received	: 21-Sep-2022 17:15
PO	: ----	Issue Date	: 29-Sep-2022 13:44
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: GEOPRO 2022 Standing Offer		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT-48h]										
BH5	E550	20-Sep-2022	----	----	----		22-Sep-2022	48 hrs	48 hrs	✓
Aggregate Organics : Biochemical Oxygen Demand (Carbonaceous) - 5 day										
HDPE [BOD HT-48h]										
BH5	E555	20-Sep-2022	----	----	----		22-Sep-2022	48 hrs	48 hrs	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid)										
BH5	E559-L	20-Sep-2022	----	----	----		22-Sep-2022	28 days	3 days	✓
Aggregate Organics : Mineral Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid)										
BH5	E567SG	20-Sep-2022	22-Sep-2022	28 days	2 days	✓	23-Sep-2022	40 days	1 days	✓
Aggregate Organics : Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid)										
BH5	E567	20-Sep-2022	22-Sep-2022	28 days	2 days	✓	23-Sep-2022	40 days	1 days	✓
Aggregate Organics : Phenols (4AAP) in Water by Colorimetry										
Amber glass total (sulfuric acid)										
BH5	E562	20-Sep-2022	22-Sep-2022	----	----		22-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE [ON MECP]										
BH5	E235.Cl	20-Sep-2022	22-Sep-2022	----	----		22-Sep-2022	28 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride in Water by IC										
HDPE [ON MECP]										
BH5	E235.F	20-Sep-2022	22-Sep-2022	----	----		22-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE [ON MECP]										
BH5	E235.SO4	20-Sep-2022	22-Sep-2022	----	----		22-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
BH5	E318	20-Sep-2022	22-Sep-2022	----	----		23-Sep-2022	28 days	4 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
BH5	E372-U	20-Sep-2022	22-Sep-2022	----	----		22-Sep-2022	28 days	2 days	✓
Cyanides : Total Cyanide										
UV-inhibited HDPE - total (sodium hydroxide)										
BH5	E333	20-Sep-2022	22-Sep-2022	----	----		22-Sep-2022	14 days	2 days	✓
Physical Tests : pH by Meter										
HDPE [ON MECP]										
BH5	E108	20-Sep-2022	22-Sep-2022	----	----		22-Sep-2022	14 days	2 days	✓
Physical Tests : TSS by Gravimetry										
HDPE [ON MECP]										
BH5	E160	20-Sep-2022	----	----	----		22-Sep-2022	7 days	2 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) [ON MECP]										
BH5	E508	20-Sep-2022	22-Sep-2022	----	----		22-Sep-2022	28 days	2 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
BH5	E420	20-Sep-2022	22-Sep-2022	----	----		22-Sep-2022	180 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Sulfides : Total Sulfide by Colourimetry (Automated Flow)										
HDPE total (zinc acetate+sodium hydroxide)										
BH5	E395-H	20-Sep-2022	----	----	----		23-Sep-2022	7 days	4 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Biochemical Oxygen Demand - 5 day	E550	659730	1	19	5.2	5.0	✓
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	659731	1	20	5.0	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	660129	1	7	14.2	5.0	✓
Chloride in Water by IC	E235.Cl	659337	1	2	50.0	5.0	✓
Fluoride in Water by IC	E235.F	659334	1	2	50.0	5.0	✓
pH by Meter	E108	659248	1	3	33.3	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	659535	1	2	50.0	5.0	✓
Sulfate in Water by IC	E235.SO4	659338	1	2	50.0	5.0	✓
Total Cyanide	E333	659627	1	1	100.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	659533	1	2	50.0	5.0	✓
Total Mercury in Water by CVAAS	E508	659434	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	659273	1	4	25.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	659534	1	2	50.0	5.0	✓
Total Sulfide by Colourimetry (Automated Flow)	E395-H	662928	1	7	14.2	5.0	✓
TSS by Gravimetry	E160	659519	1	3	33.3	4.7	✓
Laboratory Control Samples (LCS)							
Biochemical Oxygen Demand - 5 day	E550	659730	1	19	5.2	5.0	✓
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	659731	1	20	5.0	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	660129	1	7	14.2	5.0	✓
Chloride in Water by IC	E235.Cl	659337	1	2	50.0	5.0	✓
Fluoride in Water by IC	E235.F	659334	1	2	50.0	5.0	✓
Mineral Oil & Grease by Gravimetry	E567SG	659260	1	7	14.2	5.0	✓
Oil & Grease by Gravimetry	E567	659259	1	20	5.0	5.0	✓
pH by Meter	E108	659248	1	3	33.3	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	659535	1	2	50.0	5.0	✓
Sulfate in Water by IC	E235.SO4	659338	1	2	50.0	5.0	✓
Total Cyanide	E333	659627	1	1	100.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	659533	1	2	50.0	5.0	✓
Total Mercury in Water by CVAAS	E508	659434	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	659273	1	4	25.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	659534	1	2	50.0	5.0	✓
Total Sulfide by Colourimetry (Automated Flow)	E395-H	662928	1	7	14.2	5.0	✓
TSS by Gravimetry	E160	659519	1	3	33.3	4.7	✓
Method Blanks (MB)							
Biochemical Oxygen Demand - 5 day	E550	659730	1	19	5.2	5.0	✓
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	659731	1	20	5.0	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	660129	1	7	14.2	5.0	✓

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Method Blanks (MB) - Continued							
Chloride in Water by IC	E235.Cl	659337	1	2	50.0	5.0	✓
Fluoride in Water by IC	E235.F	659334	1	2	50.0	5.0	✓
Mineral Oil & Grease by Gravimetry	E567SG	659260	1	7	14.2	5.0	✓
Oil & Grease by Gravimetry	E567	659259	1	20	5.0	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	659535	1	2	50.0	5.0	✓
Sulfate in Water by IC	E235.SO4	659338	1	2	50.0	5.0	✓
Total Cyanide	E333	659627	1	1	100.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	659533	1	2	50.0	5.0	✓
Total Mercury in Water by CVAAS	E508	659434	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	659273	1	4	25.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	659534	1	2	50.0	5.0	✓
Total Sulfide by Colourimetry (Automated Flow)	E395-H	662928	1	7	14.2	5.0	✓
TSS by Gravimetry	E160	659519	1	3	33.3	4.7	✓
Matrix Spikes (MS)							
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	660129	1	7	14.2	5.0	✓
Chloride in Water by IC	E235.Cl	659337	1	2	50.0	5.0	✓
Fluoride in Water by IC	E235.F	659334	1	2	50.0	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	659535	1	2	50.0	5.0	✓
Sulfate in Water by IC	E235.SO4	659338	1	2	50.0	5.0	✓
Total Cyanide	E333	659627	1	1	100.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	659533	1	2	50.0	5.0	✓
Total Mercury in Water by CVAAS	E508	659434	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	659273	1	4	25.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	659534	1	2	50.0	5.0	✓
Total Sulfide by Colourimetry (Automated Flow)	E395-H	662928	1	7	14.2	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter	E108 Waterloo - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TSS by Gravimetry	E160 Waterloo - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Chloride in Water by IC	E235.Cl Waterloo - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Waterloo - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Waterloo - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Waterloo - Environmental	Water	Method Fialab 100, 2018	TKN in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021).
Total Cyanide	E333 Waterloo - Environmental	Water	ISO 14403 (mod)	Total or Strong Acid Dissociable (SAD) Cyanide is determined by Continuous Flow Analyzer (CFA) with in-line UV digestion followed by colourmetric analysis. Method Limitation: High levels of thiocyanate (SCN) may cause positive interference (up to 0.5% of SCN concentration).
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U Waterloo - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Sulfide by Colourimetry (Automated Flow)	E395-H Vancouver - Environmental	Water	APHA 4500 -S E-Auto-Colorimetry	Sulfide is determined using the gas dialysis automated methlyene blue colourimetric method. Results expressed "as H2S" if reported represent the maximum possible H_2S concentration based on the total sulfide concentration in the sample. The H_2S calculation converts Total Sulphide as (S2-) and reports it as Total Sulphide as (H2S)

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Metals in Water by CRC ICPMS	E420 Waterloo - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508 Waterloo - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Biochemical Oxygen Demand - 5 day	E550 Waterloo - Environmental	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555 Waterloo - Environmental	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Nitrification inhibitor is added to samples to prevent nitrogenous compounds from consuming oxygen resulting in only carbonaceous oxygen demand being reported by this method. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L Waterloo - Environmental	Water	APHA 5220 D (mod)	Samples are analyzed using the closed reflux colourimetric method.
Phenols (4AAP) in Water by Colorimetry	E562 Waterloo - Environmental	Water	EPA 9066	This automated method is based on the distillation of phenol and subsequent reaction of the distillate with alkaline ferricyanide ($K_3Fe(CN)_6$) and 4-amino-antipyrine (4-AAP) to form a red complex which is measured colorimetrically.
Oil & Grease by Gravimetry	E567 Waterloo - Environmental	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane and the extract is evaporated to dryness. The residue is then weighed to determine Oil and Grease.
Mineral Oil & Grease by Gravimetry	E567SG Waterloo - Environmental	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane, followed by silica gel treatment after which the extract is evaporated to dryness. The residue is then weighed to determine Mineral Oil and Grease.
Animal & Vegetable Oil & Grease by Gravimetry	EC567A.SG Waterloo - Environmental	Water	APHA 5520 (mod)	Animal & vegetable oil and grease is calculated as follows: Oil & Grease (gravimetric) minus Mineral Oil & Grease (gravimetric)

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for TKN in water	EP318 Waterloo - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.
Digestion for Total Phosphorus in water	EP372 Waterloo - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Oil & Grease Extraction for Gravimetry	EP567 Waterloo - Environmental	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane by liquid-liquid extraction.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **WT2215075**	Page	: 1 of 10
Client	: GeoPro Consulting Limited	Laboratory	: Waterloo - Environmental
Contact	: Elab	Account Manager	: Costas Farassoglou
Address	: 40 Vogell Road Unit 57 Richmond Hill ON Canada L4B 3N6	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: 416 209 5668	Telephone	: 613 225 8279
Project	: 22-4078 (NORFOLK SEWER USE)	Date Samples Received	: 21-Sep-2022 17:15
PO	: ----	Date Analysis Commenced	: 22-Sep-2022
C-O-C number	: ----	Issue Date	: 29-Sep-2022 13:49
Sampler	: ----		
Site	: ----		
Quote number	: GEOPRO 2022 Standing Offer		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Caitlin Macey	Team Leader - Inorganics	Vancouver Inorganics, Burnaby, British Columbia
Greg Pokocky	Supervisor - Inorganic	Waterloo Inorganics, Waterloo, Ontario
Greg Pokocky	Supervisor - Inorganic	Waterloo Metals, Waterloo, Ontario
Jocelyn Kennedy	Department Manager - Semi-Volatile Organics	Waterloo Organics, Waterloo, Ontario
Jon Fisher	Department Manager - Inorganics	Waterloo Inorganics, Waterloo, Ontario
Walt Kippenhuck	Team Leader - Inorganics	Waterloo Inorganics, Waterloo, Ontario

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 659248)											
WT2215072-001	Anonymous	pH	----	E108	0.10	pH units	7.43	7.47	0.537%	4%	----
Physical Tests (QC Lot: 659519)											
WT2214912-001	Anonymous	solids, total suspended [TSS]	----	E160	3.0	mg/L	<3.0	<3.0	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 659334)											
WT2214666-001	Anonymous	fluoride	16984-48-8	E235.F	0.020	mg/L	0.094	0.092	0.003	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 659337)											
WT2214666-001	Anonymous	chloride	16887-00-6	E235.Cl	0.50	mg/L	166	171	2.55%	20%	----
Anions and Nutrients (QC Lot: 659338)											
WT2214666-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	31.9	32.6	2.31%	20%	----
Anions and Nutrients (QC Lot: 659533)											
WT2215075-001	BH5	Kjeldahl nitrogen, total [TKN]	----	E318	0.500	mg/L	<0.500	<0.500	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 659534)											
WT2215080-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0026	0.0027	0.00006	Diff <2x LOR	----
Cyanides (QC Lot: 659627)											
WT2215075-001	BH5	cyanide, strong acid dissociable (total)	----	E333	0.0020	mg/L	<0.0020	<0.0020	0	Diff <2x LOR	----
Total Sulfides (QC Lot: 662928)											
GP2201750-001	Anonymous	sulfide, total (as S)	18496-25-8	E395-H	0.100	mg/L	1.46	1.50	2.39%	20%	----
Total Metals (QC Lot: 659273)											
WT2214981-001	Anonymous	aluminum, total	7429-90-5	E420	0.0300	mg/L	<0.0300	<0.0300	0	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00100	mg/L	0.00520	0.00492	0.00028	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000500	mg/L	<0.000500	<0.000500	0	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000500	mg/L	<0.0000500	<0.0000500	0	Diff <2x LOR	----
		chromium, total	7440-47-3	E420	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00100	mg/L	0.00950	0.00938	0.00013	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00500	mg/L	0.00676	0.00676	0.000001	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.100	mg/L	0.828	0.816	0.012	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000500	mg/L	<0.000500	<0.000500	0	Diff <2x LOR	----
		manganese, total	7439-96-5	E420	0.00100	mg/L	0.332	0.330	0.815%	20%	----
		molybdenum, total	7439-98-7	E420	0.000500	mg/L	0.00545	0.00532	2.35%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 659273) - continued											
WT2214981-001	Anonymous	nickel, total	7440-02-0	E420	0.00500	mg/L	0.0230	0.0225	0.00051	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000500	mg/L	0.00486	0.00479	0.000078	Diff <2x LOR	----
		silver, total	7440-22-4	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00300	mg/L	<0.00300	<0.00300	0	Diff <2x LOR	----
		vanadium, total	7440-62-2	E420	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0300	mg/L	<0.0300	<0.0300	0	Diff <2x LOR	----
Total Metals (QC Lot: 659434)											
TY2201724-001	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 659535)											
WT2215080-001	Anonymous	phenols, total (4AAP)	----	E562	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 659730)											
WT2214988-001	Anonymous	biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	17.8	17.9	0.0%	30%	----
Aggregate Organics (QC Lot: 659731)											
WT2215029-001	Anonymous	carbonaceous biochemical oxygen demand [CBOD]	----	E555	2.0	mg/L	<2.0	<2.0	0.0%	30%	----
Aggregate Organics (QC Lot: 660129)											
WT2214983-002	Anonymous	chemical oxygen demand [COD]	----	E559-L	10	mg/L	78	79	1	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 659519)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Anions and Nutrients (QCLot: 659334)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 659337)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 659338)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 659533)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 659534)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Cyanides (QCLot: 659627)						
cyanide, strong acid dissociable (total)	----	E333	0.002	mg/L	<0.0020	----
Total Sulfides (QCLot: 662928)						
sulfide, total (as S)	18496-25-8	E395-H	0.01	mg/L	<0.010	----
Total Metals (QCLot: 659273)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 659273) - continued						
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Total Metals (QCLot: 659434)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Aggregate Organics (QCLot: 659259)						
oil & grease (gravimetric)	----	E567	5	mg/L	<5.0	----
Aggregate Organics (QCLot: 659260)						
oil & grease, mineral (gravimetric)	----	E567SG	5	mg/L	<5.0	----
Aggregate Organics (QCLot: 659535)						
phenols, total (4AAP)	----	E562	0.001	mg/L	<0.0010	----
Aggregate Organics (QCLot: 659730)						
biochemical oxygen demand [BOD]	----	E550	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 659731)						
carbonaceous biochemical oxygen demand [CBOD]	----	E555	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 660129)						
chemical oxygen demand [COD]	----	E559-L	10	mg/L	<10	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 659248)									
pH	----	E108	----	pH units	7 pH units	101	98.0	102	----
Physical Tests (QCLot: 659519)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	89.0	85.0	115	----
Anions and Nutrients (QCLot: 659334)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 659337)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 659338)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 659533)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	98.0	75.0	125	----
Anions and Nutrients (QCLot: 659534)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.53 mg/L	96.6	80.0	120	----
Cyanides (QCLot: 659627)									
cyanide, strong acid dissociable (total)	----	E333	0.002	mg/L	0.25 mg/L	93.6	80.0	120	----
Total Sulfides (QCLot: 662928)									
sulfide, total (as H2S)	7783-06-4	E395-H	----	mg/L	0.085 mg/L	98.8	80.0	120	----
sulfide, total (as S)	18496-25-8	E395-H	0.01	mg/L	0.08 mg/L	99.3	80.0	120	----
Total Metals (QCLot: 659273)									
aluminum, total	7429-90-5	E420	0.003	mg/L	0.1 mg/L	102	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	0.05 mg/L	104	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	0.05 mg/L	102	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.0125 mg/L	102	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	0.05 mg/L	93.4	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.005 mg/L	106	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.0125 mg/L	100	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.0125 mg/L	99.6	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.0125 mg/L	96.8	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	0.05 mg/L	99.8	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.025 mg/L	96.3	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 659273) - continued									
manganese, total	7439-96-5	E420	0.0001	mg/L	0.0125 mg/L	102	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.0125 mg/L	105	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.025 mg/L	99.7	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	0.05 mg/L	102	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.005 mg/L	100	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.025 mg/L	107	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.0125 mg/L	98.7	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.025 mg/L	102	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.025 mg/L	102	80.0	120	----
Total Metals (QCLot: 659434)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	100	80.0	120	----
Aggregate Organics (QCLot: 659259)									
oil & grease (gravimetric)	----	E567	5	mg/L	200 mg/L	85.8	70.0	130	----
Aggregate Organics (QCLot: 659260)									
oil & grease, mineral (gravimetric)	----	E567SG	5	mg/L	100 mg/L	77.9	70.0	130	----
Aggregate Organics (QCLot: 659535)									
phenols, total (4AAP)	----	E562	0.001	mg/L	0.02 mg/L	110	85.0	115	----
Aggregate Organics (QCLot: 659730)									
biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	98.5	85.0	115	----
Aggregate Organics (QCLot: 659731)									
carbonaceous biochemical oxygen demand [CBOD]	----	E555	2	mg/L	198 mg/L	101	85.0	115	----
Aggregate Organics (QCLot: 660129)									
chemical oxygen demand [COD]	----	E559-L	10	mg/L	100 mg/L	108	85.0	115	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 659334)										
WT2214666-001	Anonymous	fluoride	16984-48-8	E235.F	1.01 mg/L	1 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 659337)										
WT2214666-001	Anonymous	chloride	16887-00-6	E235.Cl	ND mg/L	100 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 659338)										
WT2214666-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	103 mg/L	100 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 659533)										
WT2215075-001	BH5	Kjeldahl nitrogen, total [TKN]	----	E318	24.0 mg/L	2.5 mg/L	95.9	70.0	130	----
Anions and Nutrients (QCLot: 659534)										
WT2215080-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0815 mg/L	0.1 mg/L	81.5	70.0	130	----
Cyanides (QCLot: 659627)										
WT2215075-001	BH5	cyanide, strong acid dissociable (total)	----	E333	0.207 mg/L	0.25 mg/L	82.8	75.0	125	----
Total Sulfides (QCLot: 662928)										
GP2201751-001	Anonymous	sulfide, total (as S)	18496-25-8	E395-H	1.09 mg/L	1 mg/L	109	75.0	125	----
Total Metals (QCLot: 659273)										
WT2214981-002	Anonymous	aluminum, total	7429-90-5	E420	0.104 mg/L	0.1 mg/L	104	70.0	130	----
		antimony, total	7440-36-0	E420	0.0509 mg/L	0.05 mg/L	102	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0506 mg/L	0.05 mg/L	101	70.0	130	----
		barium, total	7440-39-3	E420	0.0122 mg/L	0.0125 mg/L	97.3	70.0	130	----
		bismuth, total	7440-69-9	E420	0.0466 mg/L	0.05 mg/L	93.1	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00496 mg/L	0.005 mg/L	99.2	70.0	130	----
		chromium, total	7440-47-3	E420	0.0125 mg/L	0.0125 mg/L	99.7	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0120 mg/L	0.0125 mg/L	95.8	70.0	130	----
		copper, total	7440-50-8	E420	0.0118 mg/L	0.0125 mg/L	94.7	70.0	130	----
		iron, total	7439-89-6	E420	ND mg/L	0.05 mg/L	ND	70.0	130	----
		lead, total	7439-92-1	E420	0.0235 mg/L	0.025 mg/L	93.9	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.0125 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0128 mg/L	0.0125 mg/L	102	70.0	130	----
		nickel, total	7440-02-0	E420	0.0226 mg/L	0.025 mg/L	90.6	70.0	130	----
		selenium, total	7782-49-2	E420	0.0504 mg/L	0.05 mg/L	101	70.0	130	----
		silver, total	7440-22-4	E420	0.00470 mg/L	0.005 mg/L	94.1	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 659273) - continued										
WT2214981-002	Anonymous	tin, total	7440-31-5	E420	0.0255 mg/L	0.025 mg/L	102	70.0	130	----
		titanium, total	7440-32-6	E420	0.0118 mg/L	0.0125 mg/L	94.6	70.0	130	----
		vanadium, total	7440-62-2	E420	0.0254 mg/L	0.025 mg/L	101	70.0	130	----
		zinc, total	7440-66-6	E420	0.0231 mg/L	0.025 mg/L	92.4	70.0	130	----
Total Metals (QCLot: 659434)										
TY2201778-001	Anonymous	mercury, total	7439-97-6	E508	0.0000732 mg/L	0.0001 mg/L	73.2	70.0	130	----
Aggregate Organics (QCLot: 659535)										
WT2215080-001	Anonymous	phenols, total (4AAP)	----	E562	0.106 mg/L	0.1 mg/L	106	75.0	125	----
Aggregate Organics (QCLot: 660129)										
WT2214983-002	Anonymous	chemical oxygen demand [COD]	----	E559-L	100 mg/L	100 mg/L	100	75.0	125	----

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 22-4078 (NORFOLK SI

Page 1 of 1

Environmental Division Waterloo

Work Order Reference WT2215075

Telephone : +1 519 886 6910

Report To	Contact and company name below will appear on the final report
Company:	GeoPro Consulting Limited
Contact:	Elab elab@geoproconsulting.ca
Phone:	(905) 237-8336
	Company address below will appear on the final report
Street:	40 Vogell Road, Unit 23
City/Province:	Richmond Hill, ON
Postal Code:	L4B 3N6
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☑ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	skylerc@geoproconsulting.ca
Email 2	nickl@geoproconsulting.ca
Email 3	elab@geoproconsulting.ca

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	skylerc@geoproconsulting.ca
Email 2	elab@geoproconsulting.ca

Select Service Level Below - Please confirm all E&P

Regular [R] ☐ Standard TAT

PRIORITY (Business Days): 4 day [P4] ☐ | 3 day [P3] ☐ | 2 day [P2] ☐

Date and Time Required for all E&P TA

For tests that can not be performed according to thi

An

Indicate Filtered (F), Preserved (P) o

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	Q84031	AFE/Cost Center:	PO#
Job #:	22-4078 (NORFOLK SEWER USE)	Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)	WT2215075	ALS Contact:	Sampler:

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Barrie RegionCombined Sewer Use Bylaw	Number of Containers
	BH5	20-Sep-22	PM	Water	E1	1

BHMW5

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ ☑ NO

Are samples for human drinking water use? ☐ ☑ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

Barrie region Combined Sewer Bylaw
compare with PWQO / Metals E 1 day rush

September, 22, 2022

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
14.5			18.2		

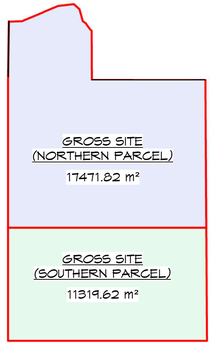
SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: FB	Date: August 24, 2021	Time:	Received by:	Date: Sep 21/22	Time: 13:10	Received by:	Date: 09/21/22	Time: 15 5pm

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

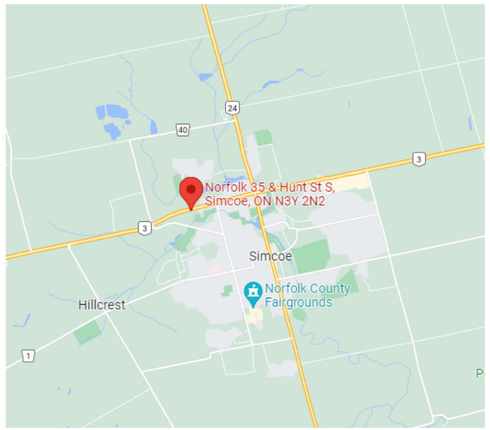
WHITE - LABORATORY COPY YELLOW - CLIENT COPY

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy

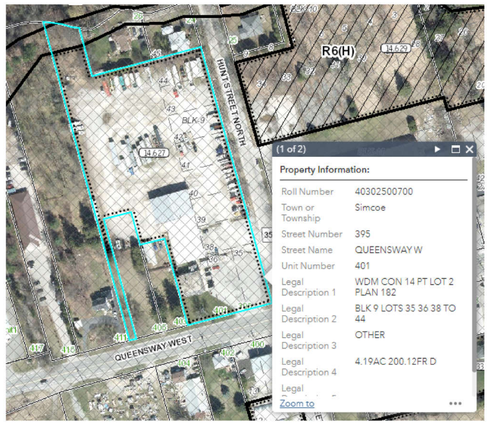
APPENDIX D



2 GROSS SITE - PC/Z
PC/Z100 SCALE 1 : 2000



KEY MAP
SCALE 1 : 100

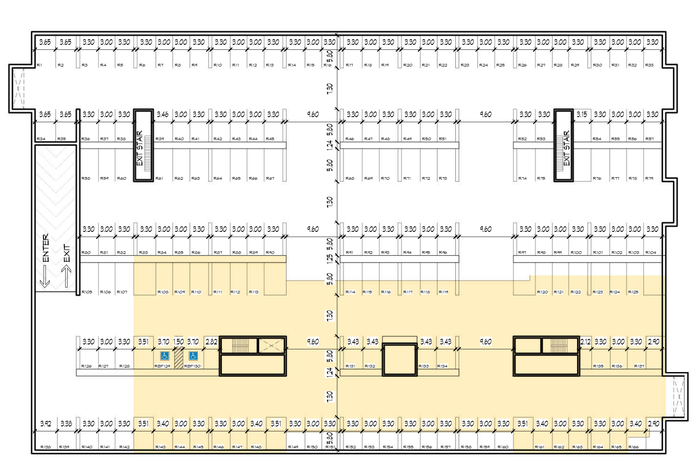


SITE MAP
SCALE 1 : 100

'NORTHERN PARCEL'

1 SITE PLAN PRECON / ZONING AMENDMENT
PC/Z100 SCALE 1 : 500

'SOUTHERN PARCEL'



UNDERGROUND PARKING LAYOUT

SITE PLAN LEGEND

ENT.	MAIN ENTRANCE / EXIT DOOR
B/F	ENTRANCE / EXIT DOOR (BARRIER FREE OPERATOR)
O/H	ENTRANCE / EXIT DOOR (OVERHEAD DOOR W/ OPERATOR)
	PROPERTY LINE
	SETBACKS
	FIRE ROUTE (6m WIDE / 12m CENTER RADIUS)
CE	COVERED ENTRANCE
P	PATIO (ON GRADE)
CP	COVERED PATIO (ON GRADE)
B	BALCONY
CD	COVERED DECK / UNENCLOSED PORCH
D	DECK / UNENCLOSED PORCH
	PAINTED GRAPHICS ON ASPHALT / CONC. (COORD. W/ THE CITY / TOWN HAVING JURISDICTION GUIDELINES)
	• WHEELCHAIR SIGN ON ASPHALT / CONC. (WHITE & BLUE COLOUR)
V#	• VEHICULAR STALL MARKINGS (YELLOW COLOUR) V# - VISITOR S# - SPARE B/C1 - ONE REQ'D DWELLING PARKING B/C2 - TWO REQ'D DWELLING PARKING (LETTER REPRESENTS UNIT TYPE)
	• DIAGONAL MARKINGS
VARIES	NEW CONIFEROUS TREE
VARIES	NEW DECIDUOUS TREE (~4500mm TREE RADIUS @ FULL GROWTH)
	SNOW STORAGE (SS) (ALL ADDITIONAL SNOW TO BE TAKEN AWAY BY OWNER)

HATCH IDENTIFICATION LEGEND

	CONC. SIDEWALK / PAD / CROSSWALK / SIDEWALK / LANDWAY / STAIRS / ETC.
	AREA OF ASPHALT
	LANDSCAPING
	COMMERCIAL
A	7-STOREY MIXED-USE MID-RISE
B	3-STOREY RESIDENTIAL DWELLING (VEHICULAR - x1 GARAGE, x1 DRIVEWAY) (APPROX. 7300mm W x 10000mm D)
C	1-STOREY RESIDENTIAL DWELLING (VEHICULAR - x1 GARAGE, x1 DRIVEWAY) (APPROX. 9600mm W x 24000mm D)

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE ONTARIO N3Y 3W4
(519) 426-6270

Project Title
HUNT ST. N. RESIDENTIAL
HUNT STREET NORTH,
SIMCOE, ON N3Y 2M9

PROJECT No.
22-013

Drawing Title
SITE PLAN PRE-CON / ZONING AMENDMENT

Drawing No.
PC/Z100

H:\Projects\2022\22-013 HFW Holdings Hunt St Residential\Drawings\Arch\22-013 Hunt St Residential Site.vwt
DATE LAST PLOTTED 5/30/2023 11:06:30 AM

SITE STATISTIC & ZONING REQ.'S

ZA - ZONING AMENDMENTS (RED TEXT)

PROPERTY: LEGAL DESCRIPTION:
395, 401, 402, 405, 411 QUEENSWAY WEST IN THE TOWN OF NORTH SIMCOE, IN THE DISTRICT OF NORFOLK COUNTY

ZONING:
IN ACCORDANCE TO THE TOWN OF SIMCOE, ZONING BY-LAW 1-Z-2014 NORFOLK COUNTY - JANUARY-2021-CONSOLIDATION

PROVISION	LAND USE: EXISTING (SOUTHERN PORTION)
6.3 6.3.1	EX. - SERVICE COMMERCIAL ZONE (CS) PERMITTED USES *Permitted Uses* in a *CS zone*, no land, *building* or *structure* shall be used except in accordance with the following uses: a) ambulance service b) *animal hospital*, provided the entire operation is carried on within an enclosed *building* c) any non-residential use *permitted* in the Neighbourhood Institutional *Zone* (IN), subject to the provisions of that *Zone* d) auction centre e) automobile gas station f) automobile service and repair station g) *automobile washing establishment* h) automotive parts shop i) bar or night club j) clinic or doctors' offices k) commercial greenhouse, tree and plant nursery l) community centre m) contractor shop n) contractor supply and service shop o) convenience store p) day care nursery q) *dry cleaning distribution station* r) dry cleaning establishment s) *dwelling, single detached or dwelling unit* in a non-residential *building* - maximum one *(1) (8-Z-2020)* t) equipment rental establishment u) farm implement sales and service establishment v) financial institution w) fire hall x) florist shop y) fruit and vegetable outlet z) funeral home aa) garden supply centre bb) home occupation cc) hotel dd) laundromat ee) *lumber yard and building supply establishment* ff) manufacturing and retail sale of monuments gg) merchandise service shop hh) miniature golf, golf driving range and baseball pitch ii) *outdoor storage accessory to permitted uses* jj) *parking lot or structure* kk) personal service shop ll) place of assembly mm) place of sports and recreation nn) *place of worship* oo) police station pp) private club qq) *restaurant* rr) *restaurant, fast-food* ss) *restaurant, take-out* tt) sheet metal, plumbing, heating, electrical or woodworking shop or any similar activity uu) swimming pool sales and service establishment vv) training and rehabilitation centre ww) *vehicle sales or rental establishment* xx) video store yy) wholesale outlets zz) office, all types (special provision 14.627) ADD THE FOLLOWING ADDITIONAL PERMITTED USES: aaa) dwelling units in a commercial building, max. bbb) boutique ccc) college or trade school ddd) delicatessen and specialty food stores eee) farmers market fff) office accessory to a shopping centre operation ggg) retail store

PROVISION	SETBACKS (m - METERS):	REQUIRED (m)	PROVIDED (m)
6.3.2a)	MIN. LOT AREA: i) INTERIOR LOT ii) CORNER LOT	 450m² 495m²	 - 11,320m²
6.3.2b)	MIN. LOT FRONTAGE: i) INTERIOR LOT ii) CORNER LOT	 15 16.5	 - 78.3
6.3.2c)	MIN. FRONT YARD:	3	7.27
6.3.2d)	MIN. EXTERIOR SIDE YARD:	3	5.52
6.3.2e)	MIN. INTERIOR SIDE YARD	3	13.71
6.3.2f)	MIN. REAR YARD:	9	21.35
6.3.2g)	MN. USABLE FLOOR AREA FOR A DWELLING UNIT N A NON-RESIDENTIAL BLDG.	40m²	MIN. 40m²
6.3.2h)	MAX. BLDG. HEIGHT	11	30m or SIX (6) STORIES
6.3.2i)	MAX. LOT COVERAGE	35%	28%
6.3.2j)	MAX. USABLE FLOOR AREA: OF A FRUIT AND VEGETABLE OUTLET	200m²	N/A
6.3.2.k)	OUTDOOR STORAGE	PROHIBITED IN A FRONT YARD & WITHIN 3M OF ANY LOT LINE ADJOINING A RESIDENTIAL ZONE	N/A
6.3.3	Outdoor Display of Goods Outdoor display of *vehicles* on paved areas shall be *permitted* in the *front yard* subject to Subsection 6.3.5. Outdoor display of other non-vehicular items shall be *permitted* within a *front yard* provided such display is located on a grassed or landscaped area without surrounding fences and subject to Subsection 6.3.5.		
6.3.4	Landscaped Strip All *buildings*, *parking lots* and *parking spaces* and display areas shall be *setback* 3 metres from the *front lot line*. This area shall be landscaped which may include patio pavers.		
6.3.5	Zone Provision for Convenience Store The *usable floor area* of a *convenience store* shall not exceed 280 square metres.		
6.3.6	Zone Provisions for Dwellings Notwithstanding the provisions in Subsection 6.3.2, all *single detached dwellings* shall conform to the Urban Residential Type 3 (R3) *Zone* provisions in Subsection 5.3. (8-Z-2020) (27-Z-2020)		

COORD. W/ ZONING BY-LAW FOR ALL OTHER ZONING REQ.'S

PARKING REQ.'D MIXED USE RESIDENTIAL (CS)

PROVISION	NUMBER OF PARKING SPACES	REQUIRED	PROVIDED
4.9b)	APARTMENT DWELLING (8-Z-2017): 1.5 SPACES / DWELLING UNIT 1.5 SPACES x 72 DWELLING UNITS =	108 SPACE(S)	108 SPACE(S)
	APARTMENT DWELLING (8-Z-2017): 1.25 SPACES / DWELLING UNIT 1.25 SPACES x 42 DWELLING UNITS =	53 SPACE(S)	58 SPACE(S)

PARKING REQ.'D MIXED USE RESIDENTIAL - VISITOR:

4.9f)	VISITOR PARKING: 1 SPACE / 3 DWELLING UNITS 1 SPACE x (114 / 3) = 38	38 SPACE(S)	38 SPACE(S)

PARKING REQ.'D MIXED USE RESIDENTIAL TOTAL:

	TOTAL	146 SPACE(S)	204 SPACE(S)

PARKING REQ.'D MIXED USE RESIDENTIAL - BARRIER FREE (PART OF REQ.'D PARKING)

4.3.3	BARRIER FREE PARKING REQ.'D: 26-50 PARKING SPACES =		
	TYPE 'A' (3.4m WIDE) PLUS 1.5m AISLE	1 SPACE(S)	3 SPACE(S)
	TYPE 'B' (2.4m WIDE) PLUS 1.5m AISLE	1 SPACE(S)	1 SPACE(S)

PARKING REQ.'D MIXED USE NON-RESIDENTIAL (CS)

PROVISION	NUMBER OF PARKING SPACES	REQUIRED	PROVIDED
4.9t)	OTHER NON-RESIDENTIAL USES: 1 SPACE / 35m² USABLE FLOOR AREA 1 SPACE x (MAX. 3432m² / 35m² = 98	98 SPACE(S)	98 SPACE(S)

NOTE - THROUGH THE ZBA, A SITE SPECIFIC PROVISION IS SOUGHT THAT ALL COMMERCIAL SPACES - REGARDLESS OF TENNANCY - WILL SUBJECT TO A BLANKET REQUIREMENT OF 1 PARKING SPACE FOR EVERY 35m² OF USEABLE FLOOR AREA

PARKING REQ.'D MIXED USE NON-RESIDENTIAL TOTAL:

	TOTAL	98 SPACE(S)	98 SPACE(S)

PARKING REQ.'D MIXED USE NON-RESIDENTIAL BARRIER FREE: (PART OF REQ.'D PARKING)

4.3.3	BARRIER FREE PARKING REQ.'D: 76-100 PARKING SPACES =		
	TYPE 'A' (3.4m WIDE) PLUS 1.5m AISLE	2 SPACE(S)	2 SPACE(S)
	TYPE 'B' (2.4m WIDE) PLUS 1.5m AISLE	2 SPACE(S)	2 SPACE(S)

4.0 OFF STREET PARKING

PARKING SPACE DIMENSIONS

4.1 4.1.3a) 4.1.3b) 	PARKING SPACE DIMENSIONS WIDTH OF PARKING SPACE: FOR VEHICLES PARKED SIDE BY SIDE FOR VEHICLES PARKED WITH WALL OR FENCE ADJ. DEPTH OF PARKING SPACE: FOR 90 DEGREE PARKING FOR PARALLEL PARKING	 3 MIN. 3.3 MIN. 5.8 MIN. 7 MIN.	 3 3.3 5.8 7
4.1.4 4.1.4b)	PARKING AISLE REQ.'S TWO-WAY TRAFFIC	7.3 MIN.	7.3 MIN.

4.2 LOCATION OF PARKING ON A LOT

4.2.4	**4.2.4 Other Provisions** a) For tri-plex dwellings, duplex dwellings, four-plex dwellings, street townhouses, stacked townhouses, and boarding or lodging houses, required parking spaces shall be prohibited within the required front yard or required exterior side yard; except where a dwelling unit has a private garage in which case the driveway leading to the private garage may be used as a parking space subject to the size requirements herein; b) For *group townhouses* and *apartment dwellings*, no *parking lot* shall be located closer than 3 metres from any *dwelling* on the *lot* or of any *interior lot line* abutting another residential *Zone*; c) For *group townhouses* and *apartment dwellings*, no parking lot or *parking space* shall be located between a *dwelling* and the *street line*, except for individual or tandem *parking spaces* leading directly to each *townhouse dwelling unit*; d) For commercial or industrial properties, no *parking lot* shall be located closer than 4.5 metres from any *interior lot line* abutting a residential *Zone*; e) For *accessory residential dwelling units*, notwithstanding the foregoing, one (1) *parking space* dedicated for the use of the *accessory residential dwelling unit*, may be *permitted* in the *front yard* provided a minimum of 50 percent of the *required front yard* shall be maintained as landscaped open space notwithstanding such dedicated *parking space*.

PARKING REQ.'D - LOADING SPACES

4.7	LOADING SPACES: 9m WIDTH x 10m DEPTH	N/A	1 PROVIDED

LANDSCAPED AREA

2.81	**"LANDSCAPE AREA"** shall mean an area of land comprised of trees, shrubs, flowers, grass or other horticultural elements. Landscaping may include pervious paths, patios, walkways, or elements designed to enhance the visual amenity of a property but does not include open storage display areas, parking or loading areas, or areas covered by *driveways*. *(8-Z-2018)*

4.2.5	**4.2.5 Parking and *Landscape Area* *(7-Z-2018)*** Within Urban Residential Type 1 to 4 *Zones* (R1 to R4), the following shall apply: a) A minimum of 50 percent of the *front yard* shall be maintained as *landscape area*. b) In the case of a *corner lot*, a minimum of 50 percent of each of the *front yard* and *exterior side yard* shall be maintained as *landscape area*.

2.170
"USABLE FLOOR AREA" shall mean the total area of all floors of a *building*, *outdoor patio or cafe*, or *dwelling unit* including:
a) a hallway, aisle, stairway and corridor within a suite or unit;
b) an internal wall and partition within a suite or unit;
c) a storage room and storage area within a suite or unit;
d) a *boatslip* in the case of a *boathouse*;
e) a *habitable room* or area in the *basement* of a *dwelling*.
But excluding:
a) an area occupied by a common area in a multi-tenant *building* including but not limited to a public stairwell, public or shared corridor and lobby;
b) a mechanical shaft;
c) an entry vestibule not within a *dwelling unit*;
d) a garage attached to a *building*;
e) an unfinished *basement* in a *dwelling* used for storage or laundry.

The *usable floor area* for a *dwelling* is measured from the outside face of exterior walls or to the centre-line of party or *common walls*.
The *usable floor area* for all other *buildings* shall be measured from the inside face of exterior walls, interior *common walls* and firewalls.

PROVISION	LAND USE: PROPOSED (NORTHERN PORTION)
5.0 5.4 5.4.1	ZONING AMENDMENT: RESIDENTIAL ZONES URBAN RESIDENTIAL TYPE 4 ZONE (R4) PERMITTED USES In an R4 *Zone*, no land, *building* or *structure* shall be used except in accordance with the following uses: a) group townhouse c) street townhouse d) *semi-detached*, duplex, tri-plex and four-plex *dwellings* provided they are located on the same *lot* with, and in accordance with the *Zone* provisions of, *group townhouse*

PROVISION	SETBACKS (m - METERS):	REQUIRED (m) Street Townhouse (per unit)	REQUIRED (m) Group Townhouse Stacked Townhouse	PROVIDED (m)
5.4.2a)	MIN. LOT AREA: i) ATTACHED GARAGE ii) CORNER LOT iii) DETACHED GARAGE	 156m² 264m² 162m²	 195m² 195m² 215m²	 17,472m² - -
5.4.2b)	MN. LOT FRONTAGE: i) INTERIOR LOT ii) CORNER LOT iii) CORNER LOT ACCESSED BY A REAR LANE	 6.5 11 6.5	 30 30	 104.8 - -
5.4.2c)	MN. FRONT YARD: i) ATTACHED GARAGE ii) DETACHED GARAGE OR REAR YARD PARKING	 6 1.5	 6 1.5	 MIN. 6 -
5.4.2d)	MIN. EXTERIOR SIDE YARD: i) W/ A 6m FRONT YARD ii) W/ A 1.5m FRONT YARD	 6 1.5	 6 1.5	 - -
5.4.2e)	MIN. INTERIOR SIDE YARD	1.2	3	MIN. 3
5.4.2f)	MN. REAR YARD : i) ATTACHED GARAGE ii) DETACHED GARAGE ACCESSED VIA A REAR LANE INCLUDING HALF OF THE LANE PROPOSED SITE SPECIFIC PROVISION: WHERE THE SIDE ELEVATION OF A BLOCK TOWNHOUSE OR SEMI-DETACHED HOUSE FACES THE REAR YARD	 7.5 13	 7.5 7.5	 - - MIN. 3
5.4.2g)	MIN. SEPARATION BETWEEN TOWNHOUSE DWELLINGS	2	2	3
5.4.2h)	MAX. BLDG. HEIGHT	11 (8-Z-2017)	11 (8-Z-2017)	MAX. 13
5.4.3	*Setback* from Mutual *Side Lot Line* Notwithstanding the *required side yard*, on a mutual *side lot line* separating two (2) attached *townhouse* units, no *interior side yard* is *required* where the walls are joined, where the walls are not joined, a 1.2 metre *side yard* shall be *required*.	1.2	1.2	MIN. 1.2
5.4.4	Maximum Units in a *Townhouse Dwelling* No more than eight *(8) dwelling units* shall be located in a townhouse *dwelling*.	8 UNITS	8 UNITS	5 UNITS

COORD. W/ ZONING BY-LAW FOR ALL OTHER ZONING REQ.'S

PARKING REQ.'D RESIDENTIAL (R4)

PROVISION	NUMBER OF PARKING SPACES	REQUIRED	PROVIDED
4.9a)	SINGLE DETACHED, SEMI-DETACHED, DUPLEX, TRI-PLEX, FOUR-PLEX, TOWNHOUSE DWELLINGS & VACATION HOME (8-Z-2017): 2 SPACES / DWELLING UNIT 2 SPACES x 38 DWELLING UNITS = 76	76 SPACE(S)	82 SPACE(S)

PARKING REQ.'D RESIDENTIAL - VISITOR:

4.9f)	VISITOR PARKING: 1 SPACE / 3 DWELLING UNITS 1 SPACE x (38 / 3) = 13	13 SPACE(S)	13 SPACE(S)

PARKING REQ.'D RESIDENTIAL - TOTAL:

	TOTAL	89 SPACE(S)	95 SPACE(S)

PARKING REQ.'D RESIDENTIAL - BARRIER FREE: (PART OF REQ.'D PARKING)

4.3.3	BARRIER FREE PARKING REQ.'D: 1-25 PARKING SPACES =		
	TYPE 'A' (3.4m WIDE) PLUS 1.5m AISLE	1 SPACE(S)	1 SPACE(S)
	TYPE 'B' (2.4m WIDE) PLUS 1.5m AISLE	0 SPACE(S)	0 SPACE(S)

4.0 OFF STREET PARKING

PARKING SPACE DIMENSIONS

4.1 4.1.3a) 4.1.3b) 	PARKING SPACE DIMENSIONS WIDTH OF PARKING SPACE: FOR VEHICLES PARKED SIDE BY SIDE FOR VEHICLES PARKED WITH WALL OR FENCE ADJ. DEPTH OF PARKING SPACE: FOR 90 DEGREE PARKING FOR PARALLEL PARKING	 3 MIN. 3.3 MIN. 5.8 MIN. 7 MIN.	 3 3.3 5.8 7
4.1.4 4.1.4b)	PARKING AISLE REQ.'S TWO-WAY TRAFFIC	7.3 MIN.	7.3 MIN.

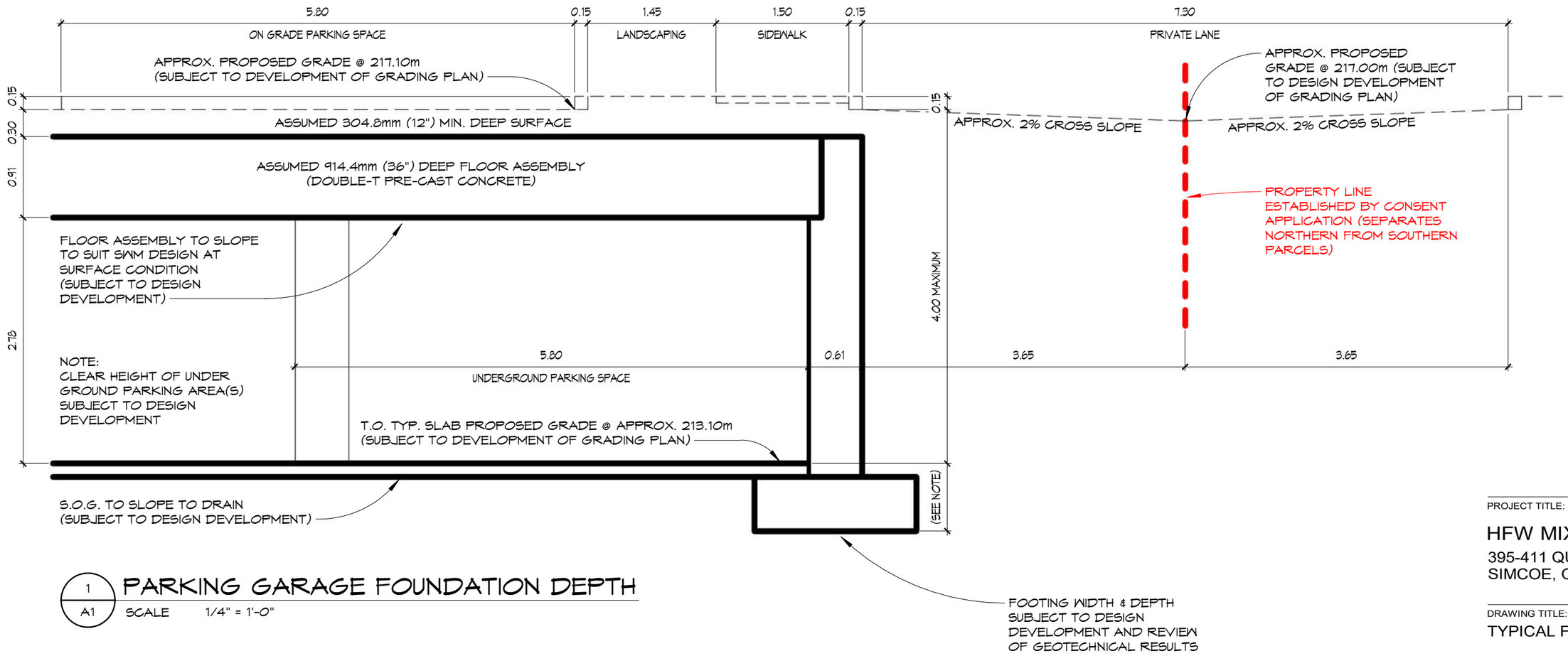
4.2 LOCATION OF PARKING ON A LOT

4.2.3	**4.2.3 Residential Parking Area** For Urban Residential Type 1 to 4 *Zones* (R1 to R4), the following shall apply: a) within a *front yard* or *exterior side yard*, motor *vehicles* shall only be parked on a *driveway*, in a *parking space* or private garage (7-Z-2018); b) not more than one *(1) required parking space* may be located within the *required front yard* or *required exterior side yard* (7-Z-2018); c) *vehicles* shall not be parked within any *landscape area* (7-Z-2018);
4.2.4	**4.2.4 Other Provisions** a) For tri-plex dwellings, duplex dwellings, four-plex dwellings, street townhouses, stacked townhouses, and boarding or lodging houses, required parking spaces shall be prohibited within the required front yard or required exterior side yard; except where a dwelling unit has a private garage in which case the driveway leading to the private garage may be used as a parking space subject to the size requirements herein; b) For *group townhouses* and *apartment dwellings*, no *parking lot* shall be located closer than 3 metres from any *dwelling* on the *lot* or of any *interior lot line* abutting another residential *Zone*; c) For *group townhouses* and *apartment dwellings*, no parking lot or *parking space* shall be located between a *dwelling* and the *street line*, except for individual or tandem *parking spaces* leading directly to each *townhouse dwelling unit*; d) For commercial or industrial properties, no *parking lot* shall be located closer than 4.5 metres from any *interior lot line* abutting a residential *Zone*; e) For *accessory residential dwelling units*, notwithstanding the foregoing, one (1) *parking space* dedicated for the use of the *accessory residential dwelling unit*, may be *permitted* in the *front yard* provided a minimum of 50 percent of the *required front yard* shall be maintained as landscaped open space notwithstanding such dedicated *parking space*.

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE ONTARIO N3Y 3W4
(519) 426-6270

Project Title
HUNT ST. N. RESIDENTIAL
HUNT STREET NORTH,
SIMCOE, ON N3Y 2M9

PROJECT No.
22-013
Drawing Title
SITE PLAN PRE-CON / ZONING AMENDMENT
Drawing No.
PC/Z101



1 / A1 PARKING GARAGE FOUNDATION DEPTH

SCALE 1/4" = 1'-0"

PROJECT TITLE:

HFW MIXED USE

395-411 QUEENSWAY WEST
SIMCOE, ONTARIO

DRAWING TITLE:

TYPICAL FOUNDATION DEPTH

DRAWING SCALE:
1/4" = 1'-0"

DATE ISSUED:
2024.01.23

DRAWING NO.:
A1

PROJECT NO.:
22-013

LIMITATIONS TO THE REPORT

This report is intended solely for the Client named. The report is prepared based on the work has been undertaken in accordance with normally accepted geotechnical engineering practices in Ontario.

The comments and recommendations given in this report are based on information determined at the limited number of the test hole and test pit locations. The boundaries between the various strata as shown on the borehole logs are based on non-continuous sampling and represent an inferred transition between the various strata and their lateral continuation rather than a precise plane of geological change. Subsurface and groundwater conditions between and beyond the test holes and test pits may differ significantly from those encountered at the test hole and test pit locations. The benchmark and elevations used in this report are primarily to establish relative elevation differences between the test hole and test pit locations and should not be used for other purposes, such as grading, excavating, planning, development, etc.

It should be noted that the results of the chemical analysis refer only to the sample analyzed which was obtained from specific sampling location and sampling depth, which may vary between and beyond the location and depth of the sample taken. Please note that the level of chemical testing outlined herein is meant to provide a broad indication of groundwater quality based on the limited sample(s) tested. The analytical results contained in this report should not be considered a warranty with respect to the groundwater quality for any specific purpose or the acceptability of the groundwater discharge.

It should be noted that not all of the well screens and sealed in the saturated zone of unconfined aquifer, and are not necessarily screened in the same unconfined aquifer. Therefore, the groundwater table contour lines based on limited number of groundwater level measurements in limited number of monitoring wells should be considered to be very approximate.

The report reflects our best judgment based on the information available to GeoPro Consulting Limited at the time of preparation. Unless otherwise agreed in writing by GeoPro Consulting Limited, it shall not be used to express or imply warranty as to any other purposes. No portion of this report shall be used as a separate entity, it is written to be read in its entirety. The information contained herein in no way reflects on the environment aspects of the project, unless otherwise stated.

The design recommendations given in this report are applicable only to the project designed and constructed completely in accordance with the details stated in this report. Otherwise, our responsibility is limited to interpreting the subsurface information at the borehole or test pit locations.

Should any comments and recommendations provided in this report be made on any construction related issues, they are intended only for the guidance of the designers. The number of test holes and test pits may not be sufficient to determine all the factors that may affect construction activities, methods and costs. Such as, the thickness of surficial topsoil or fill layers may vary significantly and unpredictably; the amount of the cobbles and boulders may vary significantly than what described in the report; unexpected water bearing zones/layers with various thickness and extent may be encountered in the fill and native soils. The contractors bidding on this project or undertaking the construction should, therefore, make their own interpretation of the factual information presented and make their own conclusions as to how the subsurface conditions may affect their work and determine the proper construction methods.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. GeoPro Consulting Limited accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

We accept no responsibility for any decisions made or actions taken as a result of this report unless we are specifically advised of and participate in such action, in which case our responsibility will be as agreed to at that time.

APPENDIX C

Stormceptor Sizing Report

Stormceptor®

Rinker MATERIALS™

Stormceptor® EF Sizing Report

Imbrium® Systems
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

02/05/2024

Province:	Ontario
City:	Simcoe
Nearest Rainfall Station:	BRANTFORD MOE
Climate Station Id:	6140954
Years of Rainfall Data:	41

Site Name:	HFW Development

Drainage Area (ha):	1.91
% Imperviousness:	72.00

Runoff Coefficient 'c': 0.73

Particle Size Distribution:	Fine
Target TSS Removal (%):	80.0

Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	50.87
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	
Influent TSS Concentration (mg/L):	100
Estimated Average Annual Sediment Load (kg/yr):	820
Estimated Average Annual Sediment Volume (L/yr):	666

Project Name:	HFW Development
Project Number:	22-013 HFW
Designer Name:	Natalie Biesinger
Designer Company:	G. Douglas Vallee Limited
Designer Email:	natalieongena@gdvallee.ca
Designer Phone:	519-501-6278
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	65
EFO6	79
EFO8	86
EFO10	91
EFO12	94

Recommended Stormceptor EFO Model: EFO8

Estimated Net Annual Sediment (TSS) Load Reduction (%): 86

Water Quality Runoff Volume Capture (%): > 90

imbrium

THIRD-PARTY TESTING AND VERIFICATION

►**Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

►**Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterwavs.

PARTICLE SIZE DISTRIBUTION (PSD)

►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

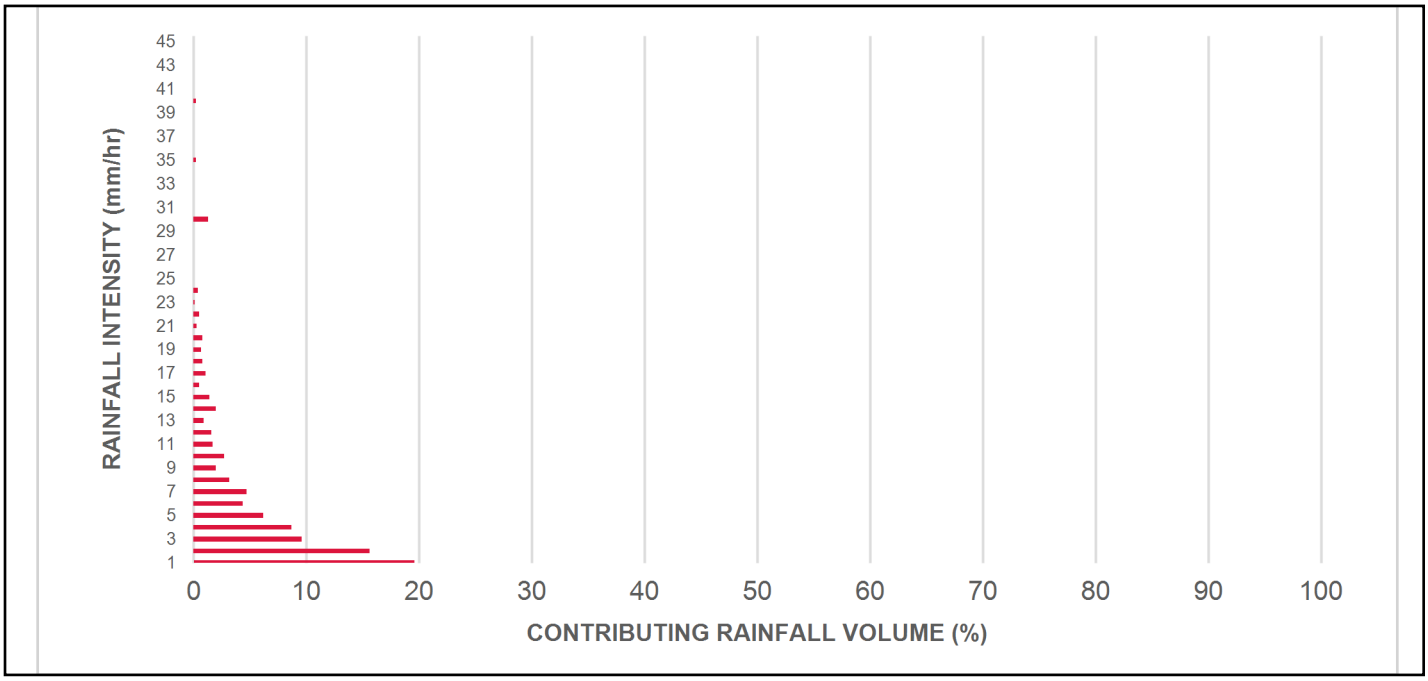
Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

Stormceptor® EF Sizing Report

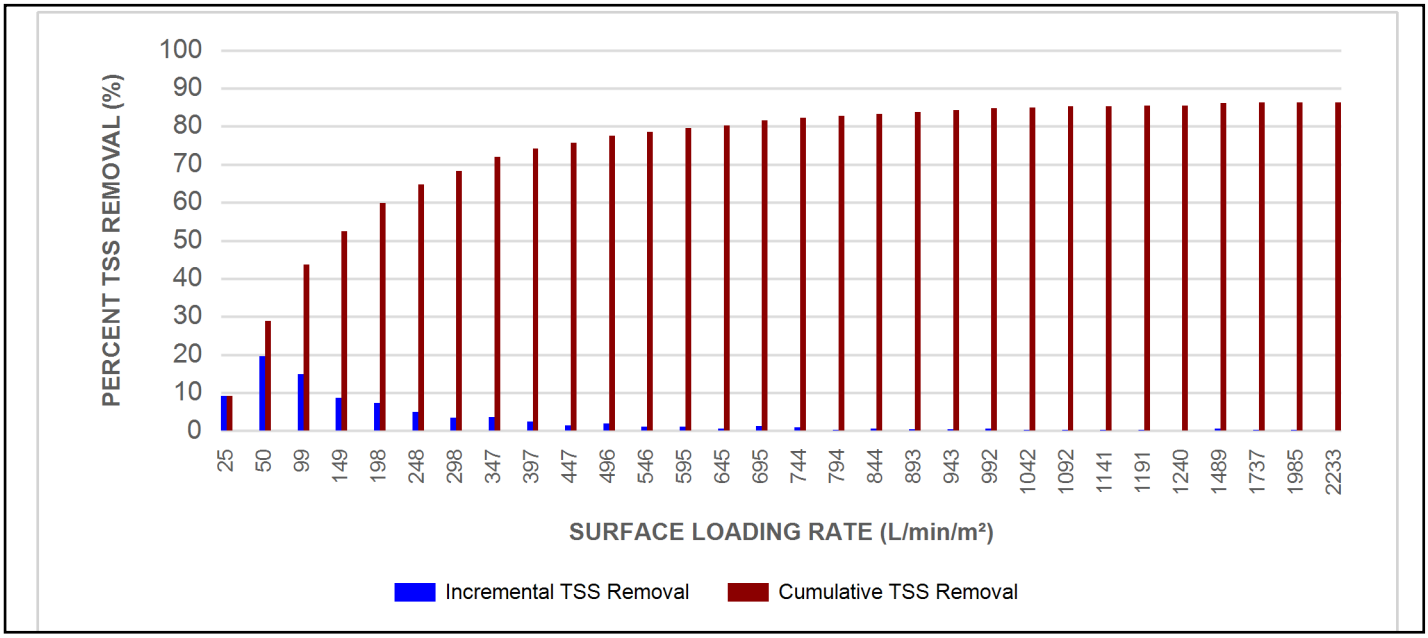
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	9.1	9.1	1.94	117.0	25.0	100	9.1	9.1
1.00	19.6	28.8	3.89	233.0	50.0	100	19.6	28.8
2.00	15.6	44.4	7.77	466.0	99.0	96	15.0	43.7
3.00	9.6	54.0	11.66	700.0	149.0	91	8.7	52.5
4.00	8.7	62.7	15.55	933.0	198.0	84	7.3	59.8
5.00	6.2	68.9	19.43	1166.0	248.0	81	5.0	64.8
6.00	4.4	73.3	23.32	1399.0	298.0	79	3.5	68.3
7.00	4.7	77.9	27.21	1632.0	347.0	77	3.6	71.9
8.00	3.2	81.1	31.09	1866.0	397.0	74	2.4	74.2
9.00	2.0	83.1	34.98	2099.0	447.0	72	1.4	75.6
10.00	2.7	85.7	38.87	2332.0	496.0	70	1.9	77.5
11.00	1.7	87.4	42.75	2565.0	546.0	67	1.1	78.6
12.00	1.6	89.0	46.64	2798.0	595.0	65	1.0	79.6
13.00	0.9	89.8	50.53	3032.0	645.0	64	0.6	80.2
14.00	2.0	91.8	54.41	3265.0	695.0	64	1.3	81.5
15.00	1.4	93.2	58.30	3498.0	744.0	64	0.9	82.3
16.00	0.5	93.7	62.19	3731.0	794.0	63	0.3	82.7
17.00	1.1	94.8	66.08	3965.0	844.0	63	0.7	83.3
18.00	0.8	95.5	69.96	4198.0	893.0	62	0.5	83.8
19.00	0.7	96.2	73.85	4431.0	943.0	62	0.4	84.2
20.00	0.8	97.0	77.74	4664.0	992.0	62	0.5	84.7
21.00	0.3	97.4	81.62	4897.0	1042.0	61	0.2	84.9
22.00	0.5	97.8	85.51	5131.0	1092.0	59	0.3	85.2
23.00	0.1	97.9	89.40	5364.0	1141.0	58	0.1	85.3
24.00	0.4	98.3	93.28	5597.0	1191.0	57	0.2	85.5
25.00	0.0	98.3	97.17	5830.0	1240.0	56	0.0	85.5
30.00	1.3	99.6	116.60	6996.0	1489.0	49	0.6	86.1
35.00	0.2	99.8	136.04	8162.0	1737.0	42	0.1	86.2
40.00	0.2	100.0	155.47	9328.0	1985.0	37	0.1	86.3
45.00	0.0	100.0	174.90	10494.0	2233.0	33	0.0	86.3
Estimated Net Annual Sediment (TSS) Load Reduction =								**86 %**

Climate Station ID: 6140954 *Years of Rainfall Data*: 41

RAINFALL DATA FROM BRANTFORD MOE RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

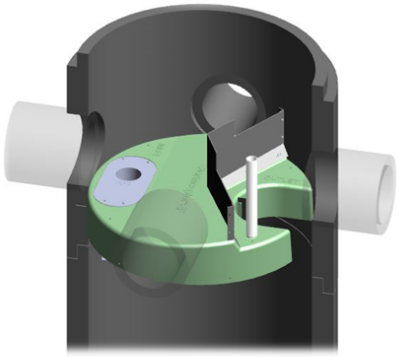
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

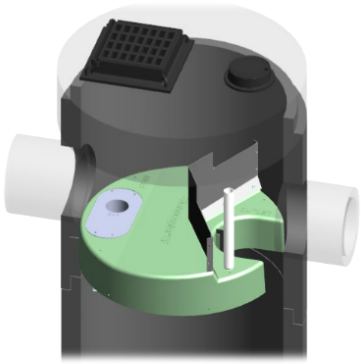
DESIGN FLEXIBILITY

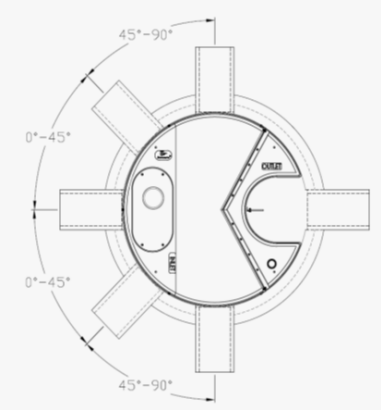
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

►While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.







INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.
0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.
45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1. For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity
** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

For specifications, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD PERFORMANCE SPECIFICATION FOR "OIL GRIT SEPARATOR" (OGS) STORMWATER QUALITY TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit** S**eparators**

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The minimum sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1	4 ft (1219 mm) Diameter OGS Units:	1.19 m^3 sediment / 265 L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m^3 sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m^3 sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m^3 sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m^3 sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall

remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m^2 to 1400 L/min/m^2, and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m^2 and 1400 L/min/m^2 shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m^2 shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m^2. No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m^2.

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m^2 shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m^2, and shall be calculated using a simple proportioning formula, with 1400 L/min/m^2 in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m^2.

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators,** with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to

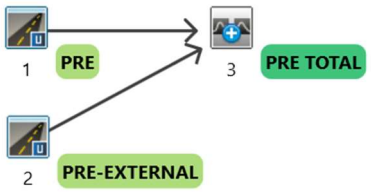
assess whether light liquids captured after a spill are effectively retained at high flow rates.

3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m^2 to 2600 L/min/m^2) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.** However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.

APPENDIX D

Visual OTTHYMO Outputs

22-013 HFW HUNT STREET DEVELOPMENT
PRE-DEVELOPMENT
OTTHYMO MODEL



2-YEAR STORM – PRE-DEVELOPMENT

```
================================================================================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
         V V    I      SS   U   U  A   A  L
          VV    I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Smart City Water Inc
Copyright 2007 - 2022 Smart City Water Inc
All rights reserved.

                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\Natalie\AppData\Local\Civica\VH5\c399a01c-8370-
442e-925a-91933bdc17fe\d0fbdccd-27e1-4044-be50-b3ccf38a6de6\scen
  Summary filename: C:\Users\Natalie\AppData\Local\Civica\VH5\c399a01c-8370-
442e-925a-91933bdc17fe\d0fbdccd-27e1-4044-be50-b3ccf38a6de6\scen

DATE: 02/06/2024                          TIME: 11:32:17

USER:


COMMENTS: _____

--------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 01_2-Year Norfolk             **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 529.711
| Ptotal= 35.21 mm |                          B=   4.501
--------------------                          C=   0.745
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

      TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
       hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
      0.00    2.68 |  1.00   17.69 |  2.00    5.90 |  3.00    3.14
      0.17    3.04 |  1.17   72.24 |  2.17    5.09 |  3.17    2.94
      0.33    3.53 |  1.33   22.78 |  2.33    4.50 |  3.33    2.76
      0.50    4.26 |  1.50   12.62 |  2.50    4.04 |  3.50    2.60
      0.67    5.49 |  1.67    8.98 |  2.67    3.68 |  3.67    2.47
      0.83    8.02 |  1.83    7.08 |  2.83    3.39 |  3.83    2.35

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0001)|   Area     (ha)=   2.55
|ID= 1 DT= 5.0 min |   Total Imp(%)=  41.00   Dir. Conn.(%)=  27.00
--------------------

                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=    1.05          1.50
     Dep. Storage     (mm)=    1.00         13.60
     Average Slope     (%)=    1.00          2.00
     Length            (m)=  130.38         40.00
     Mannings n            =   0.013         0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                  ---- TRANSFORMED HYETOGRAPH ----
      TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
       hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
     0.083    2.68 | 1.083   17.69 | 2.083    5.90 |  3.08    3.14
     0.167    2.68 | 1.167   17.69 | 2.167    5.90 |  3.17    3.14
     0.250    3.04 | 1.250   72.24 | 2.250    5.09 |  3.25    2.94
     0.333    3.04 | 1.333   72.24 | 2.333    5.09 |  3.33    2.94
     0.417    3.53 | 1.417   22.78 | 2.417    4.50 |  3.42    2.76
     0.500    3.53 | 1.500   22.78 | 2.500    4.50 |  3.50    2.76
     0.583    4.26 | 1.583   12.62 | 2.583    4.04 |  3.58    2.60
     0.667    4.26 | 1.667   12.62 | 2.667    4.04 |  3.67    2.60
     0.750    5.49 | 1.750    8.98 | 2.750    3.68 |  3.75    2.47
     0.833    5.49 | 1.833    8.98 | 2.833    3.68 |  3.83    2.47
     0.917    8.02 | 1.917    7.08 | 2.917    3.39 |  3.92    2.35
     1.000    8.02 | 2.000    7.08 | 3.000    3.39 |  4.00    2.35

     Max.Eff.Inten.(mm/hr)=      72.24          4.25
               over (min)        5.00         30.00
     Storage Coeff.  (min)=      3.41 (ii)    28.38 (ii)
     Unit Hyd. Tpeak (min)=      5.00         30.00
     Unit Hyd. peak  (cms)=      0.26          0.04
                                                      *TOTALS*
     PEAK FLOW       (cms)=      0.13          0.01      0.133 (iii)
     TIME TO PEAK    (hrs)=      1.33          2.00       1.33
     RUNOFF VOLUME    (mm)=     34.21          3.91      12.08
     TOTAL RAINFALL   (mm)=     35.21         35.21      35.21
     RUNOFF COEFFICIENT   =      0.97          0.11       0.34

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  62.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0002)|   Area     (ha)=   0.34
|ID= 1 DT= 5.0 min |   Total Imp(%)=  23.00   Dir. Conn.(%)=  19.00
--------------------

                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=    0.08          0.26
     Dep. Storage     (mm)=    1.00         13.60
     Average Slope     (%)=    1.00          2.00
     Length            (m)=   47.61         40.00
     Mannings n            =   0.013         0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                  ---- TRANSFORMED HYETOGRAPH ----
      TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
       hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
     0.083    2.68 | 1.083   17.69 | 2.083    5.90 |  3.08    3.14
     0.167    2.68 | 1.167   17.69 | 2.167    5.90 |  3.17    3.14
     0.250    3.04 | 1.250   72.24 | 2.250    5.09 |  3.25    2.94
     0.333    3.04 | 1.333   72.24 | 2.333    5.09 |  3.33    2.94
     0.417    3.53 | 1.417   22.78 | 2.417    4.50 |  3.42    2.76
     0.500    3.53 | 1.500   22.78 | 2.500    4.50 |  3.50    2.76
     0.583    4.26 | 1.583   12.62 | 2.583    4.04 |  3.58    2.60
     0.667    4.26 | 1.667   12.62 | 2.667    4.04 |  3.67    2.60
     0.750    5.49 | 1.750    8.98 | 2.750    3.68 |  3.75    2.47
     0.833    5.49 | 1.833    8.98 | 2.833    3.68 |  3.83    2.47
     0.917    8.02 | 1.917    7.08 | 2.917    3.39 |  3.92    2.35
     1.000    8.02 | 2.000    7.08 | 3.000    3.39 |  4.00    2.35

     Max.Eff.Inten.(mm/hr)=      72.24          2.17
               over (min)        5.00         35.00
     Storage Coeff.  (min)=      1.86 (ii)    34.55 (ii)
     Unit Hyd. Tpeak (min)=      5.00         35.00
     Unit Hyd. peak  (cms)=      0.32          0.03
                                                      *TOTALS*
     PEAK FLOW       (cms)=      0.01          0.00       0.013 (iii)
     TIME TO PEAK    (hrs)=      1.33          2.25       1.33
     RUNOFF VOLUME    (mm)=     34.21          2.92       8.80
     TOTAL RAINFALL   (mm)=     35.21         35.21      35.21
     RUNOFF COEFFICIENT   =      0.97          0.08       0.25

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  62.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)      (cms)     (hrs)      (mm)
        ID1= 1 (  0001):      2.55     0.133      1.33     12.08
      + ID2= 2 (  0002):      0.34     0.013      1.33      8.80
        ==========================================================
        ID = 3 (  0003):      2.89     0.146      1.33     11.70

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
```

5-YEAR STORM – PRE-DEVELOPMENT

```
==============================================================================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M M M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Smart City Water Inc
Copyright 2007 - 2022 Smart City Water Inc
All rights reserved.

                  *****  D E T A I L E D   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\Natalie\AppData\Local\Civica\VH5\c399a01c-8370-
442e-925a-91933bdc17fe\68df8f01-0be3-4ad1-afd1-b237623e8528\scen
  Summary filename: C:\Users\Natalie\AppData\Local\Civica\VH5\c399a01c-8370-
442e-925a-91933bdc17fe\68df8f01-0be3-4ad1-afd1-b237623e8528\scen


DATE: 02/06/2024                          TIME: 11:32:17

USER:


COMMENTS: _____________________________________________________

--------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 02_5-Year Norfolk             **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 583.017
| Ptotal= 49.03 mm |                          B=   3.007
--------------------                          C=   0.703
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

    TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
     hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
    0.00    4.20 |  1.00   23.22 |'  2.00    8.64 |  3.00    4.87
    0.17    4.72 |  1.17   96.03 |'  2.17    7.56 |  3.17    4.58
    0.33    5.42 |  1.33   29.33 |'  2.33    6.76 |  3.33    4.32
    0.50    6.44 |  1.50   17.13 |'  2.50    6.13 |  3.50    4.10
    0.67    8.09 |  1.67   12.62 |'  2.67    5.63 |  3.67    3.90
    0.83   11.39 |  1.83   10.19 |'  2.83    5.22 |  3.83    3.72

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0001)|   Area    (ha)=   2.55
|ID= 1 DT= 5.0 min |   Total Imp(%)=  41.00   Dir. Conn.(%)=  27.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.05          1.50
     Dep. Storage     (mm)=       1.00         13.60
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     130.38         40.00
     Mannings n           =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
    TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
     hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
   0.083    4.20 | 1.083   23.22 | 2.083    8.64 |  3.08    4.87
   0.167    4.20 | 1.167   23.22 | 2.167    8.64 |  3.17    4.87
   0.250    4.72 | 1.250   96.03 | 2.250    7.56 |  3.25    4.58
   0.333    4.72 | 1.333   96.03 | 2.333    7.56 |  3.33    4.58
   0.417    5.42 | 1.417   29.33 | 2.417    6.76 |  3.42    4.32
   0.500    5.42 | 1.500   29.33 | 2.500    6.76 |  3.50    4.32
   0.583    6.44 | 1.583   17.13 | 2.583    6.13 |  3.58    4.10
   0.667    6.44 | 1.667   17.13 | 2.667    6.13 |  3.67    4.10
   0.750    8.09 | 1.750   12.62 | 2.750    5.63 |  3.75    3.90
   0.833    8.09 | 1.833   12.62 | 2.833    5.63 |  3.83    3.90
   0.917   11.39 | 1.917   10.19 | 2.917    5.22 |  3.92    3.72
   1.000   11.39 | 2.000   10.19 | 3.000    5.22 |  4.00    3.72

     Max.Eff.Inten.(mm/hr)=      96.03         10.64
               over (min)        5.00         25.00
     Storage Coeff.  (min)=      3.04 (ii)    20.34 (ii)
     Unit Hyd. Tpeak (min)=      5.00         25.00
     Unit Hyd. peak  (cms)=      0.27          0.05
                                                      *TOTALS*
     PEAK FLOW       (cms)=      0.18          0.03      0.182 (iii)
     TIME TO PEAK    (hrs)=      1.33          1.83       1.33
     RUNOFF VOLUME    (mm)=     48.03          8.83      19.41
     TOTAL RAINFALL   (mm)=     49.03         49.03      49.03
     RUNOFF COEFFICIENT   =      0.98          0.18       0.40

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  62.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0002)|   Area    (ha)=   0.34
|ID= 1 DT= 5.0 min |   Total Imp(%)=  23.00   Dir. Conn.(%)=  19.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.08          0.26
     Dep. Storage     (mm)=       1.00         13.60
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      47.61         40.00
     Mannings n           =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
    TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
     hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
   0.083    4.20 | 1.083   23.22 | 2.083    8.64 |  3.08    4.87
   0.167    4.20 | 1.167   23.22 | 2.167    8.64 |  3.17    4.87
   0.250    4.72 | 1.250   96.03 | 2.250    7.56 |  3.25    4.58
   0.333    4.72 | 1.333   96.03 | 2.333    7.56 |  3.33    4.58
   0.417    5.42 | 1.417   29.33 | 2.417    6.76 |  3.42    4.32
   0.500    5.42 | 1.500   29.33 | 2.500    6.76 |  3.50    4.32
   0.583    6.44 | 1.583   17.13 | 2.583    6.13 |  3.58    4.10
   0.667    6.44 | 1.667   17.13 | 2.667    6.13 |  3.67    4.10
   0.750    8.09 | 1.750   12.62 | 2.750    5.63 |  3.75    3.90
   0.833    8.09 | 1.833   12.62 | 2.833    5.63 |  3.83    3.90
   0.917   11.39 | 1.917   10.19 | 2.917    5.22 |  3.92    3.72
   1.000   11.39 | 2.000   10.19 | 3.000    5.22 |  4.00    3.72

     Max.Eff.Inten.(mm/hr)=      96.03          6.30
               over (min)        5.00         25.00
     Storage Coeff.  (min)=      1.66 (ii)    22.99 (ii)
     Unit Hyd. Tpeak (min)=      5.00         25.00
     Unit Hyd. peak  (cms)=      0.32          0.05
                                                      *TOTALS*
     PEAK FLOW       (cms)=      0.02          0.00      0.018 (iii)
     TIME TO PEAK    (hrs)=      1.33          1.83       1.33
     RUNOFF VOLUME    (mm)=     48.03          7.08      14.82
     TOTAL RAINFALL   (mm)=     49.03         49.03      49.03
     RUNOFF COEFFICIENT   =      0.98          0.14       0.30

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  62.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):     2.55   0.182     1.33    19.41
     + ID2= 2 (  0002):     0.34   0.018     1.33    14.82
       ================================================
       ID = 3 (  0003):     2.89   0.200     1.33    18.87

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
```

10-YEAR STORM – PRE-DEVELOPMENT

```
================================================================================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M M M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Smart City Water Inc
Copyright 2007 - 2022 Smart City Water Inc
All rights reserved.

                  *****  D E T A I L E D   O U T P U T *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\Natalie\AppData\Local\Civica\VH5\c399a01c-8370-
442e-925a-91933bdc17fe\7c4cf53c-25f6-4d99-8afb-4a5a581305be\scen
  Summary filename: C:\Users\Natalie\AppData\Local\Civica\VH5\c399a01c-8370-
442e-925a-91933bdc17fe\7c4cf53c-25f6-4d99-8afb-4a5a581305be\scen

DATE: 02/06/2024                          TIME: 11:32:17

USER:


COMMENTS: _____________________________________________________________

--------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 03_10-Year Norfolk            **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 670.324
| Ptotal= 57.94 mm |                          B=   3.007
--------------------                          C=   0.698
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
   0.00    5.04 |  1.00   27.43 |  2.00   10.30 |  3.00    5.84
   0.17    5.66 |  1.17  111.84 |  2.17    9.03 |  3.17    5.49
   0.33    6.49 |  1.33   34.58 |  2.33    8.07 |  3.33    5.18
   0.50    7.70 |  1.50   20.31 |  2.50    7.33 |  3.50    4.92
   0.67    9.66 |  1.67   15.00 |  2.67    6.74 |  3.67    4.68
   0.83   13.55 |  1.83   12.13 |  2.83    6.25 |  3.83    4.47

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0001)|   Area    (ha)=   2.55
|ID= 1 DT= 5.0 min |   Total Imp(%)=  41.00   Dir. Conn.(%)=  27.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.05         1.50
     Dep. Storage     (mm)=       1.00        13.60
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     130.38        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
  0.083    5.04 | 1.083   27.43 | 2.083   10.30 |  3.08    5.84
  0.167    5.04 | 1.167   27.43 | 2.167   10.30 |  3.17    5.84
  0.250    5.66 | 1.250  111.84 | 2.250    9.03 |  3.25    5.49
  0.333    5.66 | 1.333  111.84 | 2.333    9.03 |  3.33    5.49
  0.417    6.49 | 1.417   34.58 | 2.417    8.07 |  3.42    5.18
  0.500    6.49 | 1.500   34.58 | 2.500    8.07 |  3.50    5.18
  0.583    7.70 | 1.583   20.31 | 2.583    7.33 |  3.58    4.92
  0.667    7.70 | 1.667   20.31 | 2.667    7.33 |  3.67    4.92
  0.750    9.66 | 1.750   15.00 | 2.750    6.74 |  3.75    4.68
  0.833    9.66 | 1.833   15.00 | 2.833    6.74 |  3.83    4.68
  0.917   13.55 | 1.917   12.13 | 2.917    6.25 |  3.92    4.47
  1.000   13.55 | 2.000   12.13 | 3.000    6.25 |  4.00    4.47

     Max.Eff.Inten.(mm/hr)=     111.84        17.72
               over (min)          5.00        20.00
     Storage Coeff.  (min)=       2.86 (ii)   16.97 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.28         0.06
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.21         0.04      0.220 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.67       1.33
     RUNOFF VOLUME    (mm)=      56.94        12.76      24.69
     TOTAL RAINFALL   (mm)=      57.94        57.94      57.94
     RUNOFF COEFFICIENT   =       0.98         0.22       0.43

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  62.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0002)|   Area    (ha)=   0.34
|ID= 1 DT= 5.0 min |   Total Imp(%)=  23.00   Dir. Conn.(%)=  19.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.08         0.26
     Dep. Storage     (mm)=       1.00        13.60
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      47.61        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
  0.083    5.04 | 1.083   27.43 | 2.083   10.30 |  3.08    5.84
  0.167    5.04 | 1.167   27.43 | 2.167   10.30 |  3.17    5.84
  0.250    5.66 | 1.250  111.84 | 2.250    9.03 |  3.25    5.49
  0.333    5.66 | 1.333  111.84 | 2.333    9.03 |  3.33    5.49
  0.417    6.49 | 1.417   34.58 | 2.417    8.07 |  3.42    5.18
  0.500    6.49 | 1.500   34.58 | 2.500    8.07 |  3.50    5.18
  0.583    7.70 | 1.583   20.31 | 2.583    7.33 |  3.58    4.92
  0.667    7.70 | 1.667   20.31 | 2.667    7.33 |  3.67    4.92
  0.750    9.66 | 1.750   15.00 | 2.750    6.74 |  3.75    4.68
  0.833    9.66 | 1.833   15.00 | 2.833    6.74 |  3.83    4.68
  0.917   13.55 | 1.917   12.13 | 2.917    6.25 |  3.92    4.47
  1.000   13.55 | 2.000   12.13 | 3.000    6.25 |  4.00    4.47

     Max.Eff.Inten.(mm/hr)=     111.84        10.62
               over (min)          5.00        20.00
     Storage Coeff.  (min)=       1.57 (ii)   18.87 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.33         0.06
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.02         0.00       0.021 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.75       1.33
     RUNOFF VOLUME    (mm)=      56.94        10.50      19.29
     TOTAL RAINFALL   (mm)=      57.94        57.94      57.94
     RUNOFF COEFFICIENT   =       0.98         0.18       0.33

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  62.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):     2.55    0.220     1.33    24.69
     + ID2= 2 (  0002):     0.34    0.021     1.33    19.29
       ================================================
       ID = 3 (  0003):     2.89    0.241     1.33    24.05

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
```

25-YEAR STORM – PRE-DEVELOPMENT

```
       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Smart City Water Inc
Copyright 2007 - 2022 Smart City Water Inc
All rights reserved.
```

***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\Natalie\AppData\Local\Civica\VH5\c399a01c-8370-442e-925a-91933bdc17fe\024e83fd-0ea8-422f-894b-d2466d0f826f\scen
Summary filename: C:\Users\Natalie\AppData\Local\Civica\VH5\c399a01c-8370-442e-925a-91933bdc17fe\024e83fd-0ea8-422f-894b-d2466d0f826f\scen

DATE: 02/06/2024 TIME: 11:32:17

USER:

COMMENTS: _____

** SIMULATION : 04_25-Year Norfolk **

| CHICAGO STORM | Ptotal= 69.38 mm |

IDF curve parameters: A= 721.533
B= 2.253
C= 0.679
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	6.34	1.00	31.84	2.00	12.58	3.00	7.30
0.17	7.08	1.17	131.63	2.17	11.08	3.17	6.87
0.33	8.07	1.33	39.74	2.33	9.96	3.33	6.50
0.50	9.51	1.50	23.97	2.50	9.08	3.50	6.18
0.67	11.82	1.67	17.98	2.67	8.38	3.67	5.90
0.83	16.33	1.83	14.70	2.83	7.79	3.83	5.64

CALIB	STANDHYD (0001)	Area (ha)= 2.55	ID= 1 DT= 5.0 min	Total Imp(%)= 41.00 Dir. Conn.(%)= 27.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.05	1.50
Dep. Storage	(mm)=	1.00	13.60
Average Slope	(%)=	1.00	2.00
Length	(m)=	130.38	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	6.34	1.083	31.84	2.083	12.58	3.08	7.30
0.167	6.34	1.167	31.84	2.167	12.58	3.17	7.30
0.250	7.08	1.250	131.63	2.250	11.08	3.25	6.87
0.333	7.08	1.333	131.63	2.333	11.08	3.33	6.87
0.417	8.07	1.417	39.74	2.417	9.96	3.42	6.50
0.500	8.07	1.500	39.74	2.500	9.96	3.50	6.50
0.583	9.51	1.583	23.97	2.583	9.08	3.58	6.18
0.667	9.51	1.667	23.97	2.667	9.08	3.67	6.18
0.750	11.82	1.750	17.98	2.750	8.38	3.75	5.90
0.833	11.82	1.833	17.98	2.833	8.38	3.83	5.90
0.917	16.33	1.917	14.70	2.917	7.79	3.92	5.64
1.000	16.33	2.000	14.70	3.000	7.79	4.00	5.64

				TOTALS
Max.Eff.Inten.(mm/hr)=		131.63	26.93	
over (min)		5.00	15.00	
Storage Coeff. (min)=		2.68 (ii)	14.61 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.29	0.08	
PEAK FLOW	(cms)=	0.25	0.07	0.276 (iii)
TIME TO PEAK	(hrs)=	1.33	1.50	1.33
RUNOFF VOLUME	(mm)=	68.38	18.51	31.97
TOTAL RAINFALL	(mm)=	69.38	69.38	69.38
RUNOFF COEFFICIENT	=	0.99	0.27	0.46

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 62.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	STANDHYD (0002)	Area (ha)= 0.34	ID= 1 DT= 5.0 min	Total Imp(%)= 23.00 Dir. Conn.(%)= 19.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.08	0.26
Dep. Storage	(mm)=	1.00	13.60
Average Slope	(%)=	1.00	2.00
Length	(m)=	47.61	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	6.34	1.083	31.84	2.083	12.58	3.08	7.30
0.167	6.34	1.167	31.84	2.167	12.58	3.17	7.30
0.250	7.08	1.250	131.63	2.250	11.08	3.25	6.87
0.333	7.08	1.333	131.63	2.333	11.08	3.33	6.87
0.417	8.07	1.417	39.74	2.417	9.96	3.42	6.50
0.500	8.07	1.500	39.74	2.500	9.96	3.50	6.50
0.583	9.51	1.583	23.97	2.583	9.08	3.58	6.18
0.667	9.51	1.667	23.97	2.667	9.08	3.67	6.18
0.750	11.82	1.750	17.98	2.750	8.38	3.75	5.90
0.833	11.82	1.833	17.98	2.833	8.38	3.83	5.90
0.917	16.33	1.917	14.70	2.917	7.79	3.92	5.64
1.000	16.33	2.000	14.70	3.000	7.79	4.00	5.64

				TOTALS
Max.Eff.Inten.(mm/hr)=		131.63	17.98	
over (min)		5.00	20.00	
Storage Coeff. (min)=		1.47 (ii)	15.49 (ii)	
Unit Hyd. Tpeak (min)=		5.00	20.00	
Unit Hyd. peak (cms)=		0.33	0.07	
PEAK FLOW	(cms)=	0.02	0.01	0.026 (iii)
TIME TO PEAK	(hrs)=	1.33	1.58	1.33
RUNOFF VOLUME	(mm)=	68.38	15.59	25.59
TOTAL RAINFALL	(mm)=	69.38	69.38	69.38
RUNOFF COEFFICIENT	=	0.99	0.22	0.37

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 62.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0003)	1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 1 (0001):		2.55	0.276	1.33	31.97
	+ ID2= 2 (0002):		0.34	0.026	1.33	25.59
	ID = 3 (0003):		2.89	0.302	1.33	31.22

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

50-YEAR STORM – PRE-DEVELOPMENT

```
       V    V   I    SSSSS  U   U    A    L             (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Smart City Water Inc
Copyright 2007 - 2022 Smart City Water Inc
All rights reserved.
```

***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\Natalie\AppData\Local\Civica\VH5\c399a01c-8370-442e-925a-91933bdc17fe\8783dfd6-abf6-4604-937f-7b6f4e5a43de\scen
Summary filename: C:\Users\Natalie\AppData\Local\Civica\VH5\c399a01c-8370-442e-925a-91933bdc17fe\8783dfd6-abf6-4604-937f-7b6f4e5a43de\scen

DATE: 02/06/2024 TIME: 11:32:17

USER:

COMMENTS: _____

** SIMULATION : 05_50-Year Norfolk **

| CHICAGO STORM | IDF curve parameters: A= 766.038
| Ptotal= 78.32 mm | B= 1.898
C= 0.668
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	7.35	1.00	35.40	2.00	14.38	3.00	8.44
0.17	8.19	1.17	146.50	2.17	12.71	3.17	7.96
0.33	9.32	1.33	43.93	2.33	11.45	3.33	7.55
0.50	10.95	1.50	26.91	2.50	10.46	3.50	7.18
0.67	13.53	1.67	20.36	2.67	9.66	3.67	6.85
0.83	18.53	1.83	16.73	2.83	9.00	3.83	6.56

| CALIB
| STANDHYD (0001) | Area (ha)= 2.55
|ID= 1 DT= 5.0 min | Total Imp(%)= 41.00 Dir. Conn.(%)= 27.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.05	1.50
Dep. Storage	(mm)=	1.00	13.60
Average Slope	(%)=	1.00	2.00
Length	(m)=	130.38	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	7.35	1.083	35.40	2.083	14.38	3.08	8.44
0.167	7.35	1.167	35.40	2.167	14.38	3.17	8.44
0.250	8.19	1.250	146.50	2.250	12.71	3.25	7.96
0.333	8.19	1.333	146.50	2.333	12.71	3.33	7.96
0.417	9.32	1.417	43.93	2.417	11.45	3.42	7.55
0.500	9.32	1.500	43.93	2.500	11.45	3.50	7.55
0.583	10.95	1.583	26.91	2.583	10.46	3.58	7.18
0.667	10.95	1.667	26.91	2.667	10.46	3.67	7.18
0.750	13.53	1.750	20.36	2.750	9.66	3.75	6.85
0.833	13.53	1.833	20.36	2.833	9.66	3.83	6.85
0.917	18.53	1.917	16.73	2.917	9.00	3.92	6.56
1.000	18.53	2.000	16.73	3.000	9.00	4.00	6.56

				TOTALS
Max.Eff.Inten.	(mm/hr)=	146.50	42.36	
	over (min)	5.00	15.00	
Storage Coeff.	(min)=	2.57 (ii)	12.52 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	15.00	
Unit Hyd. peak	(cms)=	0.29	0.08	
PEAK FLOW	(cms)=	0.28	0.10	0.320 (iii)
TIME TO PEAK	(hrs)=	1.33	1.50	1.33
RUNOFF VOLUME	(mm)=	77.32	23.47	38.01
TOTAL RAINFALL	(mm)=	78.32	78.32	78.32
RUNOFF COEFFICIENT	=	0.99	0.30	0.49

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 62.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| CALIB
| STANDHYD (0002) | Area (ha)= 0.34
|ID= 1 DT= 5.0 min | Total Imp(%)= 23.00 Dir. Conn.(%)= 19.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.08	0.26
Dep. Storage	(mm)=	1.00	13.60
Average Slope	(%)=	1.00	2.00
Length	(m)=	47.61	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	7.35	1.083	35.40	2.083	14.38	3.08	8.44
0.167	7.35	1.167	35.40	2.167	14.38	3.17	8.44
0.250	8.19	1.250	146.50	2.250	12.71	3.25	7.96
0.333	8.19	1.333	146.50	2.333	12.71	3.33	7.96
0.417	9.32	1.417	43.93	2.417	11.45	3.42	7.55
0.500	9.32	1.500	43.93	2.500	11.45	3.50	7.55
0.583	10.95	1.583	26.91	2.583	10.46	3.58	7.18
0.667	10.95	1.667	26.91	2.667	10.46	3.67	7.18
0.750	13.53	1.750	20.36	2.750	9.66	3.75	6.85
0.833	13.53	1.833	20.36	2.833	9.66	3.83	6.85
0.917	18.53	1.917	16.73	2.917	9.00	3.92	6.56
1.000	18.53	2.000	16.73	3.000	9.00	4.00	6.56

				TOTALS
Max.Eff.Inten.	(mm/hr)=	146.50	23.93	
	over (min)	5.00	15.00	
Storage Coeff.	(min)=	1.40 (ii)	13.91 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	15.00	
Unit Hyd. peak	(cms)=	0.33	0.08	
PEAK FLOW	(cms)=	0.03	0.01	0.031 (iii)
TIME TO PEAK	(hrs)=	1.33	1.50	1.33
RUNOFF VOLUME	(mm)=	77.32	20.04	30.90
TOTAL RAINFALL	(mm)=	78.32	78.32	78.32
RUNOFF COEFFICIENT	=	0.99	0.26	0.39

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 62.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| ADD HYD (0003)|
| 1 + 2 = 3 |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0001):	2.55	0.320	1.33	38.01
+ ID2= 2 (0002):	0.34	0.031	1.33	30.90
ID = 3 (0003):	2.89	0.351	1.33	37.17

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

100-YEAR STORM – PRE-DEVELOPMENT

```
V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
V    V   I    SS     U   U   A A   L
 V  V    I     SS    U   U  AAAAA  L
 V  V    I      SS   U   U  A   A  L
  VV     I    SSSSS  UUUUU  A   A  LLLLL

 OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
O   O    T      T    H   H   Y Y   MM MM  O   O
O   O    T      T    H   H    Y    M   M  O   O
 OOO     T      T    H   H    Y    M   M   OOO
```


***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\Natalie\AppData\Local\Civica\VH5\c399a01c-8370-442e-925a-91933bdc17fe\313c2732-e9d0-43d8-b2e2-9897a841716b\scen
Summary filename: C:\Users\Natalie\AppData\Local\Civica\VH5\c399a01c-8370-442e-925a-91933bdc17fe\313c2732-e9d0-43d8-b2e2-9897a841716b\scen

DATE: 02/06/2024 TIME: 11:32:17

USER:

COMMENTS: _____

** SIMULATION : 06_100-Year Norfolk **

| CHICAGO STORM | IDF curve parameters: A= 801.041
| Ptotal= 87.09 mm | B= 1.501
C= 0.657
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	8.40	1.00	38.70	2.00	16.17	3.00	9.61
0.17	9.34	1.17	160.97	2.17	14.33	3.17	9.08
0.33	10.59	1.33	47.72	2.33	12.95	3.33	8.61
0.50	12.39	1.50	29.71	2.50	11.86	3.50	8.20
0.67	15.24	1.67	22.67	2.67	10.97	3.67	7.84
0.83	20.69	1.83	18.74	2.83	10.24	3.83	7.51

CALIB	STANDHYD (0001)	Area (ha)= 2.55	ID= 1 DT= 5.0 min	Total Imp(%)= 41.00 Dir. Conn.(%)= 27.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.05	1.50
Dep. Storage	(mm)=	1.00	13.60
Average Slope	(%)=	1.00	2.00
Length	(m)=	130.38	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	8.40	1.083	38.70	2.083	16.17	3.08	9.61
0.167	8.40	1.167	38.70	2.167	16.17	3.17	9.61
0.250	9.34	1.250	160.97	2.250	14.33	3.25	9.08
0.333	9.34	1.333	160.97	2.333	14.33	3.33	9.08
0.417	10.59	1.417	47.72	2.417	12.95	3.42	8.61
0.500	10.59	1.500	47.72	2.500	12.95	3.50	8.61
0.583	12.39	1.583	29.71	2.583	11.86	3.58	8.20
0.667	12.39	1.667	29.71	2.667	11.86	3.67	8.20
0.750	15.24	1.750	22.67	2.750	10.97	3.75	7.84
0.833	15.24	1.833	22.67	2.833	10.97	3.83	7.84
0.917	20.69	1.917	18.74	2.917	10.24	3.92	7.51
1.000	20.69	2.000	18.74	3.000	10.24	4.00	7.51

Max.Eff.Inten.	(mm/hr)=	160.97	52.97	
	over (min)	5.00	15.00	
Storage Coeff.	(min)=	2.48 (ii)	11.58 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	15.00	
Unit Hyd. peak	(cms)=	0.29	0.09	
				TOTALS
PEAK FLOW	(cms)=	0.30	0.13	0.363 (iii)
TIME TO PEAK	(hrs)=	1.33	1.50	1.33
RUNOFF VOLUME	(mm)=	86.09	28.68	44.18
TOTAL RAINFALL	(mm)=	87.09	87.09	87.09
RUNOFF COEFFICIENT	=	0.99	0.33	0.51

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 62.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	STANDHYD (0002)	Area (ha)= 0.34	ID= 1 DT= 5.0 min	Total Imp(%)= 23.00 Dir. Conn.(%)= 19.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.08	0.26
Dep. Storage	(mm)=	1.00	13.60
Average Slope	(%)=	1.00	2.00
Length	(m)=	47.61	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	8.40	1.083	38.70	2.083	16.17	3.08	9.61
0.167	8.40	1.167	38.70	2.167	16.17	3.17	9.61
0.250	9.34	1.250	160.97	2.250	14.33	3.25	9.08
0.333	9.34	1.333	160.97	2.333	14.33	3.33	9.08
0.417	10.59	1.417	47.72	2.417	12.95	3.42	8.61
0.500	10.59	1.500	47.72	2.500	12.95	3.50	8.61
0.583	12.39	1.583	29.71	2.583	11.86	3.58	8.20
0.667	12.39	1.667	29.71	2.667	11.86	3.67	8.20
0.750	15.24	1.750	22.67	2.750	10.97	3.75	7.84
0.833	15.24	1.833	22.67	2.833	10.97	3.83	7.84
0.917	20.69	1.917	18.74	2.917	10.24	3.92	7.51
1.000	20.69	2.000	18.74	3.000	10.24	4.00	7.51

Max.Eff.Inten.	(mm/hr)=	160.97	30.21	
	over (min)	5.00	15.00	
Storage Coeff.	(min)=	1.35 (ii)	12.74 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	15.00	
Unit Hyd. peak	(cms)=	0.33	0.08	
				TOTALS
PEAK FLOW	(cms)=	0.03	0.01	0.035 (iii)
TIME TO PEAK	(hrs)=	1.33	1.50	1.33
RUNOFF VOLUME	(mm)=	86.09	24.76	36.39
TOTAL RAINFALL	(mm)=	87.09	87.09	87.09
RUNOFF COEFFICIENT	=	0.99	0.28	0.42

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

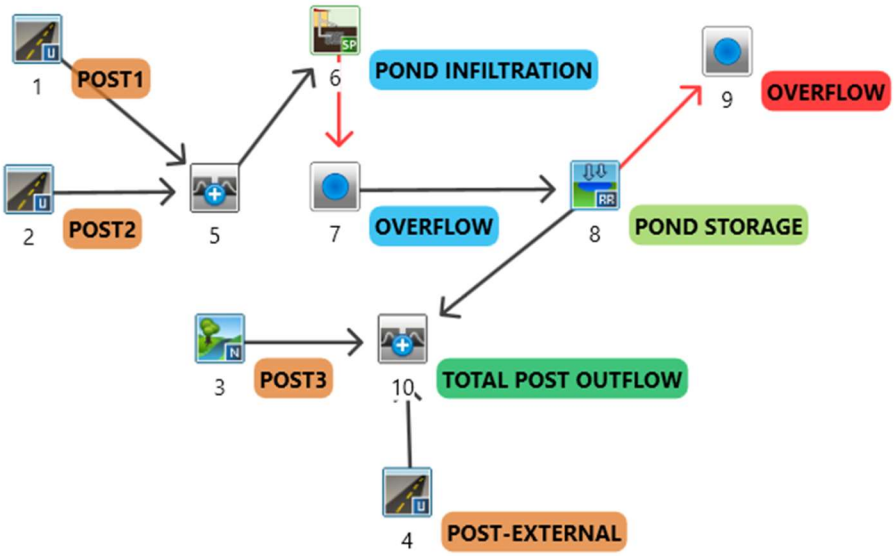
(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 62.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0003)	1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
		ID1= 1 (0001):	2.55	0.363	1.33	44.18
		+ ID2= 2 (0002):	0.34	0.035	1.33	36.39
		ID = 3 (0003):	2.89	0.399	1.33	43.26

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

FINISH

22-013 HFW HUNT STREET DEVELOPMENT
2, 5 and 10 YEAR POST-DEVELOPMENT
OTTHYMO MODEL



2-YEAR STORM – POST-DEVELOPMENT

```
================================================================================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Smart City Water Inc
Copyright 2007 - 2022 Smart City Water Inc
All rights reserved.


                 *****  D E T A I L E D   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\Natalie\AppData\Local\Civica\VH5\c399a01c-8370-
442e-925a-91933bdc17fe\5d416867-9424-41f6-8a9f-6aaf1d807d40\scen
  Summary filename: C:\Users\Natalie\AppData\Local\Civica\VH5\c399a01c-8370-
442e-925a-91933bdc17fe\5d416867-9424-41f6-8a9f-6aaf1d807d40\scen


DATE: 02/26/2024                          TIME: 01:24:15

USER:


COMMENTS: _____________________________________________________________


--------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 01_2-Year Norfolk             **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 529.711
| Ptotal= 35.21 mm |                          B=   4.501
--------------------                          C=   0.745
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    2.68 |  1.00   17.69 |'  2.00    5.90 |  3.00    3.14
                0.17    3.04 |  1.17   72.24 |'  2.17    5.09 |  3.17    2.94
                0.33    3.53 |  1.33   22.78 |'  2.33    4.50 |  3.33    2.76
                0.50    4.26 |  1.50   12.62 |'  2.50    4.04 |  3.50    2.60
                0.67    5.49 |  1.67    8.98 |'  2.67    3.68 |  3.67    2.47
                0.83    8.02 |  1.83    7.08 |'  2.83    3.39 |  3.83    2.35


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0003)|   Area     (ha)=   0.23   Curve Number    (CN)= 62.0
|ID= 1 DT= 1.0 min |   Ia       (mm)=  13.60   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20
```

```
NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.

                                ---- TRANSFORMED HYETOGRAPH ----
  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
 0.017    2.68 | 1.017   17.69 | 2.017    5.90 |  3.02    3.14
 0.033    2.68 | 1.033   17.69 | 2.033    5.90 |  3.03    3.14
 0.050    2.68 | 1.050   17.69 | 2.050    5.90 |  3.05    3.14
 0.067    2.68 | 1.067   17.69 | 2.067    5.90 |  3.07    3.14
 0.083    2.68 | 1.083   17.69 | 2.083    5.90 |  3.08    3.14
 0.100    2.68 | 1.100   17.69 | 2.100    5.90 |  3.10    3.14
 0.117    2.68 | 1.117   17.69 | 2.117    5.90 |  3.12    3.14
 0.133    2.68 | 1.133   17.69 | 2.133    5.90 |  3.13    3.14
 0.150    2.68 | 1.150   17.69 | 2.150    5.90 |  3.15    3.14
 0.167    2.68 | 1.167   17.69 | 2.167    5.90 |  3.17    3.14
 0.183    3.04 | 1.183   72.24 | 2.183    5.09 |  3.18    2.94
 0.200    3.04 | 1.200   72.24 | 2.200    5.09 |  3.20    2.94
 0.217    3.04 | 1.217   72.24 | 2.217    5.09 |  3.22    2.94
 0.233    3.04 | 1.233   72.24 | 2.233    5.09 |  3.23    2.94
 0.250    3.04 | 1.250   72.24 | 2.250    5.09 |  3.25    2.94
 0.267    3.04 | 1.267   72.24 | 2.267    5.09 |  3.27    2.94
 0.283    3.04 | 1.283   72.24 | 2.283    5.09 |  3.28    2.94
 0.300    3.04 | 1.300   72.24 | 2.300    5.09 |  3.30    2.94
 0.317    3.04 | 1.317   72.24 | 2.317    5.09 |  3.32    2.94
 0.333    3.04 | 1.333   72.24 | 2.333    5.09 |  3.33    2.94
 0.350    3.53 | 1.350   22.78 | 2.350    4.50 |  3.35    2.76
 0.367    3.53 | 1.367   22.78 | 2.367    4.50 |  3.37    2.76
 0.383    3.53 | 1.383   22.78 | 2.383    4.50 |  3.38    2.76
 0.400    3.53 | 1.400   22.78 | 2.400    4.50 |  3.40    2.76
 0.417    3.53 | 1.417   22.78 | 2.417    4.50 |  3.42    2.76
 0.433    3.53 | 1.433   22.78 | 2.433    4.50 |  3.43    2.76
 0.450    3.53 | 1.450   22.78 | 2.450    4.50 |  3.45    2.76
 0.467    3.53 | 1.467   22.78 | 2.467    4.50 |  3.47    2.76
 0.483    3.53 | 1.483   22.78 | 2.483    4.50 |  3.48    2.76
 0.500    3.53 | 1.500   22.78 | 2.500    4.50 |  3.50    2.76
 0.517    4.26 | 1.517   12.62 | 2.517    4.04 |  3.52    2.60
 0.533    4.26 | 1.533   12.62 | 2.533    4.04 |  3.53    2.60
 0.550    4.26 | 1.550   12.62 | 2.550    4.04 |  3.55    2.60
 0.567    4.26 | 1.567   12.62 | 2.567    4.04 |  3.57    2.60
 0.583    4.26 | 1.583   12.62 | 2.583    4.04 |  3.58    2.60
 0.600    4.26 | 1.600   12.62 | 2.600    4.04 |  3.60    2.60
 0.617    4.26 | 1.617   12.62 | 2.617    4.04 |  3.62    2.60
 0.633    4.26 | 1.633   12.62 | 2.633    4.04 |  3.63    2.60
 0.650    4.26 | 1.650   12.62 | 2.650    4.04 |  3.65    2.60
 0.667    4.26 | 1.667   12.62 | 2.667    4.04 |  3.67    2.60
 0.683    5.49 | 1.683    8.98 | 2.683    3.68 |  3.68    2.47
 0.700    5.49 | 1.700    8.98 | 2.700    3.68 |  3.70    2.47
 0.717    5.49 | 1.717    8.98 | 2.717    3.68 |  3.72    2.47
 0.733    5.49 | 1.733    8.98 | 2.733    3.68 |  3.73    2.47
 0.750    5.49 | 1.750    8.98 | 2.750    3.68 |  3.75    2.47
 0.767    5.49 | 1.767    8.98 | 2.767    3.68 |  3.77    2.47
 0.783    5.49 | 1.783    8.98 | 2.783    3.68 |  3.78    2.47
 0.800    5.49 | 1.800    8.98 | 2.800    3.68 |  3.80    2.47
 0.817    5.49 | 1.817    8.98 | 2.817    3.68 |  3.82    2.47
 0.833    5.49 | 1.833    8.98 | 2.833    3.68 |  3.83    2.47
 0.850    8.02 | 1.850    7.08 | 2.850    3.39 |  3.85    2.35
 0.867    8.02 | 1.867    7.08 | 2.867    3.39 |  3.87    2.35
 0.883    8.02 | 1.883    7.08 | 2.883    3.39 |  3.88    2.35
 0.900    8.02 | 1.900    7.08 | 2.900    3.39 |  3.90    2.35
 0.917    8.02 | 1.917    7.08 | 2.917    3.39 |  3.92    2.35
 0.933    8.02 | 1.933    7.08 | 2.933    3.39 |  3.93    2.35
 0.950    8.02 | 1.950    7.08 | 2.950    3.39 |  3.95    2.35
 0.967    8.02 | 1.967    7.08 | 2.967    3.39 |  3.97    2.35
 0.983    8.02 | 1.983    7.08 | 2.983    3.39 |  3.98    2.35
 1.000    8.02 | 2.000    7.08 | 3.000    3.39 |  4.00    2.35
```

Unit Hyd Qpeak (cms)= 0.044

PEAK FLOW (cms)= 0.001 (i)
TIME TO PEAK (hrs)= 1.717
RUNOFF VOLUME (mm)= 2.632
TOTAL RAINFALL (mm)= 35.210
RUNOFF COEFFICIENT = 0.075

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0002)	Area (ha)= 2.16
ID= 1 DT= 1.0 min	Total Imp(%)= 71.00 Dir. Conn.(%)= 49.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.53	0.63
Dep. Storage (mm)=	1.00	9.00
Average Slope (%)=	1.00	2.00
Length (m)=	120.00	40.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	2.68	1.017	17.69	2.017	5.90	3.02	3.14
0.033	2.68	1.033	17.69	2.033	5.90	3.03	3.14
0.050	2.68	1.050	17.69	2.050	5.90	3.05	3.14
0.067	2.68	1.067	17.69	2.067	5.90	3.07	3.14
0.083	2.68	1.083	17.69	2.083	5.90	3.08	3.14
0.100	2.68	1.100	17.69	2.100	5.90	3.10	3.14
0.117	2.68	1.117	17.69	2.117	5.90	3.12	3.14
0.133	2.68	1.133	17.69	2.133	5.90	3.13	3.14
0.150	2.68	1.150	17.69	2.150	5.90	3.15	3.14
0.167	2.68	1.167	17.69	2.167	5.90	3.17	3.14
0.183	3.04	1.183	72.24	2.183	5.09	3.18	2.94
0.200	3.04	1.200	72.24	2.200	5.09	3.20	2.94
0.217	3.04	1.217	72.24	2.217	5.09	3.22	2.94
0.233	3.04	1.233	72.24	2.233	5.09	3.23	2.94
0.250	3.04	1.250	72.24	2.250	5.09	3.25	2.94
0.267	3.04	1.267	72.24	2.267	5.09	3.27	2.94
0.283	3.04	1.283	72.24	2.283	5.09	3.28	2.94
0.300	3.04	1.300	72.24	2.300	5.09	3.30	2.94
0.317	3.04	1.317	72.24	2.317	5.09	3.32	2.94
0.333	3.04	1.333	72.24	2.333	5.09	3.33	2.94
0.350	3.53	1.350	22.78	2.350	4.50	3.35	2.76
0.367	3.53	1.367	22.78	2.367	4.50	3.37	2.76
0.383	3.53	1.383	22.78	2.383	4.50	3.38	2.76
0.400	3.53	1.400	22.78	2.400	4.50	3.40	2.76
0.417	3.53	1.417	22.78	2.417	4.50	3.42	2.76
0.433	3.53	1.433	22.78	2.433	4.50	3.43	2.76
0.450	3.53	1.450	22.78	2.450	4.50	3.45	2.76
0.467	3.53	1.467	22.78	2.467	4.50	3.47	2.76
0.483	3.53	1.483	22.78	2.483	4.50	3.48	2.76
0.500	3.53	1.500	22.78	2.500	4.50	3.50	2.76
0.517	4.26	1.517	12.62	2.517	4.04	3.52	2.60
0.533	4.26	1.533	12.62	2.533	4.04	3.53	2.60
0.550	4.26	1.550	12.62	2.550	4.04	3.55	2.60
0.567	4.26	1.567	12.62	2.567	4.04	3.57	2.60
0.583	4.26	1.583	12.62	2.583	4.04	3.58	2.60
0.600	4.26	1.600	12.62	2.600	4.04	3.60	2.60
0.617	4.26	1.617	12.62	2.617	4.04	3.62	2.60
0.633	4.26	1.633	12.62	2.633	4.04	3.63	2.60
0.650	4.26	1.650	12.62	2.650	4.04	3.65	2.60
0.667	4.26	1.667	12.62	2.667	4.04	3.67	2.60
0.683	5.49	1.683	8.98	2.683	3.68	3.68	2.47
0.700	5.49	1.700	8.98	2.700	3.68	3.70	2.47
0.717	5.49	1.717	8.98	2.717	3.68	3.72	2.47
0.733	5.49	1.733	8.98	2.733	3.68	3.73	2.47
0.750	5.49	1.750	8.98	2.750	3.68	3.75	2.47
0.767	5.49	1.767	8.98	2.767	3.68	3.77	2.47
0.783	5.49	1.783	8.98	2.783	3.68	3.78	2.47
0.800	5.49	1.800	8.98	2.800	3.68	3.80	2.47
0.817	5.49	1.817	8.98	2.817	3.68	3.82	2.47
0.833	5.49	1.833	8.98	2.833	3.68	3.83	2.47
0.850	8.02	1.850	7.08	2.850	3.39	3.85	2.35
0.867	8.02	1.867	7.08	2.867	3.39	3.87	2.35
0.883	8.02	1.883	7.08	2.883	3.39	3.88	2.35
0.900	8.02	1.900	7.08	2.900	3.39	3.90	2.35
0.917	8.02	1.917	7.08	2.917	3.39	3.92	2.35
0.933	8.02	1.933	7.08	2.933	3.39	3.93	2.35
0.950	8.02	1.950	7.08	2.950	3.39	3.95	2.35
0.967	8.02	1.967	7.08	2.967	3.39	3.97	2.35
0.983	8.02	1.983	7.08	2.983	3.39	3.98	2.35
1.000	8.02	2.000	7.08	3.000	3.39	4.00	2.35

Max.Eff.Inten.(mm/hr)=	72.24	27.95	
over (min)	5.00	10.00	
Storage Coeff. (min)=	3.25 (ii)	9.76 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.29	0.12	
			TOTALS
PEAK FLOW (cms)=	0.20	0.03	0.214 (iii)
TIME TO PEAK (hrs)=	1.33	1.48	1.35
RUNOFF VOLUME (mm)=	34.21	9.84	21.78
TOTAL RAINFALL (mm)=	35.21	35.21	35.21
RUNOFF COEFFICIENT =	0.97	0.28	0.62

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0001)	Area (ha)= 0.27
ID= 1 DT= 1.0 min	Total Imp(%)= 100.00 Dir. Conn.(%)= 100.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.27	0.00
Dep. Storage (mm)=	1.00	9.00
Average Slope (%)=	1.00	2.00
Length (m)=	42.43	40.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	2.68	1.017	17.69	2.017	5.90	3.02	3.14
0.033	2.68	1.033	17.69	2.033	5.90	3.03	3.14
0.050	2.68	1.050	17.69	2.050	5.90	3.05	3.14
0.067	2.68	1.067	17.69	2.067	5.90	3.07	3.14
0.083	2.68	1.083	17.69	2.083	5.90	3.08	3.14
0.100	2.68	1.100	17.69	2.100	5.90	3.10	3.14
0.117	2.68	1.117	17.69	2.117	5.90	3.12	3.14
0.133	2.68	1.133	17.69	2.133	5.90	3.13	3.14
0.150	2.68	1.150	17.69	2.150	5.90	3.15	3.14
0.167	2.68	1.167	17.69	2.167	5.90	3.17	3.14
0.183	3.04	1.183	72.24	2.183	5.09	3.18	2.94
0.200	3.04	1.200	72.24	2.200	5.09	3.20	2.94
0.217	3.04	1.217	72.24	2.217	5.09	3.22	2.94
0.233	3.04	1.233	72.24	2.233	5.09	3.23	2.94
0.250	3.04	1.250	72.24	2.250	5.09	3.25	2.94
0.267	3.04	1.267	72.24	2.267	5.09	3.27	2.94
0.283	3.04	1.283	72.24	2.283	5.09	3.28	2.94
0.300	3.04	1.300	72.24	2.300	5.09	3.30	2.94
0.317	3.04	1.317	72.24	2.317	5.09	3.32	2.94
0.333	3.04	1.333	72.24	2.333	5.09	3.33	2.94
0.350	3.53	1.350	22.78	2.350	4.50	3.35	2.76
0.367	3.53	1.367	22.78	2.367	4.50	3.37	2.76
0.383	3.53	1.383	22.78	2.383	4.50	3.38	2.76
0.400	3.53	1.400	22.78	2.400	4.50	3.40	2.76
0.417	3.53	1.417	22.78	2.417	4.50	3.42	2.76
0.433	3.53	1.433	22.78	2.433	4.50	3.43	2.76
0.450	3.53	1.450	22.78	2.450	4.50	3.45	2.76
0.467	3.53	1.467	22.78	2.467	4.50	3.47	2.76
0.483	3.53	1.483	22.78	2.483	4.50	3.48	2.76
0.500	3.53	1.500	22.78	2.500	4.50	3.50	2.76
0.517	4.26	1.517	12.62	2.517	4.04	3.52	2.60
0.533	4.26	1.533	12.62	2.533	4.04	3.53	2.60
0.550	4.26	1.550	12.62	2.550	4.04	3.55	2.60
0.567	4.26	1.567	12.62	2.567	4.04	3.57	2.60
0.583	4.26	1.583	12.62	2.583	4.04	3.58	2.60
0.600	4.26	1.600	12.62	2.600	4.04	3.60	2.60
0.617	4.26	1.617	12.62	2.617	4.04	3.62	2.60
0.633	4.26	1.633	12.62	2.633	4.04	3.63	2.60
0.650	4.26	1.650	12.62	2.650	4.04	3.65	2.60
0.667	4.26	1.667	12.62	2.667	4.04	3.67	2.60
0.683	5.49	1.683	8.98	2.683	3.68	3.68	2.47
0.700	5.49	1.700	8.98	2.700	3.68	3.70	2.47
0.717	5.49	1.717	8.98	2.717	3.68	3.72	2.47
0.733	5.49	1.733	8.98	2.733	3.68	3.73	2.47
0.750	5.49	1.750	8.98	2.750	3.68	3.75	2.47
0.767	5.49	1.767	8.98	2.767	3.68	3.77	2.47
0.783	5.49	1.783	8.98	2.783	3.68	3.78	2.47
0.800	5.49	1.800	8.98	2.800	3.68	3.80	2.47
0.817	5.49	1.817	8.98	2.817	3.68	3.82	2.47
0.833	5.49	1.833	8.98	2.833	3.68	3.83	2.47
0.850	8.02	1.850	7.08	2.850	3.39	3.85	2.35
0.867	8.02	1.867	7.08	2.867	3.39	3.87	2.35
0.883	8.02	1.883	7.08	2.883	3.39	3.88	2.35
0.900	8.02	1.900	7.08	2.900	3.39	3.90	2.35
0.917	8.02	1.917	7.08	2.917	3.39	3.92	2.35
0.933	8.02	1.933	7.08	2.933	3.39	3.93	2.35
0.950	8.02	1.950	7.08	2.950	3.39	3.95	2.35
0.967	8.02	1.967	7.08	2.967	3.39	3.97	2.35
0.983	8.02	1.983	7.08	2.983	3.39	3.98	2.35
1.000	8.02	2.000	7.08	3.000	3.39	4.00	2.35

Max.Eff.Inten.(mm/hr)=	72.24	6.59	
over (min)	5.00	2.00	
Storage Coeff. (min)=	1.74 (ii)	1.77 (ii)	
Unit Hyd. Tpeak (min)=	5.00	2.00	
Unit Hyd. peak (cms)=	0.40	0.82	
			TOTALS
PEAK FLOW (cms)=	0.05	0.00	0.053 (iii)
TIME TO PEAK (hrs)=	1.33	1.33	1.33
RUNOFF VOLUME (mm)=	34.21	5.09	34.13
TOTAL RAINFALL (mm)=	35.21	35.21	35.21
RUNOFF COEFFICIENT =	0.97	0.14	0.97

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0005)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0001):	0.27	0.053	1.33	34.13
+ ID2= 2 (0002):	2.16	0.214	1.35	21.78
ID = 3 (0005):	2.43	0.266	1.35	23.15

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

SOAKAWAY(0006)	UNDERDRAIN: OFF
IN= 2--> OUT= 3	
DT= 5.0 MIN	STORAGE LAYER:
	Length (m)= 42.00 Height (m)= 0.30

Porosity = 0.40 Initial Water Level (m)= 0.00
Width (m)= 3.30 Min. Drawdown (hr)= 24.00
Max. Drawdown (hr)= 3.00 Available Storage (cu.m.)= 16.63

NATIVE SOIL LAYER:
Infiltration (m/hr) = 0.0400

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW:ID= 2	2.43	0.266	1.35	23.15
OVERFLOW:ID= 3	2.43	0.264	1.35	21.55

Volume Reduction Rate[(RVin-RVout)/RVin](%):
If RVout= (Overflow)= 6.93
Time to reach Max storage (Hr)= 0.78
Volume of water for drawdown in LID (cu.m.)= 14.95
Volume of maximum water storage (cu.m.)= 16.63
Calculated Drawdown Time (Hr)= 2.68

| Junction Command(0007) |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0006)	2.43	0.26	1.35	21.55
OUTFLOW: ID= 2(0007)	2.43	0.26	1.35	21.55

RESERVOIR(0008)| IN= 2---> OUT= 1 | DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0730	0.0240
	0.0000	0.0016	0.1290	0.0289
	0.0280	0.0036	0.1830	0.0342
	0.0390	0.0060	0.2380	0.0400
	0.0480	0.0087	0.2920	0.0463
	0.0550	0.0119	0.3470	0.0531
	0.0620	0.0155	0.4010	0.0603
	0.0680	0.0195	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0007)	2.430	0.264	1.35	21.55
OUTFLOW: ID= 1 (0008)	2.430	0.070	1.68	20.89
OVERFLOW:ID= 3 (0003)	0.000	0.000	0.00	0.00

TOTAL NUMBER OF SIMULATION OVERFLOW = 0
CUMULATIVE TIME OF OVERFLOW (HOURS) = 0.00
PERCENTAGE OF TIME OVERFLOWING (%) = 0.00

PEAK FLOW REDUCTION [Qout/Qin](%)= 26.36
TIME SHIFT OF PEAK FLOW (min)= 20.00
MAXIMUM STORAGE USED (ha.m.)= 0.0210

**** WARNING : SELECTED ROUTING TIME STEP DENIED.

CALIB | STANDHYD (0004)| ID= 1 DT= 1.0 min | Area (ha)= 0.23 Total Imp(%)= 48.00 Dir. Conn.(%)= 35.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.11	0.12
Dep. Storage	(mm)=	1.00	9.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	39.16	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	2.68	1.017	17.69	2.017	5.90	3.02	3.14
0.033	2.68	1.033	17.69	2.033	5.90	3.03	3.14
0.050	2.68	1.050	17.69	2.050	5.90	3.05	3.14
0.067	2.68	1.067	17.69	2.067	5.90	3.07	3.14
0.083	2.68	1.083	17.69	2.083	5.90	3.08	3.14
0.100	2.68	1.100	17.69	2.100	5.90	3.10	3.14
0.117	2.68	1.117	17.69	2.117	5.90	3.12	3.14
0.133	2.68	1.133	17.69	2.133	5.90	3.13	3.14
0.150	2.68	1.150	17.69	2.150	5.90	3.15	3.14
0.167	2.68	1.167	17.69	2.167	5.90	3.17	3.14
0.183	3.04	1.183	72.24	2.183	5.09	3.18	2.94
0.200	3.04	1.200	72.24	2.200	5.09	3.20	2.94
0.217	3.04	1.217	72.24	2.217	5.09	3.22	2.94
0.233	3.04	1.233	72.24	2.233	5.09	3.23	2.94
0.250	3.04	1.250	72.24	2.250	5.09	3.25	2.94
0.267	3.04	1.267	72.24	2.267	5.09	3.27	2.94
0.283	3.04	1.283	72.24	2.283	5.09	3.28	2.94
0.300	3.04	1.300	72.24	2.300	5.09	3.30	2.94
0.317	3.04	1.317	72.24	2.317	5.09	3.32	2.94
0.333	3.04	1.333	72.24	2.333	5.09	3.33	2.94
0.350	3.53	1.350	22.78	2.350	4.50	3.35	2.76
0.367	3.53	1.367	22.78	2.367	4.50	3.37	2.76
0.383	3.53	1.383	22.78	2.383	4.50	3.38	2.76
0.400	3.53	1.400	22.78	2.400	4.50	3.40	2.76
0.417	3.53	1.417	22.78	2.417	4.50	3.42	2.76
0.433	3.53	1.433	22.78	2.433	4.50	3.43	2.76
0.450	3.53	1.450	22.78	2.450	4.50	3.45	2.76
0.467	3.53	1.467	22.78	2.467	4.50	3.47	2.76
0.483	3.53	1.483	22.78	2.483	4.50	3.48	2.76
0.500	3.53	1.500	22.78	2.500	4.50	3.50	2.76
0.517	4.26	1.517	12.62	2.517	4.04	3.52	2.60
0.533	4.26	1.533	12.62	2.533	4.04	3.53	2.60
0.550	4.26	1.550	12.62	2.550	4.04	3.55	2.60
0.567	4.26	1.567	12.62	2.567	4.04	3.57	2.60
0.583	4.26	1.583	12.62	2.583	4.04	3.58	2.60
0.600	4.26	1.600	12.62	2.600	4.04	3.60	2.60
0.617	4.26	1.617	12.62	2.617	4.04	3.62	2.60
0.633	4.26	1.633	12.62	2.633	4.04	3.63	2.60
0.650	4.26	1.650	12.62	2.650	4.04	3.65	2.60
0.667	4.26	1.667	12.62	2.667	4.04	3.67	2.60
0.683	5.49	1.683	8.98	2.683	3.68	3.68	2.47
0.700	5.49	1.700	8.98	2.700	3.68	3.70	2.47
0.717	5.49	1.717	8.98	2.717	3.68	3.72	2.47
0.733	5.49	1.733	8.98	2.733	3.68	3.73	2.47
0.750	5.49	1.750	8.98	2.750	3.68	3.75	2.47
0.767	5.49	1.767	8.98	2.767	3.68	3.77	2.47
0.783	5.49	1.783	8.98	2.783	3.68	3.78	2.47
0.800	5.49	1.800	8.98	2.800	3.68	3.80	2.47
0.817	5.49	1.817	8.98	2.817	3.68	3.82	2.47
0.833	5.49	1.833	8.98	2.833	3.68	3.83	2.47
0.850	8.02	1.850	7.08	2.850	3.39	3.85	2.35
0.867	8.02	1.867	7.08	2.867	3.39	3.87	2.35
0.883	8.02	1.883	7.08	2.883	3.39	3.88	2.35
0.900	8.02	1.900	7.08	2.900	3.39	3.90	2.35
0.917	8.02	1.917	7.08	2.917	3.39	3.92	2.35
0.933	8.02	1.933	7.08	2.933	3.39	3.93	2.35
0.950	8.02	1.950	7.08	2.950	3.39	3.95	2.35
0.967	8.02	1.967	7.08	2.967	3.39	3.97	2.35
0.983	8.02	1.983	7.08	2.983	3.39	3.98	2.35
1.000	8.02	2.000	7.08	3.000	3.39	4.00	2.35

				TOTALS
Max.Eff.Inten.(mm/hr)=		72.24	10.12	
over (min)		5.00	20.00	
Storage Coeff. (min)=		1.66 (ii)	19.30 (ii)	
Unit Hyd. Tpeak (min)=		5.00	20.00	
Unit Hyd. peak (cms)=		0.40	0.06	
PEAK FLOW	(cms)=	0.02	0.00	0.016 (iii)
TIME TO PEAK	(hrs)=	1.33	1.73	1.33
RUNOFF VOLUME	(mm)=	34.21	6.82	16.36
TOTAL RAINFALL	(mm)=	35.21	35.21	35.21
RUNOFF COEFFICIENT	=	0.97	0.19	0.46

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0010)| 1 + 2 = 3 |	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0003):	0.23	0.001	1.72	2.63
+ ID2= 2 (0004):	0.23	0.016	1.33	16.36
ID = 3 (0010):	0.46	0.016	1.33	9.49

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)| 3 + 2 = 1 |	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0010):	0.46	0.016	1.33	9.49
+ ID2= 2 (0008):	2.43	0.070	1.68	20.89
ID = 1 (0010):	2.89	0.076	1.55	19.08

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

| Junction Command(0009) |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0008)	0.00	0.00	0.00	0.00
OUTFLOW: ID= 2(0009)	0.00	0.00	0.00	0.00

5-YEAR STORM – POST-DEVELOPMENT

```
==========================================================================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Smart City Water Inc
Copyright 2007 - 2022 Smart City Water Inc
All rights reserved.

                  *****  D E T A I L E D   O U T P U T *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\Natalie\AppData\Local\Civica\VH5\c399a01c-8370-
442e-925a-91933bdc17fe\3b57a75c-900d-4d0c-b54a-6ea8713f4b22\scen
  Summary filename: C:\Users\Natalie\AppData\Local\Civica\VH5\c399a01c-8370-
442e-925a-91933bdc17fe\3b57a75c-900d-4d0c-b54a-6ea8713f4b22\scen

DATE: 02/26/2024                          TIME: 01:24:15

USER:


COMMENTS: _____________________________________________________

--------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 02_5-Year Norfolk             **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 583.017
| Ptotal= 49.03 mm |                          B=   3.007
--------------------                          C=   0.703
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
   0.00    4.20 |  1.00   23.22 |'  2.00    8.64 |  3.00    4.87
   0.17    4.72 |  1.17   96.03 |'  2.17    7.56 |  3.17    4.58
   0.33    5.42 |  1.33   29.33 |'  2.33    6.76 |  3.33    4.32
   0.50    6.44 |  1.50   17.13 |'  2.50    6.13 |  3.50    4.10
   0.67    8.09 |  1.67   12.62 |'  2.67    5.63 |  3.67    3.90
   0.83   11.39 |  1.83   10.19 |'  2.83    5.22 |  3.83    3.72

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD  (  0003)|   Area    (ha)=   0.23   Curve Number   (CN)= 62.0
|ID= 1 DT= 1.0 min |   Ia      (mm)=  13.60   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

        NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
  0.017    4.20 | 1.017   23.22 | 2.017    8.64 |  3.02    4.87
  0.033    4.20 | 1.033   23.22 | 2.033    8.64 |  3.03    4.87
  0.050    4.20 | 1.050   23.22 | 2.050    8.64 |  3.05    4.87
  0.067    4.20 | 1.067   23.22 | 2.067    8.64 |  3.07    4.87
  0.083    4.20 | 1.083   23.22 | 2.083    8.64 |  3.08    4.87
  0.100    4.20 | 1.100   23.22 | 2.100    8.64 |  3.10    4.87
  0.117    4.20 | 1.117   23.22 | 2.117    8.64 |  3.12    4.87
  0.133    4.20 | 1.133   23.22 | 2.133    8.64 |  3.13    4.87
  0.150    4.20 | 1.150   23.22 | 2.150    8.64 |  3.15    4.87
  0.167    4.20 | 1.167   23.22 | 2.167    8.64 |  3.17    4.87
  0.183    4.72 | 1.183   96.03 | 2.183    7.56 |  3.18    4.58
  0.200    4.72 | 1.200   96.03 | 2.200    7.56 |  3.20    4.58
  0.217    4.72 | 1.217   96.03 | 2.217    7.56 |  3.22    4.58
  0.233    4.72 | 1.233   96.03 | 2.233    7.56 |  3.23    4.58
  0.250    4.72 | 1.250   96.03 | 2.250    7.56 |  3.25    4.58
  0.267    4.72 | 1.267   96.03 | 2.267    7.56 |  3.27    4.58
  0.283    4.72 | 1.283   96.03 | 2.283    7.56 |  3.28    4.58
  0.300    4.72 | 1.300   96.03 | 2.300    7.56 |  3.30    4.58
  0.317    4.72 | 1.317   96.03 | 2.317    7.56 |  3.32    4.58
  0.333    4.72 | 1.333   96.03 | 2.333    7.56 |  3.33    4.58
  0.350    5.42 | 1.350   29.33 | 2.350    6.76 |  3.35    4.32
  0.367    5.42 | 1.367   29.33 | 2.367    6.76 |  3.37    4.32
  0.383    5.42 | 1.383   29.33 | 2.383    6.76 |  3.38    4.32
  0.400    5.42 | 1.400   29.33 | 2.400    6.76 |  3.40    4.32
  0.417    5.42 | 1.417   29.33 | 2.417    6.76 |  3.42    4.32
  0.433    5.42 | 1.433   29.33 | 2.433    6.76 |  3.43    4.32
  0.450    5.42 | 1.450   29.33 | 2.450    6.76 |  3.45    4.32
  0.467    5.42 | 1.467   29.33 | 2.467    6.76 |  3.47    4.32
  0.483    5.42 | 1.483   29.33 | 2.483    6.76 |  3.48    4.32
  0.500    5.42 | 1.500   29.33 | 2.500    6.76 |  3.50    4.32
  0.517    6.44 | 1.517   17.13 | 2.517    6.13 |  3.52    4.10
  0.533    6.44 | 1.533   17.13 | 2.533    6.13 |  3.53    4.10
  0.550    6.44 | 1.550   17.13 | 2.550    6.13 |  3.55    4.10
  0.567    6.44 | 1.567   17.13 | 2.567    6.13 |  3.57    4.10
  0.583    6.44 | 1.583   17.13 | 2.583    6.13 |  3.58    4.10
  0.600    6.44 | 1.600   17.13 | 2.600    6.13 |  3.60    4.10
  0.617    6.44 | 1.617   17.13 | 2.617    6.13 |  3.62    4.10
  0.633    6.44 | 1.633   17.13 | 2.633    6.13 |  3.63    4.10
  0.650    6.44 | 1.650   17.13 | 2.650    6.13 |  3.65    4.10
  0.667    6.44 | 1.667   17.13 | 2.667    6.13 |  3.67    4.10
  0.683    8.09 | 1.683   12.62 | 2.683    5.63 |  3.68    3.90
  0.700    8.09 | 1.700   12.62 | 2.700    5.63 |  3.70    3.90
  0.717    8.09 | 1.717   12.62 | 2.717    5.63 |  3.72    3.90
  0.733    8.09 | 1.733   12.62 | 2.733    5.63 |  3.73    3.90
  0.750    8.09 | 1.750   12.62 | 2.750    5.63 |  3.75    3.90
  0.767    8.09 | 1.767   12.62 | 2.767    5.63 |  3.77    3.90
  0.783    8.09 | 1.783   12.62 | 2.783    5.63 |  3.78    3.90
  0.800    8.09 | 1.800   12.62 | 2.800    5.63 |  3.80    3.90
  0.817    8.09 | 1.817   12.62 | 2.817    5.63 |  3.82    3.90
  0.833    8.09 | 1.833   12.62 | 2.833    5.63 |  3.83    3.90
  0.850   11.39 | 1.850   10.19 | 2.850    5.22 |  3.85    3.72
  0.867   11.39 | 1.867   10.19 | 2.867    5.22 |  3.87    3.72
  0.883   11.39 | 1.883   10.19 | 2.883    5.22 |  3.88    3.72
  0.900   11.39 | 1.900   10.19 | 2.900    5.22 |  3.90    3.72
  0.917   11.39 | 1.917   10.19 | 2.917    5.22 |  3.92    3.72
  0.933   11.39 | 1.933   10.19 | 2.933    5.22 |  3.93    3.72
  0.950   11.39 | 1.950   10.19 | 2.950    5.22 |  3.95    3.72
  0.967   11.39 | 1.967   10.19 | 2.967    5.22 |  3.97    3.72
  0.983   11.39 | 1.983   10.19 | 2.983    5.22 |  3.98    3.72
  1.000   11.39 | 2.000   10.19 | 3.000    5.22 |  4.00    3.72

     Unit Hyd Qpeak  (cms)=   0.044

     PEAK FLOW       (cms)=   0.003 (i)
     TIME TO PEAK    (hrs)=   1.633
     RUNOFF VOLUME    (mm)=   6.567
     TOTAL RAINFALL   (mm)=  49.033
     RUNOFF COEFFICIENT   =   0.134

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0002)|   Area    (ha)=   2.16
|ID= 1 DT= 1.0 min |   Total Imp(%)=  71.00   Dir. Conn.(%)=  49.00
--------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     1.53          0.63
     Dep. Storage     (mm)=     1.00          9.00
     Average Slope     (%)=     1.00          2.00
     Length            (m)=   120.00         40.00
     Mannings n            =    0.013         0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
  0.017    4.20 | 1.017   23.22 | 2.017    8.64 |  3.02    4.87
  0.033    4.20 | 1.033   23.22 | 2.033    8.64 |  3.03    4.87
  0.050    4.20 | 1.050   23.22 | 2.050    8.64 |  3.05    4.87
  0.067    4.20 | 1.067   23.22 | 2.067    8.64 |  3.07    4.87
  0.083    4.20 | 1.083   23.22 | 2.083    8.64 |  3.08    4.87
  0.100    4.20 | 1.100   23.22 | 2.100    8.64 |  3.10    4.87
  0.117    4.20 | 1.117   23.22 | 2.117    8.64 |  3.12    4.87
  0.133    4.20 | 1.133   23.22 | 2.133    8.64 |  3.13    4.87
  0.150    4.20 | 1.150   23.22 | 2.150    8.64 |  3.15    4.87
  0.167    4.20 | 1.167   23.22 | 2.167    8.64 |  3.17    4.87
  0.183    4.72 | 1.183   96.03 | 2.183    7.56 |  3.18    4.58
  0.200    4.72 | 1.200   96.03 | 2.200    7.56 |  3.20    4.58
  0.217    4.72 | 1.217   96.03 | 2.217    7.56 |  3.22    4.58
  0.233    4.72 | 1.233   96.03 | 2.233    7.56 |  3.23    4.58
  0.250    4.72 | 1.250   96.03 | 2.250    7.56 |  3.25    4.58
  0.267    4.72 | 1.267   96.03 | 2.267    7.56 |  3.27    4.58
  0.283    4.72 | 1.283   96.03 | 2.283    7.56 |  3.28    4.58
  0.300    4.72 | 1.300   96.03 | 2.300    7.56 |  3.30    4.58
  0.317    4.72 | 1.317   96.03 | 2.317    7.56 |  3.32    4.58
  0.333    4.72 | 1.333   96.03 | 2.333    7.56 |  3.33    4.58
  0.350    5.42 | 1.350   29.33 | 2.350    6.76 |  3.35    4.32
  0.367    5.42 | 1.367   29.33 | 2.367    6.76 |  3.37    4.32
  0.383    5.42 | 1.383   29.33 | 2.383    6.76 |  3.38    4.32
  0.400    5.42 | 1.400   29.33 | 2.400    6.76 |  3.40    4.32
  0.417    5.42 | 1.417   29.33 | 2.417    6.76 |  3.42    4.32
  0.433    5.42 | 1.433   29.33 | 2.433    6.76 |  3.43    4.32
  0.450    5.42 | 1.450   29.33 | 2.450    6.76 |  3.45    4.32
  0.467    5.42 | 1.467   29.33 | 2.467    6.76 |  3.47    4.32
  0.483    5.42 | 1.483   29.33 | 2.483    6.76 |  3.48    4.32
  0.500    5.42 | 1.500   29.33 | 2.500    6.76 |  3.50    4.32
  0.517    6.44 | 1.517   17.13 | 2.517    6.13 |  3.52    4.10
  0.533    6.44 | 1.533   17.13 | 2.533    6.13 |  3.53    4.10
  0.550    6.44 | 1.550   17.13 | 2.550    6.13 |  3.55    4.10
  0.567    6.44 | 1.567   17.13 | 2.567    6.13 |  3.57    4.10
  0.583    6.44 | 1.583   17.13 | 2.583    6.13 |  3.58    4.10
  0.600    6.44 | 1.600   17.13 | 2.600    6.13 |  3.60    4.10
  0.617    6.44 | 1.617   17.13 | 2.617    6.13 |  3.62    4.10
  0.633    6.44 | 1.633   17.13 | 2.633    6.13 |  3.63    4.10
  0.650    6.44 | 1.650   17.13 | 2.650    6.13 |  3.65    4.10
  0.667    6.44 | 1.667   17.13 | 2.667    6.13 |  3.67    4.10
  0.683    8.09 | 1.683   12.62 | 2.683    5.63 |  3.68    3.90
  0.700    8.09 | 1.700   12.62 | 2.700    5.63 |  3.70    3.90
  0.717    8.09 | 1.717   12.62 | 2.717    5.63 |  3.72    3.90
  0.733    8.09 | 1.733   12.62 | 2.733    5.63 |  3.73    3.90
  0.750    8.09 | 1.750   12.62 | 2.750    5.63 |  3.75    3.90
  0.767    8.09 | 1.767   12.62 | 2.767    5.63 |  3.77    3.90
  0.783    8.09 | 1.783   12.62 | 2.783    5.63 |  3.78    3.90
  0.800    8.09 | 1.800   12.62 | 2.800    5.63 |  3.80    3.90
  0.817    8.09 | 1.817   12.62 | 2.817    5.63 |  3.82    3.90
  0.833    8.09 | 1.833   12.62 | 2.833    5.63 |  3.83    3.90
  0.850   11.39 | 1.850   10.19 | 2.850    5.22 |  3.85    3.72
  0.867   11.39 | 1.867   10.19 | 2.867    5.22 |  3.87    3.72
  0.883   11.39 | 1.883   10.19 | 2.883    5.22 |  3.88    3.72
  0.900   11.39 | 1.900   10.19 | 2.900    5.22 |  3.90    3.72
  0.917   11.39 | 1.917   10.19 | 2.917    5.22 |  3.92    3.72
  0.933   11.39 | 1.933   10.19 | 2.933    5.22 |  3.93    3.72
  0.950   11.39 | 1.950   10.19 | 2.950    5.22 |  3.95    3.72
  0.967   11.39 | 1.967   10.19 | 2.967    5.22 |  3.97    3.72
  0.983   11.39 | 1.983   10.19 | 2.983    5.22 |  3.98    3.72
  1.000   11.39 | 2.000   10.19 | 3.000    5.22 |  4.00    3.72
```

Max.Eff.Inten.(mm/hr)=	96.03	53.66	
over (min)	5.00	9.00	
Storage Coeff. (min)=	2.90 (ii)	8.71 (ii)	
Unit Hyd. Tpeak (min)=	5.00	9.00	
Unit Hyd. peak (cms)=	0.31	0.13	
		TOTALS	
PEAK FLOW (cms)=	0.27	0.06	0.309 (iii)
TIME TO PEAK (hrs)=	1.33	1.45	1.35
RUNOFF VOLUME (mm)=	48.03	18.23	32.83
TOTAL RAINFALL (mm)=	49.03	49.03	49.03
RUNOFF COEFFICIENT =	0.98	0.37	0.67

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0001)	Area (ha)= 0.27		
ID= 1 DT= 1.0 min	Total Imp(%)= 100.00	Dir. Conn.(%)= 100.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	0.27	0.00	
Dep. Storage (mm)=	1.00	9.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	42.43	40.00	
Mannings n =	0.013	0.250	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	4.20	1.017	23.22	2.017	8.64	3.02	4.87
0.033	4.20	1.033	23.22	2.033	8.64	3.03	4.87
0.050	4.20	1.050	23.22	2.050	8.64	3.05	4.87
0.067	4.20	1.067	23.22	2.067	8.64	3.07	4.87
0.083	4.20	1.083	23.22	2.083	8.64	3.08	4.87
0.100	4.20	1.100	23.22	2.100	8.64	3.10	4.87
0.117	4.20	1.117	23.22	2.117	8.64	3.12	4.87
0.133	4.20	1.133	23.22	2.133	8.64	3.13	4.87
0.150	4.20	1.150	23.22	2.150	8.64	3.15	4.87
0.167	4.20	1.167	23.22	2.167	8.64	3.17	4.87
0.183	4.72	1.183	96.03	2.183	7.56	3.18	4.58
0.200	4.72	1.200	96.03	2.200	7.56	3.20	4.58
0.217	4.72	1.217	96.03	2.217	7.56	3.22	4.58
0.233	4.72	1.233	96.03	2.233	7.56	3.23	4.58
0.250	4.72	1.250	96.03	2.250	7.56	3.25	4.58
0.267	4.72	1.267	96.03	2.267	7.56	3.27	4.58
0.283	4.72	1.283	96.03	2.283	7.56	3.28	4.58
0.300	4.72	1.300	96.03	2.300	7.56	3.30	4.58
0.317	4.72	1.317	96.03	2.317	7.56	3.32	4.58
0.333	4.72	1.333	96.03	2.333	7.56	3.33	4.58
0.350	5.42	1.350	29.33	2.350	6.76	3.35	4.32
0.367	5.42	1.367	29.33	2.367	6.76	3.37	4.32
0.383	5.42	1.383	29.33	2.383	6.76	3.38	4.32
0.400	5.42	1.400	29.33	2.400	6.76	3.40	4.32
0.417	5.42	1.417	29.33	2.417	6.76	3.42	4.32
0.433	5.42	1.433	29.33	2.433	6.76	3.43	4.32
0.450	5.42	1.450	29.33	2.450	6.76	3.45	4.32
0.467	5.42	1.467	29.33	2.467	6.76	3.47	4.32
0.483	5.42	1.483	29.33	2.483	6.76	3.48	4.32
0.500	5.42	1.500	29.33	2.500	6.76	3.50	4.32
0.517	6.44	1.517	17.13	2.517	6.13	3.52	4.10
0.533	6.44	1.533	17.13	2.533	6.13	3.53	4.10
0.550	6.44	1.550	17.13	2.550	6.13	3.55	4.10
0.567	6.44	1.567	17.13	2.567	6.13	3.57	4.10
0.583	6.44	1.583	17.13	2.583	6.13	3.58	4.10
0.600	6.44	1.600	17.13	2.600	6.13	3.60	4.10
0.617	6.44	1.617	17.13	2.617	6.13	3.62	4.10
0.633	6.44	1.633	17.13	2.633	6.13	3.63	4.10
0.650	6.44	1.650	17.13	2.650	6.13	3.65	4.10
0.667	6.44	1.667	17.13	2.667	6.13	3.67	4.10
0.683	8.09	1.683	12.62	2.683	5.63	3.68	3.90
0.700	8.09	1.700	12.62	2.700	5.63	3.70	3.90
0.717	8.09	1.717	12.62	2.717	5.63	3.72	3.90
0.733	8.09	1.733	12.62	2.733	5.63	3.73	3.90
0.750	8.09	1.750	12.62	2.750	5.63	3.75	3.90
0.767	8.09	1.767	12.62	2.767	5.63	3.77	3.90
0.783	8.09	1.783	12.62	2.783	5.63	3.78	3.90
0.800	8.09	1.800	12.62	2.800	5.63	3.80	3.90
0.817	8.09	1.817	12.62	2.817	5.63	3.82	3.90
0.833	8.09	1.833	12.62	2.833	5.63	3.83	3.90
0.850	11.39	1.850	10.19	2.850	5.22	3.85	3.72
0.867	11.39	1.867	10.19	2.867	5.22	3.87	3.72
0.883	11.39	1.883	10.19	2.883	5.22	3.88	3.72
0.900	11.39	1.900	10.19	2.900	5.22	3.90	3.72
0.917	11.39	1.917	10.19	2.917	5.22	3.92	3.72
0.933	11.39	1.933	10.19	2.933	5.22	3.93	3.72
0.950	11.39	1.950	10.19	2.950	5.22	3.95	3.72
0.967	11.39	1.967	10.19	2.967	5.22	3.97	3.72
0.983	11.39	1.983	10.19	2.983	5.22	3.98	3.72
1.000	11.39	2.000	10.19	3.000	5.22	4.00	3.72

Max.Eff.Inten.(mm/hr)=	96.03	15.02	
over (min)	5.00	2.00	
Storage Coeff. (min)=	1.55 (ii)	1.58 (ii)	
Unit Hyd. Tpeak (min)=	5.00	2.00	
Unit Hyd. peak (cms)=	0.41	0.84	
		TOTALS	
PEAK FLOW (cms)=	0.07	0.00	0.071 (iii)
TIME TO PEAK (hrs)=	1.33	1.33	1.33
RUNOFF VOLUME (mm)=	48.03	10.76	47.92
TOTAL RAINFALL (mm)=	49.03	49.03	49.03
RUNOFF COEFFICIENT =	0.98	0.22	0.98

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0005)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0001):	0.27	0.071	1.33	47.92
	+ ID2= 2 (0002):	2.16	0.309	1.35	32.83
	ID = 3 (0005):	2.43	0.378	1.35	34.51

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

SOAKAWAY(0006)	UNDERDRAIN: OFF				
IN= 2--> OUT= 3					
DT= 5.0 MIN	STORAGE LAYER:				
	Length (m)= 42.00	Height (m)= 0.30			
	Porosity = 0.40	Initial Water Level (m)= 0.00			
	Width (m)= 3.30	Min. Drawdown (hr)= 24.00			
	Max. Drawdown (hr)= 3.00	Available Storage (cu.m.)= 16.63			
	NATIVE SOIL LAYER:				
	Infiltration (m/hr) = 0.0400				

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW:ID= 2	2.43	0.378	1.35	34.51
OVERFLOW:ID= 3	2.43	0.376	1.35	32.86

Volume Reduction Rate[(RVin-RVout)/RVin](%):
If RVout= (Overflow)= 4.76
Time to reach Max storage (Hr)= 0.58
Volume of water for drawdown in LID (cu.m.)= 15.11
Volume of maximum water storage (cu.m.)= 16.63
Calculated Drawdown Time (Hr)= 2.72

Junction Command(0007)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0006)	2.43	0.38	1.35	32.86
OUTFLOW: ID= 2(0007)	2.43	0.38	1.35	32.86

RESERVOIR(0008)	OVERFLOW IS ON			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0730	0.0240
	0.0000	0.0016	0.1290	0.0289
	0.0280	0.0036	0.1830	0.0342
	0.0390	0.0060	0.2380	0.0400
	0.0480	0.0087	0.2920	0.0463
	0.0550	0.0119	0.3470	0.0531
	0.0620	0.0155	0.4010	0.0603
	0.0680	0.0195	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0007)	2.430	0.376	1.35	32.86
OUTFLOW: ID= 1 (0008)	2.430	0.130	1.58	32.20
OVERFLOW:ID= 3 (0003)	0.000	0.000	0.00	0.00

TOTAL NUMBER OF SIMULATION OVERFLOW = 0
CUMULATIVE TIME OF OVERFLOW (HOURS) = 0.00
PERCENTAGE OF TIME OVERFLOWING (%) = 0.00

PEAK FLOW REDUCTION [Qout/Qin](%)= 34.68
TIME SHIFT OF PEAK FLOW (min)= 14.00
MAXIMUM STORAGE USED (ha.m.)= 0.0291

**** WARNING : SELECTED ROUTING TIME STEP DENIED.

CALIB			
STANDHYD (0004)	Area (ha)= 0.23		
ID= 1 DT= 1.0 min	Total Imp(%)= 48.00	Dir. Conn.(%)= 35.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	0.11	0.12	
Dep. Storage (mm)=	1.00	9.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	39.16	40.00	
Mannings n =	0.013	0.250	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	4.20	1.017	23.22	2.017	8.64	3.02	4.87
0.033	4.20	1.033	23.22	2.033	8.64	3.03	4.87
0.050	4.20	1.050	23.22	2.050	8.64	3.05	4.87
0.067	4.20	1.067	23.22	2.067	8.64	3.07	4.87
0.083	4.20	1.083	23.22	2.083	8.64	3.08	4.87
0.100	4.20	1.100	23.22	2.100	8.64	3.10	4.87
0.117	4.20	1.117	23.22	2.117	8.64	3.12	4.87
0.133	4.20	1.133	23.22	2.133	8.64	3.13	4.87
0.150	4.20	1.150	23.22	2.150	8.64	3.15	4.87
0.167	4.20	1.167	23.22	2.167	8.64	3.17	4.87

0.183	4.72	1.183	96.03	2.183	7.56	3.18	4.58
0.200	4.72	1.200	96.03	2.200	7.56	3.20	4.58
0.217	4.72	1.217	96.03	2.217	7.56	3.22	4.58
0.233	4.72	1.233	96.03	2.233	7.56	3.23	4.58
0.250	4.72	1.250	96.03	2.250	7.56	3.25	4.58
0.267	4.72	1.267	96.03	2.267	7.56	3.27	4.58
0.283	4.72	1.283	96.03	2.283	7.56	3.28	4.58
0.300	4.72	1.300	96.03	2.300	7.56	3.30	4.58
0.317	4.72	1.317	96.03	2.317	7.56	3.32	4.58
0.333	4.72	1.333	96.03	2.333	7.56	3.33	4.58
0.350	5.42	1.350	29.33	2.350	6.76	3.35	4.32
0.367	5.42	1.367	29.33	2.367	6.76	3.37	4.32
0.383	5.42	1.383	29.33	2.383	6.76	3.38	4.32
0.400	5.42	1.400	29.33	2.400	6.76	3.40	4.32
0.417	5.42	1.417	29.33	2.417	6.76	3.42	4.32
0.433	5.42	1.433	29.33	2.433	6.76	3.43	4.32
0.450	5.42	1.450	29.33	2.450	6.76	3.45	4.32
0.467	5.42	1.467	29.33	2.467	6.76	3.47	4.32
0.483	5.42	1.483	29.33	2.483	6.76	3.48	4.32
0.500	5.42	1.500	29.33	2.500	6.76	3.50	4.32
0.517	6.44	1.517	17.13	2.517	6.13	3.52	4.10
0.533	6.44	1.533	17.13	2.533	6.13	3.53	4.10
0.550	6.44	1.550	17.13	2.550	6.13	3.55	4.10
0.567	6.44	1.567	17.13	2.567	6.13	3.57	4.10
0.583	6.44	1.583	17.13	2.583	6.13	3.58	4.10
0.600	6.44	1.600	17.13	2.600	6.13	3.60	4.10
0.617	6.44	1.617	17.13	2.617	6.13	3.62	4.10
0.633	6.44	1.633	17.13	2.633	6.13	3.63	4.10
0.650	6.44	1.650	17.13	2.650	6.13	3.65	4.10
0.667	6.44	1.667	17.13	2.667	6.13	3.67	4.10
0.683	8.09	1.683	12.62	2.683	5.63	3.68	3.90
0.700	8.09	1.700	12.62	2.700	5.63	3.70	3.90
0.717	8.09	1.717	12.62	2.717	5.63	3.72	3.90
0.733	8.09	1.733	12.62	2.733	5.63	3.73	3.90
0.750	8.09	1.750	12.62	2.750	5.63	3.75	3.90
0.767	8.09	1.767	12.62	2.767	5.63	3.77	3.90
0.783	8.09	1.783	12.62	2.783	5.63	3.78	3.90
0.800	8.09	1.800	12.62	2.800	5.63	3.80	3.90
0.817	8.09	1.817	12.62	2.817	5.63	3.82	3.90
0.833	8.09	1.833	12.62	2.833	5.63	3.83	3.90
0.850	11.39	1.850	10.19	2.850	5.22	3.85	3.72
0.867	11.39	1.867	10.19	2.867	5.22	3.87	3.72
0.883	11.39	1.883	10.19	2.883	5.22	3.88	3.72
0.900	11.39	1.900	10.19	2.900	5.22	3.90	3.72
0.917	11.39	1.917	10.19	2.917	5.22	3.92	3.72
0.933	11.39	1.933	10.19	2.933	5.22	3.93	3.72
0.950	11.39	1.950	10.19	2.950	5.22	3.95	3.72
0.967	11.39	1.967	10.19	2.967	5.22	3.97	3.72
0.983	11.39	1.983	10.19	2.983	5.22	3.98	3.72
1.000	11.39	2.000	10.19	3.000	5.22	4.00	3.72

Max.Eff.Inten.(mm/hr) =	96.03	25.67	
over (min)	5.00	10.00	
Storage Coeff. (min) =	1.48 (ii)	9.88 (ii)	
Unit Hyd. Tpeak (min) =	5.00	10.00	
Unit Hyd. peak (cms) =	0.42	0.11	
			TOTALS
PEAK FLOW (cms) =	0.02	0.01	0.024 (iii)
TIME TO PEAK (hrs) =	1.33	1.47	1.33
RUNOFF VOLUME (mm) =	48.03	13.57	25.61
TOTAL RAINFALL (mm) =	49.03	49.03	49.03
RUNOFF COEFFICIENT =	0.98	0.28	0.52

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0010)					
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0003):	0.23	0.003	1.63	6.57
+ ID2= 2 (0004):	0.23	0.024	1.33	25.61
ID = 3 (0010):	0.46	0.025	1.35	16.09

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)					
3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0010):	0.46	0.025	1.35	16.09
+ ID2= 2 (0008):	2.43	0.130	1.58	32.20
ID = 1 (0010):	2.89	0.143	1.57	29.64

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

Junction Command(0009)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0008)	0.00	0.00	0.00	0.00
OUTFLOW: ID= 2(0009)	0.00	0.00	0.00	0.00

10-YEAR STORM – POST-DEVELOPMENT

```
================================================================================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Smart City Water Inc
Copyright 2007 - 2022 Smart City Water Inc
All rights reserved.

                  *****  D E T A I L E D   O U T P U T *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\Natalie\AppData\Local\Civica\VH5\c399a01c-8370-
442e-925a-91933bdc17fe\ca75fdf5-9ed3-47b8-bbce-16a110076703\scen
  Summary filename: C:\Users\Natalie\AppData\Local\Civica\VH5\c399a01c-8370-
442e-925a-91933bdc17fe\ca75fdf5-9ed3-47b8-bbce-16a110076703\scen

DATE: 02/26/2024                          TIME: 01:24:15

USER:


COMMENTS: _____________________________________________________

--------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 03_10-Year Norfolk            **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 670.324
| Ptotal= 57.94 mm |                          B=   3.007
--------------------                          C=   0.698
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
   0.00    5.04 |  1.00   27.43 |'  2.00   10.30 |  3.00    5.84
   0.17    5.66 |  1.17  111.84 |'  2.17    9.03 |  3.17    5.49
   0.33    6.49 |  1.33   34.58 |'  2.33    8.07 |  3.33    5.18
   0.50    7.70 |  1.50   20.31 |'  2.50    7.33 |  3.50    4.92
   0.67    9.66 |  1.67   15.00 |'  2.67    6.74 |  3.67    4.68
   0.83   13.55 |  1.83   12.13 |'  2.83    6.25 |  3.83    4.47

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0003)|   Area    (ha)=   0.23   Curve Number   (CN)= 62.0
|ID= 1 DT= 1.0 min |   Ia      (mm)=  13.60   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

        NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
  0.017    5.04 | 1.017   27.43 | 2.017   10.30 |  3.02    5.84
  0.033    5.04 | 1.033   27.43 | 2.033   10.30 |  3.03    5.84
  0.050    5.04 | 1.050   27.43 | 2.050   10.30 |  3.05    5.84
  0.067    5.04 | 1.067   27.43 | 2.067   10.30 |  3.07    5.84
  0.083    5.04 | 1.083   27.43 | 2.083   10.30 |  3.08    5.84
  0.100    5.04 | 1.100   27.43 | 2.100   10.30 |  3.10    5.84
  0.117    5.04 | 1.117   27.43 | 2.117   10.30 |  3.12    5.84
  0.133    5.04 | 1.133   27.43 | 2.133   10.30 |  3.13    5.84
  0.150    5.04 | 1.150   27.43 | 2.150   10.30 |  3.15    5.84
  0.167    5.04 | 1.167   27.43 | 2.167   10.30 |  3.17    5.84
  0.183    5.66 | 1.183  111.84 | 2.183    9.03 |  3.18    5.49
  0.200    5.66 | 1.200  111.84 | 2.200    9.03 |  3.20    5.49
  0.217    5.66 | 1.217  111.84 | 2.217    9.03 |  3.22    5.49
  0.233    5.66 | 1.233  111.84 | 2.233    9.03 |  3.23    5.49
  0.250    5.66 | 1.250  111.84 | 2.250    9.03 |  3.25    5.49
  0.267    5.66 | 1.267  111.84 | 2.267    9.03 |  3.27    5.49
  0.283    5.66 | 1.283  111.84 | 2.283    9.03 |  3.28    5.49
  0.300    5.66 | 1.300  111.84 | 2.300    9.03 |  3.30    5.49
  0.317    5.66 | 1.317  111.84 | 2.317    9.03 |  3.32    5.49
  0.333    5.66 | 1.333  111.84 | 2.333    9.03 |  3.33    5.49
  0.350    6.49 | 1.350   34.58 | 2.350    8.07 |  3.35    5.18
  0.367    6.49 | 1.367   34.58 | 2.367    8.07 |  3.37    5.18
  0.383    6.49 | 1.383   34.58 | 2.383    8.07 |  3.38    5.18
  0.400    6.49 | 1.400   34.58 | 2.400    8.07 |  3.40    5.18
  0.417    6.49 | 1.417   34.58 | 2.417    8.07 |  3.42    5.18
  0.433    6.49 | 1.433   34.58 | 2.433    8.07 |  3.43    5.18
  0.450    6.49 | 1.450   34.58 | 2.450    8.07 |  3.45    5.18
  0.467    6.49 | 1.467   34.58 | 2.467    8.07 |  3.47    5.18
  0.483    6.49 | 1.483   34.58 | 2.483    8.07 |  3.48    5.18
  0.500    6.49 | 1.500   34.58 | 2.500    8.07 |  3.50    5.18
  0.517    7.70 | 1.517   20.31 | 2.517    7.33 |  3.52    4.92
  0.533    7.70 | 1.533   20.31 | 2.533    7.33 |  3.53    4.92
  0.550    7.70 | 1.550   20.31 | 2.550    7.33 |  3.55    4.92
  0.567    7.70 | 1.567   20.31 | 2.567    7.33 |  3.57    4.92
  0.583    7.70 | 1.583   20.31 | 2.583    7.33 |  3.58    4.92
  0.600    7.70 | 1.600   20.31 | 2.600    7.33 |  3.60    4.92
  0.617    7.70 | 1.617   20.31 | 2.617    7.33 |  3.62    4.92
  0.633    7.70 | 1.633   20.31 | 2.633    7.33 |  3.63    4.92
  0.650    7.70 | 1.650   20.31 | 2.650    7.33 |  3.65    4.92
  0.667    7.70 | 1.667   20.31 | 2.667    7.33 |  3.67    4.92
  0.683    9.66 | 1.683   15.00 | 2.683    6.74 |  3.68    4.68
  0.700    9.66 | 1.700   15.00 | 2.700    6.74 |  3.70    4.68
  0.717    9.66 | 1.717   15.00 | 2.717    6.74 |  3.72    4.68
  0.733    9.66 | 1.733   15.00 | 2.733    6.74 |  3.73    4.68
  0.750    9.66 | 1.750   15.00 | 2.750    6.74 |  3.75    4.68
  0.767    9.66 | 1.767   15.00 | 2.767    6.74 |  3.77    4.68
  0.783    9.66 | 1.783   15.00 | 2.783    6.74 |  3.78    4.68
  0.800    9.66 | 1.800   15.00 | 2.800    6.74 |  3.80    4.68
  0.817    9.66 | 1.817   15.00 | 2.817    6.74 |  3.82    4.68
  0.833    9.66 | 1.833   15.00 | 2.833    6.74 |  3.83    4.68
  0.850   13.55 | 1.850   12.13 | 2.850    6.25 |  3.85    4.47
  0.867   13.55 | 1.867   12.13 | 2.867    6.25 |  3.87    4.47
  0.883   13.55 | 1.883   12.13 | 2.883    6.25 |  3.88    4.47
  0.900   13.55 | 1.900   12.13 | 2.900    6.25 |  3.90    4.47
  0.917   13.55 | 1.917   12.13 | 2.917    6.25 |  3.92    4.47
  0.933   13.55 | 1.933   12.13 | 2.933    6.25 |  3.93    4.47
  0.950   13.55 | 1.950   12.13 | 2.950    6.25 |  3.95    4.47
  0.967   13.55 | 1.967   12.13 | 2.967    6.25 |  3.97    4.47
  0.983   13.55 | 1.983   12.13 | 2.983    6.25 |  3.98    4.47
  1.000   13.55 | 2.000   12.13 | 3.000    6.25 |  4.00    4.47

     Unit Hyd Qpeak  (cms)=   0.044

     PEAK FLOW       (cms)=   0.005 (i)
     TIME TO PEAK    (hrs)=   1.600
     RUNOFF VOLUME    (mm)=   9.829
     TOTAL RAINFALL   (mm)=  57.945
     RUNOFF COEFFICIENT   =   0.170

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0002)|   Area    (ha)=   2.16
|ID= 1 DT= 1.0 min |   Total Imp(%)=  71.00   Dir. Conn.(%)=  49.00
--------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     1.53          0.63
     Dep. Storage     (mm)=     1.00          9.00
     Average Slope     (%)=     1.00          2.00
     Length            (m)=   120.00         40.00
     Mannings n            =    0.013         0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
  0.017    5.04 | 1.017   27.43 | 2.017   10.30 |  3.02    5.84
  0.033    5.04 | 1.033   27.43 | 2.033   10.30 |  3.03    5.84
  0.050    5.04 | 1.050   27.43 | 2.050   10.30 |  3.05    5.84
  0.067    5.04 | 1.067   27.43 | 2.067   10.30 |  3.07    5.84
  0.083    5.04 | 1.083   27.43 | 2.083   10.30 |  3.08    5.84
  0.100    5.04 | 1.100   27.43 | 2.100   10.30 |  3.10    5.84
  0.117    5.04 | 1.117   27.43 | 2.117   10.30 |  3.12    5.84
  0.133    5.04 | 1.133   27.43 | 2.133   10.30 |  3.13    5.84
  0.150    5.04 | 1.150   27.43 | 2.150   10.30 |  3.15    5.84
  0.167    5.04 | 1.167   27.43 | 2.167   10.30 |  3.17    5.84
  0.183    5.66 | 1.183  111.84 | 2.183    9.03 |  3.18    5.49
  0.200    5.66 | 1.200  111.84 | 2.200    9.03 |  3.20    5.49
  0.217    5.66 | 1.217  111.84 | 2.217    9.03 |  3.22    5.49
  0.233    5.66 | 1.233  111.84 | 2.233    9.03 |  3.23    5.49
  0.250    5.66 | 1.250  111.84 | 2.250    9.03 |  3.25    5.49
  0.267    5.66 | 1.267  111.84 | 2.267    9.03 |  3.27    5.49
  0.283    5.66 | 1.283  111.84 | 2.283    9.03 |  3.28    5.49
  0.300    5.66 | 1.300  111.84 | 2.300    9.03 |  3.30    5.49
  0.317    5.66 | 1.317  111.84 | 2.317    9.03 |  3.32    5.49
  0.333    5.66 | 1.333  111.84 | 2.333    9.03 |  3.33    5.49
  0.350    6.49 | 1.350   34.58 | 2.350    8.07 |  3.35    5.18
  0.367    6.49 | 1.367   34.58 | 2.367    8.07 |  3.37    5.18
  0.383    6.49 | 1.383   34.58 | 2.383    8.07 |  3.38    5.18
  0.400    6.49 | 1.400   34.58 | 2.400    8.07 |  3.40    5.18
  0.417    6.49 | 1.417   34.58 | 2.417    8.07 |  3.42    5.18
  0.433    6.49 | 1.433   34.58 | 2.433    8.07 |  3.43    5.18
  0.450    6.49 | 1.450   34.58 | 2.450    8.07 |  3.45    5.18
  0.467    6.49 | 1.467   34.58 | 2.467    8.07 |  3.47    5.18
  0.483    6.49 | 1.483   34.58 | 2.483    8.07 |  3.48    5.18
  0.500    6.49 | 1.500   34.58 | 2.500    8.07 |  3.50    5.18
  0.517    7.70 | 1.517   20.31 | 2.517    7.33 |  3.52    4.92
  0.533    7.70 | 1.533   20.31 | 2.533    7.33 |  3.53    4.92
  0.550    7.70 | 1.550   20.31 | 2.550    7.33 |  3.55    4.92
  0.567    7.70 | 1.567   20.31 | 2.567    7.33 |  3.57    4.92
  0.583    7.70 | 1.583   20.31 | 2.583    7.33 |  3.58    4.92
  0.600    7.70 | 1.600   20.31 | 2.600    7.33 |  3.60    4.92
  0.617    7.70 | 1.617   20.31 | 2.617    7.33 |  3.62    4.92
  0.633    7.70 | 1.633   20.31 | 2.633    7.33 |  3.63    4.92
  0.650    7.70 | 1.650   20.31 | 2.650    7.33 |  3.65    4.92
  0.667    7.70 | 1.667   20.31 | 2.667    7.33 |  3.67    4.92
  0.683    9.66 | 1.683   15.00 | 2.683    6.74 |  3.68    4.68
  0.700    9.66 | 1.700   15.00 | 2.700    6.74 |  3.70    4.68
  0.717    9.66 | 1.717   15.00 | 2.717    6.74 |  3.72    4.68
  0.733    9.66 | 1.733   15.00 | 2.733    6.74 |  3.73    4.68
  0.750    9.66 | 1.750   15.00 | 2.750    6.74 |  3.75    4.68
  0.767    9.66 | 1.767   15.00 | 2.767    6.74 |  3.77    4.68
  0.783    9.66 | 1.783   15.00 | 2.783    6.74 |  3.78    4.68
  0.800    9.66 | 1.800   15.00 | 2.800    6.74 |  3.80    4.68
  0.817    9.66 | 1.817   15.00 | 2.817    6.74 |  3.82    4.68
  0.833    9.66 | 1.833   15.00 | 2.833    6.74 |  3.83    4.68
  0.850   13.55 | 1.850   12.13 | 2.850    6.25 |  3.85    4.47
  0.867   13.55 | 1.867   12.13 | 2.867    6.25 |  3.87    4.47
  0.883   13.55 | 1.883   12.13 | 2.883    6.25 |  3.88    4.47
  0.900   13.55 | 1.900   12.13 | 2.900    6.25 |  3.90    4.47
  0.917   13.55 | 1.917   12.13 | 2.917    6.25 |  3.92    4.47
  0.933   13.55 | 1.933   12.13 | 2.933    6.25 |  3.93    4.47
  0.950   13.55 | 1.950   12.13 | 2.950    6.25 |  3.95    4.47
  0.967   13.55 | 1.967   12.13 | 2.967    6.25 |  3.97    4.47
  0.983   13.55 | 1.983   12.13 | 2.983    6.25 |  3.98    4.47
  1.000   13.55 | 2.000   12.13 | 3.000    6.25 |  4.00    4.47
```

Max.Eff.Inten.(mm/hr)=	111.84	73.24	
over (min)	5.00	9.00	
Storage Coeff. (min)=	2.73 (ii)	8.20 (ii)	
Unit Hyd. Tpeak (min)=	5.00	9.00	
Unit Hyd. peak (cms)=	0.32	0.13	
		TOTALS	
PEAK FLOW (cms)=	0.31	0.09	0.374 (iii)
TIME TO PEAK (hrs)=	1.33	1.43	1.35
RUNOFF VOLUME (mm)=	56.94	24.32	40.31
TOTAL RAINFALL (mm)=	57.94	57.94	57.94
RUNOFF COEFFICIENT =	0.98	0.42	0.70

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0001)	Area (ha)= 0.27
ID= 1 DT= 1.0 min	Total Imp(%)= 100.00 Dir. Conn.(%)= 100.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.27	0.00
Dep. Storage (mm)=	1.00	9.00
Average Slope (%)=	1.00	2.00
Length (m)=	42.43	40.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	5.04	1.017	27.43	2.017	10.30	3.02	5.84
0.033	5.04	1.033	27.43	2.033	10.30	3.03	5.84
0.050	5.04	1.050	27.43	2.050	10.30	3.05	5.84
0.067	5.04	1.067	27.43	2.067	10.30	3.07	5.84
0.083	5.04	1.083	27.43	2.083	10.30	3.08	5.84
0.100	5.04	1.100	27.43	2.100	10.30	3.10	5.84
0.117	5.04	1.117	27.43	2.117	10.30	3.12	5.84
0.133	5.04	1.133	27.43	2.133	10.30	3.13	5.84
0.150	5.04	1.150	27.43	2.150	10.30	3.15	5.84
0.167	5.04	1.167	27.43	2.167	10.30	3.17	5.84
0.183	5.66	1.183	111.84	2.183	9.03	3.18	5.49
0.200	5.66	1.200	111.84	2.200	9.03	3.20	5.49
0.217	5.66	1.217	111.84	2.217	9.03	3.22	5.49
0.233	5.66	1.233	111.84	2.233	9.03	3.23	5.49
0.250	5.66	1.250	111.84	2.250	9.03	3.25	5.49
0.267	5.66	1.267	111.84	2.267	9.03	3.27	5.49
0.283	5.66	1.283	111.84	2.283	9.03	3.28	5.49
0.300	5.66	1.300	111.84	2.300	9.03	3.30	5.49
0.317	5.66	1.317	111.84	2.317	9.03	3.32	5.49
0.333	5.66	1.333	111.84	2.333	9.03	3.33	5.49
0.350	6.49	1.350	34.58	2.350	8.07	3.35	5.18
0.367	6.49	1.367	34.58	2.367	8.07	3.37	5.18
0.383	6.49	1.383	34.58	2.383	8.07	3.38	5.18
0.400	6.49	1.400	34.58	2.400	8.07	3.40	5.18
0.417	6.49	1.417	34.58	2.417	8.07	3.42	5.18
0.433	6.49	1.433	34.58	2.433	8.07	3.43	5.18
0.450	6.49	1.450	34.58	2.450	8.07	3.45	5.18
0.467	6.49	1.467	34.58	2.467	8.07	3.47	5.18
0.483	6.49	1.483	34.58	2.483	8.07	3.48	5.18
0.500	6.49	1.500	34.58	2.500	8.07	3.50	5.18
0.517	7.70	1.517	20.31	2.517	7.33	3.52	4.92
0.533	7.70	1.533	20.31	2.533	7.33	3.53	4.92
0.550	7.70	1.550	20.31	2.550	7.33	3.55	4.92
0.567	7.70	1.567	20.31	2.567	7.33	3.57	4.92
0.583	7.70	1.583	20.31	2.583	7.33	3.58	4.92
0.600	7.70	1.600	20.31	2.600	7.33	3.60	4.92
0.617	7.70	1.617	20.31	2.617	7.33	3.62	4.92
0.633	7.70	1.633	20.31	2.633	7.33	3.63	4.92
0.650	7.70	1.650	20.31	2.650	7.33	3.65	4.92
0.667	7.70	1.667	20.31	2.667	7.33	3.67	4.92
0.683	9.66	1.683	15.00	2.683	6.74	3.68	4.68
0.700	9.66	1.700	15.00	2.700	6.74	3.70	4.68
0.717	9.66	1.717	15.00	2.717	6.74	3.72	4.68
0.733	9.66	1.733	15.00	2.733	6.74	3.73	4.68
0.750	9.66	1.750	15.00	2.750	6.74	3.75	4.68
0.767	9.66	1.767	15.00	2.767	6.74	3.77	4.68
0.783	9.66	1.783	15.00	2.783	6.74	3.78	4.68
0.800	9.66	1.800	15.00	2.800	6.74	3.80	4.68
0.817	9.66	1.817	15.00	2.817	6.74	3.82	4.68
0.833	9.66	1.833	15.00	2.833	6.74	3.83	4.68
0.850	13.55	1.850	12.13	2.850	6.25	3.85	4.47
0.867	13.55	1.867	12.13	2.867	6.25	3.87	4.47
0.883	13.55	1.883	12.13	2.883	6.25	3.88	4.47
0.900	13.55	1.900	12.13	2.900	6.25	3.90	4.47
0.917	13.55	1.917	12.13	2.917	6.25	3.92	4.47
0.933	13.55	1.933	12.13	2.933	6.25	3.93	4.47
0.950	13.55	1.950	12.13	2.950	6.25	3.95	4.47
0.967	13.55	1.967	12.13	2.967	6.25	3.97	4.47
0.983	13.55	1.983	12.13	2.983	6.25	3.98	4.47
1.000	13.55	2.000	12.13	3.000	6.25	4.00	4.47

Max.Eff.Inten.(mm/hr)=	111.84	22.14	
over (min)	5.00	2.00	
Storage Coeff. (min)=	1.46 (ii)	1.49 (ii)	
Unit Hyd. Tpeak (min)=	5.00	2.00	
Unit Hyd. peak (cms)=	0.42	0.85	
		TOTALS	
PEAK FLOW (cms)=	0.08	0.00	0.083 (iii)
TIME TO PEAK (hrs)=	1.33	1.33	1.33
RUNOFF VOLUME (mm)=	56.94	15.18	56.82
TOTAL RAINFALL (mm)=	57.94	57.94	57.94
RUNOFF COEFFICIENT =	0.98	0.26	0.98

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0005)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0001):	0.27	0.083	1.33	56.82
	+ ID2= 2 (0002):	2.16	0.374	1.35	40.31
	ID = 3 (0005):	2.43	0.455	1.35	42.14

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

SOAKAWAY(0006)	UNDERDRAIN: OFF
IN= 2--> OUT= 3	
DT= 5.0 MIN	STORAGE LAYER:

Length (m)= 42.00 Height (m)= 0.30
Porosity = 0.40 Initial Water Level (m)= 0.00
Width (m)= 3.30 Min. Drawdown (hr)= 24.00
Max. Drawdown (hr)= 3.00 Available Storage (cu.m.)= 16.63

NATIVE SOIL LAYER:
Infiltration (m/hr) = 0.0400

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW:ID= 2	2.43	0.455	1.35	42.14
OVERFLOW:ID= 3	2.43	0.454	1.35	40.49

Volume Reduction Rate[(RVin-RVout)/RVin](%):
If RVout= (Overflow)= 3.93
Time to reach Max storage (Hr)= 0.50
Volume of water for drawdown in LID (cu.m.)= 15.18
Volume of maximum water storage (cu.m.)= 16.63
Calculated Drawdown Time (Hr)= 2.73

Junction Command(0007)

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0006)	2.43	0.45	1.35	40.49
OUTFLOW: ID= 2(0007)	2.43	0.45	1.35	40.49

RESERVOIR(0008)	OVERFLOW IS ON
IN= 2---> OUT= 1	
DT= 5.0 min	

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0730	0.0240
0.0000	0.0016	0.1290	0.0289
0.0280	0.0036	0.1830	0.0342
0.0390	0.0060	0.2380	0.0400
0.0480	0.0087	0.2920	0.0463
0.0550	0.0119	0.3470	0.0531
0.0620	0.0155	0.4010	0.0603
0.0680	0.0195	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0007)	2.430	0.454	1.35	40.49
OUTFLOW: ID= 1 (0008)	2.430	0.177	1.57	39.83
OVERFLOW:ID= 3 (0003)	0.000	0.000	0.00	0.00

TOTAL NUMBER OF SIMULATION OVERFLOW = 0
CUMULATIVE TIME OF OVERFLOW (HOURS) = 0.00
PERCENTAGE OF TIME OVERFLOWING (%) = 0.00

PEAK FLOW REDUCTION [Qout/Qin](%)= 39.04
TIME SHIFT OF PEAK FLOW (min)= 13.00
MAXIMUM STORAGE USED (ha.m.)= 0.0336

**** WARNING : SELECTED ROUTING TIME STEP DENIED.

CALIB	
STANDHYD (0004)	Area (ha)= 0.23
ID= 1 DT= 1.0 min	Total Imp(%)= 48.00 Dir. Conn.(%)= 35.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.11	0.12
Dep. Storage (mm)=	1.00	9.00
Average Slope (%)=	1.00	2.00
Length (m)=	39.16	40.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	5.04	1.017	27.43	2.017	10.30	3.02	5.84
0.033	5.04	1.033	27.43	2.033	10.30	3.03	5.84
0.050	5.04	1.050	27.43	2.050	10.30	3.05	5.84
0.067	5.04	1.067	27.43	2.067	10.30	3.07	5.84
0.083	5.04	1.083	27.43	2.083	10.30	3.08	5.84
0.100	5.04	1.100	27.43	2.100	10.30	3.10	5.84
0.117	5.04	1.117	27.43	2.117	10.30	3.12	5.84
0.133	5.04	1.133	27.43	2.133	10.30	3.13	5.84
0.150	5.04	1.150	27.43	2.150	10.30	3.15	5.84
0.167	5.04	1.167	27.43	2.167	10.30	3.17	5.84

0.183	5.66	1.183	111.84	2.183	9.03	3.18	5.49
0.200	5.66	1.200	111.84	2.200	9.03	3.20	5.49
0.217	5.66	1.217	111.84	2.217	9.03	3.22	5.49
0.233	5.66	1.233	111.84	2.233	9.03	3.23	5.49
0.250	5.66	1.250	111.84	2.250	9.03	3.25	5.49
0.267	5.66	1.267	111.84	2.267	9.03	3.27	5.49
0.283	5.66	1.283	111.84	2.283	9.03	3.28	5.49
0.300	5.66	1.300	111.84	2.300	9.03	3.30	5.49
0.317	5.66	1.317	111.84	2.317	9.03	3.32	5.49
0.333	5.66	1.333	111.84	2.333	9.03	3.33	5.49
0.350	6.49	1.350	34.58	2.350	8.07	3.35	5.18
0.367	6.49	1.367	34.58	2.367	8.07	3.37	5.18
0.383	6.49	1.383	34.58	2.383	8.07	3.38	5.18
0.400	6.49	1.400	34.58	2.400	8.07	3.40	5.18
0.417	6.49	1.417	34.58	2.417	8.07	3.42	5.18
0.433	6.49	1.433	34.58	2.433	8.07	3.43	5.18
0.450	6.49	1.450	34.58	2.450	8.07	3.45	5.18
0.467	6.49	1.467	34.58	2.467	8.07	3.47	5.18
0.483	6.49	1.483	34.58	2.483	8.07	3.48	5.18
0.500	6.49	1.500	34.58	2.500	8.07	3.50	5.18
0.517	7.70	1.517	20.31	2.517	7.33	3.52	4.92
0.533	7.70	1.533	20.31	2.533	7.33	3.53	4.92
0.550	7.70	1.550	20.31	2.550	7.33	3.55	4.92
0.567	7.70	1.567	20.31	2.567	7.33	3.57	4.92
0.583	7.70	1.583	20.31	2.583	7.33	3.58	4.92
0.600	7.70	1.600	20.31	2.600	7.33	3.60	4.92
0.617	7.70	1.617	20.31	2.617	7.33	3.62	4.92
0.633	7.70	1.633	20.31	2.633	7.33	3.63	4.92
0.650	7.70	1.650	20.31	2.650	7.33	3.65	4.92
0.667	7.70	1.667	20.31	2.667	7.33	3.67	4.92
0.683	9.66	1.683	15.00	2.683	6.74	3.68	4.68
0.700	9.66	1.700	15.00	2.700	6.74	3.70	4.68
0.717	9.66	1.717	15.00	2.717	6.74	3.72	4.68
0.733	9.66	1.733	15.00	2.733	6.74	3.73	4.68
0.750	9.66	1.750	15.00	2.750	6.74	3.75	4.68
0.767	9.66	1.767	15.00	2.767	6.74	3.77	4.68
0.783	9.66	1.783	15.00	2.783	6.74	3.78	4.68
0.800	9.66	1.800	15.00	2.800	6.74	3.80	4.68
0.817	9.66	1.817	15.00	2.817	6.74	3.82	4.68
0.833	9.66	1.833	15.00	2.833	6.74	3.83	4.68
0.850	13.55	1.850	12.13	2.850	6.25	3.85	4.47
0.867	13.55	1.867	12.13	2.867	6.25	3.87	4.47
0.883	13.55	1.883	12.13	2.883	6.25	3.88	4.47
0.900	13.55	1.900	12.13	2.900	6.25	3.90	4.47
0.917	13.55	1.917	12.13	2.917	6.25	3.92	4.47
0.933	13.55	1.933	12.13	2.933	6.25	3.93	4.47
0.950	13.55	1.950	12.13	2.950	6.25	3.95	4.47
0.967	13.55	1.967	12.13	2.967	6.25	3.97	4.47
0.983	13.55	1.983	12.13	2.983	6.25	3.98	4.47
1.000	13.55	2.000	12.13	3.000	6.25	4.00	4.47

Max.Eff.Inten.(mm/hr) =	111.84	36.61		
over (min)	5.00	10.00		
Storage Coeff. (min) =	1.39 (ii)	9.30 (ii)		
Unit Hyd. Tpeak (min) =	5.00	10.00		
Unit Hyd. peak (cms) =	0.43	0.12		
			TOTALS	
PEAK FLOW (cms) =	0.02	0.01	0.029 (iii)	
TIME TO PEAK (hrs) =	1.33	1.47	1.33	
RUNOFF VOLUME (mm) =	56.94	18.68	32.05	
TOTAL RAINFALL (mm) =	57.94	57.94	57.94	
RUNOFF COEFFICIENT =	0.98	0.32	0.55	

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0010)					
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0003):	0.23	0.005	1.60	9.83
+ ID2= 2 (0004):	0.23	0.029	1.33	32.05
ID = 3 (0010):	0.46	0.031	1.35	20.94

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

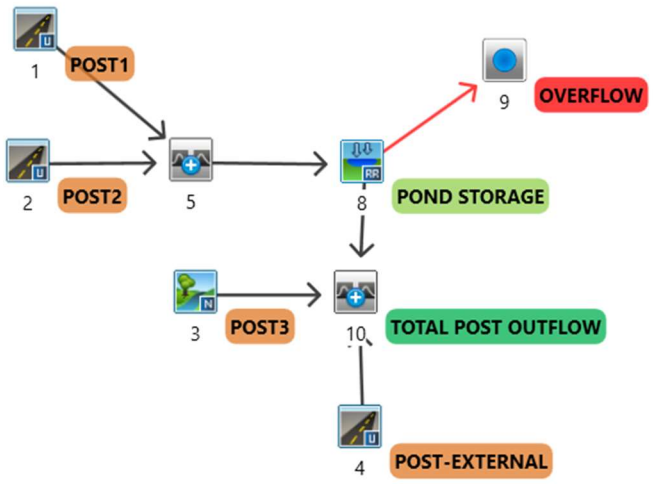
ADD HYD (0010)					
3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0010):	0.46	0.031	1.35	20.94
+ ID2= 2 (0008):	2.43	0.177	1.57	39.83
ID = 1 (0010):	2.89	0.195	1.55	36.82

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

Junction Command(0009)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0008)	0.00	0.00	0.00	0.00
OUTFLOW: ID= 2(0009)	0.00	0.00	0.00	0.00

FINISH

22-013 HFW HUNT STREET DEVELOPMENT
25, 50 and 100 YEAR POST-DEVELOPMENT
OTTHYMO MODEL



25-YEAR STORM – POST-DEVELOPMENT

```
==============================================================================

       V    V   I    SSSSS  U   U    A    L             (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Smart City Water Inc
Copyright 2007 - 2022 Smart City Water Inc
All rights reserved.

                  *****  D E T A I L E D   O U T P U T *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\Natalie\AppData\Local\Civica\VH5\c399a01c-8370-
442e-925a-91933bdc17fe\dc35e178-1115-41f3-8fd3-23557ee2c1e7\scen
  Summary filename: C:\Users\Natalie\AppData\Local\Civica\VH5\c399a01c-8370-
442e-925a-91933bdc17fe\dc35e178-1115-41f3-8fd3-23557ee2c1e7\scen

DATE: 02/26/2024                          TIME: 01:25:23

USER:


COMMENTS: _____________________________________________________

------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 04_25-Year Norfolk            **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 721.533
| Ptotal= 69.38 mm |                          B=   2.253
--------------------                          C=   0.679
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    6.34 |  1.00   31.84 |'  2.00   12.58 |  3.00    7.30
                0.17    7.08 |  1.17  131.63 |'  2.17   11.08 |  3.17    6.87
                0.33    8.07 |  1.33   39.74 |'  2.33    9.96 |  3.33    6.50
                0.50    9.51 |  1.50   23.97 |'  2.50    9.08 |  3.50    6.18
                0.67   11.82 |  1.67   17.98 |'  2.67    8.38 |  3.67    5.90
                0.83   16.33 |  1.83   14.70 |'  2.83    7.79 |  3.83    5.64

------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0003)|   Area     (ha)=   0.23   Curve Number    (CN)= 62.0
|ID= 1 DT= 1.0 min |   Ia       (mm)=  13.60   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

        NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.

                       ---- TRANSFORMED HYETOGRAPH ----

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.017   6.34 | 1.017  31.84 | 2.017  12.58 |  3.02    7.30
                0.033   6.34 | 1.033  31.84 | 2.033  12.58 |  3.03    7.30
                0.050   6.34 | 1.050  31.84 | 2.050  12.58 |  3.05    7.30
                0.067   6.34 | 1.067  31.84 | 2.067  12.58 |  3.07    7.30
                0.083   6.34 | 1.083  31.84 | 2.083  12.58 |  3.08    7.30
                0.100   6.34 | 1.100  31.84 | 2.100  12.58 |  3.10    7.30
                0.117   6.34 | 1.117  31.84 | 2.117  12.58 |  3.12    7.30
                0.133   6.34 | 1.133  31.84 | 2.133  12.58 |  3.13    7.30
                0.150   6.34 | 1.150  31.84 | 2.150  12.58 |  3.15    7.30
                0.167   6.34 | 1.167  31.84 | 2.167  12.58 |  3.17    7.30
                0.183   7.08 | 1.183 131.62 | 2.183  11.08 |  3.18    6.87
                0.200   7.08 | 1.200 131.63 | 2.200  11.08 |  3.20    6.87
                0.217   7.08 | 1.217 131.63 | 2.217  11.08 |  3.22    6.87
                0.233   7.08 | 1.233 131.63 | 2.233  11.08 |  3.23    6.87
                0.250   7.08 | 1.250 131.63 | 2.250  11.08 |  3.25    6.87
                0.267   7.08 | 1.267 131.63 | 2.267  11.08 |  3.27    6.87
                0.283   7.08 | 1.283 131.63 | 2.283  11.08 |  3.28    6.87
                0.300   7.08 | 1.300 131.63 | 2.300  11.08 |  3.30    6.87
                0.317   7.08 | 1.317 131.63 | 2.317  11.08 |  3.32    6.87
                0.333   7.08 | 1.333 131.63 | 2.333  11.08 |  3.33    6.87
                0.350   8.07 | 1.350  39.74 | 2.350   9.96 |  3.35    6.50
                0.367   8.07 | 1.367  39.74 | 2.367   9.96 |  3.37    6.50
                0.383   8.07 | 1.383  39.74 | 2.383   9.96 |  3.38    6.50
                0.400   8.07 | 1.400  39.74 | 2.400   9.96 |  3.40    6.50
                0.417   8.07 | 1.417  39.74 | 2.417   9.96 |  3.42    6.50
                0.433   8.07 | 1.433  39.74 | 2.433   9.96 |  3.43    6.50
                0.450   8.07 | 1.450  39.74 | 2.450   9.96 |  3.45    6.50
                0.467   8.07 | 1.467  39.74 | 2.467   9.96 |  3.47    6.50
                0.483   8.07 | 1.483  39.74 | 2.483   9.96 |  3.48    6.50
                0.500   8.07 | 1.500  39.74 | 2.500   9.96 |  3.50    6.50
                0.517   9.51 | 1.517  23.97 | 2.517   9.08 |  3.52    6.18
                0.533   9.51 | 1.533  23.97 | 2.533   9.08 |  3.53    6.18
                0.550   9.51 | 1.550  23.97 | 2.550   9.08 |  3.55    6.18
                0.567   9.51 | 1.567  23.97 | 2.567   9.08 |  3.57    6.18
                0.583   9.51 | 1.583  23.97 | 2.583   9.08 |  3.58    6.18
                0.600   9.51 | 1.600  23.97 | 2.600   9.08 |  3.60    6.18
                0.617   9.51 | 1.617  23.97 | 2.617   9.08 |  3.62    6.18
                0.633   9.51 | 1.633  23.97 | 2.633   9.08 |  3.63    6.18
                0.650   9.51 | 1.650  23.97 | 2.650   9.08 |  3.65    6.18
                0.667   9.51 | 1.667  23.97 | 2.667   9.08 |  3.67    6.18
                0.683  11.82 | 1.683  17.98 | 2.683   8.38 |  3.68    5.90
                0.700  11.82 | 1.700  17.98 | 2.700   8.38 |  3.70    5.90
                0.717  11.82 | 1.717  17.98 | 2.717   8.38 |  3.72    5.90
                0.733  11.82 | 1.733  17.98 | 2.733   8.38 |  3.73    5.90
                0.750  11.82 | 1.750  17.98 | 2.750   8.38 |  3.75    5.90
                0.767  11.82 | 1.767  17.98 | 2.767   8.38 |  3.77    5.90
                0.783  11.82 | 1.783  17.98 | 2.783   8.38 |  3.78    5.90
                0.800  11.82 | 1.800  17.98 | 2.800   8.38 |  3.80    5.90
                0.817  11.82 | 1.817  17.98 | 2.817   8.38 |  3.82    5.90
                0.833  11.82 | 1.833  17.98 | 2.833   8.38 |  3.83    5.90
                0.850  16.33 | 1.850  14.70 | 2.850   7.79 |  3.85    5.64
                0.867  16.33 | 1.867  14.70 | 2.867   7.79 |  3.87    5.64
                0.883  16.33 | 1.883  14.70 | 2.883   7.79 |  3.88    5.64
                0.900  16.33 | 1.900  14.70 | 2.900   7.79 |  3.90    5.64
                0.917  16.33 | 1.917  14.70 | 2.917   7.79 |  3.92    5.64
                0.933  16.33 | 1.933  14.70 | 2.933   7.79 |  3.93    5.64
                0.950  16.33 | 1.950  14.70 | 2.950   7.79 |  3.95    5.64
                0.967  16.33 | 1.967  14.70 | 2.967   7.79 |  3.97    5.64
                0.983  16.33 | 1.983  14.70 | 2.983   7.79 |  3.98    5.64
                1.000  16.33 | 2.000  14.70 | 3.000   7.79 |  4.00    5.64

Unit Hyd Qpeak  (cms)=   0.044

PEAK FLOW       (cms)=   0.007 (i)
TIME TO PEAK    (hrs)=   1.583
RUNOFF VOLUME    (mm)=  14.711
TOTAL RAINFALL   (mm)=  69.379
RUNOFF COEFFICIENT   =   0.212

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
| CALIB            |
| STANDHYD (  0002)|   Area    (ha)=   2.16
|ID= 1 DT= 1.0 min |   Total Imp(%)=  71.00   Dir. Conn.(%)=  49.00
```

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.53	0.63
Dep. Storage	(mm)=	1.00	9.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	120.00	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	6.34	1.017	31.84	2.017	12.58	3.02	7.30
0.033	6.34	1.033	31.84	2.033	12.58	3.03	7.30
0.050	6.34	1.050	31.84	2.050	12.58	3.05	7.30
0.067	6.34	1.067	31.84	2.067	12.58	3.07	7.30
0.083	6.34	1.083	31.84	2.083	12.58	3.08	7.30
0.100	6.34	1.100	31.84	2.100	12.58	3.10	7.30
0.117	6.34	1.117	31.84	2.117	12.58	3.12	7.30
0.133	6.34	1.133	31.84	2.133	12.58	3.13	7.30
0.150	6.34	1.150	31.84	2.150	12.58	3.15	7.30
0.167	6.34	1.167	31.84	2.167	12.58	3.17	7.30
0.183	7.08	1.183	131.62	2.183	11.08	3.18	6.87
0.200	7.08	1.200	131.63	2.200	11.08	3.20	6.87
0.217	7.08	1.217	131.63	2.217	11.08	3.22	6.87
0.233	7.08	1.233	131.63	2.233	11.08	3.23	6.87
0.250	7.08	1.250	131.63	2.250	11.08	3.25	6.87
0.267	7.08	1.267	131.63	2.267	11.08	3.27	6.87
0.283	7.08	1.283	131.63	2.283	11.08	3.28	6.87
0.300	7.08	1.300	131.63	2.300	11.08	3.30	6.87
0.317	7.08	1.317	131.63	2.317	11.08	3.32	6.87
0.333	7.08	1.333	131.63	2.333	11.08	3.33	6.87
0.350	8.07	1.350	39.74	2.350	9.96	3.35	6.50
0.367	8.07	1.367	39.74	2.367	9.96	3.37	6.50
0.383	8.07	1.383	39.74	2.383	9.96	3.38	6.50
0.400	8.07	1.400	39.74	2.400	9.96	3.40	6.50
0.417	8.07	1.417	39.74	2.417	9.96	3.42	6.50
0.433	8.07	1.433	39.74	2.433	9.96	3.43	6.50
0.450	8.07	1.450	39.74	2.450	9.96	3.45	6.50
0.467	8.07	1.467	39.74	2.467	9.96	3.47	6.50
0.483	8.07	1.483	39.74	2.483	9.96	3.48	6.50
0.500	8.07	1.500	39.74	2.500	9.96	3.50	6.50
0.517	9.51	1.517	23.97	2.517	9.08	3.52	6.18
0.533	9.51	1.533	23.97	2.533	9.08	3.53	6.18
0.550	9.51	1.550	23.97	2.550	9.08	3.55	6.18
0.567	9.51	1.567	23.97	2.567	9.08	3.57	6.18
0.583	9.51	1.583	23.97	2.583	9.08	3.58	6.18
0.600	9.51	1.600	23.97	2.600	9.08	3.60	6.18
0.617	9.51	1.617	23.97	2.617	9.08	3.62	6.18
0.633	9.51	1.633	23.97	2.633	9.08	3.63	6.18
0.650	9.51	1.650	23.97	2.650	9.08	3.65	6.18
0.667	9.51	1.667	23.97	2.667	9.08	3.67	6.18
0.683	11.82	1.683	17.98	2.683	8.38	3.68	5.90
0.700	11.82	1.700	17.98	2.700	8.38	3.70	5.90
0.717	11.82	1.717	17.98	2.717	8.38	3.72	5.90
0.733	11.82	1.733	17.98	2.733	8.38	3.73	5.90
0.750	11.82	1.750	17.98	2.750	8.38	3.75	5.90
0.767	11.82	1.767	17.98	2.767	8.38	3.77	5.90
0.783	11.82	1.783	17.98	2.783	8.38	3.78	5.90
0.800	11.82	1.800	17.98	2.800	8.38	3.80	5.90
0.817	11.82	1.817	17.98	2.817	8.38	3.82	5.90
0.833	11.82	1.833	17.98	2.833	8.38	3.83	5.90
0.850	16.33	1.850	14.70	2.850	7.79	3.85	5.64
0.867	16.33	1.867	14.70	2.867	7.79	3.87	5.64
0.883	16.33	1.883	14.70	2.883	7.79	3.88	5.64
0.900	16.33	1.900	14.70	2.900	7.79	3.90	5.64
0.917	16.33	1.917	14.70	2.917	7.79	3.92	5.64
0.933	16.33	1.933	14.70	2.933	7.79	3.93	5.64
0.950	16.33	1.950	14.70	2.950	7.79	3.95	5.64
0.967	16.33	1.967	14.70	2.967	7.79	3.97	5.64
0.983	16.33	1.983	14.70	2.983	7.79	3.98	5.64
1.000	16.33	2.000	14.70	3.000	7.79	4.00	5.64

Max.Eff.Inten.(mm/hr)=		131.63	100.17	
over (min)		5.00	8.00	
Storage Coeff. (min)=		2.55 (ii)	7.68 (ii)	
Unit Hyd. Tpeak (min)=		5.00	8.00	
Unit Hyd. peak (cms)=		0.33	0.15	
				TOTALS
PEAK FLOW	(cms)=	0.37	0.12	0.468 (iii)
TIME TO PEAK	(hrs)=	1.33	1.42	1.35
RUNOFF VOLUME	(mm)=	68.38	32.73	50.20
TOTAL RAINFALL	(mm)=	69.38	69.38	69.38
RUNOFF COEFFICIENT	=	0.99	0.47	0.72

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
| CALIB            |
| STANDHYD (  0001)|   Area    (ha)=   0.27
|ID= 1 DT= 1.0 min |   Total Imp(%)= 100.00   Dir. Conn.(%)= 100.00
```

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.27	0.00
Dep. Storage	(mm)=	1.00	9.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	42.43	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	6.34	1.017	31.84	2.017	12.58	3.02	7.30
0.033	6.34	1.033	31.84	2.033	12.58	3.03	7.30
0.050	6.34	1.050	31.84	2.050	12.58	3.05	7.30
0.067	6.34	1.067	31.84	2.067	12.58	3.07	7.30
0.083	6.34	1.083	31.84	2.083	12.58	3.08	7.30
0.100	6.34	1.100	31.84	2.100	12.58	3.10	7.30
0.117	6.34	1.117	31.84	2.117	12.58	3.12	7.30
0.133	6.34	1.133	31.84	2.133	12.58	3.13	7.30
0.150	6.34	1.150	31.84	2.150	12.58	3.15	7.30
0.167	6.34	1.167	31.84	2.167	12.58	3.17	7.30
0.183	7.08	1.183	131.62	2.183	11.08	3.18	6.87
0.200	7.08	1.200	131.63	2.200	11.08	3.20	6.87
0.217	7.08	1.217	131.63	2.217	11.08	3.22	6.87
0.233	7.08	1.233	131.63	2.233	11.08	3.23	6.87
0.250	7.08	1.250	131.63	2.250	11.08	3.25	6.87
0.267	7.08	1.267	131.63	2.267	11.08	3.27	6.87
0.283	7.08	1.283	131.63	2.283	11.08	3.28	6.87
0.300	7.08	1.300	131.63	2.300	11.08	3.30	6.87
0.317	7.08	1.317	131.63	2.317	11.08	3.32	6.87
0.333	7.08	1.333	131.63	2.333	11.08	3.33	6.87
0.350	8.07	1.350	39.74	2.350	9.96	3.35	6.50
0.367	8.07	1.367	39.74	2.367	9.96	3.37	6.50
0.383	8.07	1.383	39.74	2.383	9.96	3.38	6.50
0.400	8.07	1.400	39.74	2.400	9.96	3.40	6.50
0.417	8.07	1.417	39.74	2.417	9.96	3.42	6.50
0.433	8.07	1.433	39.74	2.433	9.96	3.43	6.50
0.450	8.07	1.450	39.74	2.450	9.96	3.45	6.50
0.467	8.07	1.467	39.74	2.467	9.96	3.47	6.50
0.483	8.07	1.483	39.74	2.483	9.96	3.48	6.50
0.500	8.07	1.500	39.74	2.500	9.96	3.50	6.50
0.517	9.51	1.517	23.97	2.517	9.08	3.52	6.18
0.533	9.51	1.533	23.97	2.533	9.08	3.53	6.18
0.550	9.51	1.550	23.97	2.550	9.08	3.55	6.18
0.567	9.51	1.567	23.97	2.567	9.08	3.57	6.18
0.583	9.51	1.583	23.97	2.583	9.08	3.58	6.18
0.600	9.51	1.600	23.97	2.600	9.08	3.60	6.18
0.617	9.51	1.617	23.97	2.617	9.08	3.62	6.18
0.633	9.51	1.633	23.97	2.633	9.08	3.63	6.18
0.650	9.51	1.650	23.97	2.650	9.08	3.65	6.18
0.667	9.51	1.667	23.97	2.667	9.08	3.67	6.18
0.683	11.82	1.683	17.98	2.683	8.38	3.68	5.90
0.700	11.82	1.700	17.98	2.700	8.38	3.70	5.90
0.717	11.82	1.717	17.98	2.717	8.38	3.72	5.90
0.733	11.82	1.733	17.98	2.733	8.38	3.73	5.90
0.750	11.82	1.750	17.98	2.750	8.38	3.75	5.90
0.767	11.82	1.767	17.98	2.767	8.38	3.77	5.90
0.783	11.82	1.783	17.98	2.783	8.38	3.78	5.90
0.800	11.82	1.800	17.98	2.800	8.38	3.80	5.90
0.817	11.82	1.817	17.98	2.817	8.38	3.82	5.90
0.833	11.82	1.833	17.98	2.833	8.38	3.83	5.90
0.850	16.33	1.850	14.70	2.850	7.79	3.85	5.64
0.867	16.33	1.867	14.70	2.867	7.79	3.87	5.64
0.883	16.33	1.883	14.70	2.883	7.79	3.88	5.64
0.900	16.33	1.900	14.70	2.900	7.79	3.90	5.64
0.917	16.33	1.917	14.70	2.917	7.79	3.92	5.64
0.933	16.33	1.933	14.70	2.933	7.79	3.93	5.64
0.950	16.33	1.950	14.70	2.950	7.79	3.95	5.64
0.967	16.33	1.967	14.70	2.967	7.79	3.97	5.64
0.983	16.33	1.983	14.70	2.983	7.79	3.98	5.64
1.000	16.33	2.000	14.70	3.000	7.79	4.00	5.64

Max.Eff.Inten.(mm/hr)=		131.63	32.61	
over (min)		5.00	2.00	
Storage Coeff. (min)=		1.37 (ii)	1.39 (ii)	
Unit Hyd. Tpeak (min)=		5.00	2.00	
Unit Hyd. peak (cms)=		0.43	0.85	
				TOTALS
PEAK FLOW	(cms)=	0.10	0.00	0.098 (iii)
TIME TO PEAK	(hrs)=	1.33	1.33	1.33
RUNOFF VOLUME	(mm)=	68.38	21.54	68.22
TOTAL RAINFALL	(mm)=	69.38	69.38	69.38
RUNOFF COEFFICIENT	=	0.99	0.31	0.98

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
| ADD HYD  (  0005)|
|   1 +  2 =  3    |
```

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0001):	0.27	0.098	1.33	68.22
+ ID2= 2 (0002):	2.16	0.468	1.35	50.20
ID = 3 (0005):	2.43	0.563	1.35	52.20

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
| RESERVOIR(  0008)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |
```

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0730	0.0240
0.0000	0.0016	0.1290	0.0289
0.0280	0.0036	0.1830	0.0342
0.0390	0.0060	0.2380	0.0400
0.0480	0.0087	0.2920	0.0463
0.0550	0.0119	0.3470	0.0531
0.0620	0.0155	0.4010	0.0603
0.0680	0.0195	0.0000	0.0000

AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)

```
   INFLOW : ID= 2 (  0005)      2.430      0.563      1.35      52.20
   OUTFLOW: ID= 1 (  0008)      2.430      0.236      1.55      51.53
   OVERFLOW:ID= 3 (  0003)      0.000      0.000      0.00       0.00

                  TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                  CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                  PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 41.93
                  TIME SHIFT OF PEAK FLOW         (min)= 12.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0398

    **** WARNING : SELECTED ROUTING TIME STEP DENIED.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0004)|   Area    (ha)=   0.23
|ID= 1 DT= 1.0 min |   Total Imp(%)=  48.00   Dir. Conn.(%)=  35.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.11         0.12
     Dep. Storage     (mm)=       1.00         9.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      39.16        40.00
     Mannings n           =      0.013        0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.

                          ---- TRANSFORMED HYETOGRAPH ----
     TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
      hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
    0.017    6.34 | 1.017   31.84 | 2.017   12.58 |  3.02    7.30
    0.033    6.34 | 1.033   31.84 | 2.033   12.58 |  3.03    7.30
    0.050    6.34 | 1.050   31.84 | 2.050   12.58 |  3.05    7.30
    0.067    6.34 | 1.067   31.84 | 2.067   12.58 |  3.07    7.30
    0.083    6.34 | 1.083   31.84 | 2.083   12.58 |  3.08    7.30
    0.100    6.34 | 1.100   31.84 | 2.100   12.58 |  3.10    7.30
    0.117    6.34 | 1.117   31.84 | 2.117   12.58 |  3.12    7.30
    0.133    6.34 | 1.133   31.84 | 2.133   12.58 |  3.13    7.30
    0.150    6.34 | 1.150   31.84 | 2.150   12.58 |  3.15    7.30
    0.167    6.34 | 1.167   31.84 | 2.167   12.58 |  3.17    7.30
    0.183    7.08 | 1.183  131.62 | 2.183   11.08 |  3.18    6.87
    0.200    7.08 | 1.200  131.63 | 2.200   11.08 |  3.20    6.87
    0.217    7.08 | 1.217  131.63 | 2.217   11.08 |  3.22    6.87
    0.233    7.08 | 1.233  131.63 | 2.233   11.08 |  3.23    6.87
    0.250    7.08 | 1.250  131.63 | 2.250   11.08 |  3.25    6.87
    0.267    7.08 | 1.267  131.63 | 2.267   11.08 |  3.27    6.87
    0.283    7.08 | 1.283  131.63 | 2.283   11.08 |  3.28    6.87
    0.300    7.08 | 1.300  131.63 | 2.300   11.08 |  3.30    6.87
    0.317    7.08 | 1.317  131.63 | 2.317   11.08 |  3.32    6.87
    0.333    7.08 | 1.333  131.63 | 2.333   11.08 |  3.33    6.87
    0.350    8.07 | 1.350   39.74 | 2.350    9.96 |  3.35    6.50
    0.367    8.07 | 1.367   39.74 | 2.367    9.96 |  3.37    6.50
    0.383    8.07 | 1.383   39.74 | 2.383    9.96 |  3.38    6.50
    0.400    8.07 | 1.400   39.74 | 2.400    9.96 |  3.40    6.50
    0.417    8.07 | 1.417   39.74 | 2.417    9.96 |  3.42    6.50
    0.433    8.07 | 1.433   39.74 | 2.433    9.96 |  3.43    6.50
    0.450    8.07 | 1.450   39.74 | 2.450    9.96 |  3.45    6.50
    0.467    8.07 | 1.467   39.74 | 2.467    9.96 |  3.47    6.50
    0.483    8.07 | 1.483   39.74 | 2.483    9.96 |  3.48    6.50
    0.500    8.07 | 1.500   39.74 | 2.500    9.96 |  3.50    6.50
    0.517    9.51 | 1.517   23.97 | 2.517    9.08 |  3.52    6.18
    0.533    9.51 | 1.533   23.97 | 2.533    9.08 |  3.53    6.18
    0.550    9.51 | 1.550   23.97 | 2.550    9.08 |  3.55    6.18
    0.567    9.51 | 1.567   23.97 | 2.567    9.08 |  3.57    6.18
    0.583    9.51 | 1.583   23.97 | 2.583    9.08 |  3.58    6.18
    0.600    9.51 | 1.600   23.97 | 2.600    9.08 |  3.60    6.18
    0.617    9.51 | 1.617   23.97 | 2.617    9.08 |  3.62    6.18
    0.633    9.51 | 1.633   23.97 | 2.633    9.08 |  3.63    6.18
    0.650    9.51 | 1.650   23.97 | 2.650    9.08 |  3.65    6.18
    0.667    9.51 | 1.667   23.97 | 2.667    9.08 |  3.67    6.18
    0.683   11.82 | 1.683   17.98 | 2.683    8.38 |  3.68    5.90
    0.700   11.82 | 1.700   17.98 | 2.700    8.38 |  3.70    5.90
    0.717   11.82 | 1.717   17.98 | 2.717    8.38 |  3.72    5.90
    0.733   11.82 | 1.733   17.98 | 2.733    8.38 |  3.73    5.90
    0.750   11.82 | 1.750   17.98 | 2.750    8.38 |  3.75    5.90
    0.767   11.82 | 1.767   17.98 | 2.767    8.38 |  3.77    5.90
    0.783   11.82 | 1.783   17.98 | 2.783    8.38 |  3.78    5.90
    0.800   11.82 | 1.800   17.98 | 2.800    8.38 |  3.80    5.90
    0.817   11.82 | 1.817   17.98 | 2.817    8.38 |  3.82    5.90
    0.833   11.82 | 1.833   17.98 | 2.833    8.38 |  3.83    5.90
    0.850   16.33 | 1.850   14.70 | 2.850    7.79 |  3.85    5.64
    0.867   16.33 | 1.867   14.70 | 2.867    7.79 |  3.87    5.64
    0.883   16.33 | 1.883   14.70 | 2.883    7.79 |  3.88    5.64
    0.900   16.33 | 1.900   14.70 | 2.900    7.79 |  3.90    5.64
    0.917   16.33 | 1.917   14.70 | 2.917    7.79 |  3.92    5.64
    0.933   16.33 | 1.933   14.70 | 2.933    7.79 |  3.93    5.64
    0.950   16.33 | 1.950   14.70 | 2.950    7.79 |  3.95    5.64
    0.967   16.33 | 1.967   14.70 | 2.967    7.79 |  3.97    5.64
    0.983   16.33 | 1.983   14.70 | 2.983    7.79 |  3.98    5.64
    1.000   16.33 | 2.000   14.70 | 3.000    7.79 |  4.00    5.64

    Max.Eff.Inten.(mm/hr)=     131.63        52.32
              over (min)          5.00         9.00
    Storage Coeff.  (min)=       1.30 (ii)    8.71 (ii)
    Unit Hyd. Tpeak (min)=       5.00         9.00
    Unit Hyd. peak  (cms)=       0.44         0.13
                                                      *TOTALS*
    PEAK FLOW       (cms)=       0.03         0.01          0.037 (iii)
    TIME TO PEAK    (hrs)=       1.33         1.45          1.35
    RUNOFF VOLUME    (mm)=      68.38        25.90         40.75
    TOTAL RAINFALL   (mm)=      69.38        69.38         69.38
    RUNOFF COEFFICIENT   =       0.99         0.37          0.59

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  70.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0010)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)      (mm)
       ID1= 1 (  0003):     0.23   0.007     1.58    14.71
     + ID2= 2 (  0004):     0.23   0.037     1.35    40.75
       ==========================================================
       ID = 3 (  0010):     0.46   0.040     1.35    27.73

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0010)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)      (mm)
       ID1= 3 (  0010):     0.46   0.040     1.35    27.73
     + ID2= 2 (  0008):     2.43   0.236     1.55    51.53
       ==========================================================
       ID = 1 (  0010):     2.89   0.261     1.53    47.75

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

 --------------------------
 | Junction Command(0009) |
 --------------------------

                                AREA     QPEAK    TPEAK     R.V.
                                (ha)     (cms)    (hrs)      (mm)
 INFLOW : ID= 3(  0008)        0.00      0.00     0.00      0.00
 OUTFLOW: ID= 2(  0009)        0.00      0.00     0.00      0.00

 --------------------------------------------------------------------------------
```

50-YEAR STORM – POST-DEVELOPMENT

```
==============================================================================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Smart City Water Inc
Copyright 2007 - 2022 Smart City Water Inc
All rights reserved.

                  *****  D E T A I L E D   O U T P U T *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\Natalie\AppData\Local\Civica\VH5\c399a01c-8370-
442e-925a-91933bdc17fe\647b5967-a887-4bd2-8fc9-428d78e9ab7d\scen
  Summary filename: C:\Users\Natalie\AppData\Local\Civica\VH5\c399a01c-8370-
442e-925a-91933bdc17fe\647b5967-a887-4bd2-8fc9-428d78e9ab7d\scen

DATE: 02/26/2024                          TIME: 01:25:55

USER:


COMMENTS: _____________________________________________________

------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 05_50-Year Norfolk            **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 766.038
| Ptotal= 78.32 mm |                          B=   1.898
--------------------                          C=   0.668
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
   0.00    7.35 |  1.00   35.40 |'  2.00   14.38 |  3.00    8.44
   0.17    8.19 |  1.17  146.50 |'  2.17   12.71 |  3.17    7.96
   0.33    9.32 |  1.33   43.93 |'  2.33   11.45 |  3.33    7.55
   0.50   10.95 |  1.50   26.91 |'  2.50   10.46 |  3.50    7.18
   0.67   13.53 |  1.67   20.36 |'  2.67    9.66 |  3.67    6.85
   0.83   18.53 |  1.83   16.73 |'  2.83    9.00 |  3.83    6.56

------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0003)|   Area    (ha)=   0.23   Curve Number   (CN)= 62.0
|ID= 1 DT= 1.0 min |   Ia      (mm)=  13.60   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

        NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
  0.017    7.35 | 1.017   35.40 | 2.017   14.38 |  3.02    8.44
  0.033    7.35 | 1.033   35.40 | 2.033   14.38 |  3.03    8.44
  0.050    7.35 | 1.050   35.40 | 2.050   14.38 |  3.05    8.44
  0.067    7.35 | 1.067   35.40 | 2.067   14.38 |  3.07    8.44
  0.083    7.35 | 1.083   35.40 | 2.083   14.38 |  3.08    8.44
  0.100    7.35 | 1.100   35.40 | 2.100   14.38 |  3.10    8.44
  0.117    7.35 | 1.117   35.40 | 2.117   14.38 |  3.12    8.44
  0.133    7.35 | 1.133   35.40 | 2.133   14.38 |  3.13    8.44
  0.150    7.35 | 1.150   35.40 | 2.150   14.38 |  3.15    8.44
  0.167    7.35 | 1.167   35.40 | 2.167   14.38 |  3.17    8.44
  0.183    8.19 | 1.183  146.50 | 2.183   12.71 |  3.18    7.96
  0.200    8.19 | 1.200  146.50 | 2.200   12.71 |  3.20    7.96
  0.217    8.19 | 1.217  146.50 | 2.217   12.71 |  3.22    7.96
  0.233    8.19 | 1.233  146.50 | 2.233   12.71 |  3.23    7.96
  0.250    8.19 | 1.250  146.50 | 2.250   12.71 |  3.25    7.96
  0.267    8.19 | 1.267  146.50 | 2.267   12.71 |  3.27    7.96
  0.283    8.19 | 1.283  146.50 | 2.283   12.71 |  3.28    7.96
  0.300    8.19 | 1.300  146.50 | 2.300   12.71 |  3.30    7.96
  0.317    8.19 | 1.317  146.50 | 2.317   12.71 |  3.32    7.96
  0.333    8.19 | 1.333  146.50 | 2.333   12.71 |  3.33    7.96
  0.350    9.32 | 1.350   43.94 | 2.350   11.45 |  3.35    7.55
  0.367    9.32 | 1.367   43.93 | 2.367   11.45 |  3.37    7.55
  0.383    9.32 | 1.383   43.93 | 2.383   11.45 |  3.38    7.55
  0.400    9.32 | 1.400   43.93 | 2.400   11.45 |  3.40    7.55
  0.417    9.32 | 1.417   43.93 | 2.417   11.45 |  3.42    7.55
  0.433    9.32 | 1.433   43.93 | 2.433   11.45 |  3.43    7.55
  0.450    9.32 | 1.450   43.93 | 2.450   11.45 |  3.45    7.55
  0.467    9.32 | 1.467   43.93 | 2.467   11.45 |  3.47    7.55
  0.483    9.32 | 1.483   43.93 | 2.483   11.45 |  3.48    7.55
  0.500    9.32 | 1.500   43.93 | 2.500   11.45 |  3.50    7.55
  0.517   10.95 | 1.517   26.91 | 2.517   10.46 |  3.52    7.18
  0.533   10.95 | 1.533   26.91 | 2.533   10.46 |  3.53    7.18
  0.550   10.95 | 1.550   26.91 | 2.550   10.46 |  3.55    7.18
  0.567   10.95 | 1.567   26.91 | 2.567   10.46 |  3.57    7.18
  0.583   10.95 | 1.583   26.91 | 2.583   10.46 |  3.58    7.18
  0.600   10.95 | 1.600   26.91 | 2.600   10.46 |  3.60    7.18
  0.617   10.95 | 1.617   26.91 | 2.617   10.46 |  3.62    7.18
  0.633   10.95 | 1.633   26.91 | 2.633   10.46 |  3.63    7.18
  0.650   10.95 | 1.650   26.91 | 2.650   10.46 |  3.65    7.18
  0.667   10.95 | 1.667   26.91 | 2.667   10.46 |  3.67    7.18
  0.683   13.53 | 1.683   20.36 | 2.683    9.66 |  3.68    6.85
  0.700   13.53 | 1.700   20.36 | 2.700    9.66 |  3.70    6.85
  0.717   13.53 | 1.717   20.36 | 2.717    9.66 |  3.72    6.85
  0.733   13.53 | 1.733   20.36 | 2.733    9.66 |  3.73    6.85
  0.750   13.53 | 1.750   20.36 | 2.750    9.66 |  3.75    6.85
  0.767   13.53 | 1.767   20.36 | 2.767    9.66 |  3.77    6.85
  0.783   13.53 | 1.783   20.36 | 2.783    9.66 |  3.78    6.85
  0.800   13.53 | 1.800   20.36 | 2.800    9.66 |  3.80    6.85
  0.817   13.53 | 1.817   20.36 | 2.817    9.66 |  3.82    6.85
  0.833   13.53 | 1.833   20.36 | 2.833    9.66 |  3.83    6.85
  0.850   18.53 | 1.850   16.73 | 2.850    9.00 |  3.85    6.56
  0.867   18.53 | 1.867   16.73 | 2.867    9.00 |  3.87    6.56
  0.883   18.53 | 1.883   16.73 | 2.883    9.00 |  3.88    6.56
  0.900   18.53 | 1.900   16.73 | 2.900    9.00 |  3.90    6.56
  0.917   18.53 | 1.917   16.73 | 2.917    9.00 |  3.92    6.56
  0.933   18.53 | 1.933   16.73 | 2.933    9.00 |  3.93    6.56
  0.950   18.53 | 1.950   16.73 | 2.950    9.00 |  3.95    6.56
  0.967   18.53 | 1.967   16.73 | 2.967    9.00 |  3.97    6.56
  0.983   18.53 | 1.983   16.73 | 2.983    9.00 |  3.98    6.56
  1.000   18.53 | 2.000   16.73 | 3.000    9.00 |  4.00    6.56

     Unit Hyd Qpeak  (cms)=   0.044

     PEAK FLOW       (cms)=   0.010 (i)
     TIME TO PEAK    (hrs)=   1.567
     RUNOFF VOLUME    (mm)=  19.003
     TOTAL RAINFALL   (mm)=  78.320
     RUNOFF COEFFICIENT   =   0.243

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0002)|   Area    (ha)=   2.16
|ID= 1 DT= 1.0 min |   Total Imp(%)=  71.00   Dir. Conn.(%)=  49.00
--------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     1.53          0.63
     Dep. Storage     (mm)=     1.00          9.00
     Average Slope     (%)=     1.00          2.00
     Length            (m)=   120.00         40.00
     Mannings n            =    0.013         0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
  0.017    7.35 | 1.017   35.40 | 2.017   14.38 |  3.02    8.44
  0.033    7.35 | 1.033   35.40 | 2.033   14.38 |  3.03    8.44
  0.050    7.35 | 1.050   35.40 | 2.050   14.38 |  3.05    8.44
  0.067    7.35 | 1.067   35.40 | 2.067   14.38 |  3.07    8.44
  0.083    7.35 | 1.083   35.40 | 2.083   14.38 |  3.08    8.44
  0.100    7.35 | 1.100   35.40 | 2.100   14.38 |  3.10    8.44
  0.117    7.35 | 1.117   35.40 | 2.117   14.38 |  3.12    8.44
  0.133    7.35 | 1.133   35.40 | 2.133   14.38 |  3.13    8.44
  0.150    7.35 | 1.150   35.40 | 2.150   14.38 |  3.15    8.44
  0.167    7.35 | 1.167   35.40 | 2.167   14.38 |  3.17    8.44
  0.183    8.19 | 1.183  146.50 | 2.183   12.71 |  3.18    7.96
  0.200    8.19 | 1.200  146.50 | 2.200   12.71 |  3.20    7.96
  0.217    8.19 | 1.217  146.50 | 2.217   12.71 |  3.22    7.96
  0.233    8.19 | 1.233  146.50 | 2.233   12.71 |  3.23    7.96
  0.250    8.19 | 1.250  146.50 | 2.250   12.71 |  3.25    7.96
  0.267    8.19 | 1.267  146.50 | 2.267   12.71 |  3.27    7.96
  0.283    8.19 | 1.283  146.50 | 2.283   12.71 |  3.28    7.96
  0.300    8.19 | 1.300  146.50 | 2.300   12.71 |  3.30    7.96
  0.317    8.19 | 1.317  146.50 | 2.317   12.71 |  3.32    7.96
  0.333    8.19 | 1.333  146.50 | 2.333   12.71 |  3.33    7.96
  0.350    9.32 | 1.350   43.94 | 2.350   11.45 |  3.35    7.55
  0.367    9.32 | 1.367   43.93 | 2.367   11.45 |  3.37    7.55
  0.383    9.32 | 1.383   43.93 | 2.383   11.45 |  3.38    7.55
  0.400    9.32 | 1.400   43.93 | 2.400   11.45 |  3.40    7.55
  0.417    9.32 | 1.417   43.93 | 2.417   11.45 |  3.42    7.55
  0.433    9.32 | 1.433   43.93 | 2.433   11.45 |  3.43    7.55
  0.450    9.32 | 1.450   43.93 | 2.450   11.45 |  3.45    7.55
  0.467    9.32 | 1.467   43.93 | 2.467   11.45 |  3.47    7.55
  0.483    9.32 | 1.483   43.93 | 2.483   11.45 |  3.48    7.55
  0.500    9.32 | 1.500   43.93 | 2.500   11.45 |  3.50    7.55
  0.517   10.95 | 1.517   26.91 | 2.517   10.46 |  3.52    7.18
  0.533   10.95 | 1.533   26.91 | 2.533   10.46 |  3.53    7.18
  0.550   10.95 | 1.550   26.91 | 2.550   10.46 |  3.55    7.18
  0.567   10.95 | 1.567   26.91 | 2.567   10.46 |  3.57    7.18
  0.583   10.95 | 1.583   26.91 | 2.583   10.46 |  3.58    7.18
  0.600   10.95 | 1.600   26.91 | 2.600   10.46 |  3.60    7.18
  0.617   10.95 | 1.617   26.91 | 2.617   10.46 |  3.62    7.18
  0.633   10.95 | 1.633   26.91 | 2.633   10.46 |  3.63    7.18
  0.650   10.95 | 1.650   26.91 | 2.650   10.46 |  3.65    7.18
  0.667   10.95 | 1.667   26.91 | 2.667   10.46 |  3.67    7.18
  0.683   13.53 | 1.683   20.36 | 2.683    9.66 |  3.68    6.85
  0.700   13.53 | 1.700   20.36 | 2.700    9.66 |  3.70    6.85
  0.717   13.53 | 1.717   20.36 | 2.717    9.66 |  3.72    6.85
  0.733   13.53 | 1.733   20.36 | 2.733    9.66 |  3.73    6.85
  0.750   13.53 | 1.750   20.36 | 2.750    9.66 |  3.75    6.85
  0.767   13.53 | 1.767   20.36 | 2.767    9.66 |  3.77    6.85
  0.783   13.53 | 1.783   20.36 | 2.783    9.66 |  3.78    6.85
  0.800   13.53 | 1.800   20.36 | 2.800    9.66 |  3.80    6.85
  0.817   13.53 | 1.817   20.36 | 2.817    9.66 |  3.82    6.85
  0.833   13.53 | 1.833   20.36 | 2.833    9.66 |  3.83    6.85
  0.850   18.53 | 1.850   16.73 | 2.850    9.00 |  3.85    6.56
  0.867   18.53 | 1.867   16.73 | 2.867    9.00 |  3.87    6.56
  0.883   18.53 | 1.883   16.73 | 2.883    9.00 |  3.88    6.56
  0.900   18.53 | 1.900   16.73 | 2.900    9.00 |  3.90    6.56
  0.917   18.53 | 1.917   16.73 | 2.917    9.00 |  3.92    6.56
  0.933   18.53 | 1.933   16.73 | 2.933    9.00 |  3.93    6.56
  0.950   18.53 | 1.950   16.73 | 2.950    9.00 |  3.95    6.56
  0.967   18.53 | 1.967   16.73 | 2.967    9.00 |  3.97    6.56
  0.983   18.53 | 1.983   16.73 | 2.983    9.00 |  3.98    6.56
  1.000   18.53 | 2.000   16.73 | 3.000    9.00 |  4.00    6.56
```

Max.Eff.Inten.(mm/hr)=	146.50	122.08		
over (min)	5.00	8.00		
Storage Coeff. (min)=	2.45 (ii)	7.36 (ii)		
Unit Hyd. Tpeak (min)=	5.00	8.00		
Unit Hyd. peak (cms)=	0.34	0.15		
			TOTALS	
PEAK FLOW (cms)=	0.41	0.15	0.537 (iii)	
TIME TO PEAK (hrs)=	1.33	1.42	1.35	
RUNOFF VOLUME (mm)=	77.32	39.66	58.11	
TOTAL RAINFALL (mm)=	78.32	78.32	78.32	
RUNOFF COEFFICIENT =	0.99	0.51	0.74	

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0001)	Area (ha)= 0.27
ID= 1 DT= 1.0 min	Total Imp(%)= 100.00 Dir. Conn.(%)= 100.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.27	0.00
Dep. Storage (mm)=	1.00	9.00
Average Slope (%)=	1.00	2.00
Length (m)=	42.43	40.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	7.35	1.017	35.40	2.017	14.38	3.02	8.44
0.033	7.35	1.033	35.40	2.033	14.38	3.03	8.44
0.050	7.35	1.050	35.40	2.050	14.38	3.05	8.44
0.067	7.35	1.067	35.40	2.067	14.38	3.07	8.44
0.083	7.35	1.083	35.40	2.083	14.38	3.08	8.44
0.100	7.35	1.100	35.40	2.100	14.38	3.10	8.44
0.117	7.35	1.117	35.40	2.117	14.38	3.12	8.44
0.133	7.35	1.133	35.40	2.133	14.38	3.13	8.44
0.150	7.35	1.150	35.40	2.150	14.38	3.15	8.44
0.167	7.35	1.167	35.40	2.167	14.38	3.17	8.44
0.183	8.19	1.183	146.50	2.183	12.71	3.18	7.96
0.200	8.19	1.200	146.50	2.200	12.71	3.20	7.96
0.217	8.19	1.217	146.50	2.217	12.71	3.22	7.96
0.233	8.19	1.233	146.50	2.233	12.71	3.23	7.96
0.250	8.19	1.250	146.50	2.250	12.71	3.25	7.96
0.267	8.19	1.267	146.50	2.267	12.71	3.27	7.96
0.283	8.19	1.283	146.50	2.283	12.71	3.28	7.96
0.300	8.19	1.300	146.50	2.300	12.71	3.30	7.96
0.317	8.19	1.317	146.50	2.317	12.71	3.32	7.96
0.333	8.19	1.333	146.50	2.333	12.71	3.33	7.96
0.350	9.32	1.350	43.94	2.350	11.45	3.35	7.55
0.367	9.32	1.367	43.93	2.367	11.45	3.37	7.55
0.383	9.32	1.383	43.93	2.383	11.45	3.38	7.55
0.400	9.32	1.400	43.93	2.400	11.45	3.40	7.55
0.417	9.32	1.417	43.93	2.417	11.45	3.42	7.55
0.433	9.32	1.433	43.93	2.433	11.45	3.43	7.55
0.450	9.32	1.450	43.93	2.450	11.45	3.45	7.55
0.467	9.32	1.467	43.93	2.467	11.45	3.47	7.55
0.483	9.32	1.483	43.93	2.483	11.45	3.48	7.55
0.500	9.32	1.500	43.93	2.500	11.45	3.50	7.55
0.517	10.95	1.517	26.91	2.517	10.46	3.52	7.18
0.533	10.95	1.533	26.91	2.533	10.46	3.53	7.18
0.550	10.95	1.550	26.91	2.550	10.46	3.55	7.18
0.567	10.95	1.567	26.91	2.567	10.46	3.57	7.18
0.583	10.95	1.583	26.91	2.583	10.46	3.58	7.18
0.600	10.95	1.600	26.91	2.600	10.46	3.60	7.18
0.617	10.95	1.617	26.91	2.617	10.46	3.62	7.18
0.633	10.95	1.633	26.91	2.633	10.46	3.63	7.18
0.650	10.95	1.650	26.91	2.650	10.46	3.65	7.18
0.667	10.95	1.667	26.91	2.667	10.46	3.67	7.18
0.683	13.53	1.683	20.36	2.683	9.66	3.68	6.85
0.700	13.53	1.700	20.36	2.700	9.66	3.70	6.85
0.717	13.53	1.717	20.36	2.717	9.66	3.72	6.85
0.733	13.53	1.733	20.36	2.733	9.66	3.73	6.85
0.750	13.53	1.750	20.36	2.750	9.66	3.75	6.85
0.767	13.53	1.767	20.36	2.767	9.66	3.77	6.85
0.783	13.53	1.783	20.36	2.783	9.66	3.78	6.85
0.800	13.53	1.800	20.36	2.800	9.66	3.80	6.85
0.817	13.53	1.817	20.36	2.817	9.66	3.82	6.85
0.833	13.53	1.833	20.36	2.833	9.66	3.83	6.85
0.850	18.53	1.850	16.73	2.850	9.00	3.85	6.56
0.867	18.53	1.867	16.73	2.867	9.00	3.87	6.56
0.883	18.53	1.883	16.73	2.883	9.00	3.88	6.56
0.900	18.53	1.900	16.73	2.900	9.00	3.90	6.56
0.917	18.53	1.917	16.73	2.917	9.00	3.92	6.56
0.933	18.53	1.933	16.73	2.933	9.00	3.93	6.56
0.950	18.53	1.950	16.73	2.950	9.00	3.95	6.56
0.967	18.53	1.967	16.73	2.967	9.00	3.97	6.56
0.983	18.53	1.983	16.73	2.983	9.00	3.98	6.56
1.000	18.53	2.000	16.73	3.000	9.00	4.00	6.56

Max.Eff.Inten.(mm/hr)=	146.50	41.69		
over (min)	5.00	2.00		
Storage Coeff. (min)=	1.31 (ii)	1.34 (ii)		
Unit Hyd. Tpeak (min)=	5.00	2.00		
Unit Hyd. peak (cms)=	0.44	0.86		
			TOTALS	
PEAK FLOW (cms)=	0.11	0.00	0.109 (iii)	
TIME TO PEAK (hrs)=	1.33	1.33	1.33	
RUNOFF VOLUME (mm)=	77.32	26.97	77.15	
TOTAL RAINFALL (mm)=	78.32	78.32	78.32	
RUNOFF COEFFICIENT =	0.99	0.34	0.99	

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0005)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0001):		0.27	0.109	1.33	77.15
+ ID2= 2 (0002):		2.16	0.537	1.35	58.11
ID = 3 (0005):		2.43	0.642	1.35	60.23

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0008)	OVERFLOW IS ON			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0700	0.0240
	0.0000	0.0016	0.1260	0.0289
	0.0180	0.0036	0.1810	0.0342
	0.0330	0.0060	0.2350	0.0400
	0.0430	0.0087	0.2900	0.0463
	0.0510	0.0119	0.3440	0.0531
	0.0580	0.0155	0.3980	0.0603
	0.0640	0.0195	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0005)	2.430	0.642	1.35	60.23
OUTFLOW: ID= 1 (0008)	2.430	0.281	1.53	59.56
OVERFLOW:ID= 3 (0003)	0.000	0.000	0.00	0.00

TOTAL NUMBER OF SIMULATION OVERFLOW = 0
CUMULATIVE TIME OF OVERFLOW (HOURS) = 0.00
PERCENTAGE OF TIME OVERFLOWING (%) = 0.00

PEAK FLOW REDUCTION [Qout/Qin](%)= 43.68
TIME SHIFT OF PEAK FLOW (min)= 11.00
MAXIMUM STORAGE USED (ha.m.)= 0.0452

**** WARNING : SELECTED ROUTING TIME STEP DENIED.

CALIB	
STANDHYD (0004)	Area (ha)= 0.23
ID= 1 DT= 1.0 min	Total Imp(%)= 48.00 Dir. Conn.(%)= 35.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.11	0.12
Dep. Storage (mm)=	1.00	9.00
Average Slope (%)=	1.00	2.00
Length (m)=	39.16	40.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	7.35	1.017	35.40	2.017	14.38	3.02	8.44
0.033	7.35	1.033	35.40	2.033	14.38	3.03	8.44
0.050	7.35	1.050	35.40	2.050	14.38	3.05	8.44
0.067	7.35	1.067	35.40	2.067	14.38	3.07	8.44
0.083	7.35	1.083	35.40	2.083	14.38	3.08	8.44
0.100	7.35	1.100	35.40	2.100	14.38	3.10	8.44
0.117	7.35	1.117	35.40	2.117	14.38	3.12	8.44
0.133	7.35	1.133	35.40	2.133	14.38	3.13	8.44
0.150	7.35	1.150	35.40	2.150	14.38	3.15	8.44
0.167	7.35	1.167	35.40	2.167	14.38	3.17	8.44
0.183	8.19	1.183	146.50	2.183	12.71	3.18	7.96
0.200	8.19	1.200	146.50	2.200	12.71	3.20	7.96
0.217	8.19	1.217	146.50	2.217	12.71	3.22	7.96
0.233	8.19	1.233	146.50	2.233	12.71	3.23	7.96
0.250	8.19	1.250	146.50	2.250	12.71	3.25	7.96
0.267	8.19	1.267	146.50	2.267	12.71	3.27	7.96
0.283	8.19	1.283	146.50	2.283	12.71	3.28	7.96
0.300	8.19	1.300	146.50	2.300	12.71	3.30	7.96
0.317	8.19	1.317	146.50	2.317	12.71	3.32	7.96
0.333	8.19	1.333	146.50	2.333	12.71	3.33	7.96
0.350	9.32	1.350	43.94	2.350	11.45	3.35	7.55
0.367	9.32	1.367	43.93	2.367	11.45	3.37	7.55
0.383	9.32	1.383	43.93	2.383	11.45	3.38	7.55
0.400	9.32	1.400	43.93	2.400	11.45	3.40	7.55
0.417	9.32	1.417	43.93	2.417	11.45	3.42	7.55
0.433	9.32	1.433	43.93	2.433	11.45	3.43	7.55
0.450	9.32	1.450	43.93	2.450	11.45	3.45	7.55
0.467	9.32	1.467	43.93	2.467	11.45	3.47	7.55
0.483	9.32	1.483	43.93	2.483	11.45	3.48	7.55
0.500	9.32	1.500	43.93	2.500	11.45	3.50	7.55
0.517	10.95	1.517	26.91	2.517	10.46	3.52	7.18
0.533	10.95	1.533	26.91	2.533	10.46	3.53	7.18
0.550	10.95	1.550	26.91	2.550	10.46	3.55	7.18
0.567	10.95	1.567	26.91	2.567	10.46	3.57	7.18
0.583	10.95	1.583	26.91	2.583	10.46	3.58	7.18
0.600	10.95	1.600	26.91	2.600	10.46	3.60	7.18
0.617	10.95	1.617	26.91	2.617	10.46	3.62	7.18
0.633	10.95	1.633	26.91	2.633	10.46	3.63	7.18
0.650	10.95	1.650	26.91	2.650	10.46	3.65	7.18
0.667	10.95	1.667	26.91	2.667	10.46	3.67	7.18
0.683	13.53	1.683	20.36	2.683	9.66	3.68	6.85
0.700	13.53	1.700	20.36	2.700	9.66	3.70	6.85
0.717	13.53	1.717	20.36	2.717	9.66	3.72	6.85
0.733	13.53	1.733	20.36	2.733	9.66	3.73	6.85
0.750	13.53	1.750	20.36	2.750	9.66	3.75	6.85
0.767	13.53	1.767	20.36	2.767	9.66	3.77	6.85
0.783	13.53	1.783	20.36	2.783	9.66	3.78	6.85
0.800	13.53	1.800	20.36	2.800	9.66	3.80	6.85
0.817	13.53	1.817	20.36	2.817	9.66	3.82	6.85

0.833	13.53	1.833	20.36	2.833	9.66	3.83	6.85
0.850	18.53	1.850	16.73	2.850	9.00	3.85	6.56
0.867	18.53	1.867	16.73	2.867	9.00	3.87	6.56
0.883	18.53	1.883	16.73	2.883	9.00	3.88	6.56
0.900	18.53	1.900	16.73	2.900	9.00	3.90	6.56
0.917	18.53	1.917	16.73	2.917	9.00	3.92	6.56
0.933	18.53	1.933	16.73	2.933	9.00	3.93	6.56
0.950	18.53	1.950	16.73	2.950	9.00	3.95	6.56
0.967	18.53	1.967	16.73	2.967	9.00	3.97	6.56
0.983	18.53	1.983	16.73	2.983	9.00	3.98	6.56
1.000	18.53	2.000	16.73	3.000	9.00	4.00	6.56

Max.Eff.Inten.(mm/hr)=	146.50	65.42	
over (min)	5.00	9.00	
Storage Coeff. (min)=	1.25 (ii)	8.35 (ii)	
Unit Hyd. Tpeak (min)=	5.00	9.00	
Unit Hyd. peak (cms)=	0.45	0.13	
			TOTALS
PEAK FLOW (cms)=	0.03	0.01	0.043 (iii)
TIME TO PEAK (hrs)=	1.33	1.43	1.35
RUNOFF VOLUME (mm)=	77.32	31.97	47.82
TOTAL RAINFALL (mm)=	78.32	78.32	78.32
RUNOFF COEFFICIENT =	0.99	0.41	0.61

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0010)					
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0003):	0.23	0.010	1.57	19.00
+ ID2= 2 (0004):	0.23	0.043	1.35	47.82
ID = 3 (0010):	0.46	0.047	1.35	33.41

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)					
3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0010):	0.46	0.047	1.35	33.41
+ ID2= 2 (0008):	2.43	0.281	1.53	59.56
ID = 1 (0010):	2.89	0.312	1.52	55.40

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

Junction Command(0009)				
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0008)	0.00	0.00	0.00	0.00
OUTFLOW: ID= 2(0009)	0.00	0.00	0.00	0.00

100-YEAR STORM – POST-DEVELOPMENT

```
================================================================================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Smart City Water Inc
Copyright 2007 - 2022 Smart City Water Inc
All rights reserved.

                  *****  D E T A I L E D   O U T P U T *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\Natalie\AppData\Local\Civica\VH5\c399a01c-8370-
442e-925a-91933bdc17fe\818097df-132a-4045-a624-ea66dd7118c2\scen
  Summary filename: C:\Users\Natalie\AppData\Local\Civica\VH5\c399a01c-8370-
442e-925a-91933bdc17fe\818097df-132a-4045-a624-ea66dd7118c2\scen

DATE: 02/26/2024                          TIME: 01:26:41

USER:


COMMENTS: _____

--------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 06_100-Year Norfolk           **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 801.041
| Ptotal= 87.09 mm |                          B=   1.501
--------------------                          C=   0.657
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
   0.00    8.40 |  1.00   38.70 |'  2.00   16.17 |  3.00    9.61
   0.17    9.34 |  1.17  160.97 |'  2.17   14.33 |  3.17    9.08
   0.33   10.59 |  1.33   47.72 |'  2.33   12.95 |  3.33    8.61
   0.50   12.39 |  1.50   29.71 |'  2.50   11.86 |  3.50    8.20
   0.67   15.24 |  1.67   22.67 |'  2.67   10.97 |  3.67    7.84
   0.83   20.69 |  1.83   18.74 |'  2.83   10.24 |  3.83    7.51

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0003)|   Area    (ha)=   0.23   Curve Number   (CN)= 62.0
|ID= 1 DT= 1.0 min |   Ia      (mm)=  13.60   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

        NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
  0.017    8.40 | 1.017   38.70 | 2.017   16.17 |  3.02    9.61
  0.033    8.40 | 1.033   38.70 | 2.033   16.17 |  3.03    9.61
  0.050    8.40 | 1.050   38.70 | 2.050   16.17 |  3.05    9.61
  0.067    8.40 | 1.067   38.70 | 2.067   16.17 |  3.07    9.61
  0.083    8.40 | 1.083   38.70 | 2.083   16.17 |  3.08    9.61
  0.100    8.40 | 1.100   38.70 | 2.100   16.17 |  3.10    9.61
  0.117    8.40 | 1.117   38.70 | 2.117   16.17 |  3.12    9.61
  0.133    8.40 | 1.133   38.70 | 2.133   16.17 |  3.13    9.61
  0.150    8.40 | 1.150   38.70 | 2.150   16.17 |  3.15    9.61
  0.167    8.40 | 1.167   38.70 | 2.167   16.17 |  3.17    9.61
  0.183    9.34 | 1.183  160.97 | 2.183   14.33 |  3.18    9.08
  0.200    9.34 | 1.200  160.97 | 2.200   14.33 |  3.20    9.08
  0.217    9.34 | 1.217  160.97 | 2.217   14.33 |  3.22    9.08
  0.233    9.34 | 1.233  160.97 | 2.233   14.33 |  3.23    9.08
  0.250    9.34 | 1.250  160.97 | 2.250   14.33 |  3.25    9.08
  0.267    9.34 | 1.267  160.97 | 2.267   14.33 |  3.27    9.08
  0.283    9.34 | 1.283  160.97 | 2.283   14.33 |  3.28    9.08
  0.300    9.34 | 1.300  160.97 | 2.300   14.33 |  3.30    9.08
  0.317    9.34 | 1.317  160.97 | 2.317   14.33 |  3.32    9.08
  0.333    9.34 | 1.333  160.97 | 2.333   14.33 |  3.33    9.08
  0.350   10.59 | 1.350   47.73 | 2.350   12.95 |  3.35    8.61
  0.367   10.59 | 1.367   47.72 | 2.367   12.95 |  3.37    8.61
  0.383   10.59 | 1.383   47.72 | 2.383   12.95 |  3.38    8.61
  0.400   10.59 | 1.400   47.72 | 2.400   12.95 |  3.40    8.61
  0.417   10.59 | 1.417   47.72 | 2.417   12.95 |  3.42    8.61
  0.433   10.59 | 1.433   47.72 | 2.433   12.95 |  3.43    8.61
  0.450   10.59 | 1.450   47.72 | 2.450   12.95 |  3.45    8.61
  0.467   10.59 | 1.467   47.72 | 2.467   12.95 |  3.47    8.61
  0.483   10.59 | 1.483   47.72 | 2.483   12.95 |  3.48    8.61
  0.500   10.59 | 1.500   47.72 | 2.500   12.95 |  3.50    8.61
  0.517   12.39 | 1.517   29.72 | 2.517   11.86 |  3.52    8.20
  0.533   12.39 | 1.533   29.71 | 2.533   11.86 |  3.53    8.20
  0.550   12.39 | 1.550   29.71 | 2.550   11.86 |  3.55    8.20
  0.567   12.39 | 1.567   29.71 | 2.567   11.86 |  3.57    8.20
  0.583   12.39 | 1.583   29.71 | 2.583   11.86 |  3.58    8.20
  0.600   12.39 | 1.600   29.71 | 2.600   11.86 |  3.60    8.20
  0.617   12.39 | 1.617   29.71 | 2.617   11.86 |  3.62    8.20
  0.633   12.39 | 1.633   29.71 | 2.633   11.86 |  3.63    8.20
  0.650   12.39 | 1.650   29.71 | 2.650   11.86 |  3.65    8.20
  0.667   12.39 | 1.667   29.71 | 2.667   11.86 |  3.67    8.20
  0.683   15.24 | 1.683   22.68 | 2.683   10.97 |  3.68    7.84
  0.700   15.24 | 1.700   22.67 | 2.700   10.97 |  3.70    7.84
  0.717   15.24 | 1.717   22.67 | 2.717   10.97 |  3.72    7.84
  0.733   15.24 | 1.733   22.67 | 2.733   10.97 |  3.73    7.84
  0.750   15.24 | 1.750   22.67 | 2.750   10.97 |  3.75    7.84
  0.767   15.24 | 1.767   22.67 | 2.767   10.97 |  3.77    7.84
  0.783   15.24 | 1.783   22.67 | 2.783   10.97 |  3.78    7.84
  0.800   15.24 | 1.800   22.67 | 2.800   10.97 |  3.80    7.84
  0.817   15.24 | 1.817   22.67 | 2.817   10.97 |  3.82    7.84
  0.833   15.24 | 1.833   22.67 | 2.833   10.97 |  3.83    7.84
  0.850   20.69 | 1.850   18.74 | 2.850   10.24 |  3.85    7.51
  0.867   20.69 | 1.867   18.74 | 2.867   10.24 |  3.87    7.51
  0.883   20.69 | 1.883   18.74 | 2.883   10.24 |  3.88    7.51
  0.900   20.69 | 1.900   18.74 | 2.900   10.24 |  3.90    7.51
  0.917   20.69 | 1.917   18.74 | 2.917   10.24 |  3.92    7.51
  0.933   20.69 | 1.933   18.74 | 2.933   10.24 |  3.93    7.51
  0.950   20.69 | 1.950   18.74 | 2.950   10.24 |  3.95    7.51
  0.967   20.69 | 1.967   18.74 | 2.967   10.24 |  3.97    7.51
  0.983   20.69 | 1.983   18.74 | 2.983   10.24 |  3.98    7.51
  1.000   20.69 | 2.000   18.74 | 3.000   10.24 |  4.00    7.51

     Unit Hyd Qpeak  (cms)=   0.044

     PEAK FLOW       (cms)=   0.012 (i)
     TIME TO PEAK    (hrs)=   1.567
     RUNOFF VOLUME    (mm)=  23.564
     TOTAL RAINFALL   (mm)=  87.089
     RUNOFF COEFFICIENT   =   0.271

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0002)|   Area    (ha)=   2.16
|ID= 1 DT= 1.0 min |   Total Imp(%)=  71.00   Dir. Conn.(%)=  49.00
--------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     1.53          0.63
     Dep. Storage     (mm)=     1.00          9.00
     Average Slope     (%)=     1.00          2.00
     Length            (m)=   120.00         40.00
     Mannings n            =    0.013         0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
  0.017    8.40 | 1.017   38.70 | 2.017   16.17 |  3.02    9.61
  0.033    8.40 | 1.033   38.70 | 2.033   16.17 |  3.03    9.61
  0.050    8.40 | 1.050   38.70 | 2.050   16.17 |  3.05    9.61
  0.067    8.40 | 1.067   38.70 | 2.067   16.17 |  3.07    9.61
  0.083    8.40 | 1.083   38.70 | 2.083   16.17 |  3.08    9.61
  0.100    8.40 | 1.100   38.70 | 2.100   16.17 |  3.10    9.61
  0.117    8.40 | 1.117   38.70 | 2.117   16.17 |  3.12    9.61
  0.133    8.40 | 1.133   38.70 | 2.133   16.17 |  3.13    9.61
  0.150    8.40 | 1.150   38.70 | 2.150   16.17 |  3.15    9.61
  0.167    8.40 | 1.167   38.70 | 2.167   16.17 |  3.17    9.61
  0.183    9.34 | 1.183  160.97 | 2.183   14.33 |  3.18    9.08
  0.200    9.34 | 1.200  160.97 | 2.200   14.33 |  3.20    9.08
  0.217    9.34 | 1.217  160.97 | 2.217   14.33 |  3.22    9.08
  0.233    9.34 | 1.233  160.97 | 2.233   14.33 |  3.23    9.08
  0.250    9.34 | 1.250  160.97 | 2.250   14.33 |  3.25    9.08
  0.267    9.34 | 1.267  160.97 | 2.267   14.33 |  3.27    9.08
  0.283    9.34 | 1.283  160.97 | 2.283   14.33 |  3.28    9.08
  0.300    9.34 | 1.300  160.97 | 2.300   14.33 |  3.30    9.08
  0.317    9.34 | 1.317  160.97 | 2.317   14.33 |  3.32    9.08
  0.333    9.34 | 1.333  160.97 | 2.333   14.33 |  3.33    9.08
  0.350   10.59 | 1.350   47.73 | 2.350   12.95 |  3.35    8.61
  0.367   10.59 | 1.367   47.72 | 2.367   12.95 |  3.37    8.61
  0.383   10.59 | 1.383   47.72 | 2.383   12.95 |  3.38    8.61
  0.400   10.59 | 1.400   47.72 | 2.400   12.95 |  3.40    8.61
  0.417   10.59 | 1.417   47.72 | 2.417   12.95 |  3.42    8.61
  0.433   10.59 | 1.433   47.72 | 2.433   12.95 |  3.43    8.61
  0.450   10.59 | 1.450   47.72 | 2.450   12.95 |  3.45    8.61
  0.467   10.59 | 1.467   47.72 | 2.467   12.95 |  3.47    8.61
  0.483   10.59 | 1.483   47.72 | 2.483   12.95 |  3.48    8.61
  0.500   10.59 | 1.500   47.72 | 2.500   12.95 |  3.50    8.61
  0.517   12.39 | 1.517   29.72 | 2.517   11.86 |  3.52    8.20
  0.533   12.39 | 1.533   29.71 | 2.533   11.86 |  3.53    8.20
  0.550   12.39 | 1.550   29.71 | 2.550   11.86 |  3.55    8.20
  0.567   12.39 | 1.567   29.71 | 2.567   11.86 |  3.57    8.20
  0.583   12.39 | 1.583   29.71 | 2.583   11.86 |  3.58    8.20
  0.600   12.39 | 1.600   29.71 | 2.600   11.86 |  3.60    8.20
  0.617   12.39 | 1.617   29.71 | 2.617   11.86 |  3.62    8.20
  0.633   12.39 | 1.633   29.71 | 2.633   11.86 |  3.63    8.20
  0.650   12.39 | 1.650   29.71 | 2.650   11.86 |  3.65    8.20
  0.667   12.39 | 1.667   29.71 | 2.667   11.86 |  3.67    8.20
  0.683   15.24 | 1.683   22.68 | 2.683   10.97 |  3.68    7.84
  0.700   15.24 | 1.700   22.67 | 2.700   10.97 |  3.70    7.84
  0.717   15.24 | 1.717   22.67 | 2.717   10.97 |  3.72    7.84
  0.733   15.24 | 1.733   22.67 | 2.733   10.97 |  3.73    7.84
  0.750   15.24 | 1.750   22.67 | 2.750   10.97 |  3.75    7.84
  0.767   15.24 | 1.767   22.67 | 2.767   10.97 |  3.77    7.84
  0.783   15.24 | 1.783   22.67 | 2.783   10.97 |  3.78    7.84
  0.800   15.24 | 1.800   22.67 | 2.800   10.97 |  3.80    7.84
  0.817   15.24 | 1.817   22.67 | 2.817   10.97 |  3.82    7.84
  0.833   15.24 | 1.833   22.67 | 2.833   10.97 |  3.83    7.84
  0.850   20.69 | 1.850   18.74 | 2.850   10.24 |  3.85    7.51
  0.867   20.69 | 1.867   18.74 | 2.867   10.24 |  3.87    7.51
  0.883   20.69 | 1.883   18.74 | 2.883   10.24 |  3.88    7.51
  0.900   20.69 | 1.900   18.74 | 2.900   10.24 |  3.90    7.51
  0.917   20.69 | 1.917   18.74 | 2.917   10.24 |  3.92    7.51
  0.933   20.69 | 1.933   18.74 | 2.933   10.24 |  3.93    7.51
  0.950   20.69 | 1.950   18.74 | 2.950   10.24 |  3.95    7.51
  0.967   20.69 | 1.967   18.74 | 2.967   10.24 |  3.97    7.51
  0.983   20.69 | 1.983   18.74 | 2.983   10.24 |  3.98    7.51
  1.000   20.69 | 2.000   18.74 | 3.000   10.24 |  4.00    7.51
```

Max.Eff.Inten.(mm/hr)=	160.97	144.31		
over (min)	5.00	8.00		
Storage Coeff. (min)=	2.36 (ii)	7.09 (ii)		
Unit Hyd. Tpeak (min)=	5.00	8.00		
Unit Hyd. peak (cms)=	0.35	0.15		
			TOTALS	
PEAK FLOW (cms)=	0.46	0.18	0.606 (iii)	
TIME TO PEAK (hrs)=	1.33	1.42	1.35	
RUNOFF VOLUME (mm)=	86.09	46.70	66.00	
TOTAL RAINFALL (mm)=	87.09	87.09	87.09	
RUNOFF COEFFICIENT =	0.99	0.54	0.76	

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0001)	Area (ha)= 0.27		
ID= 1 DT= 1.0 min	Total Imp(%)= 100.00	Dir. Conn.(%)= 100.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	0.27	0.00	
Dep. Storage (mm)=	1.00	9.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	42.43	40.00	
Mannings n =	0.013	0.250	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	8.40	1.017	38.70	2.017	16.17	3.02	9.61
0.033	8.40	1.033	38.70	2.033	16.17	3.03	9.61
0.050	8.40	1.050	38.70	2.050	16.17	3.05	9.61
0.067	8.40	1.067	38.70	2.067	16.17	3.07	9.61
0.083	8.40	1.083	38.70	2.083	16.17	3.08	9.61
0.100	8.40	1.100	38.70	2.100	16.17	3.10	9.61
0.117	8.40	1.117	38.70	2.117	16.17	3.12	9.61
0.133	8.40	1.133	38.70	2.133	16.17	3.13	9.61
0.150	8.40	1.150	38.70	2.150	16.17	3.15	9.61
0.167	8.40	1.167	38.70	2.167	16.17	3.17	9.61
0.183	9.34	1.183	160.97	2.183	14.33	3.18	9.08
0.200	9.34	1.200	160.97	2.200	14.33	3.20	9.08
0.217	9.34	1.217	160.97	2.217	14.33	3.22	9.08
0.233	9.34	1.233	160.97	2.233	14.33	3.23	9.08
0.250	9.34	1.250	160.97	2.250	14.33	3.25	9.08
0.267	9.34	1.267	160.97	2.267	14.33	3.27	9.08
0.283	9.34	1.283	160.97	2.283	14.33	3.28	9.08
0.300	9.34	1.300	160.97	2.300	14.33	3.30	9.08
0.317	9.34	1.317	160.97	2.317	14.33	3.32	9.08
0.333	9.34	1.333	160.97	2.333	14.33	3.33	9.08
0.350	10.59	1.350	47.73	2.350	12.95	3.35	8.61
0.367	10.59	1.367	47.72	2.367	12.95	3.37	8.61
0.383	10.59	1.383	47.72	2.383	12.95	3.38	8.61
0.400	10.59	1.400	47.72	2.400	12.95	3.40	8.61
0.417	10.59	1.417	47.72	2.417	12.95	3.42	8.61
0.433	10.59	1.433	47.72	2.433	12.95	3.43	8.61
0.450	10.59	1.450	47.72	2.450	12.95	3.45	8.61
0.467	10.59	1.467	47.72	2.467	12.95	3.47	8.61
0.483	10.59	1.483	47.72	2.483	12.95	3.48	8.61
0.500	10.59	1.500	47.72	2.500	12.95	3.50	8.61
0.517	12.39	1.517	29.72	2.517	11.86	3.52	8.20
0.533	12.39	1.533	29.71	2.533	11.86	3.53	8.20
0.550	12.39	1.550	29.71	2.550	11.86	3.55	8.20
0.567	12.39	1.567	29.71	2.567	11.86	3.57	8.20
0.583	12.39	1.583	29.71	2.583	11.86	3.58	8.20
0.600	12.39	1.600	29.71	2.600	11.86	3.60	8.20
0.617	12.39	1.617	29.71	2.617	11.86	3.62	8.20
0.633	12.39	1.633	29.71	2.633	11.86	3.63	8.20
0.650	12.39	1.650	29.71	2.650	11.86	3.65	8.20
0.667	12.39	1.667	29.71	2.667	11.86	3.67	8.20
0.683	15.24	1.683	22.68	2.683	10.97	3.68	7.84
0.700	15.24	1.700	22.67	2.700	10.97	3.70	7.84
0.717	15.24	1.717	22.67	2.717	10.97	3.72	7.84
0.733	15.24	1.733	22.67	2.733	10.97	3.73	7.84
0.750	15.24	1.750	22.67	2.750	10.97	3.75	7.84
0.767	15.24	1.767	22.67	2.767	10.97	3.77	7.84
0.783	15.24	1.783	22.67	2.783	10.97	3.78	7.84
0.800	15.24	1.800	22.67	2.800	10.97	3.80	7.84
0.817	15.24	1.817	22.67	2.817	10.97	3.82	7.84
0.833	15.24	1.833	22.67	2.833	10.97	3.83	7.84
0.850	20.69	1.850	18.74	2.850	10.24	3.85	7.51
0.867	20.69	1.867	18.74	2.867	10.24	3.87	7.51
0.883	20.69	1.883	18.74	2.883	10.24	3.88	7.51
0.900	20.69	1.900	18.74	2.900	10.24	3.90	7.51
0.917	20.69	1.917	18.74	2.917	10.24	3.92	7.51
0.933	20.69	1.933	18.74	2.933	10.24	3.93	7.51
0.950	20.69	1.950	18.74	2.950	10.24	3.95	7.51
0.967	20.69	1.967	18.74	2.967	10.24	3.97	7.51
0.983	20.69	1.983	18.74	2.983	10.24	3.98	7.51
1.000	20.69	2.000	18.74	3.000	10.24	4.00	7.51

Max.Eff.Inten.(mm/hr)=	160.97	51.19		
over (min)	5.00	2.00		
Storage Coeff. (min)=	1.26 (ii)	1.29 (ii)		
Unit Hyd. Tpeak (min)=	5.00	2.00		
Unit Hyd. peak (cms)=	0.44	0.87		
			TOTALS	
PEAK FLOW (cms)=	0.12	0.00	0.120 (iii)	
TIME TO PEAK (hrs)=	1.33	1.33	1.33	
RUNOFF VOLUME (mm)=	86.09	32.62	85.89	
TOTAL RAINFALL (mm)=	87.09	87.09	87.09	
RUNOFF COEFFICIENT =	0.99	0.37	0.99	

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0005)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0001):	0.27	0.120	1.33	85.89
+ ID2= 2 (0002):	2.16	0.606	1.35	66.00
ID = 3 (0005):	2.43	0.722	1.35	68.21

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0008)	OVERFLOW IS ON			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0340	0.0240
	0.0000	0.0016	0.0940	0.0289
	0.0000	0.0036	0.1520	0.0342
	0.0000	0.0060	0.2090	0.0400
	0.0000	0.0087	0.2650	0.0463
	0.0000	0.0119	0.3210	0.0531
	0.0000	0.0155	0.3770	0.0603
	0.0200	0.0195	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0005)	2.430	0.722	1.35	68.21
OUTFLOW: ID= 1 (0008)	2.430	0.339	1.50	61.81
OVERFLOW:ID= 3 (0003)	0.000	0.000	0.00	0.00

TOTAL NUMBER OF SIMULATION OVERFLOW = 0
CUMULATIVE TIME OF OVERFLOW (HOURS) = 0.00
PERCENTAGE OF TIME OVERFLOWING (%) = 0.00

PEAK FLOW REDUCTION [Qout/Qin](%)= 46.98
TIME SHIFT OF PEAK FLOW (min)= 9.00
MAXIMUM STORAGE USED (ha.m.)= 0.0554

**** WARNING : SELECTED ROUTING TIME STEP DENIED.

CALIB			
STANDHYD (0004)	Area (ha)= 0.23		
ID= 1 DT= 1.0 min	Total Imp(%)= 48.00	Dir. Conn.(%)= 35.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	0.11	0.12	
Dep. Storage (mm)=	1.00	9.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	39.16	40.00	
Mannings n =	0.013	0.250	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	8.40	1.017	38.70	2.017	16.17	3.02	9.61
0.033	8.40	1.033	38.70	2.033	16.17	3.03	9.61
0.050	8.40	1.050	38.70	2.050	16.17	3.05	9.61
0.067	8.40	1.067	38.70	2.067	16.17	3.07	9.61
0.083	8.40	1.083	38.70	2.083	16.17	3.08	9.61
0.100	8.40	1.100	38.70	2.100	16.17	3.10	9.61
0.117	8.40	1.117	38.70	2.117	16.17	3.12	9.61
0.133	8.40	1.133	38.70	2.133	16.17	3.13	9.61
0.150	8.40	1.150	38.70	2.150	16.17	3.15	9.61
0.167	8.40	1.167	38.70	2.167	16.17	3.17	9.61
0.183	9.34	1.183	160.97	2.183	14.33	3.18	9.08
0.200	9.34	1.200	160.97	2.200	14.33	3.20	9.08
0.217	9.34	1.217	160.97	2.217	14.33	3.22	9.08
0.233	9.34	1.233	160.97	2.233	14.33	3.23	9.08
0.250	9.34	1.250	160.97	2.250	14.33	3.25	9.08
0.267	9.34	1.267	160.97	2.267	14.33	3.27	9.08
0.283	9.34	1.283	160.97	2.283	14.33	3.28	9.08
0.300	9.34	1.300	160.97	2.300	14.33	3.30	9.08
0.317	9.34	1.317	160.97	2.317	14.33	3.32	9.08
0.333	9.34	1.333	160.97	2.333	14.33	3.33	9.08
0.350	10.59	1.350	47.73	2.350	12.95	3.35	8.61
0.367	10.59	1.367	47.72	2.367	12.95	3.37	8.61
0.383	10.59	1.383	47.72	2.383	12.95	3.38	8.61
0.400	10.59	1.400	47.72	2.400	12.95	3.40	8.61
0.417	10.59	1.417	47.72	2.417	12.95	3.42	8.61
0.433	10.59	1.433	47.72	2.433	12.95	3.43	8.61
0.450	10.59	1.450	47.72	2.450	12.95	3.45	8.61
0.467	10.59	1.467	47.72	2.467	12.95	3.47	8.61
0.483	10.59	1.483	47.72	2.483	12.95	3.48	8.61
0.500	10.59	1.500	47.72	2.500	12.95	3.50	8.61
0.517	12.39	1.517	29.72	2.517	11.86	3.52	8.20
0.533	12.39	1.533	29.71	2.533	11.86	3.53	8.20
0.550	12.39	1.550	29.71	2.550	11.86	3.55	8.20
0.567	12.39	1.567	29.71	2.567	11.86	3.57	8.20
0.583	12.39	1.583	29.71	2.583	11.86	3.58	8.20
0.600	12.39	1.600	29.71	2.600	11.86	3.60	8.20
0.617	12.39	1.617	29.71	2.617	11.86	3.62	8.20
0.633	12.39	1.633	29.71	2.633	11.86	3.63	8.20
0.650	12.39	1.650	29.71	2.650	11.86	3.65	8.20
0.667	12.39	1.667	29.71	2.667	11.86	3.67	8.20
0.683	15.24	1.683	22.68	2.683	10.97	3.68	7.84
0.700	15.24	1.700	22.67	2.700	10.97	3.70	7.84
0.717	15.24	1.717	22.67	2.717	10.97	3.72	7.84
0.733	15.24	1.733	22.67	2.733	10.97	3.73	7.84
0.750	15.24	1.750	22.67	2.750	10.97	3.75	7.84
0.767	15.24	1.767	22.67	2.767	10.97	3.77	7.84
0.783	15.24	1.783	22.67	2.783	10.97	3.78	7.84
0.800	15.24	1.800	22.67	2.800	10.97	3.80	7.84
0.817	15.24	1.817	22.67	2.817	10.97	3.82	7.84

0.833	15.24	1.833	22.67	2.833	10.97	3.83	7.84
0.850	20.69	1.850	18.74	2.850	10.24	3.85	7.51
0.867	20.69	1.867	18.74	2.867	10.24	3.87	7.51
0.883	20.69	1.883	18.74	2.883	10.24	3.88	7.51
0.900	20.69	1.900	18.74	2.900	10.24	3.90	7.51
0.917	20.69	1.917	18.74	2.917	10.24	3.92	7.51
0.933	20.69	1.933	18.74	2.933	10.24	3.93	7.51
0.950	20.69	1.950	18.74	2.950	10.24	3.95	7.51
0.967	20.69	1.967	18.74	2.967	10.24	3.97	7.51
0.983	20.69	1.983	18.74	2.983	10.24	3.98	7.51
1.000	20.69	2.000	18.74	3.000	10.24	4.00	7.51

Max.Eff.Inten.(mm/hr)=	160.97	78.96	
over (min)	5.00	9.00	
Storage Coeff. (min)=	1.20 (ii)	8.04 (ii)	
Unit Hyd. Tpeak (min)=	5.00	9.00	
Unit Hyd. peak (cms)=	0.45	0.14	
			TOTALS
PEAK FLOW (cms)=	0.04	0.02	0.049 (iii)
TIME TO PEAK (hrs)=	1.33	1.43	1.35
RUNOFF VOLUME (mm)=	86.09	38.22	54.96
TOTAL RAINFALL (mm)=	87.09	87.09	87.09
RUNOFF COEFFICIENT =	0.99	0.44	0.63

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0010)					
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0003):	0.23	0.012	1.57	23.56
+ ID2= 2 (0004):	0.23	0.049	1.35	54.96
ID = 3 (0010):	0.46	0.054	1.35	39.26

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)					
3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0010):	0.46	0.054	1.35	39.26
+ ID2= 2 (0008):	2.43	0.339	1.50	61.81
ID = 1 (0010):	2.89	0.378	1.48	58.22

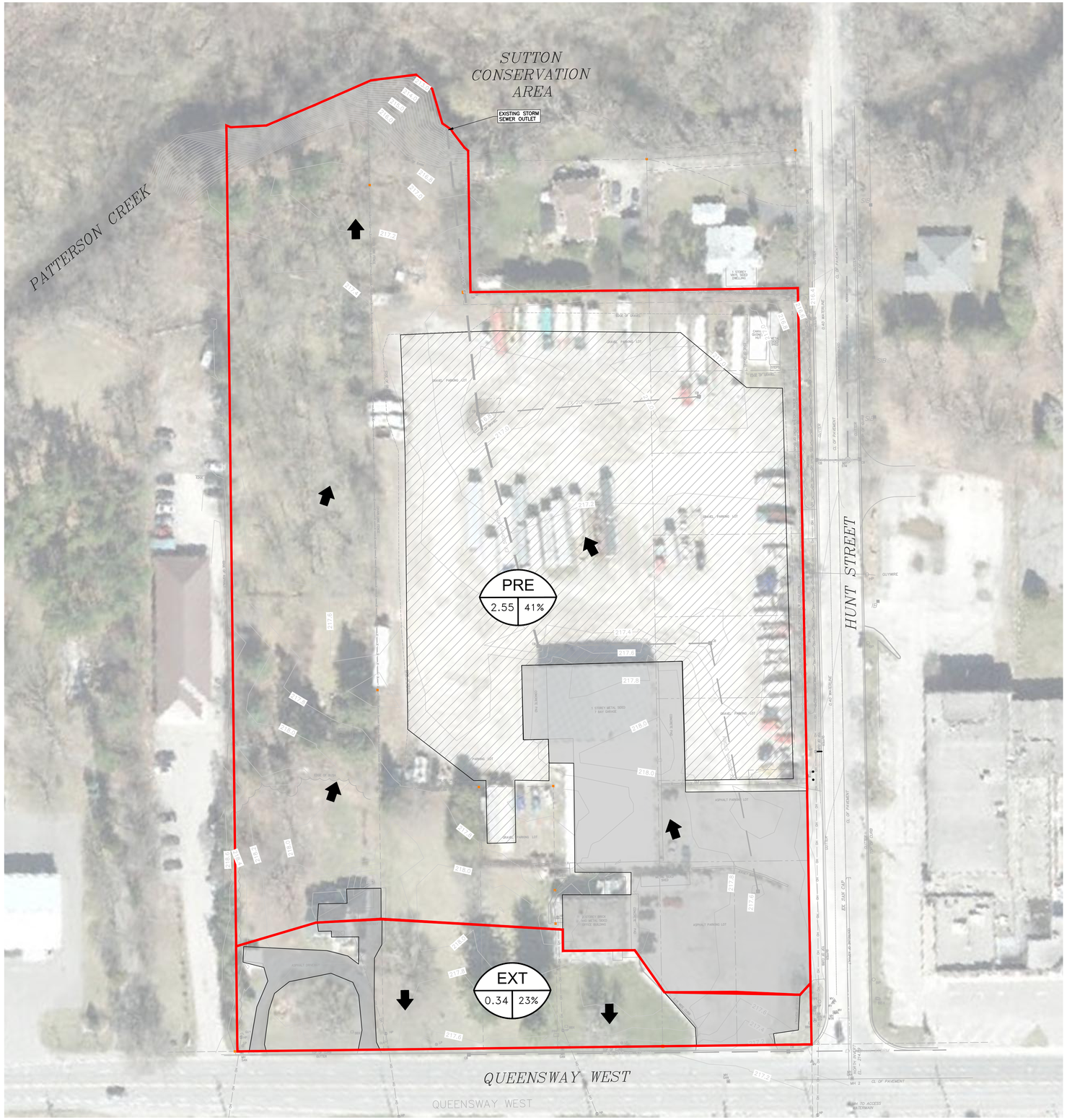
NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

Junction Command(0009)				
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0008)	0.00	0.00	0.00	0.00
OUTFLOW: ID= 2(0009)	0.00	0.00	0.00	0.00

FINISH

APPENDIX E

DWG PRE – Pre-Development Drainage Areas
DWG POST – Post-Development Drainage Areas



N

LEGEND

- OVERLAND FLOW (MAJOR)
- PROPERTY/CATCHMENT BOUNDARY
- IMPERVIOUS AREA – GRAVEL
- IMPERVIOUS AREA – ASPHALT/CONCRETE
- SWM — SWM DRAINAGE AREA
- 0.99 | 35.0% — TOTAL IMPERVIOUS PERCENTAGE (%)
- AREA (ha)

REV. No.	DATE	REVISION

SCALE:
HORIZONTAL : 1:500
10 20

DO NOT SCALE DRAWINGS, CALL FOR ANY CLARIFICATIONS THAT ARE REQUIRED, FIELD VERIFY AT ALL BUILT CONDITIONS

ALL DRAWINGS ARE TO BE READ IN COLOUR ORIGINAL PAGE SIZE ARCH 'D' - 24" x 36"

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

Stamp

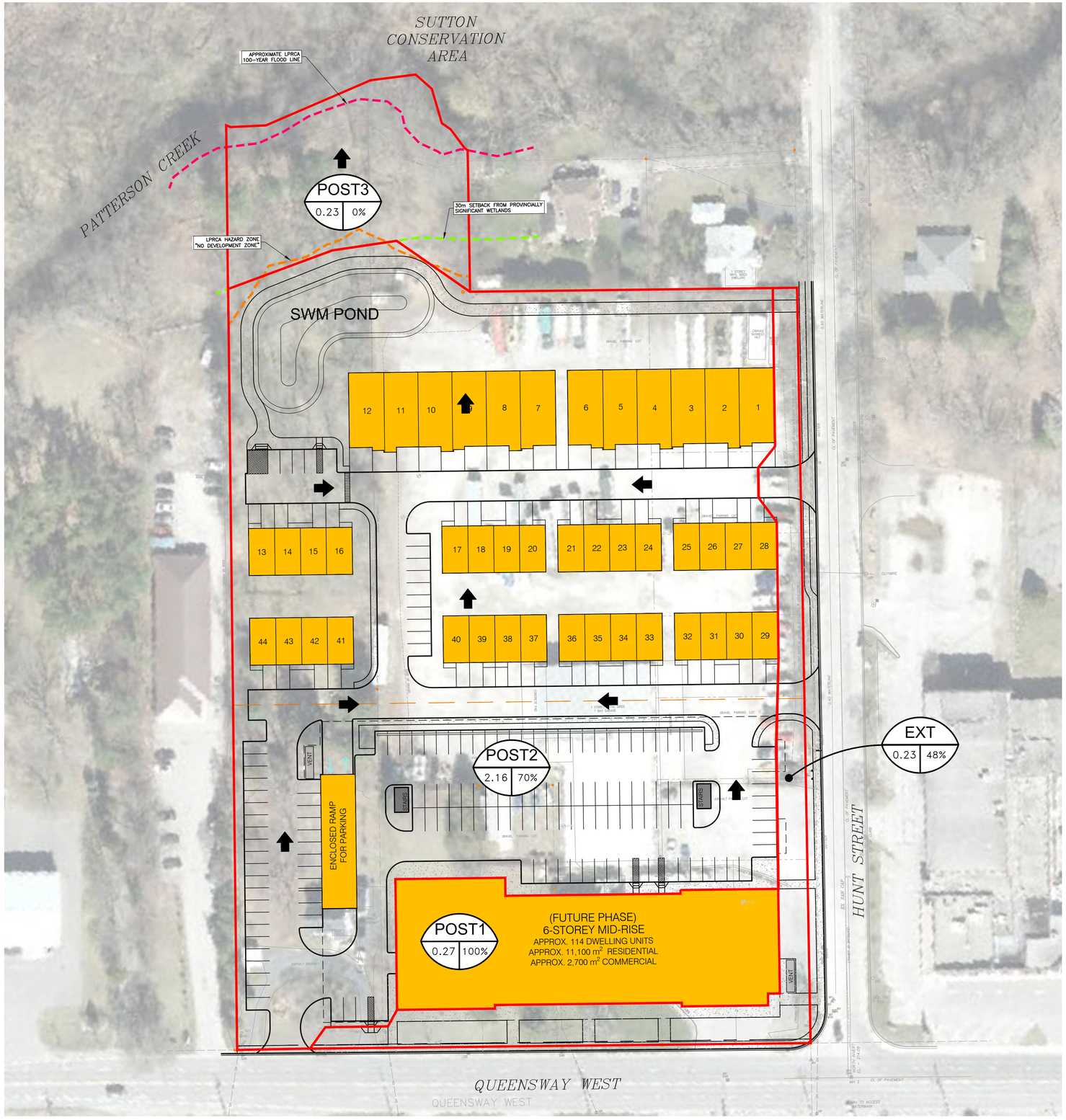
PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Project Title
HFW HUNT STREET
RESIDENTIAL DEVELOPMENT
SIMCOE - NORFOLK COUNTY

Drawing Title
PRE-DEVELOPMENT SWM AREAS

Designed by : NLB	Drawn By : NLB
Checked by : JI	Date Started : JAN 2023
Drawing Scale : 1:500	Drawing No. PRE
Project No. 22-013	

DATE PLOTTED: 5/14/2024 12:51 PM
PROJECT NUMBER & NAME: 22-013 - HFW HUNT STREET
FILE PATH: H:\PROJECTS\2022\22-013 HFW HOLDINGS HUNT ST RESIDENTIAL\DRAWINGS\CIVIL\PRODUCTION DRAWINGS\22-013 PRE SWM AREAS.DWG



N

LEGEND

- OVERLAND FLOW (MAJOR)
- PROPERTY/CATCHMENT BOUNDARY
- SWM – SWM DRAINAGE AREA
- 0.99 | 35.0% – TOTAL IMPERVIOUS PERCENTAGE (%)
- AREA (ha)

REV. No.	DATE	REVISION

SCALE:

HORIZONTAL : 1:500 (10 20)

DO NOT SCALE DRAWINGS, CALL FOR ANY CLARIFICATIONS THAT ARE REQUIRED, FIELD VERIFY AT ALL BUILT CONDITIONS

ALL DRAWINGS ARE TO BE READ IN COLOUR ORIGINAL PAGE SIZE ARCH 'D' - 24" x 36"

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

Stamp

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Project Title
HFW HUNT STREET
RESIDENTIAL DEVELOPMENT
SIMCOE - NORFOLK COUNTY

Drawing Title
POST-DEVELOPMENT SWM AREAS

Designed by : NLB	Drawn By : NLB
Checked by : JI	Date Started : JAN 2023
Drawing Scale : 1:500	Drawing No. POST
Project No. 22-013	

DATE PLOTTED: 5/14/2024 12:51 PM PROJECT NUMBER & NAME: 22-013 - HFW HUNT STREET FILE PATH: H:\PROJECTS\2022\22-013 HFW HOLDINGS HUNT ST RESIDENTIAL\DRAWINGS\CIVIL\PRODUCTION DRAWINGS\22-013 POST SWM AREAS.DWG

GeoPro Consulting Limited

Geotechnical-Hydrogeology-Environmental-Materials-Inspection

Preliminary Geotechnical Investigation

Proposed Residential Development

395-411 Queensway West, Simcoe, Ontario

Prepared For:

HFW Holdings Limited

GeoPro Project No.: 22-4078GH

Report Date: May 17, 2024

GeoPro Consulting Limited (905) 237-8336 office@geoproconsulting.ca

Unit 57, 40 Vogell Road, Richmond Hill, Ontario L4B 3N6

GeoPro CONSULTING LIMITED

Table of Contents

1. INTRODUCTION

GeoPro Consulting Limited (GeoPro) was retained by HFW Holdings Limited (the Client) to conduct a preliminary geotechnical investigation to support the preliminary design and planning of the proposed residential development consisting of 3-storey townhouses with one level of basement and a 6-storey commercial/residential building with one level of underground parking located at 395 - 411 Queensway West, Simcoe, Ontario.

The purpose of this preliminary geotechnical investigation was to obtain preliminary information on the existing subsurface conditions by means of a limited number of boreholes, in-situ tests and laboratory tests of soil samples to provide required preliminary geotechnical design information. Based on GeoPro's interpretation of the data obtained, preliminary geotechnical comments and recommendations related to the general planning and project concept design purposes are provided.

The report is prepared with the condition that the planning and preliminary designs will be in accordance with all applicable standards and codes, regulations of authorities having jurisdiction, and good engineering practice. Further, the preliminary recommendations and opinions in this report are applicable only to the proposed project as described above. On-going liaison and communication with GeoPro prior to and during the planning and preliminary design stage of the project is strongly recommended to confirm that the preliminary recommendations in this report are applicable and/or correctly interpreted and implemented. Also, any queries concerning the geotechnical aspects of the proposed project shall be directed to GeoPro for further elaboration and/or clarification.

This report is provided on the basis of the terms of reference presented in our approved proposal prepared based on our understanding of the project. If there are any changes in the preliminary design and planning features relevant to the geotechnical analyses, or if any questions arise concerning the geotechnical aspects of the codes and standards, this office should be contacted to review the design. It may then be necessary to carry out additional borings and reporting before the preliminary recommendations of this report can be relied upon.

This report deals with geotechnical issues only. The geo-environmental (chemical) aspects of the subsurface conditions, including the consequences of possible surface and/or subsurface contamination resulting from previous activities or uses of the site and/or resulting from the introduction onto the site of materials from off-site sources, were not included in this geotechnical report.

The site investigation and recommendations follow generally accepted practice for geotechnical and geo-environmental consultants in Ontario. Laboratory testing follows ASTM or CSA Standards or modifications of these standards that have become standard practice in Ontario.

This report has been prepared for the Client only. Third party use of this report without GeoPro's consent is prohibited. The limitations to the report presented in this report form an integral part of the report and they must be considered in conjunction with this report.

2. INVESTIGATION PROCEDURE

The field work for the preliminary geotechnical investigation was carried out on August 31 and September 1, 2022, during which time four (4) boreholes (Boreholes BH1, BH2, BH3 and BH5) were advanced at the locations shown on the Borehole Location Plan, Drawing 1. The boreholes were drilled to depths ranging from about 6.6 m to 9.6 m below the existing ground surface.

The requested borehole locations were provided by the Client. The boreholes were located and staked in the field by the Client; the borehole locations in the field were adjusted according to the drill rig accessibility and the underground utility conditions. The field work for this investigation was monitored by the Client and a member of our engineering staff who logged the boreholes and cared for the recovered samples.

The boreholes were advanced using a continuous flight auger drilling equipment supplied by a drilling specialist subcontracted to the Client. Samples were retrieved with a 51 mm (2 inches) O.D. split-barrel (split spoon) sampler driven with a hammer weighing 624 N and dropping 760 mm (30 inches) in accordance with the Standard Penetration Test (SPT) method.

Groundwater condition observations were made in the boreholes during drilling and upon completion of drilling. A monitoring well (51 mm in diameter) was installed in Boreholes BH1 and BH3 to measure the groundwater table as well as to facilitate the in-situ hydrogeological testing. The remaining borehole(s) were backfilled and sealed upon completion of drilling.

All soil samples obtained during this investigation were brought to our laboratory for further examination. These soil samples will be stored for a period of three (3) months after the day of issuing draft report, after which time they will be discarded unless we are advised otherwise in writing. Geotechnical classification testing (including water content, grain size distribution and Atterberg Limits, when applicable) was carried out on selected soil samples. The laboratory test results are provided in attached Figures.

The ground surface elevations at the as drilled borehole locations were not available at the time of preparing this report. Therefore, the stratigraphy at each borehole location has been referenced to the current grade level. Contractors performing the work should confirm the elevations prior to construction. The borehole locations plotted on Borehole Location Plan were based on the measurements of the site features and should be considered to be approximate.

3. SUBSURFACE CONDITIONS

Notes on sample descriptions are presented in Enclosure 1A. Explanation of terms used in the borehole logs is presented in Enclosure 1B. The subsurface conditions in the boreholes are

presented in the individual borehole logs. Detailed descriptions of the major soil strata encountered in the boreholes advanced at the site are provided as follows.

3.1 Soil Conditions

Topsoil

Topsoil with a thickness of about 150 mm was encountered surficially in Borehole BH3. In general, the topsoil consists of high contents of organics with trace to some rootlets. It should be noted that the thickness of the topsoil explored at the borehole locations may not be representative for the site and should not be relied on to calculate the amount of topsoil at the site.

Portland Cement Concrete

Portland cement concrete with a thickness of about 340 mm was encountered surficially in Borehole BH5.

Granular Fill

Granular fill with thicknesses ranging from about 220 mm to 250 mm were encountered surficially in Boreholes BH1 and BH2. Due to the generally silty/sandy nature of the subgrade soils, the exact depth of granular fill was difficult to distinguish.

Fill Materials

Fill materials consisting of silt, sandy silt, silty sand, sand, and gravelly sand were encountered below the topsoil, Portland cement concrete or granular fill in all boreholes, and extended to depths ranging from about 1.0 m to 4.0 m below the existing ground surface. SPT N values ranging from 2 to 23 blows per 300 mm penetration indicated a very loose to compact compactness. The in-situ moisture content measured in the soil samples ranged from approximately 2% to 33%.

Upper Silt

Upper silt deposit was encountered below the fill materials in Boreholes BH3 and BH5, and extended to depths ranging from about 2.9 m to 5.6 m below the existing ground surface. SPT N values ranging from 1 to 11 blows per 300 mm penetration indicated a very loose to compact compactness. The natural moisture content measured in the soil samples ranged from approximately 23% to 32%.

Lower Silt

Lower silt deposit was encountered below the sand deposit in Borehole BH1, and extended to a depth of about 9.6 m below the existing ground surface. Borehole BH1 was terminated in this deposit. An SPT N value of 6 blows per 300 mm penetration indicated a loose compactness. The natural moisture content measured in the soil sample was approximately 22%.

Fine To Medium Sand

Fine to medium sand deposit was encountered below the upper silt deposit and/or fill materials in Boreholes BH1 and BH3, and extended to a depth of about 4.0 m below the existing ground surface. SPT N values ranging from 23 to 29 blows per 300 mm penetration indicated a compact compactness. The natural moisture content measured in the soil samples ranged from approximately 4% to 16%.

Sand

Sand deposit was encountered below the upper silt, fine to medium sand deposits and/or fill materials in all boreholes, and extended to depths ranging from about 6.6 m to 8.6 m below the existing ground surface. Boreholes BH2, BH3 and BH5 were terminated in these deposits. SPT N values ranging from 9 to 23 blows per 300 mm penetration indicated a loose to compact compactness. The natural moisture content measured in the soil samples ranged from approximately 13% to 22%.

3.2 Groundwater Conditions

Groundwater condition observations made in the boreholes during and immediately upon completion of drilling are shown in the borehole logs and are also summarized in the following table. It should be noted that there may have not been enough time for groundwater to be stabilized inside the boreholes upon completion of drilling.

Borehole No.	BH Depth (m)	Depth of Water Encountered during Drilling (mBGS)	Water Level upon Completion of Drilling (mBGS)	Cave-in Depth upon Completion of Drilling (mBGS)
BH1	9.6	4.6	4.7	5.5
BH2	6.6	4.6	4.4	4.6
BH3	6.6	0.7	4.8	5.2
BH5	8.1	1.5	4.6	4.6

Note: mBGS = meters below ground surface

The monitoring well construction details and measured groundwater level are shown in the borehole log and also summarized in the following table.

Monitoring ID	Screen Interval (mBGS)	Water Level (mBGS)
		September 14, 2022
BH1	3.1 - 6.1	4.65
BH3	3.1 - 6.1	4.73

Note: mBGS = meters below ground surface

It should be noted that groundwater levels can vary and are subject to seasonal fluctuations in response to weather events.

4. PRELIMINARY GEOTECHNICAL INFORMATION

This report contains the findings of GeoPro's preliminary geotechnical investigation, together with the preliminary geotechnical engineering recommendations and comments. These preliminary recommendations and comments are based on factual information and are intended only for use by the design engineers. The number of boreholes is not sufficient for the detailed design and are not sufficient to determine all the factors that may affect construction methods and costs. Once the actual development plans are available, the information in this report should be reviewed by the geotechnical engineer from GeoPro and an additional detailed geotechnical investigation shall be carried out, compatible with the actual proposed development plans for the site.

Based on the results of this preliminary geotechnical investigation, the native soils encountered at the site are generally considered to be suitable for supporting the proposed development. The following preliminary geotechnical information is provided for the planning and preliminary design of the proposed developments. The preliminary geotechnical recommendations provided in this report are not sufficient for detailed design or construction purposes.

4.1 Preliminary Foundation Consideration

4.1.1 Shallow Spread and/or Continuous Strip Footings

Fill materials were encountered below the topsoil, granular fill or Portland cement concrete in all boreholes, and extended to depths ranging from about 1.0 m to 4.0 m below the existing ground surface. The existing fill materials are considered to be unsuitable for supporting the proposed development and any other settlement sensitive structures. The existing fill materials are also considered to be unsuitable for supporting the engineered fill.

Based on the results of this investigation, the proposed building may be founded on conventional shallow spread and/or continuous strip footings bearing in the native, undisturbed, competent native soil deposits. The soil bearing resistances at Serviceability Limit States (SLS) and a factored bearing resistance at Ultimate Limit States (ULS) together with the corresponding founding depths at the borehole locations are provided in the following table.

Proposed Townhouse (Boreholes BH1 and BH2)

BH No.	Bearing Resistance at SLS (kPa)	Factored Geotechnical Resistance at ULS (kPa)	Minimum Founding Depths (m)	Expected Soil Condition
BH1	100	150	3.2	Compact Fine to Medium Sand

BH No.	Bearing Resistance at SLS (kPa)	Factored Geotechnical Resistance at ULS (kPa)	Minimum Founding Depths (m)	Expected Soil Condition
BH2	100	150	4.5	Compact Sand

Note: the bearing resistances provided in above table are based on the condition that groundwater level will be lowered to at least 1 m below the excavation base prior to and during the construction.

Footings founded on approved engineered fill, if utilized at the site, may be designed using a preliminary allowable bearing pressure of 100 kPa.

Due to the limited number of boreholes and anticipated soil variation, additional boreholes with monitoring wells shall be carried out during the detailed design stage.

Proposed 6-Storey Commercial/Residential Building (Boreholes BH3 and BH5)

BH No.	Bearing Resistance at SLS (kPa)	Factored Geotechnical Resistance at ULS (kPa)	Minimum Founding Depths (m)	Expected Soil Condition
BH3	100	150	2.5	Loose to Compact Silt
BH5	75	112	1.6	Loose to Compact Silt
	100	150	6.0	Compact Sand

Note: the bearing resistances provided in above table are based on the condition that groundwater level will be lowered to at least 1 m below the excavation base prior to and during the construction; should higher bearing resistance be required, consideration may be given to deep foundation system such as continuous flight auger (CFA) piles to support the proposed building. A detailed geotechnical investigation consisting of additional boreholes shall be carried out and the geotechnical recommendations for CFA will be provided in the detailed geotechnical report.

Due to the limited number of boreholes and anticipated soil variation, additional boreholes with monitoring wells shall be carried out during the detailed design stage.

4.1.2 General Foundation Design Consideration

All exterior footings and footings in unheated areas should be protected with a minimum of 1.2 m of earth cover for frost protection.

Where it is necessary to place foundations at different levels, the upper foundation must be founded below an imaginary 7 vertical to 10 horizontal (7V:10H) line drawn up from the base of the lower foundation. The lower footing must be installed first to help minimize the risk of undermining the upper footing.

All foundation bases must be inspected by GeoPro to confirm design bearing values prior to pouring concrete.

Due to the great variation of soil conditions encountered in the boreholes carried out, a sufficient number of boreholes shall be considered in the detailed geotechnical investigation.

The anticipated founding soils to be exposed at the founding/subgrade level are susceptible to disturbance from construction traffic and ponded water, leading to degradation of the founding soils. To limit this detrimental condition, a working mat consisting of at least 100 mm lean concrete (i.e. 15 MPa) should be placed on the subgrade as soon as possible after the base of excavation has been inspected and approved by the geotechnical engineer from GeoPro, unless the foundation concrete is to be placed immediately after inspection.

In the event of construction during freezing temperatures, the foundation stratum should be protected from freezing by the use of loose straw, tarpaulins, propane heaters or other suitable means. In this regard, the base of the excavation should be insulated from sub-zero temperatures immediately upon exposure and until such time the footings are protected with sufficient soil cover to prevent freezing at the foundation level.

It should be noted that the recommended foundation type, founding depths, and bearing resistances were based on the borehole information only. The geotechnical recommendations and comments are necessarily on-going as new information of the underground conditions becomes available. For example, more specific information is available with respect to the subsurface conditions between and beyond the boreholes when foundation construction is underway. The interpretation between and beyond the boreholes and the recommendations of this report **must** therefore be checked through field inspections provided by a qualified geotechnical engineer from GeoPro to validate the information for use during the construction stage. Due to the anticipated variation of the subsurface conditions at this specific site, the geotechnical engineer who carried out the geotechnical investigation shall be retained during the construction stage to avoid the potential misinterpretation of the soil information presented in the report.

4.2 Uplift Consideration

Raft and Bath Tubbing

Should a water tight foundation system (i.e. raft foundation in conjunction with waterproof) be considered, the uplift forces resulting from the hydrostatic pressures for the water tight foundation system must be considered in the structural design due to the relatively high groundwater tables.

Due to the fluctuating nature of the groundwater table, the groundwater level considered for the uplifting resistances can be assumed to be at least 2.0 m above the highest groundwater table at the site in consideration of the storm events, or as an alternative, groundwater level at the ground surface can be assumed for the uplifting resistance analysis by the structural engineer. A sufficient factor of safety should be considered for the design of the uplifting resistance by the structural engineer.

Spread Footings and No Bath Tubbing

It is understood that one level of underground parking and basement are considered for the proposed commercial/residential building and townhouse, respectively. Although the groundwater was measured below the slab elevation, the slab on grade might be subject to an uplift pressure due to the pressure of a hydrostatic head (i.e. after heavy storm). Therefore, as a precaution, providing pressure relief valves/cores in the slab may be considered. Unless waterproofing in conjunction with raft foundation is considered, a layer of granular bedding with a sufficient thickness and a sufficient number of weeping tiles below the floor slabs may alternatively be considered to sufficiently intercept and collect the groundwater, which can be discharged prior to rising to the floor slabs.

A detailed hydrogeological study and long-term groundwater level monitoring should be carried out in the detail design stage to evaluate the potential uplift forces resulting from the hydrostatic pressures from the sandy/silty deposits and establish the stable groundwater table to facilitate the detailed designs.

4.3 Excavation, Backfill and Groundwater Control

- The fill materials and native silty/sandy deposits are extremely easy to be disturbed by construction activities and foot traffic, especially below the prevailing groundwater tables. Positive dewatering consisting of well points or eductors may be required to drawn down the groundwater table to at least 1 m below the excavation base elevation prior to excavation in conjunction with conventional sump pump. A 100 mm thick of concrete skim coat on the founding subgrade immediately after its approval may be required, to prevent its disturbance by construction activities.

- Based on the results of this preliminary geotechnical investigation, perched groundwater may be expected in the fill materials and native silty/sandy soils above the groundwater tables at various depths. Groundwater control during excavation within the fill materials and native silty/sandy soils above the groundwater tables at the site can be handled, as required, by pumping from properly constructed and filtered sumps located within the excavations. However, more significant groundwater seepage should be expected from the fill materials and cohesionless silty/sandy deposits below the prevailing groundwater tables. The groundwater level should be lowered to at least 1 m below the excavation base prior to excavations.

  It should be noted that any construction dewatering or water taking in Ontario is governed by Ontario Regulation 387/04 - Water Taking and Transfer, made under the Ontario Water Resources Act (OWRA), and/or Ontario Regulation 63/16 – Registrations under Part II.2 of the Act – Water Taking, made under Environmental Protection Act. Based on these regulations, water taking of more than 400,000 L/day is subject to a Permit to Take Water (PTTW), while water taking of 50,000 L/day to 400,000 L/day is to be registered through the Environmental Activity and Sector Registry (EASR).

In this regard, further investigation of the native soil types and stabilized groundwater levels should be carried out as part of the follow-up, site specific geotechnical investigation at the site. The need for and the type of groundwater control measures can be reviewed by the engineer as part of the detailed geotechnical and hydrogeological investigations including long-term groundwater level monitoring, which would be required to support the detailed designs of the proposed development.

- It is anticipated that the trench excavations for underground servicing would consist of conventional temporary open cuts with side slopes not steeper than 1.5 horizontal to 1 vertical above the groundwater table. However, some local flattening of side slopes may be required in some areas in looser soil zones or where significant water seepage is encountered. Conventional bedding thicknesses are anticipated for underground services founded within the native competent subsoils at the site. Additional bedding thicknesses may be required for services founded in wet sandy/silty soils, depending upon the excavation depths and success of the contractor's groundwater control measures. It should be noted that cobbles and boulders may be encountered throughout the soils at the site.

- Some of the subsoils above the local water table are generally near their estimated optimum water contents for compaction and may be suitable for reuse as trench backfill, provided they are free of significant amounts of topsoil, organics and other deleterious materials. Some of the cohesionless soils above groundwater levels are generally drier than their estimated laboratory optimum water contents for compaction. These materials will likely require some adjustments in their water content (wetting) prior to placement and compaction. Excavated subsoils from below the local water table (i.e. for deeper excavations, if required) would likely require some drying prior to placement. It should also be noted that due to the existing fine-grained, silty/fine sandy nature of the majority of the existing native soils, some difficulty would be expected in achieving adequate compaction during wet weather.

- Where the backfill against the exterior walls is to support settlement sensitive structures, such as concrete slabs, pavements or walkways, it should be uniformly compacted to at least 98% of SPMDD.

- Complete removal of the existing septic systems, wells, old foundations and underground utility pipes, etc. would likely to be required as part of the site redevelopment.

- Should the structure footprint be extending to the property lines, it is anticipated that the proposed excavations will be supported by a temporary shoring system consisting of timber lagging/soldier piles and/or continuous caisson walls and tie back anchors. Unsupported open cut excavation may be utilized at the areas where the sufficient space is available.

The shoring system must be designed in accordance with the 4th Edition of the Canadian Foundation Engineering Manual.

The soldier piles should be installed in pre-augered holes filled with concrete below the excavation level. The concrete strength must be specified by the shoring designer. Temporary liners may be required in order to help prevent the silty/sandy/gravelly soils from caving-in during installation.

In order to install the shoring system, dewatering might be required in the areas where sandy/silty soils are encountered.

Soil anchors should be required to support the shoring. Casing may be required during the construction of the tiebacks to prevent caving of soils. The anchors must be of a length that meets the recommendation of the 4th Edition of Canadian Foundation Engineering Manual.

Movement of the shoring system is inevitable. Vertical movements will result from the vertical load on the soldier piles resulting from the inclined tiebacks and inward horizontal movement results from earth and water pressures. The magnitude of this movement can be controlled by sound construction practices, and it is anticipated that the horizontal movement will be in the range of 0.1 to 0.25%H.

To ensure that movements of the shoring are within an acceptable range, monitoring must be carried out. Vertical and horizontal targets on the soldier piles must be located and surveyed before excavation begins. Weekly readings during excavation should show that the movements will be within those predicted; if not, the monitoring results will enable directions to be given to improve the shoring.

4.4 Grading and Engineered Fills

- Depending upon the final site grading scheme and proposed final grade elevations, the areas may need to be brought up to the underside of the footings, as required, using engineered fill. The materials proposed for use as engineered fill should be approved by qualified geotechnical personnel from GeoPro at the source, prior to hauling to the site. Portion of the native soils at the site may be suitable for reuse as engineered fill subject to the environmental quality of the soils. Difficulties may be expected for using the native soils for engineered fill due to the fine grained silty/fine sandy soils. Imported materials meeting the requirements of OPSS Select Subgrade Material (SSM) would also be suitable for use as engineered fill, which may be required. Details regarding placement and compaction requirements for engineered fill, if utilized at the site, can be provided once the actual development plans are available, as part of the detailed geotechnical recommendations for the project.

4.5 Floor Slabs and Drainage System

Proposed Townhouse

- The type of foundation drainage system required (perimeter drains and/or under slab drains; damp-proofing or water-proofing) depends upon the proposed founding elevations, soil types in the area and actual stabilized groundwater levels. Based on the results of this preliminary investigation, it is anticipated that conventional foundation drainage (i.e. perimeter drains and damp-proofing) would be adequate for basement above the groundwater tables. Basements founded in sandy/silty soils below the groundwater level (if any) may require water-proofing and/or under slab drains. In any event, the type of foundation drainage should be confirmed by the geotechnical engineer once the site grading plans are available, as part of final design process. The drainage tiles consisting of 100 mm diameter perforated pipes with filter fabric, should discharge into a positive frost-free outlet, as shown on illustrative concepts of the Drainage and Backfill Recommendations, schematic Drawing 2 or, alternatively, the drainage tiles can be connected to sump wells/pits.

Proposed 8-Storey Commercial/Residential Building

- The floor slab may be supported on grade provided all fill materials, very loose native soils and surficially softened native soils are removed and the base thoroughly proof rolled. The fill required to raise the grade can consist of inorganic soil, placed in shallow lifts not exceeding 200 mm and compacted to 98 % of Standard Proctor Maximum Dry Density (SPMDD).

  It should be noted that for the underground parking level floor slabs within the silty/sandy deposits below the prevailing groundwater tables, a permanent under-slab drainage system shall be considered.

  A moisture barrier consisting of at least 200 mm of 19 mm clear crushed stone should be installed under the floor slab. However, for the floor slabs in the sandy/silty soils, a thicker drainage layer may be required. The thickness of the drainage layer will have to be determined by a hydrogeological study.

  Where the exposed subgrade is cohesionless soil consisting of silt, sand or a mixture of the two, the subgrade and all openings should be covered or wrapped with filter fabric. Typically, a Class II non-woven geotextile with a filtration opening size (F.O.S.) of 50 to 100 µm can be used.

  Special care should be taken to ensure compaction around columns and adjacent to foundation walls. The floor slabs should be structurally separated from the foundation walls and columns. Sawcut control joints should be provided at regular intervals and

along column lines to minimize shrinkage cracking and to allow for differential settlement of the floor slabs.

For floor slabs above the prevailing groundwater tables, the placement of underfloor drainage should also be considered to collect the perched groundwater.

A perimeter drainage system will also be required. The illustrative concepts of the drainage systems are presented on the schematic Drawings 2 to 7.

For floor slabs below the prevailing groundwater tables and depending on the volume of the groundwater seepage into the building drainage system (i.e. exceeding 50,000L/day or not), a raft foundation in conjunction with water proof of the entire building foundation (i.e. bathtub) may be considered unless a permanent Permit To Take Water (PTTW) is allowed at this site.

Where a raft foundation is used, a moisture barrier consisting of a 200 mm thick layer of 19 mm clear crushed stone and subdrains should be installed between the top of the raft and the underside of the floor slab in case minor water seepage may migrate through the water proof system.

4.6 Pavement Designs

- The recommended pavement structures provided in the following table are based upon an estimate of the subgrade soil properties determined from visual examination and textural classification of the soil samples. The values may need to be adjusted based on the city/regional standards. Consequently, the recommended pavement structures should be considered for preliminary design purposes only. A functional design life of eight to ten years has been used to establish the pavement recommendations. This represents the number of years to the first rehabilitation, assuming regular maintenance is carried out. If required, a more refined pavement structure design can be performed based on specific traffic data and design life requirements and will involve specific laboratory tests to determine frost susceptibility and strength characteristics of the subgrade soils, as well as specific data input from the client.

Recommended Pavement Structure Thickness

Pavement Layer	Compaction Requirements	Light Duty Parking (Cars)	Heavy Duty Parking (Delivery Trucks)
Asphaltic Concrete	92.0 to 96.5% Maximum Relative Density (MRD)	40 mm HL 3	40 mm HL 3
		50 mm HL 8	80 mm HL 8
OPSS Granular A Base (or 19 mm Crusher Run Limestone)	100% SPMDD*	150 mm	150 mm

Granular B Type I Subbase	100% SPMDD*	200 mm	300 mm

Pavement Layer	Compaction Requirements	Local Residential Road	Collector Road
Asphaltic Concrete	92.0 to 96.5% Maximum Relative Density (MRD)	40 mm HL 3 (1 lift)	40 mm HL 3 (1 lift)
		60 mm HL 8 (1 lift)	80 mm HL 8 (1 lift)
OPSS Granular A Base (or 19 mm Crusher Run Limestone)	100% SPMDD*	150 mm	150 mm
Granular B Type I Subbase	100% SPMDD*	300 mm	400 mm

* Denotes Standard Proctor Maximum Dry Density, ASTM-D698
The subgrade must be compacted to 98% SPMDD for at least the upper 300 mm unless accepted by GeoPro.

The long term performance of the pavement structure is highly dependent upon the subgrade support conditions. Stringent construction control procedures should be maintained to ensure that uniform subgrade moisture and density conditions are achieved. In addition, the need for adequate drainage cannot be over-emphasized. The finished pavement surface and underlying subgrade should be free of depressions and should be sloped (preferably at a minimum grade of 2%) to provide effective surface drainage toward catch basins. Surface water should not be allowed to pond adjacent to the outside edges of pavement areas. Subdrains should be installed to intercept excess subsurface moisture and prevent subgrade softening. This is particularly important in heavy-duty pavement areas.

Prior to placing the granular subbase material, the exposed soil subgrade should be heavily proof-rolled in conjunction with inspection by qualified geotechnical personnel. Deleterious, organic, softened or loosened native subsoils or any fills will require subexcavation and replacement with approved material (i.e. controlled fill), as directed by geotechnical personnel.

5. CLOSURE

The preliminary geotechnical recommendations provided in this report are not sufficient for final design or construction purposes. Once the actual development plans are available, the information in this report should be reviewed by the geotechnical engineer and an additional detailed geotechnical and hydrogeological investigation compatible with the actual proposed development plans for the site shall be carried out. In this regard, GeoPro would be pleased to provide further geotechnical and hydrogeological services if site development plans proceed forward.

We appreciate the opportunity to be of service to you and trust that this report provides sufficient preliminary geotechnical engineering information to facilitate the planning and preliminary concept design of this project. We look forward to providing you with continuing service during the detailed design stage. Please do not hesitate to contact our office should you wish to discuss, in further detail, any aspects of this project.

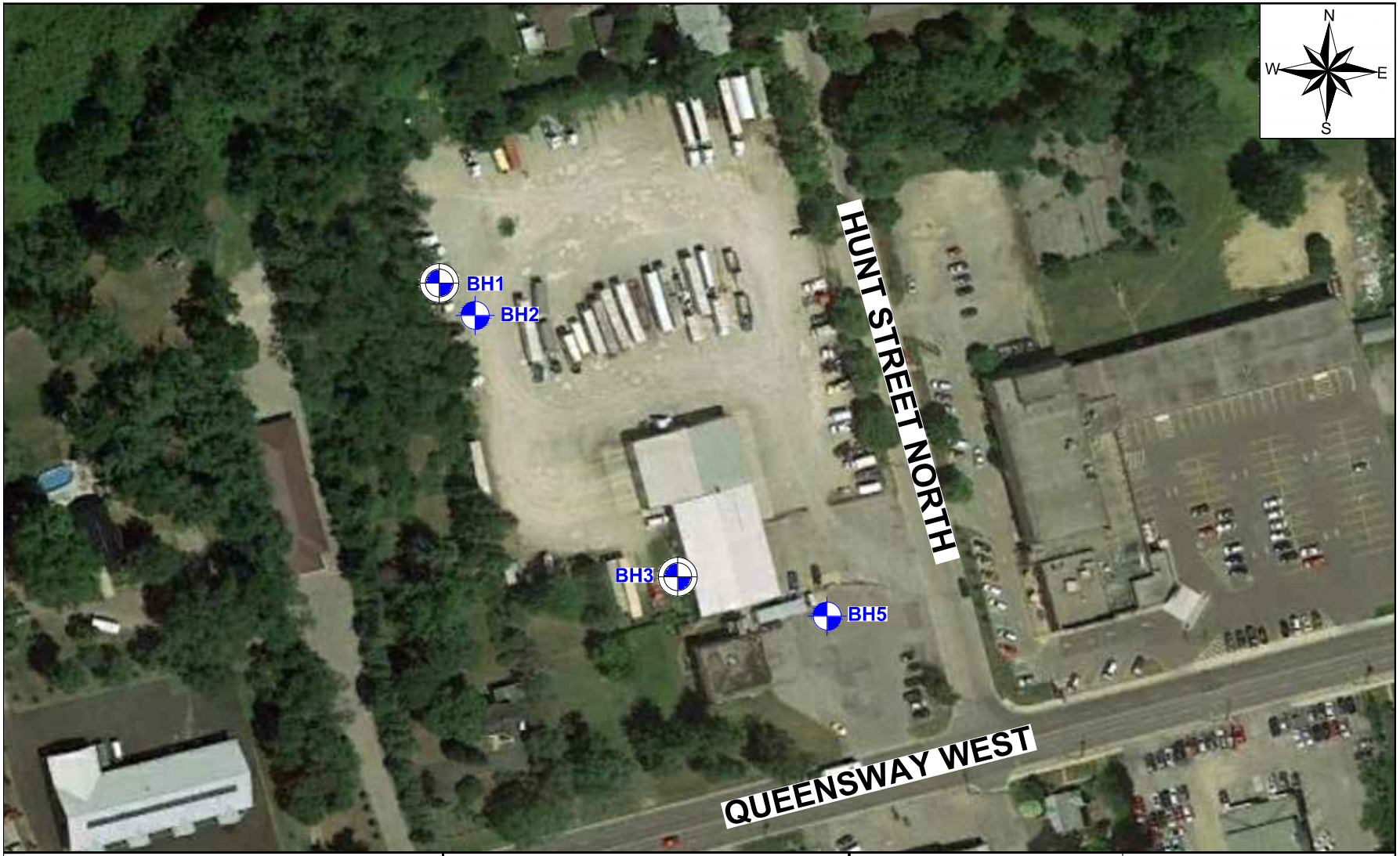
Yours very truly

GEOPRO CONSULTING LIMITED

David B. Liu

David B. Liu, P.Eng., Principal

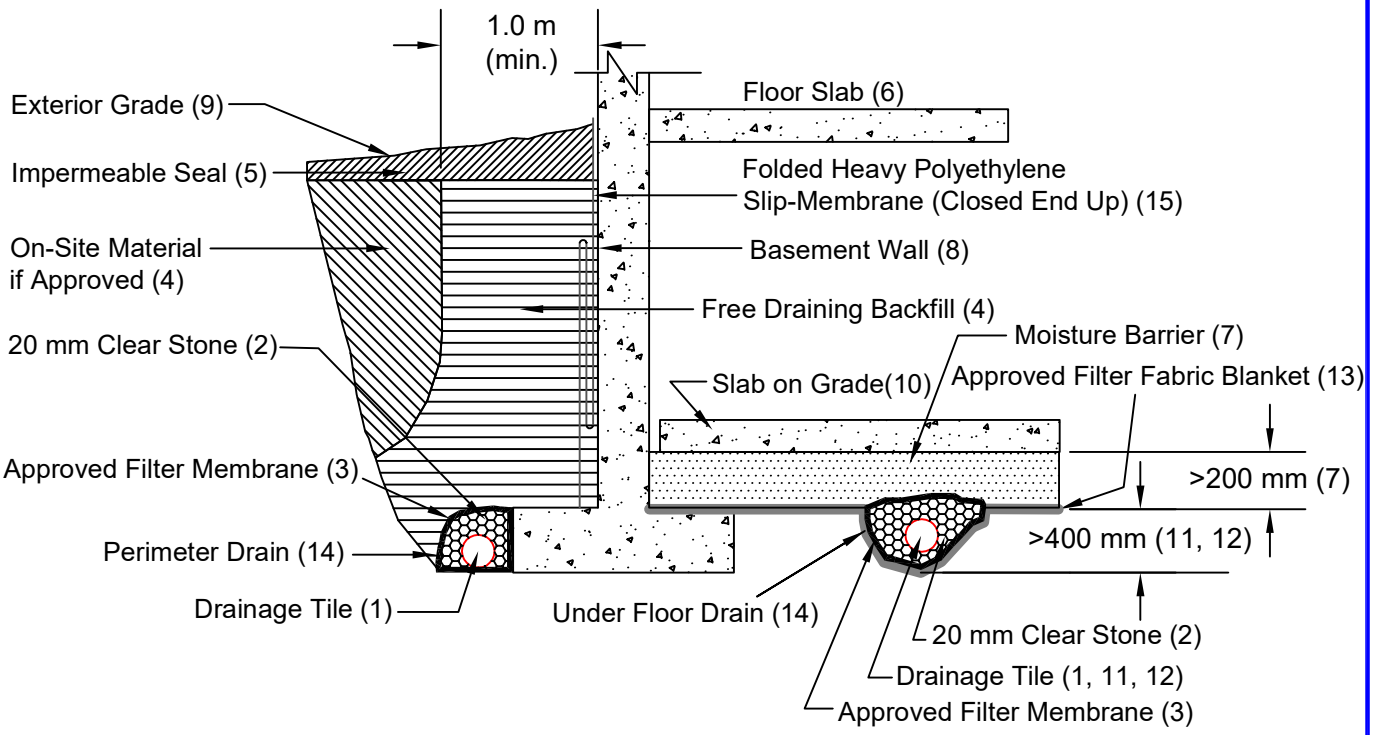
DRAWINGS



Legend:

- Borehole Location
- Monitoring Well

Client:	HFW Holdings Limited	Project No.: 22-4078GH	Drawing No.: 1
Drawn: DL	Approved: DL	Title:	Borehole Location Plan
Date: September 2022	Scale: N.T.S.	Project:	Geotechnical Investigation Proposed Development 395-411 Queensway West, Simcoe, Ontario
Original Size: Letter	Rev: DX		GeoPro Consulting Limited

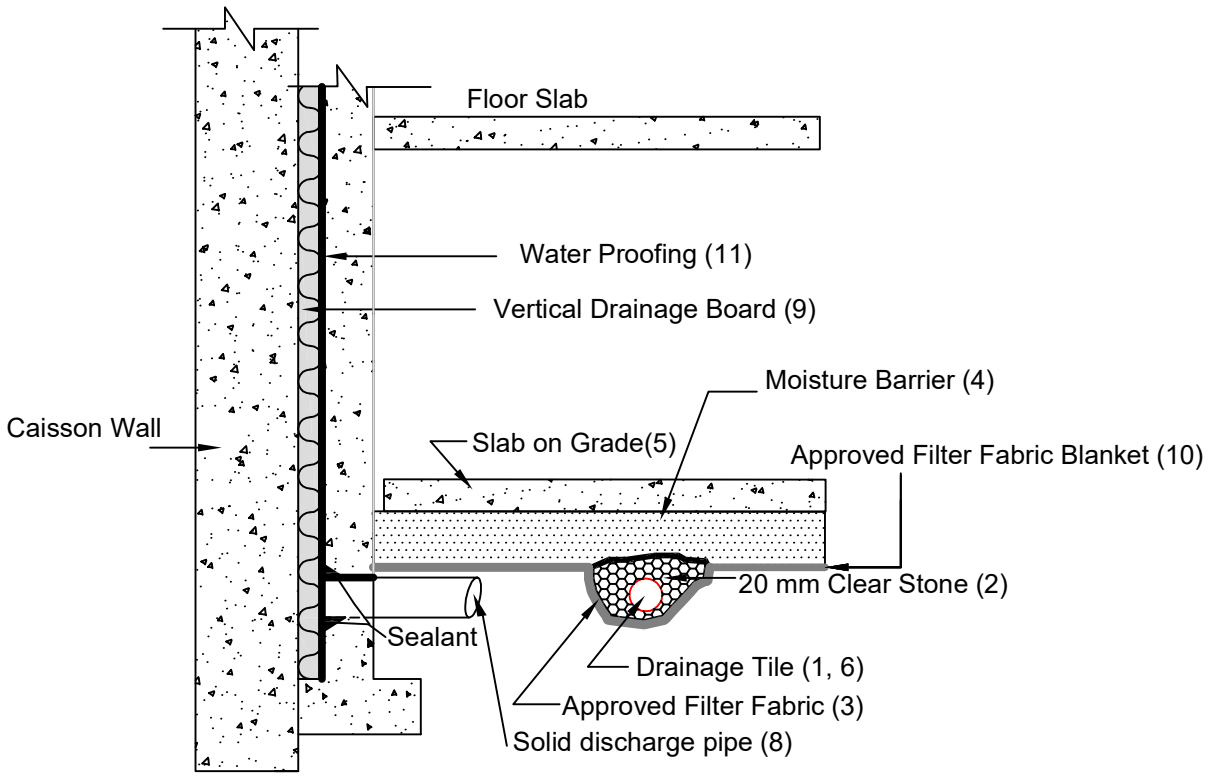


EXTERIOR FOOTING

Notes

1. Drainage tile to consist of 100 mm (4") diameter weeping tile or equivalent perforated pipe leading to a positive sump or outlet.
2. 20 mm (3/4") clear stone - 150 mm (6") top and side of drain. If drain is not on footing, place100 mm (4 inches) of stone below drain .
3. Wrap the clear stone with an approved filter membrane (Terrafix 270R or equivalent).
4. Free Draining backfill - OPSS Granular B or equivalent compacted to the specified density. Do not use heavy compaction equipment within 450 mm (18") of the wall. Use hand controlled light compaction equipment within 1.8 m (6') of wall. The minimum width of the Granular 'B' backfill must be 1.0 m.
5. Impermeable backfill seal - compacted clay, clayey silt or equivalent. If original soil is free-draining, seal may be omitted. Maximum thickness of seal to be 0.5 m.
6. Do not backfill until wall is supported by basement and floor slabs or adequate bracing.
7. Moisture barrier to be at least 200 mm (8") of compacted clear 20 mm (3/4") stone or equivalent free draining material. A vapour barrier may be required for specialty floors.
8. Basement wall to be damp proofed /water proofed.
9. Exterior grade to slope away from building.
10. Slab on grade should not be structurally connected to the wall or footing.
11. Underfloor drain invert to be at least 300 mm (12") below underside of floor slab.
12. Drainage tile placed in parallel rows 2 to 6 m (7' to 20') centers one way. Place drain on 100 mm (4") clear stone with 150 mm (6") of clear stone on top and sides. Enclose stone with filter fabric as noted in (3).
13. The entire subgrade to be sealed with approved filter fabric (Terrafix 270R or equivalent) if non-cohesive (sandy) soils below ground water table encountered.
14. Do not connect the underfloor drains to perimeter drains.
15. Externally Applied Folded Heavy Polyethylene Drainage Membrane.
16. Review the geotechnical report for specific details.

DRAINAGE AND BACKFILL RECOMMENDATIONS
Basement with Underfloor Drainage
(not to scale)

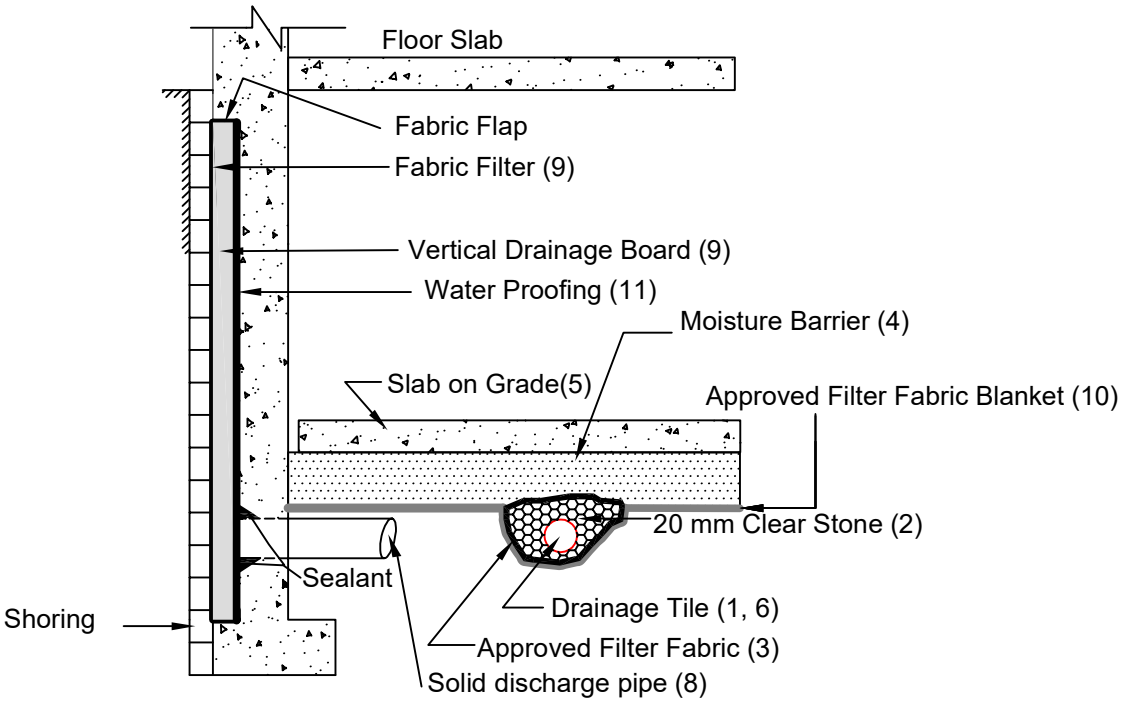


EXTERIOR FOOTING

Notes

1. Drainage tile to consist of 100 mm (4") diameter weeping tile or equivalent perforated pipe leading to a positive sump or outlet, spaced between columns.
2. 20 mm (3/4") clear stone - 150 mm (6") top and side of drain. If drain is not on footing, place100 mm (4 inches) of stone below drain .
3. Wrap the clear stone with an approved filter membrane (Terrafix 270R or equivalent).
4. Moisture barrier to be at least 200 mm (8") of compacted clear 20 mm (3/4") stone or equivalent free draining material. A vapour barrier may be required for specialty floors.
5. Slab on grade should not be structurally connected to the wall or footing.
6. Underfloor drain invert to be at least 300 mm (12") below underside of floor slab. Drainage tile placed in parallel rows 2 to 6 m (7' to 20') centers one way. Place drain on 100 mm (4") clear stone with 150 mm (6") of clear stone on top and sides. Enclose stone with filter fabric as noted in (3).
7. Do not connect the underfloor drains to perimeter drains.
8. Solid discharge pipe located at the middle of each bay between the solider piles, approximate spacing 2.5 m, outletting into a solid pipe leading to a sump.
9. Vertical drainage board mira-drain 6000 or eqivalent with filter cloth should be continous from bottom to 1.2 m below exterior finished grade.
10. The entire subgrade to be sealed with approved filter fabric (Terrafix 270R or equivalent) if non-cohesive (sandy) soils below ground water table encountered.
11. The basement walls must be water proofed using bentonite or equivalent water-proofing system.
12. Review the geotechnical report for specific details. Final detail must be approved before system is considered acceptable.

DRAINAGE RECOMMENDATIONS
Shored Basement wall with Underfloor Drainage System
(not to scale)



EXTERIOR FOOTING

Notes

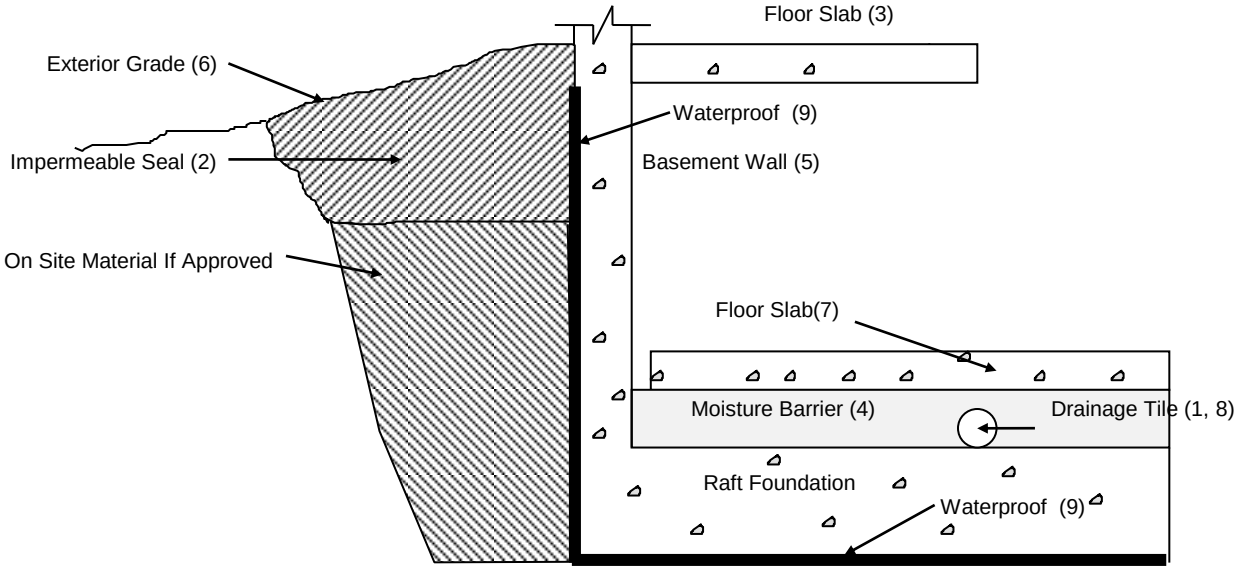
1. Drainage tile to consist of 100 mm (4") diameter weeping tile or equivalent perforated pipe leading to a positive sump or outlet, spaced between columns.
2. 20 mm (3/4") clear stone - 150 mm (6") top and side of drain. If drain is not on footing, place100 mm (4 inches) of stone below drain .
3. Wrap the clear stone with an approved filter membrane (Terrafix 270R or equivalent).
4. Moisture barrier to be at least 200 mm (8") of compacted clear 20 mm (3/4") stone or equivalent free draining material. A vapour barrier may be required for specialty floors.
5. Slab on grade should not be structurally connected to the wall or footing.
6. Underfloor drain invert to be at least 300 mm (12") below underside of floor slab. Drainage tile placed in parallel rows 2 to 6 m (7' to 20') centers one way. Place drain on 100 mm (4") clear stone with 150 mm (6") of clear stone on top and sides. Enclose stone with filter fabric as noted in (3).
7. Do not connect the underfloor drains to perimeter drains.
8. Solid discharge pipe located at the middle of each bay between the solider piles, approximate spacing 2.5 m, outletting into a solid pipe leading to a sump.
9. Vertical drainage board with filter cloth should be kept a minium of 1.2 m below exterior finished grade.
10. The entire subgrade to be sealed with approved filter fabric (Terrafix 270R or equivalent) if non-cohesive (sandy) soils below ground water table encountered.
11. The basement walls should be water proofed using bentonite or equivalent water-proofing system.
12. Review the geotechnical report for specific details. Final detail must be approved before system is considered acceptable.

DRAINAGE RECOMMENDATIONS

Shored Underground Parking/Basement wall with Underfloor Drainage System

(not to scale)

Project: 22-4078GH **Drawing No. 5**



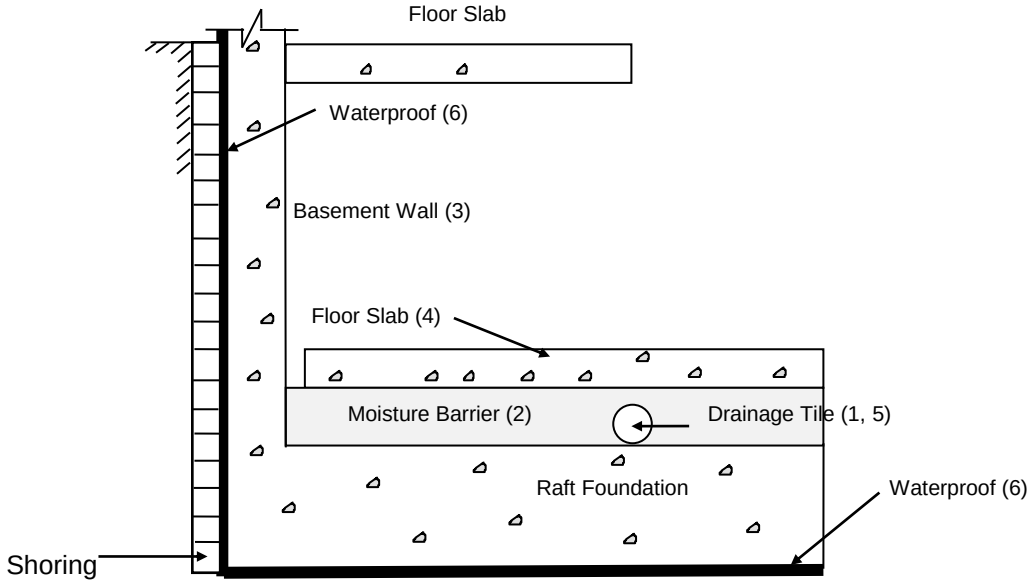
Notes

1. Drainage tile to consist of 100 mm (4") diameter weeping tile or equivalent perforated pipe leading to a positive sump or outlet. Invert to be a minimum of 150 mm (6") below underside of floor slab.
2. Impermeable backfill seal - compacted clay, clayey silt or equivalent. If original soil is free-draining, seal may be omitted.
3. Do not backfill until wall is supported by basement and floor slabs or adequate bracing.
4. Moisture barrier to be at least 200 mm (8") of compacted clear 20 mm (3/4") stone or equivalent free draining material.
5. Basement wall to be water-proofed and the wall has to be designed in consideration of the hydrostatic water pressure.
6. Exterior grade to slope away from building.
7. Slab on grade should not be structurally connected to the wall or footing.
8. Underfloor drain invert to be placed on raft foundation slab. Drainage tile placed in parallel rows 6 to 8 m (20 to 25') centres one way.
9. The waterproof should be at least 1 m above the highest groundwater tables. The water-proofing must be approved by engineer.

DRAINAGE AND BACKFILL RECOMMENDATIONS

Waterproofed Underground Parking Structure/Basement with Underfloor Drainage System (raft foundations) (not to scale)

Project: 22-4078GH **Drawing No. 6**



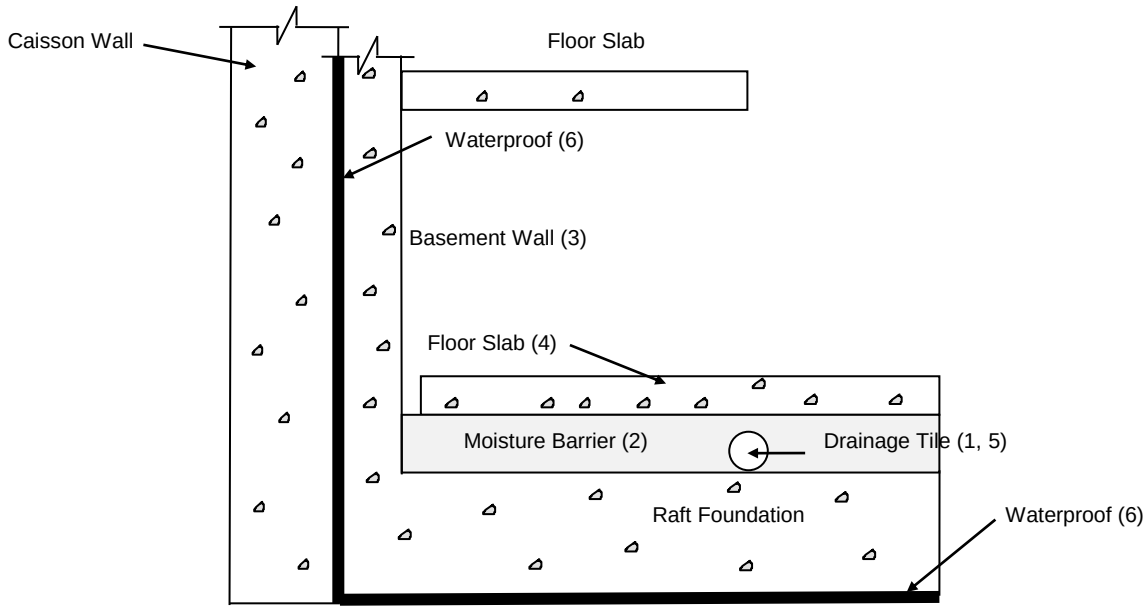
Notes

1. Drainage tile to consist of 100 mm (4") diameter weeping tile or equivalent perforated pipe leading to a positive sump or outlet. Invert to be a minimum of 150 mm (6") below underside of floor slab.
2. Moisture barrier to be at least 200 mm (8") of compacted clear 20 mm (3/4") stone or equivalent free draining material.
3. Basement wall to be water-proofed and the wall has to be designed in consideration of the hydrostatic water pressure.
4. Slab on grade should not be structurally connected to the wall or footing.
5. Underfloor drain invert to be placed on raft foundation slab. Drainage tile placed in parallel rows 6 to 8 m (20 to 25') centres one way.
6. The waterproof should be at least 1 m above the highest groundwater tables. The water-proofing system must be approved by engineer.

DRAINAGE RECOMMENDATIONS

Waterproofed Underground Parking Structure/Basement with Underfloor Drainage System (raft foundations) (not to scale)

Project: 22-4078GH **Drawing No. 7**



Notes

1. Drainage tile to consist of 100 mm (4") diameter weeping tile or equivalent perforated pipe leading to a positive sump or outlet. Invert to be a minimum of 150 mm (6") below underside of floor slab.
2. Moisture barrier to be at least 200 mm (8") of compacted clear 20 mm (3/4") stone or equivalent free draining material.
3. Basement wall to be water-proofed and the wall has to be designed in consideration of the hydrostatic water pressure.
4. Slab on grade should not be structurally connected to the wall or footing.
5. Underfloor drain invert to be placed on raft foundation slab. Drainage tile placed in parallel rows 6 to 8 m (20 to 25') centres one way.
6. The waterproof should be at least 1 m above the highest groundwater tables. The water-proofing system must be approved by engineer.

DRAINAGE RECOMMENDATIONS

Waterproofed Underground Parking Structure/Basement with Underfloor Drainage System (raft foundations) (not to scale)

ENCLOSURES

Enclosure 1A: Notes on Sample Descriptions

1. Each soil stratum is described according to the *Modified Unified Soil Classification System*. The compactness condition of cohesionless soils (SPT) and the consistency of cohesive soils (undrained shear strength) are defined according to Canadian Foundation Engineering Manual, 4th Edition. Different soil classification systems may be used by others. Please note that a description of the soil stratums is based on visual and tactile examination of the samples augmented with field and laboratory test results, such as a grain size analysis and/or Atterberg Limits testing. Visual classification is not sufficiently accurate to provide exact grain sizing or precise differentiation between size classification systems.

2. Fill: Where fill is designated on the borehole log it is defined as indicated by the sample recovered during the boring process. The reader is cautioned that fills are heterogeneous in nature and variable in density or degree of compaction. The borehole description may therefore not be applicable as a general description of site fill materials. All fills should be expected to contain obstruction such as wood, large concrete pieces or subsurface basements, floors, tanks, etc., none of these may have been encountered in the boreholes. Since boreholes cannot accurately define the contents of the fill, test pits are recommended to provide supplementary information. Despite the use of test pits, the heterogeneous nature of fill will leave some ambiguity as to the exact composition of the fill. Most fills contain pockets, seams, or layers of organically contaminated soil. This organic material can result in the generation of methane gas and/or significant ongoing and future settlements. Fill at this site may have been monitored for the presence of methane gas and, if so, the results are given on the borehole logs. The monitoring process does not indicate the volume of gas that can be potentially generated nor does it pinpoint the source of the gas. These readings are to advise of the presence of gas only, and a detailed study is recommended for sites where any explosive gas/methane is detected. Some fill material may be contaminated by toxic/hazardous waste that renders it unacceptable for deposition in any but designated land fill sites; unless specifically stated the fill on this site has not been tested for contaminants that may be considered toxic or hazardous. This testing and a potential hazard study can be undertaken if requested. In most residential/commercial areas undergoing reconstruction, buried oil tanks are common and are generally not detected in a conventional preliminary geotechnical site investigation.

3. Till: The term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Because of this geological process the till must be considered heterogeneous in composition and as such may contain pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (75 to 300 mm) or boulders (over 300 mm). Contractors may therefore encounter cobbles and boulders during excavation, even if they are not indicated by the borings. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Because of the horizontal and vertical variability of till, the sample description may be applicable to a very limited zone; caution is therefore essential when dealing with sensitive excavations or dewatering programs in till materials.

Enclosure 1B: Explanation of Terms Used in the Record of Boreholes

Sample Type

AS	Auger sample
BS	Block sample
CS	Chunk sample
DO	Drive open
DS	Dimension type sample
FS	Foil sample
NR	No recovery
RC	Rock core
SC	Soil core
SS	Spoon sample
SH	Shelby tube Sample
ST	Slotted tube
TO	Thin-walled, open
TP	Thin-walled, piston
WS	Wash sample

Penetration Resistance

Standard Penetration Resistance (SPT), N:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in) required to drive a 50 mm (2 in) drive open sampler for a distance of 300 mm (12 in).

PM – Samples advanced by manual pressure
WR – Samples advanced by weight of sampler and rod
WH – Samples advanced by static weight of hammer

Dynamic Cone Penetration Resistance, N_d:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in) to drive uncased a 50 mm (2 in) diameter, 60° cone attached to "A" size drill rods for a distance of 300 mm (12 in).

Piezo-Cone Penetration Test (CPT):

An electronic cone penetrometer with a 60 degree conical tip and a projected end area of 10 cm² pushed through ground at a penetration rate of 2 cm/s. Measurement of tip resistance (Q_t), porewater pressure (PWP) and friction along a sleeve are recorded electronically at 25 mm penetration intervals.

Textural Classification of Soils (ASTM D2487)

Classification	Particle Size
Boulders	> 300 mm
Cobbles	75 mm - 300 mm
Gravel	4.75 mm - 75 mm
Sand	0.075 mm – 4.75 mm
Silt	0.002 mm-0.075 mm
Clay	<0.002 mm(*)

(*) Canadian Foundation Engineering Manual (4th Edition)

Coarse Grain Soil Description (50% greater than 0.075 mm)

Terminology	Proportion
Trace	0-10%
Some	10-20%
Adjective (e.g. silty or sandy)	20-35%
And (e.g. sand and gravel)	> 35%

Soil Description

a) Cohesive Soils (*)

Consistency	Undrained Shear Strength (kPa)	SPT "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

(*) Hierarchy of Shear Strength prediction

1. Lab triaxial test
2. Field vane shear test
3. Lab. vane shear test
4. SPT "N" value
5. Pocket penetrometer

b) Cohesionless Soils (*)

Compactness Condition (Formerly Relative Density)	SPT "N" Value
Very loose	0-4
Loose	4-10
Compact	10-30
Dense	30-50
Very dense	>50

Soil Tests

w	Water content
w_p	Plastic limit
w_l	Liquid limit
C	Consolidation (oedometer) test
CID	Consolidated isotropically drained triaxial test
CIU	consolidated isotropically undrained triaxial test with porewater pressure measurement
D_R	Relative density (specific gravity, Gs)
DS	Direct shear test
ENV	Environmental/ chemical analysis
M	Sieve analysis for particle size
MH	Combined sieve and hydrometer (H) analysis
MPC	Modified proctor compaction test
SPC	Standard proctor compaction test
OC	Organic content test
U	Unconsolidated Undrained Triaxial Test
V	Field vane (LV-laboratory vane test)
γ	Unit weight

LOG OF BOREHOLE BH1

PROJECT: Preliminary Geotechnical Investigation for Proposed Residential Development

CLIENT: HFW Holdings Limited

PROJECT LOCATION: 395-411 Queensway West, Simcoe, Ontario

DATUM: N/A

BH LOCATION: See Borehole Location Plan

DRILLING DATA

METHOD: Continuous Flight Auger - Auto Hammer | DIAMETER: 155 mm

FIELD ENGINEER: DG/SN | DATE: 2022-08-31

SAMPLE REVIEW: IG | REF. NO.: 22-4078GH

CHECKED: DX | ENCL. NO.: 2

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	"N" BLOWS/0.3m	ELEVATION
0.0	**GRANULAR FILL:** (220 mm)	1A	SS		Concrete
0.2	**FILL:** sandy silt, trace silt, trace gravel, organic inclusions, rootlet inclusions, brown, moist, compact	1B	SS	19	
0.7	**FILL:** sand to gravelly sand, trace silt, brown, moist, loose to compact	2	SS	10	
		3	SS	21	Bentonite
		4	SS	23	
2.9	**FINE TO MEDIUM SAND:** some silt, brown, wet, compact	5	SS	23	
4.0	**SAND:** some silt, trace gravel, brown to grey, wet, compact	6	SS	17	Sand Screen 4.7mBGS Sep 14
	--- grey	7	SS	18	
		8	SS	21	Natural Pack
8.6	**SILT:** trace clay, trace sand, grey, wet, loose	9	SS	6	
9.6	**END OF BOREHOLE**				

DYNAMIC PENETRATION TEST: ○ SPT, ~ Cone, blows/0.3m; 20 40 60 80

SHEAR STRENGTH (kPa): ● Unconfined, ▲ Quick Triaxial, × Field Vane & Sensitivity, ⊠ Penetrometer, + Lab Vane; 20 40 60 80

Plastic Limit (w_P) | Natural Moisture Content (w) | Liquid Limit (w_L)

WATER CONTENT (%): 10 20 30 40

UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)

GR SA SI CL

Notes:

Continued Next Page

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +³, ×³: Numbers refer to Sensitivity; ▲ ε=3% Strain at Failure

LOG OF BOREHOLE BH1

PROJECT: Preliminary Geotechnical Investigation for Proposed Residential Development

CLIENT: HFW Holdings Limited

PROJECT LOCATION: 395-411 Queensway West, Simcoe, Ontario

DATUM: N/A

BH LOCATION: See Borehole Location Plan

DRILLING DATA

METHOD: Continuous Flight Auger - Auto Hammer

FIELD ENGINEER: DG/SN

SAMPLE REVIEW: IG

CHECKED: DX

DIAMETER: 155 mm

DATE: 2022-08-31

REF. NO.: 22-4078GH

ENCL. NO.: 2

ELEV / DEPTH (m)	DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" BLOWS/0.3m	GROUND WATER	ELEVATION	DYNAMIC PENETRATION TEST: ○ SPT ⌇ Cone blows/0.3m (20 40 60 80); SHEAR STRENGTH (kPa): ● Unconfined ✕ Field Vane & Sensitivity ▲ Quick Triaxial ⊠ Penetrometer + Lab Vane (20 40 60 80)	Plastic Limit / Natural Moisture Content / Liquid Limit (w_P w w_L); WATER CONTENT (%) (10 20 30 40)	UNIT WT (kN/m^3)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	1) Water encountered at a depth of 4.6 m below ground surface (mBGS) during drilling. 2) Water was at a depth of 4.7 mBGS upon completion of drilling. 3) Borehole caved at a depth of 5.5 mBGS upon completion of drilling. 4) 51 mm dia. monitoring well was installed in borehole upon completion of drilling. Water Level Readings Date W.L.Depth(mBGS) Sep. 14, 2022 4.65										

GROUNDWATER ELEVATIONS

Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ▲ ε=3% Strain at Failure

LOG OF BOREHOLE BH2

PROJECT: Preliminary Geotechnical Investigation for Proposed Residential Development

CLIENT: HFW Holdings Limited

PROJECT LOCATION: 395-411 Queensway West, Simcoe, Ontario

DATUM: N/A

BH LOCATION: See Borehole Location Plan

DRILLING DATA

METHOD: Continuous Flight Auger - Auto Hammer | DIAMETER: 155 mm

FIELD ENGINEER: DG/SN | DATE: 2022-08-31

SAMPLE REVIEW: IG | REF. NO.: 22-4078GH

CHECKED: DX | ENCL. NO.: 3

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	"N" BLOWS/0.3m
0.0	**GRANULAR FILL:** (250 mm)	1A	SS	
0.3	**FILL:** silty sand, trace gravel, organic inclusions, rootlet inclusions, brown, moist, loose to compact	1B	SS	22
		2	SS	5
1.4	**FILL:** gravelly sand, some silt, brown, moist, very loose	3	SS	2
2.1	**FILL:** sand, trace silt, trace gravel, organic inclusions, brown, moist, very loose to loose --- rootlet inclusions	4	SS	2
		5	SS	5
4.0	**SAND:** trace silt, trace gravel, brown, wet, compact	6	SS	13
		7	SS	16
6.6	**END OF BOREHOLE**			

Notes:

1) Water encountered at a depth of 4.6 m below ground surface (mBGS) during drilling.
2) Water was at a depth of 4.4 mBGS upon completion of drilling.
3) Borehole caved at a depth of 4.6 mBGS upon completion of drilling.

GROUND WATER ELEVATION

DYNAMIC PENETRATION TEST: ○ SPT, ≈ Cone, blows/0.3m; 20, 40, 60, 80

SHEAR STRENGTH (kPa): ● Unconfined, ✕ Field Vane & Sensitivity, ▲ Quick Triaxial, ⊠ Penetrometer, + Lab Vane; 20, 40, 60, 80

Plastic Limit (w_P) | Natural Moisture Content (w) | Liquid Limit (w_L)

WATER CONTENT (%): 10, 20, 30, 40

UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)

GR	SA	SI	CL
9	84	6	

GROUNDWATER ELEVATIONS

Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES: +³, ×³: Numbers refer to Sensitivity; ▲ ε=3% Strain at Failure

LOG OF BOREHOLE BH3

PROJECT: Preliminary Geotechnical Investigation for Proposed Residential Development

CLIENT: HFW Holdings Limited

PROJECT LOCATION: 395-411 Queensway West, Simcoe, Ontario

DATUM: N/A

BH LOCATION: See Borehole Location Plan

DRILLING DATA

METHOD: Continuous Flight Auger - Auto Hammer | DIAMETER: 155 mm

FIELD ENGINEER: DG/SN | DATE: 2022-09-01

SAMPLE REVIEW: IG | REF. NO.: 22-4078GH

CHECKED: DX | ENCL. NO.: 4

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	"N" BLOWS/0.3m	GROUND WATER / ELEVATION
0.0	**TOPSOIL:** (150 mm)				Concrete
0.2	**FILL:** silty sand, trace gravel, organic inclusions, rootlet inclusions, brown, moist, very loose	1	SS	3	
0.7	**FILL:** silt, trace to some clay, trace sand, organic inclusions, rootlet inclusions, layers of clayey silt, brown, wet, very loose	2A	SS	2	
1.0	**SILT:** trace clay, trace sand, layers of clayey silt, brown, wet, very loose to compact	2B	SS		Bentonite
		3	SS	1	
		4	SS	10	
2.9	**FINE TO MEDIUM SAND:** some silt, trace gravel, brown, moist, compact	5	SS	29	
4.0	**SAND:** trace to some silt, trace gravel, brown, wet, loose to compact				Sand / Screen / 4.7mBGS Sep 14
		6	SS	9	
		7	SS	17	Natural Pack
6.6	**END OF BOREHOLE**				

DYNAMIC PENETRATION TEST: ○ SPT, ≈ Cone, blows/0.3m; 20 40 60 80

SHEAR STRENGTH (kPa): ● Unconfined ✕ Field Vane & Sensitivity ▲ Quick Triaxial ⊠ Penetrometer + Lab Vane; 20 40 60 80

Plastic Limit / Natural Moisture Content / Liquid Limit; w_P w w_L

WATER CONTENT (%): 10 20 30 40

UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)

GR	SA	SI	CL
0	0	93	7

Notes:

1) Water encountered at a depth of 0.7 m below ground surface (mBGS) during drilling.
2) Water was at a depth of 4.8 mBGS upon completion of drilling.
3) Borehole caved at a depth of 5.2 mBGS upon completion of drilling.
4) 51 mm dia. monitoring well was installed in borehole upon completion of drilling.

Water Level Readings

Date	W.L.Depth(mBGS)
Sep. 14, 2022	4.73

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +³, ×³: Numbers refer to Sensitivity; ▲ ε=3% Strain at Failure

LOG OF BOREHOLE BH5

PROJECT: Preliminary Geotechnical Investigation for Proposed Residential Development

CLIENT: HFW Holdings Limited

PROJECT LOCATION: 395-411 Queensway West, Simcoe, Ontario

DATUM: N/A

BH LOCATION: See Borehole Location Plan

DRILLING DATA

METHOD: Continuous Flight Auger - Auto Hammer | DIAMETER: 155 mm

FIELD ENGINEER: DG/SN | DATE: 2022-09-01

SAMPLE REVIEW: IG | REF. NO.: 22-4078GH

CHECKED: DX | ENCL. NO.: 5

ELEV / DEPTH (m)	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" BLOWS/0.3m	GROUND WATER ELEVATION	DYNAMIC PENETRATION TEST (SPT / Cone, blows/0.3m) & SHEAR STRENGTH (kPa)	Plastic Limit / Natural Moisture Content / Liquid Limit; WATER CONTENT (%)	UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**PORTLAND CEMENT CONCRETE:** (340 mm)									
0.3	**FILL:** silty sand, trace gravel, organic inclusions, rootlet inclusions, brown, moist		1	AS						
0.8	**FILL:** sand, some silt, trace gravel, pockets/layers of silt, brown, moist, loose		2	SS	6					
1.4	**SILT:** trace to some clay, trace gravel, layers of clayey silt, pockets of sand, brown to grey, wet, loose to compact		3	SS	7					
			4	SS	9					
			5	SS	11					
	--- grey		6	SS	5					
5.6	**SAND:** trace silt, trace gravel, wet, brown, compact		7	SS	12					
			8	SS	23					
8.1	**END OF BOREHOLE**									

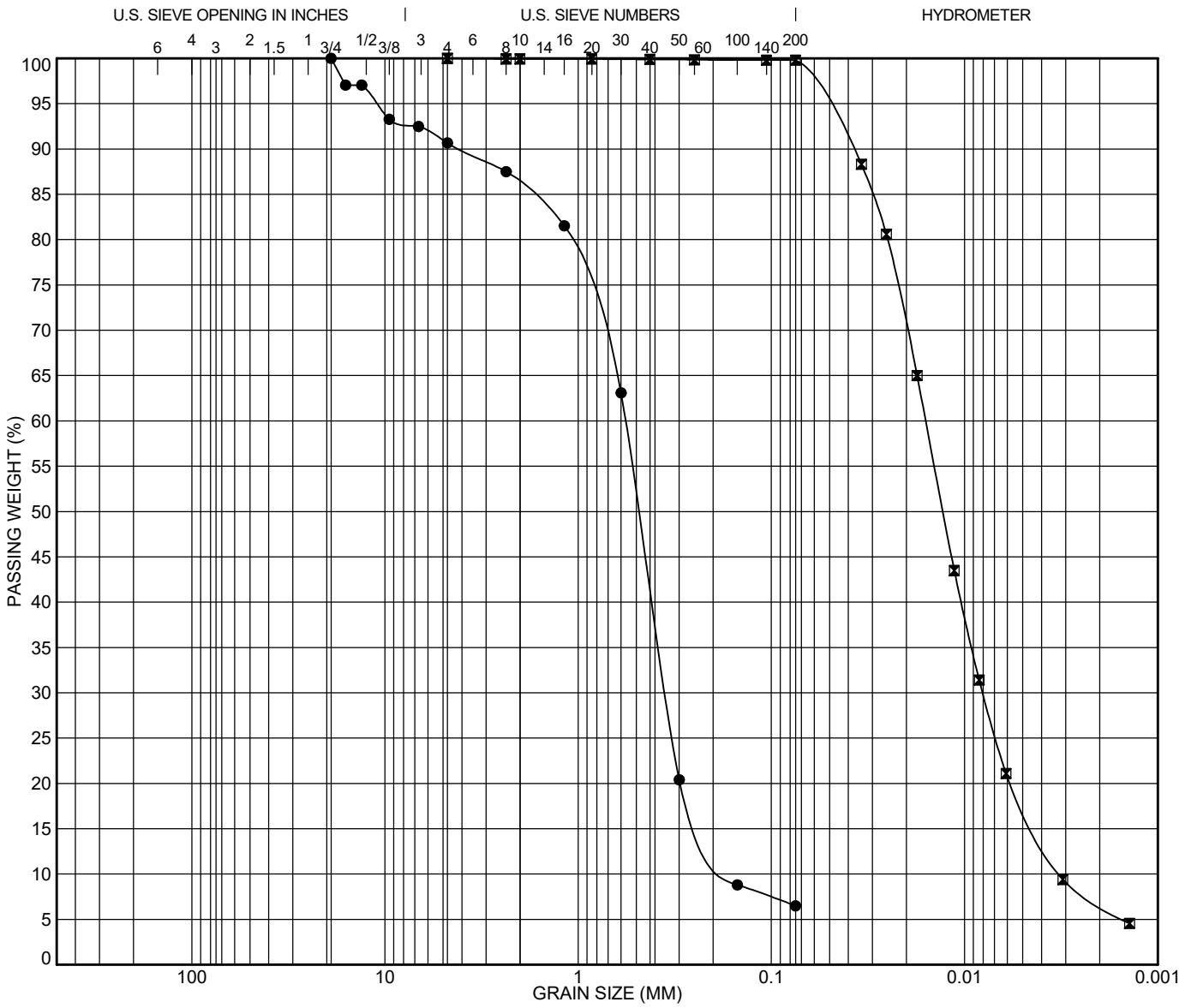
Notes:

1) Water encountered at a depth of 1.5 m below ground surface (mBGS) during drilling.
2) Water was at a depth of 4.6 mBGS upon completion of drilling.
3) Borehole caved at a depth of 4.6 mBGS upon completion of drilling.

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +³, ×³: Numbers refer to Sensitivity; ▲ ε=3% Strain at Failure

FIGURES



COBBLES	GRAVEL		SAND			SILT	CLAY
	coarse	fine	coarse	medium	fine		

Specimen Identification				Classification	LL	PL	PI	Cc	Cu
●	**BH2**	**SS6**	**4.57**					**1.34**	**3.54**
⊠	**BH3**	**SS4**	**2.29**					**1.27**	**4.95**

Specimen Identification				D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**BH2**	**SS6**	**4.57**	**19**	**0.571**	**0.351**	**0.161**	**9.3**	**84.2**	**6.5**	
⊠	**BH3**	**SS4**	**2.29**	**4.75**	**0.016**	**0.008**	**0.003**	**0.0**	**0.2**	**93.1**	**6.7**

GeoPro CONSULTING LIMITED
Unit 57, 40 Vogell Road, Richmond Hill, Ontario L4B 3N6
Tel: 905-237-8336 Fax: 905-248-3699
office@geoproconsulting.ca www.geoproconsulting.ca

GRAIN SIZE DISTRIBUTION

PROJECT: Preliminary Geotechnical Investigation for Proposed Residential Development

LOCATION: 395-411 Queensway West, Simcoe, Ontario

PROJECT NO.: 22-4078GH | SAMPLED ON: 2022-09-01

FIGURE NO.: 1 | TESTED ON: 2022-09-22

LIMITATIONS TO THE REPORT

This report is intended solely for the Client named. The report is prepared based on the work has been undertaken in accordance with normally accepted geotechnical engineering practices in Ontario.

The comments and recommendations given in this report are based on information determined at the limited number of the test hole and test pit locations. The boundaries between the various strata as shown on the borehole logs are based on non-continuous sampling and represent an inferred transition between the various strata and their lateral continuation rather than a precise plane of geological change. Subsurface and groundwater conditions between and beyond the test holes and test pits may differ significantly from those encountered at the test hole and test pit locations. The benchmark and elevations used in this report are primarily to establish relative elevation differences between the test hole and test pit locations and should not be used for other purposes, such as grading, excavating, planning, development, etc.

It should be noted that the results of the designated substance and chemical analysis refer only to the sample analyzed which was obtained from specific sampling location and sampling depth, and the presence of designated substance and soil chemistry may vary between and beyond the location and depth of the sample taken. Please note that the level of chemical testing outlined herein is meant to provide a broad indication of soil quality based on the limited soil samples tested. The analytical results contained in this report should not be considered a warranty with respect to the soil quality or the use of the soil for any specific purpose or the acceptability of the soils for any excess soil receiving sites.

The report reflects our best judgment based on the information available to GeoPro Consulting Limited at the time of preparation. Unless otherwise agreed in writing by GeoPro Consulting Limited, it shall not be used to express or imply warranty as to any other purposes. No portion of this report shall be used as a separate entity, it is written to be read in its entirety. The information contained herein in no way reflects on the environment aspects of the project, unless otherwise stated.

The design recommendations given in this report are applicable only to the project designed and constructed completely in accordance with the details stated in this report. Otherwise, our responsibility is limited to interpreting the subsurface information at the borehole or test pit locations.

Should any comments and recommendations provided in this report be made on any construction related issues, they are intended only for the guidance of the designers. The number of test holes and test pits may not be sufficient to determine all the factors that may affect construction activities, methods and costs. Such as, the thickness of surficial topsoil or fill layers may vary significantly and unpredictably; the amount of the cobbles and boulders may vary significantly than what described in the report; unexpected water bearing zones/layers with various thickness and extent may be encountered in the fill and native soils. The contractors bidding on this project or undertaking the construction should, therefore, make their own interpretation of the factual information presented and make their own conclusions as to how the subsurface conditions may affect their work and determine the proper construction methods.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. GeoPro Consulting Limited accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

We accept no responsibility for any decisions made or actions taken as a result of this report unless we are specifically advised of and participate in such action, in which case our responsibility will be as agreed to at that time.

GeoPro Consulting Limited

Geotechnical-Hydrogeology-Environmental-Materials-Inspection

Preliminary Hydrogeological Assessment

Proposed Residential Development

395-411 Queensway West, Simcoe, Ontario

Prepared For:

HFW Holdings Limited

GeoPro Project No.: 22-4078H

Report Date: February 1, 2024

GeoPro Consulting Limited Tel. (905) 237-8336

Unit 57, 40 Vogell Road, Richmond Hill, Ontario L4B 3N6

GeoPro CONSULTING LIMITED

Table of Contents

1.0 INTRODUCTION

GeoPro Consulting Limited ("GeoPro") was retained by HFW Holdimgs Limited (the "Client") to conduct a preliminary hydrogeological assessment for the proposed Hunt Street Residential development at 395-411 Queensway West, Simcoe, Ontario (the "Site"). The approximate site location is shown on Drawing No. 1.

It should be noted that the hydrogeological report was prepared based on the preliminary design information provided at the time of preparing the report. In the event the design information is modified or updated, this report should be reviewed by GeoPro and further recommendations will be provided as needed.

1.1 Purposes

The purposes of this preliminary hydrogeological assessment are to characterize the subsurface soil and groundwater conditions in the limited number of boreholes at the Site and to assess temporary dewatering and groundwater control needs (if any) in order to facilitate the design of the Project.

It should be noted that the preliminary hydrogeological assessment was completed concurrently with a geotechnical investigation carried out by GeoPro at the Site. The results of the geotechnical investigation were summarized in a separate report.

1.2 Scope of Work

In conjunction with the geotechnical investigation, the preliminary hydrogeological assessment comprised the following tasks:

1) Conducting a search and review of the available geology and hydrogeology data resources, including Ministry of the Environment, Conservation and Parks ("MECP") Water Well Records ("WWR"), Ontario Geological Survey ("OGS") and Ontario Source Water Protection Program;
2) Completing groundwater level monitoring and in-situ hydraulic conductivity testing (slug testing); and
3) Data analyses, interpretation, and report preparation.

This report has been prepared for the Client. Third party use of this report without GeoPro's consent is prohibited. The limitation conditions presented in this report form an integral part of the report and they must be considered in conjunction with this report.

1.3 Previous and Concurrent Investigations and Reports

1.3.1 Geotechnical Investigations by GeoPro

A geotechnical investigation was carried out concurrently by GeoPro, which consisted of the advancement of four (4) boreholes (BH1, BH2, BH3 and BH5) drilled to the depths ranging from 6.6 to 9.6 mBGS, and the installation of two (2) monitoring wells in each of the advanced boreholes BH1 and BH3.

The information and data obtained from GeoPro's geotechnical investigation report has been incorporated in this preliminary hydrogeological assessment report. The approximate borehole and monitoring well locations are shown on Drawing No. 2, and the Borehole Logs are included in Appendix A.

In addition, one (1) borehole (BHMW5) was drilled adjacent to the BH5 location by T. Harris Environmental Management, and a monitoring well was installed in the advanced borehole.

2.0 SITE CONDITIONS

2.1 Site Feature Observations

A site visit was conducted on September 22, 2022 to observe the general site features and sources of potential contamination and/or environmental concern.

The Site is currently occupied by residential and commercial properties on the north side of Queensway West between Hunt Street North and Park Road and generally surrounded by vacant lands, parkland , residential and commercial properties.

Catch basins and/or manholes were observed along the roadway near the Site.

Patterson Creek was observed approximately 5 m north of the Site.

Kent Creek was observed approximately 190 m south of the Site.

Auto garages (auto service shops) were noted in the area within a 500 m radius from the Site based on Google Maps and are summarized below:

- Scott´s Auto Body Repair (at 6 Hunt Street South) is approximately 95 m south of the site.
- Future Auto Service & Sales (at 10 Hunt Street South) is approximately 135 m south of the site.
- Demeyere´s Simcoe Honda (at 443 Queensway West) is approximately 225 m west of the Site
- Honda Service (At 456 Queensway West) is approximately 320 m west of the Site
- Cardial Muffler Centre (at 335 Queensway West) is approximately 160 m east of the site.
- NAPA AUTOPRO (at 10 Hunt Street South) is approximately 130 m south of the site.
- Koncir Automotive (at 425 Queensway West) is approximately 130 m West of the site.
- UniglassPlus/Ziebart (at 321 Queensway West) is approximately 180 m East of the site.

2.2 Physiography and Drainage

The Site is located within the Norfolk Sand Plain physiographical region in an area comprised of Sand Plains according to the "Physiography Map of South Central Portion of Southern Ontario" prepared by the Ontario Department of Mines and Northern Affairs, and based on the Ontario Geological Survey ("OGS") database.

The Site is located in the Lynn Creek Subwatershed, part of the Long Point Region Watershed, under the jurisdiction of the Long Point Region Conservation Authority (LPRCA). Patterson Creek, located approximately 5 m north of the site, flows easterly and drain into Crystal Lake approximately 2.1 km east to southeast of the site, then flows southerly toward Spring Creek approximately 3.0 km southeast of the Site. and eventually drains into Lake Erie approximately 14.3 km southeast of the site. Kent Creek, located approximately 190 m south of the Site, flows easterly to Crystal Lake Proximately 1.0 km southeast of the site, then flows southerly toward Spring Creek approximately 3.0 km southeast of the Site, and drains into Lake Erie approximately 14.3 km southeast of the Site.

2.3 Geology

2.3.1 Bedrock Geology

The bedrock beneath the Site consists of Middle Devonian Limestone, dolostone and shale, at the depths ranging from approximately 32 to 41 mBGS, according to the "Bedrock Geology of Southern Ontario" prepared by the Ontario Ministry of Northern Development and Mines and based on the OGS database.

2.3.2 Surficial Geology

As shown on Drawing No. 3, the Site and its surrounding area are located in an area covered with fine-course textured glaciolacustrine deposits and older alluvial deposits, according to the "Surficial Geology of Southern Ontario" database maintained by the OGS.

2.3.3 Site Stratigraphy

As indicated in the appended Borehole Logs the soil stratigraphy at the Site generally consists of fill materials below pavement structure or topsoil, underlain by cohesionless silty/sandy soils. No bedrock was encountered at the maximum drilled depth of approximately 9.6 mBGS.

Detailed descriptions of soil strata encountered in the boreholes drilled at the Site are provided on the Borehole Logs in Appendix A.

2.4 Hydrogeology

The hydrogeological conditions at the Site were evaluated based on the information obtained from the Ministry of Natural Resources and Forestry and the Ontario Source Protection Information Atlas, the water well data collected from the MECP database, the information obtained during the geotechnical investigation, and the data collected from the additional work conducted at the Site.

2.4.1 Highly Vulnerable Aquifer ("HVA")

Based on the Ontario Source Protection Information Atlas, the Site is located in an area with a Highly Vulnerable Aquifer ("HVA"). HVAs are delineated according to Technical Rules under the Clean Water Act. In general, an HVA will consist of source granular aquifer materials or fractured rock that have a high permeability and are exposed near the ground surface with a relatively shallow water table.

An aquifer is indicated as vulnerable if possible contaminants could quickly flow into it and impact water quality. In addition, a plume of the possible contaminants would migrate quickly within an HVA.

2.4.2 MECP WWR

A search of the MECP WWR database was conducted focusing on a 500 m radius from the Site. The locations of the MECP water wells are shown on Drawing No. 4. A summary of water well records is included in Appendix B and presented in the following table.

Types of Well Record	Number of Records
Commercial	1
Domestic	3
Industrial	3
Municipal	1
Monitoring	11
Monitoring and Test Hole	7
Not Used	7
Unknown	25
Total	**58**

Eight (8) well records are identified in the MECP WWR database as water supply wells. No bedrock was encountered at the maximum recorded depth of 42.4 mBGS, and water was reported at recorded depths ranging from 1.5 to 15.5 mBGS in overburden deposits.

As the MECP WWR coordinate data is unreliable, the wells plotted on the drawing should be considered as reference only. If more accurate information is needed for the wells, a door-to-door well survey may be considered.

2.4.3 Wellhead Protection Area ("WHPA")

Based on the Ontario Source Protection Information Atlas, southwest portion of the Site is located within municipal Wellhead Protection Areas WHPA-B and WHPA-C, where water (and pollutants) moves through the aquifer toward the municipal well in 2 to 5 years. The nearest municipal well is approximately 450 m southwest of the Site.

2.4.4 Intake Protection Zone ("IPZ")

Based on the information obtained from the Ontario Source Protection Information Atlas, the Site and its neighboring properties are not located within a municipal surface water intake protection zone ("IPZ").

2.4.5 Provincially Significant Wetland ("PSW")

Based on the information obtained from the Ministry of Natural Resources and Forestry, northwest corner of the Site is located within a PSW.

2.4.6 Groundwater Levels

Groundwater conditions were observed in the advanced boreholes during and immediately upon completion of drilling. The observations are included on the Borehole Logs in Appendix A.

Groundwater levels were measured between September 14, 2022 and December 13, 2023 in all GeoPro's monitoring wells (BH1 and BH3).

The monitoring well construction details and the measured groundwater levels are recorded on the appended Borehole Logs and summarized in the following table.

Monitoring Well ID	Screen Interval (mBGS)	Groundwater Level (mBGS)				
		September 14, 2022	March 23, 2023	June 16, 2023	September 13, 2023	December 13, 2023
BH1	3.1 ~ 6.1	4.65	4.25	4.44	4.60	4.51
BH3	3.0 ~ 6.0	4.73	4.36	4.51	4.70	4.66

As shown in the above table, groundwater levels ranged from 4.25 to 4.73 mBGS during the monitoring period.

Groundwater is expected to flow northwards towards Patterson Creek; however, the extensive underground infrastructure in this urban setting may influence local groundwater flow patterns.

It should be noted that the groundwater levels can be expected to vary over time and are subject to seasonal fluctuations.

2.4.7 Groundwater Quality

Groundwater sampling was conducted on September 20, 2022 by GeoPro from Monitoring Well BHMW5. The groundwater samples were collected in appropriate laboratory-supplied containers, placed in a cooler, and submitted to ALS Environmental ("ALS") in Waterloo, Ontario for analysis of selected physical and chemical parameters as specified in the Norfolk Sanitary Sewer Use Bylaw ("the Local Sewer-Bylaw"). The analytical results are provided in Appendix C.

The results were compared with the respective criteria specified in the Local Sewer Bylaw. Based on the comparison, exceedances of the sanitary criteria were measured for Total Suspended Solids ("TSS"), iron,

manganese in the analyzed groundwater samples. Exceedances of PWQO were measured for phosphorus, aluminum, arsenic, cadmium, cobalt, copper, iron, lead, nickel, silver, vanadium, zinc in the analyzed groundwater samples. A summary of the exceedances is presented in the following table.

Sample ID	Parameter	Total Concentration	Sanitary	PWQO	Unit
BHMW5	TSS	16300	350	-	mg/L
	Iron	**90.9**	50	0.3	mg/L
	Manganese	10.4	5	-	mg/L
	Phosphorus	**0.618**	10	0.01	mg/L
	Aluminum	**41.4**	50	0.015	mg/L
	Arsenic	**0.0240**	1	0.005	mg/L
	Cadmium	**0.000659**	0.1	0.0001	mg/L
	Cobalt	**0.0366**	5	0.0009	mg/L
	Copper	**0.131**	2	0.001	mg/L
	Lead	**0.0523**	3	0.001	mg/L
	Nickel	**0.0798**	3	0.025	mg/L
	Silver	**0.000194**	5	0.0001	mg/L
	Vanadium	**0.0895**	5	0.006	mg/L
	Zinc	**0.252**	2	0.02	mg/L

Notes: **41.4** = sample concentration exceeds the PWQO criteria
16300 = sample concentration exceeds the sanitary criteria

3.0 ESTIMATED HYDRAULIC CONDUCTIVITY

Hydraulic conductivity (K-value) of the soils was estimated based on the results obtained from grain size analysis of selected soil samples.

3.1 Grain Size Distribution Method

Grain size analysis (sieve and hydrometer) was conducted on two (2) soil samples collected from boreholes BH2 and BH3. The grain size analyses results are presented in Figure No. 1.

The hydraulic conductivity of the selected soil samples was estimated using applicable empirical equations based on the particle size gradations. It should be noted that where effective particle size was not observed during grain size analysis testing, the value was approximated for the empirical hydraulic conductivity calculations.

The hydraulic conductivity of the selected soil samples was estimated using applicable empirical equations based on the particle size gradation details. As shown in the table below, the estimated K value for the tested soil ranged from 2.4 x 10^{-8} cm/s to 2.5 x 10^{-2} cm/s.

Borehole ID	Sample #	Soil sample Depth (mBGS)	Soil Type	K Value (cm/s)
BH2	SS6	4.6 – 5.0	Sand	2.5 x 10^{-2}
BH3	SS4	2.3 – 2.7	Silt	2.4 x 10^{-8}

4.0 TEMPORARY DEWATERING REQUIREMENTS

Temporary dewatering is intended to lower the groundwater table within the excavation area in order to provide a "dry" working condition during excavation and installation operations.

The temporary dewatering flow rate generally depends on the design specifications of the proposed structures (such as invert elevation, length, depth, size, etc.), the site hydrogeological conditions (such as existing groundwater levels and flow regime), and the drawdown levels required for maintaining dry working conditions and stable excavation bases and slopes.

4.1 The Project Concept

Based on the concept site plan and design information provided by the Client dated June 14, 2022, the proposed development consists of townhouse blocks and 4-storey mid-rise building with excavation depth of 4 mBGS.

A copy of the concept site plan is provided in Appendix D.

4.2 Excavation and Temporary Dewatering Requirements

Groundwater levels measured in the on-site monitoring wells range from 4.25 to 4.73 mBGS during the monitoring period. Considering seasonal fluctuations, the initial water level for dewatering is assumed to be 0.5 m higher than the highest measured groundwater level (e.g., 3.75 mBGS). As a result, the excavations for the project are anticipated to occur below the groundwater table, and temporary dewatering or groundwater control is anticipated to lower the water level to at least 1 m below the excavation base to achieve dry work conditions for the excavation and installation.

Dewatering involves controlling groundwater by pumping, to locally lower groundwater levels in the vicinity of the excavation. Sump pumping is the simplest form of dewatering, by which groundwater is allowed to enter the excavation, and is then collected in a sump and pumped away by robust solids-handling pumps. Sump pumping can be effective in many circumstances, but continual seepage into the excavation may create the risk of instability and other problems.

To prevent significant groundwater seepage into the excavation and ensure stability of the excavation base and side slopes, it may be necessary to lower groundwater levels prior to excavation, which is known as 'pre-drainage'. The pre-drainage methods may include deep wells, wellpoints, eductors (ejectors), vacuum wells, horizontal wells, etc.

Excavations for the Project are anticipated to cut through fill materials and cohesionless silty/sandy soils. Considering the nature of the cohesionless soils, pre-drainage groundwater control measures using wells and/or well points should be considered in conjunction with conventional sump pumping.

4.3 Temporary Dewatering Estimation

The following assumptions are considered in estimating the temporary dewatering requirements:

- An initial groundwater level at 3.75 mBGS;
- A target water level 1 m below the excavation bottom;
- Excavation width to be 2 m plus the proposed estimated width;
- Excavation length to be 2 m plus the proposed estimated length;
- The geometric mean of the hydraulic conductivity values obtained from grain size (2.5×10^{-3} cm/s or 2.5×10^{-5} m/s) was used for the dewatering rate estimation, which was assumed for all water bearing soils encountered by the excavation.

The following Dupuit-Thiem equation was used to calculate radial flow to an open excavation from an unconfined aquifer under steady-state condition:

$$Q = [\pi \times K \times (H^2 - h_W^2)]/Ln(R_o/r_e)$$

Where:

Q = Flow Rate [m^3/s]

H = Initial Water Level [m]

h_w = Target water Level [m]

K = Hydraulic Conductivity [m/s]

r_e = effective radius [m], r_e = (excavation area/ $\pi)^{0.5}$ [m]

$R_o = 3000*(H-h_w)*K^{1/2}$ [m]

Based on the calculations shown above, the estimated steady-state groundwater inflow rate for the Project is summarized in the following table:

Type	Steady-State Dewatering Rate (L/day)
Entire Site	2,887,876

It should be noted that the dewatering requirement is expected to be highest at the beginning of the dewatering process, when the volume of groundwater stored within the pore space of the soil matrix must be removed. The additional pumping rates to be considered to allow removal of the overburden storage within 30 days for the Project are summarized in the following table:

Type	Removal of Overburden Storage (L/day)
Entire Site	449,596

During and after storm events, significantly higher dewatering flow rates are anticipated to account for direct precipitation and runoff into the excavation. The highest recorded daily rainfall at a nearby Environment Canada station (DELHI CDA) is 138.8 mm (based on data from Environmental Canada).

Assuming removal of a 138.8 mm storm event within 24 hours, the additional pumping capacities for the Project are summarized in the following table:

Type	Removal of Precipitation (L/day)
Entire Site	4,941,211

Based on the conservative assumptions described above, a total maximum daily dewatering flow rates for the Project were summarized in the following table:

Type	Estimated Total Dewatering Rate (L/day)
Entire Site	8,278,682

Based on the conservative assumptions described above, the total maximum daily dewatering flow rate for the Project would be more than 400,000 L/day, with consideration of removal of the aquifer storage within a 30-day period and storm events. The maximum estimated zone of influence for dewatering the entire site area would be 19 m from the edge of the excavation.

It should be noted that the assumed excavation depths and areas for the dewatering volume estimation are based on our understanding of the proposed development and the preliminary information provided by the Client. Should there be any modifications of the design or the assumed depths and areas, or if dewatering of the project is proposed to take place in phases, this office should be further consulted, and the dewatering estimation will need to be revised accordingly.

It is known that the subsurface soil conditions may change significantly between and beyond the on-site boreholes. As the information obtained and assumptions made in this investigation report are based on the results obtained from a limited number of investigated locations, unexpected water bearing zones with a hydraulic conductivity higher than that used in these calculations may be present. In addition, the above estimated dewatering volumes are based on the estimated hydraulic conductivities (K-value) from a limited number of grain size analysis.

Please note that it is the responsibility of the contractor to ensure dry conditions are maintained within the excavation at all times and at all costs.

4.4 Preliminary Long-term Dewatering or Under-slab Drainage

Considering the groundwater levels to the proposed basement level, unless all foundations are designed to be waterproof and resist hydrostatic uplift a sub-slab drainage system or foundation drainage/weeping tile system in conjunction with a perimeter drainage system should be installed for long-term control of the groundwater level to avoid wet conditions in the basement. The drainage system should be connected to a storm sewer system to provide a positive drainage, or alternatively, the water seepage collected from the drainage system can be discharged to a LID facility installed at the Site.

The basement slab elevations are not known at the time of preparing this preliminary hydrogeological assessment report. Should the basement level be sufficiently above the prevailing ground water tables, long-term groundwater control may not be anticipated.

4.5 Permit-to-Take-Water/Regulatory Registration

According to O. Reg. 387/04, any water taking over 50,000 litres per day requires a Permit to Take Water ("PTTW"), which shall be obtained in accordance with the MECP's PTTW Manual, dated April 2005.

According to O. Reg. 63/16, a PTTW will not be required for temporary dewatering at a construction site in an amount less than 400,000 L/day. However, the dewatering at a construction site in an amount between 50,000 L/day and 400,000 L/day shall be registered through the Environmental Activity and Sector Registry ("EASR").

According to the dewatering rate estimations, the total temporary dewatering rate of the proposed development would more than 400,000 L/day, for which a Category 3 PTTW will be required.

The basement slab elevations and long-term stable groundwater tables are not known at the time of preparing this preliminary hydrogeological assessment report. However, subject to the final designed basement slab and the stable groundwater tables, the long-term drainage rate may exceed the limit of 50,000 L/day; should this be the case, a long term PTTW will be required for the permanent drainage.

It is important to consider the permanent drainage would require a Sewer Use permit from the local municipality to allow discharge to the municipal storm or sanitary sewer. As noted below, temporary dewatering will either require a Sewer Use permit, or haulage and disposal of discharge effluent from the Site.

5.0 POTENTIAL TEMPORARY DEWATERING IMPACTS

5.1 Potential Sources of Contamination

As exceedances of the local Sewer Use By-Law were measured in the on-site groundwater sample, and roadways and commercial/industrial properties are present adjacent to the site and within the study area, treatment of pumped water prior to discharge may be required to satisfy the local Sewer Use By-Law should be considered when designing a dewatering system.

Please note that the level of environmental issues outlined herein is meant to provide a broad indication of environmental concerns. The input contained in this report should not be considered a warranty with respect to environmental evaluation or assessment of the subject site for any specific purpose. Furthermore, it must be noted that our scope of work was limited to the preliminary opinion of potential environmental concerns; the scope of work did not include any environmental evaluation or assessment of the subject site (such as a Phase One or Phase Two Environmental Site Assessment).

5.2 Highly Vulnerable Aquifer ("HVA")

As discussed previously, the Site is located in an area with a HVA present beneath the Site, which indicates that contaminants could potentially affect the aquifer if contamination occurs at the Site.

Any drinking water quality threat activities may pose a risk to a municipal or domestic drinking water supply. Frequent monitoring of the excavation and installation activities should be carried out during the project. Any products considered flammable, corrosive, hazardous, or which may contain chemicals that could contaminate a drinking water source should be stored, used, and disposed of properly following a Spill Management Plan for the project. Waste which contains pathogens that can run into storm sewers during a rainstorm should be properly managed and disposed of following a Spill Management Plan for the project. Preventative measures (such as the implementation of safe equipment fueling practices) should be in place during excavation and installation, and spill management equipment should be readily available on-site during the project.

5.3 Intake Protection Zone

As discussed previously, the Site and its neighboring properties are not located within an Intake Protection Zone. Therefore, impact on a surface water intake source due to the temporary dewatering activities should not be anticipated.

5.4 Water Supply Wells near the Site Area

Based on the MECP water well records, no water supply wells are located within the estimated zone of influence. Therefore, the impact on the water supply wells due to the temporary dewatering activities may not be anticipated. The data in the MECP WWR may not be up to date and may not be accurate, as such, a door-to-door well survey to confirm the existence of water supply wells in the neighboring properties may be considered.

5.5 Wellhead Protection Sensitivity Area

As discussed previously, the Site and its neighboring properties are located within a wellhead protection area WHPA-B and WHPA-C. Therefore, impact on the municipal supply wells due to the temporary dewatering activities should be anticipated and mitigated following the guidelines outlined previously in Section 5.2.

5.6 Surface Water

As discussed previously, PSW and Patterson Creek are located within the estimated zone of influence. Therefore, impact on PSW and Patterson Creek due to the temporary dewatering activities should be anticipated.

5.7 Ground Subsidence in Adjacent Structures

Under certain conditions, dewatering activities can cause ground settlement or subsidence. When groundwater levels are lowered in the soil deposits, effective stresses will be increased, and consolidation and subsequent settlement may occur.

During the site visit, catch basins, manholes, and residential and commercial properties were noted along the roadways on or near the Site within the preliminarily calculated radius of influence of dewatering. Therefore, potential impacts associated with the temporary dewatering should be considered for the buildings, structures, roadways, and underground utilities which are located within the estimated zone of influence.

6.0 RECOMMENDATIONS

6.1 PTTW Application

- Based on the preliminary dewatering calculations presented above, the total temporary dewatering rate is more than 400,000 L/day, for which a Category 3 PTTW will be required. In addition, subject to the final designed basement slab and the stable groundwater tables, the long-term drainage rate may exceed the limit of 50,000 L/day; should this be the case, and a separate Category 3 PTTW for long-term drainage will be required.
- The PTTW application should be conducted in accordance with the Permit to Take Water Manual, dated April 2005, issued by Ministry of the Environment and Climate Change.
- The PTTW application process will generally take a minimum of three (3) months.

6.2 Municipal Sewer Use Permit

- Should discharge of temporary dewatering effluent to the municipal sewers be desired, a Sewer Use permit would be required for temporary construction dewatering.
- The process of obtaining a Sewer Use permit can take six to twelve months or more, depending on the review and turnaround time at the City. We would recommend that the application be started as soon as practical.

6.3 Point of Discharge

As discussed, catch basins and manholes were noted along the roadway on or near the Site during the site visit. Prior to the start-up of dewatering operations, samples of groundwater shall be obtained from the dewatering system and submitted for analysis of the appropriate Sewer Use By-Law parameters. It should be noted that filtration and/or settlement of the pumped water prior to discharge would be expected to improve the water quality.

Installation of an appropriate water filtration/treatment system designed to address any measured exceedances will be necessary prior to the start-up of dewatering. Should the treated water meet the Local Sewer Bylaw criteria, the water generated could be discharged into the local municipal sewer system

provided a Municipal Sewer Use Permit is in place. In addition, during discharge, the water quality must be in compliance with the requirements set up in the Local Sewer Use By-Law.

As an option, the water generated could be hauled and disposed off-site in a licensed water treatment facility; however, a cost analysis would need to be performed to compare treatment and discharge costs to haulage costs.

6.4 Discharge Permit

Should discharge into the local sewer system be selected, prior to temporary dewatering consultations with the local municipality should be conducted to obtain a permit to use the selected sewer system for the water generated during the excavation and installation.

It should be noted that in support of applying for a discharge permit, a temporary dewatering plan may be required by the local municipality.

6.5 Temporary Dewatering Plan

Prior to the dewatering activities, a temporary dewatering plan shall be prepared by the selected contractor for GeoPro's review.

It should be noted that the design and installation of a temporary dewatering system is the responsibility of the construction contractor, including selection of a sump pump, wellpoint system or well system. The extent and details of the dewatering scheme (well size, spacing, pump level, screen size, wick gradation, etc.) are left solely to the contractor's discretion to achieve the performance objectives for stable slopes and dry conditions and will be based on their own interpretation and analysis of the site conditions, equipment, experience and system efficiency.

Once the pumping system, header pipes and a decanter tank/holding tank are installed, a trial dewatering for a short period of time should be conducted to obtain a representative groundwater sample from the decanting tank for chemical analysis to confirm the water quality.

6.6 Building/Structure Settlement Monitoring

As discussed above, structures located within the zone of influence may be susceptible to potential settlement or subsidence due to the temporary dewatering. Therefore, the following monitoring and mitigative measures are recommended to be carried out before and during the temporary dewatering:

- Complete a pre-excavation condition survey and install settlement monitoring monuments for the existing buildings and roadways within the estimated zone of influence.

- The settlement monitoring monuments should be surveyed prior to the dewatering to establish a baseline and surveyed on a daily basis during the dewatering. The survey results will be provided to the geotechnical engineer of GeoPro for evaluation. The estimated potential and actual

settlements should also be reviewed by a structural engineer to assess the potential damage to the existing structures.

- If the settlement monitoring indicates an undesirable deformation, the dewatering will have to be reduced to a lower rate or ceased temporarily, and alternative measures may be considered for the excavation, which should be approved by the geotechnical engineer and project team.

6.7 Surface Water Monitoring and Contingency/Mitigation Measures

As discussed above, PSW and Patterson Creek may be impacted due to the temporary dewatering activities because of their proximity to the excavation site. Therefore, monitoring of the creeks and PSW may be necessary.

6.7.1 Baseline Study

A baseline study of the river and tributaries within the estimated zone of influence should be conducted to establish the pre-dewatering water level, baseflow and water quality conditions, which may include chemical testing of surface water samples for general metals and inorganics or other parameters per recommendations from the local Conservation Authority.

6.7.2 Surface Water Level and Baseflow Monitoring

The monitoring of the water levels of the creek and PSW at the staff gages installed at the upstream and downstream locations will be conducted daily during the dewatering activities. Should adverse impact be observed during the dewatering, the dewatering volume should be reviewed and modified appropriately. If required, water with acceptable water quality which meets the Provincial Water Quality Objectives ("PWQO") standards may be introduced to the Creek and PSW to maintain the baseflow in the Creek and PSW.

6.7.3 Surface Water Quality Monitoring

As the pumped water is not expected to be discharged to the Creek and PSW, the surface water quality impacts are not anticipated. However, if significant water level changes occur during temporary dewatering, water sampling and chemical testing may be required to assess any change in surface water quality. Should adverse impact be observed during the temporary dewatering, the dewatering volume may need to be modified. If required, water with acceptable water quality which meets the Provincial Water Quality Objectives ("PWQO") standards may be introduced to the Creek and PSW to maintain the baseflow in the Creek and PSW.

6.8 Groundwater Monitoring and Contingency/Mitigation Measures for Temporary Dewatering

Prior to commencement of the temporary dewatering, water level measurements shall be obtained from all on-site monitoring wells to verify the assumed water levels used in the calculations. If significant variation occurs, the dewatering volume calculations may be reviewed and updated.

6.8.1 Total Dewatering Volume

- The pumping rate and discharged volume shall be measured daily using a flow measuring device to ensure that the dewatering rate/volume does not exceed the approved or accepted limits.

- If the measured daily volume exceeds the approved limit, either the dewatering methodology or the construction methodology will need to be altered to ensure the maximum permitted rate is not exceeded.

- The contractor on behalf of the Client shall maintain a record of all water takings, including the dates and durations of water takings, and the rates and total measured volumes of water pumped per day for each day that water is taken under the permit.

6.8.2 Water Quality

Depending on the selected point of discharge, water quality should be regularly monitored during the temporary dewatering to ensure that discharge meets the relevant Local Sewer Use By-Law quality criteria.

As TSS is an important parameter which may directly reflect the water quality, a treatment facility should be considered to reduce the concentration of suspended solids in the pumped water.

Prior to discharge of the treated water, a representative water sample should be collected and analyzed for the parameters specified in the applicable standards or criteria. During the temporary dewatering, daily field monitoring of the TSS and turbidity in the water to be discharged should be carried out at the first week of dewatering to establish the approximate correlation of the TSS and turbidity, which can be used for daily monitoring; a confirmatory testing of TSS should be considered on a weekly basis if required.

In addition, groundwater quality shall be monitored via chemical testing for parameters as specified in the local Sewer Use By-Law weekly for the first month. If the results demonstrate that groundwater quality consistently meets the applicable standards, the monitoring frequency can be reduced to once each month afterwards.

6.9 Groundwater Monitoring and Contingency/Mitigation Measures for Long-Term Drainage

If basements are not designed to be waterproof and resist to hydrostatic uplift, and long-term under slab drainage is used to control groundwater levels beneath the foundations, long-term monitoring and mitigation measures may need to be implemented as part of a long-term Sewer Use agreement with the local municipality. Consultation with the local municipality may be required to understand the scope of the required monitoring and mitigation program.

6.10 Monitoring Well Decommissioning

According to Ontario Regulation 903 (“O. Reg. 903”), when the monitoring wells are no longer used, they should be decommissioned by a licensed water well contractor.

7.0 CLOSURE

We trust that the information contained in this report is complete within our terms of reference. If you have any questions or require further information, please do not hesitate to contact our office.

Sincerely,

GeoPro Consulting Limited

Geotechnical - Hydrogeology - Environmental - Materials Testing – Inspection

Nick Lan

David B. Liu, P.Eng., Principal

DRAWINGS

Prepared by: DP	Rev: NL	Approved: DL	Scale: As Shown	Project No.: 22-4078H	Drawing No.: 1	Original Size: Letter
Date: August 2022	Client: HFW Holdings Limited	Title: Site Location Plan	Project: Prliminary Hydrogeological Assessment Proposed Residential Development 395-411 Queensway West, Simcoe, Ontario		GeoPro Consulting Limited	

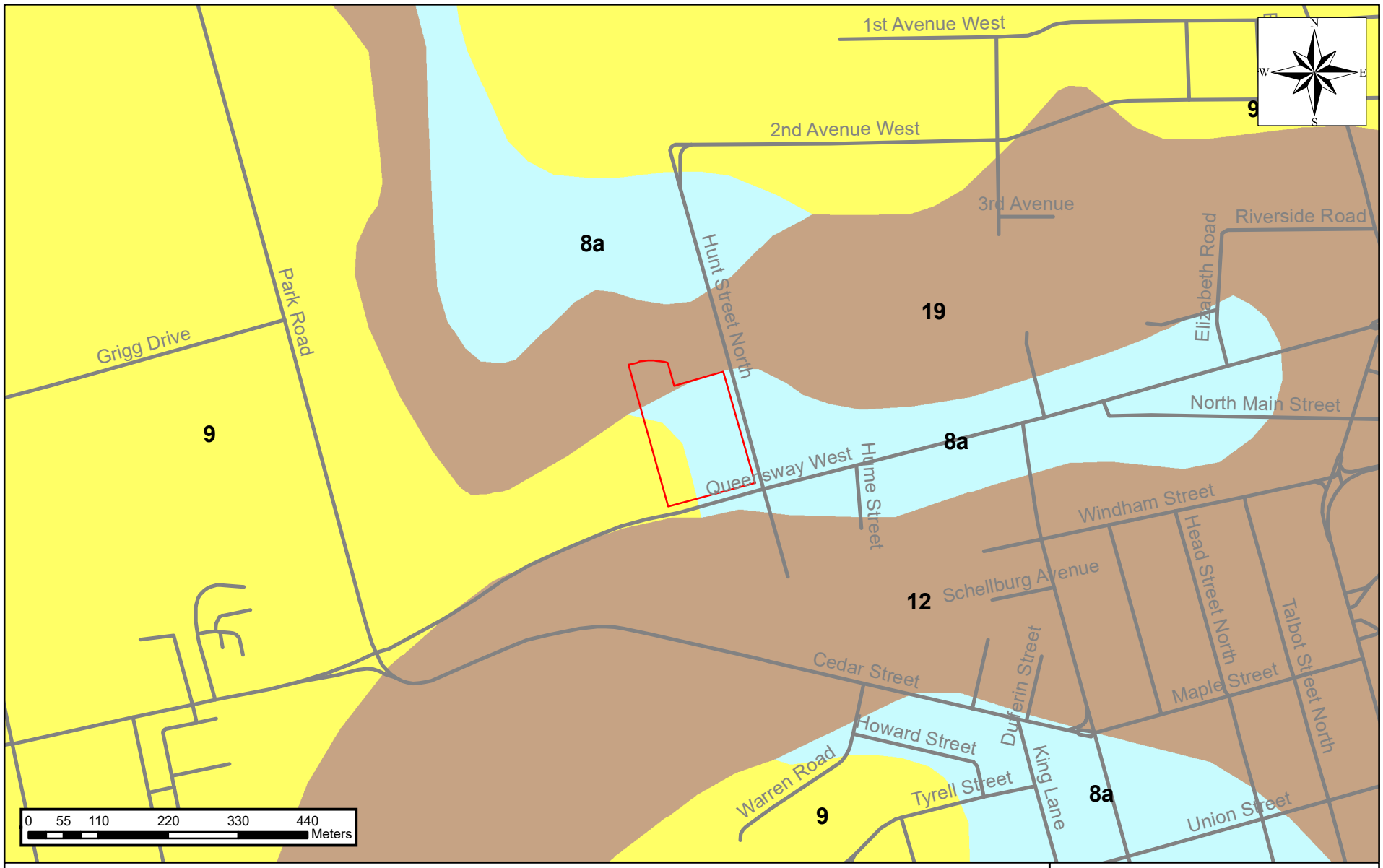
Legend

Site Location

Borehole Location

Monitoring Well Location

Client: **HFW Holdings Limited**		Project No.: **22-4078H**	Drawing No.: **2**
Prepared by: **BN**	Approved: **DL**	Title:	**Borehole/Monitoring Well Location Plan**
Date: **Nov 2022**	Scale: **As Shown**	Project:	**Prliminary Hydrogeological Assessment Proposed Residential Development 395-411 Queensway West, Simcoe, Ontario**
Original Size: **Letter**	Rev: **NL**		*GeoPro* Consulting Limited

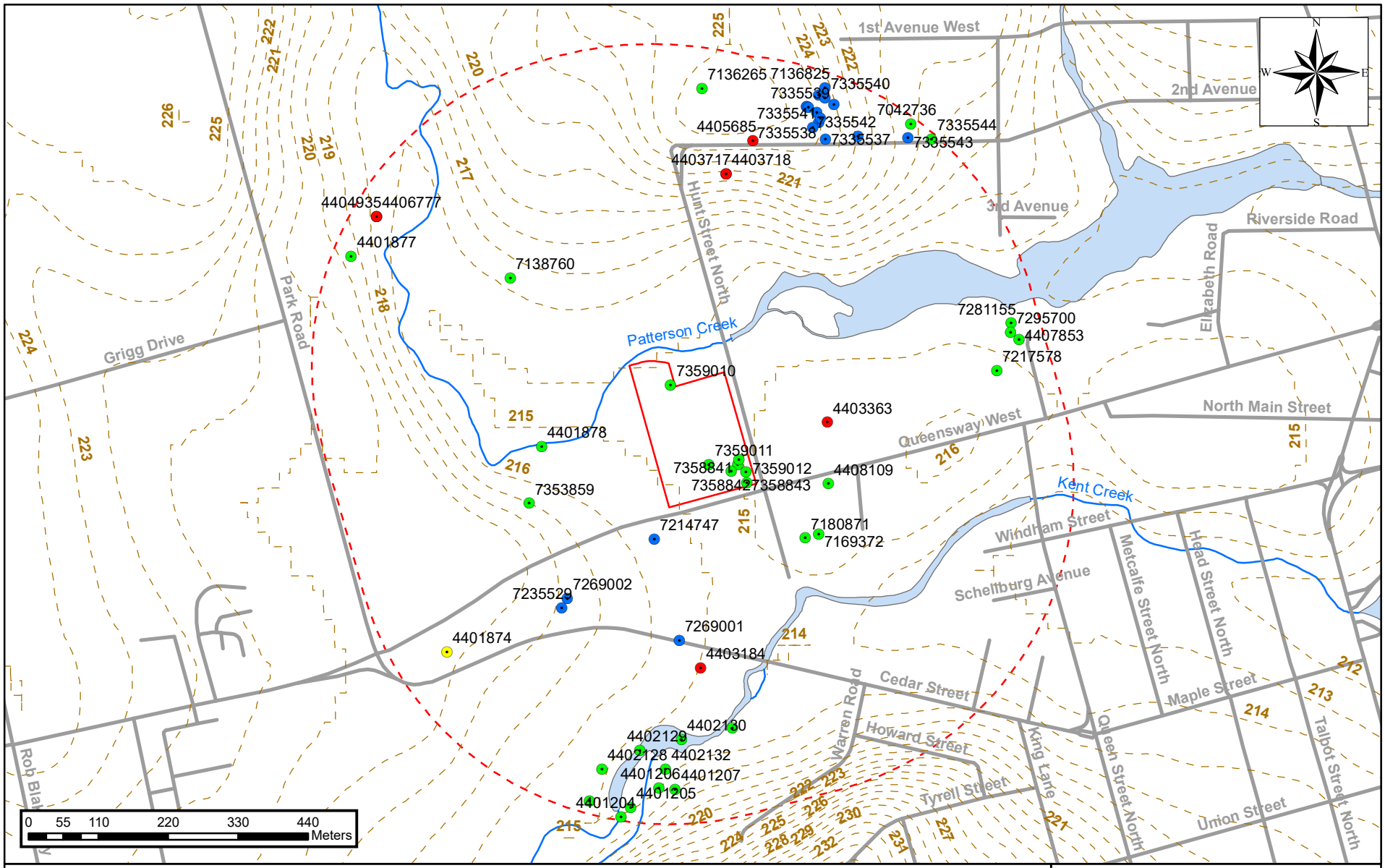


Legend

- Site Location
- 8a: Fine-textured glaciolacustrine deposits. Silt and clay, minor sand and gravel. Massive-well laminated
- 9: Coarse-textured glaciolacustrine deposits: sand, gravel, minor, silt and clay
- 12: Older alluvial deposits: clay, silt, sand, gravel, may contain organic remains

Map Sources:
1. Surficial Geology of Southern Ontario
2. Natural Resources Canada

Prepared by: DP	Rev: NL	Approved: DL	Scale: As Shown	Project No.: 22-4078H	Drawing No.: 3	Original Size: Letter
Date: August 2022	Client: HFW Holdings Limited	Title: Surficial Geology	Project: Preliminary Hydrogeological Assessment Proposed Residential Development 395-411 Queensway West, Simcoe, Ontario		GeoPro Consulting Limited	



Legend

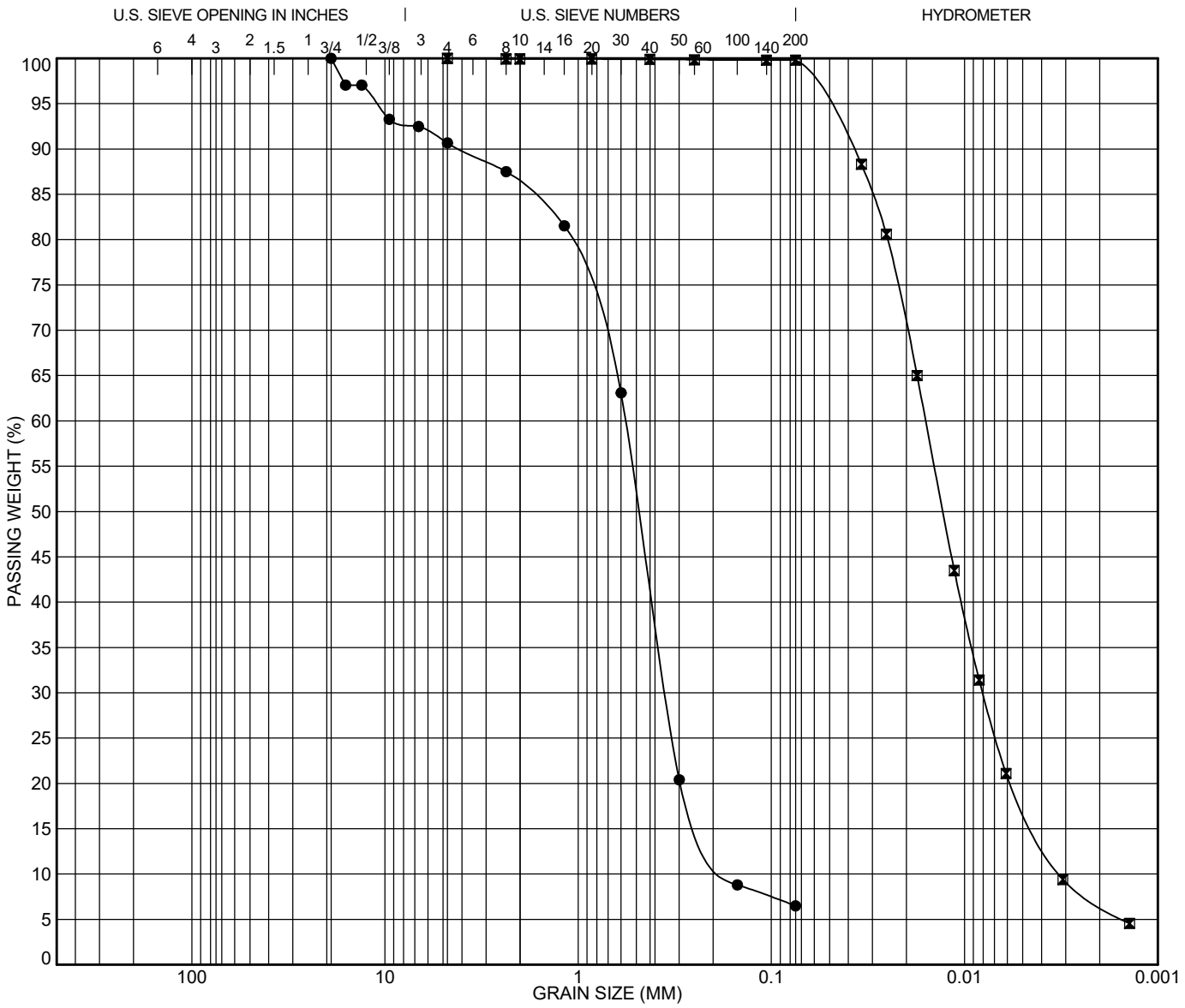
- Site Location
- 500 m Study Area
- Waterbody
- Watercourse
- Surface contour
- Road
- Railway
- Commercial / Domestic / Industrial
- Monitoring / Monitoring and Test Hole
- Municipal
- Not Used / Unknown

Map Sources:
1. Altas Canada - Toporama
2. MECP Water Well Database
3. Resources Canada

Prepared by: DP	Rev: NL	Approved: DL	Scale: As Shown	Project No.: 22-4078H	Drawing No.: 4	Original Size: Letter
Date: August 2022	Client: HFW Holdings Limited	Title: MECP Well Location Plan	Project: Preliminary Hydrogeological Assessment Proposed Residential Development 395-411 Queensway West, Simcoe, Ontario		GeoPro Consulting Limited	

Note: the MECP WWR coordinate data may not be accurate based on our previous experiences, as such, the wells plotted on the drawing should be considered as reference only.
If more accurate information of the wells is required, a door-to-door well survey should be considered.

FIGURES



COBBLES	GRAVEL		SAND			SILT	CLAY
	coarse	fine	coarse	medium	fine		

Specimen Identification				Classification	LL	PL	PI	Cc	Cu
●	**BH2**	**SS6**	**4.57**					**1.34**	**3.54**
⊠	**BH3**	**SS4**	**2.29**					**1.27**	**4.95**

Specimen Identification				D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**BH2**	**SS6**	**4.57**	**19**	**0.571**	**0.351**	**0.161**	**9.3**	**84.2**	**6.5**	
⊠	**BH3**	**SS4**	**2.29**	**4.75**	**0.016**	**0.008**	**0.003**	**0.0**	**0.2**	**93.1**	**6.7**

GeoPro CONSULTING LIMITED
Unit 57, 40 Vogell Road, Richmond Hill, Ontario L4B 3N6
Tel: 905-237-8336 Fax: 905-248-3699
office@geoproconsulting.ca www.geoproconsulting.ca

GRAIN SIZE DISTRIBUTION

PROJECT: Preliminary Geotechnical Investigation for Proposed Residential Development

LOCATION: 395-411 Queensway West, Simcoe, Ontario

PROJECT NO.: 22-4078GH | SAMPLED ON: 2022-09-01

FIGURE NO.: 1 | TESTED ON: 2022-09-22

APPENDIX A

ENCLOSURES

Enclosure 1A: Notes on Sample Descriptions

1. Each soil stratum is described according to the *Modified Unified Soil Classification System*. The compactness condition of cohesionless soils (SPT) and the consistency of cohesive soils (undrained shear strength) are defined according to Canadian Foundation Engineering Manual, 4th Edition. Different soil classification systems may be used by others. Please note that a description of the soil stratums is based on visual and tactile examination of the samples augmented with field and laboratory test results, such as a grain size analysis and/or Atterberg Limits testing. Visual classification is not sufficiently accurate to provide exact grain sizing or precise differentiation between size classification systems.

2. Fill: Where fill is designated on the borehole log it is defined as indicated by the sample recovered during the boring process. The reader is cautioned that fills are heterogeneous in nature and variable in density or degree of compaction. The borehole description may therefore not be applicable as a general description of site fill materials. All fills should be expected to contain obstruction such as wood, large concrete pieces or subsurface basements, floors, tanks, etc., none of these may have been encountered in the boreholes. Since boreholes cannot accurately define the contents of the fill, test pits are recommended to provide supplementary information. Despite the use of test pits, the heterogeneous nature of fill will leave some ambiguity as to the exact composition of the fill. Most fills contain pockets, seams, or layers of organically contaminated soil. This organic material can result in the generation of methane gas and/or significant ongoing and future settlements. Fill at this site may have been monitored for the presence of methane gas and, if so, the results are given on the borehole logs. The monitoring process does not indicate the volume of gas that can be potentially generated nor does it pinpoint the source of the gas. These readings are to advise of the presence of gas only, and a detailed study is recommended for sites where any explosive gas/methane is detected. Some fill material may be contaminated by toxic/hazardous waste that renders it unacceptable for deposition in any but designated land fill sites; unless specifically stated the fill on this site has not been tested for contaminants that may be considered toxic or hazardous. This testing and a potential hazard study can be undertaken if requested. In most residential/commercial areas undergoing reconstruction, buried oil tanks are common and are generally not detected in a conventional preliminary geotechnical site investigation.

3. Till: The term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Because of this geological process the till must be considered heterogeneous in composition and as such may contain pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (60 to 200 mm) or boulders (over 200 mm). Contractors may therefore encounter cobbles and boulders during excavation, even if they are not indicated by the borings. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Because of the horizontal and vertical variability of till, the sample description may be applicable to a very limited zone; caution is therefore essential when dealing with sensitive excavations or dewatering programs in till materials.

GeoPro Consulting Limited

Geotechnical-Hydrogeology-Environmental-Materials-Inspection

Enclosure 1B: Explanation of Terms Used in the Record of Boreholes

Sample Type

AS	Auger sample
BS	Block sample
CS	Chunk sample
DO	Drive open
DS	Dimension type sample
FS	Foil sample
NR	No recovery
RC	Rock core
SC	Soil core
SS	Spoon sample
SH	Shelby tube Sample
ST	Slotted tube
TO	Thin-walled, open
TP	Thin-walled, piston
WS	Wash sample

Penetration Resistance

Standard Penetration Resistance (SPT), N:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in) required to drive a 50 mm (2 in) drive open sampler for a distance of 300 mm (12 in).

PM – Samples advanced by manual pressure
WR – Samples advanced by weight of sampler and rod
WH – Samples advanced by static weight of hammer

Dynamic Cone Penetration Resistance, N_d:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in) to drive uncased a 50 mm (2 in) diameter, 60° cone attached to "A" size drill rods for a distance of 300 mm (12 in).

Piezo-Cone Penetration Test (CPT):

An electronic cone penetrometer with a 60 degree conical tip and a projected end area of 10 cm² pushed through ground at a penetration rate of 2 cm/s. Measurement of tip resistance (Q_t), porewater pressure (PWP) and friction along a sleeve are recorded electronically at 25 mm penetration intervals.

Textural Classification of Soils (ASTM D2487)

Classification	Particle Size
Boulders	> 300 mm
Cobbles	75 mm - 300 mm
Gravel	4.75 mm - 75 mm
Sand	0.075 mm – 4.75 mm
Silt	0.002 mm-0.075 mm
Clay	<0.002 mm(*)

(*) Canadian Foundation Engineering Manual (4th Edition)

Coarse Grain Soil Description (50% greater than 0.075 mm)

Terminology	Proportion
Trace	0-10%
Some	10-20%
Adjective (e.g. silty or sandy)	20-35%
And (e.g. sand and gravel)	> 35%

Soil Description

a) Cohesive Soils(*)

Consistency Value	Undrained Shear Strength (kPa)	SPT "N"
Very soft	<12	0-2
Soft	12-25	2-4
Firm	25-50	4-8
Stiff	50-100	8-15
Very stiff	100-200	15-30
Hard	>200	>30

(*) Hierarchy of Shear Strength prediction

1. Lab triaxial test
2. Field vane shear test
3. Lab. vane shear test
4. SPT "N" value
5. Pocket penetrometer

b) Cohesionless Soils

Density Index (Relative Density)	SPT "N" Value
Very loose	<4
Loose	4-10
Compact	10-30
Dense	30-50
Very dense	>50

Soil Tests

w	Water content
w_p	Plastic limit
w_l	Liquid limit
C	Consolidation (oedometer) test
CID	Consolidated isotropically drained triaxial test
CIU	consolidated isotropically undrained triaxial test with porewater pressure measurement
D_R	Relative density (specific gravity, Gs)
DS	Direct shear test
ENV	Environmental/ chemical analysis
M	Sieve analysis for particle size
MH	Combined sieve and hydrometer (H) analysis
MPC	Modified proctor compaction test
SPC	Standard proctor compaction test
OC	Organic content test
U	Unconsolidated Undrained Triaxial Test
V	Field vane (LV-laboratory vane test)
γ	Unit weight

LOG OF BOREHOLE BH1

PROJECT: Preliminary Geotechnical Investigation for Proposed Residential Development

CLIENT: HFW Holdings Limited

PROJECT LOCATION: 395-411 Queensway West, Simcoe, Ontario

DATUM: N/A

BH LOCATION: See Borehole Location Plan

DRILLING DATA

METHOD: Continuous Flight Auger - Auto Hammer | DIAMETER: 155 mm

FIELD ENGINEER: DG/SN | DATE: 2022-08-31

SAMPLE REVIEW: IG | REF. NO.: 22-4078GH

CHECKED: DX | ENCL. NO.: 2

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	"N" BLOWS/0.3m	ELEVATION
0.0	**GRANULAR FILL:** (220 mm)	1A	SS		Concrete
0.2	**FILL:** sandy silt, trace silt, trace gravel, organic inclusions, rootlet inclusions, brown, moist, compact	1B	SS	19	
0.7	**FILL:** sand to gravelly sand, trace silt, brown, moist, loose to compact	2	SS	10	
		3	SS	21	Bentonite
		4	SS	23	
2.9	**FINE TO MEDIUM SAND:** some silt, brown, wet, compact	5	SS	23	
4.0	**SAND:** some silt, trace gravel, brown to grey, wet, compact	6	SS	17	Sand Screen 4.7mBGS Sep 14
	--- grey	7	SS	18	
		8	SS	21	Natural Pack
8.6	**SILT:** trace clay, trace sand, grey, wet, loose	9	SS	6	
9.6	**END OF BOREHOLE**				

DYNAMIC PENETRATION TEST: ○ SPT, ~ Cone, blows/0.3m; 20 40 60 80

SHEAR STRENGTH (kPa): ● Unconfined, ▲ Quick Triaxial, × Field Vane & Sensitivity, ⊠ Penetrometer, + Lab Vane; 20 40 60 80

Plastic Limit (w_P) | Natural Moisture Content (w) | Liquid Limit (w_L)

WATER CONTENT (%): 10 20 30 40

UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)

GR SA SI CL

Notes:

Continued Next Page

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +³, ×³: Numbers refer to Sensitivity; ▲ ε=3% Strain at Failure

LOG OF BOREHOLE BH1

PROJECT: Preliminary Geotechnical Investigation for Proposed Residential Development

CLIENT: HFW Holdings Limited

PROJECT LOCATION: 395-411 Queensway West, Simcoe, Ontario

DATUM: N/A

BH LOCATION: See Borehole Location Plan

DRILLING DATA

METHOD: Continuous Flight Auger - Auto Hammer

FIELD ENGINEER: DG/SN

SAMPLE REVIEW: IG

CHECKED: DX

DIAMETER: 155 mm

DATE: 2022-08-31

REF. NO.: 22-4078GH

ENCL. NO.: 2

ELEV / DEPTH (m)	DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" BLOWS/0.3m	GROUND WATER	ELEVATION	DYNAMIC PENETRATION TEST: ○ SPT ⌇ Cone blows/0.3m (20 40 60 80); SHEAR STRENGTH (kPa): ● Unconfined ✕ Field Vane & Sensitivity ▲ Quick Triaxial ⊠ Penetrometer + Lab Vane (20 40 60 80)	Plastic Limit / Natural Moisture Content / Liquid Limit (w_P w w_L); WATER CONTENT (%) (10 20 30 40)	UNIT WT (kN/m^3)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	1) Water encountered at a depth of 4.6 m below ground surface (mBGS) during drilling. 2) Water was at a depth of 4.7 mBGS upon completion of drilling. 3) Borehole caved at a depth of 5.5 mBGS upon completion of drilling. 4) 51 mm dia. monitoring well was installed in borehole upon completion of drilling. Water Level Readings Date W.L.Depth(mBGS) Sep. 14, 2022 4.65										

GROUNDWATER ELEVATIONS

Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ▲ ε=3% Strain at Failure

LOG OF BOREHOLE BH2

PROJECT: Preliminary Geotechnical Investigation for Proposed Residential Development

CLIENT: HFW Holdings Limited

PROJECT LOCATION: 395-411 Queensway West, Simcoe, Ontario

DATUM: N/A

BH LOCATION: See Borehole Location Plan

DRILLING DATA

METHOD: Continuous Flight Auger - Auto Hammer | DIAMETER: 155 mm

FIELD ENGINEER: DG/SN | DATE: 2022-08-31

SAMPLE REVIEW: IG | REF. NO.: 22-4078GH

CHECKED: DX | ENCL. NO.: 3

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	"N" BLOWS/0.3m
0.0	**GRANULAR FILL:** (250 mm)	1A	SS	
0.3	**FILL:** silty sand, trace gravel, organic inclusions, rootlet inclusions, brown, moist, loose to compact	1B	SS	22
		2	SS	5
1.4	**FILL:** gravelly sand, some silt, brown, moist, very loose	3	SS	2
2.1	**FILL:** sand, trace silt, trace gravel, organic inclusions, brown, moist, very loose to loose --- rootlet inclusions	4	SS	2
		5	SS	5
4.0	**SAND:** trace silt, trace gravel, brown, wet, compact	6	SS	13
		7	SS	16
6.6	**END OF BOREHOLE**			

Notes:

1) Water encountered at a depth of 4.6 m below ground surface (mBGS) during drilling.
2) Water was at a depth of 4.4 mBGS upon completion of drilling.
3) Borehole caved at a depth of 4.6 mBGS upon completion of drilling.

GROUND WATER ELEVATION

DYNAMIC PENETRATION TEST: ○ SPT, ≈ Cone, blows/0.3m; 20, 40, 60, 80

SHEAR STRENGTH (kPa): ● Unconfined, ✕ Field Vane & Sensitivity, ▲ Quick Triaxial, ⊠ Penetrometer, + Lab Vane; 20, 40, 60, 80

Plastic Limit (w_P) | Natural Moisture Content (w) | Liquid Limit (w_L)

WATER CONTENT (%): 10, 20, 30, 40

UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)

GR	SA	SI	CL
9	84	6	

GROUNDWATER ELEVATIONS

Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES: +³, ×³: Numbers refer to Sensitivity; ▲ ε=3% Strain at Failure

LOG OF BOREHOLE BH3

PROJECT: Preliminary Geotechnical Investigation for Proposed Residential Development

CLIENT: HFW Holdings Limited

PROJECT LOCATION: 395-411 Queensway West, Simcoe, Ontario

DATUM: N/A

BH LOCATION: See Borehole Location Plan

DRILLING DATA

METHOD: Continuous Flight Auger - Auto Hammer | DIAMETER: 155 mm

FIELD ENGINEER: DG/SN | DATE: 2022-09-01

SAMPLE REVIEW: IG | REF. NO.: 22-4078GH

CHECKED: DX | ENCL. NO.: 4

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	"N" BLOWS/0.3m	GROUND WATER / ELEVATION
0.0	**TOPSOIL:** (150 mm)				Concrete
0.2	**FILL:** silty sand, trace gravel, organic inclusions, rootlet inclusions, brown, moist, very loose	1	SS	3	
0.7	**FILL:** silt, trace to some clay, trace sand, organic inclusions, rootlet inclusions, layers of clayey silt, brown, wet, very loose	2A	SS	2	
1.0	**SILT:** trace clay, trace sand, layers of clayey silt, brown, wet, very loose to compact	2B	SS		Bentonite
		3	SS	1	
		4	SS	10	
2.9	**FINE TO MEDIUM SAND:** some silt, trace gravel, brown, moist, compact	5	SS	29	
4.0	**SAND:** trace to some silt, trace gravel, brown, wet, loose to compact				Sand / Screen / 4.7mBGS Sep 14
		6	SS	9	
		7	SS	17	Natural Pack
6.6	**END OF BOREHOLE**				

DYNAMIC PENETRATION TEST: ○ SPT, ≈ Cone, blows/0.3m; 20 40 60 80

SHEAR STRENGTH (kPa): ● Unconfined ✕ Field Vane & Sensitivity ▲ Quick Triaxial ⊠ Penetrometer + Lab Vane; 20 40 60 80

Plastic Limit / Natural Moisture Content / Liquid Limit; w_P w w_L

WATER CONTENT (%): 10 20 30 40

UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)

GR	SA	SI	CL
0	0	93	7

Notes:

1) Water encountered at a depth of 0.7 m below ground surface (mBGS) during drilling.
2) Water was at a depth of 4.8 mBGS upon completion of drilling.
3) Borehole caved at a depth of 5.2 mBGS upon completion of drilling.
4) 51 mm dia. monitoring well was installed in borehole upon completion of drilling.

Water Level Readings

Date	W.L.Depth(mBGS)
Sep. 14, 2022	4.73

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +³, ×³: Numbers refer to Sensitivity; ▲ ε=3% Strain at Failure

LOG OF BOREHOLE BH5

PROJECT: Preliminary Geotechnical Investigation for Proposed Residential Development

CLIENT: HFW Holdings Limited

PROJECT LOCATION: 395-411 Queensway West, Simcoe, Ontario

DATUM: N/A

BH LOCATION: See Borehole Location Plan

DRILLING DATA

METHOD: Continuous Flight Auger - Auto Hammer | DIAMETER: 155 mm

FIELD ENGINEER: DG/SN | DATE: 2022-09-01

SAMPLE REVIEW: IG | REF. NO.: 22-4078GH

CHECKED: DX | ENCL. NO.: 5

ELEV / DEPTH (m)	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" BLOWS/0.3m	GROUND WATER ELEVATION	DYNAMIC PENETRATION TEST (SPT / Cone, blows/0.3m) & SHEAR STRENGTH (kPa)	Plastic Limit / Natural Moisture Content / Liquid Limit; WATER CONTENT (%)	UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**PORTLAND CEMENT CONCRETE:** (340 mm)									
0.3	**FILL:** silty sand, trace gravel, organic inclusions, rootlet inclusions, brown, moist		1	AS						
0.8	**FILL:** sand, some silt, trace gravel, pockets/layers of silt, brown, moist, loose		2	SS	6					
1.4	**SILT:** trace to some clay, trace gravel, layers of clayey silt, pockets of sand, brown to grey, wet, loose to compact		3	SS	7					
			4	SS	9					
			5	SS	11					
	--- grey		6	SS	5					
5.6	**SAND:** trace silt, trace gravel, wet, brown, compact		7	SS	12					
			8	SS	23					
8.1	**END OF BOREHOLE**									

Notes:

1) Water encountered at a depth of 1.5 m below ground surface (mBGS) during drilling.
2) Water was at a depth of 4.6 mBGS upon completion of drilling.
3) Borehole caved at a depth of 4.6 mBGS upon completion of drilling.

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +³, ×³: Numbers refer to Sensitivity; ▲ ε=3% Strain at Failure

APPENDIX B

22-4078H

Well ID	East	North	Use Type
4403363	555714	4743810	Commercial
Total: 1			
4404935	555003	4744134	Domestic
4405685	555596	4744254	Domestic
4406777	555003	4744134	Domestic
Total: 3			
4403184	555514	4743422	Industrial
4403717	555554	4744202	Industrial
4403718	555554	4744202	Industrial
Total: 3			
4401874	555114	4743447	Municipal
Total: 1			
7136825	555681	4744307	Monitoring
7136825	555700	4744326	Monitoring
7136825	555710	4744338	Monitoring
7136825	555681	4744308	Monitoring
7136825	555697	4744299	Monitoring
7136825	555700	4744282	Monitoring
7214747	555441	4743626	Monitoring
7235529	555295	4743516	Monitoring
7269001	555480	4743465	Monitoring
7269002	555304	4743532	Monitoring
7348133	555724	4744311	Monitoring
Total: 11			
7335537	555711	4744256	Monitoring and Test Hole
7335538	555703	4744289	Monitoring and Test Hole
7335539	555684	4744306	Monitoring and Test Hole
7335540	555710	4744322	Monitoring and Test Hole
7335541	555690	4744275	Monitoring and Test Hole
7335542	555762	4744261	Monitoring and Test Hole
7335543	555841	4744258	Monitoring and Test Hole
Total: 7			
4401877	554964	4744072	Not Used
4402128	555359	4743262	Not Used
4402129	555419	4743292	Not Used
4402132	555459	4743262	Not Used
4407853	556015	4743940	Not Used
7042736	555845	4744281	Not Used
7136265	555516	4744336	Not Used
Total: 7			
4401188	555339	4743212	Unknown
4401189	555564	4743327	Unknown
4401204	555389	4743187	Unknown
4401205	555404	4743202	Unknown

4401206	555449	4743232	Unknown
4401207	555474	4743230	Unknown
4401878	555264	4743772	Unknown
4402130	555484	4743309	Unknown
4408109	555715	4743713	Unknown
7138760	555214	4744037	Unknown
7169372	555700	4743633	Unknown
7180871	555679	4743627	Unknown
7217578	555980	4743892	Unknown
7281155	556003	4743966	Unknown
7295700	556002	4743952	Unknown
7335544	555878	4744256	Unknown
7353859	555244	4743682	Unknown
7358616	555572	4743743	Unknown
7358841	555574	4743751	Unknown
7358842	555562	4743733	Unknown
7358843	555585	4743731	Unknown
7359010	555467	4743868	Unknown
7359011	555527	4743743	Unknown
7359012	555587	4743715	Unknown
7389906	555819	4744013	Unknown
Total: 25			

Summary of Well Types within 500 m Radius from the Site			
Well Types	Number of Record		Total
Commercial	1	7	58
Domestic	3		
Industrial	3		
Municipal	1	1	
Monitoring	11	18	
Monitoring and Test Hole	7		
Not Used	7	32	
Unknown	25		

Water Well Records

miércoles, 24 de agosto de 2022

2:10:39 p. m.

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
SIMCOE TOWN	17 555389 4743187 W	1963/08 2801	5					4401204 ()	BLCK LOAM 0001 MSND CLAY GRVL 0005 MSND GRVL 0019 SILT 0021
SIMCOE TOWN	17 555474 4743230 W	1963/08 2801	5					4401207 ()	LOAM 0001 CLAY MSND 0004 SILT 0023
SIMCOE TOWN	17 555404 4743202 W	1963/08 2801	5					4401205 ()	BLCK LOAM 0001 MSND GRVL CLAY 0003 MSND GRVL 0011 MSND CLAY GRVL 0019 CLAY SILT 0021
SIMCOE TOWN	17 555564 4743327 W	1959/11 2801	2					4401189 ()	BLCK MUCK 0005 BLCK MUCK MSND 0011 CLAY 0025 CLAY 0078 CLAY GRVL 0085 ROCK 0086
SIMCOE TOWN	17 556003 4743966 W	2016/10 7464						7281155 (C35013) A208349 P	
SIMCOE TOWN	17 555480 4743465 W	2015/10 6607	2,00			MO	0020 5	7269001 (Z219995) A192807	BRWN SAND GRVL FILL 0004 BLCK PEAT SAND SOFT 0006 BRWN SAND FSND 0012 GREY SILT SAND SOFT 0025
SIMCOE TOWN	17 555714 4743810 W	1974/09 3310	1	FR 0027	15//25/1:0	CO	0030 4	4403363 ()	BRWN SAND 0004 YLLW CLAY 0009 BLUE CLAY 0027 GREY CSND 0037
SIMCOE TOWN	17 556002 4743952 W	2017/08 7464						7295700 (C39126) P	
SIMCOE TOWN	17 555715 4743713 W	2004/04 7190	1,97	UK 0011			0005 10	4408109 (Z06383) A006787	BRWN GRVL SAND LOOS 0005 BRWN SAND SILT LOOS 0015
SIMCOE TOWN	17 555554 4744202 W	1976/10 5201	5	FR 0038	28/28/30/2:0	IN	0050 5	4403718 ()	YLLW FILL 0010 YLLW CLAY 0023 BLUE CLAY 0044 GREY CSND 0055
SIMCOE TOWN	17 555554 4744202 W	1976/10 5201	5	FR 0036	30/30/30/2:0	IN	0052 5	4403717 ()	YLLW FILL 0010 YLLW CLAY 0030 BLUE CLAY 0048 GREY CSND 0057
SIMCOE TOWN	17 555449 4743232 W	1963/08 2801	5					4401206 ()	BLCK LOAM 0001 MSND CLAY GRVL 0004 MSND 0010 SILT 0017
SIMCOE TOWN	17 555214 4744037 W	2009/01 7193						7138760 (Z76986) A072114 A	
SIMCOE TOWN	17 555339 4743212 W	1959/11 2801	2					4401188 ()	LOAM 0001 FSND MSND 0017 CLAY SILT 0020 SILT MSND 0040 CLAY 0077 CLAY SILT 0087 CLAY GRVL 0100 ROCK 0101
SIMCOE TOWN	17 555711 4744256 W	2019/01 7241	2		///:	MT	0045 5	7335537 (Z305000) A263186	BRWN SILT SAND CLAY 0014 GREY SILT SAND WBRG 0025 GREY SILT SAND CLAY 0043 BRWN CSND WBRG 0050
SIMCOE TOWN	17 555703 4744289 W	2019/01 7241	2		///:	MT	0025 5	7335538 (Z305329) A263192	GREY GRVL 0001 BRWN FILL 0005 BRWN SAND SILT 0022 GREY SAND SILT 0030

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
SIMCOE TOWN	17 555684 4744306 W	2019/01 7241	2		///:	MT	0025 5	7335539 (Z305327) A263193	GREY GRVL 0001 BRWN FILL 0005 BRWN SAND SILT 0022 GREY SAND SILT 0030
SIMCOE TOWN	17 555514 4743422 W	1973/11 5201	4	FR 0013	13/20/45/2:0	IN	0021 5	4403184 ()	GREY LOAM CMTD 0001 GREY GRVL 0003 BLCK PEAT 0013 GREY SAND 0026 BLUE CLAY 0031
SIMCOE TOWN	17 555710 4744322 W	2019/01 7241	2		///:	MT	0025 5	7335540 (Z305326) A263194	GREY GRVL 0001 BRWN FILL 0005 BRWN SAND SILT 0022 GREY SAND SILT 0030
SIMCOE TOWN	17 555690 4744275 W	2019/01 7241	2		///:	MT	0020 5	7335541 (Z305325) A263195	GREY GRVL 0001 BRWN FILL 0005 BRWN SAND SILT 0018 GREY SAND SILT 0025
SIMCOE TOWN	17 555762 4744261 W	2019/01 7241	2		///:	MT	0015 5	7335542 (Z305324) A263196	BRWN LOAM 0002 BRWN FILL 0004 BRWN SAND SILT 0016 GREY SAND SILT 0020
SIMCOE TOWN	17 555841 4744258 W	2019/01 7241	2		///:	MT	0015 5	7335543 (Z290286) A263142	GREY ---- 0001 BRWN FILL 0003 BRWN SILT SAND 0020
SIMCOE TOWN	17 555878 4744256 W	2019/01 7241	2		///:		0034 5	7335544 (Z305267) A263346	BLCK ---- 0003 BRWN SILT 0035 BRWN SAND 0039
SIMCOE TOWN	17 555572 4743743 W	2020/03 7241						7358616 (Z334575) A291898 P	
WINDHAM TOWNSHIP	17 555700 4743633 W	2011/09 7464						7169372 (M10996) A121616 P	
WINDHAM TOWNSHIP	17 555574 4743751 W	2020/04 7241						7358841 (Z337871) A288970 P	
WINDHAM TOWNSHIP	17 555980 4743892 W	2014/02 7147						7217578 (C25002) A149643 P	
WINDHAM TOWNSHIP	17 555724 4744311 W	2019/10 7241	2		///:	MO	0010 10	7348133 (Z323481) A281669	BRWN SAND SILT WBRG 0007 BRWN SILT SAND WBRG 0018 GREY SILT CLAY 0020
WINDHAM TOWNSHIP	17 555587 4743715 W	2020/03 7241						7359012 (Z334571) A291897 P	
WINDHAM TOWNSHIP	17 555527 4743743 W	2020/03 7241						7359011 (Z334572) A291896 P	

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
WINDHAM TOWNSHIP	17 555467 4743868 W	2020/03 7241						7359010 (Z334573) A291895 P	
WINDHAM TOWNSHIP	17 555679 4743627 W	2011/12 7464						7180871 (Z137853) A	
WINDHAM TOWNSHIP	17 555295 4743516 W	2014/09 7472	0,75			MO	0015 10	7235529 (Z200687) A168472	BRWN SILT FSND PCKD 0010 GREY SILT FSND PCKD 0025
WINDHAM TOWNSHIP	17 555562 4743733 W	2020/04 7241						7358842 (Z337869) A265739 P	
WINDHAM TOWNSHIP	17 555441 4743626 W	2013/11 7190	2			MO	0018 10	7214747 (Z180391) A146236	BRWN SAND GRVL LOOS 0002 BRWN SAND SILT LOOS 0028
WINDHAM TOWNSHIP	17 555304 4743532 W	2015/10 6607	2,00			MO	0010 5	7269002 (Z219996) A192835	BRWN SAND SILT SOFT 0007 BRWN SAND SOFT 0015
WINDHAM TOWNSHIP	17 555585 4743731 W	2020/04 7241						7358843 (Z337870) A265738 P	
WINDHAM TOWNSHIP 14 002	17 555845 4744281 W	2007/03 7282	1,97 1,97	FR 0012		NU	0027 5 0015 10	7042736 (Z66007) A048068	BLCK 0000 BLUE GRVL 0001 BRWN CSND 0005 BRWN FSND SILT 0020 BRWN SILT CLAY 0025 GREY MSND 0032 0044
WINDHAM TOWNSHIP CON 14	17 555244 4743682 W	2019/11 7190						7353859 (C44966) A281409 P	
WINDHAM TOWNSHIP CON 14 001	17 556015 4743940 W	2002/07 2801				NU		4407853 (249780) A	
WINDHAM TOWNSHIP CON 14 002	17 555516 4744336 W	2009/12 7147	1,25	FR 0008		NU MO	0005 10	7136265 (Z097824) A093031	BRWN FILL 0006 BRWN CLAY SILT TILL 0015
WINDHAM TOWNSHIP CON 14 002	17 555596 4744254 L	1990/06 5201	5	FR 0024	19/19/25/1:0	DO	0030 5	4405685 (78379)	BRWN LOAM 0002 BRWN CLAY 0017 BLUE CLAY 0024 GREY CSND 0035
WINDHAM TOWNSHIP CON 14 002	17 555681 4744307 W	2009/11 7238	2,00	UK 0051		MO		7136825 (M04691) A090716	BRWN SILT SAND 0049 BRWN SAND 0062
WINDHAM TOWNSHIP CON 14 003	17 555264 4743772 W	1960/11 2801	5					4401878 ()	BLCK CLAY MSND 0015 BLUE CLAY 0038 CLAY SILT 0050 SILT 0078 SILT CLAY 0090 CLAY 0138 ROCK 0139
WINDHAM TOWNSHIP CON 14 003	17 555114 4743447 W	1958/07 2608	2	FR 0005	//50/1:0	MN		4401874 ()	BLCK MUCK 0005 FSND 0011 CSND 0016
WINDHAM TOWNSHIP CON 14 003	17 554964 4744072 W	1960/10 2801	5	UK		NU		4401877 ()	FILL 0003 BLCK MUCK 0009 MSND GRVL 0011 CLAY 0021 FSND 0026 CLAY SILT 0077 CLAY 0124 CLAY BLDR 0133 ROCK 0134

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
WINDHAM TOWNSHIP CON 14 003	17 555003 4744134 L	1996/03 5201	1	UK 0015	15//10/2:30	DO	0022 4	4406777 (168582)	BLCK LOAM 0002 BRWN CSND 0015 GREY CSND 0026
WINDHAM TOWNSHIP CON 14 003	17 555003 4744134 L	1985/06 5201	4	FR 0023	23/23/10/1:30	DO	0048 4	4404935 ()	BLCK LOAM 0002 BRWN CLAY 0015 BRWN SAND 0023 BRWN SAND 0035 GREY CSND WBRG 0052
WOODHOUSE TOWNSHIP GORE 016	17 555359 4743262 W	1962/09 2801	2	FR	1///:	NU	0015 10	4402128 ()	GRVL MSND 0001 MSND SILT CLAY 0005 MSND SILT GRVL 0011 FSND CSND CLAY 0025 CLAY 0028
WOODHOUSE TOWNSHIP GORE 016	17 555459 4743262 W	1962/10 2801	2	FR	4///:	NU	0021 5	4402132 ()	MSND CLAY 0004 MSND 0025 MSND GRVL 0026 MSND SILT CLAY 0039
WOODHOUSE TOWNSHIP GORE 016	17 555484 4743309 W	1962/09 2801	5					4402130 ()	MSND GRVL 0001 BLCK MUCK 0003 MSND GRVL 0005 CLAY SILT 0051
WOODHOUSE TOWNSHIP GORE 016	17 555419 4743292 W	1962/09 2801	2	FR	0///:	NU	0019 5	4402129 ()	LOAM 0001 MSND 0003 FSND CSND CLAY 0024 CLAY 0027

Notes:
UTM: UTM in Zone, Easting, Northing and Datum is NAD83; L: UTM estimated from Centroid of Lot; W: UTM not from Lot Centroid
DATE CNTR: Date Work Completedand Well Contractor Licence Number
CASING DIA: .Casing diameter in inches
WATER: Unit of Depth in Fee. See Table 4 for Meaning of Code

PUMP TEST: Static Water Level in Feet / Water Level After Pumping in Feet / Pump Test Rate in GPM / Pump Test Duration in Hour : Minutes
WELL USE: See Table 3 for Meaning of Code
SCREEN: Screen Depth and Length in feet
WELL: WEL (AUDIT #) Well Tag . A: Abandonment; P: Partial Data Entry Only
FORMATION: See Table 1 and 2 for Meaning of Code

1. Core Material and Descriptive terms

Code	Description	Code	Description	Code	Description	Code	Description	Code	Description
BLDR	BOULDERS	FCRD	FRACTURED	IRFM	IRON FORMATION	PORS	POROUS	SOFT	SOFT
BSLT	BASALT	FGRD	FINE-GRAINED	LIMY	LIMY	PRDG	PREVIOUSLY DUG	SPST	SOAPSTONE
CGRD	COARSE-GRAINED	FGVL	FINE GRAVEL	LMSN	LIMESTONE	PRDR	PREV. DRILLED	STKY	STICKY
CGVL	COARSE GRAVEL	FILL	FILL	LOAM	TOPSOIL	QRTZ	QUARTZITE	STNS	STONES
CHRT	CHERT	FLDS	FELDSPAR	LOOS	LOOSE	QSND	QUICKSAND	STNY	STONEY
CLAY	CLAY	FLNT	FLINT	LTCL	LIGHT-COLOURED	QTZ	QUARTZ	THIK	THICK
CLN	CLEAN	FOSS	FOSILIFEROUS	LYRD	LAYERED	ROCK	ROCK	THIN	THIN
CLYY	CLAYEY	FSND	FINE SAND	MARL	MARL	SAND	SAND	TILL	TILL
CMTD	CEMENTED	GNIS	GNEISS	MGRD	MEDIUM-GRAINED	SHLE	SHALE	UNKN	UNKNOWN TYPE
CONG	CONGLOMERATE	GRNT	GRANITE	MGVL	MEDIUM GRAVEL	SHLY	SHALY	VERY	VERY
CRYS	CRYSTALLINE	GRSN	GREENSTONE	MRBL	MARBLE	SHRP	SHARP	WBRG	WATER-BEARING
CSND	COARSE SAND	GRVL	GRAVEL	MSND	MEDIUM SAND	SHST	SCHIST	WDFR	WOOD FRAGMENTS
DKCL	DARK-COLOURED	GRWK	GREYWACKE	MUCK	MUCK	SILT	SILT	WTHD	WEATHERED
DLMT	DOLOMITE	GVLY	GRAVELLY	OBDN	OVERBURDEN	SLTE	SLATE		
DNSE	DENSE	GYPS	GYPSUM	PCKD	PACKED	SLTY	SILTY		
DRTY	DIRTY	HARD	HARD	PEAT	PEAT	SNDS	SANDSTONE		
DRY	DRY	HPAN	HARDPAN	PGVL	PEA GRAVEL	SNDY	SANDYOAPSTONE		

2. Core Color

Code	Description
WHIT	WHITE
GREY	GREY
BLUE	BLUE
GREN	GREEN
YLLW	YELLOW
BRWN	BROWN
RED	RED
BLCK	BLACK
BLGY	BLUE-GREY

3. Well Use

Code	Description	Code	Description
DO	Domestic	OT	Other
ST	Livestock	TH	Test Hole
IR	Irrigation	DE	Dewatering
IN	Industrial	MO	Monitoring
CO	Commercial	MT	Monitoring TestHole
MN	Municipal		
PS	Public		
AC	Cooling And A/C		
NU	Not Used		

4. Water Detail

Code	Description	Code	Description
FR	Fresh	GS	Gas
SA	Salty	IR	Iron
SU	Sulphur		
MN	Mineral		
UK	Unknown		

APPENDIX C

CERTIFICATE OF ANALYSIS (GUIDELINE EVALUATION)

Work Order	: **WT2215075**	Page	: 1 of 7
Client	: **GeoPro Consulting Limited**	Laboratory	: Waterloo - Environmental
Contact	: Elab	Account Manager	: Costas Farassoglou
Address	: 40 Vogell Road Unit 57 Richmond Hill ON Canada L4B 3N6	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: 416 209 5668	Telephone	: 613 225 8279
Project	: 22-4078 (NORFOLK SEWER USE)	Date Samples Received	: 21-Sep-2022 17:15
PO	: ----	Date Analysis Commenced	: 22-Sep-2022
C-O-C number	: ----	Issue Date	: 29-Sep-2022 13:48
Sampler	: ----		
Site	: ----		
Quote number	: GEOPRO 2022 Standing Offer		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Guideline Comparison

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Caitlin Macey	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Greg Pokocky	Supervisor - Inorganic	Inorganics, Waterloo, Ontario
Greg Pokocky	Supervisor - Inorganic	Metals, Waterloo, Ontario
Jocelyn Kennedy	Department Manager - Semi-Volatile Organics	Organics, Waterloo, Ontario
Jon Fisher	Department Manager - Inorganics	Inorganics, Waterloo, Ontario
Walt Kippenhuck	Team Leader - Inorganics	Inorganics, Waterloo, Ontario

Summary of Guideline Breaches by Sample

SampleID/Client ID	Matrix	Analyte	Analyte Summary	Guideline	Category	Result	Limit
BH5	Water	solids, total suspended [TSS]		NORSAN	SAN	16300 mg/L	350 mg/L
	Water	iron, total		NORSAN	SAN	90.9 mg/L	50 mg/L
	Water	manganese, total		NORSAN	SAN	10.4 mg/L	5 mg/L
	Water	phosphorus, total		ONPWQO	PWQO	0.618 mg/L	0.01 mg/L
	Water	aluminum, total		ONPWQO	PWQO	41.4 mg/L	0.015 mg/L
	Water	arsenic, total		ONPWQO	PWQO	0.0240 mg/L	0.005 mg/L
	Water	cadmium, total		ONPWQO	PWQO	0.000659 mg/L	0.0001 mg/L
	Water	cobalt, total		ONPWQO	PWQO	0.0366 mg/L	0.0009 mg/L
	Water	copper, total		ONPWQO	PWQO	0.131 mg/L	0.001 mg/L
	Water	iron, total		ONPWQO	PWQO	90.9 mg/L	0.3 mg/L
	Water	lead, total		ONPWQO	PWQO	0.0523 mg/L	0.001 mg/L
	Water	nickel, total		ONPWQO	PWQO	0.0798 mg/L	0.025 mg/L
	Water	silver, total		ONPWQO	PWQO	0.000194 mg/L	0.0001 mg/L
	Water	vanadium, total		ONPWQO	PWQO	0.0895 mg/L	0.006 mg/L
	Water	zinc, total		ONPWQO	PWQO	0.252 mg/L	0.02 mg/L
	Water	phenols, total (4AAP)		ONPWQO	PWQO	0.0012 mg/L	0.001 mg/L

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.
Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guidelines are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.

Key : LOR: Limit of Reporting (detection limit).

Unit	*Description*
mg/L	milligrams per litre
pH units	pH units

>: greater than.
<: less than.
Red shading is applied where the result is greater than the Guideline Upper Limit or the result is lower than the Guideline Lower Limit.
For drinking water samples, Red shading is applied where the result for E.coli, fecal or total coliforms is greater than or equal to the Guideline Upper Limit.

Qualifiers

Qualifier	*Description*
BODL	*Limit of Reporting for BOD was increased to account for the largest volume of sample tested.*
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*
DLHC	*Detection Limit Raised: Dilution required due to high concentration of test analyte(s).*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*

Analytical Results Evaluation

Matrix: **Water**

Analyte	CAS Number	Unit	Client sample ID: BH5	----	----	----	----	----	----
			Sampling date/time: 20-Sep-2022	----	----	----	----	----	----
			Sub-Matrix: Water	----	----	----	----	----	----
			WT2215075-001	--------	--------	--------	--------	--------	--------
Physical Tests									
pH	----	pH units	7.34	----	----	----	----	----	----
solids, total suspended [TSS]	----	mg/L	16300 DLHC	----	----	----	----	----	----
Anions and Nutrients									
chloride	16887-00-6	mg/L	237 DLDS	----	----	----	----	----	----
fluoride	16984-48-8	mg/L	<0.100 DLDS	----	----	----	----	----	----
Kjeldahl nitrogen, total [TKN]	----	mg/L	<0.500 DLM	----	----	----	----	----	----
phosphorus, total	7723-14-0	mg/L	0.618	----	----	----	----	----	----
sulfate (as SO4)	14808-79-8	mg/L	35.3 DLDS	----	----	----	----	----	----
Cyanides									
cyanide, strong acid dissociable (total)	----	mg/L	<0.0020	----	----	----	----	----	----
Total Sulfides									
sulfide, total (as H2S)	7783-06-4	mg/L	<0.011	----	----	----	----	----	----
sulfide, total (as S)	18496-25-8	mg/L	<0.010	----	----	----	----	----	----
Total Metals									
aluminum, total	7429-90-5	mg/L	41.4 DLHC	----	----	----	----	----	----
antimony, total	7440-36-0	mg/L	<0.00100 DLHC	----	----	----	----	----	----
arsenic, total	7440-38-2	mg/L	0.0240 DLHC	----	----	----	----	----	----
barium, total	7440-39-3	mg/L	0.207 DLHC	----	----	----	----	----	----
bismuth, total	7440-69-9	mg/L	0.000570 DLHC	----	----	----	----	----	----
cadmium, total	7440-43-9	mg/L	0.000659 DLHC	----	----	----	----	----	----
chromium, total	7440-47-3	mg/L	0.0647 DLHC	----	----	----	----	----	----
cobalt, total	7440-48-4	mg/L	0.0366 DLHC	----	----	----	----	----	----
copper, total	7440-50-8	mg/L	0.131 DLHC	----	----	----	----	----	----
iron, total	7439-89-6	mg/L	90.9 DLHC	----	----	----	----	----	----
lead, total	7439-92-1	mg/L	0.0523 DLHC	----	----	----	----	----	----
manganese, total	7439-96-5	mg/L	10.4 DLHC	----	----	----	----	----	----
mercury, total	7439-97-6	mg/L	0.0000115	----	----	----	----	----	----
molybdenum, total	7439-98-7	mg/L	0.000978 DLHC	----	----	----	----	----	----

Analytical Results Evaluation

Matrix: **Water**

Analyte	CAS Number	Unit	Client sample ID	----	----	----	----	----	----
			BH5	**----**	**----**	**----**	**----**	**----**	**----**
			Sampling date/time	20-Sep-2022	----	----	----	----	----	----
			Sub-Matrix	Water	----	----	----	----	----	----
			WT2215075-001	--------	--------	--------	--------	--------	--------
Total Metals										
nickel, total	7440-02-0	mg/L	0.0798 DLHC	----	----	----	----	----	----
selenium, total	7782-49-2	mg/L	<0.000500 DLHC	----	----	----	----	----	----
silver, total	7440-22-4	mg/L	0.000194 DLHC	----	----	----	----	----	----
tin, total	7440-31-5	mg/L	0.00406 DLHC	----	----	----	----	----	----
titanium, total	7440-32-6	mg/L	0.795 DLHC	----	----	----	----	----	----
vanadium, total	7440-62-2	mg/L	0.0895 DLHC	----	----	----	----	----	----
zinc, total	7440-66-6	mg/L	0.252 DLHC	----	----	----	----	----	----
Aggregate Organics										
biochemical oxygen demand [BOD]	----	mg/L	<3.0 BODL	----	----	----	----	----	----
carbonaceous biochemical oxygen demand [CBOD]	----	mg/L	<3.0 BODL	----	----	----	----	----	----
chemical oxygen demand [COD]	----	mg/L	26	----	----	----	----	----	----
oil & grease (gravimetric)	----	mg/L	<5.0	----	----	----	----	----	----
oil & grease, animal/vegetable (gravimetric)	----	mg/L	<5.0	----	----	----	----	----	----
oil & grease, mineral (gravimetric)	----	mg/L	<5.0	----	----	----	----	----	----
phenols, total (4AAP)	----	mg/L	0.0012	----	----	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

Summary of Guideline Limits

Analyte	CAS Number	Unit	NORSAN SAN	ONPWQO PWQO					
Physical Tests									
pH	----	pH units	**6 - 9.5 pH units**	**6.5 - 8.5 pH units**					
solids, total suspended [TSS]	----	mg/L	**350 mg/L**						
Anions and Nutrients									
chloride	16887-00-6	mg/L	**1500 mg/L**						
fluoride	16984-48-8	mg/L	**10 mg/L**						
Kjeldahl nitrogen, total [TKN]	----	mg/L	**100 mg/L**						
phosphorus, total	7723-14-0	mg/L	**10 mg/L**	**0.01 mg/L**					
sulfate (as SO4)	14808-79-8	mg/L							
Cyanides									
cyanide, strong acid dissociable (total)	----	mg/L		**0.005 mg/L**					
Total Sulfides									
sulfide, total (as H2S)	7783-06-4	mg/L							
sulfide, total (as S)	18496-25-8	mg/L	**2 mg/L**						
Total Metals									
aluminum, total	7429-90-5	mg/L	**50 mg/L**	**0.015 mg/L**					
antimony, total	7440-36-0	mg/L	**5 mg/L**	**0.02 mg/L**					
arsenic, total	7440-38-2	mg/L	**1 mg/L**	**0.005 mg/L**					
barium, total	7440-39-3	mg/L	**5 mg/L**						
bismuth, total	7440-69-9	mg/L	**5 mg/L**						
cadmium, total	7440-43-9	mg/L	**0.1 mg/L**	**0.0001 mg/L**					
chromium, total	7440-47-3	mg/L	**1 mg/L**						
cobalt, total	7440-48-4	mg/L	**5 mg/L**	**0.0009 mg/L**					
copper, total	7440-50-8	mg/L	**2 mg/L**	**0.001 mg/L**					
iron, total	7439-89-6	mg/L	**50 mg/L**	**0.3 mg/L**					
lead, total	7439-92-1	mg/L	**3 mg/L**	**0.001 mg/L**					
manganese, total	7439-96-5	mg/L	**5 mg/L**						
mercury, total	7439-97-6	mg/L	**0.1 mg/L**	**0.0002 mg/L**					
molybdenum, total	7439-98-7	mg/L	**5 mg/L**	**0.04 mg/L**					
nickel, total	7440-02-0	mg/L	**3 mg/L**	**0.025 mg/L**					
selenium, total	7782-49-2	mg/L	**1 mg/L**	**0.1 mg/L**					
silver, total	7440-22-4	mg/L	**5 mg/L**	**0.0001 mg/L**					
tin, total	7440-31-5	mg/L	**5 mg/L**						
titanium, total	7440-32-6	mg/L	**5 mg/L**						
vanadium, total	7440-62-2	mg/L	**5 mg/L**	**0.006 mg/L**					
zinc, total	7440-66-6	mg/L	**2 mg/L**	**0.02 mg/L**					
Aggregate Organics									

Analyte	CAS Number	Unit	NORSAN SAN	ONPWQO PWQO					
Aggregate Organics - Continued									
biochemical oxygen demand [BOD]	----	mg/L							
carbonaceous biochemical oxygen demand [CBOD]	----	mg/L	**300 mg/L**						
chemical oxygen demand [COD]	----	mg/L	**1000 mg/L**						
oil & grease (gravimetric)	----	mg/L							
oil & grease, animal/vegetable (gravimetric)	----	mg/L	**100 mg/L**						
oil & grease, mineral (gravimetric)	----	mg/L	**15 mg/L**						
phenols, total (4AAP)	----	mg/L	**1 mg/L**	**0.001 mg/L**					

Please refer to the General Comments section for an explanation of any qualifiers detected.

Key:

NORSAN	Ontario Norfolk Sanitary Sewer Use By-Law (2022-10-1)
SAN	Norfolk Sanitary Sewer By-Law (2022-10-1)
ONPWQO	Ontario PWQO (Provincial Water Quality Objectives, JULY, 1994)
PWQO	Surface Water PWQO

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **WT2215075**	Page	: 1 of 10
Client	: **GeoPro Consulting Limited**	Laboratory	: Waterloo - Environmental
Contact	: Elab	Account Manager	: Costas Farassoglou
Address	: 40 Vogell Road Unit 57 Richmond Hill ON Canada L4B 3N6	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: 416 209 5668	Telephone	: 613 225 8279
Project	: 22-4078 (NORFOLK SEWER USE)	Date Samples Received	: 21-Sep-2022 17:15
PO	: ----	Issue Date	: 29-Sep-2022 13:44
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: GEOPRO 2022 Standing Offer		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT-48h]										
BH5	E550	20-Sep-2022	----	----	----		22-Sep-2022	48 hrs	48 hrs	✓
Aggregate Organics : Biochemical Oxygen Demand (Carbonaceous) - 5 day										
HDPE [BOD HT-48h]										
BH5	E555	20-Sep-2022	----	----	----		22-Sep-2022	48 hrs	48 hrs	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid)										
BH5	E559-L	20-Sep-2022	----	----	----		22-Sep-2022	28 days	3 days	✓
Aggregate Organics : Mineral Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid)										
BH5	E567SG	20-Sep-2022	22-Sep-2022	28 days	2 days	✓	23-Sep-2022	40 days	1 days	✓
Aggregate Organics : Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid)										
BH5	E567	20-Sep-2022	22-Sep-2022	28 days	2 days	✓	23-Sep-2022	40 days	1 days	✓
Aggregate Organics : Phenols (4AAP) in Water by Colorimetry										
Amber glass total (sulfuric acid)										
BH5	E562	20-Sep-2022	22-Sep-2022	----	----		22-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE [ON MECP]										
BH5	E235.Cl	20-Sep-2022	22-Sep-2022	----	----		22-Sep-2022	28 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride in Water by IC										
HDPE [ON MECP]										
BH5	E235.F	20-Sep-2022	22-Sep-2022	----	----		22-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE [ON MECP]										
BH5	E235.SO4	20-Sep-2022	22-Sep-2022	----	----		22-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid)										
BH5	E318	20-Sep-2022	22-Sep-2022	----	----		23-Sep-2022	28 days	4 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
BH5	E372-U	20-Sep-2022	22-Sep-2022	----	----		22-Sep-2022	28 days	2 days	✓
Cyanides : Total Cyanide										
UV-inhibited HDPE - total (sodium hydroxide)										
BH5	E333	20-Sep-2022	22-Sep-2022	----	----		22-Sep-2022	14 days	2 days	✓
Physical Tests : pH by Meter										
HDPE [ON MECP]										
BH5	E108	20-Sep-2022	22-Sep-2022	----	----		22-Sep-2022	14 days	2 days	✓
Physical Tests : TSS by Gravimetry										
HDPE [ON MECP]										
BH5	E160	20-Sep-2022	----	----	----		22-Sep-2022	7 days	2 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) [ON MECP]										
BH5	E508	20-Sep-2022	22-Sep-2022	----	----		22-Sep-2022	28 days	2 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
BH5	E420	20-Sep-2022	22-Sep-2022	----	----		22-Sep-2022	180 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Sulfides : Total Sulfide by Colourimetry (Automated Flow)										
HDPE total (zinc acetate+sodium hydroxide)										
BH5	E395-H	20-Sep-2022	----	----	----		23-Sep-2022	7 days	4 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Biochemical Oxygen Demand - 5 day	E550	659730	1	19	5.2	5.0	✓
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	659731	1	20	5.0	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	660129	1	7	14.2	5.0	✓
Chloride in Water by IC	E235.Cl	659337	1	2	50.0	5.0	✓
Fluoride in Water by IC	E235.F	659334	1	2	50.0	5.0	✓
pH by Meter	E108	659248	1	3	33.3	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	659535	1	2	50.0	5.0	✓
Sulfate in Water by IC	E235.SO4	659338	1	2	50.0	5.0	✓
Total Cyanide	E333	659627	1	1	100.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	659533	1	2	50.0	5.0	✓
Total Mercury in Water by CVAAS	E508	659434	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	659273	1	4	25.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	659534	1	2	50.0	5.0	✓
Total Sulfide by Colourimetry (Automated Flow)	E395-H	662928	1	7	14.2	5.0	✓
TSS by Gravimetry	E160	659519	1	3	33.3	4.7	✓
Laboratory Control Samples (LCS)							
Biochemical Oxygen Demand - 5 day	E550	659730	1	19	5.2	5.0	✓
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	659731	1	20	5.0	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	660129	1	7	14.2	5.0	✓
Chloride in Water by IC	E235.Cl	659337	1	2	50.0	5.0	✓
Fluoride in Water by IC	E235.F	659334	1	2	50.0	5.0	✓
Mineral Oil & Grease by Gravimetry	E567SG	659260	1	7	14.2	5.0	✓
Oil & Grease by Gravimetry	E567	659259	1	20	5.0	5.0	✓
pH by Meter	E108	659248	1	3	33.3	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	659535	1	2	50.0	5.0	✓
Sulfate in Water by IC	E235.SO4	659338	1	2	50.0	5.0	✓
Total Cyanide	E333	659627	1	1	100.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	659533	1	2	50.0	5.0	✓
Total Mercury in Water by CVAAS	E508	659434	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	659273	1	4	25.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	659534	1	2	50.0	5.0	✓
Total Sulfide by Colourimetry (Automated Flow)	E395-H	662928	1	7	14.2	5.0	✓
TSS by Gravimetry	E160	659519	1	3	33.3	4.7	✓
Method Blanks (MB)							
Biochemical Oxygen Demand - 5 day	E550	659730	1	19	5.2	5.0	✓
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	659731	1	20	5.0	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	660129	1	7	14.2	5.0	✓

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Method Blanks (MB) - Continued							
Chloride in Water by IC	E235.Cl	659337	1	2	50.0	5.0	✓
Fluoride in Water by IC	E235.F	659334	1	2	50.0	5.0	✓
Mineral Oil & Grease by Gravimetry	E567SG	659260	1	7	14.2	5.0	✓
Oil & Grease by Gravimetry	E567	659259	1	20	5.0	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	659535	1	2	50.0	5.0	✓
Sulfate in Water by IC	E235.SO4	659338	1	2	50.0	5.0	✓
Total Cyanide	E333	659627	1	1	100.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	659533	1	2	50.0	5.0	✓
Total Mercury in Water by CVAAS	E508	659434	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	659273	1	4	25.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	659534	1	2	50.0	5.0	✓
Total Sulfide by Colourimetry (Automated Flow)	E395-H	662928	1	7	14.2	5.0	✓
TSS by Gravimetry	E160	659519	1	3	33.3	4.7	✓
Matrix Spikes (MS)							
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	660129	1	7	14.2	5.0	✓
Chloride in Water by IC	E235.Cl	659337	1	2	50.0	5.0	✓
Fluoride in Water by IC	E235.F	659334	1	2	50.0	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	659535	1	2	50.0	5.0	✓
Sulfate in Water by IC	E235.SO4	659338	1	2	50.0	5.0	✓
Total Cyanide	E333	659627	1	1	100.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	659533	1	2	50.0	5.0	✓
Total Mercury in Water by CVAAS	E508	659434	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	659273	1	4	25.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	659534	1	2	50.0	5.0	✓
Total Sulfide by Colourimetry (Automated Flow)	E395-H	662928	1	7	14.2	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter	E108 Waterloo - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TSS by Gravimetry	E160 Waterloo - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Chloride in Water by IC	E235.Cl Waterloo - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Waterloo - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Waterloo - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Waterloo - Environmental	Water	Method Fialab 100, 2018	TKN in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021).
Total Cyanide	E333 Waterloo - Environmental	Water	ISO 14403 (mod)	Total or Strong Acid Dissociable (SAD) Cyanide is determined by Continuous Flow Analyzer (CFA) with in-line UV digestion followed by colourmetric analysis. Method Limitation: High levels of thiocyanate (SCN) may cause positive interference (up to 0.5% of SCN concentration).
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U Waterloo - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Sulfide by Colourimetry (Automated Flow)	E395-H Vancouver - Environmental	Water	APHA 4500 -S E-Auto-Colorimetry	Sulfide is determined using the gas dialysis automated methlyene blue colourimetric method. Results expressed "as H2S" if reported represent the maximum possible H_2S concentration based on the total sulfide concentration in the sample. The H_2S calculation converts Total Sulphide as (S2-) and reports it as Total Sulphide as (H2S)

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Metals in Water by CRC ICPMS	E420 Waterloo - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508 Waterloo - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Biochemical Oxygen Demand - 5 day	E550 Waterloo - Environmental	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555 Waterloo - Environmental	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Nitrification inhibitor is added to samples to prevent nitrogenous compounds from consuming oxygen resulting in only carbonaceous oxygen demand being reported by this method. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L Waterloo - Environmental	Water	APHA 5220 D (mod)	Samples are analyzed using the closed reflux colourimetric method.
Phenols (4AAP) in Water by Colorimetry	E562 Waterloo - Environmental	Water	EPA 9066	This automated method is based on the distillation of phenol and subsequent reaction of the distillate with alkaline ferricyanide ($K_3Fe(CN)_6$) and 4-amino-antipyrine (4-AAP) to form a red complex which is measured colorimetrically.
Oil & Grease by Gravimetry	E567 Waterloo - Environmental	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane and the extract is evaporated to dryness. The residue is then weighed to determine Oil and Grease.
Mineral Oil & Grease by Gravimetry	E567SG Waterloo - Environmental	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane, followed by silica gel treatment after which the extract is evaporated to dryness. The residue is then weighed to determine Mineral Oil and Grease.
Animal & Vegetable Oil & Grease by Gravimetry	EC567A.SG Waterloo - Environmental	Water	APHA 5520 (mod)	Animal & vegetable oil and grease is calculated as follows: Oil & Grease (gravimetric) minus Mineral Oil & Grease (gravimetric)

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for TKN in water	EP318 Waterloo - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.
Digestion for Total Phosphorus in water	EP372 Waterloo - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Oil & Grease Extraction for Gravimetry	EP567 Waterloo - Environmental	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane by liquid-liquid extraction.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **WT2215075**	Page	: 1 of 10
Client	: GeoPro Consulting Limited	Laboratory	: Waterloo - Environmental
Contact	: Elab	Account Manager	: Costas Farassoglou
Address	: 40 Vogell Road Unit 57 Richmond Hill ON Canada L4B 3N6	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: 416 209 5668	Telephone	: 613 225 8279
Project	: 22-4078 (NORFOLK SEWER USE)	Date Samples Received	: 21-Sep-2022 17:15
PO	: ----	Date Analysis Commenced	: 22-Sep-2022
C-O-C number	: ----	Issue Date	: 29-Sep-2022 13:49
Sampler	: ----		
Site	: ----		
Quote number	: GEOPRO 2022 Standing Offer		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Caitlin Macey	Team Leader - Inorganics	Vancouver Inorganics, Burnaby, British Columbia
Greg Pokocky	Supervisor - Inorganic	Waterloo Inorganics, Waterloo, Ontario
Greg Pokocky	Supervisor - Inorganic	Waterloo Metals, Waterloo, Ontario
Jocelyn Kennedy	Department Manager - Semi-Volatile Organics	Waterloo Organics, Waterloo, Ontario
Jon Fisher	Department Manager - Inorganics	Waterloo Inorganics, Waterloo, Ontario
Walt Kippenhuck	Team Leader - Inorganics	Waterloo Inorganics, Waterloo, Ontario

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 659248)											
WT2215072-001	Anonymous	pH	----	E108	0.10	pH units	7.43	7.47	0.537%	4%	----
Physical Tests (QC Lot: 659519)											
WT2214912-001	Anonymous	solids, total suspended [TSS]	----	E160	3.0	mg/L	<3.0	<3.0	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 659334)											
WT2214666-001	Anonymous	fluoride	16984-48-8	E235.F	0.020	mg/L	0.094	0.092	0.003	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 659337)											
WT2214666-001	Anonymous	chloride	16887-00-6	E235.Cl	0.50	mg/L	166	171	2.55%	20%	----
Anions and Nutrients (QC Lot: 659338)											
WT2214666-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	31.9	32.6	2.31%	20%	----
Anions and Nutrients (QC Lot: 659533)											
WT2215075-001	BH5	Kjeldahl nitrogen, total [TKN]	----	E318	0.500	mg/L	<0.500	<0.500	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 659534)											
WT2215080-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0026	0.0027	0.00006	Diff <2x LOR	----
Cyanides (QC Lot: 659627)											
WT2215075-001	BH5	cyanide, strong acid dissociable (total)	----	E333	0.0020	mg/L	<0.0020	<0.0020	0	Diff <2x LOR	----
Total Sulfides (QC Lot: 662928)											
GP2201750-001	Anonymous	sulfide, total (as S)	18496-25-8	E395-H	0.100	mg/L	1.46	1.50	2.39%	20%	----
Total Metals (QC Lot: 659273)											
WT2214981-001	Anonymous	aluminum, total	7429-90-5	E420	0.0300	mg/L	<0.0300	<0.0300	0	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00100	mg/L	0.00520	0.00492	0.00028	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000500	mg/L	<0.000500	<0.000500	0	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000500	mg/L	<0.0000500	<0.0000500	0	Diff <2x LOR	----
		chromium, total	7440-47-3	E420	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00100	mg/L	0.00950	0.00938	0.00013	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00500	mg/L	0.00676	0.00676	0.000001	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.100	mg/L	0.828	0.816	0.012	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000500	mg/L	<0.000500	<0.000500	0	Diff <2x LOR	----
		manganese, total	7439-96-5	E420	0.00100	mg/L	0.332	0.330	0.815%	20%	----
		molybdenum, total	7439-98-7	E420	0.000500	mg/L	0.00545	0.00532	2.35%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 659273) - continued											
WT2214981-001	Anonymous	nickel, total	7440-02-0	E420	0.00500	mg/L	0.0230	0.0225	0.00051	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000500	mg/L	0.00486	0.00479	0.000078	Diff <2x LOR	----
		silver, total	7440-22-4	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00300	mg/L	<0.00300	<0.00300	0	Diff <2x LOR	----
		vanadium, total	7440-62-2	E420	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0300	mg/L	<0.0300	<0.0300	0	Diff <2x LOR	----
Total Metals (QC Lot: 659434)											
TY2201724-001	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 659535)											
WT2215080-001	Anonymous	phenols, total (4AAP)	----	E562	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 659730)											
WT2214988-001	Anonymous	biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	17.8	17.9	0.0%	30%	----
Aggregate Organics (QC Lot: 659731)											
WT2215029-001	Anonymous	carbonaceous biochemical oxygen demand [CBOD]	----	E555	2.0	mg/L	<2.0	<2.0	0.0%	30%	----
Aggregate Organics (QC Lot: 660129)											
WT2214983-002	Anonymous	chemical oxygen demand [COD]	----	E559-L	10	mg/L	78	79	1	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 659519)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Anions and Nutrients (QCLot: 659334)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 659337)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 659338)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 659533)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 659534)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Cyanides (QCLot: 659627)						
cyanide, strong acid dissociable (total)	----	E333	0.002	mg/L	<0.0020	----
Total Sulfides (QCLot: 662928)						
sulfide, total (as S)	18496-25-8	E395-H	0.01	mg/L	<0.010	----
Total Metals (QCLot: 659273)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 659273) - continued						
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Total Metals (QCLot: 659434)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Aggregate Organics (QCLot: 659259)						
oil & grease (gravimetric)	----	E567	5	mg/L	<5.0	----
Aggregate Organics (QCLot: 659260)						
oil & grease, mineral (gravimetric)	----	E567SG	5	mg/L	<5.0	----
Aggregate Organics (QCLot: 659535)						
phenols, total (4AAP)	----	E562	0.001	mg/L	<0.0010	----
Aggregate Organics (QCLot: 659730)						
biochemical oxygen demand [BOD]	----	E550	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 659731)						
carbonaceous biochemical oxygen demand [CBOD]	----	E555	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 660129)						
chemical oxygen demand [COD]	----	E559-L	10	mg/L	<10	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 659248)									
pH	----	E108	----	pH units	7 pH units	101	98.0	102	----
Physical Tests (QCLot: 659519)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	89.0	85.0	115	----
Anions and Nutrients (QCLot: 659334)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 659337)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 659338)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 659533)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	98.0	75.0	125	----
Anions and Nutrients (QCLot: 659534)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.53 mg/L	96.6	80.0	120	----
Cyanides (QCLot: 659627)									
cyanide, strong acid dissociable (total)	----	E333	0.002	mg/L	0.25 mg/L	93.6	80.0	120	----
Total Sulfides (QCLot: 662928)									
sulfide, total (as H2S)	7783-06-4	E395-H	----	mg/L	0.085 mg/L	98.8	80.0	120	----
sulfide, total (as S)	18496-25-8	E395-H	0.01	mg/L	0.08 mg/L	99.3	80.0	120	----
Total Metals (QCLot: 659273)									
aluminum, total	7429-90-5	E420	0.003	mg/L	0.1 mg/L	102	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	0.05 mg/L	104	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	0.05 mg/L	102	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.0125 mg/L	102	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	0.05 mg/L	93.4	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.005 mg/L	106	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.0125 mg/L	100	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.0125 mg/L	99.6	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.0125 mg/L	96.8	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	0.05 mg/L	99.8	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.025 mg/L	96.3	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 659273) - continued									
manganese, total	7439-96-5	E420	0.0001	mg/L	0.0125 mg/L	102	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.0125 mg/L	105	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.025 mg/L	99.7	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	0.05 mg/L	102	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.005 mg/L	100	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.025 mg/L	107	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.0125 mg/L	98.7	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.025 mg/L	102	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.025 mg/L	102	80.0	120	----
Total Metals (QCLot: 659434)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	100	80.0	120	----
Aggregate Organics (QCLot: 659259)									
oil & grease (gravimetric)	----	E567	5	mg/L	200 mg/L	85.8	70.0	130	----
Aggregate Organics (QCLot: 659260)									
oil & grease, mineral (gravimetric)	----	E567SG	5	mg/L	100 mg/L	77.9	70.0	130	----
Aggregate Organics (QCLot: 659535)									
phenols, total (4AAP)	----	E562	0.001	mg/L	0.02 mg/L	110	85.0	115	----
Aggregate Organics (QCLot: 659730)									
biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	98.5	85.0	115	----
Aggregate Organics (QCLot: 659731)									
carbonaceous biochemical oxygen demand [CBOD]	----	E555	2	mg/L	198 mg/L	101	85.0	115	----
Aggregate Organics (QCLot: 660129)									
chemical oxygen demand [COD]	----	E559-L	10	mg/L	100 mg/L	108	85.0	115	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 659334)										
WT2214666-001	Anonymous	fluoride	16984-48-8	E235.F	1.01 mg/L	1 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 659337)										
WT2214666-001	Anonymous	chloride	16887-00-6	E235.Cl	ND mg/L	100 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 659338)										
WT2214666-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	103 mg/L	100 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 659533)										
WT2215075-001	BH5	Kjeldahl nitrogen, total [TKN]	----	E318	24.0 mg/L	2.5 mg/L	95.9	70.0	130	----
Anions and Nutrients (QCLot: 659534)										
WT2215080-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0815 mg/L	0.1 mg/L	81.5	70.0	130	----
Cyanides (QCLot: 659627)										
WT2215075-001	BH5	cyanide, strong acid dissociable (total)	----	E333	0.207 mg/L	0.25 mg/L	82.8	75.0	125	----
Total Sulfides (QCLot: 662928)										
GP2201751-001	Anonymous	sulfide, total (as S)	18496-25-8	E395-H	1.09 mg/L	1 mg/L	109	75.0	125	----
Total Metals (QCLot: 659273)										
WT2214981-002	Anonymous	aluminum, total	7429-90-5	E420	0.104 mg/L	0.1 mg/L	104	70.0	130	----
		antimony, total	7440-36-0	E420	0.0509 mg/L	0.05 mg/L	102	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0506 mg/L	0.05 mg/L	101	70.0	130	----
		barium, total	7440-39-3	E420	0.0122 mg/L	0.0125 mg/L	97.3	70.0	130	----
		bismuth, total	7440-69-9	E420	0.0466 mg/L	0.05 mg/L	93.1	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00496 mg/L	0.005 mg/L	99.2	70.0	130	----
		chromium, total	7440-47-3	E420	0.0125 mg/L	0.0125 mg/L	99.7	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0120 mg/L	0.0125 mg/L	95.8	70.0	130	----
		copper, total	7440-50-8	E420	0.0118 mg/L	0.0125 mg/L	94.7	70.0	130	----
		iron, total	7439-89-6	E420	ND mg/L	0.05 mg/L	ND	70.0	130	----
		lead, total	7439-92-1	E420	0.0235 mg/L	0.025 mg/L	93.9	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.0125 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0128 mg/L	0.0125 mg/L	102	70.0	130	----
		nickel, total	7440-02-0	E420	0.0226 mg/L	0.025 mg/L	90.6	70.0	130	----
		selenium, total	7782-49-2	E420	0.0504 mg/L	0.05 mg/L	101	70.0	130	----
		silver, total	7440-22-4	E420	0.00470 mg/L	0.005 mg/L	94.1	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 659273) - continued										
WT2214981-002	Anonymous	tin, total	7440-31-5	E420	0.0255 mg/L	0.025 mg/L	102	70.0	130	----
		titanium, total	7440-32-6	E420	0.0118 mg/L	0.0125 mg/L	94.6	70.0	130	----
		vanadium, total	7440-62-2	E420	0.0254 mg/L	0.025 mg/L	101	70.0	130	----
		zinc, total	7440-66-6	E420	0.0231 mg/L	0.025 mg/L	92.4	70.0	130	----
Total Metals (QCLot: 659434)										
TY2201778-001	Anonymous	mercury, total	7439-97-6	E508	0.0000732 mg/L	0.0001 mg/L	73.2	70.0	130	----
Aggregate Organics (QCLot: 659535)										
WT2215080-001	Anonymous	phenols, total (4AAP)	----	E562	0.106 mg/L	0.1 mg/L	106	75.0	125	----
Aggregate Organics (QCLot: 660129)										
WT2214983-002	Anonymous	chemical oxygen demand [COD]	----	E559-L	100 mg/L	100 mg/L	100	75.0	125	----

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 22-4078 (NORFOLK SI

Page 1 of 1

Environmental Division Waterloo

Work Order Reference WT2215075

Telephone : +1 519 886 6910

Report To	Contact and company name below will appear on the final report
Company:	GeoPro Consulting Limited
Contact:	Elab elab@geoproconsulting.ca
Phone:	(905) 237-8336
	Company address below will appear on the final report
Street:	40 Vogell Road, Unit 23
City/Province:	Richmond Hill, ON
Postal Code:	L4B 3N6
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☑ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	skylerc@geoproconsulting.ca
Email 2	nickl@geoproconsulting.ca
Email 3	elab@geoproconsulting.ca

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	skylerc@geoproconsulting.ca
Email 2	elab@geoproconsulting.ca

Select Service Level Below - Please confirm all E&P

Regular [R] ☐ Standard TAT

PRIORITY (Business Days): 4 day [P4] ☐ | 3 day [P3] ☐ | 2 day [P2] ☐

Date and Time Required for all E&P TA

For tests that can not be performed according to thi

An

Indicate Filtered (F), Preserved (P) o

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	Q84031	AFE/Cost Center:	PO#
Job #:	22-4078 (NORFOLK SEWER USE)	Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)	WT2215075	ALS Contact:	Sampler:

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Barrie RegionCombined Sewer Use Bylaw	Number of Containers
	BH5	20-Sep-22	PM	Water	E1	1

BHMW5

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ ☑ NO

Are samples for human drinking water use? ☐ ☑ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

Barrie region Combined Sewer Bylaw
compare with PWQO / Metals E 1 day rush

September, 22, 2022

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
14.5			18.2		

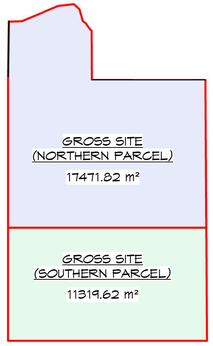
SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: FB	Date: August 24, 2021	Time:	Received by:	Date: Sep 21/22	Time: 13:10	Received by:	Date: 09/21/22	Time: 15 5pm

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

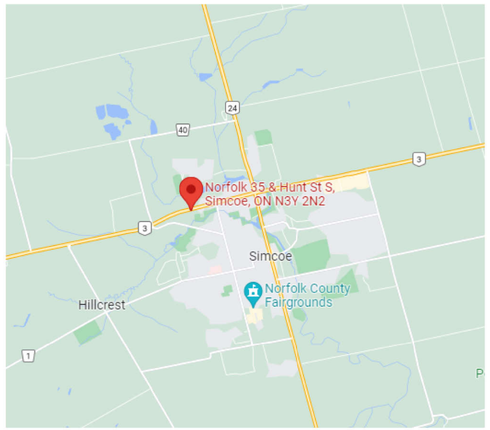
WHITE - LABORATORY COPY YELLOW - CLIENT COPY

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy

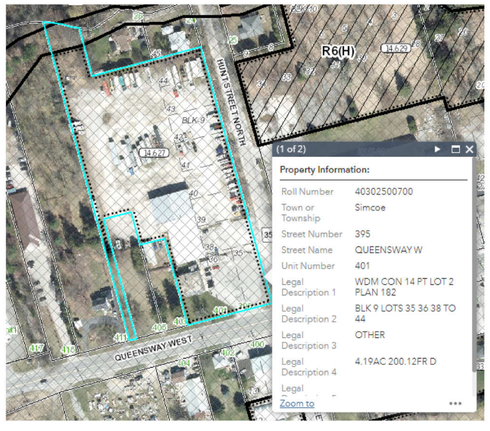
APPENDIX D



2 GROSS SITE - PC/Z
PC/Z100 SCALE 1 : 2000



KEY MAP
SCALE 1 : 100

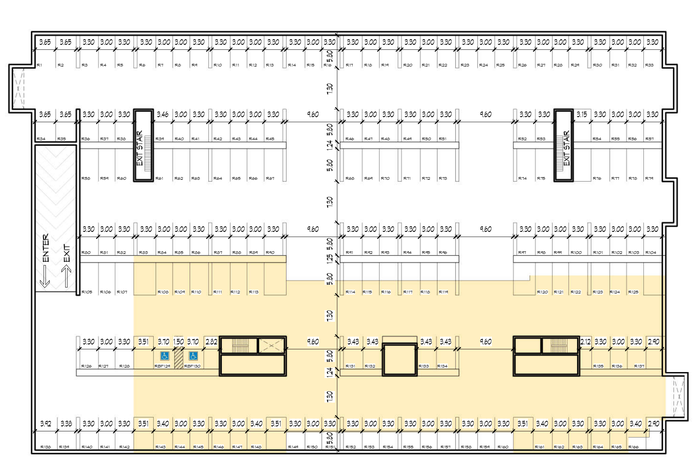


SITE MAP
SCALE 1 : 100

'NORTHERN PARCEL'

1 SITE PLAN PRECON / ZONING AMENDMENT
PC/Z100 SCALE 1 : 500

'SOUTHERN PARCEL'



UNDERGROUND PARKING LAYOUT

SITE PLAN LEGEND

ENT.	MAIN ENTRANCE / EXIT DOOR
B/F	ENTRANCE / EXIT DOOR (BARRIER FREE OPERATOR)
O/H	ENTRANCE / EXIT DOOR (OVERHEAD DOOR W/ OPERATOR)
	PROPERTY LINE
	SETBACKS
	FIRE ROUTE (6m WIDE / 12m CENTER RADIUS)
CE	COVERED ENTRANCE
P	PATIO (ON GRADE)
CP	COVERED PATIO (ON GRADE)
B	BALCONY
CD	COVERED DECK / UNENCLOSED PORCH
D	DECK / UNENCLOSED PORCH
	PAINTED GRAPHICS ON ASPHALT / CONC. (COORD. W/ THE CITY / TOWN HAVING JURISDICTION GUIDELINES)
	• WHEELCHAIR SIGN ON ASPHALT / CONC. (WHITE & BLUE COLOUR)
V#	• VEHICULAR STALL MARKINGS (YELLOW COLOUR) V# - VISITOR S# - SPARE B/C1 - ONE REQ'D DWELLING PARKING B/C2 - TWO REQ'D DWELLING PARKING (LETTER REPRESENTS UNIT TYPE)
	• DIAGONAL MARKINGS
VARIES	NEW CONIFEROUS TREE
VARIES	NEW DECIDUOUS TREE (~4500mm TREE RADIUS @ FULL GROWTH)
	SNOW STORAGE (SS) (ALL ADDITIONAL SNOW TO BE TAKEN AWAY BY OWNER)

HATCH IDENTIFICATION LEGEND

	CONC. SIDEWALK / PAD / CROSSWALK / SIDEWALK / LANDWAY / STAIRS / ETC.
	AREA OF ASPHALT
	LANDSCAPING
	COMMERCIAL
A	7-STOREY MIXED-USE MID-RISE
B	3-STOREY RESIDENTIAL DWELLING (VEHICULAR - x1 GARAGE, x1 DRIVEWAY) (APPROX. 7300mm W x 10000mm D)
C	1-STOREY RESIDENTIAL DWELLING (VEHICULAR - x1 GARAGE, x1 DRIVEWAY) (APPROX. 9600mm W x 24000mm D)

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE ONTARIO N3Y 3W4
(519) 426-6270

Project Title
HUNT ST. N. RESIDENTIAL
HUNT STREET NORTH,
SIMCOE, ON N3Y 2M9

PROJECT No.
22-013

Drawing Title
SITE PLAN PRE-CON / ZONING AMENDMENT

Drawing No.
PC/Z100

H:\Projects\2022\22-013 HFW Holdings Hunt St Residential\Drawings\Arch\22-013 Hunt St Residential Site.vwt
DATE LAST PLOTTED 5/30/2023 11:06:30 AM

SITE STATISTIC & ZONING REQ.'S

ZA - ZONING AMENDMENTS (RED TEXT)

PROPERTY: LEGAL DESCRIPTION:
395, 401, 402, 405, 411 QUEENSWAY WEST IN THE TOWN OF NORTH SIMCOE, IN THE DISTRICT OF NORFOLK COUNTY

ZONING:
IN ACCORDANCE TO THE TOWN OF SIMCOE, ZONING BY-LAW 1-Z-2014 NORFOLK COUNTY - JANUARY-2021-CONSOLIDATION

PROVISION	LAND USE: EXISTING (SOUTHERN PORTION)
6.3 6.3.1	EX. - SERVICE COMMERCIAL ZONE (CS) PERMITTED USES *Permitted Uses* in a *CS zone*, no land, *building* or *structure* shall be used except in accordance with the following uses: a) ambulance service b) *animal hospital*, provided the entire operation is carried on within an enclosed *building* c) any non-residential use *permitted* in the Neighbourhood Institutional *Zone* (IN), subject to the provisions of that *Zone* d) auction centre e) automobile gas station f) automobile service and repair station g) *automobile washing establishment* h) automotive parts shop i) bar or night club j) clinic or doctors' offices k) commercial greenhouse, tree and plant nursery l) community centre m) contractor shop n) contractor supply and service shop o) convenience store p) day care nursery q) *dry cleaning distribution station* r) dry cleaning establishment s) *dwelling, single detached or dwelling unit* in a non-residential *building* - maximum one *(1) (8-Z-2020)* t) equipment rental establishment u) farm implement sales and service establishment v) financial institution w) fire hall x) florist shop y) fruit and vegetable outlet z) funeral home aa) garden supply centre bb) home occupation cc) hotel dd) laundromat ee) *lumber yard and building supply establishment* ff) manufacturing and retail sale of monuments gg) merchandise service shop hh) miniature golf, golf driving range and baseball pitch ii) *outdoor storage accessory to permitted uses* jj) *parking lot or structure* kk) personal service shop ll) place of assembly mm) place of sports and recreation nn) *place of worship* oo) police station pp) private club qq) *restaurant* rr) *restaurant, fast-food* ss) *restaurant, take-out* tt) sheet metal, plumbing, heating, electrical or woodworking shop or any similar activity uu) swimming pool sales and service establishment vv) training and rehabilitation centre ww) *vehicle sales or rental establishment* xx) video store yy) wholesale outlets zz) office, all types (special provision 14.627) ADD THE FOLLOWING ADDITIONAL PERMITTED USES: aaa) dwelling units in a commercial building, max. bbb) boutique ccc) college or trade school ddd) delicatessen and specialty food stores eee) farmers market fff) office accessory to a shopping centre operation ggg) retail store

PROVISION	SETBACKS (m - METERS):	REQUIRED (m)	PROVIDED (m)
6.3.2a)	MIN. LOT AREA: i) INTERIOR LOT ii) CORNER LOT	 450m² 495m²	 - 11,320m²
6.3.2b)	MIN. LOT FRONTAGE: i) INTERIOR LOT ii) CORNER LOT	 15 16.5	 - 78.3
6.3.2c)	MIN. FRONT YARD:	3	7.27
6.3.2d)	MIN. EXTERIOR SIDE YARD:	3	5.52
6.3.2e)	MIN. INTERIOR SIDE YARD	3	13.71
6.3.2f)	MIN. REAR YARD:	9	21.35
6.3.2g)	MN. USABLE FLOOR AREA FOR A DWELLING UNIT N A NON-RESIDENTIAL BLDG.	40m²	MIN. 40m²
6.3.2h)	MAX. BLDG. HEIGHT	11	30m or SIX (6) STORIES
6.3.2i)	MAX. LOT COVERAGE	35%	28%
6.3.2j)	MAX. USABLE FLOOR AREA: OF A FRUIT AND VEGETABLE OUTLET	200m²	N/A
6.3.2.k)	OUTDOOR STORAGE	PROHIBITED IN A FRONT YARD & WITHIN 3M OF ANY LOT LINE ADJOINING A RESIDENTIAL ZONE	N/A
6.3.3	Outdoor Display of Goods Outdoor display of *vehicles* on paved areas shall be *permitted* in the *front yard* subject to Subsection 6.3.5. Outdoor display of other non-vehicular items shall be *permitted* within a *front yard* provided such display is located on a grassed or landscaped area without surrounding fences and subject to Subsection 6.3.5.		
6.3.4	Landscaped Strip All *buildings*, *parking lots* and *parking spaces* and display areas shall be *setback* 3 metres from the *front lot line*. This area shall be landscaped which may include patio pavers.		
6.3.5	Zone Provision for Convenience Store The *usable floor area* of a *convenience store* shall not exceed 280 square metres.		
6.3.6	Zone Provisions for Dwellings Notwithstanding the provisions in Subsection 6.3.2, all *single detached dwellings* shall conform to the Urban Residential Type 3 (R3) *Zone* provisions in Subsection 5.3. (8-Z-2020) (27-Z-2020)		

COORD. W/ ZONING BY-LAW FOR ALL OTHER ZONING REQ.'S

PARKING REQ.'D MIXED USE RESIDENTIAL (CS)

PROVISION	NUMBER OF PARKING SPACES	REQUIRED	PROVIDED
4.9b)	APARTMENT DWELLING (8-Z-2017): 1.5 SPACES / DWELLING UNIT 1.5 SPACES x 72 DWELLING UNITS =	108 SPACE(S)	108 SPACE(S)
	APARTMENT DWELLING (8-Z-2017): 1.25 SPACES / DWELLING UNIT 1.25 SPACES x 42 DWELLING UNITS =	53 SPACE(S)	58 SPACE(S)

PARKING REQ.'D MIXED USE RESIDENTIAL - VISITOR:

4.9f)	VISITOR PARKING: 1 SPACE / 3 DWELLING UNITS 1 SPACE x (114 / 3) = 38	38 SPACE(S)	38 SPACE(S)

PARKING REQ.'D MIXED USE RESIDENTIAL TOTAL:

	TOTAL	146 SPACE(S)	204 SPACE(S)

PARKING REQ.'D MIXED USE RESIDENTIAL - BARRIER FREE (PART OF REQ.'D PARKING)

4.3.3	BARRIER FREE PARKING REQ.'D: 26-50 PARKING SPACES =		
	TYPE 'A' (3.4m WIDE) PLUS 1.5m AISLE	1 SPACE(S)	3 SPACE(S)
	TYPE 'B' (2.4m WIDE) PLUS 1.5m AISLE	1 SPACE(S)	1 SPACE(S)

PARKING REQ.'D MIXED USE NON-RESIDENTIAL (CS)

PROVISION	NUMBER OF PARKING SPACES	REQUIRED	PROVIDED
4.9t)	OTHER NON-RESIDENTIAL USES: 1 SPACE / 35m² USABLE FLOOR AREA 1 SPACE x (MAX. 3432m² / 35m² = 98	98 SPACE(S)	98 SPACE(S)

NOTE - THROUGH THE ZBA, A SITE SPECIFIC PROVISION IS SOUGHT THAT ALL COMMERCIAL SPACES - REGARDLESS OF TENNANCY - WILL SUBJECT TO A BLANKET REQUIREMENT OF 1 PARKING SPACE FOR EVERY 35m² OF USEABLE FLOOR AREA

PARKING REQ.'D MIXED USE NON-RESIDENTIAL TOTAL:

	TOTAL	98 SPACE(S)	98 SPACE(S)

PARKING REQ.'D MIXED USE NON-RESIDENTIAL BARRIER FREE: (PART OF REQ.'D PARKING)

4.3.3	BARRIER FREE PARKING REQ.'D: 76-100 PARKING SPACES =		
	TYPE 'A' (3.4m WIDE) PLUS 1.5m AISLE	2 SPACE(S)	2 SPACE(S)
	TYPE 'B' (2.4m WIDE) PLUS 1.5m AISLE	2 SPACE(S)	2 SPACE(S)

4.0 OFF STREET PARKING

PARKING SPACE DIMENSIONS

4.1 4.1.3a) 4.1.3b) 	PARKING SPACE DIMENSIONS WIDTH OF PARKING SPACE: FOR VEHICLES PARKED SIDE BY SIDE FOR VEHICLES PARKED WITH WALL OR FENCE ADJ. DEPTH OF PARKING SPACE: FOR 90 DEGREE PARKING FOR PARALLEL PARKING	 3 MIN. 3.3 MIN. 5.8 MIN. 7 MIN.	 3 3.3 5.8 7
4.1.4 4.1.4b)	PARKING AISLE REQ.'S TWO-WAY TRAFFIC	7.3 MIN.	7.3 MIN.

4.2 LOCATION OF PARKING ON A LOT

4.2.4	**4.2.4 Other Provisions** a) For tri-plex dwellings, duplex dwellings, four-plex dwellings, street townhouses, stacked townhouses, and boarding or lodging houses, required parking spaces shall be prohibited within the required front yard or required exterior side yard; except where a dwelling unit has a private garage in which case the driveway leading to the private garage may be used as a parking space subject to the size requirements herein; b) For *group townhouses* and *apartment dwellings*, no *parking lot* shall be located closer than 3 metres from any *dwelling* on the *lot* or of any *interior lot line* abutting another residential *Zone*; c) For *group townhouses* and *apartment dwellings*, no parking lot or *parking space* shall be located between a *dwelling* and the *street line*, except for individual or tandem *parking spaces* leading directly to each *townhouse dwelling unit*; d) For commercial or industrial properties, no *parking lot* shall be located closer than 4.5 metres from any *interior lot line* abutting a residential *Zone*; e) For *accessory residential dwelling units*, notwithstanding the foregoing, one (1) *parking space* dedicated for the use of the *accessory residential dwelling unit*, may be *permitted* in the *front yard* provided a minimum of 50 percent of the *required front yard* shall be maintained as landscaped open space notwithstanding such dedicated *parking space*.

PARKING REQ.'D - LOADING SPACES

4.7	LOADING SPACES: 9m WIDTH x 10m DEPTH	N/A	1 PROVIDED

LANDSCAPED AREA

2.81	**"LANDSCAPE AREA"** shall mean an area of land comprised of trees, shrubs, flowers, grass or other horticultural elements. Landscaping may include pervious paths, patios, walkways, or elements designed to enhance the visual amenity of a property but does not include open storage display areas, parking or loading areas, or areas covered by *driveways*. *(8-Z-2018)*

4.2.5	**4.2.5 Parking and *Landscape Area* *(7-Z-2018)*** Within Urban Residential Type 1 to 4 *Zones* (R1 to R4), the following shall apply: a) A minimum of 50 percent of the *front yard* shall be maintained as *landscape area*. b) In the case of a *corner lot*, a minimum of 50 percent of each of the *front yard* and *exterior side yard* shall be maintained as *landscape area*.

2.170
"USABLE FLOOR AREA" shall mean the total area of all floors of a *building*, *outdoor patio or cafe*, or *dwelling unit* including:
a) a hallway, aisle, stairway and corridor within a suite or unit;
b) an internal wall and partition within a suite or unit;
c) a storage room and storage area within a suite or unit;
d) a *boatslip* in the case of a *boathouse*;
e) a *habitable room* or area in the *basement* of a *dwelling*.
But excluding:
a) an area occupied by a common area in a multi-tenant *building* including but not limited to a public stairwell, public or shared corridor and lobby;
b) a mechanical shaft;
c) an entry vestibule not within a *dwelling unit*;
d) a garage attached to a *building*;
e) an unfinished *basement* in a *dwelling* used for storage or laundry.

The *usable floor area* for a *dwelling* is measured from the outside face of exterior walls or to the centre-line of party or *common walls*.
The *usable floor area* for all other *buildings* shall be measured from the inside face of exterior walls, interior *common walls* and firewalls.

PROVISION	LAND USE: PROPOSED (NORTHERN PORTION)
5.0 5.4 5.4.1	ZONING AMENDMENT: RESIDENTIAL ZONES URBAN RESIDENTIAL TYPE 4 ZONE (R4) PERMITTED USES In an R4 *Zone*, no land, *building* or *structure* shall be used except in accordance with the following uses: a) group townhouse c) street townhouse d) *semi-detached*, duplex, tri-plex and four-plex *dwellings* provided they are located on the same *lot* with, and in accordance with the *Zone* provisions of, *group townhouse*

PROVISION	SETBACKS (m - METERS):	REQUIRED (m) Street Townhouse (per unit)	REQUIRED (m) Group Townhouse Stacked Townhouse	PROVIDED (m)
5.4.2a)	MIN. LOT AREA: i) ATTACHED GARAGE ii) CORNER LOT iii) DETACHED GARAGE	 156m² 264m² 162m²	 195m² 195m² 215m²	 17,472m² - -
5.4.2b)	MN. LOT FRONTAGE: i) INTERIOR LOT ii) CORNER LOT iii) CORNER LOT ACCESSED BY A REAR LANE	 6.5 11 6.5	 30 30	 104.8 - -
5.4.2c)	MN. FRONT YARD: i) ATTACHED GARAGE ii) DETACHED GARAGE OR REAR YARD PARKING	 6 1.5	 6 1.5	 MIN. 6 -
5.4.2d)	MIN. EXTERIOR SIDE YARD: i) W/ A 6m FRONT YARD ii) W/ A 1.5m FRONT YARD	 6 1.5	 6 1.5	 - -
5.4.2e)	MIN. INTERIOR SIDE YARD	1.2	3	MIN. 3
5.4.2f)	MN. REAR YARD : i) ATTACHED GARAGE ii) DETACHED GARAGE ACCESSED VIA A REAR LANE INCLUDING HALF OF THE LANE PROPOSED SITE SPECIFIC PROVISION: WHERE THE SIDE ELEVATION OF A BLOCK TOWNHOUSE OR SEMI-DETACHED HOUSE FACES THE REAR YARD	 7.5 13	 7.5 7.5	 - - MIN. 3
5.4.2g)	MIN. SEPARATION BETWEEN TOWNHOUSE DWELLINGS	2	2	3
5.4.2h)	MAX. BLDG. HEIGHT	11 (8-Z-2017)	11 (8-Z-2017)	MAX. 13
5.4.3	*Setback* from Mutual *Side Lot Line* Notwithstanding the *required side yard*, on a mutual *side lot line* separating two (2) attached *townhouse* units, no *interior side yard* is *required* where the walls are joined, where the walls are not joined, a 1.2 metre *side yard* shall be *required*.	1.2	1.2	MIN. 1.2
5.4.4	Maximum Units in a *Townhouse Dwelling* No more than eight *(8) dwelling units* shall be located in a townhouse *dwelling*.	8 UNITS	8 UNITS	5 UNITS

COORD. W/ ZONING BY-LAW FOR ALL OTHER ZONING REQ.'S

PARKING REQ.'D RESIDENTIAL (R4)

PROVISION	NUMBER OF PARKING SPACES	REQUIRED	PROVIDED
4.9a)	SINGLE DETACHED, SEMI-DETACHED, DUPLEX, TRI-PLEX, FOUR-PLEX, TOWNHOUSE DWELLINGS & VACATION HOME (8-Z-2017): 2 SPACES / DWELLING UNIT 2 SPACES x 38 DWELLING UNITS = 76	76 SPACE(S)	82 SPACE(S)

PARKING REQ.'D RESIDENTIAL - VISITOR:

4.9f)	VISITOR PARKING: 1 SPACE / 3 DWELLING UNITS 1 SPACE x (38 / 3) = 13	13 SPACE(S)	13 SPACE(S)

PARKING REQ.'D RESIDENTIAL - TOTAL:

	TOTAL	89 SPACE(S)	95 SPACE(S)

PARKING REQ.'D RESIDENTIAL - BARRIER FREE: (PART OF REQ.'D PARKING)

4.3.3	BARRIER FREE PARKING REQ.'D: 1-25 PARKING SPACES =		
	TYPE 'A' (3.4m WIDE) PLUS 1.5m AISLE	1 SPACE(S)	1 SPACE(S)
	TYPE 'B' (2.4m WIDE) PLUS 1.5m AISLE	0 SPACE(S)	0 SPACE(S)

4.0 OFF STREET PARKING

PARKING SPACE DIMENSIONS

4.1 4.1.3a) 4.1.3b) 	PARKING SPACE DIMENSIONS WIDTH OF PARKING SPACE: FOR VEHICLES PARKED SIDE BY SIDE FOR VEHICLES PARKED WITH WALL OR FENCE ADJ. DEPTH OF PARKING SPACE: FOR 90 DEGREE PARKING FOR PARALLEL PARKING	 3 MIN. 3.3 MIN. 5.8 MIN. 7 MIN.	 3 3.3 5.8 7
4.1.4 4.1.4b)	PARKING AISLE REQ.'S TWO-WAY TRAFFIC	7.3 MIN.	7.3 MIN.

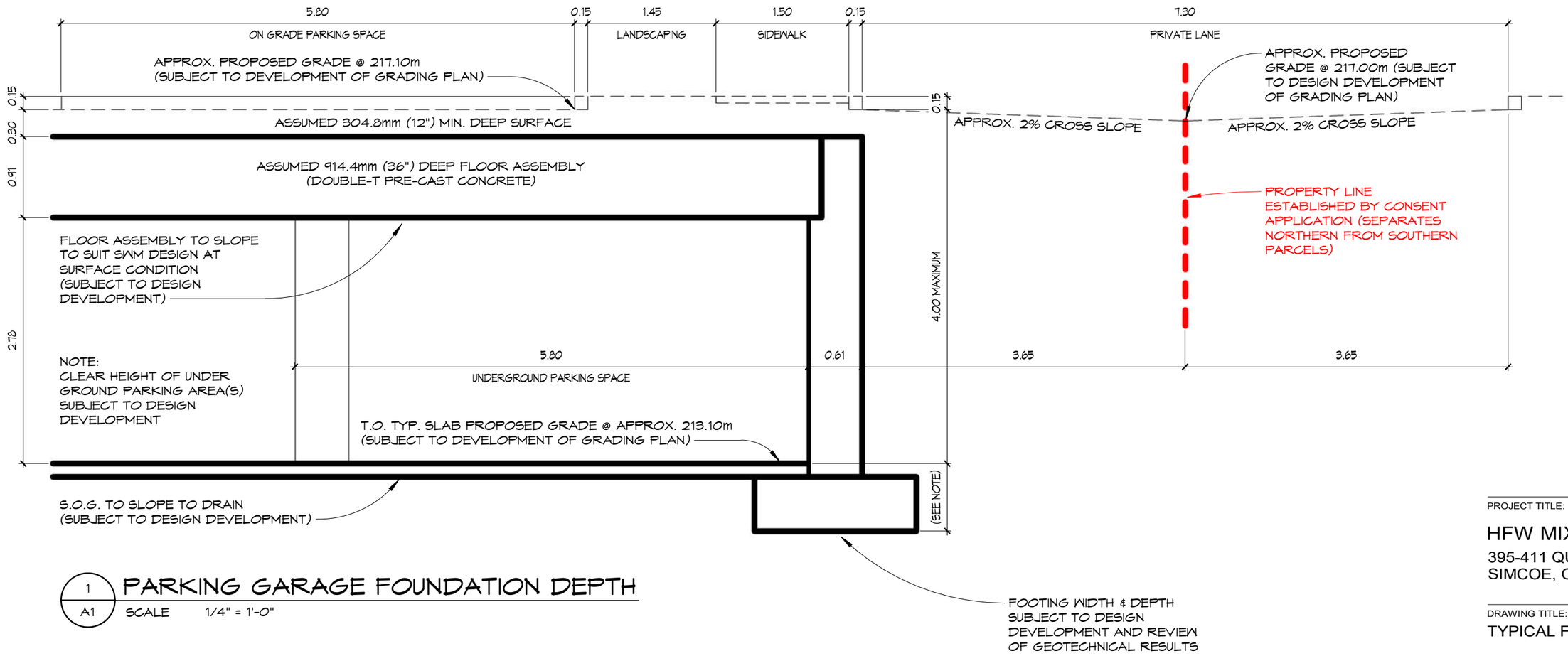
4.2 LOCATION OF PARKING ON A LOT

4.2.3	**4.2.3 Residential Parking Area** For Urban Residential Type 1 to 4 *Zones* (R1 to R4), the following shall apply: a) within a *front yard* or *exterior side yard*, motor *vehicles* shall only be parked on a *driveway*, in a *parking space* or private garage (7-Z-2018); b) not more than one *(1) required parking space* may be located within the *required front yard* or *required exterior side yard* (7-Z-2018); c) *vehicles* shall not be parked within any *landscape area* (7-Z-2018);
4.2.4	**4.2.4 Other Provisions** a) For tri-plex dwellings, duplex dwellings, four-plex dwellings, street townhouses, stacked townhouses, and boarding or lodging houses, required parking spaces shall be prohibited within the required front yard or required exterior side yard; except where a dwelling unit has a private garage in which case the driveway leading to the private garage may be used as a parking space subject to the size requirements herein; b) For *group townhouses* and *apartment dwellings*, no *parking lot* shall be located closer than 3 metres from any *dwelling* on the *lot* or of any *interior lot line* abutting another residential *Zone*; c) For *group townhouses* and *apartment dwellings*, no parking lot or *parking space* shall be located between a *dwelling* and the *street line*, except for individual or tandem *parking spaces* leading directly to each *townhouse dwelling unit*; d) For commercial or industrial properties, no *parking lot* shall be located closer than 4.5 metres from any *interior lot line* abutting a residential *Zone*; e) For *accessory residential dwelling units*, notwithstanding the foregoing, one (1) *parking space* dedicated for the use of the *accessory residential dwelling unit*, may be *permitted* in the *front yard* provided a minimum of 50 percent of the *required front yard* shall be maintained as landscaped open space notwithstanding such dedicated *parking space*.

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE ONTARIO N3Y 3W4
(519) 426-6270

Project Title
HUNT ST. N. RESIDENTIAL
HUNT STREET NORTH,
SIMCOE, ON N3Y 2M9

PROJECT No.
22-013
Drawing Title
SITE PLAN PRE-CON / ZONING AMENDMENT
Drawing No.
PC/Z101



1 / A1 PARKING GARAGE FOUNDATION DEPTH

SCALE 1/4" = 1'-0"

PROJECT TITLE:

HFW MIXED USE

395-411 QUEENSWAY WEST
SIMCOE, ONTARIO

DRAWING TITLE:

TYPICAL FOUNDATION DEPTH

DRAWING SCALE:
1/4" = 1'-0"

DATE ISSUED:
2024.01.23

DRAWING NO.:
A1

PROJECT NO.:
22-013

LIMITATIONS TO THE REPORT

This report is intended solely for the Client named. The report is prepared based on the work has been undertaken in accordance with normally accepted geotechnical engineering practices in Ontario.

The comments and recommendations given in this report are based on information determined at the limited number of the test hole and test pit locations. The boundaries between the various strata as shown on the borehole logs are based on non-continuous sampling and represent an inferred transition between the various strata and their lateral continuation rather than a precise plane of geological change. Subsurface and groundwater conditions between and beyond the test holes and test pits may differ significantly from those encountered at the test hole and test pit locations. The benchmark and elevations used in this report are primarily to establish relative elevation differences between the test hole and test pit locations and should not be used for other purposes, such as grading, excavating, planning, development, etc.

It should be noted that the results of the chemical analysis refer only to the sample analyzed which was obtained from specific sampling location and sampling depth, which may vary between and beyond the location and depth of the sample taken. Please note that the level of chemical testing outlined herein is meant to provide a broad indication of groundwater quality based on the limited sample(s) tested. The analytical results contained in this report should not be considered a warranty with respect to the groundwater quality for any specific purpose or the acceptability of the groundwater discharge.

It should be noted that not all of the well screens and sealed in the saturated zone of unconfined aquifer, and are not necessarily screened in the same unconfined aquifer. Therefore, the groundwater table contour lines based on limited number of groundwater level measurements in limited number of monitoring wells should be considered to be very approximate.

The report reflects our best judgment based on the information available to GeoPro Consulting Limited at the time of preparation. Unless otherwise agreed in writing by GeoPro Consulting Limited, it shall not be used to express or imply warranty as to any other purposes. No portion of this report shall be used as a separate entity, it is written to be read in its entirety. The information contained herein in no way reflects on the environment aspects of the project, unless otherwise stated.

The design recommendations given in this report are applicable only to the project designed and constructed completely in accordance with the details stated in this report. Otherwise, our responsibility is limited to interpreting the subsurface information at the borehole or test pit locations.

Should any comments and recommendations provided in this report be made on any construction related issues, they are intended only for the guidance of the designers. The number of test holes and test pits may not be sufficient to determine all the factors that may affect construction activities, methods and costs. Such as, the thickness of surficial topsoil or fill layers may vary significantly and unpredictably; the amount of the cobbles and boulders may vary significantly than what described in the report; unexpected water bearing zones/layers with various thickness and extent may be encountered in the fill and native soils. The contractors bidding on this project or undertaking the construction should, therefore, make their own interpretation of the factual information presented and make their own conclusions as to how the subsurface conditions may affect their work and determine the proper construction methods.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. GeoPro Consulting Limited accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

We accept no responsibility for any decisions made or actions taken as a result of this report unless we are specifically advised of and participate in such action, in which case our responsibility will be as agreed to at that time.

HFW RESIDENTIAL DEVELOPMENT
PHASE 1
SIMCOE, NORFOLK COUNTY
Estimated Cost and Securities

Rev0 - 2024-05-17 Project #22-013

ITEM	DESCRIPTION	UNIT	APPROX. QUANTITY	UNIT PRICE	AMOUNT	SECURITY %	SECURITY AMOUNT
	A. SANITARY SEWERS						
1	Connect new sanitary to future sanitary stub on Hunt Street.	L.S.	1	$3,000	$3,000	100%	$3,000
2	Supply and install 125mm dia. sanitary services including all fittings and marker 1m from proposed buidling within development site.	Each.	44	$1,000	$44,000	10%	$4,400
3	Supply and install 200mm PVC sanitary sewers.						
	a) SAMH1 to SAMH2	metre	101.5	$200.00	$20,300	10%	$2,030
	b) SAMH2 to SAMH3	metre	29.5	$200.00	$5,900	10%	$590
	c) SAMH2 to SAMH4	metre	48.3	$200.00	$9,660	10%	$966
	d) SAMH4 to SAMH5	metre	29.5	$200.00	$5,900	10%	$590
	e) SAMH1 to SAMH6	metre	48.3	$200.00	$9,660	10%	$966
	f) SAMH6 to SAMH7	metre	94.6	$200.00	$18,920	10%	$1,892
4	Supply and install 1200mm diameter precast concrete maintenance holes complete with benching.						
	a) SAMH1	L.S.	1	$7,000	$7,000	10%	$700
	b) SAMH2	L.S.	1	$7,000	$7,000	10%	$700
	c) SAMH3	L.S.	1	$7,000	$7,000	10%	$700
	d) SAMH4	L.S.	1	$7,000	$7,000	10%	$700
	e) SAMH5	L.S.	1	$7,000	$7,000	10%	$700
	f) SAMH6	L.S.	1	$7,000	$7,000	10%	$700
5	Flush and CCTV Video Sanitary System.	L.S.	1	$3,500	$3,500	10%	$350
	TOTAL SANITARY SEWERS				**$162,840**		**$18,984**
	B. WATERMAINS						
1	Connect new 200mm watermain to ex 400mm Watermain along Hunt Street.	L.S.	1	$5,000	$5,000	100%	$5,000
2	Supply and install 200mm dia. water main including all fittings and anodes within development site.	metre	325	$170.00	$55,250	10%	$5,525
3	Supply and install 200mm dia. water main including all fittings and anodes within County ROW.	metre	5	$170.00	$850	100%	$850
4	Supply and install 25mm PEX water services including all fittings and anodes within development site.	each	44	$1,000.00	$44,000	10%	$4,400
5	Supply and install hydrant set complete with valve within development site.	each	1	$5,000.00	$5,000	100%	$5,000
6	Supply and install backflow preventer complete with chamber.	each	1	$55,000.00	$55,000	10%	$5,500
	TOTAL WATERMAIN				**$165,100**		**$26,275**

ITEM	DESCRIPTION	UNIT	APPROX. QUANTITY	UNIT PRICE	AMOUNT	SECURITY %	SECURITY AMOUNT
	C. STORM SEWERS						
1	Supply and install 300mm dia. storm sewers.						
	a) CBMH5 to CBMH4	metre	60.5	$150.00	$9,075	10%	$908
	b) CBMH2 to CBMH3	metre	27.6	$150.00	$4,140	10%	$414
	c) CBMH1 to STMH2	metre	38.5	$150.00	$5,775	10%	$578
2	Supply and install 450mm dia. storm sewers.						
	a) HW3 to STMH3	metre	29.6	$250.00	$7,400	10%	$740
	b) STMH3 to CB3	metre	11.2	$250.00	$2,800	10%	$280
3	Supply and install 525mm dia. storm sewers.						
	a) CBMH2 to CBMH1	metre	60.5	$300.00	$18,150	10%	$1,815
4	Supply and install 600mm dia. storm sewers.						
	a) CBMH6 to CBMH5	metre	22.4	$350.00	$7,840	10%	$784
	b) CBMH5 to CBMH2	metre	53.3	$350.00	$18,655	10%	$1,866
5	Supply and install 675mm dia. storm sewers.						
	a) HW1 to OGS EFO8	metre	6.2	$450.00	$2,790	10%	$279
	b) OGS EFO8 to CBMH6	metre	16.4	$450.00	$7,380	10%	$738
7	Supply and install 1200mm dia. precast concrete maintenance holes complete with benching.						
	a) CBMH1	L.S.	1	$7,000	$7,000	10%	$700
	b) CBMH2	L.S.	1	$7,000	$7,000	10%	$700
	c) CBMH3	L.S.	1	$7,000	$7,000	10%	$700
	d) CBMH4	L.S.	1	$7,000	$7,000	10%	$700
	e) CBMH5	L.S.	1	$7,000	$7,000	10%	$700
	f) CBMH6	L.S.	1	$7,000	$7,000	10%	$700
	g) STMH2	L.S.	1	$7,000	$7,000	10%	$700
	h) STMH3	L.S.	1	$7,000	$7,000	10%	$700
8	Supply and install 600x600 precast concrete catch basins complete with grate, connections, and subdrains.	each	1	$2,500	$2,500	10%	$250
9	Construct Headwalls per OPSD 804.030.	each	3	$5,500.00	$16,500	10%	$1,650
10	Construct proposed stormwater management pond.	L.S.	1	$200,000.00	$200,000	10%	$20,000
11	Supply and place rip rap at stormwater inlets and outlet.	L.S.	1	$5,000.00	$5,000	10%	$500
12	Supply and install oil and grit separator Stormceptor EFO8 or approved equivalent	L.S.	1	$40,000.00	$40,000	10%	$4,000
13	Flush and CCTV video storm system	L.S.	1	$3,500	$3,500	10%	$350
	TOTAL STORM SEWER				**$407,505**		**$40,751**

ITEM	DESCRIPTION	UNIT	APPROX. QUANTITY	UNIT PRICE	AMOUNT	SECURITY %	SECURITY AMOUNT
	D. ROAD CONSTRUCTION						
1	Sub-excavation to below finish grade for proposed asphalt areas.	L.S.	1	$25,000	$25,000	10%	$2,500
2	Supply, place and compact 300mm Granular 'B' Type 2 100% crushed limestone for light-duty asphalt area.	tonne	425	$15.00	$6,375	10%	$638
3	Supply, place and compact 150mm Granular 'A' 100% crushed limestone for light-duty asphalt area.	tonne	200	$20.00	$4,000	10%	$400
4	Supply, place and compact 50mm of HL8 base asphalt pavement for light-duty asphalt area.	tonne	70	$100.00	$7,000	10%	$700
5	Supply, place and compact 40mm of HL3 top asphalt pavement for light-duty asphalt area.	tonne	55	$110.00	$6,050	10%	$605
2	Supply, place and compact 300mm Granular 'B' Type 2 100% crushed limestone for heavy-duty asphalt area.	tonne	1940	$15.00	$29,100	10%	$2,910
3	Supply, place and compact 150mm Granular 'A' 100% crushed limestone for heavy-duty asphalt area.	tonne	890	$20.00	$17,800	10%	$1,780
4	Supply, place and compact 80mm of HL8 base asphalt pavement for heavy-duty asphalt area.	tonne	500	$100.00	$50,000	10%	$5,000
5	Supply, place and compact 40mm of HL3 top asphalt pavement for heavy-duty asphalt area.	tonne	250	$110.00	$27,500	10%	$2,750
10	Supply, place and compact 150mm Granular 'A' 100% crushed limestone for Driveways	tonne	400	$20.00	$8,000	10%	$800
11	Supply, place and compact 40mm of HL3 top asphalt pavement for Driveways	tonee	110	$110.00	$12,100	10%	$1,210
7	Construct concrete sidewalk within development site.	sqm	675	$50.00	$33,750	10%	$3,375
7	Construct concrete sidewalk within County ROW.	sqm	130	$50.00	$6,500	100%	$6,500
8	Construct curb and gutter per OPSD 600.110 within development site.	m	620	$40.00	$24,800	10%	$2,480
9	Adjust manholes to base asphalt.	each	15	$350.00	$5,250	10%	$525
10	Adjust manholes to surface asphalt.	each	15	$350.00	$5,250	10%	$525
9	Construct curb and gutter per OPSD 600.040 within County ROW.	m	110	$40.00	$4,400	100%	$4,400
	TOTAL ROAD CONSTRUCTION				**$272,875**		**$37,098**
	E. LANDSCAPING						
1	Landscaping Allowance	L.S.	1	$40,000.00	$40,000	100%	$40,000
	TOTAL LANDSCAPING				**$40,000**		**$40,000**
	F. RECORD DRAWINGS						
1	Complete record drawings for development site and work within county ROW.	L.S.	1	$4,000.00	$4,000	100%	$4,000
	TOTAL RECORD DRAWINGS				**$4,000**		**$4,000**

ITEM	DESCRIPTION	UNIT	APPROX. QUANTITY	UNIT PRICE	AMOUNT	SECURITY %	SECURITY AMOUNT

SECURITY SUMMARY

A.	SANITARY SEWERS	$18,984
B.	WATERMAIN	$26,275
C.	STORM SEWERS	$40,751
D.	ROAD CONSTRUCTION	$37,098
E.	LANDSCAPING	$40,000
F.	RECORD DRAWINGS	$4,000
	GRAND TOTAL	**$167,107**

I REQUIRE THIS PLAN TO BE DEPOSITED UNDER THE LAND TITLES ACT.

DATED MARCH 21, 2024

R. C. DIXON
ONTARIO LAND SURVEYOR

PLAN 37R-11733

RECEIVED AND DEPOSITED

DATED 2024/05/01

REPRESENTATIVE FOR THE LAND REGISTRAR FOR THE LAND TITLES DIVISION OF NORFOLK (No. 37)

SCHEDULE

PART	LOT/BLOCK	CONCESSION/PLAN	PIN	AREA (SQ.M)
1	PART LOT 2	CONCESSION 14	PART OF PIN 50188-0237 (LT)	14523.686 sq.m
	PART LOTS 39 & 44 BLOCK 9 AND ALL OF LOTS 40, 41, 42 & 43, BLOCK 9	REGISTERED PLAN 182		
2	PART LOT 2	CONCESSION 14	PART OF PIN 50188-0237 (LT)	250.831 sq.m
	PART LOT 44 BLOCK 9	REGISTERED PLAN 182		
3	PART LOT 2	CONCESSION 14	PART OF PIN 50188-0237 (LT)	2192.068 sq.m
4	PART LOT 2	CONCESSION 14	PART OF PIN 50188-0237 (LT)	844.514 sq.m
	PART LOT 39 BLOCK 9	REGISTERED PLAN 182		
5	PART LOT 2	CONCESSION 14	PART OF PIN 50188-0237 (LT)	11130.325 sq.m
	PART LOT 39 BLOCK 9 ALL OF LOTS 35, 36 & 37 BLOCK 9	REGISTERED PLAN 182		

PARTS 1, 2, 3, 4 & 5 COMPRISE ALL OF PIN 50188-0237 (LT)
PART 2 IS SUBJECT TO AN EASEMENT AS IN INSTRUMENT No. NR582776

PLAN OF SURVEY

OF ALL OF

LOT 35, 36, 38, 39, 40, 41, 42, 43 & 44 BLOCK 9 REGISTERED PLAN 182

(TOWN OF SIMCOE)

AND PART OF

LOT 2 CONCESSION 14

IN THE GEOGRAPHIC

TOWNSHIP OF WINDHAM

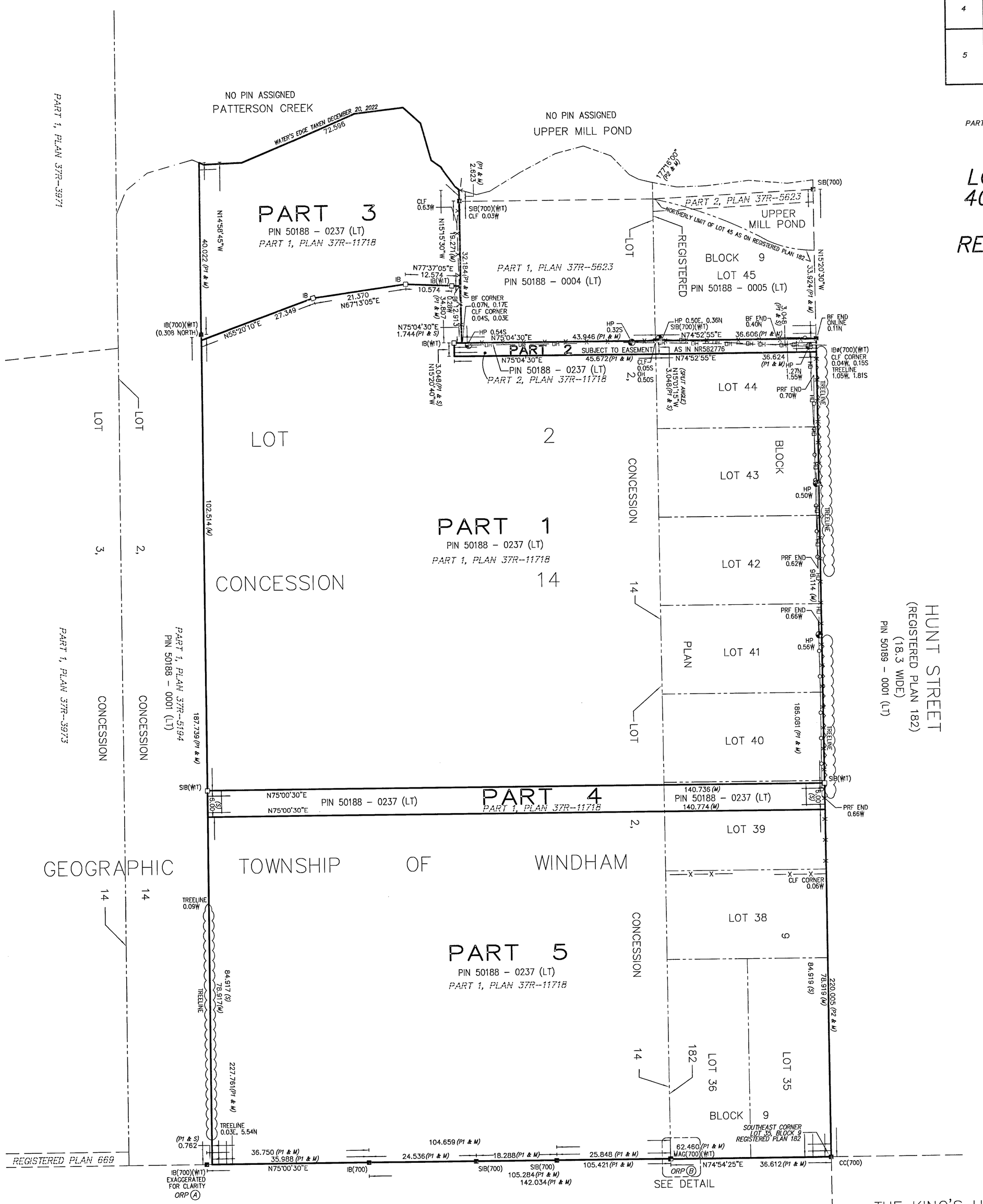
IN

NORFOLK COUNTY

SCALE: 1 : 500

METRES 5 0 20

JEWITT AND DIXON LTD.



THE KING'S HIGHWAY No. 3
(SEE REGISTERED PLANS 477 & 669)

QUEENSWAY WEST
(BY BY-LAW 76-34; INSTRUMENT No. NR372132)

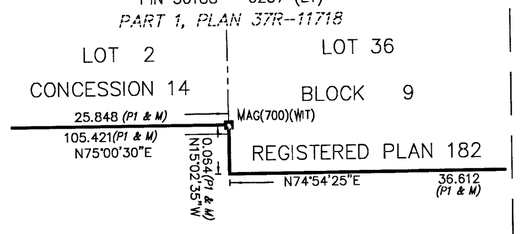
PIN 50188 – 0188 (LT)

THE KING'S HIGHWAY No. 3
(SEE REGISTERED PLANS 477 & 669)

QUEENSWAY WEST
(BY BY-LAW 76-34; INSTRUMENT No. NR372132)

PIN 50189 – 0002 (LT)

DETAIL – NOT TO SCALE



THE KING'S HIGHWAY No. 3
(SEE REGISTERED PLANS 477 & 669)

QUEENSWAY WEST
(BY BY-LAW 76-34; INSTRUMENT No. NR372132)

PIN 50188 – 0188 (LT)

METRIC NOTE:

DISTANCES AND COORDINATES ARE METRIC AND CAN BE CONVERTED TO IMPERIAL BY DIVIDING BY 0.3048

NOTE:

BEARINGS ARE GRID AND WERE DERIVED FROM SIMULTANEOUS GPS OBSERVATIONS ON MONUMENT A TO B, SHOWN HEREON HAVING A BEARING OF N75°00'30"E [UTM ZONE 17, (81° WEST LONGITUDE) NAD83 (CSRS) (2010)]

TO CONVERT (P1) BEARINGS TO GRID BEARINGS
– ADD 0°25'00" TO THE NORTHWEST BEARINGS
– SUBTRACT 00°25'00" FROM THE NORTHEAST BEARINGS

DISTANCES SHOWN ON THIS PLAN ARE GROUND DISTANCES AND CAN BE CONVERTED TO GRID DISTANCES BY MULTIPLYING BY 0.999686969

OBSERVED REFERENCE POINTS (ORPs): DERIVED FROM GPS OBSERVATIONS USING THE CAN-NET NETWORK, UTM ZONE 17 (81° WEST LONGITUDE) NAD83 (CSRS) HTv2.0 (2010) COORDINATES ARE TO AN URBAN ACCURACY AS PER SEC. 14 (2) OF O.REG. 216/10

POINT ID	NORTHING	EASTING
ORP (A)	4743671.652	555466.933
ORP (B)	4743698.914	555568.734

COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT, AND THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON THE 20TH DAY OF MARCH, 2024

DATED: MARCH 21, 2024

R. C. DIXON, O.L.S.
FOR JEWITT & DIXON LTD.

THIS PLAN OF SURVEY RELATES TO AOLS PLAN SUBMISSION FORM NUMBER V-73115

LEGEND

2.5cm X 2.5cm X 1.2m STANDARD IRON BARS	SHOWN	SIB	
1.6cm X 1.6cm X 0.6m IRON BARS	SHOWN	IB	
1.6cm ROUND X 0.6m IRON BARS	SHOWN	IB Ø	
LOT LINES	SHOWN		
DEED LINES	SHOWN		
ROAD LINES	SHOWN		
OVERHEAD WIRES	SHOWN	OH	
CHAIN LINK FENCE (CLF)	SHOWN	X	
BOARD FENCE (BF)/ POST & RAIL FENCE (PRF)	SHOWN		

FOUND IRON BARS	SHOWN
PLANTED IRON BARS	SHOWN
JEWITT AND DIXON LTD.	SHOWN (700)
PLAN 37R-11718	SHOWN (P1)
BELL BOX	SHOWN BBX
HYDRO POLE	SHOWN HP
WITNESS MONUMENT	SHOWN (WIT)
MAGNETIC NAIL	SHOWN MAG

JEWITT AND DIXON LTD.
ONTARIO LAND SURVEYORS
650 IRELAND ROAD, SIMCOE, ON, N3Y 4K2
PHONE: (519) 426-0842
E-mail: info@jewittdixon.com

F.W. – J.R.
BOOK – LL-FILE
CALC. – J.L.M.
PLAN – J.L.M.
CHECK – K.H.
CLIENT – BRASENELL

22-3563-RP3

MEETING MINUTES

Project #: 22-013 (County file SPPL2024179)
Project: HFW Simcoe Mixed Use (Northern Parcel SPA)

Date: June 12, 2024
Category: Pre-Submission Meeting with County Staff for Site Plan Application
Organizer: Norfolk County Planning Department
Attendees: Gary Brasenell, Denton Choo, Stephen Gradish, Alison Bucking, Fabian Serra, Scott Puillandre, John Iezzi, John Vallee

Agenda: Confirm submission requirements for Site Plan application.

Notes:

Required:	Provided:	Comments:
Confirmation of Submission Requirements	A pre-submission meeting will be scheduled by Norfolk County staff. These notes will be updated and circulated as a follow-up to the pending meeting.	A pre-submission meeting was held on June 12, 2024.
Pre-Consultation Minutes	A copy of the minutes from County staff received January 24, 2023 for the pre-consultation meeting held on August 3, 2022 is included in the submission package.	
Development Application Form	A development application form has been completed, signed & commissioned by the applicant and is included in the submission package.	
Proposed Site Plan / Drawing	A proposed site plan drawing prepared by G. Douglas Vallee Limited is included in the submission package.	The proposed bearings & distances have been added to the proposed site plan as requested. The updated site plan is enclosed and will replace the original site plan previously submitted.
Environmental Impact Study	An Environmental Impact Study prepared by Pinchin Limited will be provided prior to the pre-submission meeting.	The EIS was provided to the County on May 27, 2024.
Archaeological Assessment	A Stage 1 & 2 Archaeological Assessment prepared by Archaeological Consultants Canada is included in the submission package, complete with confirmation of being entered into the public register.	
Topographical Survey	Topographical base data is included on the proposed grading plan enclosed within the detailed civil drawings.	

Landscaping Plan	The Environmental Impact Study prepared by Pinchin speaks to restoration plantings required as a result of the minor encroachment into the protected woodland at the northwest corner of the property. We kindly ask that the requirement for a landscaping plan be deferred until preliminary comments are received from the County's planning team regarding the restoration concept so that the landscape design can be prepared in accordance with County input.	We discussed the timing of the preparation of the landscaping plan, and Vallee's request to defer until the County is able to provide comment on support in principle of the intent to address the minor encroachment into the protected woodland with restoration plantings, as well as any specific related requirements from the County's perspective. We agreed that a landscaping plan will be provided as a condition of site plan approval following receipt of comments.
Elevation Plan	Elevation plans for the proposed building(s) prepared by G. Douglas Vallee Limited are included in the submission package.	
Photometrics Plan(s)	A photometrics plan prepared by Seguin Electrical Engineering Inc. will be provided prior to the pre-submission meeting.	The Photometrics Plan was provided to the County on May 27, 2024.
Phase I & II Environmental Site Assessment & RSC	A Phase I & II Environmental Site Assessment prepared by G2S Consulting Inc. is included in the submission package, which notes that the site meets the requirements for the RSC. Filing of the RSC is pending and is anticipated to be a condition of the site plan approval.	RSC has been filed on the strength of the information contained in the Phase I & II ESA, which noted that there is no contamination on the Northern Parcel. The proponent is awaiting comments from MECP on the submission. As discussed, the provision of the RSC will be noted as a condition of site plan approval.
Detailed Civil Design	The following detailed design plans prepared by G. Douglas Vallee Limited are included with the submission package: - Servicing Plan - Grading Plan - Erosion Control Plan - Plan & Profile Drawings - Sanitary Drainage Plan - Storm Drainage Plans - Fire Separation Plan	We discussed previous comments related to the location of proposed services along the central shared drive aisle and agreed that further comment from development engineering may be provided following their review. We also discussed that the proximity and location of the future underground parking structure for the southern parcel is intended to provide sufficient clearance so that the drive aisle can be installed in full as part of the north parcel development.

Utility Plan	The preparation of the Utility Plan is dependent on finalization of the general plan of services and related civil engineering design. We kindly ask that the requirement for a utility plan be deferred until preliminary comments are received from the County's development engineering team so that the utility plan can be prepared in accordance with County input.	We discussed the timing of preparation of utility & hydro plans. The timeframes and cost implications imposed by utility providers for the preparation of utility plans do not allow for the extended review timeframes associated with the detailed engineering review. We therefore agreed to defer the submission of utility plans until comments from development engineering are received.
Functional Servicing Report	A Functional Servicing Report (FSR) prepared by G. Douglas Vallee Limited is included in the submission package.	We discussed the timing of the installation of the sanitary sewer extension along Hunt Street, which was included in the site plan agreement for the neighboring project (Boer Homes - Sutton's Trail). It is our expectation that the planned sewer extension will be completed prior to the execution of the Site Plan Agreement for this application. We are amenable to the inclusion of a condition in the conditional site plan approval or site plan agreement that the proponent would be responsible for the extension in the event the work is not completed as planned. We would appreciate appropriate wording of the condition to ensure that it is easily cleared down the road.
Watermain Looping	The proposed servicing design does not include watermain looping.	
Disconnection of Water & Sanitary Services	The detailed civil drawings include notation that all existing water & sanitary services will be disconnected as part of the pending demolition of the existing structures, prior to the installation of new services.	
Water & Sanitary Modelling	Water & sanitary modelling is underway by the County's third party consultant. County staff are kindly asked to provide an update on the status of this work.	
Backflow Preventer	A backflow preventer has been included, as shown on the servicing plan.	
Water Allocation	As part of this application, the proponent kindly requests confirmation of capacity and water allocation by County staff.	

Sanitary Design & Extension of Sanitary Mainline	The sanitary service has been designed assuming that the planned extension of the sanitary sewer along Hunt Street proposed by the adjacent development under SPPL2021021 occurs in the interim.	
Pumping Station Design	The proposed development does not require a private pumping station.	
Property Line Inspection Maintenance Hole	A maintenance hole has been included as shown on the servicing plan.	
Stormwater Management Report & Confirmation of Legal & Adequate Outlet	A Stormwater Management Report prepared by G. Douglas Vallee Limited is included in the submission package.	
Geotechnical Report	A geotechnical report prepared by GeoPro Consulting Limited will be provided prior to the pre-submission meeting.	The stamped geotechnical report, as well as the stamped hydrogeological report, was provided to the County on May 27, 2024.
Traffic Impact Study	A traffic impact study prepared by Paradigm Transportation Solutions Inc. is included with the submission.	The TIS was updated in October 2023 to include the proposed Sutton's Trail development and is enclosed for your review – our apologies for this oversight. The TIS will be updated further to reflect the updated site layout for the Northern Parcel. As discussed, review of the application will commence on the strength of the updated October 2023 TIS, and a condition will be included where necessary for the additional updates to the TIS.
Street Signage/Traffic Control Plan	Street signage is included on the concept site plan.	
Securities Estimate	An estimate of securities required has been prepared by G. Douglas Vallee Ltd. and is included in the submission package.	
Appraisal	An appraisal prepared by Antec Appraisal Group is included with the submission.	

Mutual Drain Agreement and Access/Servicing Easements		A mutual drain agreement and easements required to facilitate shared access to the site and servicing configuration will be prepared following receipt of comments from Norfolk County regarding the proposed design strategy. The proponent has engaged with Sorbara Law, who is firm experienced in complex condominium sites. As discussed, conditions will be included as necessary for the provision of these agreements.

DRAWING LIST SPA

ARCHITECTURAL

A100	COVER SHEET SPA
A101	SITE PLAN
A102	SITE PLAN DETAILS & CANADA POST

CONSULTANT LIST

ARCHITECTURAL / STRUCTURAL / CIVIL

vallee
Consulting Engineers, Architects & Planners

CONTACTS:

ARCHITECTURE:
LESLEY HUTTON-RHORA
BRODI MARTIN, B.ARCH.SC.

CIVIL ENGINEERING:
JOHN IEZZI, P.ENG.
NATALIE ORGENA, P.ENG.

ELECTRICAL

SEI Electrical Engineering
12 ARGYLE ST. N.,
CALEDONIA, ON N3W 1B6
TEL. (289)284-0954

CONTACTS:

KEITH SEGUIN, P. ENG., LEED® AP
JAKUB RUDY, B.A

MECHANICAL

G2S Consulting Inc.
GS2 CONSULTING INC.
4361 HARVESTER RD. SUITE 12,
BURLINGTON, ON L7L 5M4
TEL.: (905) 331-3735

CONTACT:

STEPHEN CAMPBELL, P.GEO
GEOFF BELL, P.GEO

ABBREVIATIONS & SHORT FORMS

GENERAL ABBREVIATIONS

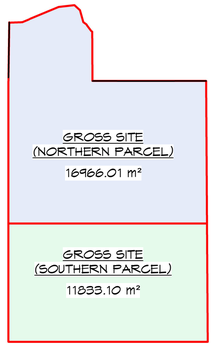
A/F/F & AFF - ABOVE FINISHED FLOOR
AF - ABOVE FINISHED
ADJ. - ADJUSTABLE
ALT. - ALTERNATE
APP. - APPLICATION
ARCH. - ARCHITECTURAL
AODA - ACCESSIBILITY FOR ONTARIANS W/ DISABILITIES ACT
BD - BOARD
BF - BARRIER FREE
BFP - BACK FLOW PREVENTER
B/N/G & BNG - BULL NOSE CORNER
BOL. - BOLLARD
BP - BEARING POCKET
BPP - BEARING PLATE POCKET
BR - BICYCLE RACK
CANT. - CANTILEVERED
CBS - CALL BUTTON STATION
CCJ - COMPARTMENT CONTROL JOINT
CHB - CHALK BOARD
CH.TBL. - CHANGE TABLE
CI - CONTINUOUS INSULATION
CJ - CONTROL JOINT
CM - CONTROL MODULE
CH / CCH - COAT HOOK
CMD - CARBON MONOXIDE DETECTOR
COMP. - COMPRESSIBLE / COMPRESSOR
CONT. - CONTINUOUS
CONN. - CONNECTION
CP - CONTROL PANEL
CU - CONDENSING UNIT
CV - CONTROL VALVE
CV - CENTRAL VAC
CVP - CENTRAL VAC PORT
C/W - COMPLETE WITH
DBL. - DOUBLE
DC - DROPPED CURB
DF - DRINKING FOUNTAIN
DW - DISH WASHER
DWG. - DRAWING
DIST. - DISTANCE
DISP. - DISPLAY CASE
DSR - DESIGNATED SUBSTANCE REPORT
EA. - EACH
EGS - EMERGENCY CALL SWITCH
E.F. - EACH FACE
ELEV. - ELEVATION
ENG. D - ENGINEERED
ENG - ENGINEER
EPB - EMERGENCY PUSH BUTTON
EW - EYE WASH STATION
E.W. - EACH WAY
EX. - EXISTING
EXP. - EXPOSED
FB - FIRE BLOCK
FD - FLOOR DRAIN
FDTN. - FOUNDATION
FEC - FIRE EXTINGUISHER CABINET
FE - FIRE EXTINGUISHER
FDG - FOLD DOWN GRAB BAR
FLEX. - FLEXIBLE
FLR. - FLOOR
FLRING. - FLOORING
FR - REFRIDGERATOR
FREE - FREEZER
F/R/R & FRR. - FIRE RESISTANCE RATING
FS - FIRE STOP
FSS - FOLD DOWN SHOWER SEAT
FTG.'S - FOOTINGS
F/V - FIELD VERIFY
FN - FOUNDATION WALL
GALV. - GALVANIZED
GAZ. - GAZEBO
GB & GB# - GRAB BAR
GD - GARBAGE DISPOSAL
GEN. - GENERATOR
GL - GRID LINE
GM - GAS METER
HB - HOSE BIB
HD - HAND DRYER
H/D - HEAVY DUTY
HO - HOLD OPEN
HORIZ. - HORIZONTAL
HWH - HOT WATER HEATER
INSUL. - INSULATION
ICB - INTEGRAL COVE BASE
KP - KEY PAD
L - LOCK
M / MIRR. - MIRROR
MANUF. - MANUFACTURED
MAX. - MAXIMUM
MECH. - MECHANICAL
MIN. - MINIMUM
M/O/L & MOL - MINISTRY OF LABOUR
M/O/T & MOT - MINISTRY OF TRANSPORTATION
MS - MOP SINK
MTD. - MOUNTED
MW - MICROWAVE
NADS - NORFOLK ACCESSIBILITY DESIGN GUIDELINES
N/I/C & NIC - NOT IN CONTRACT
NO. - NUMBER
NTS - NOT TO SCALE
OBC - ONTARIO BUILDING CODE
O/D - OUTSIDE DIAMETER
O/H - OVERHEAD
O/W - ONE WAY
PER.'S - PERIMETER / PERIMETERS PER.('S)
PB - POWER OPERATOR PUSH BUTTON
PDC - POWER DOOR CONTROL BUTTON
PDO - POWER DOOR OPERATOR
PDS - PROTECTION OF SOFFITS
PTD/D - PAPER TOWEL DISPENSER/DISPOSAL
P/I/P & PIP - POURED IN PLACE
PRE-FIN. - PRE-FINISHED
PROF. ENG. - PROFESSIONAL ENGINEER
P/T - PRESERVATIVE TREATED
RCH - RECESSED CABINET HEATER
REQ.D - REQUIRED
RCP - REFLECTED CEILING PLAN
REIN. - REINFORCED
REINF.'G - REINFORCING
REF. - REFERENCE
REF - REFRIDGERATOR
REL. - RELOCATED
RD - ROOF DRAIN
RM. - ROOM
R/O - ROUGH OPENING
RWL - RAIN WATER LEADER
SA - SMOKE ALARM
SC - SAW CUT
SCD - TOILET SEAT COVER DISPENSER
SCH.'S - SCHEDULES
SD - SCUPPER DRAIN
SD - SOAP DISPENSER
SH - SOAP HOLDER
SHH - SHOWER HEAD & MIXING VALVE / WAND
SHF - SHELF
SND - SANITARY NAPKIN DISPOSAL
SNV - SANITARY NAPKIN VENDING DISPENSER
S/O/G & SOG - SLAB ON GRADE
SP - SOAP DISPENSER
SP - SUMP PUMP
SPEC.'D - SPECIFIED
SPMDD - STD. PROCTOR MAX. DRY DENSITY
SR - SHOWER ROD
ST. - STOVE
STRUCT. - STRUCTURAL
TB - TACK BOARD
TBD - TO BE DETERMINED
TC - TEACHER'S CABINET/CLOSET
TH. - THERMOSTAT
THERM. - THERMAL
TM - TILTED MIRROR
TOB - TOWEL BAR
TPD - TOILET PAPER DISPENSER
TWF - THRU WALL FLASHING
TYP. - TYPICAL
ULC - UNDERWRITERS LABORATORIES OF CANADA
U/C - UNDER CUT
U/S - UNDER SIDE
U/N/O - UNO - UNLESS NOTED OTHERWISE
VAP. - VAPOUR
VAR. - VARIES
VERT. - VERTICAL
W/ - WITH
WB - WHITE BOARD/MARKER BOARD
WBF - WATER BOTTLE FILL UP STATION
WC - WATER COOLER
WM - WATER METER
WR - WASTE RECEPTACLE
WS - WATER SOFTENER
% - PERCENT
@ - AT
O/C - ON CENTER

MATERIAL ABBREVIATIONS

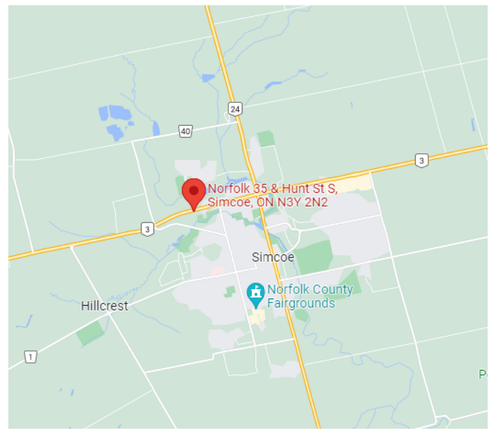
AB - ARCHITECTURAL BLOCK
ACT - ACOUSTIC CEILING TILE
ASPH. - ASPHALT
AWP - ACOUSTIC WALL PANEL
AT - ACOUSTIC TILE
AL - ALUMINUM
AN - ANODIZED
AN(C) - ANODIZED COLOURED
B - BRICK
B4B - BOARD & BATTEN
BPG - BACK PTD. GLASS
CAR - CARPET
CPT - CARPET TILE
CB - CONCRETE BLOCK
CBM - CEMENT BOARD
CT - CERAMIC TILE
CONC - CONCRETE
C(S) - CONC. SEALED
CTF - CORK TILE FLOORING
EM - EXPANDED METAL
EP - EPOXY PAINT & PRIMER
ESF - EPOXY SEALED FLOORING
ET - EPOXY TERRAZZO
F - FIRELITE GLAZING
FG - FIBREGLASS
FT - FLOCKED TILE (CARPETING)
GB / SBD. / GYP.BD. - GYPSUM BOARD
GLB - GLASS BLOCK
GLBL - GLAZED BLOCK
GL - GLAZING / GLASS
GWG - GEORGIAN WIRE GLAZING
GM - GYM MAT
GMT - GLASS MOSAIC TILE
HM - HOLLOW METAL
HARDWD. - HARDWOOD
H/D/G - HDG - HOT DIPPED GALV.
IMP - INSULATED METAL PANELS
LCG - LEAD COATED COPPER
LINO - LINOLEUM
LSG - LAMINATED SAFETY GLAZING
LVT - LUXURY VINYL TILE
LVP - LUXURY VINYL PLANK
LXG - LEXAN GLAZING
MAR - MARMOLEUM
MAS - MASONITE
MS - METAL SIDING
MTL - METAL
MVN - MOVEABLE WALL SYSTEM
NAT. - NATURAL
PB - PARTICLE BOARD
PC - PRECAST CONC.
P / PTD. - PAINTED
PF / PRE.FN. - PREFINISHED
PL - PLASTER
PLAM - PLASTIC LAMINATE
PLYWD. - PLYWOOD
PMP - PREFORMED METAL PANEL
PSP - PIERCED STEEL PLANKING
PT - PORCELAIN TILE
PQF - PARQUET FLOORING
QT - QUARRY TILE
QVT - QUARTZ VINYLTILE
R - RUBBER
RB - RUBBER BASE
RSF - RESILIENT SHEET FLOORING
S - STONE
SAFF - SAFETY FLOORING
SG - SPEGIAL COATING
SF - SPORTS FLOORING
SG - LAMINATED SAFETY GLASS
SGL - SPANDREL GLAZING
SHV - SHEET VINYL FLOORING
S.S. - SOLID SURFACE
ST - STUCCO
ST / STL - STEEL
S/S - STAINLESS STEEL
S#V - STAINED & VARNISHED
SWC - SOLID WOOD CORE
T - TEMPERED GLAZING / GLASS
TDG - TEMPERED DOUBLE GLAZING / GLASS
TBB - TILE BACKER BOARD
TECTUM - TECTUM ACOUSTIC PANEL
TERR - TERRAZZO
TURF - ARTIFICIAL TURF
U - POLYURETHANE
V - VINYL
VCGB - VINYL COATED GYPSUM BOARD
VCP - VENEER CORE PLYWOOD
VCT - VINYL COMPOSITE TILE
VPF - VINYL PLANK FLOORING
VR - VENTED RUBBER BASE
WD. - WOOD
WP - WATER PROOFING

RM. NAMES

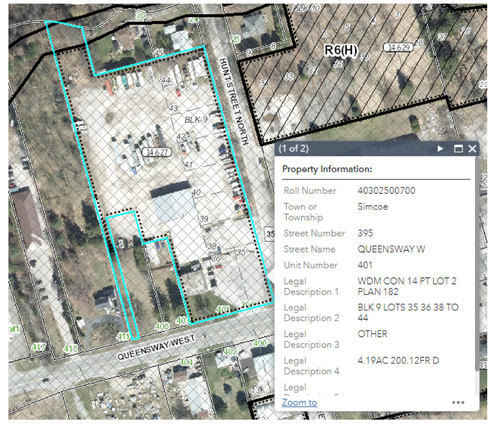
AL. - AIR LOCK
CL. - CLOSET
CLASSRM. - CLASSROOM
COMM. - COMMUNICATION
CONF. - CONFERENCE
CORR. - CORRIDOR
ELEC. - ELECTRICAL
ELEV. - ELEVATOR
INST. - INSTRUCTOR
LAB - LABORATORY
LAU. - LAUNDRY
PR. - POWDER ROOM
PRINC. - PRINCIPAL
REC. - RECEPTION
RECEIV. - RECEIVING
RM. - ROOM
SHWR. - SHOWER
STOR. - STORAGE
ST. - STATION
SUR. - SURGERY
VEST. - VESTIBULE
VP - VICE PRINCIPAL
WR. - WASHROOM



1 / A100 GROSS SITE
SCALE 1 : 2000



KEY MAP
SCALE 1 : 100



SITE MAP
SCALE 1 : 100

SITE STATISTIC & ZONING REQ.'S

PROPERTY LEGAL DESCRIPTION:
395, 401, 402, 405, 411 QUEENSWAY WEST IN THE TOWN OF NORTH SIMCOE, IN THE DISTRICT OF NORFOLK COUNTY

ZONING:
IN ACCORDANCE TO THE TOWN OF SIMCOE, ZONING BY-LAW 1-Z-2014 NORFOLK COUNTY - JANUARY-2021-CONSOLIDATION

PROVISION	***LAND USE: PROPOSED (NORTHERN PORTION)***
5.0 5.4 5.4.1	***ZONING AMENDMENT:*** RESIDENTIAL ZONES URBAN RESIDENTIAL TYPE 4 ZONE (R4) PERMITTED USES In an R4 *zone*, no land, *building* or *structure* shall be used except in accordance with the following uses: a) group townhouse c) street townhouse d) semi-detached, duplex, tri-plex and four-plex dwellings provided they are located on the same *lot* with, and in accordance with the *Zone* provisions of, *group townhouse*

PROVISION	***SETBACKS (m - METERS):***	***REQ'D (s) Street Townhouse (per unit)***	***REQ'D (s) Group Townhouse Stacked Townhouse***	***PROVIDED (m)***
5.4.2a)	MIN. LOT AREA: i) ATTACHED GARAGE ii) CORNER LOT iii) DETACHED GARAGE	156m² 264m² 162m²	145m² 145m² 215m²	16,966m² - -
5.4.2b)	MIN. LOT FRONTAGE: i) INTERIOR LOT ii) CORNER LOT iii) CORNER LOT ACCESSED BY A REAR LANE	6.5 11 6.5	30 30	101.2 - -
5.4.2c)	MIN. FRONT YARD: i) ATTACHED GARAGE ii) DETACHED GARAGE OR REAR YARD PARKING	6 1.5	6 1.5	MIN. 6 -
5.4.2d)	MIN. EXTERIOR SIDE YARD: i) W/ A 6m FRONT YARD ii) W/ A 1.5m FRONT YARD	6 1.5	6 1.5	- -
5.4.2e)	MIN. INTERIOR SIDE YARD	1.2	3	MIN. 6.6
14.1038	MIN. REAR YARD : i) ATTACHED GARAGE	3	3	4.3
5.4.2g)	MIN. SEPARATION BETWEEN TOWNHOUSE DWELLINGS	2	2	3
14.1038	MAX. BLDG. HEIGHT	13	13	MAX. 13
5.4.3	*Setback from Mutual Side Lot Line* Notwithstanding the *required side yard*, on a mutual *side lot line* separating two (2) attached *townhouse* units, no *interior side yard* is required where the walls are joined, where the walls are not joined, a 1.2 metre *side yard* shall be required.	1.2	1.2	MIN. 1.2
5.4.4	*Maximum Units in a Townhouse Dwelling* No more than eight (8) *dwelling units* shall be located in a *townhouse dwelling*.	8 UNITS	8 UNITS	6 UNITS

COORD. W/ ZONING BY-LAW FOR ALL OTHER ZONING REQ.'S

PARKING REQ.'D RESIDENTIAL (R4)

PROVISION	***NUMBER OF PARKING SPACES***	***REQUIRED***	***PROVIDED***
4.9a)	SINGLE DETACHED, SEMI-DETACHED, DUPLEX, TRI-PLEX, FOUR-PLEX, TOWNHOUSE DWELLINGS & VACATION HOME (0-Z-2017): 2 SPACES / DWELLING UNIT 2 SPACES x 44 DWELLING UNITS = 88	88 SPACE(S)	88 SPACE(S)

PARKING REQ.'D RESIDENTIAL - VISITOR:

4.9f)	VISITOR PARKING: 1 SPACE / 3 DWELLING UNITS 1 SPACE x (44 / 3) = 15	15 SPACE(S)	15 SPACE(S)

PARKING REQ.'D RESIDENTIAL - TOTAL:

	TOTAL	103 SPACE(S)	103 SPACE(S)

PARKING REQ.'D RESIDENTIAL - BARRIER FREE: (PART OF REQ.'D PARKING)

4.3.3	BARRIER FREE PARKING REQ.'D: 1-25 PARKING SPACES =		
	TYPE 'A' (3.4m WIDE) PLUS 1.5m AISLE	1 SPACE(S)	1 SPACE(S)
	TYPE 'B' (2.4m WIDE) PLUS 1.5m AISLE	0 SPACE(S)	0 SPACE(S)

4.0 OFF STREET PARKING
PARKING SPACE DIMENSIONS

4.1 4.1.3a)	PARKING SPACE DIMENSIONS WIDTH OF PARKING SPACE: FOR VEHICLES PARKED SIDE BY SIDE	3 MIN.	3
	FOR VEHICLES PARKED WITH WALL OR FENCE ADJ.	3.3 MIN.	3.3
4.1.3b)	DEPTH OF PARKING SPACE: FOR 90 DEGREE PARKING	5.8 MIN.	5.8
	FOR PARALLEL PARKING	7 MIN.	7
4.1.4 4.1.4b)	PARKING AISLE REQ.'S TWO-WAY TRAFFIC	7.3 MIN.	7.3 MIN.

4.2 LOCATION OF PARKING ON A LOT

4.2.3	**4.2.3 Residential Parking Area** For Urban Residential Type 1 to 4 *Zones* (R1 to R4), the following shall apply: a) within a *front yard* or *exterior side yard*, *motor vehicles* shall only be parked on a *driveway*, in a *parking space* or private garage (1-Z-2018); b) not more than one (1) *required parking space* may be located within the *required front yard* or *required exterior side yard* (1-Z-2018); c) *vehicles* shall not be parked within any *landscape area* (1-Z-2018);
4.2.4	**4.2.4 Other Provisions** a) For tri-plex *dwellings*, duplex *dwellings*, four-plex *dwellings*, street townhouses, stacked townhouses, and boarding or lodging houses, required parking spaces shall be prohibited within the required front yard or required exterior side yard; except where a dwelling unit has a private garage in which case the driveway leading to the private garage may be used as a parking space subject to the size requirements herein; b) for *group townhouses* and *apartment dwellings*, no *parking lot* shall be located closer than 3 metres from any *dwelling* on the *lot* or off any *interior lot line* abutting another residential *Zone*; c) for *group townhouses* and *apartment dwellings*, no parking lot or *parking space* shall be located between a *dwelling* and the *street line*, except for individual or tandem *parking spaces* leading directly to each *townhouse dwelling unit*; d) for commercial or industrial properties, no *parking lot* shall be located closer than 4.5 metres from any *interior lot line* abutting a residential *Zone*; e) for *accessory residential dwelling units*, notwithstanding the foregoing, one (1) *parking space* dedicated for the use of the *accessory residential dwelling unit*, may be *permitted* in the *front yard* provided a minimum of 50 percent of the *required front yard* shall be maintained as landscaped open space notwithstanding such dedicated *parking space*.

LANDSCAPED AREA

2.61	**"LANDSCAPE AREA"** shall mean an area of land comprised of trees, shrubs, flowers, grass or other horticultural elements. Landscaping may include pervious paths, patios, walkways, or elements designed to enhance the visual amenity of a property but does not include open storage display areas, parking or loading areas, or areas covered by *driveways*. (5-Z-2018)
4.2.5	**4.2.5 Parking and *Landscape Area* (1-Z-2018)** Within Urban Residential Type 1 to 4 *Zones* (R1 to R4), the following shall apply: a) A minimum of 50 percent of the *front yard* shall be maintained as *landscape area*. b) In the case of a *corner lot*, a minimum of 50 percent of each of the *front yard* and *exterior side yard* shall be maintained as *landscape area*.

LOT COVERAGE:	***PROVIDED (m²)***	
BLDG. (GROSS / FOOTPRINT)	5100.6m²	30%
ASPHALT PARKING, PLAY & DRIVEWAY	3198.1m²	19%
SIDEWALKS & HARD SURFACE AREAS	950.2m²	6%
LANDSCAPED OPEN SPACE	7620.3m²	45%

BLDG. & OBC CLASSIFICATION:
GROUP C, RESIDENTIAL

NO.	DATE	ISSUANCE
2	2024.06.12	ISSUED FOR SPA (UPDATED)
1	2024.05.17	ISSUED FOR SPA

NO.	DATE	ISSUANCE

PROPERTY LEGAL DESCRIPTION:
PARTS 1, 2, & 3 ON PLAN 37R 11733

APPLICANT:
KFH HOLDINGS LIMITED
HERBERT CHU
3 FERNWOOD COURT,
RICHMOND HILL, ONTARIO
L4B 3G2
1.416.419.9760

DO NOT SCALE DRAWINGS, CALL FOR ANY CLARIFICATIONS THAT ARE REQUIRED, FIELD VERIFY AT ALL BUILT CONDITIONS
ALL DWG.'S ARE TO BE READ IN COLOUR
ORIGINAL PAGE SIZE ARCH 'D' - 24" x 36"

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE ONTARIO N3Y 3W4
(519) 426-6270

LICENSED PROFESSIONAL ENGINEER
2024-06-12
J. T. IEZZI
100193485
PROVINCE OF ONTARIO

PROJECT TITLE:
HUNT ST. N. RESIDENTIAL
HUNT STREET NORTH,
SIMCOE, ON N3Y 2M9

DRAWING TITLE:
COVER SHEET SPA

CHECKED BY:	DRAWN BY:
JI/LHR	BM
DRAWING SCALE: As indicated	DRAWING NO.: A100
PROJECT NO.: 22-013	

DATE PLOTTED: 6/12/2024 11:34:44 AM PROJECT NUMBER & NAME: 22-013 HUNT ST N. RESIDENTIAL FILE PATH: H:\Projects\2022\22-013 HFW Holdings Hunt St Residential\Drawings\Arch\22-013 Hunt St Residential - Site.rvt

BLDG. HEIGHT - NORFOLK COUNTY:
shall mean the vertical distance between the average *finished grade* of the ground at the front wall of a *building* and:
a) in the case of a flat roof or a mansard roof, the highest point of the roof surface;
b) in the case of any other roof, the highest point of the ridge. *[6-2-2017]*

DISCLAIMER:
ALL EXISTING SITE INFORMATION WAS PROVIDED BY JEWITT AND DIXON ONTARIO LAND SURVEYORS IN THE FORM OF AN ELECTRONIC FILE PLAN FILE NO. 23-3563 DATED 2023.11.02 CONSISTING OF THE LEGAL SURVEY PLAN

REFERENCE NOTE:
FOR OTHER SITE CONDITIONS, EXISTING TO REMAIN OR NEW TO BE PROVIDED, THIS DWG. IS TO BE READ IN CONJUNCTION W/ ALL OTHER DWG.'S LISTED ON A100 DWG. LIST

LIGHTING NOTE:
LIGHTING MUST BE DIRECTED ON SITE AND MUST NOT SPILL OVER TO / ONTO ADJACENT PROPERTIES OR STREETS. PROVIDE "HOUSE SHIELDS" WHERE NEEDED, TO COMPLETELY ELIMINATE SPILL / GLARE TO ADJACENT PROPERTIES, DARK SKY COMPLIANT
(COORD. W/ ELEC. PHOTOMETRIC SITE PLAN)

BEFORE STARTING WORK

- THE ***AUTHORITY HAVING JURISDICTION*** IS NORFOLK COUNTY
- THE CONTRACTOR SHALL NOTIFY THE ***AUTHORITY HAVING JURISDICTION*** ARCHITECT & CONSULTANTS AT LEAST 48 HOURS PRIOR TO COMMENCING ANY CONST. OR DEMOLITION.
- THE POSITION OF THE POLE LINES, CONDUITS, WATER MAINS, SEWERS, & OTHER UTILITIES & STRUCTURES ARE NOT NECESSARILY SHOWN ON THE CONTRACT DWG.'S. WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES & STRUCTURES IS NOT GUARANTEED & ARE TO BE VERIFIED ON SITE.
- ALL POSITIONS OF THE EX. UNDERGROUND UTILITIES WITHIN THE LIMITS OF CONST. SHALL BE LOCATED, MARKED & PROTECTED BY THE CONTRACTOR. ANY UTILITIES DAMAGED OR DISTURBED DURING CONST. SHALL BE REPAIRED OR REPLACED TO THE SATISFACTION OF THE ENGINEER, AT THE CONTRACTOR'S EXPENSE.
- PRIOR TO THE COMMENCEMENT OF CONST., ALL BENCHMARKS, ELEVATIONS, DIMENSIONS, & GRADES MUST BE CHECKED BY THE CONTRACTOR & ANY DISCREPANCIES REPORTED TO THE ENGINEER / ARCHITECT

BENCHMARKS
TWO DIFFERENT BENCHMARKS MUST BE REFERRED TO @ ALL TIMES; REFER TO CIVIL DRAWING SET.

SITE PLAN NOTES

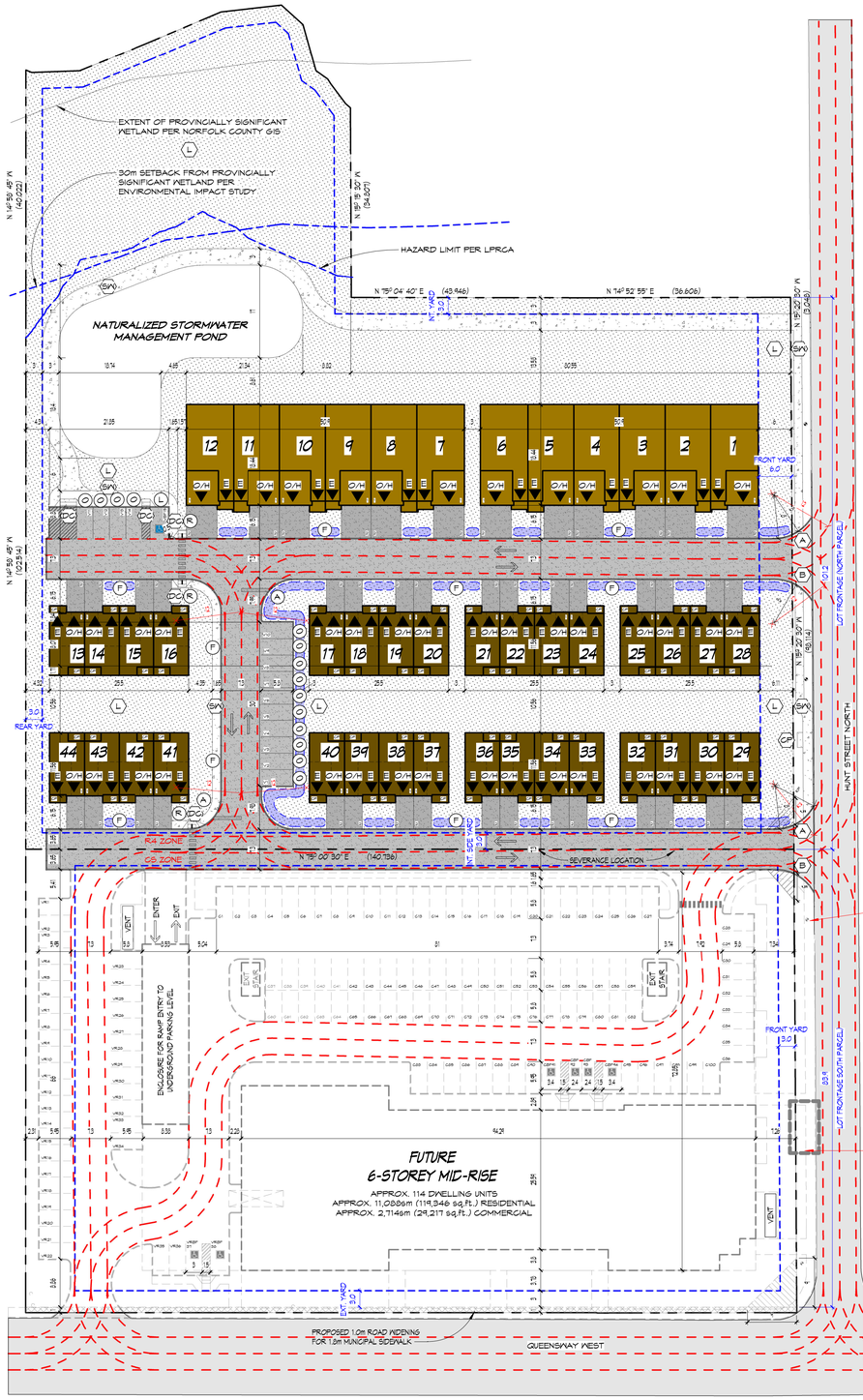
- ALL WORK INVOLVED IN THE CONST., RELOCATION, REPAIR OF MUNICIPAL SERVICES FOR THE PROJECT SHALL BE TO THE SATISFACTION OF THE ***AUTHORITY HAVING JURISDICTION***
- FIRE ROUTE SIGNS & 3-WAY FIRE HYDRANTS SHALL BE ESTABLISHED TO THE SATISFACTION OF THE LOCAL FIRE DEPARTMENT & AT THE EXPENSE OF THE OWNER.
- MAIN DRIVEWAY DIMENSIONS AT THE PROPERTY LINE BOUNDARIES ARE PLUS OR MINUS 7.5m UNO.
- THE APPROVAL OF THIS PLAN DOES NOT EXEMPT THE CONTRACTOR FROM THE REQ.'S TO OBTAIN THE VARIOUS PERMITS/APPROVALS AS MAY BE REQUIRED, SUCH AS, BUT NOT LIMITED TO:

- BUILDING PERMIT
- SANITARY / STORM & WATER PERMITS
- ROAD CUT PERMITS
- RELOCATION OF SERVICES
- APPROACH APPROVAL PERMITS
- ENCROACHMENT AGREEMENTS (IF REQ.'D)
- COMMITTEE OF ADJUSTMENT
- ROAD OCCUPANCY PERMIT
- SITE ALTERATION

GENERAL NOTES:

- FIRE ACCESS ROUTE TO BE POSTED & DESIGNATED UNDER MUNICIPAL BY-LAW (FIRE ACCESS ROUTE TO BE MIN. 6 m WIDE W/ A MIN. 12 m CENTER LINE TURNING RADIUS & MAX. 6% SLOPE)
- COORD. W/ MECH. & ELEC. SITE PLANS FOR ALL EX. & NEW LOCATIONS OF SERVICES & ENTRY OF SERVICES INTO THE BLDG. ENVELOPE. (ALL MECH. & ELEC. INFORMATION INDICATED ON ARCH. SITE DWG. A101 IS FOR GENERAL REFERENCE & COORD. ONLY)
- COORD. W/ SITE GRADING PLAN FOR PROPOSED FINAL FINISH GRADE ELEV.'S & DRAINAGE SLOPES
- COORD. W/ LANDSCAPE SITE PLAN FOR LOCATIONS OF SEEDING, SODDING, PLANTING & PAVING & OTHER HARD SURFACING. COORD. W/ ARCH. SITE PLAN
- TYP. DRIVEWAY & PARKING LOT CONC. CURBS AS INDICATED ON DRAWNG. COORD. W/ OPSD DETAILS & SPEC'S. FOR TYPICAL CURB TYPES. SITE DIMENSIONS ARE TO THE FACE OF CURBS
- THE SUB-GRADE SOILS EXPOSED AFTER EXCAVATION SHALL BE INSPECTED & CERTIFIED BY A QUALIFIED REGISTERED PROFESSIONAL SOILS ENGINEER & A COPY OF THE REPORT SHALL BE FORWARDED TO THE ***AUTHORITY HAVING JURISDICTION*** BUILDING DIVISION. WHERE THE FOOTING WILL BE SITUATED ON FILL MATERIAL, THE FOOTINGS SHALL BE DESIGNED & APPROVED BY QUALIFIED REGISTERED PROFESSIONAL ENGINEER.
- ALL FILL PLACED ON THE SITE SHALL BE COMPACTED TO A MIN.OF 95% STANDARD PROCTOR DENSITY. A SUFFICIENT NUMBER OF TESTS SHALL BE TAKEN AT VARIOUS LEVELS SATISFACTORY TO THE ENGINEER. TEST RESULTS SHALL BE SENT TO THE ***AUTHORITY HAVING JURISDICTION*** W/ A LETTER, SIGNED & STAMPED BY THE SOILS ENGINEER, STATING THAT A SUFFICIENT NUMBER OF TESTS HAVE BEEN TAKEN & THE MIN. COMPACTION HAS BEEN REACHED
- APPROVAL OF THIS DWG. IS FOR MATERIAL ACCEPTABILITY & COMPLIANCE W/ MUNICIPAL & PROVINCIAL SPEC.'S & STANDARDS ONLY. APPROVAL & INSPECTION BY THE MUNICIPALITY OF THE WORKS DOES NOT CERTIFY THE LINE & GRADE OF THE WORKS & IT IS THE OWNER'S RESPONSIBILITY TO HAVE THEIR ENGINEER CERTIFY THIS ACCORDINGLY
- PROVIDE CONST. GATES / FENCES / BOUNDARIES AS SHOWN / REQ.'D TO THE ***AUTHORITY HAVING JURISDICTION*** REQ.'S. (SUBMIT SHOP DWG.'S FOR LOCATIONS & EXTENTS).
  A 2.4m HIGH CHAIN LINK FENCE C/W SUPPORTS AS REQ.'D, @ WORK BOUNDARIES TO BE ERECTED BY THE CONTRACTOR PRIOR TO THE COMMENCEMENT OF THE DEMOLITION PROCESS & SHALL REMAIN & BE MAINTAINED IN POSITION INDEFINITELY UNTIL COMPLETION OF NEW CONST. WORK
- CONTRACTOR IS RESPONSIBLE FOR PLANTINGS, SOD, WATERING & MAINTENANCE UNTIL SUBSTANTIAL PERFORMANCE IS ACHIEVED. THE WARRANTY PERIOD WILL COMMENCE UPON SUBSTANTIAL PERFORMANCE OF THIS WORK.
- ALL CONCRETE CURBS TO BE 150mm

NOTE:
THIS SITE PLAN APPLICATION APPLIES TO THE NORTHERN PARCEL ONLY (PARTS 1, 2, & 3 ON PLAN 37R-11733).
A SEPERATE AND SUBSEQUENT SITE PLAN APPLICATION WILL BE SUBMITTED FOR THE SOUTHERN PORTION AT A LATER DATE.
(THE INTENDED LAYOUT OF THE SOUTHERN PORTION IS SHOWN FOR COORDINATION PURPOSES ONLY.)



1 / A101 SITE PLAN
SCALE 1 : 500

GENERAL NOTES:

(A) GENERAL CONTRACTOR TO COORDINATE ALL WORK WITHIN THE BOULEVARD W/ THE ***AUTHORITY HAVING JURISDICTION*** & OBTAIN ALL NECESSARY PERMITS & APPROVALS FROM LOCAL AUTHORITIES. EXECUTE ALL WORK AS PER THE MUNICIPAL REQUIREMENTS.

(B) GENERAL CONTRACTOR TO EXECUTE WORK TO DRIVEWAY ENTRANCE UNDER SUPERVISION OF THE ***AUTHORITY HAVING JURISDICTION*** REFER TO ENTRANCE PERMIT REQUIREMENTS WHERE EXIST. DRIVEWAY ENTRANCE TO BE MODIFIED OR INSTALLATION OF NEW ENTRANCE AS PER MUNICIPAL REQUIREMENTS. PROVIDE NEW CONC. ENTRANCE CURBS TO MATCH EXISTING WHERE INDICATED

(L) PLANTING BEDS, TREE PLANTINGS, LANDSCAPE FEATURES & SODDED AREAS

(SW) CONCRETE SIDEWALK

(DC) CONCRETE SIDEWALK DROP CURB

(CP) CANADA POST
(COORD. W/ ***A103***)

SIGN LEGEND

(A) STOP SIGN

(F) NO PARKING - FIRE ROUTE

(L) NO PARKING, BY PERMIT ONLY, BARRIER-FREE PARKING, VAN ACCESSIBLE - TYPE 'A'

(O) VISITOR PARKING ONLY

(R) PEDESTRIAN CROSSING SIGN

NOTE:
CONFIRM LOCATIONS & CONTENT OF ALL SIGNAGE W/ THE OWNER & ***AUTHORITY HAVING JURISDICTION*** PRIOR TO FABRICATION & ERECTION. PROPOSED SITE SIGNAGE TO COMPLY W/ SIGNAGE BY-LAWS
NOTE:
ALL SIGNS TO BE CENTERED ON POSTS TYP.

SITE PLAN LEGEND

- E — ENTRANCE / EXIT DOOR
- O/H — ENTRANCE / EXIT DOOR (OVERHEAD DOOR W/ OPERATOR)
- PROPERTY BOUNDARY LINE(S)
- SETBACKS
- SNOW STORAGE (ALL ADDITIONAL SNOW TO BE TAKEN AWAY BY OWNER) (ALL ADDITIONAL SNOW TO BE PILED IN AREAS SHOWN ON SITE PLAN)
- FIRE ROUTE (6m WIDE / 12m CENTER RADIUS)
- CP — COVERED PORCH
- PAINTED GRAPHICS ON ASPHALT / CONC. (COORD. W/ ***THE CITY / TOWN HAVING JURISDICTION*** GUIDELINES)
- ACCESSIBLE SIGN ON ASPHALT / CONC. (WHITE & BLUE COLOUR)
- DIRECTIONAL SIGNS ON ASPHALT / CONC. (WHITE COLOUR)
- CROSSWALK / CROSSING (WHITE COLOUR)
- VEHICULAR STALL MARKINGS (YELLOW COLOUR) VBF# - BARRIER FREE / ACCESSIBLE V# - VISITOR S# - SPARE A1 - ONE REQ.'D DWELLING PARKING A2 - TWO REQ.'D DWELLING PARKING (LETTER REPRESENTS UNIT TYPE)
- DIAGONAL MARKINGS (WHITE / YELLOW COLOUR)
- STOP SIGN VEHICULAR MARKINGS (WHITE COLOUR)
- SIGN (COORD. W/ SIGN LEGEND)
- DROP CURB

LOCATED ON THE PROPERTY LINES TYP.

- VISIBILITY TRIANGLES / SIGHT / DAYLIGHT TO BE MAINTAINED (REMAIN CLEAR) @ BOTH SIDES OF ALL LANEWAY / DRIVEWAYS & INTERSECTIONS. THE MAX. HEIGHT OF ANY OBJECT OR MATURE VEGETATION WITHIN THE VISIBILITY TRIANGLE IS NOT TO EXCEED REQ.'D HEIGHT ABOVE THE CENTRELINE OF THE CORRESPONDING ADJACENT STREET
  NORFOLK COUNTY
  5m X 5m LANEWAY
  1m HEIGHT
  NO PARKING ALLOWED
- TACTILE WARNING SURFACE INDICATORS (600mmxLENGTH - TILE) (FOR SITE CONDITIONS ONLY) (COORD. W/ OPSD 310.39)

ON SITE

- KINESIK ARMOR-TILE CAST IN PLACE IN NEW SURFACES (COLOUR TO BE VERIFIED BY ARCHITECT)

MUNICIPAL SIDEWALK LOCATIONS

- KINESIK ADVANTAGE CAST IRON CAST IN PLACE IN NEW SURFACES (UNCOATED NATURAL PATINA) (COLOUR TO BE VERIFIED BY ARCHITECT)

HATCH IDENTIFICATION LEGEND

- CONC. SIDEWALK / PAD / CROSSWALK / SIDEWALK / LANEWAY / STAIRS / ETC.
- AREA OF NEW SOD ON 150mm TOPSOIL (COORD. W/ CONST. FOR EXTENTS)

GENERAL NOTES:

- SHOP DWG.'S ARE TO BE DIMENSIONED IN METRIC UNITS (IMPERIAL & METRIC BOTH SHOWN IS ACCEPTABLE)
- COORD. W/ EX. SURVEY DWG. FOR LINE WEIGHTS & TYPES AS REVIT IS NOT COMPATIBLE WITH AUTOCAD LINE WEIGHTS & TYPES

NO.	DATE	ISSUANCE
2	2024.06.12	ISSUED FOR SPA (UPDATED)
1	2024.05.17	ISSUED FOR SPA
NO.	DATE	ISSUANCE

PROPERTY LEGAL DESCRIPTION:
PARTS 1, 2, & 3 ON PLAN 37R 11733

APPLICANT:

KFH HOLDINGS LIMITED
HERBERT CHU
3 FERNWOOD COURT,
RICHMOND HILL, ONTARIO
L4B 3G2
1.416.819.9768

DO NOT SCALE DRAWINGS, CALL FOR ANY CLARIFICATIONS THAT ARE REQUIRED, FIELD VERIFY AT ALL BUILT CONDITIONS

ALL DWG.'S ARE TO BE READ IN COLOUR

ORIGINAL PAGE SIZE ARCH 'D' - 24" x 36"

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE ONTARIO N3Y 3W4
(519) 426-6270

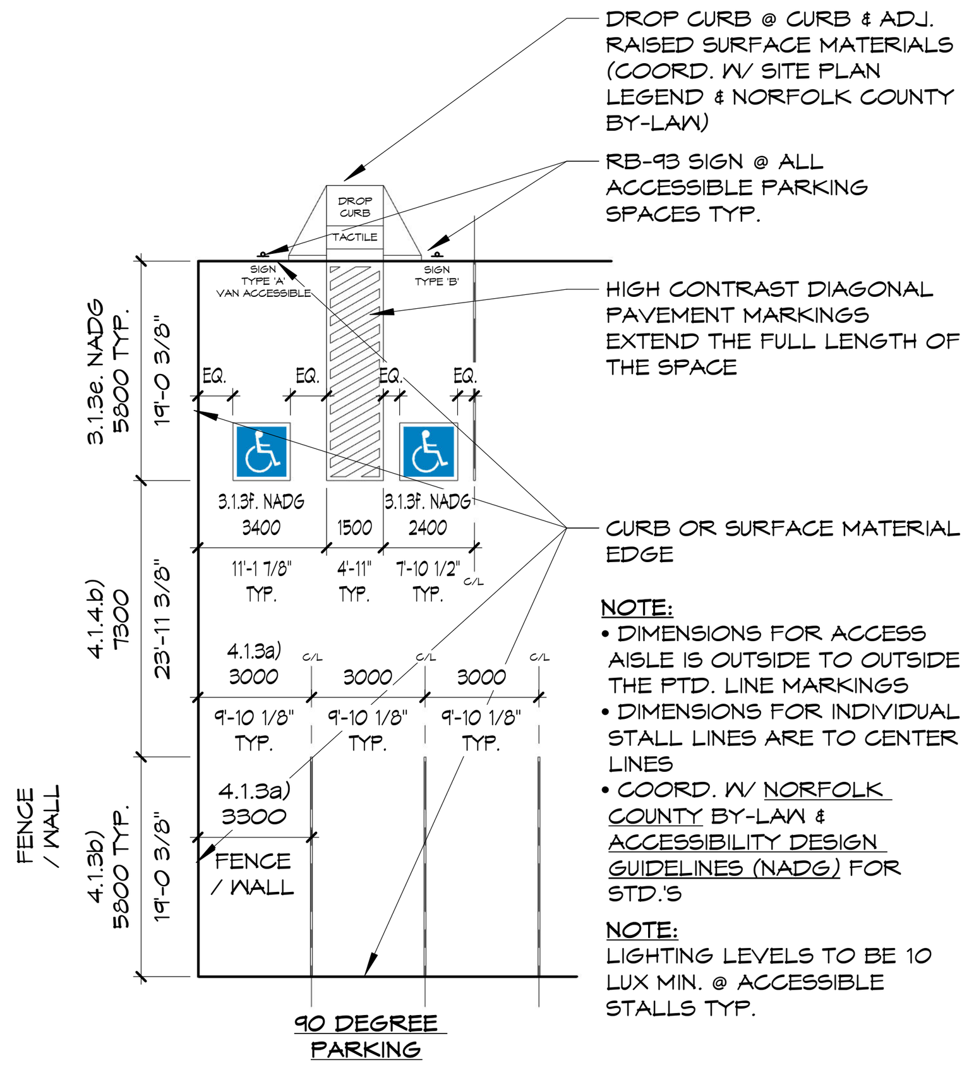
LICENSED PROFESSIONAL ENGINEER
2024-06-12
J. T. IEZZI
100189485
PROVINCE OF ONTARIO

PROJECT TITLE:
HUNT ST. N. RESIDENTIAL
HUNT STREET NORTH,
SIMCOE, ON N3Y 2M9

DRAWING TITLE:
SITE PLAN

CHECKED BY:	DRAWN BY:
JI/LHR	LHR/BM
DRAWING SCALE: As indicated	DRAWING NO.: A101
PROJECT NO.: 22-013	

DATE PLOTTED: 6/12/2024 11:54:52 AM PROJECT NUMBER & NAME: 22-013 HUNT ST. N. RESIDENTIAL FILE PATH: H:\Projects\2022\22-013 HFW Holdings Hunt St Residential\Drawings\Arch\22-013 Hunt St Residential - Site.vwx



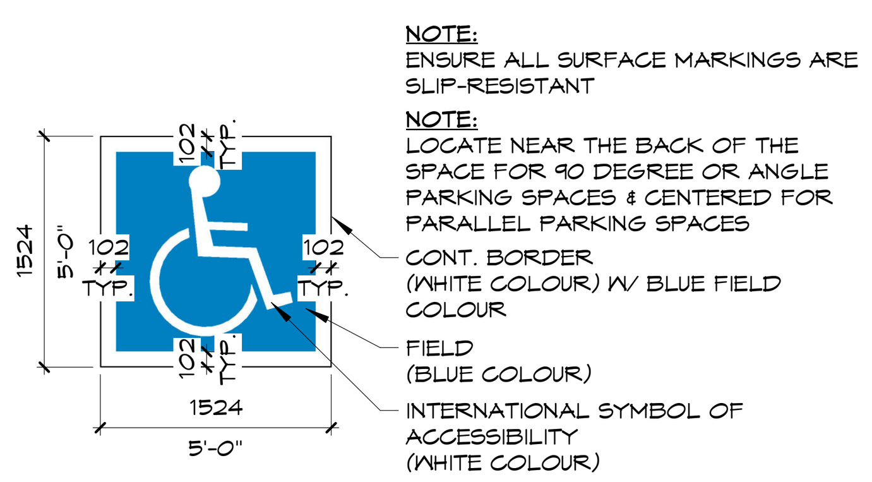
PARKING STALL GUIDELINES - NORFOLK COUNTY

1 / A102 SCALE 1 : 200

• ALL SIGNS TO BE 1.6mm (0.064") THICK ALUM. MIN.

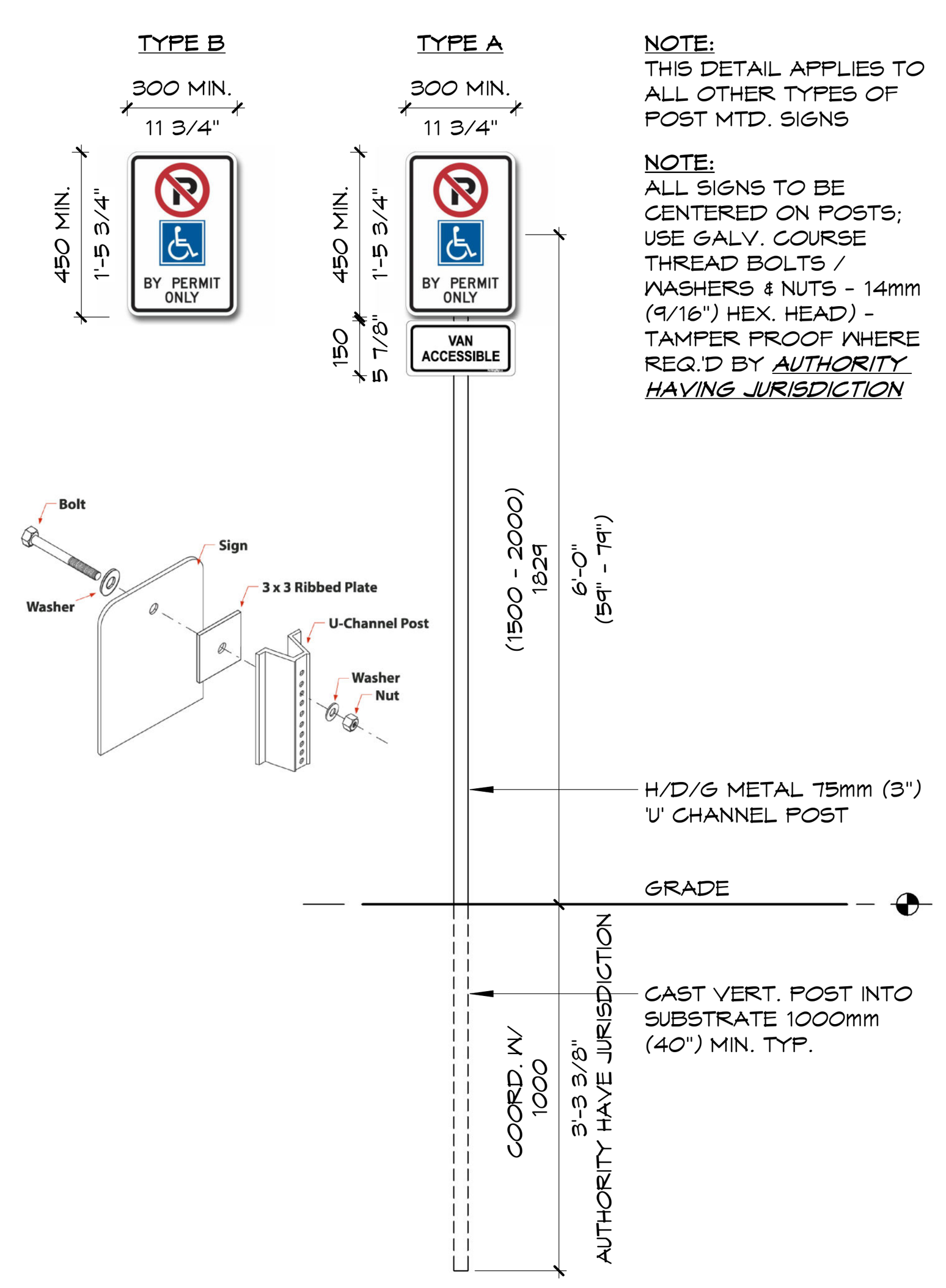
SIGNS - FACE ELEVATIONS

4 / A102 SCALE 1 : 50



ACCESSIBLE PARKING PAVEMENT MARKING

2 / A102 SCALE 1 : 50



ACCESSIBLE PARKING VERT. SIGNAGE - NORFOLK

3 / A102 SCALE 1 : 20

DATE PLOTTED 6/12/2024 11:54:59 AM PROJECT NUMBER & NAME: 22-013 HUNT ST. N. RESIDENTIAL FILE PATH: H:\Projects\2022\22-013 HFW Holdings Hunt St Residential\Drawings\Arch\22-013 Hunt St.Residential - Site.rvt

NO.	DATE	ISSUANCE
2	2024.06.12	ISSUED FOR SPA (UPDATED)
1	2024.05.17	ISSUED FOR SPA
NO.	DATE	ISSUANCE

PROPERTY LEGAL DESCRIPTION:
PARTS 1, 2, & 3 ON PLAN 37R 11733

APPLICANT:
WFH HOLDINGS LIMITED
HERBERT CHIU
3 FERNWOOD COURT,
RICHMOND HILL, ONTARIO
L4B 3C2
1.416.919.9768

DO NOT SCALE DRAWINGS, CALL FOR ANY CLARIFICATIONS THAT ARE REQUIRED, FIELD VERIFY AT ALL BUILT CONDITIONS

ALL DWG.'S ARE TO BE READ IN COLOUR

ORIGINAL PAGE SIZE ARCH 'D' - 24" x 36"

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE ONTARIO N3Y 3W4
(519) 426-6270

LICENSED PROFESSIONAL ENGINEER
2024-06-12
J. T. IEZZI
100189485
PROVINCE OF ONTARIO

PROJECT TITLE:
HUNT ST. N. RESIDENTIAL
HUNT STREET NORTH,
SIMCOE, ON N3Y 2M9

DRAWING TITLE:
SITE PLAN DETAILS & CANADA POST

CHECKED BY:	DRAWN BY:
JI/LHR	BM
DRAWING SCALE: As indicated	DRAWING NO.: A102
PROJECT NO.: 22-013	

MAP A

CONTEXT MAP

Urban Area of SIMCOE

28TPL2024452

Legend

- Subject Lands
- Lands Owned
- 2020 Air Photo

3/5/2025

N

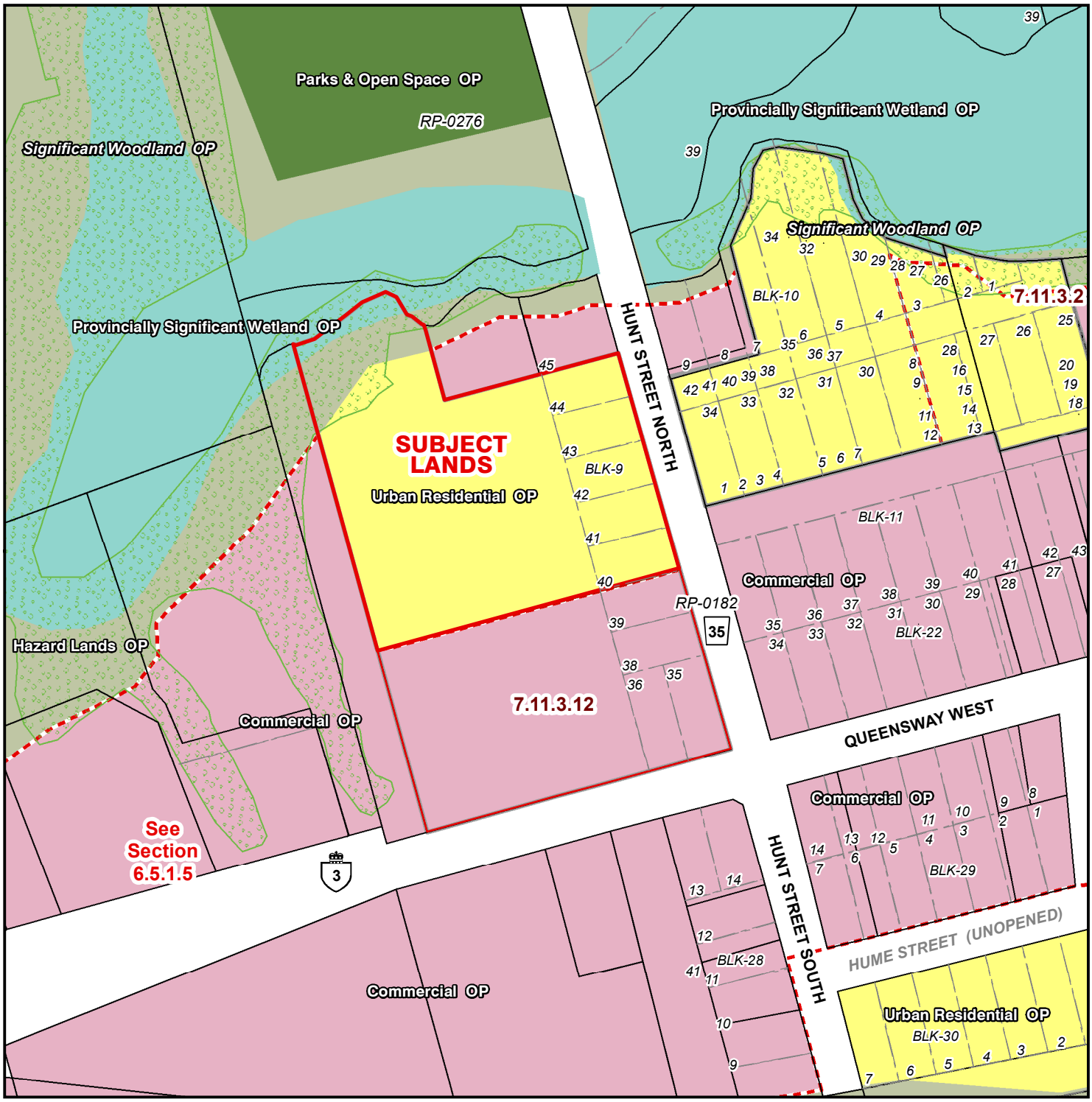
40 20 0 40 80 120 160 Meters

MAP B

28TPL2024452

OFFICIAL PLAN MAP

Urban Area of SIMCOE



Legend

- Subject Lands
- Lands Owned

Official Plan Designations

- Hazard Lands
- Provincially Significant Wetland
- Urban Residential
- Commercial
- Protected Industrial
- Parks & Open Space
- Special Policy Area
- Urban Area Boundary
- Significant Woodland

3/5/2025

N

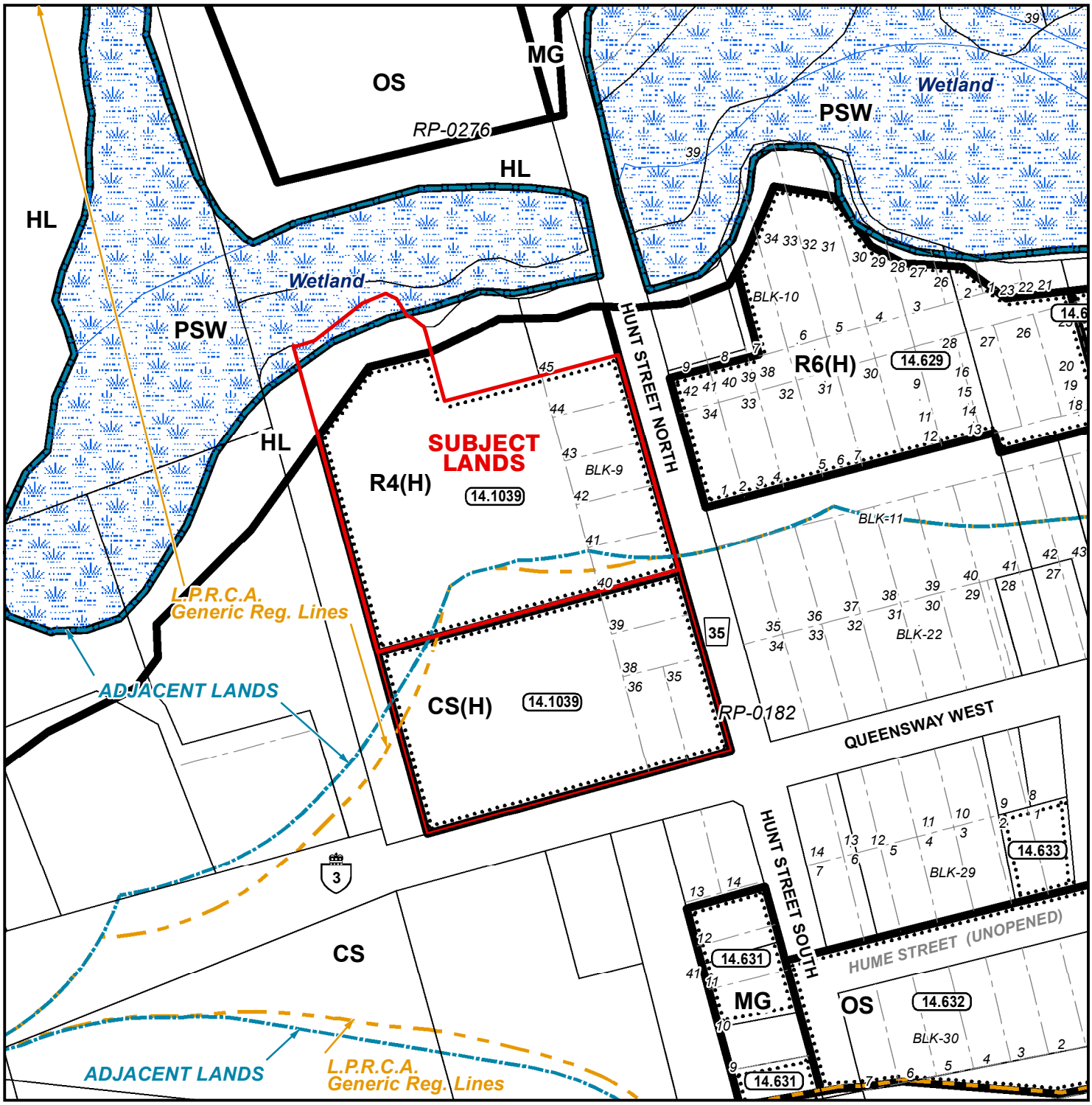
20 10 0 20 40 60 80 Meters

MAP C

ZONING BY-LAW MAP

Urban Area of SIMCOE

28TPL2024452



LEGEND

- Subject Lands
- Lands Owned
- Adjacent Lands
- Wetland
- LPRCA Generic RegLines

ZONING BY-LAW 1-Z-2014

- (H) - Holding
- CS - Service Commercial Zone
- MG - General Industrial Zone
- HL - Hazard Land Zone
- OS - Open Space Zone
- PSW - Provincially Significant Wetland Zone
- R4 - Residential R4 Zone
- R6 - Residential R6 Zone

3/5/2025

N

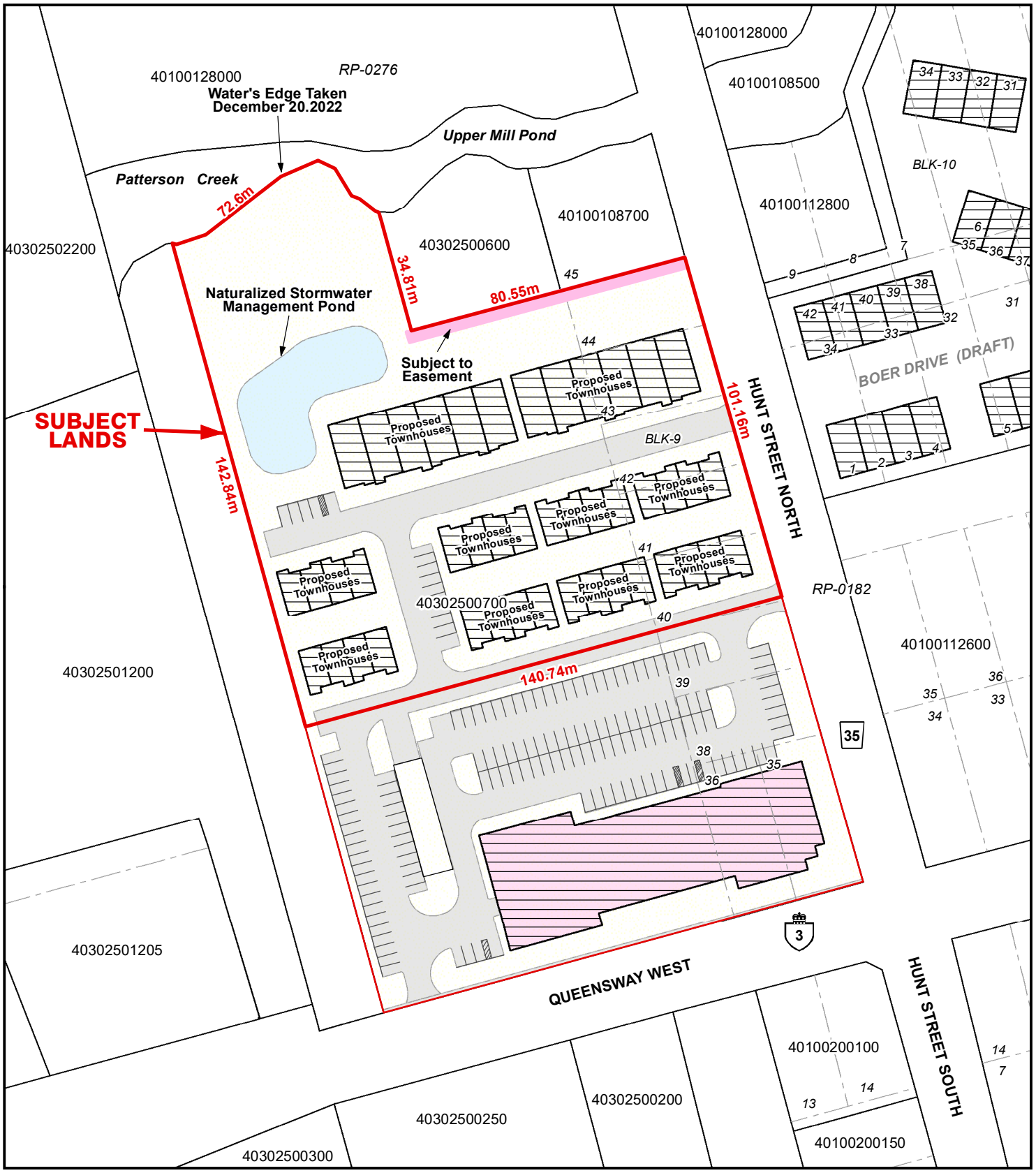
20 10 0 20 40 60 80 Meters

MAP D

28TPL2024452

CONCEPTUAL PLAN

Urban Area of SIMCOE



Legend

- Subject Lands
- Lands Owned

3/5/2025

N

10 5 0 10 20 30 40 Meters