City of Port Colborne
Committee of Adjustment Meeting Agenda

Date:	**Wednesday, October 9, 2024**
Time:	**6:00 pm**
Location:	**Committee Room 3-City Hall**
	66 Charlotte Street, Port Colborne, Ontario, L3K 3C8

Pages

1. Call to Order

2. Reading of Meeting Protocol

3. Disclosures of Interest

4. Request for Any Deferrals or Withdrawals of Applications

5. New Business

5.1 A24-24-PC - 1070 Brookfield Road — 1

Action: Minor Variance

Agent: Julian Allen

Applicant: James and Jannet Symes

Location: 1070 Brookfield Road

5.2 A23-24-PC - VL Northland Avenue — 22

Action: Minor Variance

Agent: Matt Kernahan

Applicant: 2600261 Ontario Inc.

Location: VL Northland Avenue

6. Other Business

7. Approval of Minutes

7.1 September 11th, 2024, Committee of Adjustment Minutes — 135

8. Adjournment

PORT COLBORNE
DEVELOPMENT AND GOVERNMENT RELATIONS DEPARTMENT

COMMITTEE OF ADJUSTMENT NOTICE OF PUBLIC HEARING

Minor Variance Application
File No. A24-24-PC

IN THE MATTER OF the *Planning Act, R.S.O., 1990,* c.P.13, as amended, and section 2.9.1 (a) (iii) of the City of Port Colborne Zoning By-law 6575/30/18, as amended;

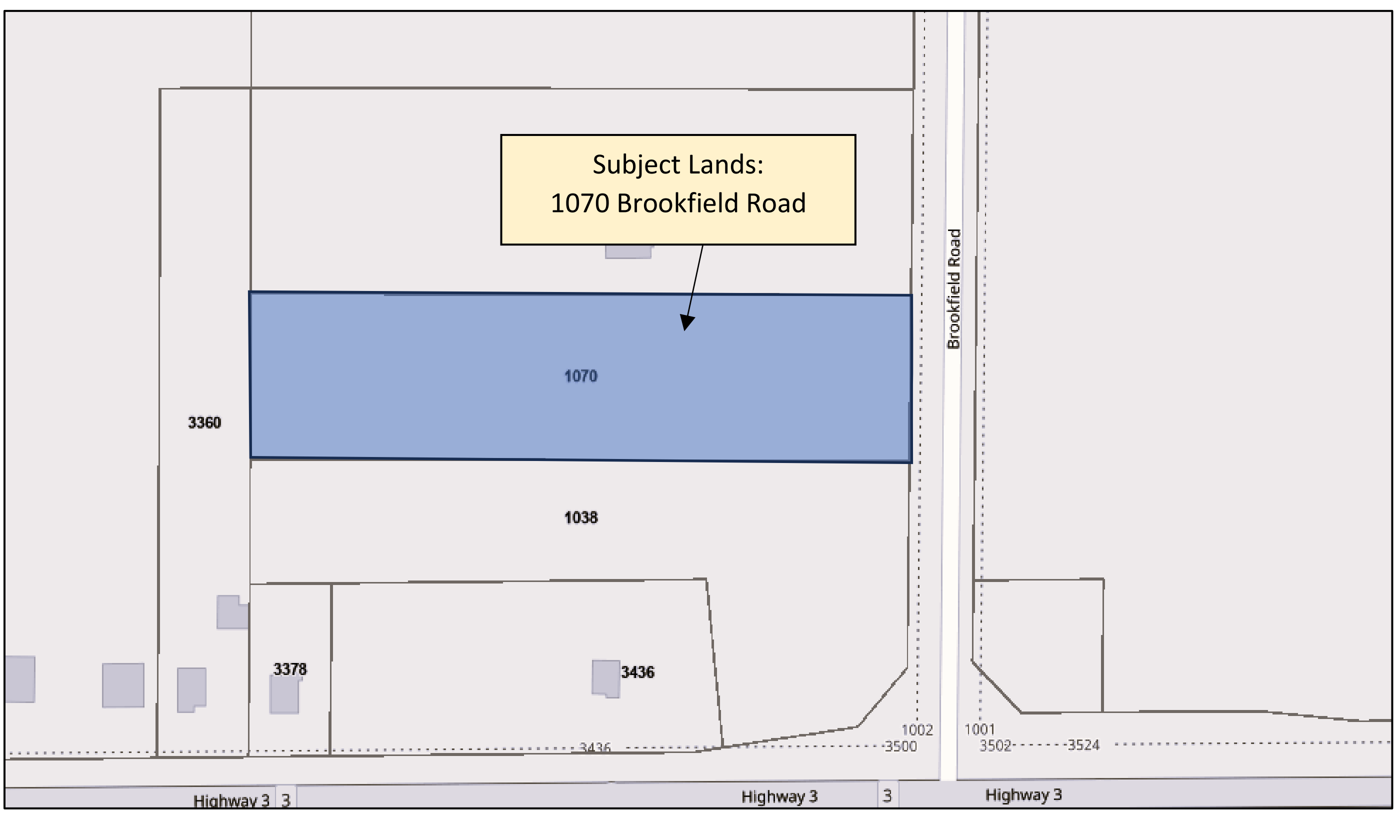
AND IN THE MATTER OF the lands legally known as Concession 2, Part of Lot 11, Part 1 on Reference Plan 59R14222, formerly in the Township of Humberstone, currently in the City of Port Colborne, located in the Hamlet Residential (HR) zone, municipally known as 1070 Brookfield Road;

AND IN THE MATTER OF AN APPLICATION by the agent Julian Allen, on behalf of the owners James and Jannet Symes, for relief from the provisions of Zoning by-law 6575/30/18, as amended, under section 45 of the *Planning Act, R.S.O 1990* c.P.13, to permit an accessory dwelling unit exceeding the maximum permitted square footage, notwithstanding the following:

1. That an accessory dwelling unit with a floor area of 95% of the gross floor area of the principal dwelling be permitted, where a maximum floor area of 40% of the gross floor area of the principal dwelling is required.

Explanatory Relief from the Zoning By-law: The applicant is requesting permission to build an addition to the existing garage on the property and convert the structure into an accessory dwelling unit. Due to the size of the existing structure and the proposed addition, a variance is required. A sketch of the proposed site plan is shown on the reverse side of this notice. A higher resolution PDF version of this sketch can be found on the City's website.

<u>LOCATION MAP</u>



PLEASE TAKE NOTICE that this application will be heard in-person and virtually by the Committee of Adjustment as shown below:

Date:	**October 9, 2024**
Time:	**6:00 p.m.**
Location:	**66 Charlotte Street – Third Floor Council Chambers and Virtually via Zoom**

Additional information regarding this application is available for public inspection. An appointment can be scheduled in the office of the Planning and Development department, Monday to Friday, during the hours of 8:30 A.M. to 4:30 P.M., by telephone at (905)-228-8124 or through email at taya.taraba@portcolborne.ca to view the material.

PUBLIC HEARING: You are entitled to participate and express your views about this application, or you may be represented by counsel for that purpose. The Planning Division report is to be made available for public inspection by **Friday, October 4, 2024**. If you are receiving this notice as the owner of land that contains multiple residential units, please post this in a location that Is visible to all tenants.

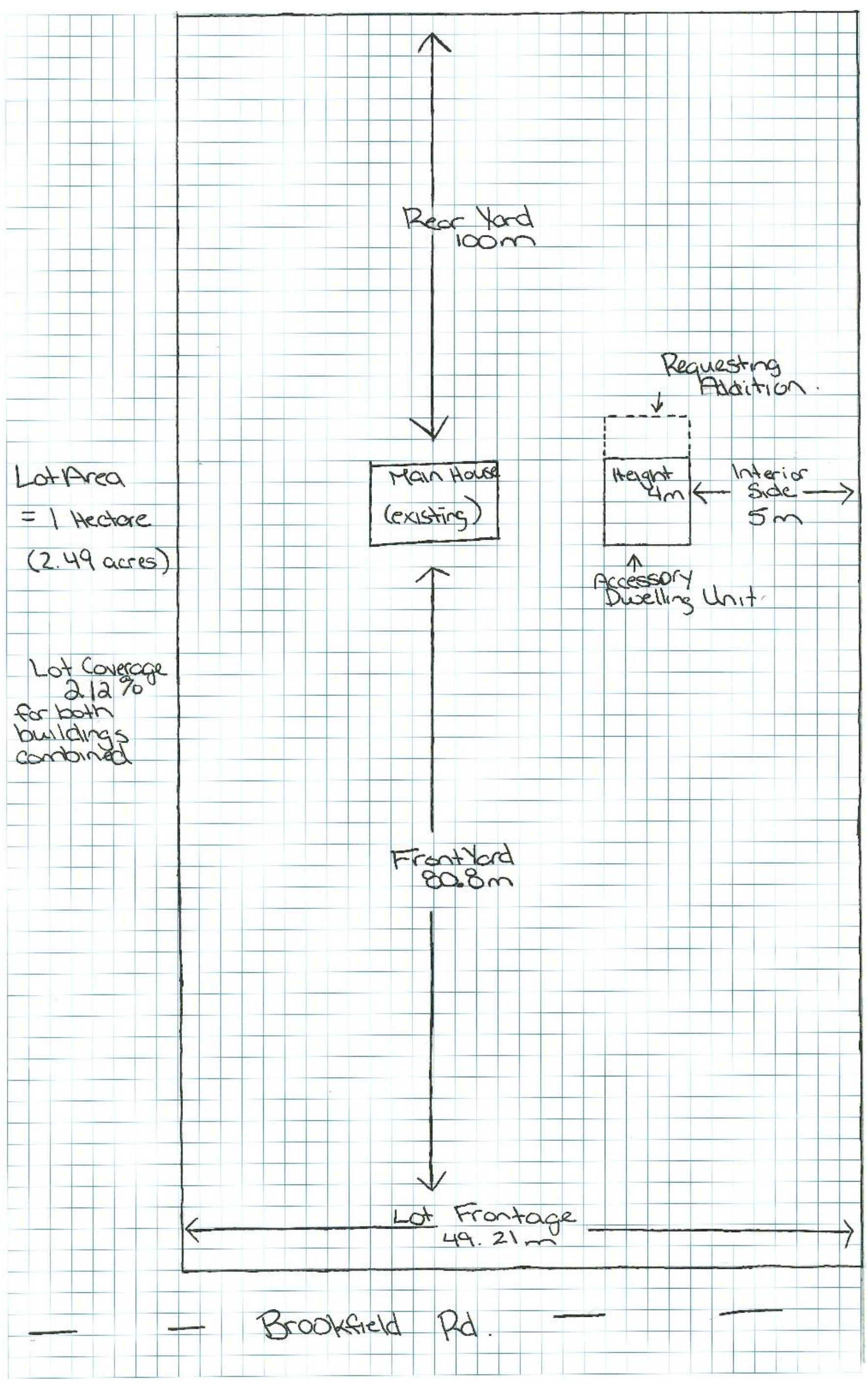
Electronic Hearing Procedures ***How to Get Involved in the Hearing***
The meeting will be held in person and will be livestreamed on the City's YouTube channel. Anyone wishing to participate in the meeting can attend either virtually or in-person and is encouraged to submit a written submission that will be circulated to the Committee of Adjustment prior to the meeting. All comments submitted are part of the public record. If anyone wishes to orally participate in the meeting, they must pre-register with the Secretary-Treasurer. **Written submissions and participation requests must be received by 12:00 p.m. on Tuesday, October 8, 2024**, by emailing taya.taraba@portcolborne.ca or by calling (905)-228-8124. Written submissions may also be submitted to the mail slot located in the front-left of City Hall; 66 Charlotte Street. If you have any questions about the application(s) or submission process, please email taya.taraba@portcolborne.ca or call (905)-228-8124. If you wish to be notified of the decision of the Committee of Adjustment in respect to this application, you must submit a written request to the Secretary-Treasurer. The Notice of Decision will also explain the process for appealing a decision to the Ontario Land Tribunal.

By order of the Committee of Adjustment,

Taya Taraba
Secretary-Treasurer

Date of Mailing: September 26, 2024

SKETCH



PORT COLBORNE
DEVELOPMENT AND LEGISLATIVE SERVICES

MINOR VARIANCE APPLICATION

THE CITY OF PORT COLBORNE

The Planning Act – Section 45

For Office Use Only		
Date Received: RECEIVED AUG 01 2024		Application Complete: ☐ Yes ☐ No
Date of Completion:		

SUBMISSION OF APPLICATION

Completed applications can be sent to:

City of Port Colborne
Taya Taraba
Secretary Treasurer of the Committee of Adjustment
City Hall
66 Charlotte Street
Port Colborne, Ontario L3K 3C8

Telephone: 1-905-835-2900 ext. 204
Fax: 1-905-835-2939
Email: taya.taraba@portcolborne.ca

2023 APPLICATION FEES

Minor Variance	**$1,383**
Minor Variance (Building without a Permit)	**$1,805**
Minor Variance & Consent Combination	**$2,528**

COMPLETENESS OF APPLICATION

A complete application includes all required forms, fees, and applicable sketches, as well as any additional information that may be identified by the Secretary-Treasurer in accordance with the provisions under *the Planning Act, R.S.O. 1990*, c.P. 13, as amended.

To be considered complete, submitted applications must include:

— One fully completed application for minor variance or permission signed by the applicant(s) and/or authorized agent and properly witnessed by a Commissioner for the taking of affidavits.

— A letter of authorization from the property owner, if applicable.

— **Two (2) copies** of a completed preliminary drawing (see the "Drawing Requirements" section).

— Payment of the appropriate fee submitted at the time of application through cash, credit, debit, or cheque payable to the City of Port Colborne.

— Payment of the appropriate Regional Review & Approval fee(s) if required by the Region, submitted at the time of the preliminary review. Payment can be submitted to the City of Port Colborne or to the Niagara Region. If payment is submitted to the Region directly, please submit the receipt to the City of Port Colborne. Failure to pay the Region's fee may result in an incomplete application. The Region's fees are available on its website, https://www.niagararegion.ca/business/fpr/forms_fees.aspx

— Payment of the appropriate NPCA fee, if required, submitted at the time of the preliminary review. Payment can be submitted to the City of Port Colborne or to the NPCA. If payment is submitted to the NPCA directly, please submit the receipt to the City of Port Colborne. Failure to pay the NPCA's fee may result in an incomplete application.

***Note:** Additional information may be required once a full review has been completed by planning staff. This may prevent deferral of your application. ***

DRAWING REQUIREMENTS

Please submit two copies of each separate plan along with your completed application. Ensure that all the information below is included in the plan(s). Depending on the extent of the proposal, **the Planning Division may request a sketch prepared by a professional, and the Committee may require (at the discretion of the Manager of Planning Services) that the sketch be signed by an Ontario Land Surveyor.** This requirement can be clarified by the Planning Staff. The required sketch should be based on an actual survey by an Ontario Land Surveyor or drawn to a usable metric scale [e.g., 1:100, 1:300, 1:500].

To be considered complete, each sketch must identify:

1. The boundaries and dimensions of the land / lot.

2. The location and nature of any easement affecting the land, if applicable.

3. The location, size, height, and type of all existing and proposed buildings and structures on the land, indicating the distance of the buildings or structures from the front lot line, rear lot line and the side lot lines.

4. The parking areas, loading spaces, driveway entrance / exits.

PROCEDURES FOR PROCESSING APPLICATIONS FOR MINOR VARIANCE OR PERMISSION

Once the Secretary-Treasurer has received an application, the application will be circulated to external agencies for up to 10 days to determine whether additional information and/or fees are required. Once comments from these agencies have been received, the Secretary-Treasurer will inform the applicant of any additional information and/or fees required by these agencies (ie. Niagara Region, Niagara Peninsula Conservation Authority). If applicable, the applicant must submit this additional information and/or pay the additional fees for their application to be deemed complete. Once the application is deemed complete, a hearing date will be confirmed in writing by the Secretary-Treasurer.

Prior to the hearing, members of the Committee may choose to conduct a site visit and/or contact the applicants. **Please note that the Committee should not be contacted by members of the public.** Any comments, questions, or concerns should be addressed through the Planning Division.

Following the hearing, the applicant/agent/solicitor will be notified of the Committee's decision in a written Notice of Decision. In addition, any other person or agency who filed a written request for the Committee's decision will be sent a copy. Any applicant objecting to the decision of the Committee, or the condition(s) imposed by the Committee may appeal the decision to the Local Planning Appeal Tribunal within 20 days after the Notice of Decision has been given. The notice of appeal, together with written reasons supporting the appeal and the fee, by certified cheque or money order payable to the Minister of Finance, must be filed with the Secretary-Treasurer, who in turn, will forward the appeal to the Local Planning Appeal Tribunal. The fee is $300.00 for the first application to be appealed and $25.00 for each additional related minor variance appeal.

NIAGARA PENINSULA CONSERVATION AUTHORITY REVIEW

Fees which are payable directly to Authority vary depending on the location and on the type of application. For land: abutting or within 15 meters of a water course; on or within 30 meters of the Lake Erie shoreline; on land identified as "Hazard Land" or "Environmental Protection" by the Port Colborne Official Plan or Zoning Bylaw; or within a groundwater recharge / discharge area, aquifer, or headwater on the property or within 30 meters of the property, the Niagara Peninsula Conservation Authority will charge an additional Plan Review Fee. These fees are provided on the Niagara Peninsula Conservation Authority's website.

I acknowledge that I have read, understand, and agree to the terms outlined above.		
Name: Julian Allen	Date: Aug 1, 2024	Initials: JA

PORT COLBORNE
DEVELOPMENT AND LEGISLATIVE SERVICES

MINOR VARIANCE APPLICATION

THE CITY OF PORT COLBORNE

The Planning Act – Section 45

SECTION 1 : CONTACT INFORMATION

1.1 Registered Owner (s):	
Name: James and Janet Symes.	
Mailing Address: 1070 Brookfield Rd.	
City: Port Colborne	Province: ON.
Postal Code: L3K 5V3	Telephone: 416-606-6932.
Fax:	Email:
1.2 Owner's SOLICITOR (if applicable)	
Name:	
Mailing Address:	
City:	Province:
Postal Code:	Telephone:
Fax:	Email:
1.3 Owner's Authorized AGENT (if applicable)	
Name: Julian Allen	
Mailing Address: 6534 Kuhn Cres	
City: Niagara Falls.	Province: ON
Postal Code: L2H 2H1	Telephone: (905) 467-8033
Fax:	Email: julian@golfiteam.com
1.4 Owner's ONTARIO LAND SURVEYOR (if applicable)	
Name:	
Mailing Address:	
City:	Province:
Postal Code:	Telephone:
Fax:	Email:
1.5 All communications should be sent to the:	
☐ Owner ☐ Solicitor ☑ Agent	

SECTION 2: LOCATION OF SUBJECT LAND

Former Municipality: Humberstone	
Concession No. 2	Lot(s): PT LT 11
Registered Plan No.	Lot(s):
Reference Plan No. 59R 14222.	Part(s): PT 1
Name of Street: Brookfield	Street No. 1070

SECTION 3: SUBJECT LAND DESCRIPTION

Part No. On Sketch:

3.1 Lot Description		
Frontage: 49.21 m	Depth:	Area: 1.00 Hectars
Existing Use: Residential		
Proposed Use: Residential		
3.2 What is the current designation of the land in the Official Plan and the Regional Plan?		
Port Colborne Official Plan: Hamlet		
Regional Policy Plan: Rural settlements		
3.3 What is the current zoning of the land (By-law 6575/30/18)? HR.		

SECTION 4: LAND INFORMATION

4.1 Date the Subject Land was acquired by the Current Owner:

4.2 Are there any existing EASMENTS OR RESTRICTIVE COVENANTS affecting the land?

- ☐ Yes
- ☑ No

If "Yes" describe the easement or covenant and its effect:

4.3 MORTGAGES, Charges & Other Encumbrances:

List the name(s) and address(es) of any mortgages, charges, or other encumbrances in respect of the land.

Unknown

4.4 DATE OF CONSTRUCTION of all existing buildings and structures on the land:

4.5 Type of ACCESS

- ☐ Provincial Highway
- ☐ Regional Road
- ☑ Municipal Road maintained all year
- ☐ Other Public Road
- ☐ Municipal Road maintained seasonally
- ☐ Right-of-Way
- ☐ Water Access
- ☐ Private Road

4.6 What type of WATER SUPPLY is proposed?

- ☐ Publicly owned and operated piped water supply
- ☐ Lake
- ☑ Well (private or communal)
- ☐ Other (specify) ______

4.7 What type of SEWAGE DISPOSAL is proposed?

- ☐ Publicly owned and operated sanitary sewage system
- ☑ Septic system (private or communal)
- ☐ Other (specify) ______

4.8 What type of STORMWATER DISPOSAL is proposed?

- ☐ Publicly owned and operated stormwater system
- ☐ Other (specify) ______

4.9 Has a Pre-Consultation application been filed for this proposal?

☐ Yes ☑ No

If Yes, please indicate the meeting date: ______

SECTION 5: NATURE & EXTENT OF RELIEF FROM THE ZONING BY-LAW

5.1 Nature and Extent of Relief from the Zoning By-law:

Requesting an accessory dwelling unit to be 95% of the gross square footage of the primary dwelling

5.2 Why is it not possible to comply with the Zoning By-law?

The current structure already excedes the 40% bylaw.

5.3 Does the structure(s) pertaining to the application for Minor Variance already exist?

- ☑ Yes
- ☐ No

5.4 If the answer to 5.3 is YES, has a building permit been issued?

- ☐ Yes
- ☑ No

If the answer is "Yes," please provide the following information:

File Number:	
Decision:	

SECTION 6: ALL EXISTING, PREVIOUS AND ADJACENT USE OF THE LAND

6.1 ALL EXISTING USE

☑ Residential	☐ Institutional	☐ Vacant
☐ Industrial	☐ Agricultural	☐ Other (specify):
☐ Commercial	☐ Parkland	

6.2 What is the length of time the existing use(s) of the land have continued?

Unknown

6.3 Are there any buildings or structures on the subject land?

☑ Yes ☐ No

If Yes, briefly describe and indicate their use.

6.4 Are any of these buildings designated under the Ontario Heritage Act?		
☐ Yes	☑ No	☐ Unknown
6.5 Has the grading of the subject land been changed by adding earth or material? Has filling occurred on the subject land?		
☐ Yes	☑ No	☐ Unknown
6.6 Has a gasoline station and/or automobile service station been located on the subject land or adjacent lands at any time?		
☐ Yes	☑ No	☐ Unknown
6.7 Has there been petroleum or other fuel stored on the subject land or adjacent lands?		
☐ Yes	☑ No	☐ Unknown
6.8 Are there or have there ever been underground storage tanks or buried waste on the subject land or adjacent lands?		
☐ Yes	☑ No	☐ Unknown
6.9 Have the lands or adjacent lands ever been used as an agricultural operation where pesticides have been applied to the lands?		
☐ Yes	☑ No	☐ Unknown
6.10 Have the lands or adjacent lands ever been used as a weapon firing range?		
☐ Yes	☑ No	☐ Unknown
6.11 Is the nearest boundary line of the application within 500 metres (1,640 feet) of the boundary line of an operational / non-operational public or private landfill or dump?		
☐ Yes	☑ No	☐ Unknown
6.12 If there are existing or previously existing buildings on the subject lands, are there any building materials remaining on site which are potentially hazardous to public health (e.g., asbestos, PCB's)?		
☐ Yes	☑ No	☐ Unknown
6.13 If there has been industrial or commercial uses on the property, a previous use inventory is needed. Is a previous use inventory attached?		
☐ Yes	☑ No	☐ Unknown
6.14 Is there reason to believe the subject lands may have been contaminated by existing or former uses on the site or adjacent sites?*		
☐ Yes	☑ No	☐ Unknown

If previous use of property is industrial or commercial or if the answer was **YES** to any of the above, please attach a previous use inventory showing all former uses of the land, or if applicable, the land(s) adjacent to the land.

*Possible uses that can cause contamination include operation of electrical transformer stations, disposal of waste minerals, raw material storage, and residues left in containers, maintenance activities, and spills. Some commercial properties such as gasoline stations, automotive repair garages, and dry-cleaning plants have similar potential. Any industrial use can result in potential contamination. The longer a property is under industrial or similar use, the greater the potential for site contamination. Also, a series of different industrial or similar uses upon a site could potentially increase the number of chemicals which are present.

ACKNOWLEDGMENT CLAUSE

I hereby acknowledge that is my responsibility to ensure that I am in compliance with all applicable laws, regulations, and standards pertaining to contaminated sites. I further acknowledge that the City of Port Colborne is not responsible for the identification and/or remediation of contaminated sites, and I agree, whether in (or as a result of) any action or proceeding for environmental clean-up of any damage or otherwise, I will not sue or make claim whatsoever against the City of Port Colborne, its officers, officials, employees or agents for or in respect of any loss, damage, injury or costs.

X Aug 1, 2024
Date

X [signature]
Signature of Owner

9.1 Is there land on the property identified in the Official Plan and / or Zoning By-law as "hazard lands"?		
☐ Yes	☑ No	☐ Unknown
9.2 Is there a watercourse or municipal drain on the property or within 15 metres of the property?		
☐ Yes	☑ No	☐ Unknown
9.3 Is the property located on or within 30 metres of the Lake Erie shoreline?		
☐ Yes	☑ No	☐ Unknown
9.4 Is there a valley slope on the property?		
☐ Yes	☑ No	☐ Unknown
9.5 Is there known localized flooding or a marsh / bog area on or within 30 metres of the property?		
☐ Yes	☑ No	☐ Unknown
9.6 Is the property on a Regional Road?		
☐ Yes	☑ No	☐ Unknown

AUTHORIZATIONS

SIGNATURE OF APPLICANT(S)

X Aug 1, 2024
Date

X [signature]
Signature of Applicant(s)

Please note: If the applicant is not the owner of the subject land or there is more than one owner, written authorization of the owner(s) is required (Complete Form 1) indicating that the applicant is authorized to make application.

I/We Julian Allen

Of the City/Town/Township of Niagara Falls

In the County/District/Regional Municipality of Niagara Region

solemnly declare that all the statements contained in this application are true, and I/we 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 Port Colborne

In the Region of Niagara

This 1st day of August

20 24.

[signature]

A Commissioner, etc.

Taya Hope Taraba, a Commissioner, etc.,
Province of Ontario, for the Corporation
of the City of Port Colborne.
Expires January 31, 2027.

TO BE SIGNED IN THE PRESENCE OF A COMMISIONER FOR TAKING AFFIDAVITS

X [signature]
Signature of applicant(s), solicitor, or authorized agent

Julian Allen

Personal information collected on this application will become part of a public record. Any questions regarding this collection should be directed to the City Clerk at 66 Charlotte Street, Port Colborne, Ontario L3K 3C8 (905) 835-2900 Ext. 106.

POSTING OF PUBLIC HEARING SIGN

A public hearing sign is required to be posted by all applicants or agents on each property under application. A sign will be made available to you after review of your application, and you are required to post each sign in a prominent location on the subject property. The sign should be placed so that it is legible from the roadway.

Each sign must remain posted a minimum of 14 days prior to the hearing, until the day following the hearing. Should a sign go missing or become damaged or illegible please contact the Secretary-Treasurer as soon as possible to request a replacement sign. Failure to post the sign as required may result in deferral of you application(s).

Please note that an affidavit must also be signed and commissioned in the presence of a Commissioner of Oaths. This can be done at City Hall AFTER the signs have been posted.

I/We Julian Allen am/are the owner(s) of the land subject to this application for a Minor Variance and I/We agree to post the required sign(s) a minimum of 14 days prior to the hearing and will remain posted, and replaced, if necessary, until the day following the hearing.

X [signature]
Signature of Owner/Agent

X Aug 1, 2024
Date

X
Signature of Owner/Agent

X
Date

PERMISSION TO ENTER

I/We Julian Allen am/are the owner(s) of the land subject to this application for a Minor Variance and I/We authorize the members of the Committee of Adjustment and the City of Port Colborne Planning Staff to enter onto the property for the purpose of evaluating the merits of the application(s).

***Please note that the Committee should not be contacted by members of the public**. Any comments, questions or concerns should be addressed through the Planning Division.*

X [signature]
Signature of Owner

X Aug 1, 2024
Date

X
Signature of Owner

X
Date

AUTHORIZATION FOR AGENT / SOLICITOR (IF APPLICABLE)

If the application is not the owner of the lane that is subject to this application for a Minor Variance, the authorization set out below must be completed by the owner(s). All registered owners must complete the authorization form for it to be valid.

Please Note: If the registered owner is a corporation, in addition to the signatures of the authorized signing officers, the corporate seal must be affixed.

Where the Owner is without a spouse, common-law or legally married, the Owner is required to sign only once. Where the spouse of the Owner is not an owner, the spouse is required to sign. Spouse shall include a common-law spouse as defined within the *Family Law Reform Act.*

I/We ____ am/are the owner(s) of the land that is subject to this application for a Minor Variance and I/We hereby authorize as my/our agent for the purposes of submitting an application(s) to the Committee of Adjustment for a Minor Variance.

X ______________________ X ______________________
Signature of Owner Date

X ______________________ X ______________________
Signature of Owner Date

X ______________________ X ______________________
Signature of Agent Date

AUTHORIZATION FOR AGENT / SOLICITOR (IF APPLICABLE)

If the application is not the owner of the lane that is subject to this application for a Minor Variance, the authorization set out below must be completed by the owner(s). All registered owners must complete the authorization form for it to be valid.

Please Note: If the registered owner is a corporation, in addition to the signatures of the authorized signing officers, the corporate seal must be affixed.

Where the Owner is without a spouse, common-law or legally married, the Owner is required to sign only once. Where the spouse of the Owner is not an owner, the spouse is required to sign. Spouse shall include a common-law spouse as defined within the *Family Law Reform Act.*

I/We James and Janet Symes am/are the owner(s) of the land that is subject to this application for a Minor Variance and I/We hereby authorize as my/our agent for the purposes of submitting an application(s) to the Committee of Adjustment for a Minor Variance.

X [signature]
Signature of Owner

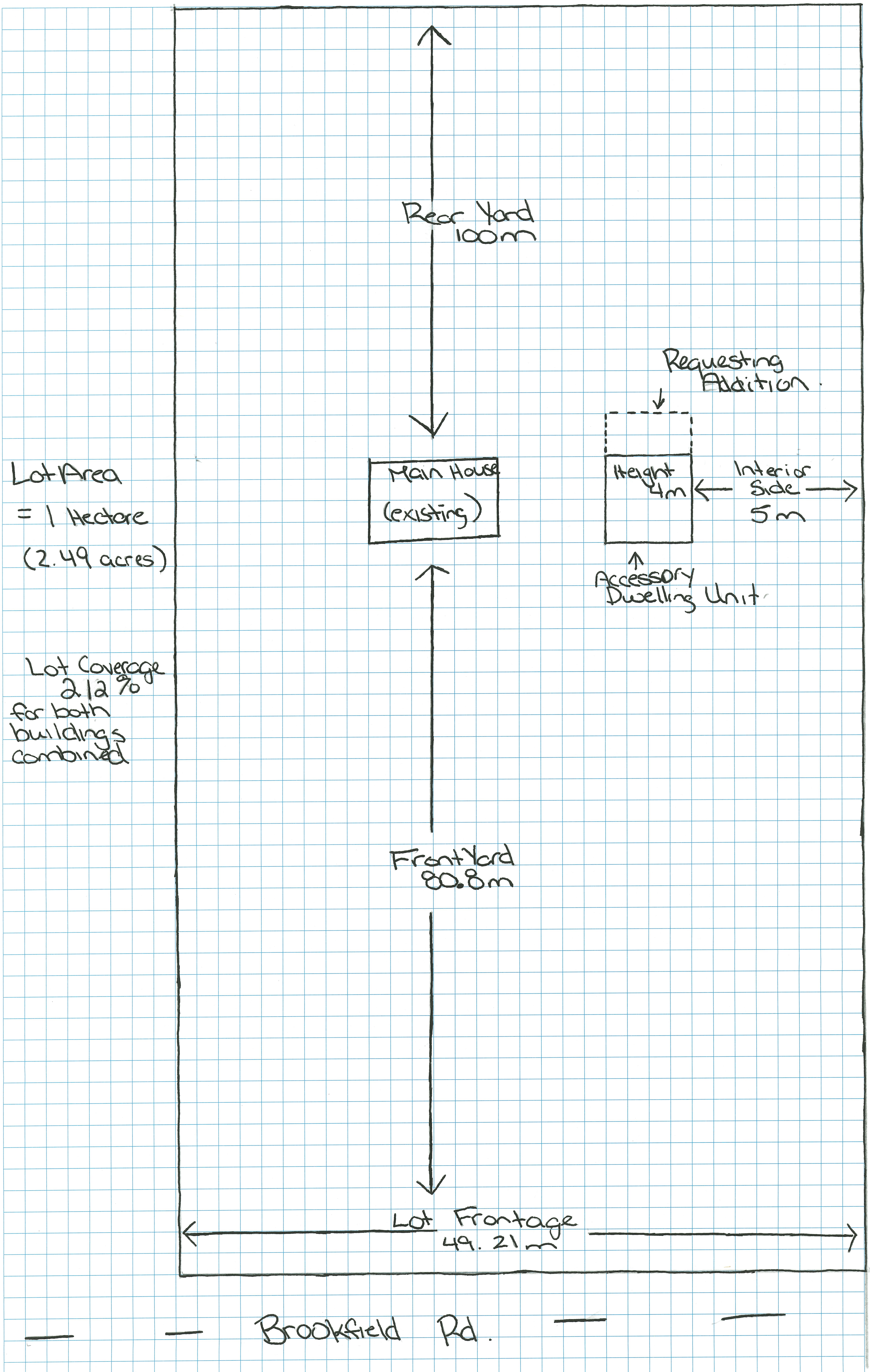
X Aug 1, 2024
Date

X [signature]
Signature of Owner

X Aug 1, 2024
Date

X [signature]
Signature of Agent

X Aug 1, 2024
Date


Rear Yard
100m
Requesting Addition
Main House
(existing)
Height
4m
Interior Side
5m
Accessory Dwelling Unit
Lot Area
= 1 Hectare
(2.49 acres)
Lot Coverage
2.12 %
for both buildings combined
Front Yard
80.8m
Lot Frontage
49.21m
Brookfield Rd.

PORT COLBORNE

City of Port Colborne
Municipal Offices
66 Charlotte Street
Port Colborne, Ontario
L3K 3C8
www.portcolborne.ca

Development and Government Relations Department
Planning Division Report

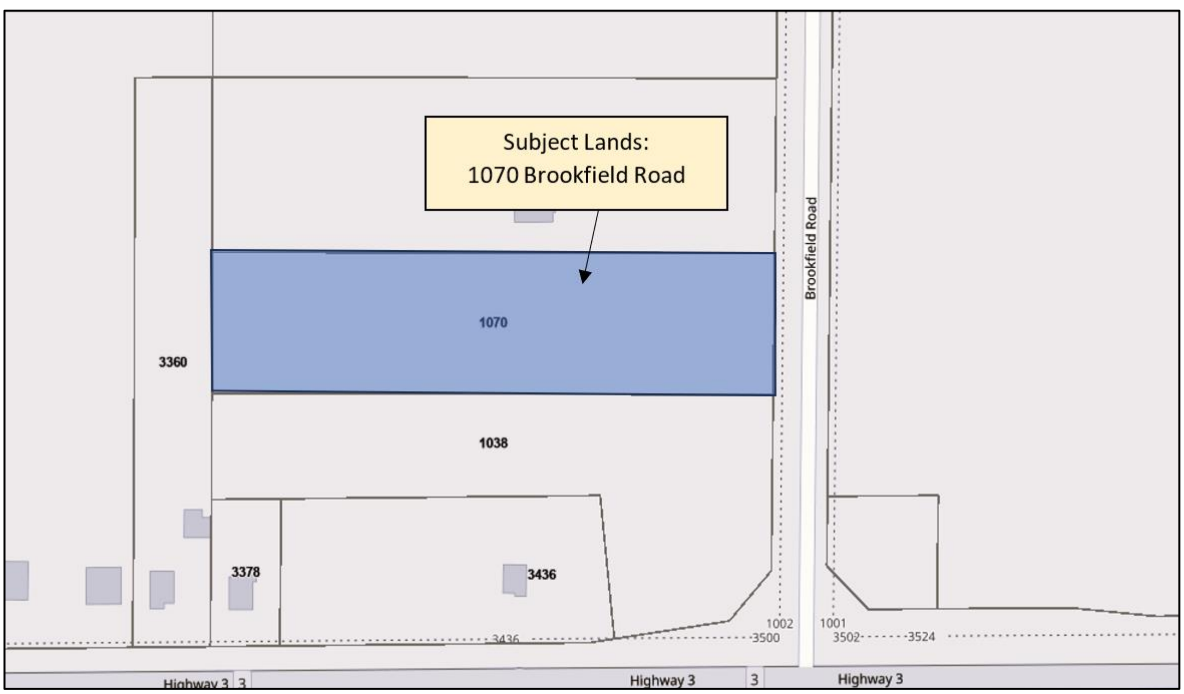
October 4, 2024

Secretary-Treasurer
Port Colborne Committee of Adjustment
66 Charlotte Street
Port Colborne, ON L3K 3C8

Re: Application for Minor Variance A24-24-PC
1070 Brookfield Road
Concession 2, Part of Lot 11, Part 1 on Reference Plan 59R14222, formerly in the Township of Humberstone, now in the City of Port Colborne
Owner(s): Christina and Kolin Mayne
Agent: Julian Allen

Proposal

The purpose of this application is to permit the construction of an addition to the existing garage on the property and convert the structure into an accessory dwelling unit. The application is requesting that an accessory dwelling unit with a floor area of 95% of the gross floor area of the principal dwelling be permitted, where a maximum floor area of 40% of the gross floor area of the principal dwelling is required.



Surrounding Land Uses and Zoning

The parcels surrounding the subject lands are zoned Hamlet Residential (HR) to the north, south, and west. The lands to the east are zoned Agricultural (A), Agricultural Purposes Only (APO), and Agricultural Residential (AR). The surrounding uses consist of primarily of detached dwellings to the east, west, north, and south.

Official Plan

The subject lands are in the Hamlet designation in the City of Port Colborne Official Plan. This designation supports the development of accessory dwelling units.

Zoning

The subject lands are in the Hamlet Residential (HR) zone under Zoning By-law 6575/30/18, which permits residential uses including accessory dwelling units.

Environmentally Sensitive Areas

The subject lands do not contain any environmentally sensitive areas.

Public Comments

Notice was circulated on September 26, 2024, as per section 45 (5) of the *Planning Act*, to properties within 60 metres of the subject lands. As of October 4, 2024, no comments from the public have been received.

Agency Comments

Notice was circulated on August 16, 2024, to internal departments and external agencies. As of October 4, 2024, the following comments have been received:

<u>Drainage Superintendent</u>

No comments.

<u>Fire Department</u>

No objections.

<u>Engineering Technologist</u>

No comments.

<u>Ministry of Transportation (MTO)</u>

The subject lands are within the MTO permit jurisdiction. MTO review, approvals and permits will be required at the time of the building permit.

Niagara Peninsula Conseration Authority (NPCA)

The NPCA have no objection to the proposed variance. NPCA staff noted that there are possible unevaluated wetlands west of the subject lands which would require NPCA review and approval if development were proposed in the back of the lot.

Niagara Region

The Niagara Region identified that this proposal would require the installation of a new septic system. Regional staff required that the applicant provide the design of the new septic system (with spare area). Regional staff also required that an inspection be completed to confirm the condition of the existing septic system. Both requirements have been met by the applicants. Regional staff also noted that the property is mapped for archaeological potential; however, due to the location of the proposed expansion, Regional staff waived their archaeological assessment requirements.

Planning Act – Four Tests

In order for a Minor Variance to be approved, it must meet the four-part test outlined under section 45 (1) of the *Planning Act*. These four tests are listed and analyzed below.

Is the application minor in nature?

Planning staff find the requested variance to be minor in nature. The increase in the maximum permitted accessory dwelling unit floor area of 40% the gross floor area of the principal dwelling to 95% is required due to the size of the existing garage. Staff note that, while the applicant requested permission for 95%, a detailed review of the minor variance application in conjunction with data retrieved from prior building permits found that only 77% is required to facilitate the proposal. The existing garage measures 9.14m in width by 9.75m in length, for an existing floor area of 89.12m^2. The dwelling is approximately 8.3m in width by 15.86m in length, for a total gross floor area of 131.64m^2. The addition is proposed to measure 6.1m in length by 1.98m in width, for a proposed additional floor area of 12.08m^2. The total floor area proposed for the accessory dwelling unit is 101.2m^2. The existing garage floor area is already 68% of the gross floor area of the dwelling, which would require a variance to facilitate the conversion of the garage into an accessory dwelling unit without the proposed addition. The existing structure is situated behind the dwelling, and the addition is proposed to extend towards the rear of the lot, which will help mitigate the increased size of the proposed structure. The maximum accessory dwelling unit floor area provisions intend to ensure that accessory structures remain a secondary use to the primary use of the dwelling. As the area of the accessory dwelling unit with the proposed addition will not exceed the area of the dwelling, Planning staff are satisfied that the application is minor in nature.

Is it desirable for the appropriate development or use of the land, building, or structure?

The proposal is desirable and appropriate as the development is located in a suitable location on the site. The proposed development reflects the types of dwellings and uses already existing in the neighbourhood. The requested variance is minimal and will facilitate the addition of a new dwelling unit to the supply of housing options within the City. The development is compatible with most of the requirements of the Zoning By-law, with the exception of the requested variance. The new dwelling unit proposed in this application supports a more efficient use of the land and resources that must be expended to service the existing dwelling, which demonstrates that the application is desireable for the appropriate development and use of the land and building.

Is it in keeping with the general intent and purpose of the Zoning By-law?

The Zoning By-law permits accessory dwelling units within the HR zone, and the proposal meets the majority of the zoning requirements. The accessory structure will remain accessory in nature to the primary dwelling as the accessory structure is not within the front yard, is more than 1 metre from the interior side and rear lot lines, does not exceed 5% of the lot area, as is required by the accessory building provisions established in section 2.8 of the Zoning By-law. Planning staff therefore find the application to be in keeping with the general intent and purpose of the Zoning-By-law.

Is it in keeping with the general intent and purpose of the Official Plan?

Planning staff find this variance application meets the general intent and purpose of the Official Plan, as the Official Plan permits accessory structures and accessory dwelling units within the Hamlet designation.

Recommendation:

Given the information above, Planning staff recommend application A24-24-PC be **granted** for the following reasons:

1. **The application is minor in nature.**

2. **It is appropriate for the development of the site.**

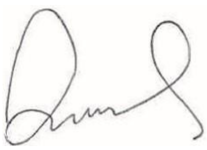
3. **It is desirable and in compliance with the general intent and purpose of the Zoning By-Law.**

4. **It is desirable and in compliance with the general intent and purpose of the Official Plan.**

Prepared by,

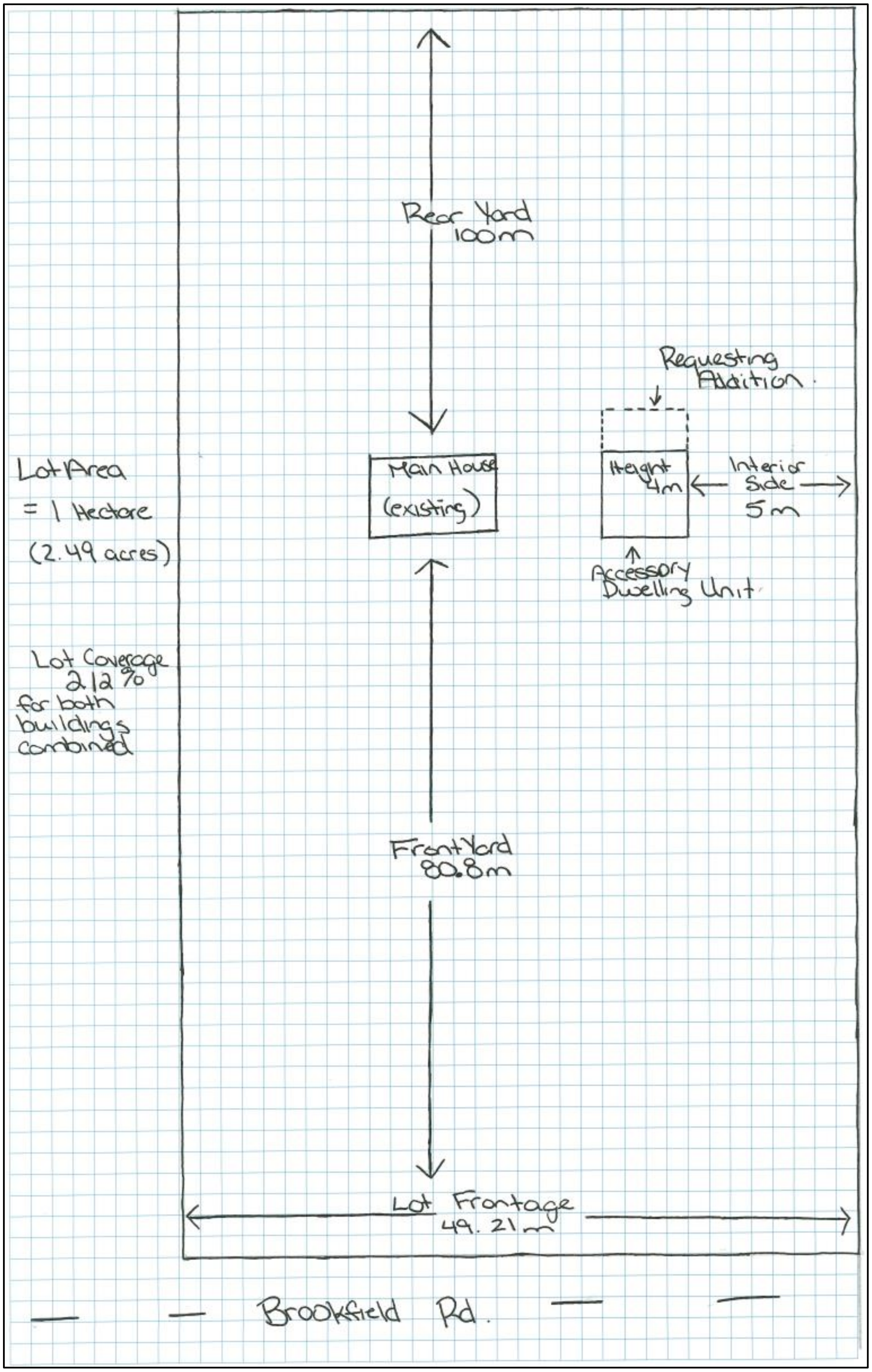
Diana Vasu, BA, MA
Planner

Submitted by,



David Schulz, MCIP, RPP
Manager of Planning

Appendix A


Rear Yard
100m
Requesting
Addition
Lot Area
= 1 Hectare
(2.49 acres)
Main House
(existing)
Height
4m
Interior
Side
5m
Accessory
Dwelling Unit
Lot Coverage
2.12%
for both
buildings
combined
Front Yard
80.8m
Lot Frontage
49.21m
Brookfield Rd.

PORT COLBORNE
DEVELOPMENT AND GOVERNMENT RELATIONS

COMMITTEE OF ADJUSTMENT NOTICE OF PUBLIC HEARING

Minor Variance Application File No. A23-24-PC

IN THE MATTER OF the *Planning Act, R.S.O., 1990,* c.P.13, as amended, and sections 2.19.1, 3.2, 7.8 (c), 7.8 (e), 7.8 (g), and 37 (Special Provision: R3-73) of the City of Port Colborne Zoning By-law 6575/30/18, as amended;

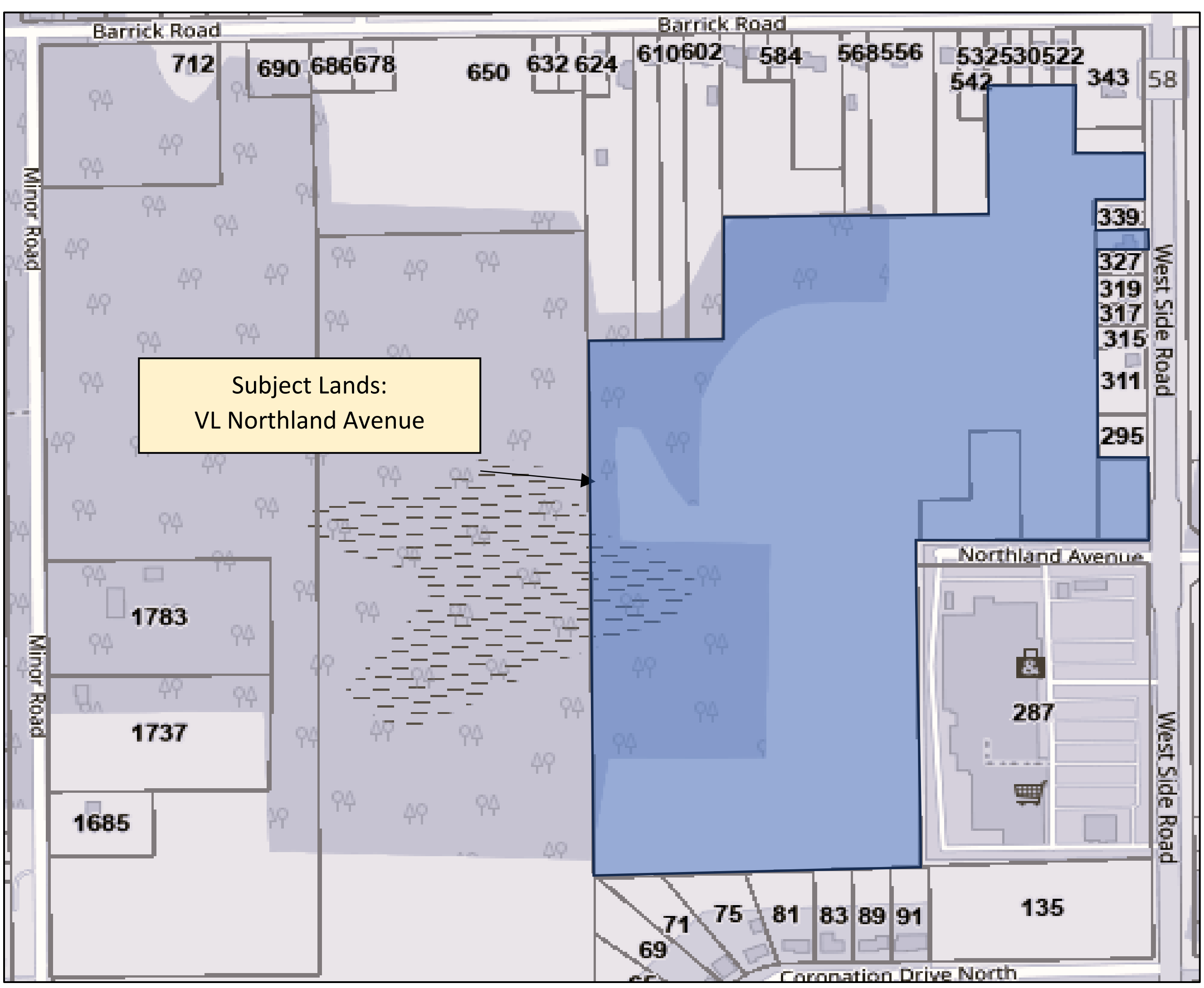
AND IN THE MATTER OF the lands legally known as Concession 2, Part of Lot 31, Parts 2 to 5 on Reference Plan 59R1186, Parts 1 and 2 on Reference Plan 59R12021, in the City of Port Colborne, located in the Residential Development (RD) zone, municipally known as a vacant lot on Northland Avenue;

AND IN THE MATTER OF AN APPLICATION by the agent Matt Kernahan, on behalf of the applicant 2600261 Ontario Inc., for relief from the provisions of Zoning by-law 6575/30/18, as amended, under section 45 of the *Planning Act, R.S.O 1990* c.P.13, to permit the construction of a new subdivision, notwithstanding the following:

1. That a minimum setback for uncovered stairs of the first storey of a dwelling to a lot line of 0.3m be permitted, whereas a minimum of 0.5m is required.
2. That a parking space obstructed on two sides be permitted a minimum width of 3m, whereas a minimum of 3.5m is required.
3. That a minimum lot area for townhouses of 160 m^2 be permitted, whereas a minimum of 180 m^2 is required.
4. That a minimum front yard setback of 6m be permitted, whereas a minimum of 7.5m is required.
5. That a minimum corner side yard setback of 3m to a dwelling be permitted, whereas a minimum of 4.5m is required.
6. That a minimum corner side yard setback of 1.5m from a deck 1.2m or greater above the ground floor level to a lot line be permitted, whereas a minimum of 4.5m is required.
7. That a maximum dwelling height of 12m be permitted, whereas a maximum of 11m is required.

Explanatory Relief from the Zoning By-law: The applicant is requesting relief from several Zoning By-law provisions to facilitate the development of a new subdivision. A sketch of the proposed site plan is shown on the reverse side of this notice. A higher resolution PDF version of this sketch can be found on the City's website.

<u>LOCATION MAP</u>



PLEASE TAKE NOTICE that this application will be heard in-person and virtually by the Committee of Adjustment as shown below:

Date:	**September 11, 2024**
Time:	**6:00 p.m.**
Location:	**66 Charlotte Street – Third Floor Council Chambers and Virtually via Zoom**

Additional information regarding this application is available for public inspection. An appointment can be scheduled in the office of the Planning and Development department, Monday to Friday, during the hours of 8:30 A.M. to 4:30 P.M., by telephone at (905)-228-8124 or through email at taya.taraba@portcolborne.ca to view the material.

PUBLIC HEARING: You are entitled to participate and express your views about this application, or you may be represented by counsel for that purpose. The Planning Division report is to be made available for public inspection by **Friday, September 6, 2024**.

NOTE: If you are receiving this notice as the owner of land that contains multiple residential units, please post this in a location that Is visible to all tenants.

Electronic Hearing Procedures

How to Get Involved in the Hearing

The meeting will be held in person and will be livestreamed on the City's YouTube channel.

Anyone wishing to participate in the meeting can attend either virtually or in-person and is encouraged to submit a written submission that will be circulated to the Committee of Adjustment prior to the meeting. All comments submitted are part of the public record. If anyone wishes to orally participate in the meeting, they must pre-register with the Secretary-Treasurer. **Written submissions and participation requests must be received by 12:00 p.m. on Tuesday, September 10, 2024**, by emailing taya.taraba@portcolborne.ca or by calling (905)-228-8124. Written submissions may also be submitted to the mail slot located in the front-left of City Hall; 66 Charlotte Street.

If you have any questions about the application(s) or submission process, please email taya.taraba@portcolborne.ca or call (905)-228-8124.

If you wish to be notified of the decision of the Committee of Adjustment in respect to this application, you must submit a written request to the Secretary-Treasurer. The Notice of Decision will also explain the process for appealing a decision to the Ontario Land Tribunal.

By order of the Committee of Adjustment,

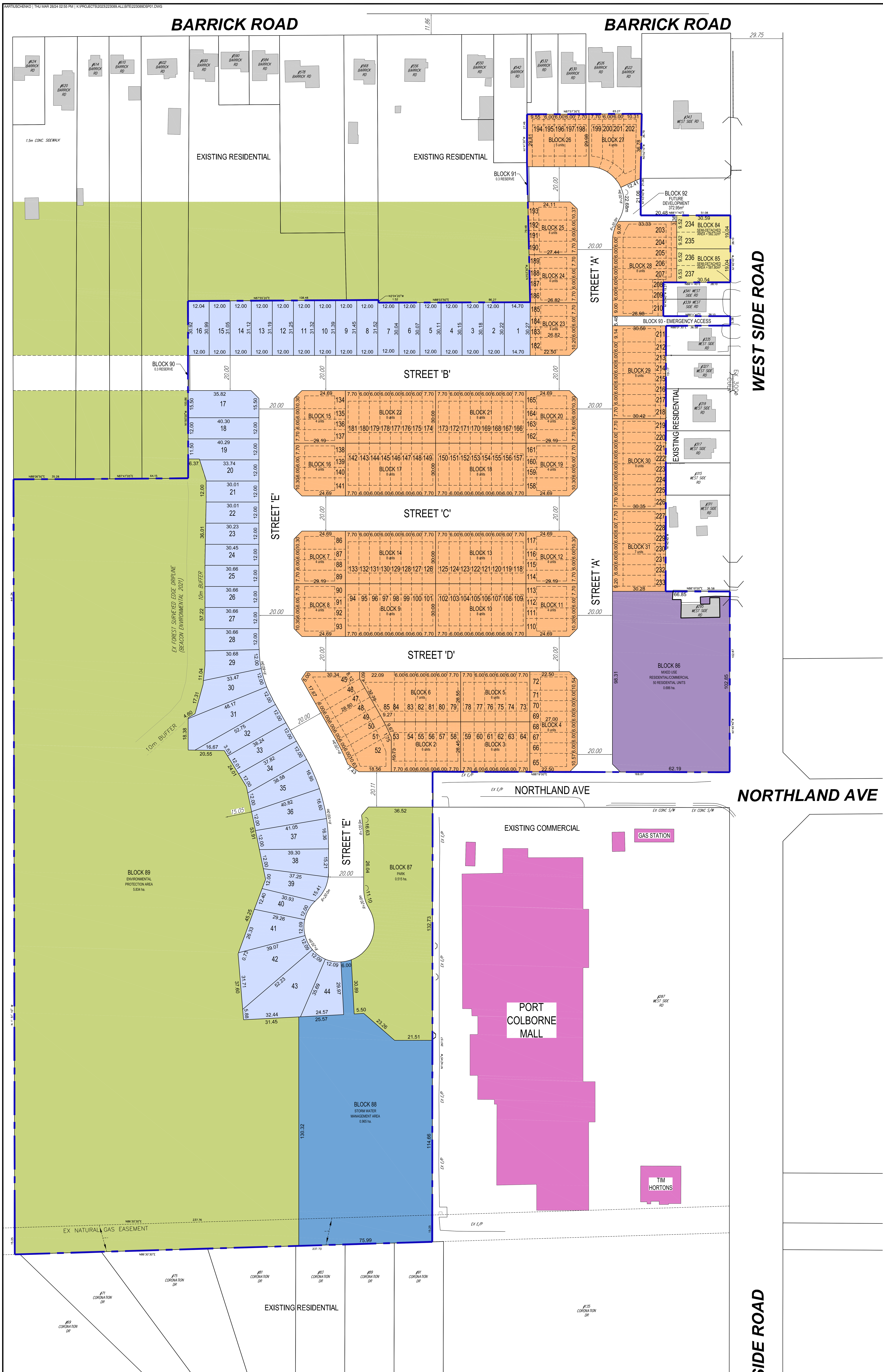
Taya Taraba
Secretary-Treasurer

Date of Mailing: August 28, 2024

SKETCH

UNITS TYPOLOGY

MODEL TYPE:	TYPE A (20') 6 m STREET TOWNHOUSE	TYPE B (31') 18 m SEMI	TYPE C (40') 12 m SINGLE
TOTAL:	189	4	44
SITE TOTAL:	237		



UNITS TYPOLOGY

MODEL TYPE:	TYPE A (20') 6 m STREET TOWNHOUSE	TYPE B (31') 19 m SEMI	TYPE C (40') 12 m SINGLE
TOTAL:	189	4	44
SITE TOTAL:	237		

ISSUED FOR FINAL APPROVAL
ISSUED FOR PRELIMINARY APPROVAL

HUNT DESIGN ASSOCIATES INC.
www.huntdesign.ca
8966 Woodbine Ave, Markham, ON L3R 0J7
T 905.737.5133 email: hdai@huntdesign.ca

PRELIMINARY SITEPLAN
West Side Road, Port Colborne, Ontario
Alliance Homes - 223089
West Side Trails
1:250
223089DSP01.DWG

GARDEN CITY
DEVELOPMENT

June 27, 2024

David Schulz BURPL, MCIP, RPP
Senior Planner,
City of Port Colborne
66 Charlotte Street
Port Colborne, ON L3K 3C8

Re: Northland Estates Subdivision
Application for Redline Revision to Draft Plan of Subdivision
Application for Minor Variance
Addendum to Planning Justification Report (June 2022)

Garden City Development is pleased to provide this letter in support of the application for redline revision to the Northland Estates Draft Plan of Subdivision and the associated application for Minor Variance. The following letter is submitted along with the Application for Minor Variance, Revised Functional Servicing Study and Stormwater Management Report and Traffic Impact Study Addendum. I trust you will find this submission is responsive to the submission requirements outlined at our meeting of May 17, 2024, and Ms. Landry's email of May 3, 2024.

The purpose of this letter is to provide background and context to the applications and to provide Planning Justification for the proposed redline revision and associated application for minor variance. This letter is to serve as an addendum to the Planning Justification Report by Upper Canada Consultants (by this author), dated July 2022 in support of the application for Draft Plan of Subdivision and Zoning By-law Amendment.

<u>Background and Context</u>

2600261 Ontario Inc. (Northland) is the owner of the Northland Estates Subdivision, which is legally described as Part of Lot 31, Concession 2, Geographic Township of Humberstone, City of Port Colborne, Regional Municipality of Niagara. The subject lands are located south of Barrick Road and west of West Side Road at the terminus of Northland Avenue. Northland filed applications for a Draft Plan of Subdivision and Zoning By-law Amendment to facilitate the development of the subject lands as a residential subdivision, mixed use block, park and associated stormwater management pond and natural area in July 2022. The July 2022 Draft Plan of Subdivision was comprised of 120 single detached dwelling lots, 46 street townhouses and a mixed-use block containing 50 residential apartments. The Northland Estates Draft Plan of Subdivision and By-law 7141/83/23, which established the site-specific zoning to implement the subdivision were approved by Port Colborne Council on September 26, 2023.

By-law No. 7141/83/23 was appealed to the Ontario Land Tribunal by a resident that made submissions in opposition to the Zoning By-law Amendment. The appeal was dismissed by an order of the Ontario Land Tribunal dated May 31, 2024.

In the intervening two-year period between when the Northland applications for Draft Plan of Subdivision and associated Zoning By-law Amendment were made and present, the housing market conditions have changed drastically. There is a significantly increased demand for more affordable housing and less demand for large lot single detached dwellings. Northland is seeking to respond to this demand by making changes to the Draft Plan of Subdivision and the Zoning regulations that will implement it.

Purpose of the Applications

The purpose of the proposed redline revision to the draft plan of subdivision is generally to increase the proportion of more affordable housing typologies within the subdivision. The proposed changes to the North Estates Subdivision are summarised as follows:

1. Decrease the number of single detached dwellings from 120 to 44. Several of the remaining single detached dwelling lots have also been reduced in size (i.e. frontage).
2. Increase the number of townhouse dwellings from 46 to 189.
3. Addition of 4 semi-detached dwelling units.
4. Other minor technical changes to the subdivision plan.

Port Colborne By-law 7141/83/23 Zones the portion of the Northland Estates Subdivision that was approved for single detached dwellings and street townhouses R3-73. The R3-73 Zone permits single detached dwellings, street townhouse dwellings and semi-detached dwellings. There is no change to the boundary within which these dwellings are proposed within the redlined subdivision compared to the location where they are proposed within the draft plan approved subdivision.

The detailed design of the single detached and street townhouse dwelling units has now been completed by Hunt Design Associates Inc. Various site plans and elevations by Hunt Design Associates are included with this submission. To implement Northland's vision for more affordable housing units on compact lots, the proposed dwellings require deviation from the approved zoning regulations contained in By-law 7141/83/23 and Port Colborne's parent by-law. The purpose of the Minor Variance Application is to permit the development of the dwelling units designed by Hunt Design Associates within the redlined Draft Plan. In particular, the Minor Variance Application seeks the following zoning relief:

1. (By-law 7141/83/23, 3. a) Minimum Lot Area for Townhouses (Interior and Exterior) – 160 m^2
2. (By-law 6575-30-18, 7.8 c) Minimum Front Yard to House and Garage – 6.0 m
3. (By-law 6575-30-18, 7.8 e) Minimum Flankage to House – 3.0 m
4. (By-law 6575-30-18, 7.8 e) Minimum Flankage to Porch – 1.5 m
5. (By-law 6575-30-18, 7.8 g) Maximum Building Height – 12.0 m
6. (By-law 6575-30-18, 3.2) Minimum Garage Width (Obstructed Parking) – 3.0 m
7. (By-law 6575-30-18, 2.19.1) Minimum setback of uncovered stairs to first storey from lot line – 0.3 m

Planning Justification

The Planning Justification Report prepared in support of the 2022 Application for Draft Plan of Subdivision and Zoning By-law Amendment provides a Planning Rationale for the development of the subject property as a residential subdivision containing a mix of dwelling types, a mixed-use block, park and environmental protection areas generally. The Planning Justification Report contains an analysis of the development proposal in the context of the Planning Act, Provincial Policy Statement, Growth Plan, Region of Niagara Official Plan and Urban Design Guidelines, City of Port Colborne Official Plan and Comprehensive By-law 675-30-18. The analysis contained in the July 2022 Planning Justification Report is directly applicable to and should be relied upon for the consideration of the redline revision. The following is the summary of the planning analysis contained in the July 2022 Planning Justification Report:

> *"The proposed development achieves a balance between environmental conservation and the accommodation of prescribed growth. The subject lands are located within the City of Port Colborne's Settlement Area and are further within a designated Greenfield area. Provincial, Regional and local land use planning documents direct that these lands be developed to accommodate a range and mix of land uses and dwelling types through compact and efficient land use patterns to meet prescribed growth targets. The lands are also affected by Natural Heritage Features protected under the Region's Core Natural Heritage System. Provincial, Regional and local land use policies require the long-term protection of Natural Heritage features and their functions. The on-site environmental features have been delineated through an Environmental Impact Study and will be contained within an environmental conservation block. This block will be designated and zoned to prohibit development which would negatively impact these features. The areas outside of the environmental conservation area are proposed to be developed through a compact mix of land uses, including a mix of dwelling types as encouraged in the Provincial, Regional and local plans. The proposed development yield contributes positively to the achievement of the City's density obligations.*
>
> *Based on the above analysis, it is my opinion that the applications comply with the Planning Act, are consistent with the Provincial Policy Statement, conform with the Growth Plan, Region of Niagara Official Plan and the City of Port Colborne Official Plan, represent good planning and should be supported."*

The additional density proposed through the redline revision improves the efficiency and affordability of the proposed development which further contribute to the development's consistency and conformity with relevant planning policy.

The revised subdivision plan continues to protect natural heritage features in proximity to the development. An Addendum to the Environmental Impact Study was prepared and peer reviewed subsequent to the July 2022 submission. This Environmental Impact Study Addendum and the City's peer review confirm that natural heritage features will be adequately protected by the proposed development.

<u>Minor Variance Analysis</u>

The following provides an analysis of the required minor variance for the severed parcel in the context of Section 45 of the Planning Act:

Are the variances consistent with the general intent of the Official Plan

The proposed variances will facilitate the intensification of a subdivision within an area Designated Greenfield in the City of Port Colborne and Region of Niagara Official Plan. The general intent of the

City's Official Plan is to promote compact, mixed-use communities, higher densities and a greater mix of housing types. The general intent of the Official Plan is to support the achievement of the Greenfield density target of 50 people and jobs per hectare. The revised plan of subdivision that is facilitated by the proposed variances will is a compact, mixes use development containing variety of housing forms at a density of 60 persons and jobs per hectare. The variances therefore conform to the general intent of the Official Plan.

Are the variances consistent with the general intent of the Zoning By-law

The general intent of the zoning by-law for minimum lot area for townhouses is to ensure that there is adequate space available on the lot for a dwelling, parking and amenity area. The proposed variance will apply to a limited amount of interior townhouse lots that have shallow depth. These lots will still accommodate a dwelling, minimum of 6 m front and rear yard setbacks which provide for adequate amenity area and a parking space in the driveway (and garage). The proposed variance for minimum lot area is therefore consistent with the general intent of the zoning by-law.

The general intent of the zoning by-law for minimum front yard setback to the house and garage is to ensure that there is adequate space in the front yard for parking and to minimize streetscape impacts. In this instance, the minimum front yard setback will apply universally to the new subdivision so a consistent streetscape will be achieved within the subdivision. The 6.0 m setback will also provide adequate space for a legal parking space in the front yard of each dwelling. The proposed variance for front yard setback is therefore consistent with the general intent of the zoning by-law.

The general intent of the zoning by-law for minimum flankage yards for dwellings and porches is to ensure that there is adequate separation between dwellings/porches and the street. In this instance, the proposed 1.5 m will be adequate to ensure that sight lines are not obstructed and will provide for consistency of setbacks within the subdivision. The proposed variance for flanking yard setback is therefore consistent with the general intent of the zoning by-law.

The general intent of the zoning by-law for maximum height is to ensue that buildings do not overpower the lot on which they are located and to ensure that consistency with existing, traditional development is maintained. The increase in height is required due to the shallow bedrock within the subdivision. The dwellings within the subdivision will have very limited interface with established development and will generally only interface with a rear yard-rear yard condition. The proposed dwellings will not overpower their lots and will maintain consistency with the surrounding neighbourhood. The proposed variance for maximum height is therefore consistent with the general intent of the zoning by-law.

The general intent for minimum obstructed parking space width is to ensure that adequate parking is provided for the use it serves. In this instance, a 6 m front yard setback will be provided to each dwelling unit. This setback provides for a legal parking space in the front yard of each dwelling which ensures adequate parking is provided to each dwelling. The proposed variance for obstructed parking space width is therefore consistent with the general intent of the zoning by-law.

The general intent of the zoning by-law for minimum setback of stairs to the first storey of a dwelling is to prevent the encroachment of stairs onto adjacent lots or municipal rights of way. In this instance, a slight decrease in setback is necessary to accommodate the raised first storey which is required as a consequence of the shallow bedrock. The requested variance will only apply to a limited number of flanking yards and will not cause encroachment into the right of way. The proposed variance for setback to stairs to the first storey of the dwelling is therefore consistent with the general intent of the zoning by-law.

Are the variances considered desirable for the appropriate development or use of the land

The variances will facilitate a compact mixed-use development at an appropriate density considering the Greenfield designation of the site. The proposed development consistent with the Provincial Policy Statement, conforms to the Growth Plan, Region of Niagara Official Plan and the City of Port Colborne Official Plan, represents good planning and is in the public interest. The variances are therefore considered desirable for the appropriate development of the subject property.

Are the variances minor in nature

The minor variances will apply uniform zoning regulations to a new subdivision with limited interface with adjacent established neighbourhoods. There will be no tangible impact of the granting any of the minor variances requested on existing or future residents. There The minor variances are therefore minor in nature.

Conclusion

The applications for redline revision and minor variance will facilitate modifications to a subdivision plan in response to the change in market conditions which have occurred subsequent to the original application two years ago. The applications will facilitate efficient, compact, mixed-use development at an appropriate density for the Greenfield area. The applications satisfy the requirements under the Planning Act, are consistent with the Provincial Policy Statement, conform to the Growth Plan, the Region of Niagara Official Plan, and the City of Port Colborne Official Plan, represent good planning and should therefore be supported.

Respectfully submitted,

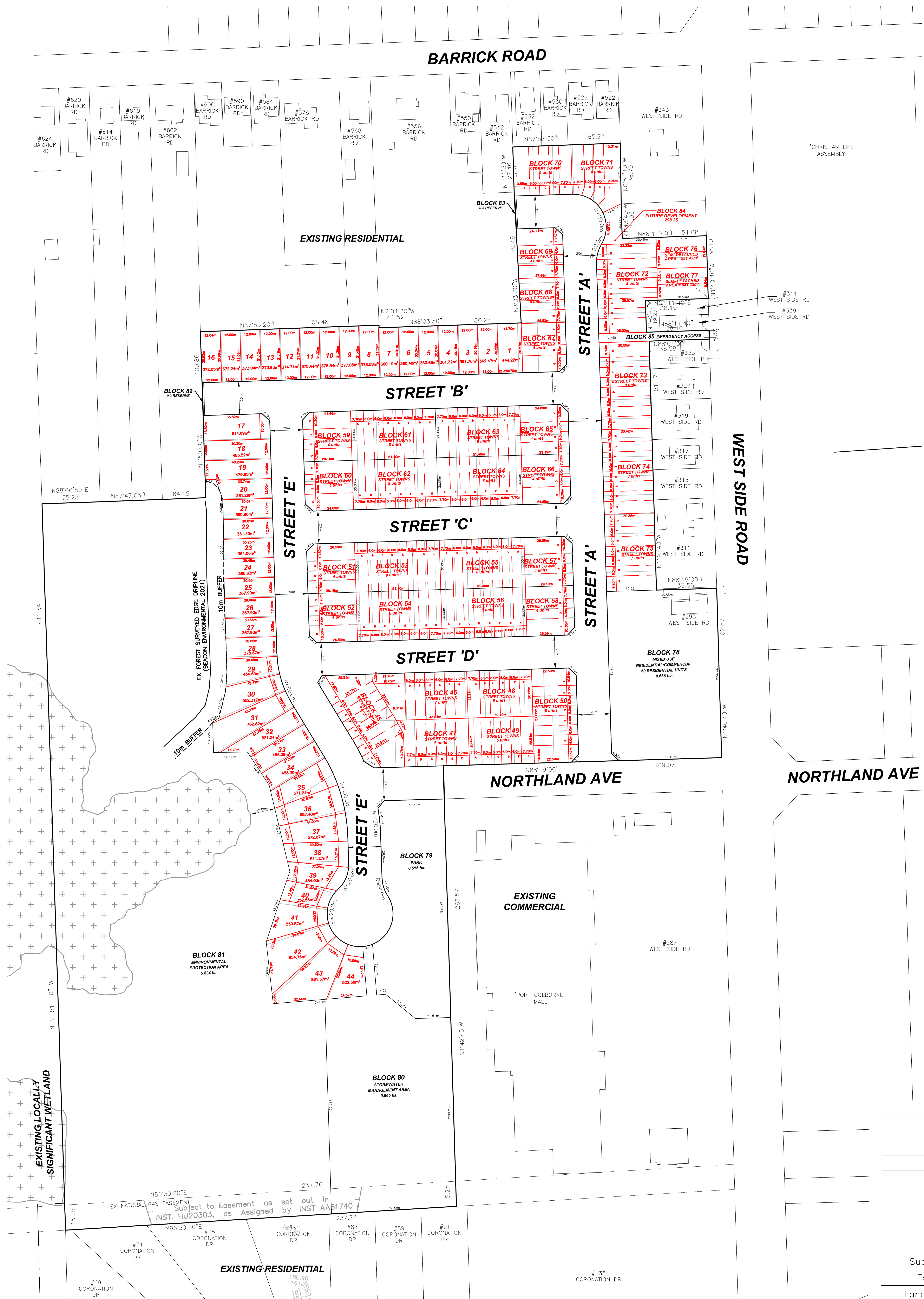
Matt Kernahan, MCIP, RPP
Principal
Garden City Development
289-783-8598
matt@gardencitydevelopment.ca

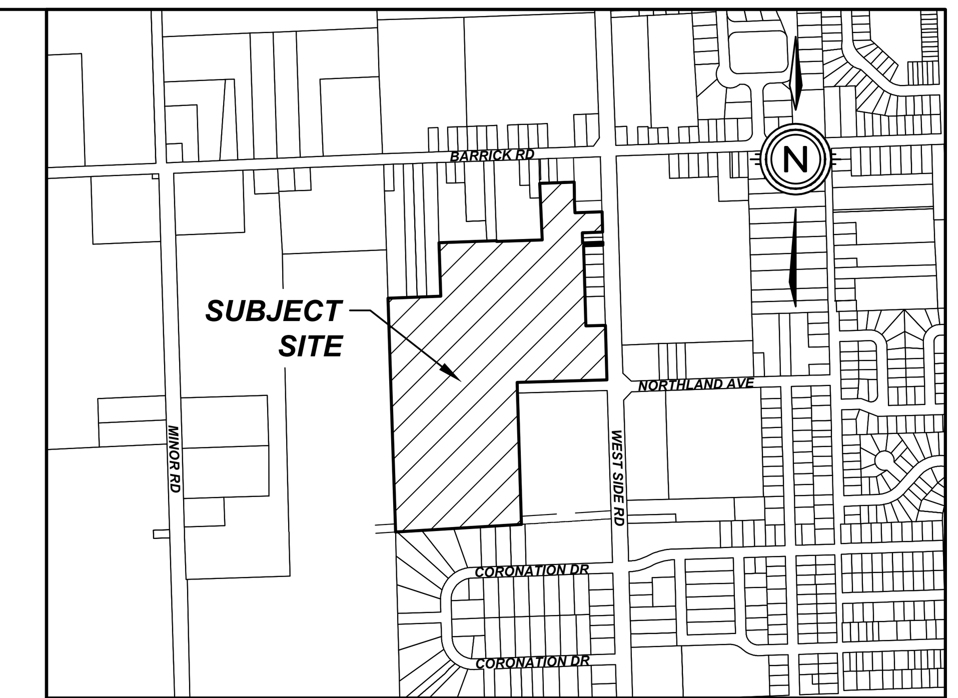
GARDEN CITY
DEVELOPMENT

NORTHLAND ESTATES
CITY OF PORT COLBORNE

STREET TOWNHOUSE BLOCK UNIT AREA

BLOCK	UNIT	AREA
BLOCK 45 TOTAL AREA= 1756.55m²	A	369.16m²
	B	172.62m²
	C	172.62m²
	D	172.62m²
	E	172.48m²
	F	172.79m²
	G	173.23m²
	H	351.03m²
BLOCK 46 TOTAL AREA = 1471.62m²	A	395.22m²
	B	171.31m²
	C	171.31m²
	D	171.31m²
	E	171.31m²
	F	171.31m²
	G	219.85m²
BLOCK 47 TOTAL AREA = 1141.13m²	A	237.75m²
	B	171.04m²
	C	171.06m²
	D	170.87m²
	E	171.17m²
	F	219.24m²
BLOCK 48 TOTAL AREA = 1124.94m²	A	219.85m²
	B	171.31m²
	C	171.31m²
	D	171.31m²
	E	171.31m²
	F	219.85m²
BLOCK 49 TOTAL AREA = 1122.00	A	218.37m²
	B	170.92m²
	C	170.98m²
	D	171.04m²
	E	171.07m²
	F	219.62m²
BLOCK 50 TOTAL AREA = 1521.76m²	A	274.59m²
	B	162.00m²
	C	162.00m²
	D	162.00m²
	E	162.00m²
	F	162.00m²
	G	162.00m²
	H	275.17m²
BLOCK 51 TOTAL AREA = 865.86m²	A	290.50m²
	B	175.12m²
	C	175.12m²
	D	225.12m²
BLOCK 52 TOTAL AREA = 865.86m²	A	225.12m²
	B	175.12m²
	C	175.12m²
	D	290.50m²
BLOCK 53 TOTAL AREA = 1542.00m²	A	231.00m²
	B	180.00m²
	C	180.00m²
	D	180.00m²
	E	180.00m²
	F	180.00m²
	G	180.00m²
	H	231.00m²
BLOCK 54 TOTAL AREA = 1542.00m²	A	231.00m²
	B	180.00m²
	C	180.00m²
	D	180.00m²
	E	180.00m²
	F	180.00m²
	G	180.00m²
	H	231.00m²
BLOCK 55 TOTAL AREA = 1542.00m²	A	231.00m²
	B	180.00m²
	C	180.00m²
	D	180.00m²
	E	180.00m²
	F	180.00m²
	G	180.00m²
	H	231.00m²
BLOCK 56 TOTAL AREA = 1542.00m²	A	231.00m²
	B	180.00m²
	C	180.00m²
	D	180.00m²
	E	180.00m²
	F	180.00m²
	G	180.00m²
	H	231.00m²
BLOCK 57 TOTAL AREA = 865.86m²	A	290.50m²
	B	175.12m²
	C	175.12m²
	D	225.12m²
BLOCK 58 TOTAL AREA = 865.86m²	A	225.12m²
	B	175.12m²
	C	175.12m²
	D	290.50m²
BLOCK 59 TOTAL AREA = 865.86m²	A	290.50m²
	B	175.12m²
	C	175.12m²
	D	225.12m²
BLOCK 60 TOTAL AREA = 865.86m²	A	225.12m²
	B	175.12m²
	C	175.12m²
	D	290.50m²
BLOCK 61 TOTAL AREA = 1542.00m²	A	231.00m²
	B	180.00m²
	C	180.00m²
	D	180.00m²
	E	180.00m²
	F	180.00m²
	G	180.00m²
	H	231.00m²
BLOCK 62 TOTAL AREA = 1542.00m²	A	231.00m²
	B	180.00m²
	C	180.00m²
	D	180.00m²
	E	180.00m²
	F	180.00m²
	G	180.00m²
	H	231.00m²
BLOCK 63 TOTAL AREA = 1542.00m²	A	231.00m²
	B	180.00m²
	C	180.00m²
	D	180.00m²
	E	180.00m²
	F	180.00m²
	G	180.00m²
	H	231.00m²
BLOCK 64 TOTAL AREA = 1542.00m²	A	231.00m²
	B	180.00m²
	C	180.00m²
	D	180.00m²
	E	180.00m²
	F	180.00m²
	G	180.00m²
	H	231.00m²
BLOCK 65 TOTAL AREA = 865.86m²	A	290.50m²
	B	175.12m²
	C	175.12m²
	D	225.12m²
BLOCK 66 TOTAL AREA = 865.86m²	A	225.12m²
	B	175.12m²
	C	175.12m²
	D	290.50m²
BLOCK 67 TOTAL AREA = 769.07m²	A	183.76m²
	B	160.93m²
	C	160.93m²
	D	263.45m²
BLOCK 68 TOTAL AREA = 743.27m²	A	210.60m²
	B	163.16m²
	C	162.36m²
	D	207.15m²
BLOCK 69 TOTAL AREA = 825.13m²	A	280.24m²
	B	166.89m²
	C	166.07m²
	D	211.93m²
BLOCK 70 TOTAL AREA = 1054.60m²	A	285.54m²
	B	179.27m²
	C	179.45m²
	D	179.61m²
	E	230.73m²
BLOCK 71 TOTAL AREA = 1060.00m²	A	228.45m²
	B	195.64m²
	C	222.83m²
	D	413.08m²
BLOCK 72 TOTAL AREA = 1843.93m²	A	260.91m²
	B	174.01m²
	C	213.61m²
	D	219.41m²
	E	219.41m²
	F	219.41m²
	G	219.36m²
	H	317.81m²
BLOCK 73 TOTAL AREA = 1609.77m²	A	234.31m²
	B	182.64m²
	C	182.69m²
	D	182.74m²
	E	182.79m²
	F	182.84m²
	G	182.89m²
	H	278.87m²
BLOCK 74 TOTAL AREA = 1561.90m²	A	233.74m²
	B	182.19m²
	C	182.25m²
	D	182.30m²
	E	182.35m²
	F	182.40m²
	G	182.45m²
	H	234.22m²
BLOCK 75 TOTAL AREA = 1421.38m²	A	279.18m²
	B	181.81m²
	C	181.85m²
	D	181.90m²
	E	181.95m²
	F	181.01m²
	G	233.68m²





KEY PLAN
N.T.S.

DRAFT PLAN OF SUBDIVISION

LEGAL DESCRIPTION

PART OF LOT 31, CONCESSION 2
GEOGRAPHIC TOWNSHIP OF HUMBERSTONE
CITY OF PORT COLBORNE
REGIONAL MUNICIPALITY OF NIAGARA

OWNER'S CERTIFICATE

BEING THE REGISTERED OWNER, I HEREBY AUTHORIZE UPPER CANADA CONSULTANTS TO PREPARE AND SUBMIT THIS DRAFT PLAN OF SUBDIVISION TO THE CITY OF PORT COLBORNE FOR APPROVAL.

2600261 ONTARIO INC. — JUNE 24, 2022 — DATE

2751131 ONTARIO INC. — JULY 22, 2022 — DATE

ARTHUR SEKO — JULY 22, 2022 — DATE

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LANDS TO BE SUBDIVIDED ARE CORRECTLY SHOWN.

ROY S. KIRKUP, B.Sc., O.L.S., Ontario Land Surveyor — Oct 03, 2022 — DATE
KIRKUP MASCOE URE SURVEYING
(a Division of J.D. Barnes Limited)

LAND USE SCHEDULE

LAND USE	LOT/BLOCK	UNIT NO.	AREA(ha)	AREA(%)
SINGLE FAMILY RESIDENTIAL	1–44	44	1.993	11.96
STREET TOWN RESIDENTIAL	45–75	189	3.828	22.96
SEMI–DETACHED RESIDENTIAL	76–77	4	0.116	0.70
MIXED–USE RES./COMM.	78	50	0.686	4.12
PARK	79		0.515	3.09
STORMWATER MGMT FACILITY	80		1.373	8.24
ENVIRONMENTAL PROTECTION AREA	81		5.424	32.54
0.3m RESERVE	82–83		0.004	0.02
FUTURE DEVELOPMENT	84		0.030	0.18
EMERGENCY ACCESS	85		0.036	0.22
ROADWAY			2.665	15.99
TOTAL		287	16.670	100.00

DEVELOPABLE AREA (EXCLUDING EPA) = 10.836ha
DEVELOPABLE DENSITY = 26.49 units/ha

GREENFIELD DENSITY CALCULATION

	People		Jobs		
	Units	Ratio	Units	Ratio	Total
	287 Dwellings	2.28 people per dwelling[1]	287 Dwellings	5% "at home" employment	14.35 Jobs
			16,576.42ft² of commercial space	1 employee per 500ft² of commercial space[2]	33.15 Jobs
Subtotal	654.36 people		47.50 jobs		
Total	701.86 people and jobs				
Land Area	10.84 hectares (exclusive of the Environmental Protection Area)				
Greenfield Density	64.75 people and jobs per hectare				

REQUIREMENTS OF SECTION 51(17) OF THE PLANNING ACT

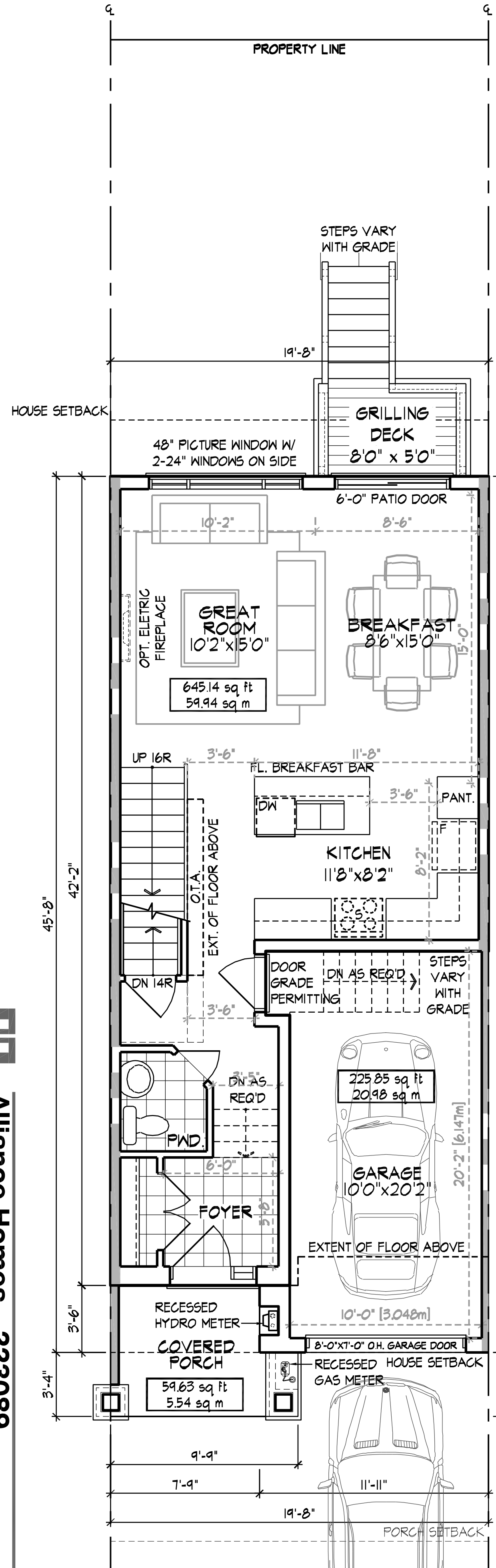
a) SEE PLAN
b) SEE PLAN
c) SEE PLAN
d) SEE PLAN
e) SEE PLAN
f) SEE PLAN
g) SEE PLAN
h) MUNICIPAL WATER
i) VARIOUS TEXTURES OVER BEDROCK
j) SEE PLAN
k) FULL SERVICE
l) SEE PLAN

#	REVISION	DATE	INIT
2	PROPOSED REDLINE REVISION	2024–07–09	A.S
1	REVISED AS PER REGION'S COMMENTS	2022–11–25	M.K
0	ISSUED FOR APPROVAL	2022–10–03	M.K

UPPER CANADA CONSULTANTS
ENGINEERS / PLANNERS

DRAWING TITLE	
DRAFT PLAN OF SUBDIVISION (REDLINE)	DRAFTING MK,AS
	DATE JULY 9, 2024
	PRINTED JULY 9, 2024
	SCALE 1:1500
	DWG No. 21132-DP — REV 1

DRAWING FILE: F:\21132\Planning\21132_MAY_2024.dwg PLOTTED: Jul 09, 2024 – 4:09pm PLOTTED BY: alexandra

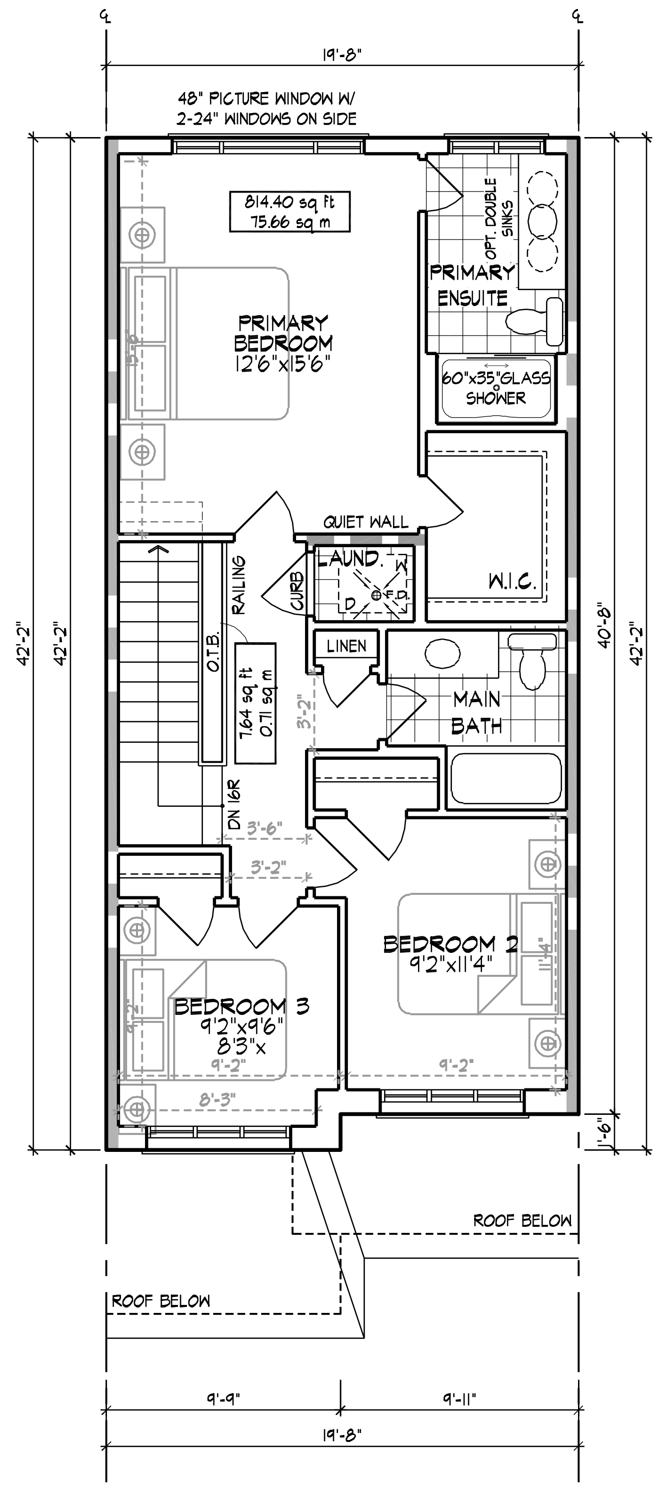


GROUND FLOOR PLAN, EL.'A'

645 sq ft

COVERAGE W/O PORCH	871 sq ft
COVERAGE W/ PORCH	931 sq ft

PROPERTY LINE



SECOND FLOOR PLAN, EL.'A'

807 sq ft

GROSS FLOOR AREA	814 sq ft
DEDUCT OPEN AREAS	8 sq ft
NET AREA	807 sq ft

Alliance Homes - 223089

South Coast Homes, Port Colborne, Ontario

HUNT DESIGN ASSOCIATES INC.

www.huntdesign.ca

8966 Woodbine Ave, Markham, ON L3R 0J7 ■ T 905.737.5133 ■ F 905.737.7326 ■ MAR-2024 ■ AA ■ TARGET: 1450 SF

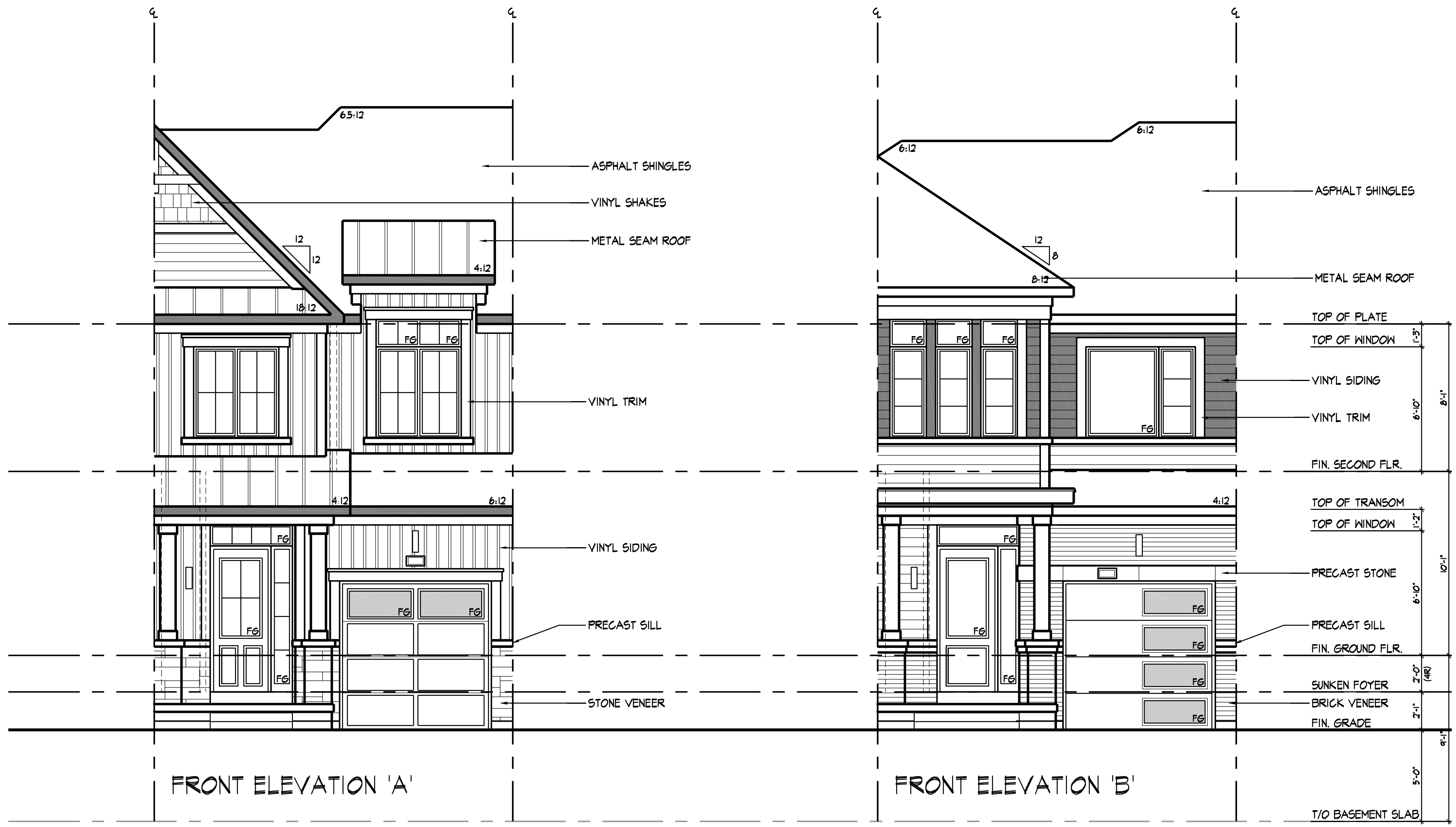
UNIT 2002

AREA - EL. 'A' 1452 SF

223089DT2002

FOR 6.0mX26.82m LOTS

ZONING STANDARDS	
MAX. HOUSE WIDTH	19'-8"
MAX. LENGTH GARAGE SIDE	48'-7"
MAX. LENGTH HOUSE SIDE	48'-7"
MAX. COVERAGE W/ PORCH	N/A
MAX. COVERAGE W/O PORCH	N/A
MAX. G.F.A.	N/A
MAX. HEIGHT	11 m
MIN. GARAGE WIDTH	3.5m x 5.2m
MAX. GARAGE WIDTH	N/A
MAX. GARAGE PROJ.	N/A



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Alliance Homes - 223089 **UNIT 2002**

South Coast Homes, Port Colborne, Ontario

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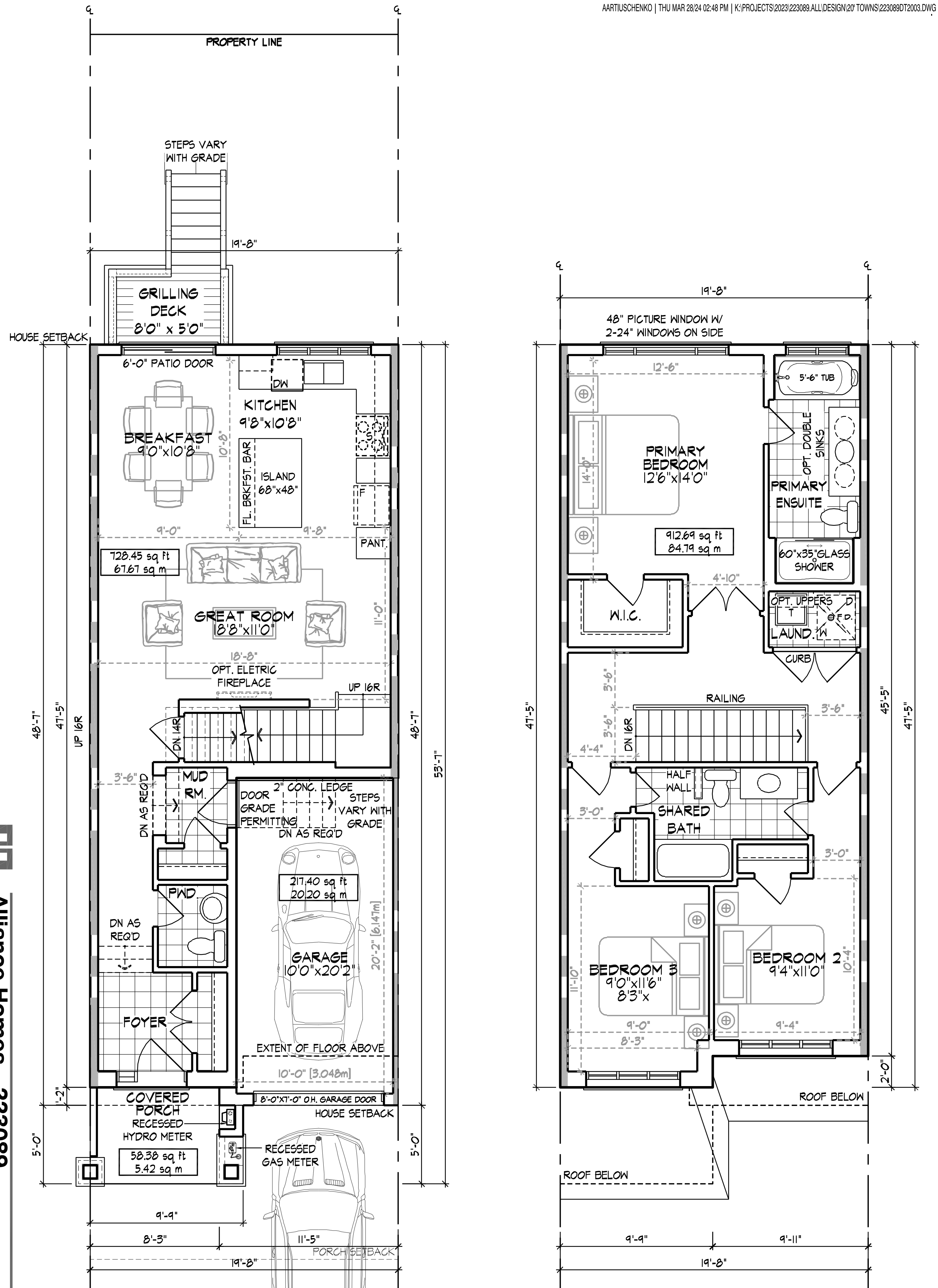

GROUND FLOOR PLAN, EL.'A'
728 sq ft

COVERAGE W/O PORCH	946 sq ft
COVERAGE W/ PORCH	1004 sq ft

SECOND FLOOR PLAN, EL.'A'
913 sq ft

GROSS FLOOR AREA	913 sq ft
DEDUCT OPEN AREAS	0 sq ft
NET AREA	913 sq ft

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Alliance Homes - 223089
South Coast Homes, Port Colborne, Ontario

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MAR-2024 ■ AA ■

TARGET: 1650 SF

UNIT 2003
AREA - EL. 'A' 1641 SF
223089DT2003

FOR 6.0mX26.82m LOTS

ZONING STANDARDS	
MAX. HOUSE WIDTH	19'-8"
MAX. LENGTH GARAGE SIDE	48'-7"
MAX. LENGTH HOUSE SIDE	48'-7"
MAX. COVERAGE W/ PORCH	N/A
MAX. COVERAGE W/O PORCH	N/A
MAX. G.F.A.	N/A
MAX. HEIGHT	11 m
MIN. GARAGE WIDTH	3.5m x 5.2m
MAX. GARAGE WIDTH	N/A
MAX. GARAGE PROJ.	N/A

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Alliance Homes - 223089

UNIT 2003

South Coast Homes, Port Colborne, Ontario

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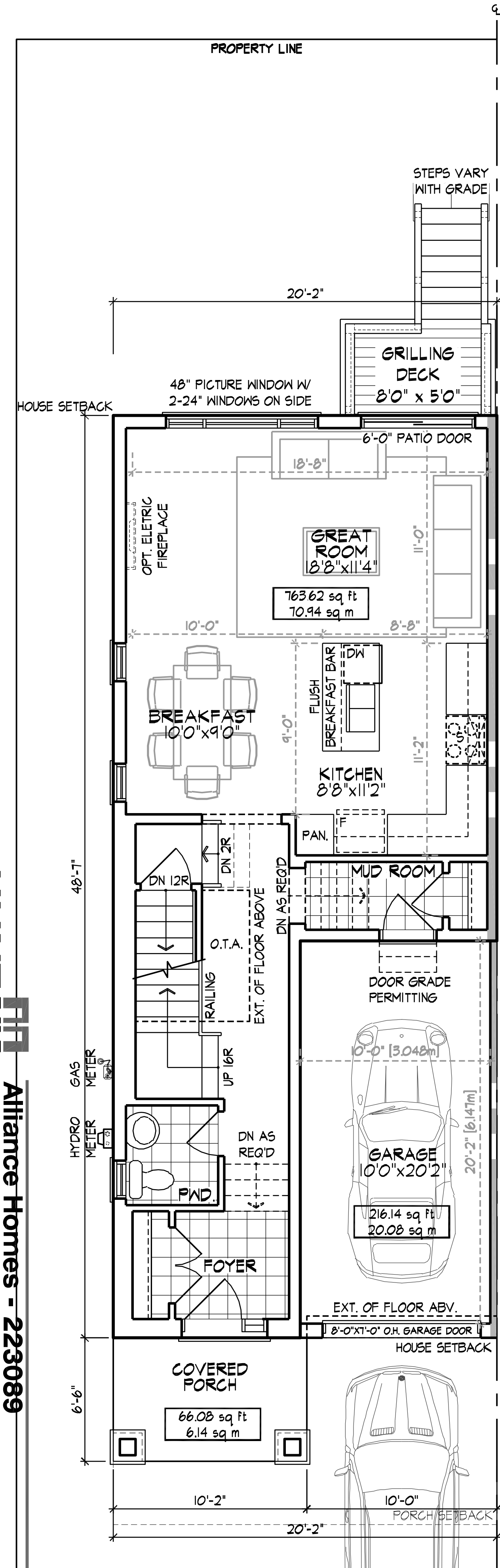
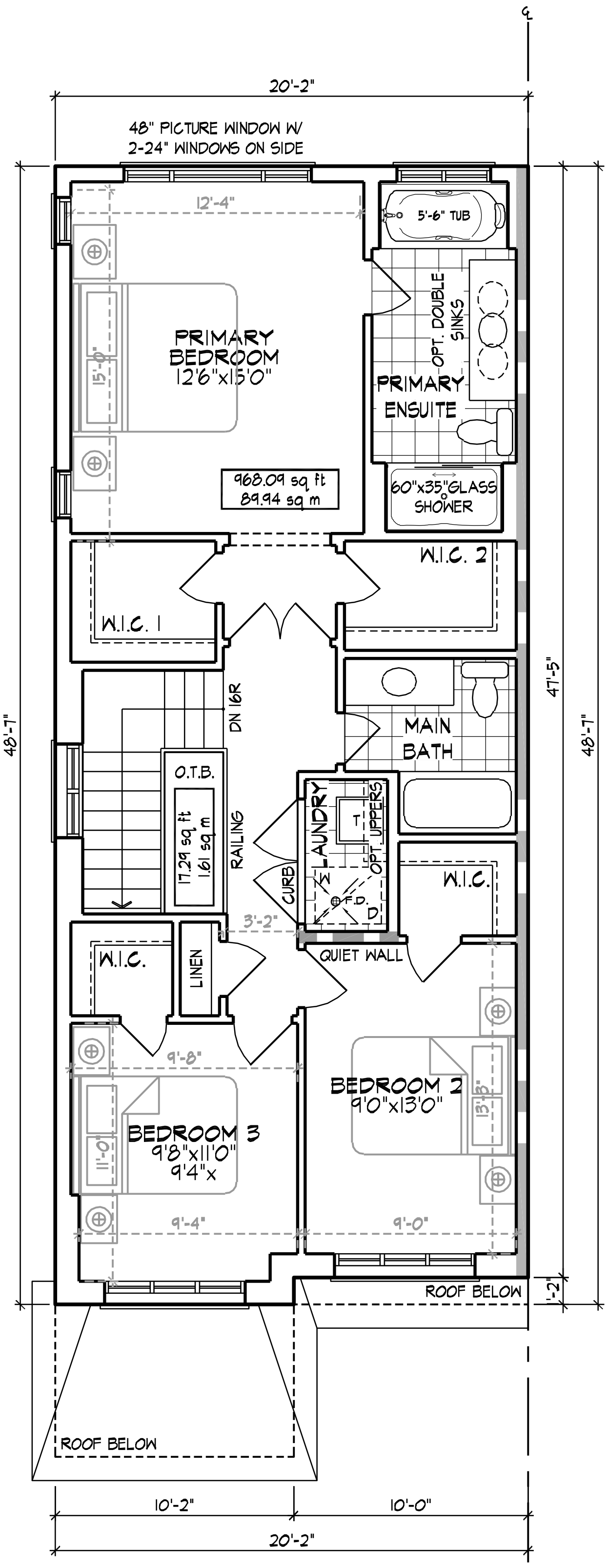


END GROUND FLOOR PLAN, EL.'A'

764 sq ft

COVERAGE W/O PORCH	980 sq ft
COVERAGE W/ PORCH	1046 sq ft



END SECOND FLOOR PLAN, EL.'A'

951 sq ft

GROSS FLOOR AREA	968 sq ft
DEDUCT OPEN AREAS	17 sq ft
NET AREA	951 sq ft

FOR 7.7mX26.82m LOTS

ZONING STANDARDS	
MAX. HOUSE WIDTH	20'-2"
MAX. LENGTH GARAGE SIDE	48'-7"
MAX. LENGTH HOUSE SIDE	48'-7"
MAX. COVERAGE W/ PORCH	N/A
MAX. COVERAGE W/O PORCH	N/A
MAX. G.F.A.	N/A
MAX. HEIGHT	11 m
MIN. GARAGE WIDTH	3.5m x 5.2m
MAX. GARAGE WIDTH	N/A
MAX. GARAGE PROJ.	N/A

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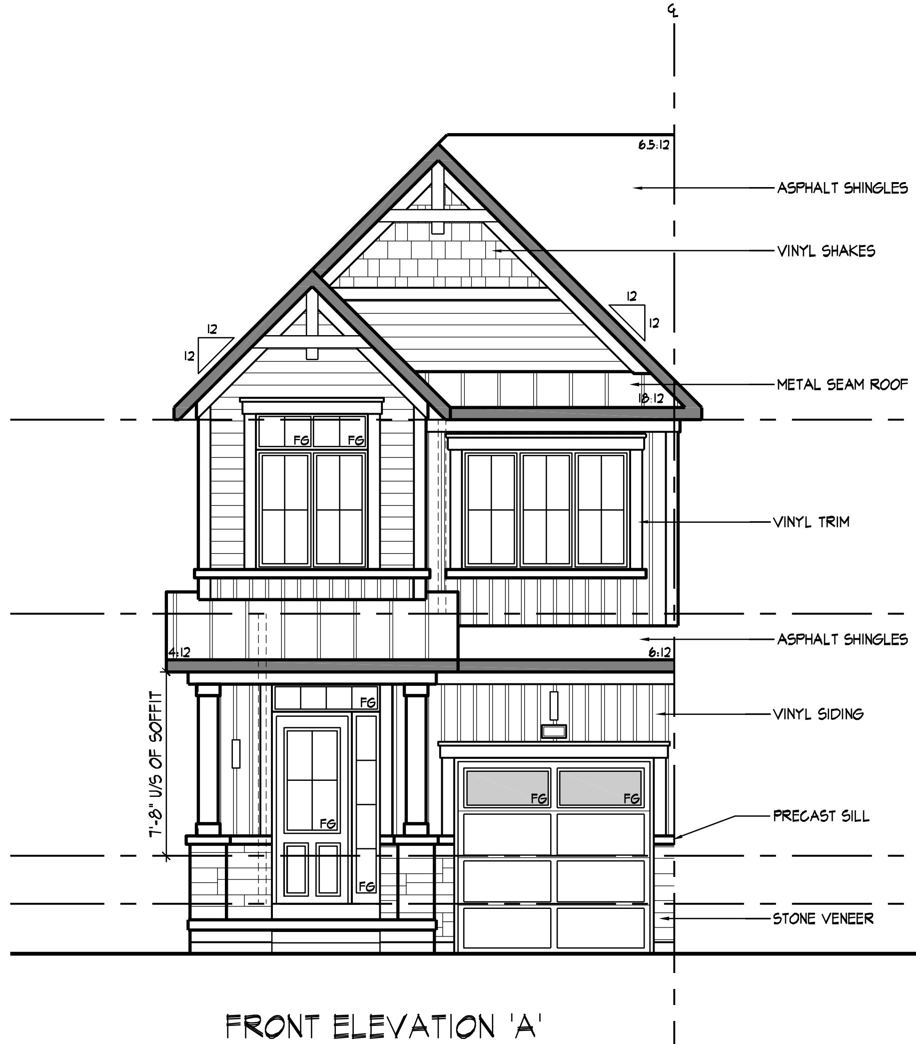
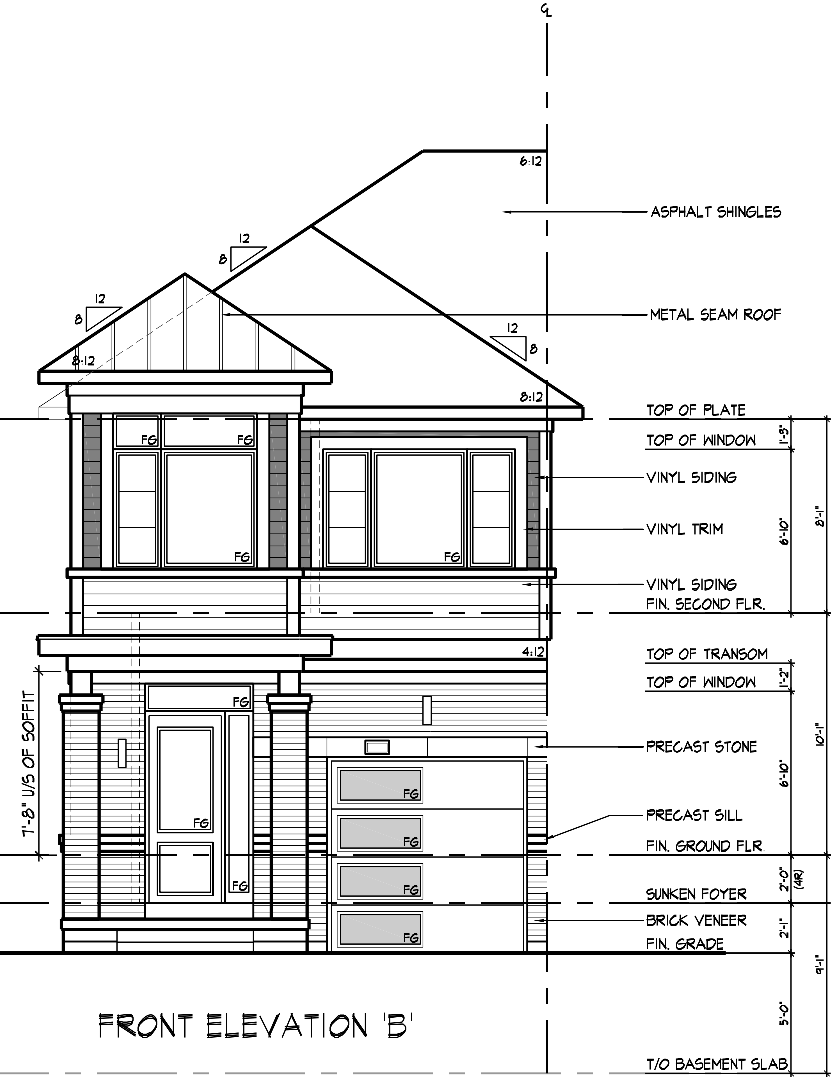
South Coast Homes, Port Colborne, Ontario
8966 Woodbine Ave, Markham, ON L3R 0J7 ■ T 905.737.5133 ■ F 905.737.7326 ■ MAR-2024 ■ AA ■

TARGET: 1700 SF

UNIT 2004 END
AREA - EL. 'A' 1715 SF
223089DT2004





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UNIT 2004 END

South Coast Homes, Port Colborne, Ontario

-

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UNIT 2005 C

223089DT2005C

FLANKAGE ELEVATION 'A'

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Alliance Homes - 223089

UNIT 2005 C

South Coast Homes, Port Colborne, Ontario

-

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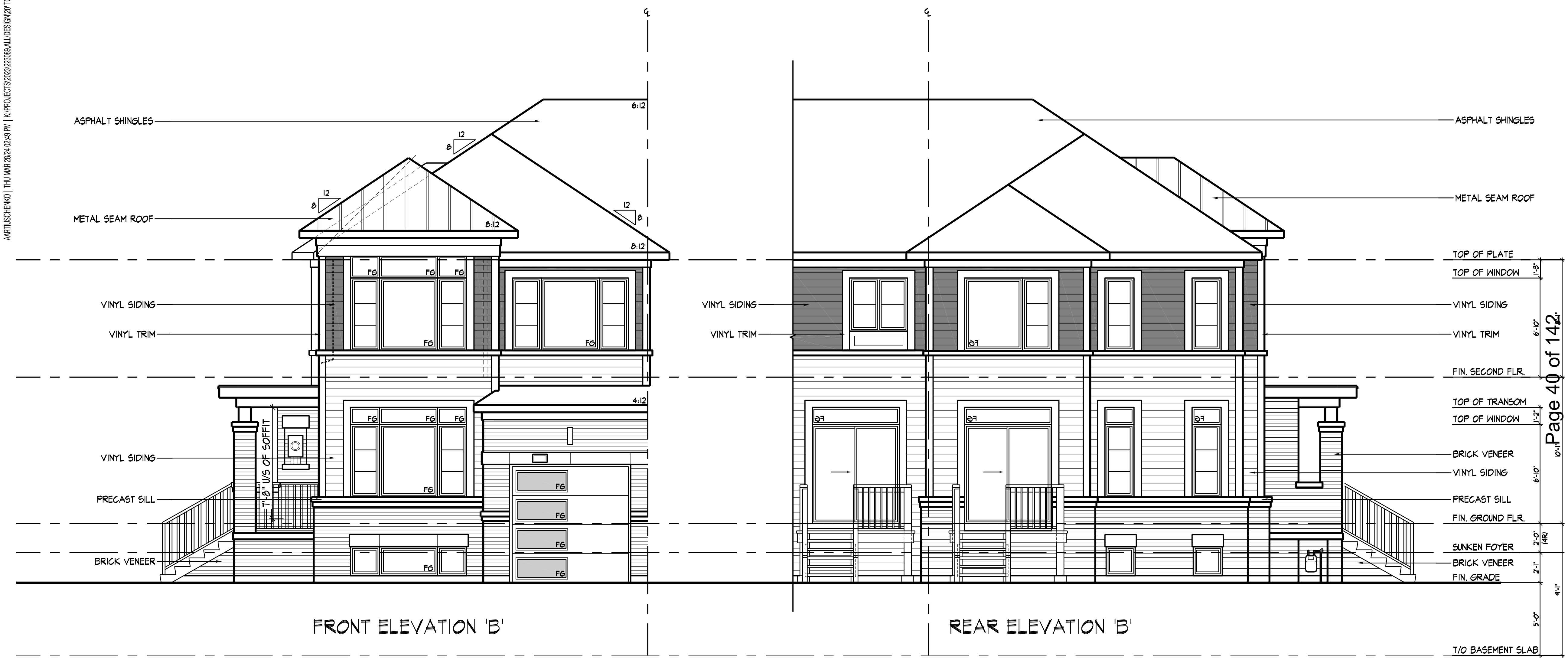

Alliance Homes - 223089

UNIT 2005 C

South Coast Homes, Port Colborne, Ontario

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FLANKAGE ELEVATION 'B'

HUNT DESIGN ASSOCIATES INC.
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Alliance Homes - 223089

UNIT 2005 C

South Coast Homes, Port Colborne, Ontario

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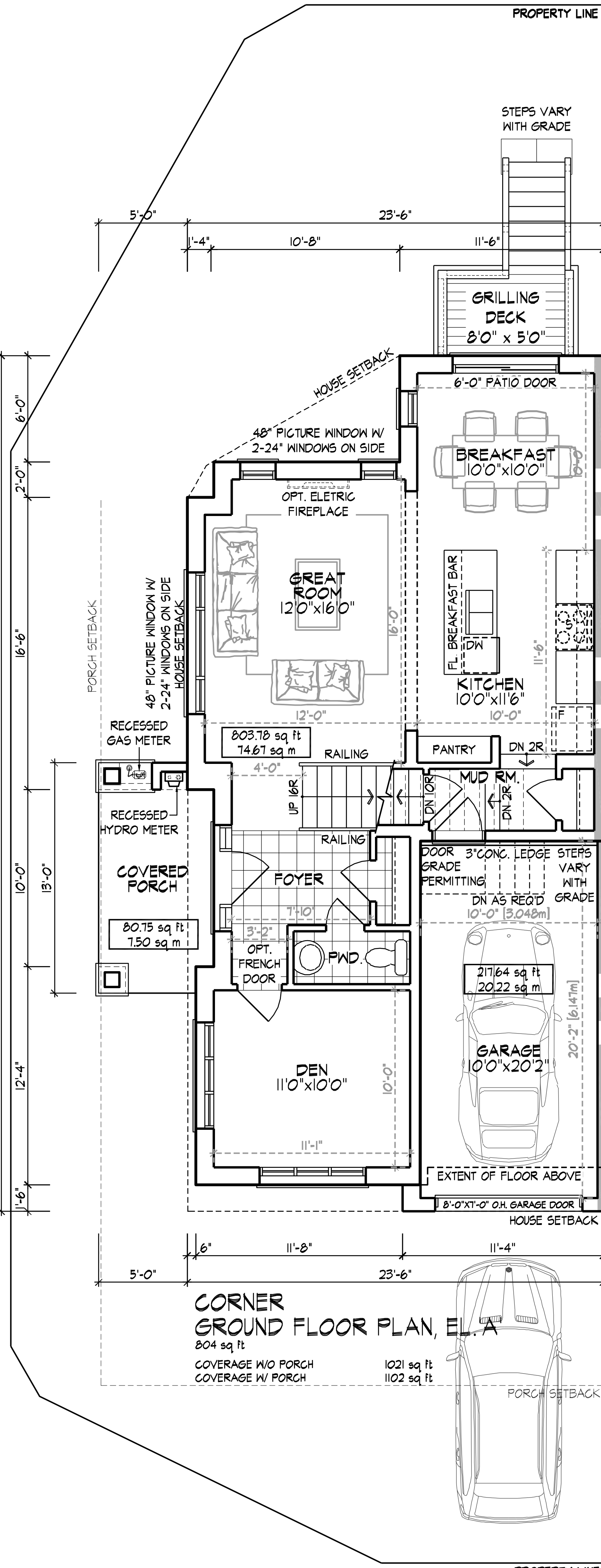

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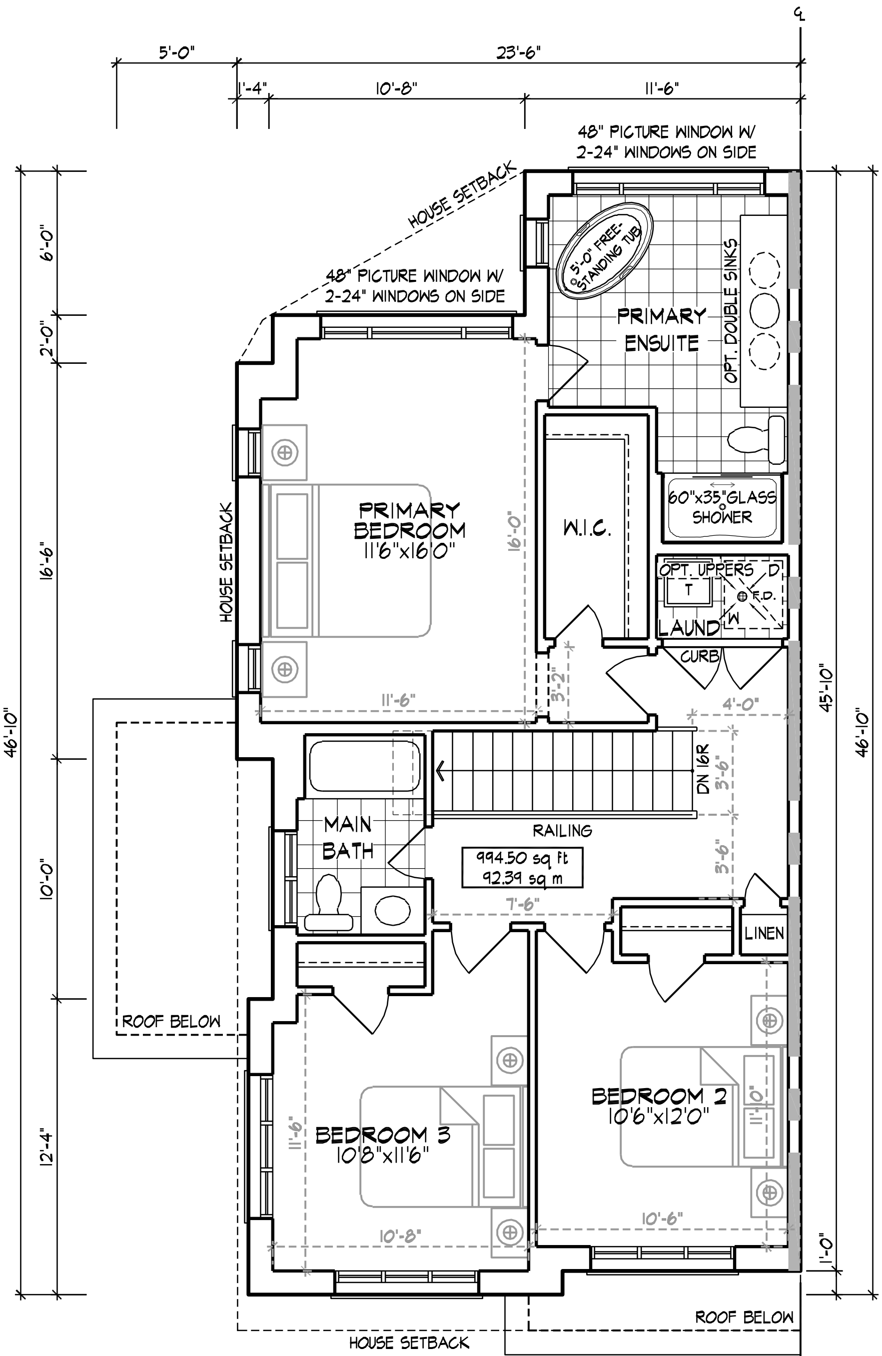
South Coast Homes, Port Colborne, Ontario
8966 Woodbine Ave, Markham, ON L3R 0J7 ■ T 905.737.5133 ■ F 905.737.7326 ■ JAN-2024 ■ AA ■

TARGET: 1800 SF

UNIT 2005 C
AREA - EL. 'A' 1800 SF
223089DT2005C

FOR 10.2mX26.82m LOTS

ZONING STANDARDS	
MAX. HOUSE WIDTH	23'-6"
MAX. LENGTH GARAGE SIDE	48'-4"
MAX. LENGTH HOUSE SIDE	48'-4"
MAX. COVERAGE W/ PORCH	N/A
MAX. COVERAGE W/O PORCH	N/A
MAX. G.F.A.	N/A
MAX. HEIGHT	11 m
MIN. GARAGE WIDTH	3.5m x 5.2m
MAX. GARAGE WIDTH	N/A
MAX. GARAGE PROJ.	N/A



CORNER SECOND FLOOR PLAN, EL.'A'

995 sq ft

GROSS FLOOR AREA	995 sq ft
DEDUCT OPEN AREAS	0 sq ft
NET AREA	995 sq ft

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South Coast Homes, Port Colborne, Ontario
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TARGET: 1800 SF

UNIT 2005 C
AREA - EL. 'A' 1800 SF
223089DT2005C

UPPER CANADA CONSULTANTS
ENGINEERS / PLANNERS

Upper Canada
Planning &
Engineering Ltd.
3-30 Hannover Drive
St. Catharines, ON
L2W 1A3
Phone 905-688-9400
Fax 905-688-5274

UCC File: 21132

FUNCTIONAL SERVICING REPORT

Northland Estates
City of Port Colborne
Revised June 2024

INTRODUCTION

Upper Canada Consultants has been retained to undertake and provide a Functional Servicing Report to address the servicing needs and requirements for the proposed residential development known as Northland Estates as part of the Red Line of Draft Plan of Subdivision application process for the City of Port Colborne.

The project site is located in the City of Port Colborne as part of Lot 31 and Concession 2 and is situated north of Coronation Drive North, east of Minor Road, south of Barrick Road and west of West Side Road (Regional Road 58) with site entrances on Northland Avenue. The site is bound by a Locally Significant Wetland at the west limits of the site, and the development area has historically been agricultural/vacant land.

The development site is approximately 16.67 hectares and has been previously Draft Approved to accommodate 120 single family dwellings, 46 townhouse units, and a mixed commercial/residential block with 50 residential units for a total unit count of 216 units. The proposed Red-Line Draft Plan submission has revised the previous design to now incorporate 44 single family dwellings and 189 townhouse units with the commercial residential block remaining unchanged for a new total unit count of 287. The site shall include associated asphalt road, concrete curb, catch basins, storm sewers, sanitary sewers, and watermain.

The objectives of this study are as follows:

1. Identify domestic and fire protection water service needs for the site;
2. Identify sanitary servicing needs for the site; and,
3. Identify stormwater management needs for the site.

WATER SERVICING

There is an existing municipal 300mm diameter Ductile Iron watermain located on the north side of Northland Avenue as well as a municipal 400mm diameter PVC watermain on the west side of West Side Road (Regional Road 58). Two connections will be made to the Northland Avenue watermain to provide an internal loop within the development to provide both domestic water supply and fire protection. Four single family dwellings are to be constructed fronting West Side Road and will be provided service via the 400mm diameter watermain fronting the units.

The sizes and locations of the proposed internal watermain will be finalized as part of the future detailed design. At this time, a preliminary internal watermain design can be found in Appendix A. The proposed development will continue the 300mm diameter watermain westerly from its' current limit on Northland Avenue to Street 'E'. A second watermain connection to the existing West Main Street 400mm diameter watermain will be made through the access path between #339 and #335 West Main Street. As well a 200mm diameter watermain will be constructed on Street 'A' from Northland Avenue to the northerly limit with the intention of eventually connecting to the existing 300mm diameter watermain on Barrick Road through future development. Watermains constructed on Streets 'B' and 'E' will both be 200mm diameter and watermains constructed on Streets 'D' and 'C' are expected to be 150mm in diameter.

Fire protection will be provided to the proposed development with municipal fire hydrants within the subdivision and private fire hydrants within the mixed-use condominium block. The spacing and location shall be identified as part future detailed design. Fire protection will be provided to the four proposed units fronting West Side Road via an existing hydrant fronting #339 West Side Road.

Upper Canada Consultants has undertaken a watermain analysis using the EPANET software to model flows and pressures within the existing and proposed system as a result of the proposed development under various conditions. The software was used to model the conditions utilizing average day, maximum day, and peak unit consumption rates per MECP standards. The model has been calibrated utilizing hydrant test flow data provided by the municipality from tests conducted in May/June of this year and have ensured supportable conclusions for this development.

The EPANET model has utilized flow test data from four hydrants located at the following locations:

1. Fronting #341 West Side Road
2. Fronting #311 West Side Road
3. North-west corner of West Side Road and Northland Avenue
4. South-east corner of West Side Road and Northland Avenue

The results of the conducted modelling have been included in Appendix A along with images depicting the existing and proposed conditions utilized for this model. The existing testing outlines the existing watermain system having static pressures within the preferred system pressure range of 50-80 PSI and above the minimum pressures of 40 PSI. The modelled static pressures and residual pressures were within 5% (typical) of the results when compared to existing conditions provided by the hydrant flow tests. The existing hydrant fronting #341 West Side Road has the lowest theoretical flow rate of 3069 GPM under fire flow conditions (at 20 PSI). This flow rate would be attributed a BLUE rating (>1499GPM) and has ample flow to provide both domestic and fire flow protection to the surrounding residential properties.

Overall, mainly due to the elevation difference between the north and south ends of the site, the existing hydrant fronting #341 West Side Road as well as the most north-easterly proposed hydrant experience the lowest pressures (and therefore flow rates) through the modelling. However, even under peak daily conditions (720 LPCD), both noted hydrants will experience almost identical pressures with an approximate drop of 0.7% under future conditions. All hydrants will maintain static pressures of approximately 50PSI under future developed conditions. Therefore, it is expected that the existing municipal watermain system will have adequate capacity to provide both domestic and fire water supply for the proposed development.

Unfortunately, due to the complicated nature of this model, theoretical flows calculated by the model are not comparable to theoretical flows modelled during the municipal hydrant flow tests. Therefore, the model has been utilized to model the difference between pressures observed in the system. It should be noted that the pressures and flow rates observed by this model are purely theoretical, attempting to replicate information provided by the City's hydrant flow test data for hydrants within the immediate vicinity of the proposed development site. Without a complete model of the city's entire water system, a highly accurate model providing reliable flow rate data for the future development is unobtainable.

SANITARY SERVICING

There is an existing 200mm diameter municipal sanitary sewer on the west side of West Side Road (Regional Road 58) as well as a 200mm diameter sanitary sewer on Northland Avenue. The three proposed single-family dwellings fronting West Side Road will be provided service via the existing 200mm diameter sewer on West Side Road, with the remaining majority of the development block discharging sanitary flows to the existing sanitary sewer on Northland Avenue. All sanitary sewers will convey flows via gravity to their respective outlets.

An overall sanitary analysis has been conducted and included in Appendix B for the municipal sanitary sewer system downstream of the proposed development site from the site connection to the Regional Sanitary Sewer at the Steele Street Sanitary Pumping Station (SPS). The analysis utilizes a flow rate of 28 m^3/ha/day for commercial and institutional land uses as well a residential flow rate of 255 L/person/day as per the 2021 Niagara Regional Wastewater Master Servicing Plan (MSP) Update. An infiltration rate of 0.28 L/s/ha has been used for residential land uses as well as drainage areas consisting of solely commercial/institutional land uses (containing a reduced sewer system with a highly reduced number of infiltration points). Per Plan and Profile information provided by the municipality, sanitary flows from the Oxford Boulevard Pumping Station and north od Steele Street on Barrick Road have been removed from the revised analysis as it has been determined sanitary flows continue flowing east on Barrick Road.

Three separate analyses have been completed and included in Appendix B:

1. Municipal Sanitary System under existing conditions with current Northland Estates Draft Plan.
2. Municipal Sanitary System with the proposed Red-Lined Draft Plan

3. Municipal Sanitary System with the proposed Red-Lined Draft Plan and potential future development north east of the site.

The analysis has concluded that the existing downstream municipal sanitary sewer system will theoretically reach capacities of approximately 83% on Northland Avenue, east of the proposed development, under currently approved Northland Estates Draft Plan. The development will produce a dry weather flow of 6.32L/s and total peak wet weather flow of 9.01L/s to the municipal system. The downstream sanitary sewers will experience a maximum capacity of 83.2% at the east end of Northland Avenue and will discharge a peak wet weather flow of 24.08L/s to the Steele Street SPS.

Under future conditions proposed by the Red-Lined Draft Plan, the development will discharge an increased dry weather flow of 8.16L/s and wet weather flow of 10.84L/s to the downstream sanitary sewer system. This will increase peak wet weather flow capacities experienced within the downstream sanitary sewer system to approximately 90.6% at the east end of Northland Avenue and will discharge a peak wet weather flow of 25.84L/s to the Steele Street SPS.

The analysis concludes that the existing downstream municipal sanitary sewer system from the proposed development to the Steele Street SPS will have adequate capacity for the proposed Northland Estates Subdivision development. The analysis also concludes that the existing municipal system would have capacity to accommodate sanitary flows from an additional 23 residential dwellings - shown as part of Drainage Area 'NEX' immediately north-west of the proposed development. The proposed internal sanitary sewer system for this development will be design to include capacity for future development in this area. It should be noted that any additional development occurring upstream of the existing 200mm diameter sanitary sewer system on Northland Avenue, east of West Side Road, may result in further capacity issues and would require upgrades to the existing sanitary sewer system.

The proposed development will discharge sanitary flows to the existing municipal sanitary sewer system ultimately conveying flows to the Regional Steele Street Pumping Station. Per the Water and Wastewater Master Servicing Plan Update (2021), the capacities and performance of the Steele Street SPS are included in the following table:

Steele Street Pumping Station Characteristics	
Criteria	**Flow (L/s)**
Operational Firm Capacity	25.2
ECA Firm Capacity	35.0
2021 Existing 5-Yr Peak Wet Weather Flow	48.8
2051 Design 5-Yr Peak Wet Weather Flow	53.0
Forcemain Capacity @ 2.5m/s	78.5

According to the MSP Update and values included in the previous table, the existing Steele Street SPS does not have the capacity to accommodate existing flows from its' drainage area under the current Operational Firm Capacity. With the additional sanitary flows from the proposed development, the Steele Street SPS will be inadequate in providing the necessary sanitary infrastructure required for the population in this area. Upgrades to the Regional Steel Street Sanitary Pumping Station will be required in order to provide the adequate downstream infrastructure required for this development.

STORMWATER MANAGEMENT PLAN

As part of the site development, the following is a summary of the stormwater management plan for the proposed residential development.

The criteria provided by the City of Port Colborne and Region of Niagara for this development includes the requirement to control peak stormwater flows from the proposed development area up to and including the 100 year design storm event and improve stormwater quality levels to MECP Normal (70% TSS removal) Protection levels prior to discharge from the development.

To limit future stormwater flows to allowable levels, and improve stormwater quality to the required TSS removal levels, a stormwater management wetpond facility will provide the necessary controls for this development. Stormwater quality levels will be provided to a Normal Standard before outletting from the development site. A channel will be created to convey stormwater flows from the proposed stormwater management facility and surrounding lands to the Eagle Marsh Drain. Roadway overland flows will be directed to the stormwater management facility at the south end of the site. A Stormwater Management Plan for this development has been created and can be found in Appendix C.

CONCLUSIONS AND RECOMMENDATIONS

Therefore, based on the above comments and design calculations provided for this site, the following summarizes the servicing for this site.

1. The existing municipal watermain system will have sufficient capacity to provide both domestic and fire protection water supply.

2. The existing municipal sanitary sewer system downstream of the site will have adequate capacity for the proposed residential development. Upgrades may be required to the Steele Street Sanitary Pumping Station.

3. Stormwater quality controls are being provided to Normal Protection (70% TSS removal) levels by a stormwater wetpond facility before outletting to the Eagle Marsh Drain.

4. Stormwater quantity controls are being provided by a stormwater management wetpond facility up to the 100-year design storm event prior to discharging from the site.

5. The site stormwater overland route from the road system is to the proposed stormwater management facility before outletting to the Eagle Marsh Drain.

6. A channel will be created as an extension to the Eagle Marsh Drain to convey stormwater flows from the proposed stormwater management facility and surrounding lands to the Eagle Marsh Drain.

Based on the above and the accompanying Stormwater Management Brief, there exists adequate municipal servicing for this development. We trust the above comments and enclosed calculations are satisfactory for approval. If you have any questions or require additional information, please do not hesitate to contact our office.

Yours very truly,

Jason Schooley, P.Eng.
Revised June 10, 2024

LICENSED PROFESSIONAL ENGINEER
J. P. SCHOOLEY
PROVINCE OF ONTARIO

Encl.

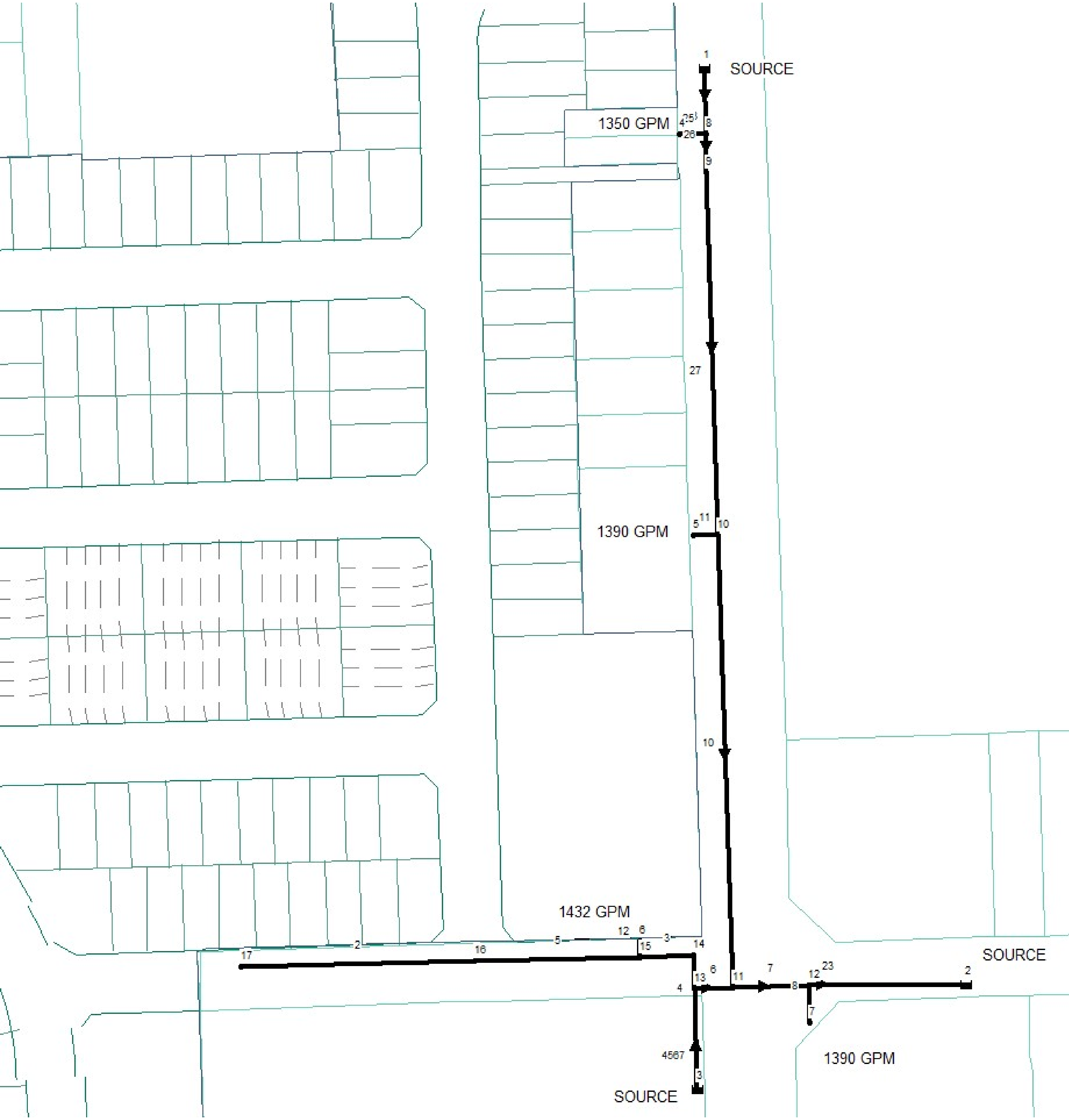
APPENDICES

UPPER CANADA CONSULTANTS
ENGINEERS / PLANNERS

APPENDIX A

EPANET Analysis – Existing Conditions Imagery
EPANET Analysis Calculations

EPANET Analysis
Northland Estates Subdivision
Existing Conditions



WATERMAIN ANALYSIS

Software Utilized: EPANET

Upper Canada Consultants

Project Name: Northland Estates

Project Number: 21132

Date: June 10, 2024

Provided Hydrant Test Data

Model Node No.	Physical Location	Test Static Pressure (PSI)	*Modelled Static Pressures (PSI)*	Test Residual Pressures (PSI)	*Modelled Residual Pressures (PSI)*	Actual Flow Rate (GPM)
4	Fronting #341	50	*50.2*	43	*43.2*	1350
5	Fronting #311	53	*51.9*	45	*44.7*	1390
6	NW Corner	54	*53.1*	46	*45.6*	1432
7	SE Corner	53	*53.5*	43	*44.7*	1390

Hydrant with Lowest Modelled Pressures: Node #20

Table 1. Modelled Average Day Pressures and Flow Rates

Hydrant Node Number	Number of Units	Population	Average Daily Load (LPM)	Existing Static Pressures (PSI)	Future Static Pressures (PSI)	% Change
Existing Hydrants						
4	10	24	4.0	50.2	50.1	0.20%
5	3	7	1.2	51.9	51.8	0.19%
6	0	0	0.0	53.1	53.0	0.16%
7	19	46	7.6	53.5	53.4	0.19%
Northlands Estates Subdivision						
18	82	197	32.8	-	51.5	-
19	54	130	21.6	-	51.1	-
20	47	113	18.8	-	50.1	-
21	38	91	15.2	-	51.2	-
22	41	98	16.4	-	51.5	-
23	22	53	8.8	-	51.8	-
Note: Average Daily Unit Consuption Rate of 240 LPCD Utilized per 2021 MSPU						

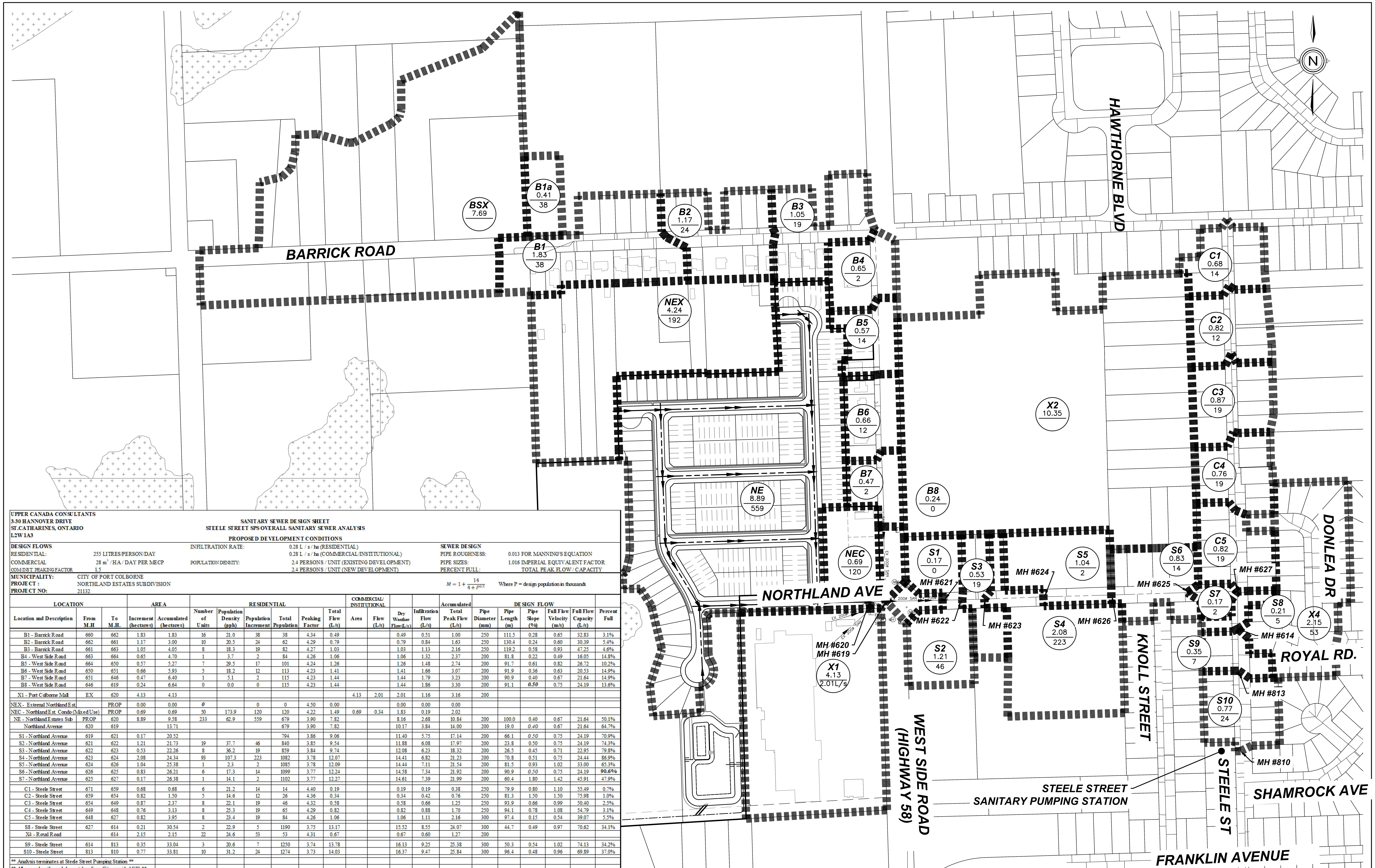
Table 2. Modelled Maximum Day Pressures and Flow Rates						
Hydrant Node Number	Number of Units	Population	Average Daily Load (LPM)	Existing Static Pressures (PSI)	Future Static Pressures (PSI)	% Change
Existing Hydrants						
4	10	24	7.6	50.2	50.0	0.40%
5	3	7	2.3	51.9	51.7	0.36%
6	0	0	0.0	53.0	52.9	0.35%
7	19	46	14.4	53.5	53.3	0.35%
Northlands Estates Subdivision						
18	82	197	62.3	-	51.4	-
19	54	130	41.0	-	51.0	-
20	47	113	35.7	-	50.0	-
21	38	91	28.9	-	51.1	-
22	41	98	31.2	-	51.4	-
23	22	53	16.7	-	51.7	-
Note: Maximum Daily Unit Consuption Rate of 456 LPCD Utilized based on peaking factor of 1.9 (MECP Peaking Factor)						

Table 3. Modelled Peak Pressures and Flow Rates						
Hydrant Node Number	Number of Units	Population	Average Daily Load (LPM)	Existing Static Pressures (PSI)	Future Static Pressures (PSI)	% Change
Existing Hydrants						
4	10	24	12.0	50.2	49.9	0.60%
5	3	7	3.6	51.9	51.6	0.60%
6	0	0	0.0	53.0	52.7	0.56%
7	19	46	22.8	53.5	53.2	0.56%
Northlands Estates Subdivision						
18	82	197	98.4	-	51.3	-
19	54	130	64.8	-	50.9	-
20	47	113	56.4	-	49.9	-
21	38	91	45.6	-	50.9	-
22	41	98	49.2	-	51.3	-
23	22	53	26.4	-	51.6	-
Note: Peak Hourly Unit Consuption Rate of 720 LPCD Utilized based on peaking factor of 3.0 (2021 MSPU)						

UPPER CANADA CONSULTANTS
ENGINEERS / PLANNERS

APPENDIX B

Overall Sanitary Drainage Area Plan – Proposed Conditions
Overall Sanitary Calculations – Existing Conditions
Overall Sanitary Calculations – Proposed Conditions with Additional Development



UPPER CANADA CONSULTANTS
3-30 HANNOVER DRIVE
ST.CATHARINES, ONTARIO
L2W 1A3

SANITARY SEWER DESIGN SHEET
STEELE STREET SPS OVERALL SANITARY SEWER ANALYSIS

PROPOSED DEVELOPMENT CONDITIONS

DESIGN FLOWS
RESIDENTIAL: 255 LITRES/PERSON/DAY
COMMERCIAL: 28 m^3 / HA / DAY PER MECP
COM/INST. PEAKING FACTOR: 1.5

INFILTRATION RATE: 0.28 L / s / ha (RESIDENTIAL)
0.28 L / s / ha (COMMERCIAL/INSTITUTIONAL)
POPULATION DENSITY: 2.4 PERSONS / UNIT (EXISTING DEVELOPMENT)
2.4 PERSONS / UNIT (NEW DEVELOPMENT)

SEWER DESIGN
PIPE ROUGHNESS: 0.013 FOR MANNING'S EQUATION
PIPE SIZES: 1.016 IMPERIAL EQUIVALENT FACTOR
PERCENT FULL: TOTAL PEAK FLOW / CAPACITY

MUNICIPALITY: CITY OF PORT COLBORNE
PROJECT : NORTHLAND ESTATES SUBDIVISION
PROJECT NO: 21132

$$M = 1 + \frac{14}{4 + P^{0.5}}$$ Where P = design population in thousands

LOCATION			AREA		RESIDENTIAL						COMMERCIAL/ INSTITUTIONAL				Accumulated	DESIGN FLOW					
Location and Description	From M.H	To M.H.	Increment (hectares)	Accumulated (hectares)	Number of Units	Population Density (pph)	Population Increment	Total Population	Peaking Factor	Total Flow (L/s)	Area	Flow (L/s)	Dry Weather Flow (L/s)	Infiltration Flow (L/s)	Total Peak Flow (L/s)	Pipe Diameter (mm)	Pipe Length (m)	Pipe Slope (%)	Full Flow Velocity (m/s)	Full Flow Capacity (L/s)	Percent Full
B1 - Barrick Road	660	662	1.83	1.83	16	21.0	38	38	4.34	0.49			0.49	0.51	1.00	250	111.5	0.28	0.65	32.83	3.1%
B2 - Barrick Road	662	661	1.17	3.00	10	20.5	24	62	4.29	0.79			0.79	0.84	1.63	250	130.4	0.24	0.60	30.39	5.4%
B3 - Barrick Road	661	663	1.05	4.05	8	18.3	19	82	4.27	1.03			1.03	1.13	2.16	250	119.2	0.58	0.93	47.25	4.6%
B4 - West Side Road	663	664	0.65	4.70	1	3.7	2	84	4.26	1.06			1.06	1.32	2.37	200	81.8	0.22	0.49	16.05	14.8%
B5 - West Side Road	664	650	0.57	5.27	7	29.5	17	101	4.24	1.26			1.26	1.48	2.74	200	91.7	0.61	0.82	26.72	10.2%
B6 - West Side Road	650	651	0.66	5.93	5	18.2	12	113	4.23	1.41			1.41	1.66	3.07	200	91.9	0.36	0.63	20.53	14.9%
B7 - West Side Road	651	646	0.47	6.40	1	5.1	2	115	4.23	1.44			1.44	1.79	3.23	200	90.9	0.40	0.67	21.64	14.9%
B8 - West Side Road	646	619	0.24	6.64	0	0.0	0	115	4.23	1.44			1.44	1.86	3.30	200	91.1	***0.50***	0.75	24.19	13.6%
X1 - Port Colborne Mall	EX	620	4.13	4.13							4.13	2.01	2.01	1.16	3.16	200					
NEX - External Northland Est.		PROP	0.00	0.00	*0*		0	0	4.50	0.00			0.00	0.00	0.00						
NEC - Northland Est. Condo (Mixed Use)		PROP	0.69	0.69	50	173.9	120	120	4.22	1.49	0.69	0.34	1.83	0.19	2.02						
NE - Northland Estates Sub	PROP	620	8.89	9.58	233	62.9	559	679	3.90	7.82			8.16	2.68	10.84	200	100.0	0.40	0.67	21.64	50.1%
Northland Avenue	620	619		13.71				679	3.90	7.82			10.17	3.84	14.00	200	19.0	*0.40*	0.67	21.64	64.7%
S1 - Northland Avenue	619	621	0.17	20.52				794	3.86	9.06			11.40	5.75	17.14	200	66.1	*0.50*	0.75	24.19	70.9%
S2 - Northland Avenue	621	622	1.21	21.73	19	37.7	46	840	3.85	9.54			11.88	6.08	17.97	200	23.8	0.50	0.75	24.19	74.3%
S3 - Northland Avenue	622	623	0.53	22.26	8	36.2	19	859	3.84	9.74			12.08	6.23	18.32	200	26.5	0.45	0.71	22.95	79.8%
S4 - Northland Avenue	623	624	2.08	24.34	93	107.3	223	1082	3.78	12.07			14.41	6.82	21.23	200	70.8	0.51	0.75	24.44	86.9%
S5 - Northland Avenue	624	626	1.04	25.38	1	2.3	2	1085	3.78	12.09			14.44	7.11	21.54	200	81.5	0.93	1.02	33.00	65.3%
S6 - Northland Avenue	626	625	0.83	26.21	6	17.3	14	1099	3.77	12.24			14.58	7.34	21.92	200	90.9	*0.50*	0.75	24.19	**90.6%**
S7 - Northland Avenue	625	627	0.17	26.38	1	14.1	2	1102	3.77	12.27			14.61	7.39	21.99	200	60.4	1.80	1.42	45.91	47.9%
C1 - Steele Street	671	659	0.68	0.68	6	21.2	14	14	4.40	0.19			0.19	0.19	0.38	250	79.9	0.80	1.10	55.49	0.7%
C2 - Steele Street	659	654	0.82	1.50	5	14.6	12	26	4.36	0.34			0.34	0.42	0.76	250	81.3	1.50	1.50	75.98	1.0%
C3 - Steele Street	654	649	0.87	2.37	8	22.1	19	46	4.32	0.58			0.58	0.66	1.25	250	93.9	0.66	0.99	50.40	2.5%
C4 - Steele Street	649	648	0.76	3.13	8	25.3	19	65	4.29	0.82			0.82	0.88	1.70	250	94.1	0.78	1.08	54.79	3.1%
C5 - Steele Street	648	627	0.82	3.95	8	23.4	19	84	4.26	1.06			1.06	1.11	2.16	300	97.4	0.15	0.54	39.07	5.5%
S8 - Steele Street	627	614	0.21	30.54	2	22.9	5	1190	3.75	13.17			15.52	8.55	24.07	300	44.7	0.49	0.97	70.62	34.1%
X4 - Royal Road		614	2.15	2.15	22	24.6	53	53	4.31	0.67			0.67	0.60	1.27	200					
S9 - Steele Street	614	813	0.35	33.04	3	20.6	7	1250	3.74	13.78			16.13	9.25	25.38	300	50.3	0.54	1.02	74.13	34.2%
S10 - Steele Street	813	810	0.77	33.81	10	31.2	24	1274	3.73	14.03			16.37	9.47	25.84	300	96.4	0.48	0.96	69.89	37.0%

** Analysis terminates at Steele Street Pumping Station **
** All sewer lengths and slopes taken from City provided GIS **

#	REVISION	DATE	INIT

NOTES:

1. THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWER, AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM.
2. PROPERTY LINES WERE PLOTTED USING REGISTERED PLANS AND BARS LOCATED IN THE FIELD. TO VERIFY THE ACCURACY OF THESE PROPERTY LINES, A LEGAL SURVEY SHOULD BE PERFORMED PRIOR TO CONSTRUCTION.
3. ALL CONSTRUCTION MUST COMPLY WITH THE NIAGARA PENINSULA STANDARD CONTRACT DOCUMENT.

DRAFTING K.T.
DESIGN K.T.
CHECKED BY K.T.
APPROVED BY J.S.

PORT COLBORNE
UPPER CANADA CONSULTANTS ENGINEERS / PLANNERS

NORTHLAND ESTATES SUBDIVISION
CITY OF PORT COLBORNE
OVERALL SANITARY DRAINAGE AREA PLAN

CONSULTANT FILE No. 21132
DATE 2024-06-10
PRINTED 2024-06-10
SCALE 1:2000 m
REF No.
DWG No. 21132-OSANDA
REV 0

DRAWING FILE: F:\21132\Engineering\21132-BASE-R1.dwg PLOTTED: Jun 10, 2024 - 1:17pm PLOTTED BY: kurt

UPPER CANADA CONSULTANTS
3-30 HANNOVER DRIVE
ST.CATHARINES, ONTARIO
L2W 1A3

SANITARY SEWER DESIGN SHEET
STEELE STREET SPS OVERALL SANITARY SEWER ANALYSIS

EXISTING CONDITIONS WITH CURRENT NORTHLAND ESTATES DRAFT APPROVED SUBDIVISION

DESIGN FLOWS		INFILTRATION RATE:	0.28 L / s / ha (RESIDENTIAL)	**SEWER DESIGN**	
RESIDENTIAL:	255 LITRES/PERSON/DAY		0.28 L / s / ha (COMMERCIAL/INSTITUTIONAL)	PIPE ROUGHNESS:	0.013 FOR MANNING'S EQUATION
COMMERCIAL	28 m^3 / HA / DAY PER MECP	POPULATION DENSITY:	2.4 PERSONS / UNIT (EXISTING DEVELOPMENT)	PIPE SIZES:	1.016 IMPERIAL EQUIVALENT FACTOR
COM/INST. PEAKING FACT(	1.5		2.4 PERSONS / UNIT (NEW DEVELOPMENT)	PERCENT FULL:	TOTAL PEAK FLOW / CAPACITY

MUNICIPALITY: CITY OF PORT COLBORNE
PROJECT : NORTHLAND ESTATES SUBDIVISION
PROJECT NO: 21132

$$M = 1 + \frac{14}{4 + P^{0.5}}$$ Where P = design population in thousands

LOCATION			AREA		RESIDENTIAL						COMMERCIAL/ INSTITUTIONAL				Accumulated	DESIGN FLOW					
Location and Description	From M.H	To M.H.	Increment (hectares)	Accumulated (hectares)	Number of Units	Population Density (pph)	Population Increment	Total Population	Peaking Factor	Total Flow (L/s)	Area	Flow (L/s)	Dry Weather Flow (L/s)	Infiltration Flow (L/s)	Total Peak Flow (L/s)	Pipe Diameter (mm)	Pipe Length (m)	Pipe Slope (%)	Full Flow Velocity (m/s)	Full Flow Capacity (L/s)	Percent Full
B1 - Barrick Road	660	662	1.83	1.83	16	21.0	38	38	4.34	0.49			0.49	0.51	1.00	250	111.5	0.28	0.65	32.83	3.1%
B2 - Barrick Road	662	661	1.17	3.00	10	20.5	24	62	4.29	0.79			0.79	0.84	1.63	250	130.4	0.24	0.60	30.39	5.4%
B3 - Barrick Road	661	663	1.05	4.05	8	18.3	19	82	4.27	1.03			1.03	1.13	2.16	250	119.2	0.58	0.93	47.25	4.6%
B4 - West Side Road	663	664	0.65	4.70	1	3.7	2	84	4.26	1.06			1.06	1.32	2.37	200	81.8	0.22	0.49	16.05	14.8%
B5 - West Side Road	664	650	0.57	5.27	5	21.1	12	96	4.25	1.20			1.20	1.48	2.68	200	91.7	0.61	0.82	26.72	10.0%
B6 - West Side Road	650	651	0.66	5.93	5	18.2	12	108	4.23	1.35			1.35	1.66	3.01	200	91.9	0.36	0.63	20.53	14.7%
B7 - West Side Road	651	646	0.47	6.40	1	5.1	2	110	4.23	1.38			1.38	1.79	3.17	200	90.9	0.40	0.67	21.64	14.7%
B8 - West Side Road	646	619	0.24	6.64	0	0.0	0	110	4.23	1.38			1.38	1.86	3.24	200	91.1	***0.50***	0.75	24.19	13.4%
X1 - Port Colborne Mall	EX	620	4.13	4.13							4.13	2.01	2.01	1.16	3.16	200					
!EX - External Northland Est.		PROP																			
NEC - Northland Est. Condo (Mixed Us		PROP	0.69	0.69	50	173.9	120	120	4.22	1.49	0.69	0.34	1.83	0.19	2.02						
NE - Northland Estates Sub	PROP	620	8.89	9.58	163	44.0	391	511	3.97	5.99			6.32	2.68	9.01	200	100.0	0.40	0.67	21.64	41.6%
Northland Avenue	620	619		13.71				511	3.97	5.99			8.33	3.84	12.17	200	19.0	*0.40*	0.67	21.64	56.2%
S1 - Northland Avenue	619	621	0.17	20.52				622	3.92	7.20			9.54	5.75	15.29	200	66.1	*0.50*	0.75	24.19	63.2%
S2 - Northland Avenue	621	622	1.21	21.73	19	37.7	46	667	3.91	7.69			10.04	6.08	16.12	200	23.8	0.50	0.75	24.19	66.6%
S3 - Northland Avenue	622	623	0.53	22.26	8	36.2	19	686	3.90	7.90			10.24	6.23	16.48	200	26.5	0.45	0.71	22.95	71.8%
S4 - Northland Avenue	623	624	2.08	24.34	93	107.3	223	910	3.83	10.27			12.61	6.82	19.43	200	70.8	0.51	0.75	24.44	79.5%
S5 - Northland Avenue	624	626	1.04	25.38	1	2.3	2	912	3.83	10.30			12.64	7.11	19.75	200	81.5	0.93	1.02	33.00	59.8%
S6 - Northland Avenue	626	625	0.83	26.21	6	17.3	14	926	3.82	10.45			12.79	7.34	20.13	200	90.9	*0.50*	0.75	24.19	**83.2%**
S7 - Northland Avenue	625	627	0.17	26.38	1	14.1	2	929	3.82	10.47			12.82	7.39	20.20	200	60.4	1.80	1.42	45.91	44.0%
C1 - Steele Street	671	659	0.68	0.68	6	21.2	14	14	4.40	0.19			0.19	0.19	0.38	250	79.9	0.80	1.10	55.49	0.7%
C2 - Steele Street	659	654	0.82	1.50	5	14.6	12	26	4.36	0.34			0.34	0.42	0.76	250	81.3	1.50	1.50	75.98	1.0%
C3 - Steele Street	654	649	0.87	2.37	8	22.1	19	46	4.32	0.58			0.58	0.66	1.25	250	93.9	0.66	0.99	50.40	2.5%
C4 - Steele Street	649	648	0.76	3.13	8	25.3	19	65	4.29	0.82			0.82	0.88	1.70	250	94.1	0.78	1.08	54.79	3.1%
C5 - Steele Street	648	627	0.82	3.95	8	23.4	19	84	4.26	1.06			1.06	1.11	2.16	300	97.4	0.15	0.54	39.07	5.5%
S8 - Steele Street	627	614	0.21	30.54	2	22.9	5	1018	3.80	11.40			13.74	8.55	22.29	300	44.7	0.49	0.97	70.62	31.6%
X4 - Royal Road		614	2.15	2.15	22	24.6	53	53	4.31	0.67			0.67	0.60	1.27	200					
S9 - Steele Street	614	813	0.35	33.04	3	20.6	7	1078	3.78	12.02			14.36	9.25	23.61	300	50.3	0.54	1.02	74.13	31.9%
S10 - Steele Street	813	810	0.77	33.81	10	31.2	24	1102	3.77	12.27			14.61	9.47	24.08	300	96.4	0.48	0.96	69.89	34.4%

** Analysis terminates at Steele Street Pumping Station **
** All sewer lengths and slopes taken from City provided GIS **

UPPER CANADA CONSULTANTS
3-30 HANNOVER DRIVE
ST.CATHARINES, ONTARIO
L2W 1A3

SANITARY SEWER DESIGN SHEET
STEELE STREET SPS OVERALL SANITARY SEWER ANALYSIS
FULLY DEVELOPED CONDITIONS

DESIGN FLOWS
RESIDENTIAL: 255 LITRES/PERSON/DAY
COMMERCIAL 28 m^3 / HA / DAY PER MECP
COM/INST. PEAKING FACT(1.5

INFILTRATION RATE: 0.28 L / s / ha (RESIDENTIAL)
0.28 L / s / ha (COMMERCIAL/INSTITUTIONAL)
POPULATION DENSITY: 2.4 PERSONS / UNIT (EXISTING DEVELOPMENT)
2.4 PERSONS / UNIT (NEW DEVELOPMENT)

SEWER DESIGN
PIPE ROUGHNESS: 0.013 FOR MANNING'S EQUATION
PIPE SIZES: 1.016 IMPERIAL EQUIVALENT FACTOR
PERCENT FULL: TOTAL PEAK FLOW / CAPACITY

MUNICIPALITY: CITY OF PORT COLBORNE
PROJECT : NORTHLAND ESTATES SUBDIVISION
PROJECT NO: 21132

$$M = 1 + \frac{14}{4 + P^{0.5}}$$ Where P = design population in thousands

LOCATION			AREA		RESIDENTIAL						COMMERCIAL/ INSTITUTIONAL		Dry Weather Flow (L/s)	Infiltration Flow (L/s)	Accumulated Total Peak Flow (L/s)	DESIGN FLOW					Percent Full
Location and Description	From M.H	To M.H.	Increment (hectares)	Accumulated (hectares)	Number of Units	Population Density (pph)	Population Increment	Total Population	Peaking Factor	Total Flow (L/s)	Area	Flow (L/s)				Pipe Diameter (mm)	Pipe Length (m)	Pipe Slope (%)	Full Flow Velocity (m/s)	Full Flow Capacity (L/s)	
BSX - Barrick Road West (Not Included)			***7.69***	*7.69*	***240***	***74.9***	*576*	*576*	*3.94*	*6.70*			*6.70*	*2.15*	*8.85*						
B1a - Future Dev *(towns)*		660	0.41	0.41	16	93.7	38	38	4.34	0.49			0.49	0.11	0.61	200	90.0	0.40	0.67	21.64	
B1 - Barrick Road	660	662	1.83	2.24	16	21.0	38	77	4.27	0.97			0.97	0.63	1.60	250	111.5	0.28	0.65	32.83	4.9%
B2 - Barrick Road	662	661	1.17	3.41	10	20.5	24	101	4.24	1.26			1.26	0.95	2.22	250	130.4	0.24	0.60	30.39	7.3%
B3 - Barrick Road	661	663	1.05	4.46	8	18.3	19	120	4.22	1.49			1.49	1.25	2.74	250	119.2	0.58	0.93	47.25	5.8%
B4 - West Side Road	663	664	0.65	5.11	1	3.7	2	122	4.22	1.52			1.52	1.43	2.95	200	81.8	0.22	0.49	16.05	18.4%
B5 - West Side Road	664	650	0.57	5.68	6	25.3	14	137	4.20	1.70			1.70	1.59	3.29	200	91.7	0.61	0.82	26.72	12.3%
B6 - West Side Road	650	651	0.66	6.34	5	18.2	12	149	4.19	1.84			1.84	1.78	3.62	200	91.9	0.36	0.63	20.53	17.6%
B7 - West Side Road	651	646	0.47	6.81	1	5.1	2	151	4.19	1.87			1.87	1.91	3.78	200	90.9	0.40	0.67	21.64	17.5%
B8 - West Side Road	646	619	0.24	7.05	0	0.0	0	151	4.19	1.87			1.87	1.97	3.84	200	91.1	***0.50***	0.75	24.19	15.9%
X1 - Port Colborne Mall	EX	620	4.13	4.13		0.0					4.13	2.01	2.01	1.16	3.16	200					
NEX - External Northland Est.		PROP	4.24	4.24	***23***	13.0	55	55	4.31	0.70			0.70	1.19	1.89						
NEC - Northland Est. Condo (Mixed Us		PROP	0.69	0.69	50	173.9	120	120	4.22	1.49	0.69	0.34	1.83	0.19	2.02						
NE - Northland Estates Sub	PROP	620	8.89	13.82	233	62.9	559	734	3.88	8.42			8.75	3.87	12.62	200	100.0	0.40	0.67	21.64	58.3%
Northland Avenue	620	619		17.95				734	3.88	8.42			8.75	5.03	13.78	200	19.0	*0.40*	0.67	21.64	63.7%
S1 - Northland Avenue	619	621	0.17	25.17				886	3.83	10.02			12.36	7.05	19.41	200	66.1	*0.50*	0.75	24.19	80.2%
S2 - Northland Avenue	621	622	1.21	26.38	19	37.7	46	931	3.82	10.50			12.84	7.39	20.23	200	23.8	0.50	0.75	24.19	83.6%
S3 - Northland Avenue	622	623	0.53	26.91	8	36.2	19	950	3.81	10.70			13.04	7.53	20.58	200	26.5	0.45	0.71	22.95	89.6%
S4 - Northland Avenue	623	624	2.08	28.99	93	107.3	223	1174	3.75	13.00			15.35	8.12	23.46	200	70.8	0.51	0.75	24.44	96.0%
S5 - Northland Avenue	624	626	1.04	30.03	1	2.3	2	1176	3.75	13.03			15.37	8.41	23.78	200	81.5	0.93	1.02	33.00	72.1%
S6 - Northland Avenue	626	625	0.83	30.86	6	17.3	14	1190	3.75	13.17			15.52	8.64	24.16	200	90.9	*0.50*	0.75	24.19	**99.9%**
S7 - Northland Avenue	625	627	0.17	31.03	1	14.1	2	1193	3.75	13.20			15.54	8.69	24.23	200	60.4	1.80	1.42	45.91	52.8%
C1 - Steele Street	671	659	0.68	0.68	6	21.2	14	14	4.40	0.19			0.19	0.19	0.38	250	79.9	0.80	1.10	55.49	0.7%
C2 - Steele Street	659	654	0.82	1.50	5	14.6	12	26	4.36	0.34			0.34	0.42	0.76	250	81.3	1.50	1.50	75.98	1.0%
C3 - Steele Street	654	649	0.87	2.37	8	22.1	19	46	4.32	0.58			0.58	0.66	1.25	250	93.9	0.66	0.99	50.40	2.5%
C4 - Steele Street	649	648	0.76	3.13	8	25.3	19	65	4.29	0.82			0.82	0.88	1.70	250	94.1	0.78	1.08	54.79	3.1%
C5 - Steele Street	648	627	0.82	3.95	8	23.4	19	84	4.26	1.06			1.06	1.11	2.16	300	97.4	0.15	0.54	39.07	5.5%
S8 - Steele Street	627	614	0.21	35.19	2	22.9	5	1282	3.73	14.10			16.44	9.85	26.30	300	44.7	0.49	0.97	70.62	37.2%
X4 - Royal Road		614	2.15	2.15	22	24.6	53	53	4.31	0.67			3.01	0.60	3.62	200					
S9 - Steele Street	614	813	0.35	37.69	3	20.6	7	1342	3.71	14.71			17.05	10.55	27.60	300	50.3	0.54	1.02	74.13	37.2%
S10 - Steele Street	813	810	0.77	38.46	10	31.2	24	1366	3.71	14.95			17.29	10.77	28.06	300	96.4	0.48	0.96	69.89	40.1%

** Analysis terminates at Steele Street Pumping Station **
** All sewer lengths and slopes taken from City provided GIS **

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APPENDIX C

Northland Estates – Stormwater Management Plan

STORMWATER MANAGEMENT PLAN

NORTHLAND ESTATES

CITY OF PORT COLBORNE

Prepared for:

2600261 Ontario Inc.

Prepared by:

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Revised May 2024

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APPENDICES

Appendix A	Weighted Percent Impervious Calculation Sheet Stormwater Management Facility Calculations
Appendix B	MIDUSS Output Files

REFERENCES

1. Stormwater Management Planning and Design Manual
   Ontario Ministry of Environment (March 2003)

STORMWATER MANAGEMENT PLAN

NORTHLAND ESTATES

CITY OF PORT COLBORNE

1.0 INTRODUCTION

1.1 Study Area

The proposed residential development is located in the City of Port Colborne as part of Lot 31 and Concession 2. As shown on the enclosed Site Location Plan (Figure 1), the subject property is situated north of Coronation Drive North, east of Minor Road, south of Barrick Road and west of West Side Road (Regional Road 58) with site entrances on Northland Avenue. This Stormwater Management Plan has been written to obtain approvals as part of the Redline of Draft Plan of Subdivision process.

The approximately 16.67ha property is bound by a Locally Significant Wetland to the west, a commercial plaza at the south east corner, and multiple residential properties to the north, east and south. The drainage areas contributing to this stormwater management plan consist primarily of the subject lands, though incorporate surrounding residential areas that convey stormwater flows through the development lands. The receiving body of water for the proposed stormwater flows will be the Eagle Marsh Drain.

1.2 Objectives

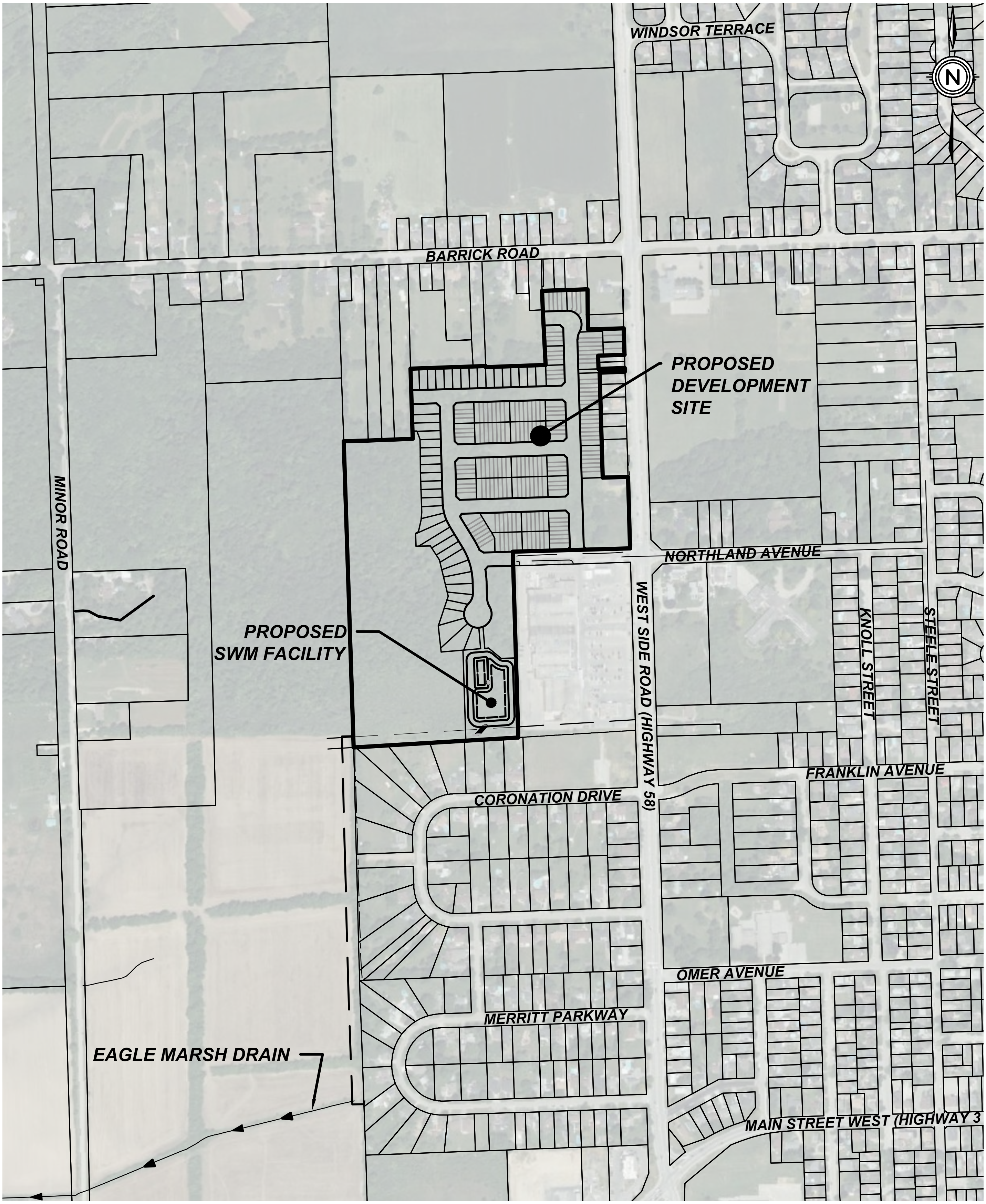
The objectives of this study are as follows:

1. Establish specific criteria for the management of stormwater from this site.

2. Determine the impact of development on the stormwater peak flow & volume from this site.

3. Investigate alternatives for controlling the quantity and quality of stormwater from this site.

4. Establish property requirements for the Stormwater Management Facility for the Draft Plan of Subdivision.



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NORTHLAND ESTATES

CITY OF PORT COLBORNE

SITE LOCATION PLAN

DATE	2024-05-24
SCALE	1:7,500 m
REF No.	21132
DWG No.	FIGURE 1

DRAWING FILE: F:\21132\Engineering\21132-BASE-R1.dwg PLOTTED: May 24, 2024 - 3:22pm PLOTTED BY: kurt

1.3 Existing & Proposed Conditions

a) Existing Conditions

Historically, the site has been used for agricultural purposes, though more recently has been vacant land. The approximately 16.67-hectare property includes 5.83 hectares of undevelopable lands along the western limits comprised of an existing Locally Significant Wetland. The proposed development is located within the upper reaches of the Eagle Marsh Drain drainage area, with the current actual drain upstream limit located approximately 500m south of the south-west corner of the site. The existing topography of the site generally directs flows to the south-east to the adjacent Locally Significant Wetland or Eagle Marsh Drain with all flows ultimately outletting to the Eagle Marsh Drain.

The majority of native soils within the study area have been characterized as imperfectly drained loam/clay loam Franktown Soils (hydrologic soil group CB) with bedrock located less than 1m below the surface. Within the south-western portion of the site, the soil transitions to a low permeability clay and silt resulting in the perched water necessary to create the Locally Significant Wetlands.

b) Proposed Conditions

Approximately 11.0 hectares of the site is proposed to be developed, consisting of 44 single family dwellings, 4 semi-detached units, 189 townhouse units, and a mixed-use commercial/residential block with 50 units, resulting in a total unit count of 287 units. The site shall be provided with full municipal services including sanitary sewers, storm sewers and watermain with asphalt pavement, concrete curbs and gutters. The proposed stormwater management plan discusses the proposed development under fully developed conditions.

The Northland Estates Subdivision development was previously draft approved with an associated Stormwater Management (SWM) Plan detailing the construction of a swale from the proposed SWM Facility to the current upstream limit of the Eagle Marsh Drain approximately 500m south of the south-east corner of the site providing a sufficient outlet. Since this approval, a design was set into motion by the City’s Municipal Drain Engineering Consultant to extend the Eagle Marsh Drain from its’ current upstream limit, through the rear yards of houses on Coronation Drive to the south-east corner of the site. It is expected that the Eagle Marsh Drain extension will be constructed prior to the development of the Northland Estates Subdivision and will therefore become the focus stormwater outlet for this development.

2.0 STORMWATER MANAGEMENT CRITERIA

New developments are required to provide stormwater management in accordance with provincial and municipal policies including:

- Stormwater Quality Guidelines for New Development (MECP/MNRF, May 1991)
- Stormwater Management Planning and Design Manual (MECP, March 2003)

Based on the comments and outstanding policies from various agencies (City of Port Colborne, Regional Municipality of Niagara, Niagara Peninsula Conservation Authority

(NPCA), and the Ministry of the Environment, Conservation and Parks (MECP), and others) the following site-specific considerations were identified:

- The receiving watercourse, Eagle Marsh Drain has been identified by the Ministry of Natural Resources watercourse evaluation as a **Type 2** (*Important*) fish habitat. Based on this fish habitat, the corresponding MECP level of protection for stormwater management quality practices on all new developments shall be *Normal*.

- The site outlets to the Eagle Marsh Drain which contains lands that would be negatively impacted by increased flooding levels, and, therefore, stormwater quantity control is considered necessary to maintain the downstream peak water elevations.

Based on the above policies and site specific considerations, the following stormwater management criteria have been established for this site.

- Stormwater **quality** controls are to be provided for the internal storm system of the development according to MECP guidelines. It is proposed to provide Normal Protection (70% TSS removal) to the stormwater before outletting to the Eagle Marsh Drain.

- Stormwater **quantity** controls are to be provided for the outlet to limit the proposed development peak flows from the 2, 5, 10, 25, 50, and 100 year storm events to existing peak flow levels

3.0 STORMWATER ANALYSIS

A stormwater analysis has been conducted by Upper Canada Consultants as part of the design of the Northland Estates development using the MIDUSS computer modelling program. A new stormwater analysis was conducted to represent the existing and future conditions to the Eagle Marsh Drain.

This program was selected because it is applicable to an urban drainage area like the study area, it is relatively easy to use and modify for the proposed drainage conditions and control facilities, and it readily allows for the use of design storm hyetographs for the various return periods being investigated. Copies of the current model output files are enclosed in Appendix B.

3.1 Design Storms

Design storm hyetographs were developed using a Chicago distribution based on the Ministry of Transportations (MTO) Intensity-Duration-Frequency curves for the development area in Port Colborne. These curves were utilized due to the developments' proximity to West Side Road (Highway 58) and review requirements of the MTO. Hyetographs for the 25mm, 2, 5, 10, 25, 50 and 100 year events were developed using a 4-hour Chicago distribution. Table 1 summarizes the rainfall data.

Table 1. Rainfall Data			
Design Storm (Return Period)	**Chicago Distribution Parameters**		
	a	**b**	**c**
25mm	512.000	0.0	0.699
2 Year	397.149	0.0	0.699
5 Year	524.867	0.0	0.699
10 Year	608.845	0.0	0.699
25 Year	715.568	0.0	0.699
50 Year	794.298	0.0	0.699
100 Year	871.279	0.0	0.699
$Intensity\ (mm/hr) = \frac{a}{(t_d + b)^c}$			

3.2 Existing Conditions

The existing conditions were modelled to establish the stormwater peak flows and volumes prior to development within this site. The existing drainage areas for this subwatershed are shown on Figure 2 with a schematic depicting the modelling strategy detailed on Figure 4. This area was determined from field investigations and a combination of recent topographic surveys as well as topographic information gathered from the Niagara Peninsula Conservation Authority (NPCA).

Stormwater flows from the majority of the development site are conveyed southerly overland towards the natural gas easement under existing conditions shown by Drainage Area EX10. Flows from the rear of the adjacent commercial property (EX20) join and are directed through EX30 to the south-west corner of the development property (Outlet A). Stormwater flows from Drainage Area EX40 are conveyed through the wetland to EX50 and ultimately directed south to Outlet A, confluencing with the previously described drainage areas. Under existing conditions, stormwater flows are directed south from Outlet A to ultimately discharge to the Eagle Marsh Drain (Outlet B).

Input parameters for the computer model for the existing conditions are shown in Table 2. Table 3 details the stormwater peak flows and volumes generated by the various design storm events.

3.3 Proposed Conditions

The future drainage areas for the proposed development, shown in Figure 3, were modelled to establish the stormwater peak flows and volumes once development has been completed at the proposed site.

It is proposed to construct and internal storm sewer system to collect peak flows from the proposed development, and discharge to a proposed Stormwater Management (SWM) Facility. The facility has been designed to accommodate potential future development north-east of the site fronting Barrick Road. Stormwater flows discharging from the SWM facility will outlet to a proposed channel conveying flows westerly through a channel within the existing natural gas easement to the south-west corner of the site (Outlet A) to the expected future upstream limit of the Eagle Marsh Drain. As stated previously, it is expected the Drain Extension will be completed prior to construction of this development.

Stormwater flows from the rear of lots 20 to 43 as part of Drainage Area A40 will outlet uncontrolled to the adjacent Locally Significant Wetland to maintain runoff volumes as required by the Water Balance Study (Terra-Dynamics, 2022). Stormwater flows directed southerly from the existing residential properties north of the site, fronting Barrick Road, will be captured and conveyed via swales and rear yard catch basins located on the proposed properties backing onto the Barrick road properties.

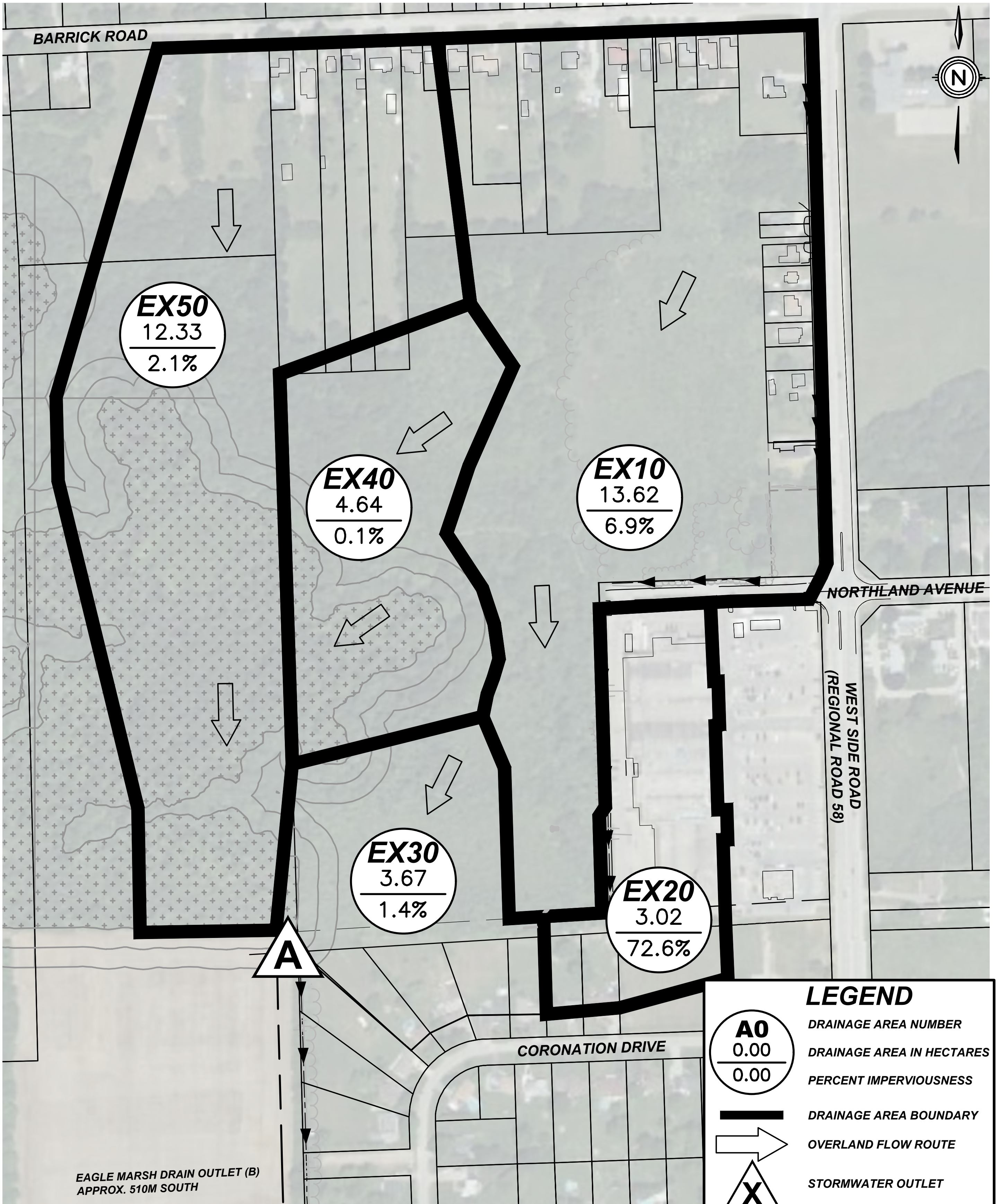
Input parameters for the computer model with the proposed development conditions are shown in Table 2. Impervious Calculations for existing conditions are included in Appendix A.

Table 2. Hydrologic Parameters					
Area No.	**Area (ha)**	**Length (m)**	**Slope (%)**	**SCS CN**	**Percent Impervious**
Existing Conditions					
EX10	13.62	500	2.0	77	6.9
EX20	3.02	100	0.5	77	72.6
EX30	3.67	80	0.5	77	1.4
EX40	4.64	100	0.5	77	0.1
EX50	12.33	350	1.0	77	2.1
	37.28	**Total Area**			
Future Conditions					
A10	17.99	500	1.0	77	75.0
A20	3.02	100	0.5	77	72.6
A30	3.21	80	0.5	77	1.6
A40	3.89	100	0.5	77	3.7
A50	9.18	350	1.0	77	1.3
	37.29	**Total Area**			

The results of the modelling are shown in Table 3, where the peak flows and runoff volumes were calculated for the 2, 5, 10, 25, 50 and 100 year design storm events.

Table 3. Peak Flows and Volumes at Outlet A						
Design Storm	**Peak Flow (m^3/s)**			**Volume (m^3)**		
	Existing	**Future***	**Change**	**Existing**	**Future***	**Change**
2 Year	0.327	1.588	+386%	3,364	6,093	+2,729
5 Year	0.513	2.192	+327%	5,645	8,952	+3,307
10 Year	0.668	2.682	+301%	7,329	11,015	+3,686
25 Year	0.916	3.377	+269%	9,637	13,758	+4,121
50 Year	1.168	3.900	+234%	11,443	15,825	+4,382
100 Year	1.451	4.424	+205%	13,268	17,899	+4,631
*Note: Future stormwater values depict conditions without stormwater quantity controls						

As seen above in Table 3, stormwater quantity controls are considered necessary for the proposed development since the peak flows and volumes outletting from the proposed development area increase as a result of the proposed development. The existing and future stormwater drainage areas shown on Figures 2 and 3 were used to assess the stormwater management plan for this study. Figure 4 outlines the stormwater schematic used to model the conditions for this development.



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CITY OF PORT COLBORNE

EXISTING OVERALL STORM DRAINAGE AREA PLAN

DATE	2024–05–24
SCALE	1:4000 m
REF No.	21132
DWG No.	FIGURE 2

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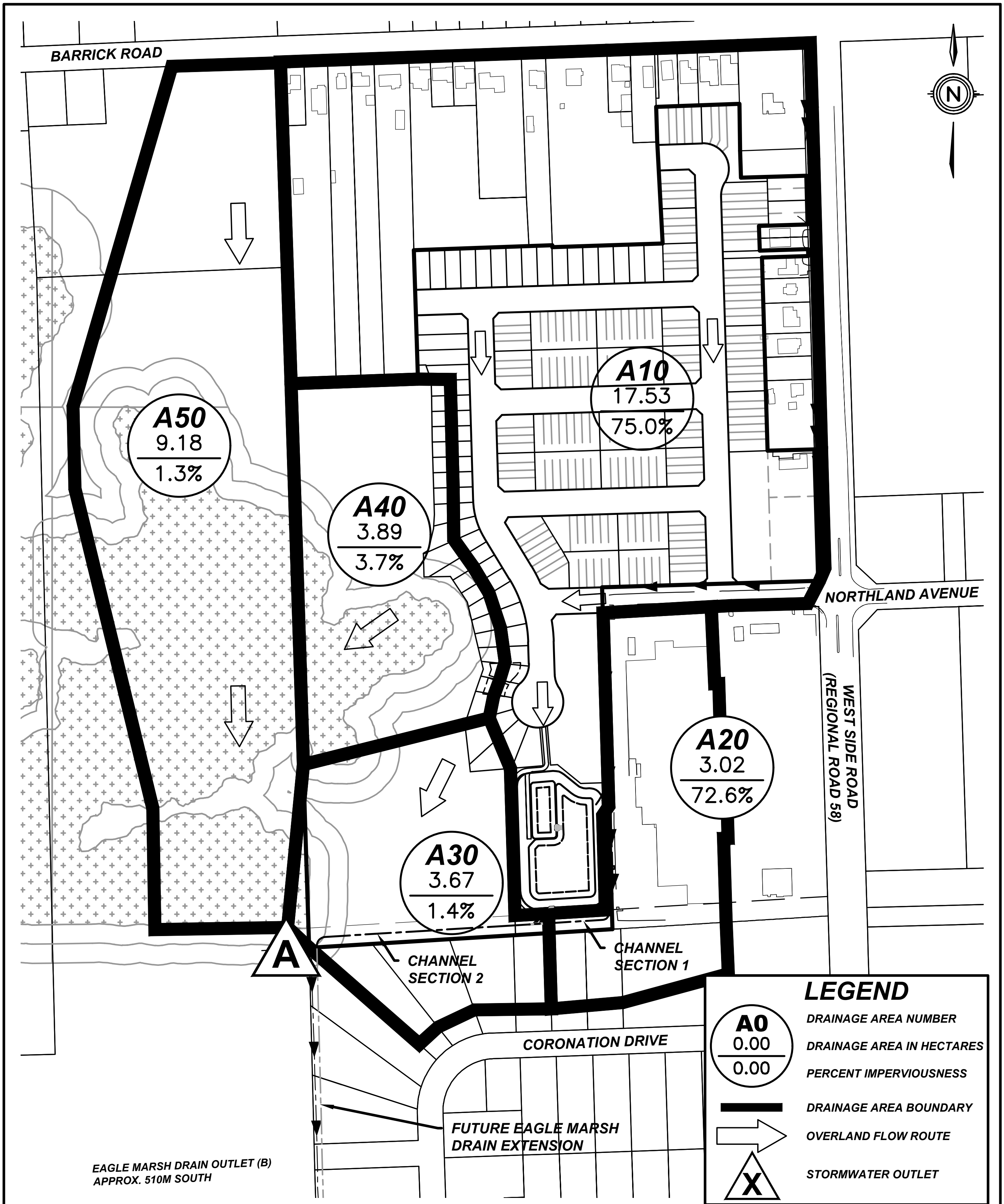

UPPER CANADA CONSULTANTS ENGINEERS / PLANNERS	NORTHLAND ESTATES	DATE	2024–05–24
	CITY OF PORT COLBORNE	SCALE	1:4000 m
		REF No.	21132
	PROPOSED OVERALL STORM DRAINAGE AREA PLAN	DWG No.	FIGURE 3

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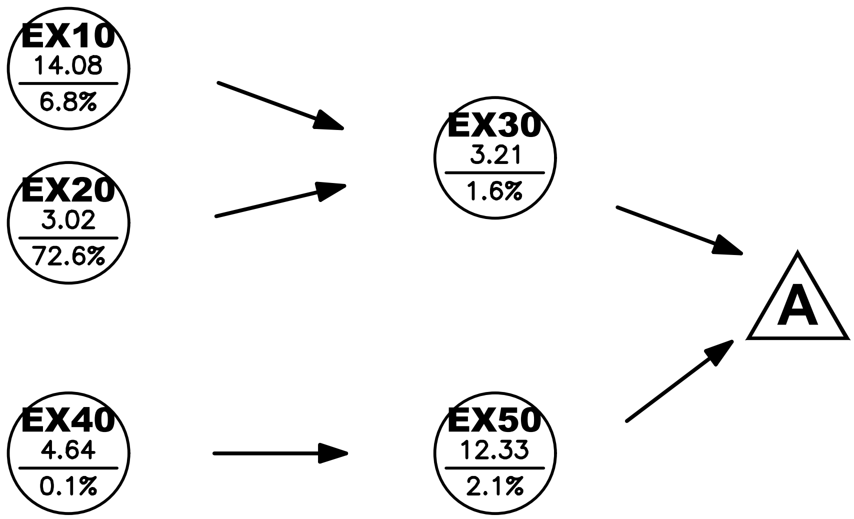

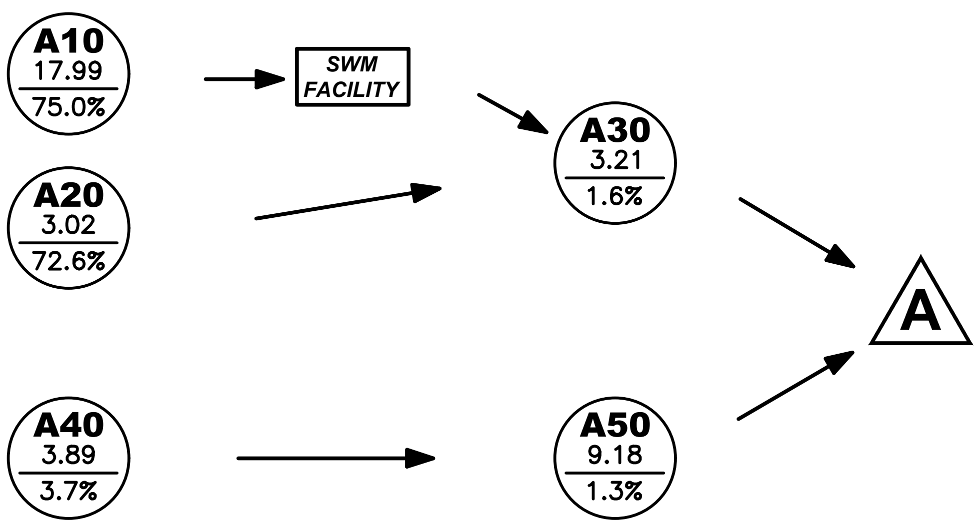

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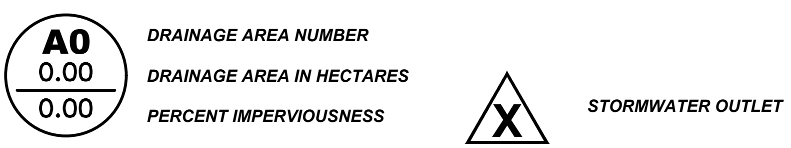

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CITY OF PORT COLBORNE

STORMWATER MODELLING SCHEMATIC

DATE	2024–05–24
SCALE	1:4000 m
REF No.	21132
DWG No.	FIGURE 4

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4.0 STORMWATER MANAGEMENT ALTERNATIVES

4.1 Screening of Stormwater Management Alternatives

A variety of stormwater management alternatives are available to control the quality of stormwater, most of which are described in the Stormwater Management Planning and Design Manual (MECP, March 2003). Alternatives for the proposed and ultimate developments were considered in the following broad categories: lot level, vegetative, infiltration, and end-of-pipe controls. General comments on each category are provided below. Individual alternatives for the proposed development are listed in Table 4 with comments on their effectiveness and applicability to the proposed outlet.

a) Lot Level Controls

Lot level controls are not generally suitable as the primary control facility for quality control. They are generally used to enhance stormwater quality in conjunction with other types of control facilities.

b) Vegetative Alternatives

Vegetative stormwater management practices are not generally suitable as the primary control facility for quality control. They are generally used to enhance stormwater quality in conjunction with other types of control facilities.

c) Infiltration Alternatives

Where soils are suitable, infiltration techniques can be very effective in providing quantity and quality control. However, the very small amount of surface area on this site dedicated to permeable surfaces such as greenspace and landscaping make this an impractical option. Therefore, infiltration techniques will not be considered for this development.

d) End-of-Pipe Alternatives

Surface storage techniques can be very effective in providing quality and quantity control. Dry facilities are effective practices for stormwater erosion and flood control for large drainage areas.

Wet facilities are effective practices for stormwater erosion, quality and quantity control for large drainage areas.

Table 4. Evaluation of Stormwater Management Practices								
	Criteria for Implementation of Stormwater Management Practices (SWMP)							
Northland Estates	**Topography**	**Soils**	**Bedrock**	**Groundwater**	**Area**	**Technical Effectiveness (10 high)**	**Recommend Implementation Yes / No**	**Comments**
Site Conditions	***Variable 1 to 3%***	***Clay Loam <12mm/hr***	***At Considerable Depth***	***At Considerable Depth***	***± 17.99ha***			
Lot Level Controls								
Lot Grading	<5%	nlc	nlc	nlc	nlc	2	Yes	Quality/quantity benefits
Roof Leaders to Surface	nlc	nlc	nlc	nlc	nlc	2	Yes	Quality/quantity benefits
Roof Ldrs.to Soakaway Pits	nlc	loam, infiltr. > 15 mm/hr	>1m Below Bottom	>1m Below Bottom	< 0.5 ha	6	No	Unsuitable site conditions
Sump Pump Fdtn. Drains	nlc	nlc	nlc	nlc	nlc	2	No	Unsuitable site conditions
Vegetative								
Grassed Swales	< 5 %	nlc	nlc	nlc	nlc	7	Yes	Quality/quantity benefits
Filter Strips(Veg. Buffer)	< 10 %	nlc	nlc	>.5m Below Bottom	< 2 ha	5	No	Unsuitable site conditions
Infiltration								
Infiltration Basins	nlc	loam, infiltr. > 15 mm/hr	>1m Below Bottom	>1m Below Bottom	< 5 ha	2	No	Unsuitable site conditions
Infiltration Trench	nlc	loam, infiltr. > 15 mm/hr	>1m Below Bottom	>1m Below Bottom	< 2 ha	4	No	Unsuitable site conditions
Rear Yard Infiltration	< 2.0 %	loam, infiltr. > 15 mm/hr	>1m Below Bottom	>1m Below Bottom	< 0.5 ha	7	No	Unsuitable site conditions
Perforated Pipes	nlc	loam, infiltr. > 15 mm/hr	>1m Below Bottom	>1m Below Bottom	nlc	4	No	Unsuitable site conditions
Pervious Catch basins	nlc	loam, infiltr. > 15 mm/hr	>1m Below Bottom	>1m Below Bottom	nlc	3	No	Unsuitable site conditions
Sand Filters	nlc	nlc	nlc	>.5m Below Bottom	< 5 ha	5	No	High maintenance/poor aesthetics
Surface Storage								
Dry Ponds	nlc	nlc	nlc	nlc	> 5 ha	7	No	No quality control
Wet Ponds	nlc	nlc	nlc	nlc	> 5 ha	9	Yes	Very effective quality control
Wetlands	nlc	nlc	nlc	nlc	> 5 ha	10	No	Very effective quality control
Other								
Oil/Grit Separator	nlc	nlc	nlc	nlc	<2 ha	3	No	Limited benefit/area too large

Reference: Stormwater Management Practices Planning and Design Manual - 1994
nlc - No Limiting Criteria

4.2 Selection of Stormwater Management Alternatives

Stormwater management alternatives were screened based on technical effectiveness, physical suitability for this site, and their ability to meet the stormwater management criteria established for proposed and future development areas. The following stormwater management alternatives are recommended for implementation on the proposed development:

- **Lot grading** to be kept as flat as practical, while remaining consistent with municipal standards, in order to slow down stormwater and encourage infiltration.
- **Roof leaders to be discharged to the ground surface** in order to slow down stormwater and encourage infiltration.
- **Grassed swales** to be used to collect rear lot drainage. Grassed swales tend to filter sediments and slow down the rate of stormwater.
- A **wet pond facility** to be constructed to provide stormwater quality enhancement for frequent storms.

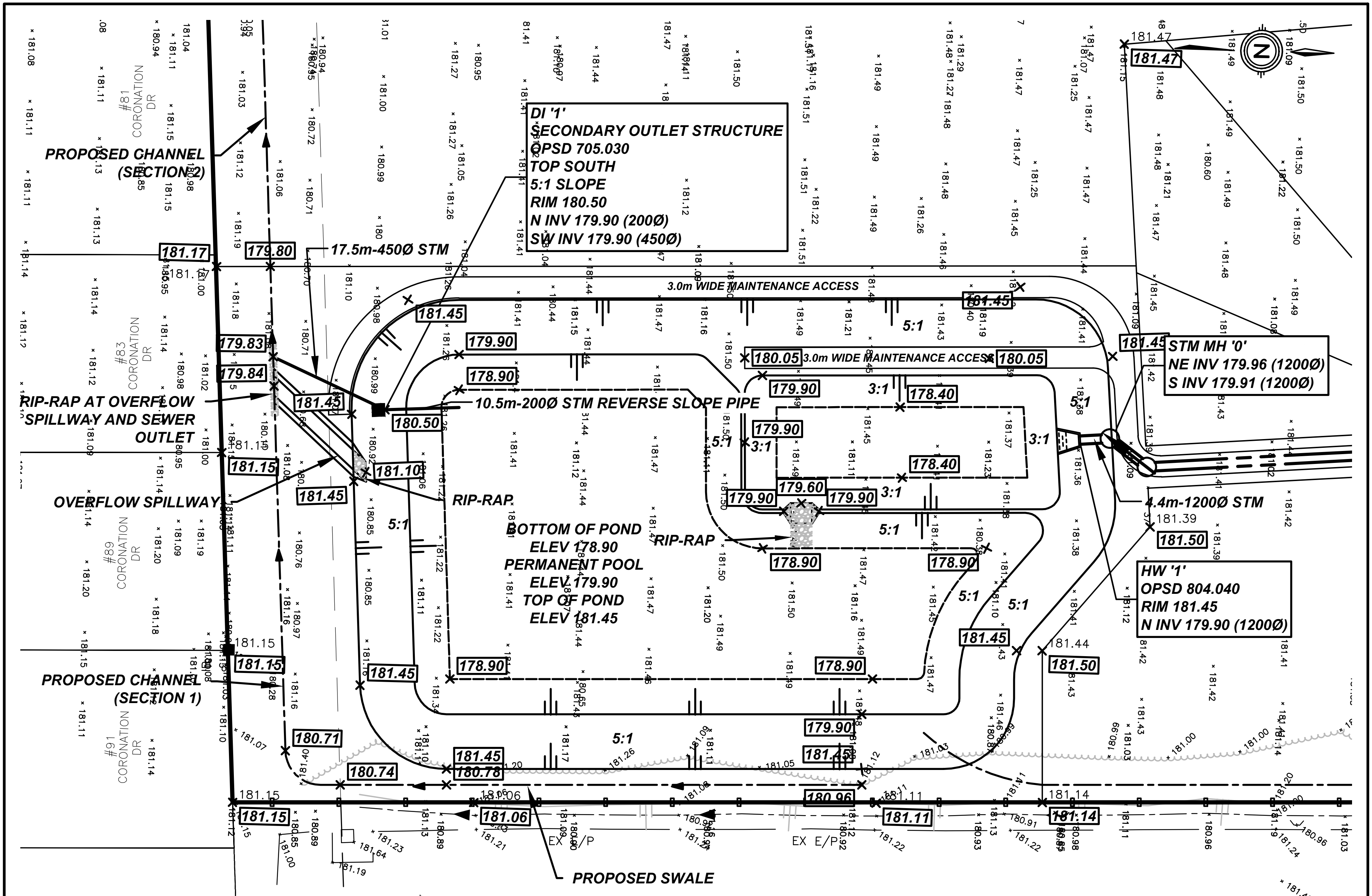
5.0 STORMWATER MANAGEMENT PLAN

A MIDUSS model was created to assess existing, future and ultimate development peak flows and stormwater volumes generated by the proposed subdivision. The stormwater management facility was sized according to MECP Guidelines (MECP, March 2003) as follows:

5.1 Proposed Stormwater Management Facility

5.1.1 Stormwater Quality

The stormwater drainage outlet for the proposed development is the Eagle Marsh Drain, which has been identified by the Ministry of Natural Resources watercourse evaluation as a **Type 2** fish habitat. Based on this fish habitat, the corresponding MECP level of protection for stormwater management <u>quality</u> practices on all new developments shall be *Normal* (70% TSS removal). Based on Table 3.2 of SWMP & Design Manual, the water quality storage requirement is approximately 136.7m^3/ha for *Normal* protection for developments with 75% impervious areas. The drainage area requiring stormwater quality improvement draining to the proposed facility is 17.99 hectares. The storage volumes required for this proposed facility are shown in Table 5.



**NOTE: CONTRACTOR TO MATCH EXISTING GRADE AT PROPERTY LINE

UPPER CANADA CONSULTANTS
ENGINEERS / PLANNERS

NORTHLAND ESTATES

CITY OF PORT COLBORNE
PROPOSED STORMWATER MANAGEMENT FACILITY

DATE	2024-05-24
SCALE	1:750 m
REF No.	21132
DWG No.	FIGURE 5

DRAWING FILE: F:\21132\Engineering\21132-BASE-R1.dwg PLOTTED: May 24, 2024 - 3:56pm PLOTTED BY: kurt

Table 5. Stormwater Quality Volume Calculations	
Total Water Quality Volume = 17.53 ha x 136.7 m^3/ha = 2,396.4 m^3 → *5,588.0 m^3 (provided)*	Reference: Table 3.2, SWMP & Design Manual (MECP 2003)
Permanent Pool Volume = 17.53 ha x 96.7 m^3/ha = 1,695.2 m^3 → *2,745 m^3 (provided)*	**Extended Detention Volume** = 17.53 ha x 40 m^3/ha = 701.2 m^3 → *2,843 m^3 (provided)*

5.1.3 Stormwater Quantity Control

As shown in the previous Table 3, stormwater management quantity controls are required to reduce the peak flows from the development area to existing conditions up to and including the 100-year design storm event. The stormwater peak flows from the proposed development shall be reduced to existing levels by providing stormwater quantity storage. It is proposed to construct a control structure outlet to reduce the peak stormwater flows discharging from the proposed facility.

5.1.4 Stormwater Management Facility Configuration

As seen on the Proposed Stormwater Management Facility detail (Figure 5), the layout of the stormwater management facility is providing a single sewer outlet to a proposed ditch immediately south of the proposed SWM facility. The ditch will convey flows west through the natural gas easement to the future Eagle Marsh Drain outlet (Outlet A) at the south-west corner of the site.

It is proposed to construct a three-stage outlet for the stormwater management facility as shown in Figure 5. The first stage of control consists of a reverse slope pipe acting as a 200mm diameter orifice to provide the required quality controls. The second stage of control consists of a ditch inlet catch basin and outlet pipe which provides an outlet for flows exceeding the extended detention volume. An emergency spillway will provide an outlet for flows exceeding the capacity of the ditch inlet catch basin and outlet pipe.

The proposed effective bottom elevation of the facility is 178.90m, and the permanent pool water level is 179.90m for a water depth of 1.0 metres. The configuration of the facility provides 2,745m^3 of permanent pool volume, which is more than the required 1,695m^3. The proposed top of pond is at an elevation of 181.45m which provides a total active volume of 8,479m^3. As stated previously, it is known that the bedrock elevation is quite close (+/- 1.0m) to the surface. It is expected that a considerable amount of rock excavation will be necessary to provide the depths required for the stormwater quality and quantity controls.

Based on the configuration of the proposed facility, the 200mm diameter quality orifice shall provide 24.2 hours (24 hrs is MECP minimum) of detention during the 25mm design storm event. The rim elevation for the proposed ditch inlet chamber is 180.50m and will provide an extended detention volume of 2,842m^3, which is more than the required 701m^3.

The outflow pipe from the stormwater management facility is to be 450mm in diameter and will convey the stormwater flows from the ditch inlet to the proposed channel ultimately conveying flows to the Eagle Marsh Drain. The emergency overflow spillway will be constructed at an elevation of 181.10m with a base width of 2.0m and side slopes of 2:1 to the top of the facility. A stage-storage-discharge relationship was determined for the facility and is included in Appendix A for reference purposes.

The proposed on-site storm sewer system will convey stormwater flows up to and including the 5-year design storm event directly to the stormwater management facility. During extreme storm events greater than the 5-year event, overland flows from the development area shall be directed to the proposed stormwater management facility. The storm sewer system will be design to convey stormwater flows from the development site as well as the expected future development area to the north-east. As well, stormwater flows from the private condo development at the north-west corner of the intersection of Northland Avenue and West Side Road will discharge stormwater flows directly to the Subdivision storm sewer system without the need for quantity or quality controls.

Table 6 summarizes the peak inflows and outflows for the stormwater management facility along with corresponding pond elevations. Based on the MIDUSS model, Table 6 shows the maximum wet pond elevation of 181.15m, and an active storage volume of 6,580m^3 for the 100-year design storm event. This will provide a freeboard of 0.30m during the 100 year design storm event.

Table 6. Stormwater Management Wet Pond Facility Characteristics

Design Storm (Return Period)	Peak Flows (L/s)			Maximum Elevation (m)	Maximum Volume (m^3)
	Existing	Future			
		Inflow	Outflow		
25mm	84	924	48	180.36	2,183
2 Year	129	1,646	87	180.56	3,185
5 Year	191	2,324	155	180.73	4,113
10 Year	238	2,767	203	180.85	4,769
25 Year	304	3,322	281	180.99	5,590
50 Year	397	3,762	342	181.09	6,171
100 Year	484	4,115	468	181.15	6,580

As seen in Table 6 above, the proposed stormwater management facility will restrict flows from the proposed development area to existing storm levels up to and including the 100-year design storm event.

Table 7 details the difference in peak stormwater flows for existing and future conditions with the constructed and operational stormwater management facility.

Table 7. Impacts of Wet Pond Facility on Peak Flows at Outlet A

Design Storm	Peak Flow (m^3/s)		
	Existing	**Future with SWM**	**Change***
2 Year	0.327	0.285	-12.8%
5 Year	0.513	0.431	-15.4%
10 Year	0.668	0.559	-16.3%
25 Year	0.916	0.757	-17.4%
50 Year	1.168	0.957	-18.1%
100 Year	1.451	1.182	-18.5%

Note: *indicates the percent change between existing conditions and future conditions with stormwater management controls in place.

As shown in Table 7 above, peak stormwater flows discharging from the proposed development site to Outlet A at the south-west corner will ultimately be reduced as a result of the proposed development plan during all storm events.

The proposed facility has a single storm sewer inlet, therefore, the sediment forebay was designed to minimize the transport of heavy sediment from the storm sewer outlet throughout the facility and to localize maintenance activities. Calculations for the forebay sizing follow MECP Guidelines and are shown in Tables 8 for the storm sewer outlet.

Table 8. Stormwater Management Facility Forebay Sizing

a) Forebay Settling Length (MOECC SWMP&D, Equation 4.5)

$$Settling\ Length = \sqrt{\frac{r * Q_p}{V_s}}$$

r =	3.5	:1	(Length:Width Ratio)
Q_p =	0.048	m^3/s	(25mm Storm Pond Discharge)
V_s =	0.0003	m/s	(Settling Velocity)

Settling Length = **23.66 m**

b) Dispersion Length (MOECC SWMP&D, Equation 4.6)

$$Dispersion\ Length = \frac{8 * Q}{D * V_f}$$

Q =	2.324	m^3/s	(5 Yr Stm Sew Design Inflow)
D =	1.50	m	(Depth of Forebay)
V_f =	0.5	m/s	(Desired Velocity)

Dispersion Length = **24.79 m**

c) Minimum Forebay Deep Zone Bottom Width (MOECC SWMP&D, Equation 4.7)

$$Width = \frac{Dispersion\ Length}{8}$$

Minimum Forebay Length from Equations 3.3 and 3.4

24.79 m (minimum required length)

Width = **3.10 m** (minimum required width)

d) Average Velocity of Flow

$$Average\ Velocity = \frac{Q}{A}$$

Q =	0.924	m^3/s	(Quality Design Inflow)
A =	21.75	m^2	(Cross Sectional Area)
D =	1.50	m	(Depth of Forebay)
W =	10.00	m	(Proposed Bottom Width)
S =	3	:1	(Side slopes - minimum)

Average Velocity = **0.04 m/s**

Is this Acceptable? **Yes** (Maximum velocity of flow = 0.15 m/s)

e) Cleanout Frequency

Is this Acceptable? **Yes**

L =	35.0	m	(Proposed Bottom Length)
ASL =	3.13	m^3/ha	(Annual Sediment Loading)
A =	17.58	ha	(Drainage Area)
FRC =	70	%	(Facility Removal Efficiency)
FV =	889.50	m^3	(Forebay Volume)

Cleanout Frequency = **11.3 years**

Is this Acceptable? **Yes** (10 year minimum cleanout frequency)

5.1.5 Proposed Channel

As part of the proposed stormwater management plan, a channel will be constructed to provide an outlet for stormwater flows discharged from the stormwater management facility and surrounding lands. The proposed channel will begin at the south-east corner of the site, providing an outlet for stormwater flows discharging from the adjacent commercial property (287 West Side Road) and surrounding residential lands (Drainage Area A20). The channel will continue west within the existing natural gas easement to the south-west corner of the development and discharge to the future upstream Eagle Marsh Drain limit (Outlet A) at the south-west corner of the site.

As part of the stormwater analysis of this development, the channel has been modelled using the MIDUSS computer modelling program to have capacity for flows up to and including the 100-year design storm event. The channel has been modelled in three sections as follows:

1. Start of channel at south-east corner of development to proposed stormwater management facility outlet.

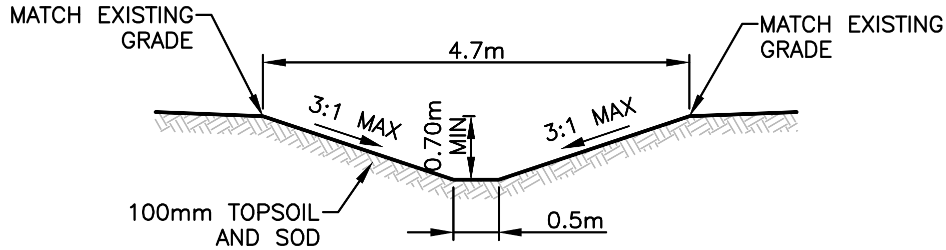
2. SWM facility outlet to south-west corner (Outlet A) of development property.

The modelled sections of the channel have been noted on the Proposed Overall Storm Drainage Area Plan (Figure 3) included previously on Page 9 of this report. The channel modelling was incorporated into the overall development MIDUSS stormwater management model and utilizes input parameters noted previously in the report.

The proposed channel has been modelled to have capacity for stormwater flows from the proposed development and surrounding lands for storm events up to and including the 100-year design storm event. Table 10 below details the stormwater characteristics of the proposed channel conveying stormwater flows from upstream of the SWM facility outlet to the Eagle Marsh Drain during the 100-year design storm event. It is proposed to construct a channel with dimensions and side slopes as detailed in Table 10. Cross sections of the proposed channel have been included on the next page.

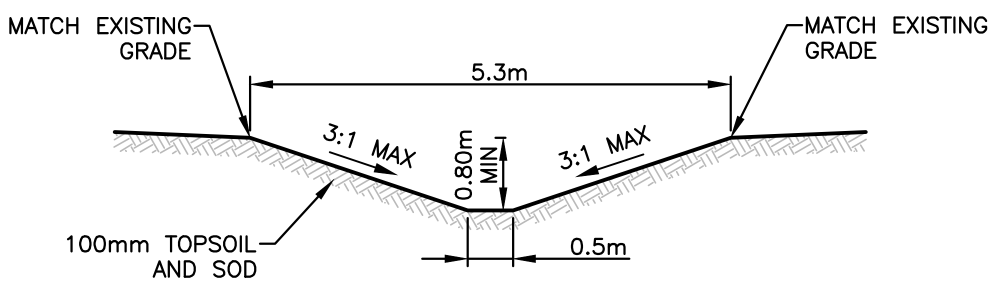
Table 9. Channel Characteristics

Channel Section	Length (m)	Base Width (m)	Slope (%)	Side Slopes	Minimum Proposed Channel Depth (m)	Peak Flow Rate (m^3/s)	100-Year Peak Flow Depth (m)
1 – Start	50	0.5	0.30	3:1	0.70m	0.694	0.64
2 – End	200	0.5	0.20	3:1	0.80m	0.843	0.76



CHANNEL CROSS SECTION '1'

CONSTRUCTED FROM SOUTH -EAST CORNER OF DEVELOPMENT TO SWM FACILITY OUTLET



CHANNEL CROSS SECTION '2'

CONSTRUCTED FROM SWM FACILITY OUTLET TO SOUTH-WEST CORNER OF DEVELOPMENT SITE (OUTLET 'A')

UPPER CANADA CONSULTANTS
ENGINEERS / PLANNERS

NORTHLAND ESTATES

CITY OF PORT COLBORNE

CHANNEL CROSS SECTIONS

DATE	2024-05-24
SCALE	N.T.S.
REF No.	21132
DWG No.	FIGURE 6

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6.0 SEDIMENT AND EROSION CONTROL

Sediment and erosion controls are required during all construction phases of this development to limit the transport of sediment into the adjacent Locally Significant Wetland as well as the Eagle Marsh Drain.

The following additional erosion and sediment controls will also be implemented during construction:

- Install silt control fencing along the limits of construction of the development to collect sediment in overland flows before discharging to downstream systems. The silt control fence installed along east end of site will be installed along the wetland buffer to act as the limit of construction.

- Re-vegetate disturbed areas as soon as possible after grading works have been completed.

- Lot grading and siltation controls plans will be provided with sediment and erosion control measures to the appropriate agencies for approval during the final design stage.

7.0 STORMWATER MANAGEMENT FACILITY MAINTENANCE

7.1 Wetpond Facility

Maintenance is a necessary and important aspect of urban stormwater quality and quantity measures such as constructed wetlands. Many pollutants (ie. nutrients, metals, bacteria, etc.) bind to sediment and therefore removal of sediment on a scheduled basis is required.

The wet pond for this development is subject to frequent wetting and deposition of sediments as a result of frequent low intensity storm events. The purpose of the wet pond is to improve post development sediment and contaminant loadings by detaining the 'first flush' flow for a 24 hour period. For the initial operation period of the stormwater management facility, the required frequency of maintenance is not definitively known and many of the maintenance tasks will be performed on an 'as required' basis. For example, during the home construction phase of the development there will be a greater potential for increased maintenance frequency, which depends on the effectiveness of sediment and erosion control techniques employed.

Inspections of the wet pond will indicate whether or not maintenance is required. Inspections should be made after every significant storm during the first two years of operation or until all development is completed to ensure the wet pond is functioning properly. This may translate into an average of six inspections per year. Once all building activity is finalized, inspections shall be performed annually. The following points should be addressed during inspections of the facility.

a) Standing water above the inlet storm sewer invert a day or more after a storm may indicate a blockage in the reverse slope pipe or orifice. The blockage may be caused by trash or sediment and a visual inspection would be required to determine the cause.

b) The vegetation around the wet pond should be inspected to ensure its function and aesthetics. Visual inspections will indicate whether replacement of plantings are required. A decline in vegetation habitat may indicate that other aspects of the constructed wet pond are operating improperly, such as the detention times may be inadequate or excessive.

c) The accumulation of sediment and debris at the wet pond inlet sediment forebay or around the high water line of the wet pond should be inspected. This will indicate the need for sediment removal or debris clean up.

d) The wet pond has been created by excavating a detention area. The integrity of the embankments should be periodically checked to ensure that it remains watertight and the side slopes have not sloughed.

Grass cutting is a maintenance activity that is done solely for aesthetic purposes. It is recommended that grass cutting be eliminated. It should be noted that municipal by-laws may require regular grass maintenance for weed control.

Trash removal is an integral part of maintenance and an annual cleanup, usually in the spring, is a minimum requirement. After this, trash removal is performed as required basis on observation of trash build-up during inspections.

To ensure long term effectiveness, the sediment that accumulates in the forebay area should be removed periodically to ensure that sediment in not deposited throughout the facility. For sediment removal operations, typical grading/excavating equipment should be used to remove sediment from the inlet forebay and detention areas. Care should be taken to ensure that limited damage occurs to existing vegetation and habitat.

Generally, the sediment which is removed from the detention pond will not be contaminated to the point that it would be classified as hazardous waste. However, the sediment should be tested to determine the disposal options.

8.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the findings of this study, the following conclusions are offered:

- Infiltration techniques are not suitable for this site as the primary control facility due to the low soil infiltration rates and the large drainage area for this development.

- The proposed stormwater management facilities will provide stormwater quality and quantity controls for the approximately 17.99-hectare catchment area.

- The proposed channel will convey stormwater flows from the proposed stormwater management facility and surrounding lands directly to the Eagle Marsh Drain.

- Various lot level vegetative stormwater management practices can be implemented to enhance stormwater quality.

- This report was prepared in accordance with the provincial guidelines contained in "Stormwater Management Planning and Design Manual, March 2003".

The above conclusions lead to the following recommendations:

- That the stormwater management criteria established in this report be accepted.

- That a stormwater management wet pond facility be constructed to provide stormwater quality protection to MECP *Normal* Protection levels and quantity controls as outlined in this report.

- That additional lot level controls and vegetative stormwater management practices as described previously in this report be implemented.

Prepared By:

Kurt Tiessen, E.I.T.

LICENSED PROFESSIONAL ENGINEER
J. P. SCHOOLEY
PROVINCE OF ONTARIO

Reviewed By:

Jason Schooley, P.Eng.

Revised May 24, 2024

APPENDICES

APPENDIX A

Weighted Impervious Calculation Sheet
Stormwater Management Facility Calculations

Weighted Imperviousness Percentage Calculation Worksheet

Project Name:	Northland Estates
Project Number:	21132
Date:	May 2024
Person:	K. Tiessen E.I.T

EX10 - EXISTING CONDITIONS

	Footprint	*% Impervious*		*Effective Impervious Area*
Residential Dwellings	5108.1 m^2	100.0%	ea	5108.1 m^2
Open Space	129385.9 m^2	2%	ea	2587.7 m^2
Northland Roadway	1731.0 m^2	100%	ea	1731.0 m^2
TOTAL CATCHMENT IMPERVIOUS AREAS				9,427 m^2
TOTAL CATCHMENT AREA				136,225 m^2
			EFFECTIVE WEIGHTED CATCHMENT % IMPERVIOUS	**6.9 %**
			RUNOFF COEFFICIENT	**0.25**

EX30 - EXISTING CONDITIONS

	Footprint	*% Impervious*		*Effective Impervious Area*
Residential Dwellings	468.4 m^2	100.0%	ea	468.4 m^2
Open Space	36193.6 m^2	0%	ea	36.2 m^2
TOTAL CATCHMENT IMPERVIOUS AREAS				505 m^2
TOTAL CATCHMENT AREA				36,662 m^2
			EFFECTIVE WEIGHTED CATCHMENT % IMPERVIOUS	**1.4 %**
			RUNOFF COEFFICIENT	**0.21**

EX50 - EXISTING CONDITIONS

	Footprint	*% Impervious*		*Effective Impervious Area*
Residential Dwellings	2519.7 m^2	100.0%	ea	2519.7 m^2
Open Space	120794.5 m^2	0%	ea	120.8 m^2
TOTAL CATCHMENT IMPERVIOUS AREAS				2,640 m^2
TOTAL CATCHMENT AREA				123,314 m^2
			EFFECTIVE WEIGHTED CATCHMENT % IMPERVIOUS	**2.1 %**
			RUNOFF COEFFICIENT	**0.21**

EX20/A20 - EXISTING/FUTURE CONDITIONS

	Footprint	*% Impervious*		*Effective Impervious Area*
Residential Dwellings	265.2 m^2	100.0%	ea	265.2 m^2
Commercial Area	21633.8 m^2	100%	ea	21633.8 m^2
Open Space	8284.3 m^2	0%	ea	8.3 m^2
TOTAL CATCHMENT IMPERVIOUS AREAS				21,907 m^2
TOTAL CATCHMENT AREA				30,183 m^2
			EFFECTIVE WEIGHTED CATCHMENT % IMPERVIOUS	**72.6 %**
			RUNOFF COEFFICIENT	**0.71**

A30 - FUTURE CONDITIONS				
	Footprint	*% Impervious*		*Effective Impervious Area*
Residential Dwellings	468.4 m^2	100.0%	ea	468.4 m^2
Open Space	36193.6 m^2	0%	ea	36.2 m^2
TOTAL CATCHMENT IMPERVIOUS AREAS				505 m^2
TOTAL CATCHMENT AREA				36,662 m^2
			EFFECTIVE WEIGHTED CATCHMENT % IMPERVIOUS	**1.4 %**
			RUNOFF COEFFICIENT	**0.21**

A40 - FUTURE CONDITIONS				
	Footprint	*% Impervious*		*Effective Impervious Area*
Future Single Residential	4968.4 m^2	28.6%	ea	1421.0 m^2
Open Space	33977.2 m^2	0%	ea	34.0 m^2
TOTAL CATCHMENT IMPERVIOUS AREAS				1,455 m^2
TOTAL CATCHMENT AREA				38,946 m^2
			EFFECTIVE WEIGHTED CATCHMENT % IMPERVIOUS	**3.7 %**
			RUNOFF COEFFICIENT	**0.23**

A50 - FUTURE CONDITIONS				
	Footprint	*% Impervious*		*Effective Impervious Area*
Existing Residential Dwellings	1079.7 m^2	100.0%	ea	1079.7 m^2
Open Space	90692.0 m^2	0%	ea	90.7 m^2
TOTAL CATCHMENT IMPERVIOUS AREAS				1,170 m^2
TOTAL CATCHMENT AREA				91,772 m^2
			EFFECTIVE WEIGHTED CATCHMENT % IMPERVIOUS	**1.3 %**
			RUNOFF COEFFICIENT	**0.21**

Upper Canada Consultants
30 HANNOVER DRIVE, UNIT 3
St. Catharines, Ontario L2W 1A3

DATE: MAY 2024

PROJECT NAME: **NORTHLAND ESTATES**
PROJECT NO.: **21132**

STORMWATER MANAGEMENT FACILITY WETPOND

Quality Requirements

- Drainage Area (ha) = 17.53
- Normal (m^3/ha) = 137 (@ 75% Imp)
- Perm Pool (m^3/ha) = 97
- Perm Pool Vol (m^3) = 1,695
- Active Vol (m^3) 701
- 25mm MOEE (m^3) 2,447 m^3
- **Perm. Pool Elev. =** 179.90 m

Quality Orifice

- Diameter (m) = 0.203
- Cd = 0.63
- Invert (m) = 179.90

Ditch Inlet Weir

- Length (m) = 0.60
- Width (m) = 0.60
- Grate Slope (X:1) = 5
- Inlet Elevation (m) = 180.50
- Cd = 1.84

Outflow Pipe Orifice

- Diameter (m) = 0.457
- Cd = 0.63
- Invert (m) = 179.90
- Overt (m) = 180.36

Overflow Spillway

- Minor Length (m) = 2.00
- Slopes (X:1) = 2.00
- Minor Invert (m) = 181.10

MOE Equation 4.11 Drawdown Coefficient 'C2' = 1,624
MOE Equation 4.11 Drawdown Coefficient 'C3' = 4,251
MOE Equation 4.11 Drawdown Time (h) = **24.2**

Elevation	Increment Depth (m)	Active Depth (m)	Surface Area (m^2)	Average Surface Area (m^2)	Increment Volume (m^3)	Permanent Volume (m^3)	Active Volume (m^3)	Quality Orifice (m^3/s)	Ditch Inlet (m^3/s)	Max Pipe Orifice (m^3/s)	Overflow Spillway (m^3/s)	Total Outflow (m^3/s)	Average Discharge (m^3/s)	Average Drawdown Time (hr)
178.90		-1.00	2,147			0								
	0.50			2,440	1,220									
179.40		-0.50	2,733			1,220								
	0.50			3,050	1,525									
179.90		0.00	**3,368**			**2,745**								
	0.00			3,809	0									
179.90		0.00	4,251				0.0	0.000	0.000	0.00	0.00	0.000		
	0.60			4,738	2,843								0.031	
180.50		0.60	5,225				**2842.9**	0.062	0.000	0.249	0.000	0.062		25.65
	0.40			5,519	2,208								0.143	
180.90		1.00	5,813				5050.5	0.084	0.140	0.382	0.000	0.224		29.95
	0.20			5,964	1,193								0.287	
181.10		1.20	6,116				6243.3	0.093	0.257	0.433	0.000	0.350		31.11
	0.15			6,231	935								0.514	
181.25		1.35	6,347				7177.9	0.100	0.359	0.468	0.220	0.678		31.61
	0.20			6,504	1,301								1.038	
181.45		1.55	6,661				**8478.7**	0.107	0.511	0.511	0.888	1.399		31.96

Notes

1. Quality Orifice flow is the orifice controlling for the 24 hour detention period and uses an orifice formula.
2. Pipe Orifice flow is calculated using an orifice formula on the pipe from the ditch inlet to the outlet and uses the total head on the orifice.
3. Overflow Weir flow is calculated using a trapezondial weir to convey outflow for less frequent storms through the embankment with an emergency spillway.
4. Total Outflow is calculated by adding the Overflow Spillway with the lowest of Quality Orifice plus Ditch Inlet or Max Pipe Orifice.

APPENDIX B

MIDUSS Output Files

Existing Conditions

```
        Output File (4.7) EX.OUT      opened 2024-05-24  14:20
        Units used are defined by G =    9.810
           24  144   10.000       are MAXDT MAXHYD & DTMIN values
        Licensee: UPPER CANADA CONSULTANTS
 35     COMMENT
       4    line(s) of comment
        PROJECT NAME: NORTHLAND ESTATES, PORT COLBORNE
        PROJECT NO.:  21132
        STORMWATER MANAGEMENT ANALYSIS MAY 2022
        EXISTING CONDITIONS
 14     START
       1    1=Zero; 2=Define
 35     COMMENT
       3    line(s) of comment
        *****************************
        ** 25mm DESIGN STORM EVENT **
        *****************************
  2     STORM
          1    1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
     512.000    Coefficient  a
       6.000    Constant  b   (min)
        .800    Exponent  c
        .400    Fraction to peak  r
     240.000    Duration ó  240 min
              25.036 mm    Total depth
  3     IMPERVIOUS
          1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .013    Manning "n"
      98.000    SCS Curve No or C
        .100    Ia/S Coefficient
        .518    Initial Abstraction
  4     CATCHMENT
      20.000    ID No.ó 99999
       3.020    Area in hectares
     100.000    Length (PERV) metres
        .500    Gradient (%)
      72.600    Per cent Impervious
     100.000    Length (IMPERV)
        .000    %Imp. with Zero Dpth
          1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250    Manning "n"
      77.000    SCS Curve No or C
        .100    Ia/S Coefficient
       7.587    Initial Abstraction
          1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .202      .000      .000      .000 c.m/s
             .130      .797      .614     C perv/imperv/total
 15     ADD RUNOFF
             .202      .202      .000      .000 c.m/s
 27     HYDROGRAPH DISPLAY
       5    is # of Hyeto/Hydrograph chosen
        Volume  =  .4636960E+03 c.m
 11     CHANNEL
        .500    Base Width    =
      10.000    Left  bank slope  1:
      10.000    Right bank slope  1:
        .060    Manning's "n"
       1.000    O/a Depth in metres
        .100    Select Grade in %
       Depth         =     .326 metres
       Velocity      =     .164 m/sec
       Flow Capacity =    3.531 c.m/s
       Critical depth =     .130 metres
  9     ROUTE
      50.000    Conduit Length
        .000    Supply X-factor <.5
     228.369    Supply K-lag (sec)
        .808    Beta weighting factor
     600.000    Routing timestep
          1    No. of sub-reaches
             .202      .202      .179      .000 c.m/s
 17     COMBINE
       1    Junction Node No.
             .202      .202      .179      .179 c.m/s
 14     START
       1    1=Zero; 2=Define
  4     CATCHMENT
      10.000    ID No.ó 99999
      13.620    Area in hectares
     500.000    Length (PERV) metres
       2.000    Gradient (%)
       6.900    Per cent Impervious
     500.000    Length (IMPERV)
        .000    %Imp. with Zero Dpth
          1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250    Manning "n"
      77.000    SCS Curve No or C
        .100    Ia/S Coefficient
       7.587    Initial Abstraction
          1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .084      .000      .179      .179 c.m/s
             .130      .804      .177     C perv/imperv/total
 15     ADD RUNOFF
             .084      .084      .179      .179 c.m/s
 27     HYDROGRAPH DISPLAY
       5    is # of Hyeto/Hydrograph chosen
        Volume  =  .6027209E+03 c.m
  9     ROUTE
        .000    Conduit Length
        .500    Supply X-factor <.5
        .000    Supply K-lag (sec)
        .500    Beta weighting factor
     600.000    Routing timestep
          1    No. of sub-reaches
             .084      .084      .084      .179 c.m/s
 17     COMBINE
       1    Junction Node No.
             .084      .084      .084      .263 c.m/s
 18     CONFLUENCE
       1    Junction Node No.
             .084      .263      .084      .000 c.m/s
  4     CATCHMENT
      30.000    ID No.ó 99999
       3.670    Area in hectares
      80.000    Length (PERV) metres
        .500    Gradient (%)
       1.400    Per cent Impervious
      80.000    Length (IMPERV)
        .000    %Imp. with Zero Dpth
          1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250    Manning "n"
      77.000    SCS Curve No or C
        .100    Ia/S Coefficient
       7.587    Initial Abstraction
          1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .010      .263      .084      .000 c.m/s
             .130      .785      .139     C perv/imperv/total
 15     ADD RUNOFF
             .010      .269      .084      .000 c.m/s
 11     CHANNEL
        .500    Base Width    =
      10.000    Left  bank slope  1:
      10.000    Right bank slope  1:
        .060    Manning's "n"
       1.000    O/a Depth in metres
        .100    Select Grade in %
       Depth         =     .366 metres
       Velocity      =     .177 m/sec
       Flow Capacity =    3.531 c.m/s
       Critical depth =     .148 metres
  9     ROUTE
     200.000    Conduit Length
        .135    Supply X-factor <.5
     849.757    Supply K-lag (sec)
        .500    Beta weighting factor
     600.000    Routing timestep
          1    No. of sub-reaches
             .010      .269      .193      .000 c.m/s
 17     COMBINE
       2    Junction Node No.
             .010      .269      .193      .193 c.m/s
 14     START
       1    1=Zero; 2=Define
  4     CATCHMENT
      40.000    ID No.ó 99999
       4.640    Area in hectares
     100.000    Length (PERV) metres
        .500    Gradient (%)
        .100    Per cent Impervious
     100.000    Length (IMPERV)
        .000    %Imp. with Zero Dpth
          1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250    Manning "n"
      77.000    SCS Curve No or C
        .100    Ia/S Coefficient
       7.587    Initial Abstraction
          1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .011      .000      .193      .193 c.m/s
             .130      .797      .131     C perv/imperv/total
 15     ADD RUNOFF
             .011      .011      .193      .193 c.m/s
  4     CATCHMENT
      50.000    ID No.ó 99999
      12.330    Area in hectares
     350.000    Length (PERV) metres
       1.000    Gradient (%)
       2.100    Per cent Impervious
     350.000    Length (IMPERV)
        .000    %Imp. with Zero Dpth
          1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250    Manning "n"
      77.000    SCS Curve No or C
        .100    Ia/S Coefficient
       7.587    Initial Abstraction
          1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .024      .011      .193      .193 c.m/s
             .130      .803      .144     C perv/imperv/total
 15     ADD RUNOFF
             .024      .029      .193      .193 c.m/s
  9     ROUTE
        .000    Conduit Length
        .500    Supply X-factor <.5
        .000    Supply K-lag (sec)
        .500    Beta weighting factor
     600.000    Routing timestep
          1    No. of sub-reaches
             .024      .029      .029      .193 c.m/s
 17     COMBINE
       2    Junction Node No.
             .024      .029      .029      .214 c.m/s
 18     CONFLUENCE
       2    Junction Node No.
             .024      .214      .029      .000 c.m/s
 27     HYDROGRAPH DISPLAY
       5    is # of Hyeto/Hydrograph chosen
        Volume  =  .1786801E+04 c.m
 14     START
       1    1=Zero; 2=Define
 35     COMMENT
       3    line(s) of comment
        *******************************
        ** 2 YEAR DESIGN STORM EVENT **
        *******************************
  2     STORM
          1    1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
     397.149    Coefficient  a
        .000    Constant  b   (min)
        .699    Exponent  c
        .400    Fraction to peak  r
     240.000    Duration ó  240 min
              34.453 mm    Total depth
  3     IMPERVIOUS
          1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .013    Manning "n"
      98.000    SCS Curve No or C
        .100    Ia/S Coefficient
        .518    Initial Abstraction
  4     CATCHMENT
      20.000    ID No.ó 99999
       3.020    Area in hectares
     100.000    Length (PERV) metres
        .500    Gradient (%)
      72.600    Per cent Impervious
     100.000    Length (IMPERV)
        .000    %Imp. with Zero Dpth
          1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250    Manning "n"
      77.000    SCS Curve No or C
        .100    Ia/S Coefficient
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      7.587    Initial Abstraction
         1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
            .275      .000      .029      .000 c.m/s
            .204      .828      .657    C perv/imperv/total
15    ADD RUNOFF
            .275      .275      .029      .000 c.m/s
27    HYDROGRAPH DISPLAY
     5    is # of Hyeto/Hydrograph chosen
      Volume  =  .6835738E+03 c.m
11    CHANNEL
       .500    Base Width    =
     10.000    Left  bank slope  1:
     10.000    Right bank slope  1:
       .060    Manning's "n"
      1.000    O/a Depth in metres
       .100    Select Grade in %
      Depth         =     .369 metres
      Velocity      =     .178 m/sec
      Flow Capacity =    3.531 c.m/s
      Critical depth =     .150 metres
 9    ROUTE
     50.000    Conduit Length
       .000    Supply X-factor <.5
    211.250    Supply K-lag (sec)
       .842    Beta weighting factor
    600.000    Routing timestep
         1    No. of sub-reaches
            .275      .275      .257      .000 c.m/s
17    COMBINE
     1    Junction Node No.
            .275      .275      .257      .257 c.m/s
14    START
     1    1=Zero; 2=Define
 4    CATCHMENT
     10.000    ID No.ó 99999
     13.620    Area in hectares
    500.000    Length (PERV) metres
      2.000    Gradient (%)
      6.900    Per cent Impervious
    500.000    Length (IMPERV)
       .000    %Imp. with Zero Dpth
         1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250    Manning "n"
     77.000    SCS Curve No or C
       .100    Ia/S Coefficient
      7.587    Initial Abstraction
         1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
            .129      .000      .257      .257 c.m/s
            .204      .847      .248    C perv/imperv/total
15    ADD RUNOFF
            .129      .129      .257      .257 c.m/s
27    HYDROGRAPH DISPLAY
     5    is # of Hyeto/Hydrograph chosen
      Volume  =  .1164711E+04 c.m
 9    ROUTE
       .000    Conduit Length
       .500    Supply X-factor <.5
       .000    Supply K-lag (sec)
       .500    Beta weighting factor
    600.000    Routing timestep
         1    No. of sub-reaches
            .129      .129      .129      .257 c.m/s
17    COMBINE
     1    Junction Node No.
            .129      .129      .129      .386 c.m/s
18    CONFLUENCE
     1    Junction Node No.
            .129      .386      .129      .000 c.m/s
 4    CATCHMENT
     30.000    ID No.ó 99999
      3.670    Area in hectares
     80.000    Length (PERV) metres
       .500    Gradient (%)
      1.400    Per cent Impervious
     80.000    Length (IMPERV)
       .000    %Imp. with Zero Dpth
         1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250    Manning "n"
     77.000    SCS Curve No or C
       .100    Ia/S Coefficient
      7.587    Initial Abstraction
         1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
            .025      .386      .129      .000 c.m/s
            .204      .838      .213    C perv/imperv/total
15    ADD RUNOFF
            .025      .399      .129      .000 c.m/s
11    CHANNEL
       .500    Base Width    =
     10.000    Left  bank slope  1:
     10.000    Right bank slope  1:
       .060    Manning's "n"
      1.000    O/a Depth in metres
       .100    Select Grade in %
      Depth         =     .428 metres
      Velocity      =     .195 m/sec
      Flow Capacity =    3.531 c.m/s
      Critical depth =     .177 metres
 9    ROUTE
    200.000    Conduit Length
       .077    Supply X-factor <.5
    769.853    Supply K-lag (sec)
       .500    Beta weighting factor
    600.000    Routing timestep
         1    No. of sub-reaches
            .025      .399      .284      .000 c.m/s
17    COMBINE
     2    Junction Node No.
            .025      .399      .284      .284 c.m/s
14    START
     1    1=Zero; 2=Define
 4    CATCHMENT
     40.000    ID No.ó 99999
      4.640    Area in hectares
    100.000    Length (PERV) metres
       .500    Gradient (%)
       .100    Per cent Impervious
    100.000    Length (IMPERV)
       .000    %Imp. with Zero Dpth
         1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250    Manning "n"
     77.000    SCS Curve No or C
       .100    Ia/S Coefficient
      7.587    Initial Abstraction
         1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
            .028      .000      .284      .284 c.m/s
            .204      .828      .205    C perv/imperv/total
15    ADD RUNOFF
            .028      .028      .284      .284 c.m/s
 4    CATCHMENT
     50.000    ID No.ó 99999
     12.330    Area in hectares
    350.000    Length (PERV) metres
      1.000    Gradient (%)
      2.100    Per cent Impervious
    350.000    Length (IMPERV)
       .000    %Imp. with Zero Dpth
         1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250    Manning "n"
     77.000    SCS Curve No or C
       .100    Ia/S Coefficient
      7.587    Initial Abstraction
         1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
            .051      .028      .284      .284 c.m/s
            .204      .848      .217    C perv/imperv/total
15    ADD RUNOFF
            .051      .078      .284      .284 c.m/s
 9    ROUTE
       .000    Conduit Length
       .500    Supply X-factor <.5
       .000    Supply K-lag (sec)
       .500    Beta weighting factor
    600.000    Routing timestep
         1    No. of sub-reaches
            .051      .078      .078      .284 c.m/s
17    COMBINE
     2    Junction Node No.
            .051      .078      .078      .327 c.m/s
18    CONFLUENCE
     2    Junction Node No.
            .051      .327      .078      .000 c.m/s
27    HYDROGRAPH DISPLAY
     5    is # of Hyeto/Hydrograph chosen
      Volume  =  .3363599E+04 c.m
14    START
     1    1=Zero; 2=Define
35    COMMENT
     3    line(s) of comment
      *******************************
      ** 5 YEAR DESIGN STORM EVENT **
      *******************************
 2    STORM
         1    1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
    524.867    Coefficient  a
       .000    Constant  b   (min)
       .699    Exponent  c
       .400    Fraction to peak  r
    240.000    Duration ó  240 min
              45.533 mm    Total depth
 3    IMPERVIOUS
         1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .013    Manning "n"
     98.000    SCS Curve No or C
       .100    Ia/S Coefficient
       .518    Initial Abstraction
 4    CATCHMENT
     20.000    ID No.ó 99999
      3.020    Area in hectares
    100.000    Length (PERV) metres
       .500    Gradient (%)
     72.600    Per cent Impervious
    100.000    Length (IMPERV)
       .000    %Imp. with Zero Dpth
         1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250    Manning "n"
     77.000    SCS Curve No or C
       .100    Ia/S Coefficient
      7.587    Initial Abstraction
         1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
            .364      .000      .078      .000 c.m/s
            .278      .869      .707    C perv/imperv/total
15    ADD RUNOFF
            .364      .364      .078      .000 c.m/s
27    HYDROGRAPH DISPLAY
     5    is # of Hyeto/Hydrograph chosen
      Volume  =  .9720645E+03 c.m
11    CHANNEL
       .500    Base Width    =
     10.000    Left  bank slope  1:
     10.000    Right bank slope  1:
       .060    Manning's "n"
      1.000    O/a Depth in metres
       .100    Select Grade in %
      Depth         =     .413 metres
      Velocity      =     .191 m/sec
      Flow Capacity =    3.531 c.m/s
      Critical depth =     .170 metres
 9    ROUTE
     50.000    Conduit Length
       .000    Supply X-factor <.5
    196.842    Supply K-lag (sec)
       .873    Beta weighting factor
    600.000    Routing timestep
         1    No. of sub-reaches
            .364      .364      .350      .000 c.m/s
17    COMBINE
     1    Junction Node No.
            .364      .364      .350      .350 c.m/s
14    START
     1    1=Zero; 2=Define
 4    CATCHMENT
     10.000    ID No.ó 99999
     13.620    Area in hectares
    500.000    Length (PERV) metres
      2.000    Gradient (%)
      6.900    Per cent Impervious
    500.000    Length (IMPERV)
       .000    %Imp. with Zero Dpth
         1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250    Manning "n"
     77.000    SCS Curve No or C
       .100    Ia/S Coefficient
      7.587    Initial Abstraction
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      1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
         .191      .000      .350      .350 c.m/s
         .278      .884      .320    C perv/imperv/total
15    ADD RUNOFF
         .191      .191      .350      .350 c.m/s
27    HYDROGRAPH DISPLAY
   5    is # of Hyeto/Hydrograph chosen
    Volume  =  .1982292E+04 c.m
 9    ROUTE
     .000    Conduit Length
     .500    Supply X-factor <.5
     .000    Supply K-lag (sec)
     .500    Beta weighting factor
  600.000    Routing timestep
      1    No. of sub-reaches
         .191      .191      .191      .350 c.m/s
17    COMBINE
   1    Junction Node No.
         .191      .191      .191      .541 c.m/s
18    CONFLUENCE
   1    Junction Node No.
         .191      .541      .191      .000 c.m/s
 4    CATCHMENT
   30.000    ID No.ó 99999
    3.670    Area in hectares
   80.000    Length (PERV) metres
     .500    Gradient (%)
    1.400    Per cent Impervious
   80.000    Length (IMPERV)
     .000    %Imp. with Zero Dpth
      1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
     .250    Manning "n"
   77.000    SCS Curve No or C
     .100    Ia/S Coefficient
    7.587    Initial Abstraction
      1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
         .059      .541      .191      .000 c.m/s
         .278      .877      .286    C perv/imperv/total
15    ADD RUNOFF
         .059      .570      .191      .000 c.m/s
11    CHANNEL
     .500    Base Width    =
   10.000    Left  bank slope  1:
   10.000    Right bank slope  1:
     .060    Manning's "n"
    1.000    O/a Depth in metres
     .100    Select Grade in %
    Depth        =     .493 metres
    Velocity      =     .213 m/sec
    Flow Capacity  =    3.531 c.m/s
    Critical depth =     .208 metres
 9    ROUTE
  200.000    Conduit Length
     .016    Supply X-factor <.5
  703.815    Supply K-lag (sec)
     .500    Beta weighting factor
  600.000    Routing timestep
      1    No. of sub-reaches
         .059      .570      .414      .000 c.m/s
17    COMBINE
   2    Junction Node No.
         .059      .570      .414      .414 c.m/s
14    START
   1    1=Zero; 2=Define
 4    CATCHMENT
   40.000    ID No.ó 99999
    4.640    Area in hectares
  100.000    Length (PERV) metres
     .500    Gradient (%)
     .100    Per cent Impervious
  100.000    Length (IMPERV)
     .000    %Imp. with Zero Dpth
      1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
     .250    Manning "n"
   77.000    SCS Curve No or C
     .100    Ia/S Coefficient
    7.587    Initial Abstraction
      1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
         .069      .000      .414      .414 c.m/s
         .278      .869      .278    C perv/imperv/total
15    ADD RUNOFF
         .069      .069      .414      .414 c.m/s
 4    CATCHMENT
   50.000    ID No.ó 99999
   12.330    Area in hectares
  350.000    Length (PERV) metres
    1.000    Gradient (%)
    2.100    Per cent Impervious
  350.000    Length (IMPERV)
     .000    %Imp. with Zero Dpth
      1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
     .250    Manning "n"
   77.000    SCS Curve No or C
     .100    Ia/S Coefficient
    7.587    Initial Abstraction
      1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
         .119      .069      .414      .414 c.m/s
         .278      .884      .291    C perv/imperv/total
15    ADD RUNOFF
         .119      .178      .414      .414 c.m/s
 9    ROUTE
     .000    Conduit Length
     .500    Supply X-factor <.5
     .000    Supply K-lag (sec)
     .500    Beta weighting factor
  600.000    Routing timestep
      1    No. of sub-reaches
         .119      .178      .178      .414 c.m/s
17    COMBINE
   2    Junction Node No.
         .119      .178      .178      .513 c.m/s
18    CONFLUENCE
   2    Junction Node No.
         .119      .513      .178      .000 c.m/s
27    HYDROGRAPH DISPLAY
   5    is # of Hyeto/Hydrograph chosen
    Volume  =  .5645400E+04 c.m
14    START
   1    1=Zero; 2=Define
35    COMMENT
   3    line(s) of comment
```

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      ********************************
      ** 10 YEAR DESIGN STORM EVENT **
      ********************************
 2    STORM
      1    1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
  608.845    Coefficient  a
     .000    Constant  b   (min)
     .699    Exponent  c
     .400    Fraction to peak  r
  240.000    Duration ó  240 min
          52.818 mm    Total depth
 3    IMPERVIOUS
      1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
     .013    Manning "n"
   98.000    SCS Curve No or C
     .100    Ia/S Coefficient
     .518    Initial Abstraction
 4    CATCHMENT
   20.000    ID No.ó 99999
    3.020    Area in hectares
  100.000    Length (PERV) metres
     .500    Gradient (%)
   72.600    Per cent Impervious
  100.000    Length (IMPERV)
     .000    %Imp. with Zero Dpth
      1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
     .250    Manning "n"
   77.000    SCS Curve No or C
     .100    Ia/S Coefficient
    7.587    Initial Abstraction
      1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
         .442      .000      .178      .000 c.m/s
         .320      .887      .732    C perv/imperv/total
15    ADD RUNOFF
         .442      .442      .178      .000 c.m/s
27    HYDROGRAPH DISPLAY
   5    is # of Hyeto/Hydrograph chosen
    Volume  =  .1167105E+04 c.m
11    CHANNEL
     .500    Base Width    =
   10.000    Left  bank slope  1:
   10.000    Right bank slope  1:
     .060    Manning's "n"
    1.000    O/a Depth in metres
     .100    Select Grade in %
    Depth        =     .446 metres
    Velocity      =     .200 m/sec
    Flow Capacity  =    3.531 c.m/s
    Critical depth =     .186 metres
 9    ROUTE
   50.000    Conduit Length
     .000    Supply X-factor <.5
  187.592    Supply K-lag (sec)
     .894    Beta weighting factor
  600.000    Routing timestep
      1    No. of sub-reaches
         .442      .442      .411      .000 c.m/s
17    COMBINE
   1    Junction Node No.
         .442      .442      .411      .411 c.m/s
14    START
   1    1=Zero; 2=Define
 4    CATCHMENT
   10.000    ID No.ó 99999
   13.620    Area in hectares
  500.000    Length (PERV) metres
    2.000    Gradient (%)
    6.900    Per cent Impervious
  500.000    Length (IMPERV)
     .000    %Imp. with Zero Dpth
      1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
     .250    Manning "n"
   77.000    SCS Curve No or C
     .100    Ia/S Coefficient
    7.587    Initial Abstraction
      1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
         .238      .000      .411      .411 c.m/s
         .320      .898      .360    C perv/imperv/total
15    ADD RUNOFF
         .238      .238      .411      .411 c.m/s
27    HYDROGRAPH DISPLAY
   5    is # of Hyeto/Hydrograph chosen
    Volume  =  .2587458E+04 c.m
 9    ROUTE
     .000    Conduit Length
     .500    Supply X-factor <.5
     .000    Supply K-lag (sec)
     .500    Beta weighting factor
  600.000    Routing timestep
      1    No. of sub-reaches
         .238      .238      .238      .411 c.m/s
17    COMBINE
   1    Junction Node No.
         .238      .238      .238      .649 c.m/s
18    CONFLUENCE
   1    Junction Node No.
         .238      .649      .238      .000 c.m/s
 4    CATCHMENT
   30.000    ID No.ó 99999
    3.670    Area in hectares
   80.000    Length (PERV) metres
     .500    Gradient (%)
    1.400    Per cent Impervious
   80.000    Length (IMPERV)
     .000    %Imp. with Zero Dpth
      1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
     .250    Manning "n"
   77.000    SCS Curve No or C
     .100    Ia/S Coefficient
    7.587    Initial Abstraction
      1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
         .093      .649      .238      .000 c.m/s
         .320      .893      .328    C perv/imperv/total
15    ADD RUNOFF
         .093      .695      .238      .000 c.m/s
11    CHANNEL
     .500    Base Width    =
   10.000    Left  bank slope  1:
   10.000    Right bank slope  1:
     .060    Manning's "n"
    1.000    O/a Depth in metres
```

```
      .100    Select Grade in %
     Depth        =     .533 metres
     Velocity     =     .224 m/sec
     Flow Capacity =    3.531 c.m/s
     Critical depth =     .227 metres
 9    ROUTE
   200.000    Conduit Length
      .000    Supply X-factor <.5
   669.769    Supply K-lag (sec)
      .524    Beta weighting factor
   600.000    Routing timestep
        1    No. of sub-reaches
          .093      .695      .511      .000 c.m/s
17    COMBINE
    2    Junction Node No.
          .093      .695      .511      .511 c.m/s
14    START
    1    1=Zero; 2=Define
 4    CATCHMENT
    40.000    ID No.ó 99999
     4.640    Area in hectares
   100.000    Length (PERV) metres
      .500    Gradient (%)
      .100    Per cent Impervious
   100.000    Length (IMPERV)
      .000    %Imp. with Zero Dpth
        1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250    Manning "n"
    77.000    SCS Curve No or C
      .100    Ia/S Coefficient
     7.587    Initial Abstraction
        1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
          .101      .000      .511      .511 c.m/s
          .320      .887      .320    C perv/imperv/total
15    ADD RUNOFF
          .101      .101      .511      .511 c.m/s
 4    CATCHMENT
    50.000    ID No.ó 99999
    12.330    Area in hectares
   350.000    Length (PERV) metres
     1.000    Gradient (%)
     2.100    Per cent Impervious
   350.000    Length (IMPERV)
      .000    %Imp. with Zero Dpth
        1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250    Manning "n"
    77.000    SCS Curve No or C
      .100    Ia/S Coefficient
     7.587    Initial Abstraction
        1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
          .181      .101      .511      .511 c.m/s
          .320      .898      .332    C perv/imperv/total
15    ADD RUNOFF
          .181      .269      .511      .511 c.m/s
 9    ROUTE
      .000    Conduit Length
      .500    Supply X-factor <.5
      .000    Supply K-lag (sec)
      .500    Beta weighting factor
   600.000    Routing timestep
        1    No. of sub-reaches
          .181      .269      .269      .511 c.m/s
17    COMBINE
    2    Junction Node No.
          .181      .269      .269      .668 c.m/s
18    CONFLUENCE
    2    Junction Node No.
          .181      .668      .269      .000 c.m/s
27    HYDROGRAPH DISPLAY
    5    is # of Hyeto/Hydrograph chosen
     Volume  =  .7329000E+04 c.m
14    START
    1    1=Zero; 2=Define
35    COMMENT
    3    line(s) of comment
     ********************************
     ** 25 YEAR DESIGN STORM EVENT **
     ********************************
 2    STORM
        1    1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
   715.568    Coefficient  a
      .000    Constant  b   (min)
      .699    Exponent  c
      .400    Fraction to peak  r
   240.000    Duration ó  240 min
            62.077 mm    Total depth
 3    IMPERVIOUS
        1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .013    Manning "n"
    98.000    SCS Curve No or C
      .100    Ia/S Coefficient
      .518    Initial Abstraction
 4    CATCHMENT
    20.000    ID No.ó 99999
     3.020    Area in hectares
   100.000    Length (PERV) metres
      .500    Gradient (%)
    72.600    Per cent Impervious
   100.000    Length (IMPERV)
      .000    %Imp. with Zero Dpth
        1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250    Manning "n"
    77.000    SCS Curve No or C
      .100    Ia/S Coefficient
     7.587    Initial Abstraction
        1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
          .543      .000      .269      .000 c.m/s
          .367      .905      .757    C perv/imperv/total
15    ADD RUNOFF
          .543      .543      .269      .000 c.m/s
27    HYDROGRAPH DISPLAY
    5    is # of Hyeto/Hydrograph chosen
     Volume  =  .1419536E+04 c.m
11    CHANNEL
      .500    Base Width    =
    10.000    Left  bank slope  1:
    10.000    Right bank slope  1:
      .060    Manning's "n"
     1.000    O/a Depth in metres
      .100    Select Grade in %
     Depth        =     .484 metres
     Velocity     =     .211 m/sec
     Flow Capacity =    3.531 c.m/s
     Critical depth =     .204 metres
 9    ROUTE
    50.000    Conduit Length
      .000    Supply X-factor <.5
   178.126    Supply K-lag (sec)
      .916    Beta weighting factor
   600.000    Routing timestep
        1    No. of sub-reaches
          .543      .543      .485      .000 c.m/s
17    COMBINE
    1    Junction Node No.
          .543      .543      .485      .485 c.m/s
14    START
    1    1=Zero; 2=Define
 4    CATCHMENT
    10.000    ID No.ó 99999
    13.620    Area in hectares
   500.000    Length (PERV) metres
     2.000    Gradient (%)
     6.900    Per cent Impervious
   500.000    Length (IMPERV)
      .000    %Imp. with Zero Dpth
        1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250    Manning "n"
    77.000    SCS Curve No or C
      .100    Ia/S Coefficient
     7.587    Initial Abstraction
        1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
          .304      .000      .485      .485 c.m/s
          .367      .911      .404    C perv/imperv/total
15    ADD RUNOFF
          .304      .304      .485      .485 c.m/s
27    HYDROGRAPH DISPLAY
    5    is # of Hyeto/Hydrograph chosen
     Volume  =  .3418805E+04 c.m
 9    ROUTE
      .000    Conduit Length
      .500    Supply X-factor <.5
      .000    Supply K-lag (sec)
      .500    Beta weighting factor
   600.000    Routing timestep
        1    No. of sub-reaches
          .304      .304      .304      .485 c.m/s
17    COMBINE
    1    Junction Node No.
          .304      .304      .304      .789 c.m/s
18    CONFLUENCE
    1    Junction Node No.
          .304      .789      .304      .000 c.m/s
 4    CATCHMENT
    30.000    ID No.ó 99999
     3.670    Area in hectares
    80.000    Length (PERV) metres
      .500    Gradient (%)
     1.400    Per cent Impervious
    80.000    Length (IMPERV)
      .000    %Imp. with Zero Dpth
        1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250    Manning "n"
    77.000    SCS Curve No or C
      .100    Ia/S Coefficient
     7.587    Initial Abstraction
        1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
          .137      .789      .304      .000 c.m/s
          .367      .908      .374    C perv/imperv/total
15    ADD RUNOFF
          .137      .865      .304      .000 c.m/s
11    CHANNEL
      .500    Base Width    =
    10.000    Left  bank slope  1:
    10.000    Right bank slope  1:
      .060    Manning's "n"
     1.000    O/a Depth in metres
      .100    Select Grade in %
     Depth        =     .580 metres
     Velocity     =     .237 m/sec
     Flow Capacity =    3.531 c.m/s
     Critical depth =     .250 metres
 9    ROUTE
   200.000    Conduit Length
      .000    Supply X-factor <.5
   634.232    Supply K-lag (sec)
      .570    Beta weighting factor
   600.000    Routing timestep
        1    No. of sub-reaches
          .137      .865      .651      .000 c.m/s
17    COMBINE
    2    Junction Node No.
          .137      .865      .651      .651 c.m/s
14    START
    1    1=Zero; 2=Define
 4    CATCHMENT
    40.000    ID No.ó 99999
     4.640    Area in hectares
   100.000    Length (PERV) metres
      .500    Gradient (%)
      .100    Per cent Impervious
   100.000    Length (IMPERV)
      .000    %Imp. with Zero Dpth
        1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250    Manning "n"
    77.000    SCS Curve No or C
      .100    Ia/S Coefficient
     7.587    Initial Abstraction
        1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
          .162      .000      .651      .651 c.m/s
          .367      .905      .367    C perv/imperv/total
15    ADD RUNOFF
          .162      .162      .651      .651 c.m/s
 4    CATCHMENT
    50.000    ID No.ó 99999
    12.330    Area in hectares
   350.000    Length (PERV) metres
     1.000    Gradient (%)
     2.100    Per cent Impervious
   350.000    Length (IMPERV)
      .000    %Imp. with Zero Dpth
        1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250    Manning "n"
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     77.000    SCS Curve No or C
       .100    Ia/S Coefficient
      7.587    Initial Abstraction
         1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .270      .162      .651      .651 c.m/s
           .367      .911      .378    C perv/imperv/total
15   ADD RUNOFF
           .270      .404      .651      .651 c.m/s
 9   ROUTE
       .000    Conduit Length
       .500    Supply X-factor <.5
       .000    Supply K-lag (sec)
       .500    Beta weighting factor
    600.000    Routing timestep
         1    No. of sub-reaches
           .270      .404      .404      .651 c.m/s
17   COMBINE
     2    Junction Node No.
           .270      .404      .404      .916 c.m/s
18   CONFLUENCE
     2    Junction Node No.
           .270      .916      .404      .000 c.m/s
27   HYDROGRAPH DISPLAY
     5    is # of Hyeto/Hydrograph chosen
     Volume  =  .9636599E+04 c.m
14   START
     1    1=Zero; 2=Define
35   COMMENT
     3    line(s) of comment
     *******************************
     ** 50 YEAR DESIGN STORM EVENT **
     *******************************
 2   STORM
         1    1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
    794.298    Coefficient  a
       .000    Constant  b   (min)
       .699    Exponent  c
       .400    Fraction to peak  r
    240.000    Duration ó  240 min
              68.907 mm    Total depth
 3   IMPERVIOUS
         1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .013    Manning "n"
     98.000    SCS Curve No or C
       .100    Ia/S Coefficient
       .518    Initial Abstraction
 4   CATCHMENT
     20.000    ID No.ó 99999
      3.020    Area in hectares
    100.000    Length (PERV) metres
       .500    Gradient (%)
     72.600    Per cent Impervious
    100.000    Length (IMPERV)
       .000    %Imp. with Zero Dpth
         1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250    Manning "n"
     77.000    SCS Curve No or C
       .100    Ia/S Coefficient
      7.587    Initial Abstraction
         1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .619      .000      .404      .000 c.m/s
           .397      .913      .772    C perv/imperv/total
15   ADD RUNOFF
           .619      .619      .404      .000 c.m/s
27   HYDROGRAPH DISPLAY
     5    is # of Hyeto/Hydrograph chosen
     Volume  =  .1606272E+04 c.m
11   CHANNEL
       .500    Base Width    =
     10.000    Left  bank slope  1:
     10.000    Right bank slope  1:
       .060    Manning's "n"
      1.000    O/a Depth in metres
       .100    Select Grade in %
     Depth         =     .509 metres
     Velocity      =     .218 m/sec
     Flow Capacity  =    3.531 c.m/s
     Critical depth =     .216 metres
 9   ROUTE
     50.000    Conduit Length
       .000    Supply X-factor <.5
    172.375    Supply K-lag (sec)
       .930    Beta weighting factor
    600.000    Routing timestep
         1    No. of sub-reaches
           .619      .619      .539      .000 c.m/s
17   COMBINE
     1    Junction Node No.
           .619      .619      .539      .539 c.m/s
14   START
     1    1=Zero; 2=Define
 4   CATCHMENT
     10.000    ID No.ó 99999
     13.620    Area in hectares
    500.000    Length (PERV) metres
      2.000    Gradient (%)
      6.900    Per cent Impervious
    500.000    Length (IMPERV)
       .000    %Imp. with Zero Dpth
         1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250    Manning "n"
     77.000    SCS Curve No or C
       .100    Ia/S Coefficient
      7.587    Initial Abstraction
         1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .397      .000      .539      .539 c.m/s
           .398      .918      .434    C perv/imperv/total
15   ADD RUNOFF
           .397      .397      .539      .539 c.m/s
27   HYDROGRAPH DISPLAY
     5    is # of Hyeto/Hydrograph chosen
     Volume  =  .4069199E+04 c.m
 9   ROUTE
       .000    Conduit Length
       .500    Supply X-factor <.5
       .000    Supply K-lag (sec)
       .500    Beta weighting factor
    600.000    Routing timestep
         1    No. of sub-reaches
           .397      .397      .397      .539 c.m/s
17   COMBINE
     1    Junction Node No.
           .397      .397      .397      .898 c.m/s
18   CONFLUENCE
     1    Junction Node No.
           .397      .898      .397      .000 c.m/s
 4   CATCHMENT
     30.000    ID No.ó 99999
      3.670    Area in hectares
     80.000    Length (PERV) metres
       .500    Gradient (%)
      1.400    Per cent Impervious
     80.000    Length (IMPERV)
       .000    %Imp. with Zero Dpth
         1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250    Manning "n"
     77.000    SCS Curve No or C
       .100    Ia/S Coefficient
      7.587    Initial Abstraction
         1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .173      .898      .397      .000 c.m/s
           .397      .916      .404    C perv/imperv/total
15   ADD RUNOFF
           .173     1.001      .397      .000 c.m/s
11   CHANNEL
       .500    Base Width    =
     10.000    Left  bank slope  1:
     10.000    Right bank slope  1:
       .060    Manning's "n"
      1.000    O/a Depth in metres
       .100    Select Grade in %
     Depth         =     .614 metres
     Velocity      =     .245 m/sec
     Flow Capacity  =    3.531 c.m/s
     Critical depth =     .266 metres
 9   ROUTE
    200.000    Conduit Length
       .000    Supply X-factor <.5
    611.414    Supply K-lag (sec)
       .600    Beta weighting factor
    600.000    Routing timestep
         1    No. of sub-reaches
           .173     1.001      .767      .000 c.m/s
17   COMBINE
     2    Junction Node No.
           .173     1.001      .767      .767 c.m/s
14   START
     1    1=Zero; 2=Define
 4   CATCHMENT
     40.000    ID No.ó 99999
      4.640    Area in hectares
    100.000    Length (PERV) metres
       .500    Gradient (%)
       .100    Per cent Impervious
    100.000    Length (IMPERV)
       .000    %Imp. with Zero Dpth
         1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250    Manning "n"
     77.000    SCS Curve No or C
       .100    Ia/S Coefficient
      7.587    Initial Abstraction
         1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .206      .000      .767      .767 c.m/s
           .397      .913      .398    C perv/imperv/total
15   ADD RUNOFF
           .206      .206      .767      .767 c.m/s
 4   CATCHMENT
     50.000    ID No.ó 99999
     12.330    Area in hectares
    350.000    Length (PERV) metres
      1.000    Gradient (%)
      2.100    Per cent Impervious
    350.000    Length (IMPERV)
       .000    %Imp. with Zero Dpth
         1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250    Manning "n"
     77.000    SCS Curve No or C
       .100    Ia/S Coefficient
      7.587    Initial Abstraction
         1    Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .357      .206      .767      .767 c.m/s
           .398      .918      .409    C perv/imperv/total
15   ADD RUNOFF
           .357      .523      .767      .767 c.m/s
 9   ROUTE
       .000    Conduit Length
       .500    Supply X-factor <.5
       .000    Supply K-lag (sec)
       .500    Beta weighting factor
    600.000    Routing timestep
         1    No. of sub-reaches
           .357      .523      .523      .767 c.m/s
17   COMBINE
     2    Junction Node No.
           .357      .523      .523     1.168 c.m/s
18   CONFLUENCE
     2    Junction Node No.
           .357     1.168      .523      .000 c.m/s
27   HYDROGRAPH DISPLAY
     5    is # of Hyeto/Hydrograph chosen
     Volume  =  .1143120E+05 c.m
14   START
     1    1=Zero; 2=Define
35   COMMENT
     3    line(s) of comment
     ********************************
     ** 100 YEAR DESIGN STORM EVENT **
     ********************************
 2   STORM
         1    1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
    871.279    Coefficient  a
       .000    Constant  b   (min)
       .699    Exponent  c
       .400    Fraction to peak  r
    240.000    Duration ó  240 min
              75.585 mm    Total depth
 3   IMPERVIOUS
         1    Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .013    Manning "n"
     98.000    SCS Curve No or C
       .100    Ia/S Coefficient
       .518    Initial Abstraction
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```
 4    CATCHMENT
    20.000    ID No.ó 99999
     3.020    Area in hectares
   100.000    Length (PERV) metres
      .500    Gradient (%)
    72.600    Per cent Impervious
   100.000    Length (IMPERV)
      .000    %Imp. with Zero Dpth
        1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250    Manning "n"
    77.000    SCS Curve No or C
      .100    Ia/S Coefficient
     7.587    Initial Abstraction
        1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
          .694      .000      .523      .000 c.m/s
          .425      .921      .785    C perv/imperv/total
15    ADD RUNOFF
          .694      .694      .523      .000 c.m/s
27    HYDROGRAPH DISPLAY
    5     is # of Hyeto/Hydrograph chosen
     Volume  =  .1792627E+04 c.m
11    CHANNEL
      .500    Base Width    =
    10.000    Left  bank slope  1:
    10.000    Right bank slope  1:
      .060    Manning's "n"
     1.000    O/a Depth in metres
      .100    Select Grade in %
     Depth          =     .532 metres
     Velocity       =     .224 m/sec
     Flow Capacity =    3.531 c.m/s
     Critical depth =     .227 metres
 9    ROUTE
    50.000    Conduit Length
      .000    Supply X-factor <.5
   167.518    Supply K-lag (sec)
      .943    Beta weighting factor
   600.000    Routing timestep
        1     No. of sub-reaches
          .694      .694      .591      .000 c.m/s
17    COMBINE
    1     Junction Node No.
          .694      .694      .591      .591 c.m/s
14    START
    1     1=Zero; 2=Define
 4    CATCHMENT
    10.000    ID No.ó 99999
    13.620    Area in hectares
   500.000    Length (PERV) metres
     2.000    Gradient (%)
     6.900    Per cent Impervious
   500.000    Length (IMPERV)
      .000    %Imp. with Zero Dpth
        1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250    Manning "n"
    77.000    SCS Curve No or C
      .100    Ia/S Coefficient
     7.587    Initial Abstraction
        1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
          .484      .000      .591      .591 c.m/s
          .425      .922      .459    C perv/imperv/total
15    ADD RUNOFF
          .484      .484      .591      .591 c.m/s
27    HYDROGRAPH DISPLAY
    5     is # of Hyeto/Hydrograph chosen
     Volume  =  .4729494E+04 c.m
 9    ROUTE
      .000    Conduit Length
      .500    Supply X-factor <.5
      .000    Supply K-lag (sec)
      .500    Beta weighting factor
   600.000    Routing timestep
        1     No. of sub-reaches
          .484      .484      .484      .591 c.m/s
17    COMBINE
    1     Junction Node No.
          .484      .484      .484     1.003 c.m/s
18    CONFLUENCE
    1     Junction Node No.
          .484     1.003      .484      .000 c.m/s
 4    CATCHMENT
    30.000    ID No.ó 99999
     3.670    Area in hectares
    80.000    Length (PERV) metres
      .500    Gradient (%)
     1.400    Per cent Impervious
    80.000    Length (IMPERV)
      .000    %Imp. with Zero Dpth
        1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250    Manning "n"
    77.000    SCS Curve No or C
      .100    Ia/S Coefficient
     7.587    Initial Abstraction
        1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
          .210     1.003      .484      .000 c.m/s
          .425      .922      .432    C perv/imperv/total
15    ADD RUNOFF
          .210     1.137      .484      .000 c.m/s
11    CHANNEL
      .500    Base Width    =
    10.000    Left  bank slope  1:
    10.000    Right bank slope  1:
      .060    Manning's "n"
     1.000    O/a Depth in metres
      .100    Select Grade in %
     Depth          =     .646 metres
     Velocity       =     .253 m/sec
     Flow Capacity =    3.531 c.m/s
     Critical depth =     .281 metres
 9    ROUTE
   200.000    Conduit Length
      .000    Supply X-factor <.5
   592.153    Supply K-lag (sec)
      .626    Beta weighting factor
   600.000    Routing timestep
        1     No. of sub-reaches
          .210     1.137      .891      .000 c.m/s
17    COMBINE
    2     Junction Node No.
          .210     1.137      .891      .891 c.m/s
14    START
    1     1=Zero; 2=Define
 4    CATCHMENT
    40.000    ID No.ó 99999
     4.640    Area in hectares
   100.000    Length (PERV) metres
      .500    Gradient (%)
      .100    Per cent Impervious
   100.000    Length (IMPERV)
      .000    %Imp. with Zero Dpth
        1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250    Manning "n"
    77.000    SCS Curve No or C
      .100    Ia/S Coefficient
     7.587    Initial Abstraction
        1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
          .252      .000      .891      .891 c.m/s
          .425      .921      .425    C perv/imperv/total
15    ADD RUNOFF
          .252      .252      .891      .891 c.m/s
 4    CATCHMENT
    50.000    ID No.ó 99999
    12.330    Area in hectares
   350.000    Length (PERV) metres
     1.000    Gradient (%)
     2.100    Per cent Impervious
   350.000    Length (IMPERV)
      .000    %Imp. with Zero Dpth
        1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250    Manning "n"
    77.000    SCS Curve No or C
      .100    Ia/S Coefficient
     7.587    Initial Abstraction
        1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
          .437      .252      .891      .891 c.m/s
          .425      .922      .436    C perv/imperv/total
15    ADD RUNOFF
          .437      .645      .891      .891 c.m/s
 9    ROUTE
      .000    Conduit Length
      .500    Supply X-factor <.5
      .000    Supply K-lag (sec)
      .500    Beta weighting factor
   600.000    Routing timestep
        1     No. of sub-reaches
          .437      .645      .645      .891 c.m/s
17    COMBINE
    2     Junction Node No.
          .437      .645      .645     1.451 c.m/s
18    CONFLUENCE
    2     Junction Node No.
          .437     1.451      .645      .000 c.m/s
27    HYDROGRAPH DISPLAY
    5     is # of Hyeto/Hydrograph chosen
     Volume  =  .1326780E+05 c.m
20    MANUAL
```

Developed Conditions – NO SWM

```
        Output File (4.7) NOSWM.OUT    opened 2024-05-24  15:09
        Units used are defined by G =    9.810
            24   144    10.000        are MAXDT MAXHYD & DTMIN values
        Licensee: UPPER CANADA CONSULTANTS
  35    COMMENT
       3     line(s) of comment
        PROJECT NAME: NORTHLAND ESTATES
        PROJECT NO.:  21132
        PROPOSED CONDITIONS WITH SWM
  14    START
       1     1=Zero; 2=Define
  35    COMMENT
       3     line(s) of comment
        *******************************
        ** 2 YEAR DESIGN STORM EVENT **
        *******************************
   2    STORM
            1      1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
      397.149      Coefficient  a
         .000      Constant  b    (min)
         .699      Exponent  c
         .400      Fraction to peak  r
      240.000      Duration ó  240 min
               34.453 mm     Total depth
   3    IMPERVIOUS
            1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .013      Manning "n"
       98.000      SCS Curve No or C
         .100      Ia/S Coefficient
         .518      Initial Abstraction
   4    CATCHMENT
       20.000      ID No.ó 99999
        3.020      Area in hectares
      100.000      Length (PERV) metres
         .500      Gradient (%)
       72.600      Per cent Impervious
      100.000      Length (IMPERV)
         .000      %Imp. with Zero Dpth
            1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .250      Manning "n"
       77.000      SCS Curve No or C
         .100      Ia/S Coefficient
        7.587      Initial Abstraction
            1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .275       .000       .025       .000 c.m/s
              .204       .828       .657     C perv/imperv/total
  15    ADD RUNOFF
              .275       .275       .025       .000 c.m/s
  27    HYDROGRAPH DISPLAY
       5     is # of Hyeto/Hydrograph chosen
        Volume  =  .6835738E+03 c.m
  11    CHANNEL
         .500      Base Width     =
        3.000      Left  bank slope  1:
        3.000      Right bank slope  1:
         .060      Manning's "n"
        1.500      O/a Depth in metres
         .300      Select Grade in %
        Depth          =      .433 metres
        Velocity       =      .353 m/sec
        Flow Capacity  =     5.657 c.m/s
        Critical depth =      .211 metres
   9    ROUTE
       50.000      Conduit Length
         .000      Supply X-factor <.5
      106.220      Supply K-lag (sec)
         .567      Beta weighting factor
      200.000      Routing timestep
            1      No. of sub-reaches
              .275       .275       .270       .000 c.m/s
  17    COMBINE
       1     Junction Node No.
              .275       .275       .270       .270 c.m/s
  14    START
       1     1=Zero; 2=Define
   4    CATCHMENT
       10.000      ID No.ó 99999
       17.530      Area in hectares
      500.000      Length (PERV) metres
        1.000      Gradient (%)
       75.000      Per cent Impervious
      500.000      Length (IMPERV)
         .000      %Imp. with Zero Dpth
            1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .250      Manning "n"
       77.000      SCS Curve No or C
         .100      Ia/S Coefficient
        7.587      Initial Abstraction
            1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             1.646       .000       .270       .270 c.m/s
              .204       .852       .690     C perv/imperv/total
  15    ADD RUNOFF
             1.646      1.646       .270       .270 c.m/s
  27    HYDROGRAPH DISPLAY
       5     is # of Hyeto/Hydrograph chosen
        Volume  =  .4165142E+04 c.m
   9    ROUTE
         .000      Conduit Length
         .500      Supply X-factor <.5
         .000      Supply K-lag (sec)
         .500      Beta weighting factor
      600.000      Routing timestep
            1      No. of sub-reaches
             1.646      1.646      1.646       .270 c.m/s
  17    COMBINE
       1     Junction Node No.
             1.646      1.646      1.646      1.916 c.m/s
  18    CONFLUENCE
       1     Junction Node No.
             1.646      1.916      1.646       .000 c.m/s
   4    CATCHMENT
       30.000      ID No.ó 99999
        3.670      Area in hectares
       80.000      Length (PERV) metres
         .500      Gradient (%)
        1.400      Per cent Impervious
       80.000      Length (IMPERV)
         .000      %Imp. with Zero Dpth
            1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .250      Manning "n"
       77.000      SCS Curve No or C
         .100      Ia/S Coefficient
        7.587      Initial Abstraction
            1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .025      1.916      1.646       .000 c.m/s
              .204       .838       .213     C perv/imperv/total
  15    ADD RUNOFF
              .025      1.929      1.646       .000 c.m/s
  11    CHANNEL
         .500      Base Width     =
        3.000      Left  bank slope  1:
        3.000      Right bank slope  1:
         .060      Manning's "n"
        1.500      O/a Depth in metres
         .200      Select Grade in %
        Depth          =     1.059 metres
        Velocity       =      .495 m/sec
        Flow Capacity  =     4.619 c.m/s
        Critical depth =      .533 metres
   9    ROUTE
      200.000      Conduit Length
         .000      Supply X-factor <.5
      303.041      Supply K-lag (sec)
         .516      Beta weighting factor
      600.000      Routing timestep
            1      No. of sub-reaches
              .025      1.929      1.557       .000 c.m/s
  17    COMBINE
       2     Junction Node No.
              .025      1.929      1.557      1.557 c.m/s
  14    START
       1     1=Zero; 2=Define
   4    CATCHMENT
       40.000      ID No.ó 99999
        3.890      Area in hectares
      100.000      Length (PERV) metres
         .500      Gradient (%)
        3.700      Per cent Impervious
      100.000      Length (IMPERV)
         .000      %Imp. with Zero Dpth
            1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .250      Manning "n"
       77.000      SCS Curve No or C
         .100      Ia/S Coefficient
        7.587      Initial Abstraction
            1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .025       .000      1.557      1.557 c.m/s
              .204       .828       .227     C perv/imperv/total
  15    ADD RUNOFF
              .025       .025      1.557      1.557 c.m/s
   4    CATCHMENT
       50.000      ID No.ó 99999
        9.180      Area in hectares
      350.000      Length (PERV) metres
        1.000      Gradient (%)
        1.300      Per cent Impervious
      350.000      Length (IMPERV)
         .000      %Imp. with Zero Dpth
            1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .250      Manning "n"
       77.000      SCS Curve No or C
         .100      Ia/S Coefficient
        7.587      Initial Abstraction
            1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .038       .025      1.557      1.557 c.m/s
              .204       .848       .212     C perv/imperv/total
  15    ADD RUNOFF
              .038       .061      1.557      1.557 c.m/s
   9    ROUTE
         .000      Conduit Length
         .500      Supply X-factor <.5
         .000      Supply K-lag (sec)
         .500      Beta weighting factor
      600.000      Routing timestep
            1      No. of sub-reaches
              .038       .061       .061      1.557 c.m/s
  17    COMBINE
       2     Junction Node No.
              .038       .061       .061      1.588 c.m/s
  18    CONFLUENCE
       2     Junction Node No.
              .038      1.588       .061       .000 c.m/s
  27    HYDROGRAPH DISPLAY
       5     is # of Hyeto/Hydrograph chosen
        Volume  =  .6093000E+04 c.m
  14    START
       1     1=Zero; 2=Define
  35    COMMENT
       3     line(s) of comment
        *******************************
        ** 5 YEAR DESIGN STORM EVENT **
        *******************************
   2    STORM
            1      1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
      524.867      Coefficient  a
         .000      Constant  b    (min)
         .699      Exponent  c
         .400      Fraction to peak  r
      240.000      Duration ó  240 min
               45.533 mm     Total depth
   3    IMPERVIOUS
            1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .013      Manning "n"
       98.000      SCS Curve No or C
         .100      Ia/S Coefficient
         .518      Initial Abstraction
   4    CATCHMENT
       20.000      ID No.ó 99999
        3.020      Area in hectares
      100.000      Length (PERV) metres
         .500      Gradient (%)
```

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      72.600     Per cent Impervious
     100.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      77.000     SCS Curve No or C
        .100     Ia/S Coefficient
       7.587     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .364       .000       .061       .000 c.m/s
              .278       .869       .707     C perv/imperv/total
 15    ADD RUNOFF
              .364       .364       .061       .000 c.m/s
 27    HYDROGRAPH DISPLAY
      5     is # of Hyeto/Hydrograph chosen
       Volume  =  .9720645E+03 c.m
 11    CHANNEL
        .500     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .060     Manning's "n"
       1.500     O/a Depth in metres
        .300     Select Grade in %
       Depth          =       .489 metres
       Velocity       =       .379 m/sec
       Flow Capacity  =      5.657 c.m/s
       Critical depth =       .243 metres
  9    ROUTE
      50.000     Conduit Length
        .000     Supply X-factor <.5
      98.911     Supply K-lag (sec)
        .598     Beta weighting factor
     200.000     Routing timestep
           1     No. of sub-reaches
              .364       .364       .364       .000 c.m/s
 17    COMBINE
      1     Junction Node No.
              .364       .364       .364       .364 c.m/s
 14    START
      1     1=Zero; 2=Define
  4    CATCHMENT
      10.000     ID No.ó 99999
      17.530     Area in hectares
     500.000     Length (PERV) metres
       1.000     Gradient (%)
      75.000     Per cent Impervious
     500.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      77.000     SCS Curve No or C
        .100     Ia/S Coefficient
       7.587     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             2.324       .000       .364       .364 c.m/s
              .278       .874       .725     C perv/imperv/total
 15    ADD RUNOFF
             2.324      2.324       .364       .364 c.m/s
 27    HYDROGRAPH DISPLAY
      5     is # of Hyeto/Hydrograph chosen
       Volume  =  .5784277E+04 c.m
  9    ROUTE
        .000     Conduit Length
        .500     Supply X-factor <.5
        .000     Supply K-lag (sec)
        .500     Beta weighting factor
     600.000     Routing timestep
           1     No. of sub-reaches
             2.324      2.324      2.324       .364 c.m/s
 17    COMBINE
      1     Junction Node No.
             2.324      2.324      2.324      2.688 c.m/s
 18    CONFLUENCE
      1     Junction Node No.
             2.324      2.688      2.324       .000 c.m/s
  4    CATCHMENT
      30.000     ID No.ó 99999
       3.670     Area in hectares
      80.000     Length (PERV) metres
        .500     Gradient (%)
       1.400     Per cent Impervious
      80.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      77.000     SCS Curve No or C
        .100     Ia/S Coefficient
       7.587     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .059      2.688      2.324       .000 c.m/s
              .278       .877       .286     C perv/imperv/total
 15    ADD RUNOFF
              .059      2.717      2.324       .000 c.m/s
 11    CHANNEL
        .500     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .060     Manning's "n"
       1.500     O/a Depth in metres
        .200     Select Grade in %
       Depth          =      1.215 metres
       Velocity       =       .539 m/sec
       Flow Capacity  =      4.619 c.m/s
       Critical depth =       .622 metres
  9    ROUTE
     200.000     Conduit Length
        .000     Supply X-factor <.5
     278.130     Supply K-lag (sec)
        .549     Beta weighting factor
     600.000     Routing timestep
           1     No. of sub-reaches
              .059      2.717      2.118       .000 c.m/s
 17    COMBINE
      2     Junction Node No.
              .059      2.717      2.118      2.118 c.m/s
 14    START
      1     1=Zero; 2=Define
  4    CATCHMENT
      40.000     ID No.ó 99999
       3.890     Area in hectares
     100.000     Length (PERV) metres
        .500     Gradient (%)
       3.700     Per cent Impervious
     100.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      77.000     SCS Curve No or C
        .100     Ia/S Coefficient
       7.587     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .060       .000      2.118      2.118 c.m/s
              .278       .869       .299     C perv/imperv/total
 15    ADD RUNOFF
              .060       .060      2.118      2.118 c.m/s
  4    CATCHMENT
      50.000     ID No.ó 99999
       9.180     Area in hectares
     350.000     Length (PERV) metres
       1.000     Gradient (%)
       1.300     Per cent Impervious
     350.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      77.000     SCS Curve No or C
        .100     Ia/S Coefficient
       7.587     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .088       .060      2.118      2.118 c.m/s
              .278       .884       .286     C perv/imperv/total
 15    ADD RUNOFF
              .088       .138      2.118      2.118 c.m/s
  9    ROUTE
        .000     Conduit Length
        .500     Supply X-factor <.5
        .000     Supply K-lag (sec)
        .500     Beta weighting factor
     600.000     Routing timestep
           1     No. of sub-reaches
              .088       .138       .138      2.118 c.m/s
 17    COMBINE
      2     Junction Node No.
              .088       .138       .138      2.192 c.m/s
 18    CONFLUENCE
      2     Junction Node No.
              .088      2.192       .138       .000 c.m/s
 27    HYDROGRAPH DISPLAY
      5     is # of Hyeto/Hydrograph chosen
       Volume  =  .8952002E+04 c.m
 14    START
      1     1=Zero; 2=Define
 35    COMMENT
      3     line(s) of comment
       *******************************
       ** 10 YEAR DESIGN STORM EVENT **
       *******************************
  2    STORM
           1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
     608.845     Coefficient  a
        .000     Constant  b    (min)
        .699     Exponent  c
        .400     Fraction to peak  r
     240.000     Duration ó  240 min
               52.818 mm     Total depth
  3    IMPERVIOUS
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .013     Manning "n"
      98.000     SCS Curve No or C
        .100     Ia/S Coefficient
        .518     Initial Abstraction
  4    CATCHMENT
      20.000     ID No.ó 99999
       3.020     Area in hectares
     100.000     Length (PERV) metres
        .500     Gradient (%)
      72.600     Per cent Impervious
     100.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      77.000     SCS Curve No or C
        .100     Ia/S Coefficient
       7.587     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .442       .000       .138       .000 c.m/s
              .320       .887       .732     C perv/imperv/total
 15    ADD RUNOFF
              .442       .442       .138       .000 c.m/s
 27    HYDROGRAPH DISPLAY
      5     is # of Hyeto/Hydrograph chosen
       Volume  =  .1167105E+04 c.m
 11    CHANNEL
        .500     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .060     Manning's "n"
       1.500     O/a Depth in metres
        .300     Select Grade in %
       Depth          =       .531 metres
       Velocity       =       .398 m/sec
       Flow Capacity  =      5.657 c.m/s
       Critical depth =       .267 metres
  9    ROUTE
      50.000     Conduit Length
        .000     Supply X-factor <.5
      94.229     Supply K-lag (sec)
        .618     Beta weighting factor
     200.000     Routing timestep
           1     No. of sub-reaches
              .442       .442       .425       .000 c.m/s
 17    COMBINE
      1     Junction Node No.
              .442       .442       .425       .425 c.m/s
```

```
 14    START
        1     1=Zero; 2=Define
  4    CATCHMENT
      10.000     ID No.ó 99999
      17.530     Area in hectares
     500.000     Length (PERV) metres
       1.000     Gradient (%)
      75.000     Per cent Impervious
     500.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      77.000     SCS Curve No or C
        .100     Ia/S Coefficient
       7.587     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             2.767       .000       .425       .425 c.m/s
              .320       .892       .749     C perv/imperv/total
 15    ADD RUNOFF
             2.767      2.767       .425       .425 c.m/s
 27    HYDROGRAPH DISPLAY
        5     is # of Hyeto/Hydrograph chosen
       Volume  =  .6933451E+04 c.m
  9    ROUTE
        .000     Conduit Length
        .500     Supply X-factor <.5
        .000     Supply K-lag (sec)
        .500     Beta weighting factor
     600.000     Routing timestep
           1     No. of sub-reaches
             2.767      2.767      2.767       .425 c.m/s
 17    COMBINE
        1     Junction Node No.
             2.767      2.767      2.767      3.192 c.m/s
 18    CONFLUENCE
        1     Junction Node No.
             2.767      3.192      2.767       .000 c.m/s
  4    CATCHMENT
      30.000     ID No.ó 99999
       3.670     Area in hectares
      80.000     Length (PERV) metres
        .500     Gradient (%)
       1.400     Per cent Impervious
      80.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      77.000     SCS Curve No or C
        .100     Ia/S Coefficient
       7.587     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .093      3.192      2.767       .000 c.m/s
              .320       .893       .328     C perv/imperv/total
 15    ADD RUNOFF
              .093      3.238      2.767       .000 c.m/s
 11    CHANNEL
        .500     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .060     Manning's "n"
       1.500     O/a Depth in metres
        .200     Select Grade in %
       Depth          =     1.303 metres
       Velocity       =      .564 m/sec
       Flow Capacity  =     4.619 c.m/s
       Critical depth =      .672 metres
  9    ROUTE
     200.000     Conduit Length
        .000     Supply X-factor <.5
     266.193     Supply K-lag (sec)
        .565     Beta weighting factor
     600.000     Routing timestep
           1     No. of sub-reaches
              .093      3.238      2.571       .000 c.m/s
 17    COMBINE
        2     Junction Node No.
              .093      3.238      2.571      2.571 c.m/s
 14    START
        1     1=Zero; 2=Define
  4    CATCHMENT
      40.000     ID No.ó 99999
       3.890     Area in hectares
     100.000     Length (PERV) metres
        .500     Gradient (%)
       3.700     Per cent Impervious
     100.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      77.000     SCS Curve No or C
        .100     Ia/S Coefficient
       7.587     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .086       .000      2.571      2.571 c.m/s
              .320       .887       .341     C perv/imperv/total
 15    ADD RUNOFF
              .086       .086      2.571      2.571 c.m/s
  4    CATCHMENT
      50.000     ID No.ó 99999
       9.180     Area in hectares
     350.000     Length (PERV) metres
       1.000     Gradient (%)
       1.300     Per cent Impervious
     350.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      77.000     SCS Curve No or C
        .100     Ia/S Coefficient
       7.587     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .134       .086      2.571      2.571 c.m/s
              .320       .898       .327     C perv/imperv/total
 15    ADD RUNOFF
              .134       .208      2.571      2.571 c.m/s
  9    ROUTE
        .000     Conduit Length
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        .500     Supply X-factor <.5
        .000     Supply K-lag (sec)
        .500     Beta weighting factor
     600.000     Routing timestep
           1     No. of sub-reaches
              .134       .208       .208      2.571 c.m/s
 17    COMBINE
        2     Junction Node No.
              .134       .208       .208      2.682 c.m/s
 18    CONFLUENCE
        2     Junction Node No.
              .134      2.682       .208       .000 c.m/s
 27    HYDROGRAPH DISPLAY
        5     is # of Hyeto/Hydrograph chosen
       Volume  =  .1101540E+05 c.m
 14    START
        1     1=Zero; 2=Define
 35    COMMENT
        3     line(s) of comment
       ********************************
       ** 25 YEAR DESIGN STORM EVENT **
       ********************************
  2    STORM
           1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
     715.568     Coefficient  a
        .000     Constant  b    (min)
        .699     Exponent  c
        .400     Fraction to peak  r
     240.000     Duration ó  240 min
               62.077 mm     Total depth
  3    IMPERVIOUS
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .013     Manning "n"
      98.000     SCS Curve No or C
        .100     Ia/S Coefficient
        .518     Initial Abstraction
  4    CATCHMENT
      20.000     ID No.ó 99999
       3.020     Area in hectares
     100.000     Length (PERV) metres
        .500     Gradient (%)
      72.600     Per cent Impervious
     100.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      77.000     SCS Curve No or C
        .100     Ia/S Coefficient
       7.587     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .543       .000       .208       .000 c.m/s
              .367       .905       .757     C perv/imperv/total
 15    ADD RUNOFF
              .543       .543       .208       .000 c.m/s
 27    HYDROGRAPH DISPLAY
        5     is # of Hyeto/Hydrograph chosen
       Volume  =  .1419536E+04 c.m
 11    CHANNEL
        .500     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .060     Manning's "n"
       1.500     O/a Depth in metres
        .300     Select Grade in %
       Depth          =      .579 metres
       Velocity       =      .419 m/sec
       Flow Capacity  =     5.657 c.m/s
       Critical depth =      .295 metres
  9    ROUTE
      50.000     Conduit Length
        .000     Supply X-factor <.5
      89.446     Supply K-lag (sec)
        .640     Beta weighting factor
     200.000     Routing timestep
           1     No. of sub-reaches
              .543       .543       .500       .000 c.m/s
 17    COMBINE
        1     Junction Node No.
              .543       .543       .500       .500 c.m/s
 14    START
        1     1=Zero; 2=Define
  4    CATCHMENT
      10.000     ID No.ó 99999
      17.530     Area in hectares
     500.000     Length (PERV) metres
       1.000     Gradient (%)
      75.000     Per cent Impervious
     500.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      77.000     SCS Curve No or C
        .100     Ia/S Coefficient
       7.587     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             3.322       .000       .500       .500 c.m/s
              .367       .910       .774     C perv/imperv/total
 15    ADD RUNOFF
             3.322      3.322       .500       .500 c.m/s
 27    HYDROGRAPH DISPLAY
        5     is # of Hyeto/Hydrograph chosen
       Volume  =  .8425626E+04 c.m
  9    ROUTE
        .000     Conduit Length
        .500     Supply X-factor <.5
        .000     Supply K-lag (sec)
        .500     Beta weighting factor
     600.000     Routing timestep
           1     No. of sub-reaches
             3.322      3.322      3.322       .500 c.m/s
 17    COMBINE
        1     Junction Node No.
             3.322      3.322      3.322      3.822 c.m/s
 18    CONFLUENCE
        1     Junction Node No.
             3.322      3.822      3.322       .000 c.m/s
  4    CATCHMENT
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       30.000     ID No.ó 99999
        3.670     Area in hectares
       80.000     Length (PERV) metres
         .500     Gradient (%)
        1.400     Per cent Impervious
       80.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .250     Manning "n"
       77.000     SCS Curve No or C
         .100     Ia/S Coefficient
        7.587     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .137      3.822      3.322       .000 c.m/s
              .367       .908       .374     C perv/imperv/total
 15     ADD RUNOFF
              .137      3.898      3.322       .000 c.m/s
 11     CHANNEL
         .500     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .060     Manning's "n"
        1.500     O/a Depth in metres
         .200     Select Grade in %
        Depth          =     1.403 metres
        Velocity       =      .590 m/sec
        Flow Capacity  =     4.619 c.m/s
        Critical depth =      .730 metres
  9     ROUTE
      200.000     Conduit Length
         .000     Supply X-factor <.5
      254.140     Supply K-lag (sec)
         .582     Beta weighting factor
      600.000     Routing timestep
            1     No. of sub-reaches
              .137      3.898      3.213       .000 c.m/s
 17     COMBINE
       2     Junction Node No.
              .137      3.898      3.213      3.213 c.m/s
 14     START
       1     1=Zero; 2=Define
  4     CATCHMENT
       40.000     ID No.ó 99999
        3.890     Area in hectares
      100.000     Length (PERV) metres
         .500     Gradient (%)
        3.700     Per cent Impervious
      100.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .250     Manning "n"
       77.000     SCS Curve No or C
         .100     Ia/S Coefficient
        7.587     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .138       .000      3.213      3.213 c.m/s
              .367       .905       .387     C perv/imperv/total
 15     ADD RUNOFF
              .138       .138      3.213      3.213 c.m/s
  4     CATCHMENT
       50.000     ID No.ó 99999
        9.180     Area in hectares
      350.000     Length (PERV) metres
        1.000     Gradient (%)
        1.300     Per cent Impervious
      350.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .250     Manning "n"
       77.000     SCS Curve No or C
         .100     Ia/S Coefficient
        7.587     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .200       .138      3.213      3.213 c.m/s
              .367       .911       .374     C perv/imperv/total
 15     ADD RUNOFF
              .200       .313      3.213      3.213 c.m/s
  9     ROUTE
         .000     Conduit Length
         .500     Supply X-factor <.5
         .000     Supply K-lag (sec)
         .500     Beta weighting factor
      600.000     Routing timestep
            1     No. of sub-reaches
              .200       .313       .313      3.213 c.m/s
 17     COMBINE
       2     Junction Node No.
              .200       .313       .313      3.377 c.m/s
 18     CONFLUENCE
       2     Junction Node No.
              .200      3.377       .313       .000 c.m/s
 27     HYDROGRAPH DISPLAY
       5     is # of Hyeto/Hydrograph chosen
        Volume  =  .1375860E+05 c.m
 14     START
       1     1=Zero; 2=Define
 35     COMMENT
       3     line(s) of comment
        ********************************
        ** 50 YEAR DESIGN STORM EVENT **
        ********************************
  2     STORM
            1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
      794.298     Coefficient  a
         .000     Constant  b    (min)
         .699     Exponent  c
         .400     Fraction to peak  r
      240.000     Duration ó  240 min
                68.907 mm     Total depth
  3     IMPERVIOUS
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .013     Manning "n"
       98.000     SCS Curve No or C
         .100     Ia/S Coefficient
         .518     Initial Abstraction
  4     CATCHMENT
       20.000     ID No.ó 99999
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        3.020     Area in hectares
      100.000     Length (PERV) metres
         .500     Gradient (%)
       72.600     Per cent Impervious
      100.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .250     Manning "n"
       77.000     SCS Curve No or C
         .100     Ia/S Coefficient
        7.587     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .619       .000       .313       .000 c.m/s
              .397       .913       .772     C perv/imperv/total
 15     ADD RUNOFF
              .619       .619       .313       .000 c.m/s
 27     HYDROGRAPH DISPLAY
       5     is # of Hyeto/Hydrograph chosen
        Volume  =  .1606272E+04 c.m
 11     CHANNEL
         .500     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .060     Manning's "n"
        1.500     O/a Depth in metres
         .300     Select Grade in %
        Depth          =      .612 metres
        Velocity       =      .433 m/sec
        Flow Capacity  =     5.657 c.m/s
        Critical depth =      .314 metres
  9     ROUTE
       50.000     Conduit Length
         .000     Supply X-factor <.5
       86.544     Supply K-lag (sec)
         .653     Beta weighting factor
      200.000     Routing timestep
            1     No. of sub-reaches
              .619       .619       .553       .000 c.m/s
 17     COMBINE
       1     Junction Node No.
              .619       .619       .553       .553 c.m/s
 14     START
       1     1=Zero; 2=Define
  4     CATCHMENT
       10.000     ID No.ó 99999
       17.530     Area in hectares
      500.000     Length (PERV) metres
        1.000     Gradient (%)
       75.000     Per cent Impervious
      500.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .250     Manning "n"
       77.000     SCS Curve No or C
         .100     Ia/S Coefficient
        7.587     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             3.726       .000       .553       .553 c.m/s
              .398       .920       .789     C perv/imperv/total
 15     ADD RUNOFF
             3.726      3.726       .553       .553 c.m/s
 27     HYDROGRAPH DISPLAY
       5     is # of Hyeto/Hydrograph chosen
        Volume  =  .9530810E+04 c.m
  9     ROUTE
         .000     Conduit Length
         .500     Supply X-factor <.5
         .000     Supply K-lag (sec)
         .500     Beta weighting factor
      600.000     Routing timestep
            1     No. of sub-reaches
             3.726      3.726      3.726       .553 c.m/s
 17     COMBINE
       1     Junction Node No.
             3.726      3.726      3.726      4.279 c.m/s
 18     CONFLUENCE
       1     Junction Node No.
             3.726      4.279      3.726       .000 c.m/s
  4     CATCHMENT
       30.000     ID No.ó 99999
        3.670     Area in hectares
       80.000     Length (PERV) metres
         .500     Gradient (%)
        1.400     Per cent Impervious
       80.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .250     Manning "n"
       77.000     SCS Curve No or C
         .100     Ia/S Coefficient
        7.587     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .173      4.279      3.726       .000 c.m/s
              .397       .916       .404     C perv/imperv/total
 15     ADD RUNOFF
              .173      4.382      3.726       .000 c.m/s
 11     CHANNEL
         .500     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .060     Manning's "n"
        1.500     O/a Depth in metres
         .200     Select Grade in %
        Depth          =     1.469 metres
        Velocity       =      .608 m/sec
        Flow Capacity  =     4.619 c.m/s
        Critical depth =      .768 metres
  9     ROUTE
      200.000     Conduit Length
         .000     Supply X-factor <.5
      246.805     Supply K-lag (sec)
         .593     Beta weighting factor
      600.000     Routing timestep
            1     No. of sub-reaches
              .173      4.382      3.687       .000 c.m/s
 17     COMBINE
       2     Junction Node No.
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           .173      4.382      3.687      3.687 c.m/s
 14     START
        1     1=Zero; 2=Define
  4     CATCHMENT
        40.000     ID No.ó 99999
         3.890     Area in hectares
       100.000     Length (PERV) metres
          .500     Gradient (%)
         3.700     Per cent Impervious
       100.000     Length (IMPERV)
          .000     %Imp. with Zero Dpth
             1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          .250     Manning "n"
        77.000     SCS Curve No or C
          .100     Ia/S Coefficient
         7.587     Initial Abstraction
             1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .174       .000      3.687      3.687 c.m/s
           .397       .913       .416     C perv/imperv/total
 15     ADD RUNOFF
           .174       .174      3.687      3.687 c.m/s
  4     CATCHMENT
        50.000     ID No.ó 99999
         9.180     Area in hectares
       350.000     Length (PERV) metres
         1.000     Gradient (%)
         1.300     Per cent Impervious
       350.000     Length (IMPERV)
          .000     %Imp. with Zero Dpth
             1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          .250     Manning "n"
        77.000     SCS Curve No or C
          .100     Ia/S Coefficient
         7.587     Initial Abstraction
             1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .265       .174      3.687      3.687 c.m/s
           .398       .918       .404     C perv/imperv/total
 15     ADD RUNOFF
           .265       .404      3.687      3.687 c.m/s
  9     ROUTE
          .000     Conduit Length
          .500     Supply X-factor <.5
          .000     Supply K-lag (sec)
          .500     Beta weighting factor
       600.000     Routing timestep
             1     No. of sub-reaches
           .265       .404       .404      3.687 c.m/s
 17     COMBINE
        2     Junction Node No.
           .265       .404       .404      3.900 c.m/s
 18     CONFLUENCE
        2     Junction Node No.
           .265      3.900       .404       .000 c.m/s
 27     HYDROGRAPH DISPLAY
        5     is # of Hyeto/Hydrograph chosen
        Volume  =  .1582500E+05 c.m
 14     START
        1     1=Zero; 2=Define
 35     COMMENT
        3     line(s) of comment
        ***********************************
        **  100 YEAR DESIGN STORM EVENT  **
        ***********************************
  2     STORM
             1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
       871.279     Coefficient  a
          .000     Constant  b    (min)
          .699     Exponent  c
          .400     Fraction to peak  r
       240.000     Duration ó  240 min
             75.585 mm     Total depth
  3     IMPERVIOUS
             1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          .013     Manning "n"
        98.000     SCS Curve No or C
          .100     Ia/S Coefficient
          .518     Initial Abstraction
  4     CATCHMENT
        20.000     ID No.ó 99999
         3.020     Area in hectares
       100.000     Length (PERV) metres
          .500     Gradient (%)
        72.600     Per cent Impervious
       100.000     Length (IMPERV)
          .000     %Imp. with Zero Dpth
             1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          .250     Manning "n"
        77.000     SCS Curve No or C
          .100     Ia/S Coefficient
         7.587     Initial Abstraction
             1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .694       .000       .404       .000 c.m/s
           .425       .921       .785     C perv/imperv/total
 15     ADD RUNOFF
           .694       .694       .404       .000 c.m/s
 27     HYDROGRAPH DISPLAY
        5     is # of Hyeto/Hydrograph chosen
        Volume  =  .1792627E+04 c.m
 11     CHANNEL
          .500     Base Width     =
         3.000     Left  bank slope  1:
         3.000     Right bank slope  1:
          .060     Manning's "n"
         1.500     O/a Depth in metres
          .300     Select Grade in %
        Depth          =      .642 metres
        Velocity       =      .446 m/sec
        Flow Capacity  =     5.657 c.m/s
        Critical depth =      .332 metres
  9     ROUTE
        50.000     Conduit Length
          .000     Supply X-factor <.5
        84.095     Supply K-lag (sec)
          .665     Beta weighting factor
       200.000     Routing timestep
             1     No. of sub-reaches
           .694       .694       .615       .000 c.m/s
```

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 17     COMBINE
        1     Junction Node No.
           .694       .694       .615       .615 c.m/s
 14     START
        1     1=Zero; 2=Define
  4     CATCHMENT
        10.000     ID No.ó 99999
        17.530     Area in hectares
       500.000     Length (PERV) metres
         1.000     Gradient (%)
        75.000     Per cent Impervious
       500.000     Length (IMPERV)
          .000     %Imp. with Zero Dpth
             1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          .250     Manning "n"
        77.000     SCS Curve No or C
          .100     Ia/S Coefficient
         7.587     Initial Abstraction
             1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
          4.115       .000       .615       .615 c.m/s
           .425       .926       .801     C perv/imperv/total
 15     ADD RUNOFF
          4.115      4.115       .615       .615 c.m/s
 27     HYDROGRAPH DISPLAY
        5     is # of Hyeto/Hydrograph chosen
        Volume  =  .1061312E+05 c.m
  9     ROUTE
          .000     Conduit Length
          .500     Supply X-factor <.5
          .000     Supply K-lag (sec)
          .500     Beta weighting factor
       600.000     Routing timestep
             1     No. of sub-reaches
          4.115      4.115      4.115       .615 c.m/s
 17     COMBINE
        1     Junction Node No.
          4.115      4.115      4.115      4.721 c.m/s
 18     CONFLUENCE
        1     Junction Node No.
          4.115      4.721      4.115       .000 c.m/s
  4     CATCHMENT
        30.000     ID No.ó 99999
         3.670     Area in hectares
        80.000     Length (PERV) metres
          .500     Gradient (%)
         1.400     Per cent Impervious
        80.000     Length (IMPERV)
          .000     %Imp. with Zero Dpth
             1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          .250     Manning "n"
        77.000     SCS Curve No or C
          .100     Ia/S Coefficient
         7.587     Initial Abstraction
             1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .210      4.721      4.115       .000 c.m/s
           .425       .922       .432     C perv/imperv/total
 15     ADD RUNOFF
           .210      4.855      4.115       .000 c.m/s
 11     CHANNEL
         1.000     Base Width     =
         3.000     Left  bank slope  1:
         3.000     Right bank slope  1:
          .060     Manning's "n"
         2.000     O/a Depth in metres
          .200     Select Grade in %
        Depth          =     1.454 metres
        Velocity       =      .623 m/sec
        Flow Capacity  =    10.613 c.m/s
        Critical depth =      .734 metres
  9     ROUTE
       200.000     Conduit Length
          .000     Supply X-factor <.5
       240.715     Supply K-lag (sec)
          .600     Beta weighting factor
       600.000     Routing timestep
             1     No. of sub-reaches
           .210      4.855      4.155       .000 c.m/s
 17     COMBINE
        2     Junction Node No.
           .210      4.855      4.155      4.155 c.m/s
 14     START
        1     1=Zero; 2=Define
  4     CATCHMENT
        40.000     ID No.ó 99999
         3.890     Area in hectares
       100.000     Length (PERV) metres
          .500     Gradient (%)
         3.700     Per cent Impervious
       100.000     Length (IMPERV)
          .000     %Imp. with Zero Dpth
             1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          .250     Manning "n"
        77.000     SCS Curve No or C
          .100     Ia/S Coefficient
         7.587     Initial Abstraction
             1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .211       .000      4.155      4.155 c.m/s
           .425       .921       .443     C perv/imperv/total
 15     ADD RUNOFF
           .211       .211      4.155      4.155 c.m/s
  4     CATCHMENT
        50.000     ID No.ó 99999
         9.180     Area in hectares
       350.000     Length (PERV) metres
         1.000     Gradient (%)
         1.300     Per cent Impervious
       350.000     Length (IMPERV)
          .000     %Imp. with Zero Dpth
             1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          .250     Manning "n"
        77.000     SCS Curve No or C
          .100     Ia/S Coefficient
         7.587     Initial Abstraction
             1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .325       .211      4.155      4.155 c.m/s
           .425       .922       .432     C perv/imperv/total
 15     ADD RUNOFF
```

```
              .325       .499      4.155      4.155 c.m/s
  9     ROUTE
          .000     Conduit Length
          .500     Supply X-factor <.5
          .000     Supply K-lag (sec)
          .500     Beta weighting factor
       600.000     Routing timestep
             1     No. of sub-reaches
              .325       .499       .499      4.155 c.m/s
 17     COMBINE
       2     Junction Node No.
              .325       .499       .499      4.424 c.m/s
 18     CONFLUENCE
       2     Junction Node No.
              .325      4.424       .499       .000 c.m/s
 27     HYDROGRAPH DISPLAY
       5     is # of Hyeto/Hydrograph chosen
        Volume  =  .1789860E+05 c.m
 20     MANUAL
```

Developed Conditions – FULL SWM

```
       Output File (4.7) SWM.OUT      opened 2024-05-24  14:19
       Units used are defined by G =    9.810
           24   144    10.000        are MAXDT MAXHYD & DTMIN values
       Licensee: UPPER CANADA CONSULTANTS
 35    COMMENT
      3     line(s) of comment
       PROJECT NAME: NORTHLAND ESTATES
       PROJECT NO.:  21132
       PROPOSED CONDITIONS WITH SWM
 14    START
      1     1=Zero; 2=Define
 35    COMMENT
      3     line(s) of comment
       *****************************
       ** 25MM DESIGN STORM EVENT **
       *****************************
  2    STORM
           1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
     512.000     Coefficient  a
       6.000     Constant  b    (min)
        .800     Exponent  c
        .400     Fraction to peak  r
     240.000     Duration ó  240 min
              25.036 mm     Total depth
  3    IMPERVIOUS
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .013     Manning "n"
      98.000     SCS Curve No or C
        .100     Ia/S Coefficient
        .518     Initial Abstraction
  4    CATCHMENT
      20.000     ID No.ó 99999
       3.020     Area in hectares
     100.000     Length (PERV) metres
        .500     Gradient (%)
      72.600     Per cent Impervious
     100.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      77.000     SCS Curve No or C
        .100     Ia/S Coefficient
       7.587     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
            .202       .000       .000       .000 c.m/s
            .130       .797       .614     C perv/imperv/total
 15    ADD RUNOFF
            .202       .202       .000       .000 c.m/s
 27    HYDROGRAPH DISPLAY
      5     is # of Hyeto/Hydrograph chosen
       Volume  =  .4636960E+03 c.m
 11    CHANNEL
        .500     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .060     Manning's "n"
       1.000     O/a Depth in metres
        .300     Select Grade in %
       Depth          =      .378 metres
       Velocity       =      .326 m/sec
       Flow Capacity  =     2.047 c.m/s
       Critical depth =      .180 metres
  9    ROUTE
      50.000     Conduit Length
        .000     Supply X-factor <.5
     114.938     Supply K-lag (sec)
        .531     Beta weighting factor
     200.000     Routing timestep
           1     No. of sub-reaches
            .202       .202       .192       .000 c.m/s
 17    COMBINE
      1     Junction Node No.
            .202       .202       .192       .192 c.m/s
 14    START
      1     1=Zero; 2=Define
  4    CATCHMENT
      10.000     ID No.ó 99999
      17.530     Area in hectares
     500.000     Length (PERV) metres
       1.000     Gradient (%)
      75.000     Per cent Impervious
     500.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      77.000     SCS Curve No or C
        .100     Ia/S Coefficient
       7.587     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
            .924       .000       .192       .192 c.m/s
            .130       .806       .637     C perv/imperv/total
 15    ADD RUNOFF
            .924       .924       .192       .192 c.m/s
 27    HYDROGRAPH DISPLAY
      5     is # of Hyeto/Hydrograph chosen
       Volume  =  .2788153E+04 c.m
 10    POND
      6 Depth - Discharge - Volume sets
       179.900        .000          .0
       180.500       .0620      2842.9
       180.900        .224      5050.5
       181.100        .350      6243.3
       181.250        .678      7177.9
       181.450       1.399      8478.7
       Peak Outflow    =      .048 c.m/s
       Maximum Depth   =   180.361 metres
       Maximum Storage =     2183. c.m
            .924       .924       .048       .192 c.m/s
 17    COMBINE
      1     Junction Node No.
            .924       .924       .048       .204 c.m/s
 18    CONFLUENCE
      1     Junction Node No.
            .924       .204       .048       .000 c.m/s
```

```
  4    CATCHMENT
      30.000     ID No.ó 99999
       3.670     Area in hectares
      80.000     Length (PERV) metres
        .500     Gradient (%)
       1.400     Per cent Impervious
      80.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      77.000     SCS Curve No or C
        .100     Ia/S Coefficient
       7.587     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
            .010       .204       .048       .000 c.m/s
            .130       .785       .139     C perv/imperv/total
 15    ADD RUNOFF
            .010       .210       .048       .000 c.m/s
 11    CHANNEL
        .500     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .060     Manning's "n"
       1.000     O/a Depth in metres
        .200     Select Grade in %
       Depth          =      .420 metres
       Velocity       =      .283 m/sec
       Flow Capacity  =     1.671 c.m/s
       Critical depth =      .184 metres
  9    ROUTE
     200.000     Conduit Length
        .271     Supply X-factor <.5
     529.337     Supply K-lag (sec)
        .500     Beta weighting factor
     600.000     Routing timestep
           1     No. of sub-reaches
            .010       .210       .185       .000 c.m/s
 17    COMBINE
      2     Junction Node No.
            .010       .210       .185       .185 c.m/s
 14    START
      1     1=Zero; 2=Define
  4    CATCHMENT
      40.000     ID No.ó 99999
       3.890     Area in hectares
     100.000     Length (PERV) metres
        .500     Gradient (%)
       3.700     Per cent Impervious
     100.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      77.000     SCS Curve No or C
        .100     Ia/S Coefficient
       7.587     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
            .014       .000       .185       .185 c.m/s
            .130       .797       .155     C perv/imperv/total
 15    ADD RUNOFF
            .014       .014       .185       .185 c.m/s
  4    CATCHMENT
      50.000     ID No.ó 99999
       9.180     Area in hectares
     350.000     Length (PERV) metres
       1.000     Gradient (%)
       1.300     Per cent Impervious
     350.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      77.000     SCS Curve No or C
        .100     Ia/S Coefficient
       7.587     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
            .015       .014       .185       .185 c.m/s
            .130       .803       .139     C perv/imperv/total
 15    ADD RUNOFF
            .015       .025       .185       .185 c.m/s
  9    ROUTE
        .000     Conduit Length
        .500     Supply X-factor <.5
        .000     Supply K-lag (sec)
        .500     Beta weighting factor
     600.000     Routing timestep
           1     No. of sub-reaches
            .015       .025       .025       .185 c.m/s
 17    COMBINE
      2     Junction Node No.
            .015       .025       .025       .202 c.m/s
 18    CONFLUENCE
      2     Junction Node No.
            .015       .202       .025       .000 c.m/s
 14    START
      1     1=Zero; 2=Define
 35    COMMENT
      3     line(s) of comment
       ******************************
       ** 2 YEAR DESIGN STORM EVENT **
       ******************************
  2    STORM
           1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
     397.149     Coefficient  a
        .000     Constant  b    (min)
        .699     Exponent  c
        .400     Fraction to peak  r
     240.000     Duration ó  240 min
              34.453 mm     Total depth
  3    IMPERVIOUS
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .013     Manning "n"
      98.000     SCS Curve No or C
        .100     Ia/S Coefficient
        .518     Initial Abstraction
  4    CATCHMENT
      20.000     ID No.ó 99999
       3.020     Area in hectares
     100.000     Length (PERV) metres
```

```
        .500     Gradient (%)
      72.600     Per cent Impervious
     100.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      77.000     SCS Curve No or C
        .100     Ia/S Coefficient
       7.587     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .275       .000       .025       .000 c.m/s
              .204       .828       .657     C perv/imperv/total
 15    ADD RUNOFF
              .275       .275       .025       .000 c.m/s
 27    HYDROGRAPH DISPLAY
      5     is # of Hyeto/Hydrograph chosen
       Volume  =  .6835738E+03 c.m
 11    CHANNEL
        .500     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .060     Manning's "n"
       1.000     O/a Depth in metres
        .300     Select Grade in %
       Depth          =      .433 metres
       Velocity       =      .353 m/sec
       Flow Capacity  =     2.047 c.m/s
       Critical depth =      .211 metres
  9    ROUTE
      50.000     Conduit Length
        .000     Supply X-factor <.5
     106.220     Supply K-lag (sec)
        .567     Beta weighting factor
     200.000     Routing timestep
           1     No. of sub-reaches
              .275       .275       .270       .000 c.m/s
 17    COMBINE
      1     Junction Node No.
              .275       .275       .270       .270 c.m/s
 14    START
      1     1=Zero; 2=Define
  4    CATCHMENT
      10.000     ID No.ó 99999
      17.530     Area in hectares
     500.000     Length (PERV) metres
       1.000     Gradient (%)
      75.000     Per cent Impervious
     500.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      77.000     SCS Curve No or C
        .100     Ia/S Coefficient
       7.587     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             1.646       .000       .270       .270 c.m/s
              .204       .852       .690     C perv/imperv/total
 15    ADD RUNOFF
             1.646      1.646       .270       .270 c.m/s
 27    HYDROGRAPH DISPLAY
      5     is # of Hyeto/Hydrograph chosen
       Volume  =  .4165142E+04 c.m
 10    POND
      6 Depth - Discharge - Volume sets
       179.900        .000         .0
       180.500       .0620      2842.9
       180.900        .224      5050.5
       181.100        .350      6243.3
       181.250        .678      7177.9
       181.450       1.399      8478.7
       Peak Outflow    =      .087 c.m/s
       Maximum Depth   =   180.562 metres
       Maximum Storage =     3185. c.m
             1.646      1.646       .087       .270 c.m/s
 17    COMBINE
      1     Junction Node No.
             1.646      1.646       .087       .290 c.m/s
 18    CONFLUENCE
      1     Junction Node No.
             1.646       .290       .087       .000 c.m/s
  4    CATCHMENT
      30.000     ID No.ó 99999
       3.670     Area in hectares
      80.000     Length (PERV) metres
        .500     Gradient (%)
       1.400     Per cent Impervious
      80.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      77.000     SCS Curve No or C
        .100     Ia/S Coefficient
       7.587     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .025       .290       .087       .000 c.m/s
              .204       .838       .213     C perv/imperv/total
 15    ADD RUNOFF
              .025       .303       .087       .000 c.m/s
 11    CHANNEL
        .500     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .060     Manning's "n"
       1.000     O/a Depth in metres
        .200     Select Grade in %
       Depth          =      .492 metres
       Velocity       =      .311 m/sec
       Flow Capacity  =     1.671 c.m/s
       Critical depth =      .221 metres
  9    ROUTE
     200.000     Conduit Length
        .237     Supply X-factor <.5
     482.477     Supply K-lag (sec)
        .500     Beta weighting factor
     600.000     Routing timestep
           1     No. of sub-reaches
              .025       .303       .254       .000 c.m/s
```

```
 17    COMBINE
      2     Junction Node No.
              .025       .303       .254       .254 c.m/s
 14    START
      1     1=Zero; 2=Define
  4    CATCHMENT
      40.000     ID No.ó 99999
       3.890     Area in hectares
     100.000     Length (PERV) metres
        .500     Gradient (%)
       3.700     Per cent Impervious
     100.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      77.000     SCS Curve No or C
        .100     Ia/S Coefficient
       7.587     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .025       .000       .254       .254 c.m/s
              .204       .828       .227     C perv/imperv/total
 15    ADD RUNOFF
              .025       .025       .254       .254 c.m/s
  4    CATCHMENT
      50.000     ID No.ó 99999
       9.180     Area in hectares
     350.000     Length (PERV) metres
       1.000     Gradient (%)
       1.300     Per cent Impervious
     350.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      77.000     SCS Curve No or C
        .100     Ia/S Coefficient
       7.587     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .038       .025       .254       .254 c.m/s
              .204       .848       .212     C perv/imperv/total
 15    ADD RUNOFF
              .038       .061       .254       .254 c.m/s
  9    ROUTE
        .000     Conduit Length
        .500     Supply X-factor <.5
        .000     Supply K-lag (sec)
        .500     Beta weighting factor
     600.000     Routing timestep
           1     No. of sub-reaches
              .038       .061       .061       .254 c.m/s
 17    COMBINE
      2     Junction Node No.
              .038       .061       .061       .285 c.m/s
 18    CONFLUENCE
      2     Junction Node No.
              .038       .285       .061       .000 c.m/s
 14    START
      1     1=Zero; 2=Define
 35    COMMENT
      3     line(s) of comment
       *******************************
       ** 5 YEAR DESIGN STORM EVENT **
       *******************************
  2    STORM
           1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
     524.867     Coefficient  a
        .000     Constant  b    (min)
        .699     Exponent  c
        .400     Fraction to peak  r
     240.000     Duration ó  240 min
                45.533 mm     Total depth
  3    IMPERVIOUS
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .013     Manning "n"
      98.000     SCS Curve No or C
        .100     Ia/S Coefficient
        .518     Initial Abstraction
  4    CATCHMENT
      20.000     ID No.ó 99999
       3.020     Area in hectares
     100.000     Length (PERV) metres
        .500     Gradient (%)
      72.600     Per cent Impervious
     100.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      77.000     SCS Curve No or C
        .100     Ia/S Coefficient
       7.587     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .364       .000       .061       .000 c.m/s
              .278       .869       .707     C perv/imperv/total
 15    ADD RUNOFF
              .364       .364       .061       .000 c.m/s
 27    HYDROGRAPH DISPLAY
      5     is # of Hyeto/Hydrograph chosen
       Volume  =  .9720645E+03 c.m
 11    CHANNEL
        .500     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .060     Manning's "n"
       1.000     O/a Depth in metres
        .300     Select Grade in %
       Depth          =      .489 metres
       Velocity       =      .379 m/sec
       Flow Capacity  =     2.047 c.m/s
       Critical depth =      .243 metres
  9    ROUTE
      50.000     Conduit Length
        .000     Supply X-factor <.5
      98.910     Supply K-lag (sec)
        .598     Beta weighting factor
     200.000     Routing timestep
           1     No. of sub-reaches
              .364       .364       .364       .000 c.m/s
 17    COMBINE
```

```
       1     Junction Node No.
             .364       .364       .364       .364 c.m/s
 14     START
       1     1=Zero; 2=Define
  4     CATCHMENT
      10.000     ID No.ó 99999
      17.530     Area in hectares
     500.000     Length (PERV) metres
       1.000     Gradient (%)
      75.000     Per cent Impervious
     500.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      77.000     SCS Curve No or C
        .100     Ia/S Coefficient
       7.587     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
            2.324       .000       .364       .364 c.m/s
             .278       .874       .725     C perv/imperv/total
 15     ADD RUNOFF
            2.324      2.324       .364       .364 c.m/s
 27     HYDROGRAPH DISPLAY
       5     is # of Hyeto/Hydrograph chosen
        Volume  =  .5784277E+04 c.m
 10     POND
       6 Depth - Discharge - Volume sets
        179.900        .000         .0
        180.500       .0620      2842.9
        180.900        .224      5050.5
        181.100        .350      6243.3
        181.250        .678      7177.9
        181.450       1.399      8478.7
        Peak Outflow    =      .155 c.m/s
        Maximum Depth   =   180.730 metres
        Maximum Storage =     4113. c.m
            2.324      2.324       .155       .364 c.m/s
 17     COMBINE
       1     Junction Node No.
            2.324      2.324       .155       .397 c.m/s
 18     CONFLUENCE
       1     Junction Node No.
            2.324       .397       .155       .000 c.m/s
  4     CATCHMENT
      30.000     ID No.ó 99999
       3.670     Area in hectares
      80.000     Length (PERV) metres
        .500     Gradient (%)
       1.400     Per cent Impervious
      80.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      77.000     SCS Curve No or C
        .100     Ia/S Coefficient
       7.587     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .059       .397       .155       .000 c.m/s
             .278       .877       .286     C perv/imperv/total
 15     ADD RUNOFF
             .059       .426       .155       .000 c.m/s
 11     CHANNEL
        .500     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .060     Manning's "n"
       1.000     O/a Depth in metres
        .200     Select Grade in %
        Depth          =      .570 metres
        Velocity       =      .339 m/sec
        Flow Capacity  =     1.671 c.m/s
        Critical depth =      .262 metres
  9     ROUTE
     200.000     Conduit Length
        .200     Supply X-factor <.5
     442.546     Supply K-lag (sec)
        .500     Beta weighting factor
     600.000     Routing timestep
           1     No. of sub-reaches
             .059       .426       .357       .000 c.m/s
 17     COMBINE
       2     Junction Node No.
             .059       .426       .357       .357 c.m/s
 14     START
       1     1=Zero; 2=Define
  4     CATCHMENT
      40.000     ID No.ó 99999
       3.890     Area in hectares
     100.000     Length (PERV) metres
        .500     Gradient (%)
       3.700     Per cent Impervious
     100.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      77.000     SCS Curve No or C
        .100     Ia/S Coefficient
       7.587     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .060       .000       .357       .357 c.m/s
             .278       .869       .299     C perv/imperv/total
 15     ADD RUNOFF
             .060       .060       .357       .357 c.m/s
  4     CATCHMENT
      50.000     ID No.ó 99999
       9.180     Area in hectares
     350.000     Length (PERV) metres
       1.000     Gradient (%)
       1.300     Per cent Impervious
     350.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      77.000     SCS Curve No or C
        .100     Ia/S Coefficient
       7.587     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
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             .088       .060       .357       .357 c.m/s
             .278       .884       .286     C perv/imperv/total
 15     ADD RUNOFF
             .088       .138       .357       .357 c.m/s
  9     ROUTE
        .000     Conduit Length
        .500     Supply X-factor <.5
        .000     Supply K-lag (sec)
        .500     Beta weighting factor
     600.000     Routing timestep
           1     No. of sub-reaches
             .088       .138       .138       .357 c.m/s
 17     COMBINE
       2     Junction Node No.
             .088       .138       .138       .431 c.m/s
 18     CONFLUENCE
       2     Junction Node No.
             .088       .431       .138       .000 c.m/s
 14     START
       1     1=Zero; 2=Define
 35     COMMENT
       3     line(s) of comment
        *******************************
        ** 10 YEAR DESIGN STORM EVENT **
        *******************************
  2     STORM
           1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
     608.845     Coefficient  a
        .000     Constant  b    (min)
        .699     Exponent  c
        .400     Fraction to peak  r
     240.000     Duration ó  240 min
              52.818 mm     Total depth
  3     IMPERVIOUS
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .013     Manning "n"
      98.000     SCS Curve No or C
        .100     Ia/S Coefficient
        .518     Initial Abstraction
  4     CATCHMENT
      20.000     ID No.ó 99999
       3.020     Area in hectares
     100.000     Length (PERV) metres
        .500     Gradient (%)
      72.600     Per cent Impervious
     100.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      77.000     SCS Curve No or C
        .100     Ia/S Coefficient
       7.587     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .442       .000       .138       .000 c.m/s
             .320       .887       .732     C perv/imperv/total
 15     ADD RUNOFF
             .442       .442       .138       .000 c.m/s
 27     HYDROGRAPH DISPLAY
       5     is # of Hyeto/Hydrograph chosen
        Volume  =  .1167105E+04 c.m
 11     CHANNEL
        .500     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .060     Manning's "n"
       1.000     O/a Depth in metres
        .300     Select Grade in %
        Depth          =      .531 metres
        Velocity       =      .398 m/sec
        Flow Capacity  =     2.047 c.m/s
        Critical depth =      .267 metres
  9     ROUTE
      50.000     Conduit Length
        .000     Supply X-factor <.5
      94.229     Supply K-lag (sec)
        .618     Beta weighting factor
     200.000     Routing timestep
           1     No. of sub-reaches
             .442       .442       .425       .000 c.m/s
 17     COMBINE
       1     Junction Node No.
             .442       .442       .425       .425 c.m/s
 14     START
       1     1=Zero; 2=Define
  4     CATCHMENT
      10.000     ID No.ó 99999
      17.530     Area in hectares
     500.000     Length (PERV) metres
       1.000     Gradient (%)
      75.000     Per cent Impervious
     500.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .250     Manning "n"
      77.000     SCS Curve No or C
        .100     Ia/S Coefficient
       7.587     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
            2.767       .000       .425       .425 c.m/s
             .320       .892       .749     C perv/imperv/total
 15     ADD RUNOFF
            2.767      2.767       .425       .425 c.m/s
 27     HYDROGRAPH DISPLAY
       5     is # of Hyeto/Hydrograph chosen
        Volume  =  .6933451E+04 c.m
 10     POND
       6 Depth - Discharge - Volume sets
        179.900        .000         .0
        180.500       .0620      2842.9
        180.900        .224      5050.5
        181.100        .350      6243.3
        181.250        .678      7177.9
        181.450       1.399      8478.7
        Peak Outflow    =      .203 c.m/s
        Maximum Depth   =   180.849 metres
        Maximum Storage =     4769. c.m
            2.767      2.767       .203       .425 c.m/s
```

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17     COMBINE
     1     Junction Node No.
          2.767      2.767       .203       .468 c.m/s
18     CONFLUENCE
     1     Junction Node No.
          2.767       .468       .203       .000 c.m/s
 4     CATCHMENT
    30.000     ID No.ó 99999
     3.670     Area in hectares
    80.000     Length (PERV) metres
      .500     Gradient (%)
     1.400     Per cent Impervious
    80.000     Length (IMPERV)
      .000     %Imp. with Zero Dpth
         1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250     Manning "n"
    77.000     SCS Curve No or C
      .100     Ia/S Coefficient
     7.587     Initial Abstraction
         1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .093       .468       .203       .000 c.m/s
           .320       .893       .328     C perv/imperv/total
15     ADD RUNOFF
           .093       .514       .203       .000 c.m/s
11     CHANNEL
      .500     Base Width     =
     3.000     Left  bank slope  1:
     3.000     Right bank slope  1:
      .060     Manning's "n"
     1.000     O/a Depth in metres
      .200     Select Grade in %
     Depth         =      .616 metres
     Velocity      =      .355 m/sec
     Flow Capacity  =     1.671 c.m/s
     Critical depth =      .287 metres
 9     ROUTE
   200.000     Conduit Length
      .177     Supply X-factor <.5
   422.150     Supply K-lag (sec)
      .500     Beta weighting factor
   600.000     Routing timestep
         1     No. of sub-reaches
           .093       .514       .439       .000 c.m/s
17     COMBINE
     2     Junction Node No.
           .093       .514       .439       .439 c.m/s
14     START
     1     1=Zero; 2=Define
 4     CATCHMENT
    40.000     ID No.ó 99999
     3.890     Area in hectares
   100.000     Length (PERV) metres
      .500     Gradient (%)
     3.700     Per cent Impervious
   100.000     Length (IMPERV)
      .000     %Imp. with Zero Dpth
         1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250     Manning "n"
    77.000     SCS Curve No or C
      .100     Ia/S Coefficient
     7.587     Initial Abstraction
         1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .086       .000       .439       .439 c.m/s
           .320       .887       .341     C perv/imperv/total
15     ADD RUNOFF
           .086       .086       .439       .439 c.m/s
 4     CATCHMENT
    50.000     ID No.ó 99999
     9.180     Area in hectares
   350.000     Length (PERV) metres
     1.000     Gradient (%)
     1.300     Per cent Impervious
   350.000     Length (IMPERV)
      .000     %Imp. with Zero Dpth
         1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250     Manning "n"
    77.000     SCS Curve No or C
      .100     Ia/S Coefficient
     7.587     Initial Abstraction
         1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .134       .086       .439       .439 c.m/s
           .320       .898       .327     C perv/imperv/total
15     ADD RUNOFF
           .134       .208       .439       .439 c.m/s
 9     ROUTE
      .000     Conduit Length
      .500     Supply X-factor <.5
      .000     Supply K-lag (sec)
      .500     Beta weighting factor
   600.000     Routing timestep
         1     No. of sub-reaches
           .134       .208       .208       .439 c.m/s
17     COMBINE
     2     Junction Node No.
           .134       .208       .208       .559 c.m/s
18     CONFLUENCE
     2     Junction Node No.
           .134       .559       .208       .000 c.m/s
14     START
     1     1=Zero; 2=Define
35     COMMENT
     3     line(s) of comment
     ********************************
     ** 25 YEAR DESIGN STORM EVENT **
     ********************************
 2     STORM
         1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
   715.568     Coefficient  a
      .000     Constant  b    (min)
      .699     Exponent  c
      .400     Fraction to peak  r
   240.000     Duration ó  240 min
             62.077 mm     Total depth
 3     IMPERVIOUS
         1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .013     Manning "n"
    98.000     SCS Curve No or C
      .100     Ia/S Coefficient
      .518     Initial Abstraction
 4     CATCHMENT
    20.000     ID No.ó 99999
     3.020     Area in hectares
   100.000     Length (PERV) metres
      .500     Gradient (%)
    72.600     Per cent Impervious
   100.000     Length (IMPERV)
      .000     %Imp. with Zero Dpth
         1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250     Manning "n"
    77.000     SCS Curve No or C
      .100     Ia/S Coefficient
     7.587     Initial Abstraction
         1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .543       .000       .208       .000 c.m/s
           .367       .905       .757     C perv/imperv/total
15     ADD RUNOFF
           .543       .543       .208       .000 c.m/s
27     HYDROGRAPH DISPLAY
     5     is # of Hyeto/Hydrograph chosen
     Volume  =  .1419536E+04 c.m
11     CHANNEL
      .500     Base Width     =
     3.000     Left  bank slope  1:
     3.000     Right bank slope  1:
      .060     Manning's "n"
     1.000     O/a Depth in metres
      .300     Select Grade in %
     Depth         =      .579 metres
     Velocity      =      .419 m/sec
     Flow Capacity  =     2.047 c.m/s
     Critical depth =      .295 metres
 9     ROUTE
    50.000     Conduit Length
      .000     Supply X-factor <.5
    89.446     Supply K-lag (sec)
      .640     Beta weighting factor
   200.000     Routing timestep
         1     No. of sub-reaches
           .543       .543       .500       .000 c.m/s
17     COMBINE
     1     Junction Node No.
           .543       .543       .500       .500 c.m/s
14     START
     1     1=Zero; 2=Define
 4     CATCHMENT
    10.000     ID No.ó 99999
    17.530     Area in hectares
   500.000     Length (PERV) metres
     1.000     Gradient (%)
    75.000     Per cent Impervious
   500.000     Length (IMPERV)
      .000     %Imp. with Zero Dpth
         1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250     Manning "n"
    77.000     SCS Curve No or C
      .100     Ia/S Coefficient
     7.587     Initial Abstraction
         1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
          3.322       .000       .500       .500 c.m/s
           .367       .910       .774     C perv/imperv/total
15     ADD RUNOFF
          3.322      3.322       .500       .500 c.m/s
27     HYDROGRAPH DISPLAY
     5     is # of Hyeto/Hydrograph chosen
     Volume  =  .8425626E+04 c.m
10     POND
     6 Depth - Discharge - Volume sets
      179.900        .000          .0
      180.500       .0620      2842.9
      180.900        .224      5050.5
      181.100        .350      6243.3
      181.250        .678      7177.9
      181.450       1.399      8478.7
     Peak Outflow    =      .281 c.m/s
     Maximum Depth   =   180.990 metres
     Maximum Storage =     5590. c.m
          3.322      3.322       .281       .500 c.m/s
17     COMBINE
     1     Junction Node No.
          3.322      3.322       .281       .555 c.m/s
18     CONFLUENCE
     1     Junction Node No.
          3.322       .555       .281       .000 c.m/s
 4     CATCHMENT
    30.000     ID No.ó 99999
     3.670     Area in hectares
    80.000     Length (PERV) metres
      .500     Gradient (%)
     1.400     Per cent Impervious
    80.000     Length (IMPERV)
      .000     %Imp. with Zero Dpth
         1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
      .250     Manning "n"
    77.000     SCS Curve No or C
      .100     Ia/S Coefficient
     7.587     Initial Abstraction
         1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           .137       .555       .281       .000 c.m/s
           .367       .908       .374     C perv/imperv/total
15     ADD RUNOFF
           .137       .631       .281       .000 c.m/s
11     CHANNEL
      .500     Base Width     =
     3.000     Left  bank slope  1:
     3.000     Right bank slope  1:
      .060     Manning's "n"
     1.000     O/a Depth in metres
      .200     Select Grade in %
     Depth         =      .671 metres
     Velocity      =      .374 m/sec
     Flow Capacity  =     1.671 c.m/s
     Critical depth =      .317 metres
 9     ROUTE
   200.000     Conduit Length
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         .151      Supply X-factor <.5
      401.078      Supply K-lag (sec)
         .500      Beta weighting factor
      600.000      Routing timestep
            1      No. of sub-reaches
               .137       .631       .560       .000 c.m/s
 17    COMBINE
        2     Junction Node No.
               .137       .631       .560       .560 c.m/s
 14    START
        1     1=Zero; 2=Define
  4    CATCHMENT
       40.000      ID No.ó 99999
        3.890      Area in hectares
      100.000      Length (PERV) metres
         .500      Gradient (%)
        3.700      Per cent Impervious
      100.000      Length (IMPERV)
         .000      %Imp. with Zero Dpth
            1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .250      Manning "n"
       77.000      SCS Curve No or C
         .100      Ia/S Coefficient
        7.587      Initial Abstraction
            1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .138       .000       .560       .560 c.m/s
               .367       .905       .387     C perv/imperv/total
 15    ADD RUNOFF
               .138       .138       .560       .560 c.m/s
  4    CATCHMENT
       50.000      ID No.ó 99999
        9.180      Area in hectares
      350.000      Length (PERV) metres
        1.000      Gradient (%)
        1.300      Per cent Impervious
      350.000      Length (IMPERV)
         .000      %Imp. with Zero Dpth
            1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .250      Manning "n"
       77.000      SCS Curve No or C
         .100      Ia/S Coefficient
        7.587      Initial Abstraction
            1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .200       .138       .560       .560 c.m/s
               .367       .911       .374     C perv/imperv/total
 15    ADD RUNOFF
               .200       .313       .560       .560 c.m/s
  9    ROUTE
         .000      Conduit Length
         .500      Supply X-factor <.5
         .000      Supply K-lag (sec)
         .500      Beta weighting factor
      600.000      Routing timestep
            1      No. of sub-reaches
               .200       .313       .313       .560 c.m/s
 17    COMBINE
        2     Junction Node No.
               .200       .313       .313       .757 c.m/s
 18    CONFLUENCE
        2     Junction Node No.
               .200       .757       .313       .000 c.m/s
 14    START
        1     1=Zero; 2=Define
 35    COMMENT
        3     line(s) of comment
       ********************************
       ** 50 YEAR DESIGN STORM EVENT **
       ********************************
  2    STORM
            1      1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
      794.298      Coefficient  a
         .000      Constant  b    (min)
         .699      Exponent  c
         .400      Fraction to peak  r
      240.000      Duration ó  240 min
                 68.907 mm     Total depth
  3    IMPERVIOUS
            1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .013      Manning "n"
       98.000      SCS Curve No or C
         .100      Ia/S Coefficient
         .518      Initial Abstraction
  4    CATCHMENT
       20.000      ID No.ó 99999
        3.020      Area in hectares
      100.000      Length (PERV) metres
         .500      Gradient (%)
       72.600      Per cent Impervious
      100.000      Length (IMPERV)
         .000      %Imp. with Zero Dpth
            1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .250      Manning "n"
       77.000      SCS Curve No or C
         .100      Ia/S Coefficient
        7.587      Initial Abstraction
            1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .619       .000       .313       .000 c.m/s
               .397       .913       .772     C perv/imperv/total
 15    ADD RUNOFF
               .619       .619       .313       .000 c.m/s
 27    HYDROGRAPH DISPLAY
        5     is # of Hyeto/Hydrograph chosen
       Volume  =  .1606272E+04 c.m
 11    CHANNEL
         .500      Base Width     =
        3.000      Left  bank slope  1:
        3.000      Right bank slope  1:
         .060      Manning's "n"
        1.000      O/a Depth in metres
         .300      Select Grade in %
       Depth          =      .612 metres
       Velocity       =      .433 m/sec
       Flow Capacity  =     2.047 c.m/s
       Critical depth =      .314 metres
  9    ROUTE
       50.000      Conduit Length
         .000      Supply X-factor <.5
```

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       86.544      Supply K-lag (sec)
         .653      Beta weighting factor
      200.000      Routing timestep
            1      No. of sub-reaches
               .619       .619       .553       .000 c.m/s
 17    COMBINE
        1     Junction Node No.
               .619       .619       .553       .553 c.m/s
 14    START
        1     1=Zero; 2=Define
  4    CATCHMENT
       10.000      ID No.ó 99999
       17.530      Area in hectares
      500.000      Length (PERV) metres
        1.000      Gradient (%)
       75.000      Per cent Impervious
      500.000      Length (IMPERV)
         .000      %Imp. with Zero Dpth
            1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .250      Manning "n"
       77.000      SCS Curve No or C
         .100      Ia/S Coefficient
        7.587      Initial Abstraction
            1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              3.726       .000       .553       .553 c.m/s
               .398       .920       .789     C perv/imperv/total
 15    ADD RUNOFF
              3.726      3.726       .553       .553 c.m/s
 27    HYDROGRAPH DISPLAY
        5     is # of Hyeto/Hydrograph chosen
       Volume  =  .9530810E+04 c.m
 10    POND
        6 Depth - Discharge - Volume sets
       179.900        .000         .0
       180.500       .0620       2842.9
       180.900        .224       5050.5
       181.100        .350       6243.3
       181.250        .678       7177.9
       181.450       1.399       8478.7
       Peak Outflow    =      .342 c.m/s
       Maximum Depth   =   181.088 metres
       Maximum Storage =     6171. c.m
              3.726      3.726       .342       .553 c.m/s
 17    COMBINE
        1     Junction Node No.
              3.726      3.726       .342       .624 c.m/s
 18    CONFLUENCE
        1     Junction Node No.
              3.726       .624       .342       .000 c.m/s
  4    CATCHMENT
       30.000      ID No.ó 99999
        3.670      Area in hectares
       80.000      Length (PERV) metres
         .500      Gradient (%)
        1.400      Per cent Impervious
       80.000      Length (IMPERV)
         .000      %Imp. with Zero Dpth
            1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .250      Manning "n"
       77.000      SCS Curve No or C
         .100      Ia/S Coefficient
        7.587      Initial Abstraction
            1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .173       .624       .342       .000 c.m/s
               .397       .916       .404     C perv/imperv/total
 15    ADD RUNOFF
               .173       .727       .342       .000 c.m/s
 11    CHANNEL
         .500      Base Width     =
        3.000      Left  bank slope  1:
        3.000      Right bank slope  1:
         .060      Manning's "n"
        1.000      O/a Depth in metres
         .200      Select Grade in %
       Depth          =      .712 metres
       Velocity       =      .388 m/sec
       Flow Capacity  =     1.671 c.m/s
       Critical depth =      .339 metres
  9    ROUTE
      200.000      Conduit Length
         .132      Supply X-factor <.5
      387.012      Supply K-lag (sec)
         .500      Beta weighting factor
      600.000      Routing timestep
            1      No. of sub-reaches
               .173       .727       .660       .000 c.m/s
 17    COMBINE
        2     Junction Node No.
               .173       .727       .660       .660 c.m/s
 14    START
        1     1=Zero; 2=Define
  4    CATCHMENT
       40.000      ID No.ó 99999
        3.890      Area in hectares
      100.000      Length (PERV) metres
         .500      Gradient (%)
        3.700      Per cent Impervious
      100.000      Length (IMPERV)
         .000      %Imp. with Zero Dpth
            1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .250      Manning "n"
       77.000      SCS Curve No or C
         .100      Ia/S Coefficient
        7.587      Initial Abstraction
            1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .174       .000       .660       .660 c.m/s
               .397       .913       .416     C perv/imperv/total
 15    ADD RUNOFF
               .174       .174       .660       .660 c.m/s
  4    CATCHMENT
       50.000      ID No.ó 99999
        9.180      Area in hectares
      350.000      Length (PERV) metres
        1.000      Gradient (%)
        1.300      Per cent Impervious
      350.000      Length (IMPERV)
         .000      %Imp. with Zero Dpth
```

```
          1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250     Manning "n"
     77.000     SCS Curve No or C
       .100     Ia/S Coefficient
      7.587     Initial Abstraction
          1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .265       .174       .660       .660 c.m/s
             .398       .918       .404     C perv/imperv/total
 15     ADD RUNOFF
             .265       .404       .660       .660 c.m/s
  9     ROUTE
       .000     Conduit Length
       .500     Supply X-factor <.5
       .000     Supply K-lag (sec)
       .500     Beta weighting factor
    600.000     Routing timestep
          1     No. of sub-reaches
             .265       .404       .404       .660 c.m/s
 17     COMBINE
     2     Junction Node No.
             .265       .404       .404       .957 c.m/s
 18     CONFLUENCE
     2     Junction Node No.
             .265       .957       .404       .000 c.m/s
 14     START
     1     1=Zero; 2=Define
 35     COMMENT
     3     line(s) of comment
      ***********************************
      **  100 YEAR DESIGN STORM EVENT  **
      ***********************************
  2     STORM
          1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
    871.279     Coefficient  a
       .000     Constant  b    (min)
       .699     Exponent  c
       .400     Fraction to peak  r
    240.000     Duration ó  240 min
             75.585 mm     Total depth
  3     IMPERVIOUS
          1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .013     Manning "n"
     98.000     SCS Curve No or C
       .100     Ia/S Coefficient
       .518     Initial Abstraction
  4     CATCHMENT
     20.000     ID No.ó 99999
      3.020     Area in hectares
    100.000     Length (PERV) metres
       .500     Gradient (%)
     72.600     Per cent Impervious
    100.000     Length (IMPERV)
       .000     %Imp. with Zero Dpth
          1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250     Manning "n"
     77.000     SCS Curve No or C
       .100     Ia/S Coefficient
      7.587     Initial Abstraction
          1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .694       .000       .404       .000 c.m/s
             .425       .921       .785     C perv/imperv/total
 15     ADD RUNOFF
             .694       .694       .404       .000 c.m/s
 27     HYDROGRAPH DISPLAY
     5     is # of Hyeto/Hydrograph chosen
      Volume  =  .1792627E+04 c.m
 11     CHANNEL
       .500     Base Width     =
      3.000     Left  bank slope  1:
      3.000     Right bank slope  1:
       .060     Manning's "n"
      1.000     O/a Depth in metres
       .300     Select Grade in %
      Depth          =      .642 metres
      Velocity       =      .446 m/sec
      Flow Capacity  =     2.047 c.m/s
      Critical depth =      .332 metres
  9     ROUTE
     50.000     Conduit Length
       .000     Supply X-factor <.5
     84.095     Supply K-lag (sec)
       .665     Beta weighting factor
    200.000     Routing timestep
          1     No. of sub-reaches
             .694       .694       .615       .000 c.m/s
 17     COMBINE
     1     Junction Node No.
             .694       .694       .615       .615 c.m/s
 14     START
     1     1=Zero; 2=Define
  4     CATCHMENT
     10.000     ID No.ó 99999
     17.530     Area in hectares
    500.000     Length (PERV) metres
      1.000     Gradient (%)
     75.000     Per cent Impervious
    500.000     Length (IMPERV)
       .000     %Imp. with Zero Dpth
          1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250     Manning "n"
     77.000     SCS Curve No or C
       .100     Ia/S Coefficient
      7.587     Initial Abstraction
          1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           4.115       .000       .615       .615 c.m/s
             .425       .926       .801     C perv/imperv/total
 15     ADD RUNOFF
           4.115      4.115       .615       .615 c.m/s
 27     HYDROGRAPH DISPLAY
     5     is # of Hyeto/Hydrograph chosen
      Volume  =  .1061312E+05 c.m
 10     POND
     6 Depth - Discharge - Volume sets
      179.900        .000          .0
      180.500       .0620      2842.9
      180.900        .224      5050.5
      181.100        .350      6243.3
      181.250        .678      7177.9
      181.450       1.399      8478.7
      Peak Outflow    =      .468 c.m/s
      Maximum Depth   =   181.154 metres
      Maximum Storage =     6580. c.m
           4.115      4.115       .468       .615 c.m/s
 17     COMBINE
     1     Junction Node No.
           4.115      4.115       .468       .709 c.m/s
 18     CONFLUENCE
     1     Junction Node No.
           4.115       .709       .468       .000 c.m/s
  4     CATCHMENT
     30.000     ID No.ó 99999
      3.670     Area in hectares
     80.000     Length (PERV) metres
       .500     Gradient (%)
      1.400     Per cent Impervious
     80.000     Length (IMPERV)
       .000     %Imp. with Zero Dpth
          1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250     Manning "n"
     77.000     SCS Curve No or C
       .100     Ia/S Coefficient
      7.587     Initial Abstraction
          1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .210       .709       .468       .000 c.m/s
             .425       .922       .432     C perv/imperv/total
 15     ADD RUNOFF
             .210       .843       .468       .000 c.m/s
 11     CHANNEL
       .500     Base Width     =
      3.000     Left  bank slope  1:
      3.000     Right bank slope  1:
       .060     Manning's "n"
      1.000     O/a Depth in metres
       .200     Select Grade in %
      Depth          =      .757 metres
      Velocity       =      .402 m/sec
      Flow Capacity  =     1.671 c.m/s
      Critical depth =      .364 metres
  9     ROUTE
    200.000     Conduit Length
       .111     Supply X-factor <.5
    372.831     Supply K-lag (sec)
       .500     Beta weighting factor
    600.000     Routing timestep
          1     No. of sub-reaches
             .210       .843       .775       .000 c.m/s
 17     COMBINE
     2     Junction Node No.
             .210       .843       .775       .775 c.m/s
 14     START
     1     1=Zero; 2=Define
  4     CATCHMENT
     40.000     ID No.ó 99999
      3.890     Area in hectares
    100.000     Length (PERV) metres
       .500     Gradient (%)
      3.700     Per cent Impervious
    100.000     Length (IMPERV)
       .000     %Imp. with Zero Dpth
          1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250     Manning "n"
     77.000     SCS Curve No or C
       .100     Ia/S Coefficient
      7.587     Initial Abstraction
          1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .211       .000       .775       .775 c.m/s
             .425       .921       .443     C perv/imperv/total
 15     ADD RUNOFF
             .211       .211       .775       .775 c.m/s
  4     CATCHMENT
     50.000     ID No.ó 99999
      9.180     Area in hectares
    350.000     Length (PERV) metres
      1.000     Gradient (%)
      1.300     Per cent Impervious
    350.000     Length (IMPERV)
       .000     %Imp. with Zero Dpth
          1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .250     Manning "n"
     77.000     SCS Curve No or C
       .100     Ia/S Coefficient
      7.587     Initial Abstraction
          1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .325       .211       .775       .775 c.m/s
             .425       .922       .432     C perv/imperv/total
 15     ADD RUNOFF
             .325       .499       .775       .775 c.m/s
  9     ROUTE
       .000     Conduit Length
       .500     Supply X-factor <.5
       .000     Supply K-lag (sec)
       .500     Beta weighting factor
    600.000     Routing timestep
          1     No. of sub-reaches
             .325       .499       .499       .775 c.m/s
 17     COMBINE
     2     Junction Node No.
             .325       .499       .499      1.182 c.m/s
 18     CONFLUENCE
     2     Junction Node No.
             .325      1.182       .499       .000 c.m/s
 20     MANUAL
```

PORT COLBORNE
DEVELOPMENT AND GOVERNMENT RELATIONS DEPARTMENT

Memorandum

To: **Port Colborne Committee of Adjustment**

From: **Diana Vasu, Planner**

Cc: **David Schulz, Manager of Planning**

Date: **October 4, 2024**

Re: **Application for Minor Variance A23-24-PC**

At the September 11, 2024, Committee of Adjustment (Committee) hearing, the Committee adjourned the above-referenced application to request additional information before making their decision.

The table below identifies the information requested by the Committee, the response of the applicants, and which appendix to this memorandum that the information is located.

Committee Request	Applicant Response	Location of Response
Examples of minor variances for subdivisions that are not registered yet in other municipalities.	The applicants have provided examples of other municipalities that have granted minor variances for subdivisions that are not registered yet.	**Appendix A**
A plan that shows each requested variance and the units to which those variances are proposed to apply.	The applicants have prepared a set of drawings to identify which unit each variance is proposed to apply to.	**Appendix B**

Appendix A to Memorandum re: Application for Minor Variance A23-24-PC

Outlook

RE: A23-24-PC

From matt@gardencitydevelopment.ca <matt@gardencitydevelopment.ca>
Date Wed 9/25/2024 11:38 AM
To Denise Landry <Denise.Landry@portcolborne.ca>
Cc Taya Taraba <Taya.Taraba@portcolborne.ca>; Diana Vasu <Diana.Vasu@portcolborne.ca>

Hi Denise,

I was personally involved with the Oaks at 6 Mile Creek, Hibbard Street Townhouses and Dominion Woods in Fort Erie.
I will canvass some colleagues and see if I can find other examples.

Matt

Matt Kernahan, MCIP, RPP
Garden City Development Inc.
(289) 783-8598
matt@gardencitydevelopment.ca

GARDEN CITY DEVELOPMENT

From: Denise Landry <Denise.Landry@portcolborne.ca>
Sent: September 25, 2024 10:12 AM
To: matt@gardencitydevelopment.ca
Cc: Taya Taraba <Taya.Taraba@portcolborne.ca>; Diana Vasu <Diana.Vasu@portcolborne.ca>
Subject: RE: A23-24-PC

Hi Matt,

The committee of adjustment has requested examples of minor variances for subdivisions that are not yet registered in other municipalities. If you can share any examples staff will pass them along.

Regards,
Denise

MINOR VARIANCES TO THE BYLAW 6575-30-18

			REQUIRED	PROPOSED
	PARENT BY-LAW	6575-30-18		
	ZONING DESIGNATION	R3-73		
7.8 a)	MIN INTERIOR LOT FRONTAGE PER UNIT (& EXTERIOR)		6.0 m	6.0 m
R3-73	MIN INTERIOR LOT AREA (& EXTERIOR)		180 m2	160 m2
	MIN LOT DEPTH		N/A	N/A
7.8 c)	FRONT YARD: (TO HOUSE & GARAGE)		7.5 m	6.0 m
7.8 f)	REAR YARD		6.0 m	6.0 m
R3-73	SIDE YARD		1.5 m	1.5 m
7.8 e)	FLANKAGE (CORNER SIDE YARD) TO HOUSE		4.5 m	3.0 m
7.8 e)	FLANKAGE (CORNER SIDE YARD) TO PORCH		4.5 m	1.5 m
7.8 g)	BUILDING HEIGHT / MAX.		11 m	12 m
3.2	MIN GARAGE WIDTH (OBSTRUCTED PARKING)		3.5 m	3.0 m

AARTIUSCHENKO | WED APR 24/24 11:05 AM | K:\PROJECTS\2023\223089 ALL\ZONING\223089 ZONING.DWG

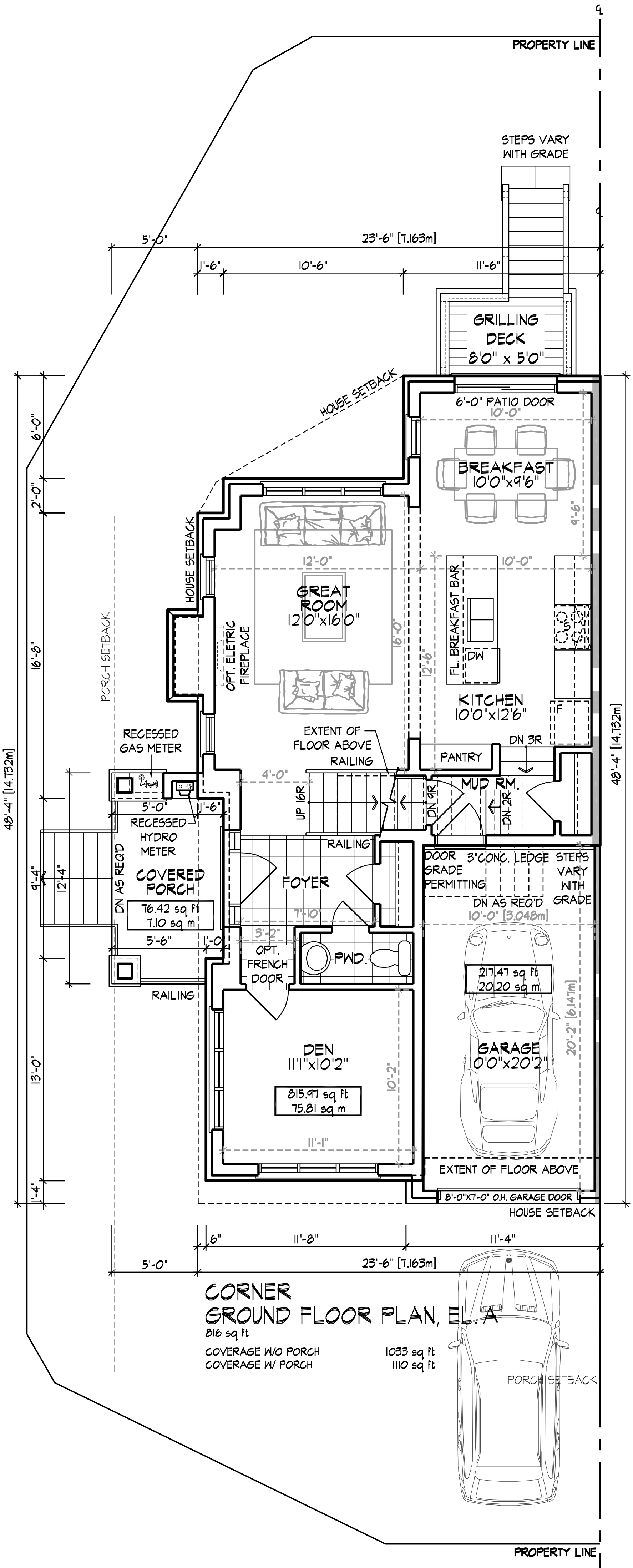
ZONING STUDY

HUNT DESIGN ASSOCIATES INC.
www.huntdesign.ca

Alliance Homes - 223089
West Side Trails, Port Colborne, Ontario

Drawn By	Checked By	Scale	File Number	Page Number
AA	-	1:250	223089 Zoning	1 of 1

8966 Woodbine Ave, Markham, ON L3R 0J7 T 905.737.5133 F 905.737.7326



HUNT DESIGN ASSOCIATES INC.
www.huntdesign.ca

Alliance Homes - 223089

South Coast Homes, Port Colborne, Ontario

8966 Woodbine Ave, Markham, ON L3R 0J7 ■ T 905.737.5133 ■ F 905.737.7326 ■

TARGET AREA: 1800 SF

JAN-2024 ■ AA ■

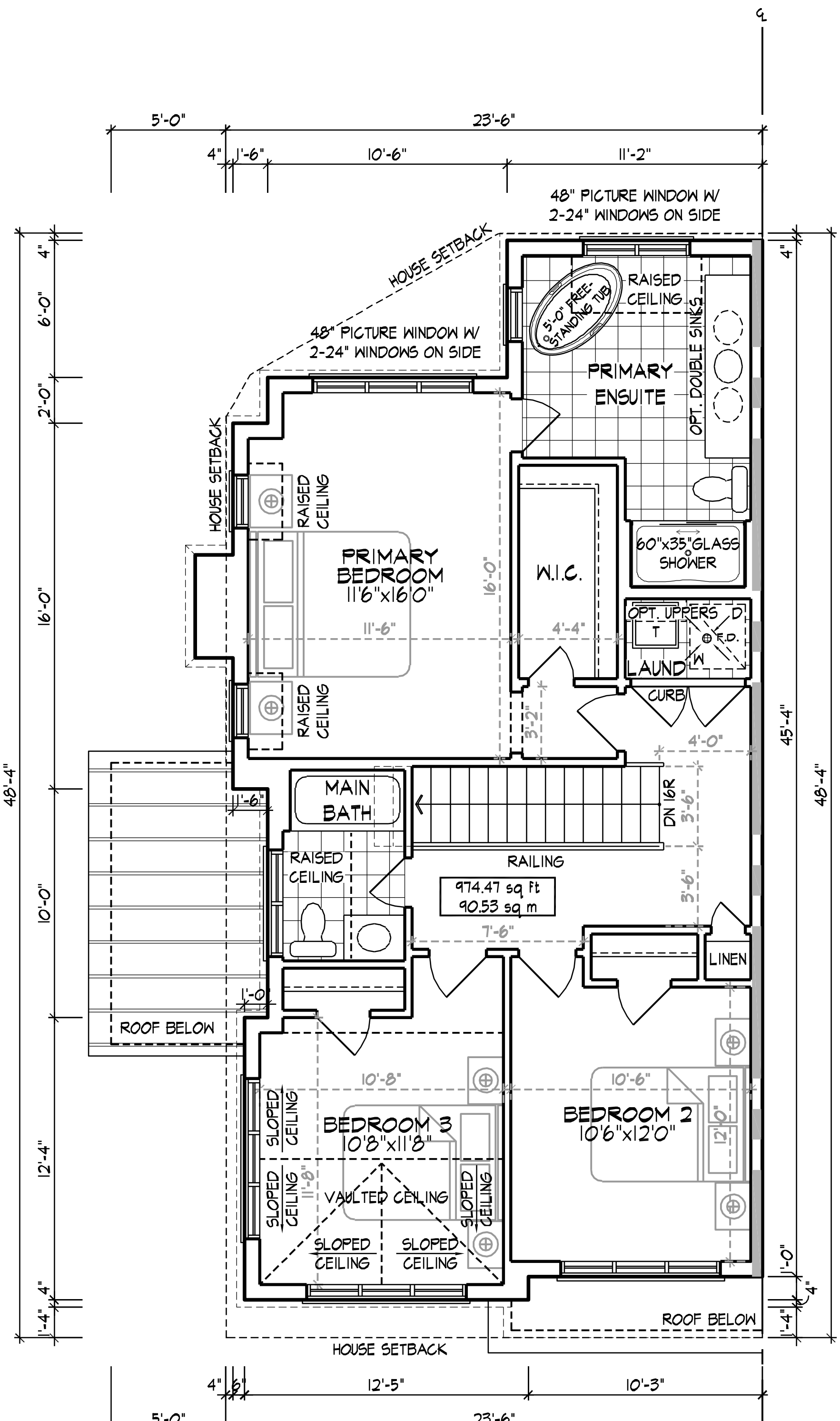
UNIT 2005 C

AREA - EL.'A' 1790 SF // EL.'B' 1774 SF

223089DT2005C

FOR 10.2mX26.82m LOTS

ZONING STANDARDS	
MAX. HOUSE WIDTH	23'-6"
MAX. LENGTH GARAGE SIDE	48'-4"
MAX. LENGTH HOUSE SIDE	48'-4"
MAX. COVERAGE W/ PORCH	N/A
MAX. COVERAGE W/O PORCH	N/A
MAX. G.F.A.	N/A
MAX. HEIGHT	11 m
MIN. GARAGE WIDTH	3.5m x 5.2m
MAX. GARAGE WIDTH	N/A
MAX. GARAGE PROJ.	N/A



CORNER
SECOND FLOOR PLAN, EL.'A'

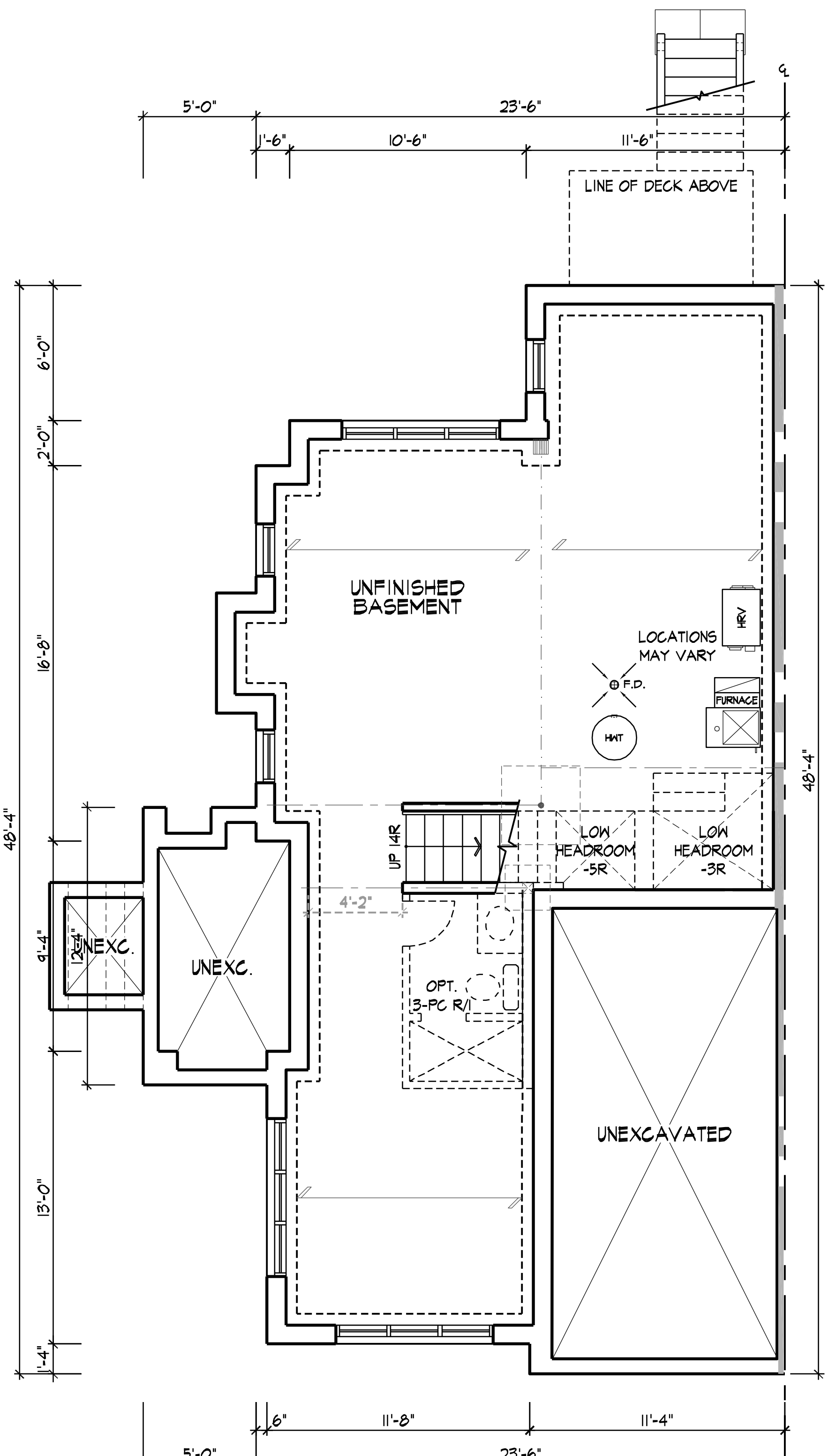
974 sq ft

GROSS FLOOR AREA	974 sq ft
DEDUCT OPEN AREAS	0 sq ft
NET AREA	974 sq ft

Alliance Homes - 223089
South Coast Homes, Port Colborne, Ontario

TARGET AREA: 1800 SF
AREA - EL. 'A' 1790 SF // EL. 'B' 1774 SF
JAN-2024 ■ AA ■
UNIT 2005 C
223089DT2005C

HUNT DESIGN ASSOCIATES INC.
www.huntdesign.ca
8966 Woodbine Ave, Markham, ON L3R 0J7 ■ T 905.737.5133 ■ F 905.737.7326 ■



CORNER
BASEMENT PLAN, EL. 'A'
0 sq ft

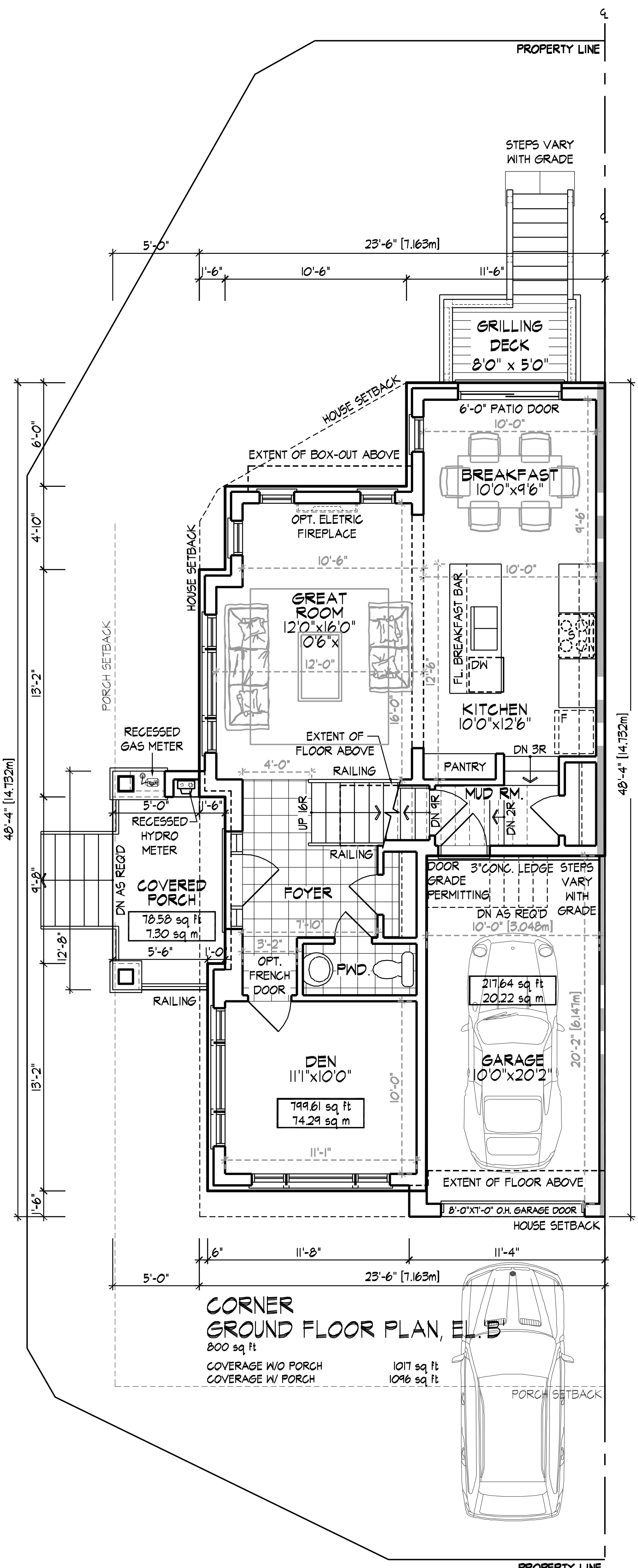
HUNT
DESIGN ASSOCIATES INC.
www.huntdesign.ca

Alliance Homes - 223089
South Coast Homes, Port Colborne, Ontario

8966 Woodbine Ave, Markham, ON L3R 0J7 ■ T 905.737.5133 ■ F 905.737.7326 ■

TARGET AREA: 1800 SF
JAN-2024 ■ AA ■

UNIT 2005 C
AREA - EL. 'A' 1790 SF // EL. 'B' 1774 SF
223089DT2005C



CORNER GROUND FLOOR PLAN, EL.'B'

800 sq ft

COVERAGE W/O PORCH 1017 sq ft
COVERAGE W/ PORCH 1096 sq ft

HUNT DESIGN ASSOCIATES INC.
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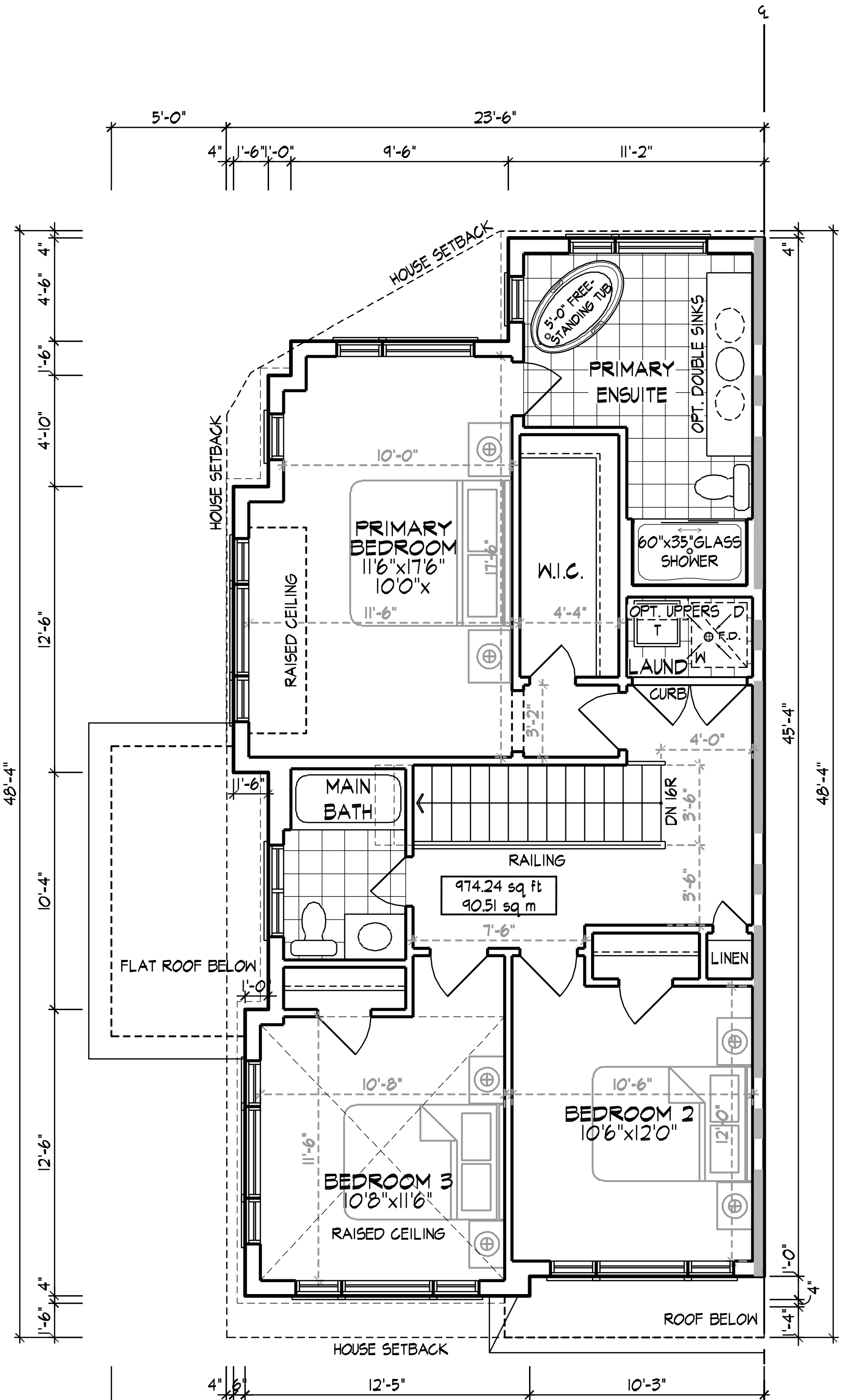
Alliance Homes - 223089
South Coast Homes, Port Colborne, Ontario
8966 Woodbine Ave, Markham, ON L3R 0J7 ■ T 905.737.5133 ■ F 905.737.7326 ■

TARGET AREA: 1800 SF
JAN-2024 ■ AA ■

UNIT 2005 C
AREA - EL.'A' 1790 SF // EL.'B' 1774 SF
223089DT2005C



CORNER
SECOND FLOOR PLAN, EL.'B'

974 sq ft

GROSS FLOOR AREA	974 sq ft
DEDUCT OPEN AREAS	0 sq ft
NET AREA	974 sq ft

HUNT DESIGN ASSOCIATES INC.
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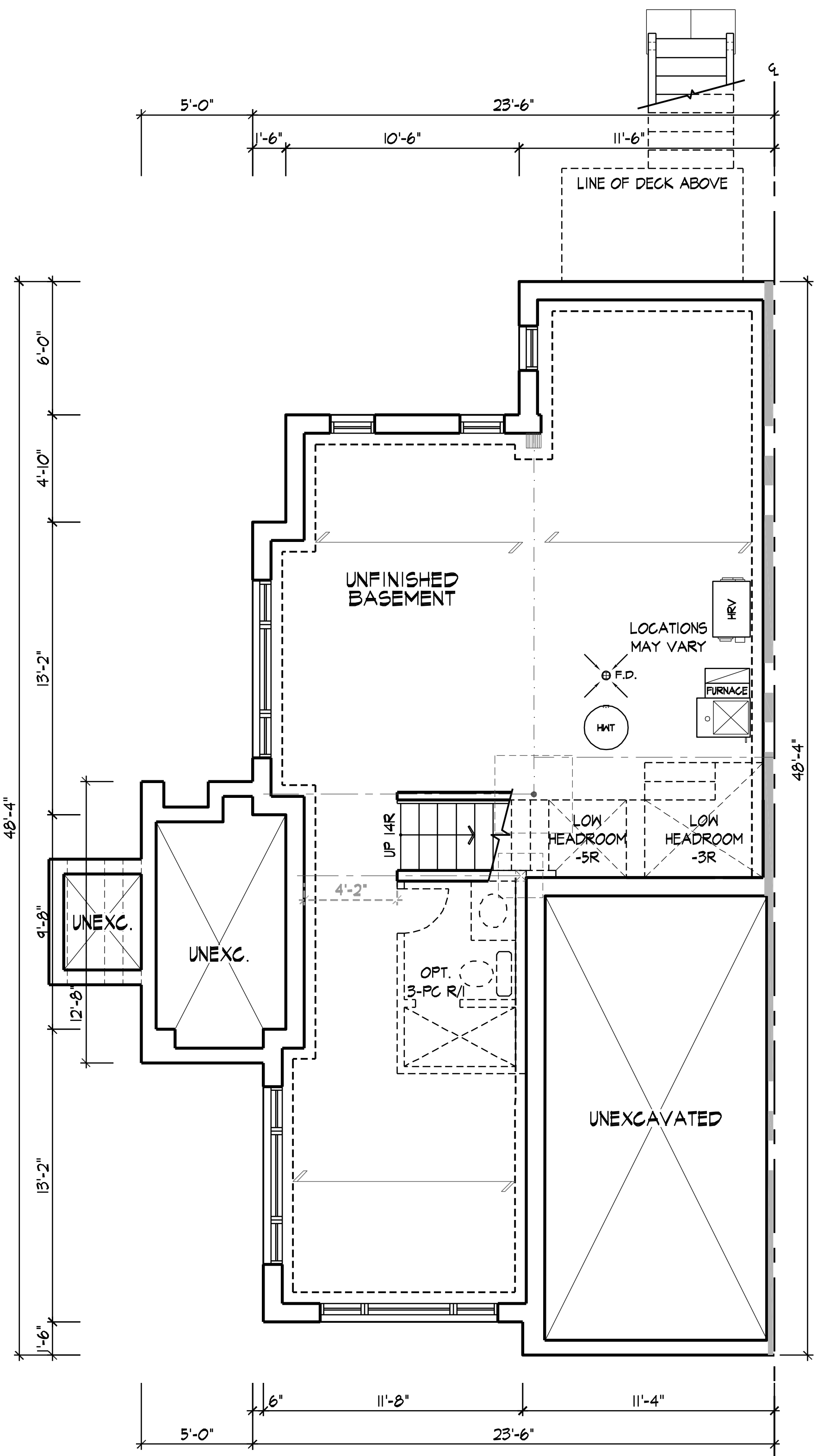
Alliance Homes - 223089
South Coast Homes, Port Colborne, Ontario
8966 Woodbine Ave, Markham, ON L3R 0J7 ■ T 905.737.5133 ■ F 905.737.7326 ■

TARGET AREA: 1800 SF
JAN-2024 ■ AA ■

UNIT 2005 C
AREA - EL.'A' 1790 SF // EL.'B' 1774 SF
223089DT2005C



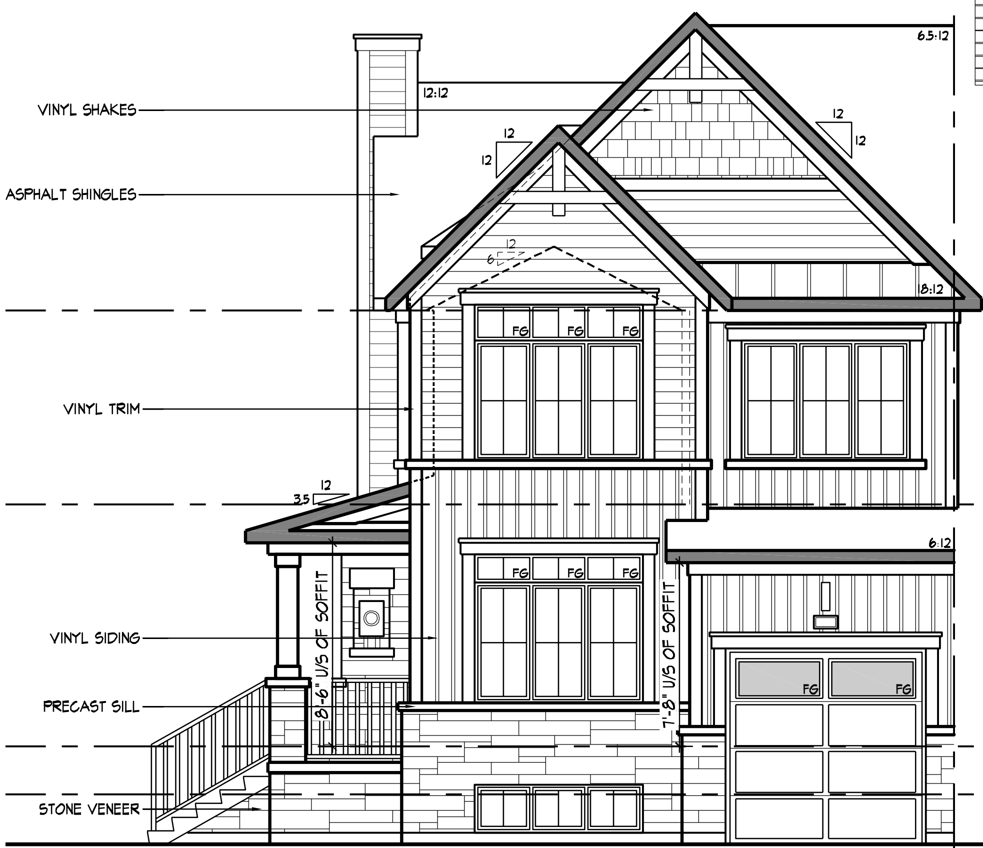
CORNER
BASEMENT PLAN, EL. 'B'
0 sq ft

HUNT
DESIGN ASSOCIATES INC.
www.huntdesign.ca

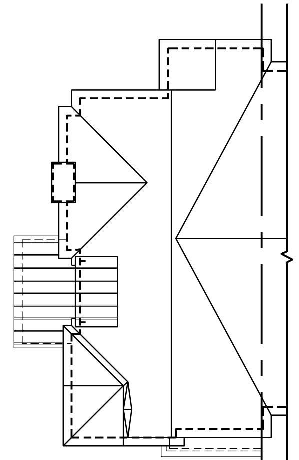
Alliance Homes - 223089
South Coast Homes, Port Colborne, Ontario
8966 Woodbine Ave, Markham, ON L3R 0J7 ■ T 905.737.5133 ■ F 905.737.7326 ■

TARGET AREA: 1800 SF
JAN-2024 ■ AA ■

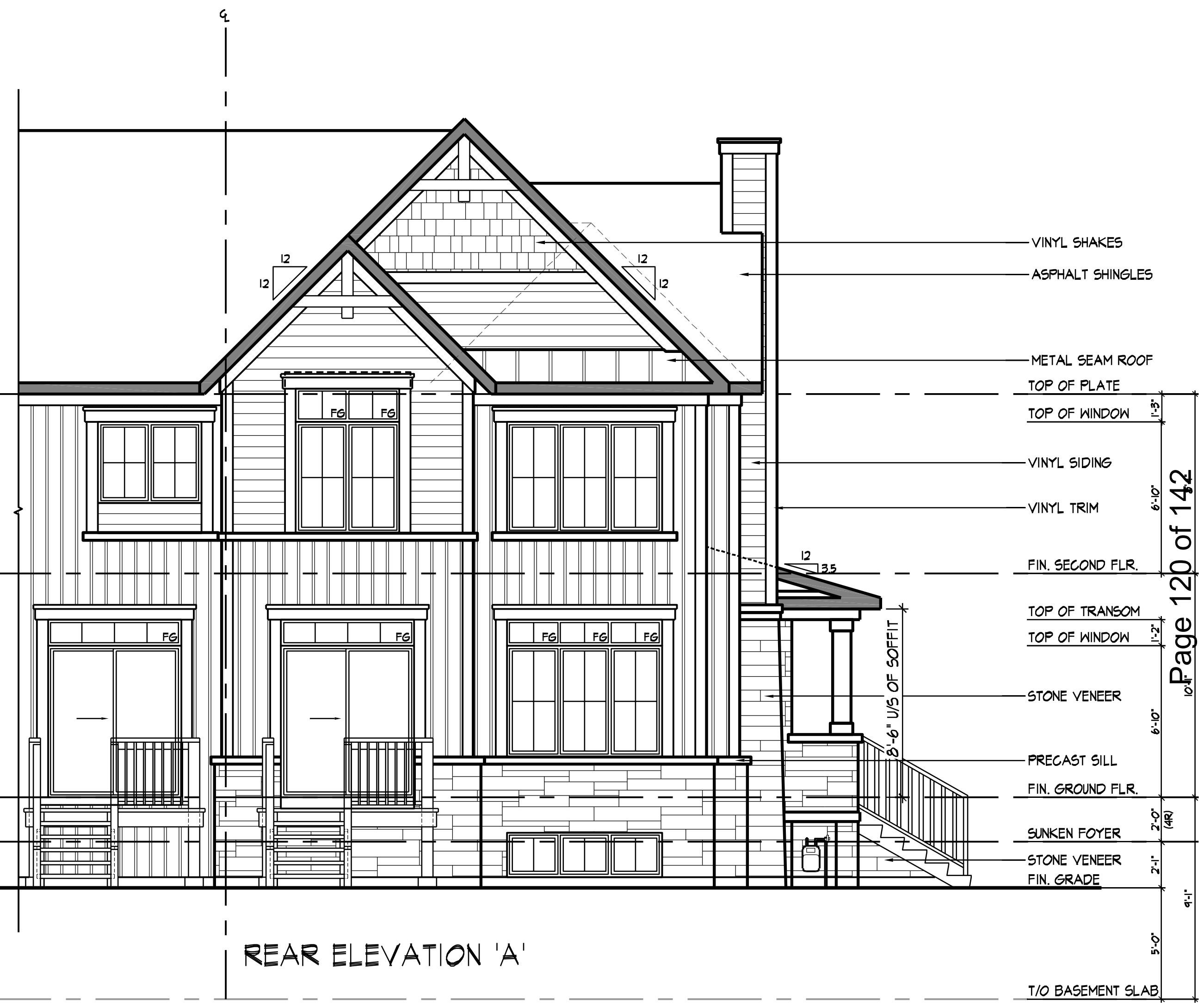
UNIT 2005 C
AREA - EL. 'A' 1790 SF // EL. 'B' 1774 SF
223089DT2005C



FRONT ELEVATION 'A'



ROOF PLAN, EL. 'A' - NTS



REAR ELEVATION 'A'

HUNT DESIGN ASSOCIATES INC.
www.huntdesign.ca

Alliance Homes - 223089 | **UNIT 2005 C**

South Coast Homes, Port Colborne, Ontario

8966 Woodbine Ave, Markham, ON L3R 0J7 ■ T 905.737.5133 ■ F 905.737.7326 ■ MAR-2024 ■ AA ■ 223089DT2005C

FLANKAGE ELEVATION 'A'

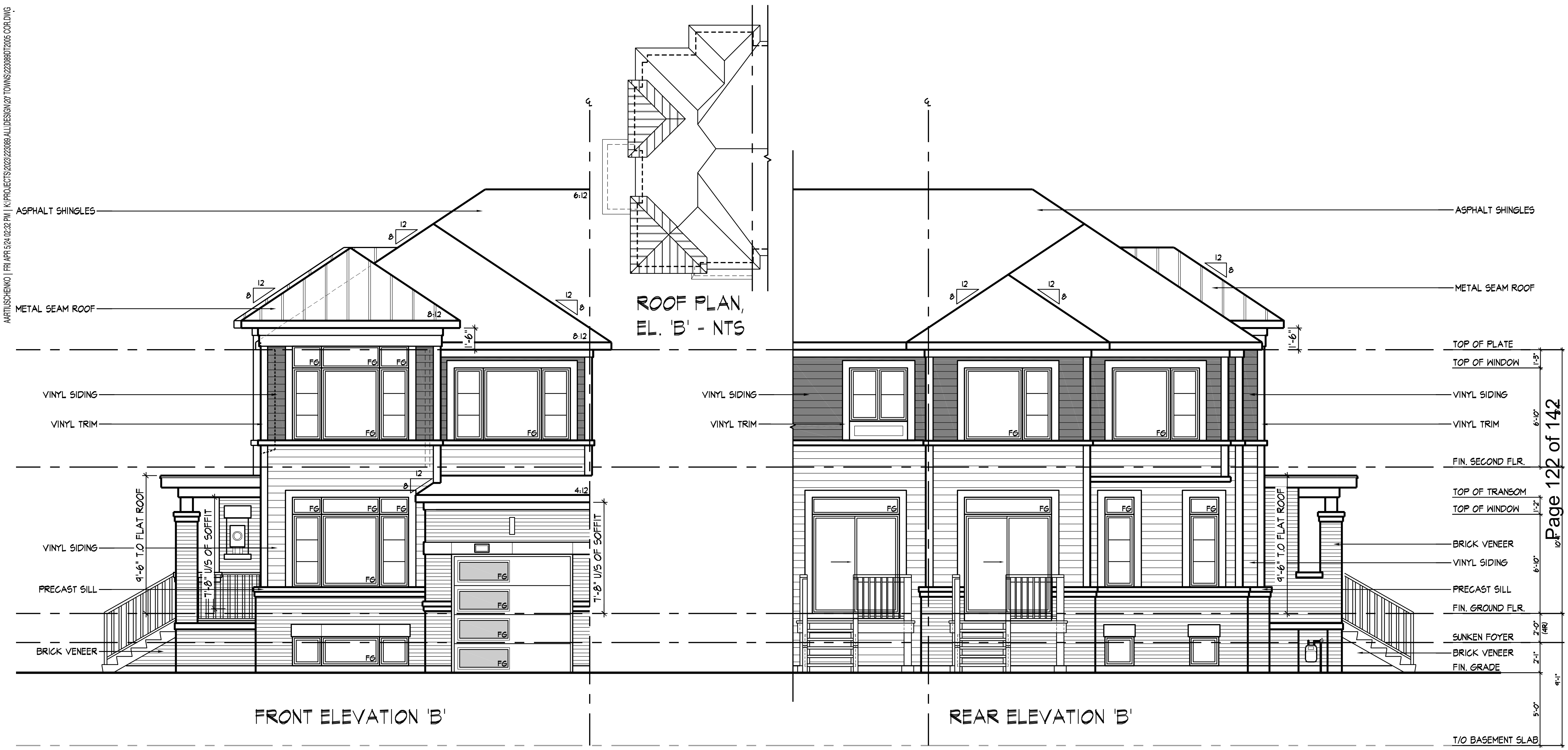
HUNT DESIGN ASSOCIATES INC.
www.huntdesign.ca

Alliance Homes - 223089

UNIT 2005 C

South Coast Homes, Port Colborne, Ontario

8966 Woodbine Ave, Markham, ON L3R 0J7 ■ T 905.737.5133 ■ F 905.737.7326 ■ MAR-2024 ■ AA ■ 223089DT2005C



HUNT DESIGN ASSOCIATES INC.
www.huntdesign.ca

Alliance Homes - 223089

South Coast Homes, Port Colborne, Ontario

8966 Woodbine Ave, Markham, ON L3R 0J7 ■ T 905.737.5133 ■ F 905.737.7326 ■ MAR-2024 ■ AA ■

UNIT 2005 C

223089DT2005C

FLANKAGE ELEVATION 'B'

HUNT DESIGN ASSOCIATES INC.
www.huntdesign.ca

Alliance Homes - 223089

UNIT 2005 C

South Coast Homes, Port Colborne, Ontario

8966 Woodbine Ave, Markham, ON L3R 0J7 ■ T 905.737.5133 ■ F 905.737.7326 ■ MAR-2024 ■ AA ■ 223089DT2005C

PORT COLBORNE
DEVELOPMENT AND LEGISLATIVE SERVICES

MINOR VARIANCE APPLICATION

THE CITY OF PORT COLBORNE

The Planning Act – Section 45

For Office Use Only
Date Received: ______________________
Date of Completion: ______________________

Application Complete: ☐ **Yes** ☐ **No**

SUBMISSION OF APPLICATION

Completed applications can be sent to:

City of Port Colborne
Taya Taraba
Secretary Treasurer of the Committee of Adjustment
City Hall
66 Charlotte Street
Port Colborne, Ontario L3K 3C8

Telephone: 1-905-835-2900 ext. 204
Fax: 1-905-835-2939
Email: taya.taraba@portcolborne.ca

2024 APPLICATION FEES

Minor Variance	**$1,383**
Minor Variance (Building without a Permit)	**$1,805**
Minor Variance & Consent Combination	**$2,528**

COMPLETENESS OF APPLICATION

A complete application includes all required forms, fees, and applicable sketches, as well as any additional information that may be identified by the Secretary-Treasurer in accordance with the provisions under *the Planning Act, R.S.O. 1990*, c.P. 13, as amended.

To be considered complete, submitted applications must include:

— One fully completed application for minor variance or permission signed by the applicant(s) and/or authorized agent and properly witnessed by a Commissioner for the taking of affidavits.

— A letter of authorization from the property owner, if applicable.

— **Two (2) copies** of a completed preliminary drawing (see the "Drawing Requirements" section).

— Payment of the appropriate fee submitted at the time of application through cash, credit, debit, or cheque payable to the City of Port Colborne.

— Payment of the appropriate Regional Review & Approval fee(s) if required by the Region, submitted at the time of the preliminary review. Payment can be submitted to the City of Port Colborne or to the Niagara Region. If payment is submitted to the Region directly, please submit the receipt to the City of Port Colborne. Failure to pay the Region's fee may result in an incomplete application. The Region's fees are available on its website, https://www.niagararegion.ca/business/fpr/forms_fees.aspx

— Payment of the appropriate NPCA fee, if required, submitted at the time of the preliminary review. Payment can be submitted to the City of Port Colborne or to the NPCA. If payment is submitted to the NPCA directly, please submit the receipt to the City of Port Colborne. Failure to pay the NPCA's fee may result in an incomplete application.

***Note: Additional information may be required once a full review has been completed by planning staff. This may prevent deferral of your application. ***

DRAWING REQUIREMENTS

Please submit two copies of each separate plan along with your completed application. Ensure that all the information below is included in the plan(s). Depending on the extent of the proposal, **the Planning Division may request a sketch prepared by a professional, and the Committee may require (at the discretion of the Manager of Planning Services) that the sketch be signed by an Ontario Land Surveyor.** This requirement can be clarified by the Planning Staff. The required sketch should be based on an actual survey by an Ontario Land Surveyor or drawn to a usable metric scale [e.g., 1:100, 1:300, 1:500].

To be considered complete, each sketch must identify:

1. The boundaries and dimensions of the land / lot.
2. The location and nature of any easement affecting the land, if applicable.
3. The location, size, height, and type of all existing and proposed buildings and structures on the land, indicating the distance of the buildings or structures from the front lot line, rear lot line and the side lot lines.
4. The parking areas, loading spaces, driveway entrance / exits.

PROCEDURES FOR PROCESSING APPLICATIONS FOR MINOR VARIANCE OR PERMISSION

Once the Secretary-Treasurer has received an application, the application will be circulated to external agencies for up to 10 days to determine whether additional information and/or fees are required. Once comments from these agencies have been received, the Secretary-Treasurer will inform the applicant of any additional information and/or fees required by these agencies (ie. Niagara Region, Niagara Peninsula Conservation Authority). If applicable, the applicant must submit this additional information and/or pay the additional fees for their application to be deemed complete. Once the application is deemed complete, a hearing date will be confirmed in writing by the Secretary-Treasurer.

Prior to the hearing, members of the Committee may choose to conduct a site visit and/or contact the applicants. **Please note that the Committee should not be contacted by members of the public.** Any comments, questions, or concerns should be addressed through the Planning Division.

Following the hearing, the applicant/agent/solicitor will be notified of the Committee's decision in a written Notice of Decision. In addition, any other person or agency who filed a written request for the Committee's decision will be sent a copy. Any applicant objecting to the decision of the Committee, or the condition(s) imposed by the Committee may appeal the decision to the Local Planning Appeal Tribunal within 20 days after the Notice of Decision has been given. The notice of appeal, together with written reasons supporting the appeal and the fee, by certified cheque or money order payable to the Minister of Finance, must be filed with the Secretary-Treasurer, who in turn, will forward the appeal to the Local Planning Appeal Tribunal. The fee is $300.00 for the first application to be appealed and $25.00 for each additional related minor variance appeal.

NIAGARA PENINSULA CONSERVATION AUTHORITY REVIEW

Fees which are payable directly to Authority vary depending on the location and on the type of application. For land: abutting or within 15 meters of a water course; on or within 30 meters of the Lake Erie shoreline; on land identified as “Hazard Land” or “Environmental Protection” by the Port Colborne Official Plan or Zoning Bylaw; or within a groundwater recharge / discharge area, aquifer, or headwater on the property or within 30 meters of the property, the Niagara Peninsula Conservation Authority will charge an additional Plan Review Fee. These fees are provided on the Niagara Peninsula Conservation Authority's website.

I acknowledge that I have read, understand, and agree to the terms outlined above.		
Name: Matt Kernahan	Date: June 21, 2024	Initials: MK

PORT COLBORNE
DEVELOPMENT AND LEGISLATIVE SERVICES

MINOR VARIANCE APPLICATION

THE CITY OF PORT COLBORNE

The Planning Act – Section 45

SECTION 1 : CONTACT INFORMATION

1.1 Registered Owner (s):	
Name: 2600261 Ontario Inc.	
Mailing Address: 90 Allstate Parkway, Suite 701	
City: Markham	Province: Ontario
Postal Code: L3R 6H3	Telephone: 416-809-3782
Fax:	Email: marcelostrongco@gmail.com
1.2 Owner's SOLICITOR (if applicable)	
Name: CHAITONS LLP - MARK WILLIS-O'CONNOR	
Mailing Address: 5000 YONGE ST. 10th FLOOR	
City: NORTH YORK	Province: ONTARIO
Postal Code: M2N 7E9	Telephone: 416 218 1160
Fax:	Email: MARKW@CHAITONS.COM
1.3 Owner's Authorized AGENT (if applicable)	
Name: Matt Kernahan	
Mailing Address: 5751 Jake Crescent	
City: Niagara Falls	Province: Ontario
Postal Code: L2H 0G3	Telephone: 289.783.8598
Fax:	Email: matt@gardencitydevelopment.ca
1.4 Owner's ONTARIO LAND SURVEYOR (if applicable)	
Name:	
Mailing Address:	
City:	Province:
Postal Code:	Telephone:
Fax:	Email:
1.5 All communications should be sent to the:	
☒ Owner ☐ Solicitor ☑ Agent	

SECTION 2: LOCATION OF SUBJECT LAND

Former Municipality: HUmberstone	
Concession No. 2	Lot(s): Part of Lot 31
Registered Plan No. 59R11866	Lot(s):
Reference Plan No.	Part(s): 2 to 5
Name of Street:	Street No.

SECTION 3: SUBJECT LAND DESCRIPTION

Part No. On Sketch:

3.1 Lot Description Refer to Northland Estates Draft Plan of Subdivision (June 2024)		
Frontage:	Depth:	Area:
Existing Use: Vacant		
Proposed Use: Residential, mixed use, park, stormwater management pond and environmental conservation.		
3.2 What is the current designation of the land in the Official Plan and the Regional Plan?		
Port Colborne Official Plan: Urban Residential / Greenfield		
Regional Policy Plan: Greenfield		
3.3 What is the current zoning of the land (By-law 6575/30/18)?		
R3-73		

SECTION 4: LAND INFORMATION

4.1 Date and Subject Land was acquired by the Current Owner:

2016

4.2 Are there any existing EASMENTS OR RESTRICTIVE COVENANTS affecting the land?

☑ Yes ☐ No	If "Yes" describe the easement or covenant and its effect: Consumer gas pipeline easement

4.3 MORTGAGES, Charges & Other Encumbrances:

List the name(s) and address(es) of any mortgages, charges, or other encumbrances in respect of the land.

NA.

4.4 DATE OF CONSTRUCTION of all existing buildings and structures on the land:

NA

4.5 Type of ACCESS

☐ Provincial Highway	☐ Municipal Road maintained seasonally
☐ Regional Road	☐ Right-of-Way
☑ Municipal Road maintained all year	☐ Water Access
☐ Other Public Road	☐ Private Road

4.6 What type of WATER SUPPLY is proposed?

- ☑ Publicly owned and operated piped water supply
- ☐ Lake
- ☐ Well (private or communal)
- ☐ Other (specify) ______________________

4.7 What type of SEWAGE DISPOSAL is proposed?

- ☑ Publicly owned and operated sanitary sewage system
- ☐ Septic system (private or communal)
- ☐ Other (specify) ______________________

4.8 What type of STORMWATER DISPOSAL is proposed?

- ☑ Publicly owned and operated stormwater system
- ☐ Other (specify) ______________________

4.9 Has a Pre-Consultation application been filed for this proposal?

☐ Yes ☑ No

If Yes, please indicate the meeting date: ______________________

SECTION 5: NATURE & EXTENT OF RELIEF FROM THE ZONING BY-LAW

5.1 Nature and Extent of Relief from the Zoning By-law:

1. (By-law 7141/83/23, 3. a) Minimum Lot Area for Townhouses (Interior and Exterior) – 160 m2
2. (By-law 6575-30-18, 7.8 c) Minimum Front Yard to House and Garage – 6.0 m
3. (By-law 6575-30-18, 7.8 e) Minimum Flankage to House – 3.0 m
4. (By-law 6575-30-18, 7.8 e) Minimum Flankage to Porch – 1.5 m
5. (By-law 6575-30-18, 7.8 g) Maximum Building Height – 12.0 m
6. (By-law 6575-30-18, 3.2) Minimum Garage Width (Obstructed Parking) – 3.0 m
7. (By-law 6575-30-18, 2.19.1) Minimum setback of uncovered stairs to first storey from lot line – 0.3m

5.2 Why is it not possible to comply with the Zoning By-law?

Development needs to be more compact to improve affordability.

5.3 Does the structure(s) pertaining to the application for Minor Variance already exist?

☐ Yes
☑ No

5.4 If the answer to 5.3 is YES, has a building permit been issued?

☐ Yes
☑ No

If the answer is "Yes," please provide the following information:

File Number:

Decision:

SECTION 6: ALL EXISTING, PREVIOUS AND ADJACENT USE OF THE LAND

8.1 ALL EXISTING USE

☒ Residential	☐ Institutional	☐ Vacant
☐ Industrial	☐ Agricultural	☐ Other (specify):
☐ Commercial	☐ Parkland	

8.2 What is the length of time the existing use(s) of the land have continued?

50+ years

8.3 Are there any buildings or structures on the subject land?

☒ Yes ☐ No

If Yes, briefly describe and indicate their use.
Single detached dwelling (to be demolished once mixed use development proceeds).

8.4 Are any of these buildings designated under the Ontario Heritage Act?		
☐ Yes	☑ No	☐ Unknown
8.5 Has the grading of the subject land been changed by adding earth or material? Has filling occurred on the subject land?		
☐ Yes	☑ No	☐ Unknown
8.6 Has a gasoline station and/or automobile service station been located on the subject land or adjacent lands at any time?		
☐ Yes	☒ No	☐ Unknown
8.7 Has there been petroleum or other fuel stored on the subject land or adjacent lands?		
☐ Yes	☑ No	☐ Unknown
8.8 Are there or have there ever been underground storage tanks or buried waste on the subject land or adjacent lands?		
☐ Yes	☑ No	☐ Unknown
8.9 Have the lands or adjacent lands ever been used as an agricultural operation where pesticides have been applied to the lands?		
☐ Yes	☑ No	☐ Unknown
8.10 Have the lands or adjacent lands ever been used as a weapon firing range?		
☐ Yes	☑ No	☐ Unknown
8.11 Is the nearest boundary line of the application within 500 metres (1,640 feet) of the boundary line of an operational / non-operational public or private landfill or dump?		
☐ Yes	☑ No	☐ Unknown
8.12 If there are existing or previously existing buildings on the subject lands, are there any building materials remaining on site which are potentially hazardous to public health (e.g., asbestos, PCB's)?		
☐ Yes	☑ No	☐ Unknown
8.13 If there has been industrial or commercial uses on the property, a previous use inventory is needed. Is a previous use inventory attached?		
☐ Yes	☑ No	☐ Unknown
8.14 Is there reason to believe the subject lands may have been contaminated by existing or former uses on the site or adjacent sites?*		
☐ Yes	☑ No	☐ Unknown
If previous use of property is industrial or commercial or if the answer was **YES** to any of the above, please attach a previous use inventory showing all former uses of the land, or if applicable, the land(s) adjacent to the land.		
*Possible uses that can cause contamination include operation of electrical transformer stations, disposal of waste minerals, raw material storage, and residues left in containers, maintenance activities, and spills. Some commercial properties such as gasoline stations, automotive repair garages, and dry-cleaning plants have similar potential. Any industrial use can result in potential contamination. The longer a property is under industrial or similar use, the greater the potential for site contamination. Also, a series of different industrial or similar uses upon a site could potentially increase the number of chemicals which are present.		

ACKNOWLEDGMENT CLAUSE

I hereby acknowledge that is my responsibility to ensure that I am in compliance with all applicable laws, regulations and standards pertaining to contaminated sites. I further acknowledge that the City of Port Colborne is not responsible for the identification and / or remediation of contaminated sites, and I agree, whether in (or as a result of) any action or proceeding for environmental clean-up of any damage or otherwise, I will not sue or make claim whatsoever against the City of Port Colborne, its officers, officials, employees or agents for or in respect of any loss, damage, injury or costs.

X June 24/2024
Date

X [signature]
Signature of Owner

Pre-Screening Criteria

9.1 Is there land on the property identified in the Official Plan and / or Zoning By-law as "hazard lands"?		
☐ Yes	☑ No	☐ Unknown
9.2 Is there a watercourse or municipal drain on the property or within 15 metres of the property?		
☐ Yes	☑ No	☐ Unknown
9.3 Is the property located on or within 30 metres of the Lake Erie shoreline?		
☐ Yes	☑ No	☐ Unknown
9.4 Is there a valley slope on the property?		
☐ Yes	☑ No	☐ Unknown
9.5 Is there known localized flooding or a marsh / bog area on or within 30 metres of the property?		
☐ Yes	☑ No	☐ Unknown
9.6 Is the property on a Regional Road?		
☐ Yes	☑ No	☐ Unknown

AUTHORIZATIONS

SIGNATURE OF APPLICANT(S)

X July 12, 2024
Date

X [signature]
Signature of Applicant(s)

Please note: If the applicant is not the owner of the subject land or there is more than one owner, written authorization of the owner(s) is required (Complete Form 1) indicating that the applicant is authorized to make application.

I/We Matt Kernahan

Of the City/Town/Township of Niagara Falls

In the County/District/Regional Municipality of Niagara

solemnly declare that all the statements contained in this application are true, and I/we 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 Port Colborne
In the Region of Niagara
This 12th day of July
20 24.
A Commissioner, etc.

TO BE SIGNED IN THE PRESENCE OF A COMMISIONER FOR TAKING AFFIDAVITS

X [signature]

Signature of applicant(s), solicitor, or authorized

Personal information collected on this application will become part of a public record. Any questions regarding this collection should be directed to the City Clerk at 66 Charlotte Street, Port Colborne, Ontario L3K 3C8 (905) 835-2900 Ext. 106.

Diana Vasu, a Commissioner, etc.,
Province of Ontario, for the Corporation
of the City of Port Colborne.
Expires July 3, 2026.

[signature]

POSTING OF PUBLIC HEARING SIGN

A public hearing sign is required to be posted by all applicants or agents on each property under application. A sign will be made available to you after review of your application, and you are required to post each sign in a prominent location on the subject property. The sign should be placed so that it is legible from the roadway.

Each sign must remain posted a minimum of 14 days prior to the hearing, until the day following the hearing. Should a sign go missing or become damaged or illegible please contact the Secretary-Treasurer as soon as possible to request a replacement sign. Failure to post the sign as required may result in deferral of you application(s).

Please note that an affidavit must also be signed and commissioned in the presence of a Commissioner of Oaths. This can be done at City Hall AFTER the signs have been posted.

I/We Matt Kernahan (Agent) am/are the owner(s) of the land subject to this application for a Minor Variance and I/We agree to post the required sign(s) a minimum of 14 days prior to the hearing and will remain posted, and replaced, if necessary, until the day following the hearing.

X [signature] ______________________
Signature of Owner/Agent

X July 12, 2024
Date

X ______________________
Signature of Owner/Agent

X ______________________
Date

PERMISSION TO ENTER

I/We Marcelo Hernandez am/are the owner(s) of the land subject to this application for a Minor Variance and I/We authorize the members of the Committee of Adjustment and the City of Port Colborne Planning Staff to enter onto the property for the purpose of evaluating the merits of the application(s).

***Please note that the Committee should not be contacted by members of the public.** Any comments, questions or concerns should be addressed through the Planning Division.*

X [signature] ______________________
Signature of Owner

X June 24/2024
Date

X ______________________
Signature of Owner

X ______________________
Date

AUTHORIZATION FOR AGENT / SOLICITOR (IF APPLICABLE)

If the application is not the owner of the lane that is subject to this application for a Minor Variance, the authorization set out below must be completed by the owner(s). All registered owners must complete the authorization form for it to be valid.

Please Note: If the registered owner is a corporation, in addition to the signatures of the authorized signing officers, the corporate seal must be affixed.

Where the Owner is without a spouse, common-law or legally married, the Owner is required to sign only once. Where the spouse of the Owner is not an owner, the spouse is required to sign. Spouse shall include a common-law spouse as defined within the *Family Law Reform Act.*

I/We 2600261 ONTARIO INC / MARCELO HERNANDEZ am/are the owner(s) of the land that is subject to this application for a Minor Variance and I/We hereby authorize as my/our agent for the purposes of submitting an application(s) to the Committee of Adjustment for a Minor Variance.

X [signature] Signature of Owner

X June 24/2024 Date

X ______ Signature of Owner

X ______ Date

X ______ Signature of Agent

X ______ Date

SUGGESTION TO THE APPLICANT

Notice of your application is required for several agencies. All written responses will be considered before reaching a decision on your application.

Although you are under no obligation to do so, we suggest that you discuss your intentions with the appropriate agencies from the list below, before submitting an application. This pre-consultation could provide you with information about the City of Port Colborne Official Plan, the minimum requirements and permitted uses of Zoning By-law 6575/30/18, the Regional Policy Plan, the concerns of various Provincial Ministries, and other relevant information which may have a direct effect upon the final decision on your application.

1. Port Colborne Planning and Development Department
   66 Charlotte Street, Port Colborne, Ontario L3K 3C8
   General Planning Department
   (905) 835-2900, Ext. 286
   Information on the Port Colborne Official Plan and Zoning Bylaw

2. Port Colborne Planning and Development Department
   66 Charlotte Street, Port Colborne, Ontario L3K 3C8
   Engineering Technologist
   (905) 835-2900, Ext. 226
   Information on Servicing, Lot Grading and Drainage

3. Port Colborne Building Division
   66 Charlotte Street, Port Colborne, Ontario L3K 3C8
   Building Clerk
   (905) 835-2900, Ext 229
   Information about the Building Code

4. Region of Niagara Public Works Department
   Planning and Development Department
   1815 Sir Isaac Brock Way, Thorold, Ontario L2V 4T7
   (905) 980-6000, Ext. 3727
   Information about the Regional Policy Plan, Agriculture, Public Works & Regional Health, and for concerns regarding Provincial Policy and Ministry responsibilities

5. The Niagara Peninsula Conservation Authority
   250 Thorold Road West, Welland, Ontario L3C 3W2
   Watershed Planner
   (905) 788-3135, Ext 272
   For information about lands which may be zoned as "Hazard" in the local zoning by law, lands adjacent to watercourses, Lake Erie or flood plains

6. Ministry of Transportation of Ontario
   Corridor Management Section
   159 Sir William Hearst Ave, 7th Floor, Toronto, Ontario M3M 1J8
   For information about sight plan applications for lands fronting onto provincial highways

7. Ministry of Transportation of Ontario
   Corridor Management Section
   1201 Wilson Avenue, Bldg D, 7th Floor, Downsview, ON, M3M 1J8
   1-866-636-0663
   For information about official plan amendments, consents, re-zonings, and other inquiries for lands fronting onto provincial highways

8. Ministry of Municipal Affairs and Housing. *Provincial Policy Statement* (PPS) available for download (On-line) at: http://www.mah.gov.on.ca
   Under "Your Ministry" – Land Use Planning – Provincial Policy Statement

Committee of Adjustment
-Meeting Minutes-
Wednesday, September 11, 2024

PORT COLBORNE

Members Present:	Dan O'Hara, Chair Angie Desmarais, Committee Member Eric Beauregard, Committee Member Gary Bruno, Committee Member
Staff Present:	Denise Landry, Chief Planner Diana Vasu, Planner Taya Taraba, Acting Secretary-Treasurer

1. Call Meeting to Order
   The Chair called the meeting to order at approximately 6:00 p.m.

2. Reading of Meeting Protocol
   The Chair read the Meeting Protocol.

3. Disclosures of Interest
   Member Beauregard declared an indirect pecuniary interest on application(s) A23-24-PC, as his employer is an agent for the owner of the Subject Lands.

4. Requests for Deferrals or Withdrawals of Applications
   Nil.

5. Order of Business

   a. Application: B11-24-PC ; B15-24-PC
      Action: Consent
      Agent: Weston Consulting
      Applicant: One Forty Development Inc.
      Location: 5088 Highway 140

   The Secretary-Treasurer read the correspondence received for the application.

   The Chair asked the applicant if they wanted to add any further information on the application; the agent gave a short presentation describing the nature of the application and the development.

A member of the public had asked whether the development planned to include sidewalks along Forkes Road to make the area safer and more accessible for residents living within the neighbourhood. The agent reassured the public that there will be stages for them to work through City standards regarding the development.

There were no further comments from the Committee or members of the public.

That consent application **B11-24-PC** be **granted** subject to the conditions outlined in the staff report dated September 6th, 2024:

1. That application B15-24-PC be granted.

2. That the applicant provides the Secretary-Treasurer with the deeds for the conveyance of the subject parcels, with a paper and electronic copy of the deposited reference plan, for use in the issuance of the Certificate of Consent.

3. That a final certification fee of $240 payable to the City of Port Colborne is submitted to the Secretary-Treasurer.

4. That a drainage apportionment agreement be completed by an approved engineer at the cost of the applicant, with a copy of the deposited plan to be delivered to the Drainage Superintendent through the planning department for the apportionment agreement to be completed, to the satisfaction of City staff.

5. That the owner enters into a Development Agreement with the City Port Colborne to require the identification of the permanent roadway location for the roadway that will service the “lands to be severed” identified on the severance sketch, such that the City will be able to place the water and sanitary into a future Right of Way, and that vehicular traffic will be provided adequate access to Highway 140 from municipal streets prior to site occupancy, to the satisfaction of City staff.

6. That the applicant submits an affidavit that Parts 4 and 5 will merge, to the satisfaction of City staff.

7. That all conditions of consent be cleared by September 11, 2026.

For the following reasons:

1. The application is consistent with the Provincial Policy Statement and conforms to the Growth Plan for the Greater Golden Horseshoe, the Regional Official Plan, City of Port Colborne Official Plan, will comply with the provisions of Zoning By-law 6575/30/18, as amended, and with O. Reg. 337/24.

That consent application **B15-24-PC** be **granted** subject to the conditions outlined in the staff report dated September 6th, 2024:

1. That the applicant provides the Secretary-Treasurer with the deeds for the conveyance of the subject parcel or a registrable legal description of the subject parcel, together with a paper copy and electronic copy of the deposited reference plan, if applicable, for use in the issuance of the Certificate of Consent.

2. That a final certification fee of $240 payable to the City of Port Colborne is submitted to the Secretary-Treasurer.

3. That application B11-24-PC be granted.

4. That all the conditions of consent for application B11-24-PC be cleared.

5. That all conditions of consent be cleared by September 11, 2026.

For the following reasons:

1. The application is consistent with the Provincial Policy Statement and conforms to the Growth Plan for the Greater Golden Horseshoe, the Regional Official Plan, City of Port Colborne Official Plan, will comply with the provisions of Zoning By-law 6575/30/18, as amended, and with O. Reg. 337/24.

Motion: Angie Desmarais   Seconded: Eric Beauregard
Carried: 4-0

b. Application: A20-24-PC
Action: Minor Variance
Agent: Isaac Adams
Applicant: Emily and Andrew Brondes
Location: 1628 Third Concession Road

The Secretary-Treasurer read the correspondence received for the application.

The Chair asked the applicant if they wanted to add any further information on the application; the applicant expanded on the reason for requesting the variance.

Member Beauregard questioned what the building would be used for and asked the applicant to provide clarification on the nature of the application.

The applicant answered that the building would be used for both storage and an accessory dwelling unit.

Member Desmarais questioned Staff regarding Melissa Bigford-Loquists concerns submitted in August 2024. The Chief Planner mentioned that the resident’s inquiries were addressed within the Staff Report.

Concerns were addressed regarding why the variance was not applied for during the building permit phase.

Melissa Bigford-Loquists presented points encompassing the development being located within NPCA regulated lands and also any potential violations of the minor variance.

There were no further comments from the Committee or members of the public.

That minor variance application **A20-24-PC** be **granted** for the following reasons:

1. The application is minor in nature.

2. It is appropriate for the development of the site.

3. It is desirable and in compliance with the general intent and purpose of the Zoning By-Law.

4. It is desirable and in compliance with the general intent and purpose of the Official Plan.

Motion: Eric Beauregard Seconded: Gary Bruno
Carried: 4-0

c. Application: A21-24-PC
Action: Minor Variance
Applicant: Henley Heights Construction Inc.
Location: VL Steele Street

The Secretary-Treasurer read the correspondence received for the application.

The Chair asked the applicant if they wanted to add any further information on the application. The applicant had no additional information to add.

Member Beauregard inquired as to whether there was enough parking for the property, to which both Staff and the applicant reassured that there was.

There were no further comments from the Committee or members of the public.

That minor variance application **A20-24-PC** be **granted** for the following reasons:

1. The application is minor in nature.

2. It is appropriate for the development of the site.

3. It is desirable and in compliance with the general intent and purpose of the Zoning By-Law.

4. It is desirable and in compliance with the general intent and purpose of the Official Plan.

Motion: Gary Bruno   Seconded: Angie Desmarais
Carried: 4-0

d. Application: A22-24-PC
Action: Minor Variance
Applicant: Henley Heights Construction Inc.
Location: VL Fielden Avenue

The Secretary-Treasurer read the correspondence received for the application.

The Chair asked the applicant if they wanted to add any further information on the application. The applicant had no additional information to add.

There were no further comments from the Committee or members of the public.

That minor variance application **A20-24-PC** be **granted** for the following reasons:

1. The application is minor in nature.

2. It is appropriate for the development of the site.

3. It is desirable and in compliance with the general intent and purpose of the Zoning By-Law.

4. It is desirable and in compliance with the general intent and purpose of the Official Plan.

Motion: Gary Bruno   Seconded: Eric Beauregard
Carried: 4-0

e. Application: A23-24-PC
Action: Consent
Agent: Matt Kernahan
Applicant: 260026 Ontario Inc.
Location: VL Northland Avenue

The Secretary-Treasurer read the correspondence received for the application.

The Chair asked the applicant if they wanted to add any further information on the application. The agent outlined concerns from the public.

Member Bruno inquired about the nature of the minor variance increasing the density of housing on the land if the setbacks are altered.

The applicant responded that it could facilitate the increase in density and about why a variance was applied for over a Zoning By-Law amendment.

Shane Parisi inquired about the negative effects on traffic regarding the development as there is only two vehicular exits.

The Committee motioned to adjourn the application until more information could be provided regarding which lots the variances applied to.

There were no further comments from the Committee or members of the public.

Motion: Angie Desmarais Seconded: Gary Bruno
Carried: 4-0

f. Application: B12-24-PC; B13-24-PC: B14-24-PC
Action: Consent
Agent: Steven Rivers
Applicant: Whiskey Run Golf Course
Location: 631 Lorraine Road

The Secretary-Treasurer read the correspondence received for the application.

The Chair asked the applicant if they wanted to add any further information on the application; the agent gave a short presentation describing the nature of the application and the development.

Member Bruno brought up concerns regarding the recommendations, particularly the Nitrate Impact Assessment.

The Chief Planner had mentioned that Planning would be hesitant on supporting altering any of the recommendations as the Region were the ones who had requested the condition initially.

There were no further comments from the Committee or members of the public.

Motion: Eric Beauregard Seconded: Angie Desmarais
Carried: 4-0

That consent application **B12-24-PC**; **B13-24-PC**; **B14-24-PC** be **granted** subject to the conditions outlined in the staff report dated September 6th, 2024:

1. That the applicant provides the Secretary-Treasurer with the deeds for the conveyance of the subject parcels or a registrable legal description of the subject parcels, together with a paper copy and electronic copy of the deposited reference plan, if applicable, for use in the issuance of the Certificate of Consent.
2. That a final certification fee of $240 payable to the City of Port Colborne is submitted to the Secretary-Treasurer.
3. That a drainage apportionment agreement be completed by the City's Drainage Superintendent or by an approved engineer at the cost of the applicant. A copy of the deposited plan must be delivered to the Drainage Superintendent through the planning department for the apportionment agreement to be completed.
4. That the applicant(s) sign the City of Port Colborne's standard "Memorandum of Understanding" explaining that development charges and cash-in-lieu of the dedication of land for park purposes, based on an appraisal, at the expense of the applicant, wherein the value of the land is to be determined as of the day before the issuance of a building permit, is required prior to the issuance of a building permit pursuant to Section 42 of the Planning Act. R.S.O 1990, as amended.
5. That the applicant/owner receive acceptance from the Ministry of Citizenship and Multiculturalism (MCM) for the archaeological assessment report titled Stage 2 Archaeological Assessment, prepared by Irvin Heritage Inc. (dated May 24, 2024). If the Ministry requires further archaeological work to be completed prior to acknowledging this report, these report(s) must also be submitted to and acknowledged by the Ministry, to the satisfaction of Niagara Region, prior to clearance of this condition. No demolition, grading or other soil disturbances shall take place on the subject property prior to the issuance of a letter from MCM through Niagara Region, confirming that all archaeological resource concerns have met licensing and resource conservation requirements.
6. That a Restoration Plan be prepared to the satisfaction of the Niagara Region. The plan should incorporate dense plantings of native trees, shrubs and wildflowers that complement the adjacent vegetation communities. The removal of invasive species should also be incorporated, as appropriate. The Landscape Plan should be completed by a full member of the Ontario Association of Landscape Architects (OALA) or a qualified environmental professional.
7. That the Nitrate Impact Assessment and Water Supply Potential Assessment, prepared by Hydrogeology Consultants Services Inc. (dated July 2, 2024) be updated with the proposed location of the bed, dilution area and groundwater

flow direction for the location of the septic systems to be located appropriately to meet the nitrate concentration requirements at the lot boundaries.

8. The owner provides a written undertaking stating future purchase and sales agreements will include a clause advising that the septic systems for Parcels 1, 2, and 3 will need to include pre-treatment with an effluent level of 5.5 mg/L.
9. That a Minimum Distance Separation I calculation be submitted which identifies that each lot is sufficiently setback from mitigating agricultural operations, to the satisfaction of City staff.
10. That all conditions of consent be cleared by September 11, 2026

For the following reasons:

1. The application is consistent with the Provincial Policy Statement and conforms to the Growth Plan for the Greater Golden Horseshoe, the Regional Official Plan, City of Port Colborne Official Plan, and will also comply with the provisions of Zoning By-law 6575/30/18, as amended.

7. Approval of Minutes

Motion: Angie Desmarais Seconded: Eric Beauregard
Carried: 4-0

8. Adjournment

There being no further business, the meeting was adjourned at approximately 9:00 pm.

Dan O'Hara, Chair

Taya Taraba, Acting Secretary-Treasurer