

For Office Use Only:

File Number	BNPL022305	Application Fee	\$2885.00
Related File Number	-	Conservation Authority Fee	N/A
Pre-consultation Meeting	May 18, 2022	Well & Septic Info Provided	Yes
Application Submitted	Oct 13, 2022	Planner	Hanne Yager
Complete Application	Nov 10, 2022	Public Notice Sign	

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

- ☒ Consent/Severance/Boundary Adjustment
- ☐ Surplus Farm Dwelling Severance and Zoning By-law Amendment
- ☐ Minor Variance
- ☐ Easement/Right-of-Way

Property Assessment Roll Number:54102063400**A. Applicant Information****Name of Owner**STUBBES PROPERTY DEVELOPMENT

It is the responsibility of the owner or applicant to notify the planner of any changes in ownership within 30 days of such a change.

Address44 MUIR ROAD**Town and Postal Code**HARLEY ON NOE1E0**Phone Number**519-424-2183**Cell Number**519-536-3294**Email**ALBERT M @ STUBBES.ORG**Name of Applicant**MIKE GEOR**Address**44 MUIR ROAD**Town and Postal Code**HARLEY ON NOE1E0**Phone Number**424-2183**Cell Number**519-532-3192**Email**MIKEG @ STUBBES.ORG

Name of Agent MANEESH PODDAR
Address 1599 ADELAIDE ST NORTH UNIT 301
Town and Postal Code LONDON ON, N5X 4E8
Phone Number 519-471-6667 EX 148
Cell Number N/A
Email mpodder@sbmltd.ca

Please specify to whom all communications should be sent. Unless otherwise directed, all correspondence and notices in respect of this application will be forwarded to the owner and agent noted above.

☒ Owner ☒ Agent ☒ Applicant

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

N/A

B. Location, Legal Description and Property Information

1. Legal Description (include Geographic Township, Concession Number, Lot Number, Block Number and Urban Area or Hamlet):

PART OF LOT 166, CONCESSION SOUTH OF TALBOT RD
GEOGRAPHIC TOWNSHIP OF MIDDLETON, PIN 50151-0184

Municipal Civic Address: 17 HIGHWAY CRESCENT, COURTLAND ON

Present Official Plan Designation(s): URBAN RESIDENTIAL

Present Zoning: AGRICULTURAL

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

☐ Yes ☒ No If yes, please specify:

3. Present use of the subject lands:

RESIDENTIAL DWELLING (SINGLE)

4. Please describe **all existing** buildings or structures on the subject lands and whether they are to be retained, demolished or removed. If retaining the buildings or structures, please describe the type of buildings or structures, and illustrate the setback, in metric units, from front, rear and side lot lines, ground floor area, gross floor area, lot coverage, number of storeys, width, length, and height on your attached sketch which must be included with your application:

SEE ATTACHED SKETCH

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

NO ADDITION PROPOSED

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

NO NEW BUILDINGS PROPOSED

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

If yes, identify and provide details of the building:

N/A

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

NOT KNOWN

9. Existing use of abutting properties:

SOUTH & EAST = MG NORTH = RH WEST = A

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

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

C. Purpose of Development Application

Note: Please complete all that apply. **Failure to complete this section will result in an incomplete application.**

1. Site Information (Please refer to Zoning By-law to confirm permitted dimensions)

	Existing	Permitted	Provision	Proposed	Deficiency
Lot frontage	62.8m	30m	—	54.8	—
Lot depth	160.1 m	NOT NOTED	—	49m	—
Lot width	289.17	NOT NOTED	—	54.8 - 67.98	—
Lot area	3.72 HA	4000m ²	—	10.28 HA	
Lot coverage	0.6 %	NOT NOTED	—	566 %	—
Front yard	7.9 m	6 m	—	7.9 m	—
Rear yard	^{to house} 141.1m	9m	—	^{to house} 27.03	
Height	6m	11m	—	6m	—
Left Interior side yard	23.7m	1.2 m	—	23.7 m	—
Right Interior side yard	20.6m	1.2m	—	12.6m	—
Exterior side yard (corner lot)	N/A				
Parking Spaces (number)	2+	2	—	min 2	—
Aisle width	N/A				
Stall size	N/A				
Loading Spaces	N/A				
Other	N/A				

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

3. **Consent/Severance/Boundary Adjustment:** Description of land intended to be severed in metric units:

Frontage: 54.8m
Depth: 49m
Width: 54.8m To 67.98
Lot Area: .28 HA PROPOSED (3.72 CURRENT)
Present Use: RESIDENTIAL (ZONED AG)
Proposed Use: RESIDENTIAL
Proposed final lot size (if boundary adjustment): 0.28 HA
If a boundary adjustment, identify the assessment roll number and property owner of the lands to which the parcel will be added: N/A

Description of land intended to be retained in metric units:

Frontage: 109m ON BYERLEY RD
Depth: 289.17m
Width: 109m C BYERLEY (VARIES)
Lot Area: 3.44 HA (3.72 CURRENT)
Present Use: AG
Proposed Use: RESIDENTIAL (RH)
Buildings on retained land: N/A

4. **Easement/Right-of-Way:** Description of proposed right-of-way/easement in metric units:

Frontage: N/A
Depth: _____

Width: _____
Area: _____
Proposed Use: _____

5. Surplus Farm Dwelling Severances Only: List all properties in Norfolk County, which are owned and farmed by the applicant and involved in the farm operation

Owners Name: _____ N/A _____
Roll Number: _____
Total Acreage: _____
Workable Acreage: _____
Existing Farm Type: (for example: corn, orchard, livestock) _____
Dwelling Present?: ☐ Yes ☐ No If yes, year dwelling built _____
Date of Land Purchase: _____

Owners Name: _____ N/A _____
Roll Number: _____
Total Acreage: _____
Workable Acreage: _____
Existing Farm Type: (for example: corn, orchard, livestock) _____
Dwelling Present?: ☐ Yes ☐ No If yes, year dwelling built _____
Date of Land Purchase: _____

Owners Name: _____ N/A _____
Roll Number: _____
Total Acreage: _____
Workable Acreage: _____
Existing Farm Type: (for example: corn, orchard, livestock) _____
Dwelling Present?: ☐ Yes ☐ No If yes, year dwelling built _____
Date of Land Purchase: _____

Owners Name: N/A
Roll Number: _____
Total Acreage: _____
Workable Acreage: _____
Existing Farm Type: (for example: corn, orchard, livestock) _____
Dwelling Present?: ☐ Yes ☐ No If yes, year dwelling built _____
Date of Land Purchase: _____

Owners Name: N/A
Roll Number: _____
Total Acreage: _____
Workable Acreage: _____
Existing Farm Type: (for example: corn, orchard, livestock) _____
Dwelling Present?: ☐ Yes ☐ No If yes, year dwelling built _____
Date of Land Purchase: _____

Note: If additional space is needed please attach a separate sheet.

D. All Applications: Previous Use of the Property

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

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

N/A

2. Is there reason to believe the subject lands may have been contaminated by former uses on the site or adjacent sites? ☐ Yes ☒ No ☐ Unknown

3. Provide the information you used to determine the answers to the above questions:

ESA REPORT COMPLETED BY A&A

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

E. All Applications: Provincial Policy

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

If no, please explain:

N/A

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

If no, please explain:

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

If no, please explain:

N/A

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

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

Livestock facility or stockyard (submit MDS Calculation with application)

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

Wooded area

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

Municipal Landfill

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

Sewage treatment plant or waste stabilization plant

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

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

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

Floodplain

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

Rehabilitated mine site

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

Non-operating mine site within one kilometre

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

Active mine site within one kilometre

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

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

☐ On the subject lands or ☒ within 500 meters – distance ME (TITAN TRAILERS)

→ **Active railway line**

☐ On the subject lands or ☒ within 500 meters – distance 10.5 m

Seasonal wetness of lands

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

Erosion

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

Abandoned gas wells

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

F. All Applications: Servicing and Access

1. Indicate what services are available or proposed:

Water Supply

- ☒ Municipal piped water
☐ Individual wells

- ☐ Communal wells
☐ Other (describe below)

Sewage Treatment

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

Storm Drainage

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

2. Existing or proposed access to subject lands:

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

Name of road/street:

Byerly RD To RETAINED LANDS, Hwy 17 CRESSENT TO SEVERED PORTION

G. All Applications: Other Information

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

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

N/A

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

PRE CONSULTATION MEETING HAS BEEN HELD TO REVIEW OUR PLANS FOR A RESIDENTIAL SUBDIVISION ON THE SEVERED LANDS THIS INCLUDES A TIS & PG COMPATIBILITY STUDY

H. Supporting Material to be submitted by Applicant

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

1. Concept/Layout Plan ✓
2. All measurements in metric ✓
3. Existing and proposed easements and right of ways ✓
4. Parking space totals – required and proposed ✓
5. All dimensions of the subject lands ✓
6. Dimensions and setbacks of all buildings and structures ✓
7. Location and setbacks of septic system and well from all existing and proposed lot lines, and all existing and proposed structures
8. Names of adjacent streets ✓
9. Natural features, watercourses and trees

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

- ☐ On-Site Sewage Disposal System Evaluation Form (to verify location and condition) —
- ☐ Environmental Impact Study
- ☐ Geotechnical Study / Hydrogeological Review —
- ☐ Minimum Distance Separation Schedule
- ☐ Record of Site Condition

Your development approval might also be dependent on Ministry of Environment Conservation and Parks, Ministry of Transportation or other relevant federal or provincial legislation, municipal by-laws or other agency approvals.

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

I. Transfers, Easements and Postponement of Interest

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

Permission to Enter Subject Lands

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

Freedom of Information

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

Owner/Applicant/Agent Signature

OCT, 21, 2022

Date

J. Owner's Authorization

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

I/We _____ am/are the registered owner(s) of the lands that is the subject of this application.

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

Owner

Date

Owner

Date

N/A

***Note:** If property is owned by an Ontario Ltd. Corporation, Articles of Incorporation are required to be attached to the application.

K. Declaration

I, Mike Gear of Brant County

solemnly declare that:

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

Declared before me at:

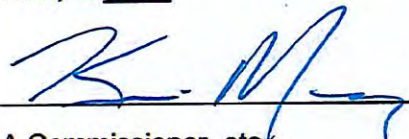
Hartley


Owner/Applicant/Agent Signature

In Brant County

This 15 day of November

A.D., 20 22


A Commissioner, etc.

KEVIN ANDREW MONIZ,
a Commissioner, etc., Province of Ontario,
for Strik, Baldinelli, Moniz Ltd.
and SBM Geomatics Ltd.
Expires November 30, 2023.

5.7 **Hamlet Residential Zone (RH)**

5.7.1 Permitted Uses

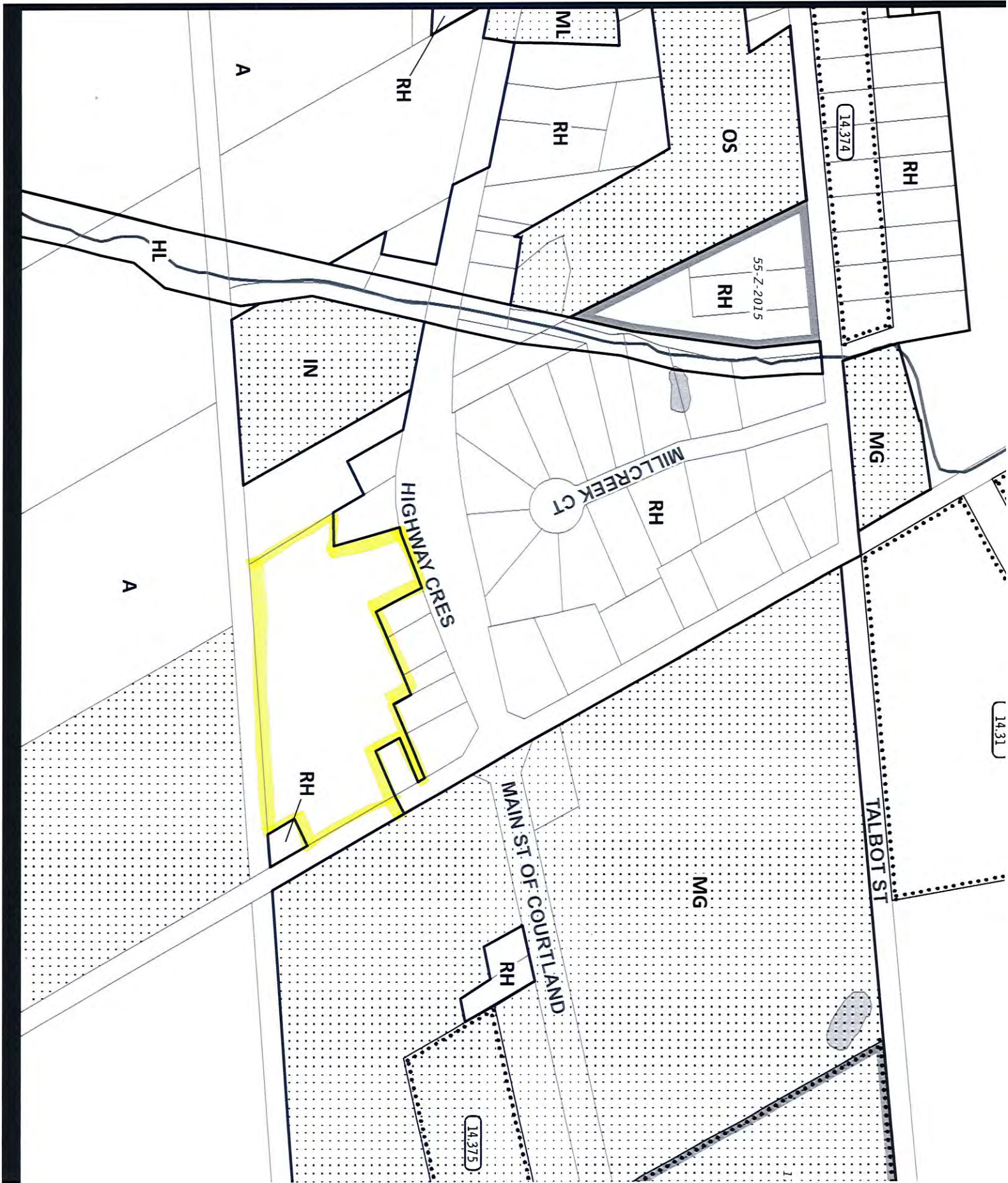
In an RH Zone, no land, *building* or *structure* shall be used except in accordance with the following uses:

- a) *dwelling, single detached*
- b) *bed & breakfast*, subject to Subsection 3.4
- c) *day care nursery*
- d) *home industry*
- e) *home occupation*
- f) *accessory residential dwelling unit*, subject to Subsection 3.2.3 [7-Z-2020]

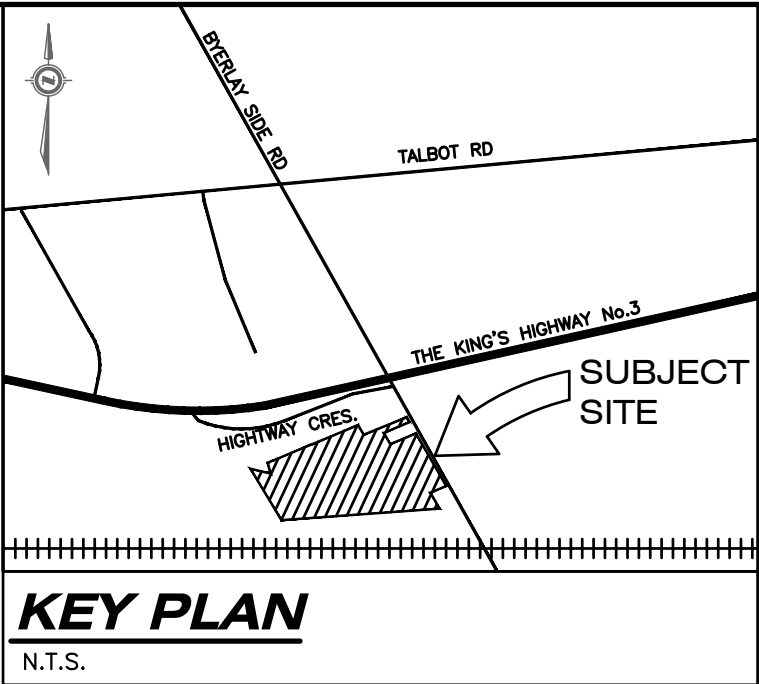
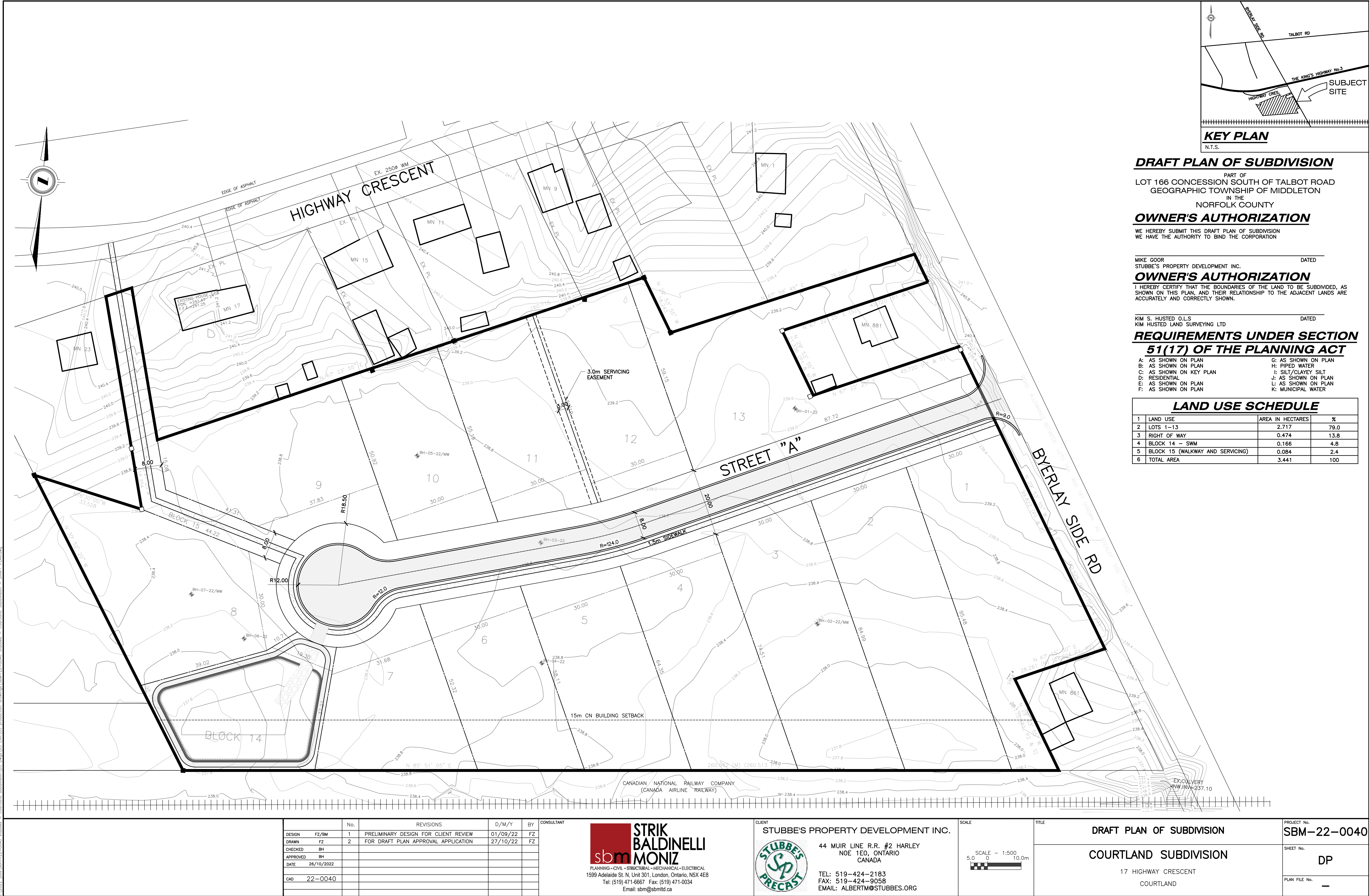
5.7.2 Zone Provisions

In an RH Zone, no *building* or *structure* shall be *erected* or *altered* except in accordance with the following provisions:

- a) minimum *lot area*: 0.4 hectares
- b) minimum *lot frontage*:
 - i) *interior lot* 30 metres
 - ii) *corner lot* 30 metres
- c) minimum *front yard*: 6 metres
- d) minimum *exterior side yard*: 6 metres
- e) minimum *interior side yard*:
 - i) *attached garage* 1.2 metres each side
 - ii) *detached garage* 3 metres and 1.2 metres
- f) minimum *rear yard*: 9 metres
- g) maximum *building height*: 11 metres [8-Z-2017]



ZONING MAP



DRAFT PLAN OF SUBDIVISION

PART OF
LOT 166 CONCESSION SOUTH OF TALBOT ROAD
GEOGRAPHIC TOWNSHIP OF MIDDLETON
IN THE
NORFOLK COUNTY

OWNER'S AUTHORIZATION

WE HEREBY SUBMIT THIS DRAFT PLAN OF SUBDIVISION
WE HAVE THE AUTHORITY TO BIND THE CORPORATION

MIKE GOOR
STUBBE'S PROPERTY DEVELOPMENT INC. DATED

OWNER'S AUTHORIZATION

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED, AS
SHOWN ON THIS PLAN, AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE
ACCURATELY AND CORRECTLY SHOWN.

KIM S. HUSTED O.L.S.
KIM HUSTED LAND SURVEYING LTD DATED

REQUIREMENTS UNDER SECTION
51(17) OF THE PLANNING ACT

- | | |
|-------------------------|---------------------|
| A: AS SHOWN ON PLAN | G: AS SHOWN ON PLAN |
| B: AS SHOWN ON PLAN | H: PIPED WATER |
| C: AS SHOWN ON KEY PLAN | I: SILT/CLAYEY SILT |
| D: RESIDENTIAL | J: AS SHOWN ON PLAN |
| E: AS SHOWN ON PLAN | L: AS SHOWN ON PLAN |
| F: AS SHOWN ON PLAN | K: MUNICIPAL WATER |

LAND USE SCHEDULE

1	LAND USE	AREA IN HECTARES	%
2	LOTS 1-13	2.717	79.0
3	RIGHT OF WAY	0.474	13.8
4	BLOCK 14 - SWM	0.166	4.8
5	BLOCK 15 (WALKWAY AND SERVICING)	0.084	2.4
6	TOTAL AREA	3.441	100

1/2/2022 pbsa\bm-22-0040 stubbes - courtland subdivision\03 Draft\03 Production Drawings\SBM-22-0040 Stubbes - Courtland Subdivision - DRAFT PLAN.dwg

PLANNING JUSTIFICATION REPORT

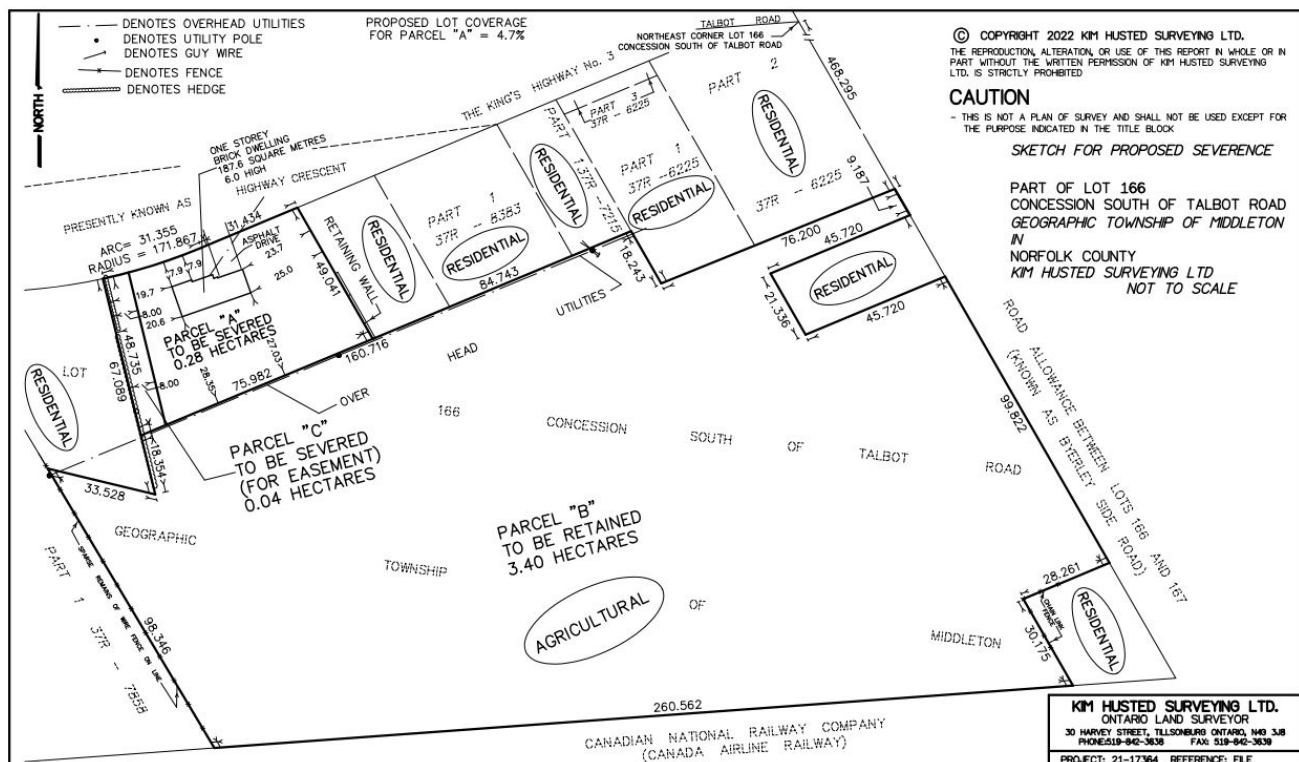
17 Highway Crescent, Courtland ON

ZONING BYLAW AMENDMENT

Prepared for:
Stubbes Property Development Inc.
44 Muir Line
Harley ON, N0J 1E0

SBM-22-0040

June 2022



Attn: Jennifer Catarino
Senior Planner
Planning
Norfolk County
185 Robinson Street, Suite 200
Simcoe, ON N3Y 5L6

17 June 2022
SBM-22-0040

RE: Planning Justification Report – 17 Highway Crescent, Courtland

Dear Ms. Catarino,

Strik, Baldinelli, Moniz Ltd. has been retained by Stubbes Property Development Inc. (Albert Meyer) to coordinate the preparation and submission of a Zoning By-law Amendment (ZBA) for the subject lands municipally addressed as 17 Highway Crescent and having Assessment Roll Number (ARN) 54102063400.

The subject lands are approximately 3.7ha (9.1 ac) in area and are partially developed with an existing single detached dwelling fronting Highway Crescent. The remainder of the subject lands which also flanks Byerlay Road is vacant but is used for cash crop production currently. It should be noted that the ZBA is in advance of a proposed application for consent for land severance for the subject lands as directed by municipal staff. The consent would fundamentally separate the already developed portion of the subject lands from the vacant portion of the subject lands. The subject lands are in the Courtland Urban Area which has municipal water service, but no municipal sanitary service currently.

The proposed lot to be severed which has partial municipal services as described above, would encompass the existing single detached dwelling, and the two existing accessory sheds and have an acreage of 0.28ha (0.69ac). The remaining lands (3.40ha/8.40ac), comprising the planned lot to be retained, are contemplated for future residential development, and ultimately are also planned to be zoned Hamlet Residential (RH), commensurate with the level of municipal services for the Courtland Urban Area. An associated 0.04ha (0.09ac) servicing easement is planned to be created as well. Future access to the proposed lot to be retained would be from Byerlay Road. The frontage of the property along Byerlay Road is not continuous but is 99.82m (327.49ft) along the longest uninterrupted section of the property fronting the street.

The proposed lot to be severed can be zoned a site specific RH(*) Zone now given there is municipal water service to the existing dwelling and the ability to meet all standard RH Zone provisions except area. The minimum lot and frontage requirements of the RH Zone are 30m (98.4ft) and 0.4ha (1.0ac) respectively. The proposed lot to be severed would generally maintain its existing frontage along Highway Crescent which is greater than 30.0m, but as mentioned before, the lot size for the severed lot would be 0.28ha (0.69ac) in size.

The proposed lot to be retained (3.40ha/8.40ac) would be rezoned so that the retained subject lands would have a compound site specific Agricultural (A)(*) and a site-specific Hamlet Residential Holding RH (*) (h) Zone. The site-specific Agricultural Zone would recognize the new acreage of the lot and be maintained until residential development can occur and allow cash crop production to continue on the subject lands in the interim. The Holding symbol prevents premature residential development of the subject lands. The Holding symbol would require the provision of municipal water service before residential development of the retained lands via a plan of subdivision. The site-specific RH(*) Zoning for these lands would also recognize lots that may be below the standard 0.40(1.00ac) lot size.

This report provides a policy review and analysis of the proposed zoning by-law amendment and the applicable relevant provincial and municipal policies. Should you have any questions or require additional information, please do not hesitate to contact the undersigned.

Respectfully submitted,

Strik, Baldinelli, Moniz Ltd.

Planning • Civil • Structural • Mechanical • Electrical



Maneesh Poddar, Hon. BA, MAES, RPP Candidate
Planner II, Planning Division

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BIBLIOGRAPHY

Provincial Policy Statement

Norfolk County Official Plan

Norfolk County Zoning By-Law

1 INTRODUCTION

The purpose of the following land use Planning Justification Report is to evaluate a proposed Zoning By-Law Amendment (ZBA) application for the lands comprising 17 Highway Crescent within the context of existing land use policies and regulations, including the Provincial Policy Statement, the Norfolk County Official Plan, and the Norfolk County Zoning By-law.



Figure 1 Subject Lands and Surrounding Land Uses

The Report demonstrates that the ZBA application is in keeping with Provincial and County/Municipal land use planning policies, is suitable for the subject lands, and would maintain compatibility with neighbouring land uses. The proposed rezoning would recognize the existing uses on the subject lands. More specifically, the proposed rezoning would recognize the existing residential development on the subject lands and facilitate the suitable and desirable residential development of the remaining subject lands in the future, contributing positively to the supply of housing in the Courtland Urban Area.

Existing Planning Policy Context

The proposed Zoning By-law Amendment is subject to the Provincial Policy Statement, 2020, as well as the following local Municipal Planning framework that applies to the subject lands proposed for future development:

- **Norfolk County Official Plan** - “Urban Area” as per Schedule A-1, Community Structure

As stated by the County with respect to the Courtland Urban Area:

Courtland is an Urban Area in the County and will accommodate a more limited range of uses and development, recognizing that Courtland is serviced by piped municipal water, but that sanitary services consist of private on-site disposal systems. There are, therefore, limitations on the amount, type, form and density of development that will be possible in the Courtland Urban Area....

Infilling and redevelopment are encouraged within the Courtland Urban Area and in the Hamlet Areas subject to the ability to provide adequate water and wastewater services

Section 7.7 of the Official Plan which pertains generally to the Urban Residential Designation states:

The Urban Residential Designation applies to the Urban Areas of the County. The Urban Areas are expected to continue to accommodate attractive neighbourhoods which will provide for a variety of residential forms as well as neighbourhood facilities such as elementary schools, parks, places of worship and convenience commercial uses integral to and supportive of a residential environment. A variety of housing types are needed to meet the needs of a diverse population...

The predominant use of land shall be a variety of urban dwelling types, including single detached dwellings, semi-detached dwellings, duplex dwellings and similar low-profile residential buildings not exceeding 2 dwelling units per lot

- **Norfolk County Zoning By-Law** – as mentioned earlier the subject lands are presently zoned Agricultural (A).

Permitted uses of the A Zone are as follows:

- a) animal kennel

- b) bed & breakfast
- c) bunk house
- d) Cannabis Production and Processing
- e) dwelling, single detached
- f) farm
- g) farm brewery
- h) farm distillery
- i) farm experience activity
- j) farm processing, accessory to a farm
- k) farm processing-value added
- l) farm produce outlet, accessory to a farm
- m) farm winery
- n) home industry
- o) home occupation
- p) on-farm diversified use
- q) seasonal storage of recreational vehicles and recreational equipment as a secondary use to a farm
- r) accessory residential dwelling unit

Permitted uses of the Hamlet Residential (RH) Zone are as follows:

- a) dwelling, single detached

- b) bed & breakfast
- c) day care nursery
- d) home industry
- e) home occupation
- f) accessory residential dwelling unit

A comprehensive review of these relevant planning regulatory documents is contained in subsequent sections of this Report.

2 SITE DESCRIPTION (LOTS TO BE SEVERED AND RETAINED)

As is common in most rural areas that are transitioning to urban areas, lands previously used for agriculture or farming, become integrated into settlement areas. The Courtland Urban Area is one of such area in Norfolk County. At this time, it is understood that Norfolk County is undertaking servicing studies to determine the capacity/availability of municipal water, sanitary, and stormwater services. The current dwelling on the subject lands remains unaffected, but the timing and availability of future municipal services, particularly water services will correspondingly determine the timing and extent of the future residential development of the remaining subject lands that are within the Courtland Urban Area.

The subject lands have an existing frontage of approximately 62.3m (204.4 ft) on 17 Highway Crescent. The existing one-storey single detached dwelling on the property is set back from the front property line by 7.90m (25.91ft). The existing easterly and westerly interior side yard setbacks from the existing dwelling are 19.70m (64.63ft) and 23.70m (77.75ft) respectively. The planned lot to be severed generally follows the extent of existing development on the subject lands and is proposed to be 0.28ha (0.69ac). The setback from the existing dwelling to the proposed rear lot line of the planned lot to be severed is approximately 27.03m (88.68ft). Coverage of the existing dwelling relative to the proposed lot to be severed is approximately 4.7%

There is a mixed coniferous and deciduous hedgerow of trees separating the developed portion of the subject lands from the vacant lands. The remaining subject lands which would comprise the proposed lot to be retained is vacant and only used for cash crop production. At this time, a 8.00m (16.4ft) future servicing easement is planned along the westerly interior lot line of the proposed lot to be severed. This servicing easement would enable municipal water service from Highway Crescent to the proposed lot to be retained. Future vehicular access to the retained lot would be by Byerlay Road. Should municipal water service be available, the proposed lot to be retained would be subdivided into 13 residential lots in keeping with Hamlet Residential (RH) zoning.



Figure 2 View of Subject Lands/Existing Dwelling from Highway Crescent

3 SURROUNDING LAND USES

The subject lands are surrounded by a mix of land uses as follows:

- **North** – Highway 3 (Main Street) and existing low density residential development in the form of single detached dwellings;
- **East** – vacant industrially zoned lands to the east across Byerlay Road and industrially zoned lands further northeast (Titan Trailers);

The Ministry of Environment, Conservation and Parks (MECP) has established guidelines to evaluate (D6) compatibility between certain types of commercial and industrial facilities and sensitive residential land uses. The Guidelines apply to uses that have potential to produce point source and or fugitive air emissions such as noise, vibration, odour, dust and other nuisances, either through normal operations, procedures, maintenance, or storage activities, or from associated traffic generation. D6 studies were

undertaken for the subject lands. It was determined through the said studies that long-term land use compatibility can be maintained. It should be noted that Titan Trailers has an existing Ministry environmental approval (ECA #8018-92MRS7, dated March 5, 2013).

If Titan were to expand onto their vacant lands closer to the subject lands they would need to have their ECA revised and would need to demonstrate that they can remain in compliance at the closer homes.

- **West** - low density residential development and an institutional use (Netherland Reformed Congregation); and
- **South** – there is a CN Rail line to the immediate south of the subject lands and agricultural lands for cash crop production beyond the rail line.

The rail line to the east is currently not in use and terminates in Delhi. The rail line to the west into Tillsonburg is leased by GoRail who have indicated there is a possibility they could lease the line adjacent to the site if a customer were to develop in Delhi. As such there is potential for rail sound levels to increase in the future. However, all recommended noise mitigation measures such as the provision of central air and masonry exterior walls for homes adjacent to the rail line can be fulfilled.

4 DEVELOPMENT PROPOSAL

As mentioned above, the Zoning By-law Amendment is in advance of an application for consent for land severance. Trusting the availability of suitable municipal services, an application for draft plan of subdivision approval would be submitted thereafter to develop the vacant retained lot into a 13-lot RH Zoned residential subdivision. Images of the severance sketch and preliminary draft plan of subdivision are below:

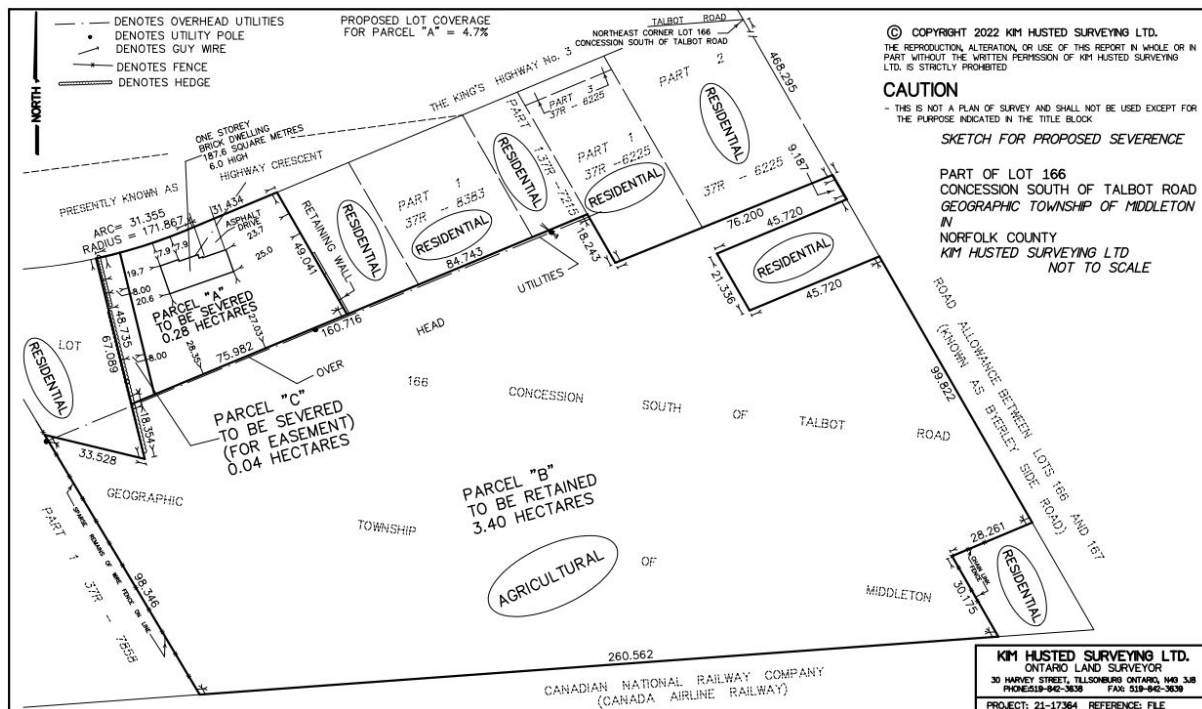


Figure 3 Severance Sketch: 17 Highway Crescent

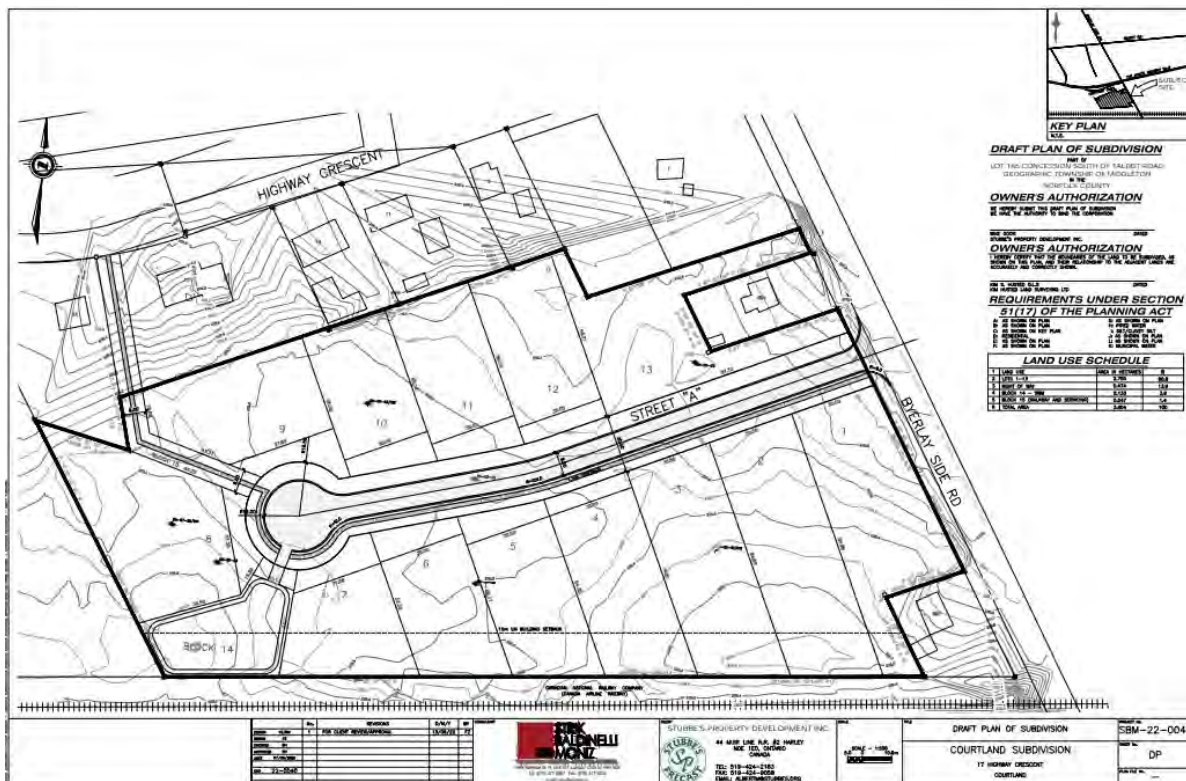


Figure 4 Preliminary Draft Plan of Subdivision: 17 Highway Crescent

4.1 Zoning By-Law Amendment

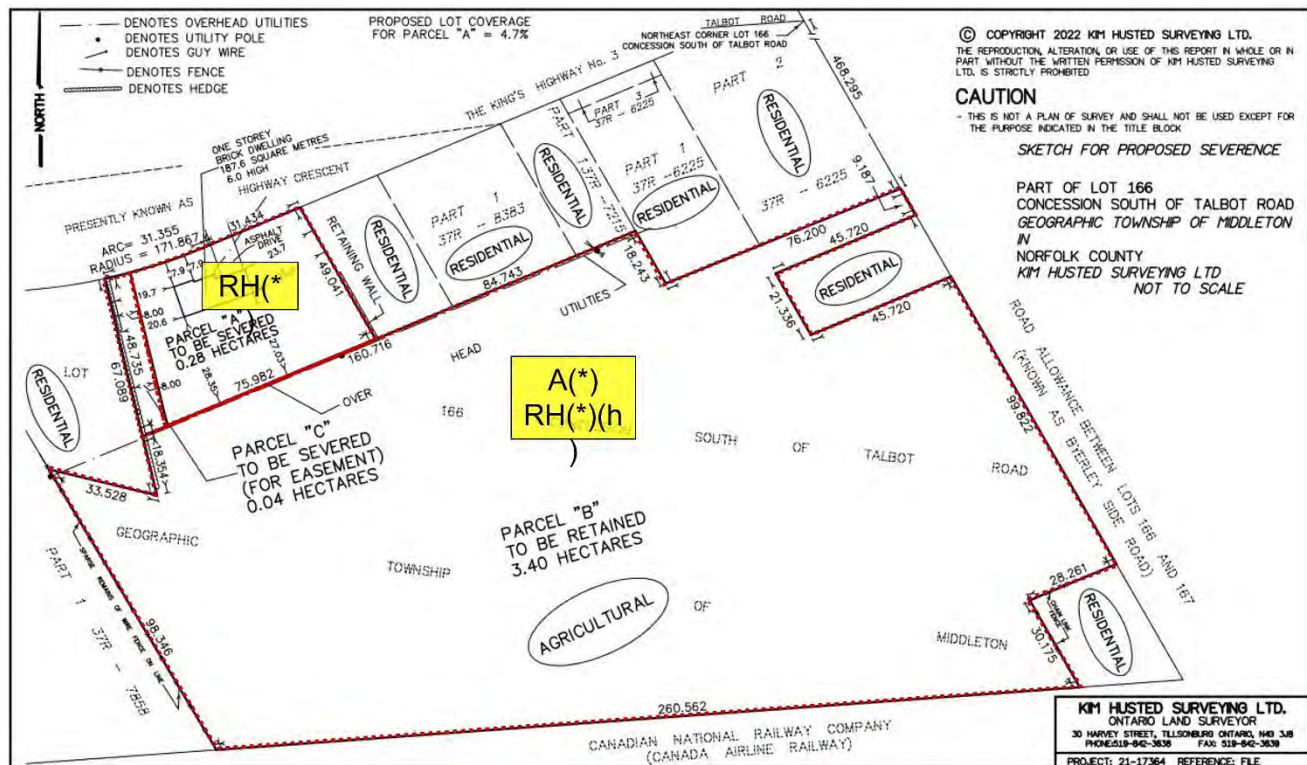


Figure 5 Proposed Zoning: 17 Highway Crescent

The proposed lot to be severed can be zoned RH(*) now given there is municipal water service to the existing dwelling and the ability to meet all standard RH Zone provisions with the exception of lot area. Notwithstanding the reduced lot area the planned lot size also accounts for the private septic system on-site. The minimum lot and frontage requirements of the RH Zone are 30m (98.4ft) and 0.4ha (1.0ac) respectively. The proposed lot to be severed would generally maintain its existing frontage of along Highway Crescent.

The proposed lot to be retained (3.40ha/8.40ac) would be rezoned so that the retained subject lands would have a compound site-specific Agricultural (A)(*) Zone and site-specific Hamlet Residential Holding RH(*) (h) Zone. The A (*) Zone would recognize the new acreage of the lot, i.e. 3.40ha/8.40ac, and be maintained until residential development can occur and allow cash crop production to continue on the subject lands in the interim. The Holding symbol prevents premature residential development of the subject lands. The Holding symbol would require the provision of municipal water service before residential development of the retained lands via a plan of subdivision. It is planned that all future lots

within the plan of subdivision would be created to meet the minimum frontage requirements of the RH Zone. Certain lots may be less than 0.4ha/1.00ac but all would be large enough to accommodate a private septic system along with municipal water service.

Table 1 provides an overview of the zoning for the proposed lot to be severed - which would encompass the existing house and private septic system.

RH Zoning Provision	Required	Severed Lot - Provided
Minimum Lot Area (m ²)	0.40ha	0.28ha
Minimum Lot Frontage (m)	30.0m	> 30.0m
Minimum Front Yard (m)	6.00m	7.90m
Minimum Exterior Side Yard (m)	6.00m	N/A
Minimum Interior Side Yard – attached garage (m)	1.2m each side	19.70m west & 23.70m east
Minimum Rear Yard (m)	9.00m	27.03m
Maximum Building Height (m)	11.00m	1 storey – 4.00m

Table 1 Zoning By-Law Comparison Chart

As is demonstrated in Table 1, all standard RH Zone provisions other than lot area can be met by the proposed lot to be severed.

5 PLANNING POLICY FRAMEWORK

5.1 Provincial Policy Statement (PPS)

The Provincial Policy Statement (PPS), issued under the authority of Section 3 of the Planning Act “provides policy direction on matters of provincial interest related to land use planning” in order to ensure efficient, cost-efficient development and the protection of resources. The proposed development is consistent with the PPS and more specifically supports the following policies:

- Direct growth and development to existing settlement areas (Policy 1.1.3.1)
- Provide for land use patterns within settlement areas that are based on densities and a mix of land uses that:
 - efficiently use land and resources,
 - are appropriate for, and efficiently use, the infrastructure and public service facilities which are planned or available, and avoid the need for their unjustified and/or uneconomical expansion; and
 - support active transportation (Policy 1.1.3.2).
- New development taking place in designated growth areas should occur adjacent to the existing built-up area and should have a compact form, mix of uses and densities that allow for the efficient use of land, infrastructure and public service facilities. (Policy 1.1.3.6).
- Planning authorities shall provide for an appropriate range and mix of housing types and densities to meet projected requirements of current and future residents of the regional market area by:
 - b) permitting and facilitating:
 - 1. all forms of housing required to meet the social, health and well-being requirements of current and future residents, including special needs requirements;
 - c) directing the development of new housing towards locations where appropriate levels of infrastructure and public service facilities are or will be available to support current and projected needs (Policy 1.4.3)
- Municipal sewage and water services are the preferred form of servicing for settlement areas to support protection of the environment and minimize potential risks to human health and safety (Policy 1.6.6.2)
- Long-term economic prosperity should be supported by:
 - b) encouraging residential uses to respond to dynamic market-based needs and provide necessary housing supply and range of housing options for a diverse workforce;
 - c) optimizing the long-term availability and use of land, resources, infrastructure and public service facilities (Policy 1.7.1).

Based on the above, the Zoning By-Law Amendment is consistent with the policies of the 2020 Provincial Policy Statement.

5.2 Norfolk County Official Plan

As stated earlier, the Urban Residential Designation applies to the Urban Areas of the County such as Courtland. The Urban Areas are expected to continue to accommodate attractive neighbourhoods which will provide for a variety of residential forms as well as neighbourhood facilities. The predominant use of land under this designation shall be a variety of urban dwelling types, including single detached dwellings, semi-detached dwellings, duplex dwellings and similar low-profile residential buildings.

With respect to housing, Section 5.3 of the County Official Plan states:

“The provision of housing is an essential part of planning in Norfolk County. There are many factors that affect supply and demand in the housing market, and only some of them can be managed by a municipality in Ontario. The County may influence the location, timing and scale of development through the provision of infrastructure and the review of residential development proposals including site plans and plans of subdivision and condominium. It is desirable to have close cooperation between all levels of government and the private sector in order to provide for sufficient and affordable housing, and a stable residential housing market. The County shall ensure that a full range of housing types are provided to meet the anticipated demand and demographic change, including accessible housing forms to facilitate aging in place and for persons with disabilities...”

Additionally Section 5.3.1 of the OP states that urban residential intensification, infilling and redevelopment of existing areas allows for the efficient provision of urban services thereby helping to minimize the costs of providing services while meeting an important component of the County’s housing needs. Specifically with respect to Courtland, the OP states:

Infilling and redevelopment are encouraged within the Courtland Urban Area and in the Hamlet Areas subject to the ability to provide adequate water and wastewater services.

Criteria for infill development, intensification and redevelopment of sites such as the subject lands include:

- i. the development proposal is within an Urban Area, and is appropriately located in the context of the residential intensification study;*

The proposed development is in the Courtland Urban Area which is an area targeted for increased housing supply by the County

- ii. *the existing water and sanitary sewer services can accommodate the additional development;*

The proposed hamlet residential development can be supported without servicing concerns.

- iii. *the road network can accommodate the traffic generated;*

There is no significant traffic impact anticipated from the proposed residential subdivision.

- iv. *the proposed development is compatible with the existing development and physical character of the adjacent properties and surrounding neighbourhood; and*

There are no significant land use compatibility issues with respect to adjacent properties and existing development as verified through the D-6 studies. The proposed subdivisions would result in housing equivalent to that found in surrounding RH zoned lands.

- v. *the proposed development is consistent with the policies of the appropriate Land Use Designation associated with the land.*

The proposed residential development is in keeping with the policies of the Urban Residential Designation which applies to the Courtland Urban Area.

Likewise, with respect to consents, the proposal meets general consent to sever land policies of the Official Plan (Section 9.6.3.2) which are as follows:

- i. *consents shall only be granted when the land fronts onto an existing, assumed public road that is maintained on a year-round basis;*

The proposed lot to be severed (encompassing the existing dwelling fronting Highway Crescent) and the proposed lot to be retained (which is presently vacant and planned to be developed via plan of subdivision into a 13 hamlet residential lots) will both have access to public roads maintained year-round.

- ii. *consents shall have the effect of infilling in existing areas and not extending existing development;*

The proposed development is an infill development.

- iii. *creation of the lot does not compromise the long-term use of the remaining land or retained parcel; and*

The proposed lot to be severed would not compromise the ability of the lot to be retained to be developed in the future.

- iv. *consents may be considered for large parcels, where future development of the large parcels is to proceed by plan of subdivision.*

The consent would create a large vacant residential parcel of land that can be further subdivided through a plan of subdivision, once municipal water services are allocated.

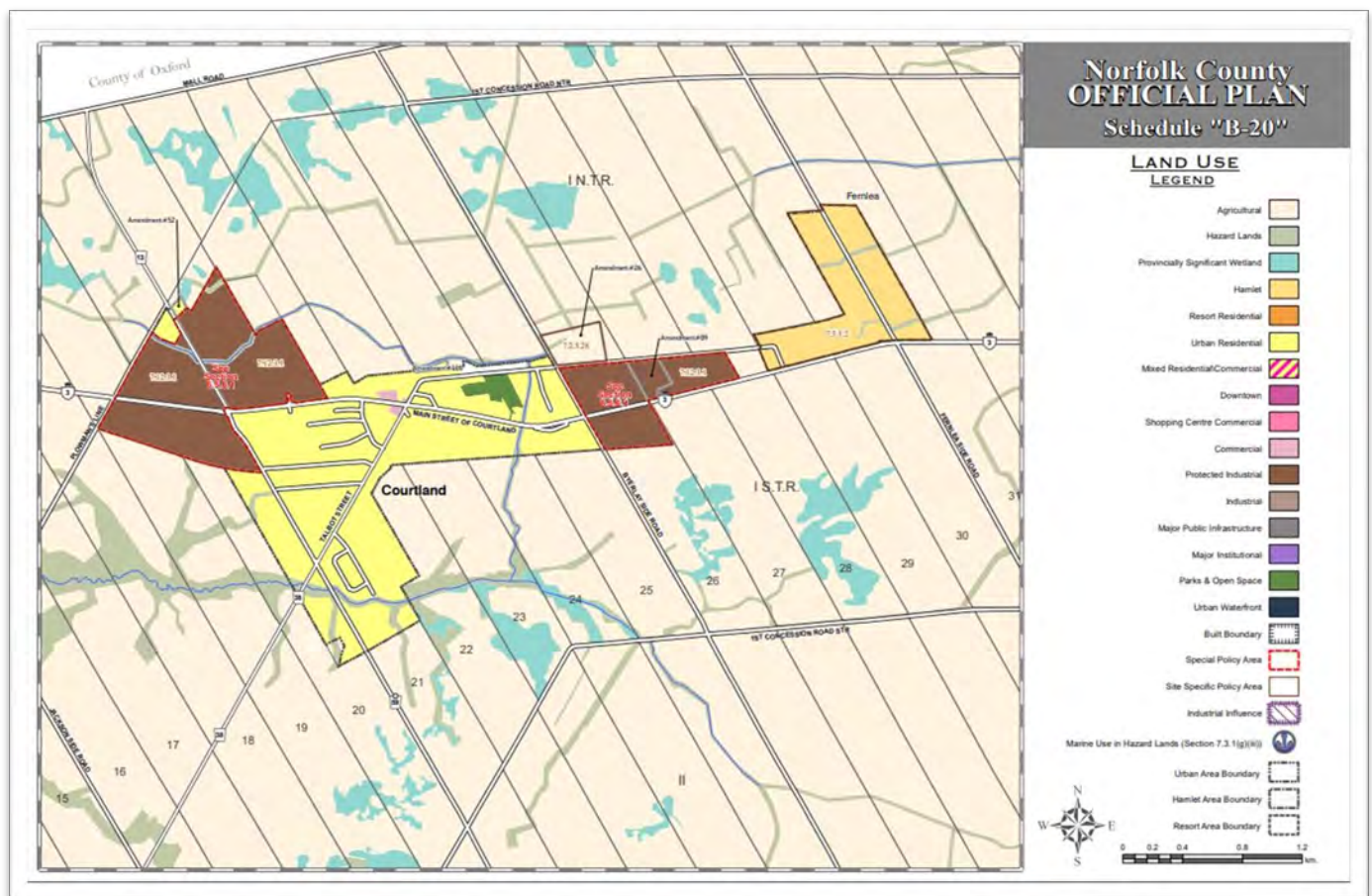


Figure 3. Norfolk County Official Plan, Schedule 'B-20', Courtland Land Use

6 **CLOSING**

Based on a review of the relevant policies and regulatory framework for the subject site, the proposed Zoning Bylaw is justified given:

- The proposal is consistent with the policies of the Provincial Policy Statement, 2020, which promotes healthy, liveable and safe communities by accommodating appropriate residential uses and recognizes the need for municipalities to accommodate growth in a cost-effective manner;
- The proposal is consistent with the County Official Plan that recognizes the need for a variety of housing within settlement areas;
- The proposed development is of a height, scale and intensity which is consistent with the character of the Urban Residential designation;
- The proposed development is able to achieve long-term land use compatibility with surrounding land uses;
- The proposed site-specific provisions sought through the Zoning By-Law Amendment are appropriate for the proposed lots for the existing residence and future subdivision and will result in residential use and built form that are compatible with the surrounding land uses; and
- The proposed application allows for an appropriate development of a municipally serviced parcel, that is designated for residential development, and represents an efficient utilization of land, infrastructure, and resources.

For the reasons noted above and throughout this report, the proposed Zoning By-Law represents sound land use planning practice.

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Terraprobe

*Consulting Geotechnical & Environmental Engineering
Construction Materials Inspection & Testing*

**HYDROGEOLOGICAL INVESTIGATION
PROPOSED RESIDENTIAL DEVELOPMENT
17 HIGHWAY CRESCENT
COURTLAND, ONTARIO**

Prepared For:

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File No. 1-22-0249-46
May 18, 2022

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Figure 2 – Borehole Location Plan

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Table 1 –Well Record Summary

Table 2 - Summary of Water Balance Analysis

APPENDICES:

Appendix A –Proposed Site Plans

Appendix B – Borehole Logs and Grain Size Analysis

1.0 INTRODUCTION

Terraprobe was retained by Englobe Corp. to complete a hydrogeological investigation for the proposed residential development located at the municipal address of 17 Highway Crescent in the Village of Courtland. The hydrogeological investigation was completed to confirm soil and ground water conditions and provide a servicing impact assessment and preliminary design requirements for private septic servicing in addition to completing a water balance assessment to confirm the post development lands maintain ground water function with regards to infiltration of precipitation to shallow ground water. The proposed development will be serviced with municipal water supplies.

The subject site (the Site) is located immediately west of Byerlay Side Road approximately 120 m south of Highway 3 in Courtland, Ontario (Norfolk County). The Site consists of an irregular shaped parcel of land covering an area of approximately 3.3 hectares in area (8.2 acres). The Site currently consists of agricultural lands and is undeveloped. It is proposed to develop the site for use as a residential subdivision consisting of up to 15 single residential lots, with the current site plan showing 11 residential lots with an internal access road.

2.0 SCOPE OF WORK

The following tasks were completed as part of the Hydrogeological Investigation:

- Background Review – A background review was completed including a review of topographical mapping, aerial photography, geological mapping, regulatory mapping, including Long Point Conservation Authority mapping and Lake Erie source protection mapping and a review of the Ministry of the Environment Conservation and Parks (MECP) well record database.
- Subsurface Investigation and Monitoring Well Installation – A subsurface investigation consisting of seven boreholes was completed at the Site as part of the geotechnical investigation completed by Englobe. Monitoring wells were instrumented within three of the completed boreholes to a depth of approximately 6.0 m to further evaluate ground water resources.
- Soil Laboratory Testing – Representative soil samples across the subject property were further assessed through laboratory testing including grain size analysis to determine the percolation rate (t-time) of shallow soils typically at depths of approximately 0.6 to 1.2 m.
- Private Well Survey – A private well survey was completed for private properties to determine the locations, construction details and operational history of private water supply wells situated within a 500 m radius of the subject property.
- Water Balance Assessment – A water balance assessment was completed based on the observed shallow soil conditions at the Site. The pre and post development conditions were evaluated, and recommendations were provided in terms of Low Impact Development techniques which could be implemented in order to limit impacts to the hydrogeological function of the Site as a result of development.
- Septic Impact Assessment – An impact assessment was completed for shallow ground water because of subsurface sewage disposal for the proposed development. Recommendations for preliminary tile design were provided along with treatment requirements to limit potential impacts to shallow ground water as a result of sewage disposal for the proposed development.

3.0 APPLICABLE REGULATIONS AND POLICIES

3.1 Conservation Authority Policies and Regulations (O. Reg. 179/06)

Under Section 28 of the Conservation Authorities Act, local conservation authorities are mandated to protect the health and integrity of the regional greenspace system and to maintain or improve the hydrological and ecological functions performed by valley and stream corridors. Long Point Region Conservation Authority, through its regulatory mandate, is responsible for issuing permits under Ontario Regulation (O.Reg. 179/06), *Development, Interference with Wetlands and Alterations to Shorelines and Watercourses* for development proposal or Site alteration work to shorelines and watercourses within the regulated areas.

Long Point Region Conservation Authority regulated area online mapping was reviewed, and the Site is not located within a Regulated Area. As such, development permits from Long Point Region Conservation Authority under Ont. Reg. 179/06 will not be required for alterations on the Property.

3.2 Clean Water Act 2006

The MECP mandates the protection of existing and future sources of drinking water under the Clean Water Act, 2006 (CWA). Initiatives under the CWA include the delineation of Wellhead Protection Areas (WHPAs), Significant Ground water Recharge Areas (SGRAs) and Highly Vulnerable Aquifers (HVAs), as well as the assessment of drinking water quality and quantity threats within Source Protection Regions. Source Protection Plans are developed under the CWA and include the restriction and prohibition of certain types of activities and land uses within WHPAs. This plan dictates that any site within the Lake Erie Source Protection Region can be rated in terms of score indicating vulnerability to drinking water quality and quantity threats. It is noted that the Village of Courtland is supplied with municipal drinking water via transmission mains from Delhi, located approximately 9 kilometres east of the Site. The Site is not located within an identified WHPA.

3.3 Norfolk County Official Plan 2022

The Property is situated within the planning jurisdiction of Norfolk County, the official plan was reviewed for potential development constraints related to planning requirements as provided under the Official Plan. The following development schedules were applicable to the Site:

- Schedule A-1 (Community Structure) – The Site is located within an urban area for the Village of Courtland.

- Schedule C-3 (Natural Heritage) – The Site is not located within an area of natural or scientific interest (ANSI) within a Provincially Significant Wetland (PSW) or a significant woodlot. An identified PSW is situated approximately 550 m southeast of the Site.
- Schedule D-2 (Water Resources) - The nearest wellheads were identified for the Town of Tillsonburg west of the Site. The Site is not located within a vulnerable area and was not assigned an Aquifer Vulnerability score.

Based on the above review the Site is not located within a special planning policy area including regulated areas with the Long Point Region Conservation Authority, under the Lake Erie Source Water Protection Plan, or through the Norfolk County Official Plan. Urban residential use for the site would be permitted under the Norfolk County Official Plan (Schedule A-1).

4.0 SITE CONDITIONS

4.0 Site Location and Description

The subject site is in the Village of Courtland immediately west of Byerlay Side Road approximately 120 m south of Highway 3 in Norfolk County as indicated on the attached **Figure 1**. The Site consists of an irregular shaped parcel of land covering an area of approximately 3.3 hectares (8.2 acres). The Site currently consists of agricultural lands. Surrounding land use consists of residential dwellings and agricultural lands. Properties in the vicinity of the Site within the Village of Courtland are serviced with municipal water supply and private septic tank and tile beds. Private water supply wells are expected along Byerlay Side Road and east of the Site along Highway 3.

It is proposed to develop the Site as a residential subdivision consisting of up to 15 single residential lots with municipal water servicing and private individual septic systems. Site development plans are provided in the attached **Appendix A**.

4.1 Topography and Surface Drainage

Topography at the Site slopes gently to the southwest. Topographic mapping for the vicinity of the Site indicates that the Site lies between elevations of 239 and 238 meters above sea level (masl) sloping towards the southwestern extent of the property (Figure 2). Topographic variations at the Site are expected to be approximately 1 m in elevation.

Surface water runoff and ground water flow are anticipated to be in a west to southwest direction. Ground water flow gradients were based on water level information obtained from site instrumentation taken on March 2, 2022. The nearest identified surface water feature is Cowan Drain located approximately 250 m west of the Site. The Cowan Drain flows south to a tributary of Big Otter Creek located 800 m south of the Site. Big Otter Creek drains to the southwest to Lake Erie at Port Burwell, situated approximately 27 kilometres southwest of the Site.

4.2 Local Geology and Hydrogeology

The Site is located within the physiographic region identified as the Norfolk Sand Plain. The region is characterized by near shore glaciolacustrine deposits of sand to gravelly sand and gravel. Isolated deposits of Port Stanley till are noted overlying regionally extensive sand deposits. Port Stanley till deposits are noted to consist of silt to sandy silt becoming silty to silty clay across areas of Norfolk

County. Bedrock is mapped to consist of Limestone, dolostone and shale of the Dundee Formation. The mapped depth to bedrock is indicated at a depth of approximately 55 m at an elevation of 181 m.

4.3 Summary of Well Records

A review of MECP well records was conducted for 500 m surrounding the subject property. A total of 22 well records were available for the study area summarized in the table below:

Summary of MECP Well Records

Total Number of wells	22
Overburden	22 (100 %)
Bedrock	0 (0 %)
Well Depth	
Less than 10 m	8 (36 %)
10 to 15 m	14 (64 %)
Well Use	
Domestic	19 (85 %)
Irrigation	1 (5 %)
Dewatering	1 (5 %)
Institutional	1 (5 %)
Well Yield	
Less Than 18.9 L/min (5 GPM or less)	6 (27 %)
22.5 – 37.8 L/min (6 – 10 GPM)	11 (50 %)
41.6 L/min – 76 L/min (11 – 20 GPM)	5 (23 %)

Wells in the vicinity of the site are reported to be completed within shallow sand deposits at depths not exceeding 155 m below grade. The common well installation consist of 32 mm diameter (1 ¼”) sand points. These wells are utilized for domestic purposes. Well yields are typically reported to be less than 38 L/min (10 GPM) which is considered to exceed typical residential demand of 19 L/min (5 GPM). A summary of well records within the study area are provided in the attached **Table 1**, well record locations are shown on the attached. **Figure 3**

Stratigraphy provided in well records indicates soils predominately consist of sand. Lower permeable clays were noted overlying sand deposits in localized areas. Sands are water bearing at depths of approximately 10 to 15 m below grade with ground water levels generally within 4 m of ground surface.

4.4 Results of Well Survey

A well survey was completed for properties located within a 500 m radius of the Site where private water servicing was anticipated, to confirm locations and use of private wells. The well survey was conducted to confirm information obtained within well records and to confirm the location, construction details and operational history of private wells completed in the vicinity of the site. In total 11 properties were visited as part of the well survey. Reviewed properties included the following addresses:

- 817, 901, 904, 913, 923, 927, 935, 941 and 947 Byerlay Side Road
- 424 and 426 Highway 3

Due to the current COVID-19 restrictions that have been imposed by the provincial government and to ensure health and safety, the survey involved limited interaction with the private property owners. These properties were reviewed during site inspection to confirm private servicing. Based on the completed site inspection private water supply is expected for residential properties located along Byerlay Side Road and east of the site along Highway 3. Property locations reviewed as part of the well survey are indicated on the attached **Figure 3**.

4.5 Results of Subsurface Investigation

A subsurface investigation was completed at the Site by Englobe as apart of the geotechnical investigation. A total of seven boreholes ere completed across the site to depths of 5.0 m and 6.6 m below existing grades. In general, subsurface conditions encountered at the Site consisted of topsoil overlying native deposits of sand and silt, clayey silt, and sand deposits. Representative soil samples were collected for confirmation of soil type by the project engineer and for further laboratory testing consisting of laboratory grain size analysis. Borehole logs and the results of grain size analysis are provided in the attached **Appendix B**, borehole locations are shown on the attached **Figure 2**. The general soil conditions encountered in completed boreholes are summarized in the sections below.

4.5.1 Topsoil

A surficial layer of topsoil was observed at each completed borehole ranging in thickness between 30 mm and 430 mm.

4.5.2 Sand to Sand and Silt

Native deposits of sand to sand and silt ere encountered underlying topsoil within boreholes BH-02-22, BH-04-22, BH-06-22, and BH-07-22. The thickness of native sand to sand and silt ranged from 0.4 m to 1.2 m.

Standard Penetration Testing carried out within sand to sand and silt indicated a compact relative density. Soil gradation analysis as carried out from samples obtained from BH-02-22 at a depth of 0.8 m to 1.2 m below existing grades. Analysis indicated soils at this depth consisted of 50% sand, 47% silt and 3% clay. Based on the relative density and grain size distribution percolation rates of 12 min/cm are expected for sand and silt soils.

4.5.3 Silt to Clayey Silt

Silt to clayey silt as encountered within each completed borehole underlying surficial topsoil deposits and sand to sand and silt, where encountered. Deposits of silt to clayey silt were encountered to the depth of completion for boreholes BH-01-22, BH-04-22, and BH-06-22, completed to depths of 5.0 m below grade. The thickness of silt to clayey silt deposits ranged from 4.1 m to 4.7 m.

Standard Penetration Testing carried out within silt to clayey silt indicated a stiff to hard relative density. Soil gradation analysis as carried out from samples obtained from BH-03-22, BH-05-22, BH-06-22, and BH-07-22 at a depth been 0.8 m and 2.8 m below existing grades. Analysis indicated soils at this depth on average consisted of 1% gravel, 7% sand, 64% silt and 28% clay. Based on the relative density and grain size distribution percolation rates of 30 min/cm are expected for clayey silt soils.

4.5.4 Sand and Sand and Gravel

Deposits of sand and sand and gravel ere encountered within boreholes BH-02-22, BH-03-22, BH-05-22, and BH-07-22 to the depth of completion of 6.6 m below grade. A 0.8 m thick layer of sand and gravel as encountered within silt deposits in borehole BH-06-22.

Standard Penetration Testing carried out within deposits of sand to sand and gravel indicated a relative density ranging from loose to compact.

4.6 Ground water

Ground water conditions were measured within installed monitoring wells during site inspection carried out on March 2, 2022. The following table provides a summary of the observed ground water conditions at the site:

Summary of Ground Water Monitoring

Monitoring Well Location	Ground Surface Elevation (m)	Well Depth (m)	Ground Water Level	
			(mbgl)	(masl)
BH-02-22	238.02	6.1	1.62	236.40
BH-05-22	238.61	5.3	2.33	236.28
BH-07-22	238.12	6.1	2.45	235.73

The above monitoring well installations are screened within silt to clayey silt and sand deposits. Based on the above observed ground water elevations it is expected that shallow ground water flow will be directed to the west of the Site toward the Cowan Drain. Perched ground water should be expected within

shallow deposits of sand to sand and silt. Perched ground water would be encountered within shallow excavations.

4.7 Climate Conditions

The following general climate data was obtained from historical climate data available online through Environment Canada. Annual precipitation data was used from the Delhi weather station located approximately 6.4 kilometers from the site. Average precipitation values were used over the period of 1976 to 2006. Climate conditions expected for the site are summarized as follows:

- Precipitation 948 mm/a
- Evapotranspiration 608 mm/a
- Water Surplus 340 mm/a

Infiltration of precipitation at the Site is expected to be controlled by soil type, vegetation type and site topography. Infiltration rates were determined based on infiltration guideline sub-factors provided within the “MOEE Hydrogeological Technical Information Requirements for Land Development Application”, (MOEE, 1995), Table 2 (page 4-62). Infiltration factors are summarized as follows:

Summary of Average Infiltration Factor

Category	Type 1	Percentage	Infiltration Sub-Factor	Type 2	Percentage	Infiltration Sub-Factor	Weighted Average Infiltration Factor
Topography	Rolling Land	20%	0.20	Flat Land	80%	0.10	0.12
Soil Type	Medium Clay and Loam	40%	0.20	Open Sandy Loam	60%	0.40	0.32
Cover	Cultivated lands	100%	0.10	-	-	-	0.10
Total Infiltration Factor:							0.54

The estimated infiltration factor (0.54) represents the factor of water surplus directed to infiltration. Based on an annual water surplus of 340 mm per year the annual rates for infiltration and runoff at the site were estimated a 184 mm and 156 mm respectively.

Potential evapotranspiration (608 mm/a) was calculated following the Thornthwaite method as below:

$$\text{PET (cm/month)} = 1.6 (L/12) (10T_a/I)^a$$

Where: L is the average day length

T_a is the average daily temperature

$$I = \Sigma (T_a/5)^{1.5}$$

$$a = (6.75 \times 10^{-7}) I^3 - (7.71 \times 10^{-5}) I^2 + (1.792 \times 10^{-2}) I + 0.49$$

Values for average day length and average daily temperature were obtained online from the Environment Canada climate normals for 1976-2006 for the Delhi weather station. The climate reported above is typical for Southern Ontario with annual total precipitation exceeding the mean annual evapotranspiration.

It is noted that the above are average values, which are representative in a regional context. There will be seasonal and annual variations in these values. However, the average values will govern long-term ground water recharge and discharge rates at the Site. Therefore, average values are considered appropriate for the assessment of the hydrogeological conditions at the Site.

4.8 Proposed Development Plan

It is proposed to develop the 3.3-hectare parcel of land for use for a residential subdivision. The following breakdown for land development has been provided:

• Single Detached Residential Blocks	28,167 m ²
• Roads	<u>4,760 m²</u>
Total Area	32,927 m²

The current draft plan for the development is included in the attached **Appendix A**.

4.9 Water Balance

Based on the proposed development plan, it is proposed to develop the site as a residential subdivision consisting of single detached residential dwellings. Soil conditions and regional climate conditions for the site were determined from available information including previous reporting completed for the site and surrounding vicinity as discussed in Section 4.7 above. Based on the proposed development plan it is expected that the increase in impervious areas at the site following development will result in a decrease in the volume of infiltration and evapotranspiration of precipitation with a corresponding increase in runoff following development.

Based on the Site area and the proposed development plan the following general water balance is expected for the Site:

Summary of Site Water Balance

	Precipitation (m ³ /a)	Evapotranspiration (m ³ /a)	Infiltration (m ³ /a)	Runoff (m ³ /a)
Pre-Development	32,215	20,020	6,045	5,150
Post-Development	32,215	8,904	2,069	20,243

An infiltration deficit of approximately 3,977 m³ is expected following site development. It is expected that the pre-development water balance at the Site can be maintained following development through the implementation of various infiltration features further discussed in Section 5.2 below. The detailed water balance for the Site is provided in the attached **Table 2**.

5.0 HYDROGEOLOGICAL ASSESSMENT

5.0 Summary of Hydrogeological Conditions

The following summarizes the Site conditions encountered as part of the completed site investigations:

1. A series of seven boreholes are completed across the Site to assess shallow soil and ground water conditions. Soils at the Site consisted of topsoil overlying native deposits of sand and silt, clayey silt, and sand deposits. Boreholes are completed to depths of 5.0 m and 6.6 m below existing grades.
2. Monitoring wells were installed within selected boreholes to allow for the measurement of stabilized ground water conditions across the Site. Shallow ground water is anticipated at depths ranging from 1.6 m to 2.5 m below existing grades. Ground water flow as observed to be directed to the west.
3. Laboratory grain size analysis was completed for representative soil samples obtained from boreholes. The results of soil grain size analysis indicate that shallow soils consist of sand and silt and clayey silt, with percolation rates are expected at 12 min/cm for sand and silt and 30 min/cm for clayey silt soils.
4. A private well survey was completed for properties within a 500 m radius of the Site. It is expected that residential properties along Byerlay Side Road north and south of the site in addition to residential properties east of the site along Highway 3 are serviced with private water supply, primarily consisting of shallow sand points. Well yield and quality were reported by residents as adequate for the required demand.
5. The Site is not located within a special planning policy area including regulated areas with the Long Point Region Conservation Authority, under the Lake Erie Source Water Protection Plan, or through the Norfolk County Official Plan. Urban residential use for the site would be permitted under the Norfolk County Official Plan (Schedule A-1).

5.1 Predicted Change in Water Balance

It is proposed to develop the site for use as a residential subdivision including an internal road. Under the pre-development scenario the site consists entirely of pervious lands (agricultural field).

The predicted annual ground water infiltration volume at the site under the current pre-development land use is estimated at 6,045 m³. Under the post-development scenario, the volume of evapotranspiration and infiltration are expected to decrease, and the Volume of surface runoff will increase due to the increase in impermeable surface across the project area. Under the current plan of development, the un-mitigated infiltration across the site is anticipated at 2,069 m³ following site development. The post development annual infiltration deficit is estimated at 3,977 m³. Given the hydrogeological function of the site to provide for ground water recharge the primary consideration following site development would be for the maintenance of the pre-development volumes of infiltration across the site.

It is anticipated that post-development infiltration volumes can be enhanced to meet the pre-development targets through the implementation of infiltration features following site development. Site conditions are considered favorable given the observed depth to shallow ground water between 1.6 m to 2.5 m below grade.

Primary consideration was provided for the following infiltration features at the site following development would be the discharge of downspouts to the grassed yards for infiltration to shallow ground water. A further assessment as to how the pre-development infiltration targets would be achieved are further discussed below.

5.2 Mitigation Measures

It is recommended to implement Low Impact Development (LID) methods to promote runoff from rooftop areas. The primary input to LID features should be rooftop runoff, as runoff from rooftop areas would be free of sediment, road salt and potential hydrocarbon contamination. Shallow soils predominately consist of sandy silt to silt, based on shallow soil conditions infiltration rates of 30 mm/hr are anticipated for the purposes of infiltration feature design. Ground water levels were observed to range between 1.6 to 2.5 m below grade. Any LID features should be designed with a 1.0 m separation from the seasonal high ground water table.

Given the proposed development is to consist of detached residential lots the primary mitigation measure is recommended to consist of lot level controls for rooftop runoff, which would include grassed swales/infiltration trench to direct runoff across pervious areas with underdrains to promote infiltration disconnection of rooftop drainage to grassed yards be implemented within detached residential lots.

Based on the completed water balance (Table 2) the expected volume of runoff from building cover was estimated at 12,016 m² based on a building cover of 50% of the residential lots. The expected post

development infiltration deficit is estimated at a volume of 3,977 m³. Given the expected post development infiltration deficit it is expected that pre-development levels of infiltration can be maintained through the direction of 33% of runoff from rooftop coverage from the developed property.

5.3 Sewage Impact Assessment

The impact of proposed private subsurface sewage disposal beds was evaluated following the approach provided within the Ministry of the Environment Procedure D-5-4 (Technical Guideline for Individual On-Site Sewage Systems: Water Quality Risk Assessment, August 1996). The risk assessment was based on soil and ground water conditions observed as part of the subsurface investigation completed at the Site and information obtained as part of the private well survey and MECP well record review.

Soil conditions at the site consist primarily of localized surficial sand to silty sand overlying silt to clayey silt and sand deposits. Soils in the vicinity of the site consist primarily of sand deposits. Ground water is expected to range across the site between depths of 1.6 m to 2.5 m below existing grades, with ground water flow observed to the west of the Site. The Village of Courtland and the proposed development is serviced with municipal water supplies. Private water servicing is present along Byerlay Side Road, and Highway 3 east of the site. Private wells predominantly consist of shallow sand points completed at depths less than 15 m below grade.

Hydrogeologically sensitive features were not noted at the site and surrounding vicinity (i.e., within a 500 m radius of the site). The expected receiver for sewage effluent is shallow unconfined ground water. Ground water discharge to surface water in the vicinity of the site is not expected due to surficial deposits of silt to clayey silt across the site. It is expected that effluent plumes will be dispersed and of limited lateral extent within shallow soils to the west of the leaching bed areas.

Notwithstanding the above the following methodology was used to assess the potential increase in nitrates within shallow ground water at the downgradient property boundary for the proposed development area:

$$\frac{Q \times N \times P}{(A \times I) + (Q \times P)}$$

Where: Q is the daily flow sewage flow rate (1,000 L/day as per D-5-4 Section 5.6.2 (a))

N is the nitrate loading for a conventional Class IV sewage system (40 mg/L)

P is the number of proposed residential lots (15 lots)

A is the site area (32,927 m²)

I is the infiltration rate of underlying native silt to clayey silt soils (0.150 m/yr)

The maximum permissible concentration of nitrate in ground water at the down-gradient property boundary is considered at 10 mg/L corresponding to the health-related maximum acceptable concentration (MAC) guideline within the Ontario Drinking Water Standards. The resultant expected nitrate increase in shallow ground water is calculated at 21.0 mg/L for a conventional system without tertiary treatment. Given this outcome the pre-treatment of sewage will be required to meet acceptable concentrations of nitrate within shallow ground water at the down-gradient property boundary (i.e., tertiary treatment of effluent) provided the proposed sewage treatment unit meets with Standard CAN/BNQ 3680-600.

5.3.1 Tertiary treatment Requirements

Given the proposed density of up to 15 residential lots for the 3.3-hectare site to meet a nitrate increase at the down-gradient property boundary of 10 mg/L treatment of sewage effluent will be required. It was considered that tertiary treatment would be capable of reducing nitrate concentrations in effluent to 19 mg/L which would result in an expected increase in nitrate at the downgradient property boundary of approximately 10 mg/L. It is anticipated that nitrate impacts would be within an acceptable level provided OBC approved tertiary treatment systems are used to pre-treat sewage effluent discharge to subsurface sewage disposal beds.

5.4 Preliminary Leaching Bed Design

Preliminary leaching bed design including the required minimum leaching bed area was evaluated based on the observed shallow soil and ground water conditions at the site. The sewage design flows for the proposed residential dwellings were determined based on values listed within Table 8.2.1.3.A of the Ontario Building Code (OBC) for residential occupancies. The proposed dwellings are anticipated to consist of a four-bedroom residence with a livable area of approximately 300 m² with daily sewage flow rates expected at 3,000 L/day.

Preliminary leaching bed design options were developed for the site based on the following technical considerations:

Native Soil	Silt to Clayey Silt
Unified Soil Classification	M.L.
Estimated Percolation Rate	30 min/cm
Depth to Ground water	Approximately 2.0 m below grade
Type of Sewage System	Absorption trenches
Design Flow	3,000 L/day

While it is noted that surficial deposits of sand to silty sand exist with higher rates of percolation than 30 min/cm expected, the predominant shallow soil across the site was observed to consist of silt to clayey silt. Thickness of surficial sand deposits are limited in areas where sand was encountered. Based on this, the design of leaching beds should be based on percolation rates of the lower permeability silts. The above noted percolation rates are based on observations and testing conducted at the noted borehole locations. Soil conditions may vary in locations proposed for septic systems and the lot specific soil conditions for the final tile bed locations may vary from those reported herein. Contractors should account for potential soil variability in final design.

Based on the above design considerations the following septic leaching bed sizing considerations are provided:

5.4.1 Absorption Trenches

Given the soils observed across the Site it is expected that tile beds can be constructed as an in-ground system. Adequate separation from ground water is expected and the requirement that absorption trenches are to be not less than 900 mm above soil with a percolation time more than 50 minutes will be met.

Where a Class IV leaching bed with treatment system is constructed, the total length of distribution pipe required is determined as follows:

$$L = QT/300$$

Where: L is total length of distribution pipe in metres;

Q is the total daily design sanitary sewage flow (3,000 L/day); and,

T is the design percolation time (30 min/cm).

The total length of distribution pipes required for a Class IV leaching bed with treatment unit given the observed shallow soil conditions at the site is expected at approximately 300 m. Distribution pipe length is not to exceed 30 m in length and spaced a minimum distance of 1.6 m between runs. Given the total length of leaching required for the anticipated design sewage flow rates, the leaching bed is expected to consist of 20 runs of tile 15 m in length covering a total area of approximately 456 m² (15 m by 30.4 m).

5.4.2 Filter Bed

Filter beds are considered a viable option for use for sewage disposal for each proposed residential lot given a sewage flow rate of 3,000 L/day. The base of the filter bed shall extend to a thickness of at least 250 mm over an area meeting the following requirements:

$A=QT/850$

Where: A is the area of contact between the base of the filter media and native soil;

Q is the total daily design sanitary sewage flows (3,000 L/day); and,

T is the lesser of 50 and the percolation rate of the underlying soil (30 min/cm).

The resulting filter bed basal area was calculated at 106 m². The effective area of the surface of the filter medium in each filter bed shall not be more than 50 m² with a loading rate not exceeding 100 L/m² per day where a treatment unit meeting OBC requirements is utilized. Given these requirements the filter bed for each lot would be divided into three separate 36 m² adjacent beds.

5.4.3 Shallow Buried Trench

Consideration has been provided for the requirements necessary for a sewage disposal system consisting of a shallow buried trench. Given that percolations rates are expected at 30 min/cm the length of a shallow buried trench would be required at a minimum length of 60 m. It is expected that shallow buried trenches would consist of two runs of 30 m length distribution pipe with minimum 2 m spacing between runs.

Given the permeability soils present a system consisting of absorption trenches would be suitable and represent the lowest construction cost and following maintenance, albeit with the largest footprint. The above options are all considered feasible given the observed Site conditions, and final design would be based on the lot sizing requirements and cost preference for construction. The above recommendations should be considered preliminary, final design for septic systems must be completed by a licenced septic designer/installer and will be subject to building code approvals with the local municipality.

5.4.4 Design Considerations

The leaching bed for the proposed residential dwelling should be constructed in accordance with the OBC guidelines as follows:

- The surface of the leaching bed shall be shaped to shed water and together with the side slopes of any raised portion, shall be protected against erosion in such a manner as to not inhibit the evaporation and transpiration of waters from the soil of leaching bed fill, and not cause plugging of the distribution pipe.
- A leaching bed shall be designed to be protected from compaction of any stress or pressure that may result in the impairment or destruction of any pipe in the leaching bed or may result in the smearing of the soil or leaching bed fill.

The septic tanks for each proposed residential dwelling should be constructed in accordance to the OBC guidelines as follows:

- Septic tank shall be greater of the minimum capacity of 3,600 L or two times the daily design flow for residential occupancies. For the proposed dwellings, the minimum septic tank volume is considered at 6,000 L.
- The septic tank should be completed such that there is a minimum of two compartments. The first compartment should consist of a minimum volume of 1.3 times the daily sanitary sewage flow at a minimum volume of 3,900 L with the second compartment at a volume of 2,100 L (minimum 50% volume of the first compartment).

It is anticipated that setback requirements for the sewage disposal system can be met. Setback requirements for the septic tank and distribution pipe are further discussed below.

5.5 Leaching Bed Setback Requirements

The following setbacks must be observed when siting septic leaching fields and tanks:

- Septic tank not closer than:
 - 1.5 m to any structure;
 - 3.0 m to the property line;
 - 15 m to surface water body or well.
- Distribution pipe not closer than:
 - 5 m to any structure;
 - 3 m to the property line;
 - 5 m between distribution pipes of leaching beds;
 - 15 m to surface water body or a well with a watertight casing to a depth of at least 6 m;
 - 30 m to any other well.

For the purposes of leaching bed design the nearest private water supply wells were identified for the properties at 817 Byerlay Side Road approximately 300 m south of the Site and for 401 Byerlay Side Road located approximately 140 m north of the Site. Proposed residential lots will be serviced with municipal water supplies. Setbacks from private wells and surface water features will not be required for consideration of leaching bed and septic placement for proposed residential lots.

6.0 CONCLUSIONS AND RECOMMENDATIONS

The following summarizes the results of field investigations for the Site completed as part of this hydrogeologic investigation:

1. A series of seven boreholes were completed across the Site to assess shallow soil and ground water conditions. Soils at the Site consisted of topsoil overlying native deposits of sand and silt, clayey silt, and sand deposits. Boreholes were completed to depths of 5.0 m and 6.6 m below existing grades.
2. Monitoring wells were installed within selected boreholes to allow for the measurement of stabilized ground water conditions across the Site. Shallow ground water is anticipated at depths ranging from 1.6 m to 2.5 m below existing grades. Ground water flow was observed to be directed to the west.
3. Laboratory grain size analysis was completed for representative soil samples obtained from boreholes. The results of soil grain size analysis indicate that shallow soils consist of sand and silt and clayey silt, with percolation rates are expected at 12 min/cm for sand and silt and 30 min/cm for clayey silt soils.
4. A private well survey was completed for properties within a 500 m radius of the Site. It is expected that residential properties along Byerlay Side Road north and south of the site in addition to residential properties east of the site along Highway 3 are serviced with private water supply, primarily consisting of shallow sand points. Well yield and quality were reported by residents as adequate for the required demand.
5. The Site is not located within a special planning policy area including regulated areas with the Long Point Region Conservation Authority, under the Lake Erie Source Water Protection Plan, or through the Norfolk County Official Plan. Urban residential use for the site would be permitted under the Norfolk County Official Plan (Schedule A-1).
6. An infiltration deficit of approximately 3,977 m³ is expected following site development due to an increase in impervious cover at the Site following development.

Based on the above investigation, the following summarizes the conclusions and recommendations of this investigation:

1. It is anticipated that 12,016 m² of runoff from building cover will drain to grassed yards. It is anticipated that following development, the increased impervious cover across the site will result in a infiltration deficit of 3,977 m³. It is expected that through the direction of 33% of runoff from building areas to infiltration that the pre-development infiltration volumes at the Site can be maintained following development.
2. It is expected that the pre-development water balance at the Site can be maintained following development through the implementation of infiltration measures, including rooftop disconnection to overland flow and through implementation of dry swales/infiltration trenches to promote infiltration of runoff from building areas.
3. Nitrate impact assessment for a conventional Class IV sewage system was calculated at 21.0 mg/L at the down-gradient property boundary for the proposed maximum density of 15 residential lots. Given the proposed density of residential lots the use of tertiary treatment systems will be required for the severed residential lots. It is anticipated that nitrate impacts would be within an acceptable level provided OBC approved tertiary treatment systems listed under Standard CAN/BNQ 3680-600 are used to pre-treat sewage effluent discharge to subsurface sewage disposal beds.
4. Sewage flows for the proposed development were determined based on daily design sewage flows for proposed uses found within the Ontario Building Code. It was assumed that residential dwellings will consist of four bedrooms with sewage flows of 3,000 L/day.
5. It is anticipated that an absorption trench system with treatment will consist of a minimum distribution pipe length of 300 m. It is anticipated that the leaching bed would consist of 20 runs of 15 m pipe for a leaching bed area of approximately 456 m² (30.4 m by 15 m).
6. A filter bed would require a basal area of 106 m² divided into three separate 36 m² adjacent beds.
7. The length of a shallow buried trench would be required at a minimum length of 60 m. It is expected that shallow buried trenches would consist of two runs of 30 m length distribution pipe with minimum 2 m spacing between runs.

8. Given the permeability soils present a system consisting of absorption trenches would be suitable and represent the lowest construction cost and following maintenance, albeit with the largest footprint. The above options are all considered feasible given the observed Site conditions.
9. Final septic system design would be based on the lot sizing requirements and cost preference for construction. The above recommendations should be considered preliminary, final design for septic systems must be completed by a licenced septic installer and will be subject to building code approvals with the local municipality.
10. The septic tank volume would be required at twice the daily design flow at a capacity of 6,000 L. The septic tank is recommended to consist of two compartments with the first compartment at 1.3 times the daily design flow at a volume of 3,900 L with the second compartment at a volume of 2,100 L.

We trust this report meets with your requirements. Should you have any questions regarding the information presented, please do not hesitate to contact our office.

Yours truly,

Terraprobe Inc.



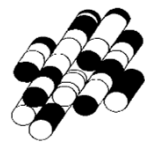
Paul L. Raepple, P.Geo.
Project Hydrogeologist



Shama M. Qureshi, P.Eng., P.Geo., QP_{RA-ESA}
Principal

FIGURES

Terraprobe Inc.



10 cm

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3

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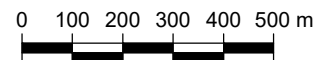
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NOTES:

1-REFERENCE: © OpenStreetMap contributors (2022).

2-Drawing scale may be distorted due to file conversion and/or copying.
Measurements taken from the drawing must be verified in the field.

SCALE 1:15,000

Project

Residential Property Development

17 Highway Crescent, Courtland, Ontario

Title

LOCATION PLAN

440, Hardy Road, Unit 3
Brantford (Ontario) N3T 5L8
Telephone : 519.720.0078
Fax : 519.720.0976Prepared **E.Ciochon**Drawn **E.Ciochon**Checked **T.Staples**Discipline **GEOTECHNICAL**Scale **1 : 15000**Date **2022-02-11**

Project manager

T.Staples

Sequence no.

01 of 02

M. dept.

04

Project

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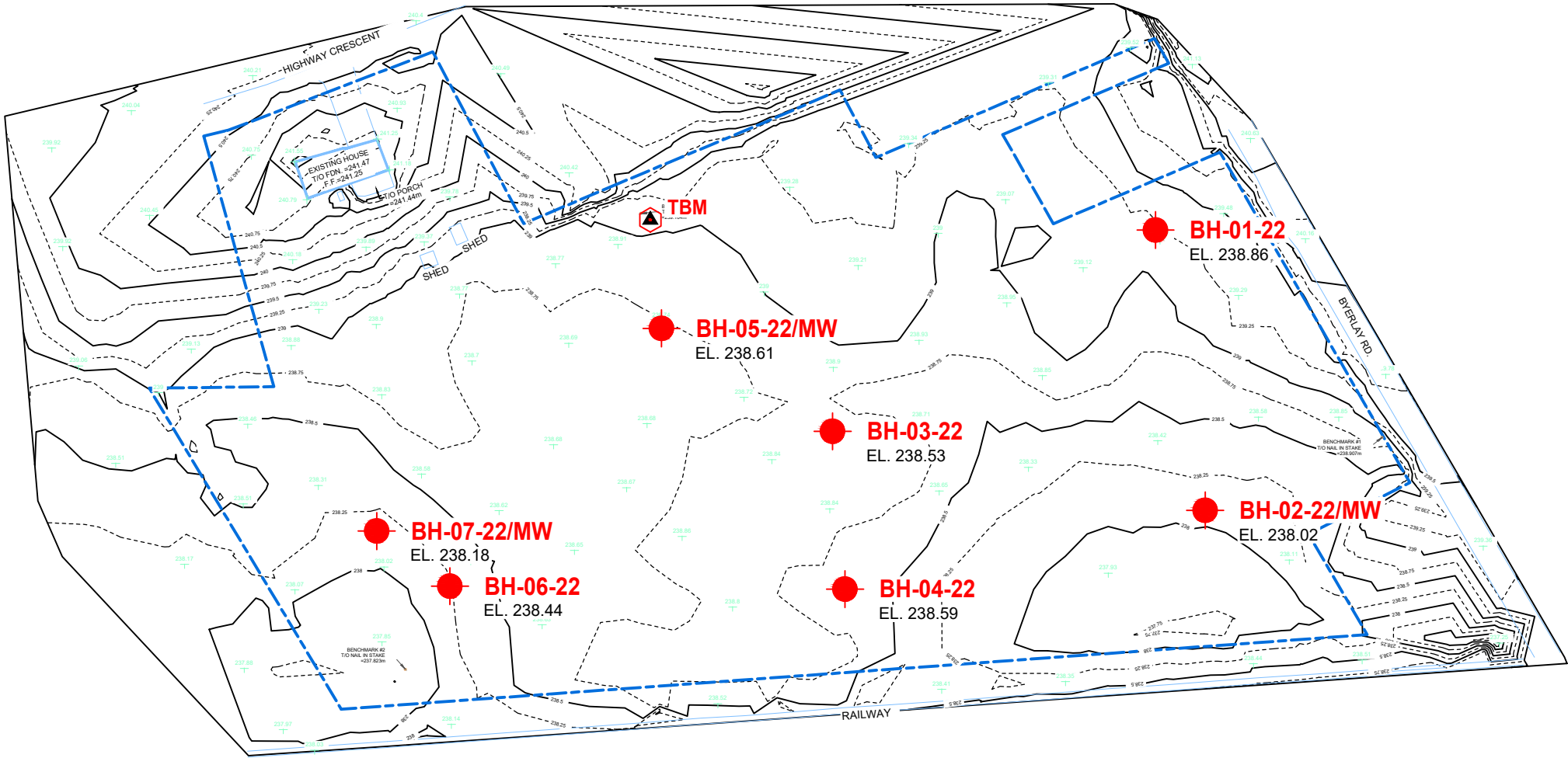
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LEGEND:

- APPROXIMATE SITE BOUNDARY LINE
- BOREHOLE LOCATION
- EL. 238.02 GROUND SURFACE ELEVATION (m)
- ▲ TBM TEMPORARY BENCHMARK



NOTES:

- 1-REFERENCE: Courtland Subdivision Grading Plan - client drawing.
- 2-TEMPORARY BENCHMARK: Top of Steel nail set up on stake, Elevation 239.10 m (geodetic).
- 3-Drawing scale may be distorted due to file conversion and/or copying. Measurements taken from the drawing must be verified in the field.
- 4-MW refers to monitoring well installed at borehole location.

Project

Residential Property Development

17 Highway Crescent, Courtland, Ontario

Title

BOREHOLE LOCATION PLAN



440, Hardy Road, Unit 3
Brantford (Ontario) N3T 5L8
Telephone : 519.720.0078
Fax : 519.720.0976

Prepared **E.Ciochon**

Drawn **E.Ciochon**

Checked **T.Staples**

Project manager

T.Staples

Discipline **GEOTECHNICAL**

Scale **1:1500**

Date **2022-02-11**

Sequence no.

02 of 02

M. dept.

04

Project

02200028.100

Disc.

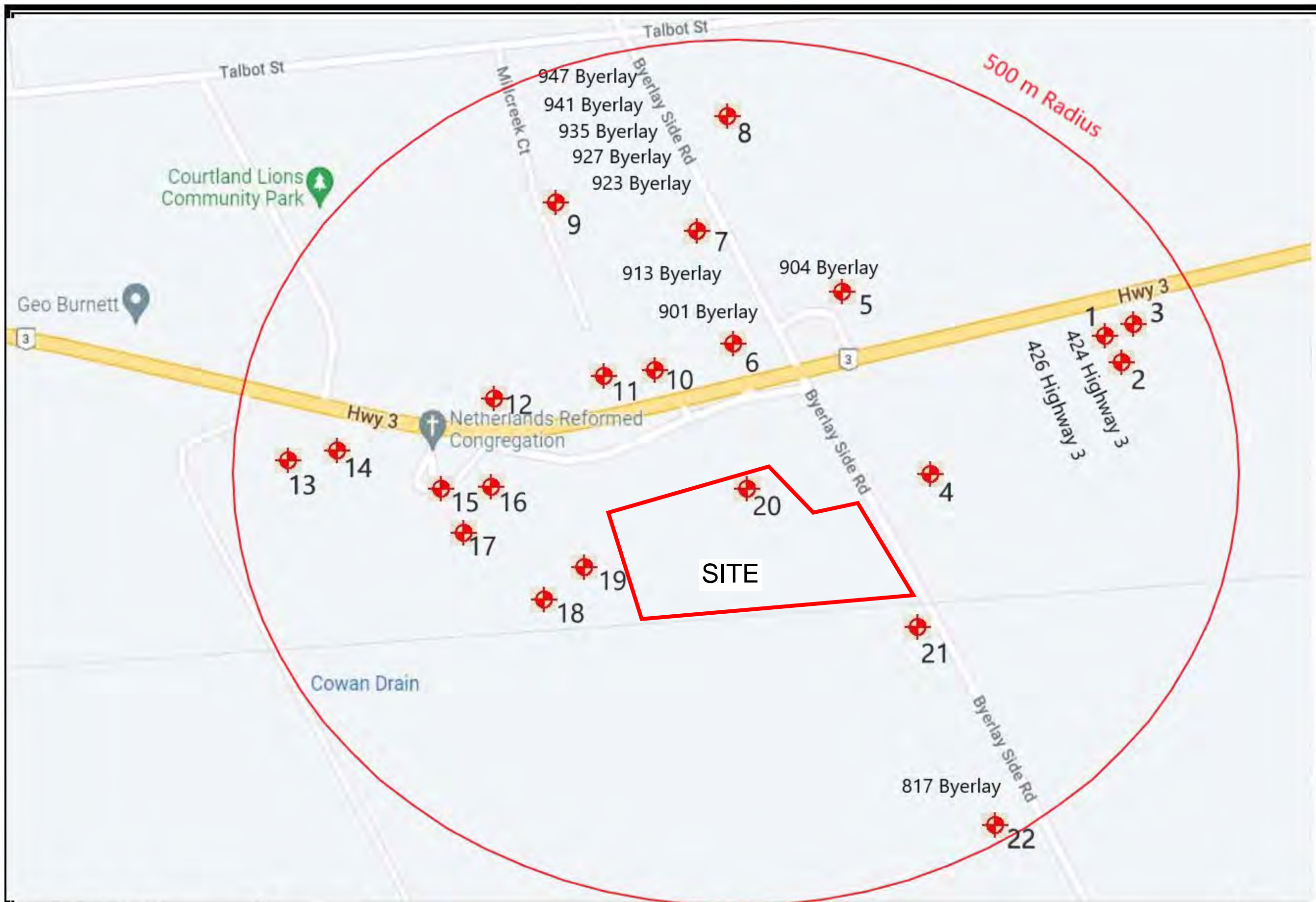
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Dwg no.

002

Rev.

00



LEGEND	
	Well Location

<p>Terraprobe 903 Barton Street - Unit 22, Stoney Creek, Ontario, L8E 5R7 Tel: (905) 643-7660, Fax: (905) 643-7559</p>	Title: Well Record and Survey Plan
	File No. 1-22-0249-46

FIGURE: <div style="font-size: 2em; text-align: center;">3</div>
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TABLES

Terraprobe Inc.

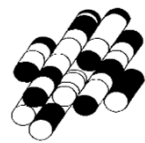


Table 1: Summary of MECP Well Records
Proposed Residential Development
17 Highway Crescent
Courtland, Ontario

Map ID	Well ID	Easting	Northing	Well Use	Year Installed	Water Level (m)	Well Yield (L/min)	Stratigraphy (Depth in Metres)
1	4400860	531 724	4 743 498	Domestic	1962	7.6	22.7	Topsoil (1) Fill (2.4) Clay (9.7) Sand (11.6)
2	4400861	531 714	4 743 488	Domestic	1964	6.7	22.7	Topsoil (1) Fill (2.4) Clay (9.7) Sand (15.2)
3	4400859	531 712	4 743 493	Domestic	1961	-	22.7	Clay (6.7) Sand (10.4)
4	4400862	531 594	4 743 353	Domestic	1965	2.1	18.9	Sand (3.6) Sand/Clay (8.5) Sand (10.7)
5	7430091	531 448	4 743 532	Domestic	2019	-	37.8	Topsoil (1) Sand (9.4)
6	4400856	531 341	4 743 483	Irrigation	1962	6.1	37.8	Sand (15.2)
7	4403627	531 314	4 743 603	Domestic	1977	1.8	56.7	Topsoil (1) Sand (7.6)
8	4408407	531 303	4 743 760	Domestic	2006	3.0	56.7	Topsoil (1) Sand (2.4) Clay (3.0) Sand (9.4)
9	4408551	531 165	4 743 648	Dewatering	2006	-	75.6	Sand (6.4)
10	4403286	531 233	4 743 418	Domestic	1974	-	56.7	Sand (1.5) Gravel (1.8) Sand (6.7)
11	4400857	531 215	4 743 425	Domestic	1962	4.6	18.9	Sand (2.7) Clay (7.0) Sand (12.2)
12	4400855	531 093	4 743 422	Domestic	1960	3.6	15.1	Sand (8.5)
13	4400854	530 963	4 743 350	Domestic	1967	3.6	26.5	Sand/Clay (3.6) Sand (9.1)
14	4400847	530 998	4 743 341	Domestic	1960	3.6	15.1	Topsoil (1) Clay (6.7) Sand (13.4)
15	4403360	531 106	4 743 329	Domestic	1974	6.1	34.0	Sand (3.0) Clay (9.1) Sand (11.6)
16	4403361	531 141	4 743 336	Domestic	1974	6.1	22.7	Sand (3.0) Clay (9.1) Sand (11.0)
17	4402430	531 123	4 743 314	Domestic	1969	4.0	37.8	Sand (3.6) Gravel (11.6)
18	4402960	531 189	4 743 273	Institution	1972	6.4	56.7	Topsoil (1) Sand (11.0)
19	4400858	531 214	4 743 293	Domestic	1966	4.3	15.1	Sand (2.1) Gravel (5.2) Clay (6.7) Sand (11.3)
20	4403192	531 368	4 743 351	Domestic	1973	4.3	37.8	Previously Dug (1.5) Clay (6.4) Sand (9.8)
21	4403041	531 513	4 743 242	Domestic	1973	3.0	37.8	Sand (10.1)
22	7290992	531 663	4 742 963	Domestic	2017	2.1	15.1	Topsoil (1) Sand (4.0) Clay (12.2)

TABLE 2: DETAILED WATER BALANCE - 17 HIGHWAY CRESCENT, COURTLAND, ONTARIO

1. Climate Information*

Precipitation	948 mm/a
Evapotranspiration	608 mm/a
Water Surplus	340 mm/a

*Data from lake simcoe region conservation authority- Page 9 East holland subwatershed Pasture and Shurubs- Silty loam

2. Infiltration Rates

Table 2 Approach - Infiltration Factors

Flat and Rolling Land	0.12
Clay and Loam and Open Sandy Loam	0.32
Cover-Cultivated	0.1
TOTAL	0.54

Infiltration (0.54 x 340)	184 mm/a
Run-Off (340 - 184)	156 mm/a

Table 2 approach from MOEE Hydrogeological Technical Information Requirements for Land Development Applications (1995)

3. Property Statistics

Single Detached Residential	2.82 ha	28,167 m ²
Roads	0.48 ha	4,760 m ²
TOTAL	3.29 ha	32,927 m ²

3. Lot Coverage

Single Detached Residential Lots		
Roof Coverage (50% of 28,167 m ²)	1.41 ha	14,084 m ²
Driveway Coverage (10% of 28,167 m ²)	0.28 ha	2,817 m ²
Grassed Yard (45% of 28,167 m ²)	1.13 ha	11,267 m ²
TOTAL	2.82 ha	28,167 m ²

**TABLE 2: DETAILED WATER BALANCE - 17 HIGHWAY CRESCENT,
COURTLAND, ONTARIO**

4. Annual Pre-Development Water Balance

Land Use	Area (m ²)	Precipitation (m ³)	Evapotranspiration (m ³)	Infiltration (m ³)	Run-Off (m ³)
Undeveloped	32,927	31,215	20,020	6,045	5,150

5. Annual Post-Development Water Balance (No Mitigation)

Land Use	Area (m ²)	Precipitation (m ³)	Evapotranspiration (m ³)	Infiltration (m ³)	Run-Off (m ³)
Rooftop Coverage	14,084	13,351	1,335	nil	12,016
Impervious Cover (Roads, Driveways)	7,577	7,183	718	nil	6,464
Landscaped	11,267	10,681	6,850	2,069	1,762
TOTAL	32,927	31,215	8,904	2,069	20,243

Evaporation was considered at 10% of precipitation falling on impervious areas (buildings and paved surfaces)

6. Comparison of Pre-Development and Post-Development

	Precipitation (m ³)	Evapotranspiration (m ³)	Infiltration (m ³)	Run-Off (m ³)
Pre-Development	31,215	20,020	6,045	5,150
Post-Development	31,215	8,904	2,069	20,243

7. Estimated Post-Development Infiltration Deficit

Volume of post-development infiltration	2,069 m ³
Volume of pre-development Infiltration	6,045 m ³
Deficit from pre to post-development infiltration	3,977 m ³

**TABLE 2: DETAILED WATER BALANCE - 17 HIGHWAY CRESCENT,
COURTLAND, ONTARIO**

Evapotranspiration Calculations*

$$\text{PET (cm/month)} = 1.6 (L/12) (10T_a/I)^a$$

L average day length (Proton 9.98 km from Dundalk, Ontario)*

T_a average daily temperature (Proton Weather Station)*

I $\Sigma (T_a/5)^{1.5}$

a $(6.75 \times 10^{-7}) I^3 - (7.71 \times 10^{-5}) I^2 + (1.792 \times 10^{-2}) I + 0.49$

	L (hrs)	T _a (°C)	(T _a /5) ^{1.5}	PET
January	9.25	-5.6		0
February	10.44	-3.4		0
March	11.89	0.3	0.0	0.0
April	13.45	6.2	1.4	3.0
May	14.77	12.7	4.0	7.3
June	15.49	19.2	7.5	12.2
July	15.18	21.7	9.0	13.6
August	14.03	19.8	7.9	11.4
September	12.53	15.6	5.5	7.8
October	11.0	9.8	2.7	4.1
November	9.64	4.1	0.7	1.4
December	8.9	-5		0

$$I = 38.88767$$

$$a = 1.109968$$

$$\text{PET} = 608.0 \text{ mm/a}$$

*Potential Evapotranspiration follows the Thornthwaite Equation as published in:

Thornthwaite, C. W. (1948). "An Approach Toward a Rational Classification of Climate". Geographical Review 38 (1): 55-94.

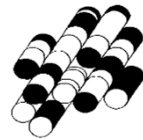
*Average day length data for Woodstock obtained online from timeanddate.com

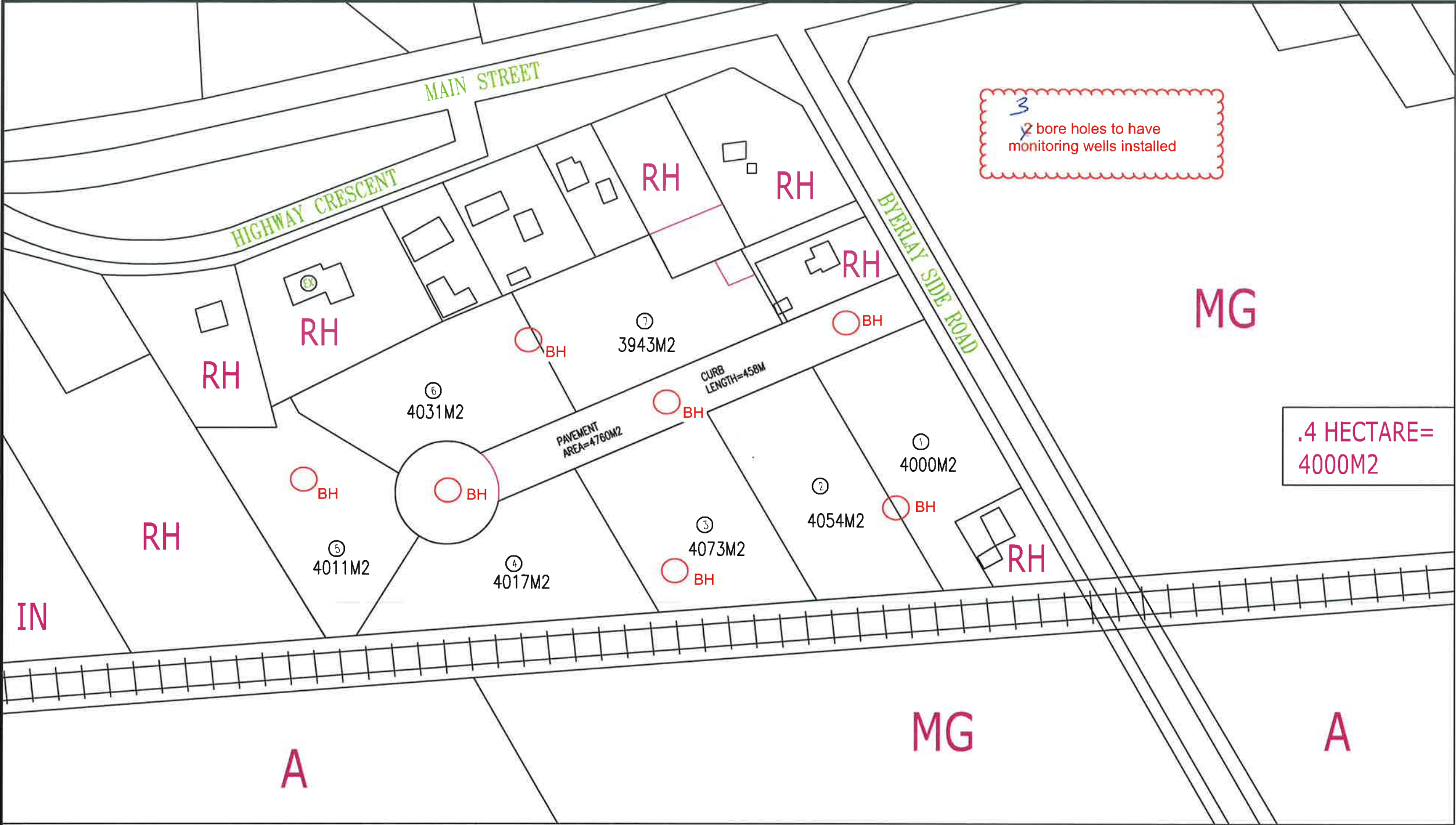
*Average daily temperature obtained online from Environment Canada for Delhi (monthly averages from 1976-2006)

Site Plan

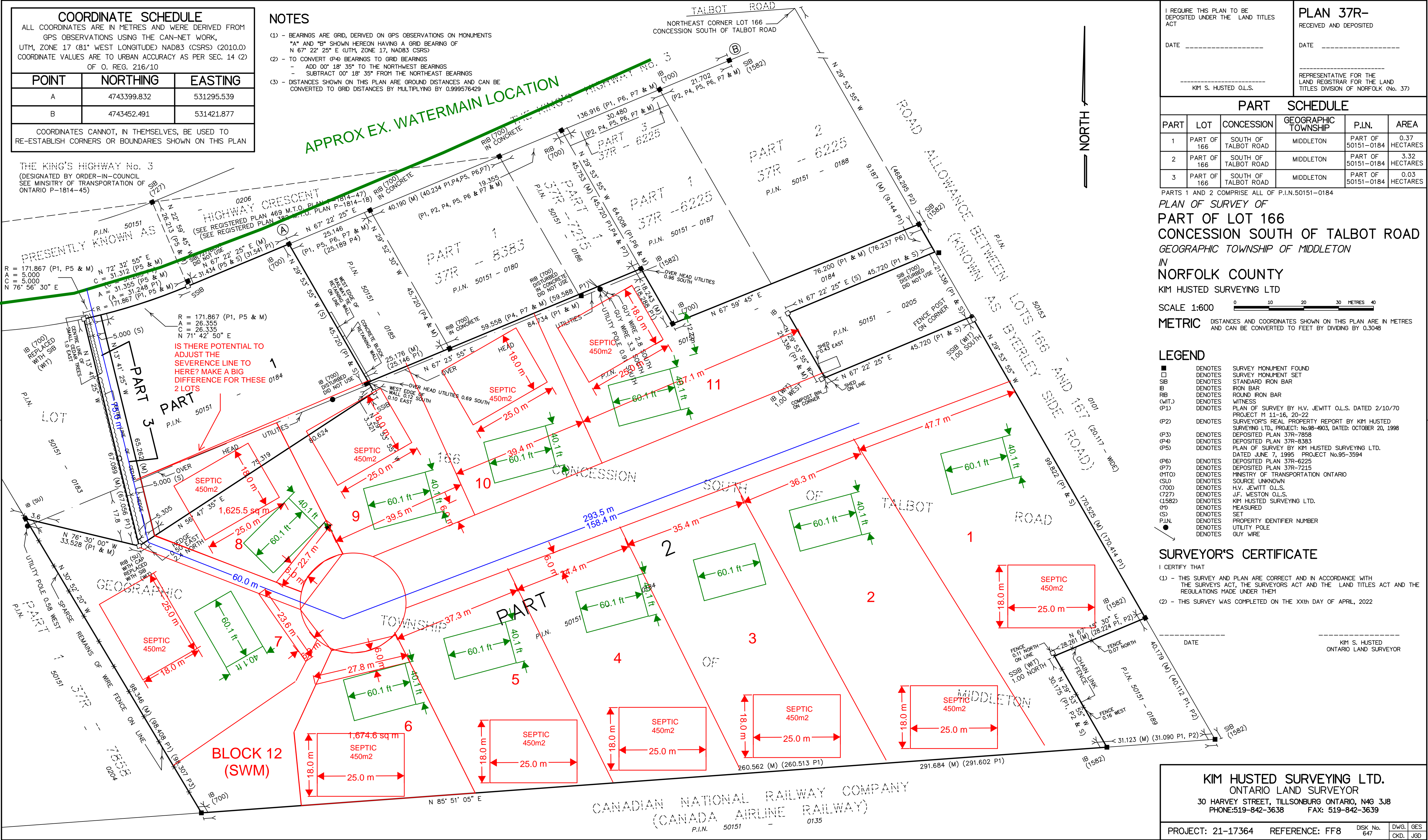
APPENDIX A

Terraprobe Inc.





<p>IT IS THE CONTRACTOR'S RESPONSIBILITY TO:</p> <ul style="list-style-type: none">-USE FINISHED DIMENSIONS IN PREFERENCE TO BOLDING-VERIFY AND CHECK ALL DIMENSIONS PRIOR TO AND DURING CONSTRUCTION-DETERMINE LOCATIONS OF EXISTING SERVICES <p>ANY CHANGES, DISCREPANCIES OR SUBSTITUTIONS SHALL BE REPORTED TO AND REVIEWED BY THE ARCHITECT BEFORE PROCEEDING</p>		<p>MUNICIPALITY ADDRESS:</p> <p>17 HIGHWAY CRESCANT COURTLAND, ON</p>		<p>PROJECT NAME:</p> <p>COURTLAND RESIDENTIAL</p>																	
<table><tr><td>No.</td><td>REVISIONS</td><td>DATE</td><td>BY</td></tr><tr><td> </td><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td><td> </td></tr></table>		No.	REVISIONS	DATE	BY													<p>NORTH</p>		<p>PROJECT NORTH</p>	
No.	REVISIONS	DATE	BY																		
<p>PROPOSAL: <input type="checkbox"/> REVIEW: <input type="checkbox"/> PERMIT: <input type="checkbox"/> TENDER: <input type="checkbox"/></p>		<p>PROJECT No:</p> <p>P21-364</p>		<p>DRAWING No:</p> <p>DP-1</p>																	



COORDINATE SCHEDULE		
ALL COORDINATES ARE IN METRES AND WERE DERIVED FROM GPS OBSERVATIONS USING THE CAN-NET WORK, UTM, ZONE 17 (81° WEST LONGITUDE) NAD83 (CSRS) (2010.0) COORDINATE VALUES ARE TO URBAN ACCURACY AS PER SEC. 14 (2) OF O. REG. 216/10		
POINT	NORTHING	EASTING
A	4743399.832	531295.539
B	4743452.491	531421.877
COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN		

THE KING'S HIGHWAY No. 3
(DESIGNATED BY ORDER-IN-COUNCIL
SEE MINISTRY OF TRANSPORTATION OF
ONTARIO P-1814-45)

- NOTES
- BEARINGS ARE GRID, DERIVED ON GPS OBSERVATIONS ON MONUMENTS
"A" AND "B" SHOWN HEREON HAVING A GRID BEARING OF
N 67° 22' 25" E (UTM, ZONE 17, NAD83 CSRS)
 - TO CONVERT (P4) BEARINGS TO GRID BEARINGS
- ADD 00° 18' 35" TO THE NORTHWEST BEARINGS
- SUBTRACT 00° 18' 35" FROM THE NORTHEAST BEARINGS
 - DISTANCES SHOWN ON THIS PLAN ARE GROUND DISTANCES AND CAN BE
CONVERTED TO GRID DISTANCES BY MULTIPLYING BY 0.999576429

APPROX EX. WATERMAIN LOCATION

PLAN 37R-	
RECEIVED AND DEPOSITED	
DATE	DATE
KIM S. HUSTED O.L.S.	
REPRESENTATIVE FOR THE LAND REGISTRAR FOR THE LAND TITLES DIVISION OF NORFOLK (No. 37)	

PART SCHEDULE					
PART	LOT	CONCESSION	GEOGRAPHIC TOWNSHIP	P.I.N.	AREA
1	PART OF 166	SOUTH OF TALBOT ROAD	MIDDLETON	PART OF 50151-0184	0.37 HECTARES
2	PART OF 166	SOUTH OF TALBOT ROAD	MIDDLETON	PART OF 50151-0184	3.32 HECTARES
3	PART OF 166	SOUTH OF TALBOT ROAD	MIDDLETON	PART OF 50151-0184	0.03 HECTARES

PARTS 1 AND 2 COMPRISE ALL OF P.I.N.50151-0184
PLAN OF SURVEY OF
PART OF LOT 166
CONCESSION SOUTH OF TALBOT ROAD
GEOGRAPHIC TOWNSHIP OF MIDDLETON
IN
NORFOLK COUNTY
KIM HUSTED SURVEYING LTD

SCALE 1:600
METRIC DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES
AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

- LEGEND
- DENOTES SURVEY MONUMENT FOUND
 - DENOTES SURVEY MONUMENT SET
 - SIB DENOTES STANDARD IRON BAR
 - IB DENOTES IRON BAR
 - RIB DENOTES ROUND IRON BAR
 - (WIT.) DENOTES WITNESS
 - (P1) DENOTES PLAN OF SURVEY BY H.V. JEWITT O.L.S. DATED 2/10/70 PROJECT M 11-16, 20-22
 - (P2) DENOTES SURVEYOR'S REAL PROPERTY REPORT BY KIM HUSTED SURVEYING LTD., PROJECT: No.98-4903, DATED: OCTOBER 20, 1998
 - (P3) DENOTES DEPOSITED PLAN 37R-7858
 - (P4) DENOTES DEPOSITED PLAN 37R-8383
 - (P5) DENOTES PLAN OF SURVEY BY KIM HUSTED SURVEYING LTD. DATED JUNE 7, 1995 PROJECT No.95-3594
 - (P6) DENOTES DEPOSITED PLAN 37R-6225
 - (P7) DENOTES DEPOSITED PLAN 37R-7215
 - (MTO) DENOTES MINISTRY OF TRANSPORTATION ONTARIO
 - (SU) DENOTES SOURCE UNKNOWN
 - (700) DENOTES H.V. JEWITT O.L.S.
 - (727) DENOTES J.F. WESTON O.L.S.
 - (1582) DENOTES KIM HUSTED SURVEYING LTD.
 - (M) DENOTES MEASURED
 - (S) DENOTES SET
 - P.I.N. DENOTES PROPERTY IDENTIFIER NUMBER
 - DENOTES UTILITY POLE
 - DENOTES GUY WIRE

SURVEYOR'S CERTIFICATE

I CERTIFY THAT

- THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM
- THIS SURVEY WAS COMPLETED ON THE XXth DAY OF APRIL, 2022

DATE

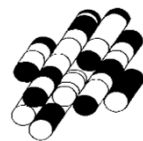
KIM S. HUSTED
ONTARIO LAND SURVEYOR

KIM HUSTED SURVEYING LTD. ONTARIO LAND SURVEYOR 30 HARVEY STREET, TILLSONBURG ONTARIO, N4G 3J8 PHONE:519-842-3638 FAX: 519-842-3639			
PROJECT: 21-17364	REFERENCE: FF8	DISK No. 647	DWG. GES CKD. JGD

Borehole Logs and Grain Size Analysis

APPENDIX B

Terraprobe Inc.



LOG OF BOREHOLE No. BH-01-22

Englobe

Project No. 02200028.100

DRAWING No. 1

Project: Residential Property Development

Sheet No. 1 of 1

Location: 17 Highway Crescent, Courtland, ON

Date Drilled: 2022-2-8

Drill Type: Hollow Stem Auger

Datum: Top of nail set up in stake, El.239.10 m

Split Spoon Sample



Auger Sample



SPT (N) Value



Dynamic Cone Test



Shelby Tube



Shear Strength by



Vane Test

Natural Moisture Content



Atterberg Limits



Undrained Triaxial at



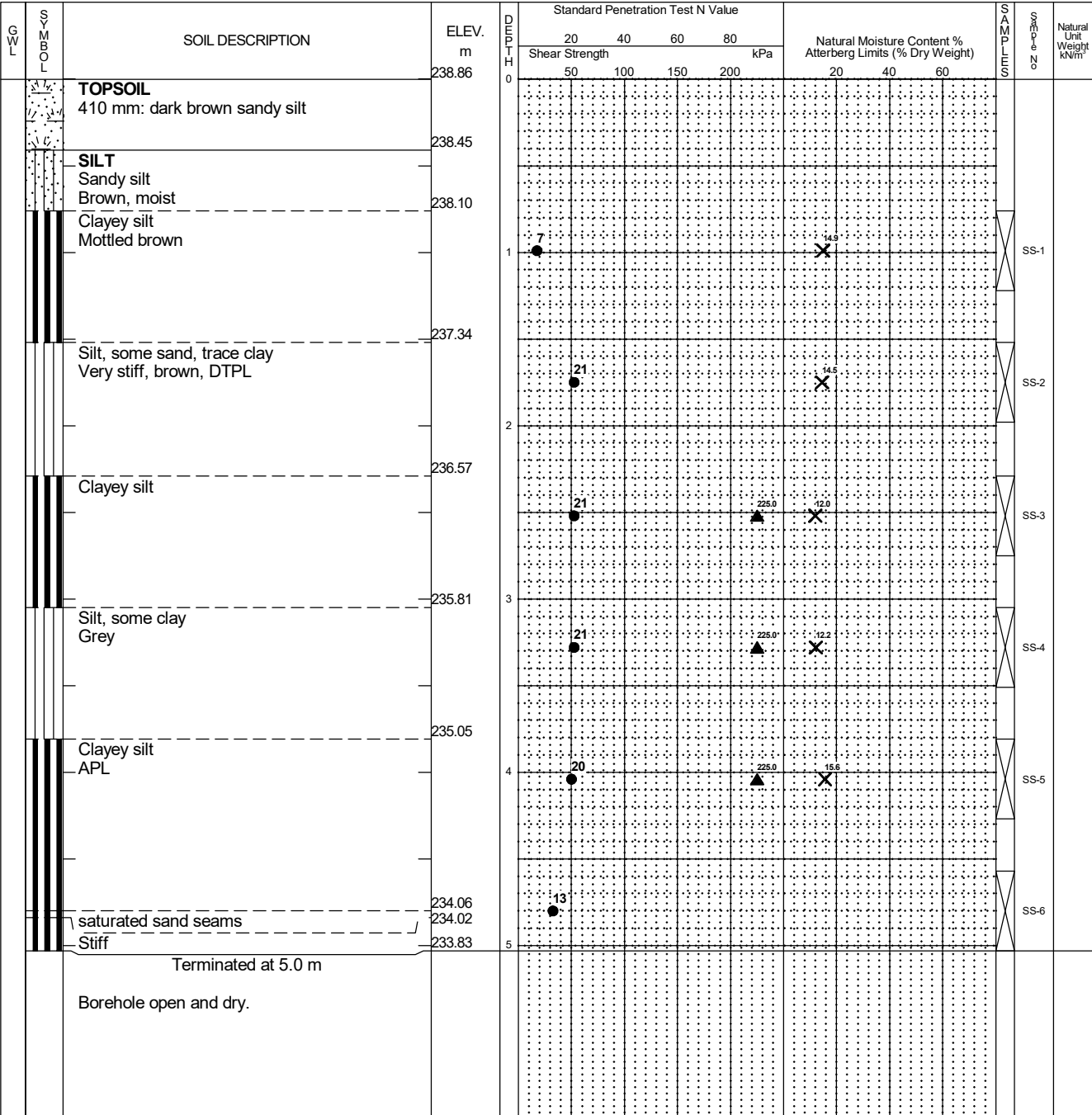
% Strain at Failure



Shear Strength by



Penetrometer Test



Time	Water Level (m)	Depth to Cave (m)

CLASSIFICATION LOG 02200028.000.GPJ LOG A GWGL02.GDT 22-3-14

LOG OF BOREHOLE No. BH-02-22

Englobe

Project No. 02200028.100

DRAWING No. 2

Project: Residential Property Development

Sheet No. 1 of 1

Location: 17 Highway Crescent, Courtland, ON

Date Drilled: 2022-2-8

Drill Type: Hollow Stem Auger

Datum: Top of nail set up in stake, El.239.10 m

Split Spoon Sample



Auger Sample



SPT (N) Value



Dynamic Cone Test



Shelby Tube



Shear Strength by



Vane Test

Natural Moisture Content



Atterberg Limits



Undrained Triaxial at



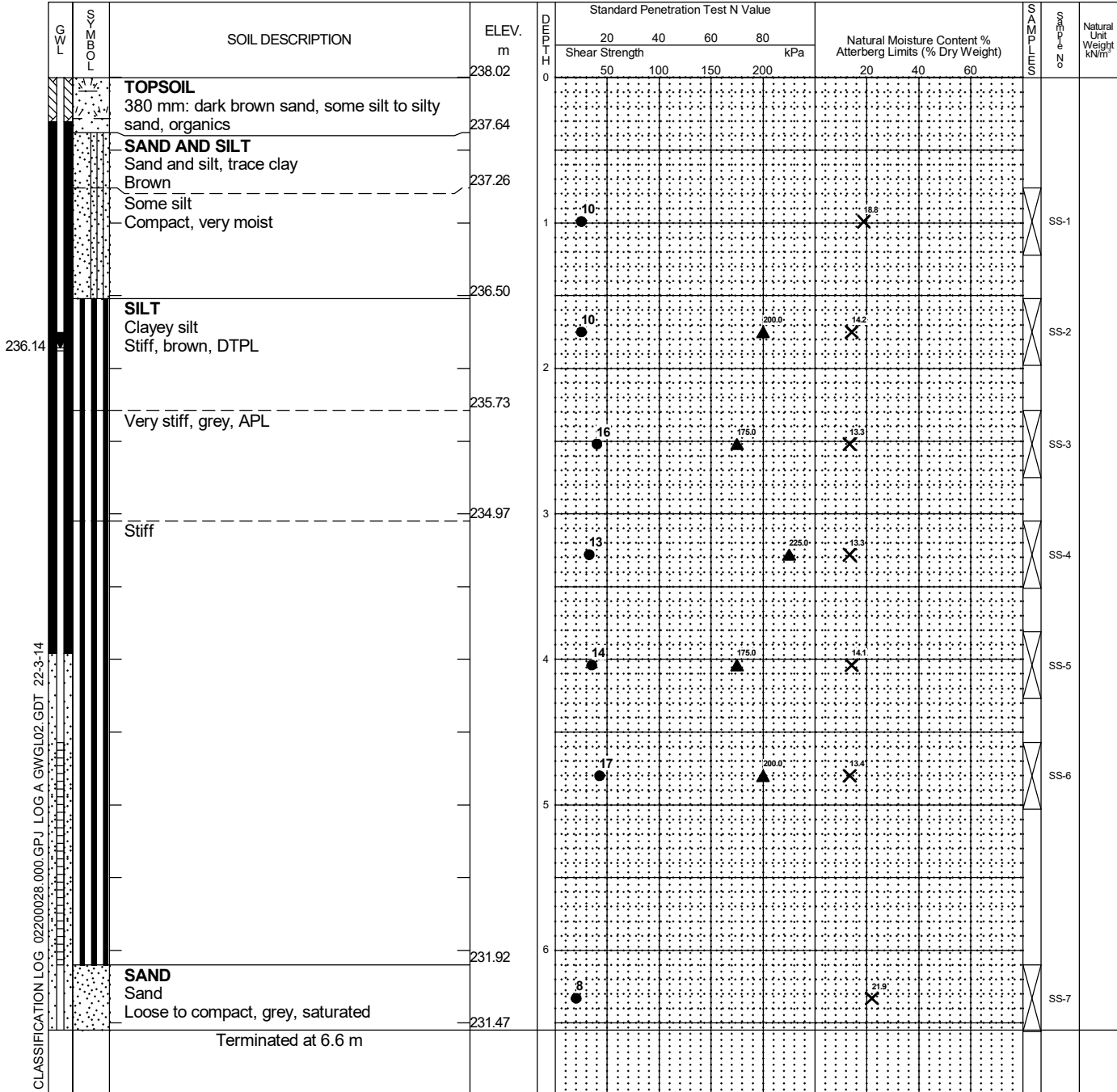
% Strain at Failure



Shear Strength by



Penetrometer Test



Time	Water Level (m)	Depth to Cave (m)
March 2, 2022	1.62 m	

LOG OF BOREHOLE No. BH-03-22

Englobe

Project No. 02200028.100

DRAWING No. 3

Project: Residential Property Development

Sheet No. 1 of 1

Location: 17 Highway Crescent, Courtland, ON

Date Drilled: 2022-2-9

Drill Type: Hollow Stem Auger

Datum: Top of nail set up in stake, El.239.10 m

Split Spoon Sample



Auger Sample



SPT (N) Value



Dynamic Cone Test



Shelby Tube



Shear Strength by



Vane Test

Natural Moisture Content



Atterberg Limits



Undrained Triaxial at



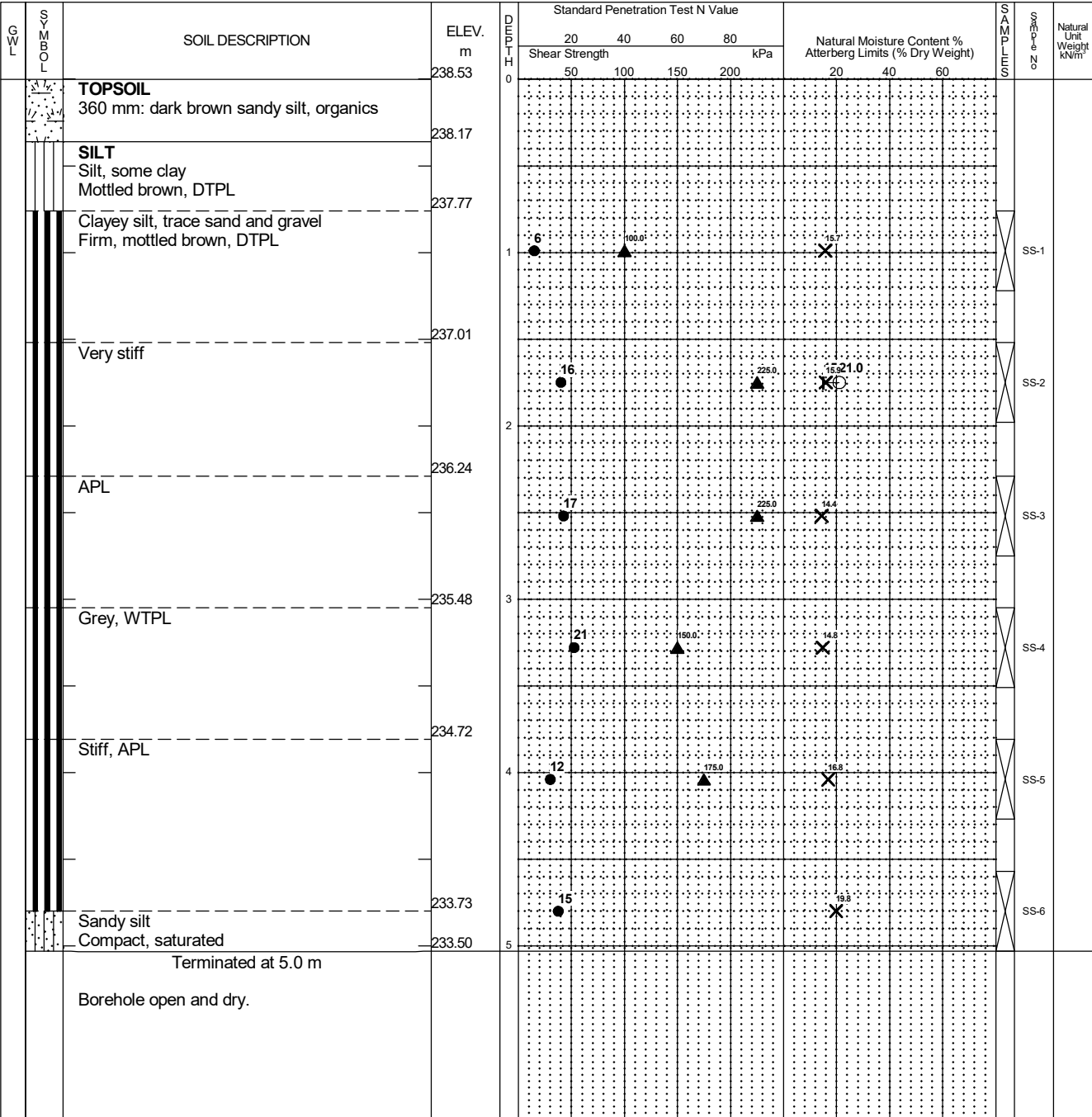
% Strain at Failure



Shear Strength by



Penetrometer Test



LOG OF BOREHOLE No. BH-04-22

Englobe

Project No. 02200028.100

DRAWING No. 4

Project: Residential Property Development

Sheet No. 1 of 1

Location: 17 Highway Crescent, Courtland, ON

Date Drilled: 2022-2-8

Drill Type: Hollow Stem Auger

Datum: Top of nail set up in stake, El.239.10 m

Split Spoon Sample



Auger Sample



SPT (N) Value



Dynamic Cone Test



Shelby Tube



Shear Strength by



Vane Test

Natural Moisture Content



Atterberg Limits



Undrained Triaxial at



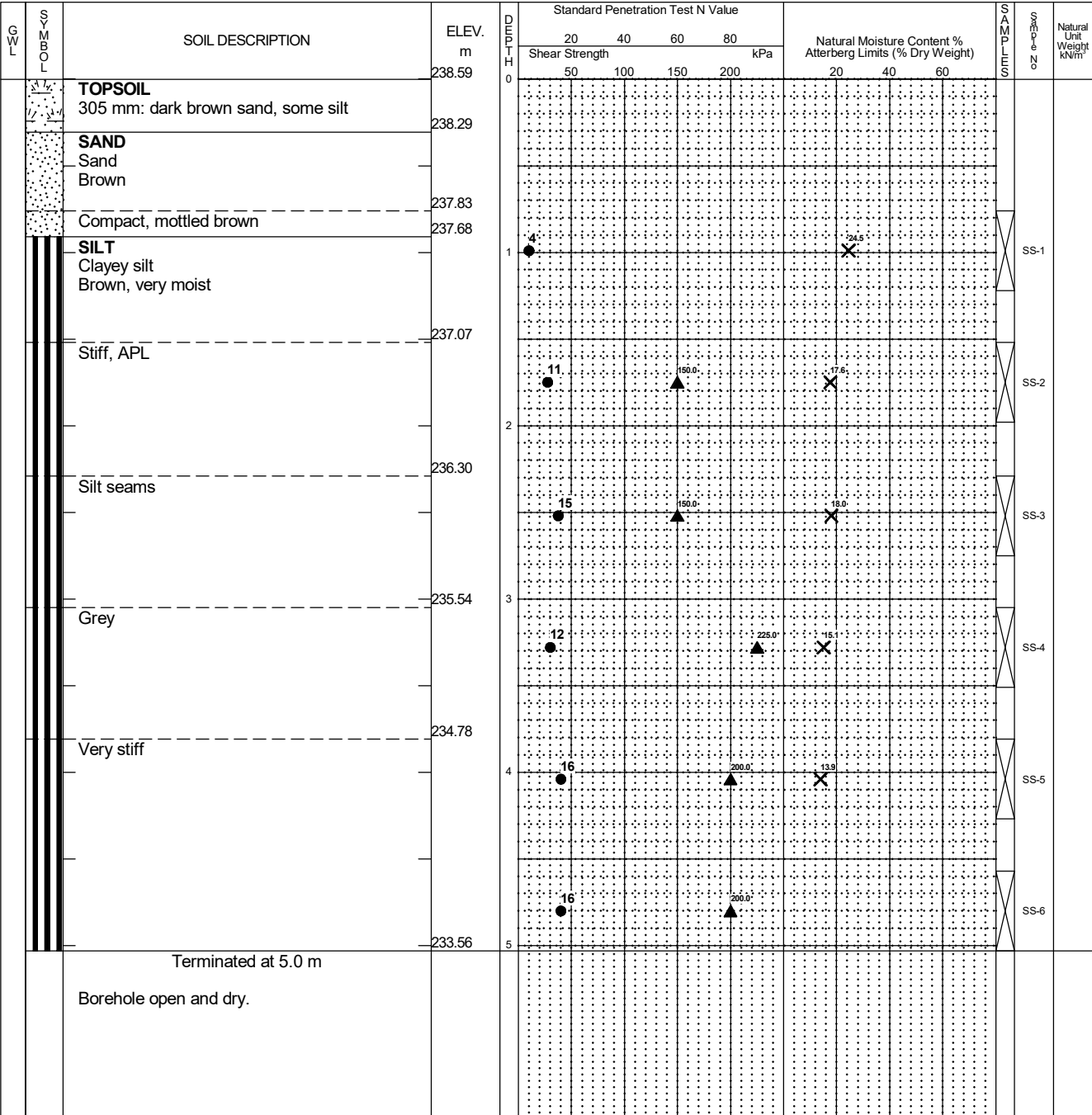
% Strain at Failure



Shear Strength by



Penetrometer Test



Time	Water Level (m)	Depth to Cave (m)

LOG OF BOREHOLE No. BH-05-22

Englobe

Project No. 02200028.100

DRAWING No. 5

Project: Residential Property Development

Sheet No. 1 of 1

Location: 17 Highway Crescent, Courtland, ON

Date Drilled: 2022-2-9

Drill Type: Hollow Stem Auger

Datum: Top of nail set up in stake, El.239.10 m

Split Spoon Sample



Auger Sample



SPT (N) Value



Dynamic Cone Test



Shelby Tube



Shear Strength by



Vane Test

Natural Moisture Content



Atterberg Limits



Undrained Triaxial at



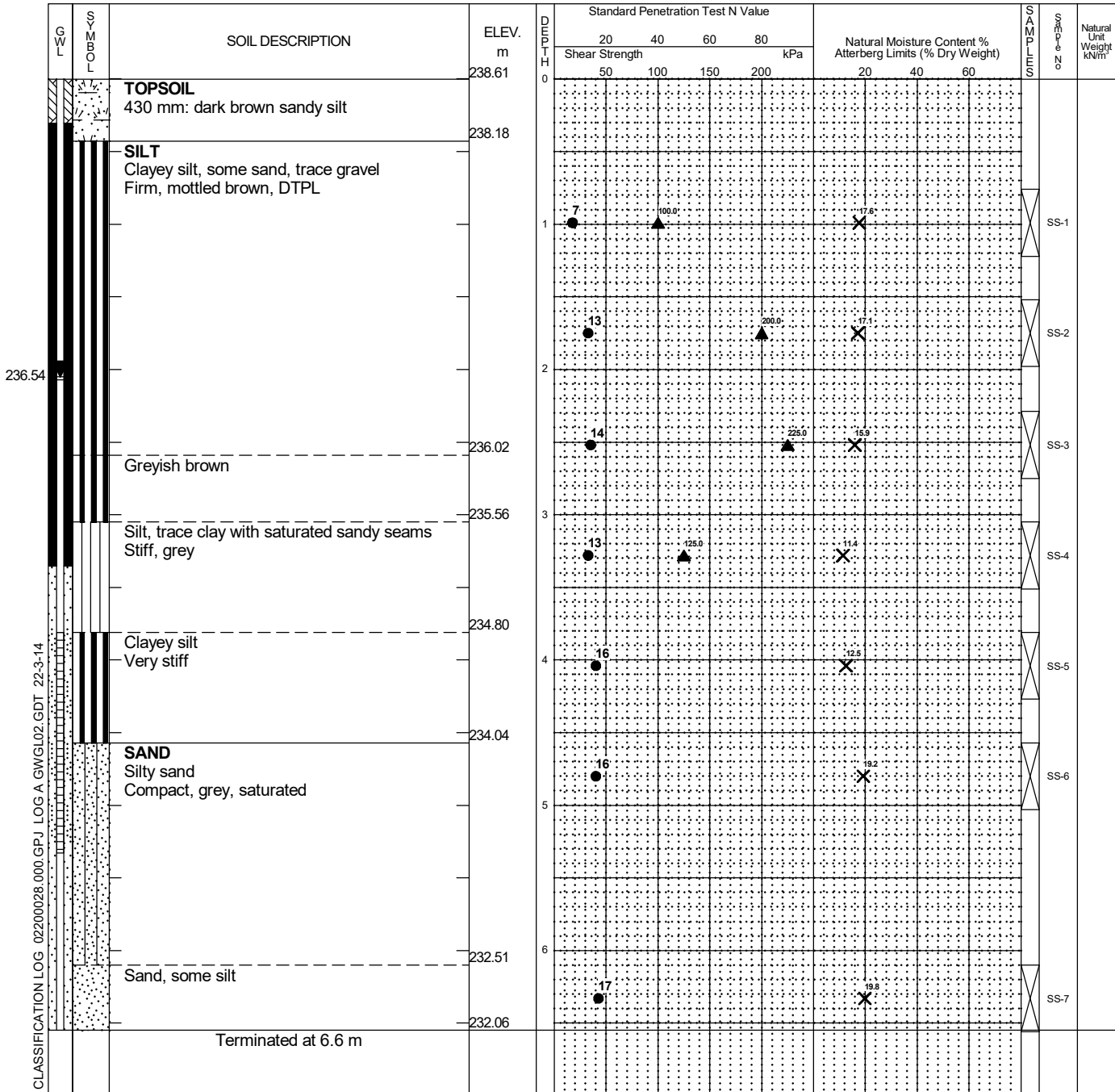
% Strain at Failure



Shear Strength by



Penetrometer Test



Time	Water Level (m)	Depth to Cave (m)
March 2, 2022	2.33 m	

LOG OF BOREHOLE No. BH-06-22

Englobe

Project No. 02200028.100

DRAWING No. 6

Project: Residential Property Development

Sheet No. 1 of 1

Location: 17 Highway Crescent, Courtland, ON

Date Drilled: 2022-2-9

Drill Type: Hollow Stem Auger

Datum: Top of nail set up in stake, El.239.10 m

Split Spoon Sample



Auger Sample



SPT (N) Value



Dynamic Cone Test



Shelby Tube



Shear Strength by



Vane Test

Natural Moisture Content



Atterberg Limits



Undrained Triaxial at



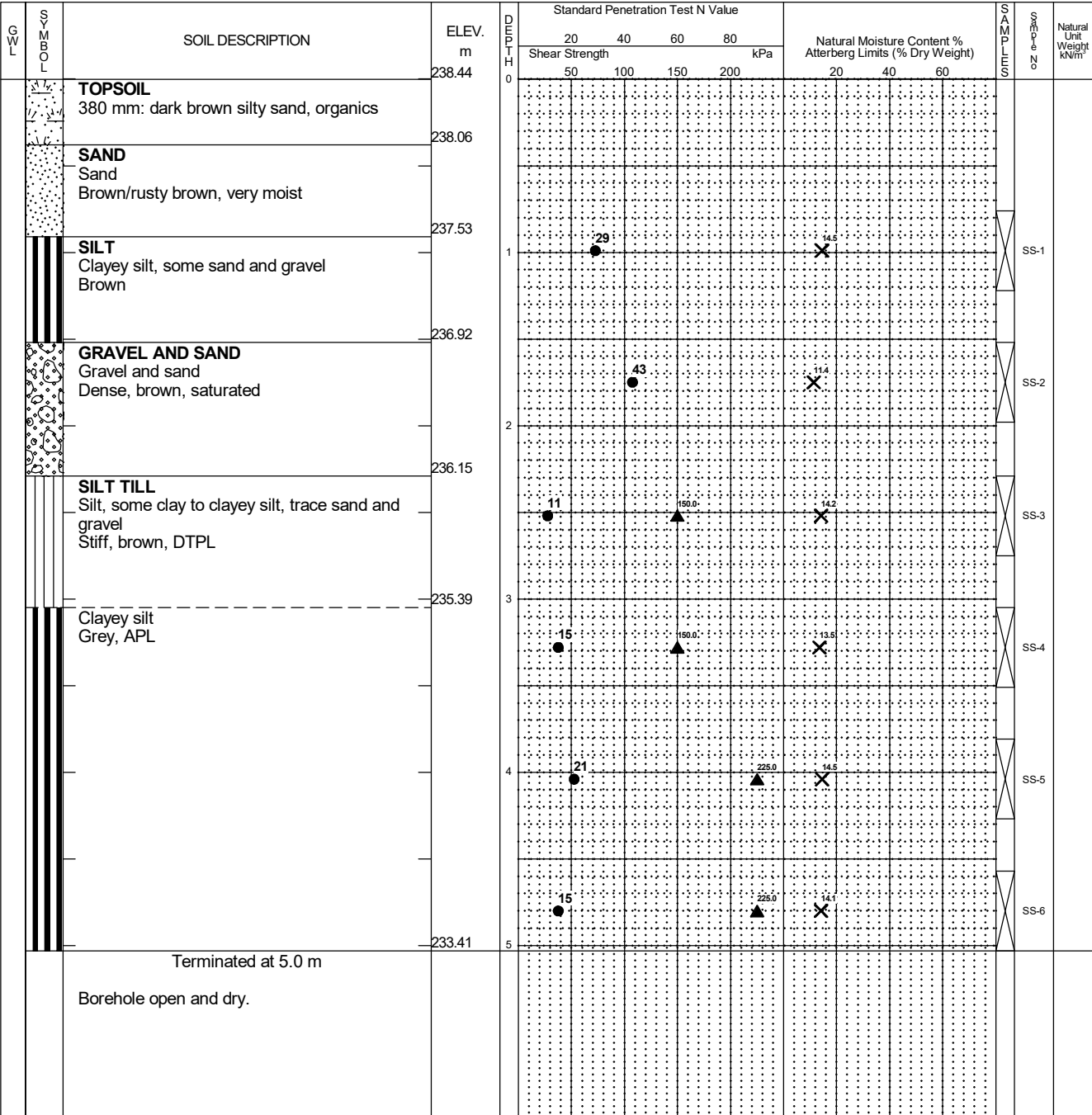
% Strain at Failure



Shear Strength by



Penetrometer Test



Time	Water Level (m)	Depth to Cave (m)

CLASSIFICATION LOG 02200028.000.GPJ LOG A GWGL02.GDT 22-3-14

Englobe

DRAWING No. 7

Sheet No. 1 of 1

☒

9

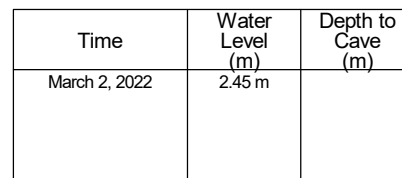
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■

% Strain at Failure

Shear Strength by





GRAIN SIZE AND HYDROMETER ANALYSIS REPORT
LS-602, 702 & 703/704

PROJECT NUMBER:

04-02200028.000

PROJECT NAME:

17 Highway Crescent, Courtland

CLIENT:

Stubbe's Property Development Inc

LAB NUMBER:

S-144

SAMPLE ID:

BH 2 SS 1

SAMPLE DEPTH:

2.5 - 5'

SAMPLED BY:

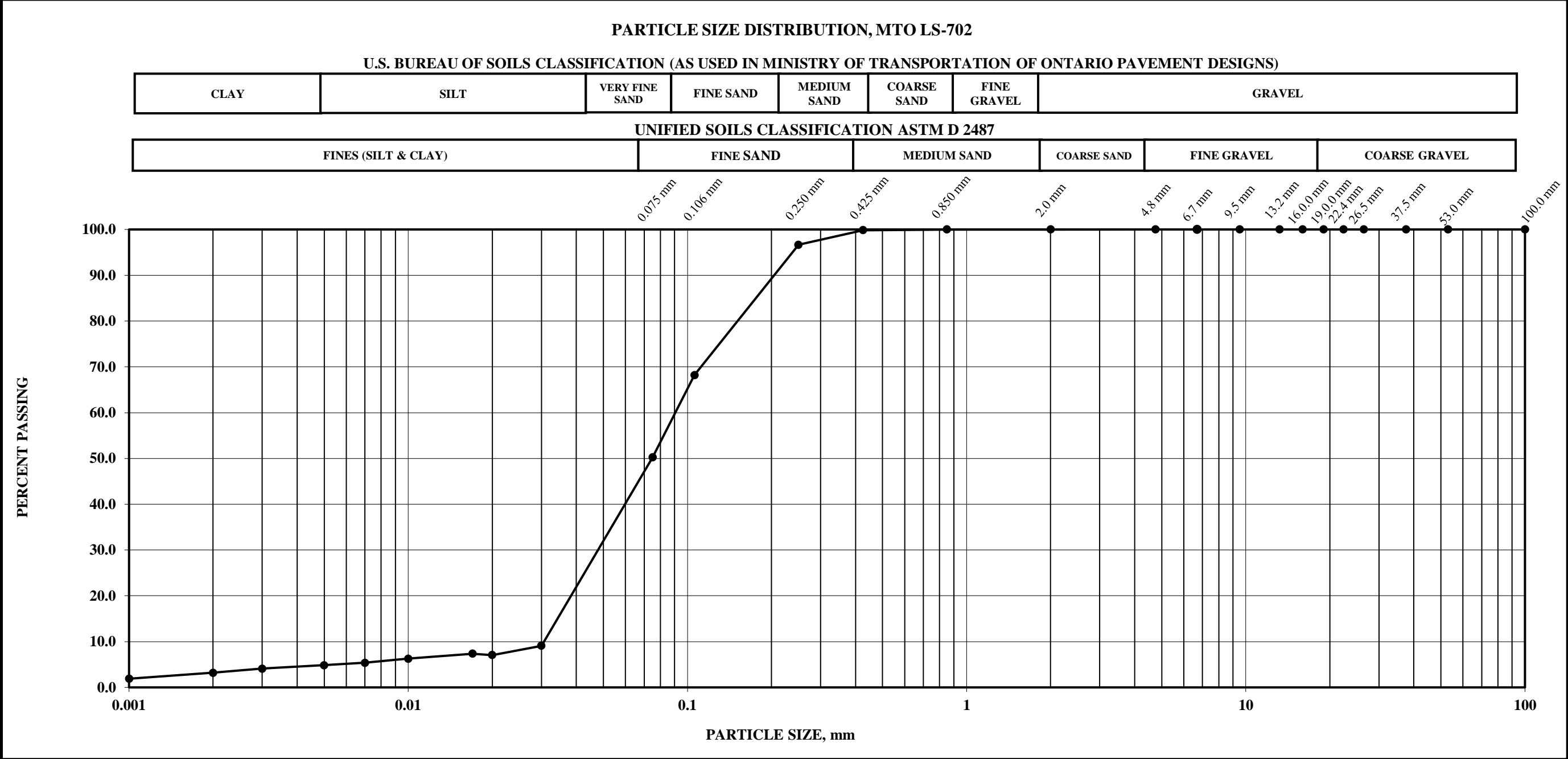
Ed VanPuymbroeck, BSc

DATE RECEIVED:

February 18, 2022

DATE COMPLETED:

February 25, 2022



COEFFICIENTS									
D60	0.092	D30	0.053	D10	0.031	Cc	0.982	Cu	2.96

GRAIN SIZE ANALYSIS		HYDROMETER ANALYSIS	
SIEVE SIZE mm	% PASSING	DIAMETER mm	% PASSING
53	100.0	0.030	9.1
37.5	100.0	0.020	7.1
26.5	100.0	0.017	7.4
22.4	100.0	0.010	6.3
19	100.0	0.007	5.4
16	100.0	0.005	4.8
13.2	100.0	0.002	3.2
9.5	100.0	0.001	1.9
6.7	100.0	ATTERBERG LIMITS	
4.75	100.0		
2.00	100.0		
0.850	100.0		
0.425	99.9	Plastic Limit	
0.250	96.7		
0.106	68.2	Plastic Index	
0.075	50.2		

GRAIN SIZE PROPORTIONS, %		
% GRAVEL (> 4.75 mm):		
% SAND (75 µm to 4.75 mm):		49.8
% SILT (2 µm to 75 µm):		47.0
% CLAY (<2 µm):		3.2
SOIL DESCRIPTION:		SAND and SILT, trace Clay
		MODERATE
REMARKS		

Figure: 1

TESTED BY:

Sarah Pietrasik
Junior Technician

REVIEWED BY

David McBay, CET.
Laboratory Supervisor

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.



GRAIN SIZE AND HYDROMETER ANALYSIS REPORT

LS-602, 702 & 703/704

PROJECT NUMBER:04-02200028.000PROJECT NAME:17 Highway Crescent, CourtlandCLIENT:Stubbe's Property Development Inc

LAB NUMBER:S-145SAMPLE ID:BH 5 SS 1SAMPLE DEPTH:2.5 - 5'

SAMPLED BY:Ed VanPuymbroeck, BScDATE RECEIVED:February 18, 2022DATE COMPLETED:February 25, 2022

PARTICLE SIZE DISTRIBUTION, MTO LS-702

U.S. BUREAU OF SOILS CLASSIFICATION (AS USED IN MINISTRY OF TRANSPORTATION OF ONTARIO PAVEMENT DESIGNS)

CLAY	SILT	VERY FINE SAND	FINE SAND	MEDIUM SAND	COARSE SAND	FINE GRAVEL	GRAVEL
------	------	----------------	-----------	-------------	-------------	-------------	--------

UNIFIED SOILS CLASSIFICATION ASTM D 2487

FINES (SILT & CLAY)	FINE SAND	MEDIUM SAND	COARSE SAND	FINE GRAVEL	COARSE GRAVEL
---------------------	-----------	-------------	-------------	-------------	---------------

PERCENT PASSING

0.0010.010.1110100

0.075 mm0.106 mm0.250 mm0.425 mm0.850 mm2.0 mm4.8 mm6.7 mm9.5 mm13.2 mm16.0 mm19.0 mm22.4 mm26.5 mm37.5 mm53.0 mm100.0 mm

100.090.080.070.060.050.040.030.020.010.00

0.0010.010.1110100

PARTICLE SIZE, mm

COEFFICIENTS

D60	0.017	D30	0.002	D10		Cc		Cu	
-----	-------	-----	-------	-----	--	----	--	----	--

GRAIN SIZE ANALYSIS

SIEVE SIZE mm	% PASSING
53	100.0
37.5	100.0
26.5	100.0
22.4	100.0
19	100.0
16	100.0
13.2	100.0
9.5	99.1
6.7	98.8
4.75	98.8
2.00	96.9
0.850	95.7
0.425	94.5
0.250	92.7
0.106	88.4
0.075	86.7

HYDROMETER ANALYSIS

DIAMETER mm	% PASSING
0.030	70.9
0.020	64.6
0.017	60.7
0.010	47.3
0.007	43.5
0.005	40.8
0.002	24.1
0.001	12.1

ATTERBERG LIMITS

Liquid Limit	
Plastic Limit	
Plastic Index	

GRAIN SIZE PROPORTIONS, %

% GRAVEL (> 4.75 mm):	1.2
% SAND (75 µm to 4.75 mm):	12.1
% SILT (2 µm to 75 µm):	62.6
% CLAY (<2 µm):	24.1

SOIL DESCRIPTION:

Clayey Silt, Some Sand, Trace Gravel

MODERATE

REMARKS

Figure: 2

TESTED BY:Sarah PietrasikJunior Technician

REVIEWED BY:David McBay, CET.Laboratory Supervisor

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

353 Bridge Street East, Kitchener N2K 2Y5

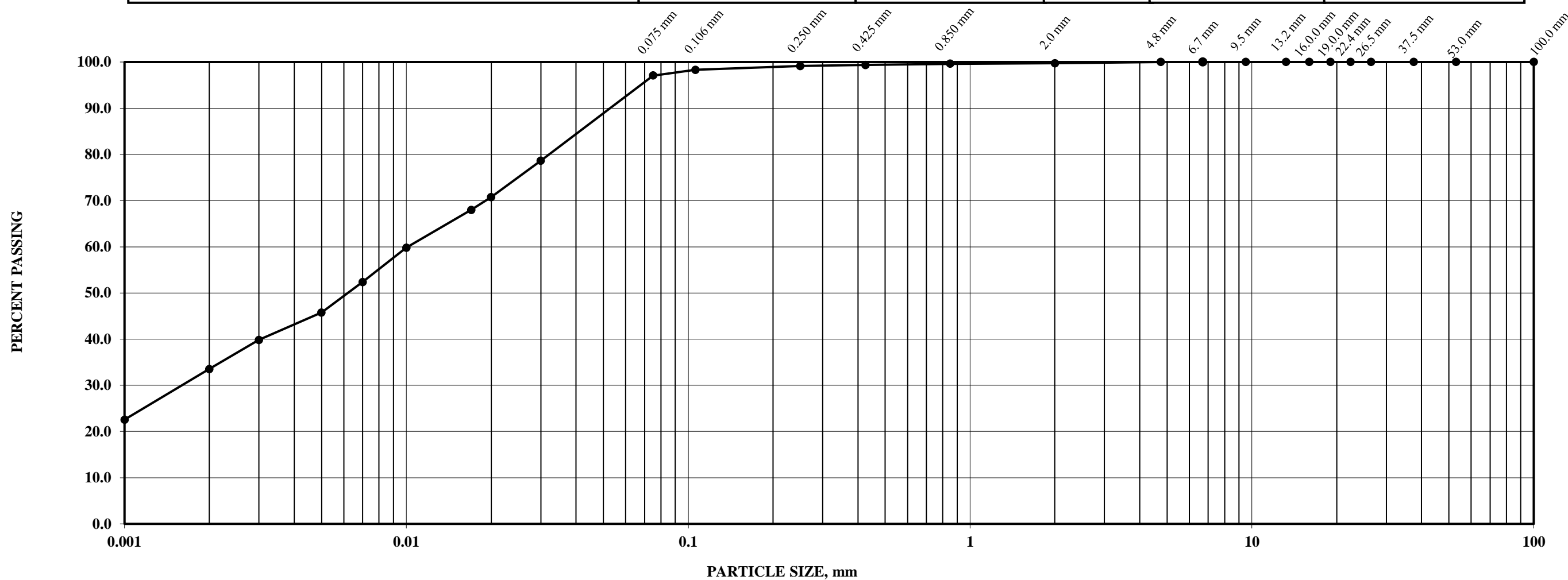
60 Meg Drive, Unit 12, London N6E 3T6

440 Hardy Road, Brantford N3T 5L8

PROJECT NUMBER:	04-02200028.000	PROJECT NAME:	17 Highway Crescent, Courtland	CLIENT:	Stubbe's Property Development Inc
LAB NUMBER:	S-146	SAMPLE ID:	BH 7 SS 1	SAMPLE DEPTH:	2.5 - 5 '
SAMPLED BY:	Ed VanPuymbroeck, BSc	DATE RECEIVED:	February 18, 2022	DATE COMPLETED:	February 25, 2022

U.S. BUREAU OF SOILS CLASSIFICATION (AS USED IN MINISTRY OF TRANSPORTATION OF ONTARIO PAVEMENT DESIGNS)

FINES (SILT & CLAY)	FINE SAND	MEDIUM SAND	COARSE SAND	FINE GRAVEL	COARSE GRAVEL
---------------------	-----------	-------------	-------------	-------------	---------------



D60	0.010	D30	0.002	D10		Cc		Cu	
-----	-------	-----	-------	-----	--	----	--	----	--

GRAIN SIZE PROPORTIONS, %		
% GRAVEL (> 4.75 mm):		
% SAND (75 µm to 4.75 mm):		2.9
% SILT (2 µm to 75 µm):		63.6
% CLAY (<2 µm):		33.5
SOIL DESCRIPTION:		Clayey Silt, Trace Sand
		MODERATE
<p align="center"><u>REMARKS</u></p>		

Figure: 3

REVIEWED BY _____ David McBay, CET.
Laboratory Supervisor

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.



GRAIN SIZE AND HYDROMETER ANALYSIS REPORT
LS-602, 702 & 703/704

PROJECT NUMBER:

04-02200028.000

PROJECT NAME:

17 Highway Crescent, Courtland

CLIENT:

Stubbe's Property Development Inc

LAB NUMBER:

S-147

SAMPLE ID:

BH 6 SS 3

SAMPLE DEPTH:

7.5 - 9 '

SAMPLED BY:

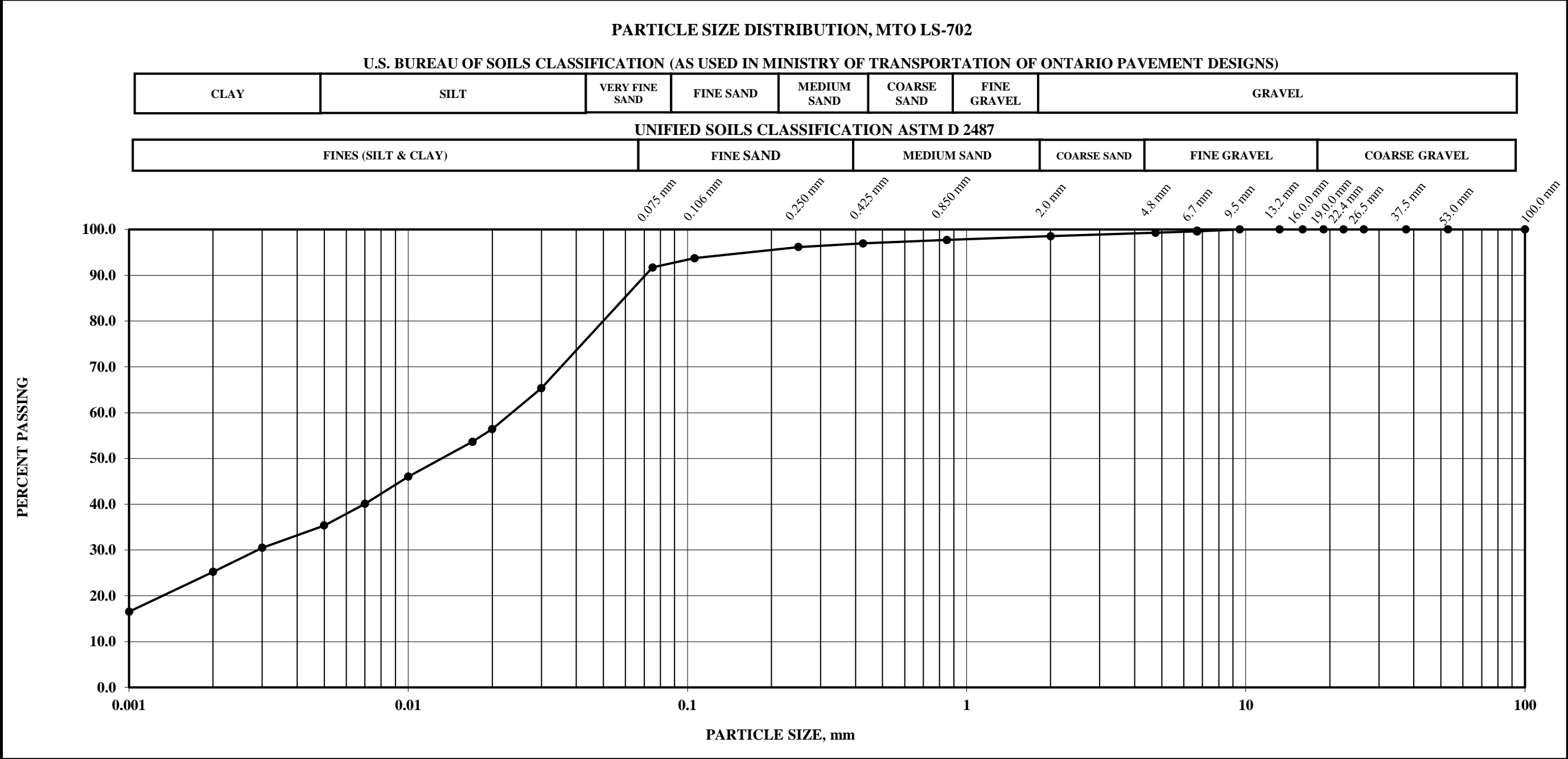
Ed VanPuymbroeck, BSc

DATE RECEIVED:

February 18, 2022

DATE COMPLETED:

February 25, 2022



COEFFICIENTS									
D60	0.024	D30	0.003	D10		Cc		Cu	

GRAIN SIZE ANALYSIS		HYDROMETER ANALYSIS	
SIEVE SIZE mm	% PASSING	DIAMETER mm	% PASSING
53	100.0	0.030	65.3
37.5	100.0	0.020	56.4
26.5	100.0	0.017	53.7
22.4	100.0	0.010	46.0
19	100.0	0.007	40.1
16	100.0	0.005	35.4
13.2	100.0	0.002	25.2
9.5	100.0	0.001	16.5
6.7	99.6	ATTERBERG LIMITS	
4.75	99.3		
2.00	98.5		
0.850	97.7	Liquid Limit	
0.425	96.9	Plastic Limit	
0.250	96.2		
0.106	93.7	Plastic Index	
0.075	91.7		

GRAIN SIZE PROPORTIONS, %	
% GRAVEL (> 4.75 mm):	0.7
% SAND (75 µm to 4.75 mm):	7.6
% SILT (2 µm to 75 µm):	66.5
% CLAY (<2 µm):	25.2
SOIL DESCRIPTION:	Clayey Silt, Traces of Sand and Gravel
HIGH	
REMARKS	

Figure: 4

TESTED BY:

Sarah Pietrasik
Junior Technician

REVIEWED BY

David McBay, CET.
Laboratory Supervisor

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

PROJECT NUMBER:	04-02200028.000	PROJECT NAME:	17 Highway Crescent, Courtland	CLIENT:	Stubbe's Property Development Inc
LAB NUMBER:	S-148/149	SAMPLE ID:	BH 3 SS 2	SAMPLE DEPTH:	5 - 7 '
SAMPLED BY:	Ed VanPuymbroech, BSc	DATE RECEIVED:	February 18, 2022	DATE COMPLETED:	February 25, 2022

440 Hardy Road, Brantford N3T 5L8

GEOTECHNICAL ENGINEERING REPORT

17 Highway Crescent
Courtland, Ontario

Stubbe's Precast
Final Report

March 16, 2022
04-02200028.0100-GS-R-0001-00



eNGLOBE

Stubbe's Precast

Prepared by:



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Raid Khamis, P.Eng.

Team Leader- Senior Geotechnical Engineer



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Revisions and publications log

REVISION No.	DATE	DESCRIPTION
00	March 16, 2022	Final Report Issued

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APPENDICES

Appendix A	Drawings
Appendix B	Borehole Logs
Appendix C	Laboratory Test Results

1 Introduction

Englobe Corp. (Englobe) was retained by Stubbe's Precast (hereinafter referred to as the "Client") to perform a geotechnical investigation on a 0.4 ha property at 17 Highway Crescent located in Courtland, Ontario, as shown on the Location Plan, Drawing 1 in Appendix A. The geotechnical investigation is for a proposed residential development comprising seven residential lots off a new cul-de-sac extending from Byerlay Side Road. This work was authorized by Albert Meyer in Purchase Order P037342 dated 01/10/2022.

The purpose of the geotechnical investigation was to determine the subsurface conditions at the site and based on that information, provide geotechnical design parameters and geotechnical recommendations for the proposed development.

Concurrently with this investigation a hydrogeological investigation was completed and the results are reported under a separate cover.

2 Investigation Procedure

2.1 Field Program

The fieldwork for this investigation was performed on February 8 and 9, 2022 and involved drilling seven boreholes (BH-01-22 to BH-07-22). The locations of the boreholes are shown on Drawing No. 2 in Appendix A, are provided in the following Table 1, and the boreholes are listed on the Borehole Logs in Appendix B.

Table 1: Summary of Boreholes

Borehole ID	Ground Surface Elevation	Depth of Borehole (m)
BH 01-22	238.86	5.00
BH 02-22	238.02	6.60
BH 03-22	238.53	5.00
BH 04-22	238.59	5.00
BH 05-22	238.61	6.60
BH 06-22	238.44	5.00
BH 07-22	238.18	6.60

The field investigation was carried out in general conformance with the professional standards set out in the Canadian Foundation Engineering Manual (CFEM 2006, 4th Edition), applicable Ontario Regulations and ASTM International. The following is a summary of field investigation tasks:

— Utility locates and drilling coordination was carried out by Englobe prior to mobilization to site.

- The boreholes were advanced using a Diedrich D-50 T drill rig equipped with hollow stem augers supplied and operated by London Soil Test under the supervision of an Englobe drilling supervisor. The boreholes were logged by our geotechnical supervisor.
- Soil samples were recovered from the boreholes at regular depth intervals using a 50 mm outside diameter split spoon sampler in accordance with ASTM D1586 Standard Penetration Test (SPT).
- Samples of the cohesive soils were tested using a hand-held pocket penetrometer and test results are plotted on the borehole logs in Appendix B.
- In order to assess the groundwater conditions, monitoring wells were installed in Boreholes BH-02-22, BH-05-22 and BH-07-22. The monitoring wells were installed by inserting a 50 mm diameter screen and pipe into the open borehole. Sand filter material was added to pack the screen in place until the level of the sand was approximately 300 mm above the top of the screen. A bentonite seal was placed above the sand pack at the well location to prevent the infiltration of surface water. A stick up well casing was installed and concreted in place. The top of the riser pipe was vented to allow accurate measurement of the stabilized groundwater levels. Details of the monitoring well installation, as well as groundwater observations and measurements, are provided on the appended borehole logs (Appendix B).
- The monitoring wells were tagged and completed well records submitted to the Ministry of Environment, Conservation and Parks (MOECP). A licensed well technician must properly decommission the monitoring wells before construction.
- Groundwater levels measured on March 2, 2022 are noted on the borehole logs and summarized in Table 6.
- The borehole locations and ground surface elevations were surveyed by Englobe. The boreholes were located relative to existing site features and property lines. The ground surface elevations are referred to the following temporary benchmark (TBM) provided by Stubbe's Precast:
 - TBM3: Top of nail in stake as shown on Drawing 2.
 - Elevation 239.104 m
- Collection of representative soil samples for and visual inspection and laboratory testing.
- Groundwater observations were made and measurements were carried out in the open boreholes during and upon completion of drilling and noted on borehole logs.
- The boreholes without monitoring wells were backfilled with soil cuttings and bentonite in accordance with Ontario Regulation 903 as amended, under the Ontario Water Resources Act.

2.2 Laboratory Testing

All soil samples recovered during this investigation were returned to our laboratory for visual examination and moisture content testing. The moisture content values are shown on the appended borehole logs. Selected soil samples were submitted for particle size and Atterberg limits analyses.

Table 2: List of laboratory tests conducted as per ASTM Standards

Test	Standard	Number of Samples
Natural Moisture Content	ASTM D2216	43
Particle Size Analysis (Sieve and Hydrometer)	ASTM D7298	5
Atterberg Limits Analysis	ASTM D4318	1

Detailed description and the results of the laboratory tests are provided in Appendix C and Section 3 of this report.

It is important to note that as per the standard policy of Englobe, the soil samples will be stored for a period of three months from the date of sampling. These soil samples will be discarded after the three-month period unless prior arrangements have been made for longer storage.

3 Subsurface Conditions

Detailed descriptions of the subsurface conditions revealed at the boreholes are shown on the enclosed Record of Borehole Logs in Appendix B. The following is a brief description of revealed subsurface conditions at this site.

The boreholes revealed surface topsoil, over native deposits of sand, silt and clayey silt subsoil.

Geological conditions are innately variable. Information about the subsurface stratigraphy is only available at discrete borehole locations at the time of report preparation. To develop recommendations from the available information, it is necessary to make some assumptions concerning conditions at locations between boreholes. Adequate inspection should be provided during construction to check that these assumptions are reasonable.

Descriptions for the subsurface conditions are detailed in the following sections:

3.1 Topsoil

A surface layer of topsoil was encountered at ground surface in all the boreholes and comprises dark brown sand with some silt to silty sand. The topsoil thickness ranged between 305 and 430 mm.

3.2 Sand to Sand and Silt

Beneath the topsoil in BH-02-22, BH-04-22, BH-06-22 and BH-07-22, a native layer of sand to silt and sand was encountered. The thickness of this native layer ranged between 0.40 m and 1.20 m.

A Standard Penetration Test result (N Value) recorded in the native material of 10 blows per 305 mm of penetration, indicating a compact compactness condition.

One gradation analysis was carried out on a sample of this native material and the results are summarized in Table 3 and provided in Appendix C.

Table 3: Particle Size Distribution Analyses

Borehole and Sample Number	Sample Depth (m)	Soil Type	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
BH-02-22 SS-1	0.77 - 1.22	Sand and SILT, trace Clay	-	49.8	47	3.2

3.3 Silt to Clayey Silt

Beneath the topsoil or sand to sand and silt deposits of clayey silt with trace to some sand and gravel to silt with some clay were encountered in all the boreholes.

Standard Penetration Test results (N Values) recorded in this native material ranged between 4 and 29 (average Value of 15) blows per 305 mm of penetration and pocket penetrometer readings ranged from 100 to 225 kPa, indicating a stiff to hard consistency or compact compactness condition.

Four gradation analyses were carried out on samples of this native material and the results are summarized in Table 4 and provided in Appendix C.

Table 4: Particle Size Distribution Analyses

Borehole and Sample Number	Sample Depth (m)	Soil Type	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
BH-03-22 SS-2	1.50 - 1.95	Clayey SILT, trace Gravel and Sand	0.5	6.5	63.7	29.3
BH-05-22 SS-1	0.77-1.22	Clayey Silt some Sand trace Gravel	1.2	12.1	62.6	24.1
BH-06-22 SS-3	2.31-2.76	Clayey Silt trace Sand and Gravel	0.7	7.6	66.5	25.2
BH-07-22 SS-1	0.77-1.22	Clayey Silt trace Sand	0	2.9	63.6	33.5

The results of one Atterberg Limits Test is summarized in Table 5 and results are indicated in Appendix C. The Atterberg Limits Test indicate that the soil sample tested from Borehole BH-06-21 has low to medium plasticity. The cohesive clayey silt is typically about the plastic limit to wetter than the plastic limit.

Table 5: Atterberg Limit Test Results

Borehole and Sample Number	Sample Depth (m)	Liquid Limit	Plastic Limit	Plasticity Index	Classification
BH-03-22 SS-2	1.50-1.95	21	15	6	ML-CL

3.4 Sand and Gravel and Sand

Beneath the silt and clayey silt in BH-02-22, BH-05-22 and BH-07-22, and within the silt in borehole BH-06-22 sand or gravel and sand layer was encountered. The thickness of the gravel and sand was 0.8 m in BH-06-22 and the boreholes BH-02-22, BH-05-22 and BH-07-22 were terminated in the sand layer.

Standard Penetration Test results (N Values) recorded in the native material ranged between 8 and 43 (typically compact) blows per 305 mm of penetration, indicating a loose to dense compactness condition. The moisture content of this native layer material ranged between 11% and 22% indicating saturated conditions.

3.5 Groundwater

Groundwater observations and measurements carried out in the monitoring wells installed in Boreholes BH-02-22, BH-05-22 and BH-07-22 are presented on the appended borehole logs and summarized in Table 6.

Table 6: Water Level Measurements - March 2, 2022

Borehole No.	Ground Surface Elevation (m)	Groundwater Depth (m)	Groundwater Elevation (m)
BH- 02-22	238.02	1.62	236.40
BH- 05-22	238.61	2.33	236.28
BH-07-22	238.18	2.45	235.73

Perched groundwater may occur above relatively less permeable layers of the soils at the site, particularly following heavy rainfall or snow melts. These conditions could be expected within the fill and silty sand/sandy silt soils.

It is important to note that the groundwater conditions described in this report refer only to those observed at the place and time of observation noted in the report. These elevations and conditions may vary locally due to seasonal fluctuations, groundwater regimes encountered at the site or as a consequence of construction activities on the site or adjacent sites.

4 Discussion and Recommendations

The boreholes revealed surface topsoil, overlying native sand and silt overlying native silt and clayey silt which in turn typically overlies native sand.

Shallow foundations and basements are considered technically feasible for the proposed house construction. Several factors exist within the study area that could impact construction of the proposed development, including:

- Presence of surficial organic; and,
- Shallow groundwater conditions.

4.1 Site Preparation

Some minor grading of the property may be required to prepare the land for construction of the proposed development. The earthworks will likely include a general levelling of the site and removal of the topsoil.

In calculating the amount of topsoil to be removed, we recommend that the topsoil thicknesses provided on the individual test pit logs be increased by 50 mm to account for variations and some stripping of the mineral soil below. The topsoil can be used for landscaping fill.

Any structural fill required for raising grades beneath the house foundations should consist of imported clean, granular material such as OPSS Granular 'B' Type 1. Any imported fill material should be tested and approved by a geotechnical engineer prior to use.

Structural fill should be placed in 200 mm thick lifts and compacted to a minimum of 100% standard Proctor maximum dry density (SPMDD). The fill pad should extend at least 2.0 m beyond the edge of any building and outwards and downwards to the subgrade level at a slope of 1 horizontal to 1 vertical.

Full-time testing by experienced geotechnical personnel should be carried out during fill placement and compaction to examine and approve potential sources of fill material, and to carefully monitor the placement and verify the compaction by insitu density testing using nuclear gauges.

4.2 Foundation Design

All organic material, and loose/soft native soil must be removed from all new foundation areas. Footings founded on the approved native silt, throughout the site at the depths shown in Table 7 or approved engineered fill as discussed above may be designed for soil bearing resistance at Serviceability Limit State (S.L.S.) of 120 kPa, and a factored geotechnical resistance at Ultimate Limit State (U.L.S.) of 180 kPa, where a geotechnical resistance factor of 0.5 has been applied.

Table 7: Depth to Competent Bearing Surface

Borehole No.	Ground Surface Elevation (m)	Depth to Bearing Stratum (mbgs)	Elevation of Bearing Strata (m)
BH 01-22	238.86	1.70	237.16
BH 02-22	238.02	2.00	236.02
BH 03-22	238.53	1.70	236.83
BH 04-22	238.59	2.00	236.59
BH 05-22	238.61	1.70	236.91
BH 06-22	238.44	1.20	237.24
BH 07-22	238.18	1.70	236.48

Properly constructed footings less than 1.5 m in width founded within the native mineral soils or engineered fill subjected to the maximum Serviceability Limit State pressures above are expected to undergo total settlements of less than 25 mm and differential settlements of less than 19 mm.

The footing areas must be checked by a geotechnical engineer from Englobe to ensure that the soil conditions encountered at the time of construction are suitable to support the design pressure. Any disturbed soil identified during the inspection should be removed from the footing areas and replaced with concrete.

4.3 Basements

House basements at this site must be provided with perimeter weeping tile systems as per the Ontario Building Code (Section 9.14). The drain tile or pipe should be laid on undisturbed or well compacted soil so that the top of the tile or pipe (minimum 100 mm diameter) is below the bottom of the basement floor slab. The top and sides of the drain tile or pipe shall be covered with not less than 150 mm of crushed stone or other clean coarse granular material containing no more than 10% of material that will pass the 4 mm sieve. The crushed stone should be covered with filter cloth. The weeping tile must drain to a suitable frost-free outlet or sump. The sump shall be equipped with an automatic pump that will discharge the water into a sewer, drainage ditch or dry well.

The portion of the exterior basement wall below finished ground level must be damp-proofed as per Section 9.13.2 of the Ontario Building Code. The basement wall backfill should be graded to prevent drainage towards the foundation after settling as per OBC 9.12.3.

The subgrade for the basement floor slabs should comprise undisturbed native soil or well compacted fill. A minimum 100 mm thick layer of coarse clean granular material containing not more than 10% material that will pass a 4 mm sieve shall be placed beneath slabs in houses as per Section 9.16.2 of the Ontario Building Code.

Groundwater was measured in the monitoring wells at depths of 1.62 to 2.45 m (Elevation 236.40 to 235.73 m). It is recommended that basements be constructed a minimum of 1 m above the groundwater.

4.4 Seismic Design

A Site Classification 'D' should be used for earthquake load and effects in accordance with Table 4.1.8.4.A of the Ontario Building Code (2012).

4.5 Frost Protection

To provide sufficient protection against heave due to frost action, all exterior footings must incorporate a minimum depth of soil cover of 1.2 m between the footing subgrade and the finished ground surface. Where a minimum soil cover of 1.2 m is not practical, insulation can be used as an alternative to offset penetration depths. The insulation manufacturer recommendations shall be referenced for equivalent frost penetration depths and shall be confirmed by the geotechnical engineer during design and construction.

4.6 Foundation Recommendations

The following recommendations are given based on results of the geotechnical investigation:

- Prior to construction of the foundations, any unsuitable material including surficial vegetation, topsoil, soft or firm fill, and loose soils shall be excavated from within the building footprint. The subgrade should be inspected and approved by an experienced geotechnical engineer/ technician upon excavation.

- Fill material within the building must be placed on approved subgrades as structural fill under full-time geotechnical supervision. The structural fill should comprise selected and approved subgrade soil placed and compacted within 2% of its optimum moisture content, placed in 200 mm thick lifts and compacted to a minimum 98% SPMDD under the full time supervision and inspection by Englobe during its placement.
- Full time compaction testing by experienced geotechnical personnel should be carried out to examine and approve structural fill materials, and to verify that the specified degree of compaction has been achieved.
- The footing areas must be inspected by a qualified geotechnical engineer/technician at the time of construction to confirm soil conditions encountered and recommended bearing capacity.
- Structural fill shall extend at least 1.0 m beyond the outer edges of the building where it may be sloped downward to the approved native subgrade level at a gradient not steeper than 1 horizontal to 1 vertical if embedded and at a slope of 3 horizontal to 1 vertical if exposed.
- All exterior footings and those exposed to freezing should be provided with minimum of 1.2 m of soil cover to provide protection from freezing. If construction extends into the winter months, all founding soil must be protected from freezing during construction.
- The materials excavated from the foundation trench areas may be suitable for reuse as exterior foundation wall backfill following approval by a geotechnical engineer/technician. The backfill should be placed in 200 mm thick lifts and compacted to 95% SPMDD on the exterior of the building and 98% SPMDD on the interior of the building. Where applicable, the backfill should be placed evenly on both sides of walls that are not designed to resist lateral earth pressure. Over-compaction must be avoided since this could cause excessive lateral earth pressure.

4.7 Excavations and Dewatering

The most common and cost-effective construction method is normally an open-cut excavation based on the borehole information. Groundwater seepage may be expected within the excavation depth. Temporary excavations to conventional depths for installation of underground pipes at this site must comply with the Ontario Occupational Health and Safety Act and Regulations for Construction Projects.

The boreholes show that the excavations for the construction are expected to extend through surface topsoil, overlying silt and clayey silt subsoil. As per the OHSA, the soil at this site may be classified as shown in the Table 8 below.

Table 8: Soil Classification for Excavations

Soil Type	Above Groundwater Level	Below Groundwater Level
Clayey Silt	Type 2	Type 3
Sandy Silt to Silty Sand	Type 3	Type 4

Where workmen must enter a trench or excavation the soil must be suitably sloped and/or braced in accordance with the regulation requirements. The regulation stipulates safe excavation slopes by soil type as Table 9.

Table 9: Safe Excavation Slope Based on Soil Type (Ontario Regulation 213/91 Occupational Health and Safety Act (OHSA))

Soil Type	Base of Slope	Steepest Slope Inclination
1	Within 1.2 metres of bottom of trench	1 horizontal to 1 vertical
2	Within 1.2 metres of bottom of trench	1 horizontal to 1 vertical
3	From bottom of trench	1 horizontal to 1 vertical
4	From bottom of trench	3 horizontal to 1 vertical

Depending on the construction feasibility and where space limitations (from utility poles, existing underground services, or buildings) do not permit overburden cut slopes at inclinations specified above, a steeper cut slope can be employed and the excavation walls can be supported by temporary shoring systems. During excavations, adjacent existing structures, if present, must be protected by proper shoring or sloping. Some ground movement adjacent to the trench is to be expected. Every prefabricated hydraulic or engineered support system shall be designed by a professional engineer and shall be constructed, installed, used and maintained in accordance with its design drawings and specifications (O.Reg. 213/91, s. 236).

The trench side slopes should be regularly inspected for evidence of instability following periods of heavy rainfall, following periods of thawing, or when the trench has been left open for an extended period of time. Appropriate remedial action should be taken to ensure the continued stability of the slopes.

The groundwater was measured in monitoring wells installed in Boreholes BH-02-22, BH-05-22 and BH-07-22 at depths of 1.62 to 2.45 (Elevation 235.73 to 236.40 m). Based on this estimation and encountered groundwater conditions at the time of fieldwork, it is anticipated that excavations may extend into stabilised groundwater.

Significant groundwater inflow would be expected for excavations extending more than 0.5 m below the stabilized groundwater table and a positive dewatering system installed by a dewatering specialist may be required to lower the groundwater level prior to excavation in order to maintain a safe and adequately dry excavation. An Environmental Activity and Sector Registry (EASR) or Permit to Take Water (PTTW) is required by the Ministry of Environment and Climate Change in the event that the daily taking of groundwater exceeds 50,000 L or 400,000 L per day, respectively.

4.8 Pipe Bedding

The subgrade soils beneath the service pipes should comprise native or recompacted soils. Prior to installation of the services, the subgrade should be inspected by an experienced geotechnical engineer/technician. If any, very loose or soft areas are encountered during inspection they should be excavated and replaced with compacted granular material such as OPSS.MUNI 1010 Granular A.

The pipe bedding for the services should be conventional Class B pipe bedding comprising a minimum 150 mm thick layer of OPSS.MUNI 1010 Granular A aggregate below the pipe invert. The bedding course may be thickened if portions of the subgrade become wet during excavation. OPSS.MUNI 1010 Granular A type aggregate should be provided around the pipe to at least 300 mm above the top, and the bedding should be compacted to 100% SPMDD. Service lines installed outside of heated areas should be provided with a minimum 1.2 m of soil cover or equivalent insulation for frost protection.

4.9 Trench Backfill

The trenches above the specified pipe bedding should be backfilled with inorganic soils that are not excessively wet placed in 200 mm thick lifts and compacted to at least 98% SPMDD. Where the service trenches enter the building, the trench backfill must be compacted as structural fill to a minimum of 100% SPMDD. Based on the results of insitu moisture content tests carried out on the native overburden deposits, the material is not suitable for reuse as trench backfill as it is overly wet with due to the high water table in this area. The overly wet material will require drying prior to reusing as backfill. If the material cannot be dried than imported trench backfill will be required. Organic material (topsoil) is not considered suitable for reuse as trench backfill and if encountered, shall be separated.

To minimize potential problems, backfilling operations should follow closely after excavation so that only a minimal length of trench is exposed. Care should be taken to direct surface runoff away from the excavations. Should construction extend into the winter season then backfilling operations should be planned to ensure that backfill material is kept to a minimum and ensured that frozen material is not used as backfill.

4.10 Pavements

A new cul-de-sac will be constructed off Byerlay Side Road to provide access to the new lots.

Existing surficial vegetation and topsoil should be removed from below the new access road and the subgrade proof rolled with a heavy non-vibratory roller. The subgrade should be inspected by a geotechnical engineer/technician, and if required, grades should be raised with approved on-site inorganic soils or imported granular soils similar to OPSS.MUNI 1010 Select Subgrade Material. The subgrade fill should be placed in 200 mm thick lifts compacted to 98% SPMDD.

The pavement component thicknesses in Table 10 are recommended based on the anticipated pavement usages, the frost susceptibility, and strength of the subgrade soils. The pavement thicknesses noted below shall be reviewed once the pavement loading is known.

Table 10: Recommended Pavement Structure Components

Pavement Structure Component	Thickness (mm)
Hot-Mix Asphalt	90 mm
Granular Base	150 mm
Granular Subbase	400 mm

Samples of both the Granular A and Granular B aggregates should be checked for conformance to OPSS.MUNI 1010 prior to utilization on site and during construction. The Granular B subbase and Granular A base courses must be compacted to 100% SPMDD, as verified by insitu density testing.

The hot-mix asphalt should comprise 50 mm of HL4 binder and 40 mm of HL3 surface. The hot-mix asphalt paving materials should conform to the requirements of OPSS 1150. The asphalt should be placed and compacted in accordance with OPSS 310. Performance graded asphalt cement (PGAC) 58-28 should be utilized in the hot mix asphalt in accordance with the recommendations of OPSS 1101.

The pavement subgrade and granular courses will lose their strength to support traffic loads if allowed to become wet due to surface water or groundwater infiltration; therefore, drainage of the pavement and the granular courses is essential. The finished pavement surface and underlying subgrade should be free of depressions and should be sloped to provide effective drainage. Surface water should not be allowed to pond adjacent to the outside edges of pavement areas.

The need for continuous paving supervision by a qualified pavement technician, and quality control testing during pavement construction cannot be over emphasized. All materials and construction services required for the work should be in accordance with the applicable sections of the Ontario Provincial Standard Specifications.

4.11 Construction Inspection and Testing

During construction of the new building, testing should be carried out for quality assurance. Soils testing for the project would include engineering site visits to confirm bearing capacity for footings for the new building. Compaction testing shall be carried out on structural fill beneath buildings, foundation wall backfill, sub-slab granular fill, service pipe bedding and trench backfill, and granular materials beneath the paved areas.

During the placement of concrete at the construction site, testing should be performed to determine the slump and air content of the concrete, and concrete cylinders should be cast for compressive strength testing in accordance with the requirements of CSA A23.1 and A23.2. Field sampling and testing of concrete shall be according to OPSS 904. Preparation of the test cylinders, curing, and testing should be carried out by Englobe.

Englobe maintains CSA/CCIL certified concrete laboratories in Kitchener and London and can provide concrete sampling and testing services for the project as required. Englobe staff also provide quality testing services for building envelope, structural steel, reinforcing steel, and roofing.

5 Statement of Limitations

The geotechnical recommendations provided in this report are applicable only to the project described in the text and then only if constructed substantially in accordance with the details stated in this report. Since all details of the design may not be known at the time of report preparation, we recommend that we be retained during the final design stage to verify that the geotechnical recommendations have been correctly interpreted in the design. Also, if any further clarification and/or elaboration are needed concerning the geotechnical aspects of the project, Englobe should be contacted.

We recommend that we be retained during construction to confirm that the subsurface conditions do not deviate materially from those encountered in the test holes and to ensure that our recommendations are properly understood. Quality assurance testing and inspection services during construction are a necessary part of the evaluation of the subsurface conditions.

The geotechnical recommendations provided in this report are intended for the use of the Client or its agent and may not be used by a Third Party without the expressed written consent of Englobe and the Client. They are not intended as specifications or instructions to contractors. Any use which a contractor makes of this report, or decisions made based on it, are the responsibility of the contractor.

The contractor must also accept the responsibility for means and methods of construction, seek additional information if required, and draw their own conclusions as to how the subsurface conditions may affect their work. Englobe accepts no responsibility and denies any liability whatsoever for any damages arising from improper or unauthorized use of the report or parts thereof.

It should be noted that the soil boundaries indicated on the borehole logs are inferred from noncontinuous sampling and observations during drilling and should not be interpreted as exact planes of geological change. These boundaries are intended to reflect approximate transition zones for the purpose of geotechnical design. Also, the subsoil and groundwater conditions have been determined at the borehole locations only.

It is further noted that, depending on the time of year the field work was completed, water levels should be expected to vary, perhaps significantly from those observed at the time of this investigation.

It is important to note that the geotechnical assessment involves a limited sampling of the site gathered at specific test hole locations and the conclusions in this report are based on this information gathered and in accordance with normally accepted practices. The subsurface geotechnical, hydrogeological, environmental and geologic conditions between and beyond the test holes will differ from those encountered at the test holes. Also such conditions are not uniform and can vary over time. Should subsurface conditions be encountered which differ materially from those indicated at the test holes, we request that we be notified in order to assess the additional information and determine whether or not changes should be made as a result of the conditions.

Englobe will not be responsible to any party for damages incurred as a result of failing to notify Englobe that differing site or subsurface conditions are present upon becoming aware of such conditions.

The professional services provided for this project include only the geotechnical aspects of the subsurface conditions at the site, unless otherwise stated specifically in the report. The recommendations and opinions given in this report are based on our professional judgment and are for the guidance of the Client or its Agent in the design of the specific project. No other warranties or guarantees, expressed or implied, are made.

The Englobe recommendations are contingent upon provision of a consistently competent, stable subgrade, which is properly drained and free of soft spots and objectionable materials such as organics.

All construction works should only be completed during periods of favourable weather. The need for continuous construction supervision by a qualified, experienced technician, and quality control testing during construction projects cannot be over-emphasized. All materials and construction services required should be in accordance with Ontario Provincial Standard Specifications.

Appendix A

Drawings

Drawing 1: Location Plan

Drawing 2: Site Plan



ENGLOBE

10 cm

5

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3

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NOTES:

1-REFERENCE: © OpenStreetMap contributors (2022).

2-Drawing scale may be distorted due to file conversion and/or copying.
Measurements taken from the drawing must be verified in the field.

0 100 200 300 400 500 m



SCALE 1:15,000

Project

Residential Property Development

17 Highway Crescent, Courtland, Ontario

Title

LOCATION PLAN



440, Hardy Road, Unit 3
Brantford (Ontario) N3T 5L8
Telephone : 519.720.0078
Fax : 519.720.0976

Prepared **E.Ciochon**

Drawn **E.Ciochon**

Checked **T.Staples**

Discipline **GEOTECHNICAL**

Scale **1 : 15000**

Date **2022-02-11**

Project manager

T.Staples

Sequence no.

01 of 02

M. dept.

04

Project

02200028.100

Disc.

GE

Dwg no.

001

Rev.

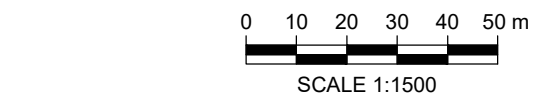
00





EL. 238.02

EL. 238.02



NOTES:

1-REFERENCE: Courtland Subdivision Grading Plan - client drawing.

2-TEMPORARY BENCHMARK: Top of Steel nail set up on stake,
Elevation 239.10 m (geodetic).

3-Drawing scale may be distorted due to file conversion and/or copying.
Measurements taken from the drawing must be verified in the field.

4-MW refers to monitoring well installed at borehole location.

Project

Residential Property Development

17 Highway Crescent, Courtland, Ontario

Title

BOREHOLE LOCATION PLAN



ENGLOBE 

440, Hardy Road, Unit 3
Brantford (Ontario) N3T 5L8
Telephone : 519.720.0078
Fax : 519.720.0976

Prepared **E.Ciochon**

Drawn **E.Ciochon**

Checked **T.Staples**

Discipline **GEOTECHNICAL**

Scale **1:1500**

Date	2022-02-11
------	------------

Project manager

T.Staples

Sequence no.

Sequence no. **02 of 02**

M. dept.

04

	Project
--	---------

1

02200028.100

	Disc.
--	-------

GE

Dwg no.

E 002

Rev.

200

Appendix B

Borehole Logs

List of Abbreviations

Boreholes BH-01-22 to BH-07-22



ENGLOBE



List of Abbreviations

The abbreviations commonly employed on the borehole logs, on the figures, and in the text of the report, are as follows:

Sample Types		Soil Test and Properties	
AS	Auger Sample	SPT	Standard Penetration Test
CS	Core Sample	UC	Unconfined Compression
RC	Rock Core	FV	Field Vane Test
SS	Split Spoon	ϕ	Angle of internal friction
TW	Thinwall, Open	γ	Unit weight
WS	Wash Sample	w_p	Plastic Limit
BS	Bulk Sample	w	Water content
GS	Grab Sample	w_L	Liquid Limit
WC	Water Content Sample	I_L	Liquidity Index
TP	Thinwall, Piston	I_p	Plastic Index
		PP	Pocket Penetrometer

Penetration Resistances	
Dynamic Penetration Resistance	The number of blows by a 63.5 kg (140 lb.) hammer dropped 760 mm (30 in.) required to drive a 50 mm (2 in.) diameter 60° cone a distance 300 mm (12 in.) The cone is attached to 'A' size drill rods and casing is not used.
Standard Penetration Resistance, N (ASTM D1586)	The number of blows by a 63.5 kg (140 lb.) hammer dropped 760 mm (30 in.) required to drive a standard split spoon sampler 300 mm (12 in.)
WH	Sampler advanced by weight of hammer
PH	Sampler advanced by hydraulic pressure
PM	Sampler advanced by manual pressure

Soil Description		
Cohesionless Soils Compactness Condition	SPT N-Value (blows per 0.3 m)	Relative Density (D_r) (%)
Very Loose	0 to 4	0 to 20
Loose	4 to 10	20 to 40
Compact	10 to 30	40 to 60
Dense	30 to 50	60 to 80
Very Dense	Over 50	80 to 100
Cohesive Soils Consistency	Undrained Shear Strength (C_u)	
	kPa	psf
Very Soft	Less than 12	Less than 250
Soft	12 to 25	250 to 500
Firm	25 to 50	500 to 1000
Stiff	50 to 100	1000 to 2000
Very Stiff	100 to 200	2000 to 4000
Hard	over 200	over 4000
DTPL	Drier than plastic limit	Low Plasticity, $w_L < 30$
APL	About plastic limit	Medium Plasticity, $30 < w_L < 50$
WTPL	Wetter than plastic limit	High Plasticity, $w_L > 50$

LOG OF BOREHOLE No. BH-01-22

Englobe

Project No. 02200028.100

DRAWING No. 1

Project: Residential Property Development

Sheet No. 1 of 1

Location: 17 Highway Crescent, Courtland, ON

Date Drilled: 2022-2-8

Drill Type: Hollow Stem Auger

Datum: Top of nail set up in stake, El.239.10 m

Split Spoon Sample



Auger Sample



SPT (N) Value



Dynamic Cone Test



Shelby Tube



Shear Strength by



Vane Test

Natural Moisture Content



Atterberg Limits



Undrained Triaxial at



% Strain at Failure



Shear Strength by



Penetrometer Test



GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH m	Standard Penetration Test N Value		Natural Moisture Content %		SAMPLES	SPT NO	Natural Unit Weight kN/m³
					20	40	60	80			
		TOPSOIL	238.86	0	50	100	150	200	20	40	60
		410 mm: dark brown sandy silt									
			238.45								
		SILT									
		Sandy silt									
		Brown, moist									
		Clayey silt	238.10								
		Mottled brown									
			237.34								
		Silt, some sand, trace clay									
		Very stiff, brown, DTPL									
			236.57								
		Clayey silt									
			235.81								
		Silt, some clay									
		Grey									
			235.05								
		Clayey silt									
		APL									
			234.06								
		saturated sand seams	234.02								
		Stiff	233.83								
		Terminated at 5.0 m									
		Borehole open and dry.									

Time	Water Level (m)	Depth to Cave (m)

CLASSIFICATION LOG 02200028.000.GPJ LOG A GWGL02.GDT 22-3-14

LOG OF BOREHOLE No. BH-02-22

Englobe

Project No. 02200028.100

DRAWING No. 2

Project: Residential Property Development

Sheet No. 1 of 1

Location: 17 Highway Crescent, Courtland, ON

Date Drilled: 2022-2-8

Drill Type: Hollow Stem Auger

Datum: Top of nail set up in stake, El.239.10 m

Split Spoon Sample



Auger Sample



SPT (N) Value



Dynamic Cone Test



Shelby Tube



Shear Strength by



Vane Test

Natural Moisture Content



Atterberg Limits



Undrained Triaxial at



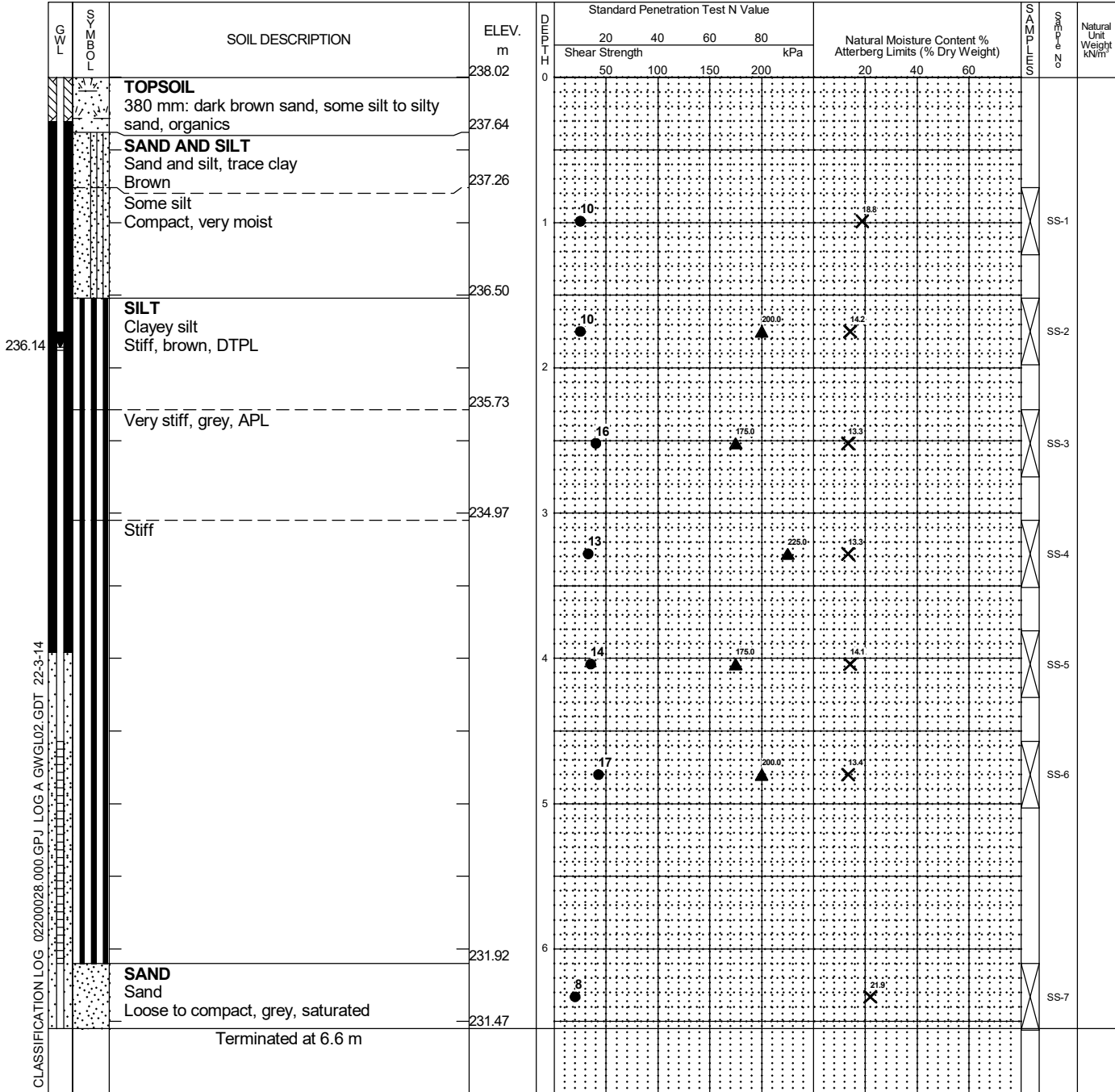
% Strain at Failure



Shear Strength by



Penetrometer Test



Time	Water Level (m)	Depth to Cave (m)
March 2, 2022	1.62 m	

LOG OF BOREHOLE No. BH-03-22

Englobe

Project No. 02200028.100

DRAWING No. 3

Project: Residential Property Development

Sheet No. 1 of 1

Location: 17 Highway Crescent, Courtland, ON

Date Drilled: 2022-2-9

Drill Type: Hollow Stem Auger

Datum: Top of nail set up in stake, El.239.10 m

Split Spoon Sample



Auger Sample



SPT (N) Value



Dynamic Cone Test



Shelby Tube



Shear Strength by



Vane Test

Natural Moisture Content



Atterberg Limits



Undrained Triaxial at



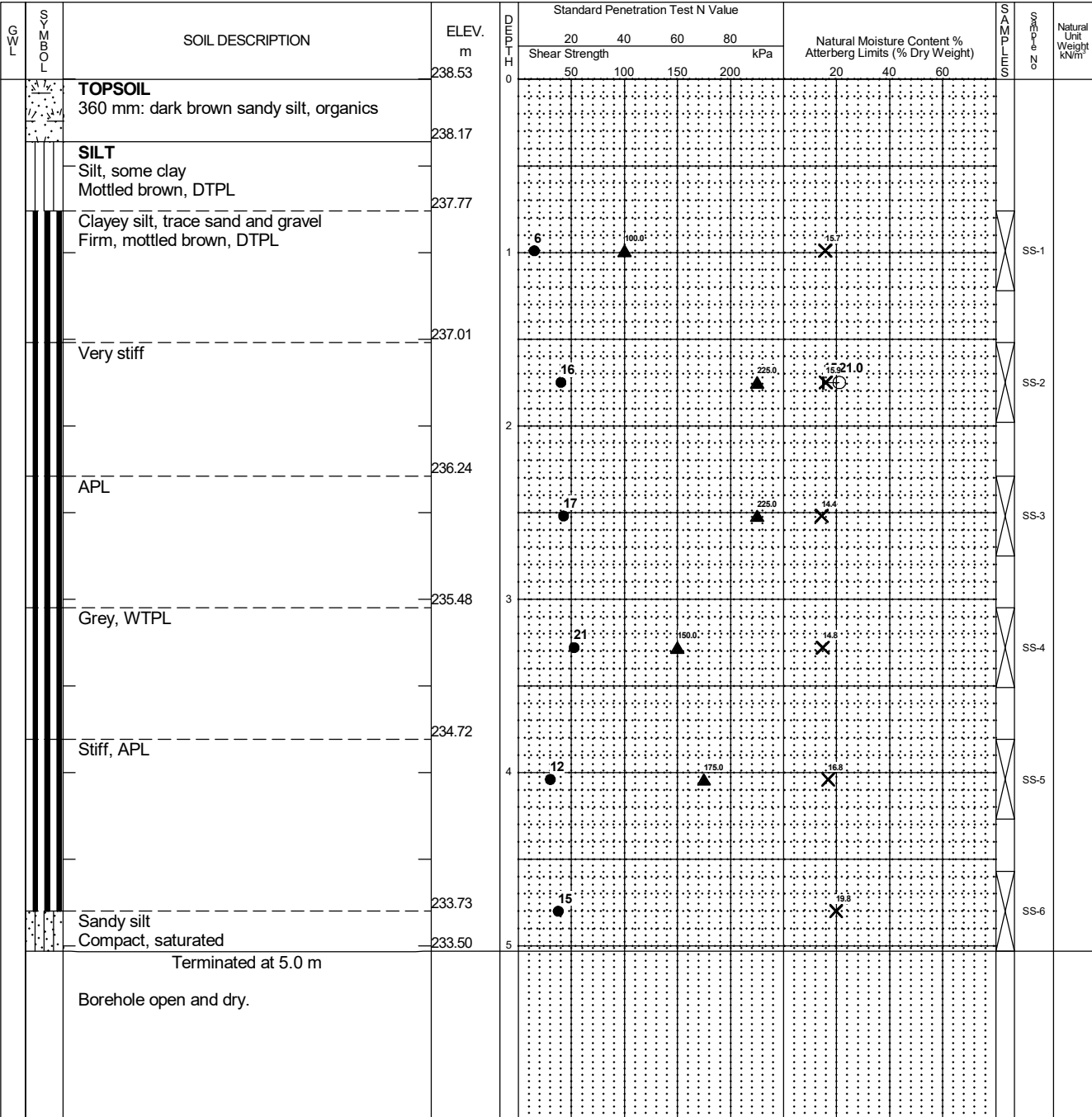
% Strain at Failure



Shear Strength by



Penetrometer Test



Time	Water Level (m)	Depth to Cave (m)

CLASSIFICATION LOG 02200028.000.GPJ LOG A GWGL02.GDT 22-3-14

LOG OF BOREHOLE No. BH-04-22

Englobe

Project No. 02200028.100

DRAWING No. 4

Project: Residential Property Development

Sheet No. 1 of 1

Location: 17 Highway Crescent, Courtland, ON

Date Drilled: 2022-2-8

Drill Type: Hollow Stem Auger

Datum: Top of nail set up in stake, El.239.10 m

Split Spoon Sample



Auger Sample



SPT (N) Value



Dynamic Cone Test



Shelby Tube



Shear Strength by



Vane Test

Natural Moisture Content



Atterberg Limits



Undrained Triaxial at



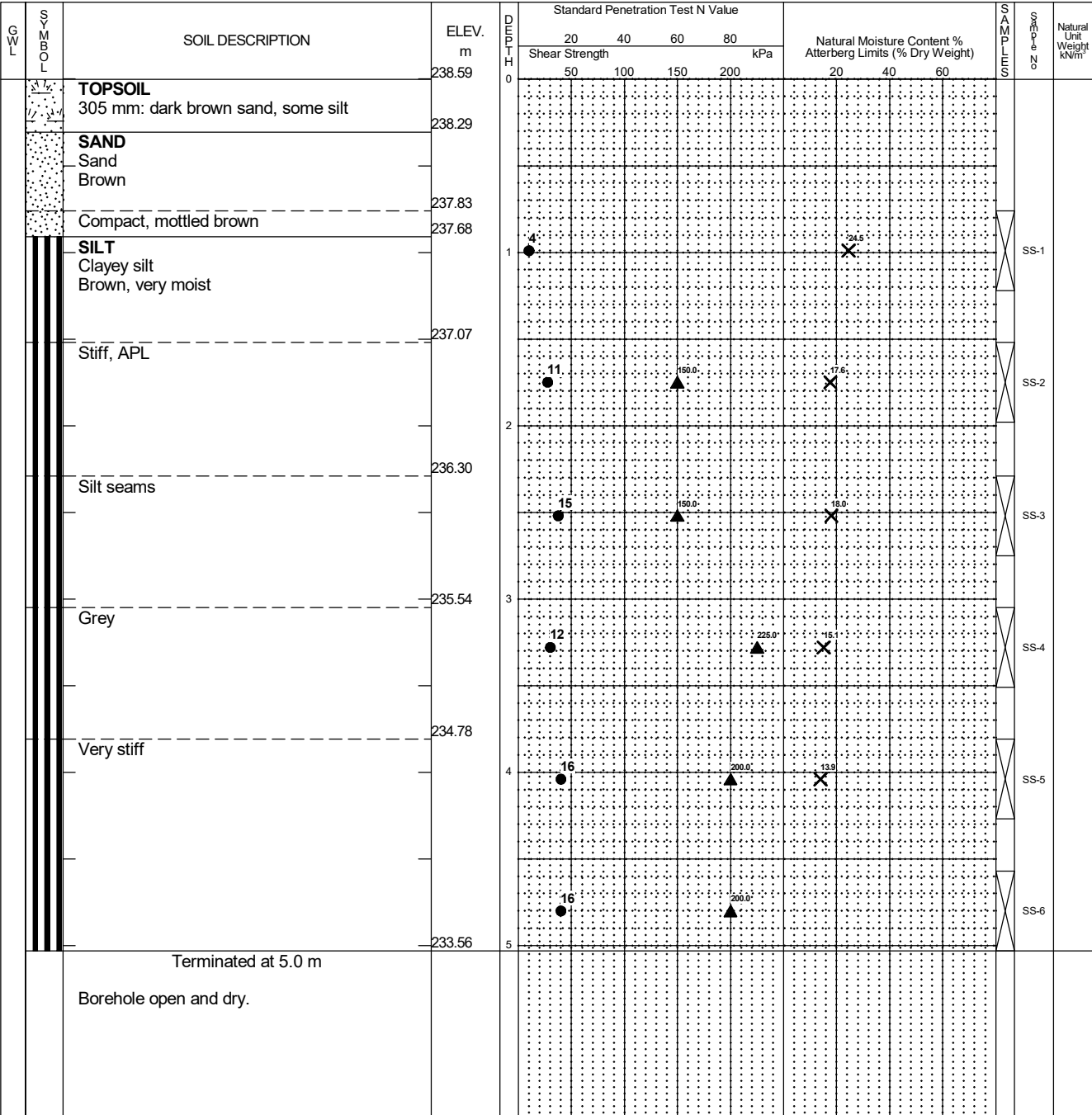
% Strain at Failure



Shear Strength by



Penetrometer Test



CLASSIFICATION LOG 02200028.000.GPJ LOG A GWGL02.GDT 22-3-14

Time	Water Level (m)	Depth to Cave (m)

LOG OF BOREHOLE No. BH-05-22

Englobe

Project No. 02200028.100

DRAWING No. 5

Project: Residential Property Development

Sheet No. 1 of 1

Location: 17 Highway Crescent, Courtland, ON

Date Drilled: 2022-2-9

Drill Type: Hollow Stem Auger

Datum: Top of nail set up in stake, El.239.10 m

Split Spoon Sample



Auger Sample



SPT (N) Value



Dynamic Cone Test



Shelby Tube



Shear Strength by



Vane Test

Natural Moisture Content



Atterberg Limits



Undrained Triaxial at



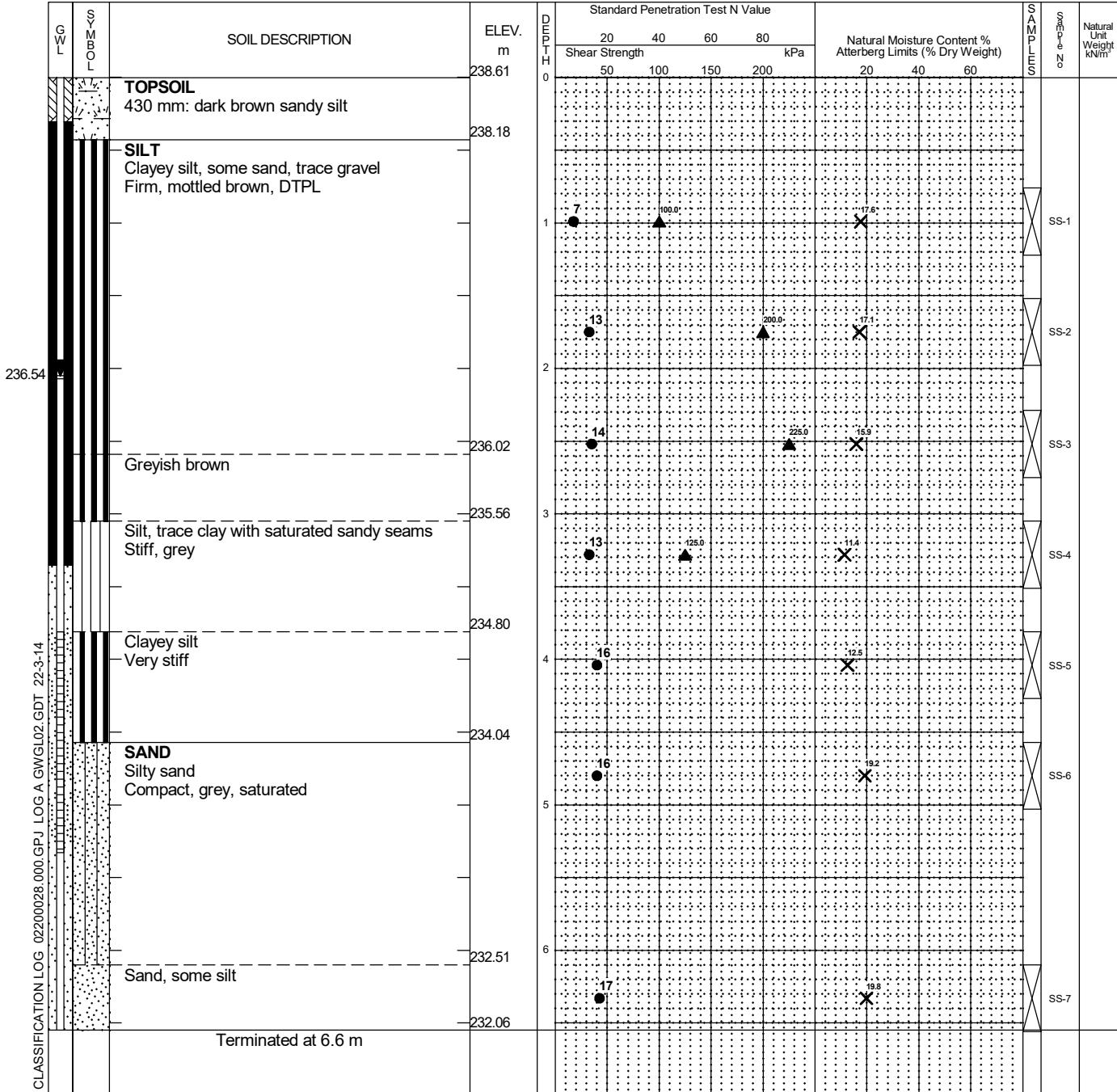
% Strain at Failure



Shear Strength by



Penetrometer Test



Time	Water Level (m)	Depth to Cave (m)
March 2, 2022	2.33 m	

LOG OF BOREHOLE No. BH-06-22

Englobe

Project No. 02200028.100

DRAWING No. 6

Project: Residential Property Development

Sheet No. 1 of 1

Location: 17 Highway Crescent, Courtland, ON

Date Drilled: 2022-2-9

Drill Type: Hollow Stem Auger

Datum: Top of nail set up in stake, El.239.10 m

Split Spoon Sample



Auger Sample



SPT (N) Value



Dynamic Cone Test



Shelby Tube



Shear Strength by



Vane Test

Natural Moisture Content



Atterberg Limits



Undrained Triaxial at



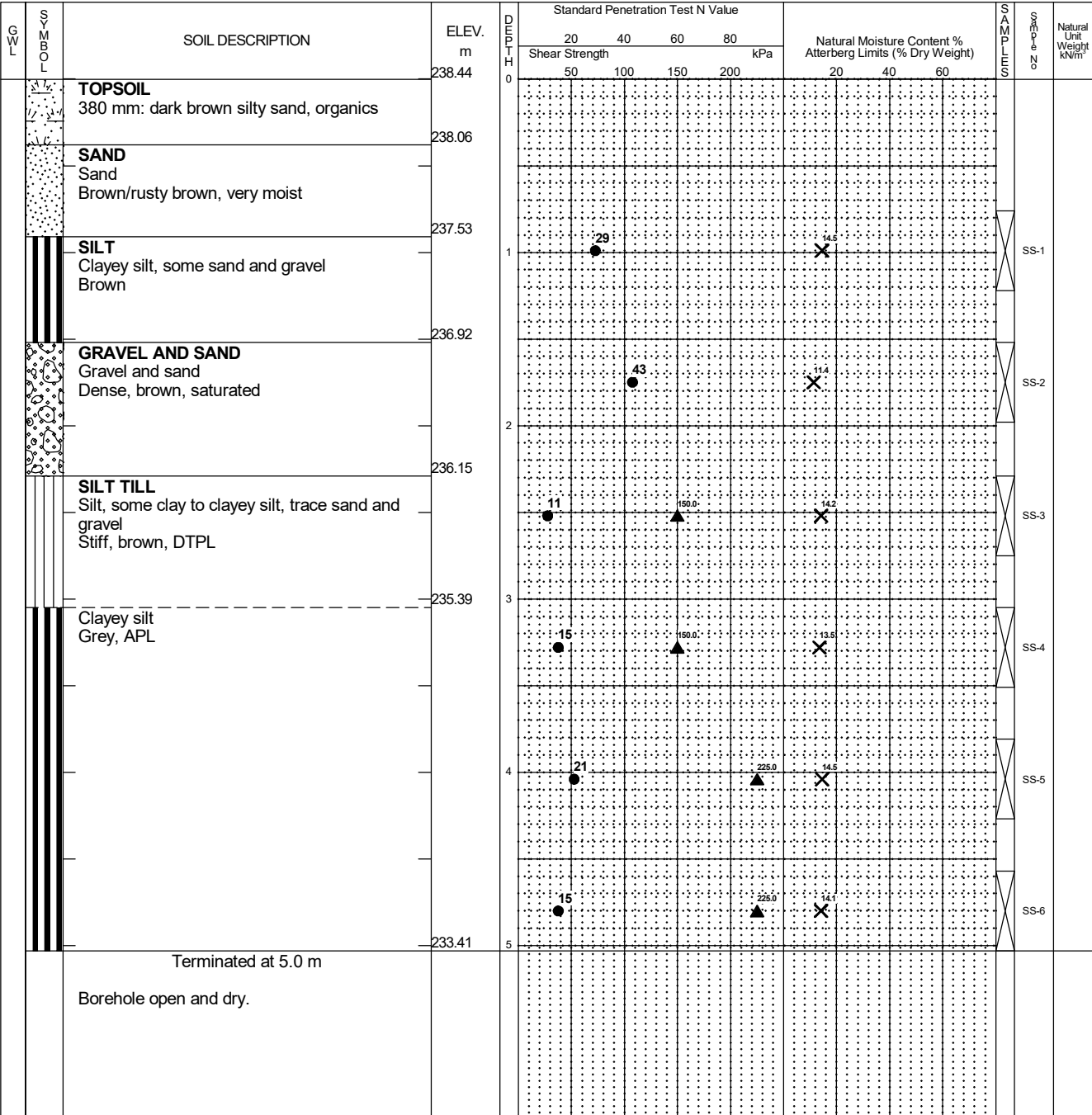
% Strain at Failure



Shear Strength by



Penetrometer Test



CLASSIFICATION LOG 02200028.000.GPJ LOG A GWGL02.GDT 22-3-14

Time	Water Level (m)	Depth to Cave (m)

Englobe

DRAWING No. 7

Sheet No. 1 of 1

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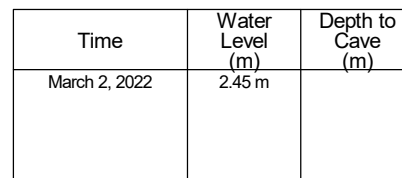
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Appendix C

Laboratory Test Results

Figures 1 to 5- Particle Size Analyses

Figure 6 - Atterberg Limits Analysis



eNGLOBE



GRAIN SIZE AND HYDROMETER ANALYSIS REPORT
LS-602, 702 & 703/704

PROJECT NUMBER:

04-02200028.000

PROJECT NAME:

17 Highway Crescent, Courtland

CLIENT:

Stubbe's Property Development Inc

LAB NUMBER:

S-144

SAMPLE ID:

BH 2 SS 1

SAMPLE DEPTH:

2.5 - 5'

SAMPLED BY:

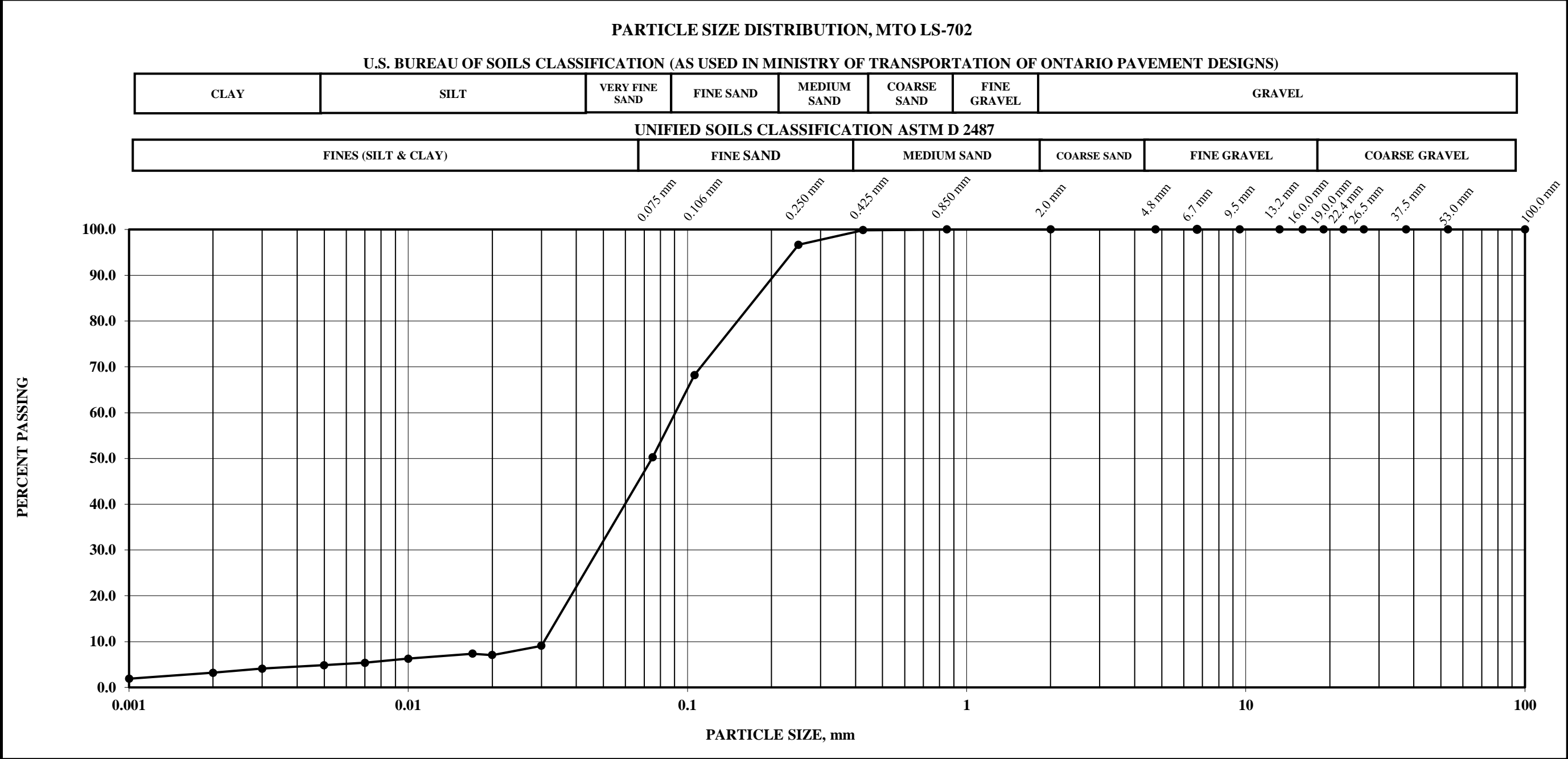
Ed VanPuymbroeck, BSc

DATE RECEIVED:

February 18, 2022

DATE COMPLETED:

February 25, 2022



COEFFICIENTS									
D60	0.092	D30	0.053	D10	0.031	Cc	0.982	Cu	2.96

GRAIN SIZE ANALYSIS		HYDROMETER ANALYSIS	
SIEVE SIZE mm	% PASSING	DIAMETER mm	% PASSING
53	100.0	0.030	9.1
37.5	100.0	0.020	7.1
26.5	100.0	0.017	7.4
22.4	100.0	0.010	6.3
19	100.0	0.007	5.4
16	100.0	0.005	4.8
13.2	100.0	0.002	3.2
9.5	100.0	0.001	1.9
6.7	100.0	ATTERBERG LIMITS	
4.75	100.0		
2.00	100.0		
0.850	100.0		
0.425	99.9	Plastic Limit	
0.250	96.7		
0.106	68.2	Plastic Index	
0.075	50.2		

GRAIN SIZE PROPORTIONS, %	
% GRAVEL (> 4.75 mm):	
% SAND (75 µm to 4.75 mm):	49.8
% SILT (2 µm to 75 µm):	47.0
% CLAY (<2 µm):	3.2
SOIL DESCRIPTION:	SAND and SILT, trace Clay
MODERATE	
REMARKS	

Figure: 1

TESTED BY:

Sarah Pietrasik
Junior Technician

REVIEWED BY

David McBay, CET.
Laboratory Supervisor

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.



GRAIN SIZE AND HYDROMETER ANALYSIS REPORT

LS-602, 702 & 703/704

PROJECT NUMBER:04-02200028.000PROJECT NAME:17 Highway Crescent, CourtlandCLIENT:Stubbe's Property Development Inc

LAB NUMBER:S-145SAMPLE ID:BH 5 SS 1SAMPLE DEPTH:2.5 - 5'

SAMPLED BY:Ed VanPuymbroeck, BScDATE RECEIVED:February 18, 2022DATE COMPLETED:February 25, 2022

PARTICLE SIZE DISTRIBUTION, MTO LS-702

U.S. BUREAU OF SOILS CLASSIFICATION (AS USED IN MINISTRY OF TRANSPORTATION OF ONTARIO PAVEMENT DESIGNS)

CLAY	SILT	VERY FINE SAND	FINE SAND	MEDIUM SAND	COARSE SAND	FINE GRAVEL	GRAVEL
------	------	----------------	-----------	-------------	-------------	-------------	--------

UNIFIED SOILS CLASSIFICATION ASTM D 2487

FINES (SILT & CLAY)	FINE SAND	MEDIUM SAND	COARSE SAND	FINE GRAVEL	COARSE GRAVEL
---------------------	-----------	-------------	-------------	-------------	---------------

PERCENT PASSING

0.0010.010.1110100

0.075 mm0.106 mm0.250 mm0.425 mm0.850 mm2.0 mm4.8 mm6.7 mm9.5 mm13.2 mm16.0 mm19.0 mm22.4 mm26.5 mm37.5 mm53.0 mm100.0 mm

100.090.080.070.060.050.040.030.020.010.00

0.0010.010.1110100

PARTICLE SIZE, mm

COEFFICIENTS

D60	0.017	D30	0.002	D10		Cc		Cu	
-----	-------	-----	-------	-----	--	----	--	----	--

GRAIN SIZE ANALYSIS

SIEVE SIZE mm	% PASSING
53	100.0
37.5	100.0
26.5	100.0
22.4	100.0
19	100.0
16	100.0
13.2	100.0
9.5	99.1
6.7	98.8
4.75	98.8
2.00	96.9
0.850	95.7
0.425	94.5
0.250	92.7
0.106	88.4
0.075	86.7

HYDROMETER ANALYSIS

DIAMETER mm	% PASSING
0.030	70.9
0.020	64.6
0.017	60.7
0.010	47.3
0.007	43.5
0.005	40.8
0.002	24.1
0.001	12.1

ATTERBERG LIMITS

Liquid Limit	
Plastic Limit	
Plastic Index	

GRAIN SIZE PROPORTIONS, %

% GRAVEL (> 4.75 mm):	1.2
% SAND (75 µm to 4.75 mm):	12.1
% SILT (2 µm to 75 µm):	62.6
% CLAY (<2 µm):	24.1

SOIL DESCRIPTION:

Clayey Silt, Some Sand, Trace Gravel

MODERATE

REMARKS

Figure: 2

TESTED BY:Sarah PietrasikJunior Technician

REVIEWED BY:David McBay, CET.Laboratory Supervisor

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

353 Bridge Street East, Kitchener N2K 2Y5

60 Meg Drive, Unit 12, London N6E 3T6

440 Hardy Road, Brantford N3T 5L8

PROJECT NUMBER:	04-02200028.000	PROJECT NAME:	17 Highway Crescent, Courtland	CLIENT:	Stubbe's Property Development Inc
LAB NUMBER:	S-146	SAMPLE ID:	BH 7 SS 1	SAMPLE DEPTH:	2.5 - 5 '
SAMPLED BY:	Ed VanPuymbroeck, BSc	DATE RECEIVED:	February 18, 2022	DATE COMPLETED:	February 25, 2022

440 Hardy Road, Brantford N3T 5L8



GRAIN SIZE AND HYDROMETER ANALYSIS REPORT
LS-602, 702 & 703/704

PROJECT NUMBER:

04-02200028.000

PROJECT NAME:

17 Highway Crescent, Courtland

CLIENT:

Stubbe's Property Development Inc

LAB NUMBER:

S-147

SAMPLE ID:

BH 6 SS 3

SAMPLE DEPTH:

7.5 - 9 '

SAMPLED BY:

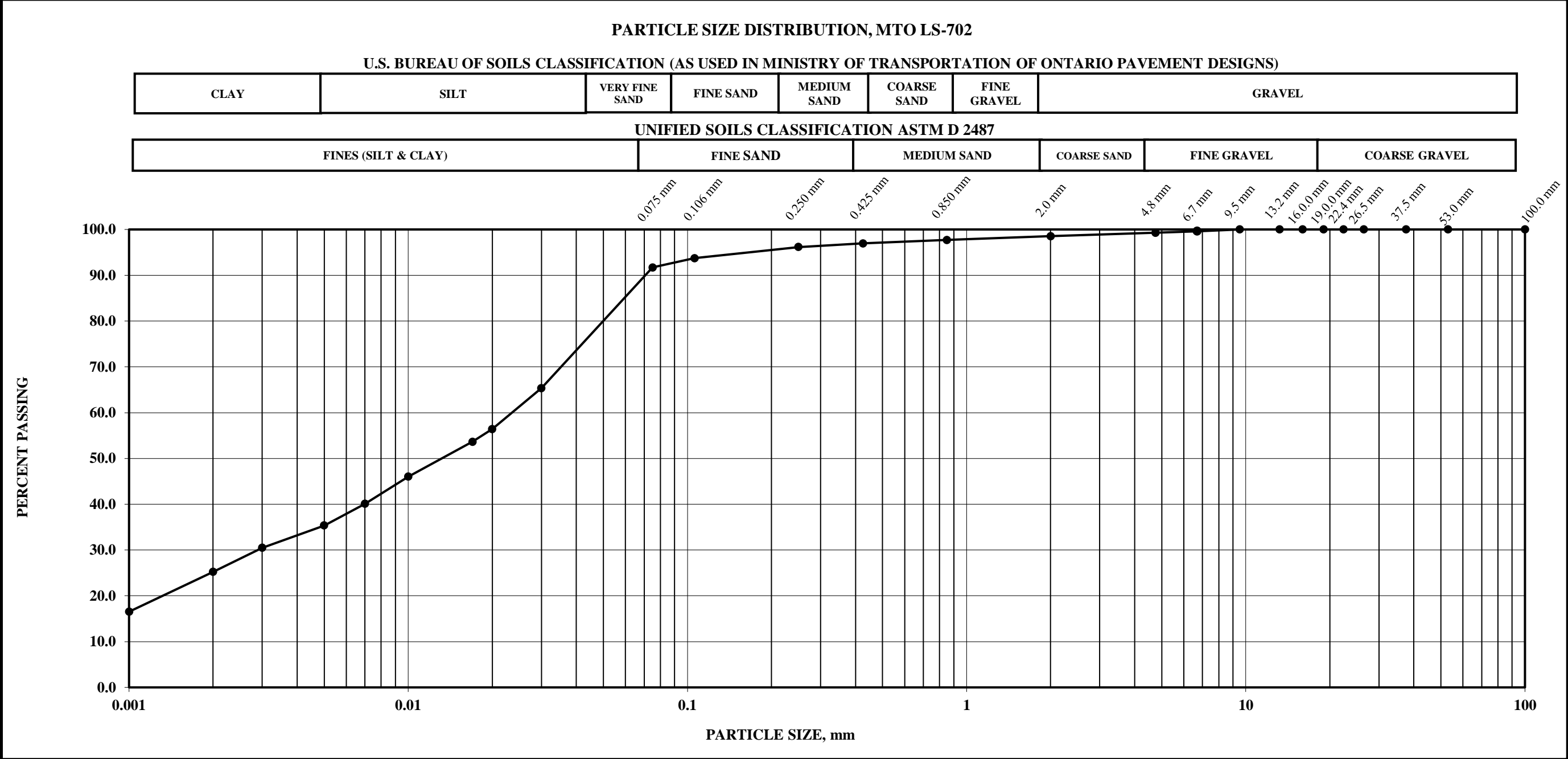
Ed VanPuymbroeck, BSc

DATE RECEIVED:

February 18, 2022

DATE COMPLETED:

February 25, 2022



COEFFICIENTS									
D60	0.024	D30	0.003	D10		Cc		Cu	

GRAIN SIZE ANALYSIS		HYDROMETER ANALYSIS	
SIEVE SIZE mm	% PASSING	DIAMETER mm	% PASSING
53	100.0	0.030	65.3
37.5	100.0	0.020	56.4
26.5	100.0	0.017	53.7
22.4	100.0	0.010	46.0
19	100.0	0.007	40.1
16	100.0	0.005	35.4
13.2	100.0	0.002	25.2
9.5	100.0	0.001	16.5
6.7	99.6	ATTERBERG LIMITS	
4.75	99.3		
2.00	98.5		
0.850	97.7	Liquid Limit	
0.425	96.9	Plastic Limit	
0.250	96.2		
0.106	93.7	Plastic Index	
0.075	91.7		

GRAIN SIZE PROPORTIONS, %	
% GRAVEL (> 4.75 mm):	0.7
% SAND (75 µm to 4.75 mm):	7.6
% SILT (2 µm to 75 µm):	66.5
% CLAY (<2 µm):	25.2
SOIL DESCRIPTION:	Clayey Silt, Traces of Sand and Gravel
HIGH	
REMARKS	

Figure: 4

TESTED BY:

Sarah Pietrasik
Junior Technician

REVIEWED BY

David McBay, CET.
Laboratory Supervisor

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

PROJECT NUMBER:	04-02200028.000	PROJECT NAME:	17 Highway Crescent, Courtland	CLIENT:	Stubbe's Property Development Inc
LAB NUMBER:	S-148/149	SAMPLE ID:	BH 3 SS 2	SAMPLE DEPTH:	5 - 7 '
SAMPLED BY:	Ed VanPuymbroeck, BSc	DATE RECEIVED:	February 18, 2022	DATE COMPLETED:	February 25, 2022

440 Hardy Road, Brantford N3T 5L8



ATTERBERG LIMITS REPORT

MTO LS-703/704

PROJECT NUMBER: 04-02200028.000

JOB NAME: 17 Highway Crescent, Courtland

CLIENT: Stubbe's Property Development Inc

LAB NUMBER: S-148/149

SAMPLE ID: BH 3 SS 2

SAMPLE DEPTH: 5 - 7 '

SAMPLED BY: Ed VanPuymbroeck, BSc

DATE RECEIVED: February 18, 2022

DATE COMPLETED: February 25, 2022

PLASTICITY INDEX

60

50

40

30

20

10

0

0

20

40

60

80

100

CL

CH

ML

MH

CL-ML

LIQUID LIMIT

ATTERBERG LIMIT / GRAINSIZE RESULTS

SUMMARY OF ATTERBERG AND MOISTURE CONTENT:

Liquid Limit, LL	21
Plastic Limit, PL	15
Plasticity Index, PI	6
In Situ Moisture Content (ASTM D2216) %	-

GRAINSIZE PROPORTION %

% GRAVEL (> 4.75 mm):	0.5
% SAND (75 µm to 4.75 mm):	6.5
% SILT (2 µm to 75 µm):	63.7
% CLAY (<2 µm):	29.3

SOIL DESCRIPTION

Clayey Silt, Traces of Sand and Gravel

USCS CLASSIFICATION

ML - CL

REMARKS

Figure: 6

Tested By: Sarah Pietrasik
Junior Technician

Reviewed By: David McBay, CET.
Laboratory Supervisor

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

353 Bridge Street East, Kitchener N2K 2Y5

60 Meg Drive, Unit 12, London N6E 3T6

440 Hardy Road, Brantford N3T 5L8





Working together with our community
to provide quality services.

Evaluation Form for Existing On-Site Sewage Systems

Date: July 2009

OFFICE USE ONLY		FILE No.:		DATE RECEIVED:	
PROPERTY INFORMATION		Municipal Address: #17 HIGHWAY CRESCENT COURTLAND			
Owner: STUBBS PROPERTY DEVELOPMENT		Lot: 166		Concession: SOUTH OF TALBOT ROAD	
Lot Area: 0.28 HA PROPOSED	Lot Frontage: 62.3 m	Assessment Roll No. 541-020-63400-0000			
PURPOSE OF EVALUATION	<input checked="" type="checkbox"/> Consent <input type="checkbox"/> Minor Variance <input checked="" type="checkbox"/> Site Plan <input checked="" type="checkbox"/> Zoning <input type="checkbox"/> Other _____				
BUILDING INFORMATION	<input checked="" type="checkbox"/> Residential <input type="checkbox"/> Commercial <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural				
Building Area: 2 1800ft ²	No. of Bedrooms: 3	No. of Fixture Units:	Is the building currently occupied? Yes / <input checked="" type="radio"/> No If No, how long? 6 mths		
EVALUATOR'S INFORMATION	Evaluator's Name: ANDREW MALCOLM		Company Name: MALCOLM HOLDINGS INC		
Address: 385432 HWY 59 BURGESSVILLE	Postal Code: N0S 1C0		Phone: 519-424-5000		
Email: info@malcolmhldginc.ca	BCIN # 34822				
SITE EVALUATION	Ground Cover (trees, bushes, grass, impermeable surface): GRASS			Soil Type: SANDY	
Site Slope: <input type="checkbox"/> Flat <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Steep	Soil Conditions: <input type="checkbox"/> Wet <input checked="" type="checkbox"/> Dry		Depth of Water Table: 5.33 ft.		
Surface Discharge Observed: Yes <input checked="" type="radio"/> No	Odour Detected: Yes <input checked="" type="radio"/> No		Current Weather (at time of evaluation): SUNNY		
SYSTEM EVALUATION	Class of System: <input type="checkbox"/> 1 (Privy) <input type="checkbox"/> 2 (Greywater) <input type="checkbox"/> 3 (Cesspool) <input checked="" type="checkbox"/> 4 (Leaching Bed) <input type="checkbox"/> 5 (Holding Tank)				
Tank: <input checked="" type="checkbox"/> Pre-cast <input type="checkbox"/> Plastic <input type="checkbox"/> Fibre Glass <input type="checkbox"/> Wood <input type="checkbox"/> Other _____		Size: 1000 Gal.		Pump: Yes <input checked="" type="radio"/> No	
Distribution System: Area: <input checked="" type="checkbox"/> Trench Bed <input type="checkbox"/> Filter Medium		No. of Tile Runs: 8	Total Length of Tile: 400'	Distance Between Tile Runs: 6'	
Tile Material: <input checked="" type="checkbox"/> PVC <input type="checkbox"/> Clay <input type="checkbox"/> Other _____		Ends: <input checked="" type="checkbox"/> Capped <input type="checkbox"/> Joined	Cover: <input type="checkbox"/> Filter Cloth <input checked="" type="checkbox"/> Sand <input checked="" type="checkbox"/> Top Soil <input checked="" type="checkbox"/> Seeded		
Setbacks:		Tank		Distribution Pipe	
Distance to Buildings & Structures (ft)		> 5'		30' FROM HOUSE	
Distance to Bodies of Water (ft)		NA		NA NO WATER	
Distance to Nearest Well (ft)		NO WELL / TOWN WATER		SAME	
Distance to Proposed Property Lines		Front 80' Rear 50' Side 60' Side 60'		Front 110' Rear 40' Side 40' Side 40'	

OVERALL SYSTEM RATING☒ System Working Properly / No Work Required☐ System Functioning / Maintenance Required☐ System Not Functioning / Minor Repair Required☐ System Failure/Major Repair / Replacement RequiredNote:

Any repair/replacement of an on site sewage system requires a building permit. Contact the Norfolk County Building Division at (519) 426-5870 for more information.

Additional Comments:

ON JULY 4, 2022 EVERYTHING APPEARS TO BE IN GOOD WORKING CONDITION FOR THE CURRENT SEPTIC BED.

VERIFICATIONOWNER:

The owner is responsible for having a site evaluation conducted of the above mentioned property. Neither the evaluation nor the approval thereof shall in any way exempt the owner(s) from complying with the Ontario Building Code or any other applicable law.

I, * Mike Goor (the owner of the subject property) hereby authorize the above mentioned evaluator to act on my behalf with respect to all matters pertaining to the existing on-site sewage system evaluation.

* [Signature]
Owner Signature

* July 5/2022
Date

EVALUATOR:

1. I, ANDREW MALCOLM declare that this site evaluation is accurate as of the date of inspection. No determination of future performance can be made due to unknown conditions, future water usage over the life of the system, abuse of the system and/or inadequate maintenance, all of which may adversely affect the life of the system. This evaluation does not grant or imply any guarantee or warranty of the future performance of the sewage system. The undersigned takes no responsibility for the accuracy of existing or proposed property lines, whether measured or implied.

[Signature]
Evaluator Signature

July 4, 2022
Date

BUILDING DIVISION COMMENTS

Comments: _____

I, _____ have reviewed the information contained in this form as submitted.

Chief Building Official or designate

Date



On Site Sewage Disposal System Location Plan

DATE: July 4, 2022.

APPLICATION NUMBER: _____

OWNER: STUBBS PROPERTY DEVELOPMENT

EVALUATOR: ANDREW MALCOLM

PROPERTY ADDRESS: 17 HIGHWAY CRESCENT
COURTLAND ONT

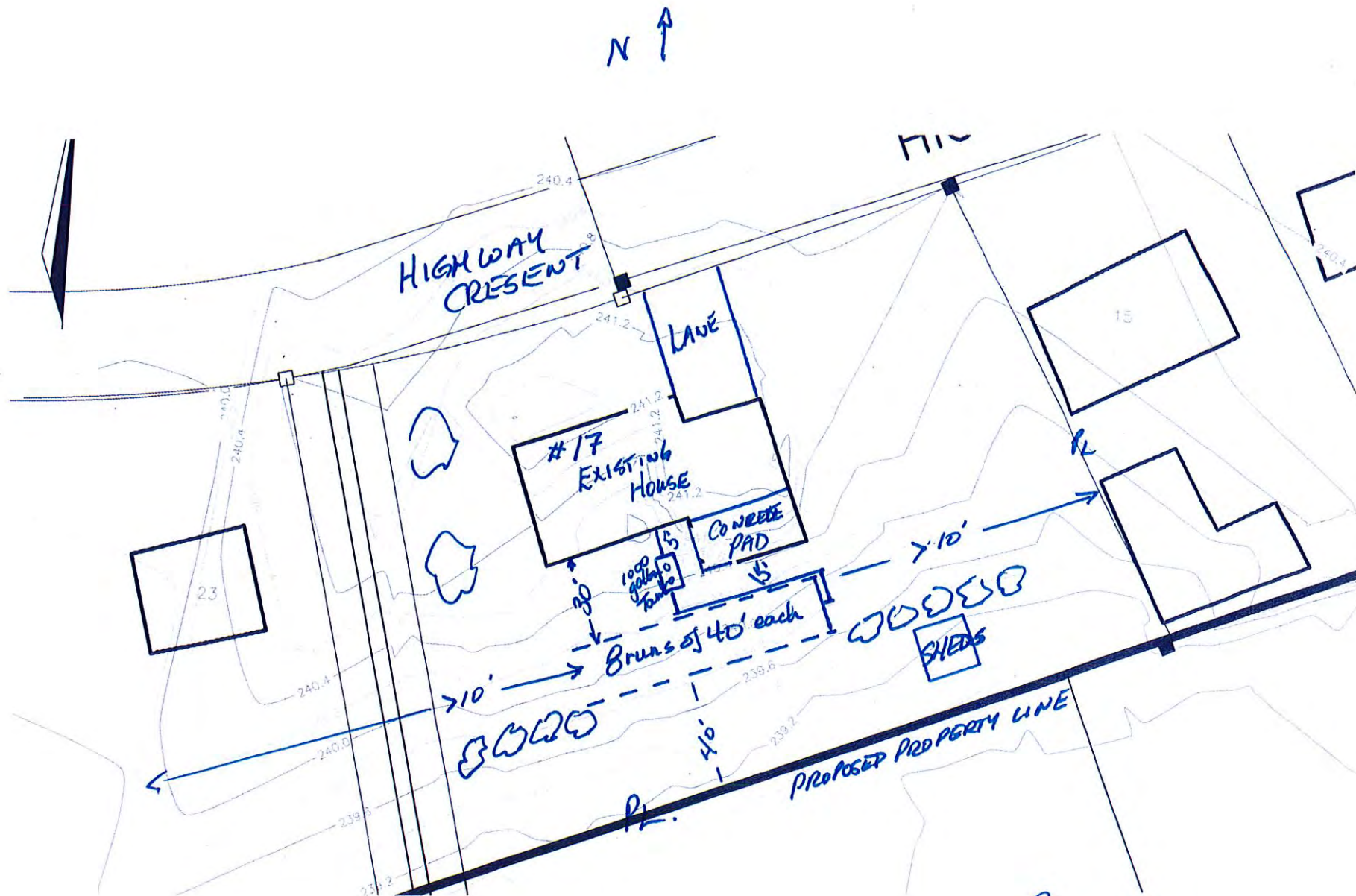
Bin # 12890

Please provide a DIMENSIONED sketch drawing indicating EXISTING AND PROPOSED property lines, existing roads and driveways, location of all existing buildings, location of existing wells, and location of existing septic tanks and tile beds.

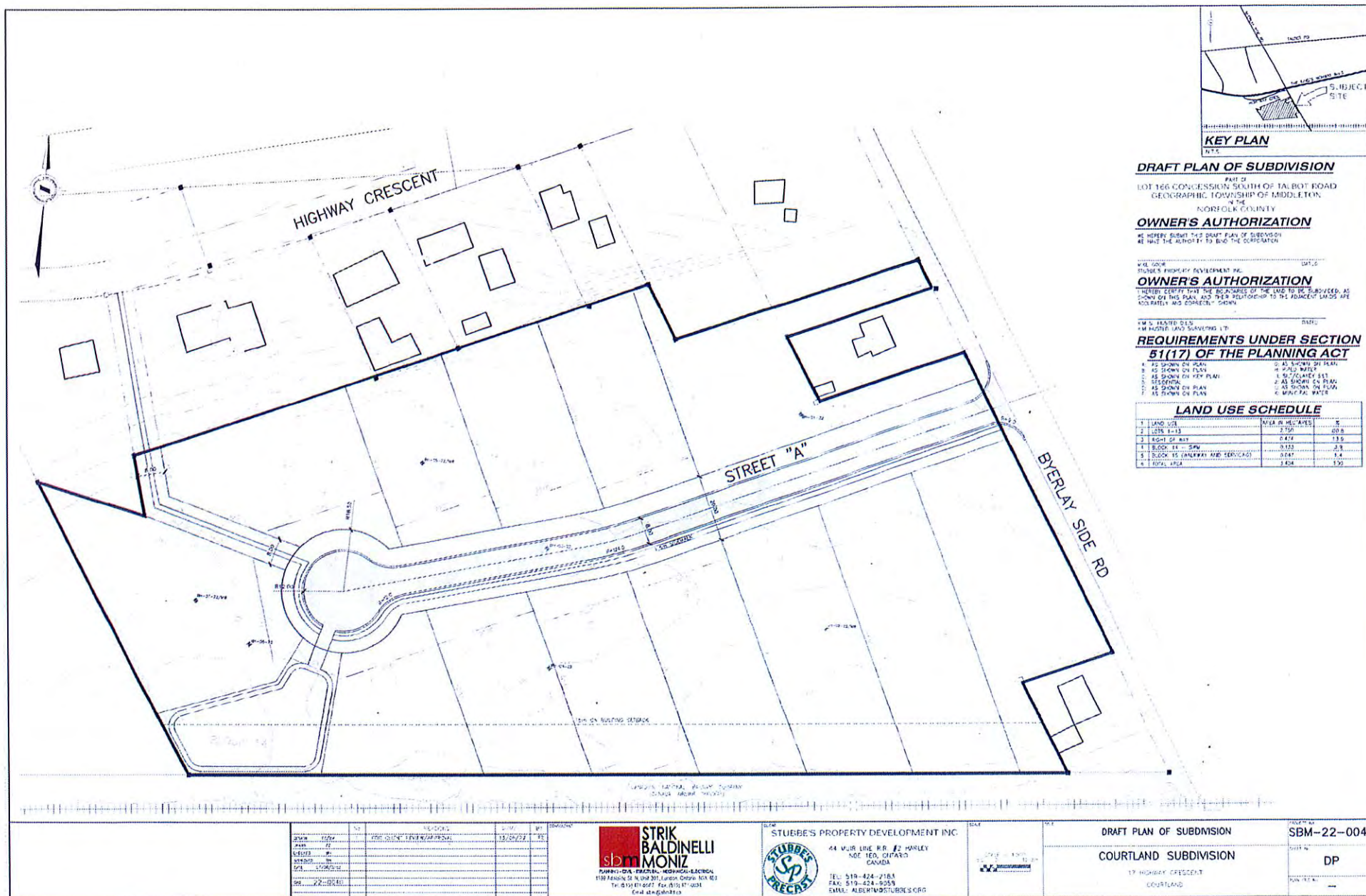
SEE ATTACHED.

PREPARED BY: Andrew Malcolm

NOTE: The above sketch is not to exact scale.



Prepared by
Andrew J. Falcione
July 4, 2022



<u>LAND USE SCHEDULE</u>			
1	2	3	4
1. LAND USE	2. AREA (ACRES)	3. DENSITY	4. TOTAL ACRES
2. LOTS 1-13	2.20	60.0	
3. RSMI OF R17	0.474	13.9	
4. BLOCK 11 - SW	0.153	3.9	
5. BLOCK 15 (HARVEST AND SERVICE)	0.047	1.4	
6. TOTAL AREA	2.874	100	



Instructions for Completing the Evaluation Form for Existing On-Site Sewage Systems

General Information Applicable to Sewage Evaluations:

1. Please complete the following form by checking appropriate lines and filling out blanks.
2. This Evaluation Form must be completed by a "Qualified" person engaged in the business of constructing on site, installing, repairing, servicing, cleaning or emptying sewage systems.
3. If sewage system malfunctions are found during an evaluation (surfacing or discharge of improperly treated sewage effluent) which indicate a possible health hazard or nuisance, orders may be issued for correction.
4. Evaluations should be scheduled accordingly so as not to delay the application process.
5. Completed Forms MUST be submitted as part of a "complete" Planning Application. Failure to meet this date may cause the application to be deferred.
6. Completed Forms must be returned to:

Building Division

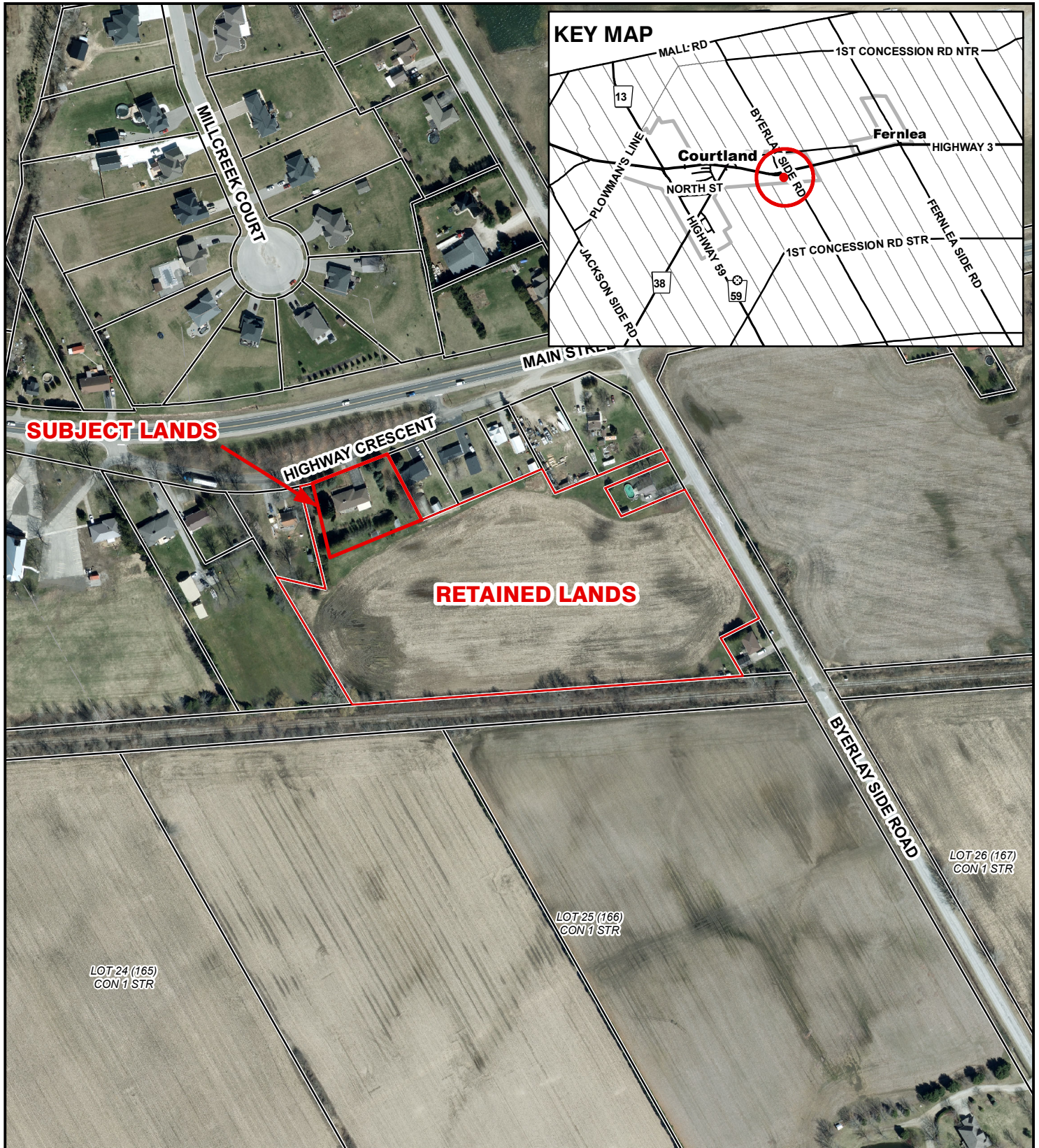
Simcoe Office

185 Robinson St. Suite 200
Simcoe, ON N3Y 2J4
Fax: (519) 427-5901

Langton Office

22 Albert St.
Langton, ON N3Y 2J4
Fax: (519) 875-4789

7. Evaluation Forms will become part of the property records of Norfolk County Building Division.
8. No On-Site Sewage System Evaluation will be conducted where:
 - snow depth exceeds two (2) inches, or
 - grass and brush exceeds twelve (12) inches
9. The comments that are given as a result of this evaluation are rendered without complete knowledge or observation of some of the individual components of the sewage system and applies only to the date and time the evaluation is conducted.



Legend

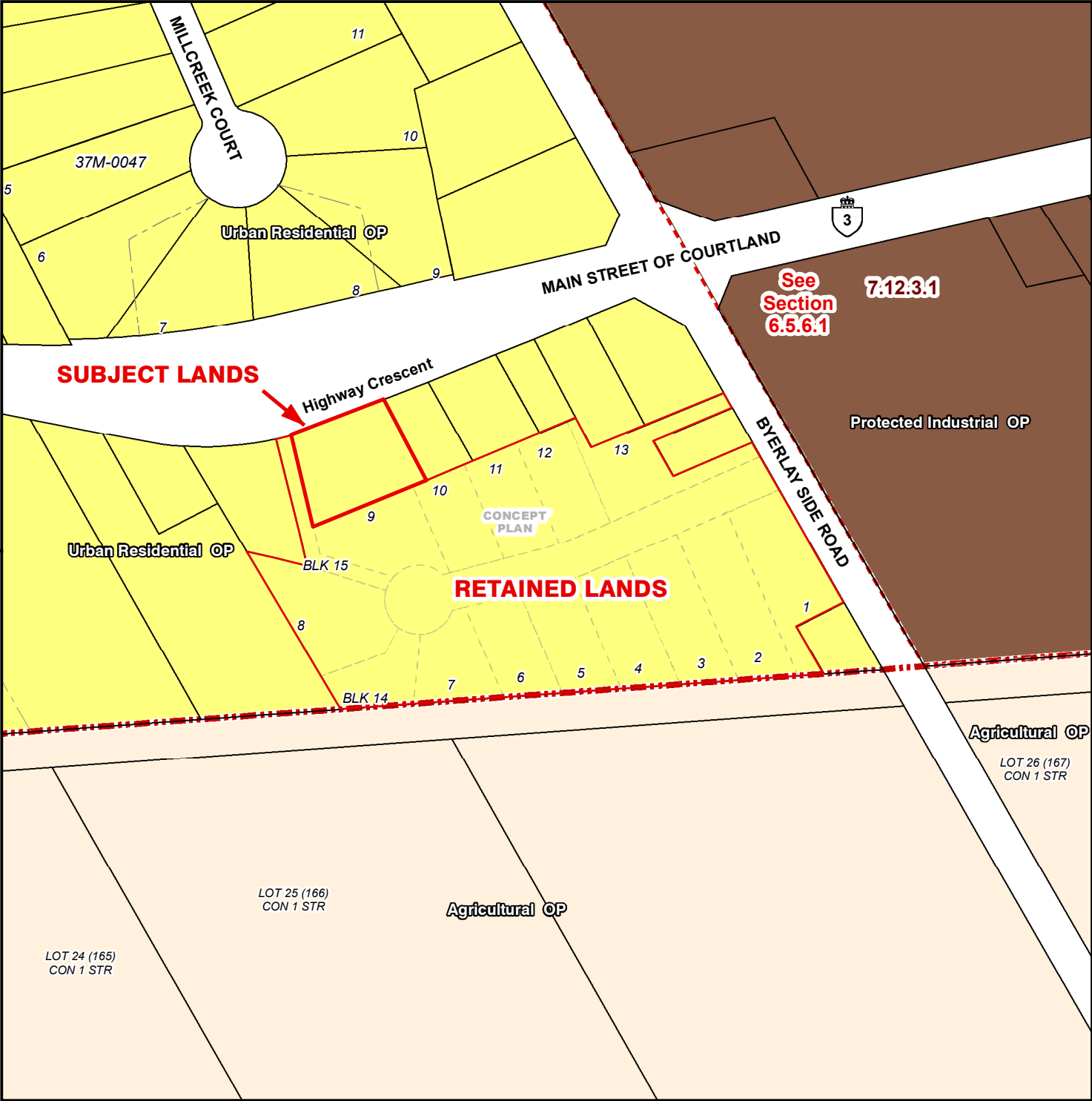
- Subject Lands
- Lands Owned

2020 Air Photo

12/14/2022



25 12.5 0 25 50 75 100 Meters



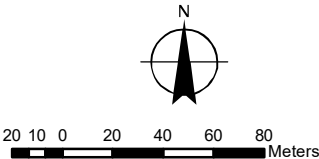
Legend

- Subject Lands
- Lands Owned

Official Plan Designations

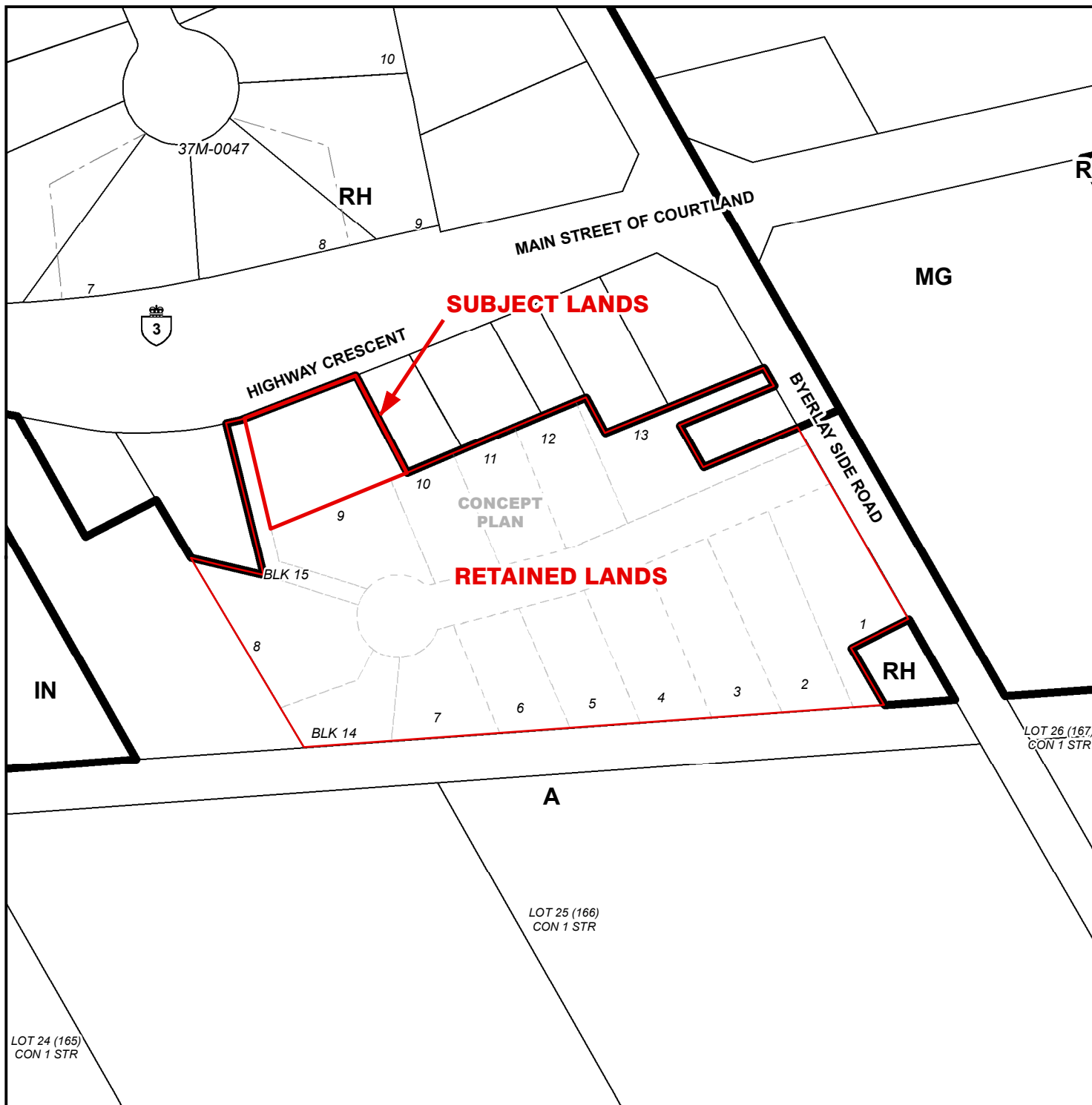
- Agricultural
- Urban Residential
- Protected Industrial
- Special Policy Area
- Urban Area Boundary

12/14/2022



MAP C
ZONING BY-LAW MAP
 Geographic Township of MIDDLETON

BNPL2022305



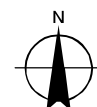
LEGEND

- Subject Lands
- Lands Owned

ZONING BY-LAW 1-Z-2014

12/14/2022

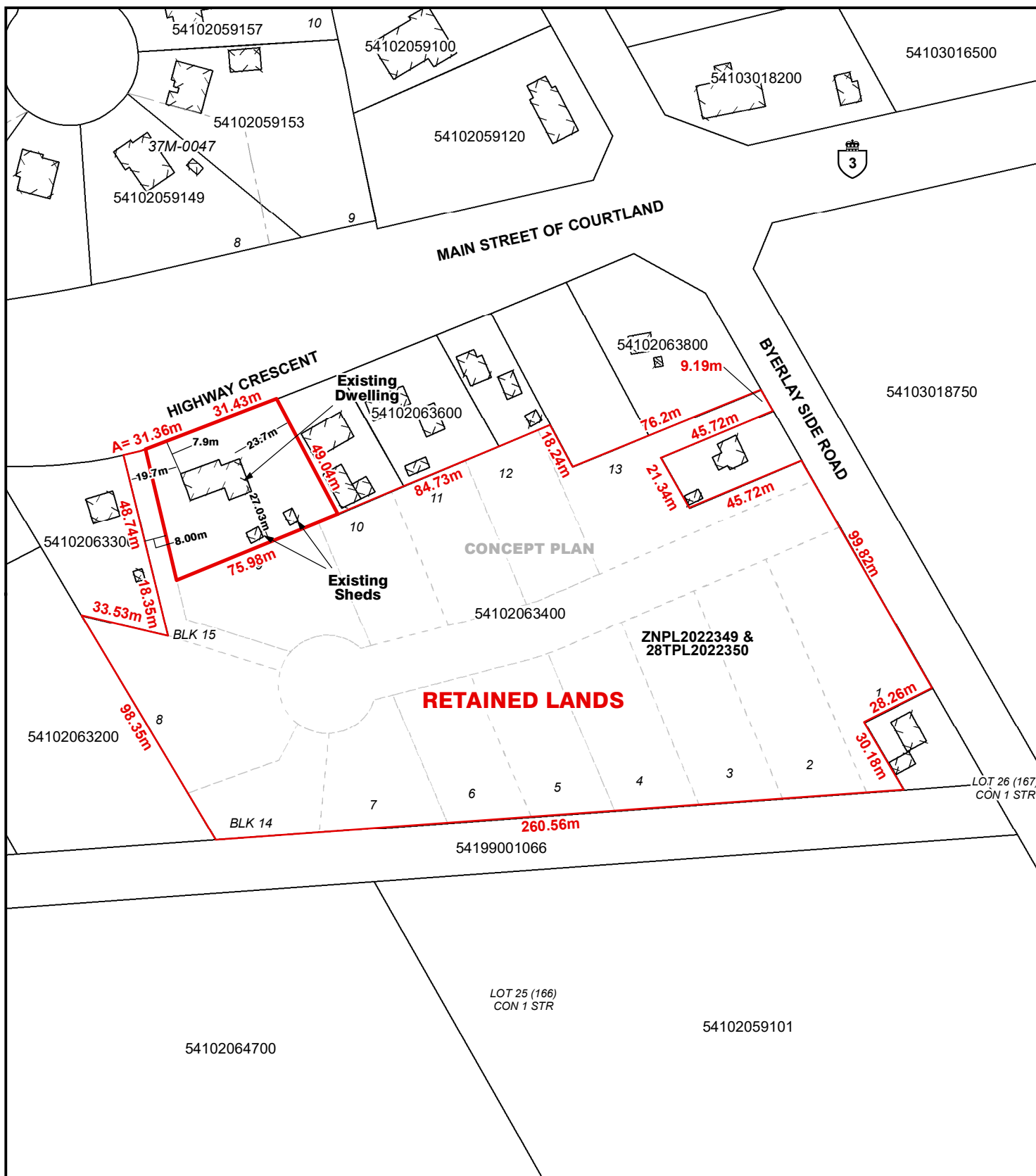
- (H) - Holding
- A - Agricultural Zone
- MG - General Industrial Zone
- RH - Hamlet Residential Zone
- IN - Neighbourhood Institutional Zone



20 10 0 20 40 60 80 Meters

CONCEPTUAL PLAN

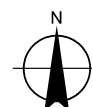
Geographic Township of MIDDLETON



Legend

- Subject Lands
- Lands Owned

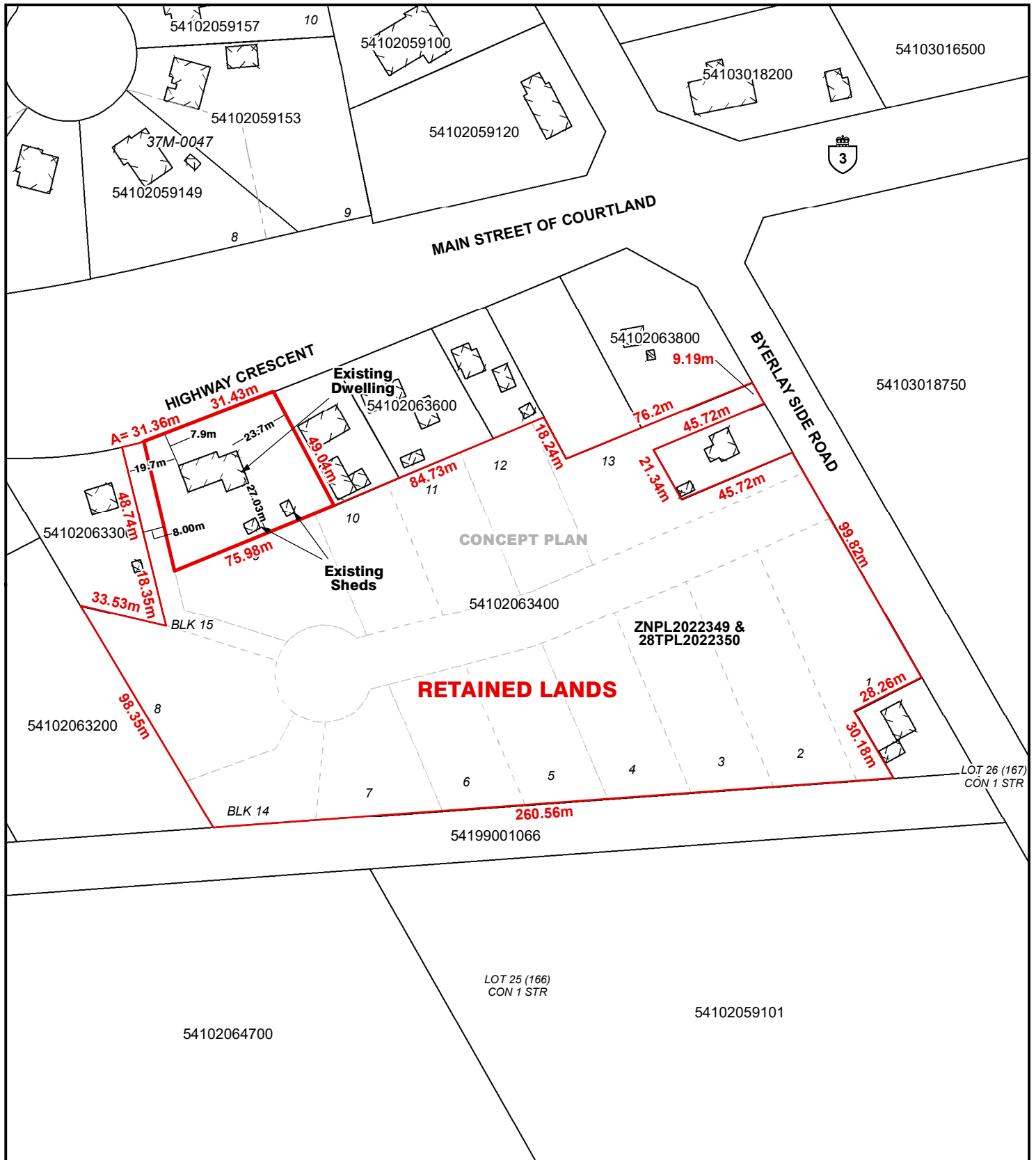
12/14/2022



20 10 0 20 40 60 80 Meters

CONCEPTUAL PLAN

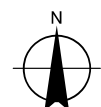
Geographic Township of MIDDLETON



Legend

- Subject Lands
- Lands Owned

12/14/2022



20 10 0 20 40 60 80 Meters