

June 20, 2021

Rob Stovel
Stovel and Associates Inc.
651 Orangeville Road
Fergus, Ontario
N1M 1T9

sent via email to: stovel.associates@sympatico.ca

Dear Mr. Stovel:

**RE: Audrey Meadows Subdivision
Wellington County Official Plan – Section 4.9.7 Paris and Galt Moraine Policy Area**

As requested, we are providing an analysis of site characteristics and proposed development objectives related to meeting the current Wellington County Official Plan Section 4.9.7 Paris and Galt Moraine Policy Area criteria, as part of the County Official Plan Amendment application.

This site scale assessment is intended to determine if the proposed land use can meet the groundwater and surface water protection objectives set out for Paris and Galt Moraine Policy Area, subject to more detailed assessments that are expected as part of any future Zoning applications, Draft Plan approvals and/or subdivision agreements.

Audrey Meadows is located within Lot 17, 18 & 19, Concession 8, Township of Puslinch, Wellington County. The application consists of a rounding out and infill north of the existing subdivision (Audrey Meadows), with the development characterized as relatively small in scale, consisting of a 29 lot concept plan. The study site (subject development) location is shown on **Figure 1** (attached).

Extensive hydrogeological analysis has been completed for the existing Audrey Meadows subdivision. Our current analysis and summary for the study site is based on a review of available data, including published geological mapping, characterization and impact assessments (e.g. Naylor Engineering Associates Ltd (Naylor), October 2004: *Geotechnical Investigation, Proposed Audrey Meadows Estate Subdivision, Part of Lots 18 and 19 Concession 8, Township of Puslinch, Ontario*; and, Hydrogeology Consulting Services (HCS), April 9, 2021: *2019-2020 Annual Report, Groundwater And Surface Water Monitoring Program, Audrey Meadows Subdivision, Lot 18 & 19, Concession 8, Township of Puslinch, Ontario*).

Wellington County Official Plan Paris and Galt Moraine Policy Area

The Wellington County Official Plan (updated January 8, 2021) Section 4.9.7 states:

The Paris and Galt Moraines are unique landforms. With their combination of soil types, numerous land surface depressions, and higher elevations relative to surrounding lands, they function as a support for hydrologic processes and features that influence groundwater and surface water resources at regional and local scales. These processes and features include:

- *groundwater recharge;*
- *groundwater storage;*

- *surface water detention;*
- *groundwater potential;*
- *baseflow to streams;*
- *springs; and*
- *watershed divides for groundwater and surface water*

On the moraines, and in catchment areas influenced by the moraines, there are cold-water fisheries, wetlands, private wells, farms, industrial and commercial businesses, mineral aggregate operations, and municipal water supplies that rely, either directly or indirectly, on these moraine processes and features. Notwithstanding the policies of this Section, portions of the Paris Galt Moraine Policy Area within the Town of Erin are located within a WHPA-Q1/Q2 vulnerable area as identified on Schedule B2 of this Plan, and shall be subject to the applicable policies of the CTC Source Protection Plan and Section 4.9.5 of this Plan.

4.9.7.1 Objectives

The Paris and Galt Moraine policies are intended to:

- *protect moraine processes and features in order to maintain and where possible restore and enhance groundwater and surface water resources; and*
- *promote stewardship activities on the moraines that maintain, restore or enhance groundwater and surface water resources.*

4.9.7.2 Policy Direction

On lands in the Paris and Galt Moraines Policy Area on Schedule 'B' that lie outside of Wellhead Protection Areas, the following shall apply:

- a) Large scale development proposals including intensive recreation, mineral aggregate operations, new rural employment area designations, and urban boundary expansions will be required to demonstrate that ground and surface water functions will be maintained, and where possible, restored and enhanced;*
- b) Small scale developments that do not rely on significant site alterations will not normally be required to demonstrate protection of the moraines. Where planning approvals for small scale developments are needed, best practices for alteration will be required to reduce or eliminate cut and fill activities that would fill in land surface depressions.*
- c) Agriculture is a major activity on the moraines and is an accepted and supported use of land. The County will encourage best practices for agriculture by developing and supporting stewardship programs.*

Although from our understanding the subject development is relatively small in scale and does not include intensive recreation, mineral aggregate operations, new rural employment area designations, or urban boundary expansions, this review will address the protection of groundwater and surface water resources.

Site Characteristics

The development area under consideration consists primarily of the remaining agricultural fields within the ownership parcel. The proposed development site and fabric is shown on **Figure 2** (attached). The remainder of the ownership parcel consists of wooded area.

The study site is located at the southern edge of the Paris Moraine, as defined by available Quaternary (geology) mapping. Surficial soils are described as (Wentworth) Till (stone-poor, sandy silt to silty sand-textured till on Paleozoic terrain). Extensive drilling and test pitting in 2004 within the existing subdivision confirmed the local overburden consist of: *silt, sand, sand and gravel, and glacial till* (Naylor, 2004). Drilling at 4 locations in 2019 (HCS, 2021) within the current proposed development area reported primarily sand and gravel with some silty clay layers. Drilling locations and borehole logs (as reported by HCS, 2021) are attached for reference in **Appendix A**.

According to mapping available at the Grand River Conservation Authority (GRCA) online mapping website (available at: <https://data.grandriver.ca/applications.html>), Ministry of Natural Resources and Forestry (MNRF) identified wetlands are reported primarily within the wooded areas (generally outside of, and northwest to southwest of, the development area).

According to available GRCA mapping, topography within the subject development area varies from a high of approximately 340 - 343 metres above sea level (mASL) along a north-south trending knoll/ridge system bisecting the property, to 330 – 334 mASL at the east corner and southwest edges of the proposed development area. The reported (preliminary) site topography is shown on **Figure 3** (attached). Based on the topographic mapping, the closest wetlands occur at elevations between approximately 330 and 336 mASL. The wetlands are associated with a tributary of Mill Creek, which flows generally north to south through the woodlot.

The reported topographic contours indicate that the site has characteristics of hummocky terrain (as expected in the moraine), with several enclosed drainage areas within and adjacent to the site. A preliminary interpretation of overland flow direction, based on the GRCA contours, and potential enclosed drainage areas is shown on **Figure 3**. As shown, most drainage at the site appears to be directed southward, toward the existing development area. Some small portions of the site may have the potential to contribute flow to the woodlot/wetland areas. Additional stormwater management studies, required as part of any the future Zoning and Draft Plan approval process, will provide a more detailed analysis of overland flow at the site and provide recommendations as needed to maintain both on-site recharge and off-site discharge conditions.

The water table elevation and groundwater flow direction has been characterized as generally north to south across the property (HCS, 2021, see **Appendix A**). Shallow groundwater flow is generally from the creek/wetland system north of the site toward the existing subdivision south of the site. The reported groundwater elevations and flow direction indicates the creek/wetland system is a losing feature which provides a groundwater recharge function.

Based on the reported site characteristics the subject development will have a groundwater recharge function, supporting the southward shallow groundwater flow system that moves below the existing subdivision and toward distance surface water features. There does not appear to be any groundwater contribution from the proposed development area toward the adjacent surface water features to the north. Based on a preliminary review of the reported site topography there may be some potential surface water runoff from the site to the woodlot/wetlands.

GRCA online mapping indicates the annual recharge rate at the site is on the order of 357 mm/yr, which is considered reasonable given the surficial soils, vegetative cover and topographic slope. GRCA indicates annual runoff volumes of 0 mm/yr, which is likely a low estimate.

The annual groundwater monitoring program (HCS, 2021) provides September 2019 and September 2020 water quality sampling results at BH03-19 and BH04-19, located on the southeast edge of the subject development area. A summary of the results is included in **Appendix A**. Reported nitrate concentrations range from approximately 6 to 7 mg/L at BH03-09, to 7 to 8 mg/L at BH04-19. Based

on the monitor location and land use, the elevated nitrates are likely a result of agricultural fertilizer use on the farm fields. Similar sampling completed at the south (downgradient) edge of the existing subdivision area (BH01-19 and BH02-19) reports nitrate concentrations on the order of <0.1 to 4 mg/L, indicating that the residential development has decreased nitrate loading at the site, and, that natural recharge significantly dilutes nitrate concentrations across the site.

Surface water sampling of Mill Creek also occurs upstream and downstream of the Audrey Meadows development area. Observed nitrate concentrations are low at the creek (0.5 mg/L or less). Some slightly elevated Total Phosphorus (above PWQO limits) are observed at the upstream location, but not at the downstream location. The Total Phosphorus loading at the creek is therefore related to upstream land-use, potentially agricultural inputs.

Proposed Development

The proposed development would create an additional 29 residential lots, each with a minimum area of 3,000 m², within an overall area of approximately 12.1 hectares (ha). Approximately 2.4 ha is designated as open space. Each lot would be serviced with a private well and individual (expected tertiary treatment level) septic system. The proposal includes a 0.58 ha stormwater management and infiltration area (Block B) and several open space or ecological enhancement areas.

It is our understanding that the engineering development plan for the site would:

- minimize landform alteration (e.g. cut and fill that would fill in depressions);
- control and detain runoff according to applicable standards;
- maintain or improve surface water quality and quantity through stormwater management;
- maintain groundwater quantity or promote infiltration recharge through the use of applicable Low Impact Development (LID) type controls; and,
- maintain or improve groundwater quality through enhanced septic treatment (similar to the existing development).

In addition, it is our understanding that standard vertical separation distances, for example between the water table and septic systems, infiltration features, foundations, etc., will be incorporated into any future development plan. This information would be expected from future detailed assessments that are expected as the development application process moves forward.

The use of individual drilled bedrock water wells for residential supply is an established practice in this area and the large lot sizes will allow standard separation distance requirements to be met. We recommend the continued use of bedrock wells to ensure capacity and to reduce potential for influence from surface water features or septic systems. The bedrock is known to be protected by an overlying till unit in this area (e.g. at the existing subdivision area). The use of wells for water supply will not significantly affect groundwater volumes. Most of the water taken from an individual well is re-infiltrated through the septic system, and therefore does not represent a consumptive use.

The following general nitrate loading calculation is provided to give context to the consideration of groundwater and surface water resource protection. Given 29 lot subdivision with individual tertiary treatment septic systems (1,000 L/day) achieving 10 mg/L nitrate concentration at the septic bed, the daily nitrate loading would be expected to be 290,000 mg/day. Assuming 0.357 m/yr recharge (maintained post development) over 12.1 ha, and incorporating septic volumes, total site recharge would be 147,250 L/day. Therefore expected nitrate loading due to the proposed development would result in nitrate concentrations of 1.97 mg/L, significantly less than observed currently. Even assuming

background concentrations decline to that observed downgradient of the existing subdivision (4 mg/L or less) as agricultural loading is eliminated at the site, the resulting overall nitrate concentration at the site related to the proposed septic systems would be lower than the existing condition. Therefore groundwater and surface water quality within the moraine would be both protected and enhanced.

Policy Targets and Development Design

With regard to the Paris and Galt Moraine Policy objectives to *protect moraine processes and features in order to maintain and where possible restore and enhance groundwater and surface water resources*, the following discussion is provided:

➤ *groundwater recharge*

Given the relatively large individual lot sizes and overall proposed layout, groundwater recharge within the proposed development area can be maintained and enhanced through standard LID stormwater management controls, similar to the existing adjacent subdivision. The sandy soils at the site can be used for either simple lot-level controls (downspout directed to rear yard) or to allow the development of a communal stormwater retention and infiltration area. We note that a 0.58 ha stormwater management and infiltration area is proposed, and that soil and groundwater conditions in that area (see BH04-19 log) indicate requirements for LID type infiltration facilities can likely be met. Detailed stormwater management needs and LID design specifications are expected to be assessed through further studies that will be required as part of future Zoning and Draft Plan approvals.

➤ *groundwater storage*

Given standard development specifications and controls, no direct change in groundwater storage would be expected due to the proposed site development. By maintaining overall recharge rates at the site, groundwater storage would also be maintained. The use of individual drilled bedrock wells for water supply will also not result in any negative effect to groundwater volumes or storage.

➤ *surface water detention*

Surface water detention should be maintained by minimizing landform alteration. Given the large lot sizes proposed, the relative disturbance due to roadways, driveways and building footprints would be reduced. Existing enhanced recharge areas associated with enclosed drainage are located at the rear of the proposed lot fabric, therefore can be protected. Specific controls and recommendations should be further analyzed through the expected geotechnical engineering and stormwater management studies that are standard conditions of development approval.

➤ *groundwater potential*

No changes to groundwater potential (assumed lateral or vertical gradient) are associated with the proposed development. Water table elevations and flow directions would be maintained through standard site development controls.

➤ *baseflow to streams, springs*

By maintaining site recharge the baseflow to local streams, and or any associated springs, would be maintained. We note that shallow groundwater flow at the site does not contribute to

the adjacent wetland/creek system. Groundwater flow at the site contributes to the stream system south of the existing subdivision. Ongoing monitoring related to the existing subdivision indicates no significant impact to groundwater or surface water systems.

➤ *watershed divides for groundwater and surface water*

We expect that local surface water drainage patterns will be respected through any detailed development design and associated stormwater assessment/management planning. Development of this site does not have the potential to significantly alter watershed scale surface water divides. Similarly, by maintaining recharge groundwater flow patterns would also be maintained.

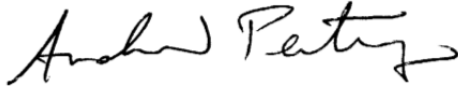
In addition, as shown by the monitoring program associated with the existing subdivision area, by lowering agricultural loadings and using advanced (tertiary) septic systems, groundwater quality at the site can be improved. This would be expected to enhance the quality of surface water systems, including streams and wetlands, within the Paris and Galt Moraine area.

Conclusion

Based on the site characteristics, current development proposal and expected implementation of standard development controls, the proposed development can be expected to meet the Paris and Galt Moraine Policy objectives to *protect moraine processes and features in order to maintain and where possible restore and enhance groundwater and surface water resources.*

If you have any questions, or require further information, please do not hesitate to contact us.

Sincerely,



Andrew Pentney, P.Geol.






Hydrogeologist

Attached: Figure 1: Site Location
 Figure 2: Proposed Development
 Figure 3: GRCA Topography
 Appendix A: Groundwater Monitoring Results



Figure 1:
Proposed Development
Site Location

Legend

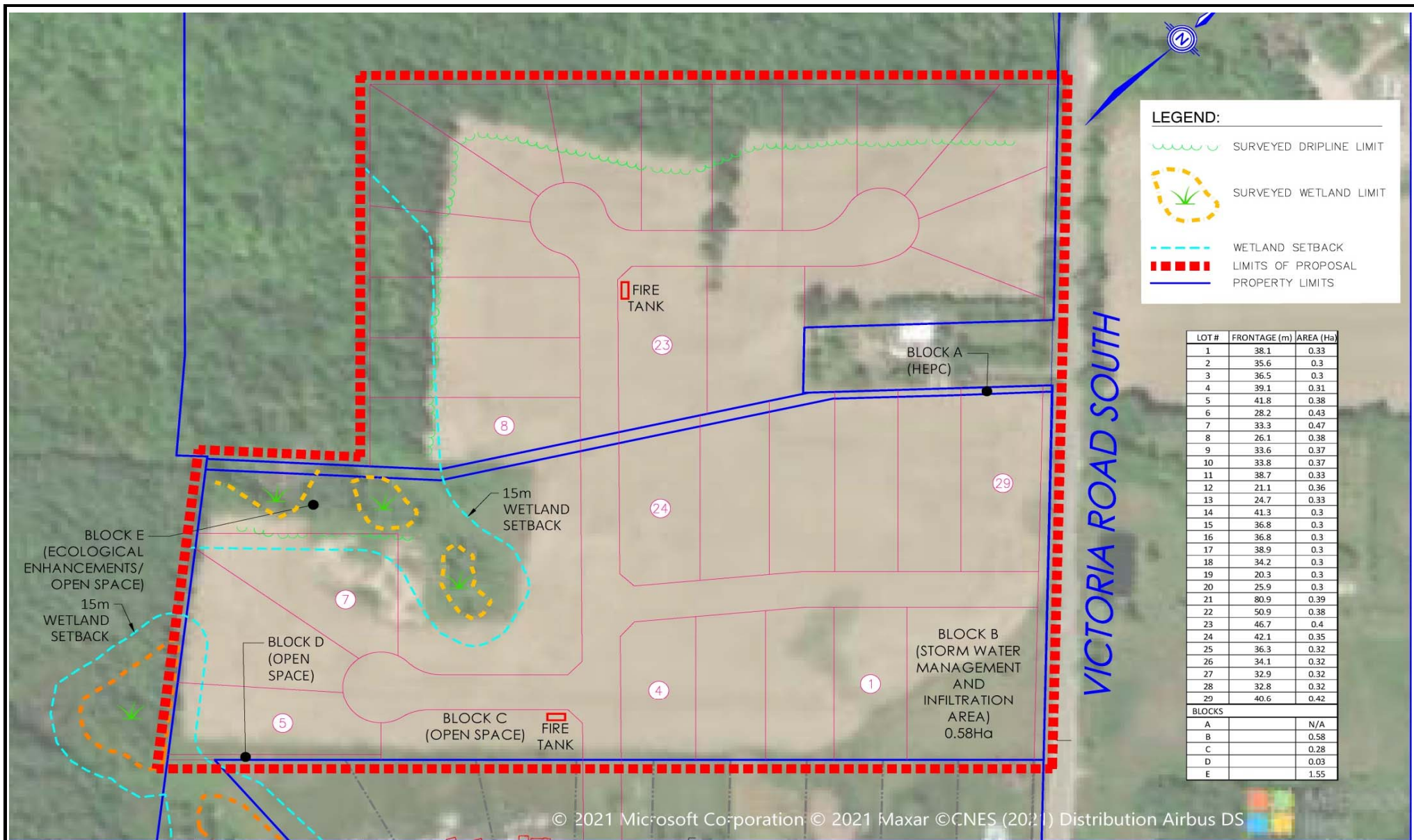
-  Municipal Boundary (GRCA)
-  Watercourse - Local (GRCA)
-  Parcel - Assessment Public (MPAC/MNRF)
-  Waterbody - Local (GRCA)
-  Great Lakes - Local (GRCA)



Groundwater Science Corp.
Paris and Galt Moraine
Policy Assessment

Modified From:
GRCA as noted below

Copyright Grand River Conservation Authority, 2021.
Disclaimer: This map is for illustrative purposes only. Information contained herein is not a substitute for professional review or a site survey and is subject to change without notice. The Grand River Conservation Authority takes no responsibility for, nor guarantees, the accuracy of the information contained on this map. Any interpretations or conclusions drawn from this map are the sole responsibility of the user.
The source for each data layer is shown in parentheses in the map legend. For a complete listing of sources and citations go to: <https://maps.grandriver.ca/Sources-and-Citations.pdf>



LEGEND:

- SURVEYED DRIPLINE LIMIT
- SURVEYED WETLAND LIMIT
- WETLAND SETBACK LIMITS OF PROPOSAL
- LIMITS OF PROPOSAL
- PROPERTY LIMITS

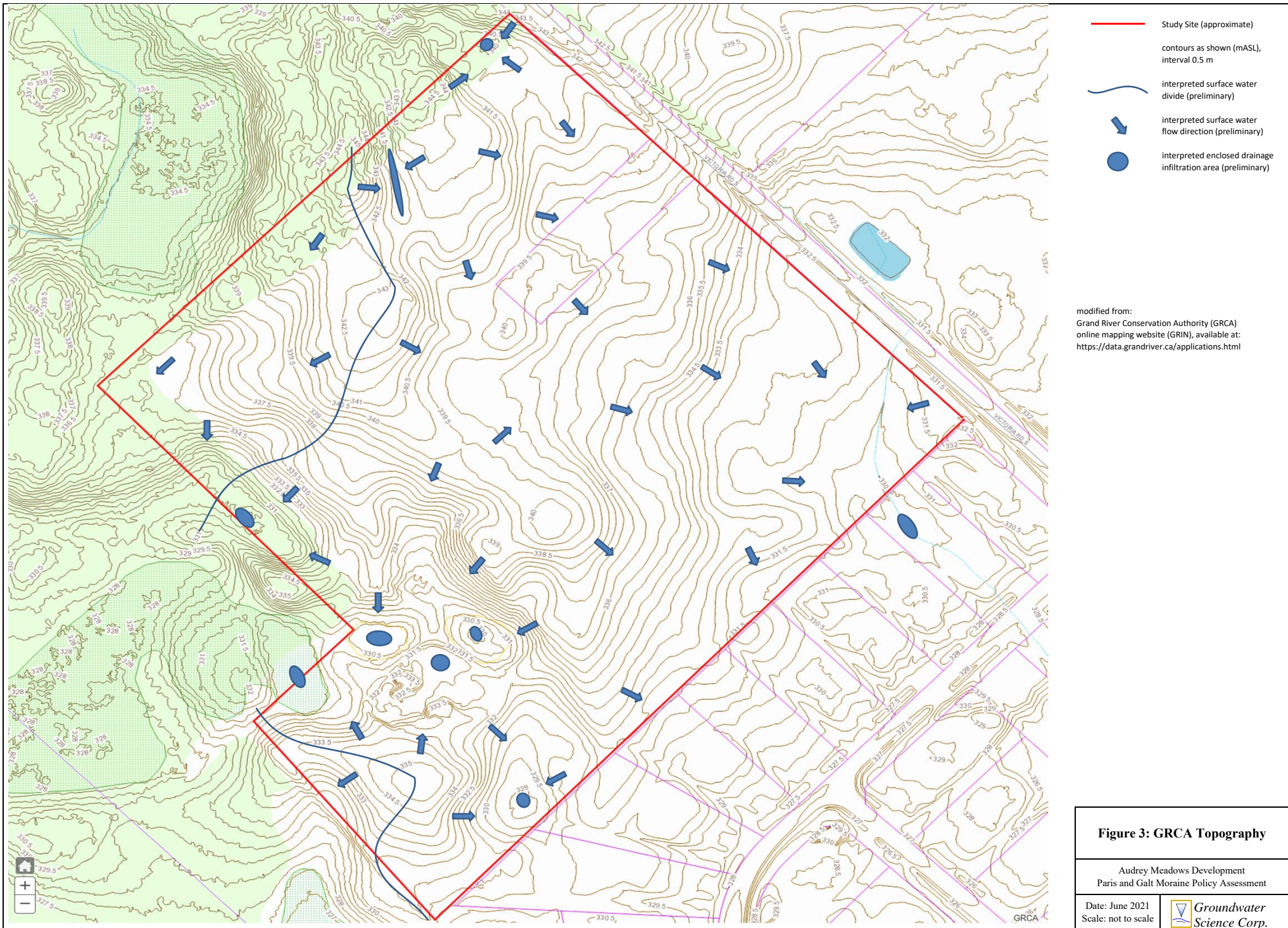
LOT #	FRONTAGE (m)	AREA (Ha)
1	38.1	0.33
2	35.6	0.3
3	36.5	0.3
4	39.1	0.31
5	41.8	0.38
6	28.2	0.43
7	33.3	0.47
8	26.1	0.38
9	33.6	0.37
10	33.8	0.37
11	38.7	0.33
12	21.1	0.36
13	24.7	0.33
14	41.3	0.3
15	36.8	0.3
16	36.8	0.3
17	38.9	0.3
18	34.2	0.3
19	20.3	0.3
20	25.9	0.3
21	80.9	0.39
22	50.9	0.38
23	46.7	0.4
24	42.1	0.35
25	36.3	0.32
26	34.1	0.32
27	32.9	0.32
28	32.8	0.32
29	40.6	0.42
BLOCKS		
A		N/A
B		0.58
C		0.28
D		0.03
E		1.55

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PING, JUNE 2021 N ENVIRONMENTAL, 2021 PNE LIMITS - SA/RESL, MAY 2021				PROPOSED RESIDENTIAL DEVELOPMENT PARTS 17,18 & 19, CONCESSION 8 TOWNSHIP OF PUSLINCH	AUDREY MEADOWS LTD. P.O. BOX 1805 GUELPH, ONTARIO N1H 7A1	PROJECT No A2680		SCALE: 1:1000 UNLESS OTHERWISE SHOWN
					PROPOSED LOT FABRIC PLAN	DESIGNED BY: C.J.D.W. CHECKED BY: P.F.Z. APPROVED BY: P.F.Z. DATE: APRIL, 2019		DRAWING NUMBER 02

modified from: Triton Engineering Services Limited (as shown)

Date: June 2021 scale: not to scale	Figure 2: Proposed Development Audrey Meadows Development Paris and Galt Moraine Policy Assessment



Appendix A: Groundwater Monitoring Results


Excerpts from:

Hydrogeology Consulting Services (HCS)
April 9, 2021
*2019-2020 Annual Report,
Groundwater and Surface Water Monitoring Program,
Audrey Meadows Subdivision,
Lot 18 & 19, Concession 8,
Township of Puslinch, Ontario*



imagery from Google Earth © 2021

Drawing 2 - Site Plan
Audrey Meadows Subdivision - Puslinch

LEGEND	
	Borehole Location (approximate)

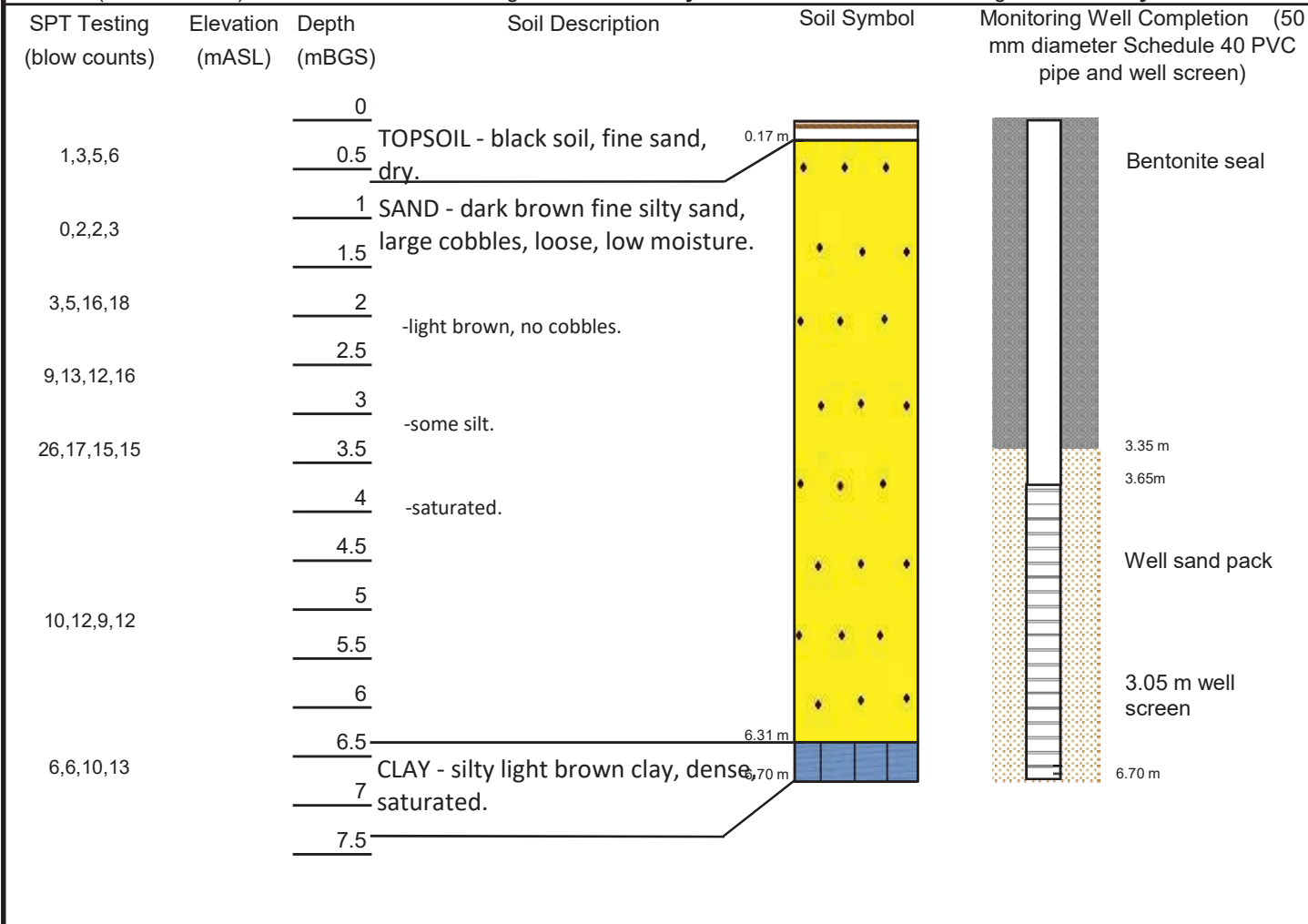


Drawn:	CFH
Date:	14-Feb-21

Project: **Proposed Land Development**
 Location: **Old Ruby Lane**
Guelph, Ontario

Name: **BH 03-19**
 Drill Date: **17-Sep-19**
 Field Tech: **SS**
 Drilling Method:
CMT 75 - Hollow Stem

Ground Elevation: **not surveyed**
 Location (UTM Zone 17): Easting: **not surveyed** Northing: **not surveyed**



Notes:

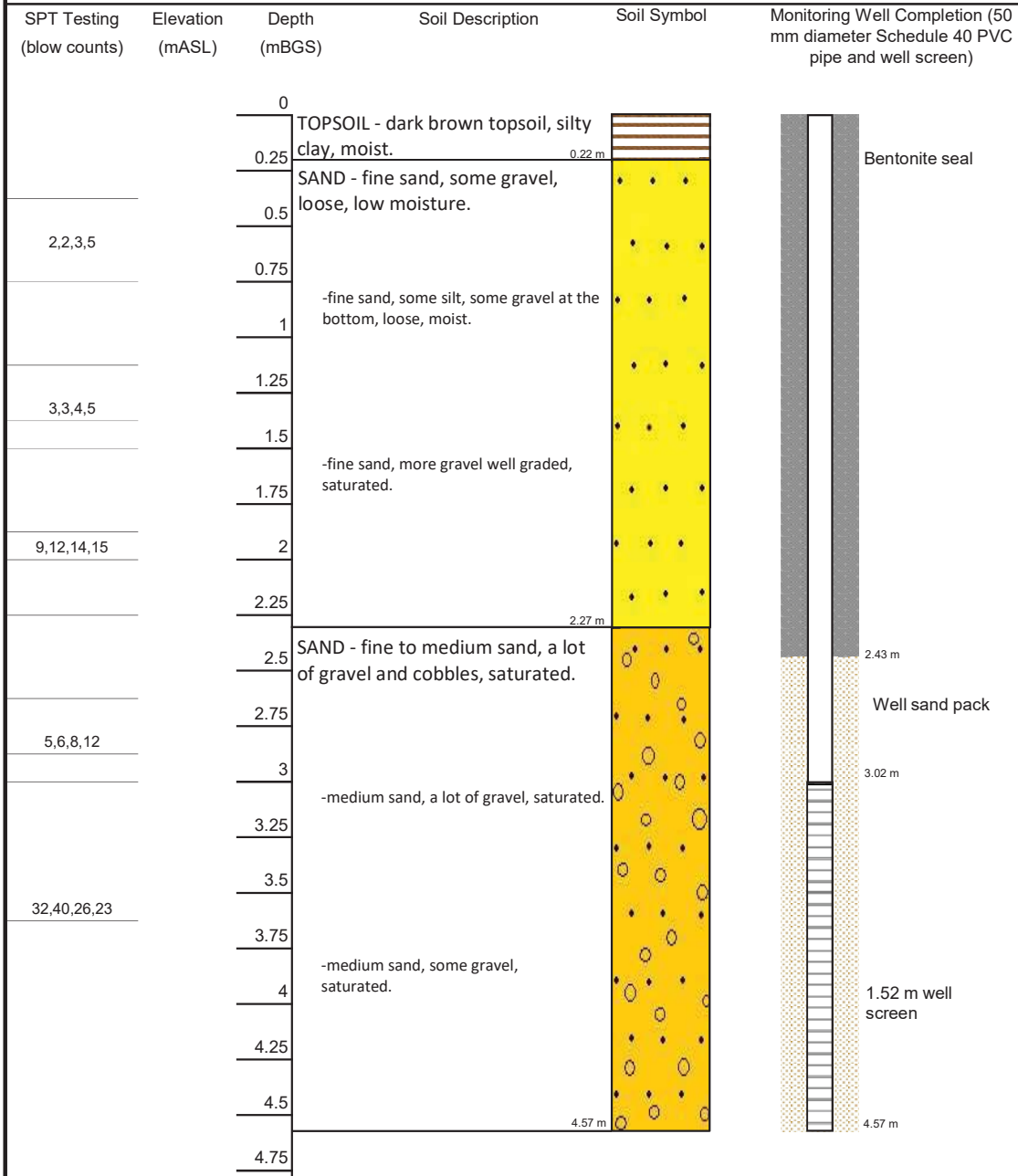
MECP Well Tag No. A270527
 Well Casing Stickup: 1.03 m
 Measured Water Level: 4.11 mBGS (24-Sep-19)



Project: **Proposed Land Development**
 Location: **Old Ruby Lane**
Guelph, Ontario

Name: **BH 04-19**
 Drill Date: **17-Sep-19**
 Field Tech: **SS**
 Drilling Method:
CMT 75 - Hollow Stem

Ground Elevation: **nor surveyed**
 Location (UTM Zone 17) Easting: **not surveyed** Northing: **not surveyed**

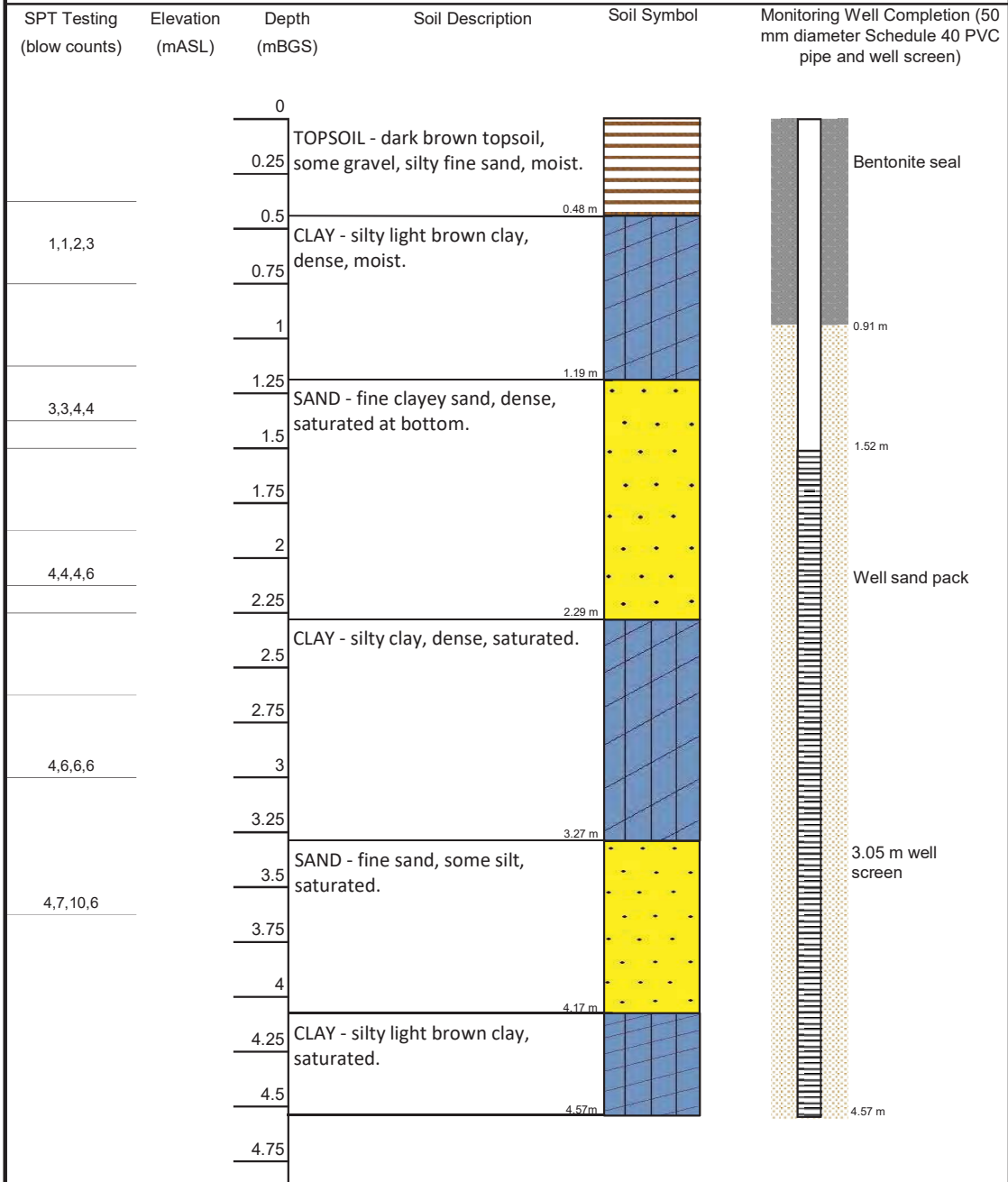


Notes: MOECC Well Tag No. A270526
 Well Casing Stickup: 1.01 m
 Measured Water Level: 1.94 mBGS (24-Sep-19)

Project: **Proposed Land Development**
 Location: **Old Ruby Lane**
Guelph, Ontario

Name: **BH 05-19**
 Drill Date: **18-Sep-19**
 Field Tech: **SS**
 Drilling Method:
CMT 75 - Hollow Stem

Ground Elevation: **not surveyed**
 Location (UTM Zone 17) Easting: **not surveyed** Northing: **not surveyed**

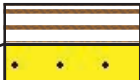













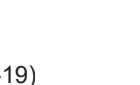
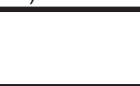





Notes: MOECC Well Tag No. A282625
 Well Casing Stickup: 0.95 m
 Measured Water Level: 2.36 mBGS (24-Sep-19)

Project: **Proposed Land Development**
 Location: **Old Ruby Lane**
Guelph, Ontario

Name: **BH 06-19**
 Drill Date: **18-Sep-19**
 Field Tech: **SS**
 Drilling Method:
CMT 75 - Hollow Stem

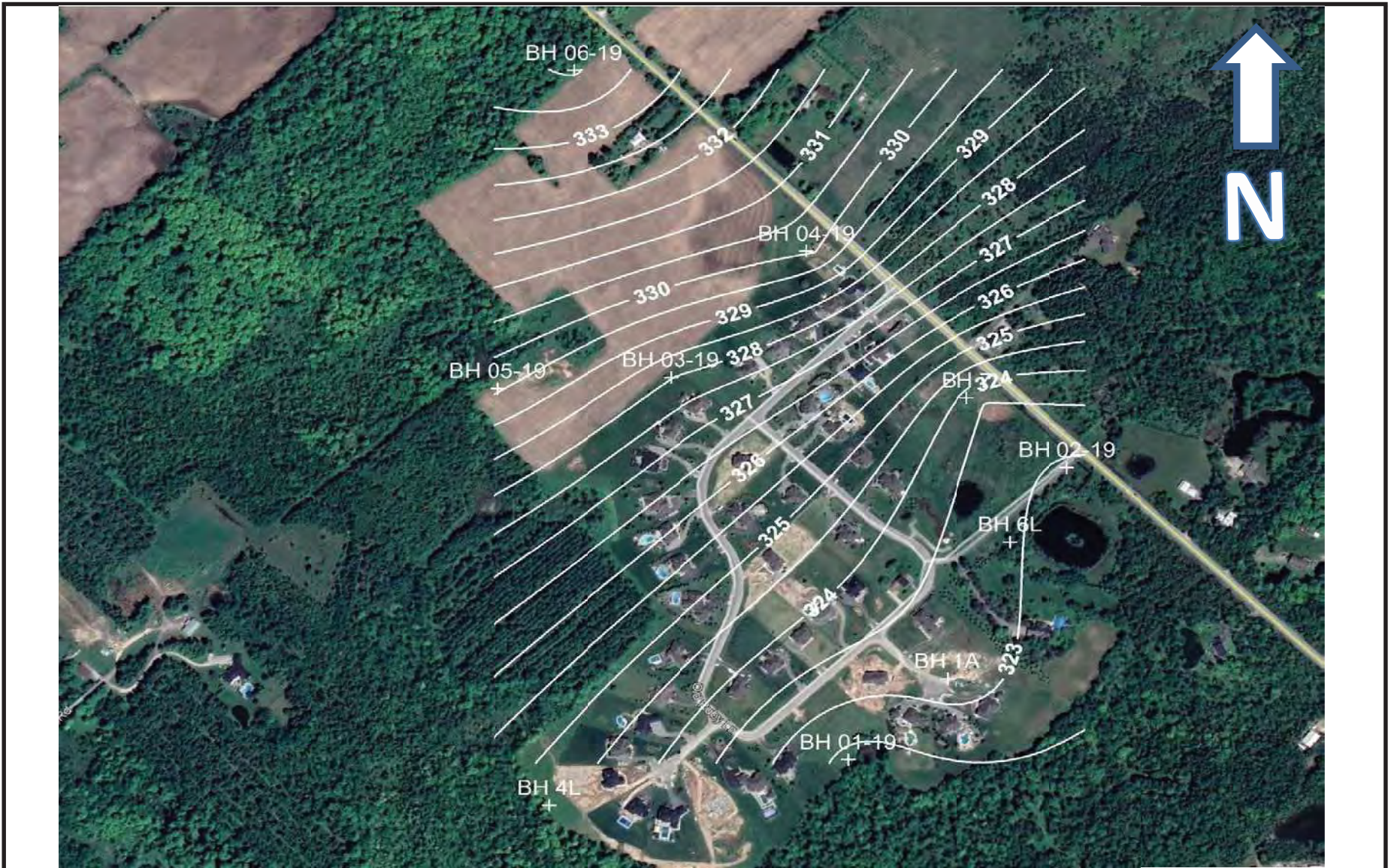
Ground Elevation: **not surveyed**
 Location (UTM Zone 17): Easting: **not surveyed** Northing: **not surveyed**

SPT Testing (blow counts)	Elevation (mASL)	Depth (mBGS)	Soil Description	Soil Symbol	Monitoring Well Completion (50 mm diameter Schedule 40 PVC pipe and well screen)
		0			
1,3,3,6		0.5	TOPSOIL - black soil, fine sand, dry.		Bentonite seal
		1	SAND - fine sand, gravel, stones at 24 cm, dry.		
20,50,x,x 4"		1.5	-silty sand, some gravel, loose, dry.		
17,17,15,19		2			
		2.5	-light gray, medium to fine sand, dry.		
15,15,13,16		3	-fine sand, some gravel, loose, dry.		
		3.5			
15,17,13,16		4	-saturated.		
		4.5			
		5	CLAY - silty light brown clay, dense, saturated.		
9,13,13,17		5.5	SAND - fine sand, gravel, well packed, moist.		5.18 m
		6	-dry.		6.10 m
13,8,13,15		6.5	-fine to medium sand, gravel, loose, well sorted, wet.		Well sand pack
		7			
		7.5			
		8	CLAY - silty clay, dense, wet.		3.05 m well screen
10,8,17,21		8.5			
		9			
		9.5			9.15 m

Notes:

MECP Well Tag No. A282626
 Well Casing Stickup: 1.01 m
 Measured Water Level: 6.70 mBGS (24-Sep-19)





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LEGEND

 Monitoring Well

Drawing 3 - Groundwater Contours - September 2019
Audrey Meadows Subdivision - Puslinch



Drawn: CFH
 Date: ###



imagery from Google Earth © 2021

LEGEND

 Monitoring Well

**Drawing 3 - Groundwater Contours - September 2020
Audrey Meadows Subdivision - Puslinch**



Drawn: CFH
Date: ###

TABLE 3
GROUNDWATER & SURFACE WATER CHEMISTRY ANALYSIS RESULTS
Audrey Meadows Subdivision
Old Ruby Lane, Puslinch

	Parameter ⁽ⁱ⁾	PWQO	2019 ⁽ⁱⁱ⁾	2020 ⁽ⁱⁱ⁾
			29-Sep	25-Sep
BH-01-19	Chloride	--	88.3	80.2
	Nitrate	--	3.63	3.59
	Nitrite	--	<0.010	<0.010
	Total Kjeldahl Nitrogen (TKN)	--	0.33	2.00
	Nitrogen (T)	--	3.96	5.59
	E.coli (CFU)	100	730	<10
	Total Coliforms (CFU)	--	28,000	500
	Phosphorus (T)	0.01	1.18	1.46
	Sodium (T)	--	40.4	39.3

i - All values in mg/L unless specified

ii - Concentrations in **red text** exceed the PWQO maximum acceptable concentrations for microbiological and chemical standards.

(T) - Total concentration

(CFU) - Coliform units/100 ml

	Parameter ⁽ⁱ⁾	PWQO	2019 ⁽ⁱⁱ⁾	2020 ⁽ⁱⁱ⁾
			29-Sep	25-Sep
BH-02-19	Chloride	--	189	189
	Nitrate	--	<0.10	<0.10
	Nitrite	--	<0.050	<0.050
	Total Kjeldahl Nitrogen (TKN)	--	1.2	9.10
	Nitrogen (T)	--	1.2	9.10
	E.coli (CFU)	100	24	<10
	Total Coliforms (CFU)	--	64,000	<100
	Phosphorus (T)	0.01	0.505	1.76
	Sodium (T)	--	88.9	89.6

i - All values in mg/L unless specified

ii - Concentrations in **red text** exceed the PWQO maximum acceptable concentrations for microbiological and chemical standards.

(T) - Total concentration

(CFU) - Coliform units/100 ml

TABLE 3, Continued
GROUNDWATER & SURFACE WATER CHEMISTRY ANALYSIS RESULTS
Audrey Meadows Subdivision
Old Ruby Lane, Puslinch

BH-03-19	Parameter ⁽ⁱ⁾	PWQO	2019 ⁽ⁱⁱ⁾ 29-Sep	2020 ⁽ⁱⁱ⁾ 25-Sep
	Chloride	--	24.7	9.76
Nitrate	--	8.4	7.08	
Nitrite	--	0.079	<0.010	
Total Kjeldahl Nitrogen (TKN)	--	0.31	0.540	
Total Nitrogen	--	8.79	7.62	
E.coli (CFU)	100	53	<2	
Total Coliforms (CFU)	--	60,000	300	
Phosphorus (T)	0.01	0.368	0.198	
Sodium (T)	--	5.34	1.98	

i - All values in mg/L unless specified

ii - Concentrations in **red text** exceed the PWQO maximum acceptable concentrations for microbiological and chemical standards.

(T) - Total concentration

(CFU) - Coliform units/100 ml

BH-04-19	Parameter ⁽ⁱ⁾	PWQO	2019 ⁽ⁱⁱ⁾ 29-Sep	2020 ⁽ⁱⁱ⁾ 25-Sep
	Chloride	--	23.8	19.5
Nitrate	--	5.82	6.96	
Nitrite	--	0.025	<0.010	
Total Kjeldahl Nitrogen (TKN)	--	0.29	2.50	
Nitrogen (T)	--	6.14	9.46	
E.coli (CFU)	100	<2	<10	
Total Coliforms (CFU)	--	20,000	100	
Phosphorus (T)	0.01	0.77	1.62	
Sodium (T)	--	9.23	6.44	

i - All values in mg/L unless specified

ii - Concentrations in **red text** exceed the PWQO maximum acceptable concentrations for microbiological and chemical standards.

(T) - Total concentration

(CFU) - Coliform units/100 ml

TABLE 3, Continued
GROUNDWATER & SURFACE WATER CHEMISTRY ANALYSIS RESULTS
Audrey Meadows Subdivision
Old Ruby Lane, Puslinch

UPGRADIENT SURFACE WATER INLET	Parameter ⁽ⁱ⁾	PWQO	2019 ⁽ⁱⁱ⁾ 29-Sep	2020 ⁽ⁱⁱ⁾ 25-Sep
	Chloride	--	23.5	41.4
Nitrate	--	0.024	0.450	
Nitrite	--	<0.010	<0.010	
Total Kjeldahl Nitrogen (TKN)	--	0.79	0.260	
Nitrogen (T)	--	0.81	0.710	
E.coli (CFU)	100	300	6	
Total Coliforms (CFU)	--	29,000	2,600	
Phosphorus (T)	0.01	0.0303	0.0117	
Sodium (T)	--	11	22.1	

i - All values in mg/L unless specified

ii - Concentrations in red text exceed the PWQO maximum acceptable concentrations for microbiological and chemical standards.

(T) - Total concentration

(CFU) - Coliform units/100 ml

DOWNGRADIENT SURFACE WATER OUTLET	Parameter ⁽ⁱ⁾	PWQO	2019 ⁽ⁱⁱ⁾ 29-Sep	2020 ⁽ⁱⁱ⁾ 25-Sep
	Chloride	--	40.1	41.8
Nitrate	--	0.465	0.519	
Nitrite	--	<0.010	<0.010	
Total Kjeldahl Nitrogen (TKN)	--	<0.15	0.190	
Nitrogen (T)	--	0.47	0.709	
E.coli (CFU)	100	37	33	
Total Coliforms (CFU)	--	1,800	1,600	
Phosphorus (T)	0.01	0.0058	<0.0030	
Sodium (T)	--	20.6	21.8	

i - All values in mg/L unless specified

ii - Concentrations in red text exceed the PWQO maximum acceptable concentrations for microbiological and chemical standards.

(T) - Total concentration

(CFU) - Coliform units/100 ml