



PEOPLE | ENGINEERING | ENVIRONMENTS

January 5, 2021  
Our File: 221051-1

Via Email – ken@hutten.ca

Ken Hutten  
177602 Grey County Road 18  
Owen Sound, ON N4K 5N5

Attention: Mr. Ken Hutten

Re: Karst Topography Assessment  
Part Lot 16, Concession 5, Derby  
Township of Georgian Bluffs

Dear Ken,

This letter report provides the findings of the Karst Topography Assessment that was conducted on the property with a legal description of Part Lot 16, Concession 5, within the Township of Georgian Bluffs, in the County of Grey. The subject property is currently vacant. No municipal sanitary sewer or water services are provided to the property.

The subject property encompasses approximately 20.19 hectares (49.89 acres) and is located on the west side of Grey County Road 18 approximately 650 metres south of Springmount (i.e. the intersection of Highway 21 and Grey Road 18). The location of the site is shown on the attached Figure 1.

The areas of proposed onsite development are situated on the eastern portion of the subject property. We understand that this Karst Assessment is primarily being completed to support the proposed construction of a series of commercial buildings consisting of a retail shop, offices, and various operations buildings serviced by an onsite individual Class 4 sewage system.

The Study Area is focused on the area of proposed development on the eastern portion of the property, as shown in Figure 2 and the Site Plan titled, "Drawing No. 2 - Easterly Grading and Drainage Plan" which is attached for reference.

The scope of this review includes:

- Review of geologic and physiographic mapping;
- Review of aerial photography;
- A site visit and reconnaissance of the study area on April 16, 2021; and
- The documentation of the nature of soil and bedrock in seven (7) excavated test holes.

The scope of work described herein relies on surface and subsurface exploration via excavated testholes. No detailed subsurface exploration (such as drilling) or geophysical work was conducted as part of this Assessment. Further investigation would be required to comment on the potential for Karst in the locations beyond the study area.

## **Karst – Background**

Karst topography is generally found in areas where carbonate rock, such as limestone or dolostone, are exposed at surface or lie beneath shallow surficial sediment or overburden. Karst is generally created through the chemical weathering (i.e., dissolution) of carbonate bedrock, subsequently forming a network of voids. In karstic areas, these voids are sometimes evident as irregular or hummocky rock outcrops, crevasses, or sinkhole patterns.

## **Geologic Setting**

The area of proposed development on the subject property is located within the physiographic region known as “Bruce Peninsula” (Chapman and Putnam, 1984). The region is characterized by generally flat topography with shallow overburden, primarily as fine-textured till, scattered on grey limestone, dolostone or shale to the east and in the vicinity of Georgian Bay. In some areas, bedrock is exposed at ground surface.

Based on geologic mapping, the surface soil in the study area is generally comprised of the Kemble series, which consists of a silty clay. More specifically, the soils observed in the testholes that were completed across the study area primarily consist of silts and clays with minor sandy units that extend to the bedrock surface or below approximately 2.5 mbgs where bedrock was not encountered.

Based on a review of the geologic setting, the potential for karstic features are considered to exist since the area is comprised of dolostone bedrock of the Amabel Formation (i.e., carbonate rock). Additionally, according to the *Karsts of Southern Ontario and Manitoulin Island* GIS Mapping (Ontario Geologic Survey, 2008; Brunton, Dodge), the area of the subject property is considered to be an area of known karst. The OGS Karst mapping is enclosed for reference.

Hydraulically active karst is known to exist in the Springmount area, predominantly evident through the “disappearance” of surface water features into the subsurface or the seepage of groundwater to the surface.

A review of the Ministry of Environment, Conservation and Parks (MECP) water well database was also completed as part of this investigation. The well records for nearby wells report that the bedrock surface was encountered from approximately 3 to 6 mbgs in the vicinity of the study area.

## **Site Setting and Reconnaissance**

The Site visit was conducted by GM BluePlan Engineering (GMBP) on April 16, 2021. During the Site visit, GMBP personnel inspected the development envelope and the surrounding area to identify potential areas of subsidence, or depressions, as well as springs or drainage features that may discharge to the subsurface.

The surface in the vicinity of the study area was observed to consist of a few areas of fill. Outside of the fill, on the eastern portion of the property where the proposed development is located, the ground surface is generally flat and grass covered. Northwest of the proposed development areas, the ground surface consists of areas of significant subsidence and boulders at the surface (as shown in Figure 2). Additionally, an area of standing water with outflow to a swale was identified approximately 80 metres west of the proposed development area. This area is inferred to be associated with seasonal groundwater seepage.

Based on the onsite observations (i.e. areas of significant subsidence and a groundwater seep), the area west of the proposed area of development is inferred to have some degree of hydraulically active karstic features. However, it is noted that only a small portion of the northwestern extent of the area of proposed development lies in an area that was observed to show some evidence of potential subsurface karst features (i.e. numerous observed depressions and surface boulders), as shown on Figure 2. However, based on the current Site Plan, this area is proposed for truck and trailer parking and no structures are proposed on or near this location (see attached Site Plan). The remaining areas of the extents of commercial development on the Site do not exhibit surface evidence that would suggest hydraulically active karst features underlying the area.

The ground surface across the study area and the adjacent land was observed to have a generally flat topographic relief. Regionally, the study area appears to be situated east of the boundary of a significant wetland complex that includes the Pottawatomi Wetlands Management Area, which extends approximately 4.5 kilometres southwest of the Site along the margins of the Pottawatomi River. The Pottawatomi river runs in a southwest to northeast direction and is situated approximately 300 metres north of the proposed development area.

Surrounding properties along Grey Road 18 consist of primarily agricultural lands with a few rural residential dwellings and some properties developed for rural commercial use. The lands to the west of the Site consist of the above noted vegetated wetland complex, with agricultural land use beyond.

Based on the topography and surficial features observed at the time of the April 16, 2021 field assessment completed by GMBP, the specific areas of proposed development containing onsite structures and the onsite leaching bed do not show evidence of hydraulically active karstic features, such as areas of subsidence or springs that would limit development.

### **Testhole Investigation Findings**

As part of the field investigations, a series of seven testholes (TH-1 to TH-7) were excavated by a machine operator and a mini excavator provided by the property owner. Each of the testholes were advanced in the specific areas of proposed development in consultation with the property owner. It is noted that the investigative testholes were advanced in locations on the Site that corresponded with proposed structures associated with an earlier draft of the proposed Site Plan. Although the proposed Site Plan has been altered since the testhole investigation in April 2021, the locations and numbers of the testholes, when considered holistically with the overall Site investigation, are considered to be generally sufficient to infer the presence or absence of active karst features in the locations proposed for development in the final draft of the Site plan (attached for reference). The location of each of the testholes and proposed development envelopes is provided in the attached Figure 2.

Each testhole was extended to a depth of at least 2.0 mbgs or the inferred bedrock surface. Where an inferred bedrock surface was encountered (i.e. only in TH-1 and TH-3), approximately one square metre was cleared to conduct a clear inspection of the structure of the bedrock surface. A summary of the testhole investigation bedrock observations are presented in the table below:

**Table 1: Testhole Observations**

Testhole ID	Testhole Depth (mbgs)	Bedrock Encountered?
TH-1	2.10	Yes – Competent, flat dolostone. No karstic features observed.
TH-2	2.50	No
TH-3	1.90	Yes – Competent, flat dolostone. No karstic features observed.
TH-4	2.20	No
TH-5	2.25	No
TH-6	2.50	No
TH-7	2.50	No

It is noted that in each testhole, the overburden generally consists of between approximately 0.1 and 0.3 metres of organic soil underlain by varying clay with silt with minor sand and trace boulders. This is consistent with the reported occurrence of the Kemble silt and clay unit across the Site, which is expected to extend to greater than 2.0 metres and/or to the bedrock surface across the study area. Testhole logs and photographs of the investigation are enclosed for reference.

In general, the results can be summarized as follows:

1. Dolostone bedrock of the Amabel formation was only encountered in two locations at less than 2.5 mbgs across the proposed area of development, at TH-1 and TH-3. The bedrock in these locations was observed to be generally flat and competent without evidence of karstic features (i.e. dissolution weathering, open fissures, etc.).
2. No evidence of active or epi-karst features (i.e. minor depressions, groundwater springs, or seeps) were observed at the surface in the area of proposed development with the exception of potential surface evidence of epi-karst on the far northwestern portion of the proposed gravel surfaced area, which is proposed to be used only for truck and trailer parking (i.e. no nearby proposed structures or leaching beds).

### **Conclusions and Recommendations**

Based on the findings of this investigation, there is no evidence of significant karst features or hydraulically active karst in the areas proposed for development on the property with the exception of the area noted above. No karst features were encountered in any of the testholes completed as part of this investigation.

Overall, karst features are not expected to affect or compromise the proposed development and the proposed development is not expected to negatively affect the water resources associated with area karsts.





Based on the findings of this investigation and the nature of the subject property, the following recommendations are made:

1. It is recommended that at the time of topsoil stripping in the far northwestern portion of the development area, that the subsurface be further investigated (via testholes) by a qualified geotechnical engineer to confirm the presence or absence of karst features that could require geotechnical considerations prior to placing fill. It is also recommended that a specific note reflecting this be added to the Site Plan for clarification during Site preparations / construction.
2. That at the time of construction, the bedrock surface be inspected in areas where it is exposed (if encountered) to confirm the nature of the bedrock and the presence or absence of any fractures or dissolution features that would pose structural limitations.
3. Development of the property beyond the limit of proposed development (Figure 2) may be subject to further study and inspection prior to approval.

### **Limitations**

The information in this report is intended for the sole use of Ken Hutten of 2765746 Ontario Inc. GM BluePlan Engineering Limited accepts no liability for use of this information by third parties. Any decisions made by third parties on the basis of information provided in this report are made at the sole risk of the third parties.

The conclusions and recommendations in this report are based on onsite surface observations, information gathered at the testhole locations and on available geological information. Sub-surface conditions between and beyond the testholes may differ from those encountered at the testhole locations and conditions may become apparent during construction, which may not have been detected or anticipated at the time of the investigation.

The conclusions pertaining to the condition of soils and/or bedrock identified at the site are based on the visual observations at the locations of the investigative testholes. GM BluePlan Engineering Limited cannot guarantee the condition of soil and/or bedrock that may be encountered at the site in locations that were not specifically investigated.

Yours truly,

**GM BLUEPLAN ENGINEERING LIMITED**

Per:

A blue ink signature of Corbin Sweet, written in a cursive style.

Corbin Sweet, P.Geo.  
CJS/kd

Per:

A blue ink signature of Matthew Nelson, written in a cursive style.

Matthew Nelson, P.Eng., P.Geo.

### **Enclosures:**

Figure 1: Site Location Map

Figure 2: Site Layout

Testhole Logs

Site Photographs

Drawing No. 2 - Easterly Grading and Drainage Plan

OGS Karst Map

cc: File No. 221051-1

**221051-1**  
**Karst Topography Assessment**  
**Part Lot 16, Concession 5, Derby**  
**Township of Georgian Bluffs**



**LEGEND**



Approximate Property Boundary

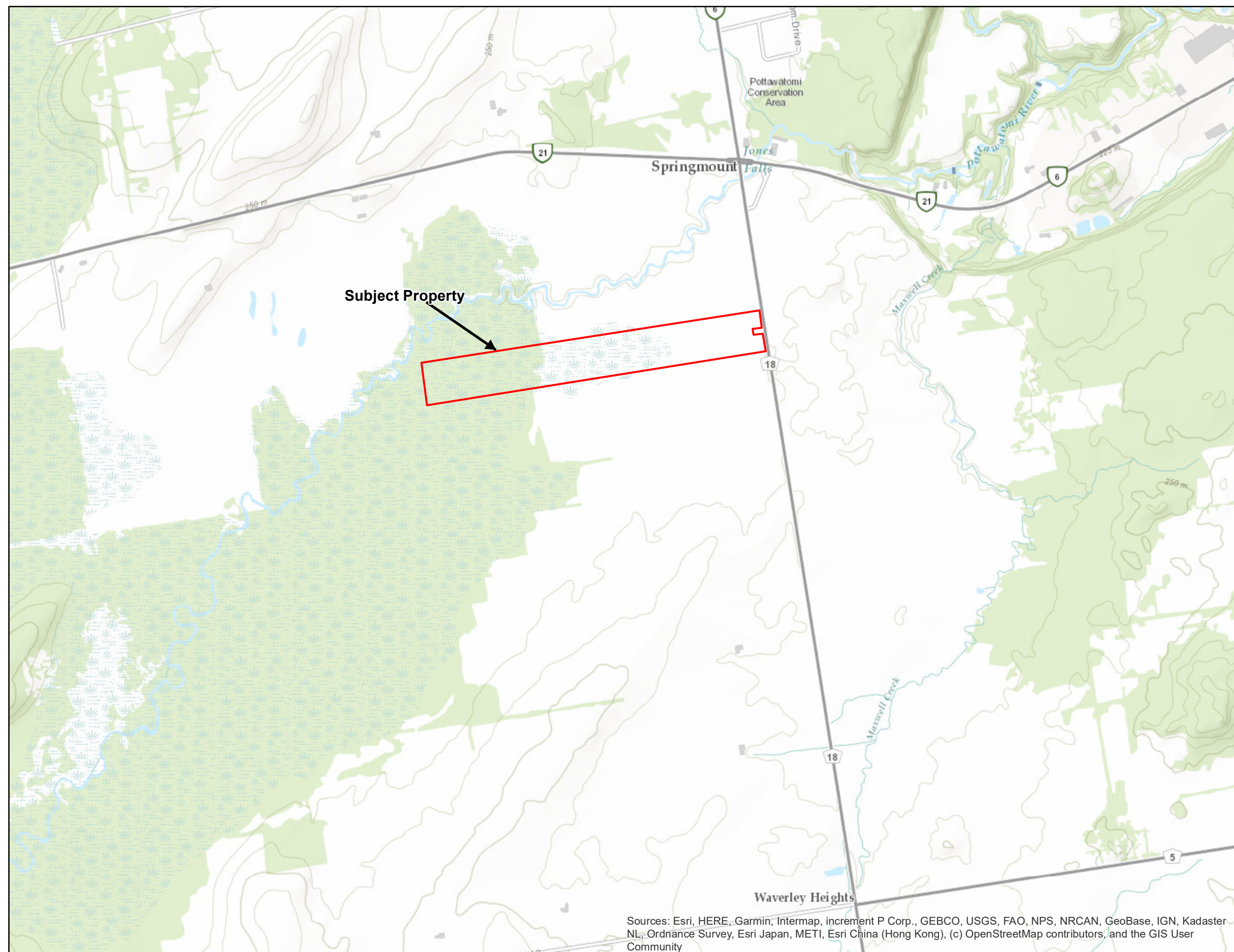
Scale  
1:15,000

May 2021

**SITE LOCATION MAP**

Part Lot 16, Concession 5, Derby  
Township of Georgian Bluffs  
Grey County

**Figure No. 1**



Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community



**221051-1**  
**Karst Topography Assessment**  
**Part Lot 16, Concession 5, Derby**  
**Township of Georgian Bluffs**



**LEGEND**

-  Approximate Property Boundary
-  Approximate Proposed Development Envelopes
-  Area of Observed Surface Depressions and Numerous Surface Boulders (i.e. Potential Evidence of Subsurface Karst Features)
-  Approximate Testhole Location
-  Approximate Western Extent of Proposed Commercial Site Development

NOTE: Testhole Investigation locations were selected based on an earlier proposed Site Plan.

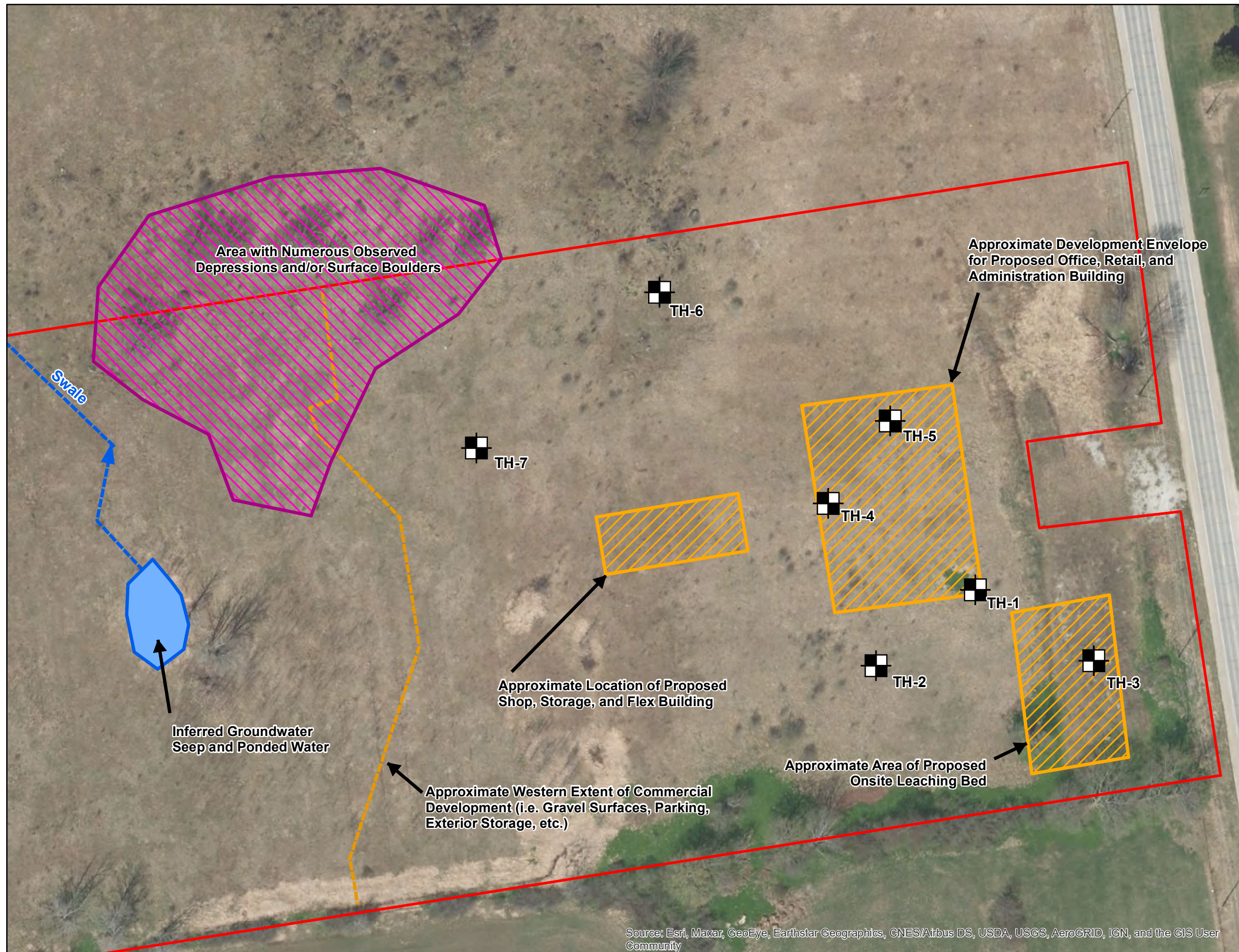
Scale  
 1:1,000

January 2022

**SITE LAYOUT**

Part Lot 16, Concession 5, Derby  
 Township of Georgian Bluffs  
 Grey County

**Figure No. 2**





## Testhole ID: TH-1

<b>CLIENT</b> 2765746 Ontario Inc.	<b>PROJECT NAME</b> Karst Topography Assessment
<b>PROJECT NUMBER</b> 221051-1	<b>PROJECT LOCATION</b> Part Lot 16, Concession 5, Derby
<b>DATE COMPLETED</b> 16-Apr-2021	<b>CONTRACTOR</b> Client
<b>LOGGED BY</b> Corbin Sweet	<b>METHOD</b> Mini Excavator
<b>WELL CONSTRUCTION</b>	<b>WATER LEVEL</b> ▽ mbgs <b>DATE MEASURED</b>

DEPTH (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION
			0.04 TOPSOIL, Dark Brown, Moist
			FILL - SAND with SILT, GRAVEL, and some COBBLES, Brown, Moist, Loose, Trace Plastic and Metal Debris
0.5			
1.0			
			1.19 FILL - SILT and SAND, Brown, Moist, Loose
1.5			1.40 SILT and CLAY with trace BOULDERS, Mottled Light Brown and Grey, Moist, Firm
2.0			
			2.10

Dolostone Bedrock of the Amabel formation  
- Competent

Borehole Terminated at 2.10 m.

## Testhole ID: TH-2

**CLIENT** 2765746 Ontario Inc. **PROJECT NAME** Karst Topography Assessment  
**PROJECT NUMBER** 221051-1 **PROJECT LOCATION** Part Lot 16, Concession 5, Derby  
**DATE COMPLETED** 16-Apr-2021 **CONTRACTOR** Client  
**LOGGED BY** Corbin Sweet **METHOD** Mini Excavator  
**WELL CONSTRUCTION** **WATER LEVEL** ▽ mbgs **DATE MEASURED**

DEPTH (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION
			TOPSOIL, Dark Brown, Moist
		0.25	SAND and SILT with trace CLAY and some COBBLES and BOULDERS, Light Brown, Moist
0.5			
1.0			
1.5		1.50	CLAY with trace SILT and BOULDERS, Greyish Brown, Moist, Firm,
2.0			
2.5		2.50	No Bedrock Encountered

Borehole Terminated at 2.50 m.

# Testhole ID: TH-3

**CLIENT** 2765746 Ontario Inc. **PROJECT NAME** Karst Topography Assessment  
**PROJECT NUMBER** 221051-1 **PROJECT LOCATION** Part Lot 16, Concession 5, Derby  
**DATE COMPLETED** 16-Apr-2021 **CONTRACTOR** Client  
**LOGGED BY** Corbin Sweet **METHOD** Mini Excavator  
**WELL CONSTRUCTION** **WATER LEVEL** ▽ mbgs **DATE MEASURED**

DEPTH (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION
			TOPSOIL, Dark Brown, Moist, Loose
		0.20	SANDY CLAY with SILT, COBBLES, and trace BOULDERS, Reddish Brown, Moist, Firm,
0.5			
1.0			
1.5			
		1.60	Weathered Dolostone Bedrock (i.e. Angular Boulders and Silt)
		1.90	

Dolostone Bedrock of the Amabel formation  
- Competent

Borehole Terminated at 1.90 m.

**Testhole ID: TH-4**

<b>CLIENT</b> 2765746 Ontario Inc.	<b>PROJECT NAME</b> Karst Topography Assessment
<b>PROJECT NUMBER</b> 221051-1	<b>PROJECT LOCATION</b> Part Lot 16, Concession 5, Derby
<b>DATE COMPLETED</b> 16-Apr-2021	<b>CONTRACTOR</b> Client
<b>LOGGED BY</b> Corbin Sweet	<b>METHOD</b> Mini Excavator
<b>WELL CONSTRUCTION</b>	<b>WATER LEVEL</b> ▽ mbgs <b>DATE MEASURED</b>

DEPTH (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION
			TOPSOIL, Dark Brown
		0.15	CLAY, Mottled Grey, Moist, Firm - Increasing Silt content with depth
0.5			
1.0			
		1.30	SILT with varying CLAY, Light Brown, Moist-to-Wet, Firm - Thinly laminated
1.5			
2.0			
		2.20	

No Bedrock Encountered

Borehole Terminated at 2.20 m.

# Testhole ID: TH-5

<b>CLIENT</b> 2765746 Ontario Inc.	<b>PROJECT NAME</b> Karst Topography Assessment
<b>PROJECT NUMBER</b> 221051-1	<b>PROJECT LOCATION</b> Part Lot 16, Concession 5, Derby
<b>DATE COMPLETED</b> 16-Apr-2021	<b>CONTRACTOR</b> Client
<b>LOGGED BY</b> Corbin Sweet	<b>METHOD</b> Mini Excavator
<b>WELL CONSTRUCTION</b>	<b>WATER LEVEL</b> ▽ mbgs <b>DATE MEASURED</b>

DEPTH (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION
			TOPSOIL, Dark Brown, Moist
		0.12	FILL - SILTY SAND with some GRAVEL and COBBLES
0.5			
		0.75	SANDY CLAY with GRAVEL and BOULDERS, Reddish Brown, Moist, Firm
1.0			
		1.60	SAND and GRAVEL with some SILT, Brown, Moist, Loose
1.5			
		2.25	No Bedrock Encountered
2.0			
			Borehole Terminated at 2.25 m.



# Testhole ID: TH-6

<b>CLIENT</b> 2765746 Ontario Inc.	<b>PROJECT NAME</b> Karst Topography Assessment
<b>PROJECT NUMBER</b> 221051-1	<b>PROJECT LOCATION</b> Part Lot 16, Concession 5, Derby
<b>DATE COMPLETED</b> 16-Apr-2021	<b>CONTRACTOR</b> Client
<b>LOGGED BY</b> Corbin Sweet	<b>METHOD</b> Mini Excavator
<b>WELL CONSTRUCTION</b>	<b>WATER LEVEL</b> ▽ mbgs <b>DATE MEASURED</b>

DEPTH (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION
			TOPSOIL, Dark Brown, Moist
		0.30	SAND and SILT with CLAY, Light Brown, Moist-to-Wet, Loose
0.5		0.57	CLAY, Grey, Moist, Firm
1.0			
1.5			
2.0		2.00	SILT with varying CLAY, Light Brown, Moist-to-Wet, Firm - Thinly laminated
2.5		2.50	No Bedrock Encountered

Borehole Terminated at 2.50 m.

# Testhole ID: TH-7

<b>CLIENT</b> 2765746 Ontario Inc.	<b>PROJECT NAME</b> Karst Topography Assessment
<b>PROJECT NUMBER</b> 221051-1	<b>PROJECT LOCATION</b> Part Lot 16, Concession 5, Derby
<b>DATE COMPLETED</b> 16-Apr-2021	<b>CONTRACTOR</b> Client
<b>LOGGED BY</b> Corbin Sweet	<b>METHOD</b> Mini Excavator
<b>WELL CONSTRUCTION</b>	<b>WATER LEVEL</b> ▽ mbgs <b>DATE MEASURED</b>

DEPTH (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION
			TOPSOIL, Dark Brown, Moist
		0.20	
0.5			CLAY, Mottled Grey, Moist, Firm - Increasing Silt content with depth
1.0			
1.5			
2.0		2.00	
			SILT with varying CLAY, Light Brown, Moist-to-Wet, Firm - Thinly laminated
2.5		2.50	

Borehole Terminated at 2.50 m.

# KARST TOPOGRAPHY ASSESSMENT

## Part Lot 16, Concession 5, Derby



**Photo 1:** Area of proposed development on the east side of the subject property.



**Photo 2:** View of surface depressions and boulders northwest of the proposed development area.



# KARST TOPOGRAPHY ASSESSMENT

## Part Lot 16, Concession 5, Derby

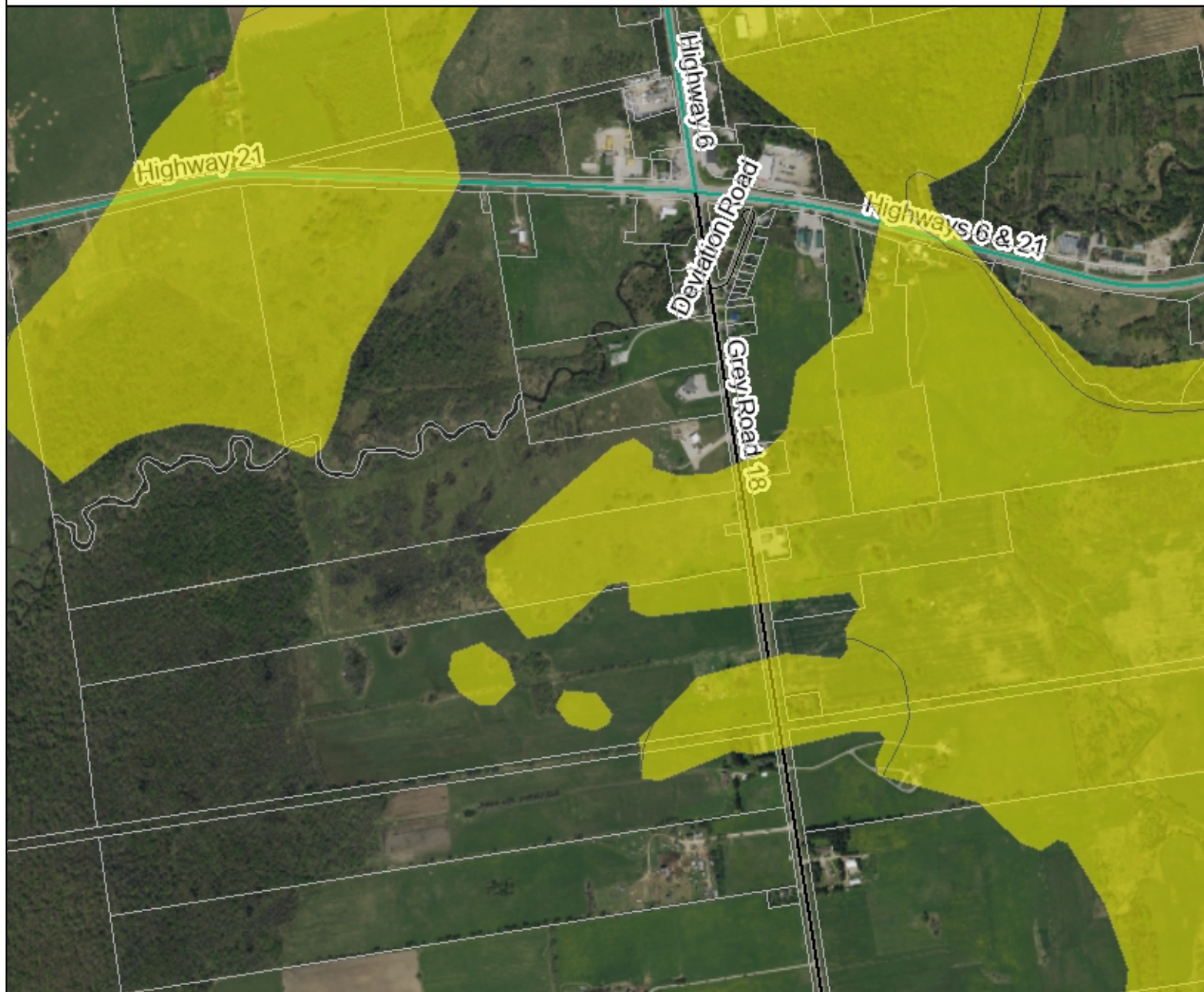


**Photo 3:** View of TH-6.



**Photo 4:** View of the groundwater seep west of the proposed development area.





## Legend

Wildland Fire (Hazardous Forest Ty

Extreme

High

Karst Area

Parcels - Current

Large Scale Roads

Provincial Highway

County Road

Township Road

Seasonal Road

Grey County Boundary

## Notes

787 0 394 787 Meters

WGS\_1984\_Web\_Mercator\_Auxiliary\_Sphere  
© County of Grey



This map is a user generated static output from an Internet mapping site and is for reference only.  
Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

Printed May 6, 2021

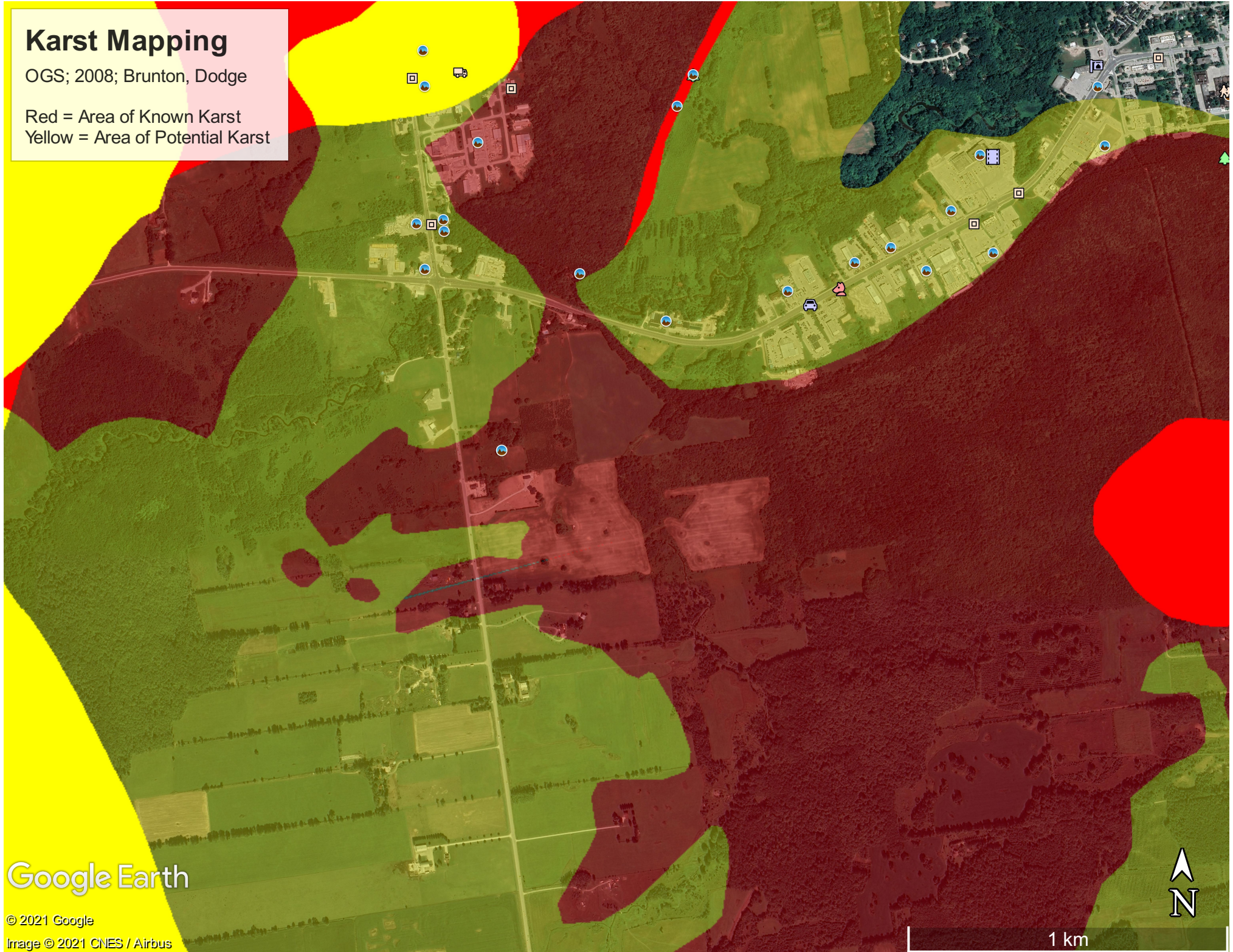
THIS MAP IS NOT TO BE USED FOR NAVIGATION



# Karst Mapping

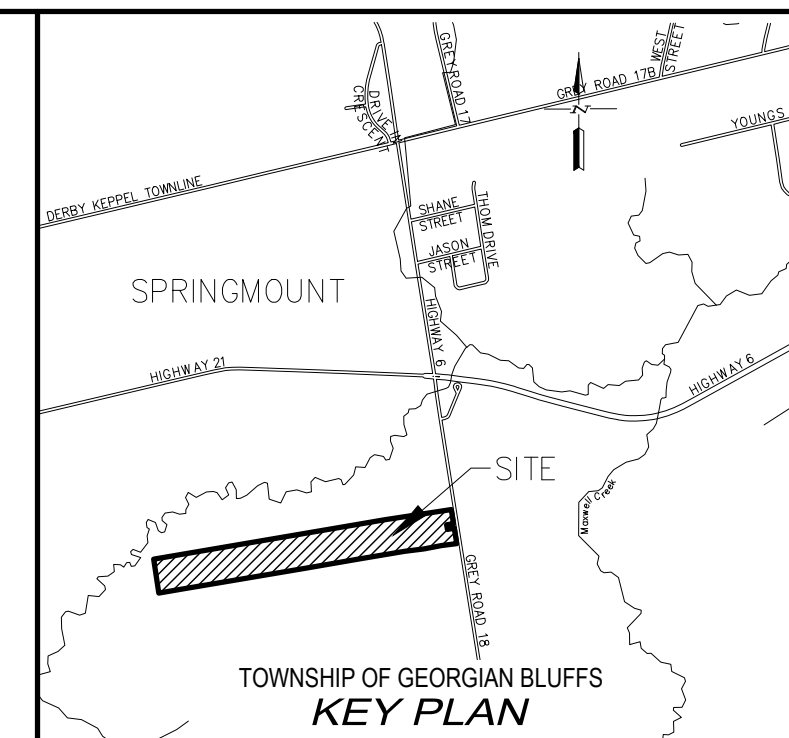
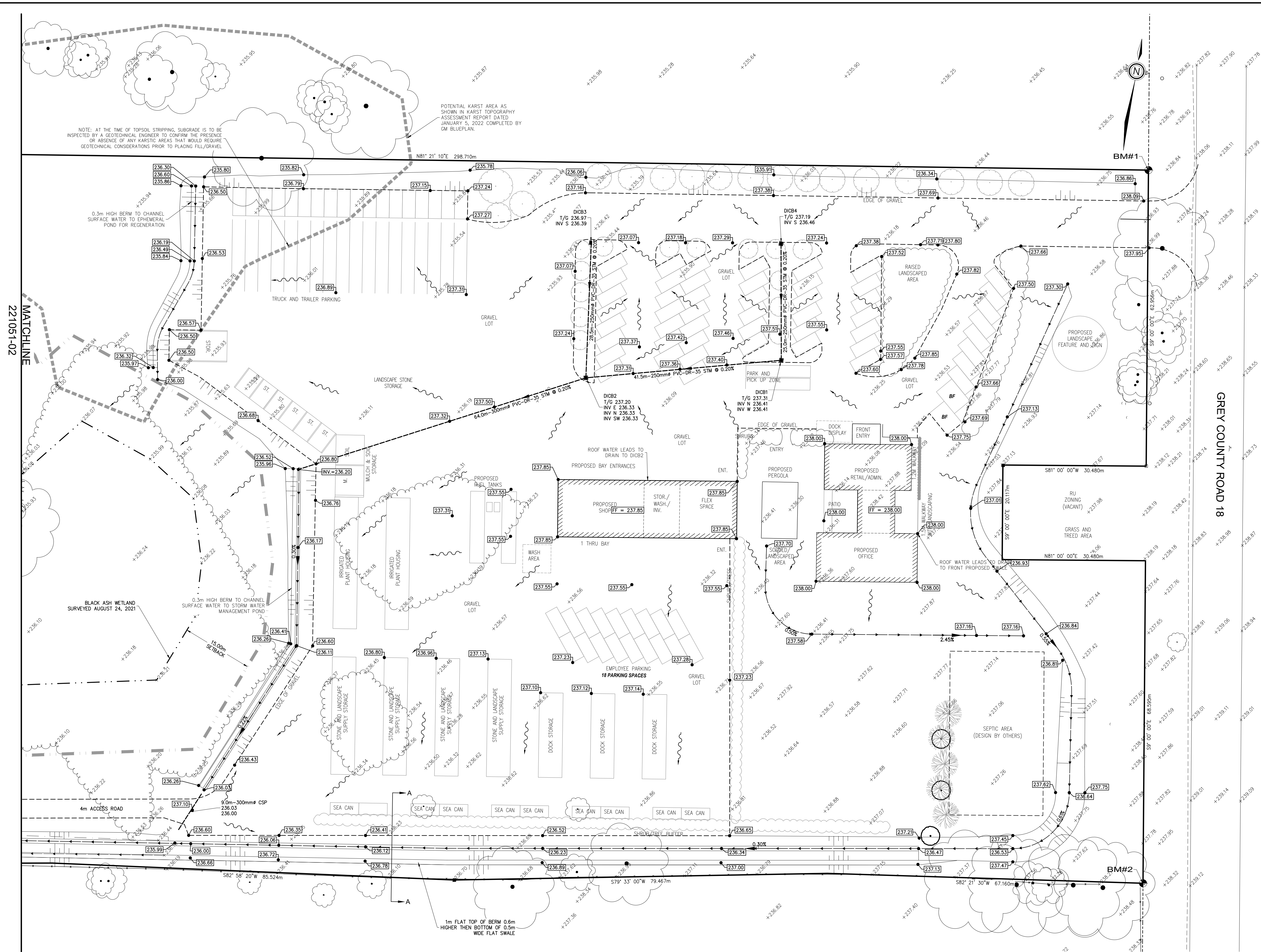
OGS; 2008; Brunton, Dodge

Red = Area of Known Karst  
Yellow = Area of Potential Karst



Google Earth





- NOTES :**
1. ALL DIMENSIONS AND ELEVATIONS IN METRIC UNLESS OTHERWISE NOTED.
  2. TOPOGRAPHIC SURVEY COMPLETED ON MARCH 10, 2021 AND AUGUST 24, 2021 BY GM BLUEPLAN ENGINEERING LTD.
  3. LEGAL INFORMATION DERIVED FROM REGISTERED PLAN 16R-10169, SIGNED APRIL 11, 2012 AND COMPLETED BY IVAN DINSMORE LTD.


- LEGEND:**

  - ± 179.25
  - 179.25
  - EXISTING ELEVATION
  - PROPOSED ELEVATION
  - PROPOSED GRADE AND DIRECTION OF SURFACE FLOW
  - EXISTING FENCE
  - EXISTING SWALE
  - EXISTING GRAVEL PATH
  - EXISTING CONTOUR ELEVATION
  - EXISTING TREELINE
  - PROPOSED PLANTING

The legend defines the symbols used in the site plan: a horizontal line with a small vertical tick for existing elevation; a horizontal line with a small square for proposed elevation; a wavy line with an arrow for proposed grade and surface flow; a line with cross-ticks for existing fence; a line with a central dot for existing swale; a dashed line for existing gravel path; a horizontal line with a number (280.5) for existing contour elevation; a wavy line for existing treeline; and a stylized sunburst for proposed planting.

 BENCHMARK 1 ELEV. - 236.96m

TOP OF S.I.B. LOCATED ON NORTH EAST CORNER OF  
SUBJECT PROPERTY.

 BENCHMARK 2 ELEV. - 238.03m

TOP OF S.I.B. LOCATED ON SOUTH EAST CORNER OF  
SUBJECT PROPERTY.

THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED.

BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR ANY DAMAGE TO THEM.



4	01/07/22	ISSUED FOR SITE PLAN APPROVAL	I.E.E.
3	12/22/21	ISSUED FOR CLIENT REVIEW	I.E.E.
2	11/18/21	ISSUED FOR CLIENT REVIEW	I.E.E.
1	01/02/21	ISSUED FOR CLIENT REVIEW	I.E.E.
NO.	DATE	REVISION DESCRIPTION	CHKD



COMMERCIAL DEVELOPMENT

177602 GREY COUNTY ROAD 18

TOWNSHIP OF GEORGIAN BLUFFS

### EASTERLY GRADING AND DRAINAGE PLAN

DRAWN BY : T.J.J.	APPROVED BY : I.E.E.	PROJECT NO. : 221051	DRAWING NO. :  2
DESIGNED BY : I.E.E.	DATE : MAR., 2021	SCALE : 1:400	