

April 13, 2016



Sent via Email only

Mr. John Murphy  
2983 County Road 8  
Waupoos, ON K1G 3N4

RE: Results of Preliminary Soils Investigation: 2983 County Road 8.

Dear Mr. Murphy:

As you are aware, we have completed our preliminary agricultural investigations on your property. Our results are as follows:

***Location and description of property:***

The property is located on the north side of 2983 County Road #8 and the character and usage of the land changes is highly dependent on the elevation and condition of the soils.

Immediately adjacent to County Road #8, a farm infrastructure consisting of a residence, fruit stands and large barn occur. These structures are in good condition, and are situated on level land with the barn slightly higher than the residence and fruit stands. This elevation change is due to a large ridge of rocky land that is noticeable immediately to the north of the barn and remains forested. It appears that this ridge and forest crosses several neighboring properties to the west and east of your property, and remains intact in most areas. It also forms a distinctive barrier from fields and orchards located along County Road #8 and fields to the north.

An inspection of the forested area on your property found it to be approximately 60 to 80 m wide and situated along the top of a bedrock ridge with many outcrops and gravel areas. Tree cover was dominated by mature shagbark hickory (*Carya ovata*), black walnut (*Juglans nigra*), black cherry (*Prunus serotina*), sugar maple (*Acer saccharum*) and common basswood (*Tilia americana*). Shrub growth included European buckthorn (*Rhamnus cathartica*), tartarian honeysuckle (*Lonicera tartarica*) and choke cherry (*P. virginiana*). While most of the understory was still in winter dormancy, several early spring ephemerals were starting to emerge including wild leek, early meadow rue and garlic mustard.

The northern edge of the forest was somewhat terraced (again due to bedrock exposure) with a large area being used as a farm dump. North of this area, the topography became level to rolling with larger crop fields (i.e., corn) or apple orchards present.

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West of the County Road #8 farm infrastructure, a small apple orchard consisting of approximately 20 rows of apple trees occurred. Inspection of these trees in the rear of the orchard found that some had died or were in poor condition near the higher elevation. Evidence of frost or freezing injury was noticed as the lower trunks had frost cracks, as well as excessive callus growth as a result of repeated freeze/thaw cycles.

**General Soil conditions:**

Inspection of the soils within the orchard found differences in soil quality from south to north. Soils situated within the southern perimeter and nearer County Road #8 were deep, stone free and had a loam to clay loam texture which is typical of the Elmbrook series that occurs along the north shore of Smith Bay.

However, the soils in the orchard became extremely stony (**Photo 1**) as an increase in elevation towards the forest occurred. It was believed that this change in soil series (i.e., from Elmbrook to Ameliasburg) was due to the predominance of bedrock that was close to or at the soil surface. (**Photo 2**)



**Photo 1 – Condition of soil within apple row showing numerous stones. Soil depth to bedrock is less than 30 cm.**



**Photo 2 – Example of bedrock at surface in grassy area. These outcrops are within 1.0 m to 2.0 m of each other with limited topsoil cover. This limitation would be Severe to Very Severe (see below for explanation).**

It should be noted that while it is possible to cultivate agricultural soils successfully with a high stone content (and such soils do occur in prime agricultural areas), limitations to cultivation and successful farming will occur if stones are too big or too numerous within the topsoil layer.

For example, Denholm and Schut (1993) in A Field Manual for Describing Soils in Ontario provides various tables regarding the occurrence of *stoniness* (i.e., coarse fragments which occur at the surface of the soil, and are 25+ cm in diameter if rounded or irregular, or 15+ cm if flat) or *rockiness* (i.e., bedrock exposed at the surface). From viewing the condition of the orchard in some areas (see **Photo 1**), there are sufficient stones to handicap cultivation due to the fact that many of these stones exceed 15 cm, and the topsoil is relatively thin. While it is possible that some roots could penetrate deeper into the ground via fissures within the bedrock, drought would likely occur during the hot summer months.

Therefore, intrusive investigations occurred to determine if the surficial bedrock was localized or more widespread on this particular property.

#### ***Bedrock investigations:***

While Denholm and Schut (1993) does provide a number classification system (i.e., 1 to 5), there are three subclass definitions that would apply when determining limitations to agriculture. These limitations range from severe to extremely severe,

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and are dependent on the depth, and abundance of bedrock exposure at the surface.

These are defined as follows according to increasing severity:

Severe (S) – Soils with a very restricted rooting zone (hard rock at 20 to 50 cm below soil surface (bss).

Very severe (VS) – Soils with a restricted rooting zone (hard rock at 50-100 cm depth) and rock outcrops covering 10 to 25% of the surface, OR soils with a very restricted rooting zone (hard rock at 20-50 cm depth) and rock outcrops covering 2-10% of the surface.

Extremely severe (ES) – Soils with a very restricted rooting zone (hard rock at 20-50 cm depth) and rock outcrops covering 10-25% of the surface.

In this regard, a series of soil test pit inspections using a backhoe was performed on March 17, 2016, when snow cover had disappeared and the majority of the frost had left the soil.

To avoid damage to the existing orchard, these inspections occurred within an open, manicured grassy field situated north of the orchard (Figure 1). This allowed easier observation of bedrock outcrops from both Google earth images as well as field investigations. We have also added topographical contours to Figure 1 to show the relief of the property from south to north. We have also shown the approximate limits of the ridge across the Murphy farm as well as adjoining properties. ✓

***Bedrock survey results:***

A series of 14 pits were examined across the entire width of the property (Figure 1). The termination of each pit excavation occurred when solid bedrock was encountered OR the depth of the pit exceeded 1.0 metre. Table 1.0 provides the results of each pit.





**Table 1.0 – Soil Texture and Depth to Bedrock**

Pit Number	General Soil texture	Depth to bedrock	Other Notes	Bedrock limitation
1	Silt to clay loam	15 cm	West side of property	S
2	Clay loam	60 cm		S
3	Loam to clay loam	50 cm	Top of orchard. Many stones at surface	VS
4	Clay loam	38 cm	Large stones throughout topsoil	S
5	Loam	40 cm	Topsoil depth is 20 cm; near large sugar maple	S
6	Loam	70 cm	Topsoil depth is 40 cm; lots of fragments in sample	S
7	Loam with gravels	32 cm	Near woodland trail. Topsoil layer is limited to 18 cm.	VS
8	Clay loam	< 20 cm or at surface	Seepage encountered at surface.	VS
9	Loam	40 cm	Large flat rocks up to 70 cm dia encountered.	VS
10	Loam	36 cm	Edge of woodlot near laneway. Seepage present in pit.	VS
11	Clay loam	25 cm	Seepage present due to lack of drainage.	VS
12	Gravel/loam	<30 cm or at surface.	Seepage encountered at surface of soil.	VS

Pit Number	General Soil texture	Depth to bedrock	Other Notes	Bedrock limitation
13	Loam/fragments	<38 cm or at surface	Seepage encountered at surface.	VS
14	Loam	36 cm	Seepage encountered at surface. Pit filled with water in less than 5 minutes.	VS

The excavation of all fourteen pits encountered bedrock within at least 70 cm of the soil surface. In some pits, large rocks were found (Photo 2) or seepage filled the pit shortly after it was excavated (Photo 3).



**Photo 3 – View of stones on surface of soil prior to pit excavation. Note: Compare shovel at bottom of photo (which is 20 cm wide) with large stones in centre of the photo.**



**Photo 4 – Example of seepage near ground level due to underlying bedrock.**

In most pits, bedrock was within 40 cm of the soil surface meaning that the underlying ridge would have severe implications on crop plant growth if this grassy area was ever cultivated, and used for agriculture. The presence of bedrock outcrops was also found in several areas immediately south of the forest as well as within the orchard area.

Furthermore, the presence of forest and the underlying ridge (**Figure 1**) also creates a barrier between the orchards along County Road #8 and the fields and orchards north of this ridge.

In our opinion, clearing this forest and ridge for agricultural usage would not be beneficial and it is doubtful that this area could not be used for agricultural accessory usage (i.e., storage of equipment/implements) due to steep topography or as a source for long-term forestry products (i.e., maple syrup, posts, lumber).

***Next steps:***

We understand that you wish to create two deep lots along the road frontage of your 127 acre farm (**Figure 2**) with a third lot being formed to retain the farm infrastructure as well to provide continued access to the better quality lands north of the ridge. However, the Town indicates that only one lot can be created due to the current Prime Agricultural zoning of this area.

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From conducting our preliminary investigations on your farm, we believe that good quality soils do occur adjacent to County Road #8, and north of the forest, but the presence of the large bedrock ridge that occurs in the southern portion of the property (and is not shown on soil mapping for Prince Edward County) does provide evidence that the Prime Agricultural land mapping is too general for this particular property, and further refinement is necessary to account for the forest ridge that has low agricultural potential.

In this regard, we suggest that further discussions occur with the Town Planner to provide an opportunity to discuss rezoning and severance for this property.

Should you have any questions, please do not hesitate to contact the undersigned.

Yours sincerely;

**Dillon Consulting Limited**



Tom Young, B.Sc.Agr., P.Ag  
Senior Agrologist

Attachs.  
IPY:mrh  
Project No. 16-3486



# Figures

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**JOHN MURPHY FARM SOIL INVESTIGATIONS**

Location of Soil Pits  
Figure #1

- Location of Soil Pits
- B Barn
- FS Fruit Sand
- H House
- FD Farm Dump
- 5m 5m Contours
- Edge of Ridge
- Forested Rocky Ridges
- Orchard
- Farm Track



MAP DRAWING INFORMATION  
 HAS CHANGED BY: JAC  
 HAS CHANGED BY: JAC  
 HAS PROJECTED: NAD 1983 UTM Zone 17N



PROJECT: 103448

STATUS: FINAL

DATE: 04/20/16