DBH Soil Services Inc.
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Via email

Mr. Pierre Chauvin
MHBC Planning, Urban Design & Landscape Architecture
540 Bingemans Centre Drive
Suite 200
Kitchener, ON
N2B 3X9

November 26, 2020

Dear Mr. Chauvin:

Re: Soil Survey and Canada Land Inventory (CLI) Assessment
Nelson Aggregate – Burlington Quarry West Extension
Part Lots 1 and 2
Concession 2 (Former Nelson Township)
City of Burlington
Region of Halton

Introduction

DBH Soil Services Inc. was retained to complete a soils assessment and Canada Land Inventory (CLI) study on the above-mentioned lands. These lands comprise a large portion of the Burlington Springs Golf Club lands (5235 Cedar Springs Road) and are generally bounded by Colling Road to the northwest, Cedar Springs Road on the southwest, 2 Side Road on the southeast, and the existing Nelson Aggregate Burlington Quarry site on the northeast. These lands are all accounted for under one Assessment Roll number as 240203050420000000. This soil survey was completed to examine and document the soil resources within the proposed License Boundary. The lands within the proposed License Boundary account for approximately 60 ha. These lands are henceforth referred to as the Subject Lands. Figure 1 illustrates the relative location of the Subject Lands with respect to the above-mentioned features.

This study is an addendum to the DBH Soil Services Inc. Soil Survey and Canada Land Inventory Classification (CLI) for Part Lots 17 & 18, Concession 2 North of Dundas Street, City of Burlington, Halton Region report completed on February 3, 2020.

Soil Investigation

Basic soils (and Canada Land Inventory classification (CLI)) information was provided in the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) soils and mapping report *The Soils of Halton County. (Report No. 43 of the Ontario Soil Survey*. Gillespie, J.E., R.E. Wicklund and M.H. Miller, 1971) with mapping at a scale of 1:63360. Digital mapping was provided by the Ontario Ministry of Agricultural, Food and Rural Affairs (OMAFRA) through the Land Information Ontario (LIO) warehouse website. The digital mapping was provided at a scale of 1:50000. Mapping at this scale is of a general nature when referring to site-specific planning.

With this in mind, a detailed soil survey was completed for the Subject Lands. The detailed soil survey was completed by following the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) *Guidelines for Detailed Soil Surveys for Agricultural Land Use Planning* (May 31, 2004). These guidelines were created in response to concerns with the accuracy of published mapping and classification of soil materials and that the existing information is of too general a nature to adequately describe and interpret the soil properties for site-specific planning purposes. A detailed onsite soil survey and surrounding land reconnaissance survey were conducted on November 17, 2020.

Due to the relative location and close proximity of the Subject Lands to the study lands identified in the original DBH Soil Services Inc Soil Survey Report identified above, the physiography, and climate characteristics will be similar to what was identified in the original report. Topography information was provided by MHBC Planning, Urban Design & Landscape Architecture in shapefile (Geographic Information System (GIS)) format.

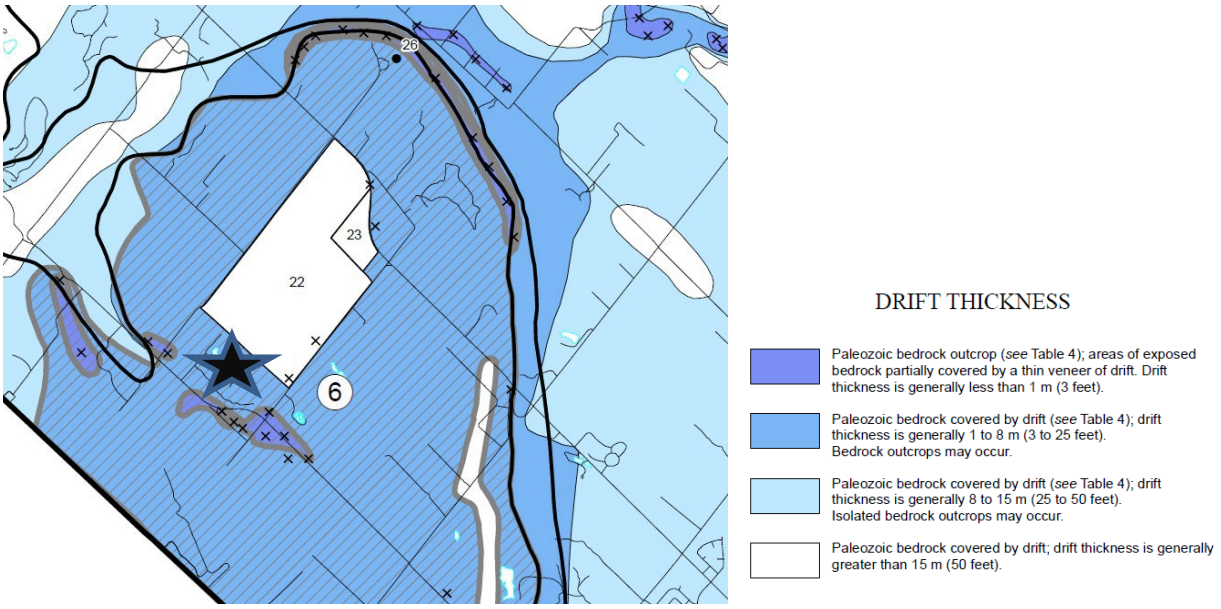
The *Physiography of Southern Ontario* (3rd Edition) Physiographic Unit Map indicates that the Subject Lands are located in the Niagara Escarpment Physiographic unit. A more detailed map of the Physiography of the South Central Portion of Southern Ontario (Map 2226) illustrates that the Subject Lands are located to the west of the Niagara Escarpment in an area of till moraines. Till moraines are the glacially formed accumulation of unconsolidated clay, sand, and stone/boulder materials. In this area the till moraines often occur as thin layers (< 10 m) over bedrock.

The Subject Lands are located within the 3100 - 3300 average accumulated Crop Heat Units area in Ontario. The Crop Heat Units (CHU) index was originally developed for field corn and has been in use in Ontario for 30 years. The CHU ratings are based on the total accumulated crop heat units for the frost-free growing season in each area of the province. CHU averages range between 2500 near North Bay to over 3500 near Windsor. The higher the CHU value, the longer the growing season and greater are the opportunities for growing value crops.
Crop Heat Units for corn (based on 1971-2000 observed daily minimum and maximum temperature (OMAFRA, 2009)) map is illustrated below. The approximate location of the Subject Lands is marked with a blue star.



Source: Agronomy Guide for Field Crops OMAFRA – Publication 811

A review of the Aggregate Resources Inventory of the Regional Municipality of Halton, Southern Ontario (Ontario Geological Survey Aggregate Resources Inventory Paper 184, 2009) reveals that the Subject Lands are located in area where the drift thickness ranges from 1 to 8 m, and bedrock outcrops may appear. The approximate location of the Subject Lands is illustrated with a black star.



From Aggregate Resources Inventory Paper 184 – ARIM 184-2 Bedrock Resources

A detailed on-site soil survey was conducted to more accurately map and classify the soil resources of the soil materials on the Subject Lands. The soil survey included the following tasks:

- Completion of a review of published soil information (*The Soils of Halton County. Report No. 43 of the Ontario Soil Survey*. Gillespie, J.E., R.E. Wicklund and M.H. Miller, 1971),
- Conduct a review of published Canada Land Inventory (CLI) ratings for the soils of this area,
- Conduct an aerial photographic review and interpretation of the soil polygons, disturbed soil areas and miscellaneous landscape units (ie: streams, boulder pavement, wayside pits),
- Conduct an on-site soil survey,
- Completion of mapping to illustrate the location of the property, the occurrence of soil polygons and appropriate CLI capability ratings,
- Completion of a report outlining the methodologies employed, findings (including a discussion of relevant features identified) and a conclusion as to the relevance of the CLI classifications for the soil polygons on the property.

The detailed soil survey was initiated with conversations of staff at Burlington Springs Golf Club to determine if any of the original golf course plans, or photographs of the construction of the golf course still existed. It was determined that those types of historical documents and resources were not available, and therefore were not used as part of this assessment.

The detailed soil survey of the Subject Lands and reconnaissance of the surrounding area was conducted on November 17, 2020. Aerial photographic interpretation was used to delineate soil polygon boundaries by comparing areas, on stereoscopic photographs, for similar tone and texture. Delineated soil polygons were evaluated for the purpose of verifying soil series and polygon boundaries. The evaluation was completed through an examination of the existing soil conditions to a minimum depth of 100 cm or to refusal. A hand held Dutch Soil Auger and/or Dutch Stone Auger was used to extract the soil material to a minimum depth of one metre (or to refusal).

Each soil profile was examined to assess inherent soil characteristics. Soil attributes were correlated with the *Canadian System of Soil Classification* (CSSC) (Agriculture Canada, 1998) and the *Field Manual for Describing Soils in Ontario* (Ontario Centre for Soil Resource Evaluation, 1993). A handheld clinometer was used to assess percent slope characteristics. Soils were assigned to a soil map unit (series) based on soil texture (hand texturing

assessment), soil drainage class and topography (position and slope).

Depth to free water within one metre of the soil surface was also recorded at inspection sites located on lower slope positions (where applicable). Names for the soil series and the Canada Land Inventory (CLI) ratings were assigned to each soil polygon by correlating the soil series with soils information presented in *The Soils of Halton County (Report No. 43 of the Ontario Soil Survey*. Gillespie, J.E., R.E. Wicklund and M.H. Miller, 1971) and with the CLI information presented on the 1:50000 scale manuscript mapping.
Observations noted at the time of the onsite soil survey included:

- The majority of the Subject Lands were used as an active golf course.
- The topography of the lands varies across the site, due to landforming that was completed in the construction of the golf course in the early 1960's.
- Stone piles and bedrock outcrops were observed in many locations on the property.
- Stone piles included stone up to boulder size.

A total of 14 soil inspection sites were examined on the Subject Lands. Staff (grounds keepers) from Burlington Springs Golf Course assisted in the selection of soil inspection locations. Staff were asked to provide locations within the golf course that may not have been influenced or disturbed during the construction of the golf course. The general comments indicated that the soil depths were very shallow (predominantly less than 40 cm), and much of the soil onsite had been moved and used in the creation of the fairways, tees and greens locations. The greens locations comprised specialized soil materials, as are found on most golf courses. It was evident during the soil survey that there had been much landforming, when comparing the topography of the sculptured tees and greens, and to some degree, the fairways.

Table 1 Soil Inspection Site Characteristics

Soil Inspection Site Number	Horizon	Depth of Horizon (cm)	Soil Texture	Drainage Class	Soil Series
1	A	0 – 25*	Loam	Unknown	Disturbed
2	A	0 – 50*	Loam	Unknown	Disturbed
3	A	0 – 20*	Loam	Unknown	Disturbed
4	A	0 – 35*	Loam	Imperfect	Disturbed
5	A	0 – 59*	Loam	Imperfect	Disturbed
6	A	0 – 25*	Loam	Unknown	Disturbed
7	A Rock	0 – 35 35*	Loam	Unknown	Disturbed
8	A	0 – 40*	Loam	Unknown	Disturbed
9	A	0 – 40*	Loam	Unknown	Disturbed
10	A	0 – 60*	Loam	Imperfect	Disturbed
11	A	0 – 20*	Loam	Unknown	Disturbed
12	A	0 – 40*	Loam	Unknown	Disturbed
13	A	0 – 50*	Loam	Imperfect	Disturbed
14	A	0 – 20*	Loam	Unknown	Disturbed

Notes: * = refusal depth. Depth of refusal based on inability to auger deeper due to excess stoniness, bedrock, or other consolidated layer.

It is evident from Table 1 that there was little information that could be determined from the soils on this site due to the landforming processes that were completed as part of the construction of the golf course.

The following photographs provide visual evidence of the landforming (creation of hills and fairways), and the abundance of bedrock outcrops.



Photograph of landformed hills adjacent to the fairways.



Photograph of landformed hills along fairways.

The grounds keepers also directed us to locations of bedrock outcrops that occurred with frequency throughout the golf course, including areas of the fairways.



Photograph of large area of bedrock outcrop.

Bedrock outcrops were observed as large areas of rock and boulder materials adjacent to the fairways, and as smaller areas that were barely exposed within the fairways.



Photograph of small area of exposed bedrock.



Photograph of exposed bedrock and sculptured landscape along edge of fairway.

The central portion of the Subject Lands comprised a small stream course that was fed by water pumped out of the Nelson Quarry to a ditch along the north side of the property. It was evident that numerous ponds had been constructed on the Subject Lands, as evidenced by the large hills adjacent to the ponds. The hills were comprised of the soil and rock/stone materials that were dug out of the pond areas.

Conclusions

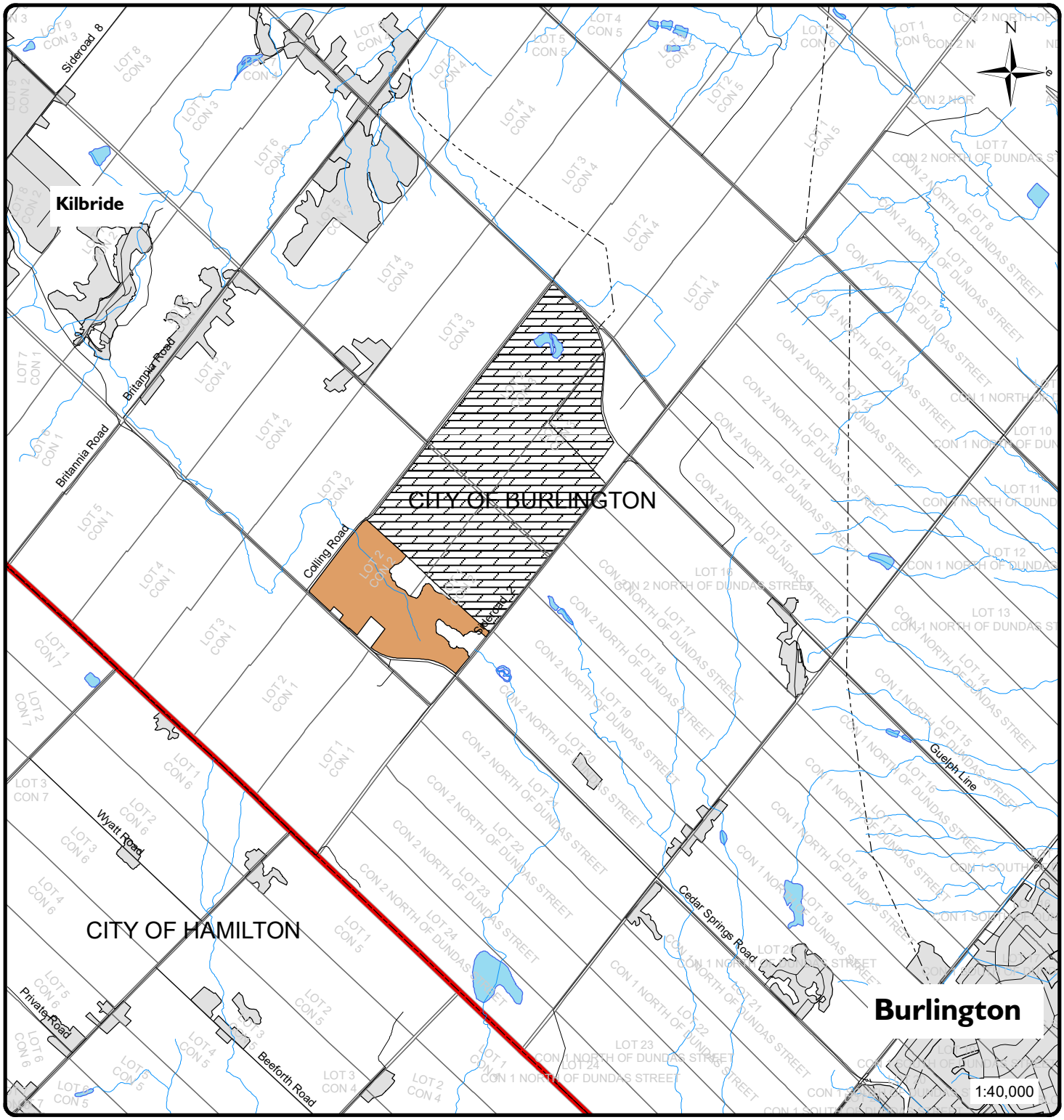
Based on the information collected during the onsite survey, and through conversations with grounds keepers, who had thorough knowledge of this property, it was determined that this property is comprised of extensive areas of disturbed (landformed) soils over shallow bedrock resources. Disturbed soils are not rated within the Canada Land Inventory (CLI) classification system. Soils that are shallow to bedrock can be rated, assuming that the area is large enough to display at the mapping scale. Due to the scale of mapping, the areas of disturbed soils comprise large portions of the Subject Lands, while the minor areas of shallow to bedrock soils are too small to map. Therefore, the entire site (Subject Lands) is considered as disturbed and is considered as not rated in the CLI system. As a result of this non-rating, these lands would be deemed as non-prime agricultural lands. Therefore, these lands should not be considered as Prime Agricultural Land and should not be considered as part of the Provincial Land Base Prime Agricultural Area mapping.

I trust this information is helpful. Should you have any questions or concerns, please feel free to contact me at your earliest convenience at 519-578-9226.

Sincerely
DBH Soil Services Inc.



Dave Hodgson, P. Ag.
President



Legend

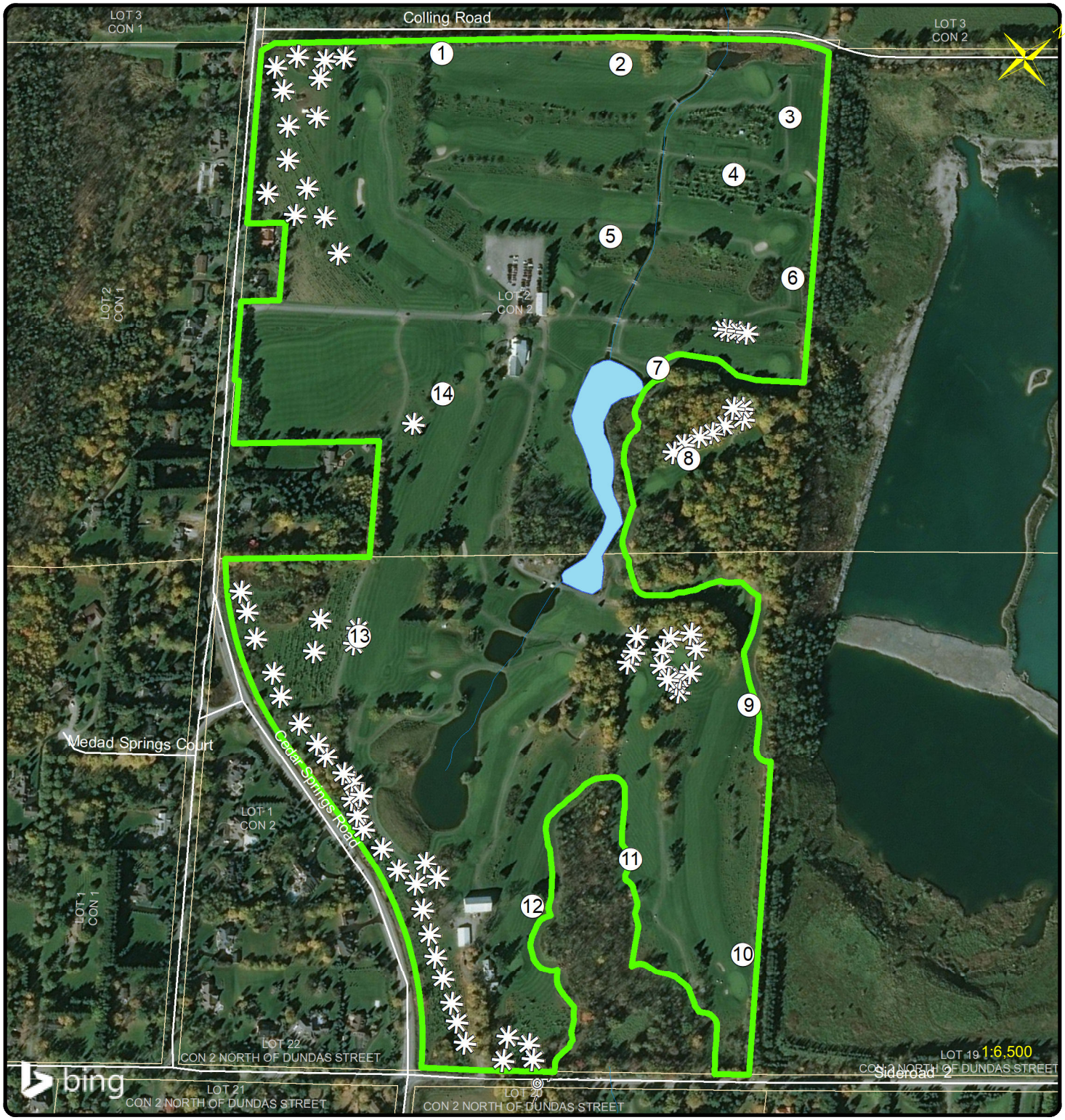
- Roads (MNRF)
- Unknown Transmission Line (MNRF)
- Watercourse (MNRF)
- Authorized Aggregate Areas (MNRF)
- Built Up Areas (MNRF)
- Lot Lines (MNRF)
- Municipal Boundary (MNRF)
- Subject Lands
- Waterbody (MNRF)

Figure 1

Location

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November 2020



Legend

- Bedrock Outcrop
- Soil Inspection Location
- Roads (MNRF)
- Watercourse (MNRF)
- Licence Boundaries
- Lot Lines (MNRF)
- Waterbody (MNRF)

Figure 2

Soil Inspection Sites

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