



October 23, 2023

The Birches Nursing Home
Musquodoboit Harbour, NS
c/o Eastin Projects Ltd

Attention: Michael Eakin, P.Eng., PMP , michael.eakin@eastin.ca

Subject: **Wetland Determination at The Birches Nursing Home proposed site, portion of PID No. 40192528, Musquodoboit Harbour, Nova Scotia**
Englobe reference: 2307051.001

As we understand, development of the above noted site with a nursing home is being considered. During site reconnaissance for a recent Phase I Environmental Site Assessment, some wet areas were noted on the property and concern was raised about the potential for wetland on the site. Therefore, with your approval, Englobe Corp. (Englobe) wetland assessors undertook desktop analysis and site reconnaissance to determine if wetlands are present with the site boundaries, and to delineate the extents of any wetlands, if present.

1 Methodology

1.1 Desktop Analysis

Wetland assessments begin with a review of available desktop information including various aerial images and maps, followed by fieldwork to ground-truth the desktop findings. Desktop resources reviewed as part of the assessment included:

- Aerial photos (1964, 1974, 1982, 1992, 2003, and Google Earth imagery between 2004 and 2018)
- The NS provincial Landscape Viewer wetland and wet areas mapping (WAM) layers
- Available Light Detection and Ranging (LiDAR) mapping
- Small scale topographic maps

1.2 Field Wetland Determination Procedure

Wetlands are determined in the field by Englobe using procedures developed by the US Army Corps of Engineers, adapted for the Northeast and North Central regions of the US, and endorsed by NSECC. The field determination procedures follow a three-parameter approach, using indicators established for vegetation, soils and hydrology to identify the presence of wetlands.

Wetland boundaries are initially identified through visual assessment of vegetation and hydrology. Dominant vegetation in each stratum (tree canopy, shrub and herbaceous layers, if present) is identified

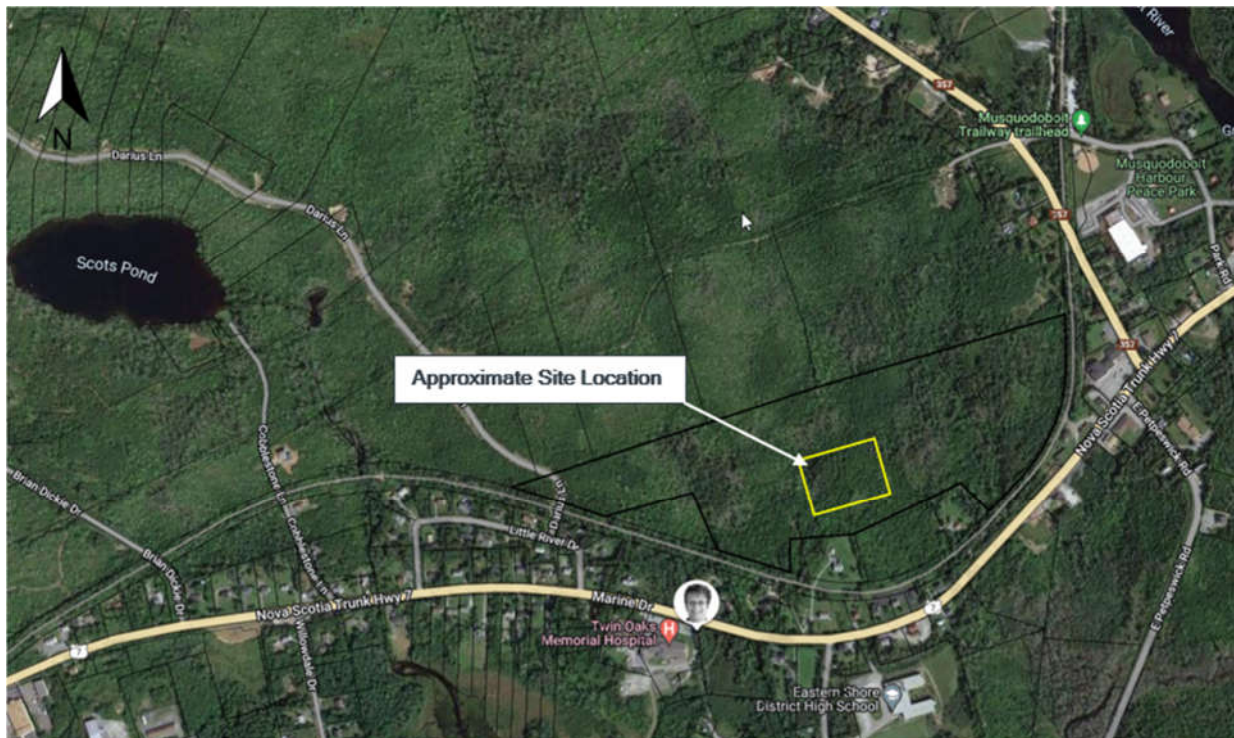
using appropriate regional field guides and a Dominance Test worksheet and are assigned their appropriate wetland indicator status for this region. This work identifies whether the dominant vegetation is that which thrives in, or is at least tolerant of, prolonged wet conditions during the growing season. A visual assessment for primary indicators of wetland hydrology (e.g., inundation, water stained leaved) is also conducted during the vegetation survey. This work looks for direct signs of prolonged wet conditions. The visual boundary is then verified through manual excavation of shallow test pits (shovel pits) or auger holes. Soil profiles are examined, and soil properties referenced against the Northeastern US Hydric Soil Indicators with Probable Application in Nova Scotia document to determine if they meet the wetland soils criteria. The shovel pits or auger holes are also examined for additional signs of wetland hydrology (e.g., soil saturation, standing water in the holes, soil that has reduced iron and/or oxidized rhizospheres, etc.). Where all three parameters (vegetation, soil and hydrology) satisfy the wetland criteria, the area is considered wetland.

As the wetland boundaries are identified in the field following this three-parameter approach, the boundary points are recorded using a GPS instrument with an accuracy of 5m or less. The unit generally provides sub meter accuracy, but accuracy can range from 1 to 5 m. Flagging tape is typically hung along the wetland boundary so that surveyors can map the wetlands with higher accuracy.

2 Site Description

The current area of interest is identified as the Birches Parcel, a portion of PID No. 40192528 located in Musquodoboit Harbour, NS. The site is a square-shaped parcel of land with an area of approximately 28,620 m² (7.07 acres). Surrounding the site is undeveloped wooded land with road development along the north boundary and residential properties along Highway 7 to the south of the site. The general site location is provided in Figure 2-1. A site sketch is also provided as Figure 1, Appendix A.

Figure 2-1 Site Location



A summary of the topographic, geologic and hydrogeologic aspects of the site summarized from the Phase I ESA report is provided in Table 2-1.

Table 2-1. Topography, Geology and Hydrogeology

Item	Description
Ground Surfaces	The site was accessed via Blueberry Run Trail and an unmarked ATV trail located at the southwestern side of residential property on PID 40192536. The site and surrounding area are currently undeveloped and wooded with mostly new growth, consisting of Balsam Fir, Spruce, Maple and Birch trees. Approximately 50% of the site had been bulldozed to allow for a previous geotechnical test pit investigation. The test pits had been backfilled.
Topography of Site and Surrounding Area	The site slopes downward from north-northwest to south-southeast toward Musquodoboit Harbour. Local regional topography slopes downward to the south toward the Petpeswick Inlet.
Site Grade Relative to Adjacent Properties	The site is at a similar grade as lands to the east and west, which follow a similar downward slope toward Musquodoboit Harbour. The site is downgradient from lands to the north and upgradient from the residential properties to the south.
Surficial Geology	Surficial geology mapping (Stea et al, 1980) indicates that the native soils in this area are identified as glacial deposits known regionally as Slate Till. Slate Tills are described as light olive brown, sandy till with abundant gravel, cobble and boulder sizes.
Bedrock Geology	Bedrock geology mapping of the area (Keppie et al, 2014) indicates that the site is underlain by early Cambrian to early Ordovician-aged Goldenville Formation bedrock of the Meguma Group. This unit is described as sandstone turbidites and slate: continental rise prism (in places metamorphosed to schist and gneiss). According to Nova Scotia Department of Natural Resources and Renewables (NSDNRR) mapping, the site is located in a low-risk zone for Karst (naturally occurring sinkholes) and is located in an area of medium risk for radon in indoor air.
Wetlands and Watercourses	Potential wetland areas and potential watercourses were observed on the north central section of the parcel. Standing water and low-lying wet areas were observed throughout the site in areas that had been cleared for test pit machinery access. NSDNRR's online Wet Area Mapping (WAM) viewer indicated that no watercourses were running into or away from the site. The site has been determined to have an index of "well to moderately-well drained".
Nearest Off-Site Surface Water Body	Petpeswick Inlet is located approximately 700 m to the south of the subject site. Scots Pond is located approximately 1 km to the northwest of the subject site. Musquodoboit River is located approximately 850 m to the northeast of the subject site
Inferred Groundwater Flow Direction	South-southeast.

3 Wetland Determination Results

3.1 Desktop Results

Based on a review of historic aerial imagery and topographic mapping, the subject property has never been developed and has remained tree-covered over the timeframe covered by the aerial photos. Review

of the available topographic and provincial landscape viewer maps did not reveal any mapped wetlands, topographic lows or wetland areas that would be indicative of wetlands.

Figure 3-1 (Provincial Landscape Viewer, Wet Areas Mapping layer), with approximate location of The Birches parcel. Predicted wet areas are shown in red and pink.

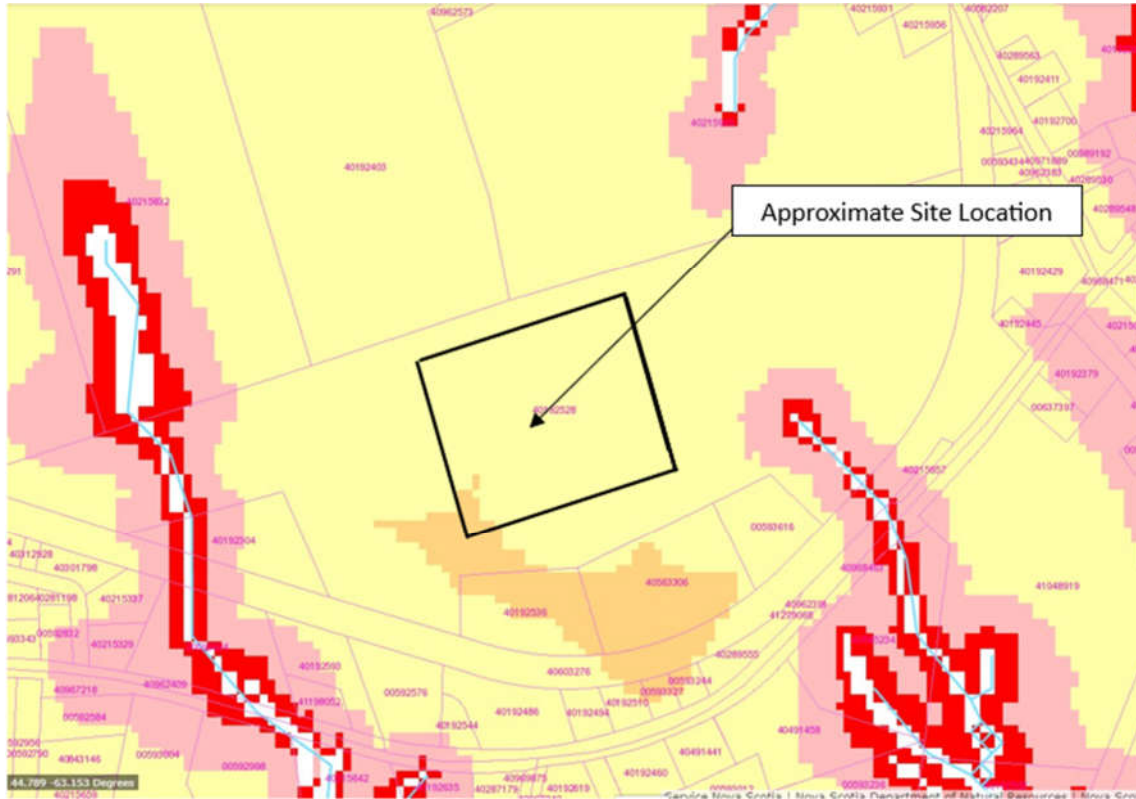


Figure 3-2 (Provincial Landscape Viewer, mapped wetlands layer), with approximate location of The Birches parcel. There are no provincially mapped wetlands on the site.

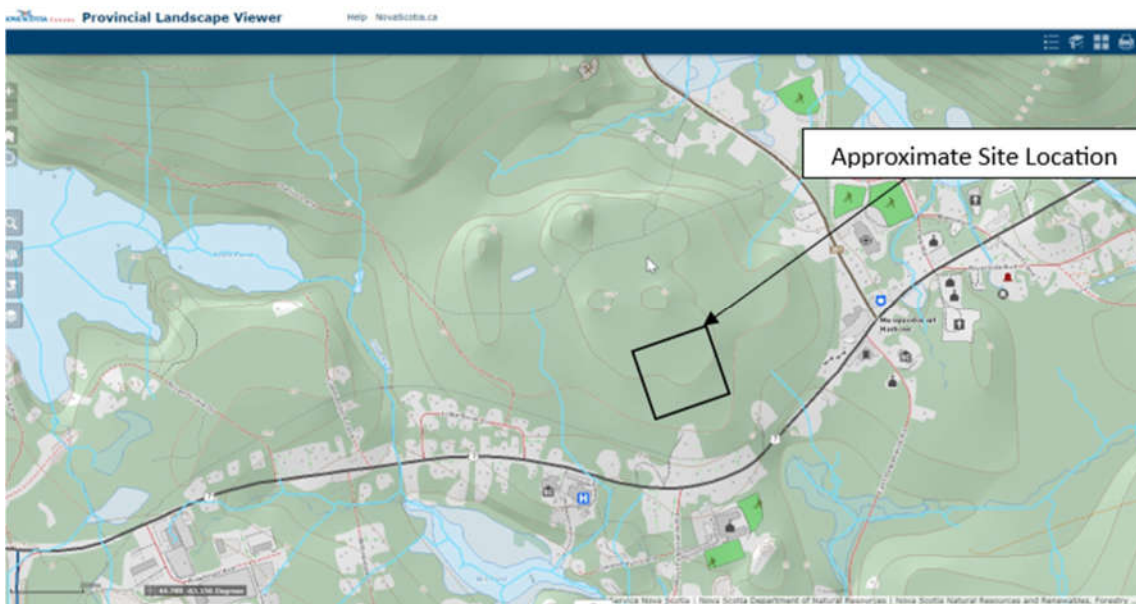


Figure 3-3, LiDAR map showing approximate site location and elevations.

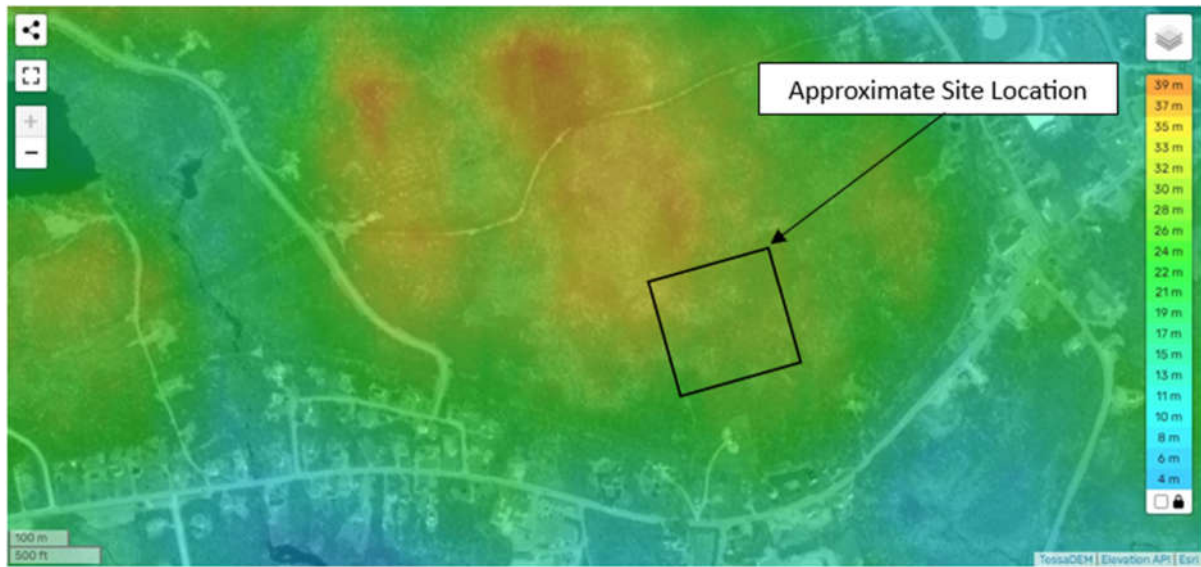
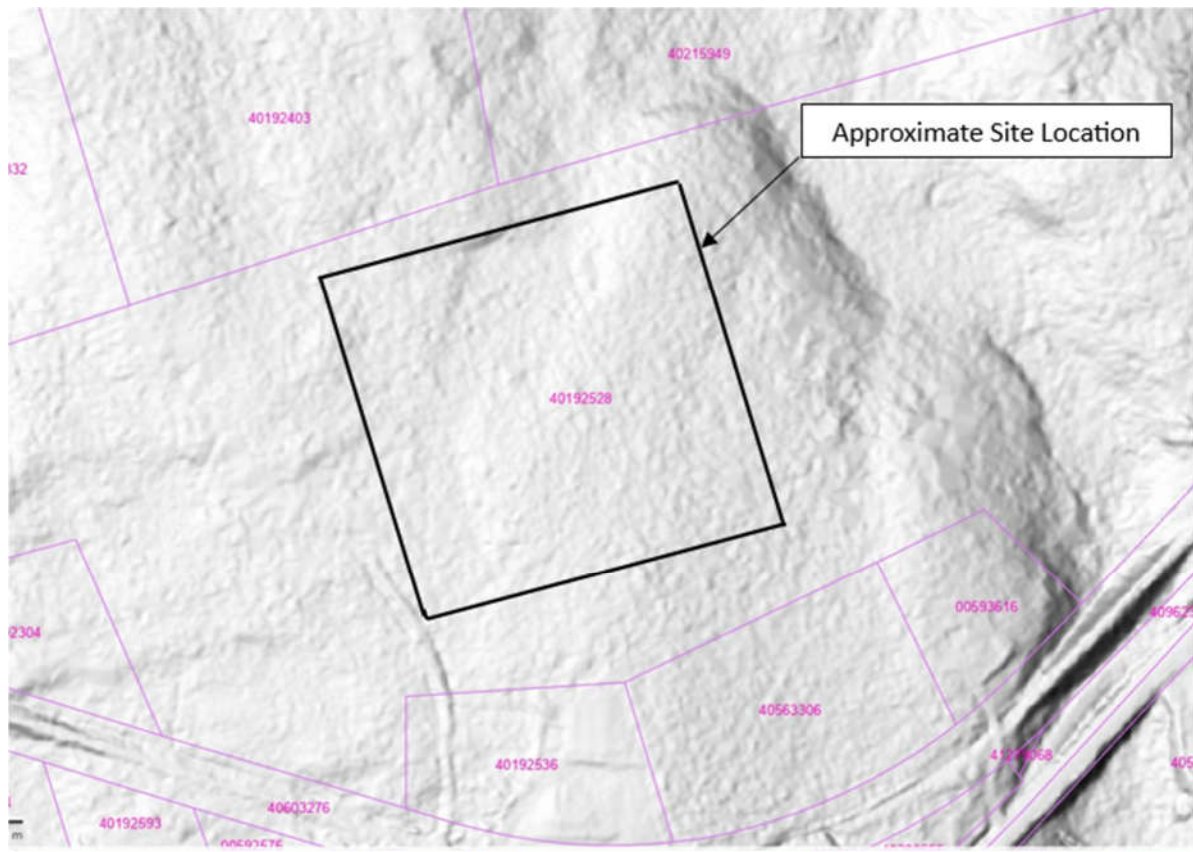


Figure 3-4, LiDAR (hillshade) map showing approximate site location and LiDAR interpreted surface features



3.2 Field Findings

After review of available background information, field reconnaissance to ground-truth the presence or absence of wetlands onsite was conducted on September 18, 2023. Wetland assessors walked throughout the site in a criss-cross pattern looking for flat, low-lying and wet areas where wetlands might be present. At various areas within the site, Englobe evaluated the three criteria, vegetation, soil and hydrology, to determine if wetlands were present. Site photographs are attached (Appendix B).

It should be noted that the field reconnaissance was conducted near the end of a particularly wet summer when record-setting rainfall events have occurred, and one day after the passage of Post Tropical Storm Lee.

As noted during the Phase I ESA site reconnaissance, a wet area was encountered in the central/northwestern area of the parcel where the site elevation was relatively high, but the topography was fairly flat. This area was highly disturbed by tree clearing, excavator track ruts and some former test pits. Ponded water was trapped in track ruts. Throughout this disturbed, wet area, the shallow soil profile generally consisted of a thin layer of organics and peat (less than 20cm) over cobbles and boulders, with scant mineral soil between and beneath the cobbles. Manual test pits were excavated to the northwest and southeast of this wet area, and soil conditions were not hydric, with the exception of localized peaty pockets between some large boulders and beneath windblown trees. Vegetation surveys were conducted and determined that the dominant vegetation was general facultative (and therefore hydric). Water was present within the upper 30cm (indicating the presence of wetland hydrology), however considering the atypical wet conditions, the recent ground disturbance and the soil conditions in the test pits, the area was determined not to be wetland.

An additional wet area was identified near the southwest corner of The Birches parcel, where the ground surface sloped downward to the south. This area showed evidence of recent heavy surface water sheet flow across the ground surface. The vegetation in this area was generally facultative (and therefore wet enough to be considered hydric vegetation) and wetland hydrology was present. However, manual test pits in this area showed a relatively thin organic layer (less than 10cm) underlain by a thin dark brown mineral soil over boulders or bedrock (manual shovel refusal approximately 20cm below ground surface). The soil conditions were not deemed to be hydric, therefore this area was interpreted to be an intermittent drainage corridor and not wetland. This area drained southward onto the ATV trail on the parent parcel; the parent parcel was not fully assessed for potential wetland.

A site sketch is provided in Appendix A. Site photos are provided in Appendix B.

4 Conclusion

Desktop analysis revealed a low potential for wetlands at the site. Although site reconnaissance revealed some wet areas at The Birches parcel, in consideration of all information including the unusually high recent rainfall, recent ground disturbance and soil conditions, these areas were deemed not to be wetlands, in our professional opinion.

5 Report Use and Conditions

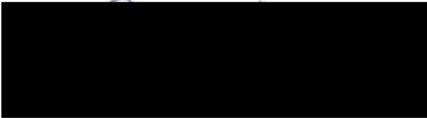
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accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

Our conclusions are based on data and information obtained from desktop resources and during a site visit by Englobe on the subject property. In conducting this wetland assessment, Englobe reviewed available desktop information, traversed parts of the land parcel and conducted site inspection of vegetation, soil and hydrology conditions. Our professional opinion is based solely upon the condition of the property on the date of such inspection, supplemented by information obtained and described herein. Environmental conditions are dynamic in nature and changing circumstances in the environment and in the use of the property can alter radically the conclusions and information contained herein

We trust the enclosed to your satisfaction. If, however, additional information should be required, please communicate with the undersigned.

Yours very truly,
Englobe Corp.



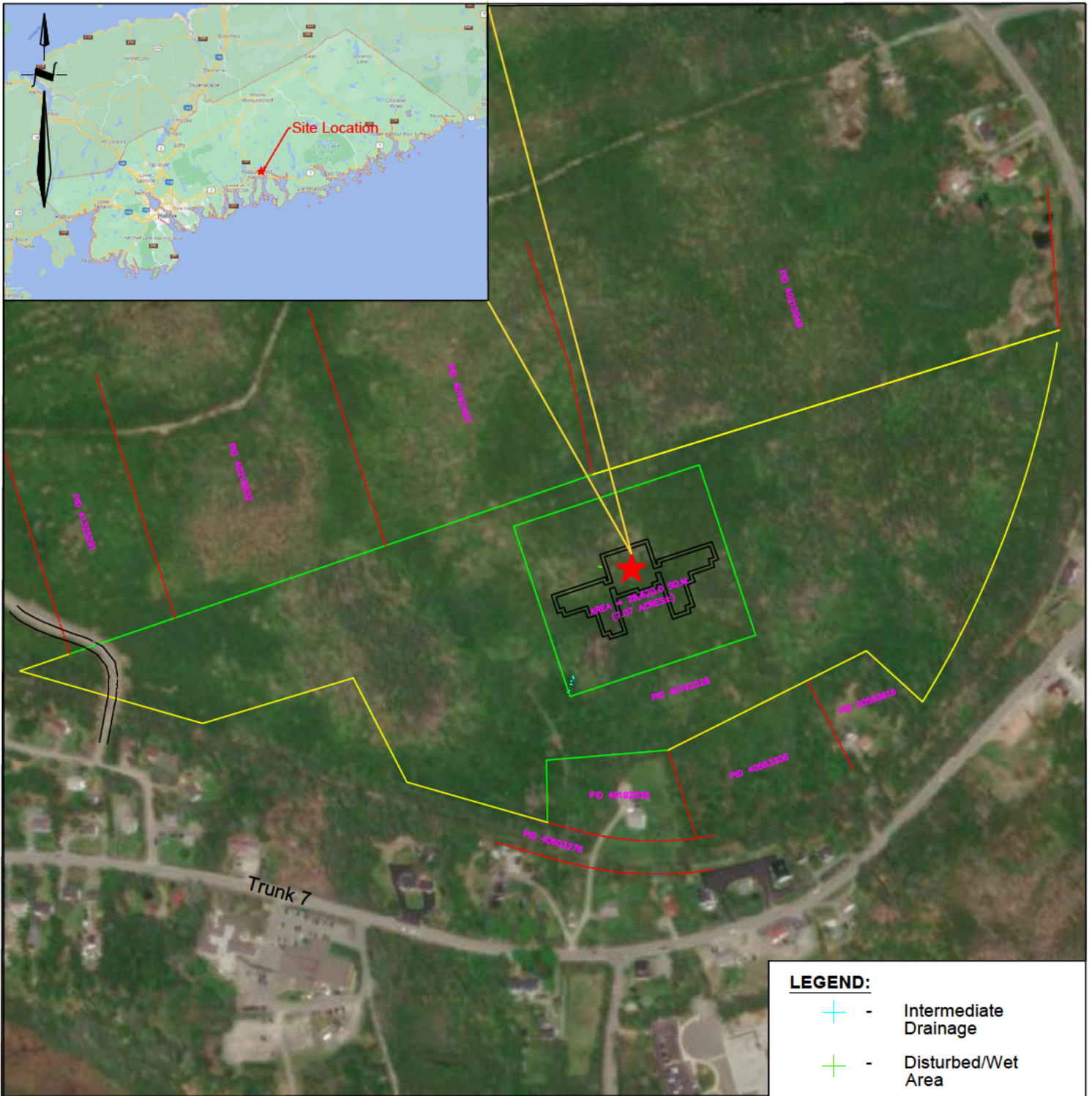
Doreen Chenard, B.Sc. in Agr.
Technical Director, Environmental Engineering

Attachments

Appendix A

Site Sketch





LEGEND:

- + - Intermediate Drainage
- + - Disturbed/Wet Area

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The Birches

**Wetland Assessment
 Highway 7**

The Birches Proposed Location PID # 40192528,
 Musquodoboit Harbour, Nova Scotia

Discipline:	Environment	Prepare by:	D.C	Verify by:	D.C
Scale:	1: 5000	Draw by:	RA	Approval by:	D.C
Date:	September 2023	Figure no:	1		
Page setup:	Paper size:	Register no:			
Figure 1	Letter				

Site Plan

Man.	Project	Otp	Project Phase	Electronic ref.	Rev.
-	02307051	-	-	-	-

Appendix B

Site Photographs





Photo 1: Wet area, significantly disturbed due to previous geotechnical test pit investigation. Photo taken in the central/northwest portion of the property where geotechnical machinery has made depressions in the landscape which hold water. Adjacent undisturbed areas did not appear to be wetland.



Photo 2: Wet area, significantly disturbed due to previous geotechnical test pit investigation. Photo taken in the central /northwest portion of the property where geotechnical machinery has made depressions in the landscape which hold water. Adjacent undisturbed areas did not appear to be wetland.



Photo 3: Intermittent drainage corridor located near the southwest corner of the study area.



Photo 4: Test pit location showing non-hydric soil.



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