Englobe
Soils Materials Environment

Clayton Developments Limited

LAND SUITABILITY ANALYSIS

Mount Hope
PID Nos. 41362161 and 41280546
Dartmouth, Nova Scotia

OCTOBER 2021

1901066.022

FINAL REPORT

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0A	October 13, 2021	Draft LSA Report Issued
0B	October 29, 2021	Final LSA Report Issued

Property and Confidentiality

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1 Introduction

Clayton Developments Limited is currently in the initial stages of pre-construction design for land holdings in the Mount Hope area at the site of a proposed residential community. Englobe Corp. (Englobe) has been contracted to conduct a Land Suitability Analysis (LSA) through a review of available information within the area and identify environmental constraints to the proposed development.

This report with its associated maps summarizes the findings of the review.

1.1 Objectives

A LSA determines areas of environmental importance based on physical attributes inherent to a study area of land. The process includes an assessment and mapping of natural systems and critical areas. The purpose is to identify, map and assess vulnerable landforms, sensitive ecological features and climate hazards, including but not limited to, any wetlands, watercourses, flood prone areas, steep slopes, forest cover, contaminated sites, and wildlife habitats and corridors.

The objectives of this LSA are to provide a broad scale, desktop overview to identify environmental limitations that may impact the development of the area of interest and the Mount Hope site.

This assessment is not intended to provide a guarantee that any development of the site will be approved; rather, the assessment will allow a determination if the anticipated environmental constraints will pose a limitation to the proposed development.

1.2 Study Area

The LSA analyzed the Mount Hope study area from two scales: 1) high-level reconnaissance (literature review) was undertaken, and; 2) detailed analysis (including a field investigation) was undertaken directly within the Mount Hope study area.

A Site Plan providing an overview of the study area is provided in Figure 1, Appendix A.

1.2.1 Mount Hope Study Area

The current area of interest is comprised of two parcels identified as PID Nos. 41362161 and 41280546. The combined parcels cover an area of approximately 36.01 hectares (88.98 acres).

The site is bound by residential properties to the north, northwest and east on Lynn Drive, Gaston Road and the Maple Ridge manufactured home community. An undeveloped parcel of land is located directly northwest of the site. Highway 111 is present to the east and southeast. Commercial and industrial properties are present along Research Drive, Neptune Crescent, and Mount Hope Avenue to the south and west. The two subject parcels are currently undeveloped and owned by A. J. Legrow Holdings Limited.

Figure 1-1. Site Location Map, Mount Hope LSA, NS

1.2.2 Watershed Area

Based on the large-scale mapping, the site is located in the Sackville primary watershed (1EJ). The secondary watershed areas for this area of Dartmouth are identified as IEJ-SD2 (majority of the site), IEJ-2 (north portion of the site) and IEJ-IC (eastern portion of the site).

At the site, surface water flows are generally toward the wetland, surface water flow is then controlled by a Halifax Water discharge structure that directs flow southwesterly into stormwater infrastructure in the Woodside Industrial Park at Neptune Crescent. This flow ultimately discharges into the Halifax Harbour (Atlantic Ocean) through piped infrastructure. The watershed areas that drains into the Halifax Harbour (IEJ-SD2 and IEJ-2) are 993 hectares and 3139 hectares in size, respectively. The watershed area that covers a small eastern portion of the site (IEJ-IE) flows northeasterly toward Russell Lake and is 37 hectares in size. The watershed mapping is presented in Figure 2, Appendix A.

2 Methodology

2.1 Land Suitability Analysis Evaluation Framework

All work has been conducted following generally accepted scientific and engineering practices. The assessment focused on identifying environmental factors that may affect the developability of the land. The information for this project was obtained from a review of available information, including environmental assessment reports, government databases and publicly available mapping.

2.2 Valued Ecological Components

The environmental effects evaluation methodology used in this report focuses the evaluation on those environmental components of greatest concern. The Valued Ecological Components (VECs) most likely to be affected by the project as listed below. The VECs were selected based on ecological importance to the existing environment, the relative sensitivity of environmental components to project influences, and their relative social, cultural or economic importance.

This Land Suitability Analysis considers the full range of project / environmental interactions and the environmental factors that could be affected by the project and the significance of related impacts with mitigation.

Mitigation measures, which can be used to reduce the potential impacts of the project on the VECs, are identified. Mitigation measures can include both project design, construction practices or project specific measures and are implemented by the proponent to reduce the identified impacts.

The VECs for this project were identified based on the existing biophysical environment, the nature of the undertaking and input from stakeholders and include:

- Wetlands;
- Watercourses;
- Watersheds;
- Steep Slopes;
- Forest Cover;
- Contaminated Sites;
- Wildlife Habitats and Corridors;
- Soil and Bedrock;
- Flood Prone Areas; and
- Cultural and Heritage Resources.

2.3 Maps

Constraint mapping for the Mount Hope site covers a radius of approximately 1.0 km from the subject site. The nature of the information presented in the maps is dynamic.

The information was collected through a review of information available from Provincial departments & private organizations. The data was sourced from imported downloads or linked feature services and compiled in a digital format using QGIS, a geographical information system.

Data sets were transformed or extracted, where required, to a standard datum (NAD83) in the UTM 20 projection.

References for all information sources are presented in Section 2.4, below.

2.4 Resources

Natural Features (Impact of Development on Nature)

Natural land features were organized for their ability to support or be an integral component of an ecological system. The following natural land features were evaluated:

- Figure 2: Wetlands
- Figure 2: Watercourses
- Figure 2: Flood Prone Areas
- Figure 4 to Figure 6: Forest Cover
- Section 3.7: Wildlife Habitats and Corridors
- Figure 7: Soil and Bedrock

Natural Hazards (Impact of Nature on Development)

Natural Hazard features were organized into areas with elevated risks associated with natural conditions and historic and ongoing human activities. The following natural hazard features were evaluated:

- Figure 3: Slopes
- Section 3.6: Contaminated Sites
- Figure 7: Soil and Bedrock

Heritage and Cultural Landscape

Heritage and cultural features were organized to determine historic community value and how they should be preserved:

- Figure 8: Archaeology

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3 Findings

3.1 Wetlands

The site is currently vegetated/tree covered with a large wetland located along the south boundary of the site. This wetland is present on the 1:10,000 and 1:50,000 topographic mapping and is visible in aerial photography and Google Earth imagery. From review of the Nova Scotia Wetland Inventory mapping, the NSE mapped wetland covers approximately 9.3 hectares, (see Figure 2, Appendix A).

For an area to be considered wetland, it must satisfy certain wetland criteria including soil, hydrology and vegetation properties that are wetland indicators. There are specific 'rules' that are followed in considering the indicators present and the strength of the evidence in making a determination that a wetland is present. Wetlands are determined 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 Nova Scotia Environment (NSE). The determination procedures follow a three-parameter approach, using indicators established for vegetation, soils and hydrology to identify the presence of wetlands. The boundaries of the wetland (as ground truthed by Englobe) are presented on Figure 2 (Appendix A).

Permitting Considerations: Any wetland alteration between 100 m^2 and 2 hectares requires an authorization from NS Environment (NSE); wetland alterations greater than 2 hectares also require a provincial EA. Also, HRM will require a buffer for all wetlands.

3.2 Watercourse

The term watercourse is defined in the *Nova Scotia Environment Act*; it includes rivers, streams, lakes, creeks and ponds, and the water contained in them. Some water bodies are obviously watercourses, but other water flows may not be as definitive. There is a screening process to determine if a water feature is a watercourse, and includes:

- If a watercourse is drawn on a National Topographic Series (NTS) map, it is considered a watercourse by NSE.
- If air photos less than 40 years old show evidence of a watercourse, it may be a watercourse and further review of characteristics is required; and
- Field characteristics such as clearly defined channels, flowing water, pools, riffles rapids, aquatic features (fish, inspects, plants) are also used to identify watercourses.

A water channel was observed discharging from Fenwick Street (west boundary of the site), into the mapped wetland at the site, flowing west to east (see Figure 2). Based on the topographic mapping, this water feature is mapped as a watercourse. In our opinion this water feature satisfies NSE's evaluation criteria and should be considered a watercourse. From our understanding of the site conditions and mapping from Halifax Water, this "watercourse" originates at a stormwater outfall at the end of Fenwick Street, and terminates at a Halifax Water control structure at Neptune Crescent. There are no other water channels present in the study area.

Permitting Considerations: The NSE *Activities Designation Regulations* designate activities that require an approval from NSE or a notification to the department related to watercourses. There is no submission requirement for work that does not alter the watercourse. All in stream work such as crossing structures, stream bed realignment, dredging, etc. requires Approval from NSE. Where appropriate, NSE consults other provincial and federal departments (such as DFO) to coordinate permitting requirements.

Since this feature is controlled at the inlet and outlet by Halifax Water, additional municipal permits may be required for any instream work. HRM also requires buffers to watercourses.

3.3 Flood Prone Areas

As noted above, the "watercourse" at the site is controlled through municipal infrastructure. The only flooding that may occur is from stormwater that could impound up to the limit of the Halifax

Water control structure. Water (from stormwater sources) may impound in the wetland up to the elevation on the control structure.

The high water mark for this potential at the site is presented in Figure 2.

Permitting Considerations: None.

3.4 Steep Slopes

Slope gradient is a key factor in influencing the relative stability of a landscape. It determines the degree to which gravity acts upon a soil mass. Slopes are often irregular and complex, with gradients varying greatly over large areas. Slopes are an important LSA factor when considering what lands are most suitable for development, as well as when considering where to locate roads and other infrastructure. The locations of stormwater, sewer and water infrastructure coincide with road layout, all of which have been considered during the development planning process.

The area of interest has a rolling topography that slopes downward to the south and concaves to the wetland. Topography along Highway 111 has been constructed to slope to the west, away from the highway infrastructure. All slopes and elevations of the site are presented in Figure 3, Appendix A.

Permitting Considerations: None.

3.5 Forest Cover

The forested areas within the project area were assessed on a desktop level by using the provincial forest cover layers. The site is currently completely forested with different communities on the upland areas than in the wetland. The forested area is made up of tolerant hardwood drumlins and hummocks and the wetland area is predominately spruce pine hummocks. Outside of the wetland, the tree species that make up the forest habitat at the site are predominately Red Maple, covering approximately 16 hectares, Red Spruce covers approximately 9.7 hectares, Eastern Larch covers approximately 1.6 hectares of the site and Black Spruce covers approximately 0.9 hectares. There are no mapped old forests. The Ecological Land Classification is provided in Figure 4, the Forest Inventory Figure 5 and Land Cover is provided in Figure 6.

Permitting Considerations: All work is to be conducted in accordance with the *Migratory Birds Convention Act* (*MBCA*), which outlines that no migratory bird nests or eggs will be moved or obstructed during the construction or operational phase of the project. To ensure project activities are in compliance with the *MBCA*, tree clearing will take place outside of the migratory/nesting bird season or a qualified person be onsite to confirm the absence of nesting or migratory birds prior to and during clearing.

3.6 Contaminated Sites

A Phase I ESA in accordance with CSA standards was conducted at the site by Englobe in March 2021. The Phase I ESA evaluated the potential for contamination at the site (i.e. study area) as well as the potential for the site to be contaminated from adjacent land uses.

Based on the information gathered and observations made during the Phase I ESA, no evidence of environmental contamination was identified at the properties identified as the study area.

Potential sources of off-site contamination may be migration of petroleum products or other chemicals from accidental leaks or spills on upgradient neighbouring properties. The property is bounded by multi-unit and single dwelling residential properties to the north (upgradient) and west (cross gradient) along Gaston Road, Lynn Drive and Fenwick Street; commercial and industrial property to the southwest (cross gradient) along Research Drive and Neptune Crescent; and industrial and tree-covered land to the west (down gradient) along Mount Hope Avenue and Neptune Crescent.

In addition to the NSE *Environmental Registry* information, previous environmental reports for multi-unit residential properties on neighboring properties upgradient from the subject properties were reviewed as part of the Phase I ESA. Based on review of available information, although many of the neighbouring upgradient residential properties formerly had fuel use and storage and/or fuel oil releases, there was no evidence of migration onto the study area.

Permitting Considerations: None.

3.7 Wildlife Habitats and Corridors

Species at Risk (SAR) appearing on the federal *Species at Risk Act* (*SARA*) Schedule 1 benefit from all the legal protection afforded and the mandatory recovery planning required under *SARA* (ECCC, 2021). Similar protection is afforded to species under the provincial *SARA*, administered by the NS *Endangered Species Act*.

Information from the ACCDC was requested by Englobe in May 2020. The ACCDC reported 30 fauna SAR or otherwise rare species within 5km of the site. Also, the ACCDC reported 8 flora SAR, or otherwise rare species, within 5km of the site. The data associated with these species observations were mapped, and none were on or in close proximity to the site; therefore, no map has been produced. The SAR identified by the ACCDC as potentially being present were evaluated during Englobe's field reconnaissance and no rare flora or fauna were observed. The fauna species may occasionally visit the site, although based on the field reconnaissance and review of their habitat preferences, none would be expected to depend upon the site exclusively for survival. The forested portion of the site (all areas of the site except for the wetland), has been mapped as part of a larger deer wintering area.

Permitting Considerations: All work is to be conducted in accordance with the *MBCA*, which outlines that no migratory bird nests or eggs will be moved or obstructed during the construction or operational phase of the project. To ensure project activities are in compliance with the *MBCA*, tree clearing will take place outside of the migratory/nesting bird season or a qualified person be onsite to confirm the absence of nesting or migratory birds prior to and during clearing.

3.8 Soil and Bedrock

Geological mapping indicates that bedrock underlying the current area of interest is the Meguma Supergroup of gold-bearing metasediments. Specifically, Taylors Head Formation (Golden Group) greywacke, quartzite and slate underlies the immediate development area.

These consolidated deposits are typically fine to medium-grained, grey in colour and massive. There are no environmental hazards associated with this bedrock type.

Surficial geology mapping of the area indicates that the site is underlain by glacial deposits known as Lawrencetown Till. These soils are comprised of a clayey soil matrix, which is a mixture of sand, silt and clay. Lawrencetown Till is typically reddish brown in colour and in a moderately compact state of relative density.

Clayey soil matrices have greater potential to erode and generate suspended sediments during storm events when not stabilized. These soils can be managed to minimize the amount of fines that may enter nearby aquatic environments through routine construction practices such as minimizing disturbed areas, re-directing clean upgradient water, stabilizing work areas as soon as work is complete and employing erosion and sediment control devices.

Soil and Bedrock geology is presented in Figure 7.

Permitting Considerations: None.

3.9 Heritage and Cultural

Davis MacIntyre and Associates Ltd. (Davis MacIntyre) conducted a Phase I archaeological resource impact assessment (ARIA) of the project site and surrounding area. A copy of the complete Davis report will be provided under separate cover. The assessment consisted of a background study and reconnaissance of the study area. The ARIA conforms to the standards required by the Department of Communities, Culture and Heritage as specified under the guidelines of the NS *Special Places Protection Act* (R.S., c.438, s.1.).

A historic background study was conducted to understand the area's history and topography. This included consultation of historic maps and manuscripts and published literature focused specifically on the current study area.

The historic background study revealed that a probable historic foundation and possible outbuilding are located at the southeast portion of the site. Reportedly, these findings are not considered a significant archaeological resource, however, it is an indicator that other archaeological resources may be nearby. Davis MacIntyre has recommended shovel testing in this area to confirm these features are historic in nature, and to recover artifacts to establish an approximate occupation date so that mitigation measures could be developed, if required.

The location of these features are presented in Figure 8, attached.

Permitting Considerations: To be determined following shovel testing at the site.

4 Conclusions

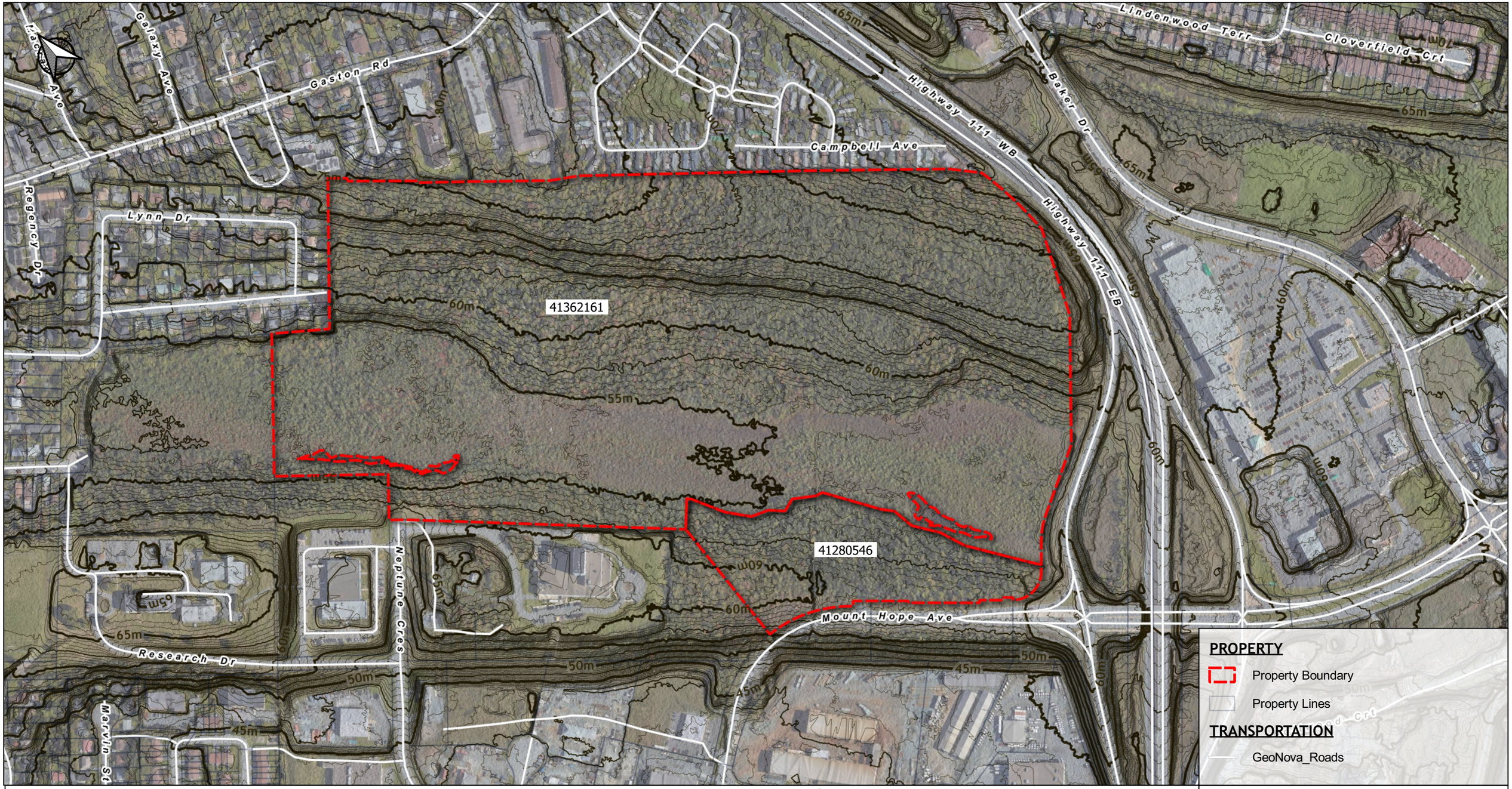
Englobe has conducted a desktop evaluation to assess for potential environmental constraints, with field verification for wetlands, watercourses, and species at risk.

Based on the results of the assessment, generally there were limited environmental constraints identified. Most areas of the site consist of forested lands. There are some steep slopes and the predominate soil type is fine-grained, although these considerations can be managed through routine construction practices.

There is a very large wetland present at the site, although there were no species at risk identified. This wetland is not considered a wetland of special significance by NSECC. From our review of the development concept, we understand that some minor alteration of this wetland will be required to access the developable lands. Given the characteristics of the wetland, the proposed wetland alteration location, and provided that any wetland alteration followed routine construction practices, approval by NSE to alter the wetland for this purpose would not be considered an environmental constraint.

The archaeological assessment identified an area that may have a historic foundation. Additional testing in this area is planned to determine if these historic features are significant. Mitigation measures will be provided following this additional assessment, if required.

Appendix A Figures



PROPERTY

Property Boundary

Property Lines

TRANSPORTATION

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MOUNT HOPE LAND SUITABILITY ANALYSIS

MOUNT HOPE AVENUE
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SITE PLAN

Rev	Version	Date	By	Verif.	Appr.
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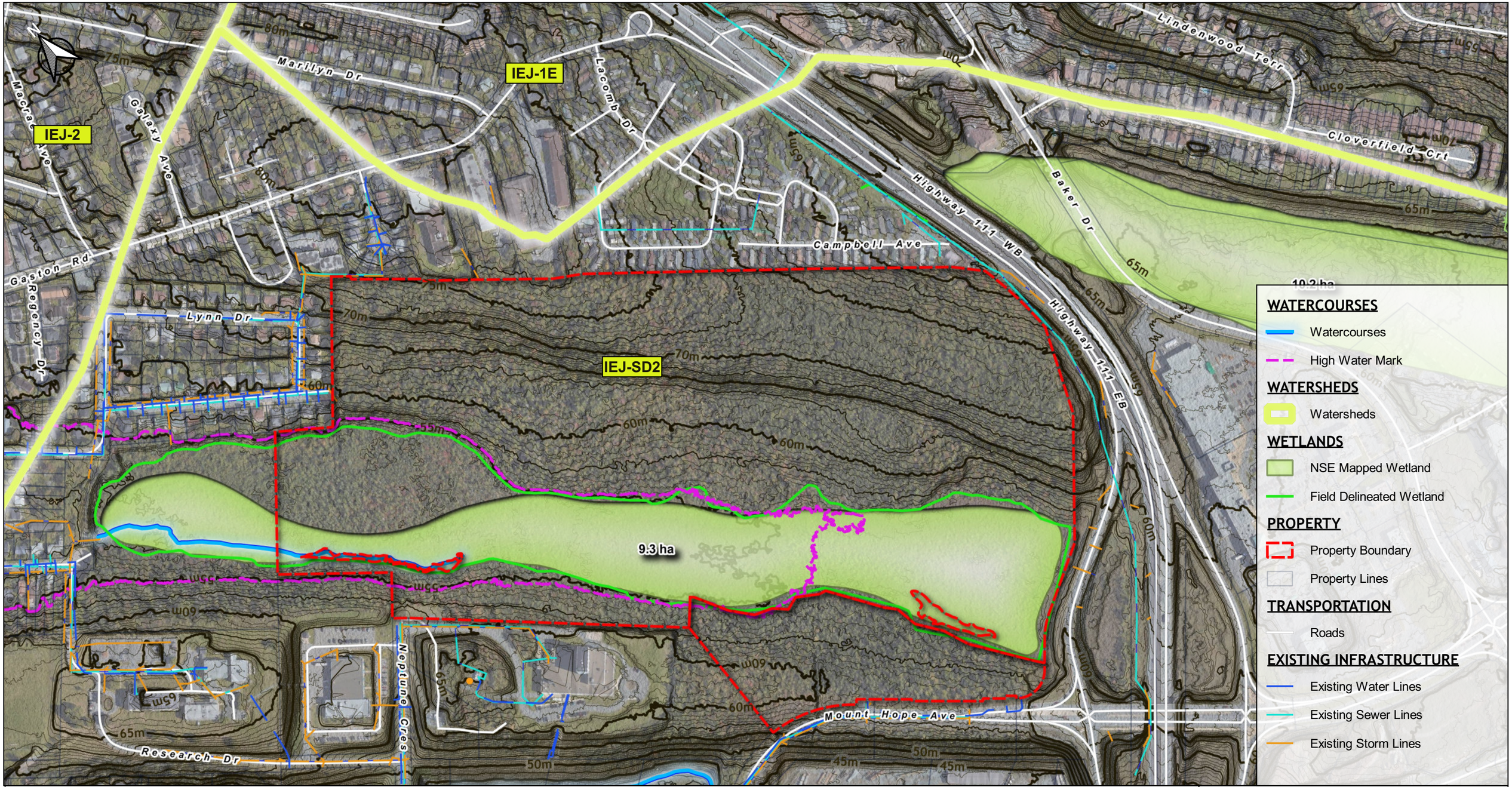

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WATERCOURSES, WATERSHEDS AND WETLANDS

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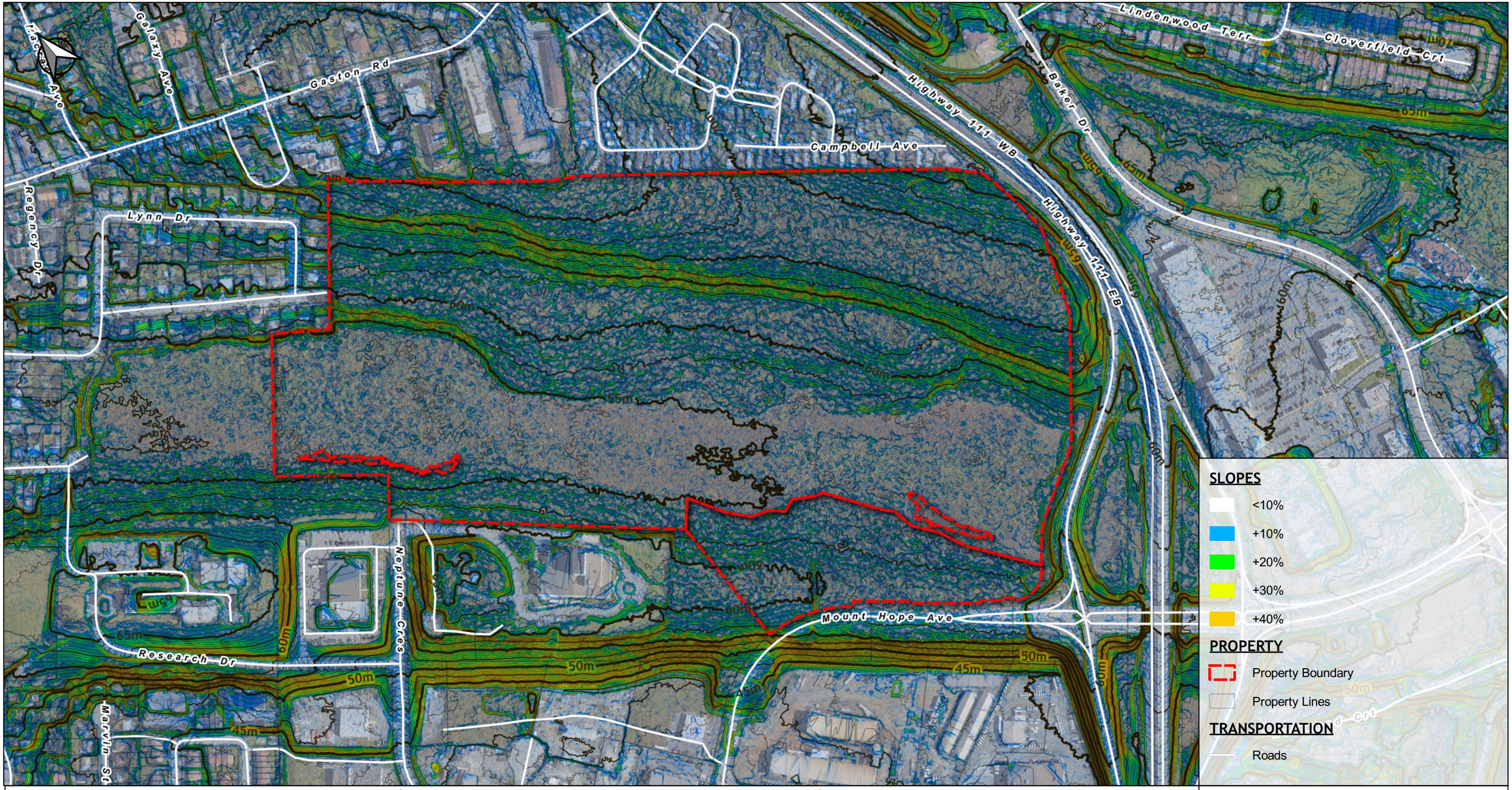

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MOUNT HOPE LAND SUITABILITY ANALYSIS

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SLOPES

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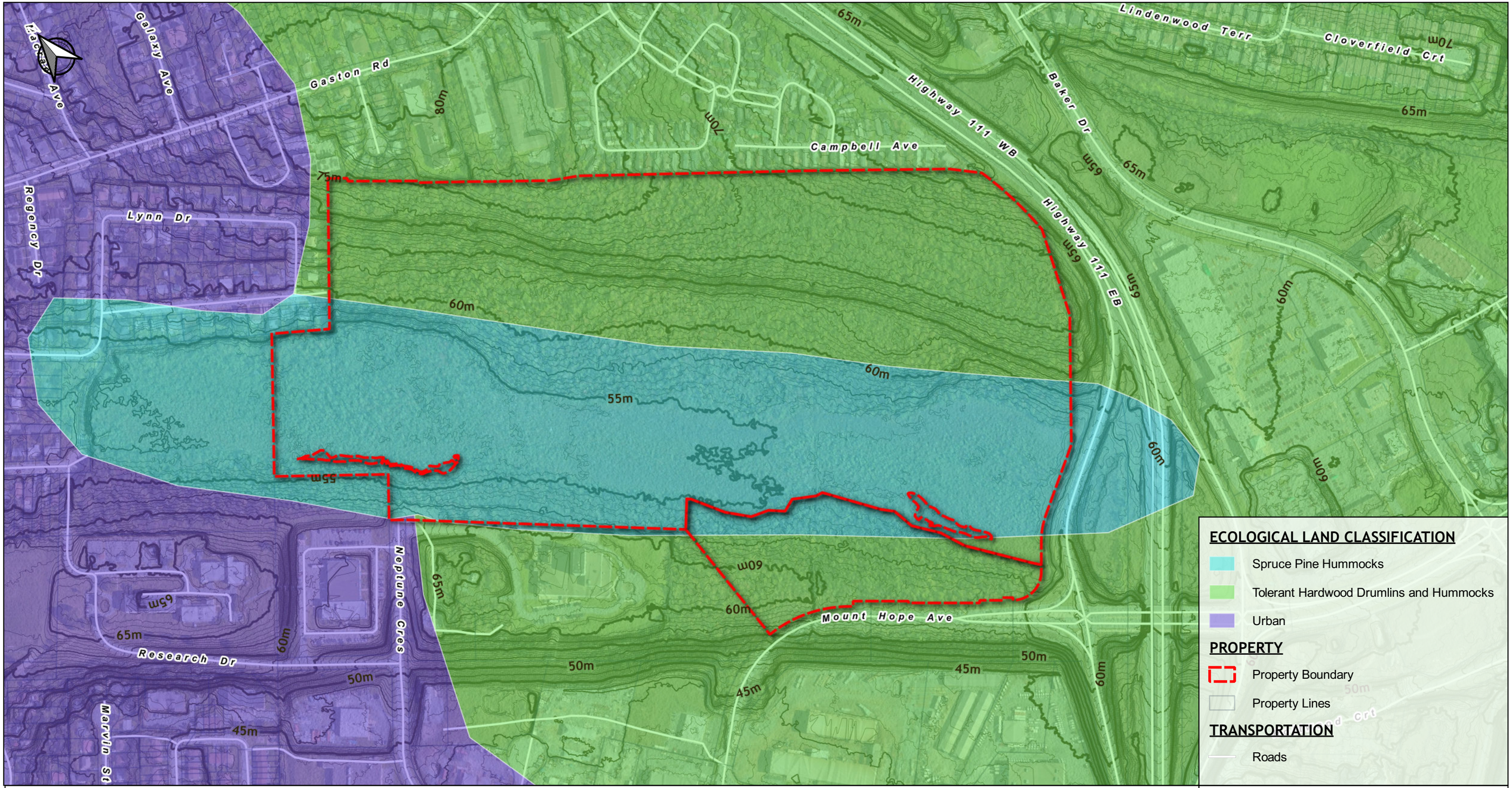

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MOUNT HOPE LAND SUITABILITY ANALYSIS

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ECOLOGICAL LAND CLASSIFICATION

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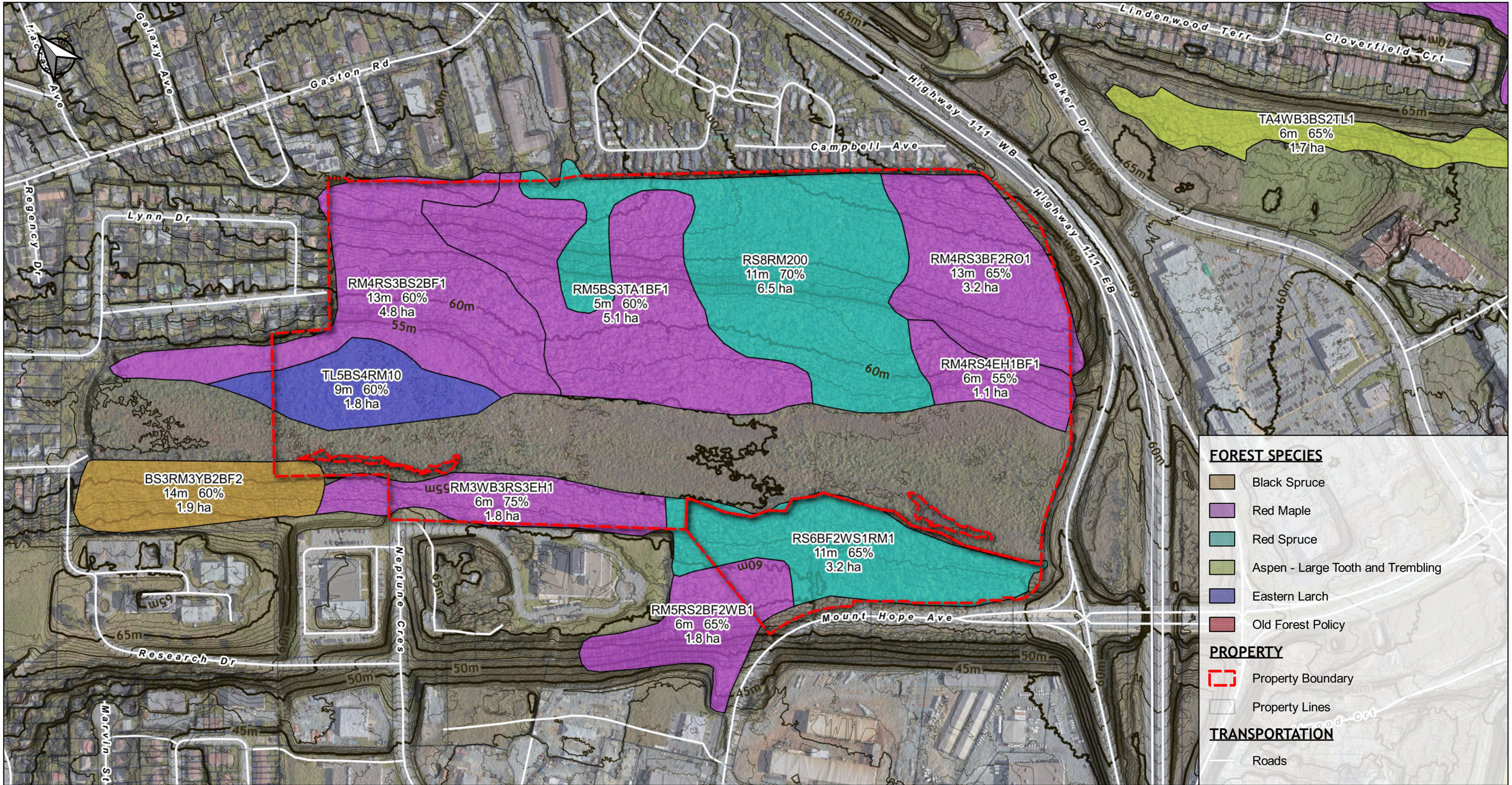

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MOUNT HOPE LAND SUITABILITY ANALYSIS

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FOREST INVENTORY

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MOUNT HOPE LAND SUITABILITY ANALYSIS

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LAND COVER

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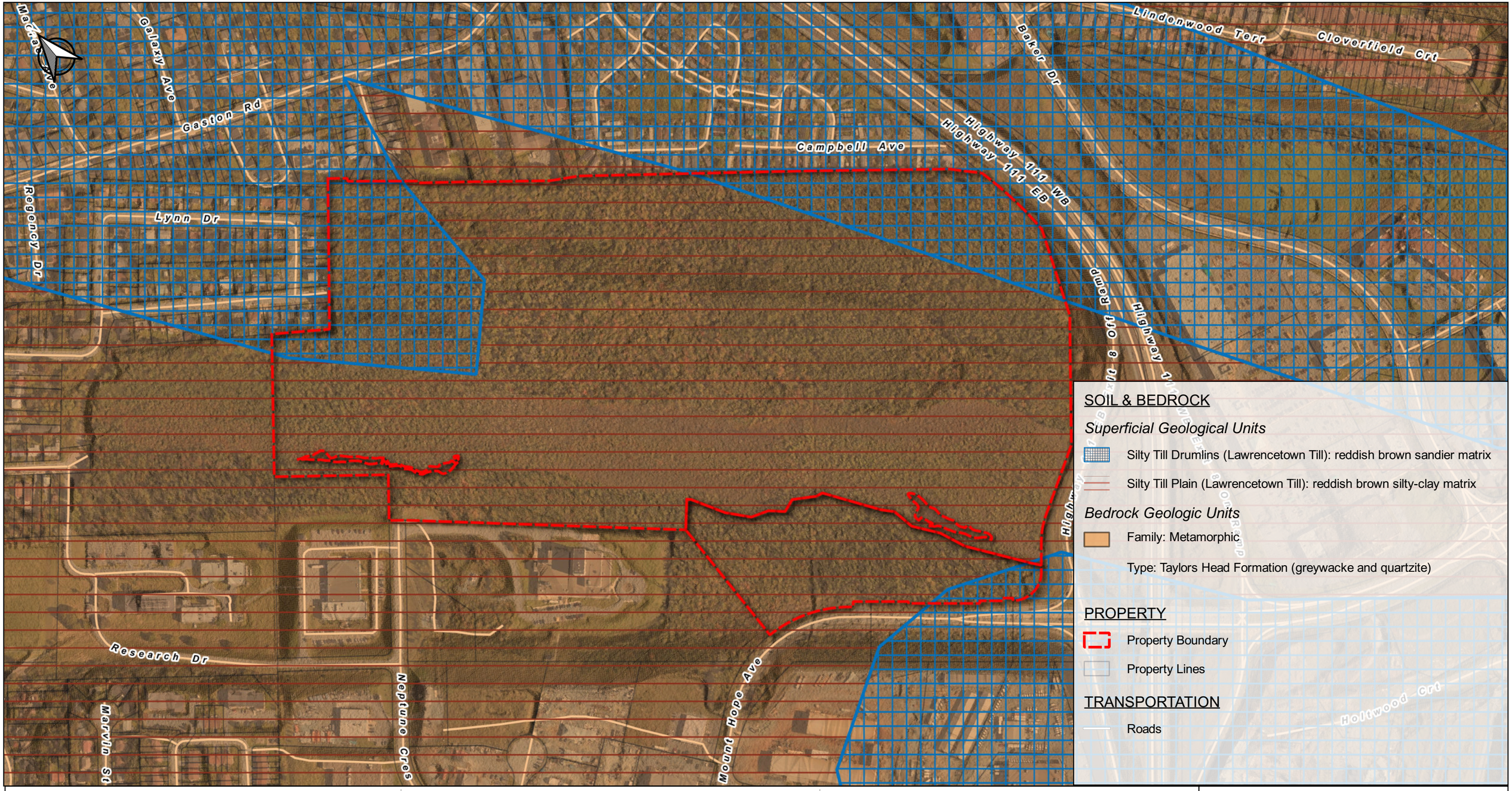

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MOUNT HOPE LAND SUITABILITY ANALYSIS

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SOIL & BEDROCK

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MOUNT HOPE LAND SUITABILITY ANALYSIS

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ARCHAEOLOGY

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Scale: 1:4000		Drawn by: M.A.	Approval by:
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Page setup: Figure 8	Paper size: ANSI B (17x11 in.)	Register no:	

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