

Land Suitability Analysis

Halifax Shopping Centre Annex (PID Nos. 41030636, 00017665, 41030644, 00017657, and 41030651),
Halifax, Nova Scotia

OPB Realty Inc.
c/o Cushman & Wakefield Asset Services ULC
Report

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OPB Realty Inc. c/o Cushman & Wakefield Asset Services ULC

Prepared by:

Lauren Bowser, B.Sc. Env.
Project Professional
Environmental Engineering

Approved by:

Aven Cole, M.Sc.E., P.Eng.
Senior Project Manager
Environmental Engineering

Production team

OPB Realty Inc. c/o Cushman & Wakefield Asset Services ULC

Managing Agent	Mike Mehak
----------------	------------

Englobe Corp.

Project Manager	Aven Cole, M.Sc.E., P.Eng
Environmental Professional	Lauren Bowser, B.Sc. Env.
GIS & Mapping	Francis Thériault, Géographe M.A.

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1 Introduction

OPB Realty Inc. (through Cushman & Wakefield Asset Services ULC) is currently in the initial stages of pre-construction design for land holdings at the Halifax Shopping Centre (HSC) Annex area for a new mixed-use 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 can determine 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, soil and bedrock, forest cover, contaminated sites, cultural and heritage resources, 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 at the HSC Annex 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 HSC Annex study area from two scales: 1) high-level reconnaissance (literature review) was undertaken, and; 2) detailed analysis (including a field reconnaissance) was undertaken directly within the HSC Annex study area.

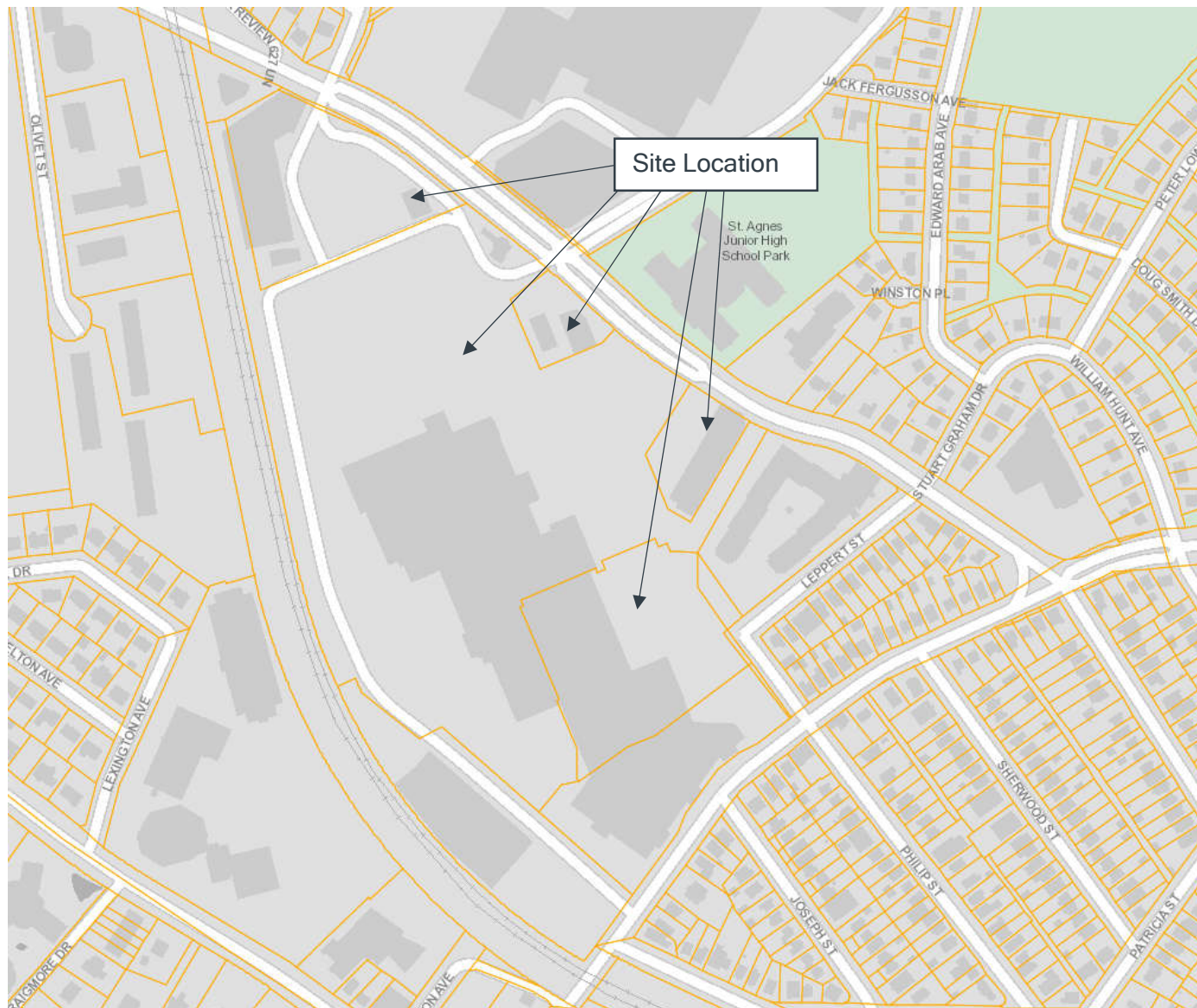
A Site Plan providing an overview of the study area is provided in Figure 1, Appendix A.

1.2.1 HSC Annex Study Area

The current area of interest is comprised of five parcels identified as PID Nos. 41030636, 00017665, 41030644, 00017657, and 41030651. The combined parcels cover an area of approximately 12 hectares (30 acres).

The site is bound by Mumford Road followed by residential properties, a shopping centre (Halifax Shopping Centre), and a school (St. Agnes Junior High School) to the north, an apartment building (Sir John S.D. Thompson Manor) and residential properties to the east, a multi-tenant commercial building (Bay West Centre) and a single-tenant commercial building (Presidents Choice Wholesale Club) to the south, and a railway line followed by residential and commercial properties to the west.

Figure 1-1. Site Location Map, HSC Annex, 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 for this area of Halifax is identified as 1EJ-SD6.

At the site, surface water flows are generally to the southeast, towards the Northwest Arm. This flow ultimately discharges into the Halifax Harbour (Atlantic Ocean) to the southeast. The primary watershed area that drains into the Halifax Harbour (1EJ) is 97,233.7 hectares in size, and the secondary watershed area (1EJ-SD6) is 3,364.1 hectares in size.

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 are 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 where appropriate. 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;
- Flood Prone Areas;
- Steep Slopes;
- Forest Cover;
- Contaminated Sites;
- Soil and Bedrock;
- Wildlife Habitats and Corridors; and
- Cultural and Heritage Resources.

2.3 Maps

Constraint mapping for the HSC Annex site covers a radius of approximately 1 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 ArcGIS and QGIS, geographical information systems.

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

2.4.1 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:

- Section 3.1: Wetlands
- Section 3.2: Watercourses
- Figure 2 and Section 3.4: Slopes
- Section 3.5: Forest Cover
- Figure 3 and Section 3.6: Bedrock
- Figure 4 and Section 3.6: Soil
- Figure 5 and Section 3.7: Wildlife - Species at Risk

2.4.2 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:

- Section 3.3: Flood Prone Areas
- Figure 2 and Section 3.4: Slopes
- Figure 3 and Section 3.6: Bedrock
- Figure 4 and Section 3.6: Soil
- Figure 6 and Section 3.8: Contaminated Sites

2.4.3 Heritage and Cultural Landscape

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

- Figure 7 and Section 3.9: Cultural and Heritage Resources

2.4.4 References

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3 Findings

3.1 Wetlands

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 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 and Climate Change (NSECC). The determination procedures follow a three-parameter approach, using indicators established for vegetation, soils and hydrology to identify the presence of wetlands.

The site is currently mostly asphalt covered and developed in a commercial capacity. No provincially mapped wetlands are present on the site, and none were noted during the site visit. Since there are no mappable features, there is no figure depicting wetlands.

Generally, if a wetland with a contiguous watercourse were present onsite, HRM would require a buffer between the wetland and any proposed development. If wetland alteration were required for the development, any wetland alteration between 100 m² and 2 hectares would require an authorization from NSECC; wetland alterations greater than 2 hectares would require a provincial EA in addition to this provincial authorization.

Permitting Considerations: None.

3.2 Watercourses

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 NSECC.
- 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.
- Field characteristics such as clearly defined channels, flowing water, pools, riffles rapids, aquatic features (fish, insects, plants) are also used to identify watercourses.

In addition to being identified as a watercourse, many water features also can support fish and are considered fish habitat.

There are no watercourses present on any of the available desktop resources (NTS Maps nor aerial photos) in the study area, and none were noted during the site visit. The closest water body are the marine waters of the Northwest Arm (460 m to the south). Since there are no mappable watercourse features, there is no figure depicting watercourses.

If a watercourse were present onsite, HRM would require a buffer between the watercourse and any proposed development. The NSECC *Activities Designation Regulations* designate activities that require an Approval from NSECC or a notification to the department related to watercourses. There is no provincial 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 NSECC.

Where appropriate, NSECC consults other provincial and federal departments (such as DFO) to coordinate permitting requirements. For water features that are fish habitat and are not considered a watercourse, consultation with DFO is required to ensure there is no harmful alteration, disruption, or destruction (HADD) to fish or fish habitat under the Fisheries Act.

Permitting Considerations: None.

3.3 Flood Prone Areas

Land development can affect the risk of flooding in a number of ways. Buildings, infilling with earth and other structures placed within flood plains can obstruct the passage of floodwaters. In addition, the potential for flood damage is greatly increased when, through lack of awareness or disregard for the potential danger, unsuitable development takes place in areas that are already subject to flooding.

Based on online predictive modelling, the study area is not expected to be at risk for flooding unless sea levels in the nearby Northwest Arm rise 15m, or more. Since this is highly unlikely, flood risk is not a concern for this area. Since there are no mappable features, there is no figure depicting flood prone areas.

Permitting Considerations: Although the site is not flood prone, climate change considerations such as increased intensity of precipitation events should be incorporated into site design (such as appropriately sized stormwater infrastructure), to mitigate potential negative impacts onsite and to downstream receptors during construction and operational phases of any new development.

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 generally flat topography that has been graded level through engineering features such as retaining walls. The overall topography slopes to the southwest. All slopes and elevations of the site are presented in Figure 2, Appendix A.

Permitting Considerations: None. Although, there are no permits required related to slopes, when steep slopes are present (especially with highly erodible soils), there can be elevated potential for transport of sediment during earthworks and other ground disturbance activities. The potential harm from sediment releases is increased when there are downgradient water bodies or other sensitive receptors or receiving environments, including municipal infrastructure. Mitigation measures would include an appropriately designed erosion and sediment control plan.

3.5 Forest Cover

The study area was assessed on a desktop level by using the provincial forest cover layers, which portrayed the whole site as urban (or non-forest). During the site visit it was confirmed that the site is mainly asphalt covered and developed. There were very small patches of landscaped areas containing trees and other plants noted onsite. These areas consisted of a mixture of what looked to be predominately Red Maple, Black Spruce, Red Spruce, White Pine, and Grey Birch.

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, if required for the development, will take place outside of the migratory/nesting bird season, or a qualified person will be onsite to confirm the absence of nesting or migratory birds prior to and during clearing.

3.6 Bedrock and Soil

Geological mapping indicates that bedrock underlying the current area of interest is the Ordovician-aged Halifax Group of the Meguma Supergroup. In the study area, specifically the Cunard Formation is present. This unit is described as black to rust-brown slate with thin beds and lenses of minor black metasiltstone; medium-bedded, fine-grained, crosslaminated metasandstone. The Cunard Formation slates are prone to acid rock drainage and, as such, any disturbance of the bedrock must be in accordance with the *Nova Scotia Sulphide Bearing Material Disposal Regulations*.

According to the Karst Risk Map, the site is located in a low-risk zone. The low-risk zone contains less than 0.1% of the sinkholes in the NSDNRR Nova Scotia Sinkhole Database. This zone typically does not contain sinkholes or karst terrain. However, sinkholes may still occur in this area due to unmapped soluble rocks or where soluble rocks are close to the ground surface but are overlain by other rock types or unconsolidated material.

According to the Potential for Radon in Indoor Air map, the site is located in an area of a combination of low and medium risk for radon in indoor air. The NSDNRR test database indicates that 5% of buildings in the low-risk areas and 14% of buildings in the medium risk areas exceed the Health Canada guideline for radon in indoor air.

Surficial geology mapping indicates that the native soils in this area are identified as glacial deposits known regionally as Stony Slate Till. Slate Tills are described as light olive brown, sandy till with abundant gravel, cobble and boulder sizes.

During a 2015 Phase II ESA by Pinchin, a subsurface investigation was conducted on PID No. 00017665 involving the execution of six boreholes. Representative soil samples were collected from each borehole and the results indicated that there was glacial till encountered beneath surface layers of fill, asphalt and gravel. The till mainly consisted of compact to very dense orange/brown sandy silt with gravel, and the fill mainly consisted of compact to very dense brown to grey sand and silty sand with gravel. Bedrock was observed to be fractured shale and was encountered at depths ranging from 1.0 to 6.0 m below surface grade.

Further, during soil remediation work at the site in 2021, the area was noted to have been infilled with rubble fill including a considerable amount of debris (brick, concrete, etc.).

Bedrock geology is presented on Figure 3 and soil geology is presented in Figure 4.

Bedrock Permitting Considerations: The Cunard Formation slates are prone to acid rock drainage and, as such, any disturbance of the bedrock must be in accordance with the *Sulphide Bearing Material Disposal Regulations*.

Native Soil Permitting Considerations: None. Although as noted above, there can be elevated potential for transport of sediment during earthworks and other ground disturbance activities. Mitigation measures would include an appropriately designed erosion and sediment control plan.

Surficial Fill Permitting Considerations: None. Although these soils do require appropriate handling and may have implications when disturbed, exposed and/or transported from the site. Any fill within the study area that is to be removed from the properties during redevelopment should have confirmatory analytical results verifying there are no impacts. If necessary, a review should be carried out by a licensed Site Professional (as defined by NSECC) to ensure that there are no additional requirements through the NSECC *Contaminated Sites Regulations*.

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, 2021a). Similar protection is afforded to species under the provincial *NS Endangered Species Act*. Information from the ACCDC was requested by Englobe in December 2022 to understand what species (flora and fauna) may be present in and around the study area.

From review of the ACCDC report of rare species list within 5km of the subject site, there were 45 flora species listed. Nineteen had provincial rarity ranks (S1 or S2) that are considered rare. Two of the species (Butternut and Dense Blazing Star) are on the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and SARA list as endangered and threatened, respectively. One species (Eastern White Cedar) is on the provincial legal protection list as vulnerable.

From review of the ACCDC report of rare species list within 5km of the subject site, there were 38 fauna species listed that were on a federal or provincial species at risk list or were considered rare (S1 or S2). These included 25 birds, 1 fish, 1 porpoise, 2 turtles, 6 butterflies, 1 dragonfly, and 2 bumble bees. The Wood Turtle, Peregrine Falcon, and bat hibernaculum or bat species were also identified on the location sensitive list.

None of the SAR listed in the ACCDC report were reported onsite, and no SAR were identified during the site visit. From review of the habitats present onsite and based on the degree of previous development of the site, most of the SARs are not likely to be present at the site or to depend on the site.

Yellow Marsh Marigold was observed to the northwest of the study area, and Thyme-Leaved Speedwell and a Question Mark butterfly were observed to the southeast of the study area. The approximate locations of these observations are presented on Figure 5, Appendix A.

The site has been mapped as part of a larger deer wintering area, as well as a mainland moose concentration area, however the onsite habitats are not suitable for deer overwintering or mainland moose.

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, if required for the development, 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. For any species present at the site identified on the federal or provincial SARA, mitigation measures would be required to ensure that rare species will not be disturbed.

3.8 Contaminated Sites

A Phase I ESA in accordance with CSA standards was conducted at PID Nos. 41030636, 00017665, 41030644, and 41030651 in 2018 by Pinchin. They concluded that there were no unresolved issues that could result in potential subsurface impacts at the site and didn't recommend any further work. However, between 2018 and 2019, a Phase II ESA was conducted by Environmental Consulting Occupations Health (ECOH) to assess potential concerns related to a Walmart Tire, Lube Express (TLE) service centre located on PID No. 00017665. Volatile Organic Compound (VOC) impacts were found in one surface soil sample, but it was concluded that the impacts were not likely from the TLE operations and potentially were from historic property use or poor-quality fill.

After further investigation and multiple remediation events by Pinchin in 2019, 2020, and 2021, it was concluded that the (imported) fill at the site is likely the source of contamination (not the TLE service centre) and remediation may no longer be the most practical option for addressing the issue. Pinchin then

submitted a recommendation for sub-slab vapour sampling, qualitative risk assessment, and site closure. This work is scheduled to commence in early 2023.

Since the 1980s NSECC has maintained a publicly accessible database of environmental records (registration, installation and removal of petroleum storage tanks, inspection reports, environmental site assessment reports, remediation reports, contaminated sites files, industrial approvals, etc.) on properties in the *Environmental Registry*. Englobe contacted NSECC on January 31 and February 6, 2023 and requested a search of the *Environmental Registry* for information related to three adjacent properties. A search was requested Civic No. 7111 Chebucto Road (PID No. 40794760), Civic No. 7020 Mumford Road (PID No. 00085068), and Civic No. 6940 Mumford Road (PID No. 00032003) in Halifax. NSECC reported no information was located for the adjacent properties at 7020 and 6940 Mumford Road; however, there was information for 7111 Chebucto Road. Based on Englobe's review of the NSECC *Environmental Registry* response, the following was identified and represents evidence of actual or potential environmental contamination for the site:

- documents pertaining to a previous registered petroleum underground storage tank (UST) at the site. An 8,000-litre fuel oil UST was reportedly installed at 7111 Chebucto Road in 1970 and was removed in 1992. During the removal, evidence of contamination in the soil was noted, therefore 28.69 metric tonnes of soil was removed from the site and disposed of at Envirosoil Limited.

No further information, such as documentation of soil testing to confirm contamination extents in the area, was provided by NSECC. This property has the potential to be impacted; however, it is located down gradient, so it poses a low risk of contamination to the study area.

These actively managed and potentially impacted properties are outlined on Figure 6, Appendix A.

Englobe reviewed internal private records related to nearby and surrounding properties, to identify potentially contaminated properties that may still pose a risk of impacts to the study area. Where appropriate, additional *Environmental Registry* search requests were conducted to verify. Based on our review of internal files, there were no properties identified that had potential to impact the study area.

Permitting Considerations: VOC impacts were identified in soil at the subject site and are currently being assessed and managed through a licensed Site Professional to ensure compliance with the NSECC *Contaminated Sites Regulations*. If soil that is impacted is to be removed from the properties during redevelopment, it must be sampled, tested and compared to current applicable guidelines before being transported to a licensed soil disposal or treatment facility. As noted above, all other soils to be removed from the properties during re-development should have confirmatory analytical results verifying there are no impacts.

3.9 Cultural and Heritage Resources

Davis MacIntyre & Associates conducted an archaeological assessment of the proposed project area. A copy of the complete Davis MacIntyre & Associates report (dated February 16, 2023) is available upon request.

“The assessment included a historic background study and reconnaissance to determine the potential for archaeological resources in the impact area and to provide recommendations for further mitigation, if necessary”. It was conducted under Category C (*Archaeological Resource Impact Assessment*) *Heritage Research Permit* A2022NS202 issued by the Department of Communities, Culture, Tourism and Heritage and the report conforms to the standards required by the Culture and Heritage Development Division under the *Special Places Protection Act* (Davis MacIntyre & Associates, 2023).

“The results of the archaeological assessment indicate that the study area is generally of low-moderate potential for encountering archaeological resources. Historic activity associated with 19th century farming and settlement may be present in the form of stone walls, midden or garbage deposits, and early infrastructure like sewers.

One area has been identified as moderate potential for encountering archaeological resources. This includes areas where georeferenced historic mapping has indicated the presence of 19th century historic homes associated with the former Murphy property and the 1920's tramline in what is today the parking lot west of the bus terminal. While development of these areas may have removed any trace of these homes, historic activity in the form of foundation walls, boundary walls, midden or garbage deposits, or sewers may be present in these locations" (Davis MacIntyre & Associates, 2023).

The areas of low-moderate and moderate potential are presented on Figure 7, Appendix A.

Permitting Considerations: Due to the study area being identified as having low-moderate and moderate potential for encountering archaeological resources, Davis MacIntyre & Associates recommends that "archaeological monitoring be conducted for ground disturbance associated with any proposed development of the Halifax Shopping Center Annex. Areas of low-moderate potential may require only periodic check-ins or for the archaeologist to be "on-call" for construction crews to notify if they encounter archaeological resources. However, in areas of moderate potential, archaeological monitoring will be required until the archaeologist can make a determination that the area has been disturbed to the extent that intact archaeological resources will not be expected to be encountered "(Davis MacIntyre & Associates, 2023).

"In the event that archaeological resources are encountered at any point during ground disturbance and an archaeologist is not present, it is required that any ground disturbing activity be halted immediately, and the Coordinator of Special Places (902- 424-6475) be contacted regarding a suitable method of mitigation. Should the impact area be modified to expand beyond the currently understood range, a qualified archaeologist should be consulted to evaluate whether further archaeological assessment may be required" (Davis MacIntyre & Associates, 2023).

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 natural features present. Most areas of the site consist of asphalt covered lands developed in commercial capacity.

No wetlands or watercourses are present in the study area. There are limited trees in the area, however, all work must 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, any 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. Also, for any species present at the site identified on *SARA* or the *NS Species at Risk Act*, mitigation measures will be required to ensure that rare species will not be disturbed.

The topography of the study area does not pose any environmental concerns.

The site is not flood prone, however climate change considerations such as increased precipitation intensity should be taken into account when designing the construction and operational phases of the new development.

The onsite bedrock is prone to acid rock drainage and, as such, any disturbance of the bedrock must be in accordance with the *Sulphide Bearing Material Disposal Regulations*.

Portions of the subject site are actively being assessed and managed such that the site will be in compliance with the *NSECC Contaminated Sites Regulations*. If soil that is impacted is to be removed from the properties during redevelopment, it must be tested and then transported to a licensed soil

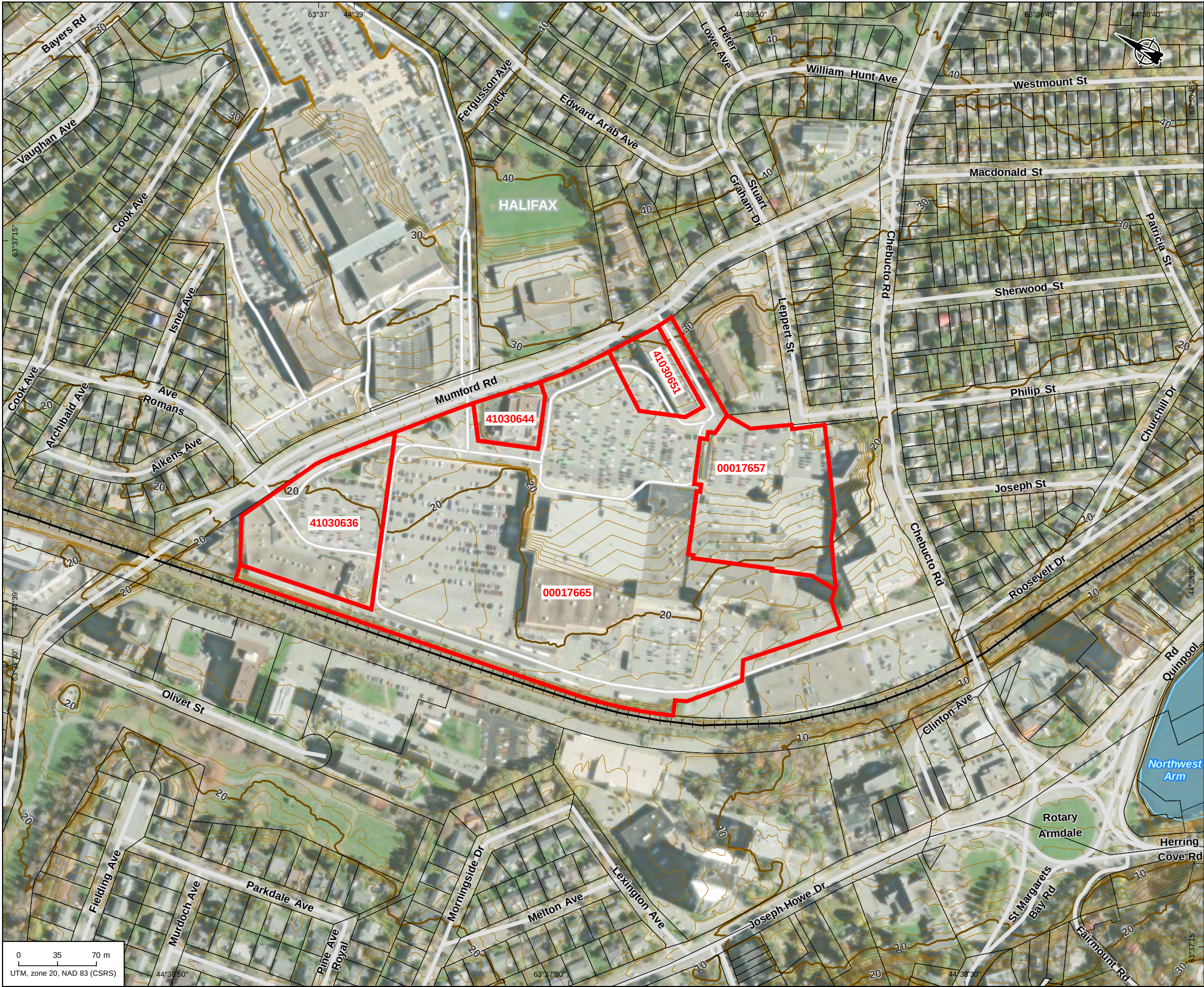
disposal or treatment facility. All other PIDs in the surrounding area are considered not contaminated or a low risk to the study area. Any soils removed from the site during re-development should have confirmatory analytical results verifying there are no impacts.

The archaeological assessment identified one area that is of moderate archaeological potential, and the rest of the study area is considered of low-moderate archaeological potential. Archaeological monitoring is recommended to be conducted for ground disturbance associated with any proposed development of the Halifax Shopping Center Annex.

Appendix A

Figures





Project Components

- Assessment Area
- 00017657 Parcel Identifier Number (PID) in the Assessment Area
- Surrounding Properties

Hydrography

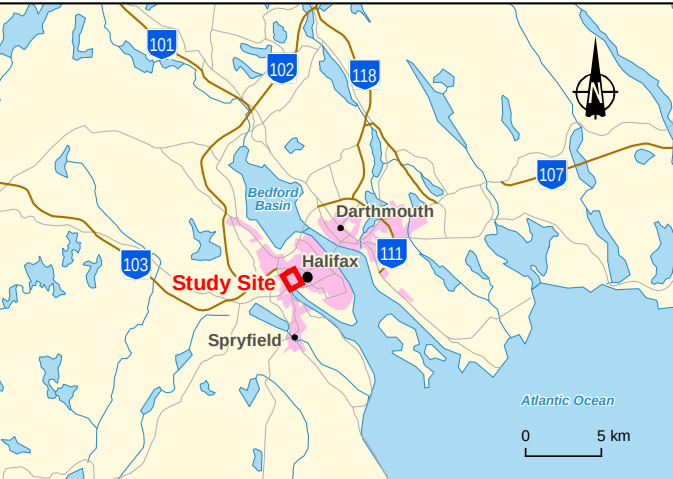
- Waterbody

Infrastructures

- Local Street
- Railroad
- Service Lane

Topography

- Topographic Contour Line (10 m interval) and Identifier
- Topographic Contour Line (1 m interval)



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Mumford Road, Halifax, NS

**Figure 1
Site Plan**

Sources :
Base : Orthophoto, © 2014 DigitalGlobe Image courtesy of USGS
Boundaries, Atlas du Canada, RNCAN, decembre 2005
CANVec, 1/250 000, RNCAN, 2019
CANVec, 1/1 000 000, RNCAN, 2019
Nova Scotia Road Network (NSRN), Service Nova Scotia and Internal Services, 2022
Nova Scotia Property Records Database (NSPRD) property boundaries, Service Nova Scotia and Internal Services, 2022
Mapping : Englobe, 2023

March 2023



Project manager : A. Cole				Date : 2023-03-07		
Prepared : L. Bowser		Drawn : F. Thériault		Verified : B. Andrieux		
Department	Projet	Sub-phase	Disc.	Type	Drawing n°	Rev.
148	02207401-000	0101	EN	F	01	0A

File : Y:\Shared\CADarmouthData\Projects\2022_detek\2207401_LandSuitabilityAssessment_HalifaxShoppingCentre\Project3_Tech\LSA\Map\GO12_map\LSA\Map\GO12_version_0A\148-02207401-000-0101-EN-F-03-0A_Bedrock_230222.mxd



Project Components

- Assessment Area

Bedrock Geology

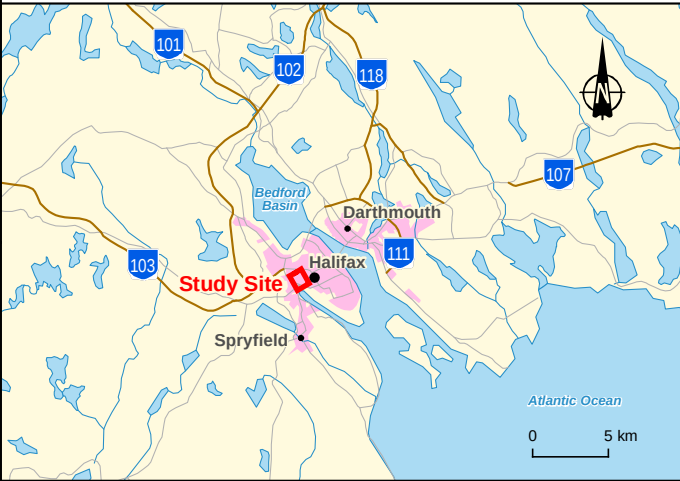
Cunard Formation :
black to rust-brown slate with thin beds and lenses of minor black metasilstone; medium-bedded, fine-grained, cross-laminated metasandstone; sulphide minerals common and prone to acid rock drainage

Infrastructures

- Local Street
- Railroad
- Service Lane

Topography

- Topographic Contour Line (10 m interval) and Identifier
- Topographic Contour Line (1 m interval)



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Mumford Road, Halifax, NS

Figure 3 Bedrock

Sources :
Base : Orthophoto, © 2014 DigitalGlobe Image courtesy of USGS
Bedrock, Geological Map of the Province of Nova Scotia, NSNR Gov. of Nova Scotia, 2000
Boundaries, Atlas du Canada, RNCAN, decembre 2005
CANVec, 1 /250 000, RNCAN, 2019
CANVec, 1 /1 000 000, RNCAN, 2019
DEM, GeoNova, Gov. of Nova Scotia, 2019
White, C. E., MacDonald, M. A. and Horne, R. J. 2014: Bedrock geology map of the Halifax area, NTS 11D/12, Halifax County, Nova Scotia; Nova Scotia Department of Natural Resources, Open File Map ME 2014-010, scale 1:50 000.

Mapping : Englobe, 2023

March 2023



Project manager : A. Cole				Date : 2023-03-07		
Prepared : L. Bowser		Drawn : F. Thériault		Verified : B. Andrieux		
Department	Projet	Sub-phase	Disc.	Type	Drawing n°	Rev.
148	02207401-000	0101	EN	F	03	0A

