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HALIFAX REGIONAL MUNICIPALITY FUTURE SERVICED COMMUNITIES: VOLUME 2: WESTPHAL STUDY AREA REPORT – LAND SUITABILITY ANALYSIS

Final Report

May 2024

Prepared for:
Halifax Regional Municipality

Prepared by:
Stantec Consulting Ltd

Project Number:
160410459

Limitations and Sign-off

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Signature

_____
Printed Name

Approved by: _____
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_____
Printed Name

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3 Land Suitability Analysis

Stantec Consulting Ltd. (Stantec) completed a land suitability analysis of four potential Future Serviced Communities (FSC) within HRM: Sandy Lake, Highway 102 West Corridor, Morris Lake Expansion, and Westphal. The land suitability analysis included an evaluation of select biophysical characteristics, a contaminated sites review, and an archaeological and cultural study for each Study Area. The objective of the land suitability analysis was to determine what portions of each Study Area are potentially suitable for new housing development based on these limited characteristics. This analysis, along with other factors, will contribute to informed decision-making regarding future community planning work.

This section discusses the work completed in the Westphal Study Area (WSA; Figure 3.1). The terms "WSA" and "Study Area" are used interchangeably in this section; both refer to the Study Area indicated on Figure 3.1. Note that not all areas within the Study Area (Figure 3.1) are being considered for future development (e.g., if they are privately owned and/or are already developed).

There are many possible ways to evaluate biophysical characteristics and the roles they play in the landscape. The land suitability analysis described in this report is one approach to evaluate biophysical components and the impact they could have on development, and vice versa, and needs to be considered in the context of climate change. Results of the landscape suitability analysis are intended to be considered alongside other study components (e.g., watershed nutrient load modelling, stormwater modelling, transportation studies and engagement activities) to inform the decision-making process for future community planning work.

3.1 Overall Study Approach

The land suitability analysis for the WSA included both desktop and field components. Information was also gathered through stakeholder engagement efforts. The desktop component involved a review of existing data for the WSA, including information gathered through previous studies provided by HRM. Desktop sources included:

- Atlantic Canada Conservation Data Centre (AC CDC) data for a 5 km radius around the WSA
- Nova Scotia Department of Natural Resources and Renewables (NSDNRR) Forest Inventory data
- NSDNRR Wetland Inventory data (and the Nova Scotia Environment and Climate Change [NSECC] Wetlands of Special Significance [WSS] layer)
- Wet Areas Mapping (WAM) data (Forest Watershed Research Centre 2012)
- Boreal felt lichen habitat model (Cameron and Neily 2008)
- Aerial imagery and LiDAR data
- The Halifax Green Network Plan (HGNP)

In addition to the desktop review, Stantec completed a variety of field surveys (spring-fall 2023) to collect further information on environmental components and evaluate the potential for areas of cultural significance.

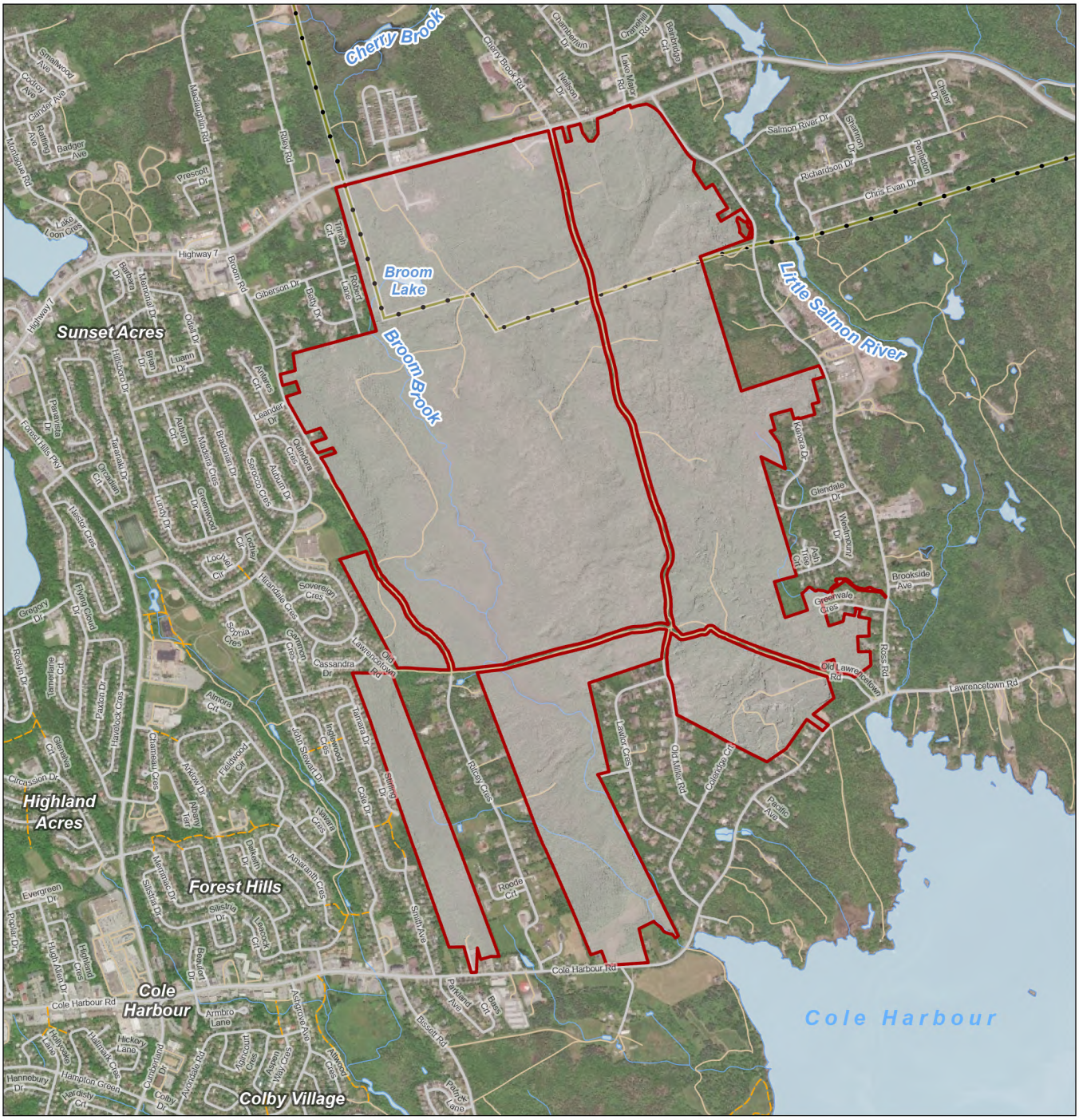
The land suitability analysis addresses the following components:

- Wetland Habitat
- Watercourses and Water Quality
- Forest Habitat and Species at Risk
- Landscape Connectivity
- Surficial and Bedrock Geology
- Topography
- Contaminated Sites
- Areas of Cultural Significance

Sections 3.2 through 3.8 describe desktop and field results followed by details about how each environmental component was evaluated from a land suitability perspective. Suitability for development was generally ranked as follows:

- a score of 1 indicates low suitability for development
- a score of 2 indicates moderate suitability for development
- a score of 3 indicates high suitability for development

Lower scores generally correspond to areas with higher ecological function, making them generally more suitable for conservation purposes and potentially less suitable for development. Conversely, higher scores indicate lands that are potentially less desirable for conservation efforts and potentially more suitable for development. It is important to note that many factors, in addition to those addressed in this section, contribute to suitability for development and/or conservation, including views expressed by members of the public, other stakeholders and Indigenous groups. Therefore, the information presented here should not be viewed in isolation.



Study Area

Utilities
- Transmission Line

Transportation
- Highway
- Road
- Resource / Seasonal Road
- Trail

Other Features
- Waterway
- Waterbody

0 250 500 Metres
(At original document size of 8.5x11)
1:24,000

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Project Location
Halifax Regional Municipality,
Nova Scotia

Prepared by NW on 2023-07-19
Reviewed by MB on 2024-03-18
Revised by NW on 2024-05-29

Fig ID: 160410459_006

Client/Project
Halifax Regional Municipality
Future Serviced Communities
Background Studies

Figure No.
3.1

Title
Westphal Study Area (WSA)

Notes
1. Coordinate System: NAD 1983 CSRS UTM Zone 20N
2. Data Sources: Government of Nova Scotia, Department of Service Nova Scotia and Internal Services
3. Background: Government of Nova Scotia, Department of Service Nova Scotia and Internal Services

\\ca0213-pp\fs01\work_group\1214\active\160410459\gis_data\mapping\ArcGIS Pro\HRM FCM 2022.aprx: HRM_FCM_006 HRM Base Map AerialRevised: 2024-05-29 By: niwhite

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3.2 Wetland Habitat

The objective of the wetland evaluation was to determine where wetland habitat exists within the WSA and determine if any Wetlands of Special Significance (WSS) are present. Having a general understanding of where the wetland boundaries are within the WSA will support development planning and guide future wetland evaluations required to support permitting.

Wetland conservation in Nova Scotia is guided by the Nova Scotia Wetland Conservation Policy and supported by regulation under the provincial *Environment Act* and Activities Designation Regulations. The goals of the policy are to have no loss of WSS and to prevent net loss in area and function for other wetlands (Government of Nova Scotia 2011).

Current NSECC guidance indicates that wetland evaluation (i.e., delineation and functional assessment) should be completed in the same year (within 12 months) of permitting application submissions. Considering this guidance and the current stage of planning, wetland evaluation to support permitting applications was not proposed as part of the current scope of work. To inform planning, Stantec instead completed a desktop review and identified potential wetland areas. Subsequent field surveys helped to refine these boundaries.

3.2.1 DESKTOP AND FIELD SUMMARY

The wetland areas presented on Figure 3.2 were developed based on a combination of desktop and field information. Prior to field surveys, preliminary wetland areas were interpreted using LiDAR and aerial imagery. During field surveys, boundaries of these preliminary wetland areas were verified as they were encountered or adjusted as necessary. Any additional wetlands encountered during field surveys (i.e., that had not been identified through desktop review) were noted. Wetlands in the WSA were categorized by class and type following the Canadian Wetland Classification System (CWCS). Wetland function was evaluated using the Wetland Ecosystem Services Protocol – Atlantic Canada (WESP-AC) method, which consists of both field and office forms (NBDELG 2018). Nineteen wetlands were identified within the WSA, and all of these wetlands were evaluated using WESP-AC (Table 3.1).

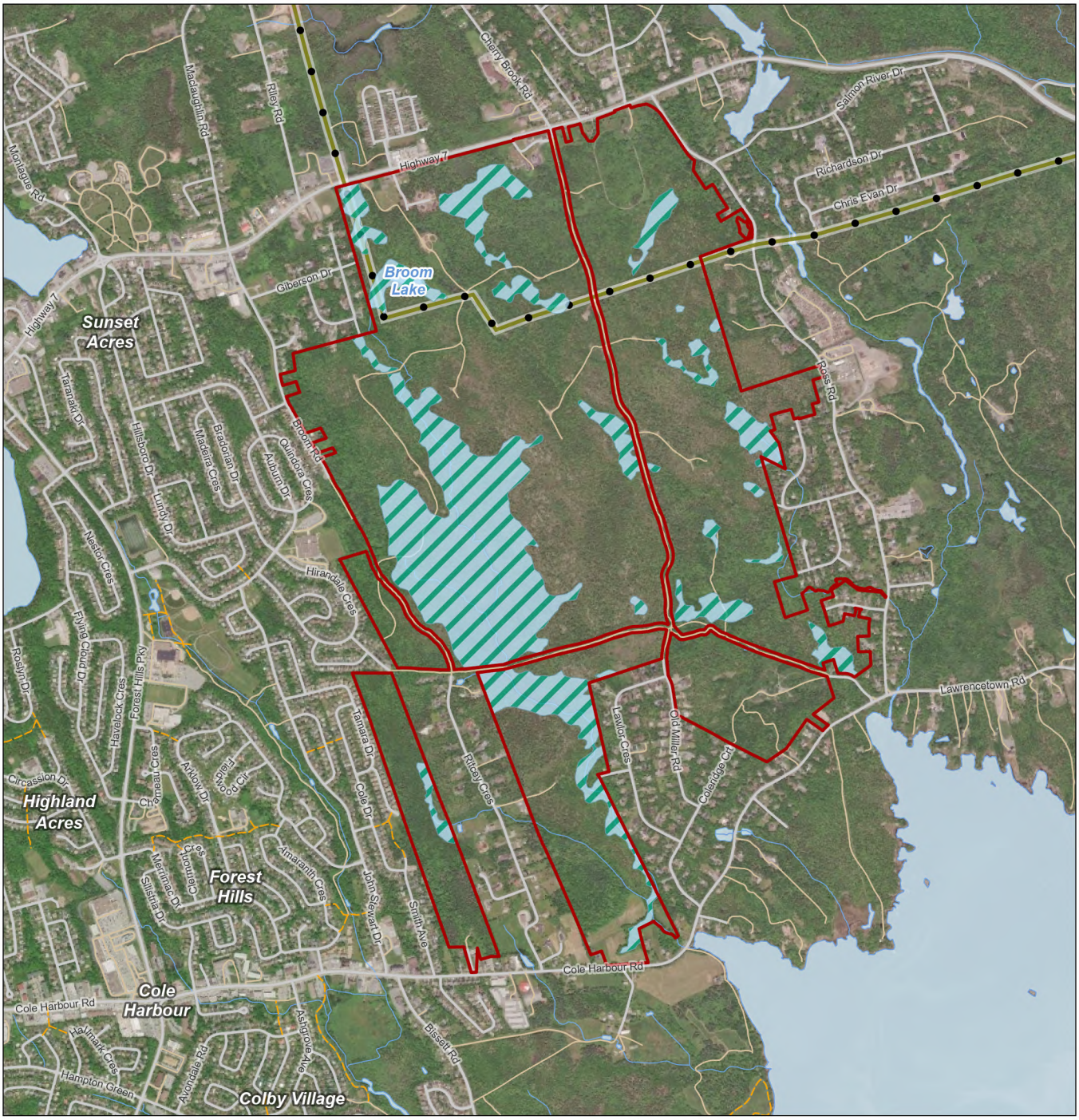
Table 3.1 Summary of Wetland Evaluation Results

Wetland ID	Wetland Class and Type	Approximate Wetland Area (ha)	Evaluated using WESP-AC	WSS1
WL1	Mixedwood Treed Swamp, Tall Shrub Swamp	1.63	Yes	No
WL2	Tall Shrub Swamp	2.43	Yes	No
WL3	Mixedwood Treed Swamp, Tall Shrub Swamp	0.45	Yes	No
WL4	Mixedwood Treed Swamp	0.39	Yes	No
WL5	Tall Shrub Swamp, Bog	0.29	Yes	No
WL6	Mixedwood Treed Swamp, Graminoid Fen	2.87	Yes	No
WL7	Coniferous Treed Swamp	0.14	Yes	No
WL8	Mixedwood Treed Swamp	0.08	Yes	No
WL9	Mixedwood Treed Swamp	1.40	Yes	No
WL10	Mixedwood Treed Swamp complex, Fresh Graminoid Marsh	0.18	Yes	No
WL11	Mixedwood Treed Swamp, Tall shrub Swamp, Low Shrub Swamp	1.94	Yes	No
WL12	Coniferous Treed Swamp	0.33	Yes	No
WL13	Mixedwood Treed Swamp, Graminoid Fen, Tall Shrub Swamp, Low Shrub Swamp	56.35	Yes	No
WLA	Mixedwood Treed Swamp, Tall Shrub Swamp, Freshwater Marsh	1.89	Yes	No
WLB	Mixedwood Treed Swamp, Tall Shrub Swamp	2.15	Yes	No
WLC	Mixedwood Treed Swamp, Tall Shrub Swamp	4.73	Yes	No
WLD	Mixedwood Treed Swamp, Tall Shrub Swam	2.70	Yes	No
WLE	Mixedwood Treed Swamp, Tall Shrub Swamp	2.28	Yes	No
WLF	Mixedwood Treed Swamp	1.21	Yes	No

Notes

1 – As indicated in the Nova Scotia Wetland Conservation Policy, a wetland can be considered a WSS based on a variety of factors. The information in this column is based on the results of the WESP-AC functional WSS interpretation tool. Further surveys, observations, and/or evaluation could result in any of these wetlands being considered a WSS.

WL – Wetland





Notes
1. Coordinate System: NAD 1983 CSRS UTM Zone 20N
2. Service Nova Scotia, Stantec
3. Background: ESRI 2023

Study Area
Wetlands (Stantec, 2023)

Transportation
- Highway
- Road
- Resource / Seasonal Road
- Trail

Utilities
- Transmission Line

Other Features
- Waterway
- Waterbody

0 250 500 Metres
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Halifax Regional Municipality, Nova Scotia	Revised by SChubbs on 2024-04-03
	Revised by NWhite on 2024-05-24
Client/Project	Fig ID: 160410459_011a
Halifax Regional Municipality Future Serviced Communities Background Studies	
Figure No.	
3.2	
Title	
Wetlands in the WSA	

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3.2.2 LAND SUITABILITY ANALYSIS – WETLANDS

The WESP-AC functional assessment method is currently the accepted standardized approach for assessing wetland function in Atlantic Canada. WESP-AC generates scores and ratings for a variety of wetland functions (e.g., water storage, carbon sequestration, habitat characteristics – refer to Table 3.5). The scores and ratings that result from the functional assessment can be used to inform decisions about development near wetlands (NBDELG 2018). In Nova Scotia, WESP-AC includes a functional WSS interpretation tool, to help determine if the wetland should be considered a WSS.

The land suitability analysis for wetlands considered the level of ecosystem function each wetland provides based on the WESP-AC functional assessment results. Wetlands were scored using the WESP-AC results for ecological condition, wetland risk, the composite function score, and the WSS interpretation tool (Table 3.2). Taken together, this evaluation system provides a relative ranking of wetland values in terms of conservation and development potential. Higher conservation values generally resulted in a lower ranking for development suitability with lower conservation values generally resulting in higher suitability for development based on this ranking matrix.

Table 3.2 Wetlands – Land Suitability Ranking Framework

Inputs	Land Suitability Ranking		
	1 - Low suitability for development	**2 - Moderate suitability for development**	**3 - Higher suitability for development**
WESP-AC Ecological Condition	Higher	Moderate	Lower
WESP-AC Risk	Higher	Moderate	Lower
Land Suitability Function Score[1]	51-40	39-29	28-17*
WESP-AC Functional WSS Interpretation Tool	None of the 19 wetlands evaluated using WESP-AC were determined to be a WSS using the WESP-AC Functional WSS Interpretation Tool		

Notes:
1 – Derived from the WESP-AC function (composite score)
*17 is the lowest possible score if all functions are assigned a 1

3.2.2.1 Ecological Condition

Wetland ecological condition is determined by the WESP-AC Non-Tidal form for Nova Scotia. It is defined in the WESP-AC Manual as the integrity or health of the wetland determined primarily by its vegetation composition (because that is the only meaningful indicator that can be estimated rapidly). The tool states that non-tidal wetlands in excellent ecological condition often have no invasive plants and at least one species of conservation concern. Equally, they have little bare ground, no strongly dominant herbaceous or shrub species, and may have varied microtopography and no extensive algal blooms. However, many wetlands perceived to be in excellent condition do not have any of these characteristics (NBDELG 2018). Thus, wetlands with higher ecological conditions are prioritized for avoidance for development as they are more likely to support higher biodiversity compared to lower scoring wetlands.

For each of the 19 wetlands assessed using WESP-AC, a value is calculated for ecological condition which is ranked as Lower, Moderate or Higher through a comparison with calibrated wetlands for the region (Table 3.3). This output value is ranked based on the output status and assigned values of 3, 2 or 1. Wetlands with higher ecological function are assigned a lower value for development suitability compared to wetlands with lower ecological function, which are assigned a higher suitability for development. All the assessed wetlands scored Lower for Ecological Condition with the exception of WL 1, which scored Higher (Table 3.3).

Table 3.3 Ecological Condition Scores

Wetland ID	Ecological Condition Score	Ecological Condition Ranking	Land Suitability Ranking[1]
WL1	8.84	Higher	1
WL2	0	Lower	3
WL3	1.01	Lower	3
WL4	1.01	Lower	3
WL5	0	Lower	3
WL6	1.3	Lower	3
WL7	0	Lower	3
WL8	0	Lower	3
WL9	2.75	Lower	3
WL10	2.75	Lower	3
WL11	0	Lower	3
WL12	0.43	Lower	3
WL13	1.88	Lower	3
WLA	0.43	Lower	3
WLB	0	Lower	3
WLC	0	Lower	3
WLD	0	Lower	3
WLE	0.72	Lower	3
WLF	1.88	Lower	3

Notes:

1 - Low suitability for development	2 - Moderate suitability for development	3 - Higher suitability for development

3.2.2.2 Wetland Risk

Wetland risk is determined by the WESP-AC Non-Tidal form for Nova Scotia. Wetland risk is defined in the WESP-AC Manual as the average of the wetland sensitivity score and the wetland stressors score. The WESP-AC Manual defines wetland sensitivity as the lack of intrinsic resistance and resilience of the wetland to human and natural stressors (Niemi et al. 1990), including but not limited to changes in water chemistry, shade, frequency and duration of inundation or soil saturation, water depth, biological invasion, habitat fragmentation, and others as described in the USEPA report by Adamus et al. (2001) (NBDELG 2018). Wetland stress is defined as the degree to which the wetland is or has recently been altered by, or exposed to risk from, human-related factors that degrade its ecological condition and/or reduce its capacity to perform one or more of the functions listed in the form (NBDELG 2018).Thus, wetlands with higher risk are relatively more vulnerable to disturbance associated with development and as such should be avoided as areas for development compared to wetlands with more risk tolerance.

For each of the 19 wetlands assessed using WESP-AC, a value was calculated for wetland sensitivity and wetland stressors which were ranked lower, moderate, or higher compared to the calibrated wetlands for the region. This output value was ranked based on the output status and assigned values of 3, 2 or 1. Wetlands with higher risk (i.e., greater sensitivity) were assigned a lower value (1) for potential development, compared to wetlands with lower risk function. All the wetlands score higher for wetland stress, while all the wetlands score either moderate or higher for wetland sensitivity except for WL12 which has lower sensitivity. All the assessed wetlands scored higher for wetland risk and were assigned a land suitability ranking of 1 for wetland risk (Table 3.4).

Table 3.4 Wetland Risk Scores

Wetland ID	Wetland Risk Score[1]	Wetland Risk Ranking	Land Suitability Ranking
WL1	7.37	Higher	1
WL2	8.12	Higher	1
WL3	7.64	Higher	1
WL4	7.48	Higher	1
WL5	7.77	Higher	1
WL6	7.67	Higher	1
WL7	7.29	Higher	1
WL8	7.42	Higher	1
WL9	7.29	Higher	1
WL10	6.98	Higher	1
WL11	8.92	Higher	1
WL12	7.31	Higher	1
WL13	9.16	Higher	1
WLA	8.40	Higher	1
WLB	8.19	Higher	1

Table 3.4 Wetland Risk Scores

Wetland ID	Wetland Risk Score[1]	Wetland Risk Ranking	Land Suitability Ranking
WLC	9.16	Higher	1
WLD	9.00	Higher	1
WLE	7.87	Higher	1
WLF	9.35	Higher	1

Notes:
1 - This number is an average of the WESP-AC scores for wetland sensitivity and stressors

1 - Low suitability for development	2 - Moderate suitability for development	3 - Higher suitability for development

3.2.2.3 Function (Composite Score) Descriptions

The wetland function (composite score) was calculated using the WESP-AC wetland function scores determined by the WESP-AC Non-Tidal protocol developed for Nova Scotia (Adamus 2018). Functions that are considered in the WESP-AC evaluation are presented in Table 3.5.

While the land suitability analysis for wetlands considers the composite function score, scores for individual functions for each wetland could be separately considered if those individual functions are particularly important when considering future development scenarios. For example, the function scores for water storage may be particularly important for certain development scenarios. The scores for each of the assessed wetlands can be viewed in Table 3.7 and the thresholds for function scores are presented in Table 3.6. Using wetland WL1 as an example, Table 3.7 indicates that this wetland scored a 0.81 for water storage, which (according to Table 3.6) is considered low. WL5, on the other hand, scored a 8.03 for water storage, which is considered high.

Table 3.5 Wetland Functions

Function		Description
WS	Water Storage	The effectiveness of a wetland for storing or delaying the downslope movement of surface water for long or short periods. This potentially influences the height, timing, duration, and frequency of inundation in downstream and downslope areas. Many of the region's wetlands can perform this function.
SFS	Stream Flow Support	The effectiveness of a wetland for prolonging surface water in headwater streams during seasonally dry periods. This is important for fish passage and overall ecological support
WC	Water Cooling	The effectiveness of a wetland for maintaining or reducing the water temperature, primarily in headwater streams. Many of the region's wetlands are capable of performing this function.
SR	Sediment Retention	The effectiveness of a wetland for intercepting and filtering suspended inorganic sediments, allowing their deposition, reducing current velocity, resisting erosion, and stabilizing underlying sediments or soil. Many of the region's wetlands are capable of performing this function.

Table 3.5 Wetland Functions

Function		Description
PR	Phosphorus Retention	The effectiveness for retaining phosphorus for long periods as a result of chemical adsorption complexation, or from translocation by plants to belowground zones or decay-resistant peat such that there is less potential for physically or chemically remobilizing phosphorus into the water.
NR	Nitrate Removal	The effectiveness for retaining particulate nitrate and converting soluble nitrate and ammonia to nitrogen gas, primarily through the microbial process of denitrification, while generating little or no nitrous oxide (a potent “greenhouse gas”).
CS	Carbon Sequestration	The effectiveness of a wetland both for retaining incoming particulate and dissolved carbon, and through the photosynthetic process, converting carbon dioxide gas to organic matter (particulate or dissolved). And to then retain that organic matter on a net annual basis for long periods while emitting little or no methane (a potent “greenhouse gas”).
OE	Organic Nutrient Export	The effectiveness of a wetland for producing, rapidly cycling, and subsequently exporting organic matter, either particulate (detritus) or dissolved, and including net export of nutrients (C, N, P, Si, Fe) comprising that matter. It does not include exports of carbon in gaseous form (methane and carbon dioxide) or as animal matter (e.g., emerging aquatic insects, fish).
FA	Anadromous Fish Habitat	The capacity to support an abundance of native anadromous fish for functions other than spawning.
FR	Resident Fish Habitat	The capacity to support an abundance and diversity of native non-anadromous fish. The model described below will not predict habitat suitability accurately for every species, nor is it intended to assess the ability to restore fish access to a currently inaccessible wetland.
INV	Aquatic Invertebrate Habitat	The capacity to support an abundance and diversity of invertebrate animals which spend all or part of their life cycle underwater, on the water surface, or in moist soil. Includes dragonflies, aquatic flies, clams, snails, crustaceans, aquatic beetles, aquatic worms, aquatic bugs, and others, including semi-aquatic species.
AM	Amphibian & Reptile Habitat	The capacity of a wetland to support an abundance and diversity of native amphibians (frogs, toads, salamanders) as well as turtles.
WBF	Waterbird Feeding Habitat	The capacity to support an abundance and diversity of feeding waterbirds, primarily the migratory species present outside of the usual nesting season.
WBN	Waterbird Nesting Habitat	The capacity to support an abundance and diversity of nesting waterbirds.
SBM	Songbird, Raptor & Mammal Habitat	The capacity to support, at multiple spatial scales, an abundance and diversity of songbirds, raptors, and mammals, especially species that are most dependent on wetlands or water.
POL	Pollinator Habitat	The capacity to support pollinating insects, such as bees, wasps, butterflies, moths, flies, and beetles, and also pollinating birds (hummingbirds and perhaps others).
PH	Native Plant Habitat	The capacity to support, at multiple spatial scales, a diversity of native vascular and non-vascular (e.g., bryophytes, lichens) species and functional groups, especially those that are most dependent on wetlands or water.
Reference: NBDELG 2018		

The score of each of the functions presented in Table 3.5 was evaluated using the WESP-AC thresholds, which are described in Table 3.6. The scores were then converted to values of 1, 2 or 3. These values correspond to the output of the WESP-AC model of lower, moderate, and higher, respectively. The sum of these values was calculated for each wetland evaluated by WESP-AC and assigned an overall land suitability function score (Table 3.7Table 3.7). The land suitability function scores were then converted to a land suitability ranking, with higher functioning wetlands scoring lower in preference for development due to the higher contribution of ecosystem functions provided by these wetlands (Table 3.7). All of the assessed wetlands scored moderate for development (39-29), except for WL7 which scored a total of 23 which falls in the higher for development category (28-17) (Table 3.7).

Table 3.6 Thresholds for Function Scores

Function	Lower if ≤	Higher if ≥
Water Storage (WS)	3.80	7.63
Stream Flow Support (SFS)	1.51	4.62
Water Cooling (WC)	2.04	5.29
Sediment Retention & Stabilization (SR)	3.54	6.44
Phosphorus Retention (PR)	3.00	6.67
Nitrate Removal (NR)	2.76	4.62
Carbon Sequestration (CS)	3.22	6.36
Organic Nutrient Export (OE)	0	7.46
Anadromous Fish Habitat (FA)	0.96	2.87
Resident Fish Habitat (FR)	1.30	5.14
Aquatic Invertebrate Habitat (INV)	3.42	5.43
Amphibian & Reptile Habitat (AM)	3.56	6.67
Waterbird Feeding Habitat (WBF)	0	6.43
Waterbird Nesting Habitat (WBN)	2.36	6.55
Songbird, Raptor, & Mammal Habitat (SBM)	0	7.52
Native Plant Habitat (PH)	0	7.95
Pollinator Habitat (POL)	3.57	6.23

Notes:
Moderate ranking assigned if value falls between the lower and higher threshold value
Threshold values of 0 occur when calibrated wetlands frequently score 0 for a given function
From WESP-AC Non-Tidal Form 2021: Nova Scotia Normalization Reference Values

Table 3.7 Wetland Function Scores

Wetland ID	WESP-AC Normalised Function Scores[1]																	Land Suitability Function Score[2]	Land Suitability Ranking[3]
	WS	SFS	WC	SR	PR	NR	CS	OE	FA	FR	INV	AM	WBF	WBN	SBM	POL	PH		
WL1	0.81	6.00	8.90	2.89	1.43	2.29	3.06	9.51	0.00	0.00	6.28	4.38	5.49	6.03	8.59	9.63	4.17	**33**	2
WL2	1.20	5.72	7.55	3.53	1.41	2.39	1.9	9.29	0.00	0.00	7.50	5.03	5.91	6.67	8.44	9.44	0.00	**33**	2
WL3	0.75	6.00	7.55	2.73	0.98	2.63	2.16	9.14	0.00	0.00	8.71	5.35	5.47	6.33	8.81	8.44	3.05	**32**	2
WL4	0.96	6.00	7.55	2.69	1.13	2.52	3.26	9.65	0.00	0.00	4.79	4.72	5.66	6.17	8.45	7.87	2.42	**31**	2
WL5	8.03	0.00	0.00	4.02	1.51	10.0	7.83	7.11	0.00	0.00	3.60	2.84	0.00	0.00	5.42	6.85	0.67	**28**	2
WL6	1.67	2.66	5.90	3.36	2.26	2.96	3.9	8.65	0.00	5.00	6.35	5.14	5.95	6.81	9.02	9.03	3.72	**36**	2
WL7	3.26	3.21	0.00	3.45	1.36	2.31	3.81	7.61	0.00	0.00	2.55	2.47	0.00	0.00	4.52	7.49	0.00	**23**	3
WL8	8.87	0.00	0.00	6.87	1.90	10.0	7.83	6.90	0.00	0.00	3.84	2.54	0.00	0.00	5.23	7.02	0.45	**29**	2
WL9	1.79	6.00	7.55	4.02	1.75	3.09	4.7	10.0	0.00	0.00	6.47	5.58	5.10	6.23	7.24	9.33	4.71	**35**	2
WL10	0.22	0.00	4.85	3.25	1.69	3.43	2.27	7.99	0.00	0.00	9.01	8.13	6.69	7.72	5.67	8.83	1.22	**32**	2
WL11	0.88	6.28	8.15	2.38	2.54	1.62	3.6	10.0	0.00	0.00	3.46	4.53	5.21	6.25	8.50	7.82	1.35	**31**	2
WL12	7.29	0.00	1.42	10.0	10.0	10.0	5.04	7.18	0.00	0.00	2.43	6.11	6.14	6.57	8.30	8.40	1.50	**34**	2
WL13	1.99	1.93	4.79	3.69	1.00	3.56	2.39	9.63	0.00	7.81	8.83	8.01	8.22	8.96	7.31	8.50	3.44	**36**	2
WLA	1.86	5.59	7.55	4.00	2.14	3.31	5.27	10.0	0.00	0.00	7.51	5.30	5.23	6.18	8.79	7.71	3.57	**35**	2
WLB	1.79	3.93	7.55	4.22	1.74	3.38	1.98	8.34	0.00	0.00	3.28	5.15	5.95	3.88	8.52	7.18	0.00	**30**	2
WLC	1.41	6.28	7.55	3.41	3.79	3.2	4.05	10.0	0.00	0.00	5.62	5.06	5.63	6.63	8.86	8.07	3.70	**37**	2
WLD	0.90	5.79	4.21	2.48	1.86	3.25	3.08	8.22	0.00	6.47	4.29	5.91	8.47	7.92	7.18	8.11	2.94	**34**	2
WLE	2.17	2.72	7.55	2.94	2.72	2.88	3.25	9.53	0.00	0.00	6.35	4.91	5.38	6.25	8.55	9.22	3.03	**33**	2
WLF	1.03	6.28	8.15	2.34	2.67	2.37	3.77	10.0	0.00	0.00	5.74	4.80	6.00	6.77	9.07	8.28	4.40	**35**	2

Notes:
1 – The normalised function scores (found in the scores tab of each WESP-AC form) are summarized here for the 19 wetlands evaluated using WESP-AC. The values were categorized as higher, moderate, lower according to the thresholds presented in Table 3.6.
2 – The land suitability function score is the sum of the function scores after they have been converted to higher (1), moderate (2), or lower (3).
3 – The land suitability ranking is based on the land suitability function score.

1 - Low suitability for development	2 - Moderate suitability for development	3 - Higher suitability for development

3.2.2.4 Summary and Recommendations

Nineteen wetlands were identified and evaluated in the WSA using the approach described in Section 3.2.1. The land suitability analysis for wetlands considered the level of ecosystem function each wetland provides based on the WESP-AC functional assessment results. Wetlands were scored using the WESP-AC results for ecological condition, wetland risk, the composite function score, and the WSS interpretation tool. These results are summarized in Table 3.8 and presented on Figure 3.3.

Table 3.8 Wetlands – Land Suitability Rankings

Wetland ID	Land Suitability Ranking			Average LSA Score[1]
	Ecological Condition	Wetland Risk	Function	
WL1	1	1	2	1.3
WL2	3	1	2	2
WL3	3	1	2	2
WL4	3	1	2	2
WL5	3	1	2	2
WL6	3	1	2	2
WL7	3	1	3	2.3
WL8	3	1	2	2
WL9	3	1	2	2
WL10	3	1	2	2
WL11	3	1	2	2
WL12	3	1	2	2
WL13	3	1	2	2
WLA	3	1	2	2
WLB	3	1	2	2
WLC	3	1	2	2
WLD	3	1	2	2
WLE	3	1	2	2
WLF	3	1	2	2

Notes:
1 – Average Land Suitability Analysis (LSA) Score is rounded to the nearest decimal

1 - Low suitability for development	2 - Moderate suitability for development	3 - Higher suitability for development

Note that while the WESP-AC functional WSS interpretation tool was included as a component of the analysis, none of the nineteen wetlands evaluated using WESP-AC were determined to be WSS using that method.

Wetlands represent an important constraint for any development in Nova Scotia. Conservation of wetlands in the province is guided by the Nova Scotia Wetland Conservation Policy and supported by regulation under the provincial *Environment Act* and Activities Designation Regulations. The goals of the policy are to have no loss of WSS and to prevent net loss in area and function for other wetlands (Government of Nova Scotia 2011). The policy states that the following are considered WSS:

- all salt marshes
- wetlands that are within or partially within a designated Ramsar site, Provincial Wildlife Management Area (Crown and Provincial lands only), Provincial Park, Nature Reserve, Wilderness Area or lands owned or legally protected by non-government charitable conservation land trusts
- intact or restored wetlands that are project sites under the North American Waterfowl Management Plan and secured for conservation through the Nova Scotia Eastern Habitat Joint Venture
- wetlands known to support at-risk species as designated under the federal SARA or the NS ESA
- wetlands in designated protected water areas as described within Section 106 of the *Environment Act*

Support/approval for alteration of a WSS will only be considered when the alteration is required to maintain, restore, or enhance a WSS, or if the alteration is deemed to provide necessary public function (Government of Nova Scotia 2011). While none of the wetlands in the WSA evaluated using WESP-AC were determined to be WSS, there are multiple factors that can result in a wetland being considered a WSS and further work and/or consultation with regulators may result in any of the wetlands within the WSA being considered a WSS.

As indicated in the Policy, wetland conservation is achieved by considering the mitigative sequence (avoidance, minimization, compensation). This sequence should be considered during the planning and design stage of any development.

The first step in the sequence (and the priority) is avoidance. This option involves avoiding alteration to wetlands, forcing the consideration of alterative options for the project that may result in fewer impacts to wetlands. If no other alternative option exists, minimization is recommended, meaning that any unavoidable impacts to the wetland be managed in such a way that adverse impacts are reduced. This can be accomplished through specific techniques, materials, and/or site choice. Compensation is required for any permanent loss of wetland area or function. Compensation can be in the form of restoration, enhancement, creation and/or expansion of a wetland ecosystem. The amount of compensation necessary is determined by NSECC and ranges from 1 to 4 ha for every 1 ha of wetland altered, depending on the compensation approach and the relative ecological/social value of the disturbed wetland.

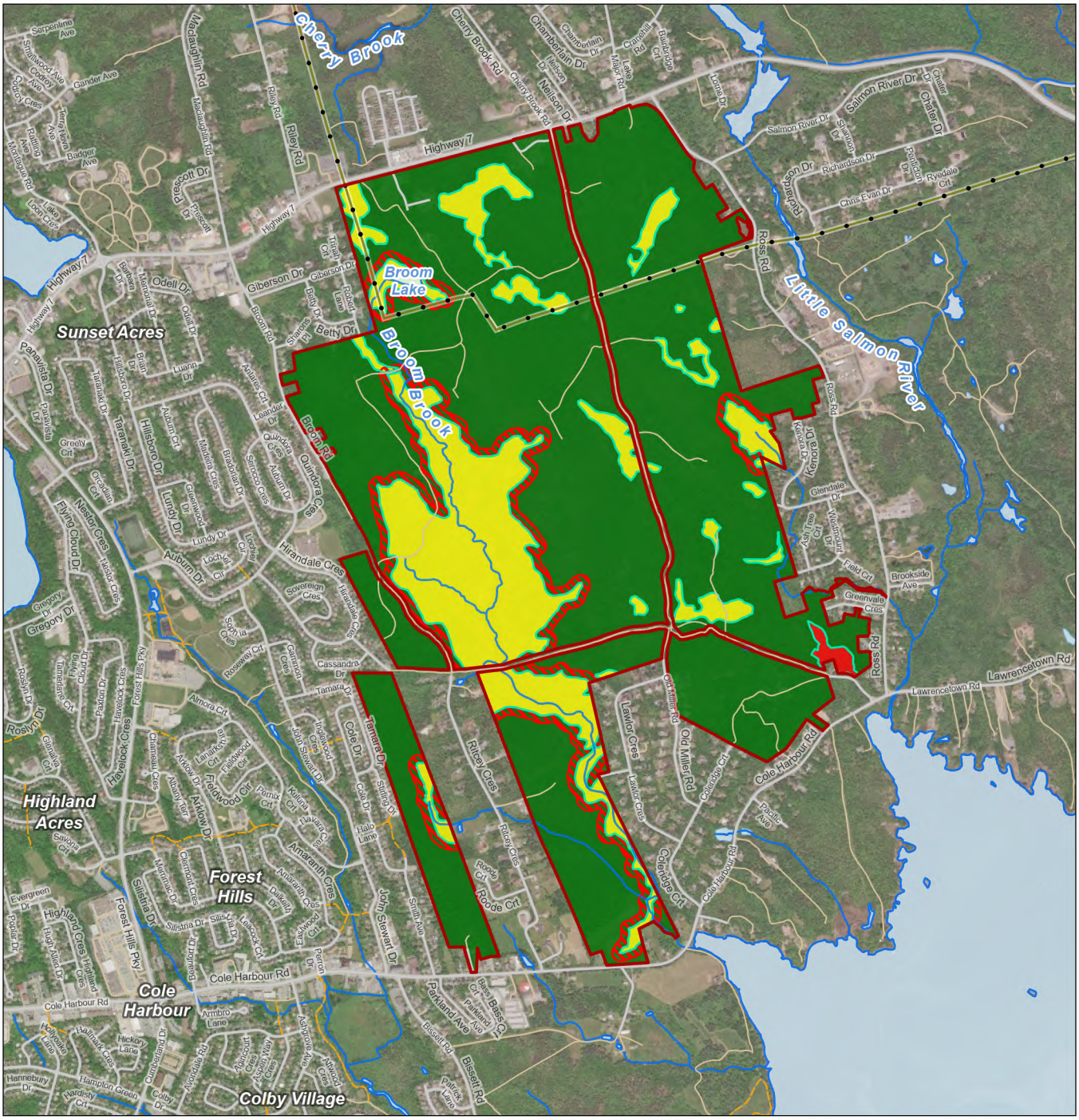
Stantec recommends engaging with NSECC as early as possible to discuss potential wetland impacts (direct or indirect), the permitting process, and compensation requirements (e.g., potential opportunities for wetland restoration, enhancement, or creation).

Once a construction timeline has been established, complete wetland evaluations (i.e., delineation and functional assessment) will likely be required to support permitting applications for wetlands that could be impacted by development. NSECC guidance indicates that wetland evaluation should be conducted during the growing season (June 1 to September 30) and within the same year that the application for alteration approval is submitted.

The land suitability analysis for wetlands is based on the WESP-AC results for ecological condition, wetland risk, the composite function score, and the WSS interpretation tool (Table 3.2). As discussed in Section 3.2.2.3, specific wetland functions may need to be considered in more detail depending on proposed development scenarios and results from other studies. When applying the mitigative sequence for decision making (i.e., avoidance, minimization, compensation, discussed above), avoidance should be a priority where larger areas of contiguous wetland habitat have been identified (e.g., WL13). Areas such as this are also considered in landscape connectivity planning (refer to Section 3.5).

The land suitability analysis represents one evaluation technique that can help prioritize areas for development and/or conservation. Within Nova Scotia there are regulatory processes and policies in place relating to wetlands and their conservation including the *Activities Designation Regulations* made under Section 66 of the *Environment Act*, Nova Scotia Wetland Conservation Policy and the Federal Policy on Wetland Conservation. These include aspects such as the prevention of a net loss of wetland area and function and the designation of wetlands of special significance based on wetlands that play particularly important roles in providing ecosystem services or functions (e.g., supporting rare or migratory species, protecting drinking water supplies, maintaining watershed health).

HRM municipal by laws were also taken into consideration when creating Figure 3.3. HRM policy indicates a 30m development buffer is required for wetlands that are connected to watercourses. This is displayed in Figure 3.3 as wetlands surrounded by red thatching.





Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 20N

2. Data Sources: Stantec; Government of Nova Scotia, Department of Service Nova Scotia and Internal Services

3. Background: Government of Nova Scotia, Department of Service Nova Scotia and Internal Services

- Study Area
- Wetlands (Stantec, 2023)
- Setback on Wetlands Contiguous with Watercourses (30 m)

Land Suitability Score

- 3 (High)
- 2
- 1 (Low)

Utilities

- Transmission Line

Transportation

- Highway
- Road
- Resource / Seasonal Road
- Trail

Other Features

- Waterway
- Waterbody

0 250 500 Metres

(At original document size of 8.5x11)
1:24,000

N

Stantec

Project Location
Halifax Regional Municipality, Nova Scotia

Prepared by NWhite on 2024-03-20
Revised by NWhite on 2024-05-24

Client/Project
Halifax Regional Municipality
Future Serviced Communities
Background Studies

Fig ID: 160410459_006

Figure No.
3.3

Title
Wetlands in the WSA with Required Setbacks – Land Suitability Analysis

\\ca0213-pp\fs01\work_group\1214\active\160410459\gis_data\mapping\ArcGIS Pro\HRM_FCM_2024_Synthesis.aprx: HRM_FCM_030_Wetland_LSARevised: 2024-05-30 By: niwhite

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3.3 Watercourses and Water Quality

Watercourses are defined in the Nova Scotia *Environment Act* to include "the bed and shore of every river, stream, lake, creek, pond, spring, lagoon, or other natural body of water – whether it contains water or not." Desktop mapping of watercourses within the WSA took place in spring 2023, with field verification of select watercourses completed concurrent with the water quality sampling between May and November. Stantec considered an aquatic feature a watercourse if:

- a watercourse was shown on a National Topographic Series (NTS) map;
- recent satellite imagery showed evidence of a watercourse channel; or
- field characteristics such as flowing water and clearly defined physical features such as substrate, bed, banks, aquatic vegetation or aquatic animals were observed.

The objectives of the watercourses and water quality section of the land suitability analysis was to:

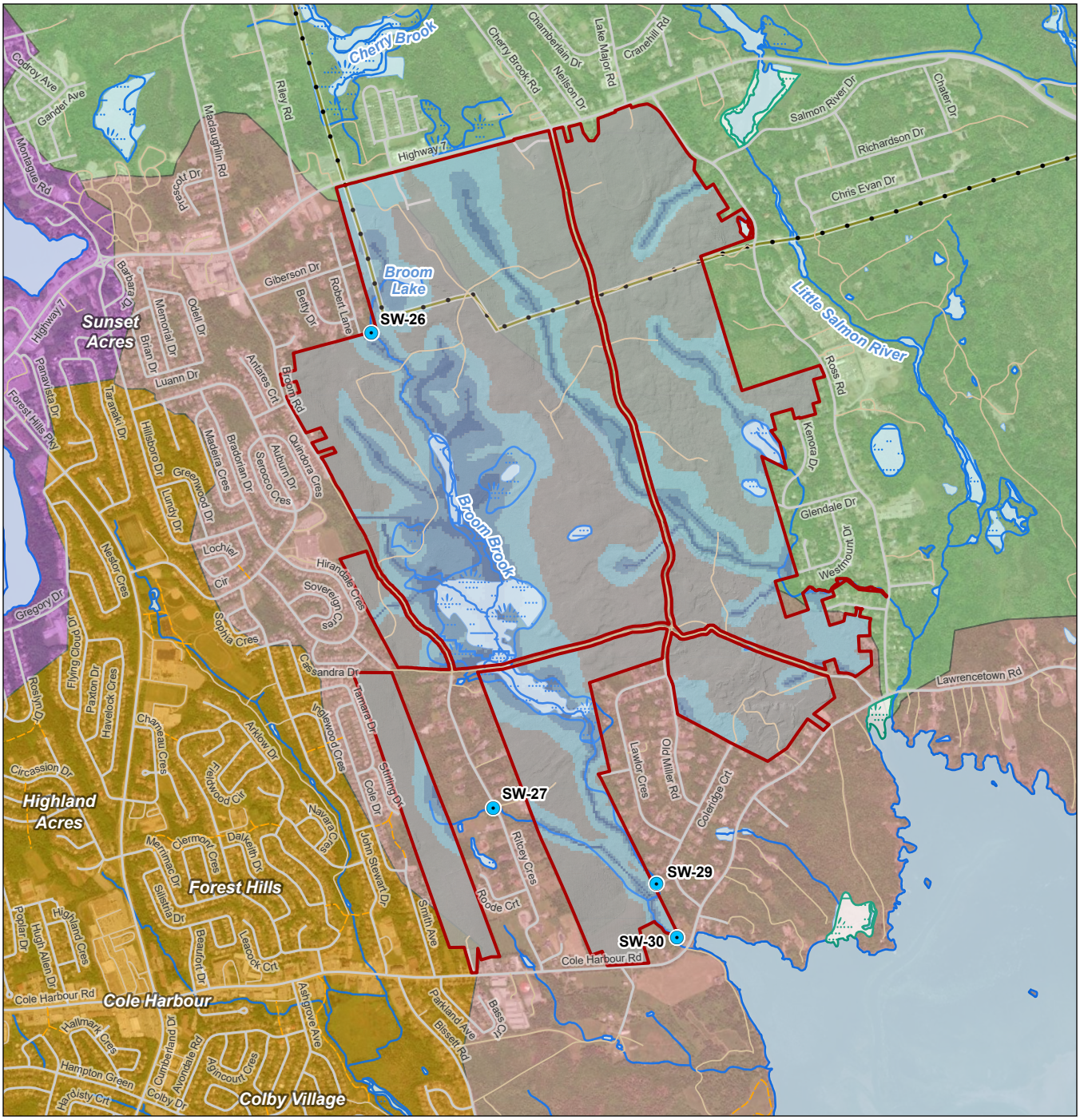
- identify watercourses present within the WSA using field and desktop methods
- describe the aquatic habitat in the watercourses within the WSA
- establish baseline water quality using historical and recently collected field data, and
- establish criteria to determine land suitability in relation to watercourses and water quality

3.3.1 DESKTOP AND FIELD SUMMARY

Stantec completed a desktop inventory of watercourses using LiDAR, aerial imagery, and flow accumulation mapping (also known as wet areas mapping; Figure 3.4). The wet areas mapping indicates depth to water table and can be used to predict what areas may accumulate surface water in watercourses and wetlands. Figure 3.4 also indicates regional watersheds.

The watercourses in this desktop inventory were verified during field surveys conducted concurrently with the 2024 water quality sampling program. At each location where a watercourse was sampled for the water quality sampling program the following information was collected:

- Channel and wetted width
- Water depth
- Substrate composition
- Bank description
- Functional in-water and riparian vegetation cover



Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 20N

2. Data Sources: Stantec; Government of Nova Scotia, Department of Service Nova Scotia and Internal Services

3. Background: Government of Nova Scotia, Department of Service Nova Scotia and Internal Services

Stantec

Project Location
Halifax Regional Municipality, Nova Scotia

Prepared by IProdrug on 2024-03-06
Revised by NWhite on 2024-03-14
Reviewed by MB on 2024-03-18

Client/Project
Halifax Regional Municipality
Future Serviced Communities Background Studies

Fig ID: 160410459_009

Figure No.
3.4

Title
Watershed and Wet Area Mapping in the WSA

\\Ca0213-ppfss01\work_group\1214\active\160410459\gis_data\mapping\ArcGIS Pro\HRM FCM 2022.aprx: HRM_FCM_009 Fig 3.4 Water Quality LocationsRevised: 2024-05-10 By: schubbs

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3.3.1.1 Watercourses

The WSA is located within the Coastal Island and Little Salmon River Watersheds. The main watercourse within the WSA drains from Broom Lake to the Atlantic Ocean.

Preliminary mapping identified three mapped watercourses and one mapped waterbody. Two of the mapped watercourses were confirmed during the water quality monitoring program and each contained at least one surface water monitoring station (Figure 3.5).

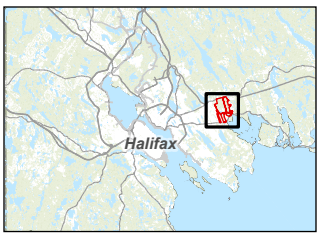
Water quality station SW-26 and SW-29 (Figure 3.5) are located along Broom Brook that flows north to south through the center of the WSA. Broom Brook drains from Broom Lake and flows through wetland WL13 before joining with another unnamed watercourse (SW-27) and draining into the Atlantic Ocean (SW-30).

SW-27 is located on an unnamed watercourse that drains from wetland WLF on the western side of the WSA. This watercourse runs beneath Ritcey Crescent before joining with the drainage from Broom Lake watercourse (SW-29) and draining into the Atlantic Ocean (SW-30)

SW-30 is located on an unnamed water course at southernmost part of the WSA approximately 50 m from the mouth of the watercourse. This unnamed watercourse is below the joining of the Broom Lake drainage (SW-30) and an unnamed watercourse (SW-27).

On the eastern side of the WSA is an unnamed watercourse that was not monitored for water quality. This watercourse drains from wetland WL6 and weaves over the boundary of the WSA before joining with the Little Salmon River and draining into the Atlantic Ocean.





Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 20N
2. Data Sources: Government of Nova Scotia, Department of Service Nova Scotia and Internal Services
3. Background: Government of Nova Scotia, Department of Service Nova Scotia and Internal Services

- Water Sampling Location
- Designated Wetland of Special Significance
- Wetland (NSECC)
- Waterbody
- Waterway

Utilities

- Transmission Line

Transportation

- Highway
- Road
- Study Area

0 250 500 Metres

(At original document size of 8.5x11)
1:24,000

N

Stantec

Project Location
Halifax Regional Municipality, Nova Scotia

Prepared by NWhite on 2023-07-19
Revised by NWhite on 2024-05-10

Client/Project
Halifax Regional Municipality
Future Serviced Communities Background Studies

Fig ID: 160410459_008

Figure No.
3.5

Title
Watercourse Mapping and Surface Water Sampling Locations in the WSA

\\Ca0213-ppfss01\work_group\1214\active\160410459\gis_data\mapping\ArcGIS Pro\HRM FCM 2022.aprx: HRM_FCM_008 Fig 3.5 Lake Watercourse InventoryRevised: 2024-05-10 By: schubbs

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3.3.1.2 Fish and Fish Habitat

Watercourse within the WSA drain into the Peter McNab wildlife conservation area which is an ocean inlet that contains estuarine flats and salt marshes. This ocean inlet is within herring spawning area (Hastings 2014) and the salt marshes contain alewife (*Alosa pseudoharengus*), stickleback species (*Gasteroeidae spp*), American eel (*Anquilla rostrata),* mummichog (*Fundulus heteroclitus*), and banded killifish (*Fundulus diaphanus*) (CBWES 2013).

While fish community surveys were not conducted as part of this analysis, potential fish presence was based on watercourse characteristics, including water levels, channel geometry, water quality and connectivity to watercourses downstream with known fish populations. Connectivity is sufficient to provide fish passage into the watercourse with in the WSA; therefore, these watercourses are expected to contain fish communities.

Physical watercourse characteristics were collected during the water quality sampling program. Table 3.9 outlines the results of the watercourse assessments for the four watercourses confirmed in the field.

Table 3.9 Physical Watercourse Characteristics – WSA

Watercourse	Channel Width (m)	Wetted Width (m)	Substrate Composition	Riparian Habitat Description
SW-26	2.0 to 2.8	1.9 to 2.4	Cobble and gravel sized rock with small boulders.	Grassy undercut banks with woody shrubs and predominantly deciduous mixed wood forest.
SW-27	0.7 to 1.3	0.5 to 1.2	Rubble sized rock with smaller amounts of cobble and fines.	Grassy low-lying banks with woody shrubs and predominantly deciduous mixed wood forest.
SW-29	4.5 to 8.0	4.0 to 7.0	Boulder sized rocks with smaller amounts of rubble and cobble.	Boulder and grassy low-lying banks and predominantly deciduous mixed wood forest.
SW-30	2.8 to 5.5	3.0 to 5.0	Fines and organic material with occasional boulder	Grassy low-lying banks with woody vegetation. At points contiguous with wetlands
Notes: Boulder = >259 mm; Rubble = 100 mm to 250 mm; Cobble = 15 mm to 100 mm; Gravel = 5 mm to 15 mm; Sand = 0.02 to 2 mm; Fines = <0.02 mm				

3.3.1.3 Water Quality

Information on surface water quality for the WSA was obtained using field-based data collected monthly since April 2023. Due to the relative lack of waterbodies in the WSA, no historical water quality data has been found for this Study Area.

Water quality sampling began in April 2023 and the final round of sampling was completed in November 2023 at nine locations across the WSA (Figure 3.5). Water quality samples were submitted under chain of custody protocols to Bureau Veritas Labs in Bedford, NS for laboratory analysis of bacteria, total suspended solids (TSS), Total Phosphorus (TP), turbidity, colour, and chloride. Initial mean water quality results are presented in Table 3-10.

Water quality across the WSA is has neutral pH (values ranging between 6.21 to 8.10). Total phosphorus values range from 17 ug/L to 66 ug/L. The median concentration of total phosphorus is 27 ug/L which is indicative of meso-eutrophic conditions. Historical sources of chloride within the watershed include septic systems, animal waste, and drainage from contact with road-salt chemicals. Chloride concentrations in WSA are low to moderate, with median concentration of 31.5 mg/L and maximum concentration of 120 mg/L. The maximum chloride value was observed at SW-26 during the May sampling event, the reported chloride maximum (120mg/L) is at guideline limit for chronic exposure established for freshwater aquatic life by the Canadian Council of Ministers of the Environment (CCME 2007).This elevated concentration may be due to the low water levels observed during this site visit and little precipitation during the month of May. Total Suspended Solids (TSS) concentrations are generally low for WSL with a median value of 2.25 mg/L. The maximum TSS value was observed at SW-27 of 250 mg/L is considered to be an anomaly due to limited flow in the stream at the time of sampling (September 2023). The low chloride and TSS concentrations suggest that WSA is not significantly affected by urban runoff or erosion within the watershed. The bacteria concentrations in WSL were observed to be consistently present in the streams with mean concentrations of 313.5 CFU/100mL for E.coli., and 959.1 CFU/100mL for total coliforms.

Table 3.10 Water Quality Results from the WSA collected during Spring/Summer 2023

	Units	Value	SW-26	SW-27	SW-29	SW-30
Microbiological						
Escherichia coli	CFU / 100mL	Mean Median Max Min	327.8 390 830 9	374 245 1000 6	258 290 600 10	294 120 920 16
Total Coliforms	CFU / 100mL	Mean Median Max Min	1194 1300 1700 370	1217.5 1200 1500 970	800 760 1500 200	625 555 990 400
Inorganics						
Dissolved Chloride (Cl-)	mg/L	Mean Median Max Min	79.12 86 120 27	30.37 27.5 53 14	36.37 32 70 21	34.88 31 67 19
Colour	TCU	Mean Median Max Min	23.5 12 54 7.9	71.12 46.5 170 28	130 122 230 55	112.88 111.5 190 49
Total Phosphorus (TP)	mg/L	Mean Median Max Min	0.0395 0.034 0.066 0.021	0.0412 0.03 0.09 0.022	0.0222 0.0215 0.029 0.017	0.0238 0.022 0.032 0.018

Table 3.10 Water Quality Results from the WSA collected during Spring/Summer 2023

	Units	Value	SW-26	SW-27	SW-29	SW-30
Total Suspended Solids (TSS)	mg/L	Mean	5.17	35.56	2	3.75
		Median	1.5	4.1	2	2.5
		Max	21	250	2.8	9.0
		Min	1.2	1.8	1.2	1.0
Turbidity	NTU	Mean	2.98	8.38	1.54	1.795
		Median	0.93	4.2	1.35	1.15
		Max	9.4	40	3.0	3.7
		Min	0.2	1.7	0.65	0.28

3.3.2 LAND SUITABILITY ANALYSIS – WATERCOURSES AND WATER QUALITY

The land suitability analysis for watercourses and water quality considered that development within watercourses is generally regulated provincially and federally. Provincially, the Nova Scotia *Environment Act* provides the overall authority to protect watercourses. Any activity that changes a watercourse, a water resource, or the flow of water therein requires an approval or a notification in accordance with the Activities Designation Regulations. Before any work can be done, an activity requires either an approval from NSECC or a notification to the Department for minor works.

Fish habitat is a significant and important component of aquatic habitat found in watercourses. In addition to provincial watercourse alteration requirements, Fisheries and Oceans Canada (DFO) is responsible, under the *Fisheries Act* and the SARA, for ensuring protection of fish and fish habitat. The federal *Fisheries Act* defines fish habitat as “water frequented by fish and any other areas on which fish depend directly or indirectly to carry out their life processes, including spawning grounds and nursery, rearing, food supply and migration areas.”

Physical works within the watercourses are regulated by provincial and federal acts. Water quality is regulated under the provincial *Environment Act*, as well as the federal *Fisheries Act* where there are prohibitions against pollution, specifically termed deleterious substances. Within the *Fisheries Act* a deleterious substance “can be any substance that, if added to any water, would degrade or alter the water quality such that it could directly or indirectly harm fish, fish habitat, or the use of fish by humans.” Stormwater discharges are also managed in accordance with the Halifax Stormwater Management Standards for Development Activities (Halifax Regional Municipality 2020). Setbacks from watercourses are provided in the Halifax Mainland Land Use By-Laws (Halifax Regional Municipality 2024).

To protect aquatic ecosystems, the land suitability analysis considered riparian zones in addition to the bed and banks of the watercourse. Riparian zones are areas adjacent to watercourses, which are ecologically and geomorphologically diverse landscapes. Riparian zones provide a buffer that protects the watercourse from the impacts of adjacent development. In urban environments riparian zones also reduce the severity of flooding on adjacent lands.

Considering the ecological value associated with watercourses and their riparian habitats, values were assigned to the lands within the WSA based on distance to the watercourse and termed 'ecological zones' (Table 3.11). Areas located within 30 m of a watercourse were considered to have low suitability for development. Areas between 30 m and 100 m from a watercourse were considered to have moderate suitability for development while areas greater than 100 m from a watercourse were considered to have higher suitability for development.

The objective of establishing these ecological zones was to provide suitable areas for development while retaining watercourse function and potential habitat quality for fish. The ecological zones were established based on watercourse setbacks and a buffer of 30 m established in the Cole Harbour / Westphal Land Use By-Laws (Halifax Regional Municipality 2024). Wider buffers are more effective at filtering contaminants, encouraging infiltration and providing diversity of habitat. However, the buffer width beyond the minimum standard must also consider the growing need for residential units and the limited land available within Halifax. Therefore, the 30 m setbacks established in the By-Laws were considered an appropriate minimum threshold for the land suitability process.

Considering the effective width varies with soil type, slope, watercourse size, ecological habitat function and vegetative cover the Halifax Land Use By-Laws setbacks are considered the minimum criteria levels and additional buffer width may be implemented during the Planning or Subdivision Approval process.

For the purpose of the land suitability analysis watercourse ecological functions were divided into two aspects:

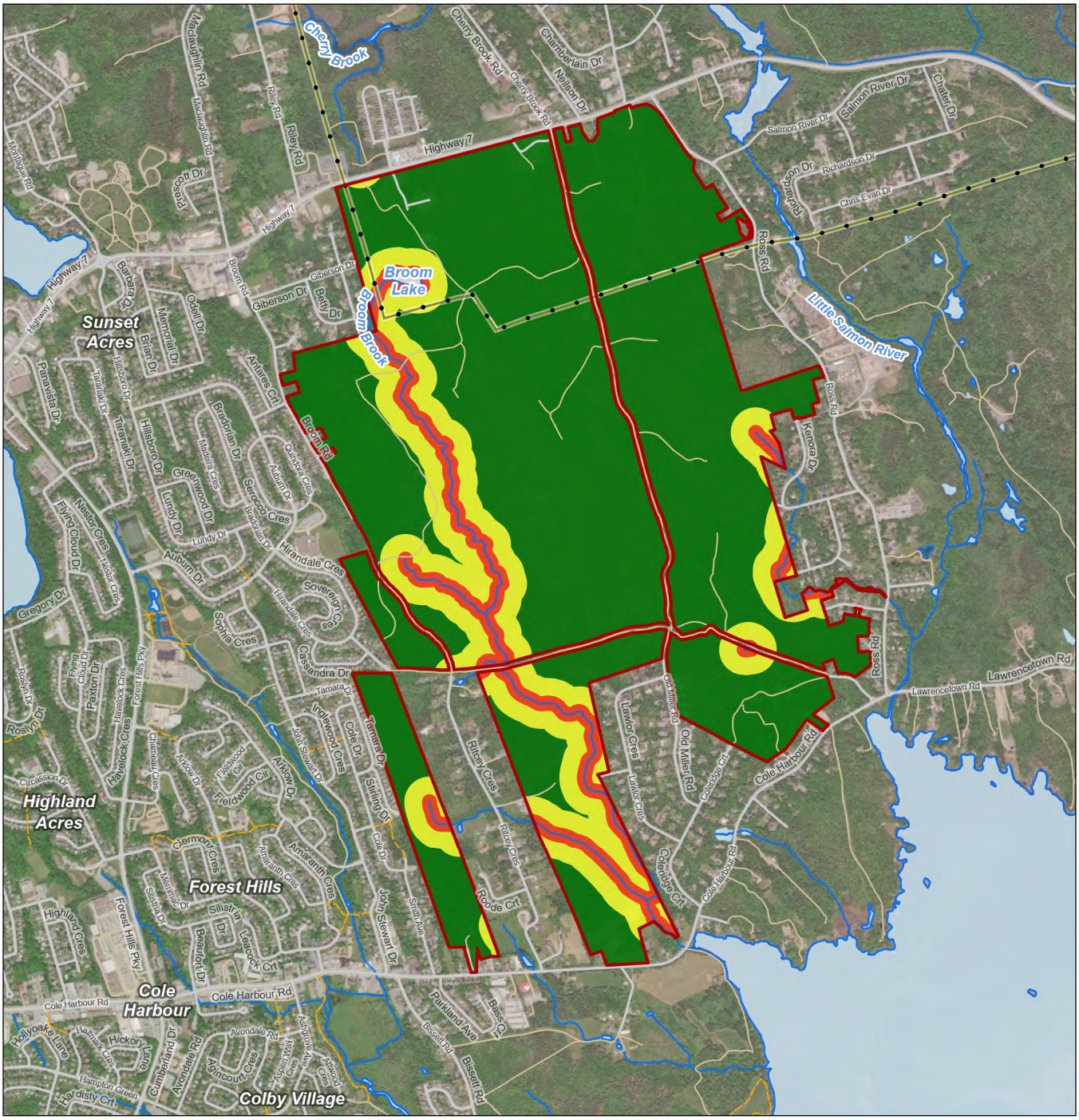
- aquatic habitat which considers the value watercourses play in providing habitat for fish and other aquatic species
- water quality which has two aspects: the provision of suitable habitat for aquatic species and the intrinsic value for local residents

This process culminated in the creation of a map (Figure 3.6) that illustrates the land suitability rating related to development suitability. The results allow for the identification of suitable and unsuitable areas, as well as the recognition of potential constraints. A lower score for land suitability for development generally corresponds with higher ecological and social value.

Note that recommendations for landscape connectivity have considered the location of watercourses in the Study Area (refer to Section 3.5)

Table 3.11 Watercourses and Water Quality– Land Suitability Ranking Framework

Layer	Land Suitability Ranking		
	1 - Low suitability for development	**2 - Moderate suitability for development**	**3 - Higher suitability for development**
Water-courses	Areas within 30 m of mapped and field identified watercourses	Areas that extend from 30 m to 100 m from a watercourse	Areas that are greater than 100 m from watercourses





Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 20N
2. Data Sources: Stantec; Government of Nova Scotia, Department of Service Nova Scotia and Internal Services
3. Background: Government of Nova Scotia, Department of Service Nova Scotia and Internal Services

Study Area

Land Suitability Score

- 3 (High)
- 2
- 1 (Low)

Utilities

- Transmission Line

Transportation

- Highway
- Road
- Resource / Seasonal Road
- Trail

Other Features

- Waterway
- Waterbody

0 250 500 Metres

(At original document size of 8.5x11)
1:24,000

N

Stantec

Project Location
Halifax Regional Municipality, Nova Scotia

Prepared by NWhite on 2024-03-08
Revised by NWhite on 2024-05-30

Client/Project
Halifax Regional Municipality
Future Serviced Communities
Background Studies

Fig ID: 160410459_031

Figure No.
3.6

Title
Watercourses in the WSA – Land Suitability Analysis

\\ca0213-pp\fs01\work_group\1214\active\160410459\gis_data\mapping\ArcGIS Pro\HRM_FCM_2024_Synthesis.aprx: HRM_FCM_031_Watercourse_LSARevised: 2024-05-30 By: niwhite

Disclaimer: This document has been prepared based on information provided by others as cited in the Notes section. Stantec has not verified the accuracy and/or completeness of this information and shall not be responsible for any errors or omissions which may be incorporated herein as a result. Stantec assumes no responsibility for data supplied in electronic format, and the recipient accepts full responsibility for verifying the accuracy and completeness of the data.

3.4 Forest Habitat and Species at Risk

Forest habitat within the WSA was evaluated using the NSDNRR Forest and Wetland Inventory databases, the Nova Scotia Forest Ecosystem Classification (FEC) system (Neily et al. 2023), and data collected during field surveys (Appendix B).

A desktop review of species at risk (SAR) and species of conservation concern (SOCC) was conducted using data requested from the AC CDC (AC CDC 2023; Appendix A) and the NSDNRR Boreal Felt Lichen predictive habitat layer (Cameron and Neily 2008). The desktop review was supplemented by incidental field observations recorded during field programs (Appendix C).

Forest habitat and SAR were combined for land suitability analysis. The FEC data (combined with wetland data and field observations) were used to understand what habitat types are present in the Study Area. Once habitat types within the WSA were identified, they were compared to known habitat preferences of SAR recorded within 5 km of the Study Area to understand the distribution of potential SAR habitat.

3.4.1 FOREST HABITAT

The NSDNRR Forest Inventory database is based on air photo interpretation and are not ground-truthed. NSDNRR forest polygons were visited during field surveys in spring and summer 2023 (indicated as ‘field survey sites’ on Figure 3.7a and Fig 3.7b). Vegetation within the polygons was evaluated and then compared with the FEC system, which places forest stands into Forest Groups (FG) that are composed of different Vegetation Types (VTs) with similar site conditions, successional pathways, and species composition (Neily et al. 2023). A patchwork of different forest and plant communities reflect a changing landscape based on disturbance (blowdown, insects, fire, disease, anthropogenic), site conditions and natural successional stages.

The WSA is located within the Eastern Interior Ecodistrict (NSDNR 2019), which is mainly underlain by meta-sedimentary rock. This is the largest ecodistrict in the province, stretching from Pockwock Lake (Halifax County) in the west to Chedabucto Bay (Guysborough County) in the east. This expansive tract of upland topography is a rolling till-plain comprised of generally gravelly and stony soils (NSDNR 2017).

This ecodistrict has three distinct concentrations of drumlins which can be identified roughly by the watersheds of the three rivers that flow through them: Sackville River, Tangier River, and Moser River. Dominant soils are derived from gravelly sandy loam till (Halifax/Danesville soils); gravelly sandy clay loam till containing shale, sandstone, and mudstone (Wolfville/Hantsport soils); shallow and/or very stony sandy loam till high in quartzite (Rockland soils); and gravelly loam to silt loam till high in slate (Bridgewater/Riverport soils) (NSDNR 2017).

The Eastern Interior Ecodistrict has several significant forest ecosystems: a zonal climax black spruce (*Picea mariana*) forest (Spruce Pine Forest Group) that is widely dispersed on dry to moist, nutrient poor soils (28%); a zonal softwood/mixedwood forest of red spruce (*Picea rubens*), hemlock (*Tsuga canadensis*) and yellow birch (*Betula alleghaniensis*) and red maple (*Acer rubrum*) (Spruce Hemlock Forest Group) on fresh to fresh-moist, nutrient medium soils (50%); and a zonal Tolerant Hardwood forest of sugar maple (*Acer saccharum*), yellow birch and red maple on fresh, nutrient medium to rich soils (10%) (NSDNR 2017). The WSA contains the following FEC FGs:

- Intolerant Hardwood Forest (IH)
- Mixedwood Forest (MW)
- Old Field (OF)
- Open Woodland (OW)
- Planted Forest (PF)
- Spruce Hemlock Forest (SH)
- Spruce Pine Forest (SP)
- Wet Coniferous Forest (WC)
- Wet Deciduous Forest (WD)
- Wet-Mixedwood (WM)

Dominant vegetation was described for 106 forest inventory polygons visited during field surveys (Table 3.12). Unique identifiers were assigned at the point surveyed (AK1-AK106). All vascular plant species within a 20 m radius were recorded at that point in the tree and shrub (10 m) layer. While within a 5 m radius the ground vegetation layers as well as site specific details such as drainage class, stand description and estimated stand age (Appendix B). VTs were identified and inventoried based on the overall percent cover of dominant tree and shrub species (Appendix B). Transitions to other VTs or wetlands were marked and compared to existing data as they were encountered. The FEC classification for each stand is presented in Appendix B. VTs and their typical description can be found below. A list of plants recorded from the WSA is included in Appendix B.

Table 3.12 Summary of Vegetation Types in the WSA

Vegetation Type (VT)	FEC VT Code	VT Frequency[1]	Forest Group (FG)
White birch – Red maple/Sarsaparilla – Bracken	IH6	6	IH
White birch – Red maple/Sarsaparilla – Bracken (Aspen variant)	IH6a	1	
White birch – Red maple/Sarsaparilla – Bracken (White birch variant)	IH6b	3	
Red maple/Hay-scented fern – Wood-sorrel	IH7	3	
Grey birch Tall white aster/Hair-cap moss	IH9	2	
Red spruce – Red maple – White birch/Goldthread	MW2	11	MW
White spruce – Red maple (White birch)/Starflower/Schreber's moss	MW6	3	
Balsam fir – Red maple/Wood-sorrel – Goldthread	MW7	6	

Table 3.12 Summary of Vegetation Types in the WSA

Vegetation Type (VT)	FEC VT Code	VT Frequency[1]	Forest Group (FG)
White birch – Balsam fir/Starflower	MW8	3	
Black spruce – Red maple/Bracken – Sarsaparilla	MW9	2	
White spruce/Aster – Goldenrod/Shaggy moss	OF1	1	OF
White pine – Balsam fir/Shinleaf – Pine-sap	OF3	1	
Black spruce/Lambkill/Reindeer lichen	OW2	4	OW
Deciduous Planted Forest	PF5b	1	PF
Sheep Laurel Highland Health	S5	1	S
Red spruce – White pine/Lambkill/Bracken	SH4	5	SH
Red spruce – Balsam fir/Schreber's moss – Stair-step moss	SH5	3	
Red spruce – Balsam fir/Schreber's moss – Stair-step moss (Balsam fir variant)	SH5b	2	
Balsam fir/Wood fern/Schreber's moss	SH8	1	
Jack pine/Bracken – Teaberry (Black spruce variant)	SP1a	1	SP
White pine/Blueberry/Bracken (Black spruce variant)	SP4a	3	
Black spruce/Feathermoss	SP5	2	
Black spruce/Lambkill – Wild raisin – Mountain holly	SP7	4	
Red oak – Yellow birch/Striped maple/Partridge-berry	TH6	1	TH
Red maple – Yellow birch/Striped maple	TH8	1	
Red maple – Yellow birch/Striped maple (White ash variant)	TH8a	1	
Black spruce/Lambkill – Labrador tea/Sphagnum	WC2	1	WC
Tamarack – Black spruce/Lambkill/Sphagnum	WC7	3	
Black spruce Woodland Bogs	WC11	2	
Red maple/Cinnamon fern/Sphagnum	WD2	1	WD
Red maple – Balsam fir/Wood aster/Sphagnum	WM1	7	WM
Red maple – Red spruce/Wood-sorrel – Sensitive fern	WM2	1	
Red maple – Black spruce/Lambkill/Cinnamon fern/Sphagnum	WM3	3	

Note:
1 – Frequency is the number of stands of each VT out of 91 total stands with VTs

3.4.2 FOREST ECOSYSTEM CLASSIFICATION

A total of 11 FGs represented the 31 individual VTs and 1 barrens type noted in Table 3.12. FGs are presented on Figure 3.7a and Fig 3.7b. The following sections describe each VT including successional stage, disturbance, and specific ecological features.

3.4.2.1 Intolerant Hardwood

Intolerant hardwoods (IH) are early to mid-successional closed canopy forest stands that are dominated by red maple, white birch, grey birch (*Betula populifolia*) and aspen (*Populus* spp.) trees. The canopy is closed hardwood, with scattered residuals from previous succession stages. The shrub layer is typically extensive and has woody shrub species (e.g., wild raisin [*Viburnum nudum*] and honey-suckle [*Lonicera canadensis]*). Intolerant hardwood stands are typically short-lived, even-aged forests that result from stand-level disturbance events such as fire, windthrow, or harvesting. These stands provide habitat for deer, moose, and snowshoe hare.

IH6 White birch-Red maple / Sarsaparilla-Bracken: White birch variant

Variants: IH6a & 6b

IH6a – Aspen variant: stands of this variant have abundant aspen species (trembling and/or large-tooth) and co-dominant white birch and red maple.

IH6b – White birch variant: stands of this variant are dominated by white birch, with little red maple and aspen.

- Succession: Early
- Typical Disturbance Type: Fire, windthrow, harvesting, insects/disease.
- Ecological Features: Red maple and white birch are favoured browse for moose and deer.

White birch (*Betula papyrifera*) and red maple are the dominant species in the IH6 vegetation type, with occasional balsam fir (*Abies balsamea*), red spruce, white spruce (*Picea glauca*), eastern white pine (*Pinus strobus*), and yellow birch. This VT establishes after disturbance events like fire, windthrow, or clearcutting on well-drained ecosites of moderate fertility. The shrub layer is well developed and is dominated by regenerating tree species and a variety of tall woody shrubs. The bryophyte layer is typically poorly developed, while the herb layer is comprised of upland forest flora such as bunchberry, sarsaparilla and bracken.

IH7 Red maple / Hay-scented fern – Wood-sorrel

- Succession: Early to Mid
- Typical Disturbance Type: Windthrow, harvesting and clear-cutting.
- Ecological Features: Regeneration of the forest is done by seed or coppice and provide early and abundant pollen and nectar sources.

This vegetation type is associated with fresh to moist, nutrient medium to rich soils. Red maple is the dominant species in the overstory which is closed canopy, along with lesser amounts of sugar maple, yellow birch, red spruce, and/or American beech (*Fagus grandifolia*). The shrub layer is moderately developed and includes regenerating tree species (e.g., balsam fir). The herb layer is dominated by ferns, notably hay-scented fern (*Dennstaedtia punctilobula*). This VT is found in upper slope positions and is the most widespread red maple forest in the Maritimes.

IH9 Grey birch / Tall white aster/Hair-cap moss

- Succession: Early
- Typical Disturbance Type: Stand-level disturbances
- Ecological Features: Has the shortest longevity of any VT which is less than 40 years.

The IH9 VT is associated with upland ecosites from fresh to moist, medium fertility, and coarse to fine soils. It is a pioneer community with short-lived grey birch trees and a well-developed understory. Other overstory species include choke cherry, pin cherry and aspen. This VT will establish quickly on clear-cut old field forests. Earthworms are commonly present and are food sources for other wildlife, like moles, shrews, woodcock, and robins.

3.4.2.2 Mixedwood

The characteristics of the mixedwood (MW) group can be quite variable, including both coniferous and deciduous trees, ranging from early to late successional stages. Mixedwood vegetation types can be composed of either shade-tolerant or intolerant canopy species and can be large patch to matrix scale forests with complex canopy structures including softwood or hardwood inclusions or, more commonly, a relatively even blend of both growth forms. Earlier successional MW forests include red maple, white birch, grey birch, aspen(s), and/or balsam fir. In turn, later successional forests are characterized by yellow birch, sugar maple, red spruce, white spruce and/or eastern hemlock.

MW2 Red spruce-Red maple-White birch / Goldthread

- Succession: Mid
- Typical Disturbance Type: Windthrow, harvesting.
- Ecological Features: Increased Forest structural complexity can provide nesting habitat for woodpeckers, owls, and northern goshawks (*Accipiter gentilis*).

This VT is associated with fresh to fresh-moist sites, and is typically dominated by red spruce, red maple, and large-tooth (*Populus grandidentata*) or trembling aspen (*Populus tremuloides*). It is a closed canopy and mid-successional forest, which follows partial disturbances such as harvesting. The shrub layer is mainly composed of regenerating tree species, and the herb layer contains species similar to other mixedwood VTs such as starflower, sarsaparilla and several fern species.

MW6 White spruce-Red maple (White birch) / Starflower / Scherber's moss

- Succession: Early to Mid
- Typical Disturbance Type: Stand-level disturbance (e.g., windthrow, fire, harvesting)
- Ecological Features: Occurs in large patches and provides nutrient cycling and rapid site revegetation.

MW6 is a closed canopy mixedwood forest associated with eastern Nova Scotia. Balsam fir and white birch provide moderate cover, and red spruce scattered as a result of the previous disturbance. It is associated with fresh to fresh-moist, medium rich nutrient soils. It is an even aged VT and typically has a high abundance of white birch or aspen trees which are shade intolerant. The frequency of white birch and aspen trees is dependent on past stand-level disturbances.

MW7 Balsam fir-Red maple / Wood-sorrel-Goldthread

- Succession: Early to Mid
- Typical Disturbance Type: Stand-level disturbances (e.g., windthrow, fire, harvesting).
- Ecological Features: Forms a matrix and has variably-sized patch ecosystems.

MW7 is comprised of shale-intolerant hardwoods, including white birch and aspen. The shrub layer is moderately developed and includes regenerative trees as this VT follows stand-replacing disturbances. MW7 occurs on fresh to moist, nutrient medium soils and is most common in eastern Nova Scotia. It supports rapid site revegetation, nutrient cycling, and establishing nursing crops for later successional stages like red spruce, hemlock, and yellow birch.

MW8 White birch – Balsam fir / Starflower

- Succession: Early
- Typical Disturbance Type: Stand-level disturbances (e.g., windthrow, fire, harvesting).
- Ecological Features: Variably-sized patch ecosystems that provides food and shelter for overwintering deer, snowshoe hare, and mice.

MW8 is a closed canopy mixedwood VT that is co-dominated by white birch and balsam fir that develops in fresh, nutrient poor to medium soil. It is even-aged that usually follows stand-level disturbances. The shrub layer is sparse and comprised mainly of regenerative species, with a herbaceous layer that is well developed. The patch sizes of MW8 are variable, and in general will provide shelter and food for various wildlife.

MW9 Black spruce – Red maple / Bracken – Sarsaparilla

- Succession: Even-aged, edaphic
- Typical Disturbance Type: Stand-replacing disturbances (e.g., windthrow, fire, harvesting).
- Ecological Features: Occurs in small to large patches on surfaces with high stoniness. Mature forests will develop old man’s beard and lichen.

MW9 is an even-aged VT which develops in fresh to moist, nutrient poor soils. There is a mixedwood overstory which has moderate canopy closure supported by herbaceous plants. The shrub layer is co-dominated by lambkill (*Kalmia angustifolia*), velvet-leaf and lowbush blueberry (*Vaccinium myrtilloides, V. angustifolium*), and huckleberry (*Gaylussacia* sp.). This VT patches are typically large and found on sites with high amounts of stoniness.

3.4.2.3 Oldfield

Oldfield (OF) vegetation types develop after the abandonment of old farmland. The soils of such sites tend to be rich in organic matter, and the vegetation is composed mostly of early successional softwood species. The structure usually consists of a dense overstory of species such as white spruce, tamarack (*Larix laricina*), balsam fir, as well as a very patchy, but diverse, shrub and herb layer. Mosses, such as Schreber's moss (*Pleurozium schreberi*) and mycorrhizal mushrooms are very common under the dense canopy cover of the overstory.

OF1 White spruce/Aster – Goldenrod / Shaggy moss

- Succession: Early
- Typical Disturbance Type: Natural disturbance agents (e.g., insects and windthrow)
- Ecological Features: Rock walls and stone piles are common, and provide habitat for wildlife that use cavities, such as rodents, snakes, and insects.

OF1 is an even-aged VT that is on fresh to fresh-moist, nutrient medium to rich soils. The overstory canopy has an abundance of white spruce which results in the floor having a carpet of needles. The shrub and herb layers are typically species rich, but poorly developed. Other species like fruit trees are common in this VT, and attract deer, red fox, coyotes, red squirrels, and field mice.

OF3 White pine – Balsam fir / Shinleaf – Pine-sap

- Succession: Early to Mid
- Typical Disturbance Type: Natural disturbance (e.g., insects and windthrow)
- Ecological Features: Rock walls, stone piles and old foundations are commonly found.

OF3 is an even-aged VT with a closed canopy of white pine and a variety of other species. The forest floor is typically a carpet of pine needles and moss with a reduced shrub and herb layer. The soil is fresh to fresh-moist and nutrient medium to rich and medium to coarse texture. Cultivation creates exposed rock walls, stone piles, and old foundations that provide habitat for variety of wildlife. There are also typically fruit trees present that attract deer and red fox.

3.4.2.4 Open Woodland

Open woodland (OW) ecosystems have open canopies resulting from stressful site conditions and/or frequent disturbances. Site qualities (e.g., low soil fertility, moisture deficits, shallow soils, abundant stoniness) determine the tree growth and density and subsequently canopy closure. The shrub-layer is typically well-developed and reindeer lichen (*Cladonia rangiferina*) is typically present. Species commonly found in the canopy layer include pine, black spruce, red maple, and red oak (*Quercus rubra*) which are all tolerant of dry, poor, and shallow soils.

OW2 Black spruce / Lambkill / Reindeer lichen

- Succession type: Early, edaphic
- Typical Disturbance Type: Stand level disturbances (e.g., fire, windthrow)
- Ecological Features: Limited distribution and only exists in Atlantic Canada, creating conservation challenges.

OW2 is a VT found on acidic bedrock and thin glacial soils, with dry to moist, nutrient very poor or stoney soils. Black spruce or pine dominate, and other species are typically uncommon. The understory is woody and has acid-tolerant shrubs (e.g., lambkill), and the herbaceous layer is low in species richness and abundance. This VT only is successful during early successional stages and only exists in the Atlantic provinces in small patches; however, it supports animal, plant, and epiphytic lichen species.

3.4.2.5 Planted Forest

Planted forests (PF) have been altered by silvicultural activities and will contain both naturally occurring vegetation and structural features. The amount of local harvesting and silvicultural activity will all contribute to the level of naturalness of the forest. Planted forest VTs will typically occur on imperfectly drained soils with medium to high fertility. In Nova Scotia, many planted forests are comprised of native species which are used for ecosystem restoration and enhancement.

PF5b Deciduous Planted Forest – Exotic species

- Succession: N/A
- Typical Disturbance Type: N/A
- Ecological Features: N/A

PF5b is an even aged, closed canopy forest characterized by plantations of exotic deciduous hardwood species. Only exotic species in the overstory are considered when classifying this VT, regardless of the density of exotic species suppressed in the understory.

3.4.2.6 Shrubland Associations

The shrubland association is one of three barrens' associations in Nova Scotia. These VTs are found in a separate guide to the FEC classifications (Porter et al. 2020). The shrubland associations are distinguished by characteristic shrub presence.

S5 Sheep Laurel Highland Health

- Succession: N/A
- Typical Disturbance Type: Stand level disturbance (e.g., fire)
- Ecological Features: N/A

S5 is a barren VT, which is dominated by sheep laurel (aka lambkill, *Kalmia angustifolia*) on inland barrens on surficial deposits. This VT typically occurs on sheltered sites with moderate to negligible wind exposure. Trees are present in this association in only one quarter to one third of all sites. The most common tree species present are black spruce and white pine. There is a distinct lichen and bryophyte layer. Physical evidence of fire disturbance is seen in charcoal near the surface in one third of sites. The association also has the presence of exposed woody substrates, surface rock, mineral soil, and humus.

3.4.2.7 Spruce-Hemlock

Spruce-Hemlock (SH) VT is a mid- to late-successional group with closed canopy and softwood species, predominantly red spruce, eastern hemlock, and eastern white pine. Mid to late successional stages are typically even-aged, closed canopy, but can develop a multi-age structure as they progress into a later successional stage. Within the well-developed canopies, the mid successional stages usually have a significant balsam fir component along with eastern hemlock, red spruce, and eastern white pine in the overstory. The SH type occurs on soils with a wide range of moisture levels; however, the fertility levels are typically moderate.

SH4 Red spruce-White pine / Lambkill / Bracken

- Succession: Late
- Typical Disturbance Type: Windthrow or harvesting.
- Ecological Features: Occupies large areas of land and supports old growth development and habitat cover for moose, deer, and fisher.

This VT occurs on dry to fresh, nutrient poor to medium soils. They are closed canopy forests that are dominated by red spruce, and lesser amounts of eastern white pine. The shrub layer is composed of regenerative balsam fir and red spruce. Bracken fern (*Pteridium aquilinum*) is typically the dominant species of the herbaceous layer. SH4 is a large matrix forest and dominates large areas of land. It supports wildlife habitat, including nesting and brood-rearing for avifauna, and overwintering habitat for deer and moose.

SH5 Red spruce-Balsam fir / Schreber's moss – Stair-step moss

Variants: SH5b

SH5b – Balsam fir variant: This variant has abundant to dominant balsam fir (>26%) in the overstory.

- Succession: Mid
- Typical Disturbance Type: Windthrow or harvesting.
- Ecological Features: Occupies large areas forming matrix forests with many microhabitats. Mature stands can support multi-cohort structures and provide habitat complexity.

The SH5 VT occurs on fresh to moist, nutrient medium soils. The canopy is closed and is composed largely of balsam fir, while the shrub and herb layers are sparsely developed because of the heavy shade cast by the tree overstory. A needle carpet is common, as well as carpets of Schreber's moss. This VT provides habitat for wildlife including ruffed grouse (*Bonasa umbellus*) and black-backed woodpecker (*Picoides arcticus*).

SH8 Balsam fir / Wood fern / Schreber's moss

- Succession: Early to Mid
- Typical Disturbance Type: Stand replacing disturbances (e.g., fire, windthrow)
- Ecological Features: Large-patch matrices that promote long-lived tree species, providing mature forests for thermal and breeding habitat.

SH8 is an even-aged VT with a closed canopy comprised of balsam fir and other softwood and hardwood species. Red maple, white birch and red spruce are common overstory species. Shrub and herb layers are typically sparse, however the bryophyte layer is extensive. The soil is fresh to moist and nutrient poor to medium with coarse texture. Balsam fir is a nursery species and promotes rapid regeneration, however reducing the nesting and roosting possibilities for wildlife.

3.4.2.8 Spruce-Pine

Spruce-pine forests are nutrient poor and are often dominated by black spruce and pines with plants in the understory that are tolerant of nutrient poor soils. They are typically associated with sloped environments with bedrock ridges and outcrops. The shrub layer of these stands are often dominated by lambkill, blueberry and black huckleberry (*Gaylussacia baccata*). The herb layer is variable in species composition depending on the amount of light available.

SP1 Jack pine / Bracken – Teaberry

Variants: SP1a

SP1a – Black Spruce variant: stands of this variant are dominated by black spruce, with lesser jack pine. This variant typically occurs as a later successional stage than the non-variant.

- Succession: Early
- Typical Disturbance: High intensity fires
- Ecological Features: Short lived and shade intolerant that develops only with high intensity fires.

SP1 is a closed canopy VT that develops on dry, nutrient poor soils. The shrub layer is dense and has species including black spruce, and lambkill, whereas the herb layer has a low species richness and is comprised of bracken and teaberry (*Gaultheria procumbens*). This VT only develops after high intensity fires which release the seeds and are therefore reduced in quantity across Nova Scotia with increasing fire suppression activities.

SP4 White pine / Blueberry / Bracken

Variants: SP4a

SP4a – Black spruce variant: stands of this variant have a black spruce dominant overstory indicating either a transitioning to a later successional stage or a recent response to a minor disturbance.

- Succession: Edaphic
- Typical Disturbance: Stand replacing events (e.g., fire, harvesting)
- Ecological Features: Comprised of long-lived species which provide habitat for wildlife.

SP4 is a closed canopy VT which develops on dry, nutrient poor soils with white pine and shade-intolerant shrub and herb layer species. SP4a variant is dominated by black spruce in the overstory, the shrub layer is dominated by black spruce and balsam fir, and the herb layer is dominated by bracken, mayflower (*Epigaea repens*), and teaberry (*Gaultheria procumbens*) and have relatively low species diversity. The white pine trees will provide disturbance resistance and a vertical structure to the VT and legacy seed sources.

SP5 Black spruce/Feathermoss

- Succession: Edaphic
- Typical Disturbance: Stand replacing events (e.g., fire, harvesting, windthrow)
- Ecological Features: Commonly large-patch matrices which are mature forests that provide wildlife habitat.

SP5 is a closed canopy VT with black spruce which develops on fresh to moist, nutrient poor soils. The understory shrubs and herbs are sparse but there is a well-developed bed of moss. The shrub layer has low species abundance and diversity, and the herb and bryophyte diversity are also generally low. These VTs are large patches and are the end-successional stage for many VTs in the spruce pine forest group.

SP7 Black spruce / Lambkill – Wild raisin – Mountain holly

- Succession: Even-aged, edaphic
- Typical Disturbance: Stand replacing disturbances (e.g., fire, harvesting, windthrow)
- Ecological Features: Provides habitat for spruce grouse, olive-sided flycatcher, mourning warbler, star-nosed mole, and amphibians.

SP7 is a closed canopy VT that is comprised of shade-tolerant black spruce, a well-developed shrubby layer, and moist- nutrient poor soils. The shrub layer has species such as lambkill, blueberry, and other ericaceous species. The herb species present will be limited, but include bunchberry, bracken, and goldthread (*Coptis trifolia*). This VT does not shift to other vegetation types after disturbance, will occur as small to large patches in ecosystems comprised of other SP VTs. Wildlife species that are associated with SP5 will also be found here, including spruce grouse, olive-sided flycatcher, mourning warbler, star-nosed mole, and amphibians.

3.4.2.9 Tolerant Hardwood

Tolerant hardwood (TH) vegetation types are typically comprised of mid to late successional shade-tolerant hardwoods on zonal Acadian Forest ecosites. Stands are dominated by sugar maple, yellow birch, and American beech. White ash (*Fraxinus americana*), ironwood (*Ostyra virginiana*), red maple (and in western Nova Scotia, red oak) are common associates. Spruce-fir understories are often common as well as an extensive shrub layer. The herbaceous layer is often dominated by ferns. Stand level disturbances are rare and most vegetation types maintain themselves through gap replacement. These vegetation types are typically large patches and matrix forests that have a high potential for old growth stands and numerous different microhabitats (e.g., vernal pools, seeps, abundant leaf litter).

TH6 Red oak – Yellow birch / Striped maple / Partridge-berry

- Succession: Mid-to-Late
- Typical Disturbance: Gap disturbances, fire
- Ecological Features: provides habitat for many songbirds, the oak present in this VT is a favored browse for deer.

This VT occurs on dry to moist, nutrient medium soils. The canopy of this forest type is composed of red oak and many other shade tolerant hardwoods. Other common associates are red maple (frequent), sugar maple, yellow birch and beech. The shrub layer can have abundant softwood composition but is often comprised of regenerating hardwoods. The herbaceous layer is diverse and characterized by sarsaparilla and other upland species. The bryophyte layer is poorly developed.

TH8 Red maple – Yellow birch / Striped maple

Variants: TH8a

TH8a – White ash variant: This variant is defined by the presence of white ash in the overstory.

- Succession: Mid to Late
- Typical Disturbance Type: Windthrow, ice damage, insects/disease, and harvesting.
- Ecological Features: Occupies large patches spanning several hundred hectares and creating internal forest ecosystems.

This VT is associated with fresh to fresh-moist, nutrient medium to rich soils. Red maple and yellow birch are the dominant species in the overstory, creating a closed canopy. The shrub layer is often dominated by advanced regeneration of balsam fir, and the herb layer is often dominated by ferns. These stands occupy large areas and can produce trees that are up to 25 m tall, with diameters of 100 cm. This is conducive to the development of living, hollow trees which provide good denning opportunities for various small mammals and avifauna.

3.4.2.10 Wet-Coniferous

Wet-coniferous (WC) VTs are wet forest ecosystems that have water at or near the soil surface. The canopy is partially closed and is dominated by softwood species. There is a well-developed understory of plants that are tolerant of wet conditions. The shrub layer of WC VTs is typically characterized by ericaceous species and tall shrubs such as mountain holly (*Ilex mucronata*). These forests create unique landscapes which are important for carbon storage, nitrogen cycling, and often form the headwaters of watercourses so they can be important in flow regulation.

WC2- Black spruce / Lambkill – Labrador tea / Sphagnum

- Succession: Edaphic
- Typical Disturbance Type: Windthrow and uprooting
- Ecological Features: Supports low species richness and limited habitat diversity due to harsh site conditions

This VT occurs on nutrient poor to very poor soils that are poorly drained. The canopy is dominated by black spruce and crown closure is considered low to moderate. The canopy may also be formed by stunted trees. The shrub layer, in instances where the stand is young, is more exposed, or extremely wet. The understory is woody and dominated by lambkill or other species such as Labrador tea (*Rhododendron groenlandicum*), rhodora (*Rhododendron canadense*) and mountain holly. These stands are maintained by limiting conditions including soil saturation limiting the rooting potential; however, they can sustain old growth conditions and some plant species of conservation concern.

WC7 Tamarack – Black spruce / Lambkill / Sphagnum

- Succession: Early to Mid, Edaphic
- Typical Disturbance Type: Harvest, windthrow
- Ecological Features: The only tamarack dominant ecosystem in Nova Scotia found on organic soils. Often contain rare plant species.

This VT occurs on poorly to very poorly drained flats or shallow depressions. This semi open canopy forest is characterized by a tamarack overstory, high sphagnum cover and high graminoid diversity. The overstory often contains red maple and black spruce.

WC11 Black spruce Woodland Bogs

- Succession: Edaphic
- Typical Disturbance Type: maintained by site limiting conditions
- Ecological Features: This VT creates a transition zone and creates habitat for species with affinities for wet open coniferous habitat.

WC11 is found on nutrient poor wet soils that are primarily organic. The canopy is open with less than 30% tree cover and dominated by stunted black spruce. The herbaceous layer is well developed and dominated by ericaceous shrubs. Similarly, the bryophyte layer is also well developed and dominated by sphagnum (*Sphagnum* spp.) moss species.

3.4.2.11 Wet-Deciduous

The wet-deciduous (WD) forest group is characterized by water at or near the ground surface for much of the growing season. Canopies are often partly open or closed and are generally dominated by red maple, and occasionally white ash. Vegetation types occur primarily on level to depressional topography or within riparian zones.

WD2 Red maple / Cinnamon fern / Sphagnum

- Succession: Early to mid, edaphic
- Typical Disturbance Type: Windthrow, harvesting.
- Ecological Features: Moderately productive system which can support black ash (*Fraxinus nigra*).

WD2 is a widespread maple swamp VT that is found throughout Nova Scotia. The soils are usually organic deposits or poorly drained mineral soils. It has a relatively high percentage of deciduous trees, primarily red maple. Shrub cover is moderate, however it is characterized by low species diversity. It can include regenerative overstory species, as well as other shrub species (e.g., speckled alder [*Alnus incana*]). The herbaceous layer is also characterized by low diversity but can have high vegetation cover.

3.4.2.12 Wet-Mixedwood

Wet-mixedwood (WM) vegetation types occur on poorly drained sites where the water table is at or near the soil surface for most of the growing season. Canopies are partly open to closed, and are generally dominated by red maple, spruce, balsam fir, white ash, and yellow birch. WM vegetation types are mid-successional and have fluctuating water levels, wind throw, and insect/disease disturbance. They support both coniferous and deciduous tree species. They exist in small patches that act as a transition ecosystem for forest wetland species.

WM1 Red maple-Balsam fir / Wood aster / Sphagnum

- Succession: Mid, Edaphic
- Typical Disturbance Type: Individual tree mortality and windthrow.
- Ecological Features: Small pools or narrow channels typically are present with slowly moving water, supporting biodiversity features similar to wet deciduous VTs.

This vegetation type is found on wet, poor to medium mineral soils with some level of groundwater and/or surface flow. The canopy is closed and comprised mainly of balsam fir and red maple, with high herbaceous cover and a well-developed bryophyte layer. The crown closure is moderate to high, and the understory supports woody species.

WM2 Red maple-Red spruce / Wood-sorrel – Sensitive fern

- Succession: Mid, Edaphic
- Typical Disturbance Type: Individual tree mortality, windthrow, timber harvest
- Ecological Features: Well-developed canopy with old growth characteristics

This VT occurs on moist to wet, nutrient medium environments that are poorly drained or organic deposits. The overstory includes yellow birch, eastern hemlock, and white ash. There is low to moderate canopy cover with a woody understory. The herbaceous layer is well developed and diverse and includes species characteristic of wet conditions. Forest patches typically are small and occur as transitional zones between wetlands and upland forests. These forests support old growth characteristics and a variety of wildlife.

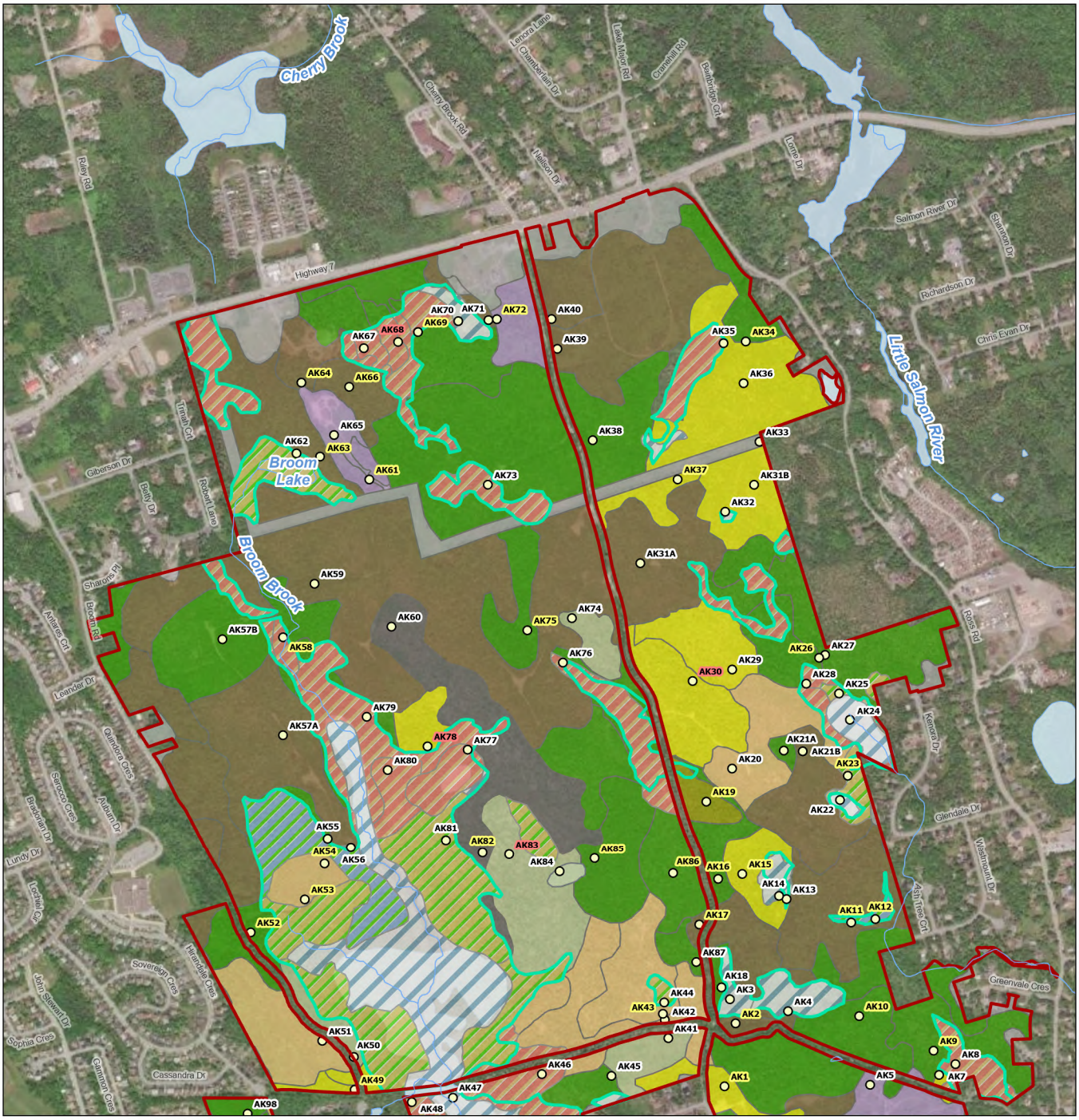
WM3 Red maple-Black spruce / Lambkill / Cinnamon fern / Sphagnum

- Succession: Mid, Edaphic
- Typical Disturbance Type: Windthrow and timber harvesting
- Ecological Features: Occupies small areas and acts as a stepping-stone in large forest matrices for wetland dependent species.

This VT occurs on poorly drained sites that are underlain by wet mineral or organic deposits. It is a closed canopy forest with high shrub and herbaceous cover, and a well-developed sphagnum moss layer. The canopy is dominated by black spruce, red maple, and balsam fir. WM3 is characterized by the lowest nutrient availability of the WM VTs. This type typically consists of small patches found within large matrices. There are often pools of open water and peaty hummocks which provide habitat for amphibians, invertebrates, and avifauna.

3.4.2.13 Forested Wetlands

There are several wetlands within the WSA, varying in size, type, and complexity. Many of these wetlands are complexes, containing more than one wetland community (i.e., a fen with a tree and shrub swamp halo around the perimeter). Although the Nova Scotia FEC system provides habitat types that are described as ‘wet coniferous’ or ‘wet deciduous’ conditions, there isn’t a sufficient classification within this system for all wetland types (Section 3.2). Some of the wet forest groups are also not always indicative of wetland conditions and can also include forest mosaics or moist sites. The variation between wet forest groups is also difficult to distinguish from digital data sources, therefore they were simply identified as ‘wetland’ in Figure 3.7a and Figure 3.7b.





Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 20N

2. Data Sources: Stantec; Government of Nova Scotia; Department of Service Nova Scotia and Internal Services

3. Background: Government of Nova Scotia, Department of Service Nova Scotia and Internal Services

Field Survey Location

Forest Group

- Intolerant Hardwood (IH)
- Tolerant Hardwood Forest (TH)
- Mixedwood (MW)
- Old Field (OF)
- Open Woodland (OW)
- Spruce - Hemlock Forest (SH)
- Spruce - Pine Forest (SP)

Non-Forest Group

- Barrens
- Urban Other

Wetland

- Wet Mixedwood Forest (WM)
- Wet Coniferous Forest (WC)
- Wet Deciduous Forest (WD)
- Wetland Other (Not Evaluated Using WESP-AC)

Other Features

- Waterway
- Waterbody
- Wetlands (Stantec, 2023)
- Study Area

Forest Stand Estimated Age

- PC18 > 80 Years
- PC18 30 to 80 Years
- PC18 < 30 Years

0 200 400 Metres

(At original document size of 8.5x11)
1:15,000

N

Stantec

Project Location
Halifax Regional Municipality, Nova Scotia

Prepared by NWhite on 2023-07-19
Revised by NWhite on 2024-05-10

Client/Project
Halifax Regional Municipality
Future Serviced Communities
Background Studies

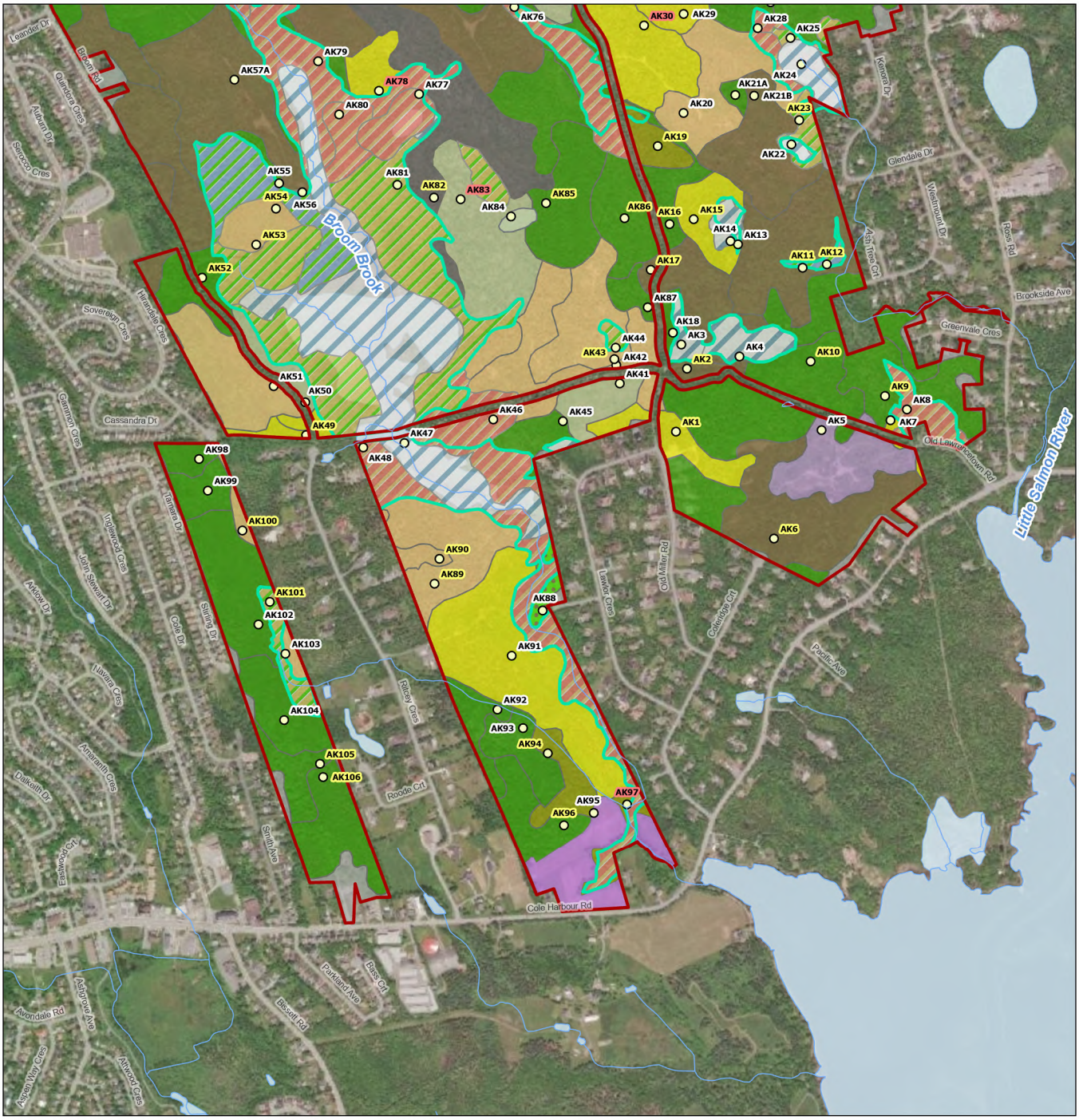
Fig ID: 160410459_021

Figure No.
3.7a

Title
Forest Groups - WSA

HRM FCM 2022.aprx Revised: 2024-05-10 By: niwhite

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Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 20N

2. Data Sources: Stantec; Government of Nova Scotia; Department of Service Nova Scotia and Internal Services

3. Background: Government of Nova Scotia, Department of Service Nova Scotia and Internal Services

Field Survey Location

Forest Group

- Intolerant Hardwood (IH)
- Tolerant Hardwood Forest (TH)
- Mixedwood (MW)
- Old Field (OF)
- Open Woodland (OW)
- Deciduous Planted Forest (PF)
- Spruce - Hemlock Forest (SH)
- Spruce - Pine Forest (SP)

Non-Forest Group

- Field
- Barrens
- Urban Other

Wetland

- Wet Mixedwood Forest (WM)
- Wet Coniferous Forest (WC)
- Wet Deciduous Forest (WD)
- Wetland Other (Not Evaluated Using WESP-AC)

Other Features

- Waterway
- Waterbody
- Wetlands (Stantec, 2023)
- Study Area

Forest Stand Estimated Age

- PC18 > 80 Years
- PC18 30 to 80 Years
- PC18 < 30 Years

0 200 400 Metres

(At original document size of 8.5x11)
1:15,000

N

Stantec

Project Location
Halifax Regional Municipality, Nova Scotia

Prepared by NWhite on 2023-07-19
Revised by NWhite on 2024-05-10

Client/Project
Halifax Regional Municipality
Future Serviced Communities
Background Studies

Fig ID: 160410459_021

Figure No.
3.7b

Title
Forest Groups - WSA

HRM FCM 2022.aprx Revised: 2024-05-10 By: niwhite

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3.4.3 SPECIES AT RISK

AC CDC records (AC CDC 2023) indicate that the WSA and surrounding environment may support a variety of wildlife, including SAR and SOCC. For the purposes of this report, SAR are defined as any species with a status of Special Concern, Vulnerable, Threatened, Vulnerable, or Endangered by the Nova Scotia *Endangered Species Act* (NS ESA), the Federal *Species at Risk Act* (SARA), or the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). SOCC are defined as any species with an AC CDC S-rank of S1 (Critically Imperiled), S2 (Imperiled), or S3 (Vulnerable), and not otherwise defined as SAR. Table 3.13 presents species identified in the AC CDC data report (full report provided in Appendix A). The distribution of SAR and SOCC that have been recorded in or near the HSA either during the field surveys or from existing records are presented on Figure 3.8.

Table 3.13 SAR and SOCC Within 5 km of the WSA (AC CDC 2023)

Scientific Name	Common Name	SARA[1]	COSEWIC[2]	NS ESA[3]	AC CDC[4]
Birds					
Anas acuta	Northern Pintail				S1B, SUM
Spatula discors	Blue-winged Teal				S3B
Spatula clypeata	Northern Shoveler				S2B, SUM
Mareca strepera	Gadwall				S2B, SUM
Somateria mollissima	Common Eider				S3B, S3M, S3N
Bucephala clangula	Common Goldeneye				S2S3B, S5N, S5M
Oxyura jamaicensis	Ruddy Duck				S1B
Cathartes aura	Turkey Vulture				S2S3B, S4S5M
Accipiter cooperii	Cooper's Hawk		NAR		S1?B, SUN, SUM
Falco peregrinus	**Peregrine Falcon *anatum/tundrius* population**		NAR	VU	
Falco sparverius	American Kestrel				S3B,S4S5M
Gallinula galeata	Common Gallinule				S1B
Fulica americana	American Coot				S1B
Pluvialis squatarola	Black-bellied Plover				S3M
Pluvialis dominica	American Golden-plover				S2S3M
Charadrius semipalmatus	Semipalmated Plover				S1B, S4M
Charadrius melodus melodus	**Piping Plover *melodus* subspecies**	EN	EN	EN	S1B
Charadrius vociferus	Killdeer				S3B
Tringa melanoleuca	Greater Yellowlegs				S3B, S4M
Tringa flavipes	**Lesser Yellowlegs**		TH		S3M
Tringa semipalmata	Willet				S3B
Numenius phaeopus	Whimbrel				S2S3M
Numenius phaeopus hudsonicus	Whimbrel				S2S3M
Limosa haemastica	**Hudsonian Godwit**		TH		S2S3M

Table 3.13 SAR and SOCC Within 5 km of the WSA (AC CDC 2023)

Scientific Name	Common Name	SARA[1]	COSEWIC[2]	NS ESA[3]	AC CDC[4]
Arenaria interpres	Ruddy Turnstone				S3M
Calidris canutus rufa	**Red Knot *rufa* subspecies**	EN	EN	EN	S2M
Calidris alba	Sanderling				S2N, S3M
Calidris pusilla	Semipalmated Sandpiper				S3M
Calidris minutilla	Least Sandpiper				S1B, S4M
Calidris melanotos	Pectoral Sandpiper				S3M
Limnodromus griseus	Short-billed Dowitcher				S3M
Gallinago delicata	Wilson's Snipe				S3B, S5M
Phalaropus lobatus	**Red-necked Phalarope**	SC	SC		S2S3M
Chroicocephalus ridibundus	Black-headed Gull				S3N
Coccyzus erythropthalmus	Black-billed Cuckoo				S3B
Asio otus	Long-eared Owl				S2S3
Asio flammeus	**Short-eared Owl**	SC	TH		S1B
Chordeiles minor	**Common Nighthawk**	SC	SC	TH	S3B
Antrostomus vociferus	**Eastern Whip-poor-will**	TH	SC	TH	S1?B
Chaetura pelagica	**Chimney Swift**	TH	TH	EN	S2S3B,S1M
Contopus cooperi	**Olive-sided Flycatcher**	SC	SC	TH	S3B
Contopus virens	**Eastern Wood-Pewee**	SC	SC	VU	S3S4B
Empidonax trailii	Willow Flycatcher				S2B
Tyrannus tyrannus	Eastern Kingbird				S3B
Riparia riparia	**Bank Swallow**	TH	TH	EN	S2B
Petrochelidon pyrrhonota	Cliff Swallow				S2S3B
Hirundo rustica	**Barn Swallow**	TH	SC	EN	S3B
Poecile hudsonicus	Boreal Chickadee				S3
Mimus polyglottos	Northern Mockingbird				S1B
Vireo philadelphicus	Philadelphia Vireo				S2?B, SUM
Setophaga pinus	Pine Warbler				S2S3B, S4S5M
Setophaga striata	Blackpoll Warbler				S3B, S5M
Cardellina pusilla	Wilson's Warbler				S3B, S5M
Cardellina canadensis	**Canada Warbler**	TH	SC	EN	S3B
Icteria virens	**Yellow-breasted Chat**	EN	EN		SNA
Pheucticus ludovicianis	Rose-breasted Grosbeak				S3B
Dolichonyx oryzivorus	**Bobolink**	TH	SC	VU	S3B
Sturnella magna	**Eastern Meadowlark**	TH	TH		SHB
Euphagus carolinus	**Rusty Blackbird**	SC	SC	EN	S2B
Molothrus ater	Brown-headed Cowbird				S2B

Table 3.13 SAR and SOCC Within 5 km of the WSA (AC CDC 2023)

Scientific Name	Common Name	SARA[1]	COSEWIC[2]	NS ESA[3]	AC CDC[4]
Icterus galbula	Baltimore Oriole				S2S3B, SUM
Pinicola enucleator	Pine Grosbeak				S3B, S5N, S5M
Spinus pinus	Pine Siskin				S3
Coccothraustes vespertinus	**Evening Grosbeak**	SC	SC	VU	S3B, S3N, S3M
Mammals					
Myotis and Perimyotis	**Bats or Bat hibernaculum†**	EN	EN	EN	S1
Globicephala melas	Long-finned Pilot Whale				S2S3
Amphibians					
Hemidactylium scutatum	Four-toed Salamander		NAR		S3
Reptiles					
Chelydra serpentina	**Snapping Turtle**	SC	SC	VU	S3
Chrysemys picta picta	**Eastern Painted Turtle**	SC	SC		S4
Glyptemys insculpta	**Wood Turtle**	TH	TH	TH	S2
Fish					
Anguilla rostrata	**American Eel**		TH		S3N
Salvelinus fontinalis	Brook Trout				S3
Insects					
Danaus plexippus	**Monarch**	SC	EN	EN	S2?B, S3M
Aglais milberti	Milbert's Tortoisehell				S2S3
Bombus terricola	**Yellow-banded Bumble Bee**	SC	SC	VU	S3
Pachydiplax longipennis	Blue Dasher				S1
Naemia seriata	Seaside Lady Beetle				S3
Myzia pullata	Streaked Lady Beetle				S3
Lichens and Mosses					
Erioderma pedicellatum	**Boreal Felt Lichen**	EN	EN	EN	S1
Pectenia plumbea	**Blue Felt Lichen**	SC	SC	VU	S3
Ramalina thrausta	Angelhair Ramalina Lichen				S2S3
Elodium blandowii	Blandow's Bog Moss				S3?

Table 3.13 SAR and SOCC Within 5 km of the WSA (AC CDC 2023)

Scientific Name	Common Name	SARA[1]	COSEWIC[2]	NS ESA[3]	AC CDC[4]
Vascular Plants					
Liatris spicata	**Dense Blazing Star**	TH	TH		SNA
Polygala sanguinea	Blood Milkwort				S3
Caltha palustris	Yellow Marsh Marigold				S2S3
Pilea pumila	Dwarf Clearweed				S3

Notes:
Bold common name indicates SAR status.
†ACCDC includes three species of bats as one unit. These species are the *Myotis lucifugus* (Little Brown Myotis), *Myotis septentrionalis* (Long-eared Myotis), and *Perimyotis subflavus* (Tri-colored Bat). Each has the same status (EN) and the same S-Rank (S1).
[1] Species at risk in Canada listed under Schedule 1 the federal *Species at Risk Act* as Endangered (EN), Threatened (TH), or Special Concern (SC) (Government of Canada 2023).
[2] Species in Canada assessed by COSEWIC as Endangered (EN), Threatened (TH), Vulnerable (VU), or Special Concern (SC); not at risk species = NAR, Data Deficient = DD (Government of Canada 2023).
[3] Species at risk in Nova Scotia listed under the provincial *Endangered Species Act* (NS) as Endangered (EN), Threatened (TH), Vulnerable (VU), or Special Concern (SC; Government of Nova Scotia 2023).
[4] Species ranked by the Atlantic Canada Conservation Data Centre (AC CDC 2023) and recorded within 5 km of the Project by desktop data source, where:
S1: Critically Imperiled – Critically imperiled in the province because of extreme rarity (often 5 or fewer occurrences). May be especially vulnerable to extirpation.
S2: Imperiled – Imperiled in the province because of rarity due to very restricted range, very few populations (6 to 20 occurrences or few remaining individuals). May be vulnerable to extirpation due to rarity or other factors.
S3: Vulnerable – Vulnerable in the province due to a restricted range, relatively few populations (often 80 or fewer).
S4: Apparently Secure – Uncommon but not rare; some cause for long-term concern due to declines or other factors (80+ occurrences).
S5: Secure – Common, widespread, and abundant in the province.
S#S#: A numeric range rank (*e.g.*, S2S3) is used to indicate any range of uncertainty about the status of the species or community.
SH: Possibly Extirpated (Historical) – Species or community occurred historically in the province, and there is some possibility that it may be rediscovered. Its presence may not have been verified in the past 20-40 years. A species or community could become SH without such a 20-40 year delay if the only known occurrences in a province were destroyed or if it had been extensively and unsuccessfully looked for. The SH rank is reserved for species or communities for which some effort has been made to relocate occurrences, rather than simply using this status for all elements not known from verified extant occurrences.
SU: Unrankable – Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

Incidental observations of wildlife were recorded during wetland, vegetation, water, and archeology field programs. Stantec observed 39 total species (25 birds, 9 mammals, 4 amphibians, 1 reptile) including 2 SAR and 3 SOCC. The only SAR observed during field studies were the Canada warbler and common nighthawk. SAR and SOCC species observed in the field are identified in Table 3.14 and shown on Figure 3.8. A full list of species observed during field studies is available in Appendix C.

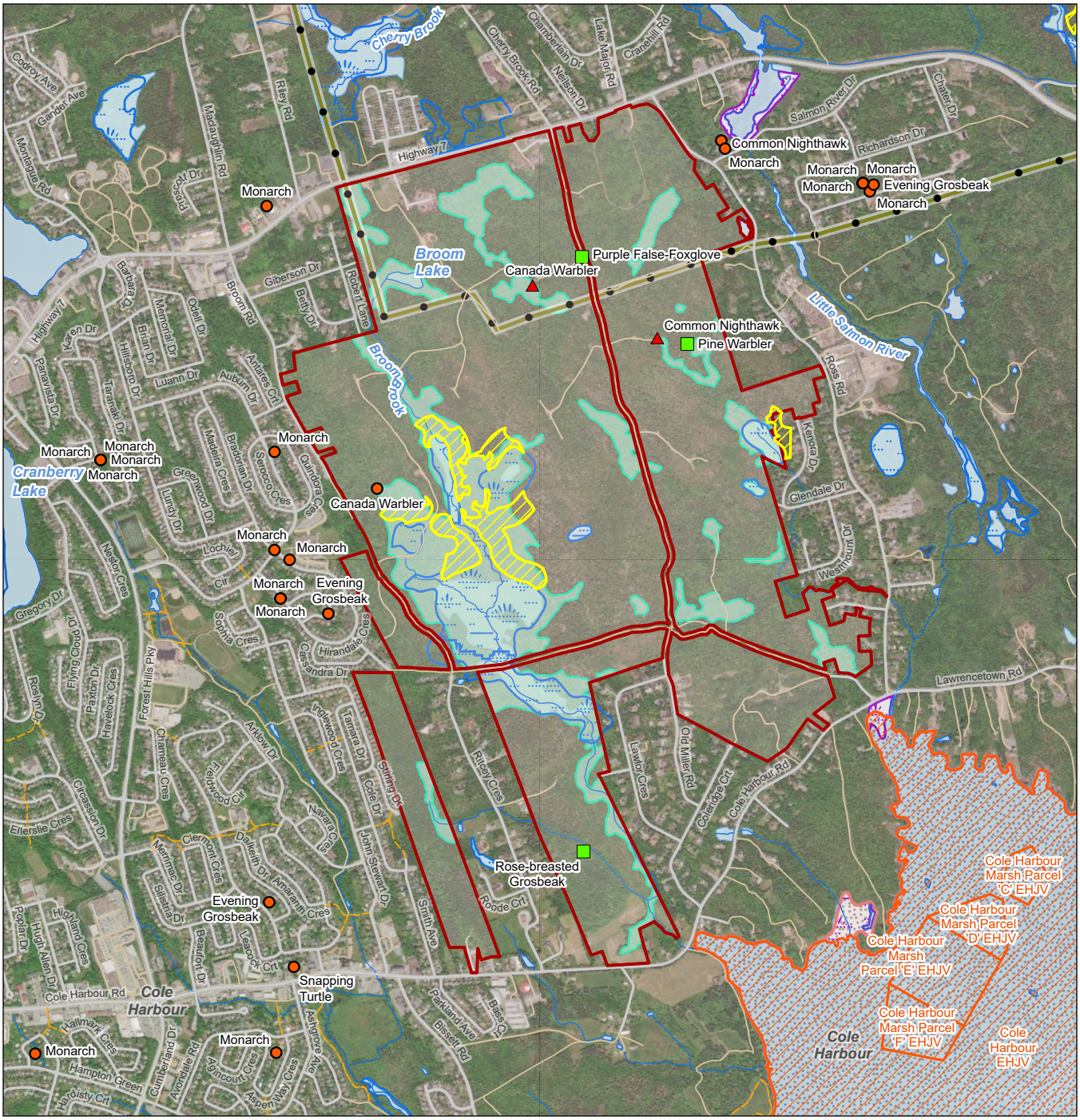
The presence of individual SAR was not used exclusively to evaluate the role of SAR on land suitability within the WSA since it was not feasible to conduct comprehensive investigations to detect all individuals of all SAR species that may be present at the WSA. Instead, SAR that are or could potentially be present in the WSA were identified from both the results of the field surveys and from AC CDC records of SAR reported within 5 km of the WSA. The habitat preferences of these species were compared to the results of the upland, wetland, and aquatic surveys conducted on the WSA along with available habitat mapping. Where matches were found between SAR habitat preferences and the habitats that had been mapped in the WSA, those species were considered potentially present.

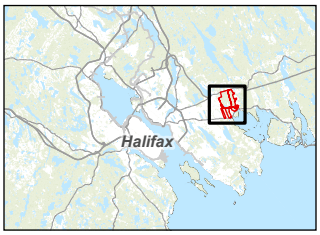
A different method was used to assess the potential presence of boreal felt lichen (*Erioderma pedicellatum*). A predictive habitat model for boreal felt lichen has been developed for Nova Scotia (Cameron and Neily 2008) and is now integral in supporting habitat identification according to Special Management Practices (NSDNR 2018). Less than 20% of known occurrences of the rare boreal felt lichen are located within the modelled habitat (NSDNR 2018), but the model identifies the coarse-scale habitat features of importance to boreal felt lichen across all of Nova Scotia. The model output showing the predicted distribution of boreal felt lichen was compared to the most recent imagery of the WSA to confirm that suitable habitat was still present. If suitable habitat was still present, boreal felt lichen was considered to be potentially present.

Table 3.14 Incidental Observations of SAR and SOCC

Scientific Name	Common Name	SARA1	COSEWIC2	NS ESA3	AC CDC4
Birds					
Carduelis canadensis	**Canada Warbler**	SC	TH	EN	S3B
Chordeiles minor	**Common Nighthawk**	SC	SC	TH	S3B
Setophaga pinus	Pine Warbler	-	-	-	S2S3B, S4S5M
Pheucticus ludovicianus	Rose-breasted Grosbeak	-	-	-	S3B
Vascular Plants					
Agalinus purpurea	Purple False-foxglove	-	-	-	S2S3

Notes:
Bold indicates SAR status.
[1] Species at risk in Canada listed under Schedule 1 the federal *Species at Risk Act* as Endangered (EN), Threatened (TH), or Special Concern (SC) (Government of Canada 2023).
[2] Species in Canada assessed by COSEWIC as Endangered (EN), Threatened (TH), Vulnerable (VU), or Special Concern (SC); not at risk species = NAR, Data Deficient = DD (Government of Canada 2023).
[3] Species at risk in Nova Scotia listed under the provincial *Endangered Species Act* (NS) as Endangered (EN), Threatened (TH), Vulnerable (VU), or Special Concern (SC; Government of Nova Scotia 2023).
[4] Species ranked by the AC CDC (AC CDC 2023) and recorded within 5 km of the Project by desktop data source, where:
S1: Critically Imperiled – Critically imperiled in the province because of extreme rarity (often 5 or fewer occurrences). May be especially vulnerable to extirpation.
S2: Imperiled – Imperiled in the province because of rarity due to very restricted range, very few populations (6 to 20 occurrences or few remaining individuals). May be vulnerable to extirpation due to rarity or other factors.
S3: Vulnerable – Vulnerable in the province due to a restricted range, relatively few populations (often 80 or fewer).
S4: Apparently Secure – Uncommon but not rare; some cause for long-term concern due to declines or other factors (80+ occurrences).
S5: Secure – Common, widespread, and abundant in the province.
S#S#: A numeric range rank (*e.g.*, S2S3) is used to indicate any range of uncertainty about the status of the species or community.
SH: Possibly Extirpated (Historical) – Species or community occurred historically in the province, and there is some possibility that it may be rediscovered. Its presence may not have been verified in the past 20-40 years. A species or community could become SH without such a 20-40 year delay if the only known occurrences in a province were destroyed or if it had been extensively and unsuccessfully looked for. The SH rank is reserved for species or communities for which some effort has been made to relocate occurrences, rather than simply using this status for all elements not known from verified extant occurrences.
SU: Unrankable – Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.





Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 20N
2. Data Sources: Government of Nova Scotia, Department of Natural Resources and Renewables; NS Environment and Climate Change; East Coast Aquatics - Ecological aspects of a local Wood Turtle (*Glyptemys insculpta*) population along the Sackville River, Nova Scotia (Page 17) 2016.; Atlantic Canada Conservation Data Centre, 2023
3. Background: Government of Nova Scotia Department of Service Nova Scotia and Internal Services; Nova Scotia Department of Natural Resources and Renewables

- Species at Risk (Incidental Observation)
- Species of Conservation Concern (Incidental Observation)
- Species at Risk and Species of Conservation Concern (ACCDC)
- Transmission Line
- Highway
- Road
- Resource / Seasonal Road
- Trail
- Waterway
- Waterbody
- Wetland (Stantec, 2023)
- Wetland (NSECC)
- Designated Wetland of Special Significance
- Significant Habitat - Migratory Bird
- Boreal Felt Lichen Predicted Habitat (NSECC, 2010)
- Managed Area (ACCDC)
- Study Area

0 250 500 Metres

(At original document size of 8.5x11)
1:24,000

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Stantec

Project Location
Halifax Regional Municipality, Nova Scotia

Prepared by IPodrug on 2024-03-07
Revised by NWhite on 2024-03-14
Revised by SChubbs on 2024-05-10

Client/Project
Halifax Regional Municipality
Future Serviced Communities
Background Studies

Figure ID: 007

Figure No.
3.8

Title
SAR, SOCC, and Sensitive Habitats Identified - WSA

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3.4.3.1 Species at Risk Descriptions

SAR identified in either the AC CDC (2023) report or identified during the field programs are described below. Species are presented in the order they appear in the tables above and information is provided on the species biology, as well as its regulatory status. Species identified during field programs are marked with an asterisk (*).

Peregrine Falcon

The peregrine falcon is listed as Vulnerable under the NS ESA but is no longer listed under the federal SARA or COSEWIC due to the recovery of peregrine populations of the *anatium/tundrius* subspecies in eastern Canada following the cessation of the use of DDT and successful re-introduction programs (COSEWIC 2017b). In Nova Scotia, all peregrine falcon nests are found on coastal cliffs along the Bay of Fundy. In other areas of Canada, peregrine falcons have been observed nesting on tall buildings, bridges, and the banks of open pit mines. In some areas where cliffs or similar human-made structures are not available, peregrine falcons will use the nests of other birds in trees.

Peregrine falcons have been recorded within 5 km of the WSA. This species is considered a location sensitive species in Nova Scotia, and thus location data for individual sightings of peregrine falcons are not provided in the AC CDC data report. No peregrine falcons were recorded during the field surveys and the habitat surveys indicate that suitable nesting habitat is not present in the WSA. In Nova Scotia, migrating shorebirds are an important prey species for peregrine falcons. It is likely that the AC CDC records of this species are from the Cole Harbour area where migrating shorebirds are plentiful.

Piping Plover

Piping plover is listed as Endangered under both the federal SARA and the NS ESA. In Nova Scotia this species nests on coastal beaches, usually on barrier islands and sand bars (COSEWIC 2013a). The beaches where piping plovers nest are typically wide, sparsely vegetated and have a mix of substrates including sand, pebbles, gravel, and shells.

There are 41 records of piping plover within 5 km of the WSA, all in Cole Harbour or at Rainbow Haven Beach. Given the fact that the WSA contains no coastal beaches, piping plovers would not use the Study Area as habitat.

Lesser Yellowlegs

The lesser yellowlegs is a medium-sized shorebird that nests in wetlands in the boreal forest of Canada and Alaska. This species is listed as Threatened by COSEWIC (2020b) but is not listed under either the federal SARA or the NS ESA. Lesser yellowlegs do not nest in Nova Scotia but pass through the province during fall migration. In the Maritime Provinces, lesser yellowlegs typically use both freshwater and marine shorelines during migration (COSEWIC 2020b).

There are 62 records of lesser yellowlegs observed within 5 km of the WSA. All these birds were observed at either Cole Harbour or Rainbow Haven Beach, presumably in coastal wetlands and shores. This species may also use freshwater shorelines. Areas within the WSA that could provide suitable migration foraging habitat for lesser yellowlegs include the shoreline of Broom Lake at the northern end of the WSA and the large stillwater system and wetland complex on Broom Brook in the west-central part of the WSA.

Hudsonian Godwit

The Hudsonian godwit is a large shorebird that nests in the Canadian Arctic and Alaska. This species is listed as Threatened by COSEWIC (2019) but is not listed under either the federal SARA or the NS ESA. Hudsonian godwits do not nest in Nova Scotia but pass through the province during fall migration. This species is noted for its long-distance flights that may take days to complete. Because of these long-distance flights, many Hudsonian godwits fly over Nova Scotia but relatively few interact with habitats in the province. During migration, Hudsonian godwits will forage in coastal marshes and mudflats in Nova Scotia (COSEWIC 2019). The WSA does not contain suitable Hudsonian godwit foraging habitat so it is unlikely that this species would make use of habitats in the Study Area. There are 14 records of Hudsonian godwits within 5 km of the WSA. All of these records were from coastal habitats at Cole Harbour and Upper Lawrencetown.

Red Knot

The red knot is a medium-sized shorebird that nests in barren habitat in the Arctic. Red knots pass through Nova Scotia during migration with more birds present in the fall than in the spring. In Nova Scotia, red knots are typically found on sandy beaches with adjacent mud flats (COSEWIC 2020c). They may also feed on low-lying meadows after the hay has been cut. Red knots were recorded on 16 occasions within 5 km of the WSA with all birds observed in Cole Harbour. Suitable foraging habitat for red knots is not present in the WSA so this species would not be present.

Red-necked Phalarope

The red-necked phalarope is a pelagic shorebird that is listed as Special Concern under the federal SARA but is not listed under the NS ESA. This species is a circumpolar breeder. Parts of the Canadian and European populations of red-necked phalaropes migrate along the Atlantic coast to their wintering area in the Humbolt Current off the coast of Ecuador, Peru, and Chile (ECCC 2022b). Most birds migrate offshore and are not commonly observed in nearshore waters. There is one record of red-necked phalarope within 5 km of the WSA. This record is from Cole Harbour in 1975. Suitable habitat for red-necked phalarope is not present at the WSA so this species would not be present.

Short-eared Owl

The short-eared owl is listed as Special Concern under the federal SARA but is not listed under the NS ESA. This species is a year-round resident of Nova Scotia. Its preferred nesting habitat is in large open habitats at least 50 ha in size such as grasslands, dyked wet meadows, coastal bogs, and marshes (COSEWIC 2021a). Most breeding occurs near the coast. Areas of open habitat are present in the WSA; however, they are not large enough to provide suitable nesting or foraging habitat for this species. There is one record of short-eared owl recorded within 5 km of the WSA. It is a 2010 record from the Halifax Maritime Breeding Bird Atlas (MBBA) square. The MBBA records are derived from a 100 km^2 area. The center of the MBBA square is used as the location coordinates for all birds recorded in this area. No precise location data are available for bird records from this program. Given the requirement of large areas of open habitat for nesting and foraging, it is unlikely that short-eared owls would be present in the WSA.

Common Nighthawk*

Common nighthawk is listed as Special Concern under the federal SARA and as Threatened under the NS ESA. Common nighthawk was first federally listed as Threatened in 2007 (COSEWIC 2007a); however, due to a stabilization in the rate of decline, and the abundance of common nighthawk in suitable environments, COSEWIC (2018b) revised the status to Special Concern in 2018. The federal SARA status was downgraded from Threatened to Special Concern in 2023. Common nighthawk is a medium-sized aerial insectivore that nests in a variety of open habitats with minimal ground vegetation including open forest (especially areas with cuts, burns or rock outcrops), short grass prairie, dry bogs, rocky areas (such as quarries, gravel pits, and bedrock outcrops), sandy coastal habitats and settled areas that resemble open natural areas such as railways, gravel roads, airports, cultivated fields, orchards, parks, buildings with gravel roofs, oil-well pads, and pipelines. Common nighthawks are opportunistic generalist foragers and aggregate in areas where flying insects are abundant including waterways, lighted areas, and wetlands.

A common nighthawk was observed flying over the eastern side of the WSA during the field surveys (Figure 3.8). Given the nature of the sighting, it was not possible to determine if and where a nest might have been present. There are seven records of common nighthawk within 5 km of the WSA. Five of the records are from the Cole Harbour MBBA square and one is from the Preston MBBA square. Each of these MBBA squares is 100 km^2 so it is not possible to determine with any accuracy where these common nighthawks were observed. The remaining record is from Little Gammon Lake which is more than 5 km from the WSA. Suitable nesting habitat is present in the WSA at several locations where grubbing has exposed bare ground and where rocky outcrops are present. These include grubbed areas adjacent to roads and an abandoned gravel pit. Most of these areas are relatively small and much of the road network in the WSA is heavily used by walkers and ATVs limiting its suitability as common nighthawk nesting habitat. There are three areas of exposed boulder fields, one near the northwestern corner of the Study Area, one near the southern end of the Study Area, and one on the eastern side of the Study Area that could potentially provide suitable nesting habitat.

Eastern Whip-poor-will

The eastern whip-poor-will is a nocturnal insectivorous bird which is listed as Threatened by both the federal SARA and the NS ESA. This species nests in sparse forests or at the edge of forests adjacent to open habitats required for foraging (ECCC 2018a). Foraging habitats are varied but typically have relatively sparse tree cover. Foraging habitat can include wetlands with shrubs, shrub thickets, regenerating clear-cuts, and agricultural lands. Suitable foraging habitat must have scattered trees or other elevated structures that can be used as perches. A variety of forest types are used as nesting habitat as well as rock or sand barrens with scattered trees, savannahs, old burns, and sparse conifer plantations. Structurally, suitable nesting sites have well drained soils (eastern whip-poor-wills nest on the ground), moderate tree cover, and moderate to sparse shrub and herbaceous cover. Eastern whip-poor-will may also nest in dense forest adjacent to suitable foraging habitat, with nests typically established within 30 m of the edge of the dense forest.

No eastern whip-poor-will were recorded during the field surveys. There are two records of eastern whip-poor-wills within 5 km of the WSA. Both were recorded in the Cole Harbour MBBA square in 2008. No precise location data are available for these records other than that they were recorded somewhere within the 100 km^2 square whose center is located 3 km from the Study Area. Suitable habitat for eastern whip-poor-will may be present at the west-central portion of the WSA. This area contains areas of rocky barrens and low shrub dominated riparian swamp that may be large enough to provide foraging habitat for nesting eastern whip-poor-wills. Adjacent dry forest, although thick, may provide suitable nesting habitat.

Chimney Swift

Chimney swift is listed as Threatened under the federal SARA and Endangered under the NS ESA. This species has been assessed by COSEWIC twice, first in 2007, followed by a confirmatory report in 2018 (COSEWIC 2007b; 2018a). Chimney swift is a small aerial insectivore which is found in Eastern North America during the breeding season. Before European settlement, chimney swifts nested and roosted in large hollow trees. These nesting and roosting sites became less common because of forest harvesting. Chimney swifts adapted to the loss of natural nesting and roosting sites by using large masonry chimneys for nesting and roosting. Eventually, large masonry chimneys fell out of favor and the supply of suitable nesting and roosting sites dwindled.

There are three records of chimney swift recorded within 5 km of the WSA. One record is from Colby Village and the second is from Rainbow Haven. The third record is from the Cole Harbour MBBA which amalgamates bird records from a 100 km^2 MBBA square. It is, therefore, not possible to determine precisely where this bird was observed. No chimney swifts were observed during the field surveys. No large masonry chimneys are present in the WSA and there are few large trees that could provide nesting sites. It is, therefore, unlikely that chimney swifts would currently breed in the WSA; although, in the absence of further disturbance the abundance of large hollow trees would eventually increase.

Olive-sided Flycatcher

Olive-sided flycatcher is listed as Special Concern under the federal SARA and as Threatened under the provincial NS ESA. It was first federally listed as Threatened in 2007; however, due to a stabilization in the rate of decline, COSEWIC (2018c) revised the status to Special Concern in 2018. The federal SARA status was downgraded in Schedule 1 from Threatened to Special Concern in 2023. In Nova Scotia, olive-sided flycatchers are found in forested areas where scattered trees or snags remain after clear-cutting or fire, as well as mature stands of black spruce (*Picea mariana*) adjacent to bogs, fens, beaver ponds, or clearcuts. Nests are established in black spruce trees.

No olive-sided flycatchers were recorded during the field surveys. The AC CDC data report (2023) indicates that one olive-sided flycatcher has been recorded within approximately 5 km of the WSA. This bird was observed in the Cole Harbour MBBA square in 2006. Habitat mapping for the Study Area indicates that suitable nesting habitat for olive-sided flycatcher may be present at three locations at the southern end of the WSA and one near the northern end. These are wooded swamps that have been affected by hydrological fluctuations that have killed many of the overstory trees creating snags that olive-sided flycatchers can use as foraging perches. These stands also have adjacent softwood thickets that would provide nest sites.

Eastern Wood-Pewee

Eastern wood-pewee is listed as Special Concern under the federal SARA and Vulnerable under the NS ESA. Eastern wood-pewee is a medium-sized flycatcher that typically nests in mature deciduous and mixedwood forest stands. They typically occupy the mid to upper layers of the canopy and favor areas where canopy openings are present where they can catch flying insects (NSDNRR 2022a). Threats to eastern wood-pewee are poorly understood, but like most aerial insectivores, a decline in insect populations is thought to be a key contributor (COSEWIC 2012a).

No eastern wood-pewee were observed during the field surveys. The AC CDC data request (AC CDC 2023) indicates that there are two records of eastern wood-pewee within approximately 5 km of the Study Area. One record is from 1986 from within the 100 km^2 Halifax MBBA square so it is not possible to determine exactly where these birds were observed. The second record is from near the Shearwater Flyer Trail 1.7 km from the WSA. No eastern wood-pewee were recorded during the field surveys; however, the FEC forest stand mapping suggests that suitable nesting habitat may be present in the Study Area. This would include mature deciduous and mixedwood forest stands in the western, northern, and central portions of the WSA that border open habitats such as old field, transmission lines, open wetlands, and recently flooded forest stands.

Bank Swallow

Bank swallow is listed as Threatened under the federal SARA and as Endangered under the provincial NS ESA. Bank swallows nest in burrows that they excavate in a variety of habitat types. These include lake and ocean bluffs; stream and riverbanks; sand and gravel pits; roadcuts; piles of sand, topsoil, sawdust, coal ash, and other materials (COSEWIC 2013b). The nest burrows are excavated in vertical or near vertical slopes (76 - 105º slope). Critical habitat has been defined and mapped for bank swallow in

Nova Scotia (NSDNRR 2021). Critical habitat is the habitat that is necessary for the survival or recovery of a species. Critical habitat for this species consists of suitable nesting habitat as well as suitable foraging habitat that is found within 500 m of the nesting habitat. Foraging habitat consists of open habitats that produce insects such as wetlands, salt marshes, grasslands, and hay fields. Seasonal wetlands or ponds that are flooded are important sources of insect prey for bank swallows.

The Study Area does not fall within bank swallow critical habitat that is currently mapped. The AC CDC data search (2023) indicated that there are nine records of bank swallow within approximately 5 km of the WSA with all but two of the records from the vicinity of Cole Harbour. No bank swallows were observed during the field surveys. No natural potential nesting sites (lake bluffs and stream banks) or anthropogenic nesting sites (steep embankments or soil stockpiles) were observed within the Study Area. It is unlikely that bank swallows nest in the WSA.

Barn Swallow

Barn swallow is listed as Threatened under the federal SARA and Endangered under the provincial NS ESA; however, the species was re-assessed as Special Concern in 2021 (COSEWIC 2021b) making it eligible for a status change under the federal SARA. Barn swallow is a mid-sized aerial insectivore that forages in open habitats (e.g., agricultural fields, shorelines) and nests on anthropogenic structures, particularly in rural areas, and other structures (e.g., culverts; COSEWIC 2011b). Before European settlement, barn swallow nesting habitat was mainly characterized by natural features such as caves, holes, crevices, and ledges associated with rocky cliff faces. Although barn swallows continue to nest in traditional natural situations, they are now most closely associated with human-made structures in rural areas. Such nesting sites include a variety of artificial structures that provide either a horizontal nesting surface (e.g., a ledge) or a vertical face, usually with some sort of overhang that provides shelter. Nests are most commonly located in and around open barns, garages, sheds, boat houses, bridges, road culverts, verandahs, and wharfs, and are situated on such things as beams and posts, light fixtures, and ledges over windows and doors (COSEWIC, 2011b). This species was listed on Schedule 1 of SARA in 2017, but critical habitat has not been identified to date.

No barn swallows were observed during the field surveys conducted in mid-July when this species would be present in Nova Scotia. There were nine records of barn swallows reported by the AC CDC (2023) within 5 km of the WSA. These included three records from Rainbow Haven, two records from Colby Village, one record each from Woodlawn and Wildwood Lake, and two records from the Cole Harbour MBBA square which is 100 km^2 in size. The center of the MBBA square is used as the location of all bird records within the MBBA square so it is not possible to determine whether the records are located near the Study Area. There is no suitable nesting habitat inside the WSA; however, the WSA is surrounded by many residences, some of which may provide suitable nesting habitat. Potential foraging habitat for barn swallows that might nest adjacent to the WSA would include Broom Lake to the north and the stillwater portion of Broom Brook to the south.

Canada Warbler*

Canada warbler is listed as Threatened under the federal SARA and Endangered under the provincial NS ESA; however, the species was re-assessed as Special Concern in 2020 (COSEWIC 2020a) making it eligible for a status change under the federal SARA. Close to 80% of the Canada warbler population breeds in Canada (COSEWIC 2020a). Many key threats identified by COSEWIC (2020a) are present on the wintering grounds outside of Canada, though habitat loss in Canada is recognized as a contributing factor.

Canada Warblers are found in a variety of forest types, but are most common in wet, mixed deciduous-coniferous forest with a well-developed shrub layer. It is also found in shrub swamps, red maple (*Acer rubrum*) stands, eastern white cedar (*Thuja occidentalis*) stands, conifer swamps dominated by black spruce (*Picea mariana*) and larch (*Larix laricin*a), and riparian woodlands along rivers and lakes.

A Canada warbler was encountered in a forested wetland near the northern end of the WSA during the field surveys (Figure 3.8). This species is typically found in dense vegetation and the field surveys were not conducted during peak Canada warbler breeding activity in June when this species can be detected by its song; therefore, it is likely that Canada warbler may be present at other locations within the Study Area. There are 82 AC CDC records of Canada warbler within approximately 5 km of the WSA. The closest record is from inside the WSA near Auburn Drive High School on the west side of the Study Area. The remaining records are from outside the WSA on the Shearwater Flyer Trail and the Salt Marsh Trail as well as from the Cole Harbour MBBA. Given the large size of the MBBA square and the lack of georeferenced bird records from within the MBBA square, it is not possible to determine if these Canada warbler records are close to the Study Area.

There is suitable habitat for Canada warblers at various locations within the WSA. Sixteen forested or tall shrub-dominated wetlands having relatively open tree overstories and dense shrub understories were encountered during the field surveys which could provide suitable breeding habit.

Yellow-breasted Chat

The yellow-breasted chat is listed as Endangered under the SARA but is not listed under the NS ESA because this species occurs in Nova Scotia as a vagrant. It does not nest in Nova Scotia and does not normally migrate through the province. There are 13 records of yellow-breasted chat from within 5 km of the WSA. Most records are from Port Wallace but there are also records from Colby village and Sunset Acres. All records are from early winter and most birds are likely birds blown north by storms or are reverse migrants. Yellow-breasted chats typically nest in dense shrub cover often near habitat edges and forage in the same habitat type outside of the breeding season (COSEWIC 2011a). Suitable nesting and foraging habitat is present in the WSA; however, since this bird occurs as a vagrant, this habitat is not ecologically important to this species.

Bobolink

The bobolink is a medium-sized grassland passerine that is listed as Threatened under the federal SARA and Vulnerable under the NS ESA; however, the species was re-assessed as Special Concern in 2022 (COSEWIC 2022) making it eligible for a status change under the federal SARA. Bobolinks nest in natural grasslands and in agricultural lands used as hay fields and pasture. They prefer to nest in areas composed mainly of dense grass of moderate height (ECCC 2022c). Grass swards with moderate thatch are preferred. Forb cover in suitable nesting habitat is low to moderate and the cover of trees and shrubs is low. Scattered trees, tall shrubs, power poles, or fence posts are required as singing posts for males. Minimum habitat size varies geographically and by habitat quality, but 10 ha is considered to be the minimum habitat size required for successful nesting.

No bobolinks were encountered in the WSA during field surveys. The AC CDC data report indicates that there are two bobolink records within 5 km of the WSA. One was from the Cole Harbour MBBA square from 1986 and the second was from Rainbow Haven. The WSA contains one old field at the northern end of the Study Area and a hay field at the southern end. The old field is too small to provide suitable nesting habitat for bobolink and has forb cover that is too high and grass cover that is too low. It is unlikely that bobolinks would be present at this location. The hay field is also less than 10 ha in size; however, there is an area of adjacent old field habitat located just outside the WSA that would increase the overall size of the grassland to approximately 10 ha. The species composition of the hayfield is characterized by moderate covers of both grasses and forbs. The species composition of the old field just outside of the WSA is not known. There is a possibility that bobolink may nest in the hay field.

Eastern Meadowlark

The eastern meadowlark is listed as Threatened under the federal SARA but is not listed under the NS ESA. This species has historically bred in Nova Scotia in very small numbers, but the last confirmed nesting occurred more than 25 years ago. Eastern meadowlark has been recorded once within 5 km of the WSA near Port Wallace on July 1, 2021. Eastern meadowlarks require large areas of open habitat for nesting. Several features are required for suitable nesting habitat including a heavy cover of moderately tall grass (between 10 and 50 cm tall) mixed with moderate cover of forbs (no more than 15% cover) and little tree and shrub cover (less than 25% cover) (ECCC 2022a). There must be at least 5 ha of this type of cover to provide suitable nesting habitat. There are two patches of pasture at the southern tip of the WSA. One of the patches is 2.9 ha and the second is 0.3 ha for a combined total area of 3.2 ha. The WSA does not contain suitable nesting habitat; consequently, eastern meadowlarks are not expected to be present.

Rusty Blackbird

Rusty blackbird is listed as Special Concern under the federal SARA and Endangered under the provincial NS ESA. Rusty blackbird is a medium-sized blackbird found in coniferous-dominated forests adjacent to wetlands (COSEWIC 2017a). Approximately 85% of the rusty blackbird breeding range is in Canada. Rusty blackbird breeding habitat includes sedge meadows, beaver ponds, muskegs, swamps, scrub riparian habitats of islands, lakes, rivers and streams, as well as alder and willow thickets. In Cape

Breton rusty blackbirds will occasionally occur in pastures. This species typically selects breeding areas that contain shallow water areas for foraging and low open coniferous cover for nesting. Rusty blackbirds are typically found in remote areas.

No rusty blackbirds were recorded during the field surveys. There is one record of rusty blackbird located within approximately 5 km of the WSA. This record is from the Cole Harbour MBBA square in 1986 and was not recorded during the more recent MBBA. Precise location data are not available for this record other than that it was recorded somewhere within the 100 km^2 square whose center is located 3 km from the center of the WSA. The habitat mapping for the Study Area reveals that potential rusty blackbird nesting habitat may be present in a large low shrub dominated swamp located near the southern end of the Study Area along Broom Brook. This wetland contains both shallow water areas and patches of low open coniferous cover. However, given the proximity of the WSA to residential development, the likelihood of rusty blackbirds nesting in this area is low.

Evening Grosbeak

Evening grosbeak is listed as Special Concern under the federal SARA and Vulnerable under the provincial NS ESA. Evening grosbeaks nest in large mature conifer stands and old mixed forest stands with a high proportion of balsam fir (*Abies balsamea*), white spruce (*Picea glauca*) or trembling aspen (*Populus tremuloides*) (COSEWIC 2016a). Forest Stands having varied structure and open canopy are preferred as breeding habitat. Evening grosbeaks are resident birds that can remain in their breeding range year-round. During the winter months evening grosbeaks are often attracted to areas where seeds and berries are abundant. This species is attracted to plant species that produce large-winged seeds, particularly Manitoba maple (*Acer negundo*) and will also visit bird feeders where common sunflower (*Helianthus anuus*) seeds are available.

No evening grosbeaks were observed during the field surveys. The AC CDC data search (AC CDC 2023) indicated that there are four records of this species within 5 km of the WSA. An evening grosbeak was confirmed as nesting within the Cole Harbour MBBA square in 1990. It is not possible to determine the precise location where it was observed. A second breeding season record was situated 1.8 km from the WSA. The two remaining records are from late fall or early winter and were recorded from the Forest Hills area 1.0 and 1.8 km from the Study Area. The WSA contains few old conifer or mixedwood stands and only one of these stands had the tree species composition preferred by nesting evening grosbeaks. As such, there is some potential for evening grosbeak to nest in the WSA. There are many residences located around the periphery of the WSA and it is likely that some of these residences feed birds which may attract evening grosbeaks to the Study Area outside of the breeding season.

Myotis and Perimyotis Bats

The AC CDC (2023) data request results indicate that bats may be present near the WSA. Three species of hibernating bat have been listed as Endangered by both the federal government and the province of Nova Scotia. These include little brown myotis (*Myotis lucifugus*), northern myotis (*Myotis septentrionalis*) and tri-colored bat (*Perimyotis subflavus*) (COSEWIC 2013c). The populations of these three bat species have been severely reduced by white-nose syndrome, an introduced disease caused by the fungus

(*Pseudogymnoascus destructans*) that affects hibernating bats. Little brown myotis, northern myotis and tri-colored bat are considered location sensitive species in Nova Scotia, and thus location data for sightings of these species are considered confidential and are not provided in AC CDC data reports.

Habitat for these three species consists of hibernacula for overwinter survival and summering areas with suitable foraging areas within commuting range to structures used for roosting or maternity colonies. Hibernacula have been identified as critical habitat for little brown myotis, northern myotis and tri-colored bat (ECCC 2018b). All three species hibernate in caves or abandoned mines. Hibernation habitat is used for approximately six months each year. No critical habitat has been identified near the WSA. The nearest areas known to provide bat hibernacula are near Ship Harbour approximately 40 km to the east and Milford Station approximately 35 km to the north.

These bat species forage in a variety of habitat types which vary by species. Foraging habitat includes lakes, ponds and rivers, forest gaps, the edges of forests and along trails. These bat species tend to avoid large open areas such as agricultural land, large clear-cuts and burned forests. Maternity colony habitat varies by species. Little brown myotis females will establish maternity colonies in buildings, under bridges, in rock crevices, or in cavities of canopy trees in forests. Northern myotis establish maternity colonies in large trees. Tri-colored bats often establish maternity roosts in clumps of arboreal lichens and may also establish maternity colonies in buildings. Maternity colonies often consist of hundreds of females and their young, so the locations of these roost sites are important. Males typically do not roost in large numbers and may use a variety of sites such as snags, crevices under bark and human made structures.

Hibernaculum sites and maternity colonies are the most important and sensitive habitats for non-migratory bats since large numbers of individuals gather at these sites. The geology of the Study Area is not conducive to the formation of solution caves and there was no evidence to indicate that underground mine workings are present in the Study Area. As such, it is unlikely that the Study Area provides potential hibernacula for bats. The Study Area is mostly forested. The mature mixed forest stands found in the Study Area could potentially be suitable for maternity colonies. Attics in residences surrounding the WSA could provide maternity colony sites for little brown myotis and possibly tri-colored bat. Suitable foraging habitat would be present throughout most of the Study Area.

Snapping Turtle

Snapping turtle is listed as Special Concern under the federal SARA and Vulnerable under the provincial NS ESA. Snapping turtles are found in Canada throughout Nova Scotia, New Brunswick, Quebec, Ontario, and in parts of Saskatchewan (COSEWIC 2008). They are typically found in slow moving or standing water with a soft mud bottom and dense aquatic vegetation. Snapping turtles are found in lakes, ponds, sloughs, shallow bays or river edges and slow streams. Snapping turtles will bask on offshore logs or rocks when water temperatures are low. This species spends most of its time in the water; however, between mid-May and mid-June female snapping turtles leave the water to find suitable sites to lay their eggs. These nesting sites include sand and gravel banks along waterways, muskrat houses, abandoned beaver lodges, railroad and road embankments, gardens, pastures, sawdust piles, manure piles, and forest clearings. Nesting sites are usually located near water. Snapping turtles may follow streams

(including rocky streams) to reach suitable nesting sites. Mating may occur in these streams during the movements to nesting sites. The eggs hatch during the early fall and the hatchlings disperse to water where they bury themselves under leaf litter and debris and hibernate until spring.

There are 16 records of snapping turtles within approximately 5 km of the WSA. The nearest record is from the Forest Hills area 2.0 km to the west of the Study Area. The WSA contains suitable habitat for snapping turtles. The best potential habitat would be along the stillwater system of Broom Brook located in the southwest part of the WSA. Another location that could provide suitable habitat would be Broom Lake at the northern end of the WSA. Sandy and gravelly areas located adjacent to the aquatic foraging habitats could provide potential nesting sites.

Eastern Painted Turtle

The eastern subspecies of the painted turtle is listed as Special Concern under the federal SARA but is not listed under the NS ESA. Eastern painted turtle was first assessed by COSEWIC in 2018 (COSEWIC 2018d) and was designated as Special Concern in 2021. This suggests that a status change under the NS ESA is possible, as the federal designation was recent. The painted turtle is a small turtle with one of the most northernly distributions of North American freshwater turtles. In Canada, the eastern painted turtle subspecies is found in mainland Nova Scotia and near the coast in New Brunswick.

Eastern painted turtles occupy slow moving, relatively shallow and well vegetated wetlands (swamps, marshes, ponds, and oxbows) and water bodies (lakes, rivers, creeks, and streams) with abundant basking sites and organic substrate. They are found in association with aquatic plants including water shield (*Brasenia schreberi*), American water lily (*Nymphaea odorata*), cow lily (*Nuphar variegata*), pickerel weed (*Pontederia cordata*), and pondweed (*Potamogeton* spp.), which are used for cover and feeding.

No eastern painted turtles were observed during the field surveys. There are 17 AC CDC records of this species from within approximately 5 km of the WSA. The nearest record is from 1.9 km to the west in Colby Village. Suitable habitat is present for eastern painted turtles within the Study Area. These areas include Broom Lake in the northern part of the WSA and the stillwater system of Broom Brook.

Wood Turtle

Wood turtle is listed as Threatened under both the federal SARA and the provincial NS ESA. Wood turtle was first added to Schedule 1 of SARA in 2010 and had the status of Threatened reaffirmed in 2018 (COSEWIC 2018e). Wood turtle is a medium-sized turtle with a grey/brown or yellow carapace. They can be found throughout Eastern North America, and prefer semi-aquatic, riparian environments. Wood turtle is considered a location sensitive species in Nova Scotia, and thus location data for individual sightings of wood turtle are considered confidential.

Wood turtles are associated with meandering shallow rivers with sand, gravel and/or cobble bottoms. These rivers are typically clear, with moderate current and frequent oxbows. Secondary tributaries (brooks) that feed these rivers may also support wood turtles by providing travel routes to resource patches. Still water or slow water habitats such as vernal pools, oxbows, marshes, and beaver ponds are

also used, though less frequently than riverine habitats. Wood turtles are highly terrestrial and will forage in riparian and wetland habitats adjacent to river systems.

A population of wood turtles is present on the Sackville River (East Coast Aquatics 2016). A two-year monitoring study of this population demonstrated a high degree of site fidelity with none of the 11 marked wood turtles leaving the Sackville River. However, incidental observations compiled by East Coast Aquatics (2016) indicated that wood turtles have been observed away from the Sackville River on its tributaries. The AC CDC records indicate that wood turtle has been recorded within 5 km of the WSA; however, since this species is considered location sensitive the precise location data are unavailable. Broom Brook runs north/south through the WSA from Broom Lake to Cole Harbour; however, it does not provide sand and gravel substrates suitable for nesting. The wetland habitats that surround it are acidic and oligotrophic and are not expected to provide good foraging habitat. Wood turtles are not expected to be present in the WSA.

American Eel

The American eel is listed as Threatened by COSEWIC but is not listed under either the federal SARA or the NS ESA. American eels reproduce in the Sargasso Sea. Some eels remain at sea while others migrate to the rivers and streams where they mature before heading back to sea to reproduce (COSEWIC 2012b). American eels use a wide range of aquatic habitats and are capable of overcoming barriers to movement by leaving the water and moving over wet surfaces on the land. As such, they can be found far up small streams. American eels are generally nocturnal and spend the day in burrows or under cover objects. They feed on fish and aquatic invertebrates.

There are two AC CDC records of American eel within approximately 5 km of the WSA with the nearest observation 4.6 km west of the Study Area at Bel Ayr Park. There are several locations in the WSA where American eels could be expected to be present. Broom Brook, a large stream along the western side of the Study Area, would provide good habitat, and Broom Lake at the northern end of the Study Area would also provide good habitat. There are also several small streams on the eastern side that may provide habitat for this species.

Monarch

Monarch is listed as Special Concern under the federal SARA and as Endangered under the NS ESA. The monarch is a milkweed butterfly in the family *Nymphalidae*. The eastern North American population is migratory and monarchs that breed in Northeastern North America migrate to over wintering sites in Mexico, Florida, and the Gulf Coast of the United States (COSEWIC 2016b). Adult monarchs feed on a variety of plant species and can be found in a variety of habitats. In Nova Scotia, monarch larvae feed on the introduced common milkweed (*Asclepias syriaca*) and the native swamp milkweed (*Asclepias incarnata*). This limited selection of suitable larval food plants restricts the distribution of larval monarchs to the distribution of the two milkweed species. Common milkweed is typically found along roadsides and in agricultural fields particularly in sandy soils. It is uncommon in most of Nova Scotia but may be locally common in the Annapolis Valley. Swamp milkweed is an uncommon native species in Nova Scotia that is typically found in wet thickets usually near a stream or lake shore.

Monarchs have been recorded 47 times within approximately 5 km of the Study Area. The nearest record is approximately 150 m west of the northwestern corner of the WSA. One of the records was a larval monarch indicating that suitable host plants were present. This record is from approximately 700 m west of the Study Area. Neither common milkweed nor swamp milkweed was noted in the Study Area during the habitat surveys; however, small populations of these species could potentially be present. Gardeners may also cultivate milkweed to provide breeding habitat for monarchs. Areas of the WSA with the greatest potential to provide breeding habitat for monarchs would be relatively rich swamps and shorelines where swamp milkweed may be present such as around Broom Lake and the large wetland complex at the southwestern part of the WSA. Patches of common milkweed could potentially be present on roadsides. Residential areas, which surround the WSA, could also provide breeding habitat. Adult monarchs feed on nectar of a wide variety of flowers. Residential areas and open habitats such as old fields and vacant lots would provide high concentrations of flowers.

Yellow-banded Bumble Bee

Yellow-banded bumble bee is designated as Special Concern under the federal SARA and as Vulnerable under the NS ESA. The species was first assessed in 2015 (COSEWIC 2015) and was designated for federal status in 2018. Yellow-banded bumble bee is found in much of Canada and parts of the United States and occurs in a diverse range of habitats, including mixed woodlands, farmlands, urban areas, montane meadows, prairie grasslands and boreal habitats. It has been recorded foraging on flowers for pollen and nectar from a variety of plant genera. Like many bumble bees, it usually nests underground in pre-existing cavities such as abandoned rodent burrows and rotten logs. Yellow-banded bumble bee queens overwinter underground and in decomposing organic material such as rotting logs" (COSEWIC 2015; ECCC 2022a).

There are two records of yellow-banded bumblebee within approximately 5 km of the WSA. Both records are from Rainbow Haven and are 4.2 km south of the Study Area. Given the generalist nature of this species and the wide range of forested and open habitats that it uses, yellow-banded bumble bees could potentially be present throughout the WSA.

Boreal Felt Lichen

Boreal felt lichen is listed as Endangered under both the federal SARA and the NS ESA. The distribution of boreal felt lichen formerly included Nova Scotia, New Brunswick and Newfoundland; however, it is now extirpated in New Brunswick. As of 2020, there are 54 sites where boreal felt lichen still exists, down from 317 sites in 2014.

This species inhabits cool, humid forests containing balsam fir (*Abies balsamea*). Boreal felt lichens are found in or adjacent to forested wetlands having a ground vegetation layer dominated by *Sphagnum* moss, located within 25 km of the Atlantic coast and at elevations < 200 m above sea level. In the past, this species was found growing on balsam fir, black spruce (*Picea mariana*), white spruce (*Picea glauca*), red maple (*Acer rubrum*), and white birch (*Betula papyrifera*); however, it is currently found only on mature balsam fir.

There are no historical records of boreal felt lichen or any indicator species within 5 km of the WSA (AC CDC 2023). However, predicted boreal felt lichen habitat polygons overlap with forested wetland habitat in WL13 in the west of the WSA along Broom Brook; therefore boreal felt lichen are potentially present in this area (Figure 3.8). There is also a small (<1 ha area) section of predicted habitat on the east side of the WSA near Kenora Drive, proximal to WL6 but primarily in upland habitat. This area is unlikely to support any suitable habitat as it is disturbed by the immediately adjacent residential area.

Targeted surveys of the predicted habitat polygons near WL 13 and a buffer of 100 m around it are required to determine if the predicted habitat is suitable for or supports boreal felt lichen (NSDNR 2018) prior to physical work at the site. If boreal felt lichen is present, a 500 m Special Management Zone applies (NSDNR 2018).

Blue Felt Lichen

Blue felt lichen is a cyanolichen that is listed as Special Concern under the federal SARA and Vulnerable under the NS ESA. Blue felt lichen requires cool, moist growing conditions with cool summers and moderate winters (ECCC 2022e). It is typically found within 30 km of the ocean which fosters these conditions. Blue felt lichen is typically found in cool, moist microsites such as valleys, gullies, wetlands, and near waterbodies such as lakes and streams. This species is epiphytic and is typically found on mature deciduous trees with rough bark, particularly red maple (*Acer rubrum*) and yellow birch (*Betula alleghaniensis*). In Nova Scotia, blue felt lichen is frequently found in mature deciduous or mixedwood forested wetlands. Blue felt lichen is sensitive to air pollution, particularly sulphur dioxide and nitrogen oxides.

There are two records of blue felt lichen within approximately 5 km of the WSA. Both are in Minesville, 5.7 km west of the Study Area. No directed searches were made for blue felt lichen during the field surveys. The WSA contains a number of mature deciduous and mixedwood forested wetlands that could provide suitable habitat for blue felt lichen. These are scattered throughout the WSA but are most abundant along the western half of the Study Area along Broom Brook.

Dense Blazing Star

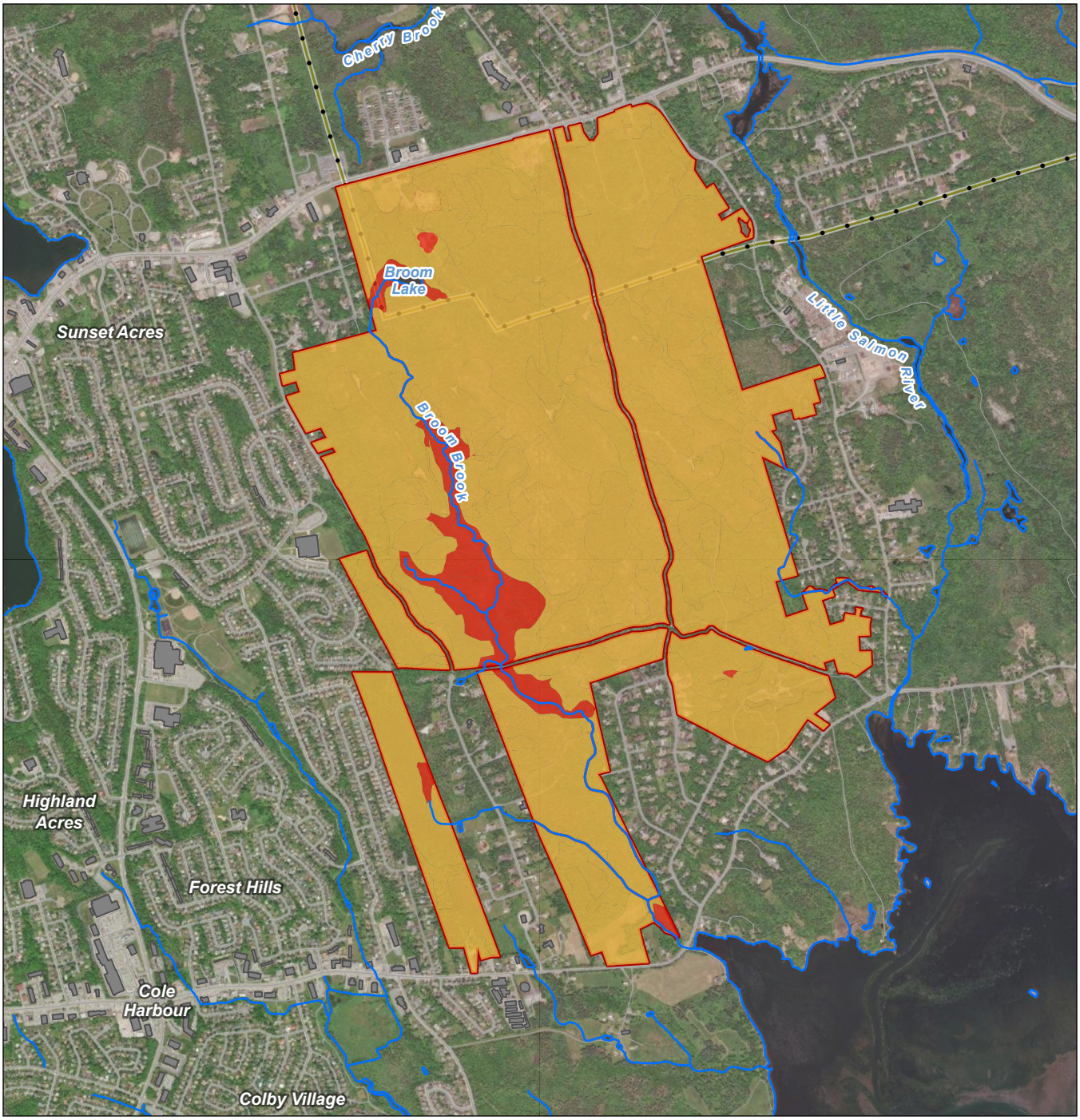
Dense blazing star (*Liatris spicata*) is listed as Threatened under the federal SARA but is not listed under the NS ESA. This species is a perennial forb that grows on moist to wet sandy soils that have a neutral to basic pH. It is intolerant of shade and does not compete well with other species of plants. It occurs mainly in tallgrass prairie but is occasionally found in wetlands, thickets, dune slacks, roadside ditches, utility corridors, and railways. Ontario is the only Canadian province found within the natural range of dense blazing star. In Ontario, it is restricted to the southern-most portion of the province. It has been successfully introduced to southern Quebec. Dense blazing star is often grown as an ornamental garden plant.

Dense blazing star has been reported from Tam O'Shanter Ridge near Lake Lamont, 5.2 km west of the WSA. Given the urban setting where this plant was found, the large distance to the natural distribution of this species and the fact that it is often grown as an ornamental plant, it is likely that this record is of a garden escape. Cultivars of dense blazing star are not afforded protection under the SARA since they may lack the genetic attributes that allow them to persist in their native habitats. This species was not encountered in the WSA and is unlikely to be present due to its preference for neutral or alkaline sandy soils which are not present in the Study Area.

3.4.3.2 Species at Risk Distribution

The presence of individual SAR was not used exclusively to evaluate the presence and distribution of SAR within the WSA since it was not feasible to conduct comprehensive investigations to detect all individuals of all SAR species that may be present in the WSA. Instead, SAR that are or could potentially be present were identified from both the results of the field surveys and from AC CDC records of SAR reported within 5 km of the WSA. The habitat preferences of these species were compared to the results of the upland, wetland and aquatic surveys conducted in the WSA along with available habitat mapping and aerial imagery. Where matches were found between SAR habitat preferences and the habitats that had been mapped in the WSA, those species were considered potentially present. The habitat mapping was then used to map the potential distribution of various SAR in the Study Area.

The distributions of each SAR that could potentially be present in the WSA were plotted onto a single map to identify areas where SAR were potentially present, absent, or where multiple SAR could be present. The habitat areas were ranked based on the number of SAR species the area could potentially support. Habitat areas that could potentially support more than three SAR were given the lowest priority for development, while habitat areas that are unlikely to support any SAR were given the highest priority for development. In some instances, SAR habitat areas are subdivisions of habitat polygons. Subdivision of habitat polygons was done when the habitat polygon contained areas that were both suitable and unsuitable for a particular SAR and where these suitable and unsuitable areas could be viewed and mapped from the available imagery. In other instances, buffers were created around habitat features such as watercourses or shorelines to identify habitat areas such as riparian areas that may be regularly used by semi-aquatic SAR. The map product incorporates the potential suitable habitat for all SAR that may be present in the WSA (Figure 3.9).





Notes
1. Coordinate System: NAD 1983 CSRS UTM Zone 20N
2. Data Sources: Government of Nova Scotia, Department of Service Nova Scotia and Internal Services
3. Background: Government of Nova Scotia, Department of Service Nova Scotia and Internal Services

- Study Area

Species at Risk
- Habitat Potentially used by 4+ SAR
- Habitat Potentially used by 1-3 SAR
- Habitat Unlikely to be used by SAR

Utilities
- Transmission Line

Other Features
- Highway
- Road
- Waterway
- Building

0 250 500 Metres
(At original document size of 8.5x11)
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Stantec

Project Location
Halifax Regional Municipality, Nova Scotia

Prepared by SChubbs on 2024-05-09

Client/Project
Halifax Regional Municipality
Future Serviced Communities Background Studies

Fig ID: 160410459_024

Figure No.
3.9

Title
Potential Distribution of Species at Risk- WSA

HRM FCM 2022.aprx Revised: 2024-05-10 By: schubbs

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Several patterns are visible in the SAR distribution mapping (Figure 3.9). There are no areas in the WSA where no SAR could potentially be present. This was attributable to the potential presence of yellow-banded bumble bee which has a broad niche. This species can potentially be found in all terrestrial habitat types in the WSA.

Areas in the WSA potentially capable of supporting more than three SAR are typically associated with four habitat features including watercourses, wetlands, mature forests, and anthropogenic habitats, although wetlands and watercourses appear to have the greatest potential to support SAR. Watercourses provide habitat and travel routes for a variety of SAR that have been recorded in the vicinity of the WSA including American eel, snapping turtle, and eastern painted turtle. SAR associated with wetlands include lesser yellowlegs, eastern whip-poor-will, Canada warbler, olive-sided flycatcher, rusty blackbird, yellow-banded bumble bee, boreal felt lichen, and blue felt lichen. SAR that are associated with mature forests include eastern wood pewee, evening grosbeak, little brown myotis, northern myotis, tri-colored bat, and yellow-banded bumble bee.

The areas where SAR are potentially concentrated in the WSA are linked by watercourses. Broom Brook on the western side of the WSA is particularly important in this regard. This is probably attributable to several factors. The watercourses provide habitat for their own suite of SAR. Wetlands often develop along these watercourses or are the headwaters for watercourses and support a different group of SAR. The riparian habitats along the watercourses are protected by buffer zones within which no forest harvesting may occur. Therefore, the remnants of mature forest can become concentrated along the shores of these watercourses. These mature forest remnants provide habitat for other SAR. These linear concentrations of SAR are of particular benefit since they can provide both habitat for SAR and corridors to connect plant and animal populations in urban areas.

Eight of the 20 SAR that have been identified as potentially present in the WSA are known to make use of anthropogenic habitat for at least part of their life history. These include barn swallow, bobolink, common nighthawk, evening grosbeak, little brown myotis, common snapping turtle, yellow-banded bumble bee, and monarch. It is important to note that although these species can exploit anthropogenic habitats, they often also require nearby undisturbed habitats to satisfy other aspects of their natural history. For instance, barn swallows and common nighthawks often nest on human structures or in areas heavily disturbed by humans; however, both species require nearby foraging habitats such as wetlands or water courses that produce abundant flying insects to provide food for themselves and their nestlings. In heavily developed areas these food sources may not be present or may be degraded to the point where they do not produce enough food.

3.4.4 LAND SUITABILITY ANALYSIS – FOREST HABITAT AND SPECIES AT RISK

Stantec conducted a land suitability assessment for forest habitat and species at risk by collating existing desktop data, referring to previously published reports, and conducting field surveys. The data underwent analysis using geographic information systems (GIS) and other tools to identify factors influencing land suitability. Following digitization, Stantec established a list of key terrestrial layers and devised a scoring system based on their significance to the assessment objectives. The evaluated layers include:

- Forest Maturity and Forest Succession
- Species at Risk Habitat

This process culminated in the creation of a map (Figure 3.10) that illustrates these criteria and weights used to evaluate the suitability of different areas for development. The results allow for the identification of potentially suitable and unsuitable areas, as well as the recognition of potential constraints. The sections below apply a suitability score for field confirmed forest habitat and its potential to facilitate SAR.

Figure 3.10 displays the land suitability output collated from the previous sections based on scoring criteria presented in Table 3.15. The reader is reminded that a lower score for land suitability for development generally corresponds with higher ecological value associated with the three categories, and a higher suitability score corresponds with a lower ecological value for the three categories.

Table 3.15 Forest Habitat and Species at Risk – Land Suitability Ranking Framework

Layers	Land Suitability Ranking		
	1 - Low suitability for development	**2 - Moderate suitability for development**	**3 - Higher suitability for development**
Forest Maturity / Forest Succession*	Potential old growth (>80 years old) / late and mid-to-late successional	Mature (30-80 years old) / mid-successional and edaphic	Immature (<30 years old) / early and early-to-mid successional
SAR Habitat	Habitat potentially used by more than 3 SAR	Habitat potentially used by 3 or fewer SAR	Habitat unlikely to be used by SAR
Note: *When no forest maturity class could be determined based on field determined stand age, forest succession was used			

3.4.4.1 Forest Maturity and Forest Succession

Forest maturity classes were assigned based on the estimated stand ages from field data collection. Forested stands under 30 years of age are considered immature stands, while stands between 30-80 years of age are considered mature. Immature stands are composed of younger overstory vegetation compared to the mature stands which have progressed towards the climax community seen in old growth forests. Forested stands above 80 years of age are considered to have the potential to be old growth forest. The province of Nova Scotia defines old growth forest as an area where 20% or more of the basal area is in trees greater than or equal to the reference age for that forest type (NSDNRR 2022b). This age criteria ranges between 100-140 years of age depending on the FEC VT. At this time, the exact stand age and forest maturity status cannot be determined without specific old growth forest sampling and thus

stands estimated to be over 80 years old are considered to have the potential to be old growth forest for this land suitability analysis.

Where age was not estimated in the field, forest succession types from the FEC manual are used based on the above ranking criteria. Forest succession is typically divided into three classes; early successional, mid successional, and late successional which correspond to stand age and successional dynamics. Using the FEC VTs for each stand, each VT (e.g., MW2, IH6, SH5) is assigned successional classifications of early, early-to-mid, mid, mid-late, late and edaphic. For sites classified as barrens types, they are assigned a score of 2 based on the lack of available knowledge on successional dynamics of barrens in Nova Scotia and the potential for diversity within the VT.

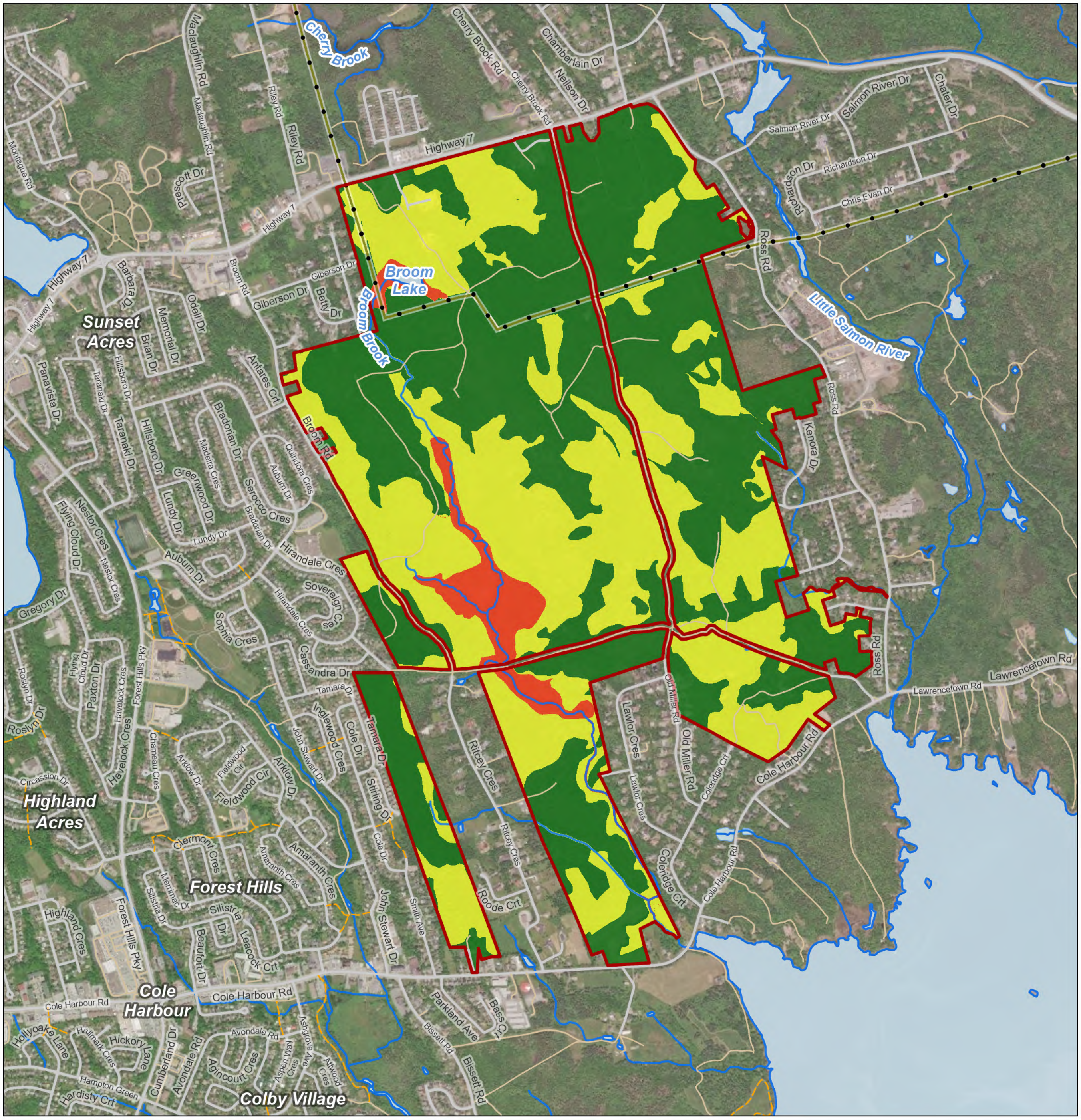
Stands with the potential for old growth forest provide the highest ecological significance and are ranked as lower for potential future development, while immature stands are ranked higher for development. VTs with early and early to mid-successional stages are assigned a higher potential for development as they generally do not support key habitat or are close to progression to later more structurally complex stands. Stands with site limiting factors such as sites with low nutrients or wetlands are denoted as edaphic and are rated as moderate for development as due to the limiting factors; they will not reach a climax stage but can provide distinct habitat types. Late successional forests are assigned the lowest priority for development due to their limited occurrence on the landscape and the high potential to provide key habitat.

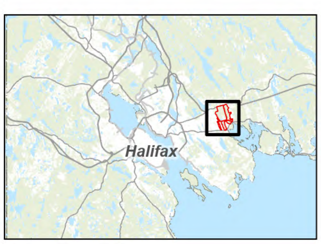
3.4.4.2 Species at Risk

The presence of individual SAR was not used exclusively to evaluate the role of SAR on land suitability within the WSA since it was not feasible to conduct comprehensive investigations to detect all individuals of all SAR species that may be present at the WSA. Instead, SAR that are or could potentially be present in the WSA were identified from both the results of the field surveys and from AC CDC records of SAR reported within 5 km of the WSA. The habitat preferences of these species were compared to the results of the upland, wetland, and aquatic surveys conducted on the WSA along with available habitat mapping. Where matches were found between SAR habitat preferences and the habitats that had been mapped in the WSA, those species were considered potentially present. The habitat mapping was then used to map the potential distribution of various SAR on the site. This information was considered and evaluated as part of the landscape connectivity exercise.

SAR identified in the AC CDC (2023) report that have suitable habitat within the WSA and/or were identified during the field programs are compiled and the habitat areas are ranked based on the number of SAR species this habitat could potentially support. Habitat areas that potentially support multiple species (i.e., 3 or more) of SAR are given the lowest priority for development, while habitat areas that are unlikely to be used by SAR are given the highest priority for development. Some habitat areas are subdivisions of habitat polygons or buffers are created around habitat features such as watercourses as habitat preferences vary by species. Figure 3.10 incorporates the potential suitable habitat for all SAR that may be present in the WSA.

The forgoing analysis of potential land suitability based on forest habitat and species at risk should only be viewed as a preliminary tool to assist in planning for future development in the WSA. Responsible land development depends on many factors including those described above, and no one factor or group of factors should be considered determinative. Rankings are meant to be indicative, and to lay the groundwork for future, site specific investigations to be conducted as planning proceeds. In particular, further field confirmation will be required (e.g., for wetlands) in areas not covered in this study.





Study Area

Land Suitability Score

- 3 (High)
- 2
- 1 (Low)

Utilities

- Transmission Line

Transportation

- Highway
- Road
- Resource / Seasonal Road
- Trail

Other Features

- Waterway
- Waterbody

0 250 500 Metres
(At original document size of 8.5x11)
1:24,000

N

Stantec

Notes
1. Coordinate System: NAD 1983 CSRS UTM Zone 20N
2. Data Sources: Stantec; Government of Nova Scotia, Department of Service Nova Scotia and Internal Services
3. Background: Government of Nova Scotia, Department of Service Nova Scotia and Internal Services

Project Location
Halifax Regional Municipality, Nova Scotia

Prepared by NWhite on 2024-03-15
Revised by NWhite on 2024-04-19

Client/Project
Halifax Regional Municipality
Future Serviced Communities
Background Studies

Fig ID: 160410459_033

Figure No.
3.10

Title
Forest Habitat and SAR Land Suitability Analysis - WSA

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3.5 Landscape Connectivity

The land suitability mapping derived from the integration of the forest maturity / succession, and SAR mapping exercises, wetland and watercourse mapping were used in conjunction with existing studies of landscape connectivity in HRM to identify potential wildlife corridors within the WSA. The goal of this exercise is to identify connectivity between patches of undisturbed habitat that may be potentially isolated by development. The provision of wildlife corridors allows wildlife that require larger home ranges to inhabit areas that would otherwise consist of isolated patches too small to support those species. Wildlife corridors allow wildlife to emigrate from areas that are overpopulated and immigrate to areas where suitable habitat is available. They also provide conduits for genetic material, reducing the potential for inbreeding.

The Halifax Green Network Plan (HGNP) identifies an Essential Corridor that passes through the WSA that connects relatively undisturbed habitat situated between Eastern Passage and Bissett Lake to an area of relatively undisturbed habitat to the east of the Salmon River. The wildlife corridor recommended in the HGNP extends in an arc from the Ross Road southwest to Carolyn's Way Park then south along Broom Brook to Cole Harbour Road (Figure 3.11). The HGNP mapping also identifies an area of Important Corridor that is found at the northern end of the WSA. This patch is not connected to any other areas identified as Important or Essential Corridors. There is also an isolated patch of Important Corridor located in the center of the WSA that is almost surrounded by the Essential Corridor. The HGNP recommends that Essential Corridors be at least 1 km wide and Important Corridors should be at least 100 m wide to facilitate movement of wildlife (Halifax Regional Municipality and O2 Planning + Design 2018).

Information collected during the field surveys suggests that the WSA currently provides habitat connectivity. American black bear tracks were observed in the Study Area. The WSA Area (286 ha) is much smaller than the average home range for a female American black bear in temperate eastern North America (approximately 33,000 ha) which would suggest that American black bears present in the Study Area must pass through the WSA and enter relatively undisturbed habitat to the north, west or south of the Study Area to meet their habitat requirements (Sadeghpour and Ginnett 2011). While development is being considered within the WSA and field surveys were limited to the area within the WSA boundaries, these boundaries should be considered porous to various species that inhabit and travel through this area. In order to support landscape connectivity, land that surrounds the WSA needs to be considered, along with the species that may traverse the general area. Maintaining connectivity between key habitat areas is vital to the success of wildlife species who require larger home ranges.

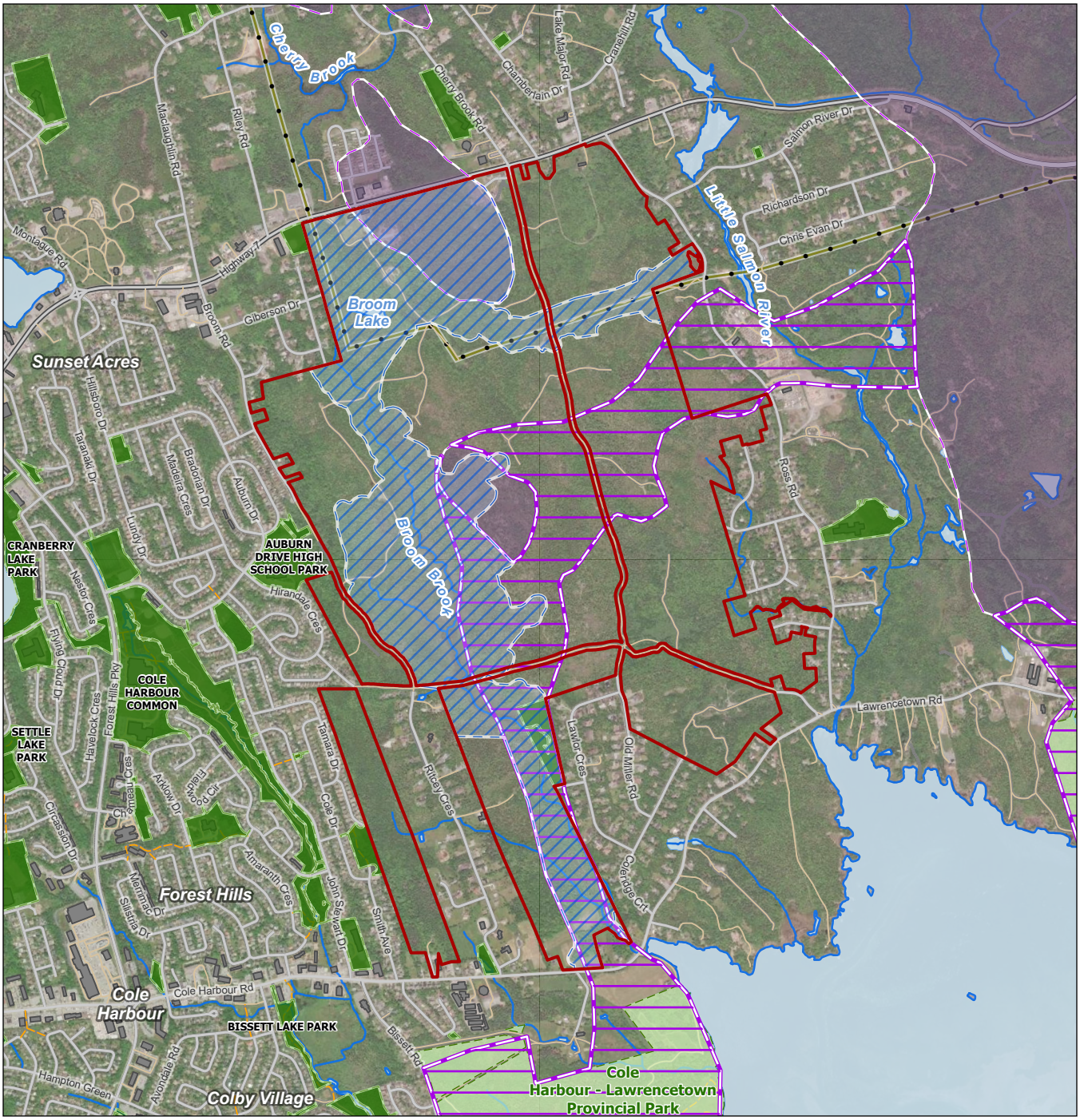
An analysis of the distribution of sensitive ecological features in the WSA such as species at risk, potential old growth forests, wetlands and watercourses has been undertaken to identify which areas of the WSA are of the greatest ecological importance and where a wildlife corridor would be most beneficial. Most of the field records of SAR and SOCC from the Study Area are from the eastern side (Figure 3.8). The species at risk habitat modelling indicates that areas that could potentially support more than three SAR are largely restricted to Broom Brook and the wetlands and riparian habitats that flank it, located in the western part of the Study Area (Figure 3.9). There is no potential old growth forest in the WSA. Patches of mature forest are scattered throughout the Study Area with the greatest concentrations

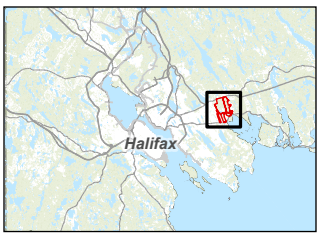
occurring in the southeastern quadrant. Wetlands are also scattered throughout the WSA; however, the greatest concentration of wetlands is found along Broom Brook. This area supports a relatively large wetland complex composed of a variety of wetland types. Broom Brook is the largest watercourse present in the WSA and has the greatest potential to support fish and other aquatic or semi-aquatic organisms.

The wildlife corridor recommended in the HGNP (Figure 3.11) would help to preserve approximately half of Broom Brook and a substantial proportion of the wetland habitat in the WSA. It also protects about half of the area that potentially supports the highest concentrations of SAR. One issue with this corridor is the fact that almost the entire width of the corridor at the point where it crosses the Ross Road is occupied by a large auto salvage facility which combined with the Ross Road may reduce the porosity of the corridor to wildlife movement. Modifications to the HGNP Essential Corridor could increase its efficacy as a wildlife corridor. Modifications would consist of extending the corridor to the west to encompass the entire wetland complex that flanks Broom Brook. In addition, the entire length of Broom Brook from Cole Harbour Road to its source at Broom Lake would be incorporated into the wildlife corridor (Figure 3.11). Areas of wetland and mature forest around Broom Lake would be incorporated into the wildlife corridor to allow it to extend to Highway 7 at the northern end of the WSA. The northern end of this spur of the wildlife corridor would abut against an undeveloped area that flanks a tributary to Cherry Brook which would provide a relatively unobstructed secondary corridor that would connect to the protected area around Lake Major.

A second spur of the wildlife corridor would extend from Broom Lake towards the Ross Road along the transmission line route that runs east/west through the WSA. This east/west spur would connect the Broom Brook corridor to the Little Salmon River and the Important Wildlife Corridor located east of the Little Salmon River. This spur would provide the east/west connectivity that the HGNP Essential Corridor was designed for. It would also protect two relatively large wetlands, one of which provides nesting habitat for Canada Warbler a SAR (Figure 3.8).

Watercourses and wetlands are important ecological features that are protected under provincial/federal legislation. Watercourses and the wetlands that are often associated with them are often used as travel routes by wildlife, and for aquatic species they are typically the only means by which they can disperse through terrestrial habitats. Given the importance of watercourses and wetlands, these features have low land suitability rankings (i.e., less favorable for development). Broom Brook is the largest stream in the WSA and extends north/south almost the entire length of the Study Area providing a natural travel route for both aquatic and terrestrial species. The riparian habitat flanking Broom Brook would be buffered 30 m to protect the stream. Broom Brook also supports an extensive wetland complex which would be difficult to develop and according to the SAR modelling could potentially support up to 12 SAR; this strongly suggests preservation of this area. HRM regulations require that wetlands associated with watercourses also be buffered. Although there are no provincial regulations that require wetland margins to be buffered, the Province of Nova Scotia does recommend that, where feasible, wetlands should be buffered in the same manner as watercourses (Government of NS 2011). The margins of wetlands in the WSA would therefore be buffered by 30 m in this corridor mapping exercise to reduce the potential for adverse effects to these wetlands from adjacent development such as hydrological or trophic level disturbances. In areas where the combined buffering of watercourses and/or wetlands along this corridor is insufficient to provide a 100 m wide corridor, additional buffering has been applied (Figure 3.11) to make the corridor at least 100 m wide.





Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 20N
2. GIS Note: *HGNP Important Corridor dataset altered. Aquatic corridor digitized from Nova Scotia Crown Share Land Legacy Trust (NSCSLLT) Wildlife Corridor Charrette Halifax Summary Report (2021).
3. Data Sources: Government of Nova Scotia, Department of Service Nova Scotia and Internal Services, NSCSLLT
4. Background: Government of Nova Scotia, Department of Service Nova Scotia and Internal Services

- Study Area
- Proposed Corridor (Stantec 2024)
- Halifax Green Network Plan Important Corridor
- Halifax Green Network Plan Essential Corridor
- Halifax Regional Municipality Parks
- Protected Wilderness Area

Utilities
- Transmission Line

Other Features
- Highway
- Road
- Resource / Seasonal Road
- Trail
- Waterway
- Waterbody
- Buildings

0 250 500 750 Metres

(At original document size of 8.5x11)
1:25,000

N

Stantec

Project Location
Halifax Regional Municipality, Nova Scotia

Prepared by SChubbs on 2024-05-07

Client/Project
Halifax Regional Municipality
Future Serviced Communities
Background Studies

Fig ID: 160410459_025

Figure No.
3.11

Title
Proposed Landscape Connectivity Options for WSA

\\ca0213-pp\fss01\work_group\1214\active\160410459\gis_data\mapping\ArcGIS Pro\HRM_SAR_workingMapping\HRM_SAR_HabitatAndCorridor.aprxRevised: 2024-05-10 By: schubbs

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3.6 Surficial and Bedrock Geology

A desktop assessment was conducted using provincial bedrock and surficial geology mapping and GIS layers to delineate and inventory the acid generating potential of bedrock and the amount of overburden that may be covering the bedrock (i.e., surficial geology). An inventory of acid rock potential was developed for the WSA using publicly available GIS data, including surficial and bedrock geologic mapping and acid-rock drainage (ARD) risk mapping developed for Nova Scotia. The reported depth to the water table in the vicinity of the Study Area was estimated through an assessment of existing groundwater wells using data gathered from the NSECC Well Logs Database (NSECC 2022).

The presence of sulphide-bearing rock has land-use planning implications as disturbance during development/construction can expose the bedrock to air and water, which has the potential to leach sulphuric acid. This leaching can result in decreased pH of associated waters, which can then result in mobilization of metals and adversely affect aquatic habitats. Increased costs for development can be incurred as excavated material in areas of known sulphide-bearing rock must be managed and disposed of according to Sulphide Bearing Material Disposal Regulations (NSECC 2021).

3.6.1 BEDROCK GEOLOGY

The WSA is underlain by the Cambrian to Early Ordovician age metamorphosed sedimentary bedrock of the Goldenville Group, and to the lesser extents, by the Halifax Group (White et. al. 2014; Figure 3.12). In this area, the Goldenville Group consists of the Taylors Head and Beaverbank Formations. The Taylors Head Formation consists of grey, thickly bedded, and weakly cleaved metasandstone locally interlayered with green, cleaved metasiltstone and rare black to rusty slate and is considered non-acid producing. The Beaverbank Formation overlies the Taylors Head Formation and consists of grey to black, cleaved metasiltstone interbedded with minor thin, light grey metasandstone and black graphitic slate and is considered potentially acid producing (White and Goodwin 2011).

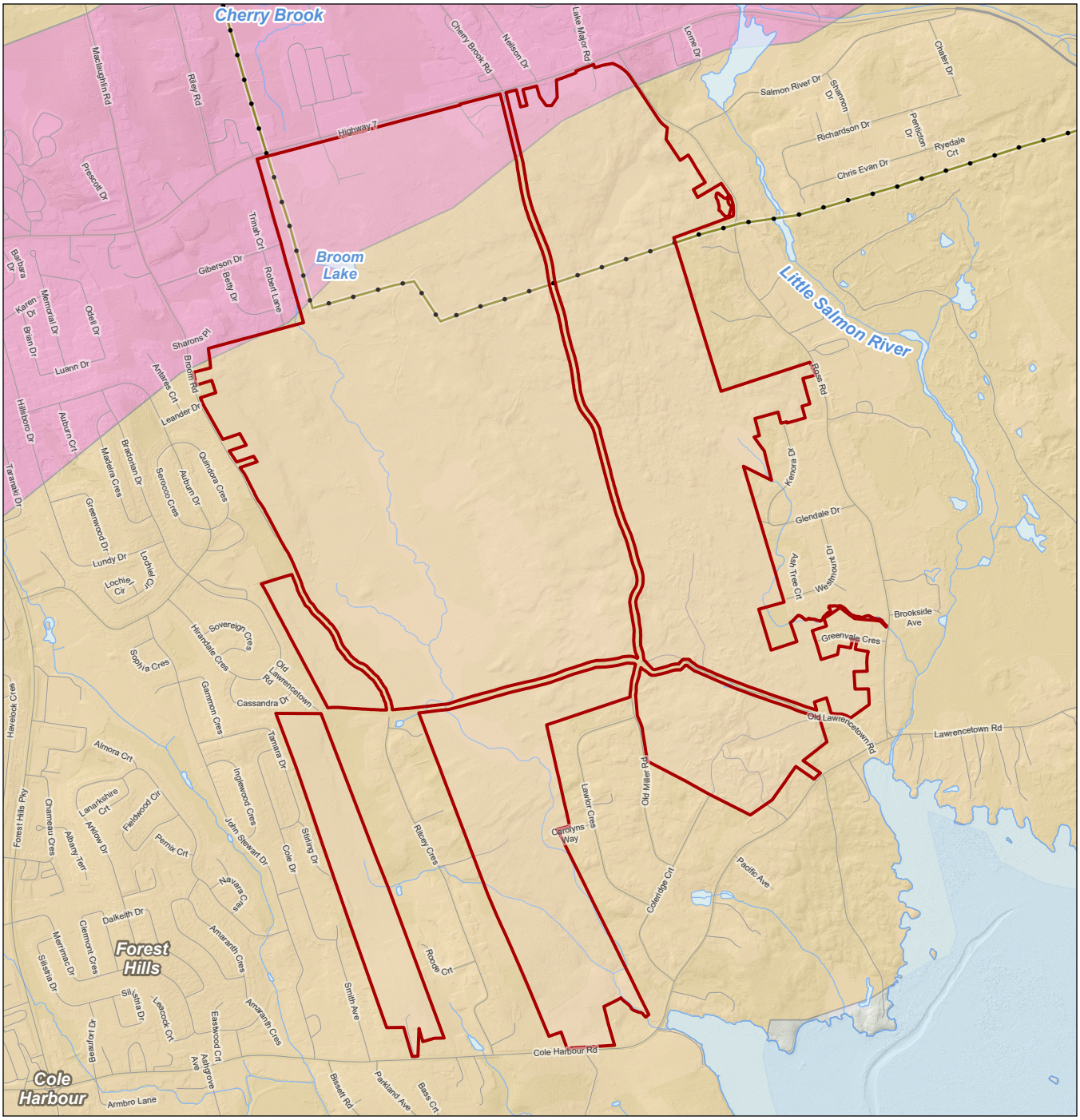
The Halifax Group consists of the Bluestone and Cunard Formations. The Cunard Formation consists of black and rusty slate with thin beds and lenses of black metasiltstone. This formation typically contains abundant sulphide-rich pyrrhotite and pyrite and is considered to have the highest acid-producing potential for bedrock in the HRM (White and Goodwin 2011). The Bluestone Formation is not located in the vicinity of the development areas.

Detailed bedrock geology mapping is not available in the area immediately surrounding the WSA. Regional mapping indicates that the WSA is underlain by the Goldenville Group with the northwest edge of the development area intersecting the Halifax Group (Figure 3.12). However, the groups can be sub-divided based on detailed bedrock geology from adjacent map sheets (White et al. 2014). The WSA is primarily underlain by the non-acid producing Taylors Head formation, but the Beaverbank Formation is inferred to exist as a geological contact between the two groups shown in Figure 3.12.

3.6.2 SURFICIAL GEOLOGY

A review of surficial geology mapping for the area (Stea et al. 1992) was carried out to identify areas of exposed bedrock, which may present a greater risk for ARD during development (Figure 3.13).

Surficial geology in the vicinity of the WSA consists of glaciofluvial deposits and stony and silty till plains ranging from approximately 2-20 m thick. No exposed bedrock was mapped in the vicinity of the development area.



Study Area
Halifax Group
Goldenville Group

Utilities
Transmission Line

Other Features
Highway
Road
Waterway
Waterbody

0 250 500 Metres
(At original document size of 8.5x11)
1:21,000

N

Notes
1. Coordinate System: NAD 1983 CSRS UTM Zone 20N
2. Data Sources: Government of Nova Scotia, Department of Natural Resources and Renewables
3. Background: Government of Nova Scotia Department of Service Nova Scotia and Internal Services; Nova Scotia Department of Natural Resources and Renewables

Stantec

Project Location
Halifax Regional Municipality, Nova Scotia

Prepared by IPodrug on 2024-01-05
Revised by NWhite on 2024-04-03
Revised by SChubbs on 2024-05-09

Figure ID: 003

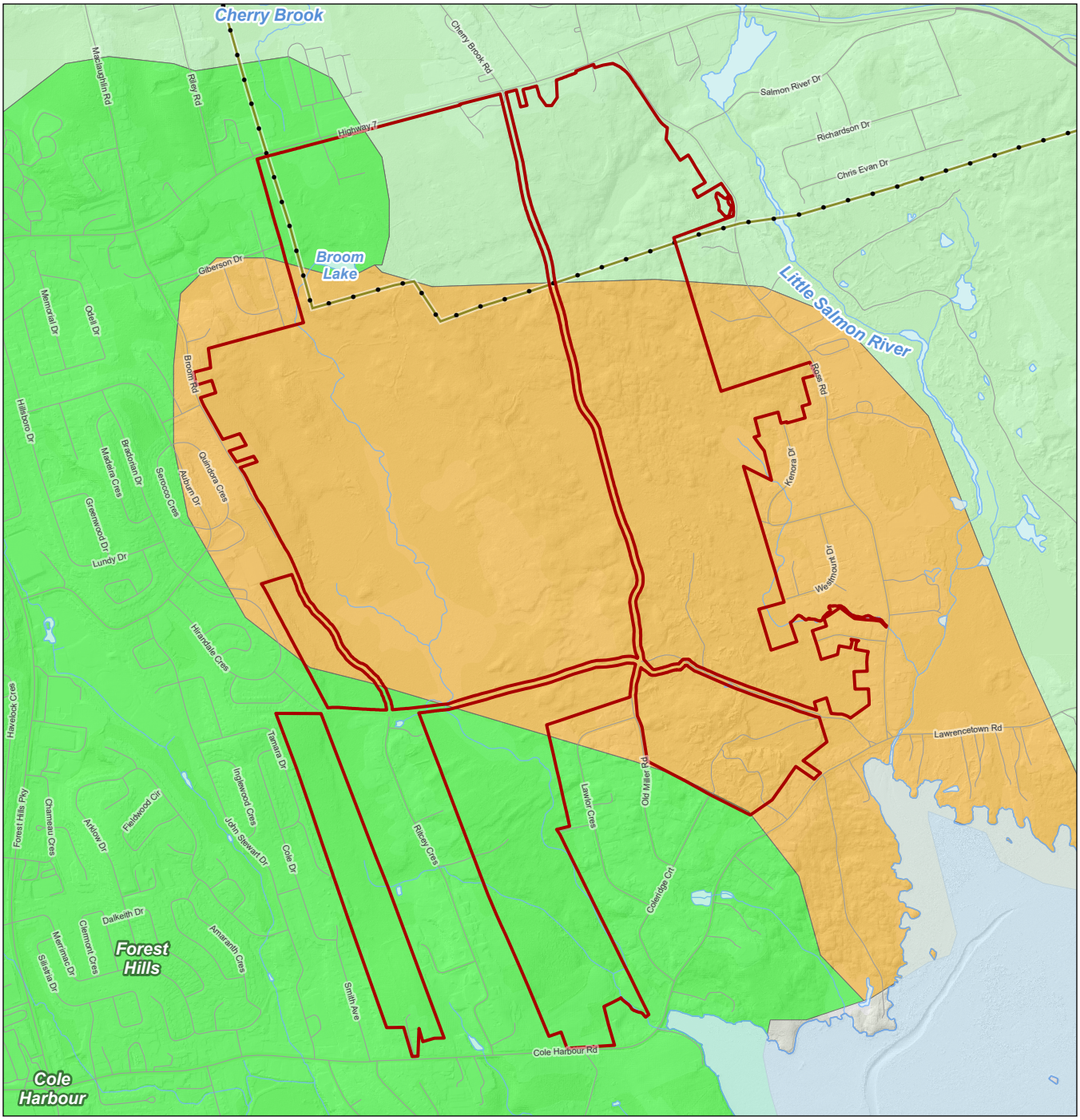
Client/Project
Halifax Regional Municipality
Future Serviced Communities
Background Studies

Figure No.
3.12

Title
Bedrock Geology - WSA

\\ca0213-pp\fs01\work_group\1214\active\160410459\gis_data\mapping\ArcGIS Pro\HRM FCM 2022.aprx Revised: 2024-05-10 By: schubbs

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Study Area

Surficial Geologic Units

- Glaciofluvial Deposits (Kames and Eskers)
- Stony Till Plain (Ground Moraine)
- Silty Till Plain (Ground Moraine)

Utilities

- Transmission Line

Other Features

- Highway
- Road
- Waterway
- Waterway

0 250 500 Metres

(At original document size of 8.5x11)
1:21,000

N

Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 20N
2. Data Sources: Government of Nova Scotia, Department of Natural Resources and Renewables
3. Background: Government of Nova Scotia Department of Service Nova Scotia and Internal Services; Nova Scotia Department of Natural Resources and Renewables

Stantec

Project Location
Halifax Regional Municipality, Nova Scotia

Prepared by IPodrug on 2024-01-05
Revised by NWhite on 2024-04-03
Revised by SChubbs on 2024-05-10

Client/Project
Halifax Regional Municipality
Future Serviced Communities
Background Studies

Figure ID: 002

Figure No.
3.13

Title
Surficial Geology - WSA

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3.6.3 DEPTH TO WATER TABLE

Depth to water table in the WSA was estimated using static water levels in existing drilled wells provided in the NSECC Well Logs Database (NSECC 2022). While static water levels in drilled wells can be used to infer the depth to water table, they are not considered a precise representation of the water table, particularly with partially confined or confined aquifer conditions, if the water level is measured prior to full recovery in the wells and if water levels are measured during different seasons. Statistical summaries of static water levels in existing groundwater wells within 100 m of the WSA are shown in Table 3.16**.**

Table 3.16 Static Water Level Summary in Existing Groundwater Wells

Development Area	Number of Wells[1]	Minimum Static Water Level (mbtoc[2])	Maximum Static Water Level (mbtoc)	Average Static Water Level (mbtoc)	Median Static Water Level (mbtoc)
Westphal	12	0.91	12.18	4.01	3.04
Notes: 1 – Includes wells with static water level data within the WSA boundary and any well within a 100 m radius of the WSA boundary 2 – mbtoc=metres below top of casing					

The NSECC Well Logs Database generally indicates that static water levels in drilled wells are shallow (generally within 6 m of ground surface). Shallow groundwater table is also inferred from nearby surface water bodies and wetlands in the vicinity of the development area.

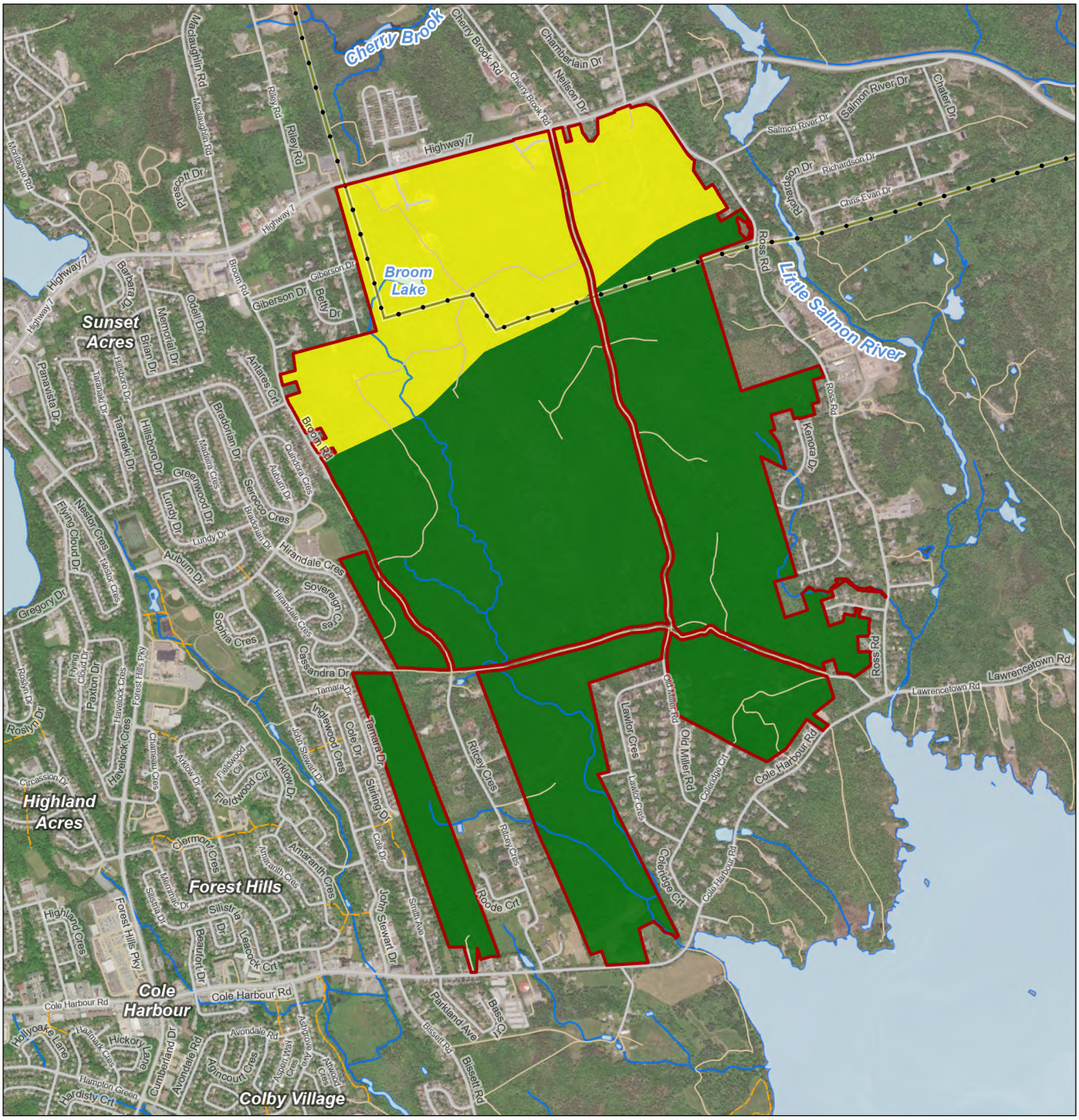
3.6.4 LAND SUITABILITY ANALYSIS – GEOLOGY

For the geology component of the land suitability analysis, bedrock was classified based on its acid producing potential (Table 3.17; Figure 3.14). In the context of ARD, surficial geology is primarily relevant where overburden thickness is insufficient to prevent exposure of potentially acid producing bedrock to air and/or water during development. Information available from provincial mapping provide a wide range of thicknesses for each surficial geology unit, so surficial geology was classified primarily on the acid producing potential of the bedrock underlying the overburden.

Surficial and bedrock geology, as it relates to potential acid generation, is only one of many factors that must be considered when evaluating land suitability for development. The current assessment of surficial and bedrock geology is based on a desktop review of available provincial mapping, and does not purport to be definitive regarding development risks and opportunities. If sulphide-bearing rock is encountered during development, it must be managed and disposed of according to Sulphide Bearing Material Disposal Regulations (NSECC 2021).

Table 3.17 Surficial and Bedrock Geology – Land Suitability Ranking Framework

Layer	Land Suitability Ranking		
	1 - Low suitability for development	**2 - Moderate suitability for development**	**3 - Higher suitability for development**
Bedrock Geology	Cunard Formation	Beaverbank Formation	Taylors Head Formation
Surficial Geology	Exposed bedrock in a potentially acid-producing formation	Soil greater than 2 m overlying potentially acid-producing bedrock	Non acid-producing bedrock





Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 20N
2. Data Sources: Stantec; Government of Nova Scotia, Department of Service Nova Scotia and Internal Services
3. Background: Government of Nova Scotia, Department of Service Nova Scotia and Internal Services

Study Area

Geology Land Suitability Analysis

- 3 (High)
- 2
- 1 (Low)

Transportation

- Highway
- Road
- Resource / Seasonal Road
- Trail

Utilities

- Transmission Line

Other Features

- Waterways
- Waterbodies

0 250 500 Metres

(At original document size of 8.5x11)
1:24,000

N

Stantec

Project Location
Halifax Regional Municipality, Nova Scotia

Prepared by NWhite on 2024-03-08
Revised by NWhite on 2024-05-10

Client/Project
Halifax Regional Municipality
Future Serviced Communities
Background Studies

Fig ID: 160410459_032

Figure No.
3.14

Title
Geology Land Suitability Analysis - WSA

HRM FCM 2022.aprx Revised: 2024-05-10 By: niwhite

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3.7 Topography

Stantec processed LiDAR data provided by HRM to classify slopes within the WSA. This was primarily a desktop exercise using ESRI ArcMAP, with considerations from the field (field crews noted any significant slopes along watercourses and wetlands).

3.7.1 LAND SUITABILITY ANALYSIS – TOPOGRAPHY

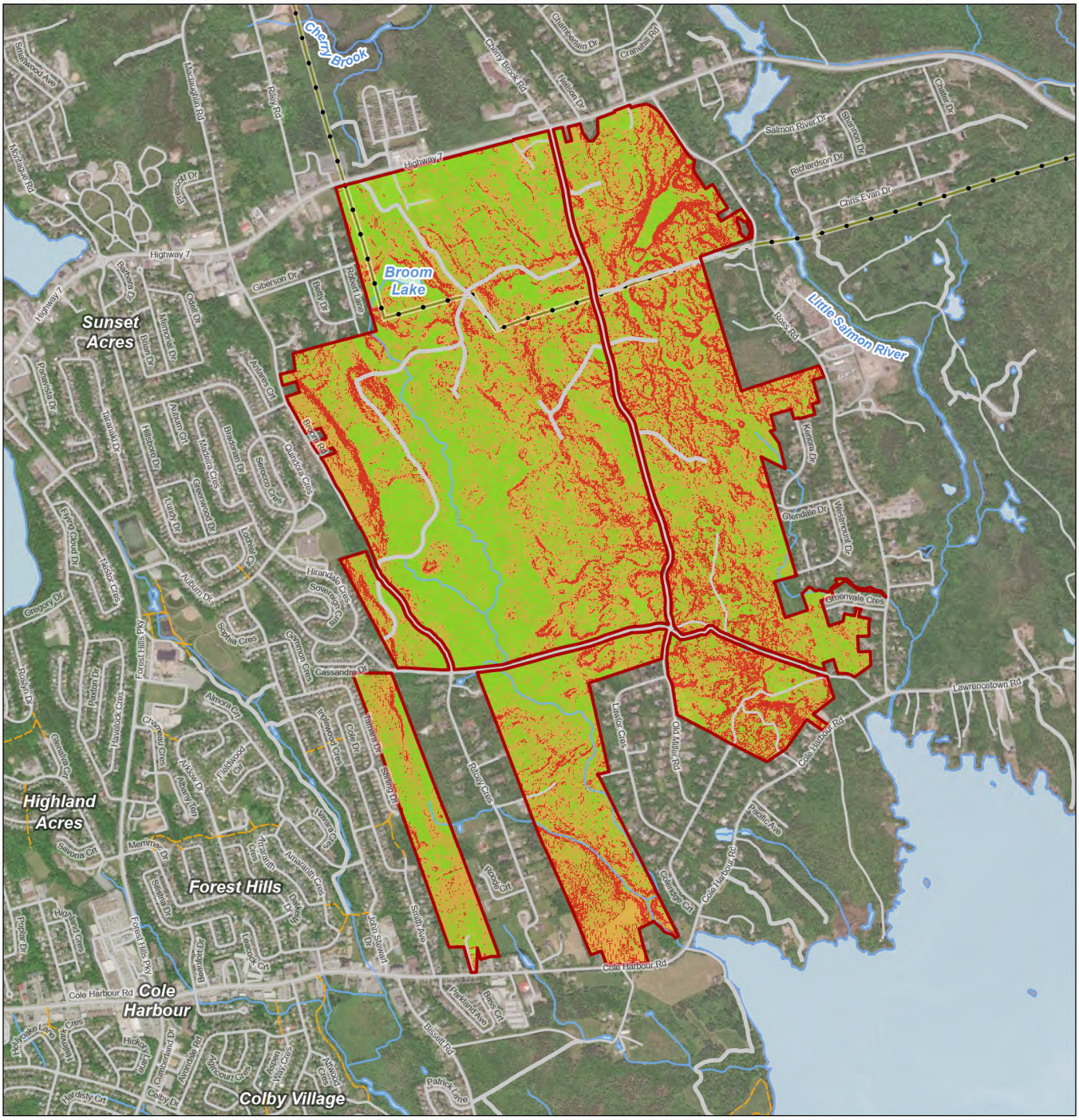
Steep slopes can be associated with environmental features such as rock outcrops, shallow soils, and groundwater springs. These features can have various impacts on development planning including surface water flow, water quality, erosion, and sediment patterns. These factors also influence microclimate which contributes to vegetation growth and succession. These unique features can also provide niche habitat for SAR, specifically bank swallows and bats.

For this land suitability analysis, steeper slopes were ranked as the lowest priority for potential development while the relatively flatter topography is ranked higher for potential development (Table 3.18). Slopes have been classified into three categories based on their percent rise: 0%-5%, 5.01%-15% and >15%. Slope mapping can be found below in Figure 3.15.

Slope is only one of many factors that must be considered when evaluating land suitability for development. The current assessment of topography is based primarily on a desktop review of available provincial mapping, and does not purport to be definitive regarding development risks and opportunities. Stantec recommends a slope review be conducted prior to finalizing consultation planning.

Table 3.18 Topography – Land Suitability Ranking Framework

Layer	Land Suitability Ranking		
	1 - Low suitability for development	2 - Moderate suitability for development	3 - Higher suitability for development
Slope	>15%	5.01%-15%	0%-5%



Study Area

Slope Analysis (Percent Rise)

- 0 - 5%
- 5.01 - 15%
- >15%

Transportation

- Trail
- Highway
- Other Road

Utilities

- Transmission Line

Other Features

- Waterway
- Waterbody

0 250 500 Metres

(At original document size of 8.5x11)
1:24,000

N

Stantec

Project Location
Halifax Regional Municipality, Nova Scotia

Prepared by IPodrug on 2023-11-09
Revised by NWhite on 2024-05-17

Client/Project
Halifax Regional Municipality
Future Serviced Communities
Background Studies

Fig ID: 160410459_014

Figure No.
3.15

Title
Slope Land Suitability Analysis - Westphal

Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 20N
2. Data Sources: Government of Nova Scotia, Department of Service Nova Scotia and Internal Services
3. Background: Government of Nova Scotia, Department of Service Nova Scotia and Internal Services

HRM FCM 2022.aprx Revised: 2024-05-29 By: niwhite

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3.8 Contaminated Sites

Stantec conducted a contaminated sites review of the WSA. The purpose of the review was to assess if evidence of potential or actual environmental contamination exists in connection with the Study Area, because of current or past activities on the Study Area or neighboring properties.

3.8.1 METHODOLOGY

The contaminated sites review consisted of the following:

- records review including, but not limited to, aerial photographs, LiDAR imagery
- provincial government regulatory search for the Study Area
- a site visit (relevant features were recorded during the wetland delineation; a site visit specifically to document potential environmental contamination concerns was not completed)
- evaluation of information

The review does not include sampling or testing of air, soil, groundwater, surface water or building materials. Nor does it include a review or audit of operational environmental compliance issues, or of any environmental management systems, which may exist for the Study Area.

Desktop mapping and field verification for the Study Area took place in spring/summer 2023. Stantec field staff documented the location of sites that exhibited characteristics of contamination as well as incidental evidence of anthropogenic activities (e.g., illegal dumping, camp sites). Existing structures were not accessed, and private properties occupied and unoccupied were not evaluated in the field. The Study Area and readily visible and publicly accessible portions of adjoining and neighboring properties were examined for the presence of potential sources of environmental contamination. No interviews were conducted with persons associated with the Study Area.

3.8.2 DESKTOP REVIEW

Aerial Photography / LiDAR Review

The WSA is roughly 78.5 ha in size and located within HRM boundaries in Halifax County, Nova Scotia. The Study Area includes HRM owned undeveloped lands, utility corridors, commercial proprieties along Highway 7, and Broom Lake on the northwestern portion.

From at least 1931 until the early 1950s the Study Area was generally undeveloped woodland with some agricultural properties along Highway 7.

By the early 1960s an apparent gravel pit appears on the southern portion of the Study Area on Property Identifier (PID) 00407601. By the mid-late 1960s residential properties and a “racetrack” (oval road/path feature but no track buildings or accommodation for spectators) and associated buildings (PID 40166282) were developed on the northern portion of the Study Area, along Highway 7.

In the mid 1970s the southern portion of the Study Area appears to have clearing/agricultural development on PID 40143166 along Cole Harbour Rd. Residential development has continued along the northern portion of the Study Area, along Highway 7.

By the early 1980s, along the northern portion of the Study Area the Akoma Family Centre including playgrounds are present on 1 & 2 Dr. Donald Skeir Way (PID 40150559) and commercial properties appear to have been developed (The Opus Café and Catering, Henry G Bauld Centre, former Nova Scotia Home for Colored Children-PID 40150567). Debris piles are noted in the area near the intersection of Highway 7 and Ross Road (PID 40166308), adjacent to the racetrack. The southern portion of the Study Area appears similar to the 1970s.

The Study Area appears similar through to the early 2000s, with some roadways/paths crosscutting through the central area of the Study Area, in otherwise treed/undeveloped land.

LiDAR imagery shows the presence of potential berms, likely the result the apparent gravel pit that appears on the southern portion of the Study Area on PID 00407601.

The following concerns regarding potential environmental contamination issues were noted:

- Fill of unknown origin may have been used either as part of the development or when the buildings were demolished throughout the Study Area.
- Evidence of human activity on PID 00407601 (gravel pit) and PID 40143166 (possible agricultural land use).
- The presence of debris associated with the racetrack (PID 40166282).

Regulatory Request

NSECC was queried for information about the WSA and received NSECC's Environmental Registry response. The information is summarized below and will be appended to the final report.

Regulatory Infractions Search: NSECC has provided no records of infractions for the Study Area.

Environmental Investigations: Information pertaining to site assessments, risk assessments, remedial work or other environmental investigations registered with NSECC for the Study Area are available only through "Freedom of Information" requests which require a ninety-day turn-around time. Ms. Tina Skeir of NSECC indicated the following files requiring a "Freedom of Information and Protection of Privacy" (FOIPOP) request were on file for the following properties, which fall within the boundary of the Study Area:

- A contaminated sites investigation/enforcement file (file #333000-35-BED-2388952) containing correspondence, remediation report, incident report soil analysis, inspection reports, and soil sample report pertaining to 1220 Highway 7, Cole Harbour (PID 40166308) was located.
- A subdivision file (file #96000-32-BED-2008-2411) pertaining to 1489 Cole Harbour Road, Cole Harbour (PID 40143166) was located.

These FOIPOP records may provide additional information relevant to the proposed development of the WSA.

Tank Registrations: No tanks were registered to the Study Area based on information provided from the NSECC Petroleum Storage Tank Registry.

Other:

990 Main Street, Westphal, portion of PID 40150567 (Kent Homes Ltd.):

Completion of Work Form for On-site Sewage Disposal System Installers dated January 27, 2010 was reviewed for a holding tank installation. The document indicates that "the tank has been installed in accordance with manufacturers recommended procedures". Additional documents related to the disposal system included Applications, Approvals, Field Inspection Report, and Installation Form.
On-site Sewage Disposal Systems notification receipt dated March 23, 2022 was reviewed.
On-site Sewage Disposal Systems notification receipt dated August 29, 2023 was reviewed.

These documents related to 990 Main Street, Westphal, portion of PID 40150567, are not expected to represent a potential environmental concern to the WSA.

35 Wilfred Jackson Way, Westphal, PID 40150567:

On-site Sewage Disposal Systems notification receipt dated December 4, 2020 was reviewed.

This document related to 35 Wilfred Jackson Way is not expected to represent a potential environmental concern to the WSA.

1016 Highway 7, Westphal, PID 40150559:

On-site Sewage Disposal Systems notification receipt dated June 18, 2020 was reviewed. An On-site Sewage System Malfunction Inspection Form dated May 11, 2020 was also reviewed.

This notification related to sewage disposal systems associated with to 1016 Highway 7 is not expected to represent a potential environmental concern to the WSA.

1224 Highway 7, Westphal, PID 40166308:

Environmental Act Directive dated September 9, 2023 was reviewed. The Directive stated "Retain a Site Professional to assess and remediate the petroleum hydrocarbon contamination as 1224 Highway #7 in Westphal, NS in accordance with the Contaminated Site Regulations. An assessment and remediation report prepared by a Site Professional documenting these efforts must be submitted to the Department by November 1, 2013.

The reported presence of petroleum hydrocarbon contamination at 1224 Highway 7 represents an actual environmental concern to the WSA.

No civic address, PID 00407601:

Correspondence dated March 26, 2018 related to a "Request for Subdivision Comment – on-site sewage lands of Lewis W. MacEachern" indicating that more information was required.
A letter from Westside Trucking, dated April 2, 2018 states that the property was inspected and that no wetlands or watercourses were observed.

These documents related to PID 00407601 are not expected to represent a potential environmental concern to the WSA.

3.8.3 FIELD RESULTS

The following environmental concerns were noted during the site visit and are noted on Figure No. 3.16-Contaminated Sites in the WSA:

- Potential Contaminated Site S1: PID 40150567-area of debris (plastic, and car bench seat) were noted at 990 Main Street.
- Potential Contaminated Site S2: PID 40150567-area of debris (construction materials) was noted in the treed area behind 35 Wilfred Jackson Way.
- Potential Contaminated Site S3/S4/S5: PID 40150567-various areas of debris (car parts, metal, siding, propane tanks, plastic, and general waste) were noted along an access road/path.
- Potential Contaminated Site S6: PID 41310913-a hunting blind was noted along a stream.
- Potential Contaminated Site S7: PID 41310913-various debris was noted in the northeastern corner of the property.
- Potential Contaminated Site S8: PID 00406579-on the southern portion of the Study Area-tents behind Sterling Drive Park.
- Potential Contaminated Site S9: PID 00406579-on the southern portion of the Study Area-debris (vehicle parts) off Roode Court.
- Potential Contaminated Site S10: PID 00460733-along an access road/path on the southern portion of the Study Area-vehicle parts behind the gravel pit.
- Potential Contaminated Site S11: PID 00460733-along an access road/path on the southern portion of the Study Area-debris behind the gravel pit (metal, glass, and fill).
- Potential Contaminated Site S12 and S13: PID 00460733-along an access road/path on the southern portion of the Study Area-debris in the undeveloped/treed area off Glendale Drive. (vehicle parts)
- Potential Contaminated Site S14: PID 00460733-on the southern portion of the Study Area off Westmount Drive, behind Ash Tree Court-evidence of human activity (patio chairs, gravel pad, and remnants of wood and tarp structure).
- Potential Contaminated Site S15: PID 40070575-an abandoned wood cabin at the southeastern corner of the property.
- Potential Contaminated Site S16: PID 40195877-metal debris along the eastern property line.

3.8.4 INFLUENCE ON LAND SUITABILITY

The study has revealed evidence of potential and/or actual environmental contamination associated with the Study Area. The following environmental concerns were identified:

- Fill of unknown origin may have been used either as part of the development or when the buildings were demolished throughout the Study Area.
- The presence of human activity (hunting blind, abandoned wood cabin, various areas of debris, patio chairs) throughout the Study Area, generally along access roads/paths, in undeveloped areas.
- 1220-1224 Highway 7, Westphal (PID 40166282 and PID 40166308)-on the northern portion of the Study Area-former racetrack and debris noted in aerial photos, and a contaminated sites investigation/enforcement file (file #333000-35-BED-2388952) containing correspondence, remediation report, incident report soil analysis, inspection reports, and soil sample report.
- The presence of a gravel pit on the southern portion of the Study Area on PID 00407601.

Due to the potential presence of environmental contamination within the Study Area, if material is exposed or is planned to be excavated and removed from the Site during redevelopment, it should be tested to confirm the handling and disposal requirements. Additional environmental assessment and reporting to NSECC under the Contaminated Sites Regulations may be required as part of the development process. There are no constraints to development provided the NSECC Regulations are followed.





Notes
1. Coordinate System: NAD 1983 CSRS UTM Zone 20N
2. Data Sources: Government of Nova Scotia, Department of Service Nova Scotia and Internal Services
3. Background: Government of Nova Scotia, Department of Service Nova Scotia and Internal Services

- Potential Contaminated Site
- NSECC File (FOIPOP, Tank Registration, other)
- NSECC Contaminated Sites File
- Study Area

Utilities
- Transmission Line

Transportation
- Highway
- Road
- Resource / Seasonal Road
- Trail

Other Features
- Waterway
- Racetrack
- Waterbody
- Property Boundary

0 250 500 Metres
(At original document size of 8.5x11)
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Stantec

Project Location
Halifax Regional Municipality, Nova Scotia

Prepared by NWhite on 2024-04-10

Client/Project
Halifax Regional Municipality
Future Serviced Communities Background Studies

Fig ID: 160410459_036

Figure No.
3.16

Title
Contaminated Sites in the WSA

\\ca0213-pp\fs01\work_group\1214\active\160410459\gis_data\mapping\ArcGIS Pro\HRM_2024_Contaminated_Sites\HRM_2024_Contaminated_Sites.aprx: Fig_3.16_HRM_FCM_036_Contaminated_SitesRevised: 2024-05-10 By: niwhite

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3.9 Areas of Cultural Significance

Stantec completed an archaeological and cultural study that included an Archaeological Resource Impact Assessment (ARIA) conducted under Heritage Research Permit (HRP) A2023NS190 to document areas of archaeological potential within the WSA. The scope of the assessment included a site walkover carried out on November 20, 21, 22, and 29 2023, and a background study (including environmental setting, Pre-Contact and Historic Period land use, property history, and past archaeological assessments). This archaeological assessment was conducted to provide a baseline for future study, informed by Mi'kmaq knowledge. The results of the ARIA are detailed in a final report under a separate cover to be submitted to the Nova Scotia Department of Communities, Culture, Tourism, and Heritage to fulfill the requirements of the HRP. Refer to Appendix D for the full ARIA report and recommendations.

The property on the corner of Highway 107 and the west side of Old Miller Road was identified as the Nova Scotia Home for Colored Children (NSCC) and now occupies the (Akoma) properties situated on 212 acres of land and located within the PDA. The NSCC was originally incorporated under a private members bill in the Nova Scotia House of Assembly in April of 1915 (NS 2019). The school was set up to take up provision of care for neglected and destitute African Nova Scotian children. By 1919 a location was identified for the Home and a farm site near the African Nova Scotia Community of Preston and the property was purchased by the province (NS 2019).

In June of 2022 the Akoma property at 18 Wilfred Way, Westphal, was added to the Registry of Heritage Properties for Halifax Regional Municipality (HRM 2022). A research report written by Beaupre-McPhee, a research planner with HRM, was submitted as a part of the application. The research report gives a thorough background on the property and is referenced as a stand-alone document (Beaupre-McPhee 2022).

The Registry of Heritage Property for the Halifax Regional Municipality requires the following actions to be taken, as referenced in the Notice of Registration of Heritage Area Form B:

a. no demolition or substantial alteration in the exterior appearance may be undertaken from the date of registration unless an application, in writing, for permission is submitted to the Council and the application is granted with or without conditions; or
b. where an application is not approved, the owner may make the alteration described in his or her application or carry out the proposed demolition at any time after three years but not more than four years from the date of application.

3.10 Summary of Land Suitability Analysis

Stantec has prepared a summary of the land suitability analysis which integrates results from the environmental components that were studied for the WSA. The objective of the land suitability analysis was to determine what portions of the Study Area are potentially most suitable for new community development based on a desktop and field analysis of these components. Note that not all areas within the Study Area (Figure 3.1) are being considered for future development (e.g., if they are privately owned and/or are already developed).

It is important to note that this is not an exhaustive analysis of all parameters that could influence whether or not a given location is amenable for development. It is also not possible to definitively declare which parameters are most important in determining whether an area is suitable for development. Therefore each parameter used in the summary analysis is equally weighted and caution should be used when applying the combined analysis for planning purposes. In Stantec's opinion, it is recommended that planners consider the results, including regulatory requirements and management implications, for each component separately for a more useful representation of development opportunities and constraints.

Sections 3.2 through 3.8 describe desktop and field results followed by details about how each environmental component was evaluated from a land suitability perspective. Suitability for development was generally ranked as follows:

- a score of 1 indicates low suitability for development
- a score of 2 indicates moderate suitability for development
- a score of 3 indicates high suitability for development

Lower scores generally correspond to areas with higher ecological function, making them generally more suitable for conservation purposes and potentially less suitable for development. Conversely, higher scores indicate lands that are potentially less desirable for conservation efforts and potentially more suitable for development. It is important to note that many factors, in addition to those addressed throughout this report, contribute to suitability for development and/or conservation, including views expressed by members of the public, other stakeholders and Indigenous groups. Therefore, the information presented in this summary should not be viewed in isolation.

This section consists of a combined summary of all data layers used in the previous LSA sections divided into two separate sections which offer the best opportunity for a meaningful combination: 1) biological components and 2) geology/topography components. Another key component that should inform development is landscape connectivity, which is discussed in Section 3.5. While it is noted that landscape connectivity coincides with other biological components explicitly considered in the sections above and this summary (i.e., watercourses, wetlands, forest habitat/SAR), Section 3.5 considers these factors in a holistic way regarding wildlife movement and sustainability.

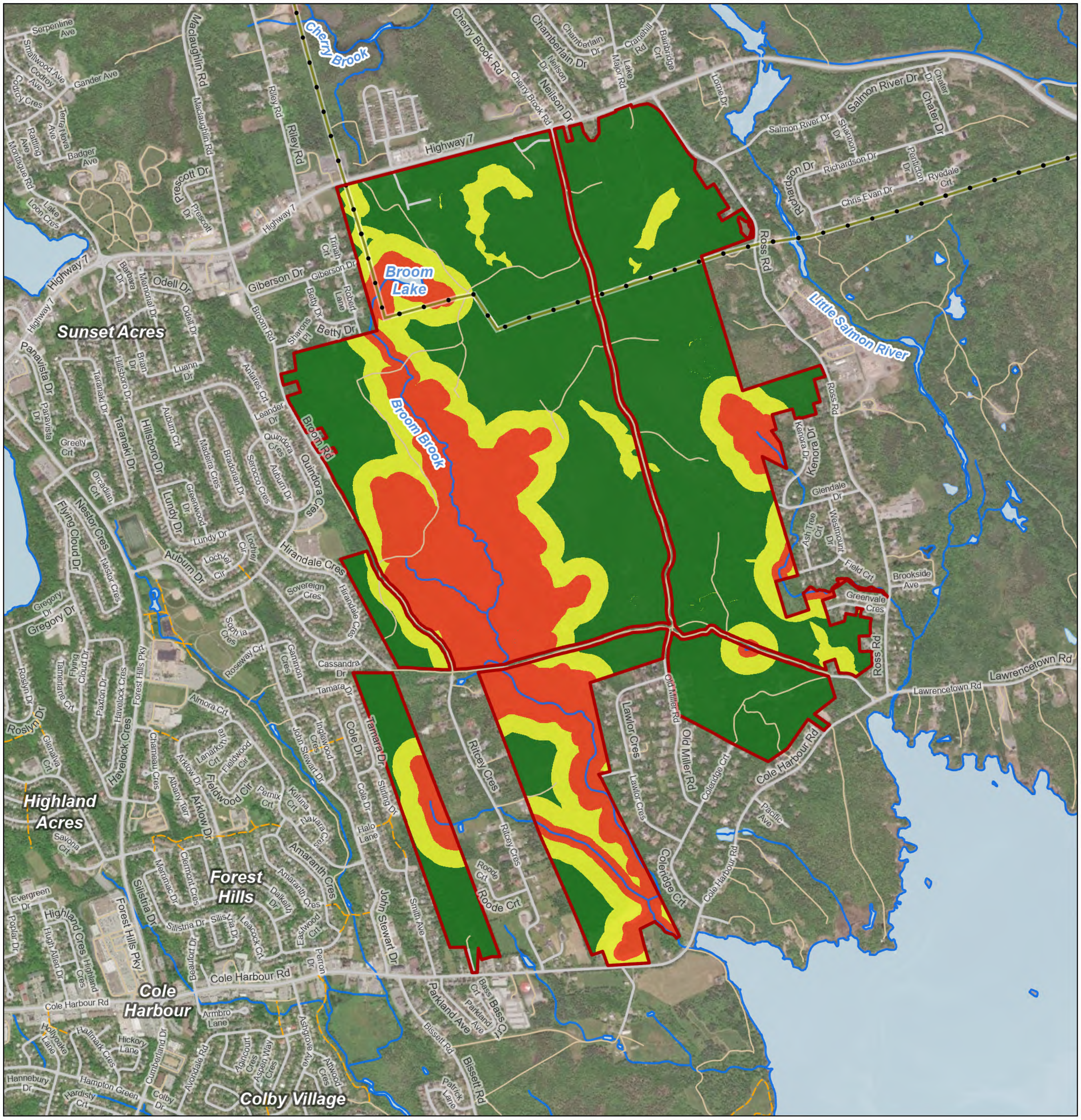
3.10.1 Biological Components

This section combines the LSA figures for wetlands (Section 3.2.1; Figure 3.3), watercourses (Section 3.3.2; Figure 3.6) and forest habitat and species at risk (Section 3.4.4; Figure 3.10).

Nineteen wetlands were identified within the WSA and all were evaluated using WESP (Table 3.1). Further evaluation and permitting are highlighted in Section 3.2.2.

The forest habitat and species at risk analysis combines two layers: the, Forest Maturity and Forest Succession and Species at Risk. For the forest maturity layer, 106 forest inventory polygons visited during field surveys were classified according to the Nova Scotia FEC system (Table 3.13). Where age is not determined in the field due to various constraints, the maturity class from the FEC or age from the NSDNRR Forest Inventory was used. The species at risk layer was created based on incidental observations within the Study Area as well as ACC DC records within 5 km of the WSA. The presence of individual SAR was not used exclusively to evaluate the presence and distribution of SAR within the WSA since it was not feasible to conduct comprehensive investigations to detect all individuals of all SAR species that may be present at the WSA. Instead, SAR that are or could potentially be present in the WSA were identified from both the results of the field surveys and from AC CDC records of SAR reported within 5 km of the WSA. Where matches were found between SAR habitat preferences and habitats mapped in the WSA, those species were considered potentially present and reflected in the LSA mapping.

Each of the three LSA figures for the biological components have been weighted and combined to show the overall summary LSA of biological components (Figure 3.17). Stantec manually adjusted the weighting of policy-protected constraints, including established environmental buffers such as watercourse setbacks and wetlands intersected by watercourses. These features were deemed to have low development suitability and were manually emphasized as indicated by the red shading in Figure 3.17.





Study Area

Land Suitability Score

- 3 (High)
- 2
- 1 (Low)

Utilities

- Transmission Line

Transportation

- Highway
- Road
- Resource / Seasonal Road
- Trail

Other Features

- Waterway
- Waterbody

0 250 500 Metres

(At original document size of 8.5x11)
1:24,000

N

Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 20N

2. Data Sources: Stantec; Government of Nova Scotia, Department of Service Nova Scotia and Internal Services

3. Background: Government of Nova Scotia, Department of Service Nova Scotia and Internal Services

Stantec

Project Location
Halifax Regional Municipality, Nova Scotia

Prepared by NWhite on 2024-03-20
Revised by NWhite on 2024-05-10

Client/Project
Halifax Regional Municipality
Future Serviced Communities
Background Studies

Fig ID: 160410459_035

Figure No.
3.17

Title
Land Suitability Analysis of Biological Components - WSA

HRM FCM 2022.aprx Revised: 2024-05-10 By: niwhite

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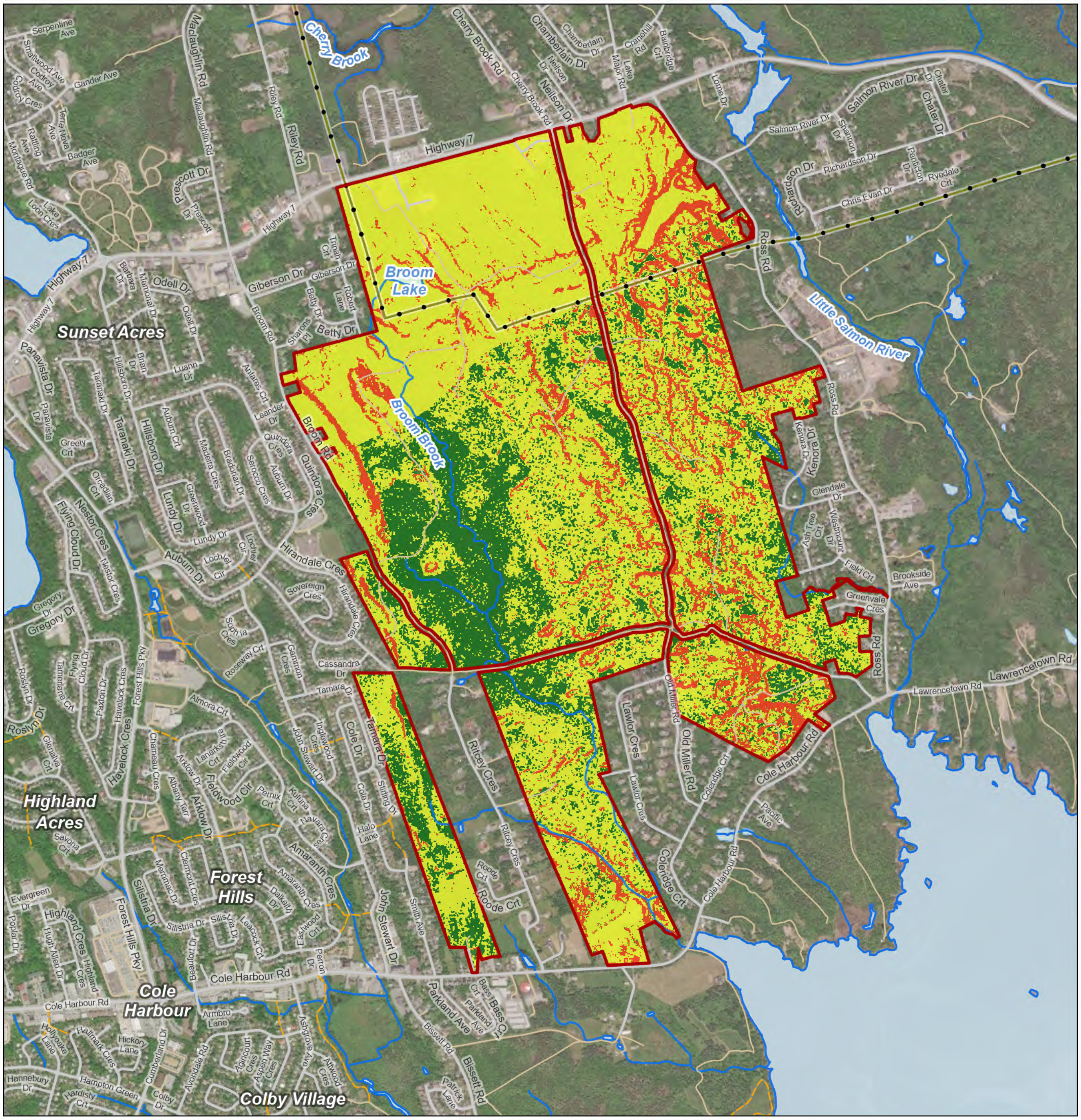
3.10.2 Geology And Topography Components

This section combines the LSA figures for geology (Section 3.6.4: Figure 3.14) and topography (Section 3.7.1: Figure 3.15).

The primary parameter used to evaluate geology in the WSA for potential land suitability for development is the acid producing potential associated with sulphide-bearing bedrock (Table 3.18; Figure 3.14). Acid producing potential is considered an important and regulated constraint for development. The current assessment of surficial and bedrock geology is based on a desktop review of available provincial mapping and indicates a general absence of acid producing bedrock in the WSA. These findings should be confirmed through further investigations. If sulphide-bearing rock is encountered during development, it must be managed and disposed of according to Sulphide Bearing Material Disposal Regulations (NSECC 2021).

For the topography component of the land suitability analysis, LiDAR data provided by HRM to was used to classify slopes within the WSA. This was primarily a desktop exercise using ESRI ArcMAP, with incidental field observations. These findings should be confirmed through further investigations.

Each of the two LSA figures for geology and topography have been weighted equally and combined to show the overall summary LSA for these components (Figure 3.18).



Study Area

Land Suitability Score

- 3 (High)
- 2
- 1 (Low)

Utilities

- Transmission Line

Transportation

- Highway
- Road
- Resource / Seasonal Road
- Trail

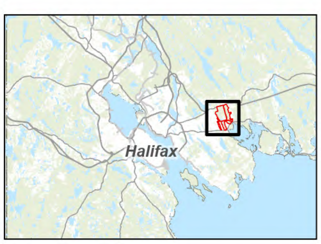
Other Features

- Waterway
- Waterbodies

0 250 500 Metres

(At original document size of 8.5x11)
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N



Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 20N

2. Data Sources: Stantec; Government of Nova Scotia, Department of Service Nova Scotia and Internal Services

3. Background: Government of Nova Scotia, Department of Service Nova Scotia and Internal Services

Stantec

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Halifax Regional Municipality, Nova Scotia

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Client/Project
Halifax Regional Municipality
Future Serviced Communities
Background Studies

Fig ID: 160410459_034

Figure No.
3.18

Title
Land Suitability Analysis of Geological and Topographic Components - WSA

HRM FCM 2022.aprx Revised: 2024-05-10 By: niwhite

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APPENDIX A

AC CDC Report

DATA REPORT 7797: Akoma Lands, NS

Prepared 4 August 2023
by J. Churchill, Data Manager

CONTENTS OF REPORT

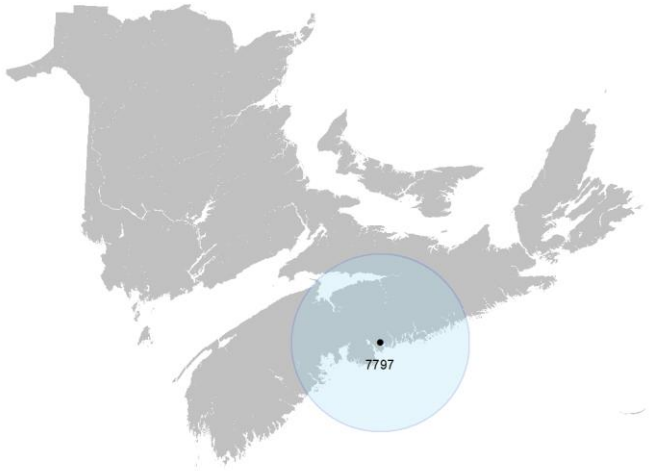
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Map 1. A 100 km buffer around the study area

1.0 PREFACE

The Atlantic Canada Conservation Data Centre (AC CDC; www.accdc.com) is part of a network of NatureServe data centres and heritage programs serving 50 states in the U.S.A, 10 provinces and 1 territory in Canada, plus several Central and South American countries. The NatureServe network is more than 30 years old and shares a common conservation data methodology. The AC CDC was founded in 1997, and maintains data for the jurisdictions of New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador. Although a non-governmental agency, the AC CDC is supported by 6 federal agencies and 4 provincial governments, as well as through outside grants and data processing fees.

Upon request and for a fee, the AC CDC queries its database and produces customized reports of the rare and endangered flora and fauna known to occur in or near a specified study area. As a supplement to that data, the AC CDC includes locations of managed areas with some level of protection, and known sites of ecological interest or sensitivity.

1.1 DATA LIST

Included datasets:

Filename	Contents
AkomaLandsNS_7797ob.xls	Rare or legally-protected Flora and Fauna in your study area
AkomaLandsNS_7797ob100km.xls	A list of Rare and legally protected Flora and Fauna within 100 km of your study area
AkomaLandsNS_7797msa.xls	Managed and Biologically Significant Areas in your study area

1.2 RESTRICTIONS

The AC CDC makes a strong effort to verify the accuracy of all the data that it manages, but it shall not be held responsible for any inaccuracies in data that it provides. By accepting AC CDC data, recipients assent to the following limits of use:

a) Data is restricted to use by trained personnel who are sensitive to landowner interests and to potential threats to rare and/or endangered flora and fauna posed by the information provided.
b) Data is restricted to use by the specified Data User; any third party requiring data must make its own data request.
c) The AC CDC requires Data Users to cease using and delete data 12 months after receipt, and to make a new request for updated data if necessary at that time.
d) AC CDC data responses are restricted to the data in our Data System at the time of the data request.
e) Each record has an estimate of locational uncertainty, which must be referenced in order to understand the record's relevance to a particular location. Please see attached Data Dictionary for details.
f) AC CDC data responses are not to be construed as exhaustive inventories of taxa in an area.
g) The absence of a taxon cannot be inferred by its absence in an AC CDC data response.

1.3 ADDITIONAL INFORMATION

The accompanying Data Dictionary provides metadata for the data provided.

Please direct any additional questions about AC CDC data to the following individuals:

Plants, Lichens, Ranking Methods, All other Inquiries
Sean Blaney
Senior Scientist / Executive Director
(506) 364-2658
sean.blaney@accdc.ca

Animals (Fauna)
John Klymko
Zoologist
(506) 364-2660
john.klymko@accdc.ca

Data Management, GIS
James Churchill
Conservation Data Analyst / Field Biologist
(902) 679-6146
james.churchill@accdc.ca

Billing
Jean Breau
Financial Manager / Executive Assistant
(506) 364-2657
jean.breau@accdc.ca

Questions on the biology of Federal Species at Risk can be directed to AC CDC: (506) 364-2658, with questions on Species at Risk regulations to: Samara Eaton, Canadian Wildlife Service (NB and PE): (506) 364-5060 or Julie McKnight, Canadian Wildlife Service (NS): (902) 426-4196.

For provincial information about rare taxa and protected areas, or information about game animals, deer yards, old growth forests, archeological sites, fish habitat etc., in New Brunswick, please contact Hubert Askanas, Energy and Resource Development: (506) 453-5873.

For provincial information about rare taxa and protected areas, or information about game animals, deer yards, old growth forests, archeological sites, fish habitat etc., in Nova Scotia, please contact Donna Hurlburt, NS DLF: (902) 679-6886. To determine if location-sensitive species (section 4.3) occur near your study site please contact a NS DLF Regional Biologist:

Western: Emma Vost
(902) 670-8187
Emma.Vost@novascotia.ca

Western: Sarah Spencer
(902) 541-0081
Sarah.Spencer@novascotia.ca

Central: Shavonne Meyer
(902) 893-0816
Shavonne.Meyer@novascotia.ca

Central: Kimberly George
(902) 890-1046
Kimberly.George@novascotia.ca

Eastern: Harrison Moore
(902) 497-4119
Harrison.Moore@novascotia.ca

Eastern: Maureen Cameron-MacMillan
(902) 295-2554
Maureen.Cameron-MacMillan@novascotia.ca

Eastern: Elizabeth Walsh
(902) 563-3370
Elizabeth.Walsh@novascotia.ca

For provincial information about rare taxa and protected areas, or information about game animals, fish habitat etc., in Prince Edward Island, please contact Garry Gregory, PEI Dept. of Communities, Land and Environment: (902) 569-7595.

2.0 RARE AND ENDANGERED SPECIES

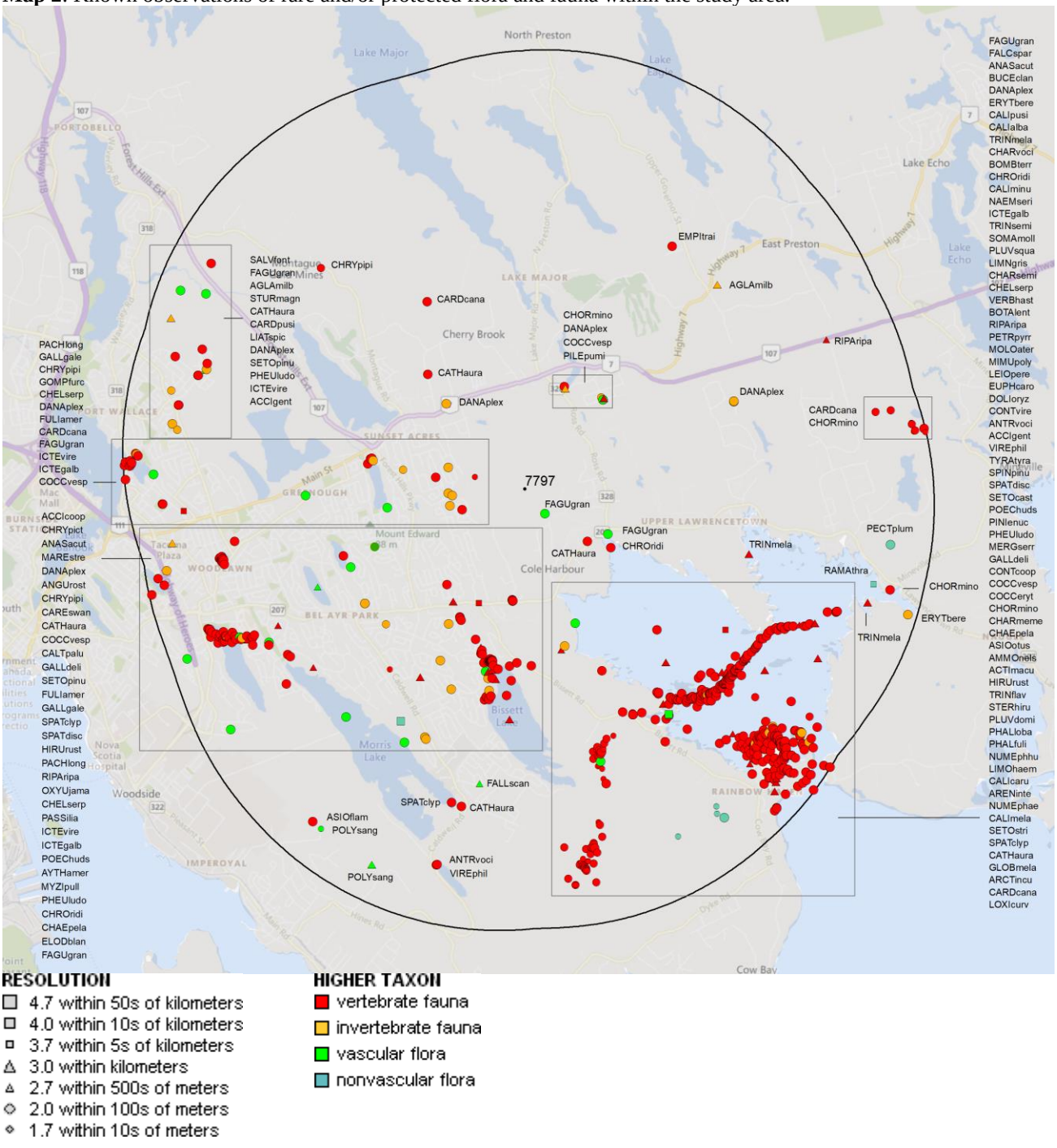
2.1 FLORA

The study area contains 26 records of 8 vascular and 8 records of 4 nonvascular flora (Map 2 and attached: *ob.xls), excluding 'location-sensitive' species.

2.2 FAUNA

The study area contains 1345 records of 81 vertebrate and 62 records of 8 invertebrate fauna (Map 2 and attached data files - see 1.1 Data List), excluding 'location-sensitive species'. Please see section 4.3 to determine if 'location-sensitive' species occur near your study site.

Map 2: Known observations of rare and/or protected flora and fauna within the study area.



3.0 SPECIAL AREAS

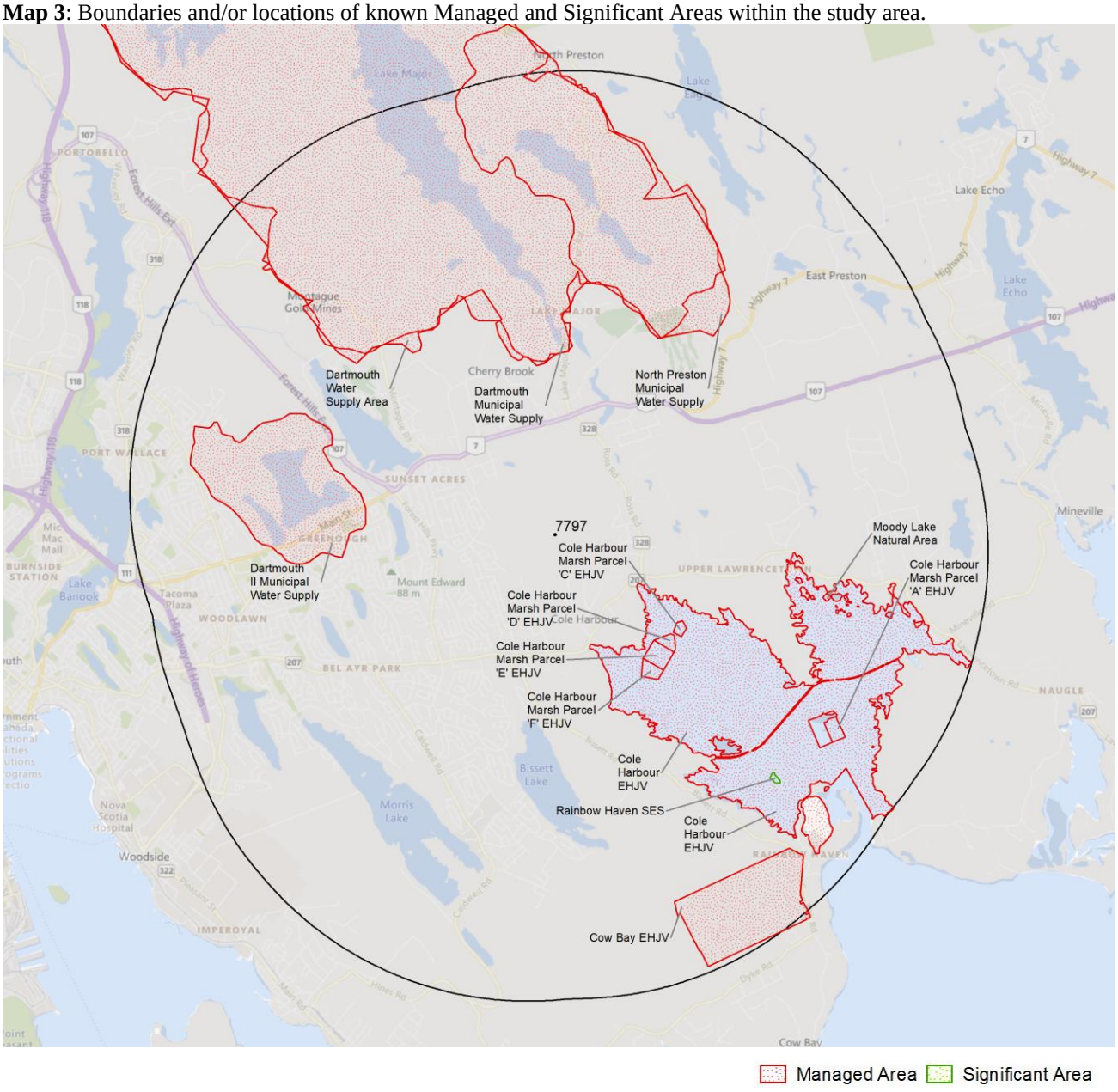
3.1 MANAGED AREAS

The GIS scan identified 12 managed areas in the vicinity of the study area (Map 3 and attached file: *msa.xls).

3.2 SIGNIFICANT AREAS

The GIS scan identified 1 biologically significant site in the vicinity of the study area (Map 3 and attached file: *msa.xls).

Map 3: Boundaries and/or locations of known Managed and Significant Areas within the study area.



4.0 RARE SPECIES LISTS

Rare and/or endangered taxa (excluding "location-sensitive" species, section 4.3) within the study area listed in order of concern, beginning with legally listed taxa, with the number of observations per taxon and the distance in kilometers from study area centroid to the closest observation (± the precision, in km, of the record). [P] = vascular plant, [N] = nonvascular plant, [A] = vertebrate animal, [I] = invertebrate animal, [C] = community. Note: records are from attached files *ob.xls/*ob.shp only.

4.1 FLORA

	Scientific *Name*	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)
N	*Pectenia plumbea*	Blue Felt Lichen	Special Concern	Special Concern	Vulnerable	S3	2	5.7 ± 0.0
N	*Ramalina thrausta*	Angelhair Ramalina Lichen				S2S3	1	5.5 ± 5.0
N	*Elodium blandowii*	Blandow's Bog Moss				S3?	1	4.0 ± 7.0
N	*Arctoparmelia incurva*	Finger Ring Lichen				S3S4	4	5.7 ± 0.0
P	*Liatris spicata*	Dense Blazing Star	Threatened	Threatened		SNA	1	5.2 ± 0.0
P	*Caltha palustris*	Yellow Marsh Marigold				S2S3	1	3.0 ± 0.0
P	*Polygala sanguinea*	Blood Milkwort				S3	2	6.1 ± 0.0
P	*Pilea pumila*	Dwarf Clearweed				S3	1	1.8 ± 0.0
P	*Carex swanii*	Swan's Sedge				S3	1	3.5 ± 0.0
P	*Fagus grandifolia*	American Beech				S3S4	18	0.5 ± 0.0
P	*Fallopia scandens*	Climbing False Buckwheat				S3S4	1	4.6 ± 0.0
P	*Verbena hastata*	Blue Vervain				S3S4	1	4.1 ± 7.0

4.2 FAUNA

	Scientific *Name*	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)
A	*Charadrius melodus melodus*	Piping Plover melodus subspecies	Endangered	Endangered	Endangered	S1B	43	4.1 ± 7.0
A	*Icteria virens*	Yellow-Breasted Chat	Endangered	Endangered		SNA	13	1.4 ± 0.0
A	*Asio flammeus*	Short-eared Owl	Threatened	Special Concern		S1B	1	6.0 ± 0.0
A	*Riparia riparia*	Bank Swallow	Threatened	Threatened	Endangered	S2B	9	4.1 ± 7.0
A	*Chaetura pelagica*	Chimney Swift	Threatened	Threatened	Endangered	S2S3B,S1M	3	3.5 ± 1.0
A	*Limosa haemastica*	Hudsonian Godwit	Threatened			S2S3M	14	4.4 ± 0.0
A	*Tringa flavipes*	Lesser Yellowlegs	Threatened			S3M	62	4.0 ± 0.0
A	*Anguilla rostrata*	American Eel	Threatened			S3N	2	4.6 ± 0.0
A	*Sturnella magna*	Eastern Meadowlark	Threatened	Threatened		SHB	1	5.4 ± 0.0
A	*Antrostomus vociferus*	Eastern Whip-Poor-Will	Special Concern	Threatened	Threatened	S1?B	2	4.1 ± 7.0
A	*Euphagus carolinus*	Rusty Blackbird	Special Concern	Special Concern	Endangered	S2B	1	4.1 ± 7.0
A	*Phalaropus lobatus*	Red-necked Phalarope	Special Concern	Special Concern		S2S3M	1	5.3 ± 0.0
A	*Chelydra serpentina*	Snapping Turtle	Special Concern	Special Concern	Vulnerable	S3	16	2.0 ± 2.0
A	*Hirundo rustica*	Barn Swallow	Special Concern	Threatened	Endangered	S3B	9	2.5 ± 1.0
A	*Cardellina canadensis*	Canada Warbler	Special Concern	Threatened	Endangered	S3B	82	0.8 ± 0.0
A	*Chordeiles minor*	Common Nighthawk	Special Concern	Special Concern	Threatened	S3B	7	1.7 ± 0.0
A	*Contopus cooperi*	Olive-sided Flycatcher	Special Concern	Special Concern	Threatened	S3B	1	4.1 ± 7.0
A	*Dolichonyx oryzivorus*	Bobolink	Special Concern	Threatened	Vulnerable	S3B	2	4.1 ± 7.0
A	*Coccothraustes vespertinus*	Evening Grosbeak	Special Concern	Special Concern	Vulnerable	S3B,S3N,S3M	4	1.0 ± 0.0
A	*Contopus virens*	Eastern Wood-Pewee	Special Concern	Special Concern	Vulnerable	S3S4B	2	4.1 ± 7.0
A	*Chrysemys picta*	Painted Turtle	Special Concern	Special Concern		S4	17	1.9 ± 4.0
A	*Chrysemys picta picta*	Eastern Painted Turtle	Special Concern	Special Concern		S4	46	1.9 ± 4.0
A	*Accipiter cooperii*	Cooper's Hawk	Not At Risk			S1?B,SUN,SUM	1	4.5 ± 0.0
A	*Fulica americana*	American Coot	Not At Risk			S1B	10	3.2 ± 0.0
A	*Globicephala melas*	Long-finned Pilot Whale	Not At Risk			S2S3	2	6.1 ± 0.0
A	*Sterna hirundo*	Common Tern	Not At Risk			S3B	15	4.2 ± 0.0
A	*Accipiter gentilis*	Northern Goshawk	Not At Risk			S3S4	5	4.1 ± 7.0
A	*Ammospiza nelsoni*	Nelson's Sparrow	Not At Risk			S3S4B	13	4.1 ± 7.0
A	*Calidris canutus rufa*	Red Knot rufa subspecies	E,SC	Endangered	Endangered	S2M	16	5.3 ± 0.0

	Scientific *Name*	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)
A	*Oxyura jamaicensis*	Ruddy Duck				S1B	7	3.2 ± 0.0
A	*Gallinula galeata*	Common Gallinule				S1B	2	5.3 ± 0.0
A	*Mimus polyglottos*	Northern Mockingbird				S1B	3	4.1 ± 7.0
A	*Charadrius semipalmatus*	Semipalmated Plover				S1B,S4M	71	3.7 ± 0.0
A	*Calidris minutilla*	Least Sandpiper				S1B,S4M	65	4.1 ± 0.0
A	*Anas acuta*	Northern Pintail				S1B,SUM	13	1.7 ± 0.0
A	*Vireo philadelphicus*	Philadelphia Vireo				S2?B,SUM	2	4.1 ± 7.0
A	*Empidonax traillii*	Willow Flycatcher				S2B	2	4.3 ± 0.0
A	*Molothrus ater*	Brown-headed Cowbird				S2B	1	4.1 ± 7.0
A	*Spatula clypeata*	Northern Shoveler				S2B,SUM	8	4.9 ± 0.0
A	*Mareca strepera*	Gadwall				S2B,SUM	4	3.2 ± 0.0
A	*Calidris alba*	Sanderling				S2N,S3M	33	2.5 ± 0.0
A	*Asio otus*	Long-eared Owl				S2S3	1	4.1 ± 7.0
A	*Petrochelidon pyrrhonota*	Cliff Swallow				S2S3B	1	4.1 ± 7.0
A	*Cathartes aura*	Turkey Vulture				S2S3B,S4S5M	13	1.2 ± 0.0
A	*Setophaga pinus*	Pine Warbler				S2S3B,S4S5M	12	2.2 ± 0.0
A	*Bucephala clangula*	Common Goldeneye				S2S3B,S5N,S5M	3	3.7 ± 5.0
A	*Icterus galbula*	Baltimore Oriole				S2S3B,SUM	4	2.2 ± 0.0
A	*Pluvialis dominica*	American Golden-Plover				S2S3M	10	5.3 ± 0.0
A	*Numenius phaeopus*	Whimbrel				S2S3M	1	4.9 ± 0.0
A	*Numenius phaeopus hudsonicus*	Whimbrel				S2S3M	9	5.3 ± 0.0
A	*Phalaropus fulicarius*	Red Phalarope				S2S3M	2	5.3 ± 0.0
A	*Poecile hudsonicus*	Boreal Chickadee				S3	4	3.4 ± 0.0
A	*Spinus pinus*	Pine Siskin				S3	1	4.1 ± 7.0
A	*Salvelinus fontinalis*	Brook Trout				S3	1	5.9 ± 0.0
A	*Spatula discors*	Blue-winged Teal				S3B	11	1.7 ± 0.0
A	*Charadrius vociferus*	Killdeer				S3B	7	4.2 ± 0.0
A	*Tringa semipalmata*	Willet				S3B	123	3.7 ± 0.0
A	*Coccyzus erythropthalmus*	Black-billed Cuckoo				S3B	1	4.1 ± 7.0
A	*Tyrannus tyrannus*	Eastern Kingbird				S3B	1	4.1 ± 7.0
A	*Pheucticus ludovicianus*	Rose-breasted Grosbeak				S3B	6	2.9 ± 0.0
A	*Somateria mollissima*	Common Eider				S3B,S3M,S3N	32	3.7 ± 5.0
A	*Tringa melanoleuca*	Greater Yellowlegs				S3B,S4M	144	2.5 ± 0.0
A	*Falco sparverius*	American Kestrel				S3B,S4S5M	1	4.9 ± 3.0
A	*Gallinago delicata*	Wilson's Snipe				S3B,S5M	2	2.2 ± 0.0
A	*Setophaga striata*	Blackpoll Warbler				S3B,S5M	3	3.0 ± 0.0
A	*Cardellina pusilla*	Wilson's Warbler				S3B,S5M	1	5.2 ± 0.0
A	*Pinicola enucleator*	Pine Grosbeak				S3B,S5N,S5M	2	4.1 ± 7.0
A	*Pluvialis squatarola*	Black-bellied Plover				S3M	116	3.7 ± 0.0
A	*Arenaria interpres*	Ruddy Turnstone				S3M	25	5.3 ± 0.0
A	*Calidris pusilla*	Semipalmated Sandpiper				S3M	63	2.5 ± 0.0
A	*Calidris melanotos*	Pectoral Sandpiper				S3M	15	5.3 ± 0.0
A	*Limnodromus griseus*	Short-billed Dowitcher				S3M	68	3.8 ± 0.0
A	*Chroicocephalus ridibundus*	Black-headed Gull				S3N	11	1.6 ± 0.0
A	*Loxia curvirostra*	Red Crossbill				S3S4	1	5.8 ± 0.0
A	*Botaurus lentiginosus*	American Bittern				S3S4B,S4S5M	1	4.1 ± 7.0
A	*Setophaga castanea*	Bay-breasted Warbler				S3S4B,S4S5M	1	4.1 ± 7.0
A	*Actitis macularius*	Spotted Sandpiper				S3S4B,S5M	19	4.1 ± 0.0
A	*Leiothlypis peregrina*	Tennessee Warbler				S3S4B,S5M	1	4.1 ± 7.0
A	*Passerella iliaca*	Fox Sparrow				S3S4B,S5M	2	2.6 ± 0.0
A	*Mergus serrator*	Red-breasted Merganser				S3S4B,S5M,S5N	14	3.9 ± 0.0
A	*Aythya americana*	Redhead				SHB	1	2.9 ± 0.0

	Scientific *Name*	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)
I	*Danaus plexippus*	Monarch	Endangered	Special Concern	Endangered	S2?B,S3M	47	1.1 ± 0.0
I	*Bombus terricola*	Yellow-banded Bumble Bee	Special Concern	Special Concern	Vulnerable	S3	2	4.2 ± 0.0
I	*Pachydiplax longipennis*	Blue Dasher				S1	6	3.0 ± 0.0
I	*Aglais milberti*	Milbert's Tortoiseshell				S2S3	2	4.3 ± 2.0
I	*Naemia seriata*	Seaside Lady Beetle				S3	1	4.0 ± 0.0
I	*Myzia pullata*	Streaked Lady Beetle				S3	1	3.3 ± 0.0
I	*Gomphaeschna furcillata*	Harlequin Darner				S3S4	1	2.4 ± 0.0
I	*Erythrodiplax berenice*	Seaside Dragonlet				S3S4	2	4.3 ± 0.0

4.3 LOCATION SENSITIVE SPECIES

The Department of Natural Resources in each Maritimes province considers a number of species "location sensitive". Concern about exploitation of location-sensitive species precludes inclusion of precise coordinates in this report. Those intersecting your study area are indicated below with "YES".

Nova Scotia

Scientific *Name*	Common Name	SARA	Prov Legal Prot	Known within the Study Site?
Fraxinus nigra	Black Ash		Threatened	No
Emydoidea blandingii	*Blanding's Turtle - Nova Scotia pop.*	Endangered	Endangered	No
Glyptemys insculpta	**Wood Turtle**	**Threatened**	**Threatened**	**YES**
Falco peregrinus pop. 1	**Peregrine Falcon - anatum/tundrius pop.**		**Vulnerable**	**YES**
Bat hibernaculum or bat species occurrence		**[Endangered][1]**	**[Endangered][1]**	**YES**

1 *Myotis lucifugus* (Little Brown Myotis), *Myotis septentrionalis* (Long-eared Myotis), and *Perimyotis subflavus* (Tri-colored Bat or Eastern Pipistrelle) are all Endangered under the Federal Species at Risk Act and the NS Endangered Species Act.

4.4 SOURCE BIBLIOGRAPHY

The recipient of these data shall acknowledge the AC CDC and the data sources listed below in any documents, reports, publications or presentations, in which this dataset makes a significant contribution.

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557	iNaturalist.ca. 2023. iNaturalist Data Export December 2022. iNaturalist.org; iNaturalist.ca.
432	Morrison, Guy. 2011. Maritime Shorebird Survey (MSS) database. Canadian Wildlife Service, Ottawa, 15939 surveys. 86171 recs.
113	Paquet, Julie. 2018. Atlantic Canada Shorebird Survey (ACSS) database 2012-2018. Environment Canada, Canadian Wildlife Service.
93	iNaturalist. 2020. iNaturalist Data Export 2020. iNaturalist.org and iNaturalist.ca, Web site: 128728 recs.
65	Lepage, D. 2014. Maritime Breeding Bird Atlas Database. Bird Studies Canada, Sackville NB, 407,838 recs.
33	Staicer, C. 2021. Additional compiled Nova Scotia Species at Risk bird records, 2005-2020. Dalhousie University.
21	Amirault, D.L. & Stewart, J. 2007. Piping Plover Database 1894-2006. Canadian Wildlife Service, Sackville, 3344 recs, 1228 new.
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10	Nova Scotia Dept Natural Resources, Forestry Branch. 2007. Restricted & Limited Use Land Database (RLUL). , http://www.gov.ns.ca/natr/FORESTRY/rlul/downloadrlul.htm.
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8	eBird. 2020. eBird Basic Dataset. Version: EBD_relNov-2019. Ithaca, New York. Nov 2019, Cape Breton Bras d'Or Lakes Watershed subset. Cornell Lab of Ornithology.
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3	Pepper, Chris. 2012. Observations of breeding Canada Warbler's along the Eastern Shore, NS. Pers. comm. to S. Blaney, Jan. 20, 28 recs.

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5.0 RARE SPECIES WITHIN 100 KM

A 100 km buffer around the study area contains 32412 records of 164 vertebrate and 1900 records of 71 invertebrate fauna; 7672 records of 272 vascular and 3047 records of 183 nonvascular flora (attached: *ob100km.xls).

Taxa within 100 km of the study site that are rare and/or endangered in the province in which the study site occurs (including “location-sensitive” species). All ranks correspond to the province in which the study site falls, even for out-of-province records. Taxa are listed in order of concern, beginning with legally listed taxa, with the number of observations per taxon and the distance in kilometers from study area centroid to the closest observation (± the precision, in km, of the record).

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
A	*Coregonus huntsmani*	Atlantic Whitefish	Endangered	Endangered	Endangered	S1	142	93.7 ± 1.0	NS
A	*Myotis lucifugus*	Little Brown Myotis	Endangered	Endangered	Endangered	S1	233	5.6 ± 0.0	NS
A	*Myotis septentrionalis*	Northern Myotis	Endangered	Endangered	Endangered	S1	20	34.5 ± 0.0	NS
A	*Perimyotis subflavus*	Tricolored Bat	Endangered	Endangered	Endangered	S1	22	34.5 ± 0.0	NS
A	*Emydoidea blandingii*	Blanding's Turtle	Endangered	Endangered	Endangered	S1	2	12.8 ± 0.0	NS
A	*Salmo salar pop. 1*	Atlantic Salmon - Inner Bay of Fundy population	Endangered	Endangered		S1	36	22.9 ± 0.0	NS
A	*Salmo salar pop. 6*	Atlantic Salmon - Nova Scotia Southern Upland population	Endangered			S1	35	9.4 ± 0.0	NS
A	*Charadrius melodus melodus*	Piping Plover melodus subspecies	Endangered	Endangered	Endangered	S1B	515	4.1 ± 7.0	NS
A	*Sterna dougallii*	Roseate Tern	Endangered	Endangered	Endangered	S1B	68	19.4 ± 0.0	NS
A	*Dermochelys coriacea pop. 2*	Leatherback Sea Turtle - Atlantic population	Endangered	Endangered		S1S2N	3	45.0 ± 5.0	NS
A	*Morone saxatilis pop. 2*	Striped Bass - Bay of Fundy population	Endangered			S2S3B,S2S3N	4	30.1 ± 0.0	NS
A	*Melanerpes erythrocephalus*	Red-headed Woodpecker	Endangered	Threatened		SNA	1	83.8 ± 0.0	NS
A	*Protonotaria citrea*	Prothonotary Warbler	Endangered	Endangered		SNA	1	25.3 ± 0.0	NS
A	*Icteria virens*	Yellow-Breasted Chat	Endangered	Endangered		SNA	24	1.4 ± 0.0	NS
A	*Lasiurus cinereus*	Hoary Bat	Endangered			SUB, S1M	23	15.3 ± 0.0	NS
A	*Lasionycteris noctivagans*	Silver-haired Bat	Endangered			SUB,S1M	9	6.5 ± 0.0	NS
A	*Lasiurus borealis*	Eastern Red Bat	Endangered			SUB,S1M	1	82.6 ± 0.0	NS
A	*Colinus virginianus*	Northern Bobwhite	Endangered	Endangered			7	22.0 ± 0.0	NS

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
A	*Asio flammeus*	Short-eared Owl	Threatened	Special Concern		S1B	31	6.0 ± 0.0	NS
A	*Glyptemys insculpta*	Wood Turtle	Threatened	Threatened	Threatened	S2	830	5.5 ± 1.0	NS
A	*Riparia riparia*	Bank Swallow	Threatened	Threatened	Endangered	S2B	1381	4.1 ± 7.0	NS
A	*Thamnophis saurita*	Eastern Ribbonsnake	Threatened	Threatened	Threatened	S2S3	13	89.6 ± 1.0	NS
A	*Chaetura pelagica*	Chimney Swift	Threatened	Threatened	Endangered	S2S3B,S1M	897	3.5 ± 1.0	NS
A	*Limosa haemastica*	Hudsonian Godwit	Threatened			S2S3M	72	4.4 ± 0.0	NS
A	*Acipenser oxyrinchus*	Atlantic Sturgeon	Threatened			S2S3N	10	34.9 ± 0.0	NS
A	*Hydrobates leucorhous*	Leach's Storm-Petrel	Threatened			S3B	58	9.4 ± 7.0	NS
A	*Tringa flavipes*	Lesser Yellowlegs	Threatened			S3M	750	4.0 ± 0.0	NS
A	*Anguilla rostrata*	American Eel	Threatened			S3N	112	4.6 ± 0.0	NS
A	*Sturnella magna*	Eastern Meadowlark	Threatened	Threatened		SHB	3	5.4 ± 0.0	NS
A	*Melanerpes lewis*	Lewis's Woodpecker	Threatened	Threatened		SNA	2	21.5 ± 0.0	NS
A	*Ixobrychus exilis*	Least Bittern	Threatened	Threatened		SUB	2	10.5 ± 0.0	NS
A	*Hylocichla mustelina*	Wood Thrush	Threatened	Threatened		SUB	34	27.9 ± 0.0	NS
A	*Antrostomus vociferus*	Eastern Whip-Poor-Will	Special Concern	Threatened	Threatened	S1?B	12	4.1 ± 7.0	NS
A	*Passerculus sandwichensis princeps*	Ipswich Sparrow	Special Concern	Special Concern		S1B	29	8.7 ± 0.0	NS
A	*Bucephala islandica*	Barrow's Goldeneye	Special Concern	Special Concern		S1N,SUM	20	7.6 ± 0.0	NS
A	*Euphagus carolinus*	Rusty Blackbird	Special Concern	Special Concern	Endangered	S2B	220	4.1 ± 7.0	NS
A	*Balaenoptera physalus*	Fin Whale	Special Concern	Special Concern		S2S3	3	28.7 ± 0.0	NS
A	*Phalaropus lobatus*	Red-necked Phalarope	Special Concern	Special Concern		S2S3M	10	5.3 ± 0.0	NS
A	*Histrionicus histrionicus pop. 1*	Harlequin Duck - Eastern population	Special Concern	Special Concern	Endangered	S2S3N,SUM	74	10.4 ± 0.0	NS
A	*Chelydra serpentina*	Snapping Turtle	Special Concern	Special Concern	Vulnerable	S3	359	2.0 ± 2.0	NS
A	*Hirundo rustica*	Barn Swallow	Special Concern	Threatened	Endangered	S3B	1057	2.5 ± 1.0	NS
A	*Cardellina canadensis*	Canada Warbler	Special Concern	Threatened	Endangered	S3B	964	0.8 ± 0.0	NS
A	*Chordeiles minor*	Common Nighthawk	Special Concern	Special Concern	Threatened	S3B	452	1.7 ± 0.0	NS
A	*Contopus cooperi*	Olive-sided Flycatcher	Special Concern	Special Concern	Threatened	S3B	748	4.1 ± 7.0	NS
A	*Dolichonyx oryzivorus*	Bobolink	Special Concern	Threatened	Vulnerable	S3B	566	4.1 ± 7.0	NS
A	*Coccothraustes vespertinus*	Evening Grosbeak	Special Concern	Special Concern	Vulnerable	S3B,S3N,S3M	559	1.0 ± 0.0	NS
A	*Podiceps auritus*	Horned Grebe	Special Concern	Special Concern		S3N,SUM	21	39.7 ± 0.0	NS
A	*Contopus virens*	Eastern Wood-Pewee	Special Concern	Special Concern	Vulnerable	S3S4B	797	4.1 ± 7.0	NS
A	*Phocoena phocoena*	Harbour Porpoise	Special Concern			S4	15	9.0 ± 0.0	NS
A	*Phocoena phocoena pop. 1*	Harbour Porpoise - Northwest Atlantic Population	Special Concern			S4	2	79.5 ± 0.0	NS
A	*Chrysemys picta*	Painted Turtle	Special Concern	Special Concern		S4	67	1.9 ± 4.0	NS
A	*Chrysemys picta picta*	Eastern Painted Turtle	Special Concern	Special Concern		S4	456	1.9 ± 4.0	NS
A	*Calidris subruficollis*	Buff-breasted Sandpiper	Special Concern	Special Concern		SNA	11	10.6 ± 0.0	NS
A	*Zonotrichia querula*	Harris's Sparrow	Special Concern			SNA	1	7.4 ± 0.0	NS
A	*Anarhichas lupus*	Atlantic Wolffish	Special Concern	Special Concern		SNR	5	11.7 ± 0.0	NS
A	*Acipenser brevirostrum*	Shortnose Sturgeon	Special Concern	Special Concern			1	86.6 ± 0.0	NS
A	*Accipiter cooperii*	Cooper's Hawk	Not At Risk			S1?B,SUN,SUM	12	4.5 ± 0.0	NS
A	*Fulica americana*	American Coot	Not At Risk			S1B	41	3.2 ± 0.0	NS
A	*Chlidonias niger*	Black Tern	Not At Risk			S1B	1	16.9 ± 0.0	NS
A	*Falco peregrinus pop. 1*	Peregrine Falcon - anatum/tundrius	Not At Risk		Vulnerable	S1B,SUM	62	4.3 ± 0.0	NS
A	*Sorex dispar*	Long-tailed Shrew	Not At Risk			S2	2	90.0 ± 0.0	NS
A	*Aegolius funereus*	Boreal Owl	Not At Risk			S2?B,SUM	4	34.6 ± 7.0	NS
A	*Lynx canadensis*	Canada Lynx	Not At Risk		Endangered	S2S3	2	85.4 ± 1.0	NS
A	*Globicephala melas*	Long-finned Pilot Whale	Not At Risk			S2S3	3	6.1 ± 0.0	NS
A	*Hemidactylium scutatum*	Four-toed Salamander	Not At Risk			S3	32	8.2 ± 0.0	NS
A	*Megaptera novaeangliae*	Humpback Whale	Not At Risk			S3	2	10.0 ± 0.0	NS
A	*Sterna hirundo*	Common Tern	Not At Risk			S3B	318	4.2 ± 0.0	NS
A	*Sialia sialis*	Eastern Bluebird	Not At Risk			S3B	58	13.1 ± 0.0	NS
A	*Buteo lagopus*	Rough-legged Hawk	Not At Risk			S3N	1	10.4 ± 0.0	NS
A	*Accipiter gentilis*	Northern Goshawk	Not At Risk			S3S4	119	4.1 ± 7.0	NS
A	*Glaucomys volans*	Southern Flying Squirrel	Not At Risk			S3S4	8	40.4 ± 2.0	NS

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
A	*Lagenorhynchus acutus*	Atlantic White-sided Dolphin	Not At Risk			S3S4	5	18.4 ± 2.0	NS
A	*Ammospiza nelsoni*	Nelson's Sparrow	Not At Risk			S3S4B	132	4.1 ± 7.0	NS
A	*Calidris canutus rufa*	Red Knot rufa subspecies	E,SC	Endangered	Endangered	S2M	307	5.3 ± 0.0	NS
A	*Calidris canutus*	Red Knot	E,SC	E,T		S2M	4	10.3 ± 1.0	NS
A	*Morone saxatilis*	Striped Bass	E,SC			S2S3B,S2S3N	29	10.9 ± 0.0	NS
A	*Gadus morhua*	Atlantic Cod	E,SC,DD			SNR	11	8.7 ± 0.0	NS
A	*Salmo salar*	Atlantic Salmon	E,T,SC			S1B,S1N	13	41.5 ± 0.0	NS
A	*Alces alces americana*	Moose			Endangered	S1	61	17.9 ± 0.0	NS
A	*Alces alces*	Moose				S1	7	27.6 ± 0.0	NS
A	*Uria aalge*	Common Murre				S1?B	7	7.6 ± 0.0	NS
A	*Passerina cyanea*	Indigo Bunting				S1?B,SUM	19	8.7 ± 0.0	NS
A	*Oxyura jamaicensis*	Ruddy Duck				S1B	13	3.2 ± 0.0	NS
A	*Gallinula galeata*	Common Gallinule				S1B	8	5.3 ± 0.0	NS
A	*Myiarchus crinitus*	Great Crested Flycatcher				S1B	27	8.5 ± 7.0	NS
A	*Cistothorus palustris*	Marsh Wren				S1B	2	78.0 ± 0.0	NS
A	*Mimus polyglottos*	Northern Mockingbird				S1B	74	4.1 ± 7.0	NS
A	*Toxostoma rufum*	Brown Thrasher				S1B	14	8.5 ± 7.0	NS
A	*Charadrius semipalmatus*	Semipalmated Plover				S1B,S4M	1257	3.7 ± 0.0	NS
A	*Calidris minutilla*	Least Sandpiper				S1B,S4M	797	4.1 ± 0.0	NS
A	*Anas acuta*	Northern Pintail				S1B,SUM	68	1.7 ± 0.0	NS
A	*Vireo gilvus*	Warbling Vireo				S1B,SUM	19	10.2 ± 7.0	NS
A	*Vespertilionidae sp.*	bat species				S1S2	184	1.4 ± 0.0	NS
A	*Pooecetes gramineus*	Vesper Sparrow				S1S2B,SUM	21	16.7 ± 7.0	NS
A	*Vireo philadelphicus*	Philadelphia Vireo				S2?B,SUM	32	4.1 ± 7.0	NS
A	*Alca torda*	Razorbill				S2B	26	10.9 ± 0.0	NS
A	*Fratercula arctica*	Atlantic Puffin				S2B	33	41.9 ± 0.0	NS
A	*Empidonax traillii*	Willow Flycatcher				S2B	25	4.3 ± 0.0	NS
A	*Molothrus ater*	Brown-headed Cowbird				S2B	138	4.1 ± 7.0	NS
A	*Spatula clypeata*	Northern Shoveler				S2B,SUM	28	4.9 ± 0.0	NS
A	*Mareca strepera*	Gadwall				S2B,SUM	35	3.2 ± 0.0	NS
A	*Piranga olivacea*	Scarlet Tanager				S2B,SUM	40	7.5 ± 0.0	NS
A	*Calidris alba*	Sanderling				S2N,S3M	792	2.5 ± 0.0	NS
A	*Martes americana*	American Marten			Endangered	S2S3	2	16.5 ± 0.0	NS
A	*Asio otus*	Long-eared Owl				S2S3	23	4.1 ± 7.0	NS
A	*Rallus limicola*	Virginia Rail				S2S3B	19	12.7 ± 7.0	NS
A	*Rissa tridactyla*	Black-legged Kittiwake				S2S3B	17	41.9 ± 0.0	NS
A	*Petrochelidon pyrrhonota*	Cliff Swallow				S2S3B	211	4.1 ± 7.0	NS
A	*Phalacrocorax carbo*	Great Cormorant				S2S3B,S2S3N	93	9.1 ± 0.0	NS
A	*Cathartes aura*	Turkey Vulture				S2S3B,S4S5M	95	1.2 ± 0.0	NS
A	*Setophaga pinus*	Pine Warbler				S2S3B,S4S5M	42	2.2 ± 0.0	NS
A	*Bucephala clangula*	Common Goldeneye				S2S3B,S5N,S5M	283	3.7 ± 5.0	NS
A	*Icterus galbula*	Baltimore Oriole				S2S3B,SUM	72	2.2 ± 0.0	NS
A	*Pluvialis dominica*	American Golden-Plover				S2S3M	127	5.3 ± 0.0	NS
A	*Numenius phaeopus*	Whimbrel				S2S3M	20	4.9 ± 0.0	NS
A	*Numenius phaeopus hudsonicus*	Whimbrel				S2S3M	80	5.3 ± 0.0	NS
A	*Phalaropus fulicarius*	Red Phalarope				S2S3M	4	5.3 ± 0.0	NS
A	*Perisoreus canadensis*	Canada Jay				S3	528	6.9 ± 7.0	NS
A	*Poecile hudsonicus*	Boreal Chickadee				S3	569	3.4 ± 0.0	NS
A	*Spinus pinus*	Pine Siskin				S3	446	4.1 ± 7.0	NS
A	*Salvelinus fontinalis*	Brook Trout				S3	119	5.9 ± 0.0	NS
A	*Salvelinus namaycush*	Lake Trout				S3	2	27.9 ± 0.0	NS
A	*Sorex maritimensis*	Maritime Shrew				S3	1	83.1 ± 1.0	NS
A	*Synaptomys cooperi*	Southern Bog Lemming				S3	1	94.1 ± 0.0	NS
A	*Pekania pennanti*	Fisher				S3	9	27.9 ± 0.0	NS
A	*Calcarius lapponicus*	Lapland Longspur				S3?N,SUM	6	9.2 ± 0.0	NS
A	*Spatula discors*	Blue-winged Teal				S3B	65	1.7 ± 0.0	NS
A	*Charadrius vociferus*	Killdeer				S3B	466	4.2 ± 0.0	NS

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
A	*Tringa semipalmata*	Willet				S3B	1345	3.7 ± 0.0	NS
A	*Sterna paradisaea*	Arctic Tern				S3B	69	8.8 ± 0.0	NS
A	*Coccyzus erythropthalmus*	Black-billed Cuckoo				S3B	42	4.1 ± 7.0	NS
A	*Tyrannus tyrannus*	Eastern Kingbird				S3B	179	4.1 ± 7.0	NS
A	*Pheucticus ludovicianus*	Rose-breasted Grosbeak				S3B	343	2.9 ± 0.0	NS
A	*Alosa pseudoharengus*	Alewife				S3B	33	10.3 ± 0.0	NS
A	*Somateria mollissima*	Common Eider				S3B,S3M,S3N	1016	3.7 ± 5.0	NS
A	*Tringa melanoleuca*	Greater Yellowlegs				S3B,S4M	1526	2.5 ± 0.0	NS
A	*Falco sparverius*	American Kestrel				S3B,S4S5M	244	4.9 ± 3.0	NS
A	*Gallinago delicata*	Wilson's Snipe				S3B,S5M	533	2.2 ± 0.0	NS
A	*Setophaga striata*	Blackpoll Warbler				S3B,S5M	135	3.0 ± 0.0	NS
A	*Cardellina pusilla*	Wilson's Warbler				S3B,S5M	77	5.2 ± 0.0	NS
A	*Pinicola enucleator*	Pine Grosbeak				S3B,S5N,S5M	137	4.1 ± 7.0	NS
A	*Setophaga tigrina*	Cape May Warbler				S3B,SUM	154	8.5 ± 7.0	NS
A	*Branta bernicla*	Brant				S3M	3	10.6 ± 0.0	NS
A	*Pluvialis squatarola*	Black-bellied Plover				S3M	1259	3.7 ± 0.0	NS
A	*Arenaria interpres*	Ruddy Turnstone				S3M	476	5.3 ± 0.0	NS
A	*Calidris pusilla*	Semipalmated Sandpiper				S3M	1100	2.5 ± 0.0	NS
A	*Calidris melanotos*	Pectoral Sandpiper				S3M	148	5.3 ± 0.0	NS
A	*Limnodromus griseus*	Short-billed Dowitcher				S3M	874	3.8 ± 0.0	NS
A	*Chroicocephalus ridibundus*	Black-headed Gull				S3N	30	1.6 ± 0.0	NS
A	*Picoides arcticus*	Black-backed Woodpecker				S3S4	164	8.5 ± 7.0	NS
A	*Loxia curvirostra*	Red Crossbill				S3S4	221	5.8 ± 0.0	NS
A	*Botaurus lentiginosus*	American Bittern				S3S4B,S4S5M	171	4.1 ± 7.0	NS
A	*Setophaga castanea*	Bay-breasted Warbler				S3S4B,S4S5M	414	4.1 ± 7.0	NS
A	*Actitis macularius*	Spotted Sandpiper				S3S4B,S5M	658	4.1 ± 0.0	NS
A	*Leiothlypis peregrina*	Tennessee Warbler				S3S4B,S5M	396	4.1 ± 7.0	NS
A	*Passerella iliaca*	Fox Sparrow				S3S4B,S5M	93	2.6 ± 0.0	NS
A	*Mergus serrator*	Red-breasted Merganser				S3S4B,S5M,S5N	325	3.9 ± 0.0	NS
A	*Calidris maritima*	Purple Sandpiper				S3S4N	158	7.9 ± 0.0	NS
A	*Lanius borealis*	Northern Shrike				S3S4N	2	21.2 ± 0.0	NS
A	*Morus bassanus*	Northern Gannet				SHB	62	7.5 ± 2.0	NS
A	*Aythya americana*	Redhead				SHB	5	2.9 ± 0.0	NS
A	*Leucophaeus atricilla*	Laughing Gull				SHB	12	8.3 ± 0.0	NS
A	*Progne subis*	Purple Martin				SHB	1	9.0 ± 0.0	NS
A	*Eremophila alpestris*	Horned Lark				SHB,S4S5N,S5M	24	9.1 ± 0.0	NS
I	*Bombus bohemicus*	Ashton Cuckoo Bumble Bee	Endangered	Endangered	Endangered	S1	24	9.3 ± 1.0	NS
I	*Danaus plexippus*	Monarch	Endangered	Special Concern	Endangered	S2?B,S3M	898	1.1 ± 0.0	NS
I	*Danaus plexippus plexippus*	Monarch	Endangered	Special Concern		S2?B,S3M	2	53.4 ± 0.0	NS
I	*Barnea truncata*	Atlantic Mud-piddock	Threatened	Threatened		S1	10	74.1 ± 0.0	NS
I	*Bombus suckleyi*	Suckley's Cuckoo Bumble Bee	Threatened			SH	4	49.5 ± 5.0	NS
I	*Alasmidonta varicosa*	Brook Floater	Special Concern	Special Concern	Threatened	S3	5	38.7 ± 0.0	NS
I	*Bombus terricola*	Yellow-banded Bumble Bee	Special Concern	Special Concern	Vulnerable	S3	144	4.2 ± 0.0	NS
I	*Coccinella transversoguttata richardsoni*	Transverse Lady Beetle	Special Concern		Endangered	SH	4	47.5 ± 2.0	NS
I	*Gomphurus ventricosus*	Skillet Clubtail	Special Concern	Endangered		SH	2	27.5 ± 0.0	NS
I	*Cicindela formosa*	Big Sand Tiger Beetle				S1	1	89.9 ± 1.0	NS
I	*Erora laeta*	Early Hairstreak				S1	1	14.5 ± 1.0	NS
I	*Pachydiplax longipennis*	Blue Dasher				S1	28	3.0 ± 0.0	NS
I	*Polygonia comma*	Eastern Comma				S1?	21	6.5 ± 0.0	NS
I	*Polygonia satyrus*	Satyr Comma				S1?	7	14.4 ± 2.0	NS
I	*Boloria chariclea*	Arctic Fritillary				S1S2	1	99.4 ± 2.0	NS
I	*Somatochlora brevicincta*	Quebec Emerald				S1S2	1	13.0 ± 0.0	NS
I	*Tharsalea dospassosi*	Maritime Copper				S2	3	12.9 ± 5.0	NS
I	*Satyrium acadica*	Acadian Hairstreak				S2	4	82.8 ± 2.0	NS
I	*Neurocordulia michaeli*	Broad-tailed Shadowdragon				S2	4	96.4 ± 0.0	NS
I	*Coenagrion resolutum*	Taiga Bluet				S2	2	16.3 ± 1.0	NS

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
I	*Margaritifera margaritifera*	Eastern Pearlshell				S2	66	27.3 ± 0.0	NS
I	*Pantala hymenaea*	Spot-Winged Glider				S2?B	6	6.9 ± 1.0	NS
I	*Nymphalis l-album*	Compton Tortoiseshell				S2S3	19	9.4 ± 2.0	NS
I	*Aglais milberti*	Milbert's Tortoiseshell				S2S3	19	4.3 ± 2.0	NS
I	*Somatochlora kennedyi*	Kennedy's Emerald				S2S3	3	6.9 ± 1.0	NS
I	*Enallagma geminatum*	Skimming Bluet				S2S3	2	94.8 ± 0.0	NS
I	*Stylurus scudderi*	Zebra Clubtail				S2S3	6	27.5 ± 0.0	NS
I	*Alasmidonta undulata*	Triangle Floater				S2S3	22	6.9 ± 0.0	NS
I	*Strophiona nitens*	Chestnut Bark Long-horned Beetle				S3	2	16.1 ± 0.0	NS
I	*Psephenus herricki*	Herrick's Water Penny Beetle				S3	1	69.9 ± 0.0	NS
I	*Carabus serratus*	Serrated Ground Beetle				S3	1	80.8 ± 0.0	NS
I	*Hippodamia parenthesis*	Parenthesis Lady Beetle				S3	3	8.2 ± 0.0	NS
I	*Disonycha pensylvanica*	Pennsylvania Flea Beetle				S3	1	90.4 ± 0.0	NS
I	*Chrysochus auratus*	Dogbane Leaf Beetle				S3	1	32.1 ± 0.0	NS
I	*Naemia seriata*	Seaside Lady Beetle				S3	29	4.0 ± 0.0	NS
I	*Elateroides lugubris*	Sapwood Ship-timber Beetle				S3	1	16.4 ± 0.0	NS
I	*Chilocorus stigma*	Twice-stabbed Lady Beetle				S3	10	14.1 ± 0.0	NS
I	*Myzia pullata*	Streaked Lady Beetle				S3	5	3.3 ± 0.0	NS
I	*Monochamus marmorator*	Balsam Fir Sawyer				S3	1	24.0 ± 0.0	NS
I	*Trachysida aspera*	Rough Flower Longhorn Beetle				S3	1	7.2 ± 0.0	NS
I	*Dicerca tuberculata*	Swollen Jewel Beetle				S3	1	26.2 ± 9.0	NS
I	*Astylopsis sexguttata*	Six-speckled Long-horned Beetle				S3	2	17.7 ± 0.0	NS
I	*Satyrium calanus*	Banded Hairstreak				S3	72	7.0 ± 0.0	NS
I	*Callophrys lanoraieensis*	Bog Elfin				S3	23	14.7 ± 2.0	NS
I	*Strymon melinus*	Gray Hairstreak				S3	13	14.4 ± 1.0	NS
I	*Ophiogomphus aspersus*	Brook Snaketail				S3	2	39.2 ± 0.0	NS
I	*Ophiogomphus mainensis*	Maine Snaketail				S3	17	84.9 ± 0.0	NS
I	*Ophiogomphus rupinsulensis*	Rusty Snaketail				S3	21	27.5 ± 0.0	NS
I	*Epitheca princeps*	Prince Baskettail				S3	14	12.0 ± 0.0	NS
I	*Somatochlora forcipata*	Forcipate Emerald				S3	4	6.9 ± 1.0	NS
I	*Enallagma vernale*	Vernal Bluet				S3	5	16.8 ± 0.0	NS
I	*Polygonia interrogationis*	Question Mark				S3B	162	6.5 ± 0.0	NS
I	*Lepturopsis biforis*	Two-spotted Long-horned Beetle				S3S4	1	68.4 ± 0.0	NS
I	*Cecropterus pylades*	Northern Cloudywing				S3S4	5	81.5 ± 2.0	NS
I	*Amblyscirtes hegon*	Pepper and Salt Skipper				S3S4	28	6.5 ± 2.0	NS
I	*Cupido comyntas*	Eastern Tailed Blue				S3S4	28	21.7 ± 0.0	NS
I	*Argynnis aphrodite*	Aphrodite Fritillary				S3S4	29	21.5 ± 0.0	NS
I	*Polygonia faunus*	Green Comma				S3S4	15	9.4 ± 2.0	NS
I	*Oeneis jutta*	Jutta Arctic				S3S4	7	36.7 ± 1.0	NS
I	*Aeshna clepsydra*	Mottled Darner				S3S4	11	11.6 ± 1.0	NS
I	*Aeshna constricta*	Lance-Tipped Darner				S3S4	21	9.0 ± 1.0	NS
I	*Boyeria grafiana*	Ocellated Darner				S3S4	4	52.4 ± 1.0	NS
I	*Gomphaeschna furcillata*	Harlequin Darner				S3S4	14	2.4 ± 0.0	NS
I	*Somatochlora franklini*	Delicate Emerald				S3S4	2	39.2 ± 1.0	NS
I	*Erythrodiplax berenice*	Seaside Dragonlet				S3S4	4	4.3 ± 0.0	NS
I	*Nannothemis bella*	Elfin Skimmer				S3S4	21	13.3 ± 0.0	NS
I	*Enallagma vesperum*	Vesper Bluet				S3S4	4	38.2 ± 0.0	NS
I	*Amphiagrion saucium*	Eastern Red Damsel				S3S4	2	76.9 ± 1.0	NS
I	*Sphaerophoria pyrrhina*	Violaceous Globetail				SH	1	75.2 ± 5.0	NS
I	*Icaricia saepiolus*	Greenish Blue				SH	1	13.6 ± 2.0	NS
I	*Polygonia gracilis*	Hoary Comma				SH	1	77.0 ± 2.0	NS
N	*Erioderma mollissimum*	Graceful Felt Lichen	Endangered	Endangered	Endangered	S1	27	34.5 ± 0.0	NS
N	*Erioderma pedicellatum*	Boreal Felt Lichen - Atlantic	Endangered	Endangered	Endangered	S1	427	19.6 ± 0.0	NS

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
	(Atlantic pop.)	pop.							
N	*Peltigera hydrothyria*	Eastern Waterfan	Threatened	Threatened	Threatened	S1	19	53.4 ± 0.0	NS
N	*Pannaria lurida*	Wrinkled Shingle Lichen	Threatened	Threatened	Threatened	S2S3	150	12.0 ± 1.0	NS
N	*Anzia colpodes*	Black-foam Lichen	Threatened	Threatened	Threatened	S3	35	12.0 ± 0.0	NS
N	*Fuscopannaria leucosticta*	White-rimmed Shingle Lichen	Threatened			S3	15	18.3 ± 0.0	NS
N	*Heterodermia squamulosa*	Scaly Fringe Lichen	Threatened			S3	15	43.7 ± 0.0	NS
N	*Pectenia plumbea*	Blue Felt Lichen	Special Concern	Special Concern	Vulnerable	S3	253	5.7 ± 0.0	NS
N	*Sclerophora peronella (Atlantic pop.)*	Frosted Glass-whiskers (Atlantic population)	Special Concern	Special Concern		S3S4	30	14.4 ± 7.0	NS
N	*Pseudevernia cladonia*	Ghost Antler Lichen	Not At Risk			S2S3	18	16.9 ± 1.0	NS
N	*Fissidens exilis*	Pygmy Pocket Moss	Not At Risk			S3	15	52.1 ± 0.0	NS
N	*Chaenotheca servitii*	Flexuous Golden Stubble	Data Deficient			S1	1	85.4 ± 1.0	NS
N	*Aloina brevirostris*	Short-Beaked Rigid Screw Moss				S1	2	54.1 ± 2.0	NS
N	*Sematophyllum demissum*	a Moss				S1	1	18.3 ± 2.0	NS
N	*Cyrto-hypnum minutulum*	Tiny Cedar Moss				S1	1	85.5 ± 0.0	NS
N	*Blennothallia crispa*	Crinkled Jelly Lichen				S1	1	73.0 ± 0.0	NS
N	*Umbilicaria vellea*	Grizzled Rocktripe Lichen				S1	1	31.2 ± 5.0	NS
N	*Usnea perplexans*	Powdered Beard Lichen				S1	1	75.7 ± 0.0	NS
N	*Lathagrium cristatum*	Fingered Jelly Lichen				S1	3	61.2 ± 0.0	NS
N	*Fuscopannaria praetermissa*	Moss Shingles Lichen				S1	1	59.3 ± 0.0	NS
N	*Scytinium schraderi*	Wrinkled Jellyskin Lichen				S1	1	61.8 ± 0.0	NS
N	*Lichina confinis*	Marine Seaweed Lichen				S1	4	25.3 ± 0.0	NS
N	*Polychidium muscicola*	Eyed Mossthorns Woollybear Lichen				S1	1	69.5 ± 0.0	NS
N	*Pseudevernia consocians*	Common Antler Lichen				S1	1	85.0 ± 0.0	NS
N	*Sticta limbata*	Powdered Moon Lichen				S1	4	48.6 ± 3.0	NS
N	*Peltigera lepidophora*	Scaly Pelt Lichen				S1	5	57.9 ± 0.0	NS
N	*Bryoria nitidula*	Tundra Horsehair Lichen				S1	2	20.7 ± 0.0	NS
N	*Hypogymnia hultenii*	Powdered Honeycomb Lichen				S1	14	15.6 ± 1.0	NS
N	*Calypogeia neogaea*	Common Pouchwort				S1?	1	70.3 ± 0.0	NS
N	*Jubula pennsylvanica*	a liverwort				S1?	1	48.1 ± 0.0	NS
N	*Aloina rigida*	Aloe-Like Rigid Screw Moss				S1?	3	54.1 ± 2.0	NS
N	*Imbribryum muehlenbeckii*	Muehlenbeck's Bryum Moss				S1?	2	71.5 ± 0.0	NS
N	*Conardia compacta*	Coast Creeping Moss				S1?	1	41.2 ± 2.0	NS
N	*Tortula obtusifolia*	a Moss				S1?	3	64.7 ± 0.0	NS
N	*Didymodon tophaceus*	Olive Beard Moss				S1?	2	72.6 ± 4.0	NS
N	*Homomallium adnatum*	Adnate Hairy-gray Moss				S1?	1	89.8 ± 0.0	NS
N	*Paludella squarrosa*	Tufted Fen Moss				S1?	3	53.4 ± 0.0	NS
N	*Physcomitrium immersum*	a Moss				S1?	1	90.3 ± 0.0	NS
N	*Schistostega pennata*	Luminous Moss				S1?	2	48.4 ± 0.0	NS
N	*Enchylium limosum*	Lime-loving Tarpaper Lichen				S1?	2	72.6 ± 4.0	NS
N	*Scytinium intermedium*	Forty-five Jellyskin Lichen				S1?	1	72.6 ± 4.0	NS
N	*Melanelia culbersonii*	Appalachain Camouflage Lichen				S1?	1	51.7 ± 0.0	NS
N	*Arrhenopterum heterostichum*	One-sided Groove Moss				S1S2	2	54.0 ± 2.0	NS
N	*Mnium thomsonii*	Thomson's Leafy Moss				S1S2	1	59.8 ± 2.0	NS
N	*Tortula acaulon*	Cuspidate Earth Moss				S1S2	1	95.7 ± 0.0	NS
N	*Plagiothecium latebricola*	Alder Silk Moss				S1S2	2	61.3 ± 5.0	NS
N	*Platydictya confervoides*	a Moss				S1S2	1	58.0 ± 0.0	NS
N	*Sematophyllum marylandicum*	a Moss				S1S2	2	18.6 ± 3.0	NS
N	*Timmia megapolitana*	Metropolitan Timmia Moss				S1S2	3	89.5 ± 1.0	NS
N	*Tortula mucronifolia*	Mucronate Screw Moss				S1S2	1	94.2 ± 3.0	NS
N	*Pseudotaxiphyllum*	a Moss				S1S2	1	53.7 ± 0.0	NS

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	distichaceum								
N	*Haplocladium microphyllum*	Tiny-leaved Haplocladium Moss				S1S2	1	70.0 ± 5.0	NS
N	*Rhynchostegium serrulatum*	Dark Beaked Moss				S1S2	1	46.6 ± 2.0	NS
N	*Enchylium bachmanianum*	Bachman's Jelly Lichen				S1S2	2	61.3 ± 0.0	NS
N	*Placidium squamulosum*	Limy Soil Stipplescale Lichen				S1S2	1	63.8 ± 6.0	NS
N	*Pilophorus cereolus*	Powdered Matchstick Lichen				S1S2	1	89.3 ± 3.0	NS
N	*Rhizoplaca subdiscrepans*	Scattered Rock-posy Lichen				S1S2	1	53.0 ± 1.0	NS
N	*Parmotrema reticulatum*	Netted Ruffle Lichen				S1S2	1	83.4 ± 0.0	NS
N	*Parmeliella parvula*	Poor-man's Shingles Lichen				S1S2	11	26.5 ± 0.0	NS
N	*Umbilicaria polyrhiza*	Ballpoint Rocktripe Lichen				S1S3	1	92.0 ± 0.0	NS
N	*Lecanora polytropa*	a lichen				S1S3	2	25.2 ± 1.0	NS
N	*Acarospora sinopica*	a cracked lichen				S1S3	2	13.1 ± 0.0	NS
N	*Heterodermia galactophylla*	Branching Fringe Lichen				S1S3	1	53.0 ± 0.0	NS
N	*Xylopsora friesii*	a Lichen				S1S3	2	10.7 ± 0.0	NS
N	*Stereocaulon grande*	Grand Foam Lichen				S1S3	1	91.9 ± 0.0	NS
N	*Stereocaulon intermedium*	Pacific Brain Foam Lichen				S1S3	3	16.6 ± 0.0	NS
N	*Anacamptodon splachnoides*	a Moss				S2	2	11.7 ± 30.0	NS
N	*Sphagnum platyphyllum*	Flat-leaved Peat Moss				S2	2	19.2 ± 3.0	NS
N	*Sphagnum subnitens*	Lustrous Peat Moss				S2	1	45.7 ± 2.0	NS
N	*Usnea flavocardia*	Blood-splattered Beard Lichen				S2	1	25.5 ± 4.0	NS
N	*Cystocoleus ebeneus*	Rockgossamer Lichen				S2	3	18.4 ± 0.0	NS
N	*Hypotrachyna catawbiensis*	Powder-tipped Antler Lichen				S2	2	52.9 ± 0.0	NS
N	*Scytinium imbricatum*	Scaly Jellyskin Lichen				S2	2	66.6 ± 4.0	NS
N	*Nephroma arcticum*	Arctic Kidney Lichen				S2	1	16.9 ± 1.0	NS
N	*Nephroma resupinatum*	a lichen				S2	11	13.4 ± 1.0	NS
N	*Placynthium flabellosum*	Scaly Ink Lichen				S2	1	32.3 ± 17.0	NS
N	*Moerckia flotoviana*	Flotow's Ruffwort				S2?	1	73.3 ± 0.0	NS
N	*Riccardia multifida*	Delicate Germanderwort				S2?	2	45.1 ± 0.0	NS
N	*Anomodon viticulosus*	a Moss				S2?	1	99.2 ± 0.0	NS
N	*Weissia muhlenbergiana*	a Moss				S2?	4	59.8 ± 1.0	NS
N	*Atrichum angustatum*	Lesser Smoothcap Moss				S2?	2	83.4 ± 2.0	NS
N	*Ptychostomum pendulum*	Drooping Bryum				S2?	1	54.0 ± 2.0	NS
N	*Drepanocladus polygamus*	Polygamous Hook Moss				S2?	4	18.3 ± 2.0	NS
N	*Dicranum condensatum*	Condensed Broom Moss				S2?	2	38.6 ± 0.0	NS
N	*Ditrichum rhynchostegium*	a Moss				S2?	1	17.9 ± 1.0	NS
N	*Grimmia anomala*	Mountain Forest Grimmia				S2?	1	71.5 ± 1.0	NS
N	*Kiaeria starkei*	Starke's Fork Moss				S2?	1	33.1 ± 10.0	NS
N	*Orthotrichum anomalum*	Anomalous Bristle Moss				S2?	1	62.0 ± 2.0	NS
N	*Philonotis marchica*	a Moss				S2?	2	82.5 ± 0.0	NS
N	*Platydictya jungermannioides*	False Willow Moss				S2?	1	40.1 ± 0.0	NS
N	*Cyrtomnium hymenophylloides*	Short-pointed Lantern Moss				S2?	1	8.8 ± 5.0	NS
N	*Platylomella lescurii*	a Moss				S2?	4	45.8 ± 0.0	NS
N	*Phylliscum demangeonii*	Black Rock-wafer Lichen				S2?	4	62.6 ± 0.0	NS
N	*Oxyrrhynchium hians*	Light Beaked Moss				S2S3	4	14.7 ± 5.0	NS
N	*Platydictya subtilis*	Bark Willow Moss				S2S3	1	99.1 ± 3.0	NS
N	*Scorpidium revolvens*	Limprichtia Moss				S2S3	3	41.5 ± 2.0	NS
N	*Moelleropsis nebulosa*	Blue-gray Moss Shingle Lichen				S2S3	58	17.9 ± 0.0	NS
N	*Moelleropsis nebulosa ssp. frullaniae*	Blue-gray Moss Shingle Lichen				S2S3	3	43.7 ± 0.0	NS
N	*Ramalina thrausta*	Angelhair Ramalina Lichen				S2S3	12	5.5 ± 5.0	NS
N	*Collema leptaleum*	Crumpled Bat's Wing Lichen				S2S3	67	23.3 ± 1.0	NS
N	*Usnea ceratina*	Warty Beard Lichen				S2S3	2	84.9 ± 0.0	NS

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N	*Usnea rubicunda*	Red Beard Lichen				S2S3	6	53.5 ± 0.0	NS
N	*Ahtiana aurescens*	Eastern Candlewax Lichen				S2S3	18	26.1 ± 0.0	NS
N	*Usnocetraria oakesiana*	Yellow Band Lichen				S2S3	9	18.6 ± 0.0	NS
N	*Cladonia mateocyatha*	Mixed-up Pixie-cup				S2S3	4	16.8 ± 5.0	NS
N	*Cladonia parasitica*	Fence-rail Lichen				S2S3	2	26.3 ± 0.0	NS
N	*Chaenotheca gracilenta*	a lichen				S2S3	1	10.5 ± 0.0	NS
N	*Scytinium tenuissimum*	Birdnest Jellyskin Lichen				S2S3	7	18.4 ± 0.0	NS
N	*Melanohalea septentrionalis*	Northern Camouflage Lichen				S2S3	1	75.6 ± 0.0	NS
N	*Myelochroa aurulenta*	Powdery Axil-bristle Lichen				S2S3	1	84.0 ± 2.0	NS
N	*Parmelia fertilis*	Fertile Shield Lichen				S2S3	8	70.2 ± 0.0	NS
N	*Hypotrachyna minarum*	Hairless-spined Shield Lichen				S2S3	2	37.6 ± 0.0	NS
N	*Parmeliopsis ambigua*	Green Starburst Lichen				S2S3	2	12.3 ± 0.0	NS
N	*Racodium rupestre*	Rockhair Lichen				S2S3	3	22.4 ± 1.0	NS
N	*Umbilicaria polyphylla*	Petalled Rocktripe Lichen				S2S3	2	30.0 ± 0.0	NS
N	*Usnea cavernosa*	Pitted Beard Lichen				S2S3	4	75.7 ± 0.0	NS
N	*Usnea mutabilis*	Bloody Beard Lichen				S2S3	1	75.7 ± 0.0	NS
N	*Fuscopannaria sorediata*	a Lichen				S2S3	6	22.4 ± 1.0	NS
N	*Physcia subtilis*	Slender Rosette Lichen				S2S3	2	29.9 ± 0.0	NS
N	*Dimelaena oreina*	Golden Moonglow Lichen				S2S3	2	14.1 ± 0.0	NS
N	*Cetraria arenaria*	Sand-loving Icelandmoss Lichen				S2S3	13	69.8 ± 0.0	NS
N	*Cladonia coccifera*	Eastern Boreal Pixie-cup Lichen				S2S3	3	21.1 ± 2.0	NS
N	*Cladonia deformis*	Lesser Sulphur-cup Lichen				S2S3	2	65.7 ± 4.0	NS
N	*Cladonia phyllophora*	Felt Lichen				S2S3	2	96.4 ± 4.0	NS
N	*Usnea flammea*	Coastal Bushy Beard Lichen				S2S3	1	25.2 ± 1.0	NS
N	*Ephemerum serratum*	a Moss				S3	3	61.8 ± 5.0	NS
N	*Fissidens taxifolius*	Yew-leaved Pocket Moss				S3	14	38.0 ± 0.0	NS
N	*Anomodon tristis*	a Moss				S3	4	42.3 ± 15.0	NS
N	*Sphagnum contortum*	Twisted Peat Moss				S3	4	70.1 ± 4.0	NS
N	*Tetraplodon angustatus*	Toothed-leaved Nitrogen Moss				S3	2	45.7 ± 2.0	NS
N	*Collema nigrescens*	Blistered Tarpaper Lichen				S3	38	20.5 ± 0.0	NS
N	*Solorina saccata*	Woodland Owl Lichen				S3	11	39.1 ± 2.0	NS
N	*Fuscopannaria ahlneri*	Corrugated Shingles Lichen				S3	84	12.0 ± 0.0	NS
N	*Scytinium lichenoides*	Tattered Jellyskin Lichen				S3	32	17.9 ± 0.0	NS
N	*Leptogium milligranum*	Stretched Jellyskin Lichen				S3	10	53.1 ± 0.0	NS
N	*Nephroma bellum*	Naked Kidney Lichen				S3	6	12.7 ± 5.0	NS
N	*Placynthium nigrum*	Common Ink Lichen				S3	2	64.7 ± 0.0	NS
N	*Platismatia norvegica*	Oldgrowth Rag Lichen				S3	1	47.0 ± 0.0	NS
N	*Punctelia appalachensis*	Appalachian Speckleback Lichen				S3	14	93.9 ± 0.0	NS
N	*Viridothelium virens*	a lichen				S3	4	28.5 ± 2.0	NS
N	*Ephebe lanata*	Waterside Rockshag Lichen				S3	4	32.3 ± 17.0	NS
N	*Phaeophyscia adiastola*	Powder-tipped Shadow Lichen				S3	1	10.5 ± 0.0	NS
N	*Phaeophyscia pusilloides*	Pompom-tipped Shadow Lichen				S3	9	10.2 ± 0.0	NS
N	*Peltigera collina*	Tree Pelt Lichen				S3	11	18.6 ± 0.0	NS
N	*Barbula convoluta*	Lesser Bird's-claw Beard Moss				S3?	3	14.9 ± 0.0	NS
N	*Calliergon giganteum*	Giant Spear Moss				S3?	1	50.6 ± 3.0	NS
N	*Drummondia prorepens*	a Moss				S3?	1	60.9 ± 5.0	NS
N	*Elodium blandowii*	Blandow's Bog Moss				S3?	5	4.0 ± 7.0	NS
N	*Mnium stellare*	Star Leafy Moss				S3?	3	54.5 ± 0.0	NS
N	*Sphagnum lindbergii*	Lindberg's Peat Moss				S3?	1	59.6 ± 0.0	NS
N	*Sphagnum riparium*	Streamside Peat Moss				S3?	2	34.8 ± 0.0	NS

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
N	*Cladonia stygia*	Black-footed Reindeer Lichen				S3?	3	27.1 ± 0.0	NS
N	*Anomodon rugelii*	Rugel's Anomodon Moss				S3S4	1	94.3 ± 0.0	NS
N	*Dichelyma capillaceum*	Hairlike Dichelyma Moss				S3S4	3	17.2 ± 3.0	NS
N	*Dicranum leioneuron*	a Dicranum Moss				S3S4	1	39.9 ± 0.0	NS
N	*Encalypta ciliata*	Fringed Extinguisher Moss				S3S4	1	94.2 ± 3.0	NS
N	*Splachnum ampullaceum*	Cruet Dung Moss				S3S4	2	34.0 ± 0.0	NS
N	*Thamnobryum alleghaniense*	a Moss				S3S4	4	79.1 ± 0.0	NS
N	*Tomentypnum nitens*	Golden Fuzzy Fen Moss				S3S4	4	46.7 ± 2.0	NS
N	*Schistidium agassizii*	Elf Bloom Moss				S3S4	2	45.3 ± 0.0	NS
N	*Hylocomiastrum pyrenaicum*	a Feather Moss				S3S4	1	12.0 ± 0.0	NS
N	*Bryoria pseudofuscescens*	Mountain Horsehair Lichen				S3S4	4	22.8 ± 1.0	NS
N	*Enchylium tenax*	Soil Tarpaper Lichen				S3S4	10	38.7 ± 0.0	NS
N	*Sticta fuliginosa*	Peppered Moon Lichen				S3S4	71	12.7 ± 5.0	NS
N	*Arctoparmelia incurva*	Finger Ring Lichen				S3S4	85	5.7 ± 0.0	NS
N	*Scytinium teretiusculum*	Curly Jellyskin Lichen				S3S4	9	16.4 ± 0.0	NS
N	*Leptogium acadiense*	Acadian Jellyskin Lichen				S3S4	29	11.4 ± 0.0	NS
N	*Scytinium subtile*	Appressed Jellyskin Lichen				S3S4	26	19.8 ± 0.0	NS
N	*Cladonia floerkeana*	Gritty British Soldiers Lichen				S3S4	4	21.1 ± 0.0	NS
N	*Heterodermia speciosa*	Powdered Fringe Lichen				S3S4	39	44.9 ± 0.0	NS
N	*Leptogium corticola*	Blistered Jellyskin Lichen				S3S4	91	20.3 ± 0.0	NS
N	*Melanohalea olivacea*	Spotted Camouflage Lichen				S3S4	1	75.7 ± 0.0	NS
N	*Parmeliopsis hyperopta*	Gray Starburst Lichen				S3S4	1	93.6 ± 0.0	NS
N	*Parmotrema perlatum*	Powdered Ruffle Lichen				S3S4	24	10.5 ± 0.0	NS
N	*Peltigera hymenina*	Cloudy Pelt Lichen				S3S4	2	21.1 ± 2.0	NS
N	*Sphaerophorus fragilis*	Fragile Coral Lichen				S3S4	11	21.1 ± 2.0	NS
N	*Sclerophora peronella*	Frosted Glass-whiskers Lichen				S3S4	2	91.9 ± 0.0	NS
N	*Coccocarpia palmicola*	Salted Shell Lichen				S3S4	681	12.0 ± 0.0	NS
N	*Physcia caesia*	Blue-gray Rosette Lichen				S3S4	2	25.2 ± 1.0	NS
N	*Physcia tenella*	Fringed Rosette Lichen				S3S4	7	10.8 ± 0.0	NS
N	*Anaptychia palmulata*	Shaggy Fringed Lichen				S3S4	90	18.9 ± 0.0	NS
N	*Evernia prunastri*	Valley Oakmoss Lichen				S3S4	36	52.7 ± 0.0	NS
N	*Heterodermia neglecta*	Fringe Lichen				S3S4	102	10.0 ± 0.0	NS
P	*Clethra alnifolia*	Coast Pepper-Bush	Endangered	Threatened	Vulnerable	S2	3	9.6 ± 0.0	NS
P	*Juglans cinerea*	Butternut	Endangered	Endangered		SNA	30	7.9 ± 0.0	NS
P	*Fraxinus nigra*	Black Ash	Threatened		Threatened	S1S2	780	8.5 ± 0.0	NS
P	*Liatris spicata*	Dense Blazing Star	Threatened	Threatened		SNA	4	5.2 ± 0.0	NS
P	*Lophiola aurea*	Goldencrest	Special Concern	Special Concern	Vulnerable	S2	19	94.1 ± 1.0	NS
P	*Lilaeopsis chinensis*	Eastern Lilaeopsis	Special Concern	Special Concern	Vulnerable	S3	140	85.2 ± 0.0	NS
P	*Isoetes prototypus*	Prototype Quillwort	Special Concern	Special Concern	Vulnerable	S3	13	92.7 ± 0.0	NS
P	*Floerkea proserpinacoides*	False Mermaidweed	Not At Risk			S2S3	34	79.7 ± 7.0	NS
P	*Acer saccharinum*	Silver Maple				S1	12	81.3 ± 0.0	NS
P	*Osmorhiza depauperata*	Blunt Sweet Cicely				S1	1	83.6 ± 5.0	NS
P	*Andersonglossum boreale*	Northern Wild Comfrey				S1	5	56.8 ± 1.0	NS
P	*Turritis glabra*	Tower Mustard				S1	1	89.6 ± 0.0	NS
P	*Lobelia spicata*	Pale-Spiked Lobelia				S1	6	77.0 ± 7.0	NS
P	*Ribes americanum*	Wild Black Currant				S1	4	55.5 ± 3.0	NS
P	*Fraxinus pennsylvanica*	Red Ash				S1	11	36.7 ± 5.0	NS
P	*Persicaria careyi*	Carey's Smartweed				S1	1	57.8 ± 3.0	NS
P	*Phytolacca americana*	Common Pokeweed				S1	4	10.7 ± 0.0	NS
P	*Podostemum ceratophyllum*	Horn-leaved Riverweed				S1	1	97.5 ± 0.0	NS
P	*Montia fontana*	Water Blinks				S1	1	12.1 ± 1.0	NS
P	*Lysimachia quadrifolia*	Whorled Yellow Loosestrife				S1	1	34.6 ± 0.0	NS
P	*Salix myrtillifolia*	Blueberry Willow				S1	1	41.6 ± 0.0	NS
P	*Salix serissima*	Autumn Willow				S1	2	41.3 ± 0.0	NS
P	*Carex garberi*	Garber's Sedge				S1	4	83.4 ± 0.0	NS
P	*Carex laxiflora*	Loose-Flowered Sedge				S1	1	94.0 ± 1.0	NS

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
P	*Carex plantaginea*	Plantain-Leaved Sedge				S1	4	79.9 ± 0.0	NS
P	*Carex prairea*	Prairie Sedge				S1	2	97.5 ± 1.0	NS
P	*Carex viridula var. saxilittoralis*	Greenish Sedge				S1	4	59.6 ± 2.0	NS
P	*Scirpus atrovirens*	Dark-green Bulrush				S1	4	38.4 ± 0.0	NS
P	*Iris prismatica*	Slender Blue Flag				S1	1	95.7 ± 100.0	NS
P	*Sisyrinchium fuscatum*	Coastal Plain Blue-eyed-grass				S1	1	95.0 ± 0.0	NS
P	*Juncus vaseyi*	Vasey Rush				S1	1	83.6 ± 0.0	NS
P	*Trillium grandiflorum*	White Trillium				S1	3	97.5 ± 1.0	NS
P	*Malaxis monophyllos var. brachypoda*	North American White Adder's-mouth				S1	4	88.3 ± 10.0	NS
P	*Spiranthes casei var. casei*	Case's Ladies'-Tresses				S1	1	78.7 ± 0.0	NS
P	*Dichanthelium xanthophysum*	Slender Panic Grass				S1	10	90.9 ± 1.0	NS
P	*Elymus hystrix*	Spreading Wild Rye				S1	11	48.8 ± 1.0	NS
P	*Adiantum pedatum*	Northern Maidenhair Fern				S1	26	50.7 ± 0.0	NS
P	*Dryopteris goldieana*	Goldie's Woodfern				S1	1	77.2 ± 1.0	NS
P	*Equisetum palustre*	Marsh Horsetail				S1	1	92.1 ± 5.0	NS
P	*Botrychium lunaria*	Common Moonwort				S1	10	9.0 ± 0.0	NS
P	*Selaginella rupestris*	Rock Spikemoss				S1	1	55.9 ± 0.0	NS
P	*Solidago hispida*	Hairy Goldenrod				S1?	2	8.5 ± 7.0	NS
P	*Suaeda rolandii*	Roland's Sea-Blite				S1?	5	57.2 ± 2.0	NS
P	*Carex pensylvanica*	Pennsylvania Sedge				S1?	3	20.7 ± 0.0	NS
P	*Allium schoenoprasum*	Wild Chives				S1?	1	14.7 ± 0.0	NS
P	*Allium schoenoprasum var. sibiricum*	Wild Chives				S1?	1	77.5 ± 7.0	NS
P	*Crocanthemum canadense*	Long-branched Frostweed			Endangered	S1S2	2	26.9 ± 1.0	NS
P	*Cypripedium arietinum*	Ram's-Head Lady's-Slipper			Endangered	S1S2	308	51.7 ± 2.0	NS
P	*Sanicula odorata*	Clustered Sanicle				S1S2	9	53.4 ± 0.0	NS
P	*Draba glabella*	Rock Whitlow-Grass				S1S2	1	94.9 ± 0.0	NS
P	*Proserpinaca intermedia*	Intermediate Mermaidweed				S1S2	2	36.9 ± 0.0	NS
P	*Anemone virginiana var. alba*	Virginia Anemone				S1S2	5	77.5 ± 7.0	NS
P	*Carex haydenii*	Hayden's Sedge				S1S2	2	78.0 ± 1.0	NS
P	*Platanthera huronensis*	Fragrant Green Orchid				S1S2	1	52.6 ± 10.0	NS
P	*Euphrasia farlowii*	Farlow's Eyebright				S1S3	2	88.6 ± 0.0	NS
P	*Carex vacillans*	Estuarine Sedge				S1S3	2	50.3 ± 0.0	NS
P	*Zizia aurea*	Golden Alexanders				S2	41	64.6 ± 1.0	NS
P	*Antennaria parlinii ssp. fallax*	Parlin's Pussytoes				S2	33	49.8 ± 7.0	NS
P	*Rudbeckia laciniata*	Cut-Leaved Coneflower				S2	24	41.3 ± 7.0	NS
P	*Arabis pycnocarpa*	Cream-flowered Rockcress				S2	1	91.3 ± 0.0	NS
P	*Cardamine maxima*	Large Toothwort				S2	1	83.6 ± 0.0	NS
P	*Hudsonia ericoides*	Pinebarren Golden Heather				S2	179	8.5 ± 7.0	NS
P	*Desmodium canadense*	Canada Tick-trefoil				S2	12	76.7 ± 5.0	NS
P	*Hylodesmum glutinosum*	Large Tick-trefoil				S2	22	54.5 ± 0.0	NS
P	*Conopholis americana*	American Cancer-root				S2	20	89.1 ± 7.0	NS
P	*Anemonastrum canadense*	Canada Anemone				S2	12	11.1 ± 0.0	NS
P	*Hepatica americana*	Round-lobed Hepatica				S2	74	39.7 ± 0.0	NS
P	*Ranunculus sceleratus*	Cursed Buttercup				S2	24	9.7 ± 1.0	NS
P	*Galium boreale*	Northern Bedstraw				S2	5	84.9 ± 1.0	NS
P	*Gratiola neglecta*	Clammy Hedge-Hyssop				S2	6	58.8 ± 0.0	NS
P	*Dirca palustris*	Eastern Leatherwood				S2	75	34.3 ± 1.0	NS
P	*Carex gynocrates*	Northern Bog Sedge				S2	2	41.7 ± 0.0	NS
P	*Carex pellita*	Woolly Sedge				S2	2	62.8 ± 10.0	NS
P	*Carex livida*	Livid Sedge				S2	13	18.9 ± 0.0	NS
P	*Juncus greenei*	Greene's Rush				S2	5	10.8 ± 10.0	NS
P	*Allium tricoccum*	Wild Leek				S2	49	82.1 ± 13.0	NS

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P	*Lilium canadense*	Canada Lily				S2	71	32.0 ± 1.0	NS
P	*Cypripedium parviflorum var. pubescens*	Yellow Lady's-slipper				S2	26	24.3 ± 7.0	NS
P	*Cypripedium parviflorum var. makasin*	Small Yellow Lady's-Slipper				S2	10	53.8 ± 0.0	NS
P	*Cypripedium reginae*	Showy Lady's-Slipper				S2	57	41.1 ± 0.0	NS
P	*Platanthera flava var. flava*	Southern Rein Orchid				S2	3	82.2 ± 7.0	NS
P	*Platanthera flava var. herbiola*	Pale Green Orchid				S2	11	81.5 ± 1.0	NS
P	*Platanthera macrophylla*	Large Round-Leaved Orchid				S2	5	65.4 ± 1.0	NS
P	*Bromus latiglumis*	Broad-Glumed Brome				S2	28	65.1 ± 0.0	NS
P	*Cinna arundinacea*	Sweet Wood Reed Grass				S2	59	65.3 ± 0.0	NS
P	*Elymus wiegandii*	Wiegand's Wild Rye				S2	6	8.5 ± 7.0	NS
P	*Festuca subverticillata*	Nodding Fescue				S2	9	60.4 ± 5.0	NS
P	*Piptatheropsis pungens*	Slender Ricegrass				S2	2	77.6 ± 10.0	NS
P	*Cryptogramma stelleri*	Steller's Rockbrake				S2	3	62.4 ± 0.0	NS
P	*Cuscuta cephalanthi*	Buttonbush Dodder				S2?	1	44.8 ± 0.0	NS
P	*Rumex persicarioides*	Peach-leaved Dock				S2?	1	60.5 ± 0.0	NS
P	*Crataegus submollis*	Quebec Hawthorn				S2?	5	37.4 ± 7.0	NS
P	*Carex peckii*	White-Tinged Sedge				S2?	4	40.0 ± 0.0	NS
P	*Thuja occidentalis*	Eastern White Cedar			Vulnerable	S2S3	8	38.0 ± 0.0	NS
P	*Osmorhiza longistylis*	Smooth Sweet Cicely				S2S3	15	56.1 ± 0.0	NS
P	*Erigeron philadelphicus*	Philadelphia Fleabane				S2S3	2	64.3 ± 1.0	NS
P	*Lactuca hirsuta*	Hairy Lettuce				S2S3	3	13.9 ± 7.0	NS
P	*Impatiens pallida*	Pale Jewelweed				S2S3	3	64.0 ± 0.0	NS
P	*Caulophyllum thalictroides*	Blue Cohosh				S2S3	73	39.0 ± 0.0	NS
P	*Draba arabisans*	Rock Whitlow-Grass				S2S3	10	94.0 ± 1.0	NS
P	*Boechera stricta*	Drummond's Rockcress				S2S3	10	82.1 ± 0.0	NS
P	*Stellaria humifusa*	Saltmarsh Starwort				S2S3	4	48.4 ± 0.0	NS
P	*Oxybasis rubra*	Red Goosefoot				S2S3	2	59.6 ± 2.0	NS
P	*Hypericum majus*	Large St John's-wort				S2S3	4	8.5 ± 7.0	NS
P	*Hypericum x dissimulatum*	Disguised St. John's-wort				S2S3	5	13.0 ± 10.0	NS
P	*Empetrum atropurpureum*	Purple Crowberry				S2S3	5	8.4 ± 7.0	NS
P	*Euphorbia polygonifolia*	Seaside Spurge				S2S3	12	71.7 ± 3.0	NS
P	*Myriophyllum farwellii*	Farwell's Water Milfoil				S2S3	8	38.0 ± 1.0	NS
P	*Hedeoma pulegioides*	American False Pennyroyal				S2S3	11	35.1 ± 5.0	NS
P	*Oenothera fruticosa ssp. tetragona*	Narrow-leaved Evening Primrose				S2S3	8	22.3 ± 7.0	NS
P	*Polygala polygama*	Racemed Milkwort				S2S3	1	10.8 ± 1.0	NS
P	*Polygonum aviculare ssp. buxiforme*	Box Knotweed				S2S3	8	59.3 ± 7.0	NS
P	*Polygonum oxyspermum ssp. raii*	Ray's Knotweed				S2S3	3	56.8 ± 1.0	NS
P	*Polygonum oxyspermum*	Sharp-fruit Knotweed				S2S3	1	20.9 ± 0.0	NS
P	*Rumex triangulivalvis*	Triangular-valve Dock				S2S3	9	22.9 ± 0.0	NS
P	*Primula mistassinica*	Mistassini Primrose				S2S3	17	70.0 ± 1.0	NS
P	*Anemone quinquefolia*	Wood Anemone				S2S3	15	12.0 ± 0.0	NS
P	*Caltha palustris*	Yellow Marsh Marigold				S2S3	25	3.0 ± 0.0	NS
P	*Amelanchier fernaldii*	Fernald's Serviceberry				S2S3	1	90.9 ± 7.0	NS
P	*Potentilla canadensis*	Canada Cinquefoil				S2S3	9	10.1 ± 0.0	NS
P	*Salix pellita*	Satiny Willow				S2S3	3	53.2 ± 4.0	NS
P	*Tiarella cordifolia*	Heart-leaved Foamflower				S2S3	8	37.4 ± 0.0	NS
P	*Agalinis purpurea var. parviflora*	Small-flowered Purple False Foxglove				S2S3	2	92.6 ± 0.0	NS
P	*Boehmeria cylindrica*	Small-spike False-nettle				S2S3	55	33.7 ± 0.0	NS
P	*Carex adusta*	Lesser Brown Sedge				S2S3	8	12.8 ± 0.0	NS
P	*Carex capillaris*	Hairlike Sedge				S2S3	1	99.6 ± 0.0	NS
P	*Carex comosa*	Bearded Sedge				S2S3	4	60.2 ± 7.0	NS

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P	*Carex houghtoniana*	Houghton's Sedge				S2S3	1	57.3 ± 1.0	NS
P	*Carex hystericina*	Porcupine Sedge				S2S3	4	89.9 ± 1.0	NS
P	*Eleocharis ovata*	Ovate Spikerush				S2S3	4	40.6 ± 0.0	NS
P	*Scirpus pedicellatus*	Stalked Bulrush				S2S3	7	34.9 ± 0.0	NS
P	*Vallisneria americana*	Wild Celery				S2S3	11	25.7 ± 1.0	NS
P	*Najas gracillima*	Thread-Like Naiad				S2S3	2	45.2 ± 0.0	NS
P	*Goodyera pubescens*	Downy Rattlesnake-Plantain				S2S3	16	36.5 ± 1.0	NS
P	*Spiranthes casei var. novaescotiae*	Case's Ladies'-Tresses				S2S3	3	51.2 ± 0.0	NS
P	*Spiranthes lucida*	Shining Ladies'-Tresses				S2S3	13	39.5 ± 1.0	NS
P	*Potamogeton friesii*	Fries' Pondweed				S2S3	10	77.9 ± 5.0	NS
P	*Woodsia glabella*	Smooth Cliff Fern				S2S3	1	90.2 ± 1.0	NS
P	*Botrychium lanceolatum ssp. angustisegmentum*	Narrow Triangle Moonwort				S2S3	4	53.4 ± 5.0	NS
P	*Botrychium simplex*	Least Moonwort				S2S3	4	27.3 ± 0.0	NS
P	*Ophioglossum pusillum*	Northern Adder's-tongue				S2S3	5	12.7 ± 7.0	NS
P	*Potamogeton pulcher*	Spotted Pondweed			Vulnerable	S3	8	63.4 ± 2.0	NS
P	*Angelica atropurpurea*	Purple-stemmed Angelica				S3	1	66.9 ± 0.0	NS
P	*Conioselinum chinense*	Chinese Hemlock-parsley				S3	2	56.9 ± 0.0	NS
P	*Hieracium robinsonii*	Robinson's Hawkweed				S3	2	75.5 ± 1.0	NS
P	*Iva frutescens*	Big-leaved Marsh-elder				S3	59	55.9 ± 0.0	NS
P	*Senecio pseudoarnica*	Seabeach Ragwort				S3	30	8.8 ± 1.0	NS
P	*Symphyotrichum boreale*	Boreal Aster				S3	5	26.7 ± 5.0	NS
P	*Symphyotrichum undulatum*	Wavy-leaved Aster				S3	120	19.0 ± 7.0	NS
P	*Symphyotrichum ciliolatum*	Fringed Blue Aster				S3	18	41.0 ± 0.0	NS
P	*Alnus serrulata*	Smooth Alder				S3	19	93.4 ± 0.0	NS
P	*Betula michauxii*	Michaux's Dwarf Birch				S3	31	17.9 ± 0.0	NS
P	*Betula pumila*	Bog Birch				S3	3	38.9 ± 0.0	NS
P	*Cardamine parviflora*	Small-flowered Bittercress				S3	14	40.2 ± 1.0	NS
P	*Palustricodon aparinoides*	Marsh Bellflower				S3	14	57.6 ± 1.0	NS
P	*Mononeuria groenlandica*	Greenland Stitchwort				S3	169	8.5 ± 7.0	NS
P	*Sagina nodosa*	Knotted Pearlwort				S3	56	8.8 ± 2.0	NS
P	*Sagina nodosa ssp. borealis*	Knotted Pearlwort				S3	10	29.2 ± 0.0	NS
P	*Stellaria longifolia*	Long-leaved Starwort				S3	11	27.5 ± 5.0	NS
P	*Ceratophyllum echinatum*	Prickly Hornwort				S3	6	67.4 ± 0.0	NS
P	*Triosteum aurantiacum*	Orange-fruited Tinker's Weed				S3	47	51.9 ± 0.0	NS
P	*Crassula aquatica*	Water Pygmyweed				S3	1	41.7 ± 0.0	NS
P	*Empetrum eamesii*	Pink Crowberry				S3	94	8.4 ± 7.0	NS
P	*Vaccinium uliginosum*	Alpine Bilberry				S3	4	19.9 ± 1.0	NS
P	*Halenia deflexa*	Spurred Gentian				S3	3	35.8 ± 0.0	NS
P	*Geranium bicknellii*	Bicknell's Crane's-bill				S3	9	59.5 ± 0.0	NS
P	*Myriophyllum verticillatum*	Whorled Water Milfoil				S3	3	54.2 ± 7.0	NS
P	*Epilobium strictum*	Downy Willowherb				S3	7	57.3 ± 0.0	NS
P	*Polygala sanguinea*	Blood Milkwort				S3	31	6.1 ± 0.0	NS
P	*Persicaria arifolia*	Halberd-leaved Tearthumb				S3	11	38.8 ± 0.0	NS
P	*Plantago rugelii*	Rugel's Plantain				S3	7	9.2 ± 0.0	NS
P	*Primula laurentiana*	Laurentian Primrose				S3	8	90.7 ± 7.0	NS
P	*Samolus parviflorus*	Seaside Brookweed				S3	43	9.5 ± 5.0	NS
P	*Pyrola minor*	Lesser Pyrola				S3	2	22.6 ± 0.0	NS
P	*Anemone virginiana*	Virginia Anemone				S3	19	52.2 ± 5.0	NS
P	*Cephalanthus occidentalis*	Common Buttonbush				S3	8	10.6 ± 0.0	NS
P	*Galium labradoricum*	Labrador Bedstraw				S3	79	38.7 ± 0.0	NS
P	*Salix pedicellaris*	Bog Willow				S3	54	27.4 ± 0.0	NS
P	*Salix sericea*	Silky Willow				S3	122	27.7 ± 1.0	NS
P	*Saxifraga paniculata ssp. laestadii*	Laestadius' Saxifrage				S3	2	88.3 ± 7.0	NS
P	*Lindernia dubia*	Yellow-seeded False				S3	8	53.8 ± 0.0	NS

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		Pimperel							
P	*Laportea canadensis*	Canada Wood Nettle				S3	48	34.0 ± 0.0	NS
P	*Pilea pumila*	Dwarf Clearweed				S3	9	1.8 ± 0.0	NS
P	*Viola nephrophylla*	Northern Bog Violet				S3	7	56.3 ± 1.0	NS
P	*Carex bebbii*	Bebb's Sedge				S3	24	53.8 ± 0.0	NS
P	*Carex castanea*	Chestnut Sedge				S3	39	38.6 ± 0.0	NS
P	*Carex cryptolepis*	Hidden-scaled Sedge				S3	11	27.4 ± 6.0	NS
P	*Carex eburnea*	Bristle-leaved Sedge				S3	11	61.7 ± 1.0	NS
P	*Carex hirtifolia*	Pubescent Sedge				S3	32	44.3 ± 7.0	NS
P	*Carex lupulina*	Hop Sedge				S3	62	14.1 ± 1.0	NS
P	*Carex rosea*	Rosy Sedge				S3	36	52.4 ± 1.0	NS
P	*Carex swanii*	Swan's Sedge				S3	3	3.5 ± 0.0	NS
P	*Carex tenera*	Tender Sedge				S3	4	53.8 ± 0.0	NS
P	*Carex tribuloides*	Blunt Broom Sedge				S3	13	41.4 ± 0.0	NS
P	*Carex tuckermanii*	Tuckerman's Sedge				S3	32	53.5 ± 2.0	NS
P	*Eleocharis nitida*	Quill Spikerush				S3	6	48.5 ± 5.0	NS
P	*Eleocharis flavescens var. olivacea*	Bright-green Spikerush				S3	7	9.2 ± 0.0	NS
P	*Eriophorum gracile*	Slender Cottongrass				S3	6	12.7 ± 7.0	NS
P	*Coeloglossum viride*	Long-bracted Frog Orchid				S3	3	79.4 ± 1.0	NS
P	*Cypripedium parviflorum*	Yellow Lady's-slipper				S3	577	6.4 ± 0.0	NS
P	*Neottia bifolia*	Southern Twayblade				S3	121	6.3 ± 0.0	NS
P	*Platanthera flava*	Southern Rein-Orchid				S3	29	90.7 ± 0.0	NS
P	*Platanthera grandiflora*	Large Purple Fringed Orchid				S3	95	6.8 ± 0.0	NS
P	*Platanthera hookeri*	Hooker's Orchid				S3	16	54.9 ± 0.0	NS
P	*Dichanthelium linearifolium*	Narrow-leaved Panic Grass				S3	7	60.2 ± 7.0	NS
P	*Piptatheropsis canadensis*	Canada Ricegrass				S3	8	14.0 ± 7.0	NS
P	*Poa glauca*	Glaucous Blue Grass				S3	3	54.5 ± 1.0	NS
P	*Potamogeton praelongus*	White-stemmed Pondweed				S3	3	67.1 ± 5.0	NS
P	*Potamogeton richardsonii*	Richardson's Pondweed				S3	4	56.9 ± 0.0	NS
P	*Potamogeton zosteriformis*	Flat-stemmed Pondweed				S3	15	27.7 ± 5.0	NS
P	*Asplenium viride*	Green Spleenwort				S3	10	90.3 ± 7.0	NS
P	*Dryopteris fragrans*	Fragrant Wood Fern				S3	5	89.4 ± 7.0	NS
P	*Sceptridium dissectum*	Dissected Moonwort				S3	2	87.2 ± 0.0	NS
P	*Polypodium appalachianum*	Appalachian Polypody				S3	18	12.4 ± 0.0	NS
P	*Persicaria amphibia var. emersa*	Long-root Smartweed				S3?	16	34.8 ± 0.0	NS
P	*Spiranthes ochroleuca*	Yellow Ladies'-tresses				S3?	40	24.6 ± 0.0	NS
P	*Diphasiastrum x sabinifolium*	Savin-leaved Ground-cedar				S3?	2	78.9 ± 0.0	NS
P	*Bidens vulgata*	Tall Beggarticks				S3S4	6	12.4 ± 0.0	NS
P	*Erigeron hyssopifolius*	Hyssop-leaved Fleabane				S3S4	25	54.7 ± 7.0	NS
P	*Hieracium paniculatum*	Panicled Hawkweed				S3S4	25	53.4 ± 11.0	NS
P	*Bidens beckii*	Water Beggarticks				S3S4	8	27.0 ± 0.0	NS
P	*Packera paupercula*	Balsam Groundsel				S3S4	104	51.7 ± 0.0	NS
P	*Atriplex glabriuscula var. franktonii*	Frankton's Saltbush				S3S4	13	63.1 ± 0.0	NS
P	*Shepherdia canadensis*	Soapberry				S3S4	113	46.2 ± 7.0	NS
P	*Vaccinium boreale*	Northern Blueberry				S3S4	3	38.7 ± 0.0	NS
P	*Vaccinium cespitosum*	Dwarf Bilberry				S3S4	76	24.7 ± 0.0	NS
P	*Vaccinium corymbosum*	Highbush Blueberry				S3S4	12	6.9 ± 0.0	NS
P	*Fagus grandifolia*	American Beech				S3S4	689	0.5 ± 0.0	NS
P	*Bartonia virginica*	Yellow Bartonia				S3S4	26	24.7 ± 7.0	NS
P	*Proserpinaca pectinata*	Comb-leaved Mermaidweed				S3S4	13	17.8 ± 1.0	NS
P	*Decodon verticillatus*	Swamp Loosestrife				S3S4	2	59.0 ± 0.0	NS
P	*Nuphar microphylla*	Small Yellow Pond-lily				S3S4	1	49.8 ± 0.0	NS
P	*Persicaria pensylvanica*	Pennsylvania Smartweed				S3S4	26	37.4 ± 7.0	NS
P	*Fallopia scandens*	Climbing False Buckwheat				S3S4	17	4.6 ± 0.0	NS
P	*Rumex pallidus*	Seabeach Dock				S3S4	1	27.6 ± 0.0	NS

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
P	*Pyrola asarifolia*	Pink Pyrola				S3S4	10	28.2 ± 50.0	NS
P	*Endotropis alnifolia*	alder-leaved buckthorn				S3S4	271	37.1 ± 0.0	NS
P	*Amelanchier spicata*	Running Serviceberry				S3S4	40	24.7 ± 0.0	NS
P	*Crataegus succulenta*	Fleshy Hawthorn				S3S4	1	14.4 ± 0.0	NS
P	*Fragaria vesca ssp. americana*	Woodland Strawberry				S3S4	66	34.2 ± 0.0	NS
P	*Fragaria vesca*	Woodland Strawberry				S3S4	16	7.9 ± 0.0	NS
P	*Galium aparine*	Common Bedstraw				S3S4	45	10.1 ± 0.0	NS
P	*Geocaulon lividum*	Northern Comandra				S3S4	4	62.3 ± 0.0	NS
P	*Limosella australis*	Southern Mudwort				S3S4	7	8.3 ± 3.0	NS
P	*Ulmus americana*	White Elm				S3S4	68	9.6 ± 0.0	NS
P	*Verbena hastata*	Blue Vervain				S3S4	148	4.1 ± 7.0	NS
P	*Viola sagittata var. ovata*	Arrow-Leaved Violet				S3S4	30	10.8 ± 0.0	NS
P	*Viola selkirkii*	Great-Spurred Violet				S3S4	3	48.8 ± 4.0	NS
P	*Symplocarpus foetidus*	Eastern Skunk Cabbage				S3S4	10	12.0 ± 0.0	NS
P	*Carex argyrantha*	Silvery-flowered Sedge				S3S4	7	63.1 ± 1.0	NS
P	*Sisyrinchium atlanticum*	Eastern Blue-Eyed-Grass				S3S4	3	75.2 ± 0.0	NS
P	*Triglochin gaspensis*	Gasp ├⌐ Arrowgrass				S3S4	29	35.7 ± 0.0	NS
P	*Juncus acuminatus*	Sharp-Fruit Rush				S3S4	5	14.6 ± 0.0	NS
P	*Juncus subcaudatus*	Woods-Rush				S3S4	23	26.2 ± 0.0	NS
P	*Luzula parviflora ssp. melanocarpa*	Black-fruited Woodrush				S3S4	2	86.2 ± 0.0	NS
P	*Goodyera repens*	Lesser Rattlesnake-plantain				S3S4	5	64.9 ± 0.0	NS
P	*Liparis loeselii*	Loesel's Twayblade				S3S4	8	14.6 ± 0.0	NS
P	*Platanthera obtusata*	Blunt-leaved Orchid				S3S4	7	8.5 ± 10.0	NS
P	*Platanthera orbiculata*	Small Round-leaved Orchid				S3S4	8	48.8 ± 4.0	NS
P	*Alopecurus aequalis*	Short-awned Foxtail				S3S4	7	37.9 ± 0.0	NS
P	*Dichanthelium clandestinum*	Deer-tongue Panic Grass				S3S4	297	16.4 ± 0.0	NS
P	*Panicum philadelphicum*	Philadelphia Panicgrass				S3S4	3	53.8 ± 0.0	NS
P	*Koeleria spicata*	Narrow False Oats				S3S4	11	53.1 ± 1.0	NS
P	*Asplenium trichomanes*	Maidenhair Spleenwort				S3S4	14	78.7 ± 0.0	NS
P	*Equisetum pratense*	Meadow Horsetail				S3S4	15	53.3 ± 0.0	NS
P	*Diphasiastrum complanatum*	Northern Ground-cedar				S3S4	12	13.8 ± 1.0	NS
P	*Diphasiastrum sitchense*	Sitka Ground-cedar				S3S4	2	83.6 ± 1.0	NS
P	*Huperzia appressa*	Mountain Firmoss				S3S4	7	67.0 ± 7.0	NS
P	*Sceptridium multifidum*	Leathery Moonwort				S3S4	8	56.6 ± 10.0	NS
P	*Botrychium matricariifolium*	Daisy-leaved Moonwort				S3S4	4	9.1 ± 0.0	NS
P	*Viola canadensis*	Canada Violet				SH	2	60.1 ± 0.0	NS
P	*Greeneochloa coarctata*	Small Reedgrass				SH	1	14.7 ± 6.0	NS

5.1 SOURCE BIBLIOGRAPHY (100 km)

The recipient of these data shall acknowledge the AC CDC and the data sources listed below in any documents, reports, publications or presentations, in which this dataset makes a significant contribution.

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1	Basquill, S.P. 2012. 2012 Bryophyte specimen data. Nova Scotia Department of Natural Resources, 37 recs.
1	Basquill, S.P.; Quigley, E. 2006. New Minuartia groenlandica record for NS. Pers. comm. to C.S. Blaney, Oct 6, 1 rec.
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1	Benjamin, L.K. 2003. Cypripedium arietinum in Cogmagun River NS. Pers. comm. to S. Blaney, 1 rec.
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1	Clayden, S.R. 2006. Pseudevernia cladonia records. NB Museum. Pers. comm. to S. Blaney, Dec, 4 recs.
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1	McKendry, Karen. 2016. Rare species observations, 2016. Nova Scotia Nature Trust, 19 recs.
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1	Phinney, L. 2019. Little Brown Myotis maternal colony counts and birdSAR, 2019. Mersey Tobeatic Research Institute.
1	Scott, F.W. 1988. Status Report on the Southern Flying Squirrel (Glaucomys volans) in Canada. Committee on the Status of Endangered Wildlife in Canada, 2 recs.
1	Skevington, Jeffrey H. 2020. Syrphid records used for the Field Guide to the Flower Flies of Northeastern North America. Canadian National Collection of Insects.
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1	Toms, Brad. 2022. Non-Lichen Observations from Lichen SMP and NCC Property Searches. Mersey Tobeatic Research Institute.
1	WIlliams, M. Cape Breton University Digital Herbarium. Cape Breton University Digital Herbarium. 2013.

APPENDIX B

Vegetation Data

Table B.1 - Observed Vegetation in the WSA

Species Name	Common Name
Abies balsamea	Balsam Fir
Acer pensylvanicum	Striped Maple
Acer pseudoplantanus	Sycamore Maple
Acer pseudoplatanus	Sycamore Maple
Acer rubrum	Red Maple
Acer spicatum	Mountain Maple
AGALINIS PURPUREA	Purple False-foxglove
Agrostis capillaris	Colonial Bent Grass
Agrostis hyemalis	Winter Bent Grass
Agrostis perennans	Upland Bent Grass
Agrostis scabra	Rough Bent Grass
Ajuga reptans	Creeping Bugleweed
Alisma triviale	Northern Water Plantain
Alnus incana	Speckled Alder
Alnus alnobetula	Green Alder
Amelanchier sp.	a Serviceberry
Anaphalis margaritacea	Pearly Everlasting
Anthoxanthum odoratum	Large Sweet Vernal Grass
Aralia hispida	Bristly Sarsaparilla
Aralia nudicaulis	Wild Sarsaparilla
Athyrium filix-femina	Common Lady Fern
Avenella flexuosa	Deschampsia flexuosa
Bazzania trilobata	Bazzania
Betula alleghaniensis	Yellow Birch
Betula papyrifera	Paper Birch
Betula populifolia	Gray Birch
Bidens cernua	Nodding Beggarticks
Bidens frondosa	Devil's Beggarticks
Brachyelytrum aristosum	Northern Shorthusk
Brachyelytrum erectum	Bearded Shorthusk
Bromus ciliatus	Bromus ciliatus var. ciliatus
Calamagrotis canadensis	Bluejoint Reed Grass
Carex atlantica	Atlantic Sedge
Carex brunnescens	Brownish Sedge
Carex canescens	Silvery Sedge
Carex debilis	White-edged Sedge
Carex echinata	Star Sedge
Carex folliculata	Northern Long Sedge
Carex gracillima	Graceful Sedge
Carex gynandra	Nodding Sedge
Carex intumescens	Bladder Sedge
Carex leptalea	Bristly-stalked Sedge
Carex lurida	Sallow Sedge
Carex magellanica	Boreal Bog Sedge
Carex novae-angliae	New England Sedge
Carex projecta	Necklace Sedge
Carex scoparia	Broom Sedge
Carex sp.	a Sedge
Carex stricta	Tussock Sedge
Carex tripserma	Three-seeded Sedge
Centaurea nigra	Black Knapweed
Chamaedaphne calyculata	Leatherleaf
Chelone glabra	White Turtlehead
Cicuta maculata	Spotted Water-Hemlock
Cinna latifolia	Drooping Wood Reed Grass
Circaea alpina	Small Enchanter's Nightshade
Cirsium muticum	Swamp Thistle
Clintonia borealis	Yellow Bluebead Lily
Comarum palustre	Marsh Cinquefoil
Comptonia peregrina	Sweet-fern
Coptis trifolia	Goldthread
Cornus canadensis	Bunchberry
Corylus cornuta	Beaked Hazel
Cypripedium acaule	Pink Lady's-Slipper
Dactylis glomerata	Orchard Grass
Danthonia spicata	Poverty Oat Grass
Daucus carota	Queen Anne's Lace
Dendrolycopodium hickeyi	Hickey's Tree-clubmoss
Dennstaedtia punctilobula	Eastern Hay-Scented Fern
Deschampsia cespitosa	Deschampsia caespitosa
Deschampsia flexuosa	Tufted Hair Grass
Dianthus armeria	Deptford Pink
Dichanthelium villosissimum	White-Hair Witchgrass
Diervilla lonicera	Northern Bush Honeysuckle
Doellingeria umbellata	Hairy Flat-top White Aster
Drosera intermedia	Spoon-Leaved Sundew
Drosera rotundifolia	Round-leaved Sundew
Dryopteris carthusiana	Spinulose Wood Fern

Table B.1 - Observed Vegetation in the WSA

Species Name	Common Name
Dryopteris cristata	Crested Wood Fern
Dryopteris intermedia	Evergreen Wood Fern
Dulichium arundinaceum	Three-Way Sedge
Echinochloa crus-galli	Large Barnyard Grass
Eleocharis obtusa	Blunt Spikerush
Epigaea repens	Trailing Arbutus
Epilobium palustre	Marsh Willowherb
Epipactis helleborine	Helleborine
Equisetum sylvaticum	Woodland Horsetail
Erigeron annuus	Annual Fleabane
Erigeron strigosus	Rough Fleabane
Eriophorum virginicum	Tawny Cottongrass
Eriophorum virginicum	Tawny Cottongrass
Eupatorium perfoliatum	Common Boneset
Euphrasia nemorosa	Common Eyebright
Euthamia graminifolia	Grass-leaved Goldenrod
Fagus grandifolia	American Beech
Fallopia cilinodis	Polygonum cilinode
Festuca filiformis	Hair Fescue
Festuca rubra	Red Fescue
Fragaria virginiana	Wild Strawberry
Frangula alnus	Glossy Buckthorn
Fraxinus americana	White Ash
Galeopsis tetrahit	Common Hemp-nettle
Galium palustre	Common Marsh Bedstraw
Gaultheria hispidula	Creeping Snowberry
Gaultheria procumbens	Eastern Teaberry
Gaylussacia baccata	Black Huckleberry
Gaylussacia bigeloviana	Dwarf Huckleberry
Glyceria canadensis	Canada Manna Grass
Glyceria grandis	Common Tall Manna Grass
Glyceria striata	Fowl Manna Grass
Glyceria striata var. striata	Fowl Mannagrass
Gnaphalium uliginosum	Marsh Cudweed
Gymnocarpium dryopteris	Common Oak Fern
Hamamelis virginiana	American Witch-Hazel
Hieracium umbellatum	Umbellate Hawkweed
Hydrocotyle americana	American Marsh Pennywort
Hylocomium splendens	Stairstep Moss
Hypericum boreale	Northern St John's-Wort
Hypericum canadense	Canada St John's-wort
Hypericum fraseri	Triadenum fraseri
Hypericum perforatum	Common St. John's-wort
Hypnom imopens	Plume Moss
Ilex mucronata	Nemopanthus mucronatus
Ilex verticillata	Common Winterberry
Impatiens capensis	Spotted Jewelweed
Iris versicolor	Harlequin Blue Flag
Juncus articulatus	Jointed Rush
Juncus canadensis	Canada Rush
Juncus effusus	Soft Rush
Juncus pelocarpus	Brown-Fruited Rush
Juncus tenuis	Slender Rush
Juniperus communis	Common Juniper
Kalmia angustfolia	Lambkill
Larix laricina	Tamarack
Leersia oryzoides	Rice Cut Grass
Leontodon autumnalis	Autumn Hawbit
Leucanthemum vulgare	Oxeye Daisy
Linnaea borealis	Twinflower
Linum usitatissimum	Common Yellow Flax
Lonicera canadensis	Canada Fly Honeysuckle
Luzula multiflora	Common Woodrush
Lycopodium annotinum	Stiff Clubmoss
Lycopus uniflorus	Northern Water Horehound
Lysimachia borealis	Trientalis borealis ssp. borealis
Lysimachia terrestris	Swamp Yellow Loosestrife
Maianthemum canadense	Wild Lily-of-The-Valley
Maianthemum trifolium	Three-leaved False Soloman's Seal
Matricaria discoidea	Pineapple Weed
Melampyrum lineare	American Cow Wheat
Menyanthes trifoliata	Bog Buckbean
Mitchella repens	Partridgeberry
Monotropa uniflora	Convulsion-Root
Morella pensylvanica	Northern Bayberry
Myrica gale	Sweet Gale
Myrica pensylvanica	Bayberry
Nabalus trifoliolatus	Three-leaved Rattlesnakeroot

Table B.1 - Observed Vegetation in the WSA

Species Name	Common Name
Nuphar variegata	Variegated Pond-lily
Oclemena acuminata	Whorled Wood Aster
Oclemena nemoralis	Bog Aster
Oclemena x blakei	a hybrid White Panicled American-Aster
Onoclea sensibilis	Sensitive Fern
Onoclea sensibilis	Senstive Fern
Oryzopsis asperifolia	White-grained Mountain Rice
Osmunda claytoniana	Interrupted Fern
Osmunda regalis	Royal Fern
Osmundastrum cinnamomeum	Cinnamon Fern
Oxalis montana	Common Wood Sorrel
Oxalis stricta	European Wood Sorrel
Parthenocissus quinquefolia	Virginia Creeper
Persicaria sagittata	Polygonum sagittatum
Phalaris arundinacea	Reed Canary Grass
Phegopteris connectilis	Northern Beech Fern
Phleum pratense	Common Timothy
Phragmites australis ssp. americanus	Common Reed
Picea glauca	White Spruce
Picea mariana	Black Spruce
Picea rubens	Red Spruce
Pilosella caespitosa	Meadow Hawkweed
Pinus banksiana	Jack Pine
Pinus strobus	Eastern White Pine
Plantago major	Common Plantain
Platanthera aquilonis	Tall Northern Green Orchid
Platanthera clavellata	Club Spur Orchid
Pleurozium schreberi	Schreber's Moss
Poa annua	Annual Blue Grass
Poa compressa	Canada Blue Grass
Poa pratensis	Kentucky Blue Grass
Pogonia ophioglossoides	Rose Pogonia
Polypodium virginianum	Rock Polypody
Pontederia cordata	Pickerelweed
Populus grandidentata	Large-toothed Aspen
Populus tremuloides	Trembling Aspen
Potamogeton epihydrus	Ribbon-leaved Pondweed
Potentilla simplex	Old Field Cinquefoil
Prunella vulgaris	Common Self-heal
Prunus pensylvanica	Pin Cherry
Prunus serotina	Black Cherry
Pteridium aquilinum	Bracken Fern
Quercus rubra	Northern Red Oak
Ranunculus repens	Creeping Buttercup
Rhododendron canadense	Rhodora
Rhododendron groenlandicum	Ledum groenlandicum
Rhynchospora alba	White Beakrush
Rhyncospora fusca	Brown Beakrush
Rhytidiadelphus triquetrus	Electrified Cat's-tail Moss
Ribes glandulosum	Skunk Currant
Ribes lacustre	Bristly Black Currant
Rosa multiflora	Multiflora Rose
Rosa nitida	Shining Rose
Rosa virginiana	Virginia Rose
Rubus allegheniensis	Alleghaney Blackberry
Rubus canadensis	Smooth Blackberry
Rubus hispidus	Bristly Dewberry
Rubus idaeus	Red Raspberry
Rubus pubescens	Dwarf Red Raspberry
Salix bebbiana	Bebb's Willow
Salix sp.	Salix spp.
Sambucus racemosa	Red Elderberry
Sarracenia purpurea	Northern Pitcher Plant
Schoenoplectus subterminalis	Water Bulrush
Scirpus cyperinus	Common Woolly Bulrush
Scirpus hattorianus	Mosquito Bulrush
Scorzoneroides autumnalis	Leontodon autumnalis
Solidago canadensis	Canada Goldenrod
Solidago gigantea	Giant Goldenrod
Solidago juncea	Early Goldenrod
Solidago puberula	Downy Goldenrod
Solidago rugosa	Rough-stemmed Goldenrod
Solidago uliginosa	Northern Bog Goldenrod
Sorbus americana	American Mountain Ash
Sorbus aucuparia	European Mountain Ash
Sparganium americanum	American Burreed
Sphagnum sp.	Sphagnum Moss
Spiraea alba	White Meadowsweet

Table B.1 - Observed Vegetation in the WSA

Species Name	Common Name
Spiraea alba var. latifolia	White Meadowsweet
Spiraea tomentosa	Steeplebush
Spiranthes cernua	Nodding Ladies'-Tresses
Sporobolus michauxianus	Spartina pectinata
Symphotrichum lateriflorum	Calico Aster
Symphyotrichum puniceum	Purple-stemmed Aster
Taraxacum officinale	
Taxus canadensis	Canada Yew
Thalictrum pubescens	Tall Meadow-Rue
Thelypteris noveboracensis	New York Fern
Toxicodendron radicans	Poison Ivy
Trientalis borealis	Starflower
Trifolium arvense	Rabbit's-foot Clover
Trifolium repens	White Clover
Trillium undulatum	Painted Trillium
Tussilago farfara	Coltsfoot
Typha latifolia	Broad-leaved Cattail
Utricularia cornuta	Horned Bladderwort
Utricularia geminiscapa	Twin-stemmed Bladderwort
Utricularia intermedia	Flat-leaved Bladderwort
Vaccinium angustifolium	Late Lowbush Blueberry
Vaccinium macrocarpon	Large Cranberry
Vaccinium myrtilloides	Velvet-leaved Blueberry
Vaccinium oxycoccos	Small Cranberry
Veronica officinalis	Common Speedwell
Veronica serpyllifolia	Thyme-Leaved Speedwell
Viburnum lantanoides	Hobblebush
Viburnum nudum	Northern Wild Raisin
Vicia cracca	Tufted Vetch
Viola cucullata	Marsh Blue Violet
Viola lanceolata	Lance-leaved Violet

Table B.2 - Stand Data for the WSA

Site ID	Field Description	Drainage Class	Estimated Stand Age	Forest Group (FG)	VT(2022)	Forest Maturity	Maturity Score	Forest Succession	Succession Score
AK1	mature softwood forest	mesic	50	SH	SH5	Mature	2	Mid	2
AK2	mature hardwood forest	mesic	50	IH	IH6	Mature	2	Early	3
AK3	tall shrub thicket	imperfectly drained	15	wetland	TSS	Immature	3	N/A	N/A
AK4	tall shrub thicket	hygric	10	wetland	TSS	Immature	3	N/A	N/A
AK5	tall shrub thicket	well drained	15	wetland	TSS	Immature	3	N/A	N/A
AK6	mature hardwood forest	well drained	30	IH	IH6b	Mature	2	Early	3
AK7	immature mixedwood forest	mesic	20	SH	SH8	Immature	3	Early-to-Mid	3
AK8	mixedwood treed basin swamp	hygric	unknown	WM	WM1	N/A	N/A	Mid	2
AK9	mixedwood treed forest	mesic	30	MW	MW7	Mature	2	Early-to-Mid	3
AK10	mature mixedwood forest	well drained	50	MW	MW2	Mature	2	Mid	2
AK11	mature hardwood forest	well drained	40	IH	IH6	Mature	2	Early	3
AK12	deciduous treed stream swamp	hydric	70	WD	WD2	Mature	2	Early-to-Mid	3
AK13	marsh/bog	hydric	unknown	wetland	marsh	N/A	N/A	N/A	N/A
AK14	tall shrub swamp	hygric	unknown	wetland	TSS	N/A	N/A	N/A	N/A
AK15	mature softwood forest	mesic	30	SH	SH4	Mature	2	Late	1
AK16	mature mixedwood forest	mesic	40	MW	MW2	Mature	2	Mid	2
AK17	mature hardwood forest	well drained	40	IH	IH6	Mature	2	Early	3
AK18	immature mixedwood forest	well drained	20	MW	MW2	Immature	3	Mid	2
AK19	mature mixedwood forest	imperfectly drained	70	TH	TH8a	Mature	2	Mid-to-Late	1
AK20	immature softwood forest	well drained	15	SP	SP5	Immature	3	Late	1
AK21a	immature mixedwood forest	mesic	15	MW	MW6	Immature	3	Early-to-Mid	3
AK21b	immature hardwood forest	imperfectly drained	15	IH	IH6b	Immature	3	Early	3
AK22	tall shrub swamp	hygric	unknown	wetland	TSS	N/A	N/A	N/A	N/A
AK23	mature softwood forest	imperfectly drained	40	WC	WC2	Mature	2	Edaphic	2
AK24	basin fen	hydric	unknown	wetland	fen	N/A	N/A	N/A	N/A
AK25	coniferous treed stream swamp	hygric	unknown	WC	WC7	N/A	N/A	arly-to-Mid, Edaph	2
AK26	mature mixedwood forest	mesic	70	MW	MW8	Mature	2	Early	3
AK27	immature mixedwood forest	well drained	20	MW	MW8	Immature	3	Early	3
AK28	mixedwood treed swamp	hydric	unknown	WM	WM3	N/A	N/A	Mid	2
AK29	immature softwood forest (woodland)	well drained	25	SH	SH5	Immature	3	Mid	2
AK30	mature softwood forest	well drained	80	SH	SH4	Potenital Old Growth	1	Late	1
AK31a	immature hardwood forest	well drained	15	IH	IH6	Immature	3	Early	3
AK31b	immature softwood forest	well drained	15	SH	SH4	Immature	3	Late	1
AK32	mixedwood treed basin swamp	hygric	unknown	wetland	swamp	N/A	N/A	N/A	N/A
AK33	immature hardwood forest (transmission row)	mesic	5	Transmission Line	N/A	Immature	3	N/A	N/A
AK34	mature mixedwood forest	mesic	50	MW	MW2	Mature	2	Mid	2

Table B.2 - Stand Data for the WSA

Site ID	Field Description	Drainage Class	Estimated Stand Age	Forest Group (FG)	VT(2022)	Forest Maturity	Maturity Score	Forest Succession	Succession Score
AK35	mixedwood treed basin swamp	hygric	unknown	WM	WM1	N/A	N/A	Mid	2
AK36	immature softwood forest	well drained	20	SH	SH4	Immature	3	Late	1
AK37	mature softwood forest	mesic	40	SH	SH5b	Mature	2	Mid	2
AK38	immature mixedwood forest	mesic	20	MW	MW2	Immature	3	Mid	2
AK39	immature hardwood forest	well drained	10	IH	IH6b	Immature	3	Early	3
AK40	immature hardwood forest	well drained	15	IH	IH9	Immature	3	Early	3
AK41	semi-barrens	well drained	20	OW	OW2	Immature	3	Early	3
AK42	immature softwood forest (woodland)	well drained	25	SP	SP7	Immature	3	N/A	N/A
AK43	mature softwood woodland	well drained	70	SP	SP7	Mature	2	Edaphic	2
AK44	former coniferous treed basin swamp	hydric	10	WC	swamp	Immature	3	N/A	N/A
AK45	immature mixedwood woodland	well drained	25	MW	MW9	Immature	2	Edaphic	2
AK46	mixedwood treed stream swamp	hygric	unknown	WM	WM1	N/A	N/A	Mid	2
AK47	stream fen	hydric	unknown	wetland	fen	N/A	N/A	N/A	N/A
AK48	softwood dominated stream swamp	hydric	unknown	wetland	swamp	N/A	N/A	N/A	N/A
AK49	mature mixedwood forest	imperfectly drained	30	SH	SH5b	Immature	3	Mid	2
AK50	semi-barrens	mesic	unknown	OW	OW2	N/A	N/A	Early	3
AK51	immature softwood woodland	well drained	20	SP	SP4a	Immature	3	Mid	2
AK52	mature mixedwood forest	mesic	30	MW	MW7	Mature	2	Early-to-Mid	3
AK53	mature softwood forest	imperfectly drained	40	SP	SP7	Mature	2	Edaphic	2
AK54	mature softwood forest	imperfectly drained	50	SP	SP5	Mature	2	Late	1
AK55	former mixedwood treed basin swamp	hydric	unknown	WD	swamp	N/A	N/A	N/A	N/A
AK56	hardwood treed stream swamp	hydric	unknown	WD	swamp	N/A	N/A	N/A	N/A
AK57a	immature hardwood forest	imperfectly drained	15	IH	IH6	Immature	3	Early	3
AK57b	immature mixedwood forest	mesic	15	MW	MW2	Immature	3	Mid	2
AK58	mixedwood treed stream swamp	riparian	50	WM	WM1	Mature	2	Mid	2
AK59	immature hardwood forest	imperfectly drained	15	IH	IH6	Immature	3	Early	3
AK60	barrens	well drained	15	Barrens	S5	Immature	3	N/A	N/A
AK61	mature softwood forest	mesic	50	OF	OF1	Mature	2	Early	3
AK62	mixedwood treed swamp	hygric	unknown	WC	WC7	N/A	N/A	Early-to-Mid	3
AK63	mature hardwood forest	mesic	60	IH	IH7	Mature	2	Early-to-Mid	3
AK64	mature hardwood forest	imperfectly drained	30	IH	IH6a	Mature	2	Early	3
AK65	old field	mesic	unknown	Field	N/A	N/A	N/A	N/A	N/A
AK66	mature hardwood forest	mesic	40	IH	IH7	Mature	2	Early-to-Mid	3
AK67	immature mixedwood forest	mesic	15	MW	swamp	Immature	3		
AK68	mixedwood treed basin swamp	hygmic	80	WM	WM2	Potenital Old Growth	1	Mid	2
AK69	mature mixedwood forest	mesic	60	MW	MW6	Mature	2	Early-to-Mid	3

Table B.2 - Stand Data for the WSA

Site ID	Field Description	Drainage Class	Estimated Stand Age	Forest Group (FG)	VT(2022)	Forest Maturity	Maturity Score	Forest Succession	Succession Score
AK70	tall shrub basin swamp	hygmic	unknown	wetland	swamp	N/A	N/A	N/A	N/A
AK71	immature hardwood forest	mesic	20	IH	IH7	Immature	3	Early-to-Mid	3
AK72	mature old field conifer forest	mesic	30	OF	OF3	Immature	3	Early-to-Mid	3
AK73	mixedwood treed swamp	hygric	unknown	WM	WM3	N/A	N/A	Mid	2
AK74	semi-barrens	well drained	20	OW	OW2	Immature	3	Early	3
AK75	mature mixedwood forest	mesic	40	MW	MW7	Mature	2	Early-to-Mid	3
AK76	mixedwood treed stream swamp	hydric	unknown	WM	WM1	N/A	N/A	Mid	2
AK77	mixedwood treed basin swamp	hydric	unknown	WM	WM3	N/A	N/A	Mid	2
AK78	mature coniferous forest	well drained	80	SH	SH4	Potenital Old Growth	1	Late	1
AK79	mixedwood treed stream swamp	hydric	unknown	WM	WM1	N/A	N/A	Mid	2
AK80	mixedwood treed stream swamp	hydric	unknown	WM	WM1	N/A	N/A	Mid	2
AK81	coniferous treed swamp	hydric	unknown	WC	WC11	N/A	N/A	Early*	3
AK82	semi-barrens/coniferous woodland	well drained	60	SP	SP4a	Mature	2	Mid	2
AK83	semi-barrrens/ coniferous woodland	well drained	80	OW	OW2	Potenital Old Growth	1	Early	3
AK84	coniferous treed basin swamp	hygmic		WC	WC11	N/A	N/A	Early*	3
AK85	mature coniferous forest	well drained	40	MW	MW2	Mature	2	Mid	2
AK86	mixedwood woodlands	well drained	30	MW	MW2	Immature	3	Mid	2
AK87	immature mixedwood forest/woodland	mesic	20	MW	MW2	Immature	3	Mid	2
AK88	hardwood forest	mesic	20	PF	PF5b	Immature	3	N/A	N/A
AK89	coniferous treed woodland	well drained	60	SP	SP7	Mature	2	N/A	N/A
AK90	mature coniferous forest	well drained	60	SP	SP4a	Mature	2	Mid	2
AK91	immature coniferous forest	mesic	15	SH	SH5	Immature	3	Mid	2
AK92	immature mixedwood	mesic	20	MW	MW7	Immature	3	Early-to-Mid	3
AK93	mature mixedwood forest	imperfectly drained	25	MW	MW7	Immature	3	N/A	N/A
AK94	mature hardwood forest	mesic	40	TH	TH8	Mature	2	Mid-to-Late	1
AK95	big field	mesic	unknown	Field	N/A	N/A	N/A	N/A	N/A
AK96	mature mixedwood forest	mesic	70	MW	MW7	Mature	2	Early-to-Mid	3
AK97	mature hardwood forest	mesic	80	TH	TH6	Potential Old Growth	1	Mid-to-Late	1
AK98	immature mixedwood forest	mesic	15	MW	MW2	Immature	3	Mid	2
AK99	immature mixedwood forest	mesic	20	MW	MW2	Immature	3	Mid	2
AK100	mature coniferous forest	imperfectly drained	50	SP	SP1a	Mature	2	Early	3
AK101	mixedwood treed stream swamp	hygmic	50	WC	WC7	Mature	2	Early-to-Mid	3
AK102	immature mixedwood forest	imperfectly drained	20	MW	MW8	Immature	3	Early	3
AK103	immature mixedwood forest	mesic	20	SP	SP7	Immature	3	N/A	N/A
AK104	immature mixedwood forest	mesic	15	MW	MW9	Immature	3	N/A	N/A
AK105	mature mixedwood forest	mesic	40	MW	MW6	Mature	2	Early-to-Mid	3
AK106	mature coniferous forest	mesic	30	IH	IH9	Mature	2		

Table B.3 - Vegetation Percent Cover Matrix for the WSA

Forest Group (FG)		Intolerant Hardwood Forest (IH)															Mixedwood Forest (MW)																									NA			Old Field Forest (OF)		Open Woodland (OW)				Planted Forest (PF)	Barrens
Vegetation Type (VT)		IH6	IH6	IH6	IH6	IH6	IH6	IH6a	IH6b	IH6b	IH6b	IH7	IH7	IH7	IH9	IH9	MW7	MW2	MW2	MW2	MW2	MW2	MW2	MW2	MW2	MW2	MW2	MW2	MW6	MW6	MW6	MW7	MW7	MW7	MW7	MW7	MW8	MW8	MW8	MW9	MW9	N/A	N/A	N/A	OF1	OF3	OW2	OW2	OW2	OW2	PF5b	S5
Vegetation Type	Species Name	AK2	AK11	AK17	AK31a	AK57a	AK59	AK64	AK6	AK21b	AK39	AK63	AK66	AK71	AK40	AK106	AK93	AK10	AK16	AK18	AK34	AK38	AK57b	AK85	AK86	AK87	AK98	AK99	AK21a	AK69	AK105	AK9	AK52	AK75	AK92	AK96	AK26	AK27	AK102	AK45	AK104	AK33	AK65	AK95	AK61	AK72	AK41	AK50	AK74	AK83	AK88	AK60
Tree	*Abies balsamea*	0	3	0	0	0	5	0	0	0	0	0	0	0	0	0	50	0	0	0	10	1	5	0	0	0	25	1	5	2	0	35	20	25	30	45	20	15	35	0	0	0	0	0	0	0	0	0	0	0	0	0
	Acer pensylvanicum	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Acer pseudoplantanus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0
	Acer rubrum	30	40	0	10	5	15	40	10	0	0	65	75	20	10	2	0	25	5	0	30	10	5	15	10	5	15	20	0	30	10	0	35	30	25	10	10	5	5	1	10	0	0	0	0	2	0	5	0	0	2	0
	Betula alleghaniensis	0	3	15	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	5	0	0	0	0	0	0	0	0	0	0	20	1	0	2	5	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Betula papyrifera	35	20	25	30	2	40	5	60	15	0	0	0	0	0	1	0	30	5	15	0	20	10	5	5	5	5	1	10	0	0	0	1	15	3	5	0	10	20	10	10	0	0	0	5	0	0	0	1	1	0	0
	Betula populifolia	0	0	0	5	0	10	0	0	0	0	0	2	10	60	25	0	0	0	2	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	15	0	0	0	0	0	0	4	0	0	0	0
	Frangula alnus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0
	Fraxinus americana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	5	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Larix laricina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	5	1	15	0	0	0	0	0	5	1	0	1	0	0
	Picea glauca	5	2	5	0	0	0	0	5	1	0	15	2	0	0	15	0	5	0	5	0	0	0	0	0	0	0	0	10	40	20	0	0	0	0	0	1	0	0	0	0	0	0	0	60	5	0	0	0	0	0	0
	Picea mariana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	20	0	0	0	0	0	5	10	15	25	0	5
	Picea rubens	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	0	15	25	60	30	40	30	50	35	20	30	50	10	0	0	20	2	10	20	0	8	10	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Pinus strobus	0	0	0	0	0	0	0	1	0	0	0	0	5	0	0	0	0	2	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	50	2	1	8	5	0	5
	Populus grandidentata	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Populus tremuloides	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Prunus pensylvanica	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Prunus serotina	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Quercus rubra	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	0.5	0	0	0	2	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sorbus americana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Shrub	*Abies balsamea*	0	10	0	0	0	5	0	0	10	0	0	0	0	0	0	5	0	0	0	10	0	25	0	0	0	0	0	5	2	0	15	3	2	0	1	5	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0
	Acer pensylvanicum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Acer pseudoplantanus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0
	Acer rubrum	0	0	0	2	20	0	0	1	10	10	0	0	0	2	0	0	0	0	0	0	0	0	0	0	10	0	0	2	0	0	2	2	0	0	0	0	5	0	0	0	5	0	0	0	0	5	0	0	0	0	1
	Acer spicatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Alnus incana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0	2	0	2	0	2	0	2	0	0	0	0	0	0	0
	Alnus alnobetula	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
	Amelanchier sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Betula alleghaniensis	0	0	0	0	1	15	0	0	0	0	0	0	0	0	0	2	0	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Betula papyrifera	0	0	0	0	15	15	0	0	50	0	0	0	0	0	0	0	0	2	1	0	0	20	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	4	0	0	0	0	2
	Betula populifolia	0	0	0	0	10	0	0	0	0	55	0	0	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2	0	0	3
	Chamaedaphne calyculata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Comptonia peregrina	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Corylu cornuta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Diervilla lonicera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0
	Fagus grandifolia	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Frangula alnus	30	0	0	40	40	2	40	10	20	1	25	30	40	25	0	2	0	5	0	0	2	2	0	0	0	2	5	10	2	0	1	5	0	0	0.5	25	10	0	0	1	75	8	0	20	25	0	0	0	0	5	0
	Fraxinus americana	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Gaylussacia baccata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	0	0	1	5	5	8	0	0
	Hamamelis virginiana	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Ilex mucronata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	10	15	0	0	0	0	0	0	0	0	0	0	5	8	0	2	0	0	0	0	0	0	3	8	8	10	0	2
	Ilex verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Juniperus communis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0
	Kalmia angustfolia	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0	40	0	0	0	2	25	25	40	0	0	40	0	0	5	0	0	0	0	0	0	0	40	0	0	0	0	0	0	70	40	30	35	0	60
	Larix laricina	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
	Lonicera canadensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Myrica gale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Myrica pensylvanica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Picea glauca	0	5	5	0	0	0	0	0	0	2	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	4	0	0	2	0	0	0.5	0	10	0	0	0	0	0	0	5	0	1	0	0	0	0	0
	Picea mariana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	15	0	0	0	0	0	10	15	10	20	0	10
	Picea rubens	0	20	5	0	5	0	0	0	0	0	0	0	0	0	0	0	15	35	5	15	15	5	15	10	10	0	15	10	0	0	0	5	1	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0
	Pinus strobus	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	2
	Populus grandidentata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Prunus pensylvanica	0	0	0	10	0	0	0	0	5	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Quercus rubra	0	0.5	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
	Rhododendron canadense	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	10	0	0
	Rhododendron groenlandicu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
	Rosa multiflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rosa nitida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Salix sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	Sambucus racemosa	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sorbus americana	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Spiraea alba	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Spiraea tomentosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Taxus canadensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Viburnum lantanoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Viburnum nudum	2	0	2	0	0	0	0	0	0	0.5	0	0.5	0	0	0	0	0	10	0	0	1	2	5	20	12	0	0	5	1	0	0	0	0	0	0	0	0	0	5	3	0	0	0	0	0	2	8	5	5	0	1
Ground Vegetation	*Anthoxanthum spp.*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0
	Athyrium filix-femina	8	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Aralia nudicaulis	0	2	0	0	0	4	0	0	0	0	0	0	0	0	0	0.5	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Agrostis capillaris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0	0	0	0	0	0	0
	Agrostis hyemalis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Agrostis perennans	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0
	Bazzania trilobata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0	0	10	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0
	Brachyelytrum aristosum	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Calamagrotis canadensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Carex echinata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Carex gracillima	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Carex leptalea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Carex novae-angliae	10	0	0	0	0	0	0	5	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0
	Carex sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0
	Carex stricta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Carex tripserma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Centaurea nigra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	20	0	0	0	0	0	0	0	0
	Chelone glabra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Cicuta maculata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Cladonia sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	10	0	20	40	0	5

Table B.3 - Vegetation Percent Cover Matrix for the WSA

Forest Group (FG)		Intolerant Hardwood Forest (IH)															Mixedwood Forest (MW)																									NA			Old Field Forest (OF)		Open Woodland (OW)				Planted Forest (PF)	Barrens
Vegetation Type (VT)		IH6	IH6	IH6	IH6	IH6	IH6	IH6a	IH6b	IH6b	IH6b	IH7	IH7	IH7	IH9	IH9	MW7	MW2	MW2	MW2	MW2	MW2	MW2	MW2	MW2	MW2	MW2	MW2	MW6	MW6	MW6	MW7	MW7	MW7	MW7	MW7	MW8	MW8	MW8	MW9	MW9	N/A	N/A	N/A	OF1	OF3	OW2	OW2	OW2	OW2	PF5b	S5
Vegetation Type	**Species Name**	**AK2**	**AK11**	**AK17**	**AK31a**	**AK57a**	**AK59**	**AK64**	**AK6**	**AK21b**	**AK39**	**AK63**	**AK66**	**AK71**	**AK40**	**AK106**	**AK93**	**AK10**	**AK16**	**AK18**	**AK34**	**AK38**	**AK57b**	**AK85**	**AK86**	**AK87**	**AK98**	**AK99**	**AK21a**	**AK69**	**AK105**	**AK9**	**AK52**	**AK75**	**AK92**	**AK96**	**AK26**	**AK27**	**AK102**	**AK45**	**AK104**	**AK33**	**AK65**	**AK95**	**AK61**	**AK72**	**AK41**	**AK50**	**AK74**	**AK83**	**AK88**	**AK60**
	Clintonia borealis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ground Vegetation (continued)	*Coptis trifolia*	0	15	5	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Cornus canadensis	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
	Cypripedium acaule	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Danthonia spicata	0	0	0	0	0	0	0	0	0	1	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dennstaedtia punctilobula	0	0	0	0	0	0	0	10	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Deschampsia flexuosa	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dicranium sp.	0	0	15	2	0	0	2	0	0	0	3	0	0	0	10	0	2	2	15	10	0	1	2	0	0	0	2	0	4	1	0	0	5	0	0	0	5	0	1	10	0	0	0	2	0	0	0	0	0	0	0
	Diervilla lonicera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Doellingeria umbellata	0	0	0	0	0	1	4	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dryopteris carthusiana	2	0	0	0	0	0	15	5	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dryopteris intermedia	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	1	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0
	Epigaea repens	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0.5	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Eriophorum virginicum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Euthamia graminifolia	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Festuca rubra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0
	Fragaria virginiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Frangula alnus	0	0	0	0	20	2	60	0	20	0	0	30	60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	15	0	0	0	0	0	0	0	50	10	0	0	0	0	0	0
	Galium palustre	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Galium sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0
	Gaultheria hispidula	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Gaultheria procumbens	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	2	0	15	1	0	10
	Glyceria canadensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Glyceria grandis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Glyceria striata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Iris versicolor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hylocomium splendens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hypnom imopens	5	0	1	2	2	10	0	2	5	0	5	5	0	5	15	5	10	10	0	15	15	1	5	0	0	10	10	0	5	5	0	0	20	20	5	20	0	10	0	5	1	0	0	0	0.5	0	0	0	0	25	0
	Juncus canadensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Juncus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Leontodon autumnalis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0
	Lysimachia terrestris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Maianthemum canadense	0	8	0	0	0	0	0	0	0	0	15	0.5	0	20	0	0	15	0	0	0	5	0	0	0	0	1	3	0	25	0	5	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Maianthemum trifoliata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mitchella repens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Moss sp.	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Monotropa uniflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Oclemena acuminata	35	0	0	0	0	1	0	20	0.5	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Oclemena x blakei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Onoclea sensibilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Oryzopsis asperifolia	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Osmunda cinnamomea	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
	Osmunda claytoniana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
	Osmunda regalis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Oxalis montana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Phleum pratense	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
	Platanthera aquilonis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Phegopteris connectilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pilosella caespitosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0
	Pleurozium schreberi	0	10	2	5	0	0	0	0	0	0	0	5	0	0	20	0	0	30	20	0	0	10	15	15	0	0	15	30	0	0	50	0	0	0	0	10	25	0	0	5	0	0	0	0	0	0	0	0	0	0	20
	Poa compressa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pogonia ophioglossoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Polytrichum sp.	8	5	0	0	0	0	3	1	4	40	2	0	2	0	5	0	5	0	5	0	4	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	25	0	0	0	0	20	0	0	0	0	0	0
	Pontederia cordata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Potentilla simplex	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Prunella vulgaris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pteridium aquilinum	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5	20	20	0	0	15	0.5	0	0	0	0	0	0	0	0	0	30	0	0	0	0	0	0	30	15	35	25	0	30
	Ranunculus repens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
	Rhynchospora alba	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rhytidiadelphus triquetrus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0
	Rubus canadensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
	Rubus hispidus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Solidago canadensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	5	0	0	0	0	0	0	0	0
	Solidago puberula	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
	Solidago rugosa	10	0	0	0.5	0	0	3	4	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	1	0	0	0	0	1	0
	Solidago uliginosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sphagnum sp.	0	0	0	0	5	5	1	0	1	0	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	5	0	5	0	0	20	0	0	0	0	10	0	20	0	10	0	0	0	0	0	0	0	0	0	0	0
	Symphotrichum lateriflorum	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0
	Thalictrum pubescens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Thelypteris noveboracensis	0	0	0	0	0	2	0	0	0	0	5	0	0	0	0	10	0	0	0	0	0	0	0	0	0	10	0	0	0	0	10	10	0	0	15	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ground Vegetation (continued)	*Trientalis borealis*	0	0	5	0	0	2	0	0	0	0	2	0	0	10	0	0	10	0	0	0	10	0.5	0	0	0	0	0	0	1	0	0	5	0	0	0	0	0	0	0	1	0.5	0	0	0	0	0	0	0	0	0	0
	Vaccinium angusifolium	0	0	0	2	1	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	1	3	2	2	0	2	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	3	10	10	5	0	20
	Vaccinium myrtilloides	0	0	0	3	0	0	0	0	0	25	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Veronica officinalis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0
	Viola sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Vicia cracca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0

Stantec

Table B.3 - Vegetation Percent Cover Matrix for the WSA

Forest Group (FG)		Spruce Hemlock Forest (SH)											Spruce Pine Forest (SP)											Tolerant Hardwood Forest (TH)			Wet Coniferous Forest (WC)						Wet Deciduous Forest (WD)	Wet Mixedwood Forest (WM)										
Vegetation Type (VT)		SH4	SH4	SH4	SH4	SH4	SH5	SH5	SH5	SH5b	SH5b	SH8	SP1a	SP4a	SP4a	SP4a	SP5	SP5	1	SP7	SP7	SP7	SP7	TH6	TH8	TH8a	WC11	WC11	WC2	WC7	WC7	WC7	WD2	WM1	WM1	WM1	WM1	WM1	WM1	WM1	WM2	WM3	WM3	WM3
Vegetation Type	Species Name	AK15	AK30	AK31b	AK36	AK78	AK1	AK29	AK91	AK37	AK49	AK7	AK100	AK51	AK82	AK90	AK20	AK54	AK42	AK43	AK53	AK89	AK103	AK97	AK94	AK19	AK81	AK84	AK23	AK25	AK62	AK101	AK12	AK8	AK35	AK46	AK58	AK76	AK79	AK80	AK68	AK28	AK73	AK77
Tree	*Abies balsamea*	0	0	0	0	0	0	2	0	25	30	30	0	0	0	0	0	0	0	0	0	0	0	0	3	5	0	0	5	0.5	10	0	1	30	10	15	20	10	10	5	5	5	0	0
	Acer pensylvanicum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Acer pseudoplantanus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Acer rubrum	2	1	0	0	5	5	0	0	10	15	5	5	0	5	0.5	0	0	1	0	0	0.5	10	15	30	25	1	0	5	1	20	10	30	10	15	40	40	30	30	15	50	10	30	30
	Betula alleghaniensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	25	5	0	0	0	0	0	0	35	20	2	0	0	0	0	0	0	20	0	0
	Betula papyrifera	3	1	0	0	0	3	0	0	10	0	10	0	0	0	0	0	0	1	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Betula populifolia	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0
	Frangula alnus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Fraxinus americana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0	0	0	0	0	1	5	0	0	10	0	0	0	0	0	0	0
	Larix laricina	0	0	0	0	1	0	0	0	0	0	0	1	1	0	0	1	10	0	0	2	0	20	0	0	0	5	15	0	10	30	20	0	0	0	1	0	0	15	1	0	0	10	10
	Picea glauca	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	10	0	0	1	0	0	0	0	0	0	0	0
	Picea mariana	0	0	0	0	0	0	0	0	0	0	0	40	15	25	40	20	60	20	30	60	30	20	0	0	0	20	35	40	8	0	15	0	0	0	1	0	0	2	0	0	30	15	25
	Picea rubens	50	40	15	50	10	60	30	10	15	25	15	0	0	0	0	0	0	0	0	0	0	0	5	2	10	0	0	0	0	0	0	0	0	0	10	0	0	0	0	15	0	0	0
	Pinus strobus	15	15	8	10	30	0	1	0	0	0	0	10	5	10	20	2	0	0	5	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0
	Populus grandidentata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Populus tremuloides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Prunus pensylvanica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Prunus serotina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Quercus rubra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sorbus americana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shrub	*Abies balsamea*	0	0	0	0	0	0	0	10	20	10	10	0	0	0	0	0	0	0	0	0	0	0	5	30	15	1	0	0	5	30	2	20	1	10	0	20	10	5	0	8	1	0	5
	Acer pensylvanicum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Acer pseudoplantanus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Acer rubrum	0	0	8	4	0	0	0	5	0	0	0	0	5	1	0	4	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	10	0	0	0	0	0	0
	Acer spicatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0
	Alnus incana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	15	0	2	0	0	0	0	5	0	0	0	0	5	0
	Alnus alnobetula	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Amelanchier sp.	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Betula alleghaniensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	2	5	0	0	0	0	0	0	0	4	1	0
	Betula papyrifera	0	5	2	10	0	0	0	2	0	0	0	0	0.5	1	0	7	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0
	Betula populifolia	0	0	0	1	0	0	0	0	0	0	0	0	10	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	Chamaedaphne calyculata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Comptonia peregrina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Corylu cornuta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	10	0	0	5	0	0	0	0	0	0	0
	Diervilla lonicera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Fagus grandifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Frangula alnus	0	0	0	12	0	0	0	2	0	5	0	0	0	0	0	0	0.5	0	0	0.5	0	15	0	0	5	1	0	10	4	20	20	5	2	50	5	25	30	20	10	20	40	10	0
	Fraxinus americana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	2	0	0
	Gaylussacia baccata	0	1	0	0	0	5	0	0	0	0	0	2	0	0	10	0	0	0	0	0	12	0	0	0	0	0	40	0	0	3	0	0	0	0	0	0	0	1	10	0	0	0	0
	Hamamelis virginiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0
	Ilex mucronata	2	8	0	0	15	2	20	0	0	0	0	5	5	5	5	0	1	5	10	20	15	0	0	0	0	20	0	2	5	0	5	0	0	1	10	0	2	25	40	0	0	0	20
	Ilex verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	10	15	5	0	1	0	0	0	10	0	0	0	0	0
	Juniperus communis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Kalmia angustfolia	5	30	40	0	50	5	70	1	0	0	0	0	60	60	25	70	1	40	50	5	10	40	0	0	0	15	10	10	0	0	3	0	0	0	0	0	0	2	0	0	0	0	5
	Larix laricina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	1	0	0	2	0	15	0	0	2	0
	Lonicera canadensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Myrica gale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Myrica pensylvanica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Picea glauca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0
	Picea mariana	0	0	0	0	0	0	0	0	0	0	0	20	25	25	15	30	0	35	30	0.5	15	0	0	0	0	12	15	15	5	2	10	0	0	0	10	0	2	0	5	0	0	10	10
	Picea rubens	25	25	35	15	10	30	35	40	15	10	5	0	0	0	0	0	0	0	0	0	0	0	10	5	10	0	0	0	0	0	0	15	0	0	0	5	0	0	0	10	0	0	0
	Pinus strobus	0	0	5	0	0	0	0	1	0	0	0	0	5	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Populus grandidentata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Prunus pensylvanica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Quercus rubra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rhododendron canadense	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0	10	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rhododendron groenlandicu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0	0	5	30	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	5
	Rosa multiflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rosa nitida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Salix sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sambucus racemosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sorbus americana	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Spiraea alba	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Spiraea tomentosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Taxus canadensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0
	Viburnum lantanoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Viburnum nudum	20	2	0	0	10	10	0	0	0	0	0	0	1	10	5	8	0	2	2	0.5	5	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
Ground Vegetation	*Anthoxanthum spp.*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Athyrium filix-femina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Aralia nudicaulis	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	2	0	0.5	0	5	0	0	2	0	0	0	0	10	0	0	0
	Agrostis capillaris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Agrostis hyemalis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Agrostis perennans	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Bazzania trilobata	0	0	0	0	0	0	0	5	7	2	20	10	0	0	0	0	10	0	0	20	0	0	0	5	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	5	0	0	0
	Brachyelytrum aristosum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Calamagrotis canadensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Carex echinata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
	Carex gracillima	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Carex leptalea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Carex novae-angliae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Carex sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Carex stricta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0	5	0	0	0	0	0	0	0	0	0	5	0	0	1	0
	Carex tripserma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	1	10	0	0	0	0	0	0	5	0	0	0.5	0	0	0	0	10
	Centaurea nigra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Chelone glabra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Cicuta maculata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0
	Cladonia sp.	0	0	25	20	0	0	0	0	0	0	0	0	0	20	1	15	0	0	15	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table B.3 - Vegetation Percent Cover Matrix for the WSA

Forest Group (FG)		Spruce Hemlock Forest (SH)											Spruce Pine Forest (SP)											Tolerant Hardwood Forest (TH)			Wet Coniferous Forest (WC)							Wet Deciduous Forest (WD)	Wet Mixedwood Forest (WM)											
Vegetation Type (VT)		SH4	SH4	SH4	SH4	SH4	SH5	SH5	SH5	SH5b	SH5b	SH8	SP1a	SP4a	SP4a	SP4a	SP5	SP5	1	SP7	SP7	SP7	SP7	TH6	TH8	TH8a	WC11	WC11	WC2	WC7	WC7	WC7	WD2	WM1	WM1	WM1	WM1	WM1	WM1	WM1	WM2	WM3	WM3	WM3
Vegetation Type	Species Name	AK15	AK30	AK31b	AK36	AK78	AK1	AK29	AK91	AK37	AK49	AK7	AK100	AK51	AK82	AK90	AK20	AK54	AK42	AK43	AK53	AK89	AK103	AK97	AK94	AK19	AK81	AK84	AK23	AK25	AK62	AK101	AK12	AK8	AK35	AK46	AK58	AK76	AK79	AK80	AK68	AK28	AK73	AK77
Ground Vegetation (continued)	*Clintonia borealis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Coptis trifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Cornus canadensis	10	0	0	0	10	0	0	1	0	0	0	10	2	0	2	0	8	0	0	0	5	15	0	0	0	10	1	2	0	0	15	1	0	25	15	0	0	30	7	0	0	0	2
	Cypripedium acaule	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5
	Danthonia spicata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dennstaedtia punctilobula	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Deschampsia flexuosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dicranium sp.	5	5	1	0	5	10	0	2	1	5	5	0	0	1	10	2	2	1	0	2	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Diervilla lonicera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Doellingeria umbellata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5	0	8	0.5	0	0	0	0	0	0
	Dryopteris carthusiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dryopteris intermedia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Epigaea repens	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Eriophorum virginicum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Euthamia graminifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Festuca rubra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Fragaria virginiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Frangula alnus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	1	1	0	0	10	0	0
	Galium palustre	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Galium sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Gaultheria hispidula	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Gaultheria procumbens	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	2	20	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Glyceria canadensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Glyceria grandis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0
	Glyceria striata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Iris versicolor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hylocomium splendens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hypnom imopens	0	0	0	0	8	2	0	0	15	10	10	0	0	0	0	0	0	0	0	0	0	0	30	15	10	0	0	0	0	0	0	0	0	0	0	5	0	0	0	5	0	0	0
	Juncus canadensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Juncus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Leontodon autumnalis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Lysimachia terrestris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Maianthemum canadense	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	1	0	0	3	1	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0
	Maianthemum trifoliata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	20	0	0	0	10	0	0	8	2	0	0	0	0
	Mitchella repens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
	Moss sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0
	Monotropa uniflora	0	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Oclemena acuminata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Oclemena x blakei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Onoclea sensibilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0
	Oryzopsis asperifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Osmunda cinnamomea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	25	0	70	30	30	25	1	40	30	0	30	5	40	25	60	30	35	
	Osmunda claytoniana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Osmunda regalis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	5	0	0	0	0	50	0
	Oxalis montana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Phleum pratense	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Platanthera aquilonis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0
	Phegopteris connectilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	1	0	0	0
	Pilosella caespitosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pleurozium schreberi	40	15	0	30	30	0	70	20	1	0	0	30	20	10	60	50	60	40	20	50	50	25	0	0	5	0	0	20	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
	Poa compressa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pogonia ophioglossoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Polytrichum sp.	0	0	0	2	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pontederia cordata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Potentilla simplex	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Prunella vulgaris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pteridium aquilinum	8	25	10	0	15	15	20	0	0	0	0	0	30	25	2	10	0	20	25	0	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Ranunculus repens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rhynchospora alba	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rhytidiadelphus triquetrus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rubus canadensis	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rubus hispidus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	5	0	0	0	0	5	0
	Solidago canadensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Solidago puberula	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Solidago rugosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0
	Solidago uliginosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sphagnum sp.	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	15	0	0	15	0	0	0	0	5	90	85	25	80	70	50	60	50	90	65	0	70	80	30	10	70	80	80
	Symphotrichum lateriflorum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Thalictrum pubescens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	1	0	0	0
	Thelypteris noveboracensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	10	0	0	0	0	0	0	0	10	0	0	0	30	0	0	0
Ground Vegetation (continued)	*Trientalis borealis*	0	0	0	1	0	0	0	0	0.5	0.5	0	0	0	0	0	0	0	1	0	0	0	2	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Vaccinium angusifolium	1	35	2	0	0	2	0	1	0	0	0	5	2	0	0	5	0.5	2	5	1	2	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Vaccinium myrtilloides	0	0	2	8	0	0	0	0	0	0	0	0	0	0	0	0	0	3	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Veronica officinalis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Viola sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Vicia cracca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table B.3 - Vegetation Percent Cover Matrix for the WSA

Forest Group (FG)		Wetland														
Vegetation Type (VT)		swamp	swamp	swamp	swamp	swamp	swamp	swamp	TSS	TSS	TSS	TSS	TSS	fen	fen	marsh
Vegetation Type	Species Name	AK32	AK44	AK48	AK55	AK56	AK67	AK70	AK3	AK4	AK5	AK14	AK22	AK24	AK47	AK13
Tree	*Abies balsamea*	5	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0
	Acer pensylvanicum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Acer pseudoplantanus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Acer rubrum	5	1	5	20	20	1	0.5	0	0	0	0	1	0	0	0
	Betula alleghaniensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Betula papyrifera	0	0	0	0	0	0	0	2	0	1	0.5	0	0	0	0
	Betula populifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Frangula alnus	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0
	Fraxinus americana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Larix laricina	2	0	10	0	0	1	0.5	1	0	0	0	0	0	0	0
	Picea glauca	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
	Picea mariana	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0
	Picea rubens	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0
	Pinus strobus	0	0	0	0.5	0	0	0	0	0	0	0	1	0	0	0
	Populus grandidentata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Populus tremuloides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Prunus pensylvanica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Prunus serotina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Quercus rubra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sorbus americana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shrub	*Abies balsamea*	5	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	Acer pensylvanicum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Acer pseudoplantanus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Acer rubrum	0	0	0	10	5	10	0	0	0	0	0	2	0.5	0	0
	Acer spicatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Alnus incana	0	0	20	0	0	0	20	40	0	0	30	30	0	7	10
	Alnus alnobetula	0	0	0	0	0	0	0	0	25	80	0	0	0	0	0
	Amelanchier sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Betula alleghaniensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Betula papyrifera	10	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Betula populifolia	5	0	0	0	0	30	0	0	0	0	0	0	0	0	0
	Chamaedaphne calyculata	0	0	0	0	0	0	0	0	0	0	0	0	1	5	0
	Comptonia peregrina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Corylu cornuta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Diervilla lonicera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Fagus grandifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Frangula alnus	40	2	2	20	60	35	30	60	25	1	45	40	1	0	5
	Fraxinus americana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Gaylussacia baccata	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hamamelis virginiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Ilex mucronata	2	10	0	0	0	0	10	0	0	0	0	0	0	0	0
	Ilex verticillata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Juniperus communis	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
	Kalmia angustfolia	25	10	0	2	0	10	0	0	0	0	0	0	0	0	0
	Larix laricina	0	0	30	8	0	0	0	0	0	0	0	1	2	0	0
	Lonicera canadensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Myrica gale	0	0	0	0	0	0	0	0	0	0	0	0	5	15	0
	Myrica pensylvanica	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
	Picea glauca	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Picea mariana	15	5	1	1	5	0	0	0	0	0	0	10	0	0	0
	Picea rubens	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	Pinus strobus	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Populus grandidentata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Prunus pensylvanica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Quercus rubra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rhododendron canadense	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rhododendron groenlandicu	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rosa multiflora	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
	Rosa nitida	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
	Salix sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sambucus racemosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sorbus americana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Spiraea alba	0	0	5	0	0	0	0	0	0	1	5	0	0	5	0
	Spiraea tomentosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
	Taxus canadensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Viburnum lantanoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Viburnum nudum	5	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0
Ground Vegetation	*Anthoxanthum spp.*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Athyrium filix-femina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Aralia nudicaulis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Agrostis capillaris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Agrostis hyemalis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
	Agrostis perennans	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Bazzania trilobata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Brachyelytrum aristosum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Calamagrotis canadensis	0	0	0	40	10	0	0	0	0	0	0	0	0	50	0
	Carex echinata	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.5
	Carex gracillima	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Carex leptalea	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
	Carex novae-angliae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Carex sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Carex stricta	0	0	60	30	5	0	0	0	0	0	0	0	0	20	0
	Carex tripserma	1	0	0	2	0	0	10	0	0	0	0	0	0	0	0
	Centaurea nigra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Chelone glabra	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0
	Cicuta maculata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Cladonia sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table B.3 - Vegetation Percent Cover Matrix for the WSA

Forest Group (FG)		Wetland														
Vegetation Type (VT)		swamp	swamp	swamp	swamp	swamp	swamp	swamp	TSS	TSS	TSS	TSS	TSS	fen	fen	marsh
Vegetation Type	Species Name	AK32	AK44	AK48	AK55	AK56	AK67	AK70	AK3	AK4	AK5	AK14	AK22	AK24	AK47	AK13
Ground Vegetation (continued)	*Clintonia borealis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Coptis trifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Cornus canadensis	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Cypripedium acaule	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Danthonia spicata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dennstaedtia punctilobula	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Deschampsia flexuosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dicranium sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Diervilla lonicera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Doellingeria umbellata	0	0	0	0	2	0	0	10	5	2	15	0	0	0	1
	Dryopteris carthusiana	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
	Dryopteris intermedia	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0
	Epigaea repens	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0	0
	Eriophorum virginicum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Euthamia graminifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Festuca rubra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Fragaria virginiana	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0
	Frangula alnus	0	0	0	0	70	0	15	0	0	0	80	0	0	0	0
	Galium palustre	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
	Galium sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Gaultheria hispidula	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Gaultheria procumbens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Glyceria canadensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15
	Glyceria grandis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Glyceria striata	0	0	5	0	0	0	0	5	0	0	0	0	0	0	0
	Iris versicolor	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0
	Hylocomium splendens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hypnom imopens	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
	Juncus canadensis	0	0	0	0	0	0	0	0	0	0	0	0	0	5	70
	Juncus sp.	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
	Leontodon autumnalis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Lysimachia terrestris	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1
	Maianthemum canadense	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Maianthemum trifoliata	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0
	Mitchella repens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Moss sp.	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0
	Monotropa uniflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Oclemena acuminata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Oclemena x blakei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Onoclea sensibilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Oryzopsis asperifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Osmunda cinnamomea	30	0	0	0	0	10	0	0	0	0	0	25	0	0	0
	Osmunda claytoniana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Osmunda regalis	0	0	0	0	0	0	0	0	0	0	0	0	70	0	0
	Oxalis montana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Phleum pratense	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Platanthera aquilonis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Phegopteris connectilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pilosella caespitosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pleurozium schreberi	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0
	Poa compressa	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0
	Pogonia ophioglossoides	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0
	Polytrichum sp.	0	0	0	0	0	0	0	5	0	0	20	0	0	0	0
	Pontederia cordata	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0
	Potentilla simplex	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
	Prunella vulgaris	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
	Pteridium aquilinum	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
	Ranunculus repens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rhynchospora alba	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
	Rhytidiadelphus triquetrus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rubus canadensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rubus hispidus	0	0	10	0	0	2	0	0	0	0	0	0	0	0	0
	Solidago canadensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Solidago puberula	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Solidago rugosa	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	Solidago uliginosa	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0
	Sphagnum sp.	80	0	40	10	80	0	70	2	0	0	40	60	90	0	90
	Symphotrichum lateriflorum	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
	Thalictrum pubescens	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0
	Thelypteris noveboracensis	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0
Ground Vegetation (continued)	*Trientalis borealis*	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0
	Vaccinium angusifolium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Vaccinium myrtilloides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Veronica officinalis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Viola sp.	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Vicia cracca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX C

Wildlife Observations

Table C.1 Incidental Wildlife Observations Recorded During Field Programs

Scientific Name	Common Name	SARA[1]	COSEWIC[2]	NS ESA[3]	AC CDC[4]
Birds					
Empidonax alnorum	Alder Flycatcher	-	-	-	S5B
Corvus brachyrhynchos	American Crow	-	-	-	S5
Spinus tristis	American Goldfinch	-	-	-	S5
Setophaga ruticilla	American Redstart	-	-	-	S5B
Turdus migratorius	American Robin	-	-	-	S5B,S3N
Scolopax minor	American Woodcock	-	-	-	S5B
Haliaeetus leucocephalus	Bald Eagle	-	NAR	-	S5
Mniotilta varia	Black-and-White Warbler	-	-	-	S5B
Poecile atricapillus	Black-capped Chickadee	-	-	-	S5
Setophaga virens	Black-throated Green Warbler	-	-	-	S5B
Cyanocitta cristata	Blue Jay	-	-	-	S5
Vireo solitarius	Blue-headed Vireo	-	-	-	S5B
Buteo platypterus	Broad-winged Hawk	-	-	-	S5B
Cardellina canadensis	Canada Warbler	TH	SC	EN	S3B
Bombycilla cedrorum	Cedar Waxwing	-	-	-	S5B
Setophaga pensylvanica	Chestnut-sided Warbler	-	-	-	S5B
Quiscalus quiscula	Common Grackle	-	-	-	S5B
Chordeiles minor	Common Nighthawk	SC	SC	TH	S3B
Corvus corax	Common Raven	-	-	-	S5
Geothlypis trichas	Common Yellowthroat	-	-	-	S5B
Junco hyemalis	Dark-eyed Junco	-	-	-	S4S5
Dryobates pubescens	Downy Woodpecker	-	-	-	S5
Regulus satrapa	Golden-crowned Kinglet	-	-	-	S5
Dumetella carolinensis	Grey Catbird	-	-	-	S4B
Dryobates villosus	Hairy Woodpecker	-	-	-	S5
Catharus guttatus	Hermit Thrush	-	-	-	S5B
Setophaga magnolia	Magnolia Warbler	-	-	-	S5B
Geothlypis philadelphia	Mourning Dove	-	-	-	S4B,S5M
Leiothlypis ruficapilla ridgwayi	Nashville Warbler	-	-	-	SNA
Cardinalis cardinalis	Northern Cardinal	-	-	-	S4
Colaptes auratus	Northern Flicker	-	-	-	S5B
Setophaga americana	Northern Parula	-	-	-	S5B

Table C.1 Incidental Wildlife Observations Recorded During Field Programs

Scientific Name	Common Name	SARA[1]	COSEWIC[2]	NS ESA[3]	AC CDC[4]
Pandion haliaetus	Osprey	-	-	-	S4S5B,S5M
Seiurus aurocapilla	Ovenbird	-	-	-	S5B
Setophaga palmarum	Palm Warbler	--	-	-	S5B
Dryocopus pileatus	Pileated Woodpecker	-	-	-	S5
Setophaga pinus	Pine Warbler	-	-	-	S2S3B,S4S5M
Haemorhous purpureus	Purple Finch	-	-	-	S4S5B,S3S4N, S5M
Loxia curvirostra	Red Crossbill	-	-	-	S3S4
Sitta canadensis	Red-breasted nuthatch	-	-	-	S4S5
Vireo olivaceus	Red-eyed Vireo	-	-	-	S5B
Phasianus colchicus	Ring-necked Pheasant	-	-	-	SNA
Pheucticus ludovicianus	Rose-breasted Grosbeak	-	-	-	S3B
Archilochus colubris	Ruby-throated Hummingbird	-	-	-	S5B
Bonasa umbellus	Ruffed Grouse	-	-	-	S5
Melospiza melodia	Song Sparrow	-	-	-	S5B
Melospiza georgiana	Swamp Sparrow	-	-	-	S5B
Zonotrichia albicollis	White-throated Sparrow	-	-	-	S4S5B,S5M
Loxia leucoptera	White-winged Crossbill	-	-	-	S4S5
Setophaga petechia	Yellow Warbler	-	-	-	S5B
Mammals					
Castor canadensis	North American Beaver	-	-	-	S5
Ursus americanus	American Black Bear	-	NAR	-	S5
Ondatra zibethicus	Common Muskrat	-	-	-	S5
Tamias striatus	Eastern Chipmunk	-	-	-	S5
Canis latrans	Eastern Coyote	-	-	-	S5
Erethizon dorsata	North American Porcupine	-	-	-	S5
Procyon lotor	Northern Raccoon	-	-	-	S5
Tamiasciurus hudsonicus	Red Squirrel	-	-	-	S5
Odocoileus virginianus	White-tailed Deer	-	-	-	S5
Amphibians					
Lithobates clamitans	Green Frog	-	-	-	S5
Lithobates palustris	Pickerel Frog	-	-	-	S5
Ambystoma maculatum	Spotted Salamander	-	-	-	S5
Lithobates sylvaticus	Wood Frog	-	-	-	S5

Table C.1 Incidental Wildlife Observations Recorded During Field Programs

Scientific Name	Common Name	SARA[1]	COSEWIC[2]	NS ESA[3]	AC CDC[4]
Reptiles					
Opheodrys vernalis	Smooth Greensnake	-	-	-	S4

Notes:
[1] Species at risk in Canada listed under Schedule 1 the federal *Species at Risk Act* as Endangered (EN), Threatened (TH), or Special Concern (SC) (Government of Canada 2023).
[2] Species of conservation concern in Canada assessed by COSEWIC as Endangered (EN), Threatened (TH), Vulnerable (VU), or Special Concern (SC); not at risk species = NAR, Data Deficient = DD (Government of Canada 2023).
[3] Species at risk in Nova Scotia listed under the provincial *Endangered Species Act* (NS) as Endangered (EN), Threatened (TH), Vulnerable (VU), or Special Concern (SC; Government of Nova Scotia 2023).
[4] Species ranked as Critically Imperiled (S1), Imperiled (S2), or Vulnerable (S3) by the Atlantic Canada Conservation Data Centre (AC CDC 2023) and recorded within 5 km of the Project by desktop data source, where:
S1: Critically Imperiled – Critically imperiled in the province because of extreme rarity (often 5 or fewer occurrences). May be especially vulnerable to extirpation.
S2: Imperiled – Imperiled in the province because of rarity due to very restricted range, very few populations (6 to 20 occurrences or few remaining individuals). May be vulnerable to extirpation due to rarity or other factors.
S3: Vulnerable – Vulnerable in the province due to a restricted range, relatively few populations (often 80 or fewer).
S4: Apparently Secure – Uncommon but not rare; some cause for long-term concern due to declines or other factors (80+ occurrences).
S5: Secure – Common, widespread, and abundant in the province.
S#S#: A numeric range rank (*e.g.*, S2S3) is used to indicate any range of uncertainty about the status of the species or community.
SH: Possibly Extirpated (Historical) – Species or community occurred historically in the province, and there is some possibility that it may be rediscovered. Its presence may not have been verified in the past 20-40 years. A species or community could become SH without such a 20-40 year delay if the only known occurrences in a province were destroyed or if it had been extensively and unsuccessfully looked for. The SH rank is reserved for species or communities for which some effort has been made to relocate occurrences, rather than simply using this status for all elements not known from verified extant occurrences.
SU: Unrankable – Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

APPENDIX D

ARIA Report

HRM Serviced Communities Background Study: Westphal (Akoma Lands) Archaeological Resource Impact Assessment, Halifax Regional Municipality, NS (2023)

HRP #A2023NS190

Final Report

April 9, 2024

Submitted to:
Nova Scotia Department of Communities, Culture, Tourism & Heritage
1741 Brunswick Street 3rd Floor
PO Box 456, STN Central
Halifax, NS B3J 2R5

Prepared for:
Halifax Regional Municipality
5251 Duke Street, 3rd floor, Suite 300, Duke Tower
Halifax, NS B3J 1P3

Prepared by:
Stantec Consulting Ltd.
102-40 Highfield Park Drive
Dartmouth, NS B3A 0A3

File: 160410459

HRM SERVICED COMMUNITIES BACKGROUND STUDY: WESTPHAL (AKOMA LANDS) ARCHAEOLOGICAL RESOURCE IMPACT ASSESSMENT, HALIFAX REGIONAL MUNICPILITY, NS (2023)

This document entitled HRM Serviced Communities Background Study: Westphal (Akoma Lands) Archaeological Resource Impact Assessment, Halifax Regional Municipality, Nova Scotia (2023) was prepared by Stantec Consulting Ltd. (“Stantec”) for the account of Halifax Regional Municipality (HRM), (the “Client”). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec’s professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Kyte, Jonathan

Digitally signed by Kyte, Jonathan
Date: 2024.04.30 11:16:01 -03'00'

Prepared by_____
(signature)

Jonathan Kyte, M.A., Archaeologist

McFarlane, Shawn

Digitally signed by McFarlane, Shawn
Date: 2024.04.30 11:17:37 -03'00'

Review by_____
(signature)

Shawn McFarlane, B.ScF, RPF, Project Manager

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Project Personnel

Project Manager:	Shawn McFarlane, B.ScF., RPF
Background Research:	Jonathan Kyte, MA.
Site Visit:	Jonathan Kyte, MA., Mike Rooney, BA., Chase McLean, MA.
Report Writer:	Jonathan Kyte, MA.
GIS Specialist:	Megan Blackwood, Mike Rooney, B.A.
Quality Review:	Chris Blair, BA
Independent Review:	Robert Federico, MPA

1.0 INTRODUCTION

Stantec Consulting Ltd. (Stantec) was retained by Halifax Regional Municipality (HRM) to conduct an Archaeological Resource Impact Assessment (ARIA), for the HRM Future Serviced Communities Background Study, Akoma Lands Study Area, located in Westphal, Nova Scotia (the Project). An ARIA is required to determine if there are heritage resources that may be affected by future ground disturbance in relation to housing and transportation developments. The ARIA is part of the background study for environmental, land-use suitability, transportation, and infrastructure for the Westphal (Akoma Lands) study area.

HRM is planning to expand housing development approvals in the Akoma Lands Development Area to accelerate the provision of land for new housing. As part of the land-use suitability analysis, an ARIA must be completed to assess the potential for archaeological resources, including Mi'kmaw and African Nova Scotian communities, to be present and if so, to be affected by the Project. The ARIA consisted of background research, and a field-based archaeological survey (walkover). All work was completed in compliance with Nova Scotia's Archaeological Resource Impact Assessment (Category C) Guidelines (2014) as well as the *Special Places Protection Act* (Chapter 438 of the Revised Statutes, 1989).

The ARIA was conducted under Heritage Research Permit (HRP) No. A2023NS190 issued to Jonathan Kyte of Stantec. The fieldwork for the walkover component of the ARIA was conducted by Jonathan Kyte, MA, Mike Rooney, BA., and Chase McLean, MA., on November 20 to 22, and 29, 2023.

2.0 PROJECT DEVELOPMENT AREA

For the purposes of this report, the Project Development Area (PDA) is the area that may be affected by the potential housing development; this was the subject of the ARIA. This area mainly consists of undeveloped Akoma lands to the south side of Main Street in Westphal, Regional Municipality, Nova Scotia. HRM initiated the background study to establish the appropriate portion of the PDA that are suitable for new housing development and future community planning work. The total size of the PDA is approximately 450 ha. The PDA is identified with the red outline in Figure 1 (Appendix A).

3.0 METHODOLOGY

3.1 BACKGROUND RESEARCH

Stantec conducted desktop historical background research for the Project using digital and archival information available from various government and non-government sources including published, unpublished, and on-line historical and environmental records. The scope of work for the desktop historical background research included, but was not limited to, the sources of information listed below to gather information on general and specific history, including the Pre-Contact and Historic Periods, and known archaeological resources within the study area, to determine the potential for archaeological resources to be within the PDA:

- Review of relevant Maritime Archaeological Resource Inventory (MARI) forms for information relating to recorded archaeological sites within a 1 km radius of the PDA
- Review of previous archaeological investigations conducted within or near the PDA through consultations with Special Places Coordinator from the Nova Scotia Department of Communities, Culture, Tourism, and Heritage (NSCCTH)
- Review of historical maps and aerial photographs, maps, published sources, and historical and archival records of the PDA and adjoining properties to gain information on historical land use
- A review of the Canadian Register of Historic Places (CRHP)
- Engagement with the Kwilmu'kw Maw-klusuaqn Negotiation Office's Archaeological Research Division (KMKNO's ARD) to gather information pertaining to traditional or historical use of the PDA
- Review of LiDAR and base mapping of the subject property to identify environmental and physiographic features such as topography and historic water margins that would influence human settlement and resource exploitation patterns
- Knowledge of the Stantec Archaeology Team
- Consultations with local historical experts, and archaeologist, as applicable

The results of the historical background research were used to identify leading archaeological and environmental indicators for the potential presence of archaeological resources within the PDA. The results of the research are presented in the sections that follow.

3.2 ARCHAEOLOGICAL WALKOVER

Stantec conducted the walkover of the PDA to identify, visually inspect, and document previously unknown heritage resources, and identify areas of elevated archaeological potential. The walkover was completed by two archaeologist via transects throughout the subject property to assess ground and topographical conditions. The findings of the walkover were documented, taking into consideration the results of the desktop historical background study, in accordance with the Provincial Guidelines (Category C, 2014), and based on the experience, knowledge and professional judgement of the Stantec Archaeology Team. Assessment notes were taken at reference points during the walkover for discussion and recorded into Field maps mobile phone application and labeled with the initials of the archaeologist and number of the assessment note (e.g., JRK-ARCH-###). Where areas of elevated archaeological

potential were identified, these locations were delineated using a mobile mapping device and labeled as polygons, with the initials of the archaeologist, “POLY”, and the number of the polygon (e.g., “Polygon XXX-POLY-###”). During the walkover, and surface-visible cultural features were noted and recorded as appropriate. These locations were recorded and labeled as archaeological assessment notes, or as “historically significant features,” and labelled. “XXX-HSF-###”).

Field data were collected using a mobile phone device running field maps, a data collection and field mapping software developed by ESRI. Digital field maps were generated for the Project that combine relevant environmental and project data in GIS-based layers. A digital copy of all data collected in the field is provided in the Project Site Plan and with this report (Figure 2, Appendix A). Additional field data collected using Field Maps included tracklogs (Figure 4, Appendix A).

4.0 BACKGROUND RESEARCH RESULTS

This section details the results of the historical background research gathered on the geology, environment, and cultural and historical background review of the PDA.

4.1 THE NATURAL ENVIRONMENT

The PDA is located between the Eastern Shore and Quartzite Barrens Theme Regions. The southern section is within the Eastern Shore Beaches Theme Region (Theme Region 833). The bedrock in the area is dominated by graywacke, with bands of slate, folded parallel to the coastline. The coastline in this area is divided up into headlands separated by long inlets where most are drowned river estuary and are not fault-controlled. Loose cobbly quartzite till forms the ground moraine and is overlain by drumlin composed of red brown Lawrencetown Till and can be seen as an eroding coastal bluff at Hartlen Point (Davis and Brown 1996).

The PDA is part of a drowned coastline where Cole Harbour forms a headland. Due to its exposure, there is an active reworking of the coastal sediment which has built a barrier beach at Ranbow Haven formed by Cow Bay. The irregular shape of the coastline is actively being smoothed out having sediments redistributed where sand and gravel are supplied from the erosion of deep glacial tills and glacial outwash deposited on the coast. This forms spits and barrier beaches which protect the shallow estuaries from ocean waves which allow marshland to develop within this area. The soils consist of well-drained Halifax gravelly sandy loams derived from quartzite. “On areas of less relief, imperfectly drained Danesville soils is common, with peat, Rockland, and some small areas of poorly drained, mottled Aspotogan soil. Some areas of shaly loam Bridgewater soil have developed from parent material derived from slate. Finer textured Hantsport soils (imperfectly drained, sandy clay loam) which have developed from Carboniferous parent materials are found around Eastern Passage” (Davis and Brown 1996:199).

White spruce and balsam fir forests with maple and birch trees predominate the area. On abandoned farmlands and drumlins, pure stands of with spruce are common. Further inland, the forest changes to spruce, fir, and pine stands (Davis and Brown 1996).

The northern section of the PDA is within the Quartzite Barrens Theme Region (Theme Region 413). "The mantle of quartzite till ranges in thickness from 1 – 10 m in this Unit but averages less than 3 m. There are several areas of exposed rock where till has been scraped off by the glacial ice" (Davis & Brown 1996:56). The bedrock-dominated topography of these extensive barrens within this region is described as "ridge-swamp-swale." Where greater thickness of glacial till has accumulated, drumlins and drumlinoid till features are found (Davis & Brown 1996). In the Halifax area the many long sub-parallel faults create linear valleys are followed by rivers and sometime filled by lakes.

The area is covered in Halifax soils and well drained, stony, sandy loam, which developed on till derived principally from quartzite. The poorly drained associated Dansville soils occur in areas of lower relief, together with Aspotogan soils and peat. Also, some Bridgewater soils, derived from metamorphic slates are also located within the area (Davis & Brown 1996).

4.2 CULTURAL AND HISTORICAL BACKGROUND

4.2.1 PRE-CONTACT PERIOD

The earliest period of human occupation in Nova Scotia is *Sa'qewe'l L'nu'k* (the Ancient People) or "Palaeo-Indian" period (13,000 – 8,000 BP), which saw the arrival of peoples who harvested caribou, possibly along with a variety of other fauna, following deglaciation of the region (Bonnichsen, Keenlyside and Turnmire 1991; Deal 2023). This period is best represented in Nova Scotia by the Debert-Belmont site complex near Truro, NS.

Sites of the following *Mu Awsami Kejihaw'k L'nu'k* (the Not so Recent People) or the Archaic Period (8,000-3,000 BP), are characterized in part by distinctive ground stone tool industries. In Nova Scotia, sites of this period are known primarily from interior locations, and for the most part date only to the latter half of this period (the Late Archaic). Nevertheless, it is inferred that people were present in the province throughout this period, and that their lifeways included a focus on harvesting the resources of the coast as well as interior waterways. The scarcity of evidence for occupation early in the period and on the coast is seen to reflect the effects of rising sea levels; such sites are now situated in marine environments.

The last phase of the Pre-Contact Period, *Kejihawek L'nu'k* (the Recent People) or Woodland/Ceramic period (3,000- 500 BP), sees the appearance of ceramic technology in the context of wide-ranging interactions with other peoples of the greater northeast. Coastal archaeological sites are more clearly documented (albeit still threatened by rising sea levels and coastal erosion) and, in some cases, include substantial shell middens, indicating the harvesting of marine shellfish. Nevertheless, both marine and terrestrial resources figured in the seasonal round during this time, with some regional variation (Nash and Miller 1987; Davis 1991).

The PDA is within an area that once was part of a greater Mi'kmaw territory known as *Eskikewa'kik*, meaning "Skin dressers" (CMM 2007). The coastlines, Islands, bays, harbours, and water systems would have been an important transportation route and resource base of the local Mi'kmaq and their ancestors for a long time prior to the founding of Halifax. A research inquiry was submitted for the PDA with KMKNO-ARD and their review revealed three traditional use sites within a one-kilometre distance of the

PDA used for fishing, encampment, harvesting, and ceremonial uses, but not within the PDA. There are three Mi'kmaw archaeological sites within a 5 km distance to the PDA: BeCu-03, BeCv-14, and BeCv-17 are recorded diagnostic lithics and petroglyphs (KMKNO-ARD 2024) (see Section 4.2.3). The Mi'kmaw name for Dartmouth is *Punamu'kwati'jk*, which means "at the tomcod place" and the name of Cole Harbour is *Wanpa'q*, which means "still water." Mi'kmaw methods for naming a place is verb based, frequently reflecting the meaning of the area to the Mi'kmaq, such as resources available or the landscape features of the area. This type of naming relies on an intimate understanding and repeated use of an area (KMKNO-ARD 2024). The PDA is located approximately 5 km to the northeast of the Cole Harbour Indian Reserve No.30 and is the closest Mi'kmaw community to the PDA. It is situated between Morris and Bassitt Lakes.

Historic references were made in 1864 of reports that shell middens became exposed in fields within the area that were frequently plowed (KMKNO 2024), indicating these areas were previously occupied into the Pre-Contact Period. At the turn of the twentieth century, Morris Lake was referenced as being named after an old Mi'kmaq family (Maurice) who resided at the outlet of Morris Lake for a long time. The Mi'kmaw name for Morris Lake is *Loocktush*, which means "place of scaffold or drying fish," suggesting the area was used for this purpose (KMKNO-ARD 2024). By 1881 the Census of Canda records noted 33 Mi'kmaq families residing in Dartmouth which represents a continuous presence within the PDA of Mi'kmaw peoples into the Historical Period.

4.2.2 HISTORIC PERIOD

The Historic Period is defined as the period from the arrival of mostly European-derived peoples to North America, approximately 500 years ago, until the modern era. For Mi'kmaq communities, this period is referred to as *Kiskukew'k L'nu'k* (Today's People) or Contact Period (500 BP- Present), which saw the growth of European settlement in the region, and with it, a variety of changes for *Kiskukew'k L'nu'k* associated with trade, conflict, and disease (Whitehead 1991).

The first European population to have a presence at the mouth of Halifax Harbour were the Acadians during the late seventeenth century. There was some seasonal use by New Englanders during the first half of the eighteenth century for the fishery, although, there was not a large population of European settlement until the British founded Halifax in 1749. The community of Dartmouth was founded a year after on the east side of Hallifax Harbour. The PDA is located between the communities of Westphal, Preston, and Cole Harbour in Dartmouth.

The community of Westphal, along the north of the PDA, is a suburb on the south side of Lake Micmac. The community was known as Preston Road until its current name, Westphal, was given in 1935 to honour two brothers named Westphal, born near Salmon River, who became Admirals of the Royal Navy (PANS 1967). A 180-acre lot was surveyed for John Wisdom and Edward King in 1785 and settled around this time and remained a small rural community until the post World War II population boom. The St. John's Anglican Church in Preston was consecrated in 1791 and a second church, built in 1828, burned in 1849. A third St. John's Church was built in 1850 (PANS 1967). The communities of Westphal and Preston are located just outside the PDA.

The community of Preston, located to the northeast of the Study Area, was named after Preston in Lancashire, England, which also had a parish church named St. John's. "The Township of Preston was granted in 1784 to Theophilus Chamberlain and others, mostly Loyalists and disbanded soldiers. Among those who actually settled (as opposed to those who received grants but did not settle) in the township were Stayner, Greenwood, King, Allan, Smith, Russel, and Wisdom" (PANS1967:560). In 1785 many freed American slaves (Black loyalists) were resettled in the Preston Township although (1,200) of them left in 1792 to resettle in Sierra Leone (CRM 2016). Four years later, in 1796, approximately 500 maroons, descendants of Spanish slaves, were expelled from Jamaica to Nova Scotia, and resettled on lots purchased for them within the Preston Township. Many of these people also left for resettlement in Sierra Leone in 1800. During the War of 1812 many American slaves were brought to Halifax and by 1816 approximately 924 people were settled at Preston on former maroon lands. In 1841 these settlers of Preston petitioned for a clear title to their land (PANS 1967).

The community of Cole Harbour is located to the south of the PDA. The name was first referenced on a land grant for 3,000-acres made to Benjamin Green and others in 1765. Another grant for 600-acres was surveyed for George Bisset and George Harper, south present-day Cole Harbour. Fishing and farming were the main means of livelihood within the community (PANS 1967).

A review of historical maps was conducted for the properties within the PDA which indicated that seven historic land grants were issued. The northern section of the PDA was a part of the Preston Township under Plantation lots in letter 'A' No. 1 Issued to Mr. Jordon and No.8 issued to Mr. Chamberlain in 1786 (PANS 1786). A portion of Philp Linzi Plantation Lot in Preston contained a small annex parcel within the northern section of the PDA originally granted in 1786, (Crown Record Book 18 page 86). Two lots in the south section of the PDA were a part of a division of land for the Rost and Morash Families in Cole Harbour in 1808. Lot #1 was issued to Jim Morash containing 102 acres along Smelt Brook and Lot #3 was issued to John Morash consisting of 101 acres (Crown Records Displaced Plan No. 305). A section in the western part of the PDA was a part of a grant made out to Benjamin Green (Crown Records Book 6 Page 510). Another historic land grant was a subdivision of the Upper Lawrencetown lot (Lot # 2) taken possession by Frances Green in 1877, (Crown Records Sheet #66) and located in the southeastern section of the PDA.

It is not known when the granted lots within the PDA were actually settled, but it is believed to be around the turn of the nineteenth century. Settlement features or buildings were noted in the north section of the PDA along Old Miller Road on a road map from Dartmouth to Musquodoboit dating to 1800 (Crown Records Displaced Plan No. 357), (Figure 5, Appendix A). The map has a reference to W. Miller residing in a home on the corner of Preston Road (Highway107) and on the east side of Old Miller Road. It is likely that the road was named after this resident. Two more buildins where noted, one along the Old Miller Road on the west side and the other along Highway 107 in the northeast corner of the PDA. Another road map from Dartmouth eastward drafted by John Chamberlan in 1813, (Figure 6, Appendix A) shows buildings in the same footprints as the previous plan (Crown Records Displaced Plan No. 264). Later historic maps show settlement features within the PDA in both the north and south sections (Church 1865; Figure 7, Appendix A). In the north, records show one house occupied by W. Elliot along Highway 107 on the corner with Old Miller Road, another house occupied by J. Stevens, on the west side of Old Miller Road and three houses on the east side occupied by W. Ross, T. Miller, and J. Janus, and one

house occupied by G. Morish in the south section of the PDA. By the turn of the twentieth century there were two houses remaining in the north, one on either side of Old Miller Road and the single home along Cole Harbour Road in the south (Faribault 1908; Figure 8, Appendix A).

The property on the corner of Highway 107 and the west side of Old Miller Road was identified as the Nova Scotia Home for Colored Children (NSCC) and now occupies the (Akoma) properties situated on 212 acres of land and located within the PDA. The NSCC was originally incorporated under a private members bill in the Nova Scotia House of Assembly in April of 1915 (NS 2019). The school was set up to take up provision of care for neglected and destitute African Nova Scotian children. By 1919 a location was identified for the Home and a farm site near the African Nova Scotia Community of Preston and the property was purchased by the province (NS 2019). The school opened in 1921 and operated as a working farm in the decades to follow as seen in aerial photos (NSDNR 1945, 1954, 1964; Figures 9 to 10, Appendix A), showing several outbuildings and fields. The main Home was also completed in 1921 and used until 1927 when the school moved from the main building to the remodeled farmhouse. Significant investment was made into the property between 1921 and 1961 and several outbuildings and improvements made (NS 2019). In June of 2022 the Akoma property at 18 Wilfred Way, Westphal was registered within the Registry of Heritage Properties for Halifax Regional Municipality (HRM 2022). A research report written by Beaupre-McPhee, a research planner with HRM, was submitted as a part of the application. The research report gives a thorough background on the property and is referenced as a stand-alone document (Beaupre-McPhee 2022).

Review of aerial photographs showed other properties were developed within the north section of the PDA. One is a small farm and a horse track, which was constructed sometime between 1954 and 1964. (NSDNR 1954, 1964). A late twentieth century quarry operated within the PDA, located near the southeastern end of Old Lawrencetown Road in Cole Harbour. As viewed from aerial photographs the quarry began operations between 1954 and 1964 (NSDNR 1954, 1964). The quarry is known as Tryner's Pit and was used by a local contractor Tryon Construction Limited for gravel in relation to construction projects for the Department of National Defence (DND) beginning in the late 1950s and mostly extracted gravel for concrete (Hudak 2014). The quarry appears in aerial photographs by 1964 and showed that it expanded into the 1970s and ended operations sometime during the 1990s (NSDNR 1964, 1974).

A review of the Canadian Register of Historic Places (CRHP 2024) found two registered historic places or heritage sites located within 5 km of the PDA. The first registered heritage building is the John Sailsbury House (1830) which is located on Summit Street in Dartmouth and to the west of the PDA. The second is the Cole Harbour Meeting House (1830-1831) being a one-story Methodist Chapel located on a lot of land originally purchased for the Jamaican Government resettlement of the Maroons in 1797. The meeting house is located on the Cole Harbour Road to the south of the PDA.

4.2.3 REGISTERED ARCHAEOLOGICAL SITES NEAR THE PDA

A review of the NSCCTH MARI online database indicates that there are twelve registered archaeological sites within a 5 km radius, but outside of, the PDA. These sites are: BeCv-14, BeCv-17, BeCu-01, BeCu-02, BeCu-03, BeCu-04, BeCu-08, BeCv-21, BdCu-03, BdCu-04, BdCu-05, and BdCu-06. Two of the registered archaeological sites (BeCu-03, BeCv-14) date to the Pre-Contact Period. One historic Mi'kmaw petroglyph site (BeCv-17) and nine other historic sites (BeCu-01, BeCu-02, BeCu-08, BeCv-21, BeCu-04, BdCu-03, BdCu-05, and BdCu-06) date to the Historic Period. Information on each site is presented below.

BeCu-03 consists of an isolated pre-contact artifact find along the Little Salmon River and dated to the Archaic Period (Piers 1895). The site is located approximately 200 m to the east of the PDA. The Chambers site (BeCv-14) consists of a diagnostic pre-contact projectile point that dating to the Paleo-Period registered by David Christianson (1986). The site is located close to Lake Micmac and near a known petroglyphs site (BeCv-17) located west approximately 4.5 km from the PDA. The petroglyphs site was interpreted as possibly dating to the Historic Period (Whitehead 1993).

The closest Historic Period site is located approximately 200 m from the northeast corner of the PDA, (BeCu-01) and consists of an exposure of artifacts in context with eighteenth and nineteenth century settlement of the area. The finds were exposed during construction of a new road at Bainbridge Court, a cul-de-sac which extends south from Crain Hill towards highway 107 and was registered in 1987 (Preston 1987). BeCu-02 is located approximately 1.2 km from the northeast corner of the PDA on Crain Hill Road. The site consists of surface features interpreted to be from St. John Anglican Church (1788-1822) (Davis 1987). BeCu-08 is the Governors Farm located in Preston and approximately 3 km northeast of the PDA. This site was originally the country estate of Sir John Wentworth, and later the Colley family homestead occupied during the late eighteenth to early nineteenth centuries (Preston 1993). BeCv-21 is an Historic Period site registered as the Morris Montague site located approximately 2.5 km to the northwest of the PDA. The site consists of settlement features relating to the Morris estate including two house foundations situated on a landscaped hill overlooking the lake (Preston 1993).

The registered archaeological sites BeCu-04, BdCu-03, BdCu-05, and BdCu-06 date to the Historic Period and were identified to the south of the PDA situated between Cole Harbour and Bissett Lake. These sites relate to Historic Period settlement (Powell 1990). The Old Country Home Complex (Poor's Farm) (BeCu-04) consist of six separate sites located approximately 600 m to the south of the PDA along the west side of Cole Harbour and dating to the late nineteenth century. The sites include four possible building locations, a reservoir, and a cemetery. The Ware Inn (BdCu-03) is 1 km to the south of the PDA and located within the Cole Harbour Heritage Park. The Inn site was identified from the Faribault map (1909) also dating to the late nineteenth century. BdCu-04 site is the Costly House located approximately 1.6 km south and situated on the west side of Cole Harbour; this site dates to the middle to late nineteenth century. The remaining sites identified are the George Bassett House (BdCu-05) and the Hezekiah Bissett House (BcCu-06) both located approximately 2 km south of the PDA. These sites consist of archaeological features related to nineteenth century settlement within the area and situated on the high ground in a wooded area west and south of Bassitt Road and the old railway bed (Powell 1990).

4.2.4 PREVIOUS ARCHAEOLOGICAL RESOURCE IMPACT ASSESSMENTS

Four previous ARIAs were carried out to the south the PDA and two recent ARIAs have been conducted for locations north and south of the PDA. Six reports provided to Stantec by NSCCTH staff indicated that four of the previous ARIAs were related to the Poor's Farm Cemetery located within the Cole Harbour Heritage Park on Bissett Road, located outside the PDA (MacLeod-Lesile 2006, 2007; Kingston 2008, 2009).

Two recent ARIAs reports provided by NSCCTH Staff were completed in proximity to, but not within, the PDA One of these ARIA reports was related to the Lake Major dam replacement archaeological testing carried out by CRM Group Ltd. (CRM) conducted in 2016 for Halifax Water. The other ARIA was for the Cole Harbour Long Term Care Facility ARIA by Davis MacIntyre & Associates (DMA) in 2023. No previous archaeological resource impact assessments have been conducted within the PDA. Relevant, information provided by these ARIAs is presented below.

5.0 FIELD SURVEY RESULTS

The walkover covered a broad portion of the PDA with specific attention to areas of interest identified during the background review. These areas of interest included: sections of two watercourses that drain into Cole Harbour; a quarry, and associated features; section of the Old Lawrencetown Road and Old Miller Road; and historic settlement features identified in the northern section of the PDA. The results of the walkover including assessment notes referenced in the text can be seen in Figure 2 (Appendix A). Archaeological potential areas are identified in Figure 3 (Appendix A), and the tracklogs from the walkover are overlayed over a LiDAR hill shade rendering of the PDA in Figure 4 (Appendix A).

5.1 WATERCOURSES

The first part of the walkover focused on two watercourse systems that empty into Cole Harbour, located in the south section of the PDA: East and West Branches of Smelt Brook and a short section of the West Branch of the Little Salmon River.

5.1.1 Smelt Brook: East & West Branch

The walkover began in Cole Harbour along a section of the East Branch of Smelt Brook that runs from Broom Lake, located in the northern section of the PDA, south down to Cole Harbour. The watercourse (Photo 1, Appendix B) was crossed at a small pedestrian bridge at assessment note JRK-ARCH-180 and the walkover commenced in a northward direction along the west side of the watercourse. Forest conditions consisted mostly of an immature birch and maple forest mixed with softwoods. Ground conditions were undulating with poor soil development within the area. An old trail was encountered with a north to south orientation and follows the watercourse. The trail appears to be associated with the historic fields located to the south of assessment note JRK-ARCH-181, (Photo 2, Appendix B).

Continuing north, the terrain was very rocky consisting of boulder swales and having an undulating surface. The watercourse was small with no well-defined banks although the watercourse was swollen at the time of the walkover due to seasonal rain. Further north along the east branch of the watercourse, (JRK-ARCH-182; Photo 3, Appendix B), the forest opened and changed to mostly immature birch and maple growth. The area showed signs of past forest harvesting activities within this section of the PDA although some old hardwood trees remain, possibly indicating selective harvesting (an older practice), as opposed to clear cutting (typically a more recent forest harvesting practice). Further north the terrain changed to a wetland environment (JRK-ARCH-183; Photo 4, Appendix B). A modern deer stand constructed of tarpaper and boards was encountered at JRK-ARCH-184 (Photo 5, Appendix B). At the Old Lawrence Town Road, the watercourse opened into a wider wetland environment at assessment note JRK-ARCH-185 (Photos 6 and 7, Appendix B).

At assessment note JRK-ARCH-193 (Photos 8 and 9, Appendix B), the ground was found to be very rocky and very undulating and showed signs of recent storm events as the area had numerous of downed trees. Several tree falls were inspected and the area was found to have little or poor soil development and no traces of pre-contact lithics anr historic artifacts observed. Overall, this section of the PDA along this section of the East Branch of Smelt Brook was found to be low in archaeological potential.

The northern section of the East Branch Smelt Brook from Boom Lake at assessment note MPR-ARCH-240 (Photos 10 and 11, Appendix B) was found to be low and wet. Forest conditions consist of mostly immature to mature mix of softwood and hardwoods. The small watercourse widened out at CMK-ARCH-164 (Photo 12, Appendix B) and surface conditions continued to be very rocky and undulating. A timber frame bridge abutment was encountered at the same assessment note (Photo 13, Appendix B) on a woods road. It was not possible to date the bridge, based on aerial photographs and the condition of the timbers in the abutment suggest recent use within the last 25 years for quarry and forest harvesting access. Bridges of this type and construction would be ubiquitous in the area and this one is not considered historically significant. Further down Smelt Brook the area showed signs of impact from recent storm events with numerous blown down trees and debris encountered at MPR-ARCH-242 (Photo 14, Appendix B). The area around the watercourse then transitioned into a wetland environment south and downstream to the Old Lawrencetown Road. The northern section of the East Branch Smelt Brook was found to be low in archaeological potential due to surface and topographical conditions noted during the walkover.

West Branch Smelt Brook was walked over from the northern end. A recently excavated drainage channel (ditch excavated and filled with stone) was noted at assessment note MPR-ARCH-227 (Photos 15 and 16, Appendix B) where the northern end of the West Branch Smelt Brook emerges out of the drainage feature. The drainage channel appears to have been created to redirect water away from nearby houses located to the west of this location and forms the start of the West Branch. The West Branch Smelt Brook was walked over on both sides downstream to the confluence with of the East Branch Smelt Brook before it empties into Cole Harbour. The terrain was found to be undulating, very rocky, low, wet in areas and consisting of mostly alder growth and immature birch trees mixed with softwood. The terrain began to have a slope > 20° on the west side of West Branch Smelt Brook towards the southwest (MPR-ARCH-228; Photos 17 to 18, Appendix B). The walkover continued downstream, where conditions showed signs of past forest harvesting activity. A line of mostly immature softwoods bordered both side of

the watercourse in this section. Further down the watercourse, at assessment note JRK-ARCH-188 (Photos 19 and 20, Appendix B), the entrance to the old trail (at JRK-ARCH-181) previously mentioned above was encountered at the end of an old farm field. The West Branch Smelt Brook above the confluence with East Branch Smelt Brook, was found to be low in archaeological potential due to wet or sloping surface conditions encountered during the walkover.

5.1.2 Smelt Brook: Confluence and Lower End

The walkover continued onto the old farm field to the west of the confluence between the West and East branches of Smelt Brook. A medium potential area was identified at MPR-POLY-016 (MPR-ARCH-231; Photos 21 and 22, Appendix B) and consisted of a flat terrace overlooking the Smelt Brook with a good view of Cole Harbour. It is considered to have elevated potential for use and/or occupation during the Pre-Contact as well as Historic Periods.

Continuing from the east side of the confluence where a small waterfall was encountered at assessment note JRK-ARCH-189 (Photos 23 and 24, Appendix B), forest conditions consist of mostly immature to mature birch growth mixed with other softwood trees. The terrain is undulating and very rocky in this location. The presence of the confluence of the watercourses and the waterfall feature (often an area where fish gather before trying to get over the falls), elevates the archaeological potential of the relatively flat and level dry area identified on the east side of Smelt Brook. The area was delineated as JRK-POLY-018 (MPR-ARCH-234, Figure 2, Appendix A; Photos 25 and 26, Appendix B). It is interpreted as a floodplain for the confluence of Smelt Brook. Two other areas were identified as having high archaeological potential within the old field along the east side of East Branch Smelt Brook consisting of an upper and lower terrace. The high, terrace overlooking the confluence of the East and West Branches of Smelt Brook and was labeled MPR-POLY-017 (MPR-ARCH-233; Photos 27 and 28, Appendix B). The lower terrace is identified as JRK-POLY-017 (MPR-ARCH-232; Photo 29, Appendix B). If these areas cannot be avoided by future development, it is recommended they be subject to archaeological shovel testing. These three elevated archaeological potential areas can be seen in Figure 3 (Appendix A).

5.1.3 Small Section of the West Branch of the Little Salmon River

Only a small portion of the West Branch Little Salmon River was located within the southeastern area of the PDA (JRK-ARCH-191; Photo 30, Appendix B) PDA. In this area, the watercourse was found to be little more than a forest drainage with no defined banks. Forest conditions in this area consist of a mix forest tree species (MPR-ARCH-235; Photo 31, Appendix B). The area is low, wet, very rocky, and with an undulating sphagnum moss cover forest floor. This area was found to be low in archaeological potential and not suitable for past occupation or other activities that would leave an archaeological footprint.

5.2 HISTORIC AND MODERN FEATURES

During the background review two roads as well as features relating to settlement from the Historic Period were identified primarily within the northern section of the PDA. Land use in most of the PDA during the recent past has been limited to forest harvesting with gravel and rock quarrying in the southeast corner of the PDA. The sections that follow present information on these segments of the walkover.

5.2.1 Quarry and Associated Features

The largest anthropogenic feature in the landscape encountered during the walkover was a former quarry located in the southeast corner of the PDA near the end of the Old Lawrencetown Road in Cole Harbour (As seen in 1964 aerial photo, Figure 11, Appendix A). The large open pit quarry had two sections: one section south of the Old Lawrencetown Road and another to the north. The extent of the quarry was evidence in the surface disturbance noted during the walkover.

The south section consisted of a large open pit quarry as encountered at assessment notes JRK-ARCH-203 (Photo 32, Appendix B) and MPR-ARCH-254 (Photo 33, Appendix B). The north section of the quarry is located north of the Old Lawrencetown Road; this section was accessed through a rocked off quarry road orientated north-south (MPR-ARCH-244; Photo 34, Appendix B). The surface conditions consisted of primarily alder growth, being a mix of immature birch and other softwood trees (JRK-ARCH-199: Photos 35 and 36, Appendix B). The area was found to be low, wet, and very rocky and heavily impacted north along the quarry road. A large pile of rip rap or armor stone was located at assessment note MPR-ARCH-246 (Photo 37, Appendix B). Evidence of continued forest harvesting activity was also observed while walking over the north section. The quarry was closed in the 1990s. Overall, both sections of the quarry within the PDA are low in archaeological potential due to impact to the area encountered during the walkover.

5.2.2 Historic Roads and Other Settlement Features within the PDA

Two historic roads were noted during the background research and considered during the walkover assessment. In the southern portion of the PDA there is a section of the Old Lawrencetown Road stretching from east to west that is currently used as a public walking trail (JRK-ARCH-204; Photo 38, Appendix B) between Cole Harbour and the residential development around Auburn Drive. The other historic road within the PDA is the Old Miller Road which stretches north to south and intersects the Old Lawrencetown Road in the south section of the PDA (Figure 8, Appendix A). This road was found to have had recent use, mostly related to forest harvesting, quarrying, and recent recreational ATV use such as at MPR-ARCH-251 (Photo 39, Appendix B). Various other woods roads were also walked encountered and walked over (JRK-ARCH-202: Photo 40, Appendix B). These were also related to tree harvesting and quarrying activities for sand and stone as observed in the landscape. Overall, the area around assessment note JRK-ARCH-202 was found to be low in archaeological potential due to surface conditions encountered. Surface conditions mostly consisting of very rough, undulating, and rocky terrain would not have been favourable for settlement or use.

The northern section of the PDA contained Historic Period features relating to settlement off Highway 107. The location of several buildings identified by surnames relevant to the local African Nova Scotia Community were noted on the Church Map of 1865. The first features encountered were at a turn in the transmission line approximately 400 m west of Old Miller Road, that intersects the PDA in the north section and consists of a long grassy field or old pasture on a drumlin to the east of Broom Lake at assessment note JRK-ARCH-205 (Photos 41 and 42, Appendix B). The southern end of the field was delineated with linear stone features (LSF) located within the tree line along the southern boundary of the field. These LSF were interpreted as being created during field clearing activities. Examples of these features can be seen at JRK-HSF-012 (Photo 43, Appendix B) and JKR-ARCH-013 (Photos 44 and 45, Appendix B). The field can be seen in the 1945 aerial photograph (Figure 9, Appendix A). At MPR-ARCH-238 (Photo 46, Appendix B) a woods road or trail was noted that led east to a historic farm located at the corner of Old Miller Road and Highway 107 at the Akoma property. It appears the field expanded to the south between the 1940s and 1950s (NSDNR 1945, 1954). The trail leads west down to Broom Lake from the field at assessment note JRK-ARCH-196 (Photo 47 to 48, Appendix B). The trail from the field met another trail from the north to the water's edge in this location and is interpreted as a landing for water access. The trail leads to the HRM properties located in the northwest corner of the PDA and in the direction of Cherry Brook located across Highway 107.

Several buildings are noted on the A. F. Church Map (1865) in the northern section of the PDA along Old Miller Road and Highway 107, (see Figure 14, Appendix A). Another pasture or old field was encountered during the walkover on the east side of Old Miller Road at JRK-ARCH-206 (Photos 49 to 50, Appendix B). This section of field was also delineated with LSF features marking the edges of the field at the tree line that surrounds the field. The field was noted in aerial photos from the middle of the twentieth century and appears to have been used recently (i.e., within the last twenty years). A nearby horse track was noted in aerial photos was encountered during the walkover in the northeast section of the PDA. The associated farm, commercial and residential property was walked over and found vacant (MPR-ARCH-263; Photo 51, Appendix B). The buildings in this location were recently removed but their concrete foundations were still onsite.

The largest concentration of features from the Historic Period were encountered within properties concentrated to the south of Wilfred Jackson Way located along Highway 107 and Old Miller Road in the north section of the PDA. A concrete foundation feature was encountered along Old Miller Road at MPR-ARCH-264 (Photos 52 and 53, Appendix B) and noted as JRK-HSF-015. The feature measured approximately 10 m (north-south) by 15 m (east-east) and appeared to date to the early to mid-twentieth century. The feature was interpreted as being associated with the NSCC (1921-1980) of the Akoma property and can be seen in Figure 12, (Appendix A). This area is still open fields and had some standing buildings at JRK-ARCH-208 (Photos 56 and 57, Appendix B). Another concrete foundation feature was noted at JRK-HSF-014 (Photo 58, Appendix B) and was interpreted as being in context with the Akoma property as noted on Figure 12. The area of the Akoma property has been assessed as having elevated potential for encountering additional Historic Period remains. If this area will be affected by groundbreaking activities, then a more detailed survey of this area will need to be undertaken. Overall, the northern section of the PDA was found to have low potential for Pre-Contact Period occupation and or use. However, the area was used during the Historic Period into modern times for settlement, farming, and forest harvesting activities, associated with the local African Nova Scotia community.

6.0 SUMMARY AND RECOMMENDATIONS

In general, the majority of the PDA was found to have low archaeological potential due to surface and topographical conditions encountered during the walkover that were generally unsuitable for habitation or other activities that would leave an archaeological footprint, and further supported by the results of the background research. The areas that were identified to have potential for the presence of Pre-Contact and Historic Period archaeological resources were in the northern and southern areas of the PDA. In the north, the evidence of the former Home for Colored Children occupying the Akoma property as well as other areas containing historic remains associated with settlement along Highway 107 and Old Miller Road were identified. Within the south, four areas of elevated archaeological potential were identified around the confluence of the east and west branches of Smelt Brook before empties into Cole Harbour and situated on two flat terraces within historic period agricultural fields overlooking the watercourse. If these areas are to be impacted from groundbreaking activities associated with the development of this area, then the following is recommended:

1) HRM has informed Stantec that the cellar feature identified as JRK-HSF-015 will be impacted by the development of a new access road along the Old Miller Road right-of way. Based on consultation with CCTH if this cellar feature is to be impacted, archaeological shovel testing must be completed at the cellar location and the results reported to NSCCTH prior to construction impacts. Depending on the results of the shovel testing additional mitigation may be required.
2) If the former Akoma property (registered HRM heritage property) as well as the historic features along the Old Miller Road and in the north section of the PDA (JRK-ARCH-206, MPR-ARCH-263, JRK-HSF-012, JRK-HSF-013) are to be impacted (also see "Dwelling/House" features identified on Figure 13, Appendix A), then it is recommended that a more detailed archaeological assessment be undertaken with archaeological shovel testing and other mitigation be implemented if these features cannot be avoided. Details on the scope and nature of this mitigation will need to be confirmed through consultation with NSCCTH prior to the implementation of the mitigation.
3) If the areas of elevated archaeological potential identified during the walkover located within the south section of the PDA (MRP-POLY-016, MRP-POLY-017, JRK-POLY-017, and JRK-POLY-018, Figure 3, Appendix A) cannot be avoided, then archaeological shovel testing is recommended to determine if archaeological resources are present and facilitate the design of appropriate mitigation for such resources if they are present.

It is important to note that while no Pre-Contact Period archaeological resources were identified during the field assessment, there is still potential for sub-surface archaeological resources to be present throughout the PDA. If any archaeological resources are discovered during ground-breaking activities, contractors or HRM are required to contact NSCCTH to assess the discovery and develop appropriate mitigation.

7.0 CLOSING

This report has been prepared as a requirement of Heritage Research Permit No. A2023NS190 for the sole benefit of HRM and may not be used by any other person or entity, other than for its intended purposes, without the express written consent of Stantec Consulting Ltd. (Stantec) and HRM. Any use which a third party makes of this report is the responsibility of such third party.

The information and recommendations contained in this report are based upon work undertaken in accordance with generally accepted scientific practices current at the time the work was performed. Further, the information and recommendations contained in this report are in accordance with our understanding of the Project as it was presented at the time of our report. The information provided in this report was compiled from existing documents, design and planning information provided by HRM, data provided by regulatory agencies and others, as well as the field survey carried out in 2023 specifically in support of this report. If any conditions become apparent that differ significantly from our understanding of conditions as presented in this report, Stantec requests that we be notified immediately, and permitted to reassess the conclusions provided herein. Any follow-up work recommended in this report must be reviewed and approved by Special Places, the Nova Scotia Department of Communities, Culture, Tourism, and Heritage.

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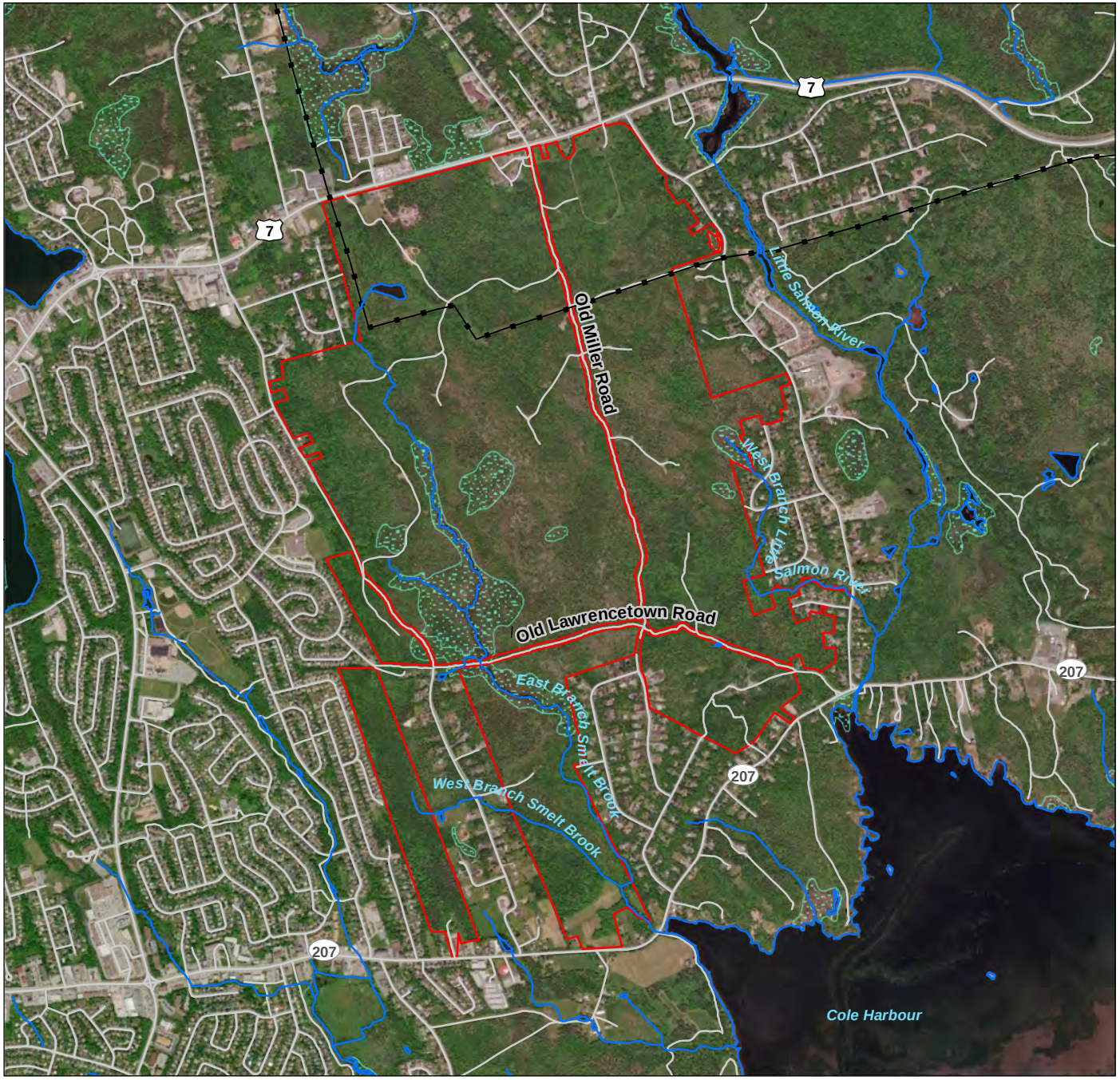
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APPENDIX A

Figures



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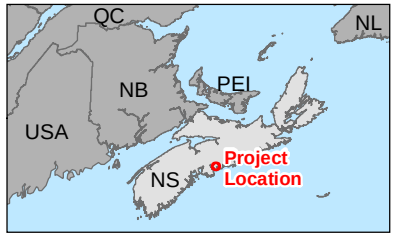
HALIFAX

Road / Highway
Transmission Line
Watercourse / Waterbody
Wetland
Project Development Area

N

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Meters
(At original document size of 8.5x11)
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Notes
1. Coordinate System: NAD 1983 CSRS UTM Zone 20N
2. Data Sources: HRM and GNS
3. Background: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



Project Location
Prepared by MPR on 2024-03-01

Halifax,
Nova Scotia

Client/Project
160410459-0001 REVA

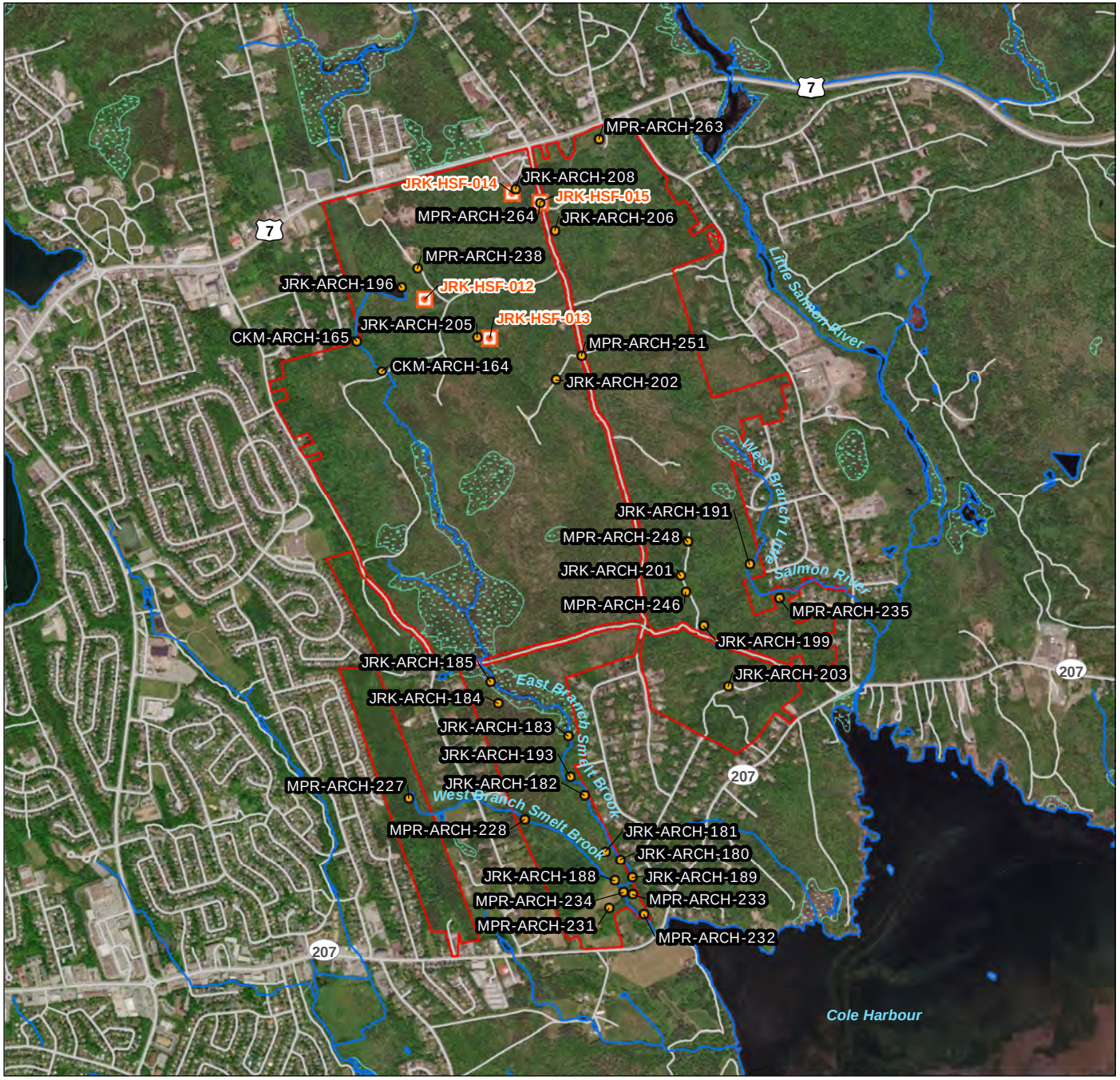
Halifax Regional Municipality
Future Serviced Communities: Akoma Lands ARIA

Figure No.
1

Title
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HALIFAX

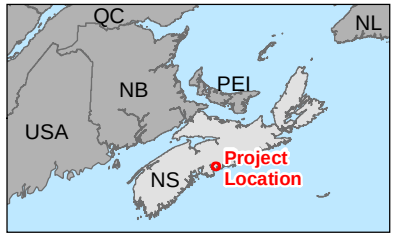
- Archaeological Assessment Note
- Heritage Feature
- Road / Highway
- Watercourse / Waterbody
- Wetland
- Project Development Area

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Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 20N
2. Data Sources: HRM and GNS
3. Background: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



Project Location

Prepared by MPR on 2024-03-01

Halifax,
Nova Scotia

Client/Project

160410459-0001 REVA

Halifax Regional Municipality
Future Serviced Communities: Akoma Lands ARIA

Figure No.

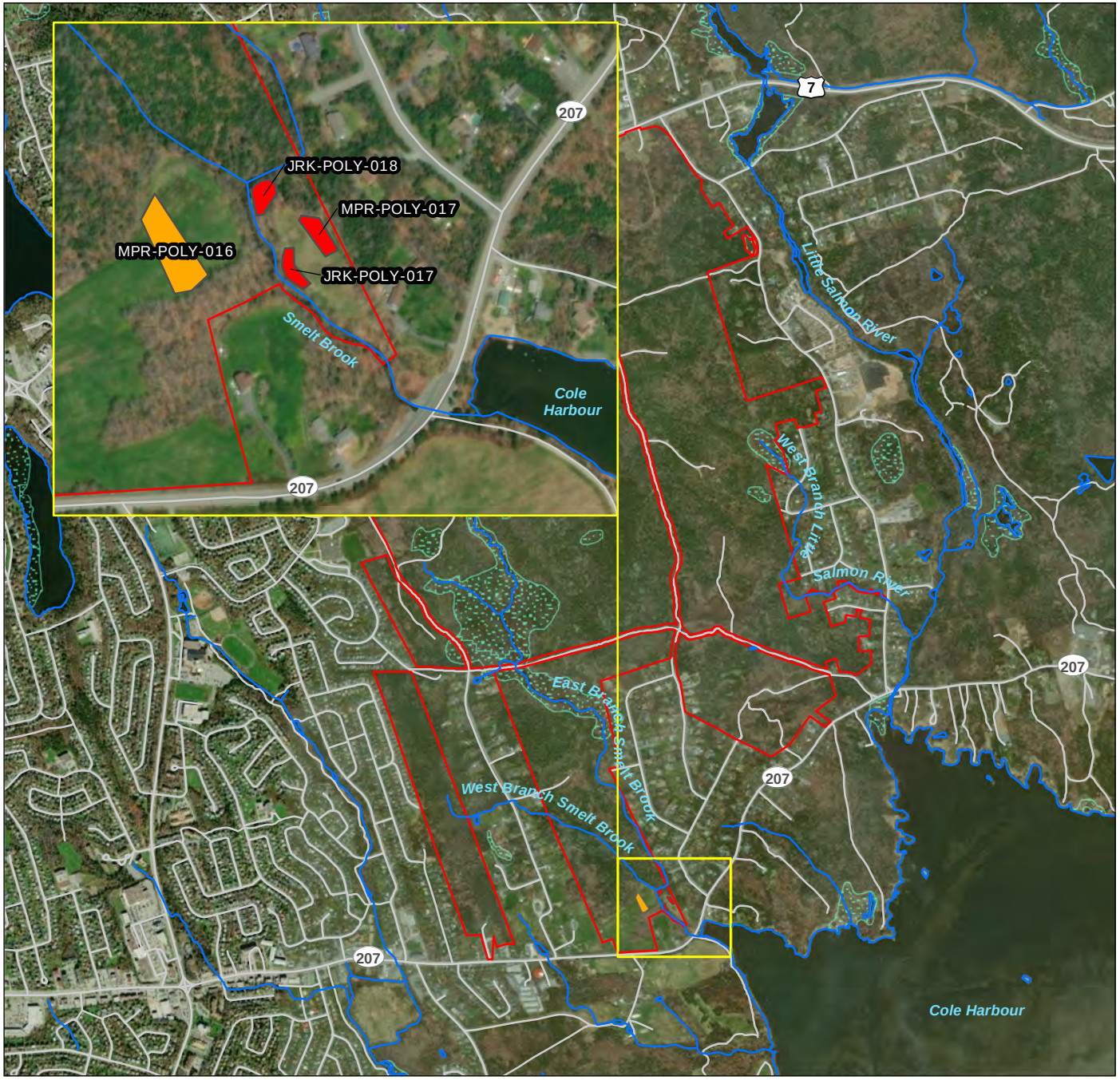
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Archaeological Assessment Notes and Heritage Features

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HALIFAX

- High Archaeological Potential
- Medium Archaeological Potential
- Road / Highway
- Watercourse / Waterbody
- Wetland
- Project Development Area

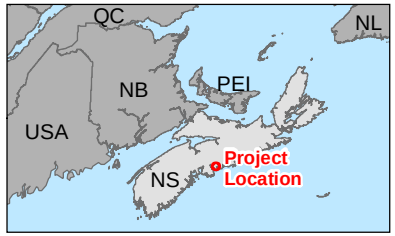
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3. Background: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



Project Location

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Halifax,
Nova Scotia

Client/Project

160410459-0001 REVA

Halifax Regional Municipality
Future Serviced Communities: Akoma Lands ARIA

Figure No.

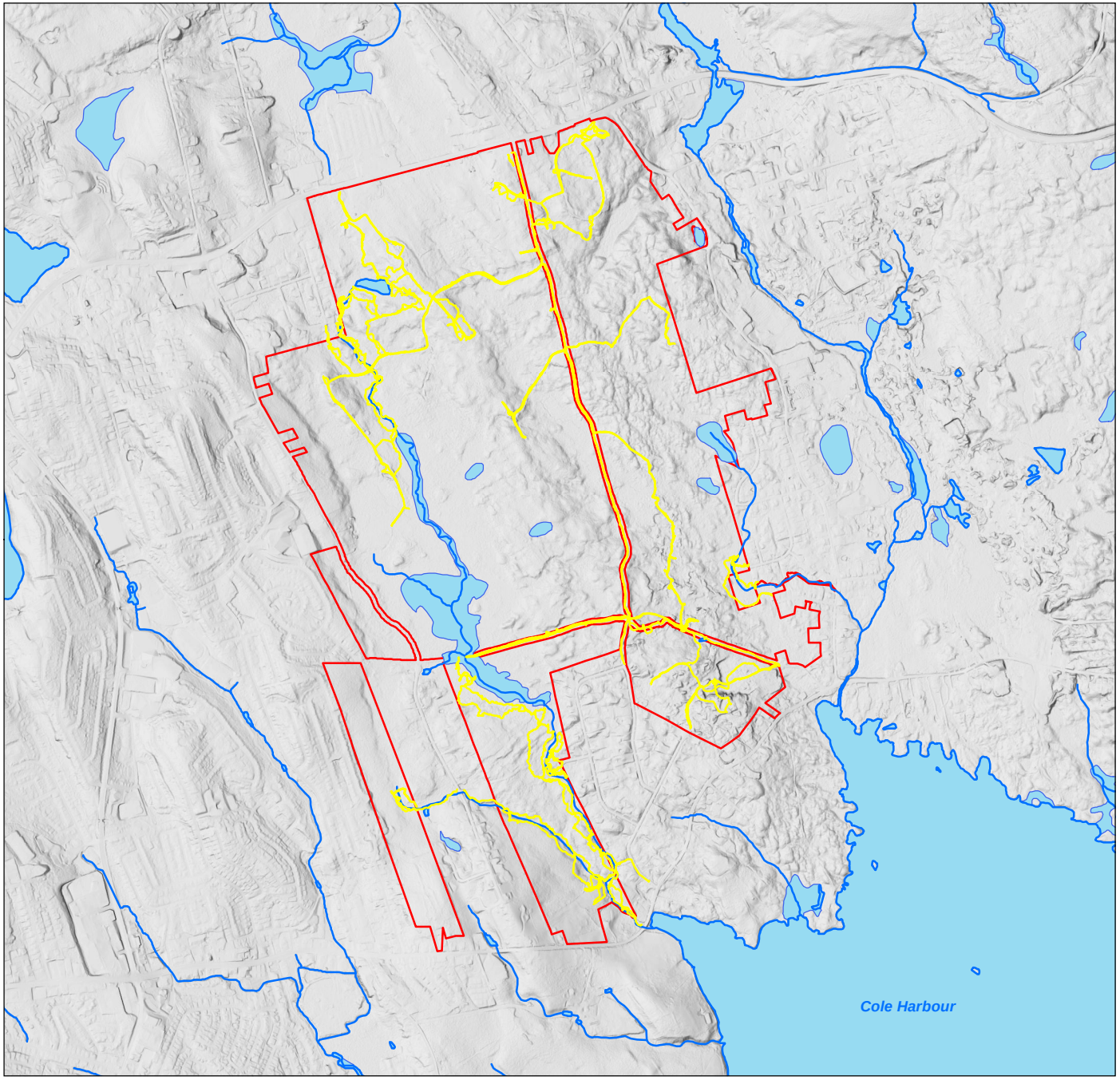
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Archaeological Potential Areas

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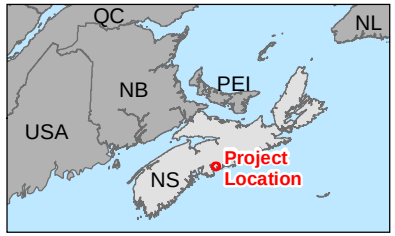
HALIFAX

Archaeological Survey Tracklog
Watercourse
Waterbody
Project Development Area

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Notes
1. Coordinate System: NAD 1983 CSRS UTM Zone 20N
2. Data Sources: HRM, GNS, and GPS
3. Background: GeoNova 10K LiDAR Derived Topographic Hillshade



Project Location
Halifax,
Nova Scotia

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Client/Project
160410459-0001 REVA

Halifax Regional Municipality
Future Serviced Communities: Akoma Lands ARIA

Figure No.
4

Title
Archaeological Survey Tracklog

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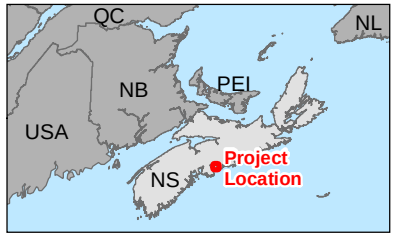
HALIFAX

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Notes
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2. Data Sources: HRM
3. Background: Crown Records Displacement Plan No. 375 (dated 1800).



Project Location

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Halifax Regional Municipality
Future Serviced Communities: Akoma Lands ARIA

Figure No.
5

Title
1800 Crown Records Displaced Plan

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HALIFAX

Project Development Area

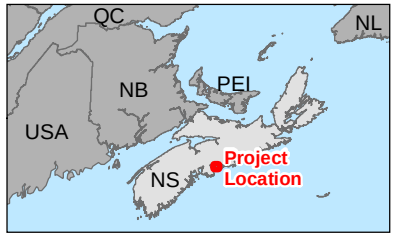
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2. Data Sources: HRM
3. Background: Chamberlain Map of Halifax No. 264 (1813).



Project Location

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Halifax,
Nova Scotia

Client/Project

160410459-0001 REVA

Halifax Regional Municipality
Future Serviced Communities: Akoma Lands ARIA

Figure No.

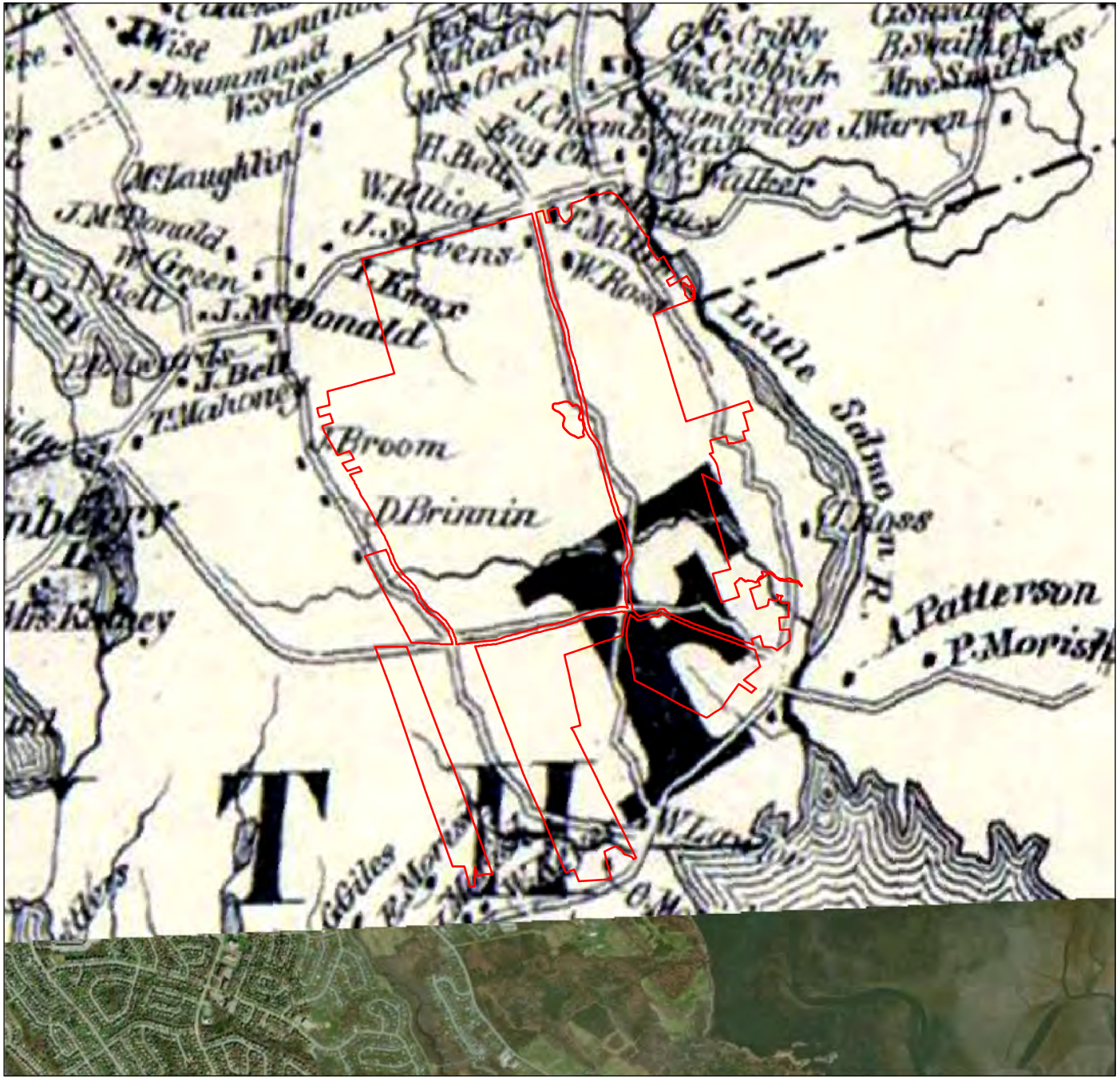
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1813 Chamberlain Map

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Project Development Area

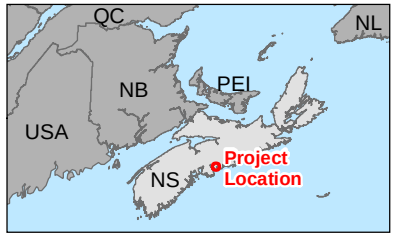
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3. Background Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community and A.F. Church 1865 Map of Halifax County.



Project Location

Halifax,
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160410459-0001 REVA

Halifax Regional Municipality
Future Serviced Communities: Akoma Lands ARIA

Figure No.

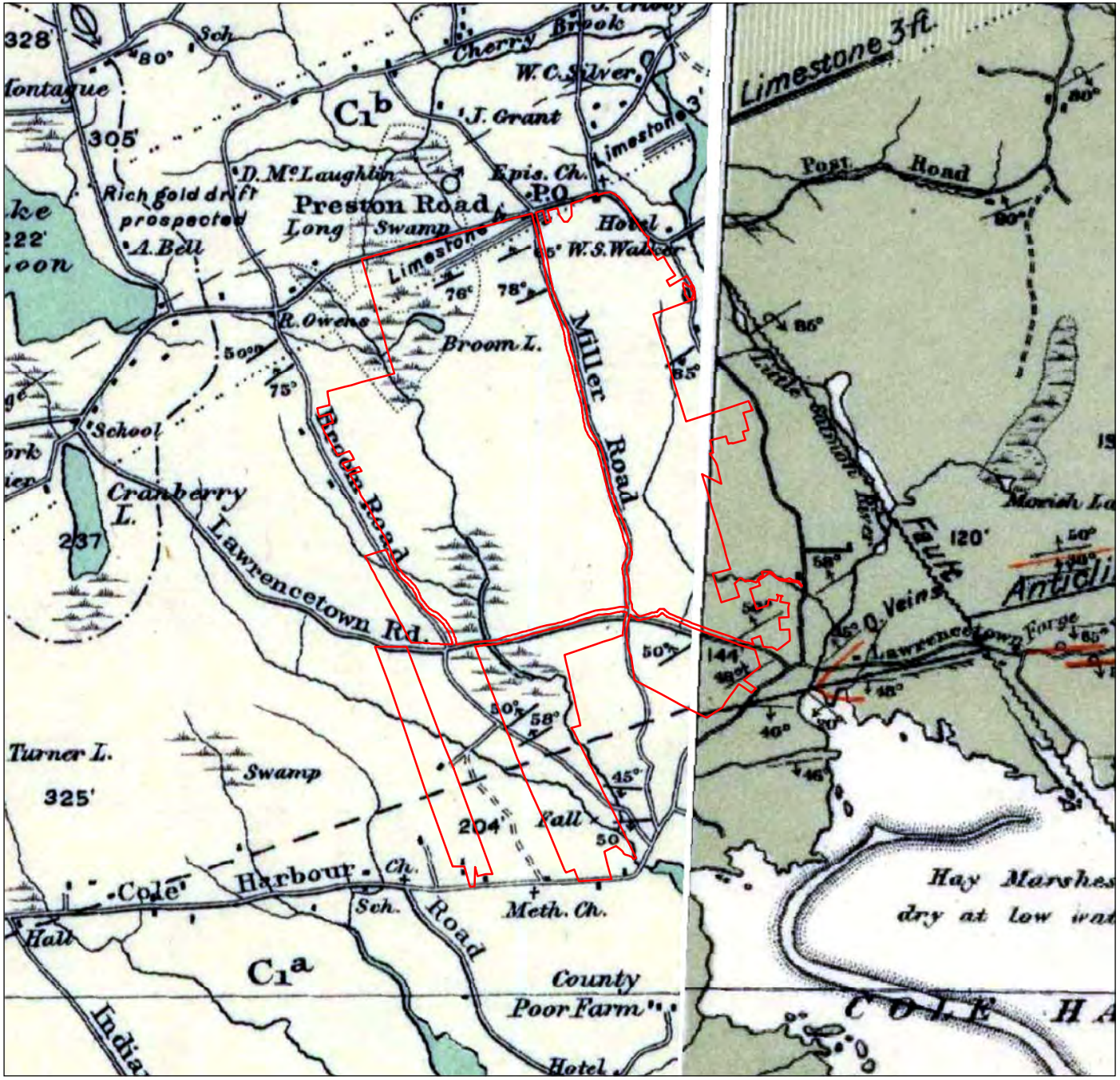
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Title

1865 Church Map

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HALIFAX

Project Development Area

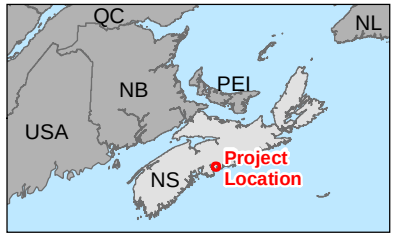
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3. Background: Department of Mines, Geological Survey Branch, City of Halifax Map Sheets 68 and 53 (E.R. Faribault 1908).



Project Location

Prepared by MPR on 2024-03-01

Halifax,
Nova Scotia

Client/Project

160410459-0001 REVA

Halifax Regional Municipality
Future Serviced Communities: Akoma Lands ARIA

Figure No.

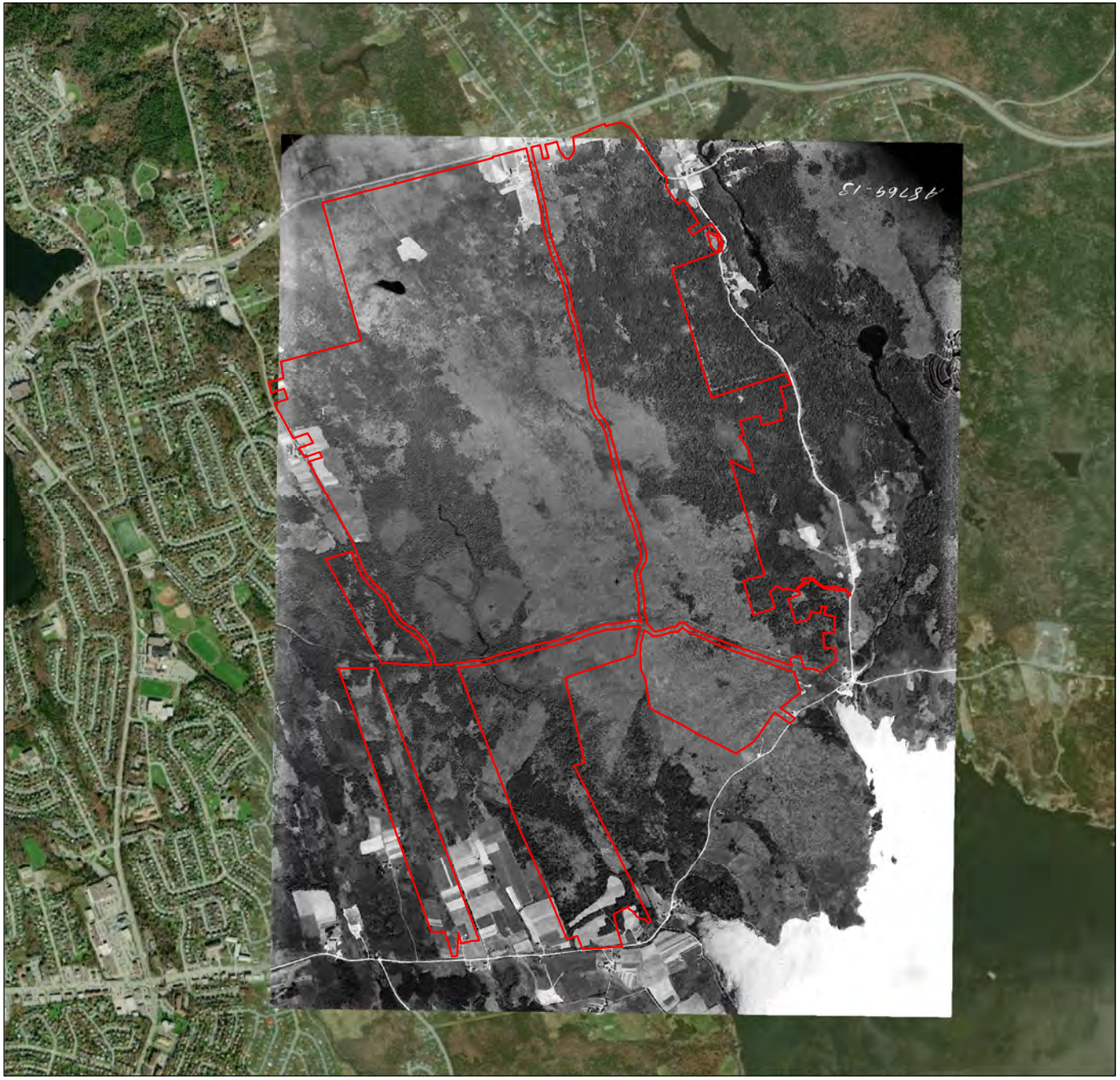
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1908 Faribaults Maps (Sheet Nos. 68 and 53)

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HALIFAX

Project Development Area

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Meters

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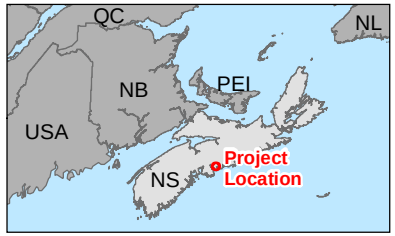
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2. Data Sources: HRM

3. Background:Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community and Natural Resource Canada's 1945 Historic Air Photo A8769-013.



Project Location

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Halifax,
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Client/Project

160410459-0001 REVA

Halifax Regional Municipality
Future Serviced Communities: Akoma Lands ARIA

Figure No.

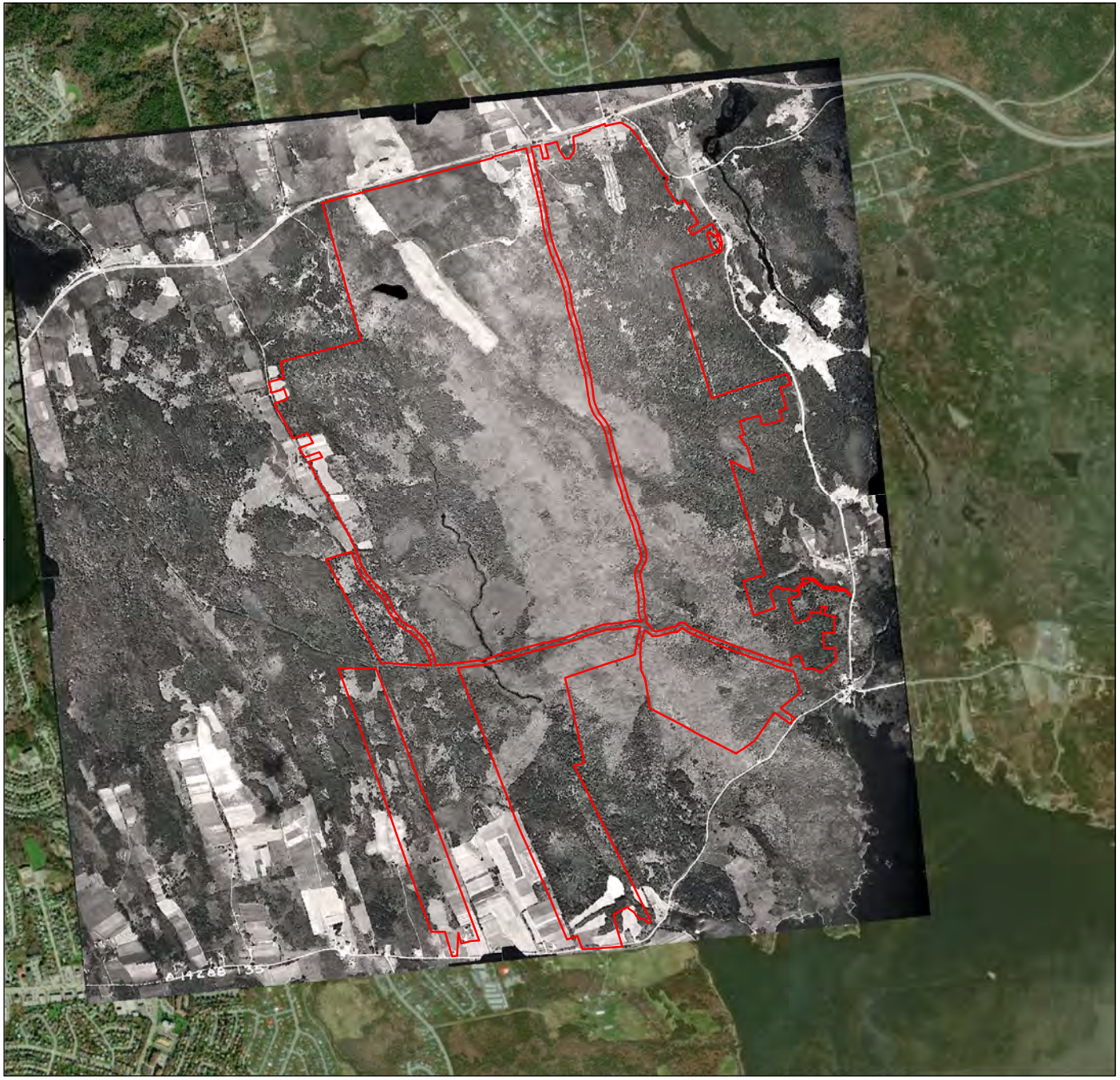
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Title

1945 Historic Air Photo

\\Ca0213-ppfss01\work_group\1214\active\160410459\gis_data\working\mpr\Akoma_Lands\Figure8-160410459_Akoma_ARIA_1945_Air_Photo.mxd Revised: 2024-03-04 By: mrooney

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Stantec

HALIFAX

Project Development Area

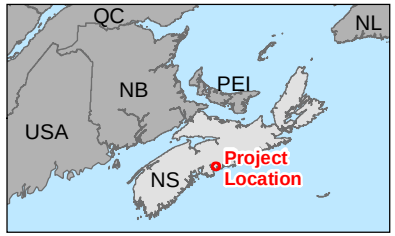
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(At original document size of 8.5x11)
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Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 20N
2. Data Sources: HRM
3. Background:Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community and Natural Resource Canada's 1954 Historic Air Photo A14268-135.



Project Location

Prepared by MPR on 2024-03-01

Halifax,
Nova Scotia

Client/Project

160410459-0001 REVA

Halifax Regional Municipality
Future Serviced Communities: Akoma Lands ARIA

Figure No.

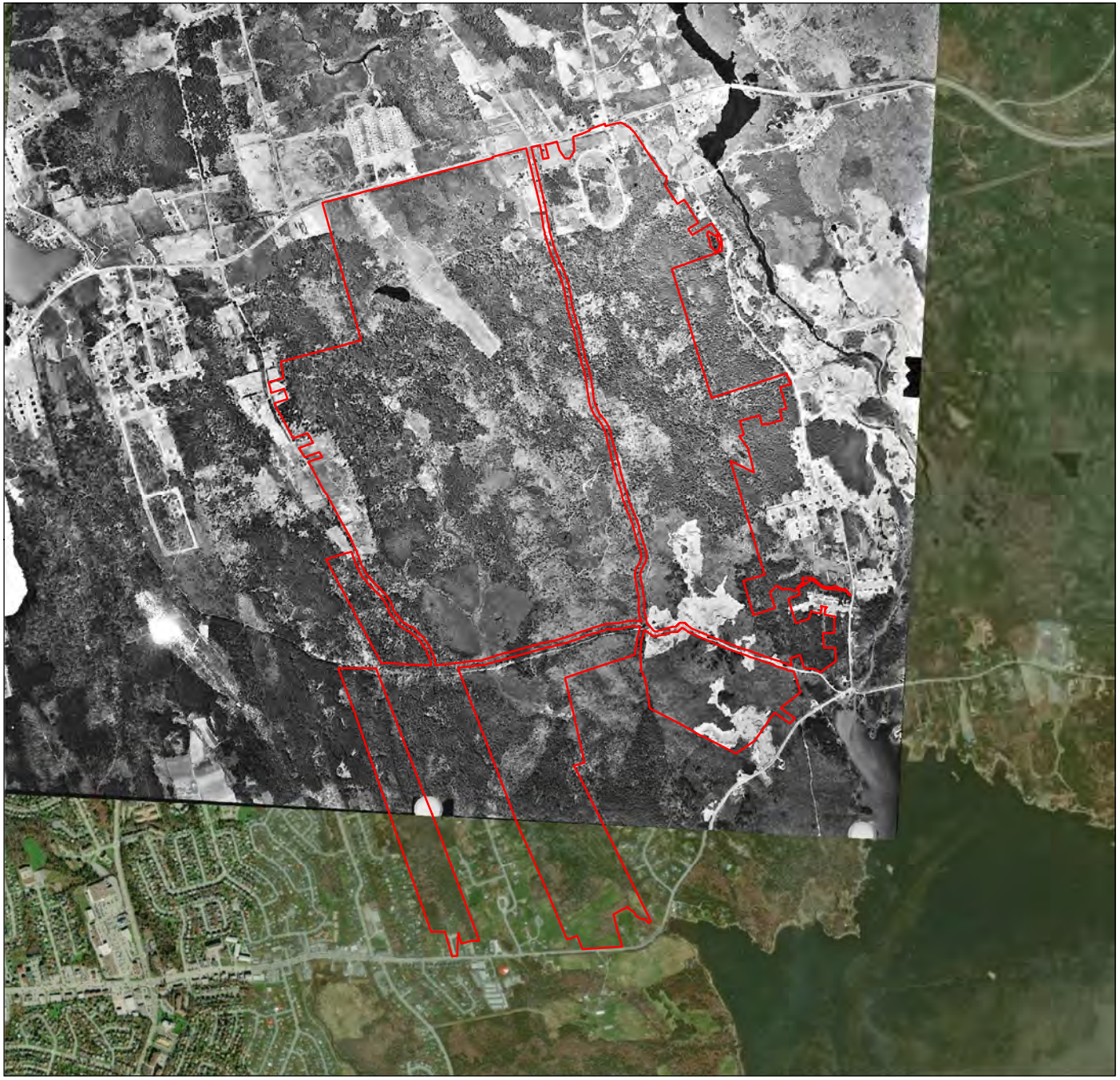
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Title

1954 Historic Air Photo

\\Ca0213-pplss01\work_group\1214\active\160410459\gis_data\working\mpr\Akoma_Lands\Figure9-160410459_Akoma_ARIA_1954_Air_Photo.mxd Revised: 2024-03-04 By: mrooney

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Stantec

HALIFAX

Project Development Area

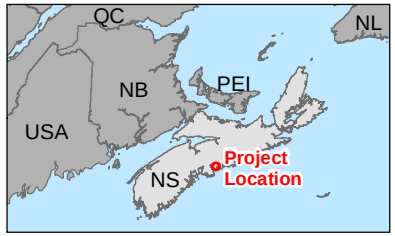
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(At original document size of 8.5x11)
1:25,000

Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 20N
2. Data Sources: HRM
3. Background:Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community and Natural Resource Canada's 1964 Historic Air Photo A18351-017.



Project Location

Prepared by MPR on 2024-03-01

Halifax,
Nova Scotia

Client/Project

160410459-0001 REVA

Halifax Regional Municipality
Future Serviced Communities: Akoma Lands ARIA

Figure No.

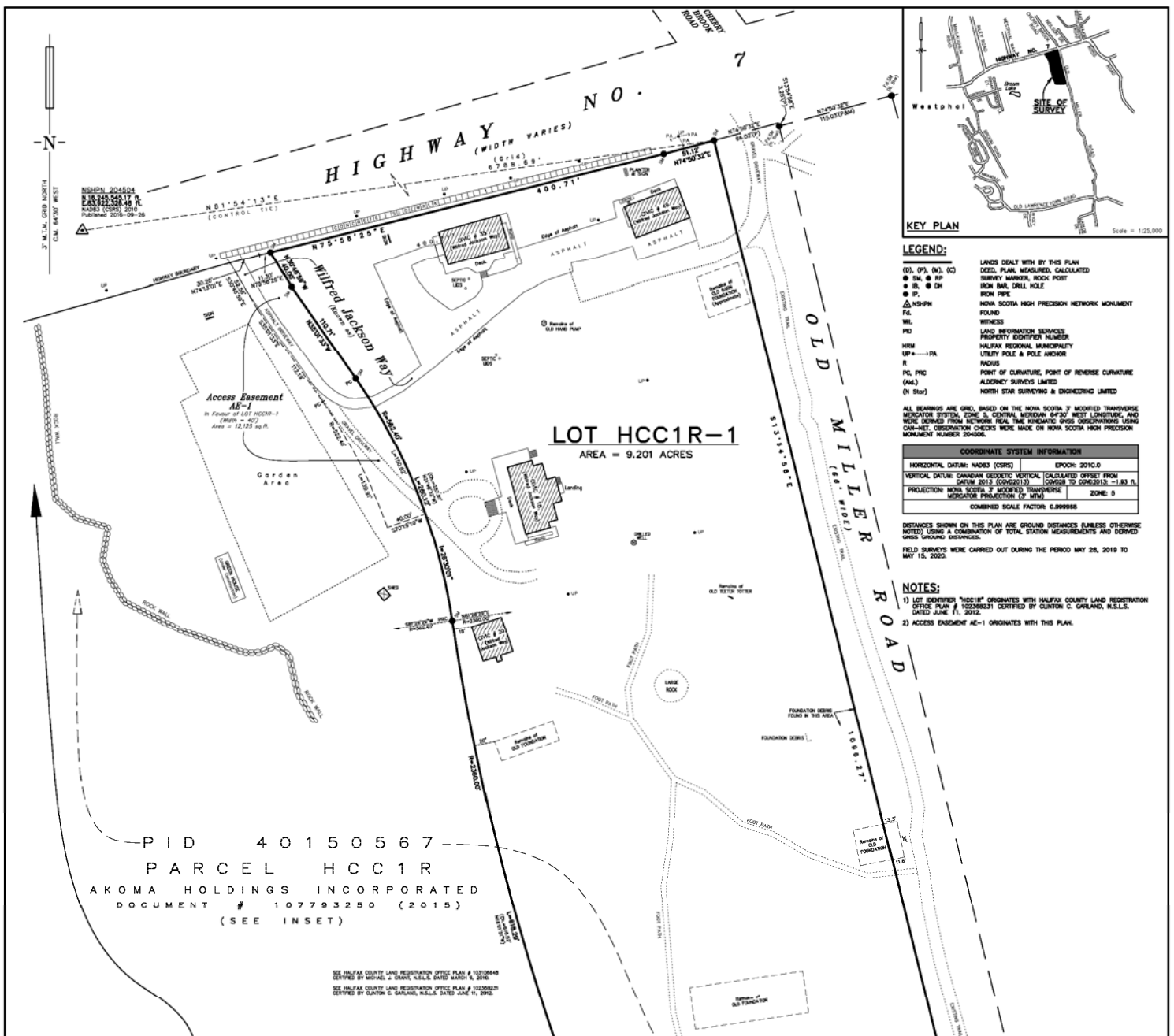
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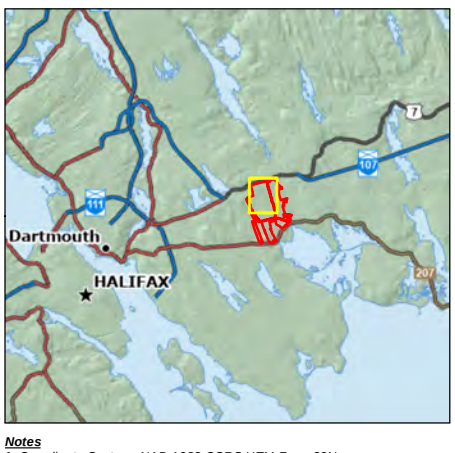
Title

1964 Historic Air Photo

\\Ca0213-pplss01\work_group\1214\active\160410459\gis_data\working\mpr\Akoma_Lands\Figure10-160410459_Akoma_ARIA_1964_Air_Photo.mxd Revised: 2024-03-04 By: mrooney

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Notes
1. Coordinate System: NAD 1983 CSRS UTM Zone 20N
2. Data Sources: HRM (inset)
3. Background: Alderney Surveys Limited, Nova Scotia Land Surveyors, Dartmouth, Drawing No. 203663-1 (2020) and inset source: Service Nova Scotia

Project Development Area (inset)

0 100 200 metres

(At original document size of 11x17)
1:6,000

N

Stantec HALIFAX

Project Location
Halifax,
Nova Scotia

Prepared by MPR on 2024-03-01

Client/Project
160410459-0001 REVA

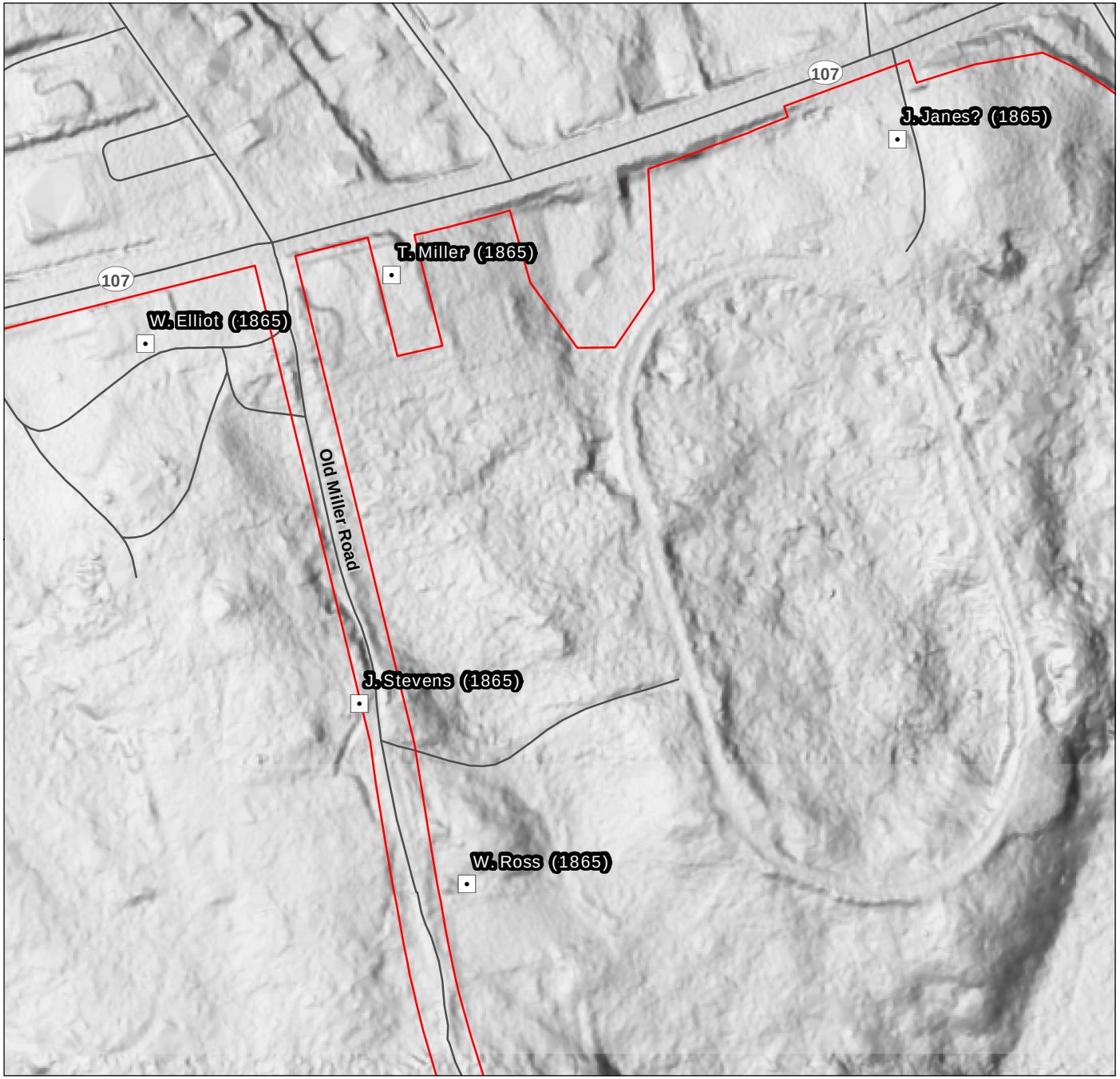
Halifax Regional Municipality
Future Serviced Communities: Akoma Lands ARIA

Figure No.
12

Title
Akoma Holdings Survey Plan of Lot HCC1R-1

\\Ca0213-ppfss01\work_group\1214\active\160410459\gis_data\working\mpr\Akoma_Lands\Figure11_160410459_Akoma_ARIA_Akoma_Property.mxd Revised: 2024-03-04 By: mrooney

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Stantec

HALIFAX

- Dwelling / House
- Road / Highway
- Project Development Area

N

0 30 60
Meters
(At original document size of 8.5x11)
1:3,000

Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 20N
2. Data Sources: HRM, GNS, and GPS
3. Background: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Communityand GeoNova 10K LiDAR Derived Topographic Hillshade



Project Location

Prepared by MPR on 2024-03-01

Halifax,
Nova Scotia

Client/Project

160410459-0001 REVA

Halifax Regional Municipality
Future Serviced Communities: Akoma Lands ARIA

Figure No.

13

Title

Dwellings Depicted on 1865 Church Map

\\Ca0213-ppfss01\work_group\1214\active\160410459\gis_data\working\mpr\Akoma_Lands\Figure14-160410459_Akoma_ARIA_Dwellings.mxd Revised: 2024-03-18 By: mrooney

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APPENDIX B

Photographs

HRP A2023NS190	
	
Photo 1 View facing south of the West Branch Smelt Brook at JRK-ARCH-180	**Photo 2** View north showing an old trail encountered along the West Branch Smelt Brook at JRK-ARCH-181
	
Photo 3 View north showing the rocky surface conditions and past forest harvesting within the area at JRK-ARCH-182	**Photo 4** View north of the East Branch Smelt Brook where the area becomes a wetland environment at JRK-ARCH-183

HRP A2023NS190	
	
Photo 5 View northwest of a modern deer stand encountered at JRK-ARCH-184	**Photo 6** View west from assessment note JRK-ARCH-185 were Smelt Brook opened into a larger wetland environment
	
Photo 7 View east from JRK-ARCH-185 towards the old Lawrencetown road at JRK-ARCH-185	**Photo 8** View north showing the undulating and rocky surface conditions at JRK-ARCH-193

HRP A2023NS190	
	
Photo 9 View south from the east side of the east branch of Smelt Brook at JRK-ARCH-193	**Photo 10** View north from the end of Boom Lake at the beginning of the eastern branch of Smelt Brook at MPR-ARCH-240
	
Photo 11 View south and looking down the east branch of Smelt Brook at MPR-ARCH-240	**Photo 12** View north from CKM-ARCH-164 showing conditions encountered along east branch of Smelt Brook in the northern section

HRP A2023NS190	
	
Photo 13 View east of an old bridge footing encountered along the northern section of the east branch of Smelt Brook at CKM-ARCH-164	**Photo 14** View south at MPR-ARCH-242 showing downed trees and forest debris
	
Photo 15 View west of a modern drainage feature installed to direct the flow of the northern end of the watercourse away from nearby houses at MPR-ARCH-227	**Photo 16** View east at the northern end of the west branch of the Smelt Brook at MPR-ARCH-227

HRP A2023NS190	
	
Photo 17 View north from assessment note MPR-ARCH-228 showing conditions encountered on West Brach Smelt Brook	**Photo 18** View east from MPR-ARCH-228 showing the slope encountered on west side West Brach Smelt Brook
	
Photo 19 View north of the old trail that leads to the old fields to the south at JRK-ARCH-188	**Photo 20** View south of the West Branch Smelt Brook and trail encountered at JRK-ARCH-188 at the end of an old field

HRP A2023NS190	
	
Photo 21 View northwest at the identified medium potential area MPR-POLY-016 taken from MPR-ARCH-231	**Photo 22** View west showing the identified medium potential area MPR-POLY-016 taken from MPR-ARCH-231
	
Photo 23 View south of the falls feature identified near the confluence of Smelt Brook east and west branches at JRK-ARCH-189	**Photo 24** View north of the fall feature identified near the confluence at JRK-ARCH-189

HRP A2023NS190	
	
Photo 25 View north showing the identified high potential area JRK-POLY-018 taken from MPR-ARCH-234	**Photo 26** View northwest showing the identified high potential area JRK-POLY-018 taken from MPR-ARCH-234
	
Photo 27 View southwest of the identified high potential area at MPR-POLY-017 taken at MPR-ARCH-233	**Photo 28** View west looking at the other elevated terrace on the west side at MPR-POLY-016 taken at MPR-ARCH-233

HRP A2023NS190	
	
Photo 29 View northwest from MPR-ARCH-232 showing the location of the high potential area JRK-POLY-017	**Photo 30** View northeast at JRK-ARCH-191 showing a short section of the west branch of Little Samon River
	
Photo 31 View northeast at MPR-ARCH-235 showing that the watercourse is more of a forest drain	**Photo 32** View southeast overlooking a section of the quarry located south of Old Lawrencetown Road at assessment note JRK-ARCH-203

HRP A2023NS190	
	
Photo 33 View west overlooking the quarry section located to the south of Old Lawrencetown Road from assessment note MPR-ARCH-254	**Photo 34** View north at the entrance for the section of the quarry located the north of Old Lawrencetown road at assessment note MPR-ARCH-244
	
Photo 35 View northwest from assessment note JRK-ARCH-199 overlooking the section of the quarry north of Old Lawrencetown Road	**Photo 36** View east from assessment note JKR-ARCH-199 overlooking the section of the quarry to the north of the Old Lawrencetown Road

HRP A2023NS190	
	
Photo 37 View west at a pile of large rip rap stones remaining within the quarry at assessment note MPR-ARCH-246	**Photo 38** View of a section of the Old Lawrencetown Road, currently a public walking trail at JRK-ARCH-204
	
Photo 39 View north along the Old Miller Road in a quarry area at MPR-ARCH-251	**Photo 40** View east from JRK-ARCH-202 down a woods road encountered in the middle of the PDA

HRP A2023NS190	
	
Photo 41 View north from JRK-ARCH-205 from the south end of grassy field	**Photo 42** View south from JRK-ARCH-205 at the end of the field
	
Photo 43 View north at a section of LSF at JRK-HSF-012 created from field clearing	**Photo 44** View east of a LSF at JRK-HSF-013 created from field clearing activities and located within the treeline

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Photo 45 View east of a LSF at JRK-HSF-013 created from field clearing activities	**Photo 46** View south at MPR-ARCH-238 showing the north section of the field
	
Photo 47 View southwest at JRK-ARCH-196 overlooking Boom Lake in an area identified as a watering hole or landing for water access	**Photo 48** View north of a trail and woods road from the old field which led to JRK-ARCH-196 located at the waters edge of Boom Lake

HRP A2023NS190	
	
Photo 49 View north from JRK-ARCH-206 at an old field encountered on the west side of Old Miller Road	**Photo 50** View south at the tree line having LSF at JRK-ARCH-206 which delineates the fields
	
Photo 51 View southwest at MPR-ARCH-263 of a vacant lot which until recently still had farm and commercial & residential buildings	**Photo 52** View north at MPR-ARCH-264 at a twentieth century foundation feature at JRK-HSF-015

HRP A2023NS190	
	
Photo 53 View northwest at MPR-ARCH-264 at a corner of a twentieth century foundation feature	**Photo 54** View north at JRK-ARCH-208 showing some building present on the Akoma property
	
Photo 55 View west at JRK-ARCH-208 of the open field encountered on the Akoma property	**Photo 56** View southwest from JRK-HSF-014 at concrete foundation features associate with the Akoma property