Appendix BSA-3

Terrestrial Environment Baseline Study

PROJECT NUJIO'QONIK
Terrestrial Environment
Baseline Study

August 2023

Prepared for:

Prepared by:

Stantec Consulting Ltd.

File: 121417575

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Abbreviations

AC CDC	Atlantic Canada Conservation Data Centre
agl	above ground level
ARU	automatic recording unit
ATV	all-terrain vehicle
BCR	Bird Conservation Region
CBC	Christmas Bird Count
CNPP	Community-nominated Priority Places
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CPAWS	Canadian Parks and Wilderness Society
DEM	Digital Elevation Model
EA	environmental assessment
EBSA	Ecologically and Biologically Significant Areas
ECCC	Environment and Climate Change Canada
EGSL	Estuary and Gulf of St. Lawrence
EIS	Environmental Impact Statement
IBA	Important Bird and Diversity Areas
km	kilometer
LAA	Local Assessment Area
LOMA	Large Ocean Management Area
MBCA	*Migratory Birds Convention Act, 1994*
MBR	*Migratory Birds Regulations*
MBU	Marine Biogeographic Unit
MMA	Moose Management Area

Mt	megatonne
MW	megawatt
NL	Newfoundland and Labrador
NL ESA	Newfoundland and Labrador Endangered Species Act
NLDECC	Newfoundland and Labrador Department of Environment and Climate Change
NLDFFA	Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture
NMCA	National Marine Conservation Area
OBIA	Object Based Image Analysis
PRISM	Program for Regional and International Shorebird Monitoring
RAA	Regional Assessment Area
ROW	right-of-way
SAR	Species at Risk
SARA	*Species at Risk Act*
SiBA	Significant Benthic Area
SOCC	Species of Conservation Concern
SMA	Special Marine Areas
SSAC	Species Status Advisory Committee
WEGH2	World Energy GH2

Glossary

barachois	Coastal lagoon partially or totally separated from the ocean by a sand or shingle bar (spit)
tuckamore	Wind stunted trees (Krummholz)

1.0 Introduction

Project Nujio'qonik (the Project) involves the development, construction, operation and maintenance, and eventual decommissioning and rehabilitation of one of the first Canadian, commercial-scale, "green hydrogen" and ammonia production plants powered by renewable wind energy. Located on the western coast of the Island of Newfoundland, Newfoundland and Labrador (NL), the Project will have a maximum production of up to approximately 206,000 t of green hydrogen per year. The hydrogen produced by the Project will be converted into ammonia and the resulting 1.17 Mt of ammonia exported to international markets by ship. The hydrogen / ammonia plant and associated storage and export facilities will be located at the Port of Stephenville (in the Town of Stephenville, NL) on a privately-owned brownfield site and at an adjacent existing marine terminal, both of which are zoned for industrial purposes.

Renewable energy from two onshore wind farms on the western coast of Newfoundland, each with a capacity of approximately 1 GW, will be used to power the hydrogen and ammonia production processes. These wind farms (referred to herein as the "Port au Port wind farm" and the "Codroy wind farm") will collectively produce 2 GW of renewable electricity. The Port au Port wind farm is currently planned to include up to 164 wind turbines, with up to 171 sites that are being studied for the EIS, on the Port au Port Peninsula, NL and adjacently on the Newfoundland "mainland" (i.e., northeast of the isthmus at Port au Port). The Codroy wind farm is also currently planned to consist of up to 164 wind turbines located on Crown land in the Anguille Mountains of the Codroy Valley, NL. The modelling and assessment work is based on preliminary layouts for both wind farm sites (i.e., 171 potential turbine locations at the Port au Port wind farm and 143 potential turbine locations at Codroy wind farm). Final wind farm layouts will be dependent on results of the wind campaign and more detailed field investigations. Once the layout and number of turbines are finalized, the results of models will be reviewed and updated as required.

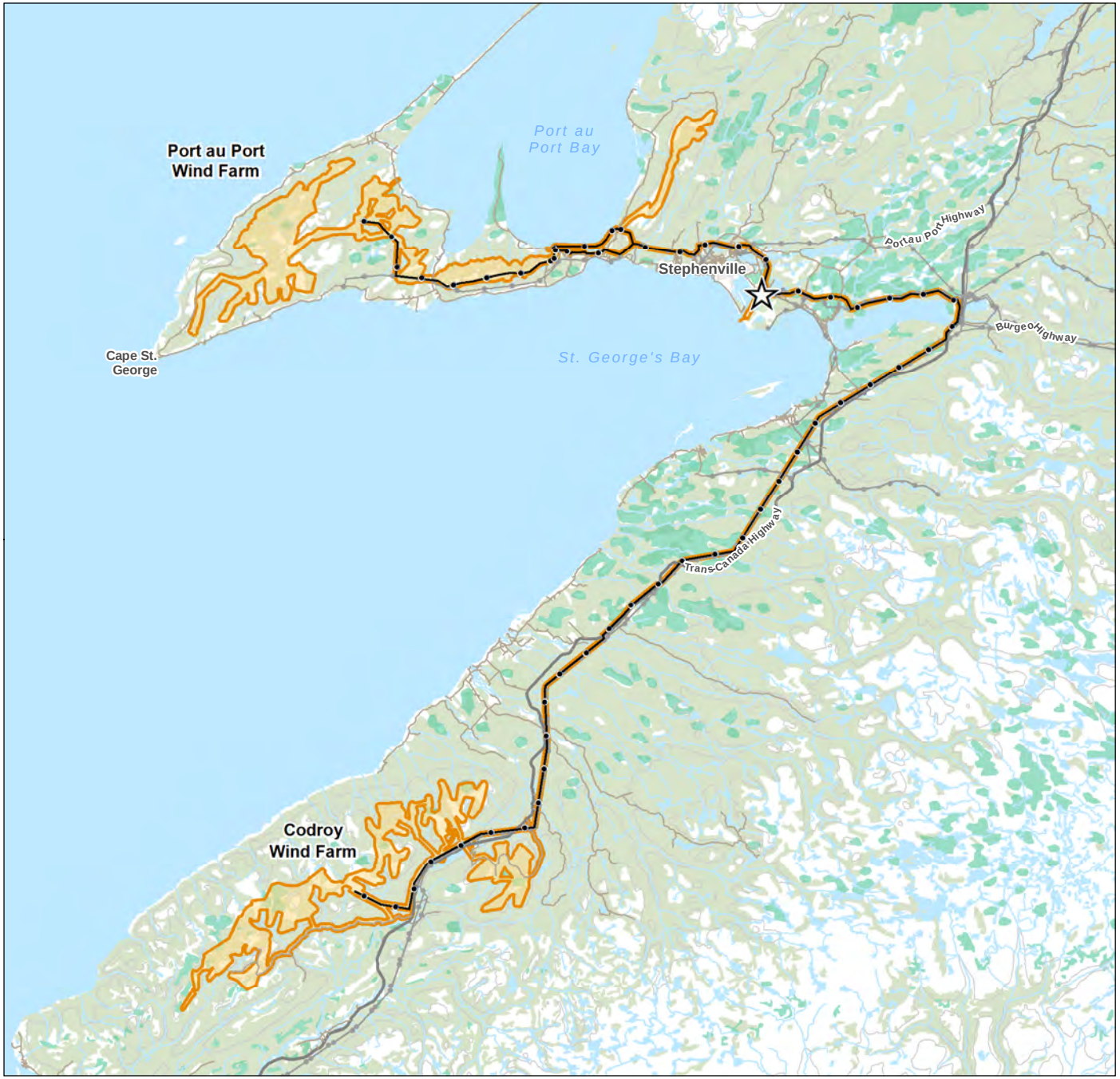
The Project is subject to provincial environmental assessment (EA) requirements under the NL *Environmental Protection Act* and associated *Environmental Assessment Regulations* (EA Regulations). This document is the Terrestrial Baseline Study, prepared in support of Project Environmental Impact Statement (EIS) and as required under section 4.3.2 of the EIS Guidelines.

1.1 Project Overview and Location

The Project includes the construction, operation and maintenance, and decommissioning of the Port au Port wind farm, Codroy wind farm, and a hydrogen / ammonia plant in Stephenville, as well as upgrades to the existing port at Stephenville (Figure 1.1).

The Project Area shown on Figure 1.1 is a conservative representation of the spatial extent of potential Project-related direct physical disturbance (i.e., the Project footprint). In addition to encompassing the immediate area in which Project components and activities will occur, the Project Area also includes up to a 175 m buffer (350 m right-of-way [ROW]) around key Project components. This buffer allows some flexibility for the micro-siting of certain Project components (e.g., wind turbines) during detailed design, based on technical considerations as well as the avoidance of environmentally sensitive areas, where practicable.

The proposed hydrogen / ammonia plant and export facilities at the Port of Stephenville are located approximately 5 kilometres (km) west of the Town of Stephenville, Newfoundland and Labrador (NL). The Port au Port wind farm (comprised of Port au Port West and Port au Port East) is located west and north of Stephenville and the Codroy wind farm is located 75 km south of Stephenville; both are connected to the hydrogen / ammonia plant by a collector system / transmission lines.



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Proposed Project Features

- Hydrogen / Ammonia Plant Location
- Transmission Line 230 kV
- Project Area

Other Features

- Transmission Line, Existing
- Trans-Canada Highway
- Road
- Contour (100 m)
- Watercourse
- Waterbody
- Wetland
- Forested Area

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0 10 Kilometres
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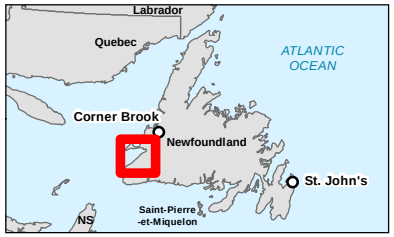
Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap
3. Background: NRCan CanVec



Project Location
Stephenville
NL

Prepared by MB on 2023-06-30
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

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Figure No.
1.1

Project Area

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1.2 Scope of the Study

A Terrestrial Baseline Study has been developed in consideration of the section 4.3.3 of the EIS Guidelines. The study is focused on the following components:

- Vegetation and Wetlands, including Rare Plants
- Avifauna
- Bats
- Other Wildlife
- Areas of Conversation Concern

As detailed below, the approach to the baselines studies has been developed based on both field data and publicly available information. Information on spatial boundaries, study scope, methods and the results are provided in the following sections.

2.0 Policy and Legislation

2.1 Species at Risk Act

The *Species at Risk Act* (SARA) provides a framework across Canada to prevent the extinction of wildlife species and to support actions for their recovery. General SARA prohibitions include Section 32(1), which states that "no person shall kill, harm, harass, capture, or take an individual of a wildlife species that is listed as an Extirpated species, an Endangered species or a Threatened species", and Section 33, which states that "no person shall damage or destroy the residence of one or more individuals of a wildlife species that is listed as an Endangered species or a Threatened species, or that is listed as an Extirpated species if a recovery strategy has recommended the reintroduction of the species into the wild in Canada." In addition, critical habitat, defined as the habitat that is necessary for the survival or recovery of a listed wildlife species, may be defined and protected under Section 58. Only those species currently listed in Schedule 1 of SARA (i.e., those listed as Extirpated, Endangered, or Threatened) are protected by the prohibitions of Sections 32 to 36 and 58 of SARA, and then only on federal lands, except for aquatic species and migratory birds which are protected throughout Canada by other acts and regulations.

2.2 Migratory Birds Convention Act

The *Migratory Birds Convention Act*, *1994* (MBCA) affords protection and conservation to migratory bird populations, individuals, and their nests within all of Canada. Most bird species in Canada are afforded protection, except for a few families (e.g., cormorants, pelicans, grouse, quail, pheasants, ptarmigan, hawks, owls, eagles, falcons, kingfishers, and corvids). The MBCA is the enabling statute for the *Migratory Birds Regulations*, which were updated in May 2022 (Migratory Birds Regulations, 2022; MBR). Section 6 of this regulation states that without the authorization of a permit, the disturbance, destruction, or taking of a nest, egg, nest shelter, eider duck shelter, or duck box of a migratory bird, or possession of a migratory bird, carcass, skin, nest, or egg of a migratory bird are prohibited. Under the 2022 MBR, nests for 18 bird species receive year-round protection for a prescribed length of time ranging from 24-36 months (Schedule 1), and all other nests of migratory birds are protected when they contain a live bird or viable egg (S. 5(2)(b)).

2.3 Newfoundland and Labrador *Endangered Species Act*

In Newfoundland and Labrador, Species at Risk (SAR) are protected under the Newfoundland and *Labrador Endangered Species Act* (NL ESA). Designation under the Act follows the recommendations of the Species Status Advisory Committee (SSAC) on the appropriate assessment of a species and referring concerns about the status of species to Committee on the Status of Endangered Wildlife in Canada (COSEWIC), where the species is of national importance.

The purpose of NL ESA is to:

- Prevent listed species from being extirpated from Newfoundland and Labrador
- Provide for the recovery of species listed as Extirpated, Endangered, or Threatened as a result of human activity
- Conserve species listed as special concern to prevent them from becoming Endangered or Threatened

Prohibitions of NL ESA include Section 16, which states "a person shall not disturb, harass, injure, or kill an individual of a species designated as Threatened, Endangered or Extirpated". Species are listed under the *Endangered Species List Regulations*.

2.4 Species at Risk and Species of Conservation Concern

For this Project, SAR are defined as species that are:

- listed on Schedule 1 of SARA as Extirpated, Endangered, Threatened or Special Concern
- listed as Extirpated, Endangered, Threatened, or Vulnerable under the NL ESA

Species of Conservation Concern (SOCC) are defined as those species that are:

- assessed as Extirpated, Endangered, Threatened, or Special Concern by COSEWIC but have not yet been added to Schedule 1 of SARA
- recommended for listing by the SSAC as Endangered, Threatened or Vulnerable but are not yet listed under the NL ESA
- ranked as provincially rare by the Atlantic Canada Conservation Canada Centre (AC CDC) including species with provincial status (S-ranks) of S1 (Critically Imperiled), S2 (Imperiled) or combinations thereof (e.g., S1S2) upon review by the AC CDC (AC CDC 2023)

3.0 Vegetation and Wetlands, including Rare Plants

3.1 Scope and Objectives of the Vegetation and Wetlands Study

The objectives of this vegetation and wetlands baseline study are to:

- Document the known locations of vegetation species of interest, i.e., Species at Risk (SAR; species listed on Schedule 1 of SARA as Extirpated, Endangered, Threatened or Special Concern and species listed as Extirpated, Endangered, Threatened, or Vulnerable under the NL ESA) and Species of Conservation Concern (SOCC; species assessed as Extirpated, Endangered, Threatened, or Special Concern by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) but have not yet been added to Schedule 1 of SARA, species recommended for listing by the Species Status Advisory Committee (SSAC) as Endangered, Threatened or Vulnerable but are not yet listed under the NL ESA, and species ranked as provincially rare by the AC CDC including species with provincial status (S-ranks) of S1 (Critically Imperiled), S2 (Imperiled) or combinations thereof (e.g., S1S2) upon review by the AC CDC (AC CDC 2023)), and culturally important plants relative to the Project Area, Local Assessment Area (LAA), and Regional Assessment Area (RAA)
- Identify those vegetation SAR and SOCC that are likely to occur within the Project Area, LAA, and RAA.
- Describe the vegetation communities that occur in the Project Area, LAA, and RAA.

Some rare species are protected by the regulations associated with SARA or the NL ESA. In Newfoundland and Labrador, wetlands are addressed in The Federal Policy on Wetland Conservation (Government of Canada 1991) and the provincial Policy for Development in Wetlands (NL Department of Environment and Conservation 2001).

3.1.1 Spatial Boundaries

The following spatial boundaries were used for the vegetation and wetlands study (Figure 3.1).

- Project Area: The Project Area encompasses the immediate area in which Project activities and components occur and is comprised of following distinct areas: the Port au Port Wind Farm, the Codroy Wind Farm, the Hydrogen/Ammonia Production and Storage Facility (hydrogen / ammonia plant), Port Facilities, and the 230 kV Transmission Lines, as well as associated infrastructure including roads, substations, and water supply infrastructure. The Project Area is the anticipated area of direct physical disturbance associated with the construction, operation and decommissioning, rehabilitation and closure of the Project. In addition to encompassing the immediate area in which Project components and activities will occur, the Project Area also includes a buffer of up to 300 m for access roads and turbines and a 350 m corridor to accommodate the 70 to 75 m wide ROW for the transmission line. These buffers allow flexibility for the micro-siting of Project components during detailed design, based on technical considerations as well as the avoidance of environmentally sensitive areas, where practicable.
- Local Assessment Area (LAA): The LAA for vegetation and wetlands is a 1 km buffer of the Project Area wind farm and hydrogen facility footprints, and a 500 m buffer of the Project Area access road and transmissions line footprints.
- Regional Assessment Area (RAA): The RAA for vegetation and wetlands is the area included within the Port au Port, St. George's Bay, and Codroy Subregions, as well as a portion of the Corner Brook Subregion (the watershed surrounding Table Mountain), within the Western Newfoundland Forest Ecoregion.

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Proposed Project Features

- Hydrogen / Ammonia Plant Location
- Transmission Line 230 kV
- Project Area
- Local Assessment Area
- Regional Assessment Area

Other Features

- Transmission Line, Existing
- Trans-Canada Highway
- Road
- Watercourse
- Contour (100 m)
- Wetland
- Waterbody
- Forested Area

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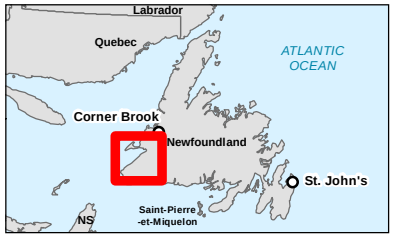

Project Location
Stephenville
NL

Prepared by MB on 2023-06-30
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

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Figure No.
3.1

Vegetation and Wetland Spatial Boundaries

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3.2 Methods

3.2.1 Review of Existing Information

Existing literature describing the vegetation communities present in the LAA and surrounding area were reviewed and summarized in this report. This information was supplemented with observations from preliminary field surveys that have been conducted in support of the Project in the area to date. Very little information is available for the Codroy Valley area relative to the Port au Port area, which has been more extensively studied due to the rare plant communities it supports.

Species ranges were reviewed for the six vascular plant SAR, one bryophyte SAR, and four lichen SAR occurring in Newfoundland and Labrador that are listed in Schedule 1 of the SARA (Government of Canada 2023) (Table 3.1). A data request of vascular plant, lichen, and bryophyte species known from the LAA and surrounding areas was made to the AC CDC in early 2023. These records were reviewed to determine which known locations are within the Project Area, LAA, or RAA.

Table 3.1 Plant and Lichen Species Listed in Schedule 1 of SARA Known to Occur in Newfoundland and Labrador

Scientific Name	Common Name	SARA Designation
Vascular Plants		
Braya fernaldii	Fernald's braya	Endangered
Braya longii	Long's braya	Endangered
Salix jejuna	barrens willow	Endangered
Arnica griscomii ssp. *griscomii*	Griscom's arnica	Threatened
Polystichum scopulinum	mountain holly fern	Threatened
Lichens		
Erioderma mollissimum	vole ears lichen	Endangered
Pannaria lurida	wrinkled shield lichen	Threatened
Degelia plumbea	blue felt lichen	Special Concern
Erioderma pedicellatum	boreal felt lichen	Special Concern
Bryophytes		
Haplodontium macrocarpum	Porsild's bryum	Threatened

Vegetation species of cultural importance (socio-economic and traditional importance) to Indigenous groups (e.g., trees, berries, medicines) that are likely to occur within the Port au Port Subregion, the St. Georges' Bay Subregion, and the Codroy Subregion were identified through a review of two documents provided by Qalipu First Nation:

- Wild Edibles Walk of Blow Me Down Mountain Trail Led by Qalipu Mi'kmaq First Nation Band Elder, Kevin Barnes booklet (Barens et al. 2014)
- Medicine walk booklet (Barens et al. 2015)

3.2.2 Land Cover Classification

A remote sensing Object Based Image Analysis (OBIA) exercise is currently being completed for vegetation communities within the LAA and surrounding areas on the Port Au Port Peninsula and the Stephenville areas where field surveys are planned to occur in 2023, but is not complete at the time of writing. The OBIA differentiates habitat types by segmenting areas based on landscape and vegetation characteristics in imagery and Digital Elevation Model (DEM) data, such as colour/elevation, texture, size, and shape of naturally occurring features. The OBIA process uses vegetation community control points derived from preliminary field survey work that has been completed in the Project Area to train the software to statistically recognize the various vegetation communities. A 50-cm resolution satellite imagery and a 5-m resolution DEM are used to segment and then classify habitats within the LAA and surrounding landscape. Given the size of the area being investigated for this work (over 1,300 km^2) and minimum mapping unit (1 hectare), the OBIA method provides the most time and cost-effective classification process available.

This process is also planned for portions of the LAA and surrounding areas east of Stephenville south to Codroy Valley after field surveys are completed and additional training data is available.

As the results of the OBIA are preliminary and not available for the entire Project Area, land use inventory data from the NL Department of Fisheries, Forestry and Agriculture (NLDFFA) (NLDFFA 2018) were also summarized for the planned cleared areas, Project Area, LAA, and RAA within each subregion, divisions of the ecoregion the Project falls within.

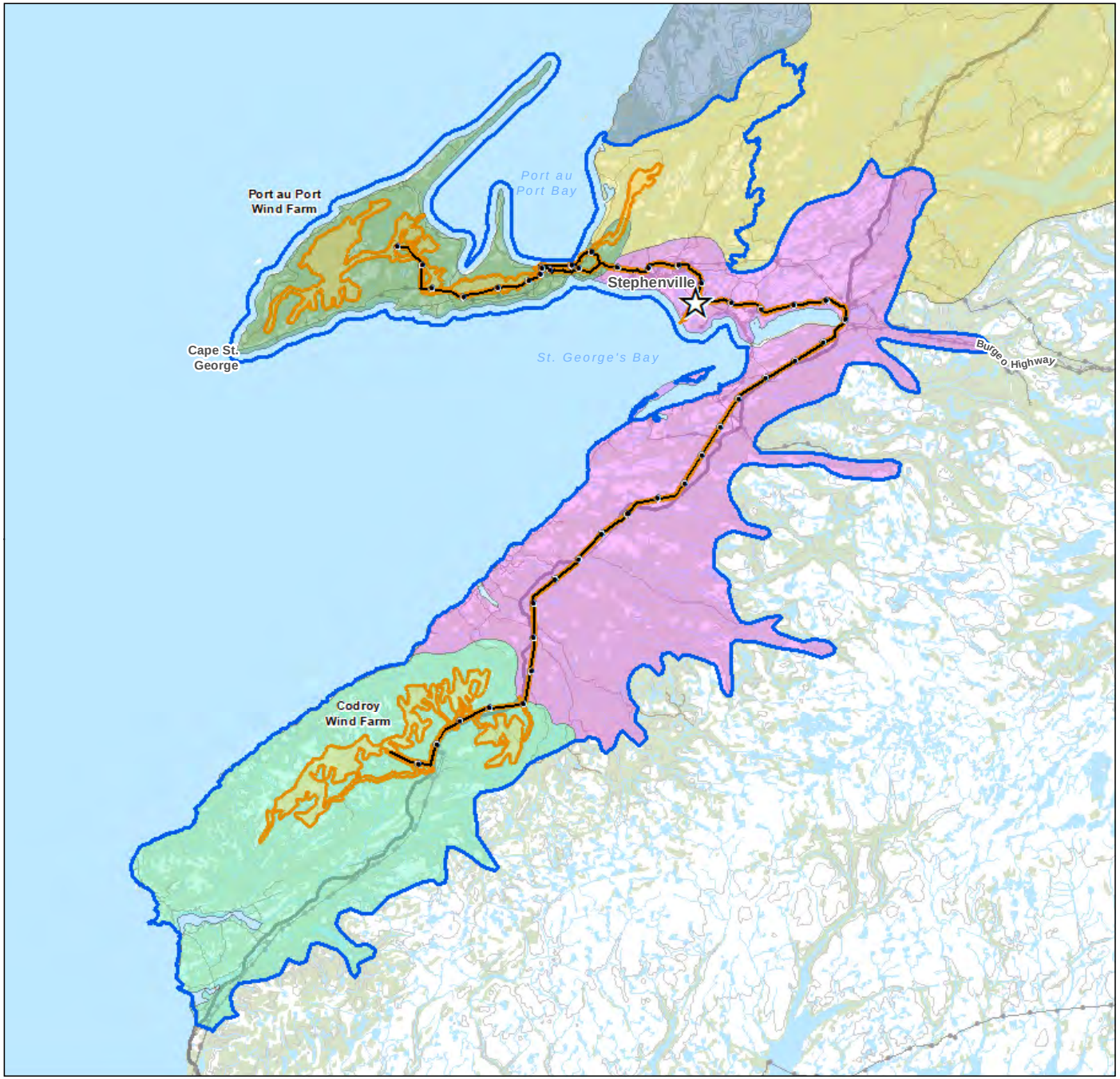
3.3 Results

The results of the literature review and preliminary field surveys conducted to describe vegetation communities and vegetation species of interest (i.e., plant and lichen SAR and SOCC) are presented below. These vegetation communities form the basis of the ecological land classification used to describe habitat availability through the Project Area, LAA and RAA for the Terrestrial Baseline Study (Appendix A).

3.3.1 Vegetation Communities

The Project Area occurs within the Western Newfoundland Forest Ecoregion (Damman 1983; Meades 1990), which is environmentally distinct in its geological diversity, humid climate, range in altitude, and relatively long, on average, growing season (Meades 1990). The ecoregion is primarily forested. Interspersed within the forested matrix are ecologically important wetland and barren ecosystems that provide habitat for vegetation and wildlife species. These areas are associated with edaphic (soil related), climatic, and topographic factors (Meades 1990).

Within the broader context of the Western Newfoundland Forest Ecoregion, the Project Area occurs within three provincial subregions, including the Port au Port Subregion, the St. Georges' Bay Subregion, and the Codroy Subregion (Meades 1990) as presented in Figure 3.2.



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Western Newfoundland Forest Subregions

- Codroy Subregion
- Corner Brook Subregion
- Port au Port Subregion
- Serpentine Range Subregion
- St. George's Bay Subregion

Proposed Project Features

- Hydrogen / Ammonia Plant Location
- Transmission Line 230 kV
- Project Area
- Regional Assessment Area

Other Features

- Transmission Line, Existing
- Trans-Canada Highway
- Road
- Watercourse
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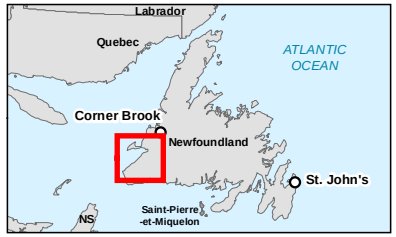

Project Location
Stephenville
NL

Prepared by MB on 2023-07-12
QR by AW on 2023-07-13

Client/Project
World Energy GH2
Project Nujio'qonik

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Figure No.
3.2

Title
Western Newfoundland Forest Ecoregion Subregions

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3.3.1.1 Port au Port Subregion

The Port au Port Subregion is approximately 415 km^2 in size and includes the Port au Port Peninsula, and the southern portion of Table Mountain (also called Pinetree Ridge), located on the mainland near the Town of Stephenville. The northern portion of Table Mountain falls within the Corner Brook subregion but is discussed within this section. Project components planned within this area include the Port au Port wind farm (including turbines and associated access roads and collector lines), transmission lines, and substations. The Project Area within the Port au Port and adjacent Corner Brook subregion totals approximately 123 km^2.

Provincial forest, wetland, and non-forest inventory data for the cleared areas, Project Area, LAA, and RAA within the Port au Port and Corner Brook Subregions are presented in Table 3.2.

Table 3.2 NLDFFA Land Use Inventory in the Port au Port Peninsula and Corner Brook Subregions

NLDFFA Land Cover Classification Type	Description	Amount in Cleared Area[1]		Amount in Project Area		Amount in LAA		Amount in RAA	
		km^2	%	km^2	%	km^2	%	km^2	%
Barrens									
Rock Barrens	Open rock barrens with little vegetation.	0.42	2.57	3.38	2.75	11.59	3.69	19.24	2.11
Soil Barrens	Barrens with a **thin** soil layer that supports vegetation communities such as dwarf shrub heath.	0.82	5.02	6.84	5.56	16.11	5.13	26.83	2.94
Wooded									
Coniferous Scrub	Windswept and stunted coniferous trees, primarily balsam fir with black spruce. Typically less than 6.5 m in height.	5.92	36.21	40.38	32.80	89.18	28.37	192.44	21.12
Deciduous Scrub	Thick, stunted deciduous trees and shrubs.	0.10	0.61	0.85	0.69	3.01	0.96	12.61	1.38
Hardwood	Forest dominated by hardwood or deciduous tree species, typically white birch.	0	0	0	0	1.31	0.42	2.84	0.31

Table 3.2 NLDFFA Land Use Inventory in the Port au Port Peninsula and Corner Brook Subregions

NLDFFA Land Cover Classification Type	Description	Amount in Cleared Area[1]		Amount in Project Area		Amount in LAA		Amount in RAA	
		km²	%	km²	%	km²	%	km²	%
Mixedwood	Forest dominated by hardwood or deciduous and softwood or coniferous tree species, primarily balsam fir and white birch.	0.16	0.98	1.2	0.97	6.91	2.20	21.58	2.37
Softwood	Forest dominated by softwood or coniferous trees, primarily balsam fir with black spruce and some scattered tamarack.	7.36	45.02	54.88	44.57	138.19	43.96	289.41	31.77
Unknown Forest	Treed land that has not been classified into one of the above-described forested classes.	0.66	4.04	6.88	5.59	19.36	6.16	42.56	4.67
Water									
Freshwater Body	Lakes or ponds	0.03	0.18	0.43	0.35	1.15	0.37	4.34	0.48
Ocean	Open ocean	0.44	2.69	2.28	1.85	8.02	2.55	215.96	23.70
River	Watercourses	0.006	0.04	0.07	0.06	0.22	0.07	3.11	0.34
Wetland									
Bog	Peatlands: bogs and fens	0.32	1.96	4.44	3.61	8.48	2.70	50.33	5.52
Small Island	Islands within the open water in bogs and fens (aka flarks or bogholes); part of the larger bog or fen complex	0	0	0.003	0.002	0.01	0.003	0.02	0.002
Treed bog	Peatlands (bogs and fens) supporting trees	0.002	0.01	0.07	0.06	0.28	0.09	0.95	0.10
Wet bog	Peatlands (bogs and fens) with visible surface water	0.01	0.06	0.17	0.14	0.39	0.12	2.22	0.24

Table 3.2 NLDFFA Land Use Inventory in the Port au Port Peninsula and Corner Brook Subregions

NLDFFA Land Cover Classification Type	Description	Amount in Cleared Area[1]		Amount in Project Area		Amount in LAA		Amount in RAA	
		km²	%	km²	%	km²	%	km²	%
Other									
Agriculture	Land used for crops, forage, or pasture.	0.01	0.06	0.10	0.08	3.44	1.09	6.66	0.73
Anthropogenic	Roads, transmission line RoWs, buildings, lawns, and other landscaped vegetated areas.	0.09	0.55	1.15	0.93	6.66	2.12	19.54	2.14
Sand	Sandy or rocky areas, typically coastal beaches but occasionally on the banks of large watercourses	0	0	0	0	0.03	0.01	0.42	0.05
Total		**16.38**	**100**	**123.12**	**100**	**314.34**	**100**	**911.06**	**100**

Note:
[1] Cleared area values are for the preferred area

Limestone Barrens

Of ecological importance within this subregion are the southernmost occurrences of Newfoundland's globally rare limestone barrens (Jones and Wiley 2012; Burzynski et al. 2016; Limestone Barrens Species at Risk Recovery Team 2021). These barrens are distributed on the Port au Port Peninsula and the adjacent Table Mountain (Stephenville) in areas of exposed bedrock.

Limestone barrens plant communities across the Project Area are characterized by sparsely vegetated weathered limestone gravel and limestone pavements, and dwarf heathlands in areas with shallow soils and sometimes humus accumulations. The distribution and maintenance of these plant communities is associated with a combination of edaphic and climatic environmental factors. The limestone barrens are subject to extreme winds and harsh winter conditions. The underlying limestone bedrock is soluble and actively weathered (e.g., through erosion), creating nutrient poor and high pH soils that are inhabited by specialist plants tolerant of basic soils (calciphiles). These soils and the coarser gravel and rock substrates in the area are frost-disturbed (cryosolic). Processes of active freezing and thawing regularly establish patterned ground features such as frost boils and rock crevices (grykes) (Meades 1983; Meades 1990; Jones and Wiley 2012; Stantec 2016; Limestone Barrens Species at Risk Recovery Team 2021; AC CDC 2023).

The harsh conditions of the limestone barrens support specialist plant species with coastal, arctic, and alpine affinities, despite their relatively low elevation (e.g., Table Mountain (Stephenville) is 381 m (Meades 1983; Jones and Wiley 2012; Limestone Barrens Species at Risk Recovery Team 2021; AC CDC 2023)). A defining characteristic of the Port au Port subregion is the presence of disjunct Cordilleran (arctic) species (Meades 1990). Notably within the Project Area are significant populations of provincially listed low northern rockcress (*Braya humilis*) and Mackenzie's sweetvetch (*Hedysarum boreale* ssp. *mackenzei)* (AC CDC 2023; Meades 1990), discussed further in Section 3.3.2. The three main limestone barren areas in the Port au Port subregion, Table Mountain (Stephenville), central or "top of" Port au Port Peninsula, and the Cape St. George area have many records of SAR, and SOCC recorded over multiple plant survey events. The barrens in the southern portion of Table Mountain support the only records of low northern rockcress recorded in the province. Similarly, the barrens in the Cape St. George area provide habitat for the only known records of MacKenzie's sweetvetch from the province. In comparison with the limestone barrens of the Great Northern Peninsula, the southern limestone barrens of the Port au Port subregion lack critical habitat for Gulf of Saint Lawrence endemic species (Meades 1990; Jones and Wiley 2012, Limestone Barrens Recovery Team 2021).

The limestone barrens on the Port au Port Peninsula are interspersed with other habitat types the locations of which are determined primarily from topography and exposure (Stantec 2016). Stunted and windswept trees that grow in harsh coastal and alpine areas, known locally as tuckamore (and elsewhere as krummholz) dominated by balsam fir (*Abies balsamea*) and black spruce (*Picea mariana*) occur in sheltered depressions across the barrens. Subalpine tuckamore also forms a band of treeline along upper slopes of limestone summits. Snow bed meadows occur across the Port au Port Peninsula in sheltered and moist depressions and ravines where snow accumulates (Stantec 2016; Limestone Barrens Recovery Team 2021). These, and a variety of other habitats within the subregion, provide habitat for Lindley's aster (*Symphyotrichum ciliolatum*), a provincially Endangered vascular plant.

Forests

Forests comprise the greatest area of the Port au Port Subregion, but these forests are considered unproductive (Meades and Moores 1994). Forested communities are boreal and frequently dominated primarily by balsam fir. Black spruce is less common, it can be dominant on poorly drained sites. Deciduous tree species such as red maple (*Acer rubrum*) are at their northern geographical limit (Meades 1990) and are relatively uncommonly within the LAA in this subecoregion. Mixedwood forests are thus relatively uncommon, but a significant component of white birch (*Betula papyrifera*) is present on sheltered valley slopes of riparian areas.

Preliminary observations made during field surveys conducted in support of this Project have noted substantial areas of forest within the Project Area have been harvested or partially harvested. Firewood harvesting is common in proximity to existing roads and all-terrain vehicle (ATV) or snowmobile paths. Forests within the Project Area are represented by the full spectrum of successional stages and states of regeneration post-harvesting, including areas best characterized as old-field.

Wetlands

Bog wetlands are both common and occupy a large proportion of the Project Area on flat terrain and low depressions where rainwater accumulates. These wetlands are underlain by deep deposits of *Sphagnum* spp. peat (i.e., peatlands) (Meades 1990). Large bog complexes are located between the barrens at the top of Port au Port Peninsula and the western coast of the peninsula. Light Detecting and Ranging (LiDAR) data indicate these are Atlantic plateau bogs, with flat surfaces raised above the surrounding terrain. Atlantic plateau bogs have surface water present near their centres (National Wetlands Working Group 1997). Basin bogs are also evident adjacent to the coast. Although bogs are generally acidic and nutrient-poor, underlying limestone bedrock lends a calcareous influence in the flora present within the Project Area. Both forested bog wetlands and open bogs occur. Typically, the largest of the open bogs within the Project Area are fringed by sparse and stunted black spruce, balsam fir, and tamarack (also known locally as juniper or larch; *Larix laricina*), ericaceous and other shrubs which grade into exposed *Sphagnum* peat with sparse graminoids such as cottongrasses (*Eriophorum* spp.) and open water depressions or hollows (flarks, also known as bogholes) in the center of the bogs. Bogs typically receive water from precipitation (Vitt 2013) and are dominated by vertical water movement.

Slope fens, Atlantic ribbed fens, ladder fens, and stream fens occur in association with calcareous soils and stream margins on slopes and in valleys across the Port au Port Peninsula and in depressions on Table Mountain (Stephenville) (Meades 1990; Stantec 2017; AC CDC 2023). Fen habitats within the Project Area are dominated by graminoids including a diversity of sedges, and sparse shrubs. Riverine alder-dominated shrub swamps are common within the Project Area on the Port au Port Peninsula (Meades 1990). Fens receive water from direct precipitation, surface run-off and groundwater discharge (Vitt 2013). Water movement is vertical and horizontal. Slope fens receive mineral rich water from surrounding mineral soils and peat may be 1 m to 2 m deep. Atlantic ribbed fens consist of alternating ridges of peat (typically less than 1.5 m deep) and shallow pools of water. Ladder fens occur on the edges of the Atlantic plateau bogs and consist of a series of parallel peat ridges surrounding narrow polls of water. Ladder fens form drainageways for water from the adjacent bog and upland and peat is typically 1 m to 2 m deep. Water levels in stream fens vary in response to stream water levels and peat depth may exceed 3 m (National Wetlands Working Group 1997).

The wetland types and forms present in the Port au Port subregion can provide important functions and ecosystem services including biogeochemical functions, hydrologic functions, and habitat for plants and wildlife (Beaulne et al. 2021; Kimmel and Mander 2010; Hanson et al. 2008; Price and Maloney 1994). Bogs and fens both have potential to store carbon in peat and woody biomass; the rate of carbon sequestration is related to the height of the peat surface above the water table (Belyea and Malmer 2004). Bogs and fens can export nutrients and organics to downstream environments if they have outflows (Hanson et al. 2008). Depending on their form, fens can store water and moderate water flows, protecting downstream environments from flooding, and protect stream shorelines from erosion (Hanson et al. 2008). Coastal wetlands, of which there are several in the Port au Port subregion, also mitigate storm surges (Wamsley et al. 2010). There are several water supply areas that intersect peatlands within the Port au Port Peninsula. These are avoided by the Project Area.

3.3.1.2 St. George's Bay Subregion

The St. George's Bay subregion encompasses an area of approximately 1,520 km^2 bounded by ocean coastline to the west and the lower slopes of the Long Range Mountains to the east, and between the Port au Port subregion to the north, and the Codroy subregion to the south (NLDECC 2008b). The Project Area within this subregion totals approximately 37 km^2, and project components planned within this area include the proposed hydrogen / ammonia plant and export facilities and transmission lines.

As this subregion is spatially between the two other subregions of interest, climate within the subregion is likewise intermediate; the growing season is longer than the Port au Port subregion, but shorter than the Codroy subregion. Except for the lower slopes of the Long Range Mountains, which are primarily outside of the Project Area, the topography is generally flat and rolling (Meades 1990). Most of the bedrock geology within the St. George's Bay subregion is characterized as sedimentary sandstone and shale. Basic (pH high) gypsum substrates are present within a relatively small area of the subregion (Meades 1990; NLDECC 2008b) Soils are predominantly nutrient-poor and coarse textured glacio-fluvial deposits and glacial till (Meades 1990).

Provincial forest, wetland, and non-forest inventory data for the cleared areas, Project Area, LAA, and RAA within the St. George's Bay Subregion are presented in Table 3.3.

Table 3.3 NLDFFA Land Use Inventory in the St. George's Bay Subregion

NLDFFA Land Cover Classification Type	Description	Amount in Cleared Area[1]		Amount in Project Area		Amount in LAA		Amount in RAA	
		km^2	%	km^2	%	km^2	%	km^2	%
Barrens									
Rock Barrens	Open rock barrens with little vegetation.	0	0	0	0	0.6	0.41	10.54	0.67
Soil Barrens	Barrens with a thin soil layer that supports vegetation communities such as dwarf shrub heath.	0.28	3.22	0.79	2.12	3.62	2.50	61.2	3.91

Table 3.3 NLDFFA Land Use Inventory in the St. George's Bay Subregion

NLDFFA Land Cover Classification Type	Description	Amount in Cleared Area[1]		Amount in Project Area		Amount in LAA		Amount in RAA	
		km²	%	km²	%	km²	%	km²	%
Wooded									
Coniferous Scrub	Windswept and stunted coniferous trees, primarily balsam fir with black spruce. Typically less than 6.5 m in height.	1.29	14.84	5.45	14.59	24.2	16.69	230.44	14.71
Deciduous Scrub	Thick, stunted deciduous trees and shrubs.	0.53	6.10	1.08	2.89	3.01	2.08	26.01	1.66
Hardwood	Forest dominated by hardwood or deciduous tree species, typically white birch.	0.06	0.69	0.23	0.62	0.93	0.64	17.44	1.11
Mixedwood	Forest dominated by hardwood or deciduous and softwood or coniferous tree species, primarily balsam fir and white birch.	0.92	10.58	3.98	10.66	16.63	11.47	160.99	10.28
Softwood	Forest dominated by softwood or coniferous trees, primarily balsam fir with black spruce and some scattered tamarack.	3.16	36.36	14.37	38.47	54.19	37.36	610.92	39.00
Unknown Forest	Treed land that has not been classified into one of the above-described forested classes.	0.36	4.14	1.42	3.80	5.31	3.66	54.57	3.48

Table 3.3 NLDFFA Land Use Inventory in the St. George's Bay Subregion

NLDFFA Land Cover Classification Type	Description	Amount in Cleared Area[1]		Amount in Project Area		Amount in LAA		Amount in RAA	
		km²	%	km²	%	km²	%	km²	%
Water									
Freshwater Body	Lakes or ponds	0.18	2.07	0.92	2.46	6.5	4.48	64.73	4.13
Ocean	Open ocean	0.0003	0.003	0.002	0.01	0.07	0.05	31.6	2.02
River	Watercourses	0.07	0.81	0.35	0.94	1.46	1.01	19.13	1.22
Wetland									
Bog	Peatlands: bogs and fens	0.85	9.78	3.99	10.68	15.99	11.03	192.89	12.31
Small Island	Islands within the open water in bogs and fens (aka flarks or bogholes); part of the larger bog or fen complex	0.0004	0.005	0.01	0.03	0.05	0.03	0.35	0.02
Treed bog	Peatlands (bogs and fens) supporting trees	0.009	0.10	0.05	0.13	0.35	0.24	8.49	0.54
Wet bog	Peatlands (bogs and fens) with visible surface water	0.10	1.15	0.47	1.26	1.58	1.09	12.84	0.82
Other									
Agriculture	Land used for crops, forage, or pasture.	0.08	0.92	0.42	1.12	1.57	1.08	16.63	1.06
Anthropogenic	Roads, transmission line RoWs, buildings, lawns, and other landscaped vegetated areas.	0.80	9.20	3.80	10.17	8.84	6.10	45.12	2.88
Sand	Sandy or rocky areas, typically coastal beaches but occasionally on the banks of large watercourses	0.002	0.02	0.02	0.05	0.13	0.09	2.57	0.16
Total		**8.69**	**100**	**37.35**	**100**	**145.03**	**100**	**1,566.46**	**100**

Note:
[1] Cleared area values are for the preferred area

Forests

Forests within the St. George's Bay subregion are boreal and dominated by balsam fir. Broadly, the herbaceous layer within the St. George's Bay subregion is to a greater extent characterized by an abundance of wood ferns (*Dryopteris* spp.) and stair-step moss (*Hylocomium splendens*), in contrast with the Port au Port subregion where various feathermosses predominate (NLDECC 2008b). Red pine (*Pinus resinosa*), which was recently listed as Threatened under the NLESA (NLDFFA 2022), is uncommon but an important forest species within the subregion; this species was once more widespread on Newfoundland but is now restricted to 22 sites, mostly in the Central Newfoundland Ecoregion. It occurs on dry, nutrient poor, shallow, and coarse-textured soils. Fire histories are scarce in Newfoundland, but red pine can be associated with historic fire (Meades and Meades 2023).

Coastal Shoreline

The coastline of the St. Georges Bay subregion is relatively low in elevation and characterized by coarse-textured shoreline deposits, including sand and cobble barrier and crescent beaches. These habitats are occupied by regionally common plant species typical of beach and dune environments, including numerous salt-loving (halophytic) forbs, and the American beach grass (*Calamagrostis brevigulata*).

The shoreline at Port Hamon near Stephenville and the inlet into Turning Basin at Little Point Hamon are disturbed and heavily developed. Much of the proposed hydrogen / ammonia plant and export facilities in Stephenville was historically developed for commercial and industrial use and is presently best characterized as disturbed, exposed soils.

Wetlands

Wetlands in the St. George's Bay Subregion include Atlantic plateau bogs, treed swamps, inland marsh wetlands and tidal marsh wetlands. Atlantic plateau bog wetlands are abundant within the St. George's Bay subregion, and include the Bras Mort Bog (Section 7.3.8.3). The Bras Mort Bog is a proposed reserve located east of Stephenville Crossing and is one of the largest undisturbed plateau bogs on the Island of Newfoundland. The bog features gently sloping topography that dips progressively from east to west with deep, rich soils. It is blanketed by mosses and stunted black spruce and is an important area for woodland caribou during fall and winter (NLDECC n.d.). Vegetation within these expansive peatlands is influenced by coastal climatic conditions (Meades 1990; NLDECC 2008b). Several particularly expansive bogs are present within the LAA north of Stephenville Crossing and St. George's River. Treed swamps, of various forms, occur amongst upland forest where the water table is close to the surface.

Numerous streams and small lakes and ponds occur across the St. Georges Bay Subregion. Fringing riparian and lacustrine freshwater marsh wetlands and the cobble and sand beaches of lake and stream shorelines occupy a relatively small area within the subregion but provide habitat for several species of conservation interest. Tradescendant aster (*Symphyotrichum tradescantia*; provincially Threatened, Section 3.3.2.1) occurs along rivershores and cobble beaches exposed at low water levels, and cyperuslike sedge (*Carex pseudocyperus*) is found along river marshes (AC CDC 2023).

Small tidal wetlands are present in sheltered inlets and fringing estuaries within the St. George's Bay Subregion. Tidal marshes in general are not well-represented in either area or distribution across Newfoundland's exposed coastline (Roberts and Robertson 1986). These small wetlands are in themselves a provincially rare habitat and provide habitat for species of provincial conservation concern, including smooth cordgrass (*Sporobolus alterniflorus*) and saltmeadow cordgrass (*Sporobolus pumilus*) (AC CDC 2023).

Swamps typically have mineral soils but can have organic soils. Marshes have mineral soils. Water movement in both swamps and marshes is vertical and horizontal and water levels are highly dynamic, varying in response to yearly and seasonal climatic conditions (National Wetlands Working Group 1997). Marshes can provide shoreline protection against storm surges, and both swamps and marshes can improve water quality through stabilization and retention of sediments, provide stream flow moderation and support, and often provide important habitat to wildlife species such as waterfowl (marshes) and forest songbirds and mammals (swamps) (Hanson et al. 2008; Johnston 1991).

3.3.1.3 Codroy Subregion

The Codroy subregion is the most southernly subregion of the Western Newfoundland Forest Ecoregion. It encompasses approximately 1,161 km^2 of Newfoundland's southwestern coastline, the Cape Anguille Mountains, and the Codroy Valley. Project components planned within this area include the Codroy wind farm (including turbines and associated access roads and collector lines), transmission lines, and substations. The Project Area within the Codroy subregion totals approximately 121 km^2.

The Codroy subregion is topographically rugged and mountainous, with glacially shaped topographic features such as U-shaped valleys (NLDECC 2008c) and cirques (Jones and Wiley 2012). Harsh alpine conditions occur at high elevations, but protected valleys experience the mildest climate and longest growing season on the Island of Newfoundland. The climate of the Codroy subregion is also generally humid, and precipitation is frequent. Bedrock geology features predominantly sedimentary shales and sandstones (Meades 1990; NLDECC 2008c).

Coastal habitats and agricultural lands within the Codroy subregion are outside of the Project Area. Provincial forest, wetland, and non-forest inventory data for the cleared areas, Project Area, LAA, and RAA within the Codroy Subregion are presented in Table 3.4.

Table 3.4 NLDFFA Land Use Inventory in the Codroy Subregion

NLDFFA Land Cover Classification Type	Description	Amount in Cleared Area[1]		Amount in Project Area		Amount in LAA		Amount in RAA	
		km²	%	km²	%	km²	%	km²	%
Barrens									
Rock Barrens	Open rock barrens with little vegetation.	0	0	0.03	0.03	0.09	0.029	13.04	1.11
Soil Barrens	Barrens with a thin soil layer that supports vegetation communities such as dwarf shrub heath.	3.51	22.38	27.74	22.92	50.02	16.11	122.37	10.43
Wooded									
Coniferous Scrub	Windswept and stunted coniferous trees, primarily balsam fir with black spruce. Typically less than 6.5 m in height.	3.68	23.46	32.81	27.11	67.41	21.71	205.85	17.54
Deciduous Scrub	Thick, stunted deciduous trees and shrubs.	0.20	1.28	1.99	1.64	5.49	1.77	20.59	1.75
Hardwood	Forest dominated by hardwood or deciduous tree species, typically white birch.	0.39	2.49	1.34	1.11	3.73	1.20	38.69	3.30
Mixedwood	Forest dominated by hardwood or deciduous and softwood or coniferous tree species, primarily balsam fir and white birch.	1.29	8.23	5.78	4.78	25.38	8.17	135.54	11.55
Softwood	Forest dominated by softwood or coniferous trees, primarily balsam fir with black spruce and some scattered tamarack.	5.10	32.52	35.74	29.53	119.54	38.50	463.04	39.45

Table 3.4 NLDFFA Land Use Inventory in the Codroy Subregion

NLDFFA Land Cover Classification Type	Description	Amount in Cleared Area[1]		Amount in Project Area		Amount in LAA		Amount in RAA	
		km²	%	km²	%	km²	%	km²	%
Unknown Forest	Treed land that has not been classified into one of the above-described forested classes.	0.15	0.96	0.94	0.78	4.50	1.45	29.01	2.47
Water									
Freshwater Body	Lakes or ponds	0.04	0.26	0.70	0.58	4.15	1.38	14.68	1.25
River	Watercourses	0.003	0.02	0.04	0.03	0.61	0.20	17.09	1.46
Wetland									
Bog	Peatlands: bogs and fens	0.99	6.31	10.40	8.59	21.74	7.00	63.87	5.44
Small Island	Islands within the open water in bogs and fens (aka flarks or bogholes); part of the larger bog or fen complex	0.00003	0.00	0.002	0.002	0.01	0.003	0.12	0.01
Treed bog	Peatlands (bogs and fens) supporting trees	0.14	0.89	1.19	0.98	2.63	0.85	6.08	0.52
Wet bog	Peatlands (bogs and fens) with visible surface water	0.14	0.89	1.65	1.36	3.35	1.08	7.46	0.64
Other									
Agriculture	Land used for crops, forage, or pasture.	0	0	0	0	0	0	18.96	1.62
Anthropogenic	Roads, transmission line RoWs, buildings, lawns, and other landscaped vegetated areas.	0.05	0.32	0.67	0.55	1.85	0.60	16.21	1.38

Table 3.4 NLDFFA Land Use Inventory in the Codroy Subregion

NLDFFA Land Cover Classification Type	Description	Amount in Cleared Area[1]		Amount in Project Area		Amount in LAA		Amount in RAA	
		km²	%	km²	%	km²	%	km²	%
Sand	Sandy or rocky areas, typically coastal beaches but occasionally on the banks of large watercourses	0	0	0	0	0.01	0.003	1.06	0.09
Total		**15.68**	**100**	**121.02**	**100**	**310.51**	**100**	**1,173.66**	**100**

Note:
[1] Cleared area values are for the preferred area

Forests

A range of forested ecosystems occupy the Codroy subregion. Boreal stands of balsam fir are abundant on exposed terrain, and black spruce is common on wet sites and in association with shallow soils (NLECC 2008c). In addition to the boreal forest stands ubiquitous across Newfoundland, the Codroy subregion supports a contingent of species more common in Acadian forests of the Maritime Provinces. Forests of the sheltered Codroy valley are provincially unique in species composition and rich species diversity. Conditions of topographic shelter and the rich alluvial soils of river valleys, combined with the mild climate support provincially uncommon (S3) species such as yellow birch (*Betula alleghaniensis)*, white pine (*Pinus strobus*), and black ash (*Fraxinus nigra*, listed as Threatened under COSEWIC but not listed under SARA or NLESA, discussed in greater detail in Section 3.3.2.2), at the northern limits of their geographic range (Natureserve 2023). Thurston (2011) considers the combination of these boreal and rich mixed wood forests "Newfoundland Highland Forest," regionally distinct in the context of eastern North America.

Data on the distribution and importance of this subregion for lichen species is limited, but the federally Threatened blue felt lichen (*Pectinia plumbea*) has been documented in the Codroy Valley (AC CDC 2023; Lewis 2019). The humid coastal forests of this subregion may be somewhat overlooked given their large area and relative inaccessibility.

Barrens

Kalmia heath dominated by sheep laurel (*Kalmia angustifolia*) occurs in sheltered areas along in the southern portions of the subregion. Kalmia heaths represent an early successional stage in boreal forest development (Meades 1983).

Alpine and arctic plant species, and alpine plant communities are present across the Southern Long Range Mountains, including Buchans plateau, and many high elevation slopes on coastal facing aspects (Jones and Wiley 2012). The Southern Long Range Mountains are known for extreme winds, persistent fog, and cold winter conditions that support arctic and alpine plant communities (Jones and Wiley 2012).

Dwarf heathlands within the barrens dominated by crowberry (*Empetrum* spp.) occur on exposed coastal headlands and high elevation topography within the Codroy subregion (Meades 1983). Species composition of these habitats consist of boreal, arctic, and alpine associated plants, as well as some species found on barrens farther south, such as the provincially rare (S2S3) pine barren golden-heather (*Hudsonia ericoides*) (Lundholm 2022).

Subalpine Tuckamore stands dominated by balsam fir and green alder (*Alnus alnoobetula*) occur on exposed sites at higher elevations and in depressions between wind-exposed alpine heathlands, and along the coast (Jones and Wiley 2012).

Wetlands

The Codroy subregion supports a mosaic of freshwater bogs, fens, marshes, and pools associated with expanses of poorly drained topography. At high elevations, these wetland types support subalpine plant communities (Jones and Wiley 2012).

Alder (*Alnus* spp.)-dominated shrub swamps are present in the Codroy subregion, especially riparian swamps in association with alluvial plains. Alder shrub swamps in the Codroy subregion feature two plant communities not found elsewhere on Newfoundland: golden rod/ alder and bracken fern/alder shrub swamps (NLDECC 2008c), and support the provincially Endangered feathery false Solomon's seal (*Maianthemum stellatum* ssp *stellatum)* (AC CDC 2023).

The Grand Codroy Valley Estuary is located approximately 9 km south of the Project Area near the southern extent of the RAA, but headwaters occur farther inland and at higher elevations within the Project Area. The estuarine marsh wetlands associated with the Grand Codroy Valley Estuary were designated as a Ramsar site in 1987 by the Convention on Wetlands of International Importance; it is "the province's most important wetland" as a large coastal estuary that supports many waterfowl (CWS 2001). This area is also an Important Bird and Biodiversity Area (Section 4.3.1.2, BSC 2017).

3.3.2 Vegetation Species of Interest

3.3.2.1 Species at Risk

The six vascular plant SAR occurring in Newfoundland and Labrador that are listed in Schedule 1 of SARA (Government of Canada 2023) include three species listed as Endangered: Fernald's braya (*Braya fernaldii*), Long's braya (*Braya longii*), and barrens willow (*Salix jejuna*); two species listed as Threatened: Griscom's arnica (*Arnica griscomii* ssp. *griscomii*) and mountain holly fern (*Polystichum scopulinum*); and Fernald's milk-vetch (*Astragalus robbinsii* var*. fernaldii*), listed as Special Concern (Table 3.5). Known occurrences of these six SARA-listed species are not near the Project Area, but are in the far northwest end of the Island of Newfoundland (Strait of Belle Isle down to Barr'd Harbour), with a disjunct population of Fernald's braya extending south to Port au Choix, which is located over 200 km north of the Project Area (COSEWIC 2005; COSEWIC 2011; COSEWIC 2012; COSEWIC 2014a; EC 2011; ECCC 2018). These species are not discussed further.

Four lichen species listed on Schedule 1 of SARA are known to occur in Newfoundland and Labrador: vole ears lichen (*Erioderma mollissimum*, Endangered); wrinkled shield lichen (*Pannaria lurida*, Threatened), blue felt lichen (*Degelia plumbea*, Special Concern), and boreal felt lichen (*Erioderma pedicellatum*, Special Concern). Of these, all but boreal felt lichen are considered to have reasonable potential to occur within the Project Area and are discussed in more detail below. Boreal felt lichen has many documented populations on the Avalon Peninsula and other locations on the east coast and south-central areas of Newfoundland, as far west as the Burgeo Highway (COSEWIC 2014b). The only documented populations on the west coast are along the Great Northern Peninsula, north of the Project Area and RAA.

A single bryophyte SAR is known to occur on the Island of Newfoundland: Porsild's bryum (*Haplodontium macrocarpum*), which is listed as Threatened under both SARA and NL ESA, with six known locations of this arctic/alpine species clustered at the northern tip of the Northern Peninsula (COSEWIC 2017). This species is not expected to occur in the Project Area because of the restricted nature of the known locations on the Island of Newfoundland despite additional search effort in appropriate habitats, and a lack of appropriate habitat within the Project Area, as known populations are primarily located on cliffs adjacent to open ocean (COSEWIC 2017).

Past survey work completed in the region has identified nine provincially listed vascular plant SAR, i.e., species listed under the Newfoundland and Labrador *Endangered Species Act* (described in Section 2.3), within the Vegetation and Wetlands RAA (Table 3.5, Appendix B).

Table 3.5 Vascular Plant Species at Risk Known to Occur Within the Vegetation and Wetlands RAA

Scientific Name	Common Name	NL ESA	Observed Location(s)	Observed Within Project Area
Arnica angustifolia subsp. *tomentosa*	woolly arnica	Endangered	One location in Cape St. George area and one historical record on Table Mountain (Stephenville).	N
Braya humilis	low northern rockcress	Endangered	Barrens in the southern portion of Table Mountain	Y
Carex petricosa var. *misandroides*	rock dwelling sedge	Endangered	Barrens in the southern portion of Table Mountain	Y
Maianthemum racemosum subsp. *racemosum*	feathery false Solomon's seal	Endangered	West bank of Grand Codroy River (single record)	N
Ranunculus gmelinii	small yellow water-crowfoot	Endangered	Historical record (single record from 1937) from pool on northern bank of Barachois Brook	N
Symphyotrichum ciliolatum	Lindley's aster	Endangered	Western and central portions of Port au Port Peninsula, southern portion of Table Mountain, and two historical records (1929) from Harry's Brook east of Stephenville	Y
Fraxinus nigra	black ash	Threatened	On shore of First Pond, and historical observations (1962, 1963) from the shores of a tributary to Harry's Brook and near the shores of Southwest Brook	N
Hedysarum boreale subsp. *mackenziei*	MacKenzie's sweetvetch	Threatened	Barrens and associated dwarf heath habitats on Cape St. George and Garden Hill areas on the southwestern coast of Port au Port Peninsula	N
Pinus resinosa	red pine	Threatened	Northern bank of Little Barachois Brook (three records in same location)	N
Symphyotrichum tradescantii	tradescant aster	Threatened	Riparian and lacustrine habitats associated with First Pond, Bottom Brook, and Southwest Brook/St. George's River	Y

Endangered Plants

Six vascular plant species listed as Endangered under NL ESA have been documented in the Project Area, LAA, or RAA (AC CDC 2023). These six species include four perennial forbs, one sedge, and one aquatic forb. None of these species are listed federally under SARA.

Woolly Arnica

Woolly arnica (*Arnica angustifolia* subsp. *tomentosa*) is a perennial forb ranked Endangered by the Province of Newfoundland and Labrador (SSAC 2012). Woolly arnica is known from only six locations in the province, one of which is historical (SSAC 2012). Two of these occurrences occur in the Port au Port area, one near Cape Saint George barrens on the southwest corner of Port au Port Peninsula, and a historical occurrence (1914) on Table Mountain (Stephenville). The Cape Saint George site is a crest of a limestone barren covered by little vegetation, on a dry 9 to 10 degree west facing slope with gravelly to rocky substrate and silt present between rocks, at an elevation of 270 m (AC CDC 2023; SSAC 2012). The historical Table Mountain (Stephenville) site was on dry exposed ledges and shingle on the limestone tableland crests at an elevation of 340 m (AC CDC 2023; SSAC 2012). Elevation ranges for known populations in the province are from 10 – 340 m (SSAC 2012). The other extant populations are in the Port au Choix area (three sites) and Gros Morne National Park (one site) (SSAC 2012). Wooly arnica is most closely associated with heath habitats, although occasionally bare substrate and vegetation islands in open limestone barrens, or alpine summits, ledges, and talus of low cliffs (Limestone Barrens Species at Risk Recovery Team 2021).

Low Northern Rockcress

Low northern rockcress (*Braya humilis*) is a small perennial forb ranked Endangered by the Province of Newfoundland and Labrador (SSAC 2004). Low northern rockcress is known from only one location in the province on the southern end of Table Mountain (Stephenville) in the Port au Port east area (SSAC 2004). The Table Mountain location has 121 occurrences documented in a roughly 1 x 2 km area, in habitats described as open gravel limestone barren, disturbed limestone barren/ATV track, disturbed limestone barren, small flat area with fine gravel and some flat rock outcrops, some of the gravel not limestone (AC CDC 2023).

Recent field surveys conducted in support of this Project on Table Mountain suggest the distribution of low northern rockcress is not an artifact of previous surveys having been limited to the southern area of Table Mountain, as was previously suspected. Though similar barrens habitat exists in surveyed areas north of the current population extent, no low northern rockcress was observed. It is speculated that the deep ravine associated with Smelt Brook, near the current northern extent of the population, may be limiting its dispersal to appropriate habitats north of the ravine.

Rock Dwelling Sedge

Rock dwelling sedge (*Carex petricosa* var. *misandroides*) is a perennial graminoid listed as Endangered under the NL ESA (SSAC 2008a). This species is known from only five localities in the province, four of which are historical. The only known extant population is at William Wheeler Point (Bay of Islands) (SSAC 2008a). There are three historical localities included in the AC CDC data in the Table Mountain area of the LAA, one of which is in the Project Area. These historical observations from 1914, 1921, and 1967 have recorded this sedge on mossy knolls on the limestone tableland, and dry limestone barrens (AC CDC 2023). Not included in AC CDC data is a general historical (1922) observation of rock dwelling sedge being present, rare, and local on dry limestone barrens within the RAA at Garden Hill, near Cape St. George (SSAC 2008a), near the western end of Port au Port Peninsula. The habitat of the sedge is specifically on dry to damp limestone cliffs, barrens, and tablelands, slippery slaty talus slopes, and upper parts of scree slopes just below the turfy zone at the base of high limestone cliffs (SSAC 2008a). The sedge has been found on substrate of gravels, mixed with fine soils, over rubble or bedrock or on mossy knolls, with small, isolated shrubs (including white birch (*Betula papyrifera)*, shrubby cinquefoil (*Dasiphora fruticosa*) and common juniper (*Juniperus communis*)).

Feathery False Solomon's Seal

Feathery false Solomon's seal (*Maianthemum racemosum* subsp. *racemosum*) is a perennial forb listed as Endangered under the NL ESA (SSAC 2008b). This species is known from only three locations in the province, one of which is historical. One of these locations is within the Codroy area along the Grand Codroy River (at Mollichignick Brook). This location is south of the Codroy Wind Farm, outside of the LAA. The habitat there is an alder (*Alnus rugosa)* thicket on alluvial flat with a meander of muddy depressions; with red elderberry (*Sambucus racemosa*), chokecherry (*Prunus virginiana*) and a rich herb layer dominated by sedge (*Carex* sp.), aster (*Symphyotrichum* sp.), evergreen woodfern (*Dryopteris intermedia),* nodding trillium (*Trillium cernuum*)*,* and starry false Solomon's seal (*Maianthemum stellatum*). This species is typically found in the elevation range of 0-800 m (SSAC 2008b). The other extant population in the province is within Gros Morne National Park (SSAC 2008b).

Small Yellow Water Crowfoot

Small yellow water-crowfoot (*Ranunculus gmelinii*) is an aquatic forb listed as Endangered under the NL ESA (SSAC 2008c). This species is known from only 2 locations in the province, one of which is historical (1937). The historical location was recorded in 1937 in a pool on the right bank of Barachois Brook, Middle Barachois River (AC CDC 2023; SSAC 2008c). The other extant population is nearby along the Robinsons River, where other vascular plant SOCC are also known to occur. This record is outside of the LAA, but both rivers are Sensitive Wildlife Areas for listed rare plants which extend from approximately 1 km east of the TransCanada Highway west to the coast and intersect with the Vegetation and Wetlands LAA and the Project Area (NLDFFA 2023).

Lindley's Aster

Lindley's aster (*Symphyotrichum ciliolatum*) is a perennial forb that is listed as Endangered under the NL ESA (SSAC 2009). Though relatively common throughout most of its range, this species is known from five locations on the Island of Newfoundland, only three of which are extant: restricted localities on the southern end of Table Mountain (within the LAA) and at Romaines Brook (outside of the LAA), and an extensive population in the central portion of Port au Port Peninsula (SSAC 2009). An updated 2019 provincial status report for Lindley's aster is pending (NLDFFA nd).

Since the writing of the SSAC 2009 report, additional occurrences of Lindley's aster were recorded from the Port au Port area during 2007 seismic line surveys, and from 2015, 2017, and 2021 Atlantic Minerals Limited (AML) quarry site surveys (AC CDC 2023). Existing AC CDC data contains 480 records of Lindley's Aster within the RAA, 192 of which are in the LAA, and 69 of which are within the Project Area (Figure 3.2). The largest known concentrations of Lindley's aster are in the central portion of Port au Port Peninsula, which is largely outside of the Project Area.

On the Island of Newfoundland, Lindley's aster occurs on the Port au Port Peninsula within a broad range of often calcareous habitats, including coniferous and mixedwood forests and forest edges, Tuckamore, and in sheltered microsites associated with limestone barrens. Outside of the Port au Port Peninsula, it is also found in gravel substrates along the shores of watercourses. It has been found frequently within areas that have been searched within the Port au Port Peninsula (SSAC 2009; AC CDC 2023; Stantec observations).

Three main threats to Lindley's aster have been described: seismic exploration, hybridization, and riverbed modification (SSAC 2009). The species is expected to be able to recover quickly from temporary disturbance related to seismic exploration activities, such as disturbance from heavy machinery (SSAC 2009). The species hybridizes readily with New York aster (*Symphyotrichum novi-belgii*) to form the hybrid *Symphyotrichum xsubgeminatum*. Infiltration of central areas of the Port au Port Peninsula by New York aster is a concern for Lindley's aster conservation, though New York aster is not known from barrens habitat, as it requires more moisture than this habitat provides (SSAC 2009). Hybrid asters are least common in barrens habitat and most common in "softwood scrub habitat" (or tuckamore) (SSAC 2009). Riverbed modification is not likely an issue within the Project Area.

Threatened Plants

Three species of Threatened plants are documented in the LAA (NL ESA, AC CDC 2023).

MacKenzie's Sweetvetch

MacKenzie's sweetvetch (*Hedysarum boreale* var. *mackenziei*), which is ranked Threatened under the NL ESA (SSAC 2006), occurs on the Port au Port peninsula within the Cape St. George Transitional Reserve. Within this area, it occurs along the west side of Cape St. George and extending along the limestone barrens to the north toward Mainland in an area unofficially called Garden Hills (SSAC 2006). The AC CDC data request for the Project returned 162 records of MacKenzie's sweetvetch in the LAA. Mackenzie's sweetvetch is most closely associated with ericaceous heath habitats, but occasionally

occupies bare substrate and vegetation islands in open limestone barren habitats (Limestone Barrens Species at Risk Recovery Team 2021).

Red Pine

Red pine (*Pinus resinosa*) is ranked Threatened by the province (NLDFFA nd). The AC CDC 2023 data in the RAA has three occurrences of this plant, but they are all at the same location (Little Barachois Brook) from years 2019, 2020, and 2021, and all are located outside of the LAA. This species has 22 known natural populations that are broadly distributed on the Island of Newfoundland, where it is at the northern extent of its range. These populations are mostly clustered within three main regions. This distribution indicates red pine may have once been more common on the Island of Newfoundland (SSAC 2016).

Tradescant Aster

Tradescant aster (*Symphyotrichum tradescantii*) is ranked Threatened by the province (SSAC 2008d). This intermittently amphibious, perennial herb is found in only one locality in Newfoundland and Labrador near St. George (SSAC 2008d). This plant occurs as three sub-populations located in Southwest Brook, and Bottom Brook (First pond) and Bottom Brook (third pond) (SSAC 2008d). There are 20 occurrences of this plant within the AC CDC Project data, all within a 2 km x 2 km area in the St. Georges' Bay Subregion (AC CDC 2023) in First Pond (Bottom Brook), Bottom Brook, Southwest Brook, and George's River on either side of the TransCanada Highway. Some of these records are within the Project Area, others within the LAA, and some outside of the LAA but within the RAA (AC CDC 2023).

Black Ash

Black ash (*Fraxinus nigra*) is a pinnately-compound broad-leaved deciduous tree with soft, spongy bark, typically not exceeding 27 m in height and 50 cm in girth (COSEWIC 2018). This species has been designated Threatened by COSEWIC and is listed as Threatened under the NLESA due to large population declines resulting from the invasive beetle emerald ash borer (*Agrilus planipennis*) (COSEWIC 2018). The range of black ash on insular NL is from the northern extent of the Anguille Mountains to Bonne Bay, excluding the Port au Port Peninsula and extending inland to roughly follow the western limits of the Buchans Plateau north to Green Bay (COSEWIC 2018). The relative isolation of black ash within the province may shelter the species longer and may afford it some protection from the emerald ash borer (COSEWIC 2018).

There are only three occurrences of black ash within the RAA within the AC CDC Project data, and two of those records are historical (from the early 1960s). The more recent observation was outside of the Project Area but within the LAA, along the shore of First Pond, near St. George's River (AC CDC 2023). It is likely that this species is much more widespread in the Project Area and LAA, but due to its recent assessment and listing, it may not have been frequently recorded during rare plant surveys completed prior its designation as Threatened.

Endangered and Threatened Lichens

Vole Ears Lichen

Vole ears lichen is a large, foliose cyanolichen only known from the Avalon Peninsula on the east coast of Newfoundland, but predictive models indicate this species is likely to occur on the Port au Port Peninsula, in the Stephenville area, and in the Codroy Valley (COSEWIC 2009). In Newfoundland, this species is known to occur on the trunks of balsam fir but is more commonly found on red maple and yellow birch trunks in other Atlantic provinces. It has been found in foggy, mature coastal forests at low elevations, typically in forests with extensive *Sphagnum* coverage (COSEWIC 2009).

Wrinkled Shield Lichen

Wrinkled shield lichen is a foliose cyanolichen that has been recorded outside of but near the southern extent of the RAA, west of Millvale (COSEWIC 2016). In Newfoundland, wrinkled shield lichen is known from the bark of white spruce coastal headland habitats on the west coast (COSEWIC 2016).

Blue Felt Lichen

Blue felt lichen is a large, foliose cyanolichen with published extant locations on the east and southern coasts of the Island of Newfoundland (COSEWIC 2010), but a historical record is present within the vegetation and wetlands LAA (or near, considering the accuracy of the record) along Crabbes River north of the Codroy Wind Farm (AC CDC 2023). Numerous observations made after the COSEWIC report was published were recorded near O'Reagan's Resource Road, within the RAA south of the Codroy Wind Farm (AC CDC 2023; Chiasson 2023). An unverified observation was also made in June 2023 east of the LAA within Barachois Pond Provincial Park (Chiasson 2023). In Newfoundland, blue felt lichen is found on the trunks of mature yellow birch trees, in mature and overmature balsam fir-dominated coniferous stands that contain scattered yellow birch. These forest stands are usually less than 25 km from the coast (COSEWIC 2010).

3.3.2.2 Species of Conservation Concern

Plant species of conservation concern (SOCC), defined for the purpose of this baseline study as S rank S1-S2 (includes S1, S1S2, S1S3, S2) or S3 with COSEWIC designation, records for the Project Area, LAA and RAA were also reviewed. A total of 37 vascular plant SOCC have been documented in the PDA, LAA or RAA (Table 3.6).

One additional species range was reviewed for a vascular plant occurring in Newfoundland that is not listed on Schedule 1, but is under consideration for addition to SARA and ranked by COSEWIC. Dense draba (*Draba pycnosperm*a) is ranked special concern by COSEWIC (COSEWIC 2018, 2022). Dense draba was historically restricted to an area near the northern extent of the Great Northern Peninsula, where it has not been observed since 1925 despite detailed search efforts in the area (COSEWIC 2022). This species is not considered likely to occur in the RAA.

Table 3.6 Known SOCC (S1, S1S2, S1S3 and S2) in the Project Area, LAA, and RAA

Scientific Name	Common name	NF S Rank [1]	Number of Known Occurrences [2]			Habitat notes [3]
			Project Area	LAA	RAA	
Port au Port Subregion (and Corner Brook Subregion)						
Amelanchier fernaldii	Fernald serviceberry	S1	0	0	1	Brooksides and damp bush ravines
Calypso bulbosa var. *americana*	fairy slipper	S1	0	4	4	Coastal limestone barren; low heath
Packera cymbalaria	dwarf arctic groundsel	S1	10	14	14	Limestone barrens
Scirpus pedicellatus	stalked bulrush	S1	1	1	1	Wet depression in fir forest
Sphenopholis intermedia	slender wedge grass	S1	0	0	1	Calcareous gravelly bank
Ranunculus recurvatus	hooked crowfoot	S1S2	1	0	1	Wooded calcareous gravelly bank
Oxytropis campestris var. *johannensis*	St. John's oxytrope	S1S3	0	1	1	Limestone barrens
Boechera stricta	Drummond's rockcress	S2	0	2	2	Limestone barren, disturbed ground
Bolboschoenus maritimus ssp. *paludosus*	saltmarsh bulrush	S2	0	0	1	Tidal flats behind barachois (coastal lagoon)
Botrypus virginianus	rattlesnake fern	S2	0	0	1	Juniper dominated bowl at toe of slope
Carex concinna	beautiful sedge	S2	0	1	1	No information
Carex hostiana	Host's sedge	S2	3	6	6	Fen, marsh, alpine meadow, boggy spot in limestone barrens
Carex umbellata	hidden sedge	S2	0	1	5	No information
Cystopteris laurentiana	Laurentian bladder fern	S2	0	0	3	Crack in limestone pavement
Drosera linearis	slender-leaved sundew	S2	4	5	5	Fen, and edge of fen pools
Festuca altaica	northern rough fescue	S2	0	0	1	Upper slope of baren limestone plateau, open heath
Festuca saximontana var. *saximontana*	rocky mountain fescue	S2	1	2	2	Limestone barrens

Table 3.6 Known SOCC (S1, S1S2, S1S3 and S2) in the Project Area, LAA, and RAA

Scientific Name	Common name	NF S Rank [1]	Number of Known Occurrences [2]			Habitat notes [3]
			Project Area	LAA	RAA	
Juncus nodosus	knotted rush	S2	1	3	7	Wet habitats including fens, and beach around pond
Platanthera hookeri	Hooker's orchid	S2	0	22	48	Limestone barren, open to dense heath/ scattered tuckamore
Potamogeton friesii	Fries' pondweed	S2	0	1	1	Pond
Salix ballii	Ball's willow	S2	2	3	3	Brookside, limestone tableland bushy ravine or mossy knoll
Stuckenia filiformis ssp. *occidentalis*	western threadleaf pondweed	S2	0	0	1	Brook within fen with mud over limestone substrate
St. George's Bay Subregion						
Amelanchier fernaldii	Fernald serviceberry	S1	0	0	1	Open muskeg
Anemone virginiana var. *alba*	Virginia anemone	S1	0	0	1	Alluvial island shore
Carex retrorsa	retrorse sedge	S1	0	0	1	Beaver cattail pool
Dennstaedtia punctilobula	hay-scented fern	S1	0	2	2	Dry peat, deciduous shrub
Dryopteris marginalis	marginal wood fern	S1	1	1	1	No information
Carex pseudocyperus	cyperus-like sedge	S2	3	4	7	Beaver and/or cattail marsh
Crataegus chrysocarpa var. *chrysocarpa*	fineberry hawthorne	S2	0	5	7	Shores, river banks, forest edge
Elatine minima	small water-wort	S2	0	1	1	Sandy lake shallows
Juncus nodosus	knotted rush	S2	0	0	1	Marsh, fen, meadow, wet spot in mossy woods, flood plain depression
Neottia auriculata	auricled twayblade	S2	0	0	2	Banks of brook above pond
Polygonum oxyspermum ssp. *raii*	Ray's knotweed	S2	0	0	1	Beach

Table 3.6 Known SOCC (S1, S1S2, S1S3 and S2) in the Project Area, LAA, and RAA

Scientific Name	Common name	NF S Rank [1]	Number of Known Occurrences [2]			Habitat notes [3]
			Project Area	LAA	RAA	
Schoenoplectus tabernaemontani	soft-stem bulrush	S2	0	0	1	No information
Sporobolus alterniflorus	saltwater cordgrass	S2	2	2	5	Pebble/cobble shoreline or open sand berm moist-mesic saline
Sporobolus pumilus	salt-meadow cordgrass	S2	0	0	4	No information
Symphyotrichum lanceolatum var. *lanceolatum*	panicled aster	S2	0	0	2	River gravel, Spruce and birch forest
Utricularia purpurea	greater purple bladderwort	S2	0	2	2	Lake shallows, sandy
Codroy Subregion						
Dennstaedtia punctilobula	hay-scented fern	S1	1	1	1	Grassy area on transmission line
Equisetum hyemale	rough horsetail	S1	0	1	1	Grassy meadow, along shoreline

Source: AC CDC Data Request (2023)

Notes:

[1] NF S Rank is S Rank 2015 for the Island of Newfoundland from AC CDC (2022)

[2] Records are cumulative (i.e., records in the Project Area are also in the LAA and the RAA).

[3] Habitat notes summarized from AC CDC provided data (AC CDC 2023)

Two records of historical observations of Fernald's serviceberry (*Amelanchier fernaldii*) are present within the AC CDC data request for the Project. This species is a Priority 3 Candidate for COSEWIC assessment, meaning it is a lower priority candidate for assessment by COSEWIC, and is provincially ranked S1, meaning it is known from five or fewer locations or is especially vulnerable to extirpation because of other factors One record from 1914 was observed within the Project Area at the southern end of Table Mountain, amongst the low northern rockcress population. A record from 1949 was observed near the E. Harmon Air Force Base (now the Stephenville Airport). Though the exact location is unknown, it is believed to have been observed outside of the LAA but within the RAA (AC CDC 2023).

3.3.2.3 Culturally Important Plants

The two booklets of culturally important plants provided by local Indigenous groups identified 14 species and 11 genera of plants that are considered culturally important (Table 3.7). Of these, 12 are trees and shrubs and 13 are herbaceous species. Island of Newfoundland S Ranks for these species range from S3 to S5 and SNA. These species are expected to be common within appropriate habitats in the Project Area, with the exception of yellow birch, which is expected to be uncommon in the Codroy Subregion. None are SAR or SOCC.

Table 3.7 Culturally Important Plants

Common name[1]	Scientific Name	Traditional Mi'kmaq Name(s)	NF S Rank[2]	Source[3]	
				Wild Edibles Walk (Barens et al. 2014)	Medicine walk (Barens et al. 2015)
Trees and Shrubs					
alder	*Alnus* sp.	Tupsi (doop-see)	-	Y	Y
balsam fir	*Abies balsamea*	Stoqon (stoe-khon)	S5	Y	Y
birch (yellow)	*Betula alleghaniensis*		S3	Y	Y
blueberry	*Vaccinium* sp.	Pkwimann (bick-wee-mahn)	-	Y	Y
ground juniper	*Juniperus communis*	Apatamkiejit (ah-baht-ahm-gey-jhit)	S5	Y	Y
Labrador tea	*Rhododendron groenlandicum*		S5	Y	Y
pine	*Pinus* sp.		-	Y	-
spruce (black)	*Picea mariana*		S5	Y	Y
spruce (white)	*Picea glauca*	kjimuatkw/Kawatk (gah-wah-d-k)	S5	Y	Y
trembling aspen	*Populus tremuloides*	Miti (me-de)	S4S5	Y	Y
raspberry	*Rubus idaeus*	Klitaw (glee-daw)	S5	Y	Y
roses	*Rosa* sp.		-	Y	Y
Forbs					
yarrow	*Achillea* sp.		-	-	Y
coltsfoot	*Petasites* sp.		-	Y	Y
bunchberry (cracker berry)	*Cornus canadensis*	Ka'qaju'manaqsi'l (gah-kay-jew-mahn-ack-seal)	S5	-	Y
dandelions	*Taraxacum* sp.		-	-	Y
cattail	*Typha latifolia*		SNA	Y	-
buttercup	*Ranunculus* sp.		-	-	Y
clover	*Trifolium* sp.		-	-	Y

Table 3.7 Culturally Important Plants

Common name[1]	Scientific Name	Traditional Mi'kmaq Name(s)	NF S Rank[2]	Source[3]	
				Wild Edibles Walk (Barens et al. 2014)	Medicine walk (Barens et al. 2015)
cow parsnip	*Heracleum maximum*	Bugosi	S5	-	Y
lambskill (sheep laurel)	*Kalmia angustifolia*		S5	-	Y
blue flag (wild iris, beaver root)	*Iris versicolor*		S5	-	Y
plantain	*Plantago major*		SNA	-	Y
lady slipper (moccasin flower)	*Cypripedium* sp.		-	-	Y
strawberry	*Fragaria* sp.	Atuomkkmink (ah-du-ohm-g-mink)	-	Y	Y

Notes:
[1] Common names were derived from Medicinal Plants – Newfoundland and the Seven Sorts (Miawpukek First Nations nd)
[2] NF S Rank is S Rank 2015 for the Island of Newfoundland from AC CDC (2022)
[3] Source Y = Yes, plant species listed in source material

3.4 Discussion

The Vegetation and Wetlands LAA includes many ecologically important habitat types within four subregions of the Western Newfoundland Forest Ecoregion on the west coast of the Island of Newfoundland. Most notable are the globally rare limestone barrens located at the top of the Port au Port Peninsula and Table Mountain (Stephenville), northwest of the Town of Stephenville. The habitats on the barrens provide harsh conditions that support many arctic and alpine species, including those that are at or near the southern extent of their ranges, and are therefore uncommon or rare. Other important habitats within the Vegetation and Wetlands LAA include large peatland complexes and sheltered forests containing species common in Acadian forests of the Maritime Provinces that are near the northern extent of their ranges in western Newfoundland.

Several vascular plant species listed under the Newfoundland and Labrador *Endangered Species Act* (NL ESA) are known to be present within the Vegetation and Wetlands LAA. Low northern rockcress (*Braya humilis*) listed as Endangered under the NL ESA, is known from the barrens habitat within the Project Area at the southern end of Table Mountain (Stephenville). This is the only known location of this species within the province. Historic records of rock dwelling sedge (*Carex petricosa*), also listed as Endangered under the NL ESA, are also known from the southern end of Table Mountain (Stephenville). Tradescant aster is known from within the Project Area in the St. George's Bay Subregion.

Lindley's aster (*Symphyotrichum ciliolatum*) is listed as Endangered under the NL ESA and has extant locations on the Port au Port Peninsula, on Table Mountain (Stephenville), and at Romaines Brook (south of Table Mountain). These are the only known extant locations on the Island of Newfoundland, and though it seems to be geographically restricted in the province, Lindley's aster occupies a range of habitats and can be found in many habitats throughout this restricted range. One of the largest threats to this species is hybridization with New York aster (*Symphyotrichum novi-belgii*), a species that is more likely to occupy roadside ditches and wet, disturbed areas (SSAC 2009).

Other SAR have not been recorded within the Project Area but have potential to be there, including lichen SAR. The RAA also contains many vegetation SOCC with potential to exist within the Project Area.

3.5 References

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4.0 Avifauna

4.1 Scope and Objectives

The objectives of the avifauna baseline study are to:

- identify and describe areas of concentration and areas of conservation concern for birds
- describe the composition of the breeding bird community in the project area based on a desktop review of background data, reports and preliminary field results
- describe use of the Project Area by birds during spring and fall migration and in winter
- identify bird SAR and SOCC that may be present in the Project Area and LAA

4.2 Methods

4.2.1 Background Review

Background data sources from government agencies and non-governmental organizations and from published literature were reviewed to compile information on the occurrence, abundance, distribution and habitat associations of avifauna in the LAA. This included a review of avian SAR and SOCC that are known to occur or have potential to occur in the LAA and interact with the project. Sensitive habitats and areas where birds are known to congregate during key time periods (i.e., nesting, migration, winter) were also identified. An overview of data sources that were reviewed for this study is provided below.

4.2.1.1 Christmas Bird Count

The Christmas Bird Count (CBC) is North America's longest-running Citizen Science project (National Audubon Society 2020). Information is collected by volunteers on one day between December 14 and January 5 within a standard 24- km diameter count circle (Table 4.1). All birds counted during the one-day period are recorded. Data from the Stephenville CBC circle (shown in Figure 4.1, Birds Canada. 2018) from 2003-2004 and 2010-2020 were reviewed for information on the distribution and abundance of wintering birds, including SAR and SOCC. Across the 11 years 80 different species have been recorded within the count circle.

Table 4.1 Number of Species and Level of Effort during Christmas Bird Count from 2003-2020

Year Surveyed	Number of Species	Level of Effort (hours)
2003	37	16
2004	38	25
2010	31	16
2011	22	16.5
2012	22	12
2013	25	17.5
2015	25	14
2016	34	24
2017	41	11
2018	32	12
2019	33	6.5
2020	42	9

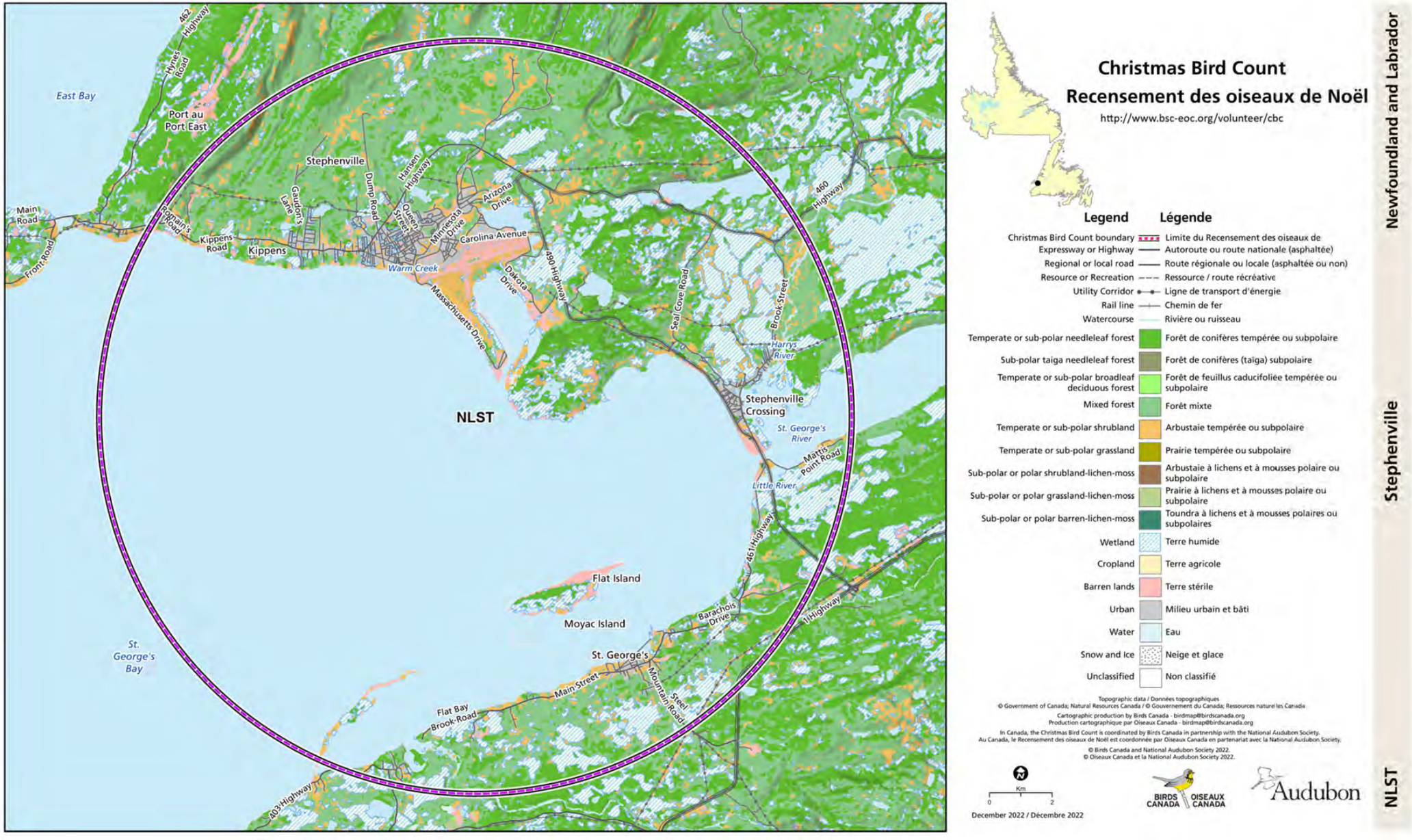


Figure 4.1 Stephenville Christmas Bird Count Circle

4.2.1.2 eBird Canada

eBird Canada is managed by Birds Canada in collaboration with The Cornell Lab of Ornithology and Québec Oiseaux. eBird is a program that allows volunteers to track the birds that they observe and submit their observations through an online portal. eBird is a global database that contains data on bird abundance and distribution at a variety of spatial and temporal scales. eBird data for the LAA from 2003 to 2022 were reviewed for information on seasonal distribution of birds in the LAA, including records of SAR and SOCC (Table 4.2). The dataset that was used for this baseline study included 91,075 records of 306 different species (eBird 2022).

Table 4.2 Summary of Records in the eBird Dataset from within and near the Local Assessment Area that was Reviewed for the Baseline Report

Year Surveyed	Number of Species	Number of Records
2003	80	203
2004	43	59
2005	105	253
2006	42	77
2007	50	105
2008	80	155
2009	44	84
2010	81	172
2011	129	628
2012	64	128
2013	113	332
2014	113	505
2015	155	2,369
2016	177	4,522
2017	191	11,736
2018	188	9,967
2019	207	10,522
2020	212	19,324
2021	226	26,932
2022	78	3,002

4.2.1.3 Newfoundland Breeding Bird Atlas

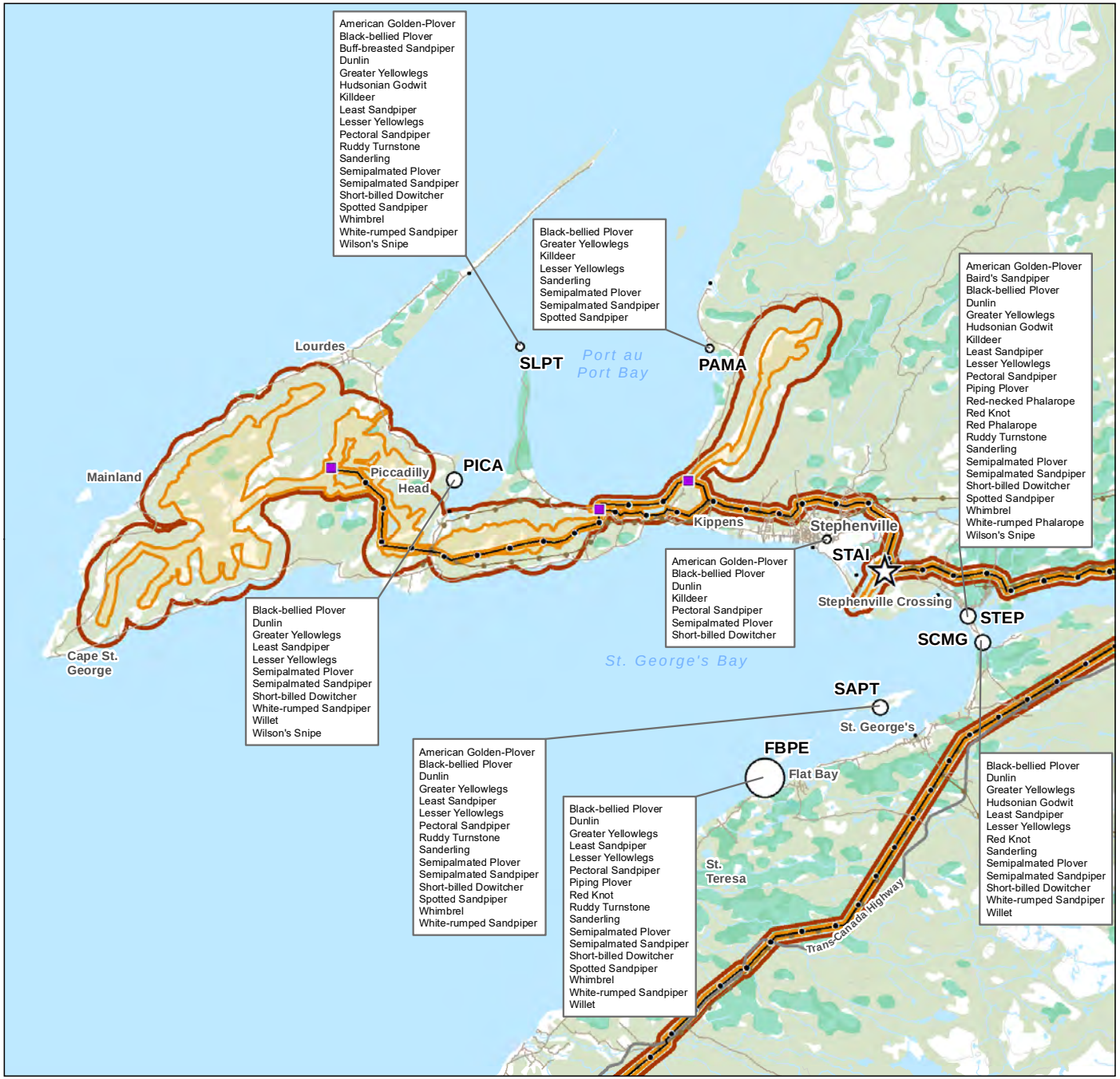
The Newfoundland Breeding Bird Atlas is a five-year project that will map the distribution and relative abundance of breeding birds across the province. Atlases follow a standardized methodology and are designed to be repeated at 20-year intervals, which allows changes in bird populations to be tracked over time. Data collection for the first Newfoundland Breeding Bird Atlas began in 2020 and will continue through to the summer of 2024. The dataset that was reviewed for this study included 3 years of data with 151 records of 35 different species (NL BBA 2022a).

4.2.1.4 Atlantic Canada Shorebird Survey

The Atlantic Canada Shorebird Survey is part of the Program for Regional and International Shorebird Monitoring (PRISM). The program began in 1974 as the Maritimes Shorebird Survey and expanded in 2003 to become the Atlantic Canada Shorebird Survey, which includes Newfoundland and Labrador. Data is collected by volunteers at over 100 survey sites and is coordinated by the Canadian Wildlife Service (a department of Environment and Climate Change Canada). Surveys are primarily completed between July 20 and November 20 of each year, but some surveys are done between April 20 and June 9 to gather information during spring migration. Survey sites are visited by volunteers once every 10 days to count and identify all observed shorebirds. Data from 2003 to 2019 were reviewed for information on the distribution and abundance of migrating shorebirds, including SAR and SOCC (Table 4.3; Figure 4.2). The dataset that was reviewed included 767 records of 28 different species (ECCC 2020).

Table 4.3 Number of Species and Individuals Recorded each Year at Atlantic Canada Shorebird Survey sites within or near the Local Assessment Area

Year Surveyed	Number of Species	Number of Records
2003	17	118
2005	10	21
2006	20	59
2008	15	39
2009	11	17
2010	7	15
2011	10	25
2012	7	10
2013	12	12
2015	14	59
2016	18	85
2017	21	243
2018	13	48
2019	8	16



Stantec

Annual Median Observations 2003-2019

- 1 - 100
- 101 - 200
- 201 - 300
- 301 - 400
- >400

Terrestrial Bird Local Assessment Area

Proposed Project Features

Project Area

Other Features

Transmission Line 230 kV

Port au Port Interconnection

Proposed Route

Alternate Route

Transmission Line, Existing

Trans-Canada Highway

Road

Watercourse

Waterbody

Wetland

Forested Area

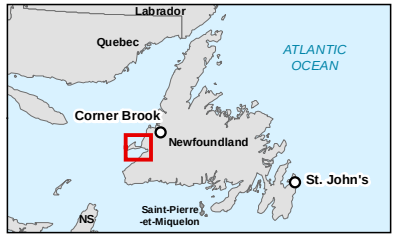
N

0 5 10 km

(At original document size of 8.5x11)
1:400,000

Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap
3. Background: NRCan CanVec



Project Location
Stephenville
NL

Prepared by AC/NW on 2023-06-15
QR by AW on 2023-06-26

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_076

Figure No.
4.2

Atlantic Canada Shorebird Survey - Observations 2003 to 2019

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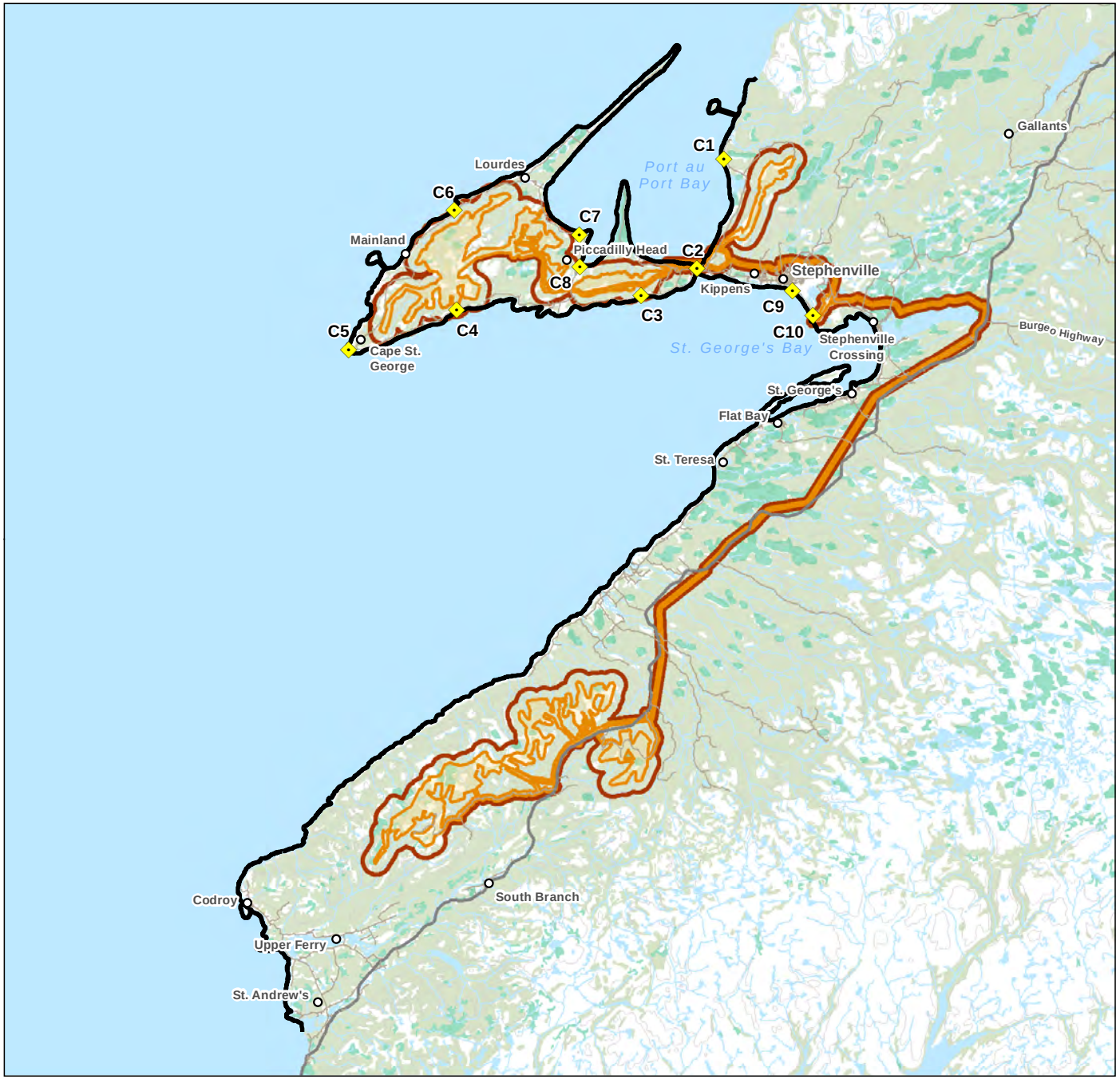
4.2.2 Field Surveys

There are three components of the coastal waterbird survey program – winter coastal waterbird land-based survey, winter coastal waterbird aerial survey, and harlequin duck/purple sandpiper aerial survey, which are described below. The purpose of the winter coastal waterbird surveys (land-based and aerial) is to assess the distribution and relative abundance of wintering coastal waterbirds (waterfowl and seabirds) shore within the LAA and RAA.

Atlantic coastlines, including those of Newfoundland, provide important habitat for a diversity of bird species including several SAR. The eastern population of the Harlequin Duck (*Histrionicus histrionicus*) is listed as a Species of Special Concern on Schedule 1 of SARA and Vulnerable on the NL ESA. This species uses coastal habitats in Newfoundland during the non-breeding season. Harlequin duck is often found in similar habitats as purple sandpiper (*Calidris maritima*) which is identified as a priority species in the NL Bird Conservation strategy for Marine Biogeographic Unit 12 (EC 2013). Because harlequin duck is a SAR that has potential to be impacted by the proposed wind farm, it is a target species for the Project. Locations and numbers of purple sandpiper were also be noted during the survey because the species will be present in similar habitats.

4.2.2.1 Winter Coastal Waterbird Land-based Survey

Land-based surveys were completed at ten locations throughout the Port au Port/Stephenville area (Figure 4.3). Survey locations were established in areas that were accessible by road with good visibility of the adjacent coastal waters. Locations of survey sites were selected to represent a variety of coastal habitats including beaches, coastal cliffs and coastal wetlands. Survey sites were limited to areas of public land located adjacent to maintained roads. Approximately half of the survey sites were situated within 2 km of proposed Project infrastructure and the remaining survey sites were located more than 2 km away from Project infrastructure.



Stantec

Land Survey Location

Aerial Coastal Survey Transect (250 m from shore)

Terrestrial Bird Local Assessment Area

Proposed Project Features

Project Area

Other Features

Trans-Canada Highway

Road

Watercourse

Waterbody

Wetland

Forested Area

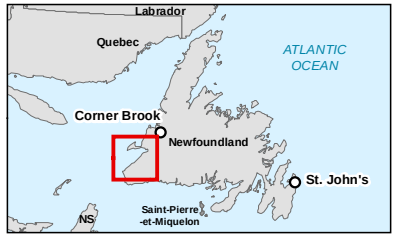
N

0 10 20 km

(At original document size of 8.5x11)
1:700,000

Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap
3. Background: NRCan CanVec



Project Location
Stephenville
NL

Prepared by AC on 2023-06-15
QR by AW on 2023-06-26

Client/Project
World Energy GH2
Project Nujio'qonik

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Figure No.
4.3

Aerial Survey Route (Winter) and Land Based Survey Locations

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The protocol that was used for the land-based coastal waterbird surveys was based on the British Columbia Coastal Waterfowl Survey Protocol (BC 2021). During surveys, all birds observed in the coastal waters from the point count site were recorded. There was no time limit for the surveys and the survey ended once all birds that were observable from each point count site were documented. For each bird observed, the surveyor recorded species, number observed, the distance and compass bearing from the observer to the bird or center of a flock of birds, and sex and age class of the bird. Observers also recorded whether the bird was sitting on the water or flying. The compass bearing to flying birds was not recorded. The distances of birds were estimated up to 500 m; birds that were beyond 500 m were recorded as distance 500 m +. At each survey site, the following data were collected:

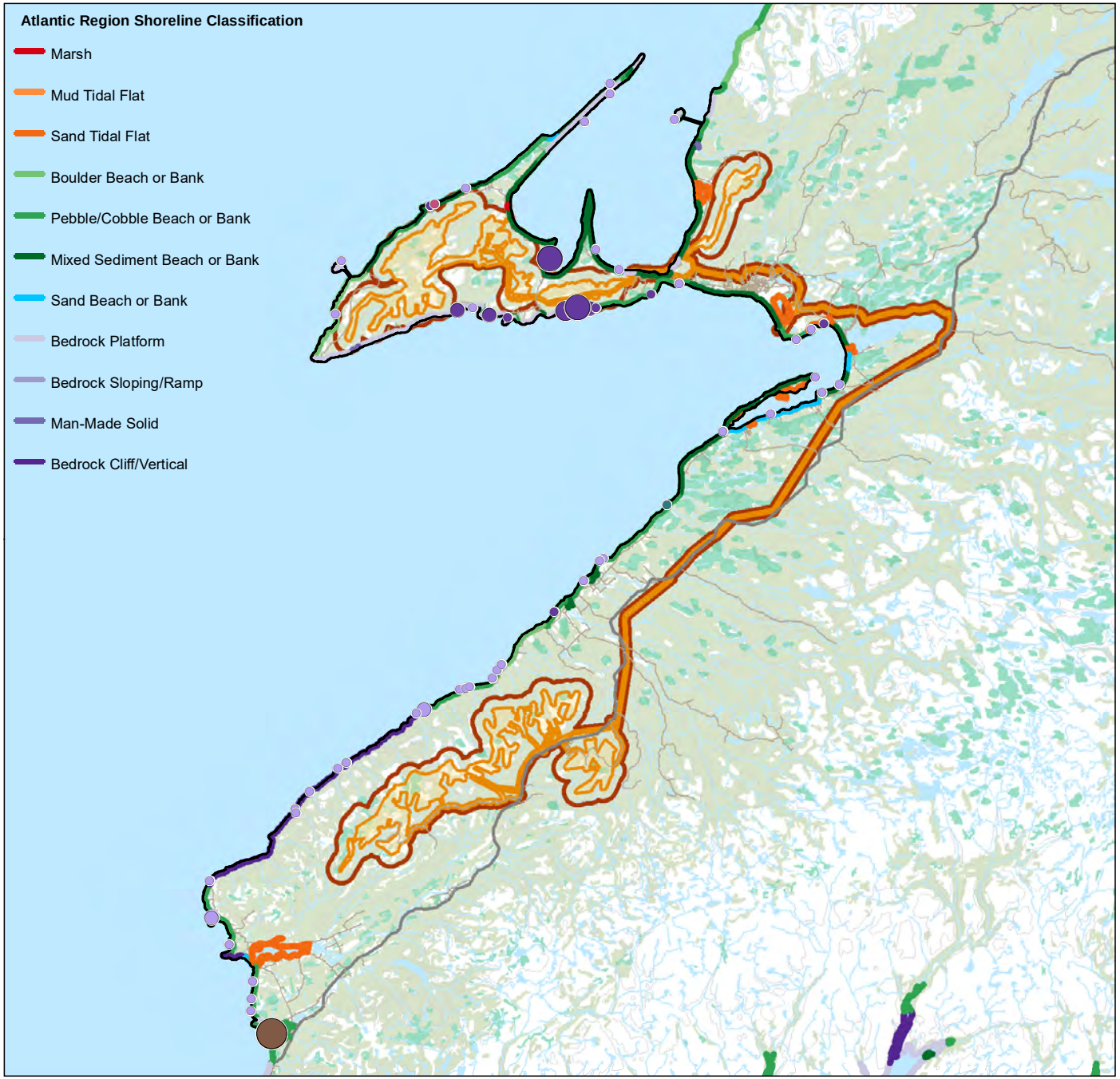
- survey site number
- survey date
- start time
- GPS coordinates
- compass bearings to describe the visual arc of coastal waters within which observations were made
- the estimated height of the observer's eye level above the water
- temperature (Celsius)
- wind (Beaufort Scale)
- sea state (Beaufort Scale)
- glare
- ice coverage (percent)
- cloud cover (percent)
- precipitation

A single survey was completed on March 13, 2023.

4.2.2.2 Winter Coastal Waterbird Aerial Survey

The winter coastal waterbird aerial surveys were flown with a team of three biologists experienced in bird identification and who have been trained using the U.S. Fish and Wildlife Aerial Waterfowl Survey Training (Bowman and Canfield 2015). The survey route extended from the mouth of Little Codroy River to Broad Cove just north of Fox Island River (408 km), along the west coast of the Island of Newfoundland (Figure 4.4). The survey route also included nearshore islands present along the survey route.

The survey was conducted using a Bell 206L Long Ranger helicopter. The surveyor in the front seat entered all observations into the ArcGIS Field Maps while surveyors in the rear seats observed birds from the right and left side of the helicopter. The helicopter was equipped with large bubble windows so that the observers could see directly below and had a full 180-degree panoramic view. Both observers had binoculars (Vortex 8x42) and one observer had a DSLR camera (300mm telephoto zoom lens, 58mm circular polarizing lens filter) to take photographs, when possible, to help with identification after the survey.



Stantec

American Black Duck
- 1 - 4
- 5 - 10
- 11 - 30
- 31 - 70

Bald Eagle
- 1 - 4
- 5 - 10

Barrow's Goldeneye
- 1 - 4

Black-headed Gull
- 1 - 4

Canada Goose
- 71 - 130

Aerial Coastal Survey Transect (250 m from shore)

Local Assessment Area

Proposed Project Features
- Project Area

Other Features
- Trans-Canada Highway
- Road
- Contour (100m)
- Watercourse
- Waterbody
- Wetland
- Forested Area

N

0 10 20 km
(At original document size of 8.5x11)
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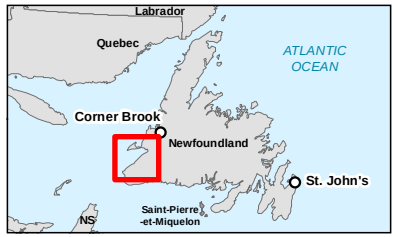
Notes
1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: Stantec
3. Background: NEEC



Project Location
Stephenville
NL

Prepared by AC/NW on 2023-06-15
QR by AW on 2023-06-26

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_045

Figure No.
4.4

Title
Aerial Coastal Survey - Winter 2023
Species: American Black Duck, Bald Eagle, Barrow's Goldeneye, Black-headed Gull, Canada Goose

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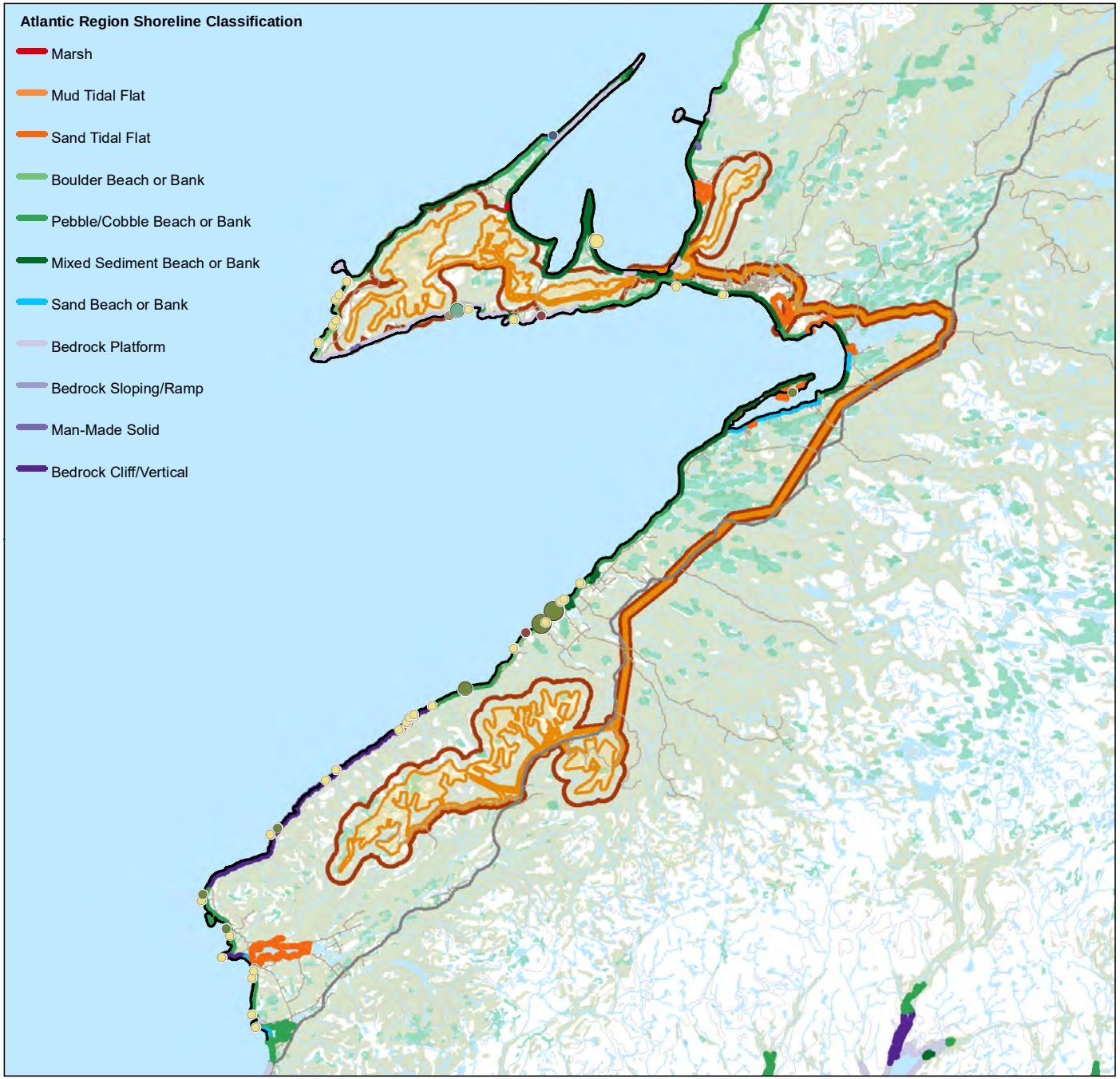


Stantec

Black Guillemot
- 1 - 4
- 5 - 10

Black Scoter
- 1 - 4
- 5 - 10
- 11 - 30

Common Loon
- 1 - 4

Mallard
- 5 - 10

Razorbill
- 1 - 4

Red-throated Loon
- 1 - 4

- Aerial Coastal Survey Transect (250 m from shore)
- Local Assessment Area

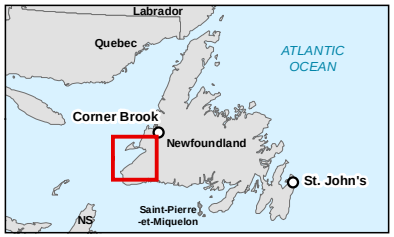
Proposed Project Features
- Project Area

Other Features
- Trans-Canada Highway
- Road
- Contour (100m)
- Watercourse
- Waterbody
- Wetland
- Forested Area

N

0 10 20 km
(At original document size of 8.5x11)
1:700,000

Notes
1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: Stantec
3. Background: NEEC



Project Location
Stephenville
NL

Prepared by AC/NW on 2023-06-15
QR by AW on 2023-06-26

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_045

Figure No.
4.4

Title
Aerial Coastal Survey - Winter 2023
Species: Black Guillemot, Black Scoter, Common Loon, Mallard, Razorbill, Red-throated Loon

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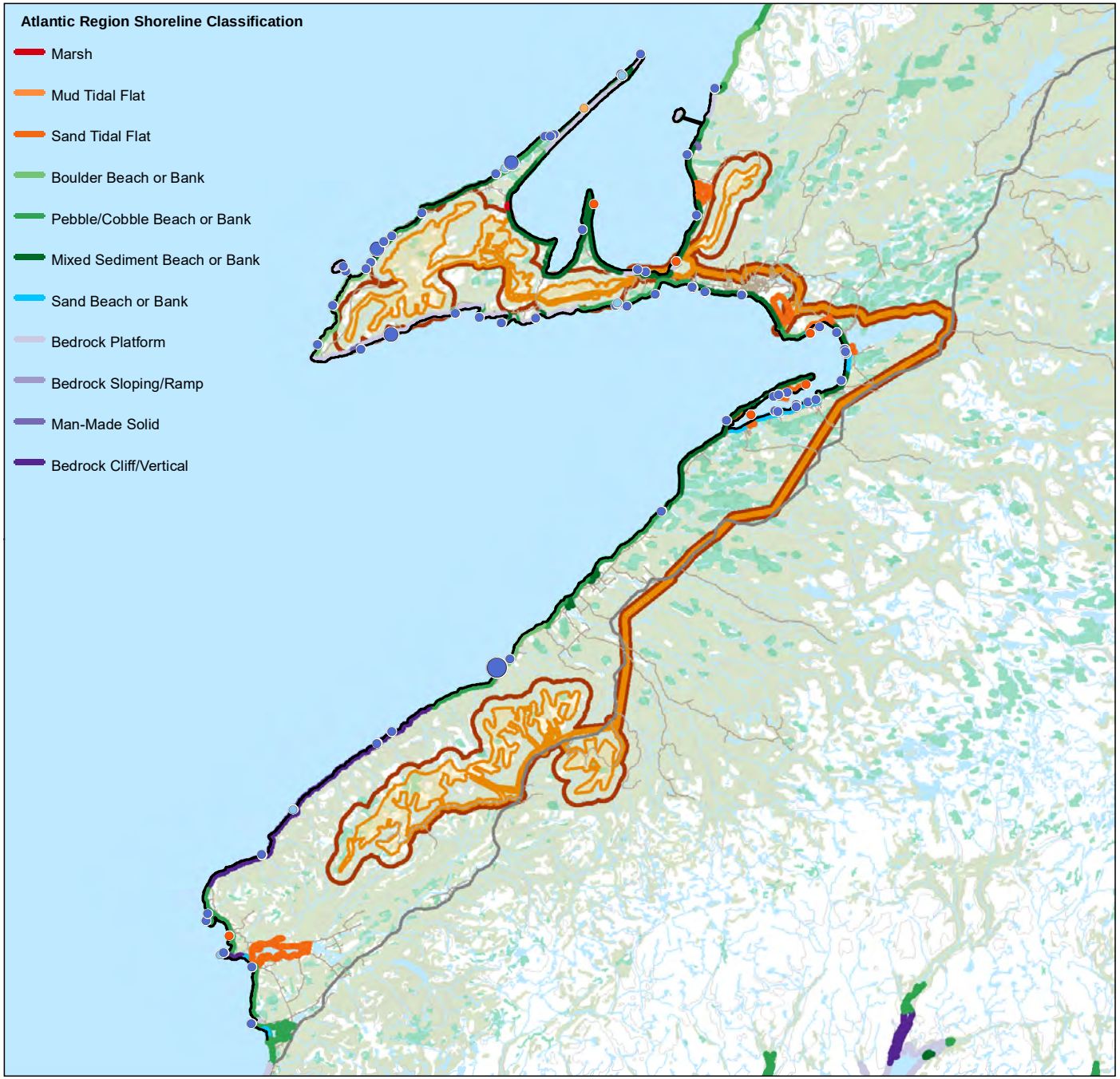


Stantec

Bufflehead
- 1 - 4

Glaucous Gull
- 1 - 4

Herring Gull
- 1 - 4
- 5 - 10
- 11 - 30

Thick-billed Murre
- 1 - 4

Aerial Coastal Survey Transect (250 m from shore)

Local Assessment Area

Proposed Project Features
- Project Area

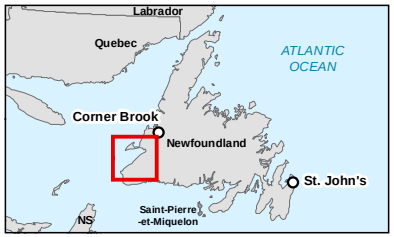
Other Features
- Trans-Canada Highway
- Road
- Contour (100m)
- Watercourse
- Waterbody
- Wetland
- Forested Area

N

0 10 20 km

(At original document size of 8.5x11)
1:700,000

Notes
1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: Stantec
3. Background: NEEC



Project Location
Stephenville
NL

Prepared by AC/NW on 2023-06-15
QR by AW on 2023-06-26

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_045

Figure No.
4.4

Title
Aerial Coastal Survey - Winter 2023
Species: Bufflehead, Glaucous Gull
Herring Gull, Thick-billed Murre

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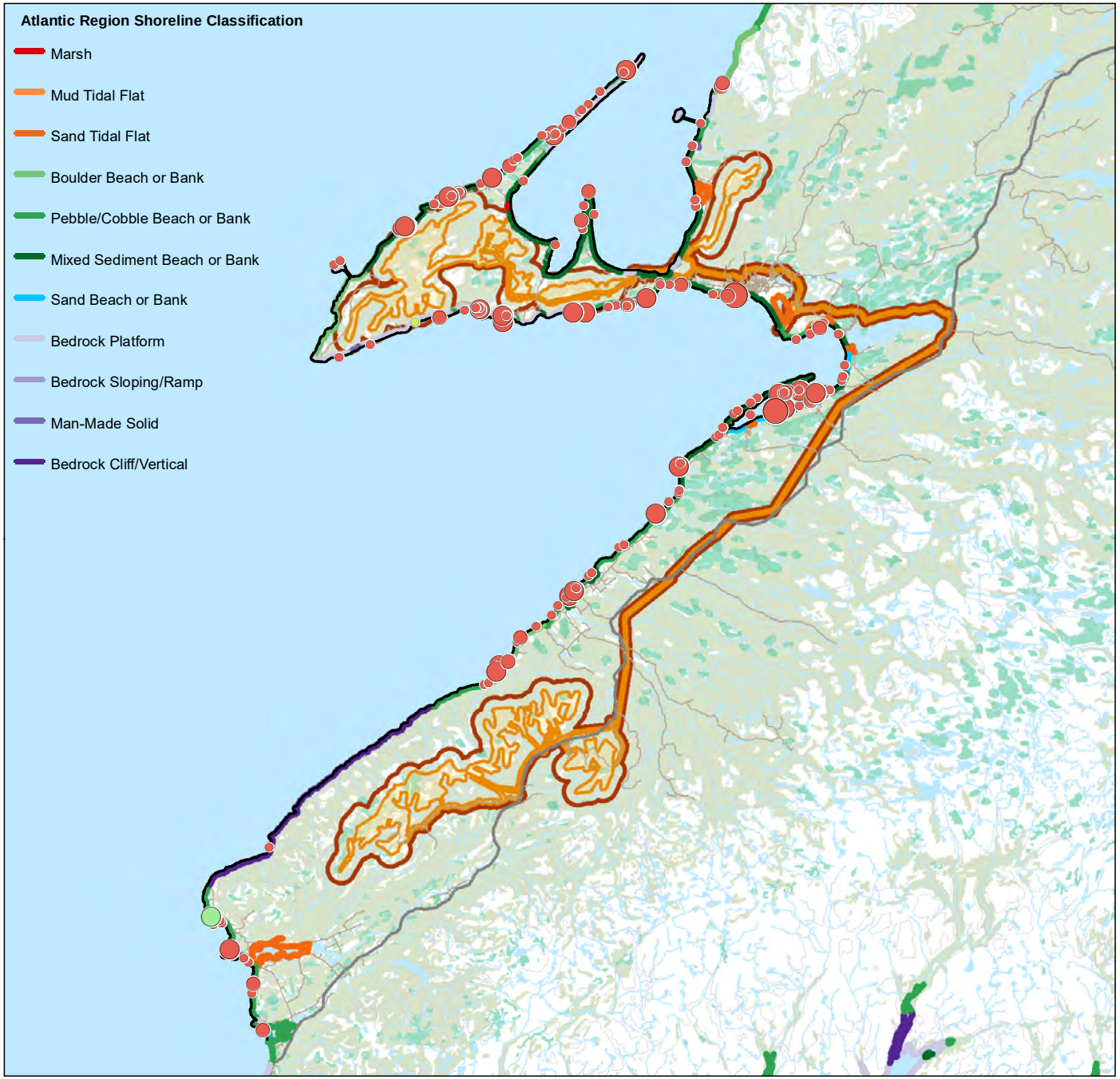

Stantec

Common Goldeneye
- 1 - 4
- 5 - 10
- 11 - 30
- 31 - 70

Common Merganser
- 1 - 4

Greater Scaup
- 11 - 30

Aerial Coastal Survey Transect (250 m from shore)

Local Assessment Area

Proposed Project Features
- Project Area

Other Features
- Trans-Canada Highway
- Road
- Contour (100m)
- Watercourse
- Waterbody
- Wetland
- Forested Area

N

0 10 20 km

(At original document size of 8.5x11)
1:700,000

Notes
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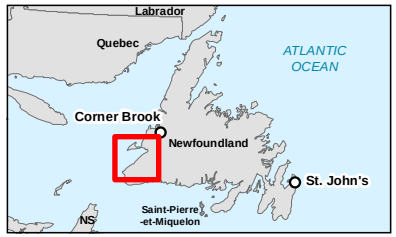
2. Data Sources: Stantec
3. Background: NEEC



Project Location
Stephenville
NL

Prepared by AC/NW on 2023-06-15
QR by AW on 2023-06-26

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_045

Figure No.
4.4

Title
Aerial Coastal Survey - Winter 2023
Species: Common Goldeneye, Common Merganser, Greater Scaup

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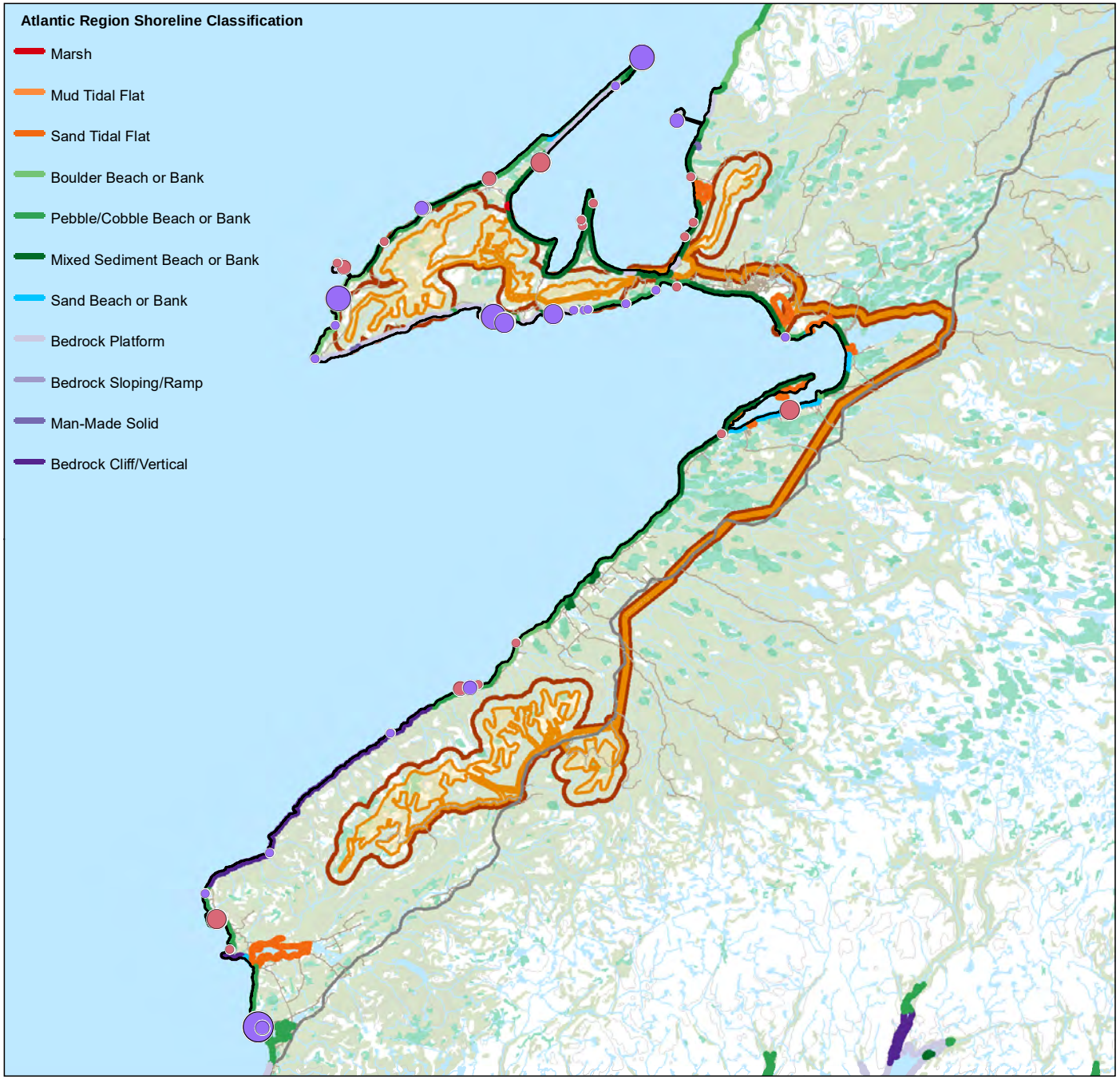

Stantec

Purple Sandpiper
- 1 - 4
- 5 - 10
- 11 - 30
- 31 - 70
- 71 - 130

White-winged Scoter
- 1 - 4
- 5 - 10
- 11 - 30

Aerial Coastal Survey Transect (250 m from shore)

Local Assessment Area

Proposed Project Features
- Project Area

Other Features
- Trans-Canada Highway
- Road
- Contour (100m)
- Watercourse
- Waterbody
- Wetland
- Forested Area

N

0 10 20 km
(At original document size of 8.5x11)
1:700,000

Notes
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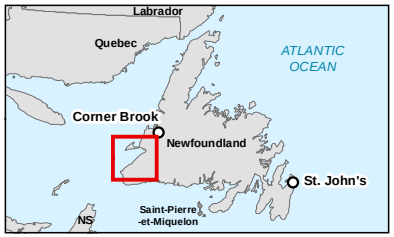
2. Data Sources: Stantec
3. Background: NEEC



Project Location
Stephenville
NL

Prepared by AC/NW on 2023-06-15
QR by AW on 2023-06-26

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_045

Figure No.
4.4

Title
Aerial Coastal Survey - Winter 2023
Species: Purple Sandpiper, White-winged Scoter

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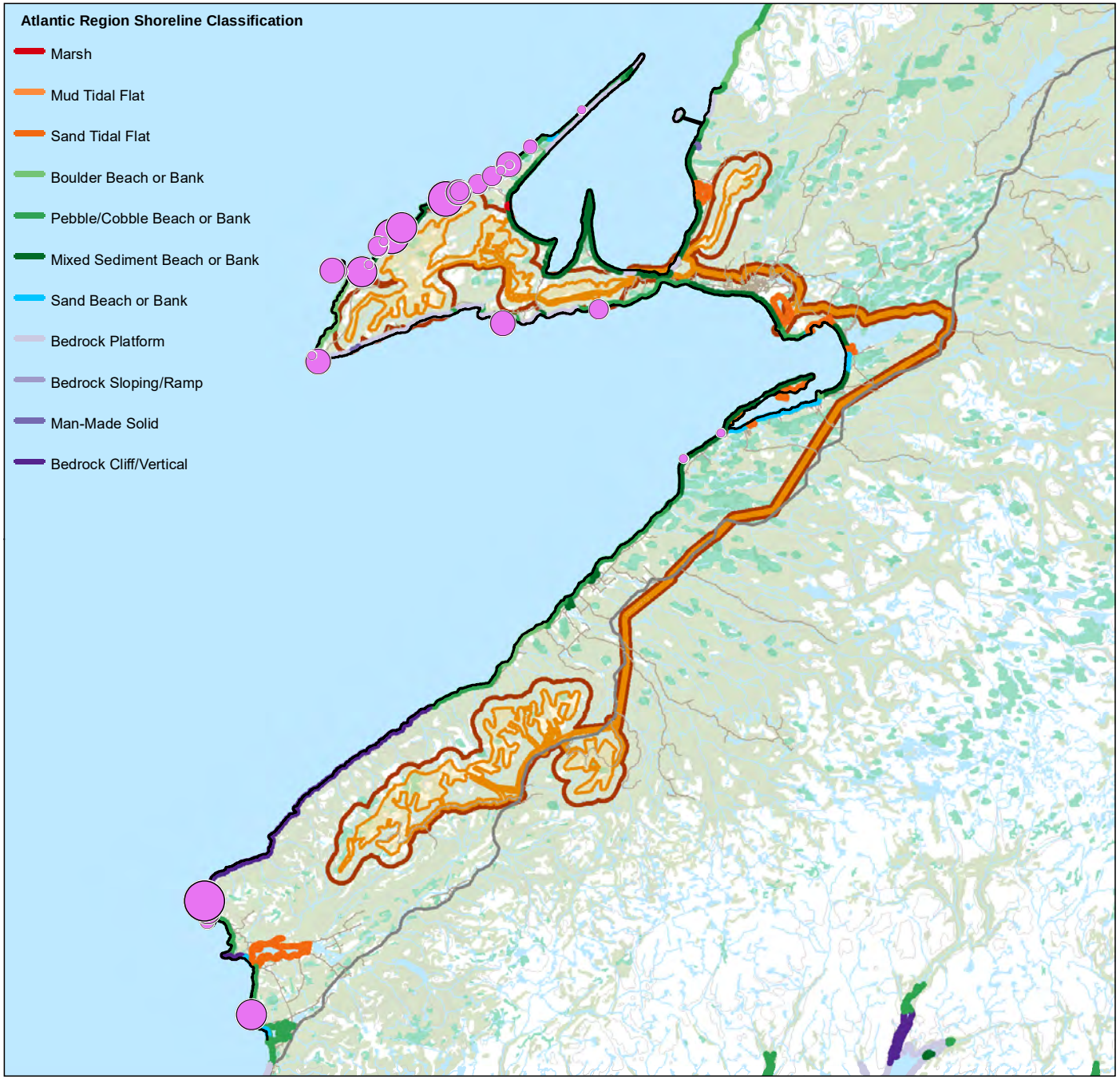

Stantec

Common Eider

- 1 - 4
- 5 - 10
- 11 - 30
- 31 - 70
- 71 - 130
- 131 - 350
- 351 - 500

Aerial Coastal Survey Transect (250 m from shore)

Local Assessment Area

Proposed Project Features

Project Area

Other Features

Trans-Canada Highway
Road
Contour (100m)
Watercourse
Waterbody
Wetland
Forested Area

N

0 10 20 km

(At original document size of 8.5x11)
1:700,000

Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: Stantec
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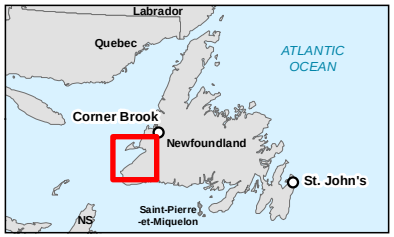


Project Location
Stephenville
NL

Prepared by AC/NW on 2023-06-15
QR by AW on 2023-06-26

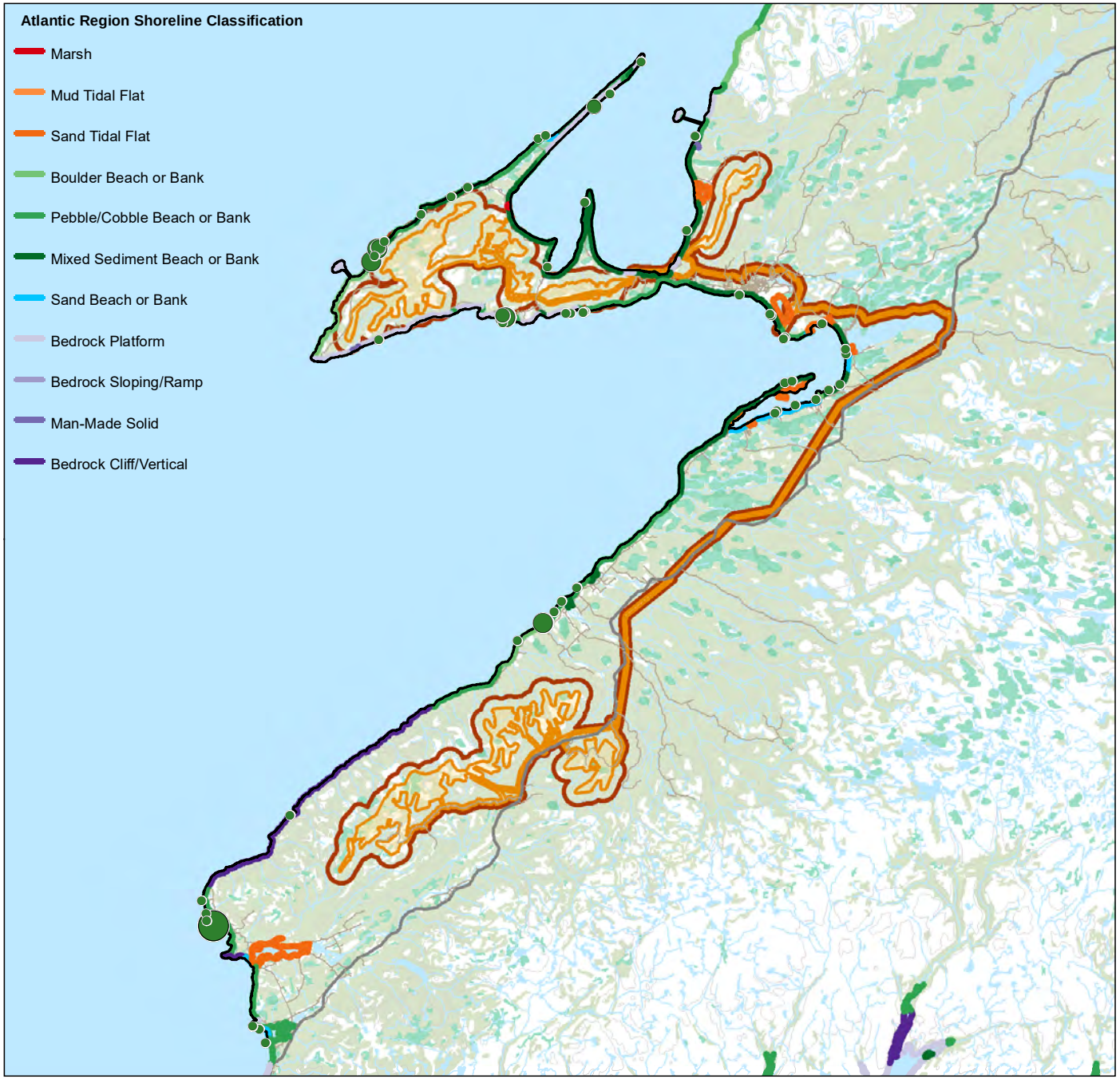
Client/Project
World Energy GH2
Project Nujio'qonik

121417233_045

Figure No.
4.4

Title
Aerial Coastal Survey - Winter 2023
Species: Common Eider

V:\1214\active\121417233\03_data\gis_cad\gis_data\mapping\mxd\general\Birds\121417233_045_Fig_4.4_Seabird_Aerial_Survey_2023_COEI.mxd Revised: 2023-08-01 By: acuff



Stantec

Great Black-backed Gull

- 1 - 4
- 5 - 10
- 11 - 30
- 71 - 130
- Aerial Coastal Survey Transect (250 m from shore)
- Local Assessment Area

Proposed Project Features

- Project Area

Other Features

- Trans-Canada Highway
- Road
- Contour (100m)
- Watercourse
- Waterbody
- Wetland
- Forested Area

N

0 10 20 km

(At original document size of 8.5x11)
1:700,000

Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: Stantec
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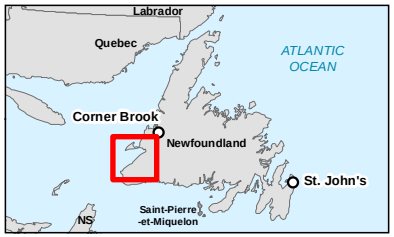

Project Location
Stephenville
NL

Prepared by AC/NW on 2023-06-15
QR by AW on 2023-06-26

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_045

Figure No.
4.4

Title
Aerial Coastal Survey - Winter 2023
Species: Great Black-backed Gull

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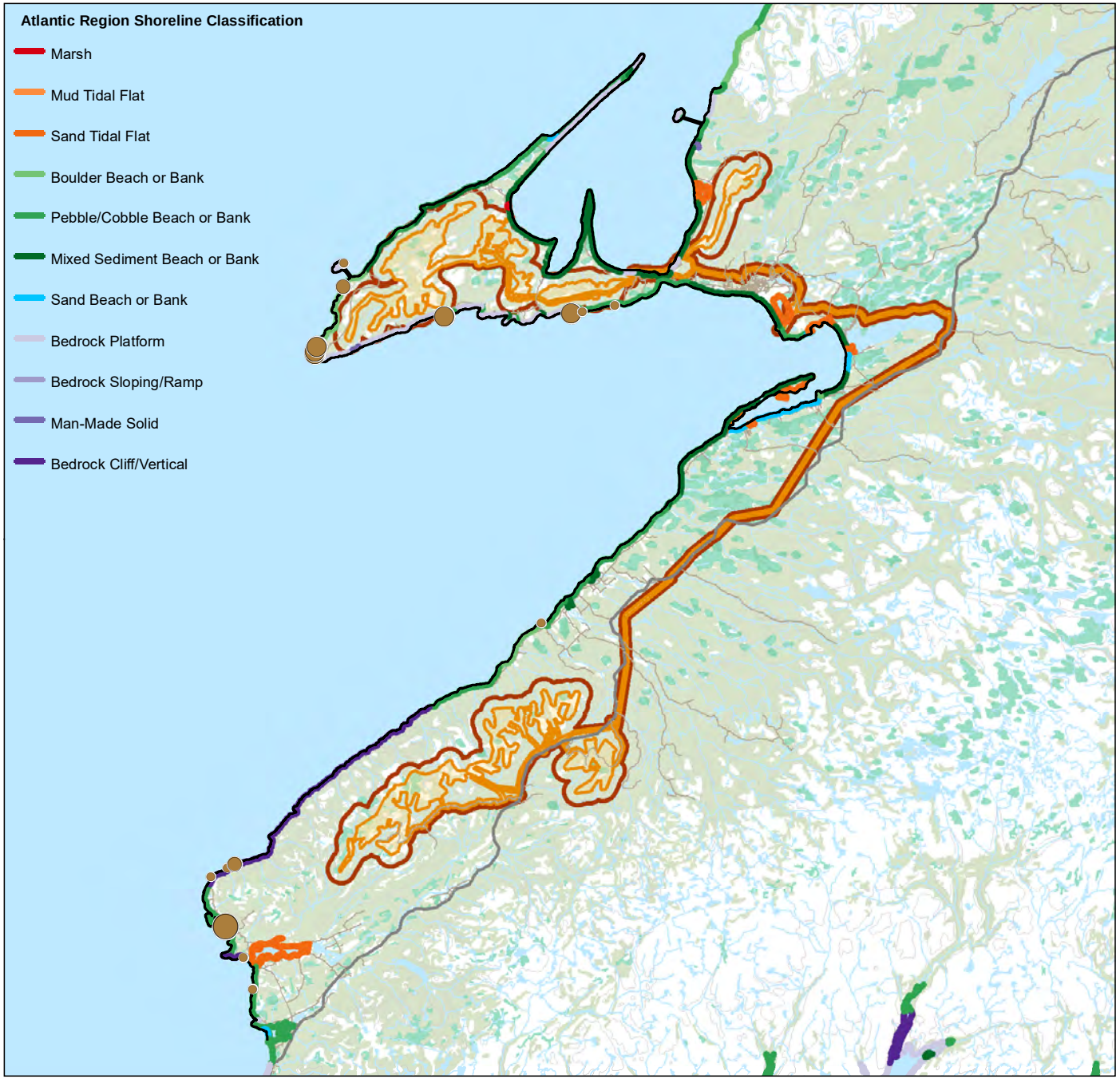

Stantec

Great Cormorant

- 1 - 4
- 5 - 10
- 11 - 30
- 31 - 70
- Aerial Coastal Survey Transect (250 m from shore)
- Local Assessment Area

Proposed Project Features

- Project Area

Other Features

- Trans-Canada Highway
- Road
- Contour (100m)
- Watercourse
- Waterbody
- Wetland
- Forested Area

N

0 10 20 km

(At original document size of 8.5x11)
1:700,000

Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
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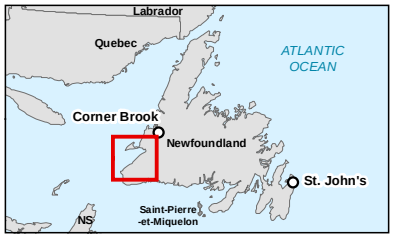

Project Location
Stephenville
NL

Prepared by AC/NW on 2023-06-15
QR by AW on 2023-06-26

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_045

Figure No.
4.4

Title
Aerial Coastal Survey - Winter 2023
Species: Great Cormorant

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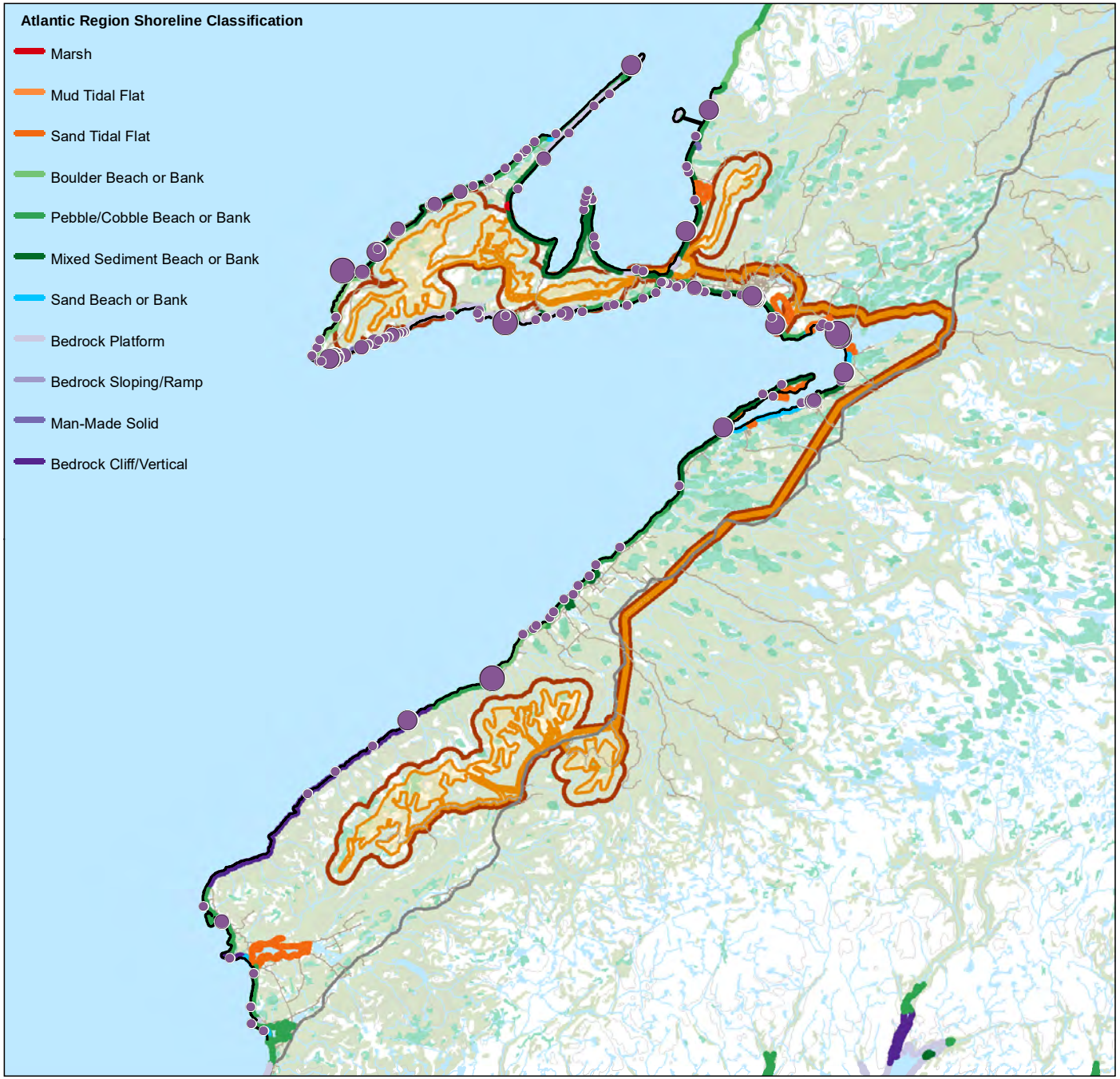

Stantec

Iceland Gull

- 1 - 4
- 5 - 10
- 11 - 30
- 31 - 70
- Aerial Coastal Survey Transect (250 m from shore)
- Local Assessment Area

Proposed Project Features

- Project Area

Other Features

- Trans-Canada Highway
- Road
- Contour (100m)
- Watercourse
- Waterbody
- Wetland
- Forested Area

N

0 10 20 km

(At original document size of 8.5x11)
1:700,000

Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
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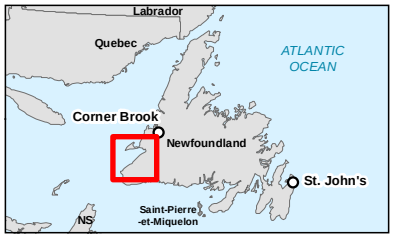


Project Location
Stephenville
NL

Prepared by AC/NW on 2023-06-15
QR by AW on 2023-06-26

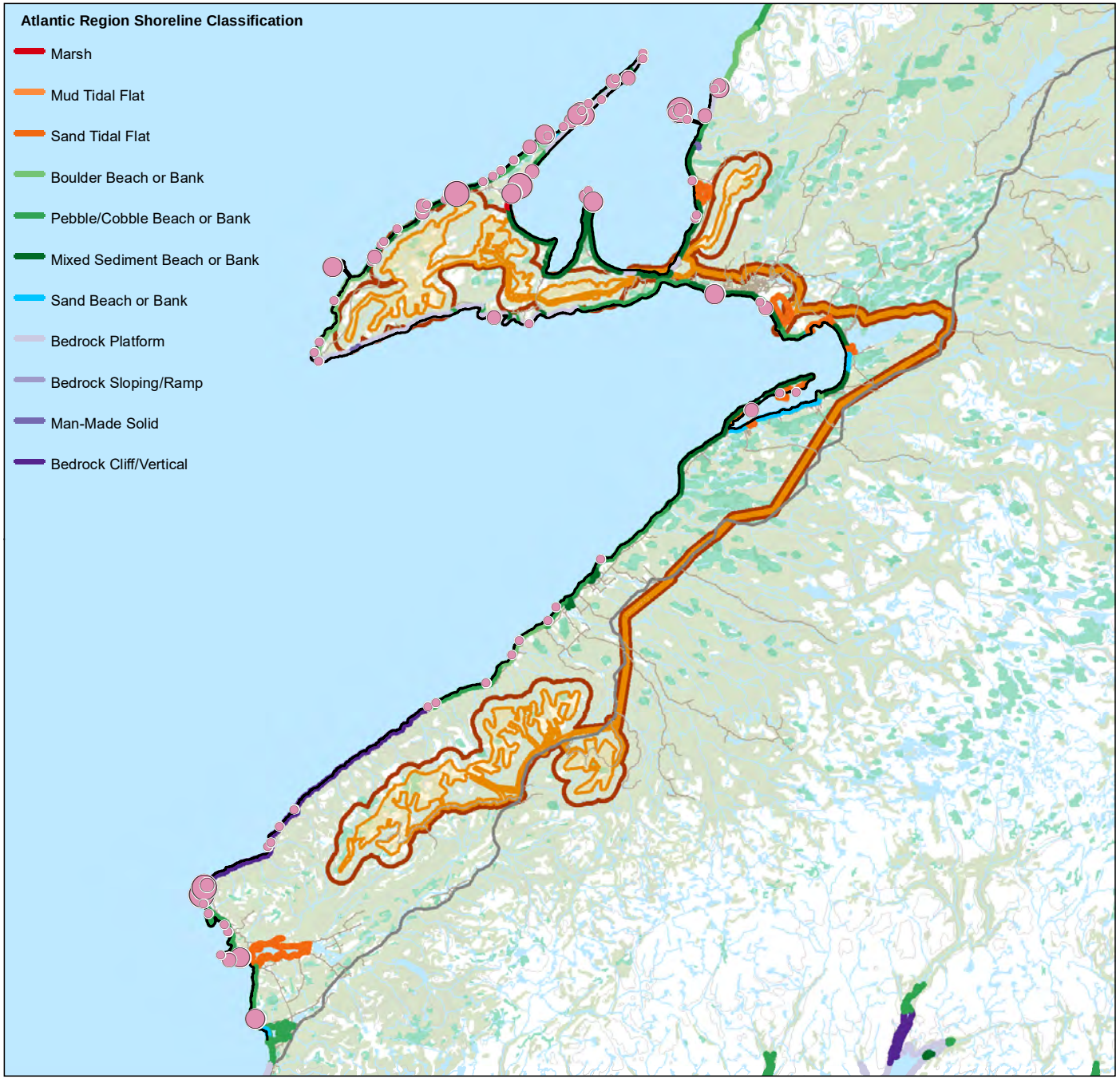
Client/Project
World Energy GH2
Project Nujio'qonik

121417233_045

Figure No.
4.4

Title
Aerial Coastal Survey - Winter 2023
Species: Iceland Gull

V:\1214\active\121417233\03_data\gis_cad\gis_data\mapping\mxd\general\Birds\121417233_045_Fig_4.4_Seabird_Aerial_Survey_2023_ICGU.mxd Revised: 2023-08-01 By: acuff



Stantec

Long-tailed Duck

- 1 - 4
- 5 - 10
- 11 - 30
- 31 - 70
- Aerial Coastal Survey Transect (250 m from shore)
- Local Assessment Area

Proposed Project Features

- Project Area

Other Features

- Trans-Canada Highway
- Road
- Contour (100m)
- Watercourse
- Waterbody
- Wetland
- Forested Area

N

0 10 20 km

(At original document size of 8.5x11)
1:700,000

Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: Stantec
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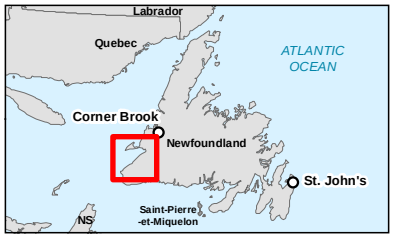


Project Location
Stephenville
NL

Prepared by AC/NW on 2023-06-15
QR by AW on 2023-06-26

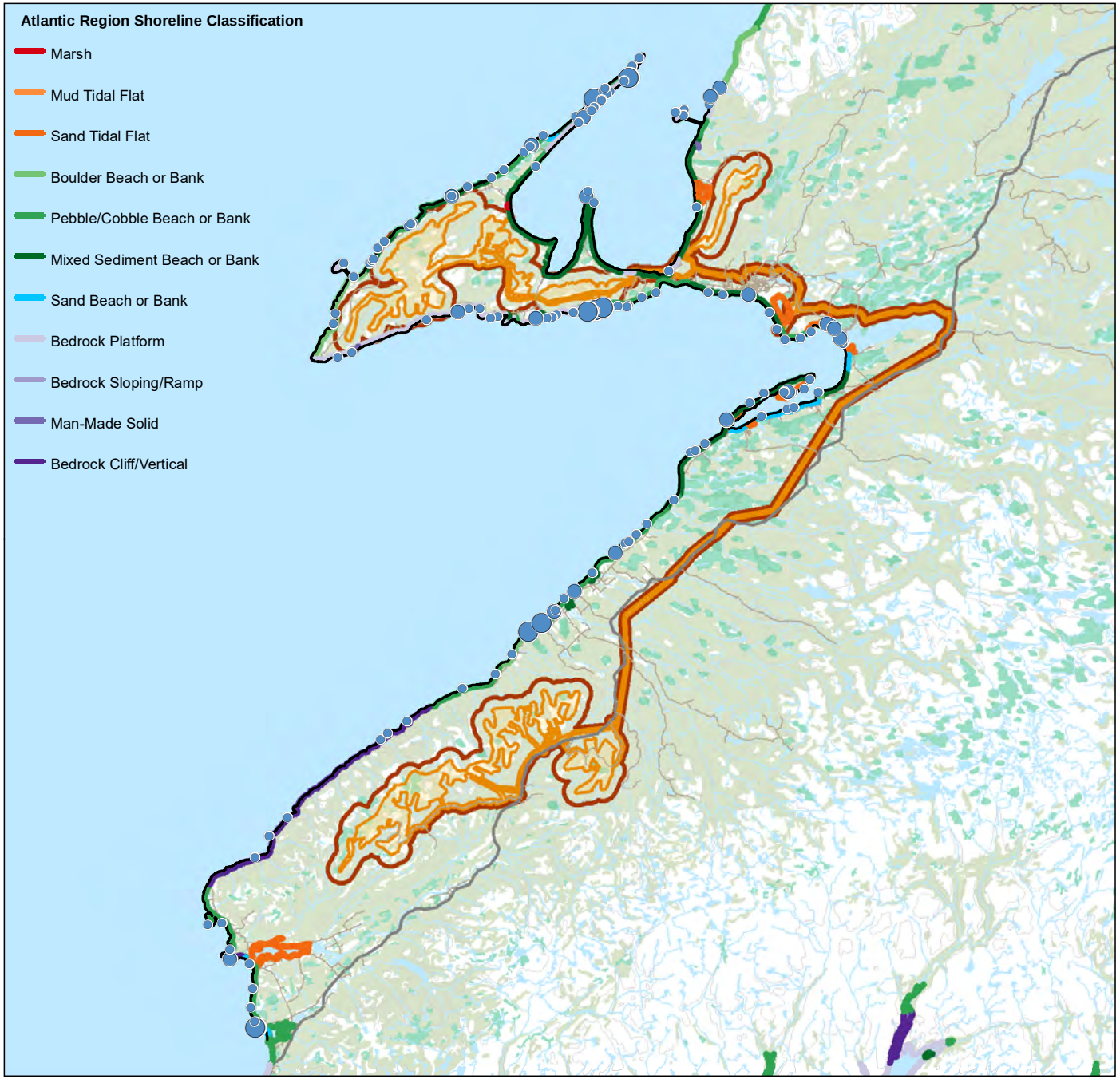
Client/Project
World Energy GH2
Project Nujio'qonik

121417233_045

Figure No.
4.4

Title
Aerial Coastal Survey - Winter 2023
Species: Long-tailed Duck

V:\1214\active\121417233\03_data\gis_cad\gis_data\mapping\mxd\general\Birds\121417233_045_Fig_4.4_Seabird_Aerial_Survey_2023_LTDU.mxd Revised: 2023-08-01 By: acuff



Stantec

Red-breasted Merganser

- 1 - 4
- 5 - 10
- 11 - 30
- Aerial Coastal Survey Transect (250 m from shore)
- Local Assessment Area

Proposed Project Features

- Project Area

Other Features

- Trans-Canada Highway
- Road
- Contour (100m)
- Watercourse
- Waterbody
- Wetland
- Forested Area

N

0 10 20 km

(At original document size of 8.5x11)
1:700,000

Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
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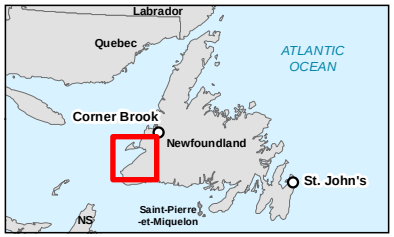

Project Location
Stephenville
NL

Prepared by AC/NW on 2023-06-15
QR by AW on 2023-06-26

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_045

Figure No.
4.4

Title
Aerial Coastal Survey - Winter 2023
Species: Red-breasted Merganser

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The winter coastal waterbird surveys were flown on February 7 and March 14, 2023, starting at approximately 9:00 am at the southern end of the route and finishing approximately 4 hours later, with a 30-minute refueling stop in Stephenville. Surveys were flown at an approximate altitude of 80 m and speed of 120 km/h. The route ran approximately 250 m from the coast, and species were recorded up to 250 m away from the flight path, covering a 500 m wide transect.

During the surveys, observers called out the species and number of birds observed on their side of the aircraft as they were encountered. Observations and times were recorded using a dictaphone or entered into an iPhone equipped with a custom application.

4.2.2.3 Winter Harlequin Duck/Purple Sandpiper Aerial Survey

Winter Harlequin Duck/Purple Sandpiper aerial surveys were conducted along the same route as the winter coastal waterbird aerial surveys using the same equipment and methods; however, the flight parameters for the survey were altered to increase the probability of observing Harlequin Ducks and Purple Sandpipers. To increase detectability, surveys were flown at 30 m altitude and at a speed of between 80 and 100 km/h. The helicopter was flown parallel to the coast approximately 100 m from the shore.

The winter Harlequin Duck/Purple Sandpiper aerial surveys were flown on February 8 and March 14, 2023, starting at the north end of the coastal transect. On February 8, the entire survey route was completed but the March 14 survey was cut short due to changes in weather conditions and limits of pilot flying hours. Only the area between Broad Cove to Stephenville was completed (Figure 4.4), which is approximately 60% of the entire route.

4.3 Results

This section summarizes the background information on avifauna within the Project Area and LAA, including areas of conservation concern and presence of SAR and SOCC. Results of 2023 winter coastal waterbird surveys and harlequin duck/purple sandpiper surveys are also discussed.

4.3.1 Areas of Conservation Concern

4.3.1.1 Atlantic Flyway

The province of Newfoundland and Labrador is situated within the Atlantic Flyway, a major migratory route for avifauna in North America. These migration "flyways" provide a corridor and staging habitats for landbirds and shorebirds migrating to and from all areas of North America (ABC 2022, Kirby et al. 2008). There is also an Atlantic Oceanic flyway, in which birds (mostly seabirds) migrate to and from nesting grounds and is almost entirely over the ocean (ABC 2022). Newfoundland and Labrador are considered launch points for each of these long-distance migration pathways. The LAA borders the Gulf of St. Lawrence, which is a part of both flyways; both land and seabirds breeding in western Newfoundland fly across the open water between the Island of Newfoundland and their next destination when migrating. There are many concentration points within or near the LAA that are bottlenecks for migrating birds, or places to congregate and stage before or after a long trans-oceanic flight. Many species groups tend to

congregate either at staging sites for feeding and resting, such as with waterfowl, shorebirds, and many landbirds (swallows, passerines), or by naturally following the best route to take advantage of key geographical features in the landscape that aid in their migration behaviour, such as eagles and hawks following high points of land to soar on thermal updrafts (Kirby et al. 2008). Some concentration areas in the LAA include: Cape St. George and Cape Anguille, which are used for stopovers by migrating landbirds; important coastal habitat such as Codroy Valley Provincial Park and Sandy Point, Flat Island that are used by shorebirds to forage and gather during migration; and land features like the Gravels Pond isthmus, which is a thin stretch of land that birds leaving and entering the Port au Port Peninsula tend to fly over (eBird 2023). The Island of Newfoundland has been identified by the Atlantic Flyway Shorebird Initiative as part of the Maritime Canada and Northeastern U.S. Focal Geographic area (ASFI 2016).

4.3.1.2 Important Bird and Biodiversity Areas

Three Important Bird and Biodiversity Areas (IBAs, BirdLife International 2023a) have been identified in southwestern Newfoundland, of which two are situated near or within the LAA (BSC 2017). These IBAs are NF040 Codroy Valley, between Searston, Saint Andrews, Doyles, and Upper Ferry, and NF041 Codroy Valley Estuary, which includes only the open waters and land up to high tide lines surrounding the estuary formed at the mouth of the Grand Codroy River. The Codroy Valley IBA in Upper Ferry is approximately 9 km from the Project Area, at the lower limit of the Codroy Wind Farm (Turbine 49). Similarly, the boundary for the Codroy Valley Estuary IBA lies approximately 8 km from the closest Project Area.

The Codroy Valley IBA is characterized by balsam fir forests mixed with yellow birch and mountain maple (BSC 2017), and contains parcels of agricultural land, as well as some small freshwater bodies, namely Shoal Pond and Loch Lomond. These ponds are the only confirmed breeding location for Pied-billed Grebes in western Newfoundland (eBird 2022). Two restricted-range forest birds are found in this IBA. The Red Crossbill, (a SAR) is found in some coniferous sections of the region, while the Ovenbird (*Seiurus aurocapilla* ssp. *Furvoir*) prefers deciduous forests. The Codroy Valley IBA also supports birds that are uncommon or absent in the rest of Newfoundland such as Ruby-throated Hummingbird (*Archilochus colubris*), Gray Catbird (*Dumetella carolinensis*), Red-eyed Vireo (*Vireo olivaceus*), Rose-breasted Grosbeak (*Pheucticus ludovicianus*) and Bobolink (*Dolichonyx oryzivorus*). Many woodland warbler species such as Magnolia Warbler (*Setophaga magnolia*), Black-throated Green Warbler (*Setophaga virens*), Bay-breasted Warbler (*Setophaga castanea*), Cape May Warbler (*Setophaga tigrine*) and Blackburnian Warbler (*Setophaga fusca*) are also found in Codroy Valley (BSC 2017).

The Codroy Valley Estuary IBA is an important staging and breeding ground for many species of waterfowl, including Northern Shoveler (*Anas clypeata*), Blue-winged Teal (*Spatula discors*), Wood Duck (*Aix sponsa*), and American Wigeon (*Mareca americana)*, all of which are absent or relatively rare in the rest of the Island of Newfoundland. In surveys between 1984 and 1995, the average number of Canada Geese (*Branta canadensis*) seen at the estuary was more than 1% of the population in all of Canada, making this site a very important wetland for the species. The rich eelgrass (*Zostera marina)* beds growing in the estuary are so important to staging Canada Geese that the Codroy Valley Estuary has been designated as a Ramsar Wetland of International Importance since 1987 (RSIS 1993; SAM 2019).

Where the Grand Codroy River empties into the Atlantic Ocean, a sandbar is formed, half of which is included in the IBA. This entire sandbar is known as Codroy Valley Provincial Park and is a known nesting ground for Piping Plovers (*Charadrius melodus*; Parks NL 2023).

4.3.1.3 Bird Conservation Regions

To plan, implement and evaluate conservation actions across North America, partners from the United States, Mexico, and Canada developed a common, ecologically based set of ecoregions appropriate to birds throughout North America, called Bird Conservation Regions (BCRs) or Marine Biogeographic Units (MBUs) (BSC and NABCI 2014). Plans were developed for each BCR (BCR Plan) to support Canada's commitments under the Migratory Birds Convention, help identify priority projects for biodiversity and ecosystem conservation, help assess project effects under the *Canadian Environmental Assessment Act* (now *Impact Assessment Act*), identify potential areas for acquisition or protection, and to guide conservation actions outside of Canada (EC 2017).

BCR Plans identify priority species from all regularly occurring bird species in each BCR/MBU subregion. Species may be identified as priorities because they are vulnerable due to population size, distribution, population trend, abundance and threats (EC 2017). However, widely distributed and abundant species may also be included because they are representative of the national or regional avifauna and/or because they have a large proportion of their range and/or continental population in the subregion (EC 2017).

Boreal Softwood Shield

The Project is located within BCR 8, which encompasses all of the Island of Newfoundland. BCR 8 is largely forested consisting of conifer stands (black spruce, and balsam fir), mixed wood stands with broadleaf trees (white and yellow birch), upland habitat, rock outcrops and barrens, numerous mid-sized lakes, wetlands and coastal landforms (EC 2013). The eastern coastlines and shores in BCR 8 are critical for seabird breeding and wintering areas year-round and upland habitats support a diversity of landbirds (EC 2013).

There are 37 priority species in BCR 8 on the Island of Newfoundland, most of which are landbirds (20 species). There are also 6 shorebirds, 3 waterbirds, and 8 waterfowl species. These species are primarily associated with wetland, coniferous forest, coastal and riparian habitats. Priority species in BCR 8 on the Island of Newfoundland are shown in Table 4.4.

Marine Biogeographic Unit 12: Gulf of St. Lawrence

MBU 12 overlaps the Project. MBU 12 within the Gulf of St. Lawrence, is one of the largest and most productive marine ecosystems in Canada (EC 2013). The portion of MBU 12 that encompasses the western coast of Newfoundland spans the Newfoundland Shelf waters that enter the Gulf of St. Lawrence on the eastern side of the Cabot Strait, continuing northeast along the west coast of the island.

There are 29 priority species in MBU 12: 12 shorebirds, 9 waterbirds, and 8 waterfowl species (EC 2013). Twenty-three of these species are associated with the intertidal coast whereas the other 16 occur in marine waters (EC 2013). Priority species in MBU 12 are shown in Table 4.4.

Table 4.4 Bird Species Identified as Priority Species in Bird Conservation Region 8 and Marine Biogeographic Unit 12 on the Island of Newfoundland

Priority species in BCR 8	Priority species in MBU 12	Species	Scientific Name	Bird Group	Provincial Status (NL ESA)	Federal Status (SARA)
Y	N	Barn Swallow	*Hirundo rustica*	Landbirds	VUL	THR
Y	N	Black-backed Woodpecker	*Picoides arcticus*	Landbirds	-	-
Y	N	Black-throated Green Warbler	*Setophaga virens*	Landbirds	-	-
Y	N	Bobolink	*Dolichonyx oryzivorus*	Landbirds	VUL	THR
Y	N	Chimney Swift	*Chaetura pelagica*	Landbirds	THR	THR
Y	N	Common Nighthawk	*Chordeiles minor*	Landbirds	THR	THR
Y	N	Gray-cheeked Thrush	*Catharus minimus*	Landbirds	THR	
Y	N	Magnolia Warbler	*Setophaga magnolia*	Landbirds	-	-
Y	N	Mourning Warbler	*Geothlypis philadelphia*	Landbirds	-	-
Y	N	Northern Hawk Owl	*Surnia ulula*	Landbirds	-	-
Y	N	Olive-sided Flycatcher	*Contopus cooperi*	Landbirds	THR	THR
Y	N	Peregrine Falcon	*Falco peregrinus*	Landbirds	VUL	SC
Y	N	Purple Finch	*Haemorhous purpureus*	Landbirds	-	-
Y	N	Red Crossbill	*Loxia curvirostra*	Landbirds	THR	THR
Y	N	Rusty Blackbird	*Euphagus carolinus*	Landbirds	VUL	SC
Y	N	Sharp-shinned Hawk	*Accipiter striatus*	Landbirds	-	-
Y	N	Short-eared Owl	*Asio flammeus*	Landbirds	VUL	SC
Y	N	Swamp Sparrow	*Melospiza georgiana*	Landbirds	-	-
Y	N	White-throated Sparrow	*Zonotrichia albicollis*	Landbirds	-	-
Y	N	Yellow-bellied Flycatcher	*Empidonax flaviventris*	Landbirds	-	-
Y	N	American Golden Plover	*Pluvialis dominica*	Shorebirds	-	-
N	Y	Black-bellied Plover	*Pluvialis squatarola*	Shorebirds	-	-

Table 4.4 Bird Species Identified as Priority Species in Bird Conservation Region 8 and Marine Biogeographic Unit 12 on the Island of Newfoundland

Priority species in BCR 8	Priority species in MBU 12	Species	Scientific Name	Bird Group	Provincial Status (NL ESA)	Federal Status (SARA)
N	Y	Dunlin	*Calidris alpina*	Shorebirds	-	-
Y	Y	Least Sandpiper	Calidris minutilla	Shorebirds	-	-
N	Y	Lesser Yellowlegs	*Tringa flavipes*	Shorebirds	THR	
Y	Y	Piping Plover	*Charadrius melodus*	Shorebirds	END	END
N	Y	Purple Sandpiper	*Calidris maritima*	Shorebirds	-	-
N	Y	Red Knot	*Calidris canutus*	Shorebirds	END	END
N	Y	Sanderling	*Calidris alba*	Shorebirds	-	-
Y	Y	Semipalmated Sandpiper	*Calidris pusilla*	Shorebirds	-	-
Y	Y	Whimbrel	*Numenius phaeopus*	Shorebirds	-	-
N	Y	White-rumped Sandpiper	*Calidris fuscicollis*	Shorebirds	-	-
N	Y	Willet	*Tringa semipalmata*	Shorebirds	-	-
Y	N	Wilson's Snipe	Gallinago delicata	Shorebirds	-	-
Y	N	American Bittern	*Botaurus lentiginosus*	Waterbirds	-	-
N	Y	Black-headed Gull	*Chroicocephalus ridibundus*	Waterbirds	-	-
Y	N	Common Loon	*Gavia immer*	Waterbirds	-	-
Y	Y	Common Tern	*Sterna hirundo*	Waterbirds	-	-
N	Y	Dovekie	*Alle alle*	Waterbirds	-	-
N	Y	Great Shearwater	*Ardenna gravis*	Waterbirds	-	-
N	Y	Horned Grebe	*Podiceps auritus*	Waterbirds	-	SC/END
N	Y	Ivory Gull	*Pagophila eburnea*	Waterbirds	END	END
N	Y	Northern Gannet	Morus bassanus	Waterbirds	-	-
N	Y	Red-necked Grebe	*Podiceps grisegena*	Waterbirds	-	-

Table 4.4 Bird Species Identified as Priority Species in Bird Conservation Region 8 and Marine Biogeographic Unit 12 on the Island of Newfoundland

Priority species in BCR 8	Priority species in MBU 12	Species	Scientific Name	Bird Group	Provincial Status (NL ESA)	Federal Status (SARA)
N	Y	Sooty Shearwater	*Ardenna grisea*	Waterbirds	-	-
Y	Y	American Black Duck	*Anas rubripes*	Waterfowl	-	-
N	Y	Barrow's Goldeneye	*Bucephala islandica*	Waterfowl	VUL	SC
N	Y	Black Scoter	*Melanitta americana*	Waterfowl	-	-
Y	Y	Canada Goose	*Branta canadensis*	Waterfowl	-	-
N	Y	Common Eider	*Somateria mollissima*	Waterfowl	-	-
Y	Y	Common Goldeneye	*Bucephala clangula*	Waterfowl	-	-
Y	N	Common Merganser	*Mergus merganser*	Waterfowl	-	-
Y	N	Green-winged Teal	*Anas carolinensis*	Waterfowl	-	-
Y	Y	Harlequin Duck	*Histrionicus histrionicus*	Waterfowl	VUL	SC
N	Y	Long-tailed Duck	*Clangula hyemalis*	Waterfowl	-	-
Y	N	Ring-necked Duck	*Aythya collaris*	Waterfowl	-	-
Y	N	Surf Scoter	*Melanitta perspicillata*	Waterfowl	-	-

Notes:
Y – yes; N – no
VUL – Vulnerable under NL ESA
THR – Threatened under SARA or NL ESA
END – Endangered under SARA or NL ESA
SC – Special Concern under SARA

4.3.2 Species at Risk

There were 21 SAR identified in the background review that may be present within the Project Area or LAA during the breeding season, spring/fall migration or in winter. These species are discussed in Table 4.5, along with their habitat requirements and presence within the Project Area and LAA as presented in Figure 4.5.

4.3.3 Species of Conservation Concern

There were 19 SOCC identified in the background review with records in the LAA. These species are discussed in Table 4.6, along with their habitat requirements and presence within the Project Area and LAA.

Table 4.5 Species at Risk that may be Present Within the Project Area and / or LAA

Common Name	Scientific Name	NL ESA	SARA	S Rank	Habitat Description	Presence in Project Area
Bank Swallow	*Riparia riparia*	THR	THR	S1S2B, SUM	Bank Swallow is an aerial insectivore that constructs nests in vertical banks, typically along watercourses and in coastal areas. Bank Swallows forage in open habitats including open water, wetlands, grasslands, agricultural areas, shrublands, and occasionally over wooded areas (SSAC 2009a).	Bank Swallow is a common breeder within areas of suitable habitat throughout the Project Area. Colonies are numerous in southwestern Newfoundland; they are found on Port au Port Peninsula, Stephenville, Stephenville Crossing, throughout the Flat Bay and Jeffrey's regions, and in coastal areas adjacent to the proposed wind farms (eBird 2022).
Barn Swallow	*Hirundo rustica*	VUL	THR	S2B, SUM	The Barn Swallow is an aerial insectivore that attaches its nests to structures such as barns, bridges and culverts. Before European colonization of North America, Barn Swallows nested on cliffs, rock overhangs, and caves (COSEWIC 2021a). They forage over open areas.	This species is present in the LAA in small numbers where suitable nesting habitat is present. There are 12 eBird records of Barn Swallow in 6 years (from 2003 to 2022 and no confirmed nesting locations within the Project Area or LAA (eBird 2022).
Barrow's Goldeneye – Eastern population	*Bucephala islandica*	VUL	SC	-	Barrow's Goldeneye is a medium sized seabird. It nests in tree cavities and exhibits strong fidelity to breeding and wintering areas. In winter, this diving duck primarily feeds on molluscs (Schmelzer 2006).	Barrow's Goldeneye is not confirmed to breed within the Project Area. Most of the population winters in the St. Lawrence Estuary and Gulf of St. Lawrence but may use coastal areas within the Project Area for molting or in winter (EC 2011). There are 156 eBird records between 2003-and 2022, most of which were observed between November and March near the Port au Port Peninsula and Flat Bay (eBird 2022).

Table 4.5 Species at Risk that may be Present Within the Project Area and / or LAA

Common Name	Scientific Name	NL ESA	SARA	S Rank	Habitat Description	Presence in Project Area
Bobolink	*Dolichonyx oryzivorus*	VUL	THR	S1B, SUM	Bobolink is a songbird that nests in grasslands and hayfields. This species is rare in Newfoundland, but can be found in hayfields, farmlands, salt marshes, and grassy fields (SSAC 2009b).	Bobolink is very rare within the Project Area. There is very little suitable habitat available, and Newfoundland is at the edge of the species range (SSAC 2009b). There is only one record from eBird within the Project Area between 2003-2022 (eBird 2022).
Common Nighthawk	*Chordeiles minor*	THR	THR	SNA	Common Nighthawk is an aerial insectivore that is active at dawn and dusk. It nests on bare ground and is found in sand dunes, forest openings, burned areas, rocky/sandy habitats, grasslands, barrens and less commonly mixed and coniferous forest (NL BBA 2022b). In other parts of the species' range, Common Nighthawks nest on gravel covered rooftops.	Common Nighthawks have not been confirmed nesting in Newfoundland, but there are eBird records for the island, which suggest small numbers of breeding birds (eBird 2022). Common Nighthawk may breed in the Codroy Valley region in very small numbers.
Evening Grosbeak	*Coccothraustes vespertinus*	VUL	SC	S4	Evening Grosbeak is a brightly colored finch that is found in boreal forests across Canada. It feeds mainly on invertebrates, including the Spruce Budworm (*Choristoneura fumiferana*), a forest pest that experiences cyclical outbreaks. Evening Grosbeak is a nomadic species with irruptive migration (COSEWIC 2016a). Evening Grosbeaks live in large flocks during the non-breeding season. During breeding season, Evening Grosbeaks prefer forested habitats that are dominated by fir species and white spruce.	Evening Grosbeak is a year-round resident in Newfoundland, but numbers vary annually due to the irruptive nature of the species. Most of the eBird records are from winter (November-February) but there are a small number of breeding season records in eBird and the NLBBA within and near the Stephenville area (eBird 2022).

Table 4.5 Species at Risk that may be Present Within the Project Area and / or LAA

Common Name	Scientific Name	NL ESA	SARA	S Rank	Habitat Description	Presence in Project Area
Gray-cheeked Thrush	*Catharus minimus minimus*	VUL	-	-	Gray-cheeked Thrush is a medium sized migratory songbird that is found in conifer scrub habitat along the coast, regenerating fir stands (including regenerating clearcuts), and mature balsam fir forests. The subspecies *C. m minimus* is indigenous to the island of Newfoundland. Gray-cheeked Thrush populations have disappeared from most coastal and low-elevation areas; the remaining population is concentrated in higher elevation habitats (NL BBA 2022b).	There is only one breeding season record of Gray-cheeked Thrush in eBird within the Project Area and no NLBBA records (eBird 2022; NL BBA 2022a). However, given the presence of suitable habitat, Gray-cheeked Thrush may occur in higher elevation forested habitats within the LAA (D. Whitaker pers. comm.).
Harlequin Duck	*Histrionicus histrionicus*	VUL	SC	-	The Harlequin Duck is a small seabird that nests in fast flowing inland watercourses and winters along rocky coastlines (EC 2007).	Although Harlequin Duck has not been confirmed breeding within the Project Area, individuals and breeding pairs have been observed during the breeding season (eBird 2022). Harlequin Ducks are known to winter within suitable habitat along coastal areas within the LAA, but it is not known to support large numbers (Section 4.3.6).
Horned Grebe – Western population and Magdalen Islands population	*Podiceps auritus*	-	SC/END	-	The Horned Grebe is a small waterbird that primarily breeds in freshwater ponds, marshes of shallow bays on lakes (COSEWIC 2009). Its breeding range includes British Columbia, Yukon, the Mackenzie River Valley in the Northwest Territories, the extreme southern part of Nunavut, the Prairies, northwestern Ontario and the Magdalen Islands (Quebec). Horned Grebes winter in greatest numbers in coastal areas (COSEWIC 2009).	The Horned Grebe does not breed in Newfoundland but is present in fall and winter (mostly November-December) records in coastal areas within the Project Area (eBird 2022). It is unknown whether these individuals are from the western population (Special Concern) or the Magdalen Islands population (Endangered).

Table 4.5 Species at Risk that may be Present Within the Project Area and / or LAA

Common Name	Scientific Name	NL ESA	SARA	S Rank	Habitat Description	Presence in Project Area
Hudsonian Godwit	*Limosa haemastica*	THR			Hudsonian Godwit is a large, long-legged shorebird. It has one of the longest migration routes of any Western Hemisphere shorebird (COSEWIC 2019). Hudsonian Godwit breeds in sub-Arctic and boreal regions of Canada and Alaska and winters in South America (COSEWIC 2019).	Hudsonian Godwits are a rare but regular fall migrant within the Project Area. eBird records are concentrated in the Port au Port Peninsula, Stephenville Crossing and Sandy Point areas (eBird 2022).
Ivory Gull	*Pagophila eburnea*	END	END	S1N, SUM	Ivory Gull is a medium sized gull with a circumpolar breeding distribution across the high arctic (COSEWIC 2006). The winter distribution is poorly understood but it is known to occur along the pack ice in Davis Strait, the Labrador Sea, Strait of Belle Isle, and northern Gulf of St. Lawrence and along the eastern shore of NL (COSEWIC 2006).	This species is very rare within the Project Area in winter. There are two confirmed sightings in the last 20 years, both of which were in Stephenville Crossing (eBird 2022).
Leach's Storm-petrel	*Hydrobates leucorhous*	THR	THR	S4B, S4M	This nocturnal pelagic seabird nests in burrows on islands in the North Atlantic and North Pacific and winters at sea in the Southern Hemisphere (Pollet at al. 2021). There are 47 colonies of Leach's Storm-petrel on the island of Newfoundland (COSEWIC 2020a), and east coast of Newfoundland has the largest Leach's Storm-petrel colonies in the world (Robertson et al. 2006).	This species does not breed in western Newfoundland, but nearby at Wreck Island off the south coast, and at St. Paul Island, Nova Scotia. May occur in coastal waters off the LAA during fall migration (eBird 2022), and near land during strong onshore wind events (d'Entremont et al. 2021; Stantec unpublished data).

Table 4.5 Species at Risk that may be Present Within the Project Area and / or LAA

Common Name	Scientific Name	NL ESA	SARA	S Rank	Habitat Description	Presence in Project Area
Lesser Yellowlegs	*Tringa flavipes*	THR		S3M	Lesser Yellowlegs is a medium sized shorebird that breeds primarily in boreal and taiga wetlands. Its breeding range in Canada extends from northern Yukon to western Labrador and it winters in South America (COSEWIC 2020b).	This species does not breed or winter in Newfoundland, but is present in coastal areas during fall, and less frequently spring migration. There are almost 200 records of this species from eBird (2003-2022) within the Project Area, concentrated in the Port au Port Peninsula. Based on eBird and ACSS data, the key period for fall stopovers for this species is August and September (eBird 2022; ECCC 2020).
Olive-sided Flycatcher	*Contopus cooperi*	THR	THR	S3B, SUM	Olive-sided Flycatcher is a medium sized migratory songbird that breeds throughout most of forested Canada (COSEWIC 2018). Olive-sided Flycatchers breed in edge habitats, such as coniferous forests with open habitats, wetlands or disturbed forest (NL BBA 2022b).	Olive-sided Flycatcher is known to breed within areas of suitable habitat in western Newfoundland, including the Project Area. There are 125 records in eBird from 2003-2022 in the Project Area in both the Port au Port Peninsula and Codroy Valley (eBird 2022).
Peregrine Falcon	*Falco peregrinus*	VUL	-	-	Peregrine Falcon is a medium sized falcon that breeds in all Canadian provinces and territories except Prince Edward Island (EC 2015). Peregrine Falcons nest on cliff ledges along the coast or on rivers (NL BBA 2022b).	There are no confirmed breeding records within the Project Area, and only two eBird sightings within the breeding season between 2003-2020. There are an additional eight records of Peregrine Falcon during fall (eBird 2022).
Piping Plover	*Charadrius melodus*	END	END	S1B, SUM	The Piping Plover is a small shorebird that nests and feeds along sandy or gravelly coastal beaches in North America. Piping Plovers winter along the southern Atlantic coast of the Unites States and in the Caribbean (EC 2012).	Piping Plovers nest in habitats with wide, sparsely vegetated sand or gravel beaches (NL BBA 2022b). There are several known and possible breeding sites for Piping Plover near Stephenville, Stephenville Crossing, Black Banks Beach, Sandy Point and Codroy Valley Provincial Park (eBird 2022). Critical habitat for Piping Plover has been identified by ECCC within the LAA at five locations between Stephenville and Flat Bay (EC 2012; Figure 4.5).

Table 4.5 Species at Risk that may be Present Within the Project Area and / or LAA

Common Name	Scientific Name	NL ESA	SARA	S Rank	Habitat Description	Presence in Project Area
Red Crossbill (Type 8)	*Loxia curvirostra percna*	THR	THR	-	Red Crossbill is a medium sized finch that uses their crossed bill to feed on conifer cones. They are associated with mature conifer forests (COSEWIC 2016b). Red Crossbills in Newfoundland have their own subspecific designation (*L. c. percna*, "Type 8").	This subspecies is primarily restricted to the island of Newfoundland, where it is found year-round in forests of red and white pine, mature black spruce, balsam fir, and white spruce. This species may be present in areas of suitable habitat throughout the Project Area and LAA, including the Codroy Valley. There are 23 eBird records of this species between 2003-2022 within the LAA (eBird 2022).
Red Knot – Southeastern USA / Gulf of Mexico / Caribbean wintering population and Tierra del Fuego / Patagonia wintering population	*Calidris canutus rufa*	END/ SC	END	S2M	Red Knot is a medium sized shorebird that breeds in the Arctic and winters in South America. This subspecies passes through western Newfoundland during fall migration (Garland and Thomas 2009).	Areas within the Port au Port Peninsula, Stephenville, Stephenville Crossing and Sandy Point are used as stopover locations for southbound Red Knots. Most of the observations are from August to October (eBird 2022).
Red-necked Phalarope	*Phalaropus lobatus*	VUL	-	-	Red-necked Phalarope is a medium sized shorebird, which breeds continuously along the coast from Alaska to Labrador and winters primarily off the coasts of Ecuador, Peru and Chile (ECCC 2022).	This species is occasionally observed in small numbers during fall migration within the LAA (eBird 2022). This includes the Port au Port Peninsula, Stephenville Crossing and Sandy Point.
Rusty Blackbird	*Euphagus carolinus*	VUL	SC	S2S3B, SUM	Rusty Blackbird is a medium sized blackbird that breeds in forested wetlands in all Canadian provinces and territories (Wildlife Division 2020).	The distribution of Rusty Blackbird in Newfoundland is not well understood, but there are many records of this species within the breeding season (eBird 2022). This species may breed in areas with suitable habitat in the Project Area and LAA, including the Stephenville area and Anguille Mountains (eBird 2022).

Table 4.5 Species at Risk that may be Present Within the Project Area and / or LAA

Common Name	Scientific Name	NL ESA	SARA	S Rank	Habitat Description	Presence in Project Area
Short-eared Owl	*Asio flammeus*	VUL	SC	S3B, SUM	Short-eared Owls are medium sized owls that are most often active at dawn and dusk. They are found in open habitats including tundra, grasslands, wetlands and pastures (NL BBA 2022b).	There are occasional records of this species in the Port au Port Peninsula and Stephenville area. However, this species is nomadic so could be present in areas of suitable habitat (COSEWIC 2021b). There are records of Short-eared Owls at Shoal Point on the Port au Port Peninsula, Indian Head Park in Stephenville, Cape Anguille, and the Codroy Valley (eBird 2022).

Notes:

VUL – Vulnerable under NL ESA

THR – Threatened under SARA or NL ESA

END – Endangered under SARA or NL ESA

SC – Special Concern under SARA

S1 – Critically imperiled in the province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the province.

S2 – Imperiled in the province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the province.

S3 – Vulnerable in the province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.

S4 – Apparently Secure – Uncommon but not rare; some cause for long-term concern due to declines or other factors.

S#S# Range Rank – A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species or community. Ranges cannot skip more than one rank (e.g., SU is used rather than S1S4).

Qualifiers:

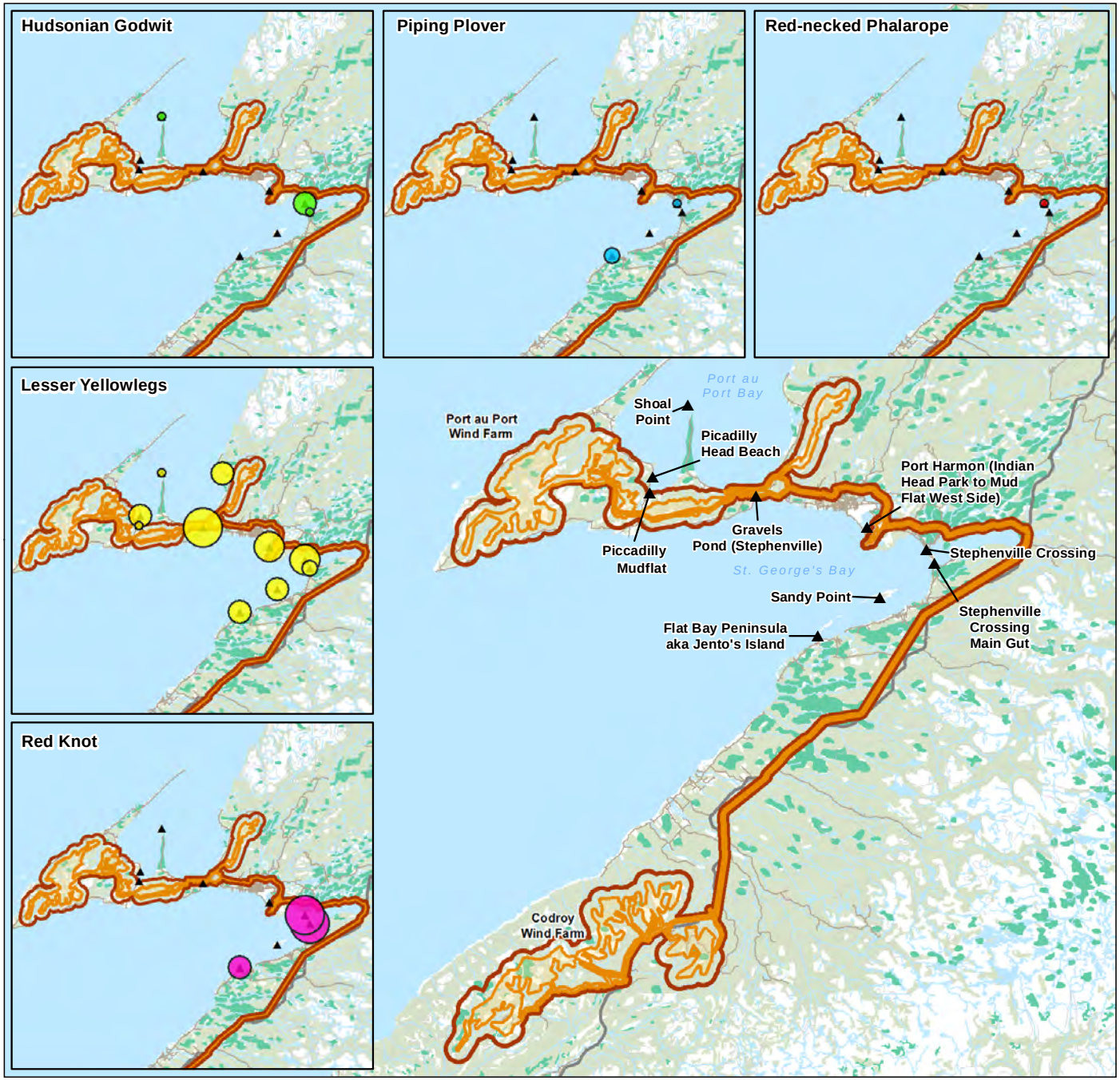
B – Breeding – Conservation status refers to the breeding population of the species in the province.

SU – Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

N – Conservation status refers to the non-breeding population of the species in the province.

M – Migrant species occurring regularly on migration at particular staging areas or concentration spots where the species might warrant conservation attention. Conservation status refers to the aggregating transient population of the species in the province.

? – Denotes inexact or uncertain numeric rank. (The ? qualifies the character immediately preceding it in the S-rank.)



Stantec

Median Annual Observations (2003 - 2019)

- 1 - 2
- 3 - 4
- 5 - 9
- 10 - 13
- 14 - 16

Observation Location

Species at Risk (SAR)

Common Name

- Hudsonian Godwit
- Lesser Yellowlegs
- Red Knot
- Piping Plover
- Red-necked Phalarope

- Local Assessment Area

Proposed Project Features

- Project Area

Other Features

- Trans-Canada Highway
- Road
- Watercourse
- Waterbody
- Wetland
- Forested Area

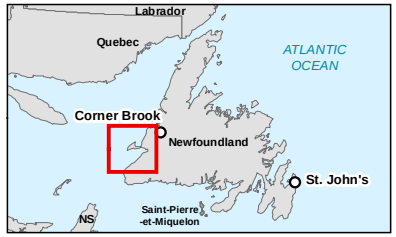
N

0 10 20 km

(At original document size of 8.5x11)
1:750,000

Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: ECCC Atlantic Canada Shorebird Survey, World Energy GH2, NRCan CanVec, OpenStreetMap
3. Background: NRCan CanVec



Project Location
Stephenville
NL

Prepared by NW on 2023-06-16
QR by AW on 2023-06-26

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_045a

Figure No.
4.5

Atlantic Canada Shorebird Survey Species At Risk (SAR) - 2003 - 2019

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Table 4.6 Species of Conservation Concern that may be Present within the Project Area and / or LAA

Common Name	Scientific Name	S Rank	Habitat Description	Presence in Project Area
Bay-breasted Warbler	*Setophaga castanea*	S2B, SUM	Bay-breasted Warbler is a neotropical migrant that breeds in boreal spruce-fir forests in eastern and central Canada (Venier et al 2020). It primarily feeds on insects and spiders, including spruce budworm (Venier et al 2020).	Bay-breasted Warbler is expected to breed in the Project Area or LAA within the Codroy Valley and the Stephenville area (eBird 2022) and potentially other areas with suitable habitat.
Blackburnian Warbler	*Setophaga fusca*	S2B, SUM	Blackburnian Warbler is a neotropical migrant that breeds in coniferous and mixed woodland from central Alberta and Manitoba to Newfoundland (Morse 2020). It primarily feeds on insects, including spruce budworm.	Within the Project Area and LAA, there are five eBird records of Blackburnian Warbler in the Stephenville area during the breeding season and the species is known to breed within the Codroy Valley (eBird 2022).
Black-headed Gull	*Chroicocephalus ridibundus*	S1B, S2N, SUM	Black-headed Gull primarily breeds outside of North America but is a rare, regular visitor (Burger et al. 2020) that historically bred across the island of Newfoundland.	Recent breeding records for this species in the LAA are restricted to a small colony nesting in the Stephenville Crossing estuary (eBird 2022).
Cape May Warbler	*Setophaga tigrina*	S2B, SUM	Cape May Warbler is a small insectivorous songbird that breeds in boreal coniferous forests across northern Canada where it feeds on spruce budworms (Baltz and Latta 2020). Cape May Warblers winter primarily in Central America.	Cape May Warbler is considered a rare breeder in NL, but its distribution is not well understood. There are a small number of eBird records within the Port au Port Peninsula during the breeding season (eBird 2022).
Caspian Tern	*Hydroprogne caspia*	S2B, SUM	Caspian Tern in a large fish-eating tern that typically nests in colonies; it has a scattered distribution throughout North America (Cuthbert and Wires 2020).	There are more than 200 eBird records of this species from the breeding season (2003-2023), including within the Project Area and LAA (eBird 2022) at Shoal Point on the Port au Port Peninsula and Stephenville Crossing.
Chipping Sparrow	*Spizella passerina*	S2S3B, SUM	Chipping Sparrow is widely distributed across North America and prefers open woodlands, edges of forest openings, edges of rivers and lakes, and brushy, weedy fields (Middleton 2020).	Chipping Sparrow reaches the edge of its range in southwestern NL (Middleton 2020). There are a small number of breeding season records for this species within the LAA, mainly near Stephenville (eBird 2022).
Gray Catbird	*Dumetella carolinensis*	S1?B, SUM	Gray Catbird is found in dense shrubby habitat across southern Canada (Smith et al 2020).	This species is rare in Newfoundland; there are only eight eBird records from 2003-2022 (eBird 2022). May be present in the LAA in the Stephenville area.

Table 4.6 Species of Conservation Concern that may be Present within the Project Area and / or LAA

Common Name	Scientific Name	S Rank	Habitat Description	Presence in Project Area
Great Blue Heron	*Ardea herodias*	S2B, SUM	Great Blue Heron is one of the most widely distributed wading birds in North America. Great Blue Heron may nest alone or in colonies and builds its nests in trees or shrubs near water (Vennesland and Butler 2020).	There are many breeding season records for Great Blue Heron in the Project Area and LAA (eBird 2022); this species may be nesting in the LAA in areas of suitable habitat.
Hooded Merganser	*Lophodytes cucullatus*	S2B, S3M	Hooded Merganser is a small diving duck that nests in tree cavities in the Pacific Northwest and eastern Canada (Dugger et al. 2020).	Hooded Merganser has been observed in pairs in the Project area during the summer (eBird 2022) but has not been confirmed to be breeding in the Project Area and LAA. This species is more likely to be encountered during fall migration (eBird 2022).
Least Flycatcher	*Empidonax minimus*	S2S3?B, SUM	Least Flycatcher is a small flycatcher that breeds in deciduous and mixed forests across most forested areas in Canada and reach the edge of their range in southwestern Newfoundland (Tarof and Briskie 2020).	Least Flycatcher is rare within the Project Area and LAA with only four eBird records within the breeding season from 2003 to 2022.
Manx Shearwater	*Puffinus puffinus*	S1B, S1M	This pelagic burrow-nesting seabird primarily breeds on small islands in Europe with one Canadian breeding location on islands off the Burin peninsula of Newfoundland (Lee et al. 2020).	Does not breed in the Project Area or LAA but may be present in shallow waters during fall migration (eBird 2022).
Northern Fulmar	*Fulmarus glacialis*	S1B, S1M	Northern Fulmar is a seabird that nests throughout arctic and boreal regions of the North Atlantic and winters at sea (Mallory et al. 2020). This species nests throughout the province of Newfoundland and Labrador in small numbers at seabird colonies, and historically bred in the Gulf of St. Lawrence (Stenhouse and Montevecchi 1999).	Northern Fulmar does not breed in the Project Area or LAA but may occasionally be present in nearby waters (eBird 2022), particularly in winter.

Table 4.6 Species of Conservation Concern that may be Present within the Project Area and / or LAA

Common Name	Scientific Name	S Rank	Habitat Description	Presence in Project Area
Northern Gannet	*Morus bassanus*	S2B, S2M	Northern Gannet is a plunge diving seabird that breeds in large colonies in the North Atlantic (Mowbray 2020). Three colonies (including the largest Northern Gannet colony in the world, Bonaventure Island) are in the Gulf of St. Lawrence west of the Project area. The closest Northern Gannet colony in Newfoundland is at Cape St. Mary's on the Avalon peninsula.	Northern Gannet does not breed within the Project Area or LAA but is regularly seen in the waters off the LAA (eBird 2022, Stantec unpublished data). The foraging ground for all three of the Gulf of St. Lawrence colonies includes the waters around western Newfoundland.
Northern Parula	*Setophaga americana*	S1B?, SUM	Northern Parula is a small warbler that breeds mature deciduous or mixedwood forests with bog or swamp habitat (Moldenhauer and Regelski 2020). In Canada, it breeds from southeastern Manitoba to the Maritime provinces (Moldenhauer and Regelski 2020).	This species is not expected to be present within the Project Area or LAA but may breed in the Codroy Valley (eBird 2022).
Pied-billed Grebe	*Podilymbus podiceps*	S1B, SUM	Pied-billed Grebe has a wide distribution in North America; in Canada it is found from British Columbia to Newfoundland (Muller and Storer 2020). During the breeding season this species is typically found in freshwater marshes or riparian habitats (Muller and Storer 2020).	There are no breeding records within the Project Area or LAA and is a rare fall and winter migrant (eBird 2022). The only breeding site for this species in Newfoundland and Labrador is at Shoal Pond in the Codroy Valley.
Red-winged Blackbird	*Agelaius phoeniceus*	S1B, SUM	Red-winged Blackbird is common throughout most of southern and central Canada in marsh and upland habitats (Yasukawa and Searcy 2020).	This species reaches the edge of its range in Newfoundland, and there are no recent breeding records in the LAA. However, there are numerous records of the species in the Stephenville area (eBird 2022).
Ruby-throated Hummingbird	*Archilochus colubris*	S1B, SUM	Ruby-throated Hummingbird is found in central and eastern Canada from Alberta to Prince Edward Island and Nova Scotia in woodlands, parks and gardens (Weidensaul et al. 2020).	Ruby-throated Hummingbirds are only known to consistently breed in two locations in the province of Newfoundland and Labrador, both of which are in the LAA. There are records near Stephenville and throughout the Codroy Valley (eBird 2022, NL BBA 2022a).

Table 4.6 Species of Conservation Concern that may be Present within the Project Area and / or LAA

Common Name	Scientific Name	S Rank	Habitat Description	Presence in Project Area
Veery	*Catharus fuscescens fuliginosus*	S2B, SUM	Veery is found in damp, deciduous forests with thick understory (Heckscher et al. 2020). Veery is a neotropical migrant thrush that breeds in Canada from interior British Columbia to the Maritime provinces and southwestern Newfoundland (Heckscher et al. 2020). This subspecies is indigenous to Newfoundland.	There are no records of this species within the Project Area or LAA from eBird between 2003-2022 (eBird 2022). This species is known to be present in the Codroy Valley but could be present elsewhere in suitable habitat, particularly the Anguille Mountains.
Willet	*Tringa semipalmata*	S1B, SUM	This shorebird nests in wetland habitats along the Atlantic coast from Newfoundland to Venezuela (Lowther et al. 2020)	One of the only breeding locations for Willet in Newfoundland and Labrador occurs within the LAA in the St. George's Bay Region (eBird 2022, NL BBA 2022a). Nesting locations include the salt marshes of the Stephenville Crossing estuary, Turf Point causeway in the community of Saint George's, and along the Flat Island/Sandy Point peninsula (eBird 2022).

Notes:

S-ranks

S1 – Critically imperiled in the province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the province.

S2 – Imperiled in the province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the province.

S3 – Vulnerable in the province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.

S4 – Apparently Secure – Uncommon but not rare; some cause for long-term concern due to declines or other factors.

S#S# Range Rank – A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species or community. Ranges cannot skip more than one rank (e.g., SU is used rather than S1S4).

Qualifiers:

B – Breeding – Conservation status refers to the breeding population of the species in the province.

SU – Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

N – Conservation status refers to the non-breeding population of the species in the province.

M – Migrant species occurring regularly on migration at particular staging areas or concentration spots where the species might warrant conservation attention. Conservation status refers to the aggregating transient population of the species in the province.

? – Denotes inexact or uncertain numeric rank (? Qualifies the character immediately preceding it in the S-rank).

4.3.4 Breeding Birds

4.3.4.1 Coastal Habitats

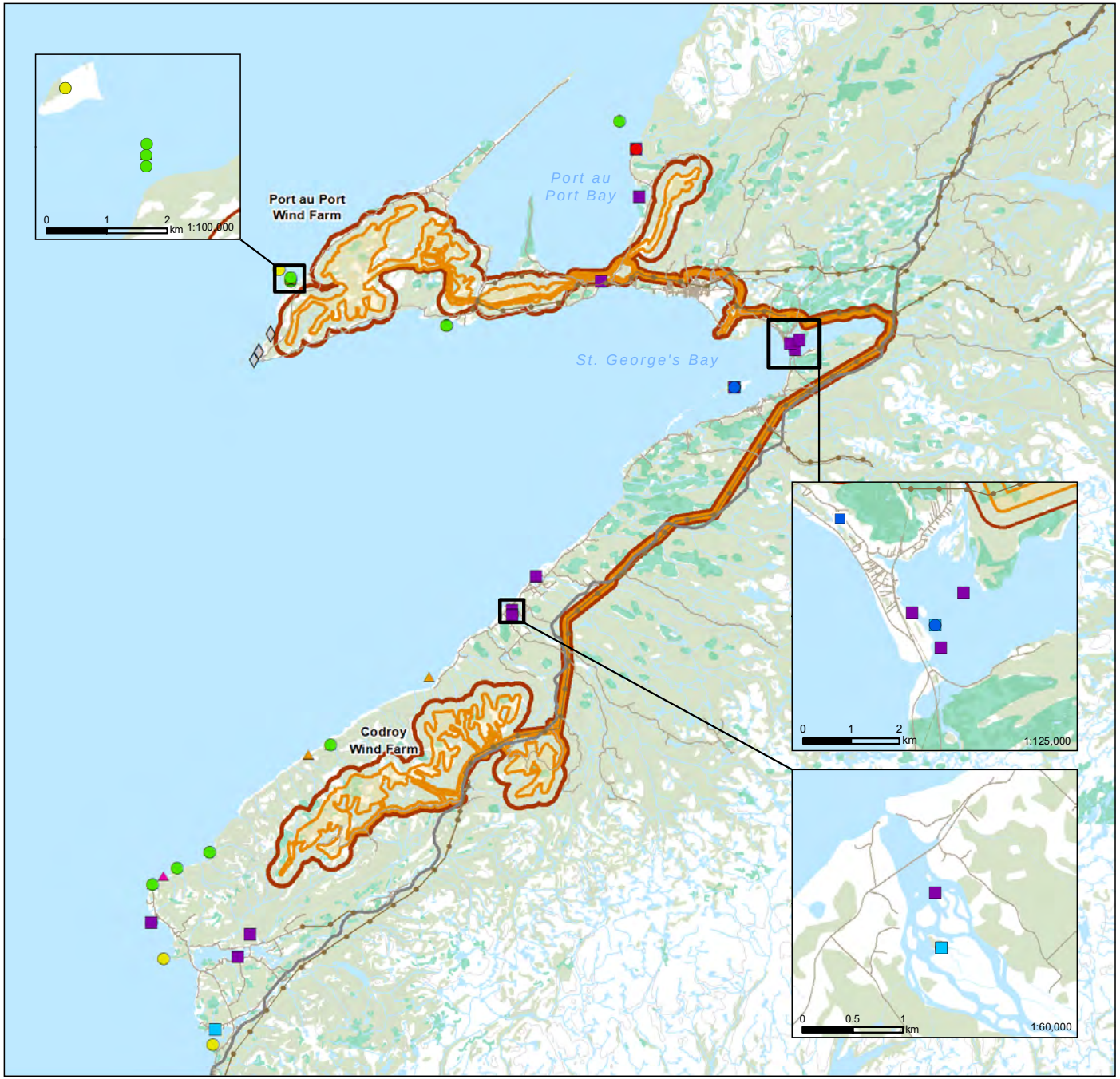
The coastal areas within the Project Area and LAA support many seabird, gull and tern colonies (Figure 4.6 and Figure 4.7). On the Port au Port Peninsula, the rocky cliffs at Cape St. George and the Boutte du Cap Park support a variety of breeding seabirds including Black-legged Kittiwakes (*Rissa tridactyla*), Black Guillemots (*Cepphus grylle*), Razorbills (*Alca torda*), Great Cormorants (*Phalacrocorax carbo*), and Double-crested Cormorants (*Nannopterum auritum*) (NL BBA 2022a; eBird 2022; ECCC 2020). The Port au Port peninsula contains the largest seabird breeding colony on the western coast of Newfoundland – Cape St. George/Big Cove – located on the southwestern tip of the peninsula. The Cape St. George/Big Cove area supports three distinct large colonies of Black-legged Kittiwakes (Figure 4.6), with an estimated population size of 15,000 to 20,000 individual kittiwakes (Montevecchi 2009). This area also supports colonies of Black Guillemots (hundreds of birds), Razorbills, Double-crested Cormorants (20-25 pairs), and Great Cormorants (200 pairs). The Port au Port peninsula is one of the only breeding locations for Great Cormorants in Newfoundland and this species is present throughout the entire year (eBird 2022)

The only other coastal seabird colony near the LAA is at Ship Cove, just south of Highlands in the Anguille Mountains (eBird 2022; ECCC 2020, Figure 4.6). This colony supports Black-legged Kittiwakes and Black Guillemots, but the number of pairs is unknown (eBird 2022, ECCC 2020, Figure 4.6).

Small coastal islands within the LAA such as Ship Island and Red Island provide nesting habitat for hundreds of Herring Gulls (*Larus argentatus*) and Great Black-backed Gulls (*Larus marinus*, Figure 4.6). A Ring-billed Gull (*Larus delawarensis*) nesting colony with approximately 650 pairs is present at Stephenville Crossing (eBird 2022; K. Marche pers. comm.). Gull colonies are also located at the mouth of the McKay's/Robinson's Rivers and within the LAA in the Codroy Valley (eBird 2022, ECCC 2020, Figure 4.6).

Common Tern (*Sterna hirundo)* and Arctic Tern (*Sterna paradisea*) are confirmed to nest on the Port au Port Peninsula and Caspian Tern, a SOCC, may be nesting in the same area (eBird 2022). Common Terns are the most abundant tern species within the LAA; large numbers nest at Long Point, Shoal Point, Gravel's Pond and Stephenville Crossing, and the mouth of Crabbe's River, along with small numbers of Arctic Terns (eBird 2022, Figure 4.6). Tern colonies are also present within the LAA in the Codroy Valley.

Coastal areas along the rocky coastline of the Port au Port Peninsula also support breeding Common Ravens (*Corvus corax;* eBird 2022) and seaducks, including eiders, scoters and Harlequin Ducks (Table 4.5) may use coastal waters for foraging during summer months (but do not breed within the LAA).



Stantec

Seabird Colony - Species

- Blacked-headed Gull
- Great Black-backed Gull
- Herring Gull
- Ring-billed Gull
- Arctic Tern
- Common Tern
- Unidentified Tern
- Great Cormorant
- Unidentified Cormorant
- Black-legged Kittiwake
- Terrestrial Bird Local Assessment Area

Proposed Project Features

- Project Area

Other Features

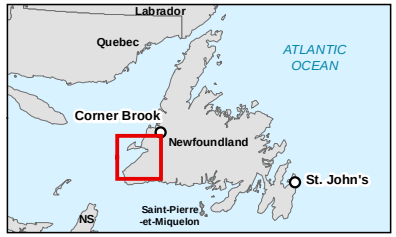
- Transmission Line, Existing
- Trans-Canada Highway
- Road
- Watercourse
- Waterbody
- Wetland
- Forested Area

N

0 10 20 km
(At original document size of 8.5x11)
1:700,000

Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: ECCC Atlantic Colonies - Density Analysis, World Energy GH2, NRCan CanVec, OpenStreetMap
3. Background: NRCan CanVec
4. Seabird colonies identified in the Atlantic Colonial Waterbird Database



Project Location
Stephenville
NL

Prepared by AC on 2023-06-14
QR by AW on 2023-06-26

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_076

Figure No.
4.6

Seabird Colonies Identified in the Atlantic Colonial Waterbird Database

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Stantec

Annual Median of Maximum Observations 2003-2021

- 1 - 25
- 26 - 75
- 76 - 150
- 151 - 300
- 301 - 600
- 601 - 1200

Terrestrial Bird Local Assessment Area

Proposed Project Features

Project Area

Hydrogen / Ammonia Plant Location

Transmission Line 230 kV

Other Features

Trans-Canada Highway

Road

Watercourse

Waterbody

Wetland

Forested Area

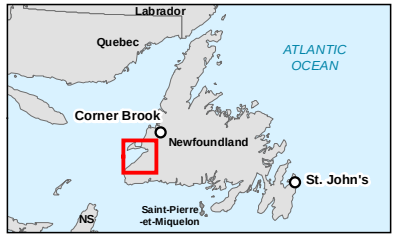
N

0 5 10 15 km

(At original document size of 8.5x11)
1:525,000

Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: eBird, World Energy GH2, NRCan CanVec, OpenStreetMap
3. Background: NRCan CanVec



Project Location
Stephenville
NL

Prepared by AC/NW on 2023-06-14
QR by AW on 2023-06-26

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_075a

Figure No.
4.7

Waterbird Breeding Density (eBird) 2003 - 2021

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4.3.4.2 Freshwater and Wetland Habitats

Freshwater and wetland habitats within the Project Area and LAA support breeding loons, waterfowl, shorebirds, herons and raptors. Common Loons (*Gavia immer*) nest in vegetation at the edge of small ponds, but their distribution within the Project Area and LAA is not well understood. There are many sightings of Common Loons within the LAA during the breeding season, so this species is likely nesting in freshwater lakes and ponds in the Project Area and LAA.

The Project Area and LAA supports a diversity of waterfowl species during the breeding season. Canada Goose is the only goose species that breeds In Newfoundland; it is very abundant in the entire Project Area, nesting in areas of suitable habitat throughout the Project Area and LAA. Mallard (*Anas platyrhynchos*), American Black Duck (*Anas rubripes*), Northern Pintail (*Anas acuta*), Green-winged Teal (*Anas crecca*), Ring-necked Duck (*Aythya collaris*), American Wigeon, Red-breasted Merganser (*Mergus serrator*) may be found in areas of appropriate freshwater marshes, ponds, lakes and rivers within the Project Area and LAA (NL BBA 2022a, eBird 2022). Other duck species including but not limited to Gadwall (*Mareca strepera*) and Northern Shoveler may also be present in small numbers within the Project Area and LAA. Common Goldeneye (*Bucephala clangula*) was once an abundant breeder (Noble 1919), but now is confirmed to nest at only one location in southwestern Newfoundland, a small pond near Stephenville Crossing called "Goldeneye Pond" (eBird 2022). Additional locations within the Project Area where groups of Common Goldeneye gather throughout the breeding season and are also considered possible breeding sites (NL BBA 2022a).

Three species of shorebirds are common within freshwater and wetland habitats in the Project Area and LAA including but not limited to wet meadows, bogs, wet thickets, swamps and marshes. Spotted Sandpipers (*Actitis macularius*) are abundant in the Project Area and LAA and eBird data show that this species is likely found breeding in most freshwater habitats (eBird 2022). There are also many breeding season records of Least Sandpiper (*Calidris minutilla*), particularly in the Port au Port Peninsula, Stephenville Crossing and Sandy Point areas (eBird 2022). Wilson's Snipe (*Gallinago delicata*) are abundant throughout the Project Area in marshes, wet meadows and bogs (eBird 2022).

Marsh habitats within the LAA support three marsh-nesting obligates – Sora (*Porzana carolina*), American Bittern (*Botaurus lentiginosus*), and Swamp Sparrow (*Melospiza georgiana*). Soras are a cryptic species that are difficult to observe and are often only heard singing at dawn or dusk, so their distribution is not well known. Within the Project Area and LAA, this species is expected to nest in marsh habitat, especially in the Codroy Valley, which is a historic nesting location (Godfrey 1986). American Bittern is found in marsh habitats with long grasses and cattails and is likely present in suitable habitat throughout the entire Project area, especially at Indian Head Park near Stephenville, Stephenville Crossing (NL BBA 2022a), and throughout the Codroy Valley (eBird 2022). Swamp Sparrow is common throughout the Project Area and LAA where suitable marsh habitat is present.

Additional species associated with freshwater habitats include Osprey (*Pandion haliaetus*), a large fish-eating raptor that constructs large stick nests on tall trees or on anthropogenic structures (poles, towers, platforms), Great Blue Heron (*Ardea Herodias*; see Table 4.6), and Belted Kingfisher (*Megaceryle alcyon*). Belted Kingfisher may breed throughout the Project Area and LAA in small ponds, streams, estuaries and shallow coastal areas (eBird 2022; NL BBA 2022a).

4.3.4.3 Forested Habitat

Forested habitats within the LAA are primarily coniferous softwood and mixedwood forests comprised of balsam fir and black spruce, with alder thickets throughout. Parts of the Western Newfoundland ecoregion contain balsam fir forests with wood fern floors, unique to this area of the province. There are some areas of deciduous hardwood stands within lower elevations of the Anguille Mountains/Codroy Valley and in a small region north of Stephenville. All forest types within the Project Area and LAA support a diverse assemblage of birds including but not limited to passerines, woodpeckers, corvids, waterfowl and raptors.

Bird species that are common within forested areas in the LAA include Black-capped Chickadee (P*oecile atricapillus*), Boreal Chickadee (*Poecile husonicus*), Red-breasted Nuthatch (*Sitta canadensis*), American Robin (*Turdus migratorius*), Hermit Thrush (*Catharus guttatus*), Swainson's Thrush (*Catharus ustulatus*) Canada Jay (*Perisoreus canadensis*), Blue Jay (*Cyanocitta cristata*), White-throated Sparrow (*Zonotrichia albicollis*), Fox Sparrow (*Passerella iliaca*), Dark-eyed Junco (*Junco hyemalis*), Golden-crowned Kinglet (*Regulus satrapa*), Ruby-crowned Kinglet (*Corthylio calendula*), Northern Flicker (*Colaptes auratus*), Hairy Woodpecker (*Dryobates villosus*) and Downy Woodpecker (*Dryobates pubescens*). Forests within the LAA also support cavity nesting ducks including Common Merganser (*Mergus merganser*), Common Goldeneye, Hooded Merganser (*Lophodytes cucullatus*), and Wood Duck although the latter three are uncommon.

Forested habitat within the Project Area and LAA support a diversity of breeding warblers including but not limited to Northern Waterthrush (*Parkesia noveboracensis*), Ovenbird, Black-and-white Warbler (*Mniotilta varia*), American Redstart (*Setophaga ruticilla*), Magnolia Warbler, Yellow Warbler (*Setophaga petechia*), Yellow-rumped Warbler (*Setophaga coronata*), Black-throated Green Warbler and Blackpoll Warbler (*Setophaga striata*) (eBird 2022, NL BBA 2022a).

The Codroy Valley provides important habitat for warbler species (including SOCC) that only breed in southwestern Newfoundland and are rarely found elsewhere on the island, including Cape May Warbler, Bay-breasted Warbler, Northern Parula (*Setophaga americana*), Blackburnian Warbler, and Chestnut-sided Warbler (*Setophaga pensylvanica*). Wilson's Warbler (*Cardellina pusilla*), however is abundant in the Port au Port Peninusla and the Stephenville/Fischells areas but is uncommon in the Codroy Valley (eBird 2022; NL BBA 2022a).

Forests within the Project Area and LAA also support breeding populations of vireos, flycatchers, woodcock, and finches. Seed-eating finches are generally quite common in western Newfoundland year-round (eBird 2022), and species such as Pine Siskin (*Spinus pinus*) and American Goldfinch (*Spinus tristis*) are expected to breed in the Project Area or LAA (NL BBA 2022a). Some species of finch are irruptive and are more frequently observed on the island of Newfoundland, including Common Redpolls (*Acanthis flammea*) and Evening Grosbeak (*Coccothraustes vespertinus*, Table 4.6, eBird 2022). White-winged Crossbills (*Loxia leucoptera*) and Red Crossbills (*Loxia curvirostra*) are non-migratory gregarious finches that are found in the LAA year-round (eBird 2022; NL BBA 2022a).

Nesting hawks, falcons and owls are also present within forested habitats. Merlin (*Falco columbarius*) is the most common raptor in forested areas within the Project Area and LAA breeding in open woods. Sharp-shinned Hawks (*Accipiter striatus*) may also nest in forested habitats but few breeding locations

have been confirmed (eBird 2022). Bald Eagles (*Haliaeetus leucocephalus*) are common throughout the province and nest and likely migrate throughout the Project Area and LAA (eBird 2022, NL BBA 2022a). Bald Eagle nests are typically in large trees. Great Horned Owl (*Bubo virginianus*) is the most common owl species and may be found in a variety of forested habitats throughout the Project Area and LAA (eBird 2022). Northern Saw-whet Owl (*Aegolius acadicus*) is also present in lower numbers within the LAA and Boreal Owl (*Aegolius funereus*) may also be present.

Two species of "gamebirds" are known to breed within forested areas within the LAA; these species are managed and hunted under the Small Game Management Plan (NL DFFA 2023). Ruffed Grouse (*Bonasa umbellus*) and Spruce Grouse (*Canachites canadensis*) were introduced to the Island of Newfoundland but have naturalized. Ruffed Grouse are expected to breed throughout all mixed wood forests in the LAA whereas records for Spruce Grouse are limited to Shoal Point on the Port au Port Peninsula, Cold Brook outside Stephenville, and east of Robinsons (eBird 2022).

4.3.4.4 Shrub/Scrub Habitat

Shrub/scrub habitat within the Project Area and LAA such as thickets support breeding flycatchers, sparrows and warblers. Alder Flycatchers (*Empidonax alnorum*) prefer to breed in brushy, deciduous thickets near swamps and fens, which are common throughout the LAA. Song Sparrows (*Melospiza melodia*), Lincoln's Sparrows (*Melospiza lincolnii*) and White-throated Sparrows occupy similar breeding habitats and are all expected to be abundant breeders across western Newfoundland (eBird 2022, NL BBA 2022a).

Mourning Warbler (*Geothlypis philadelphia*) and Common Yellowthroat (*Geothlypis trichas*) are common breeders in low thickets on the edge of grasslands and marshes in western Newfoundland (eBird 2022) and are expected breeders throughout the LAA in these habitats (NL BBA 2022a). Other warbler species such as Nashville Warbler (*Leiothlypis ruficapilla*), Tennessee Warbler (*Leiothlypis ruficapilla*), Palm Warbler (*Setophaga palmarum*) and Chestnut-sided Warbler also prefer shrub/scrub habitat but are uncommon breeders.

4.3.4.5 Open Habitats

Open habitats within the Project Area and LAA, including meadows, grassland and agricultural habitats, support breeding birds such as Horned Lark, sparrows, swallows, shorebirds and raptors.

Savannah Sparrow (*Passerculus sandwichensis*) and Cedar Waxwings (*Bombycilla cedrorum*) are common species in open habitats within the LAA and Tree Swallows (*Tachycineta bicolor*) are common in areas with old trees or nest boxes are available for nesting (eBird 2022, NL BBA 2022a).

Killdeer (*Charadrius vociferus*) is a common shorebird species that nests on the ground, commonly in fields or on gravel, and is expected to occur within areas of suitable habitat throughout the Project Area and LAA (eBird 2022). Semipalmated Plovers (*Charadrius semipalmatus*), which typically nest in tundra, nest in isolated areas at Shoal Point, Stephenville Crossing (near Mattis Point), and in the Codroy Valley (NL BBA 2022a; eBird 2022).

Piping Plover is an Endangered species that nests along sandy beaches and dunes within and close to the LAA (Table 4.5). Critical habitat for Piping Plover is present within the LAA (EC 2012; Figure 4.5). Spotted Sandpipers may also be present in beach habitat.

Open habitats within the Project Area and LAA also support nesting hawks, owls and falcons. Northern Harrier (*Circus hudsonius*) species is an expected breeder throughout the LAA, wherever appropriate habitat exists breeding habitat (wetlands and open fields) is present (eBird 2022). Short-eared Owl (*Asio flammeus*), a Vulnerable species in Newfoundland, is found in similar habitats as Northern Harrier but is very rare in the LAA (see Table 4.5). American Kestrel (*Falco sparverius*) is uncommon but is known to breed in the region and is expected to be present at a small number of locations within the Project Area in the Port au Port Peninsula (eBird 2022).

4.3.4.6 Anthropogenic Habitats

Urban adapted bird species that are common with anthropogenic or agricultural habitats within the LAA include American Crow (*Corvus brachyrhyncos*), European Starling (*Sturnus vulgaris*), House Sparrow (*Passer domesticus*), Rock Dove (*Columba livia*), and Common Grackle (*Quiscalus quiscula*). One bird SAR, Barn Swallow, may also be present in anthropogenic habitats, nesting on buildings, barns, bridges, culverts and other anthropogenic features.

4.3.4.7 Barren Habitat

Barren habitats within western Newfoundland support two species of ptarmigan – Willow Ptarmigan (*Lagopus lagopus*, ssp. *Alleni*) and Rock Ptarmigan (*Lagopus muta*). Willow Ptarmigan prefers vegetated and wet habitat whereas Rock Ptarmigan prefers open barrens. There are few records for either species in southwestern Newfoundland, but Rock Ptarmigan may be present in high-altitude habitats within or near the LAA, such as the Pine Tree Mountain area of the Port au Port Wind Farm and the Anguille Mountains (Noble 1919). Willow Ptarmigan may be present in mid-altitude habitats with dense alder thickets, such as the Anguille Mountains near the Codroy Wind Farm, in the hills north of Stephenville, and inland on the Port au Port Peninsula near the Port au Port Wind Farm. American Pipit also breeds in barren habitats within the LAA, particularly at higher altitudes.

4.3.5 Spring and Fall Migration

The LAA provides important stopover habitat for waterbirds, waterfowl, and shorebirds during spring and fall migration.

Many northern-breeding seabirds that do not breed in the LAA are found in the coastal waters in the LAA during migration. These include those that breed in other parts of Newfoundland, such as Leach's Storm-petrel (*Hydrobates leucorhous*), Atlantic Puffin (*Fratercula arctica*), and Manx Shearwater (*Puffinus puffinus*) and other northern-breeding seabirds such as jaegers, Northern Fulmars (*Fulmarus glacialis*), Dovekies (*Alle alle*) and murres. Red-throated Loons (*Gavia stellata*) are common in shallow coastal waters during fall migration. Seabirds that breed in the southern hemisphere (e.g., shearwaters, storm-petrels) migrate north and may also occasionally use the waters around the LAA.

Many waterfowl species use the Project area and LAA during migration, particularly estuarine habitats along the coast such as the Grand Codroy Estuary and Stephenville Crossing. The LAA supports some species of European migrants, such as Eurasian Wigeons (*Mareca penelope*) and Tufted Ducks (*Aythya fuligula*), and North American species such as American Wigeons and Greater (*Aythya marila*) and Lesser Scaup (*Aythya affinis*). The coastal ocean near the Project Area is frequently visited by many species of merganser, goldeneye, scoter, eider, and Long-tailed Ducks (*Clangula hyemalis*) during the migration seasons and winter. Buffleheads (*Bucephala albeola*) and Hooded Mergansers can be found in freshwater coastal habitats during the spring and fall migration seasons.

The Project Area and LAA supports many eastern North American shorebirds that breed in the high arctic and migrate across the island of Newfoundland through the Atlantic Flyway during the spring and fall (eBird 2022). Migrating shorebirds may be found in a variety of habitats during migration including mudflats, rocky shores, bogs, flooded areas and beaches. Migrating shorebirds within the LAA include White-rumped Sandpiper (*Calidris fuscicollis*), Semipalmated Sandpiper (*Calidris pusilla*), Sanderling (*Calidris alba*), Least Sandpiper, Short-billed Dowitcher, Ruddy Turnstone (*Arenaria interpres*), Dunlin (Calidris *alpina*) Pectoral Sandpiper (*Calidris melanotos*) and Baird's Sandpiper (*Calidris bairdii*), (ECCC 2020; eBird 2022). Whimbrels (*Numenius phaeopus*) are the only curlews that migrate through Newfoundland and Labrador (eBird 2022), and can be common in large fields, bogs, and flooded plains foraging on lowbush berries in the spring and fall.

Three shorebird SAR may be present during migration. Lesser Yellowlegs (*Tringa flavipes*) and Red Knot (*Calidris canutus*, Table 4.5), two SAR that do not breed in the Project Area or LAA, may be present in coastal habitats during migration in small numbers and Red-necked Phalarope (*Phalaropus lobatus*), a provincially Vulnerable species may also be present during migration in small groups on the ocean along with Red Phalaropes (*Phalaropus fulicarius*) October (ECCC 2020; eBird 2022).

The LAA is more important for migrating raptors in fall than it is in spring. In spring, there are fewer raptors and no areas of concentration. Most raptor species that arrive in Newfoundland for breeding disperse locally upon arrival. Very few species migrate through western Newfoundland on their way to more northern breeding grounds, and those that do (e.g., Rough-legged Hawks [*Buteo lagopus*]) occur in small numbers. During the fall, however, raptors that bred throughout the province arrive on the southwest coast of the island and group up, forming kettles and small flocks in areas like Cape Anguille (Stantec unpublished data) and Cape St. George, before making the flight toward the eastern seaboard of mainland North America. There is also a much more significant migration of falcons during the fall, especially of Merlins, that follow migrating shorebirds staging on beaches and mud flats throughout the region.

Many passerine species have the potential to occur in the Project Area and LAA during migration, including birds that don't breed in the area. There are no known areas of concentration for passerines during migration, rather species such as warblers tend to flock together in loose groups during their long-distance flights to and from breeding grounds. Swallows may gather in large roosts before and after the nesting season, in areas with dense prey availability such as marshes and mudflats, but these areas are also unknown.

4.3.6 Wintering Birds

Wintering seabirds, waterfowl, gulls, passerines, woodpeckers and raptors may be found within upland and coastal habitats within the Project Area and LAA. Seabirds such as Black Guillemot, Dovekie, Black-legged Kittiwake, Razorbill and cormorants and waterfowl species such as American Black Duck, Common Goldeneye, Common and Red-breasted Merganser, Common Eider (*Somateria mollissima*), Greater Scaup, Long-tailed Duck, and scoters may use coastal waters within the LAA during winter depending on ice conditions. Two duck SAR, Barrow's Goldeneye (*Bucephala islandica*) and Harlequin Duck, are also present in the LAA during the winter months and Purple Sandpiper overwinters in rocky coastal habitats. Gulls are also present in coastal waters in winter, including but not limited to Iceland Gull (*Larus glaucoides*), Herring Gull, Great Black-backed Gull, Glaucous Gull (*Larus hyperboreus*) and Black-headed Gull (*Chroicocephalus ridibundus*) and Bald Eagles regularly winter in coastal areas within the LAA.

Upland areas within the LAA including forests, open areas and anthropogenic habitats support wintering birds such as American Goldfinch, American Tree Sparrow (*Spizelloides arborea*), Blue Jay, Fox Sparrow, White-throated Sparrow, American Crow, Mourning Dove, Common Raven, Red-breasted Nuthatch, Downy Woodpecker, Hairy Woodpecker, Golden-crowned Kinglet and Dark-eyed Junco (eBird 2022). Seed-eating finches including Pine Siskin, Pine Grosbeak (*Pinicola enucleator*) and White-winged Crossbill are found in the LAA in winter (eBird 2022). Two seed-eating finch SAR, Evening Grosbeak and Red Crossbill, are also present in winter (eBird 2022). Large flocks of Snow Buntings (*Plectrophenax nivalis*) are regularly seen in the LAA in winter and during their early migration (eBird 2022) and have been observed during the winter coastal waterbird aerial surveys (Stantec unpublished data).

Between 2003-2004 and 2010-2020, there was a range of 22 to 42 bird species recorded by participants in the Stephenville CBC. The high count of 42 species was in 2020, while the low count of 22 was in 2011 and 2012. The species that were most commonly recorded during the Stephenville CBC were European Starling, followed by Canada Goose and American Black Duck (National Audubon Society 2020). Herring Gull, American Crow, Iceland Gull and Great Black-backed Gull were also common.

4.3.6.1 Winter Coastal Waterbird Aerial Survey Results

A total of 3956 individual birds of 23 species were counted on the survey route on February 8, 2023, and 3430 individual birds of 21 species were counted on the survey route on March 14, 2023 (Table 4.7). Common Eider was the most abundant species observed during both surveys; 1254 individuals were counted during the first survey and 949 individuals were counted during the second survey. Large rafts of Common Eider were present near Cape Anguille (~ 800 birds on first survey) and near Three Rock Cove on the Port au Port Peninsula (~600 birds on second survey). Other species that were common during surveys included Common Goldeneye, Long-tailed Duck, Red-breasted Merganser, White-winged Scoter (*Melanitta deglandi*), Iceland Gull, and Herring Gull. Bald Eagles were also common during both surveys (27 and 35 respectively). A large number of American Black Ducks was observed on the first survey (113). Barrow's Goldeneye was the only SAR that was encountered during the winter coastal aerial surveys; one individual was observed during the first survey near the mouth of Fischell's Brook.

Table 4.7 Bird Species Recorded during the February Winter Coastal Waterbird and Harlequin Duck/Purple Sandpiper Aerial Surveys

Species	Number of individuals observed	
	February 8, 2023	**March 14, 2023**
American Black Duck	113	56
Bald Eagle	27	35
Barrow's Goldeneye	1	0
Black Guillemot	29	17
Black Scoter	15	33
Black-headed Gull	1	0
Bufflehead	2	10
Canada Goose	0	100
Common Eider	1,254	949
Common Goldeneye	309	607
Common Loon	1	0
Common Merganser	0	1
Dovekie	3	0
Glaucous Gull	5	3
Great Black-backed Gull	14	263
Great Cormorant	21	137
Greater Scaup	20	0
Herring Gull	96	56
Iceland Gull	390	337
Long-tailed Duck	366	314
Mallard	0	10
Purple Sandpiper	244	65
Razorbill	1	0
Red-breasted Merganser	166	331
Red-throated Loon	0	1
Thick-billed Murre	0	1
White-winged Scoter	110	16
Unidentified *Larus* sp.	114	0
Unidentified duck sp.	649	88
Unidentified *Falco* sp.	1	0
Total	**3,952**	**3,430**

During the March 2023 survey, a flock of approximately 100 Canada Geese was seen in the Little Codroy estuary; this species was not seen in February. These could be overwintering individuals (many Canada Geese overwinter at Stephenville Crossing estuary [eBird 2022]), or early spring migrants.

4.3.6.2 Winter Harlequin Duck/Purple Sandpiper Aerial Survey

During the February 2023 survey, 244 Purple Sandpipers were observed at 15 locations (Table 4.7). During the March 2023 survey, which was only completed for the area between Broad Cove to Stephenville, 65 Purple Sandpipers were observed at 7 locations. No Harlequin Ducks were observed during either of the aerial surveys.

4.3.6.3 Winter Coastal Waterbird Land-based Survey

Land based surveys were completed on March 13, 2023. Of the 10 stations that were surveyed, three had no birds present due to ice cover (C1, C2, C7; Table 4.8). A total of 14 species were recorded at the seven stations where birds were present (Table 4.8). The highest number of birds was present at C4; 88 Red-breasted Mergansers were present along with 2 Black Guillemots. Station C10 had the fewest individuals with only nine birds present. All count locations had six or fewer bird species present. Red-breasted Merganser was the most abundant species (126 individuals), followed by American Black Duck and Common Eider (Table 4.8). One SAR was observed during the survey – fifteen Harlequin Ducks were observed at C5 (Table 4.8).

Table 4.8 Number of Individuals of Each Bird Species Observed at Survey Stations During the Winter Coastal Waterbird Land-based Survey.

Species	Survey Station							Total
	C3	C4	C5	C6	C8	C9	C10	
American Black Duck					25			25
Black Guillemot		2	2					4
Common Eider			1	22				23
Common Goldeneye	2			1		2		5
Common Loon				1				1
Great Black-backed Gull	1			2		15	3	21
Glaucous Gull	1						1	2
Great Cormorant			2				1	3
Harlequin Duck			15					15
Herring Gull	2			1	3			6
Iceland Gull	4				2	18		24
Long-tailed Duck	7			17				24
Mallard					4			4
Red-breasted Merganser	28	88			1	5	4	126
Total	**45**	**90**	**20**	**44**	**35**	**40**	**9**	**283**

4.4 Discussion

The Project Area and LAA support a diverse assemblage of bird species during the breeding season, spring and fall migration, and in winter. The province of Newfoundland and Labrador is situated within the Atlantic Flyway, which is a major migratory route for avifauna in North America. Two Important Bird and Biodiversity Areas (IBAs, BirdLife International 2023a) are near or within the LAA (BSC 2017). These IBAs are NF040 Codroy Valley, between Searston, Saint Andrews, Doyles, and Upper Ferry, and NF041 Codroy Valley Estuary, approximately 10 km and 9 km respectively from the Project Area, includes only the open waters and land up to high tide lines surrounding the estuary formed at the mouth of the Grand Codroy River.

There were 21 SAR identified in the background review that may be present within the Project Area or LAA during the breeding season, spring/fall migration or in winter. These include passerines, shorebirds, waterfowl and waterbirds. SAR may be present in a diversity of habitats such as forests, marshes, freshwater ponds, and mudflats. Piping Plover, an Endangered species that nests on sandy beaches and dunes is present within the LAA and critical habitat is also present (EC 2012). An additional 19 SOCC were identified in the background review as potentially being present within the Project Area and LAA.

The coastal areas within the Project Area and LAA support many seabird, gull and tern colonies. Large numbers of Black-legged Kittiwakes, Herring Gulls, Great Black-backed Gulls and Ring-billed Gulls nest within these colonies along with other species of waterbirds. Freshwater and wetland habitats within the Project Area and LAA support breeding loons, waterfowl, shorebirds, herons, marshbirds and raptors. Forested habitats within the LAA are primarily coniferous softwood and mixedwood forests comprised of balsam fir and black spruce, with alder thickets throughout. There are some areas of deciduous hardwood stands within lower elevations of the Anguille Mountains/Codroy Valley and in a small region north of Stephenville. All forest types within the Project Area and LAA support a diverse assemblage of birds including but not limited to passerines, woodpeckers, corvids, waterfowl and raptors. Shrub/scrub habitat within the Project Area and LAA such as thickets support breeding flycatchers, sparrows and warblers. Open habitats within the Project Area and LAA, including meadows, grassland and agricultural habitats, support breeding birds such as Horned Lark, sparrows, swallows, shorebirds and raptors. Barren habitats within western Newfoundland support two species of ptarmigan – Willow Ptarmigan and Rock Ptarmigan.

The LAA provides important stopover habitat for waterbirds, waterfowl, and shorebirds during spring and fall migration. There are concentration points within or near the LAA that are bottlenecks for migrating birds, or places to congregate and stage before or after a long trans-oceanic flight. Many northern-breeding seabirds that do not breed in the LAA are found in the coastal waters in the LAA during migration. The Project Area and LAA also support many eastern North American shorebirds that breed in the high arctic and migrate across the island of Newfoundland through the Atlantic Flyway during the spring and fall (eBird 2022).

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5.0 Bats

5.1 Scope And Objectives of the Bats Study

The objectives of this bats baseline study are:

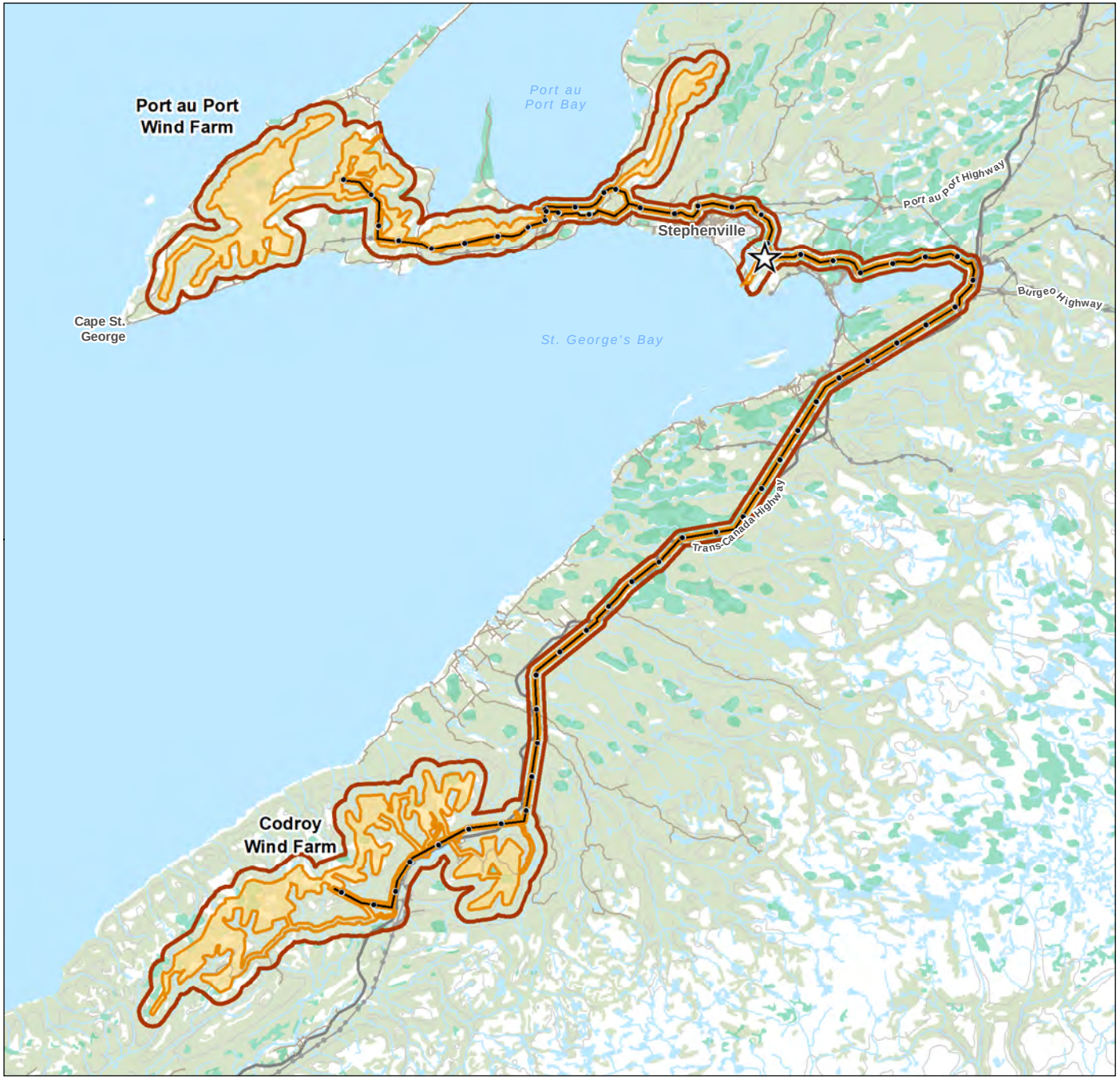
- Determine the species composition of resident and migratory bat species in western Newfoundland
- Identify the habitat requirements for each species
- Assess how much suitable habitat occurs within the Project Area, LAA and RAA

Bats fall under the jurisdiction of the NL Department of Fisheries, Forestry and Agriculture – Wildlife Division (NLDFFA-Wildlife Division).

5.1.1 Spatial Boundaries

The following spatial boundaries were used for the bat study:

- **Project Area:** The Project Area encompasses the immediate area in which Project activities and components will occur and is comprised of following distinct areas: the Port au Port Wind Farm, the Codroy Wind Farm, the Hydrogen/Ammonia Production and Storage Facility, Port Facilities, and the 230 kV Transmission Lines, as well as associated infrastructure including roads, substations, and water supply infrastructure. The Project Area is the potential area of direct physical disturbance associated with the construction, operation and decommissioning and rehabilitation of the Project. The Project Area also includes a up to a 175 m buffer (350 m right-of-way [ROW]) around key Project components to allow for micrositing during detailed design and mitigation to avoid ecological and culturally sensitive habitats.
- **Local Assessment Area (LAA):** The LAA includes a 1 km buffer around the wind farms and hydrogen facility, and 500 m around access roads and transmissions lines (Figure 5.1).
- **Regional Assessment Area (RAA):** The RAA for this VEC was delineated using ecoregions (subregions) and watersheds. It includes the Port au Port Subregion, the St. George's Bay Subregion and the Codroy Subregion. In addition, it includes the watersheds from within the Corner Brook Subregion that overlap with the Port au Port East Wind Farm (Figure 5.2).



Stantec

Proposed Project Features

- Hydrogen / Ammonia Plant Location
- Transmission Line 230 kV
- Project Area
- Local Assessment Area

Other Features

- Transmission Line, Existing
- Trans-Canada Highway
- Road
- Watercourse
- Contour (100 m)
- Wetland
- Waterbody
- Forested Area

N

0 10 Kilometres
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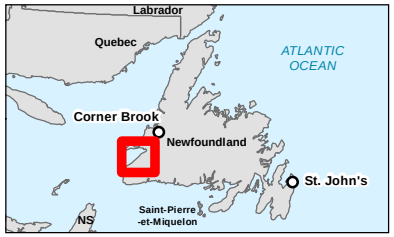
Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap
3. Background: NRCan CanVec



Project Location
Stephenville
NL

Prepared by MB on 2023-06-30
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_067b

Figure No.
5.1

Local Assessment Area for Bats

V:\1214\active\121417233\03_data\gis_cad\gis_data\mapping\mxd\general\Bats_Veg_Other_Terr\121417233_067b_5.1Bats_Terrestrial_Other_LAA.mxd Revised: 2023-07-12 By: mblackwood

Stantec

Proposed Project Features

- Hydrogen / Ammonia Plant Location
- Transmission Line 230 kV
- Project Area
- Regional Assessment Area

Other Features

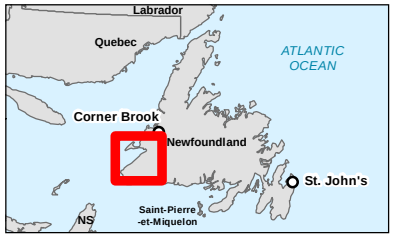
- Transmission Line, Existing
- Trans-Canada Highway
- Road
- Watercourse
- Contour (100 m)
- Waterbody
- Forested Area

N

0 10 Kilometres
(At original document size of 8.5x11)
1:730,000

Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap
3. Background: NRCan CanVec



Project Location
Stephenville
NL

Prepared by MB on 2023-06-30
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_067c

Figure No.
5.2

Regional Assessment Area for Bats

V:\1214\active\121417233\03_data\gis_cad\gis_data\mapping\mxd\general\Bats_Veg_Other_Terr\121417233_067c_5.2Bats_Terrestrial_Other_RAA.mxd Revised: 2023-07-12 By: mblackwood

5.2 Methods

5.2.1 Literature Review

The information on existing conditions was compiled from several sources including peer-reviewed published literature, field studies within the Project Area, and communications with the NLDFFA-Wildlife Division. The following key public resources were used during background review:

- Recovery Strategy for the Little Brown Myotis (*Myotis lucifugus*), the Northern Myotis (*Myotis septentrionalis*), and the Tri-colored Bat (*Perimyotis subflavus*) in Canada (ECCC 2018)
- Guide for Bat Monitoring in Atlantic Canada (McBurney and Segers 2021)

5.2.2 Habitat Assessment

An ELC/habitat classification exercise was conducted in Section 2.2.2. The habitat assessment for bats will review the availability of bat habitat, based on the results of the ELC.

5.2.3 Fall 2022 Field Survey

Acoustic bat surveys were conducted in fall 2022. Eight wildlife acoustics song meter mini bat detectors were used in the Study Area. Bat detectors were deployed in the Codroy Valley from September 16 to November 16 (61 days) and on the Port au Port Peninsula from September 14 to November 4 (51 days). Automatic recording units (ARUs) were mounted on trees, approximately 2 m above ground level (agl), with microphones pointing upwards at an approximate 45-degree angle. Devices were programmed to record bat activity from 30 minutes before sunset to 30 minutes after sunrise daily, and set to record automatically when triggered by an ultrasonic signal (minimum frequency 12 KHz). The detectors were set to record in full-spectrum, and additional settings (e.g., trigger frequency, recording length, etc.) were chosen based on standard settings previously used for bat detection in this region (Table 5.1).

Table 5.1 2022 Wildlife Acoustics Song Meter Mini Bat Detector Settings

Mini Bat Acoustic Detector Settings	
Recording format	Full-Spectrum
Sample rate	256 kHz
Minimum trigger frequency	12 kHz
Maximum recording length	15 seconds
Trigger window	3 seconds
Save noise?	No
Left channel gain	12 dB

The audio files (.wav file format) recorded by ARUs were processed using Kaleidoscope Pro (Wildlife Acoustics; Version 5.4.2). Recordings were processed using a built-in species classifier for bats in Kaleidoscope Pro. The classifier sensitivity setting was set to "0" (default setting) and Newfoundland was selected in the region drop-down list. The default classifier for NL auto-identifies little brown myotis, northern myotis, and hoary bat. Silver-haired bat was also added to the list for auto-identification, based on a previous record of this species in Labrador (Aivek Stantec Limited Partnership 2021). Other potential species, including big brown bat (McBurney and Segers 2021) and eastern red bat (LASBOR) with documented ranges approaching NL were also considered during manual verification of files. The little brown myotis, northern myotis and eastern red bat are high-frequency bat species (≥ 35 kHz), while hoary, silver-haired and big-brown bats are low frequency bat species (15-30 kHz).

After the AutoID was run, the files were manually inspected (by visual inspection in Kaleidoscope Pro) to review accuracy of identifications. Files assigned to a species were manually reviewed and reclassified as necessary. Where the two myotis species could not be reliability distinguished, they were reclassified as *Myotis* spp. Call sequences with <5 pulses, of poor quality (e.g., indistinct pulse characteristics), or sequences with non-search phase calls only (e.g., social calls) were classified as low frequency unknown), high frequency unknown, or big brown/silver-haired bat (where these two species could not be distinguished).

Files were quality reviewed by an experienced Stantec biologist. Files manually reviewed and identified as a potential migratory species were forwarded to another Stantec biologists with expertise in migratory bat call characteristics for independent data verification.

5.2.4 Qalipu Field Surveys

The Environment and Natural Resources group of Qalipu First Nation conducted acoustic bat surveys on the Port au Port Peninsula in 2019, 2020, 2021 and 2022. Each year, four ARUs were deployed at the same locations during either July or August. The number of recording nights varied from four to 18, depending on detector and year. Wildlife Acoustics SM4 bat detectors were deployed on telescoping poles, with the microphone approximately 3 to 4 m agl. Detector settings were the same as those described in Table 5.1, with the exception of trigger frequency, which was set as 15 kHz. This difference would not be expected to change results.

The audio files were analyzed using Kaleidoscope Pro (Wildlife Acoustics; Version 5.1.9). The analysis was done using the same methods as described in Section 5.2.3.

5.3 Results

5.3.1 Literature Review

Based on the literature review, three species of bats have been confirmed on the Island of Newfoundland, including little brown myotis (*Myotis lucifugus*), northern myotis (*Myotis septentrionalis*) and hoary bat (*Lasiurus cinereus*) (NLDFFA n.d.; McBurney and Segers 2021). Three other species are unconfirmed but have the potential to occur based on anecdotal or acoustic records, or nearby ranges. These include big brown bat (*Eptesicus fuscus*), silver-haired bat (*Lasionycteris noctivagans*), and eastern red bats (*Lasiurus borealis*) (McBurney and Segers 2021).

Species descriptions and distribution in NL are described for each of these species below.

5.3.1.1 Little Brown Myotis

Little brown myotis is a small, insectivorous species with an average mass between 5.5 and 11 g, and a wingspan between 22 and 27 cm (COSEWIC 2013). The little brown myotis has a wide distribution in North America that extends from Alaska to Mexico. It is found in every province and territory except for Nunavut, and all continental US states, although it is absent from large portions of Texas and Florida, and does not occur north of the tree line (Havens 2006).

Little brown myotis is the most common bat species in NL (NLDFFA n.d.). Little brown myotis is a resident species that is found in forested habitat in the spring, summer and fall, and hibernates during the winter. During the breeding season, females form maternity roosts, which can include up to hundreds of individuals, where they give birth to and raise their pups. Maternity colonies are often located in human structures, such as barns, attics, buildings or bat boxes. They are also found in large diameter trees with cavities and/or peeling bark. Female little brown myotis show a relatively high philopatry to maternity roost sites (Frick et al. 2010). Natural roosts may be used for upwards of 10 years, whereas anthropogenic roosts may be used for 50 years or more (ECCC 2018). Male bats roost alone or in small groups in a variety of roost structures, including buildings, trees cavities, under bark, or rock crevices (ECCC 2018). Male bats tend to roost closer to foraging sites, whereas female bats preferentially choose a suitable roost site over proximity to foraging sites, since thermoregulatory requirements are more constrained for breeding females (Randall et al. 2014). Foraging sites for this species include open habitats, such as ponds, roads or forest clearings. Diet of the little brown myotis consists of a wide range of insects and spiders, and includes chironomids and other aquatic insects, as little brown myotis often forages over water (COSEWIC 2013). Little brown myotis is considered an aerial hawker, meaning it catches prey in the air while in flight. However, it can also glean prey off vegetation (McBurney and Segers 2021).

Little brown myotis spends its winters in hibernation at underground sites, such as caves and abandoned mines. The locations of hibernations sites are not well known in Newfoundland and Labrador. No known hibernacula sites occur within the Project Area (J. Humber, personal communication, February 24, 2023). However, there is the potential for hibernacula, particularly in areas with rocky limestone/karst landscapes in the Anguille Mountains.

Little brown myotis is listed as Endangered under Schedule 1 of SARA. This species has seen drastic population declines in North America caused by a fungal pathogen called white-nose syndrome, which was first detected in New York state in 2006. White-nose syndrome was confirmed on the Island of Newfoundland in the winter of 2016/2017 (US Fish and Wildlife Service 2022). In areas affected by white-nose syndrome, mortality rates are typically high. Populations of little brown and northern long-eared myotis at some hibernacula in eastern Canada have declined by 94% since the arrival of white-nose syndrome (COSEWIC 2013).

5.3.1.2 Northern Myotis

Northern myotis is a small insectivorous bat, with an average weight of 7.4 g and a wingspan of 23 to 26 cm (COSEWIC 2013). The range of this species includes most of Canada and the eastern USA, and the species occurs in all provinces and territories with the exception of Nunavut. The range is generally smaller than that of little brown myotis, and does not extend as far north (COSEWIC 2013).

Similar to little brown myotis, northern myotis is a resident species in Newfoundland and Labrador, associated with interior forest habitat during the active season. This species is more forest-associated than little brown myotis, and does not typically form maternity roosts in anthropogenic structures. Maternity roosts are formed in large diameter trees in forests with an open canopy and a high density of snags (Broder and Forbes 2004; Barclay and Kurta 2007; Garroway and Broders 2008). Several studies from outside of Newfoundland have suggested that northern myotis typically form maternity roosts in deciduous trees (Broders and Forbes 2004; Foster and Kurta 1999; Menzel et al 2022). However, one study from Newfoundland, where coniferous trees are dominant, found that in this region, coniferous roost trees are used, and roost trees tend to be shorter and of smaller diameter than in conspecific populations on mainland North America (Park and Broders 2012). Bats roost in cavities or under loose bark, and maternity colonies frequently switch roost trees, but roosts are clustered in roosting areas (Foster and Kurta 1999; Broders et al 2006; ECCC 2018). Maternity colonies of northern myotis are typically smaller than those of little brown bats (Foster and Kurta 1999).

Northern myotis hibernate at the same locations as little brown myotis, and both species are often found hibernating together. However, compared to little brown myotis, northern myotis will often hibernate in cooler sections within the cave (Barbour and Davis 1969; ECCC 2018).

Little brown myotis is listed as Endangered under Schedule 1 of SARA. Northern myotis has been heavily impacted by white-nose syndrome, with estimated population declines of 94% (COSEWIC 2013).

5.3.1.3 Hoary Bat

Hoary bats are the largest of the species that may occur in western Newfoundland, with a weight of 20 to 35 g and an average wingspan of 43 cm. Hoary bats are the most widespread bat species in Northern America, and occur in all provinces and territories in Canada, with the exception of Nunavut (Neighbourhood Bat Watch n.d.).

Hoary bats are long-distance migrants, that move from northern breeding sites to overwintering sites, typically in the southern US or Mexico (Findley and Jones 1964, Cryan 2003, Baerwald 2015). Hoary bats are typically solitary and roost in the foliage of mature deciduous or coniferous trees (Bat Conservation International 2023). Females typically give birth to two pups in the spring, although litter size can range from one to four (Anderson 2002). Hoary bats are insectivorous, and feed primarily on moths, although their diet also includes flies, beetles, small wasps and grasshoppers (Anderson 2002).

In the province of NL, this species is thought to be an infrequent vagrant, and not a summer resident (Washinger et al. 2020). Based on records from Labrador (Aivek Stantec Limited Partnership 2021) and Nova Scotia (Lucas and Hebda 2011), hoary bats are most likely to occur in the fall migratory period (August and September).

5.3.1.4 Silver-haired Bat

Silver-haired bats are a small bat that weigh between 8 and 11 g and have an average wingspan of 29.5 cm (Bentley 2017). They are relatively widespread throughout the United States and southern Canada, but are not known to occur in the Yukon or Nunavut.

Silver-haired bats are a tree-roosting, migratory species. In the spring, females form maternity colonies in cavities in trees or snags, where they give birth to two pups (Bentley 2017). During this time, males are typically solitary. They roost in mature coniferous and mixed-wood forest (Bat Conservation International 2021). In the fall, silver-haired bats migrate to more southern locations with milder temperatures, where they overwinter in roosts found in tree hollows, under loose bark, in wood piles or on cliff faces (Bat Conservation International 2021). Although the migration patterns of the silver-haired bat are not well known, the bats are thought to winter in the United States Pacific Northwest, south-western states, and middle latitudes of the eastern United States (Izor 1979; Cryan 2003; Baerwald 2015).

Within Atlantic Canada, silver-haired bats have been confirmed in Nova Scotia and New Brunswick. Acoustic detections of this species have occurred in Newfoundland and Labrador and in PEI, but presence has not been positively confirmed by capture and in-hand identification (McBurney and Segers 2021). An acoustic record of silver-haired bat was identified in Labrador in 2020, which represents the first known record of this species in Labrador (Aivek Stantec Limited Partnership 2021). It is not known if this individual was a vagrant, or if silver-haired bats regularly occur in Labrador.

Records along the Atlantic Coast suggest that silver-haired bats may migrate along coastlines, and suggest that they are more associated with coastlines in the fall than during the spring migration (Cryan 2003). While silver-haired bats are typically solidary, they do form flocks during migration (Lucas and Hebda 2011).

5.3.1.5 Eastern Red Bat

Eastern red bats have a mean weight of 12.5 g, and a wingspan of 28 to 33 cm (van Zyll de Jong 1985). This species occurs in the eastern United States and Eastern Canada, from Saskatchewan to Atlantic Canada (Lucas and Hebda 2011; Cryan 2003).

Like silver-haired and hoary bats, eastern red bats are a tree-roosting, migratory species. They roost in the foliage of deciduous or conifers, and typical occur in mixedwood forests. They are typically a solidary species, and females roost alone when rearing their young. This species is unusual among North American bats with respect to litter size. While most bats give birth to only one pup, eastern red bat can have litters that range from one to five pups, with two or three being the most common (Bat Conservation International 2023).

During the fall, eastern red bats migrate long distances to more southern areas with milder climates, where they overwinter (McBurney and Segers 2021). Little is known about the wintering habitat and behaviour of eastern red bat (Bat Conservation International 2023).

In Atlantic Canada, eastern red bat is confirmed as occurring in Nova Scotia and New Brunswick, and unconfirmed in Prince Edward Island. While there are no published records of this species in Newfoundland, the NLDFFA-Wildlife Division has detected this species in the past (J. Humber, pers. comm.).

5.3.1.6 Big Brown Bat

Big brown bats weigh between 11 and 23 g and have a wingspan of 32 to 39 cm (Neighbourhood Bat Watch n.d.). This species occurs throughout the United States, and in most of southern Canada, with the exception of most of Atlantic Canada. It is the one of the most common and abundant species in North America (Bat Conservation International 2023).

Big brown bats are a habitat generalist, but are abundant in deciduous forests and suburban areas (Bat Conservation International 2023). During the breeding season, female bats typically form maternity colonies in human structures, including barns, buildings, bat houses and bridges, or in cavities or under the bark of trees (McBurney and Segers 2021; Bat Conservation International 2023). Big brown bats hibernate during the winter in heated buildings, deep rock crevices, or underground sites including caves and abandoned mines (McBurney and Segers 2021). As a foraging generalist, this species feeds on a wide variety of insects.

In Atlantic Canada, hoary bats occur relatively regularly on mainland Nova Scotia and New Brunswick. Records also exist from PEI, Cape Breton Island, and on the Island of Newfoundland. No records occur in Labrador (McBurney and Segers 2021).

5.3.2 Habitat Assessment

Based on the literature review, the following habitat types were identified as preferred habitat for roosting and foraging during the active bat season: mature forests with larger trees, wetlands, and waterbodies. It is important to note that bats may occur in any habitats throughout the Island of Newfoundland. Little brown myotis, in particular, is a habitat generalist and could occur in barren or stunted forest habitat while foraging. However, the aforementioned habitats were chosen as preferred habitats that may provide a specialized function, and bats may be more sensitive to changes in these habitat types. Myotis species often forage in wetland and over waterbodies, and typically roost in forests with large trees and snags. In Newfoundland, forest age may not be a good measure of forest suitability for bats, since mature forests are stunted, especially in coastal areas (Protected Areas Association of Newfoundland and Labrador 2008). Bats require large trees and snags, which may not be present in stunted coastal forests. To account for this, average forest height was used as the determinant of forest suitability, rather than forest maturity. All forests (including mixedwood, hardwood and softwood), with an average forest height of class 4 (≥ 9.6m) were classified as potentially suitable for bats. Within the forestry inventory data, not all forests are classified to forest type and height. Where they could not be classified, forests are identified as 'unknown forest'. To be conservative, unknown forest is classified as suitable bat habitat, since the forest attributes are unknown.

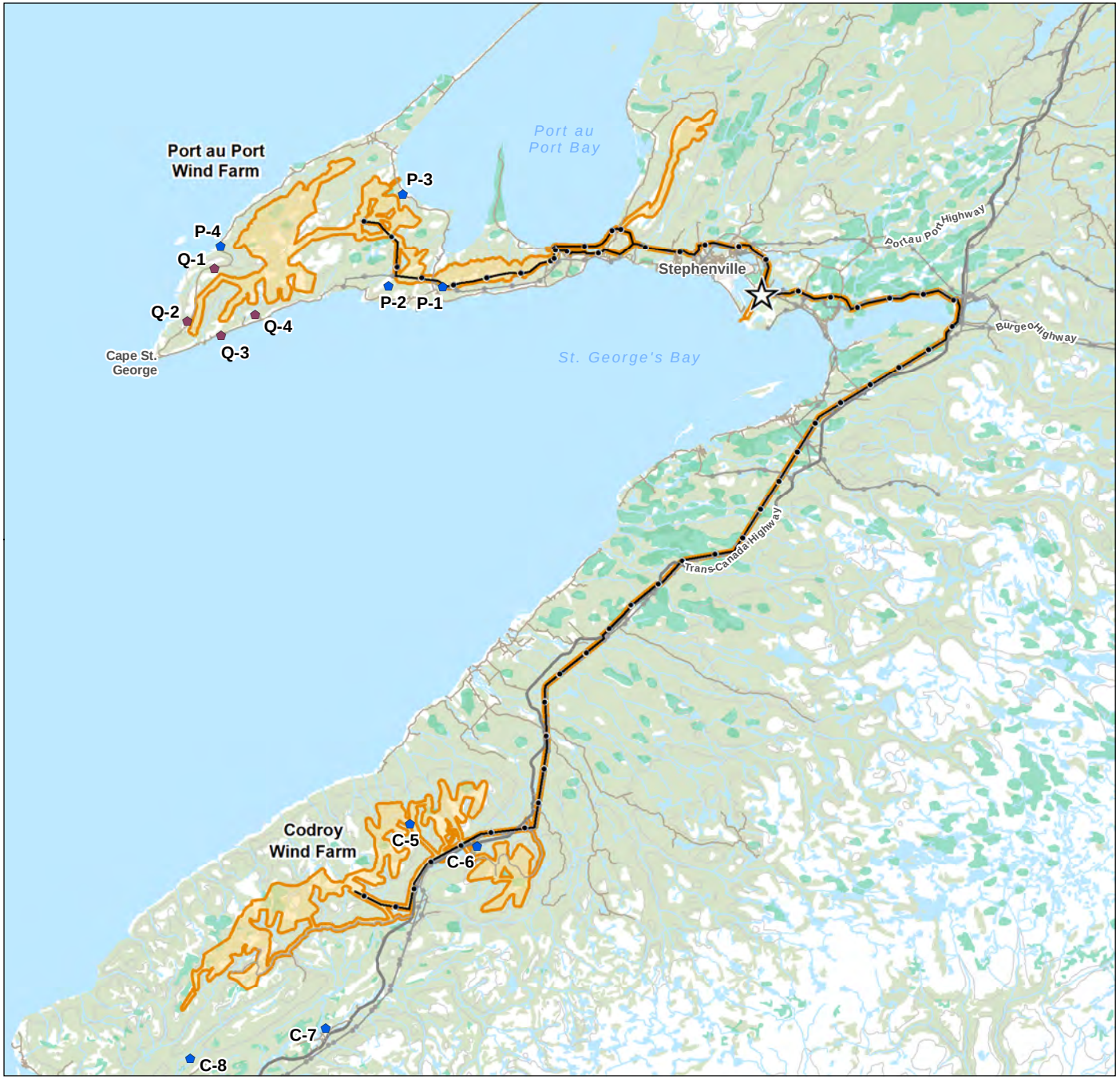
Suitable bat habitat within the Project Area is presented by Project component in Table 5.2, and is shown throughout the LAA in Appendix C. Overall, suitable bat habitat accounts for 24.8% of the Project Area, or 6,989 ha. Softwood forest and wetlands account for the largest suitable habitat categories, covering approximately 9.1% and 8.1% of the Project Area, respectively. These are also some of the most prevalent habitat types in the Project Area (Chapter 12). Very little suitable hardwood forest occurs within the Project Area, accounting for only 0.4% of land cover. Most suitable habitat occurs at the Codroy Wind Farm (9.6% of the Project Area), followed by the Port au Port Wind Farm (8.4% of the Project Area). Within the Project Area at the hydrogen/ammonia plant, potentially suitable forest habitat is classified as unknown forest. As such, the quality of that habitat for bats is not known.

Table 5.2 Suitable Bat Habitat in the Project Area by Project Component

Habitat Type	Port au Port Wind Farm		Codroy Wind Farm		Hydrogen/Ammonia Plant		Transmission Lines		Total Area (ha)	Total % of Project Area
	Area (ha)	% of Project Area	Area (ha)	% of Project Area	Area (ha)	% of Project Area	Area (ha)	% of Project Area		
Mixedwood (height ≥ 9.6 m)	77.49	0.28	241.48	0.86	-	-	287.68	1.02	606.65	2.16
Softwood (height ≥ 9.6 m)	1,098.20	3.90	896.47	3.18	-	-	570.01	2.02	2,564.68	9.11
Hardwood (height ≥ 9.6 m)	-	0.00	63.17	0.22	-	-	40.14	0.14	103.32	0.37
Unknown Forest	678.33	2.41	93.92	0.33	7.78	0.00	167.66	0.60	947.69	3.37
Water	44.35	0.16	73.71	0.26	43.45	0.00	328.50	1.17	490.01	1.74
Wetland	467.10	1.66	1,324.67	4.71	10.13	0.00	475.00	1.69	2,276.90	8.09
Total	**2,365.46**	**8.40**	**2,693.43**	**9.57**	**61.36**	**0.00**	**1,868.99**	**6.64**	**6,989.24**	**24.83**

5.3.3 Fall 2022 Field Survey

Locations and habitat descriptions of the eight Stantec ARU sites are presented in Table 5.3, and shown in Figure 5.3. ARU locations were identified based on proposed Project features (e.g., MET towers, wind turbines) and important microhabitat features for bats (e.g., forest corridors or edges, waterbodies, or watercourses). Exact placement of the eight ARUs was determined based on accessibility and habitat features with the greatest potential to detect echolocation calls.



Stantec

ARU Location (Qualipu)

ARU Location (Stantec 2022)

Proposed Project Features

Hydrogen / Ammonia Plant Location

Transmission Line 230 kV

Project Area

Other Features

Transmission Line, Existing

Trans-Canada Highway

Road

Contour (100 m)

Watercourse

Waterbody

Wetland

Forested Area

N

0 10 Kilometres

(At original document size of 8.5x11)

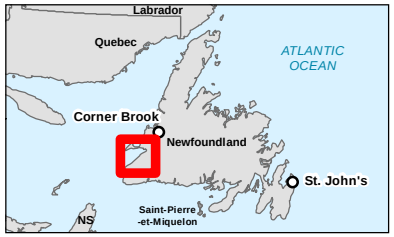
1:550,000

Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N

2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap, Qualipu, Stantec Field Team

3. Background: NRCan CanVec



Project Location
Stephenville
NL

Prepared by MB on 2023-06-30
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_037a

Figure No.
5.3

Bat Survey Locations

V:\1214\active\121417233\03_data\gis_cad\gis_data\mapping\mxd\general\Bats_Veg_Other_Terr\121417233_037a_Bat_ARUs.mxd Revised: 2023-07-12 By: mblackwood

Table 5.3 ARU Deployment Locations and General Habitat Information – Fall 2022 Surveys

Site	ARU ID	Latitude	Longitude	General Habitat
Port au Port	P-1	48.5292	58.9082	Coniferous forest edge along powerline Right-of-Way and smaller trail
	P-2	48.5286	58.9751	Coniferous forest edge, near narrow gravel road
	P-3	48.6044	58.9602	River edge, neighboring residential area
	P-4	48.5575	59.1840	Coastal river edge, neighboring residential area
Codroy Valley	C-5	48.0883	58.9321	Morris Pond, riparian habitat with surrounding coniferous dominated forest
	C-6	48.0714	58.8492	Wetland / stream edge, surrounding coniferous dominated forest
	C-7	47.9190	59.0284	Coniferous forest edge along old trailway, neighboring river and residential area
	C-8	47.8913	59.1926	Pond edge, surrounded by coniferous and deciduous forest

Notes:
1 ARU=Autonomous Recording Unit
2 Locations are shown in Figure 2-1

Five bat species were identified from the eight ARUs (Table 5.4). Little brown myotis was the most commonly recorded species, with 17 calls recorded at one detector located at the Codroy Wind Farm, and 14 calls recorded at one detector at the Port au Port Wind Farm. Only one call from northern myotis was identified at P-3. Thirteen calls at the Codroy Wind Farm were identified as Myotis species.

In addition to these resident Myotis species, three migratory species were also recorded: hoary bat, silver-haired bat and eastern red bat. Hoary bat and silver-haired bat were both only recorded at one detector (C-7) at the Codroy Wind Farm, where two calls of silver-haired bat and one call of a hoary bat were recorded. The silver-haired bat calls were recorded on the evenings of October 16 and October 21. The call files for the species were manually reviewed as a search phase call, with a call body slope and OPS (octaves per second), and a characteristic frequency of approximately 26 kHz. The hoary bat was recorded on the evening of September 28. The call file for the species was manually reviewed as an undulating search phase call, with a characteristically flat appearance and hooked upturned toe, and with a characteristic frequency of approximately 22 kHz. Both species are uncommon on the Island of Newfoundland, but have been previously recorded.

Two calls of eastern red bat calls were recorded on October 17. These calls were recorded only 29 seconds apart, suggesting that they may have been made by the same bat. These call files were manually reviewed as an undulating search phase call with a characteristic frequency of approximately 35 kHz.

Table 5.4 Number of Bat Echolocation Call Files Recorded at ARUs on the Port au Port Peninsula and near the Codroy Wind Farm, Fall 2022

Site	ARU ID	Number of Recording Nights	Little Brown Myotis	Northern Myotis	Myotis species	Eastern Red Bat	Hoary Bat	Silver-haired Bat	Big Brown/ Silver-haired Bat	High Frequency Species Unknown	Low Frequency Species Unknown	Total
Port au Port	P-1	51							1			1
	P-2	51							1			1
	P-3	51		1								1
	P-4	46	14			2			15	2	5	38
Codroy	C-5	54										0
	C-6	17	17		10					2		29
	C-7	49			3		1	2	1	1	2	10
	C-8	49									1	1
Total			**31**	**1**	**13**	**2**	**1**	**2**	**18**	**5**	**8**	**81**

An additional 18 calls from both Codroy and Port au Port wind farms were categorized as big brown bat/silver-haired bat. These two species have overlapping calls, which could not be differentiated in this case.

Finally, five calls were categorized as high-frequency unknown (three at Codroy and two at Port au Port), which could represent a Myotis species or eastern red bat. Eight low frequency calls were recorded (three at Codroy and five at Port au Port), which would represent hoary, silver-haired or big brown bat.

Most bat calls were recorded at detectors P-4 (38) and C-6 (29). Both of these detectors were located adjacent to a waterbody. Detector P-4 was located along a river, and detector C-6 was located adjacent to a brook in a wetland area. The ARU data showing bat call activity are not indicative of the number of individuals present, as one individual could pass the detector multiple times. However, the number of calls observed can be used an index of bat activity for a given location.

5.3.4 Qalipu Field Survey

Locations and habitat descriptions of the Qalipu ARUs on the Port au Port are presented in Table 5.5, and shown in Figure 5.3.

Table 5.5 ARU Deployment Location and General Habitat Information – Qalipu Surveys

Detector ID	Latitude	Longitude	Detector Location Description
Q-1	48.539313	-59.191037	Coniferous forest edge, barren highlands, low shrubs
Q-2	48.495379	-59.22201	Open highland barrens, rocky, low shrub
Q-3	48.48412	-59.18082	Coastal grassland, neighboring residential area
Q-4	48.502167	-59.138452	Coniferous forest, near small regenerating cutover

Bats were recorded at two detector locations (Q-3 and Q-4) during all three years of surveys as presented in Table 5.6. No bats were recorded at detectors Q-1 and Q-2, which were both located in barrens highlands.

Two species of bats (little brown myotis and northern myotis) were identified in the Qalipu acoustic surveys. Little brown myotis was recorded at one detector (Q-3) in 2019 and 2022. Eight calls were recorded in each year. Northern myotis was recorded at Q-4. Only two individuals were detected, one in 2019 and one in 2022.

A total of 45 calls were identified as Myotis species. These calls may have been either little brown myotis or northern myotis, but could not be identified to species. Myotis species calls were recorded at both detectors Q-3 and Q-4 on all three years of surveys.

Table 5.6 Number of Bat Echolocation Call Files Recorded at ARUs by Year

Year	Little Brown Myotis		Northern Myotis		Myotis Species		High Frequency Species Unknown		Low Frequency Species Unknown		No ID		Total
	Q-3	Q-4	Q-3	Q-4	Q-3	Q-4	Q-3	Q-4	Q-3	Q-4	Q-3	Q-4	
2019	8			1	21	1	1		1		2		**35**
2021					8	1					2		**11**
2022	8			1	10	4		3				3	**29**
Total	**16**	**0**	**0**	**2**	**39**	**6**	**1**	**3**	**1**	**0**	**4**	**3**	**75**

Four high frequency calls were recorded that could not be identified to species. These calls could have been made by a myotis species or eastern red bat. In addition, one low frequency bat was recorded at Q-3 in 2019. This call could have been made by a hoary bat, silver-haired bat or a big brown bat.

Overall, most bat calls (61 of 75) were recorded at Q-3, which was located in a coastal grassland adjacent to a residential area.

5.4 Discussion

Six species of bats have the potential to occur in western Newfoundland. The two most commonly occurring species are little brown myotis and northern myotis, both of which are resident species on the Island of Newfoundland. These species are known to occur throughout western Newfoundland. Both myotis species use mature forest habitat for roosting, and may form maternity colonies in hardwood, softwood or mixedwood trees with loose barks and/or cavities. Additionally, little brown myotis form maternity colonies in anthropogenic structures, such as barns, buildings, sheds and bat houses. No known hibernacula occur within the Project Area, however, little is known about hibernation sites on the Island of Newfoundland. There is the potential for hibernacula to occur in areas with rocky limestone/karst landscapes, which are present in both the Port au Port and Codroy are wind farms.

Three other bat species have potential to occur in this part of the Province. Three of these species are migratory, and include hoary bat, silver-haired bat and eastern red bat. These species have been most commonly recorded in Atlantic Canada during the migration period. The three migratory species (hoary, silver-haired and eastern red bat) were recorded in the fall 2022 acoustic surveys. All detections occurred in the fall (September or October), suggesting that these species occur in the Study Area during their fall migration. Prior to this survey, there were no published records of eastern red bat in Newfoundland, however, the NLDFFA-Wildlife Division has had unpublished detections of this species in the past (J. Humber, pers. comm., 2023). Nonetheless, this recording represents one of only a few recordings of eastern red bat in the province of Newfoundland. The fourth species, big brown bat, is a non-migratory species that overwinters in heated houses, deep rock cervices or underground sites. Big brown bat was not positively identified during the acoustic surveys. None of these four species has been recorded as breeding in Newfoundland; most records are likely vagrants.

Approximately 25% of the Project Area has been identified as having the potential to support bats in various habitats. Softwood forest and wetlands account for the largest suitable habitat categories and are some of the most prevalent habitat types in the area. Very little suitable hardwood forest occurs, most of which is in the Codroy area wind farm. It is important to note that bats may occur in any habitats throughout the Island of Newfoundland. One resident species, the little brown myotis, is a habitat generalist and could occur in barren or stunted forest habitat while foraging. The habitats identified as having the potential to support bats through key life-stages were identified as they may be more sensitive to changes in these habitat types.

5.5 References

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5.5.2 Personal Communication

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6.0 Other Wildlife

6.1 Scope And Objectives

The scope of the wildlife assessment is directed by the EIS Guidelines as well as regulatory inputs and concerns. The objectives of this component of the terrestrial baseline study are to:

- Describe historical occurrences as well as abundance and distribution of other wildlife SAR and SOCC including caribou (*Rangifer tarandus*), Newfoundland marten (*Martes americana atrata*), and arctic hare (*Lepus arcticus bangsii*), and species of socio-economic importance including moose (*Alces alces*) and muskrat (*Ondatra zibethicus obscurus*) within the Project Area
- Describe important habitats for other wildlife species of conservation concern that could be affected by the Project.

6.2 Methods

6.2.1 Literature Review

Existing data sources from government agencies and published literature were reviewed to compile information on the conservation status, abundance, distribution, and habitat associations for focal wildlife species in and adjacent to the Project Area.

6.2.2 Field Surveys

The EIS Guidelines (Section 4.3.3) identified moose and caribou surveys that were required to be completed prior to Project construction. The objective of the aerial ungulate survey was to provide an estimate of moose and caribou abundance in the Project Area and to describe existing (baseline) conditions to support the assessment of potential Project effects.

6.2.2.1 Moose

A modified stratified random block (SRB) survey method was used to estimate moose abundance (Gasaway et al. 1986; Timmermann 1993; Heard et al. 2008) following provincial moose survey protocols (Government NL 2022). The SRB survey method involves an initial aerial survey used to stratify the survey area into moose density categories (e.g., high/medium/low) followed by a second survey where a random sample of sampling units or blocks is chosen to survey more intensively. Stratifying the sampling units by moose density reduces variation in population estimates and increases survey precision (Gasaway et al. 1986; Timmermann 1993).

Survey Areas

The Project Area overlaps four Moose Management Areas (MMAs) including MMA 43 (Port au Port), MMA 9 (Anguille Mountains), MMA 6 (Corner Brook) and MMA 10 (Port aux Basques) identified in the 2022-2026 Moose Management Plan (Government NL 2022) (Figure 6.1). Although the initial intent was to survey MMA 43 and MMA 9 as well as portions of MMA 6 and MMA 10 that overlap the Project Area, only MMA 43 and MMA 6 were surveyed due to poor snow conditions.

Sampling Units and Transects

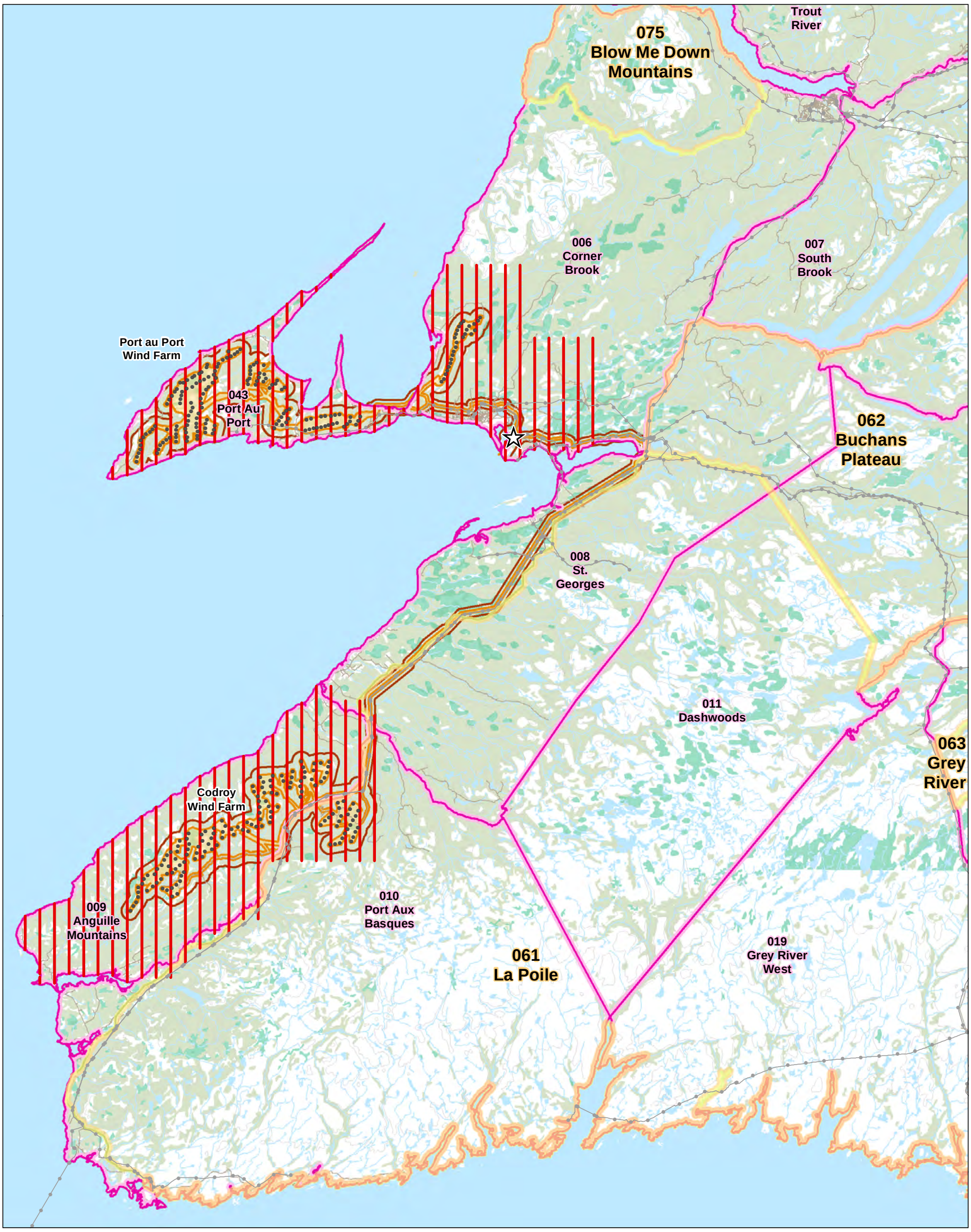
A preliminary (stratification) aerial survey was completed within MMA 43 to determine relative moose abundance using the number of moose observations and their sign (i.e., tracks) as well as habitat suitability. MMA 43 was surveyed using a 2 km x 2 km grid (sampling units) following NLDFFA-Wildlife Division survey protocols. Although moose transects are typically spaced 4 km apart during the preliminary stratification survey (A. Coward and W. Barney pers. comm. 2022), transects were flown 2 km apart because the caribou survey was completed concurrently, which required a 2 km spacing.

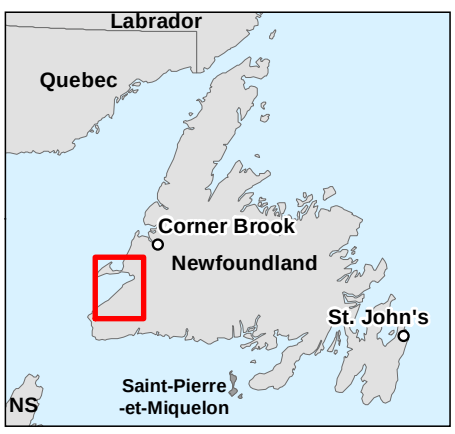
Flight Protocols

The survey flight was completed at approximately 100 m above ground and at a speed of 100-120 km/h in a Bell 206 Long Ranger with three observers plus the pilot. Each observer searched an area within 250 m of the transect line on their side of the helicopter. Moose observations including tracks were recorded using a GPS. Moose were classified by age and sex (adult cow, adult bull, calf, unknown adult, unknown) when possible. Sightability information was recorded by habitat type (e.g., coniferous forest, mixed forest, riparian, shrublands, barren uplands). In addition, air temperature, cloud cover, wind speed and direction, visibility, flight duration as well as snow cover (complete, partial) were recorded. Other incidental wildlife observations and/or tracks were also recorded.

Data Analysis

A summary of survey effort and results of the pre-stratification flight completed in MMA 43 is presented including the total number of moose observed and their sign (tracks).





Notes
1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: Client, Province of Newfoundland and Labrador, ACCDC, Stantec
3. Background: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

- Aerial Survey Transect
- Moose Management Area
- Caribou Management Area
- Local Assessment

Proposed Project Features
- Project Area
- Turbine Location
- Hydrogen / Ammonia Plant Location

Other Features
- Transmission Line, Existing
- Trans-Canada Highway
- Road
- Contour (100 m)
- Watercourse
- Waterbody
- Wetland
- Forested Area

0 10 20 km

(At original document size of 11x17)
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N

Stantec

Project Location
Port au Port Peninsula
NL

Prepared by MB/AC on 2023-05-15
QR by AW on 2023-07-14

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_021

Figure No.
6.1

Title
Provincial Moose and Caribou Management Areas in the Project Area

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6.2.2.2 Caribou

An aerial caribou survey was completed concurrently with the aerial moose survey. The purpose of the survey was to determine caribou presence/absence and not to provide an estimate of population size.

Survey Areas

Following direction provided by NLDFFA-Wildlife Division, caribou were surveyed in MMA 43 (Port au Port Peninsula) where caribou have been historically observed to determine presence/absence. Other areas where previous caribou observations have been recorded but there is no designated caribou range were also surveyed including areas north of Stephenville (Figure 6.1).

Sampling Units and Transects

The number of caribou observed including group composition (age, sex, unknown) and tracks were recorded along transects spaced 2 km (Figure 6.1) apart as per provincial protocols (W. Barney 2022. pers. comm.).

Flight Protocols

Flight protocols were the same as described for moose survey.

Data Analysis

A summary of survey effort and number of caribou observed including their sign is presented.

6.2.2.3 Muskrat

Muskrats are an important furbearer species and are undergoing declines across much of North America (Sadowski and Bowman 2021; Gregory et al. 2019; Ward and Gorelick 2018; Ahlers and Heske 2017). Declines in Newfoundland muskrat are also suspected (NLDFFA 2019). Potential muskrat habitat is found in the Project Area and a survey will be completed to determine the distribution (presence/non-detection) and relative abundance of muskrat in the Project Area.

The muskrat survey will follow the provincial muskrat survey protocol for the Island of Newfoundland (NLDFFA 2019). The study area for this survey includes potential muskrat habitat, mapped as permanent wetlands and watercourses, within the Project Area. Survey sites should have some or all of the following habitat characteristics:

- 50-80% of water surface covered with emergent vegetation
- Presence of shoreline herbaceous vegetation within 10 m of water's edge
- Water depth of 0.5 to 1.5 m with stable seasonal water levels
- Slow flowing/standing water

- Burrowing habitat:
  - soft high clay content, not rocky
  - slope ≥10º, minimum height. 0.2 m

A subset of these areas will be surveyed for muskrat, prioritizing locations with current or historic muskrat sites as identified by trappers, NLDFFA, and local knowledge.

Surveys will be completed in fall between September 1 and November 1, 2023, when population levels are at their highest and there is the greatest likelihood of detecting fresh muskrat sign. At each survey suite, surveys will consist of two steps:

1. Identify and delineate habitat boundaries (areas) at survey sites and complete a 10 × 10 habitat plot within each habitat type
2. Search for muskrat and muskrat sign to obtain data on presence/non-detection and relative abundance of muskrat

Data will be collected using NLDFFA (2019) datasheets. For each habitat plot (i.e., one for every habitat area), water depth and emergent vegetation will be recorded. Plant abundance will be described using the Braun Blanquet scale (Table 6.1) for all common species, including unknown species. Habitat areas will be defined by dominant emergent vegetation, including cattail (*Typha latifolia*), sedge (*Carex* spp.), blue flag (*Iris versicolor*), horsetail (*Equisetum* spp.), pondweed (*Potamogeton* spp.), and rush (*Eleocharis* spp.).

Table 6.1 Braun Blanquet Vegetation Cover and Abundance Categories

Rating	Description of cover
+	<5 % and sparse shoots over small area
1	<5 % and plentiful shoots over small area
2	5-25%
3	26-50%
4	51-75%
5	76-100%

The search for muskrat and muskrat sign will involve walking the shoreline of each habitat area; surveying the shoreline by watercraft is recommended for large areas or where shorelines are difficult to reach or walk along. During the survey, biologists will count the total number of distinct groups of muskrat sign, including food caches, clippings, burrows, trails, feed beds, houses, tracks and scat. Each type of sign within a one-meter section is counted as one observation. All visual observations of muskrat will also be recorded. There are no set criteria for size of wetland or distance of shoreline to survey. If feasible, the full extent of potential muskrat habitat will be covered at a given habitat area. Where possible, surveyors will distinguish between recent muskrat sign (indicative of present occupation) from old muskrat sign (indicative of past occupation) and will assign a relative age to that sign (e.g., within the year versus historic) (RIC 1998a).

The survey will be completed under suitable conditions for observing signs on water (e.g., sunshine or high overcast conditions with calm winds). Sites will not be visited within 24 hour of extensive rainfall, which can disturb or interfere with the detection of sign (e.g., tracks). Tracklogs of transects will be recorded using a GPS as will the location of all muskrat signs. Incidental observations of SAR will also be recorded.

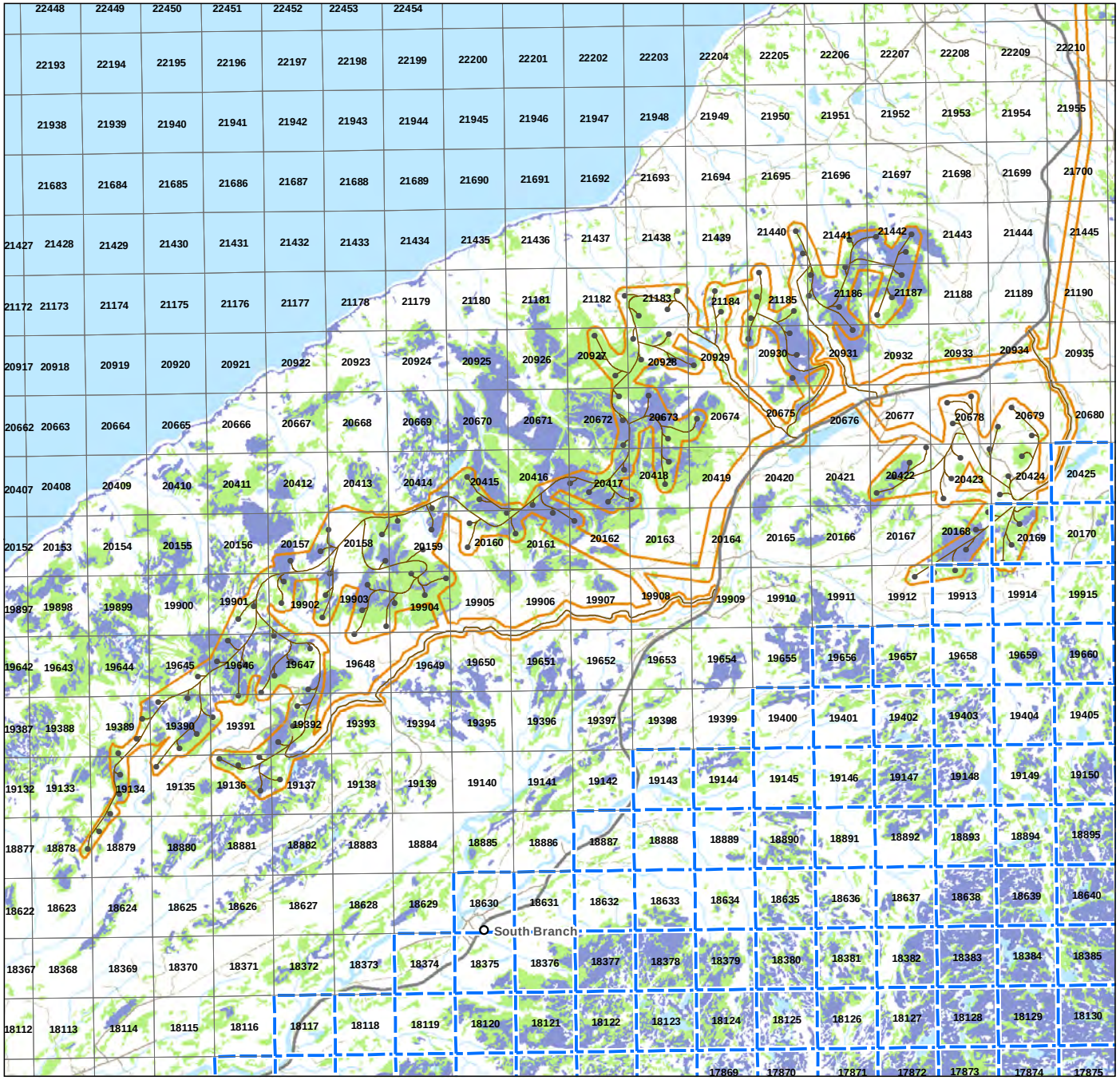
Data Analysis

Data analysis will involve the compilation and review of the survey effort (tracklogs) and results (muskrat and muskrat sign) in the study area. For each wetland or watercourse, an index of relative abundance of muskrat sign/100 m of shoreline will be calculated. A map will be generated showing the location of survey transects and survey observations.

6.2.2.4 Arctic Hare

Efforts are currently underway by the NLDFFA-Wildlife Division to define the distribution of arctic hares in Newfoundland and update the distribution of hares delineated by Mercer et al. (1981). Given the uncertainty surrounding the distribution of arctic hare in relation to the Project, a survey for arctic hare is scheduled for the spring of 2024. The objective for this survey is to determine the presence/absence of arctic hare in the Corduroy Wind Farm LAA, which overlaps the historic range for this species in the Long Range Mountains (based on Mercer et al. 1981 and SSAC 2012). The study area for this survey includes potential arctic hare habitat, mapped as barrens or coniferous scrub, within the LAA on the east side of the TransCanada Highway (Figure 6.2). Detection of arctic hare pellets will be the primary means of determining presence as pellets for this species are much larger than those of snowshoe hare and easy to differentiate compared to tracks. However, to aid in the detection of arctic hare, all sign of hare will be recorded, photographed and measured (i.e., visual observations, pellets, tracks, active runways and trails, feeding sites, and skeletal remains).

Pellets surveys are most effective in snow free conditions and will be completed in April/May 2024 after snow melt. Given the remoteness of the area, survey sites will be accessed via helicopter. Pellets surveys will be completed using a time-constrained search within 2 km x 2 km grids following provincial protocols. A sample of grids that contain barren lands and coniferous scrub that overlap the Project Area will be chosen and time-constrained searches completed in areas of suitable habitat including small, exposed hilltops/knobs and boulder outcrops. Approximately 180 person-minutes will be completed in each grid. Tracklogs will be recorded using a GPS as will the location of all arctic hare and arctic hare sign. Incidental observations of SAR will also be recorded.



Stantec

Proposed Project Features

- Turbine Location
- Access Road
- Project Area

Other Features

- 2 x 2 km grid (WD)
- Arctic Hare Presumed Presence (WD)
- Trans-Canada Highway
- Road
- Watercourse
- Waterbody

Potential Arctic Hare Habitat

- Barren
- Coniferous Scrub

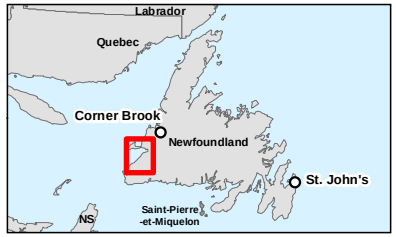
N

0 2.5 5 km

(At original document size of 8.5x11)
1:200,000

Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: Gov. N, Fisheries, Forestry, and Agriculture, Wildlife Division (WD); World Energy GH2; NRCan CanVec
3. Background: NRCan; CanVec



Project Location
Stephenville
NL

Prepared by MB/AC on 2023-07-14
QR by AW on 2023-07-14

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_052

Figure No.
6.2

Title
Potential Arctic Hare Habitat mapped as Barren and Coniferous Scrub near Codroy Wind Farm

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Data Analysis

Data analysis will involve the compilation and review of the survey effort (tracklogs) and results (pellets and other hare sign) and an assessment of the evidence for the presence of arctic hare in the survey area. A map will be generated showing the location of survey transects and survey observations.

6.3 Results

6.3.1 Literature Review

6.3.1.1 Moose

Moose were introduced to central Newfoundland in 1878 (Pimlott 1953) and to western Newfoundland in 1904 (Dodds 1983) and are now widespread across all ecoregions of the island (NLDFFA 2022; McLaren et al. 2004). This species is not listed under the province's *Endangered Species Act*, nor is it listed under SARA. Moose are hunted throughout Newfoundland, with approximately 24,000 individuals harvested each year (NLDFFA 2022). The moose population has fluctuated since its introduction with peak numbers of over 150,000 individuals in the 1950s and 1990s (NLDFFA 2022). The population estimate for Newfoundland and Labrador in 2022 was approximately 110,000 individuals (NLDFFA 2022). Moose in Newfoundland are an important game species and are managed in distinct MMAs; during the annual quota development process, a population estimate and trajectory is established for each MMA and assessed against the target population size (NLDFFA 2022). Moose is also an important traditional use species that is harvested by Indigenous communities throughout Newfoundland (NLDFFA 2022). Moose are anticipated to occur throughout the LAA and moose counts for this area will be collected during aerial surveys completed for the Project in 2023 and 2024 (Section 6.3.2). The LAA overlaps four MMAs (043, 006, 009, and 010; Figure 6.1).

Newfoundland moose occur at high densities in area with younger forests that have been recently disturbed, either by forest harvesting or natural disturbance such as fire or insect outbreaks. On the Island of Newfoundland, moose exhibit seasonal trends in diet, where green and herbaceous materials (e.g., leaves, terminal shoots of trees and shrubs, grasses, sedges, aquatic vegetation) are selected in spring and summer and woody portions of coniferous and deciduous trees (e.g., balsam fir [*Abies balsamea*]) and white birch [*Betula papyrifera*]) shrubs are consumed during fall and winter (McLaren et al. 2000; Thompson and Curran 1993; Dodds 1960).

Black bear (*Ursus americanus*) is the predominant predator of moose on Newfoundland; however, unlike regions with other predators such as wolves (e.g., Labrador), predation is not a limiting factor for Newfoundland moose, rather moose populations are limited by habitat and forage availability and hunting (NLDFFA 2022).

6.3.1.2 Caribou

Woodland caribou are native to Newfoundland and Labrador. The Newfoundland population is considered distinct from caribou in Labrador, which are recognized as part of the boreal population of caribou that ranges from Labrador to eastern Yukon. The Newfoundland population of caribou was recently added to Schedule 1 of SARA as a species of Special Concern (GOC 2023d), based on the 2014 COSEWIC status assessment that upgraded the population status to Special Concern from Not at Risk (COSEWIC 2014). Newfoundland caribou are not listed under Newfoundland and Labrador's *Endangered Species Act.* Caribou are a culturally significant species for Indigenous communities in Newfoundland and many hunt the animal for subsistence purposes (Qalipu First Nation 2016).

Caribou occur across much of the Island of Newfoundland as naturally occurring and introduced (relocated) subpopulations. The Newfoundland caribou population has fluctuated in abundance over the last 100 years and experienced a dramatic (60%) decline between the mid-1990s and early 2000s. The population fell by approximately 90,000 caribou during this timeframe (NLDEC 2015) and the decline led to the COSEWIC status upgrade to Special Concern in 2014. The population decline has since stabilized, and a recent 2019 population estimate for the island of Newfoundland was 30,580 caribou (NLDFFA 2023a).

The Port au Port Wind Farm is not within provincial Caribou Management Areas (CMAs) and there are no sub-population ranges in the LAA. The Buchans Plateau Caribou Management Area is approximately 30 km east of the to the Port au Port Wind Farm (Figure 6.1). A small herd was established on the Port au Port Peninsula in 1964-65 when 20 individuals were introduced from the Middle Ridge caribou sub-population (Bergerud and Mercer 1989). This herd had grown to 40 individuals by 1981; however, the animals eventually died off or relocated to other areas such that there is currently no identified sub-population on the peninsula (Bergerud and Mercer 1989; COSEWIC 2014). A population of caribou using the Stephenville Crossing area during winter (< 100 individuals) may have originated from the Port au Port herd (SaltWire 2019). A portion of the Codroy Wind Farm overlaps the La Poile CMA; however, caribou locations from collared individuals do not overlap the Project Area (Figure 6.1). Aerial caribou surveys will be completed concurrently with aerial moose surveys in 2024 on the Port au Port Peninsula, in the Stephenville Crossing and Table Mountain areas, and adjacent to the Codroy Wind Farm (including a portion of LA Poile CMA) to determine caribou presence/absence in these areas.

This distribution of caribou in Newfoundland tends to vary seasonally as most sub-populations undertake small seasonal migrations (COSEWIC 2014). Generally, adult caribou in Western Newfoundland select rock and heath barrens and stands of mature coniferous forest more than other habitats in all seasons (Mahoney and Virgl 2003). During winter (mid-December-March), particularly in central regions of the island with deep snow, caribou migrate to areas with mature-old coniferous forests that reduce snow accumulation and reduce energetic costs associated with travelling and foraging in deep snow (Mahoney and Virgl 2003; Wells et al. 2011). Winter and fall forage for caribou in Newfoundland consists primarily of terrestrial lichens, such as *Cladina* spp. (Mayor et al. 2007; Fortin et al. 2008; Mayor et al. 2009; Soulliere and Mahoney 2014). Arboreal lichens and evergreens are also selected to a lesser extent (Soulliere and Mahoney 2014). Wetland complexes, barren lands, and shrub lands are preferred during snow-free seasons. In early spring (April-May), females migrate to traditional calving grounds, typically characterized

by barren lands, low-lying vegetation surrounded by mature-old coniferous forests and wind-scarred trees (Saunders 2007). Caribou tend to avoid mixed-forest during calving (McCarthy et al. 2011). Summer forage for Newfoundland caribou includes deciduous shrubs, sedges, terrestrial lichen (*Cladina* spp.) and fungi (Bergerud 1969).

The Newfoundland and Labrador government implemented a 2008-2013 research program to understand the cause of the dramatic decline in caribou on the Island of Newfoundland (NLDEC 2015). The study concluded that the recent caribou decline was a natural occurrence related to density-dependent factors associated with unsustainably high number of caribou in the 1990s (NLDEC 2015). Secondary factors such as calf predation and hunting (of bull caribou) accelerated the decline, while human land use changes associated with habitat disturbance were not linked to caribou decline (NLDEC 2015). High predation rates of calves weakened by density dependent effects (e.g., nutritional stress) was identified as a primary mechanism for caribou mortality during the decline (Weir et al. 2014). Black bear (*Ursus americanus*) and coyote (*Canis latrans*), which established in Newfoundland in 1985, are the two main predators of caribou calves (NLDEC 2015; Raly 2012; Mumma 2014). The current low but stable population of approximately 30,000 caribou may persist for decades before the broad-scale pattern of rapid population increase and decease return to the island (NLDEC 2015). NLDEC (2015) state that long-term management of caribou population should be primarily focused on range quality and availability; future potential risks to caribou include land use changes that result in the loss of spring and summer ranges, unmitigated disturbance associated with snowmachine and all-terrain vehicle (ATV) use, wolf recolonization of the island, and factors associated with climate change (e.g., parasites, severe weather).

6.3.1.3 Newfoundland Marten

The Newfoundland population of American marten (*Martes americana atrata*) is a genetically and geographically distinct subspecies of marten, which is only found on the Island of Newfoundland and in Labrador and northern Quebec (COSEWIC 2022). The Newfoundland marten is one of 14 native mammal species on the Island of Newfoundland and is currently listed as Threatened under Newfoundland and Labrador's *Endangered Species Act* and Threatened under Schedule 1 of SARA (GOC 2023). In 2022, COSEWIC re-examined the status of Newfoundland marten and assessed the species as special concern (COSEWIC 2022). A provincial recovery plan has been developed for Newfoundland marten with the goal of maintaining a viable, wild population on the island that is not at risk (NMRT 2010). A federal recovery strategy, which delineates critical habitat, was released for the Newfoundland marten in 2013 (Environment Canada 2013).

Historic population estimates from the early 2000s indicated under 1,000 mature Newfoundland marten were found in five subpopulations on the island (e.g., COSEWIC 2007). An updated population estimate for the Newfoundland marten was completed in 2019 and suggested that the population had increased to 2,558–2,837, with little evidence of subpopulation structure (COSEWIC 2022). The apparent growth in the population was likely due to an actual increase in the number of marten and previous population estimates that were conservative and lacked robust data (COSEWIC 2022). Marten now occur in at least 15 of the 18 designated forest management districts on the Island of Newfoundland as well as in both national parks. On the west coast, populations are known to occur in areas surrounding Little Grand Lake,

Red Indian Lake, and Main River. The Port au Port Peninsula is outside of the known extent of occurrence for this species; however, the Port au Port Wind Farm Site A1 and Codroy Wind Farm are within the extent of occurrence and this species has been observed near the Project Area for both sites (COSEWIC 2022).

Newfoundland marten were thought to be strongly associated with mature/old-growth balsam fir forests and avoid open habitats such as recent clearcuts (COSEWIC 2007). While older forests are still recognized as an important component of marten habitat, recent data indicate this species occupies a broader array of habitat types, including partially harvested and early successional forests regenerating after clearcut logging (Hearn et al. 2010; COSEWIC 2022). Hearn et al. (2010) state that forest composition for Newfoundland marten should be > 24% mature and overmature forest and should not exceed 29% younger aged forest. This range of habitats provides sufficient structure for denning sites and supports the key prey species for marten, which include meadow voles (*Microtus pennsylvanicus*), shrews (*Sorex* sp.), snowshoe hares (*Lepus americanus*), red squirrels (*Tamiasciurus hudsonicus*) and birds. Large-scale areas of critical habitat for the American marten in Newfoundland were identified by the Newfoundland Marten Recovery Team (NMRT 2010) and this habitat from the provincial plan was adopted by Environment Canada to assist with identification of critical habitat under SARA (Environment Canada 2013). Turbines and access roads do not overlap critical habitat currently identified by the province or under SARA; a portion of the transmission line intersects the periphery of critical habitat along the TransCanada Highway near Barachois Pond Provincial Park.

Commercial trapping for Newfoundland marten has been banned since 1934; however, incidental mortality associated with snaring and trapping is the primary threat for this population (COSEWIC 2022). Habitat loss associated with forest clearing, disease, and vehicle collisions are other lesser threats for Newfoundland marten (COSEWIC 2022). Although Newfoundland marten is not currently known to inhabit the Project Area, Project activities may affect Newfoundland marten, particularly as the species appears to be expanding its home range in the province.

6.3.1.4 Muskrat

Muskrats are native to Newfoundland and Labrador and are not listed under the province's *Endangered Species Act*, nor are they listed under SARA. Muskrat on the Island of Newfoundland are considered a distinct race and differ morphologically from muskrat in other areas (Rigby and Threlfall 1982). Muskrats are the most trapped furbearer in North America (Naughton 2012; Obbard et al. 1987) and are managed and trapped throughout much of Newfoundland (NLDFFA 2023b). The muskrat is also a culturally important species to Indigenous communities in Newfoundland.

This species inhabits a variety of permanent wetlands and watercourses, including marshes, ponds, slough, lakes, and slow-moving creeks, and rivers; anthropogenic wetlands such as ditches and dugouts are also used (Boutin and Birkenholz 1987). Muskrats can occupy brackish water (e.g., estuaries) and have been observed in saltwater (Naughton 2012). During winter, muskrats remain active and den in bank burrows or lodges made from aquatic vegetation (Naughton 2012). Muskrat in Western Newfoundland tend to favor bank burrows for shelter (Lear 1952 *in* Soper 1995). Specialized "push ups" with a central plunge hole and walls of mud and vegetation are also built by muskrat on the ice surface

during winter, these features provide a protected location under the snow for resting and feeding (Naughton 2012). Cattails (e.g., *Typha latifolia*) are a preferred food source and building material for muskrat lodges; however, cattails are relatively rare in Newfoundland and, in western Newfoundland, sedge (*Carex* sp.), iris (*Iris versicolor*), horsetail (*Equisetum* sp.), pondweed, and rush (*Eleocharis* sp.) are the primary food source and lodge building material for muskrat (Soper 1995).

Between the 1930s and 1980s, this species was thought to be extirpated from parts of Newfoundland due to predation from introduced mink (*Neogale vison*) (Soper and Payne 1997; Soper 1995); populations in many of these areas are thought to have stabilized or recovered (NLDFFA 2023b). However, emerging data indicate muskrat across North America are in decline (Sadowski and Bowman 2021; Gregory et al. 2019; Ward and Gorelick 2018; Ahlers and Heske 2017) and, based on trends in trapping data, it is believed muskrat in Newfoundland may be undergoing a similar decline (NLDFFA. 2019). The cause of muskrat decline in North America is unknown, though it is likely related to multiple factors, including wetland loss and alteration combined with predation, disease, and contaminants (Sadowski and Bowman 2021; Ganoe et al. 2020). Potential muskrat habitat and muskrat surveys will be completed to collect abundance and distribution data for this species in the LAA during fall 2023 (Section 6.3.2.3).

6.3.1.5 Arctic Hare

Arctic hares are native to Newfoundland and Labrador and are considered scarce on the Island of Newfoundland (Naughton 2012; Hearn et al. 1987). The *bangsii* subspecies of arctic hare is unique to Island of Newfoundland and in southern Labrador (SSAC 2012). Arctic hares on the Island of Newfoundland are at the southern limit of their distribution (Naughton 2012) and this may explain why they occur and low densities compared to elsewhere in the range (Hearn et al. 1987). A population size fluctuating between 5,000 and 20,000 arctic hare has been estimated for the Island of Newfoundland (SSAC 2012). Arctic hare is not listed under the province's *Endangered Species Act* or under SARA. Arctic hare was reviewed by the SSAC in 2012 which recommended issuing a data deficient status (SSAC 2012).

A comprehensive understanding of artic hare distribution on the Island of Newfoundland is lacking (SSAC 2012). Arctic hares occupy upland barrens in Newfoundland (Fitzgerald and Keith 1990) and their known range is restricted to the west side of the island within the Long Range Mountains, the Buchans-Gaff Topsails plateau complex, and nearby exposed coastal barrens (SSAC 2012; Mercer et al. 1981). In addition, a small, translocated population of arctic hares occurs on Brunette Island (SSAC 2012). The Island of Newfoundland is one of the few locations where the geographic ranges of arctic hare and snowshoe hare overlap (Fitzgerald and Keith 1990); yet, as the two hare species occupy different habitats, competition from snowshoe hare is not believed to be responsible for the low density and distribution of arctic hare on the island (Fitzgerald and Keith 1990; Hearn et al. 1987). However, Small (1990) suggests that introduction of snowshoe hare could results in localized reduction of arctic hare populations from forested regions with small patches of barrens (particularly via indirect, predator-mediated competition). Both species of hare feed on graminoid and herbaceous vegetation in spring and summer and switch to a diet of predominantly woody plants in winter (Naughton 2012; Dodds 1960). White birch is a preferred forage species of hares in Newfoundland (Naughton 2012; Dodds 1960).

Arctic hares are found at naturally low densities on the Island of Newfoundland (i.e., ~ 1 hare/km^2; SSAC 2012). Cyclic fluctuation in arctic hare densities is known for local populations; for example, long term monitoring by Gerrow and Anderson (2007) reported fluctuating densities of between 0.24 and 1.05 hares/km^2 in Gros Morne National Park and suggested a cycle with a periodicity of 6-7 years. Red fox (*Vulpes vulpes*) is the most important predator of arctic hare in Newfoundland (Hearn et al. 1987). Predation by other predators (e.g., Canada lynx [*Lynx canadensis*] and coyote) is of secondary importance, although changing predator distribution and density associated with introduced prey species (e.g., snowshoe hare) and climate change is a potential threat to arctic hare populations (SSAC 2012). Canada lynx prefer forested areas rather than barrens and are the primary predator of snowshoe hare on the Island of Newfoundland (Dodds 1965; Saunders 1963).

As the distribution of arctic hares is understudied on the Island of Newfoundland, range overlap with the LAA near the Codroy wind farm is possible. Based on habitat in provincial 2 km x 2 km survey grids, arctic hare is presumed present in some of the barren lands located south of Highway 1 near the Codroy wind farm (Figure 6.2). Spring pellet surveys for arctic hare are scheduled for a portion of the LAA in the Long Range Mountains (Section 6.3.2.4).

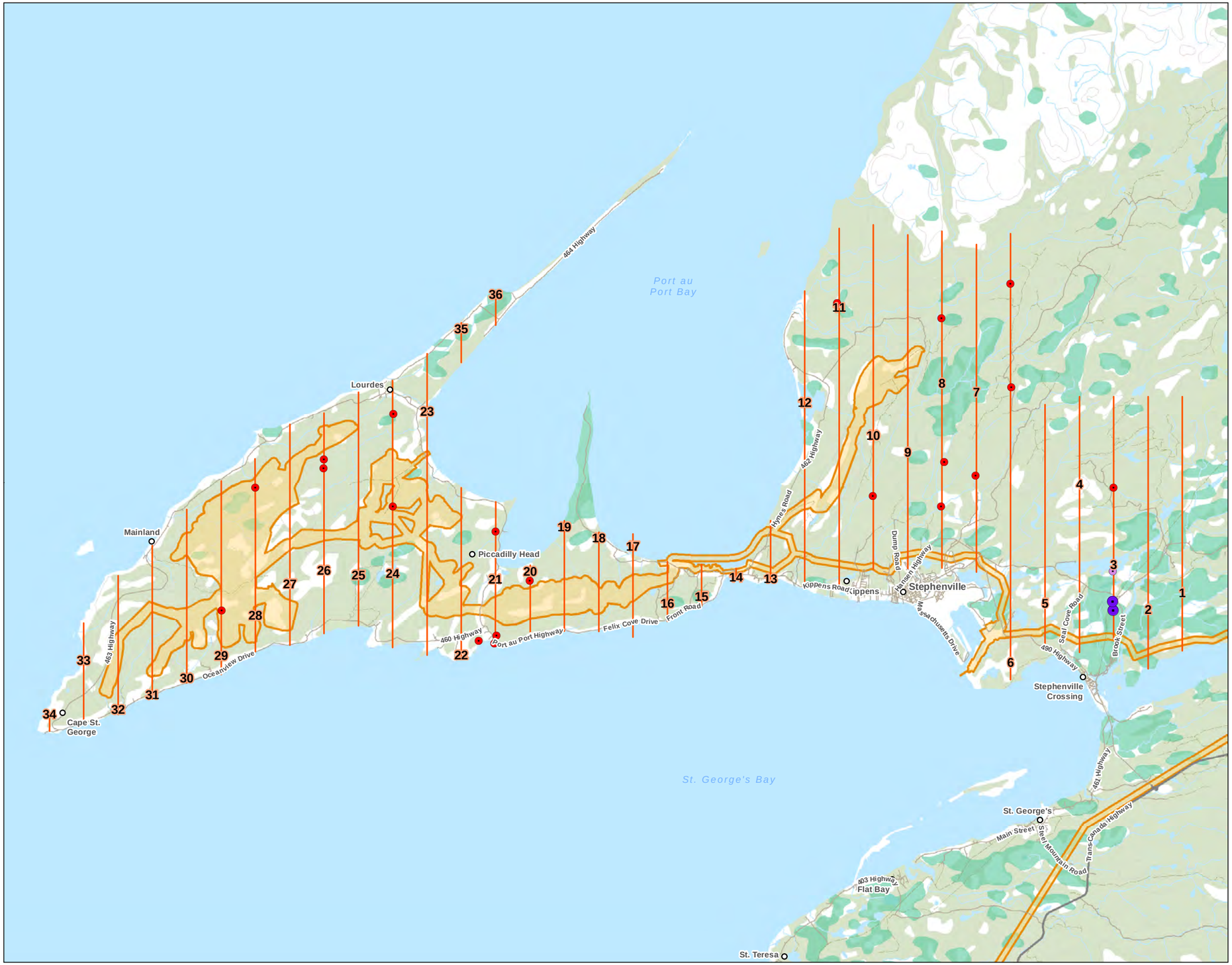
6.3.2 Field Surveys

6.3.2.1 Moose

A pre-construction aerial survey for moose was completed in MMA 43 and MMA 6. The initial pre-stratification survey was completed on March 8, 2023; however, the second intensive survey could not be completed due to poor snow conditions.

MMA 43 – Port au Port

Twenty-two survey transects were flown in MMA 43 totaling 179.5 km. Moose tracks were observed along all survey transects but were most abundant in grids that overlapped transects 21 and 28 (Figure 6.3). Seventeen moose were observed in 10 independent groups including three adult cows, one bull, one yearling, two calves, and 10 unknown adults (Figure 6.3). One moose calf was incidentally observed between transects 21 and 22 near Abrahams Cove. In addition, four bald eagle and one spruce grouse were incidentally observed.



Stantec

Aerial Survey Species and Number Observed

- Caribou, 2
- Caribou, 50
- Moose, 1-3
- Aerial Survey Transect

Proposed Project Features

- Project Area

Other Features

- Trans-Canada Highway
- Road
- Resource Road / Trail
- Contour (100 m)
- Watercourse
- Waterbody
- Wetland
- Forested Area

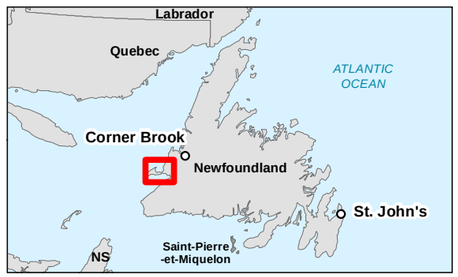
N

0 5 10 km

(At original document size of 11x17)
1:230,000

Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec
3. Background: NRCan; CanVec



Project Location
T11N, R12E, S05
T. of Dane, Dane Co., WI

Prepared by MB/AC on 2023-07-14
QR by AW on 2023-07-14

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World Energy GH2
Project Nujio'qonik

Figure No.
6.3

Title
Moose and Caribou Aerial Survey Results, March 2023

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MMA 6 – Corner Brook

Fourteen survey transects were flown in MMA 6 totaling 219.8 km (Figure 6.3). Moose sign (tracks, beds) was frequently observed in grids that overlapped transect 11 as well transects 2 through 7. Sixteen moose were observed in six independent groups including three adult cows, one adult bull, one calf and 11 unknown adults.

6.3.2.2 Caribou

A pre-construction aerial survey for boreal caribou was completed in MMA 43 and areas north of Stephenville on March 8, 2023 (Figure 6.3). A total of 22 transects were flown in MMA 43 totaling 179.5 km. Fourteen transects in MMA 6 were surveyed in areas surrounding Cold Brook north of Stephenville for a total of 220 km. No caribou or their sign (tracks) were observed in the Port au Port Peninsula. However, 3 groups of caribou were observed north of Stephenville Crossing in MMA 6 including two groups of 50 individuals and one group of two (Figure 6.3).

6.3.2.3 Muskrat

A ground-based muskrat survey will be completed during fall 2023.

6.3.2.4 Arctic Hare

A ground-based survey for arctic hare will be completed during spring (April /May) 2024 to determine presence/absence in the Project Area near the Codroy wind farm following provincial protocols and prior to any construction activities. The survey will include a time-constrained search within a subsample of provincial 2 km x 2 km grids that overlap the Project Area.

6.4 Discussion

Based on desktop review, three wildlife SAR and SOCC, caribou, Newfoundland marten and arctic hare, as well as two identified species of socio-economic importance, moose and muskrat, have the potential to interact with the Project.

Field surveys are planned to better understand the distribution and abundance of these species in and adjacent to the Project Area, to support the assessment of potential Project effects. Project-specific surveys for moose and caribou began in 2023. Although the moose and caribou surveys were not fully completed during 2023, the results indicated moose were relatively well distributed in MMA 43 based on the frequency of tracks observed. Similarly, moose were relatively abundant in MMA 6 in areas that provide suitable habitat. Additional moose surveys will be completed in MMA 43, MMA 9, MMA 6, and MMA 10 during the winter of 2024 using NLDFFA-Wildlife Division protocols. Similarly, the caribou survey will be completed again during the winter of 2024 to determine presence/absence in areas potentially affected by the Project. Surveys for muskrat are scheduled for the fall of 2023 and surveys for arctic hare are planned for the spring of 2024.

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7.0 Areas of Conservation Concern

7.1 Scope And Objectives

Due to the nature and scale of the Areas of Conservation Concern, the baseline is focused on these areas relative to the Project RAA. The objectives of this areas of conservation concern baseline study are:

- To identify potential terrestrial and marine areas of conservation concern protected under federal, provincial, international and/or other legislations or agreements due to their ecological, historical or socio-cultural characteristics and importance within the Project RAA
- To describe areas of conservation concern within the RAA, identify areas intersected by the Project or RAA, as well as the shortest linear distances from areas of conservation concern to Project components, where possible

Areas of conservation concern include protected areas designated under Canadian legislation and other special or sensitive areas that are designated federally or provincially but not protected by legislation (Table 7.1).

Table 7.1 Federal and Provincial Legislation Applicable to Areas of Conservation Concern

Legislation	Purpose
Federal	
Fisheries Act	Conserve and protect fish and fish habitat; to manage inland fisheries (among other purposes) conserve and protect marine biodiversity
Canada Wildlife Act	Conserve and protect habitat for migratory bird species
Oceans Act	Established to designate Marine Protected Areas for the purpose of conservation of marine habitat, species, and ecosystems
Provincial	
Endangered Species Act and Endangered Species Regulation	Established to oversee the protection of endangered species in the province
Wildlife Act and Wildlife Act Regulations	Oversee the management and protection of wildlife in the province
Wilderness and Ecological Reserves Act and Wilderness Reserve Regulations	Established to protect a wilderness reserve set aside under the Act
Wilderness and Ecological Reserves Act and Botanical Ecological Reserve Regulations	Protect botanical ecological reserves set aside under the Act
Wilderness and Ecological Reserves Act and Seabird Ecological Reserve Regulations	Protect seabird ecological reserves set aside under the Act

Table 7.1 Federal and Provincial Legislation Applicable to Areas of Conservation Concern

Legislation	Purpose
Wilderness and Ecological Reserves Act and Little Grand Lake Provisional Ecological Reserve Regulations and Little Grand Lake Provisional Ecological Reserve Order	Protect representative portions of three ecodistricts contributing to the Natural Areas Systems Plan and protecting the habitat of the Newfoundland Marten
Wilderness and Ecological Reserves Act and Little Grand Lake Wildlife Reserve Regulations	Established to protect the Newfoundland marten
Forestry Act	Oversee the management, protection and utilization of the forest resources of the province

7.2 Methods

7.2.1 Desktop Review

Areas of conservation concern for terrestrial and marine areas were identified through desktop review of publicly available datasets. To identify potential areas of conservation, separate terrestrial and marine RAAs were defined. The Terrestrial RAA was defined as 30 km from a Project boundary, including the Port au Port wind farm, the hydrogen / ammonia plant, and the Codroy wind farm, as well as associated transmission line rights-of-way (ROWs). The Marine RAA includes NAFO Unit Areas 4Rc and 4Rd.

Datasets reviewed for identification of terrestrial areas of conservation concern within the Terrestrial RAA include:

- Canadian Protected and Conserved Areas (Government of Canada 2023a)
- National Parks (Government of Canada 2023b)
- Provincially Protected Areas (Government of NL 2023a)
- Ecological Reserves (Government of NL 2023b)
- Ramsar Sites (Ramsar International Convention on Wetlands 2023)
- American Pine Marten Proposed Critical Habitat (Government of Canada 2023c)
- Piping Plover Proposed Critical Habitat (Government of Canada 2023d)
- Protected and Proposed Public Water Supplies (Government of NL 2023c)
- Sensitive Wildlife Areas – Plants (Government of NL 2023d)
- Important Bird Areas (IBAs) (Birds Canada 2023)
- Community Nominated Priority Places (CNPP) (Government of Canada 2023e)
- Proposed Protected Areas (Government of NL 2023a)
- Newfoundland T'Railway (T'Railways Association 2023)

Datasets reviewed for identification of marine areas of conservation within the Marine RAA include:

- Federal Marine Bioregions – Canada Marine Planning Atlas – Atlantic (Government of Canada 2023f)
- Ecologically or Biologically Significant Marine Areas (EBSA's) (Government of Canada 2023f)
- National Marine Conservation Areas (Parks Canada 2019)
- Marine Refuges, Fish Closures and Lobster Closure Areas (Government of Canada 2023f; DFO 2019a; 2019b; 2019c; 2019d)
- Significant Benthic Areas (SiBAs) (Government of Canada 2023f)
- SAR Critical Habitat for Northern and Spotted Wolffish (Government of Canada 2023f)
- Scheduled Salmon Rivers (Gov NL 2023d)

7.3 Results

7.3.1 Terrestrial Federal and Provincial Protected Areas

7.3.1.1 National Parks

No national parks currently intersect with the Project Area or are within the Terrestrial RAA (Figure 7.1).

7.3.1.2 Barachois Pond Provincial Park

Barachois Pond Provincial Park is located within the St. George's Bay subregion of the Western Newfoundland Forest ecoregion and contains occurrences of provincially rare, black ash (*Fraxinus nigra*). The closest portion of the park is located approximately 0.05 km from the Project Area and approximately 2,956 ha is intersected by the Terrestrial RAA (Figure 7.1). Barachois Pond Provincial Park is part of the Long Range Mountains and is the northern-most extension of the Appalachian Mountain chain. Tree species within the park are mainly coniferous, dominated by balsam fir (*Abies balsamea*) with moss and fern understories. Deciduous species such as yellow birch (*Betula alleghaniensis*), white birch (*Betula papyrifera*), maples (*Acer* spp.), tamarack (*Larix laricina*), white pine (*Pinus strobus*) and black ash (*Fraxinus nigra*) also occur (PAANL 2008a).

7.3.1.3 Blow Me Down Provincial Park

Blow Me Down Provincial Park is located northeast of the Project within the Serpentine Range subregion of the Western Newfoundland Forest ecoregion. Approximately 7,713 ha of Blow Me Down Provincial Park is intersected by the Terrestrial RAA (Figure 7.2). Blow Me Down Provincial Park is a mountainous area with elevations in some sections exceeding 800 m. Fir-dominated forests with moss and fern understories represent the most common community type within the park, though coastal cliffs dominated by rock barrens can also be found. Plant and wildlife species endemic to the Gulf of St. Lawrence have been observed within the area (PAANL 2008b).

7.3.1.4 Codroy Valley Provincial Park and Grand Codroy Provincial Reserve

Codroy Valley Provincial Park and Grand Codroy Provincial Reserve are located approximately 14 km and 11 km respectively south of the Project, within the Terrestrial RAA. Approximately 27 ha of Codroy Valley Provincial Park and 7 ha of Grand Codroy Provincial Reserve are within the Terrestrial RAA (Figure 7.2). Codroy Valley Provincial Park protects important beach habitat for several shorebirds while the Grand Codroy Provincial Park Reserve protects portions of fluvial delta and estuarine habitat, critical for a variety of wildlife species (PAANL 2008c).

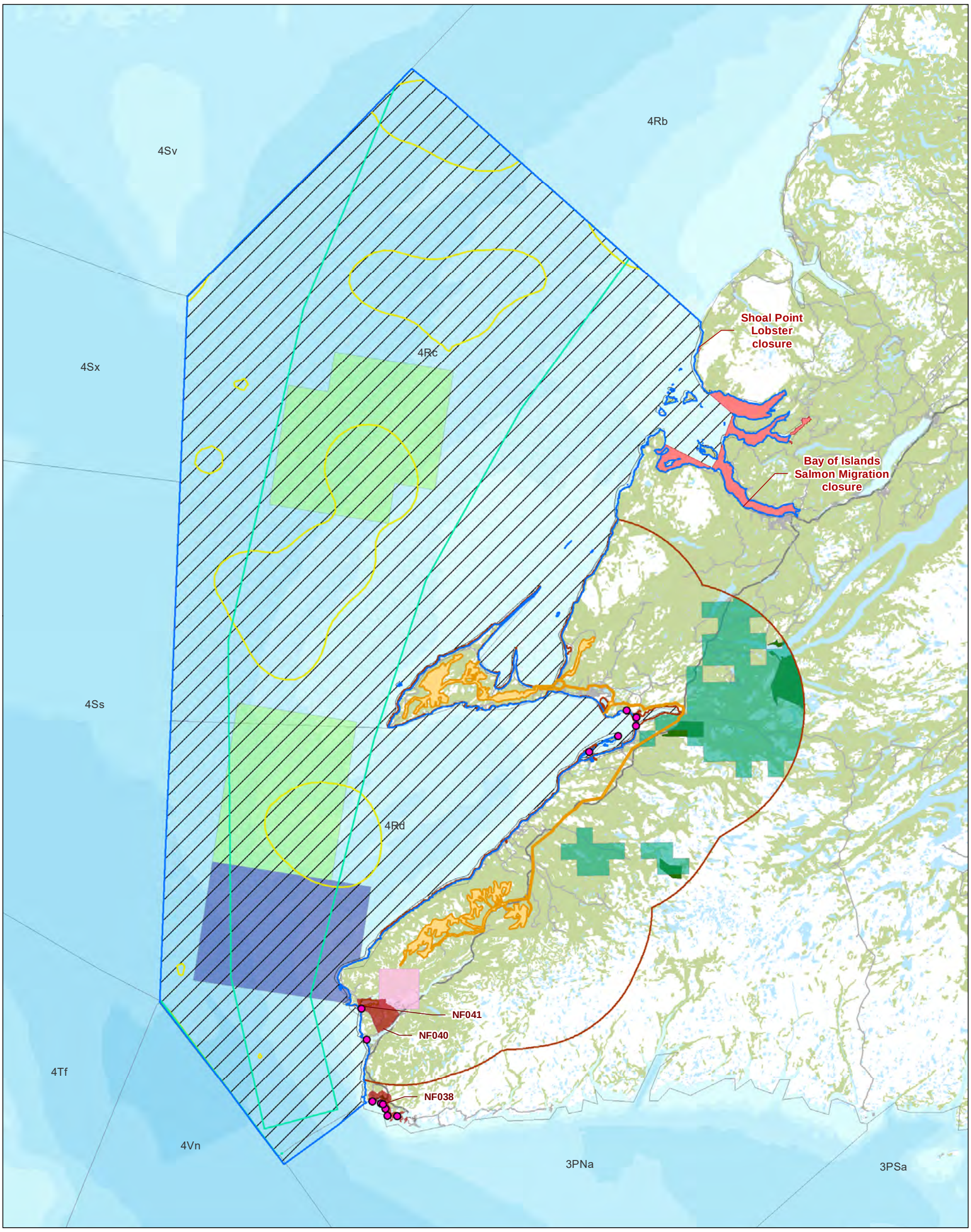
Grand Codroy Provincial Reserve also contains the Grand Codroy Estuary, which occurs between the Long Range Mountains and Codroy River (PAANL 2008c). The closest portion of the Grand Codroy Estuary occurs approximately 13 km from the Project Area (Figure 7.2). The Grand Codroy Estuary is a Ramsar-designated wetland (a wetland of international importance by the International Convention on Wetlands) and is the only such site found in NL (Ramsar 2023). The Grand Codroy Estuary is home to a large variety of songbirds, shorebirds, and waterfowl and contains two internationally recognized IBAs (Section 7.3.6). Rare plant species, such as eastern hay-scented fern (*Dennstaedtia punctilobula*) and Fernald's serviceberry (*Amelanchier fernaldii*), have also been documented within the estuary (NCC 2023a).

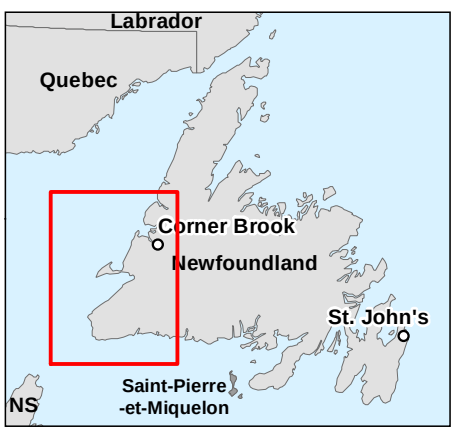
7.3.1.5 Little Grand Lake Provisional Ecological Reserve

Little Grand Lake Provisional Ecological Reserve is one of three protected areas surrounding Little Grand Lake, along with Glover Island Public Reserve and Little Grand Lake Wildlife Reserve. These reserve areas are located east of the Project. Approximately 7,713 ha of Little Grand Lake Provisional Ecological Reserve, 13 ha of Glover Island Public Reserve, and 2,543 ha of Little Grand Lake Wildlife Reserve are intersected by the Terrestrial RAA (Figure 7.2). Vegetation within the reserve areas includes extensive bog wetlands, ribbed fens, mature boreal forest, and barren habitat, all which provide habitat for woodland caribou (Government of NL 2023b). The reserves also contain critical habitat for Newfoundland populations of American [Newfoundland] marten, a wildlife species designated as special concern under COSEWIC (COSEWIC 2022) and listed as Threatened under the NL ESA (Government of NL n.d.; The Newfoundland Marten Recovery Team 2010). These reserve areas serve as a buffer against human activity potentially limiting recovery of Newfoundland marten and include restrictions on timber harvesting, mineral exploration, commercial development, altering water flows, and trapping and snaring, as well as use of motorized vehicles and equipment (Government of NL 2023b).

7.3.1.6 Mummichog Crown Land Reserve

Mummichog Crown Land Reserve is a small conservation area located south of the Project Area within the Terrestrial RAA (Figure 7.2). The reserve is approximately 1 ha in size. Limited information currently exists on Mummichog Crown Land Reserve.





Notes
1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, Environment and Climate Change Canada, Canadian Wildlife Service, Fisheries and Oceans Canada, Province of Newfoundland and Labrador, ACCDC, Stantec
3. Background: NRCan CanVec

Protected Areas
- Marine Refuges (Coastal Sites)
- Nature Conservancy of Canada

Critical Habitat
- Piping Plover (ECCC)
- American Pine Marten (ECCC)
- Bobolink, Proposed (ECCC)
- Northern Wolffish (DFO)
- Spotted Wolffish (DFO)
- Ecologically and Biologically Significant Area (DFO)
- Important Bird Areas (IBA Canada)
- Significant Benthic Area (DFO)

- Project Area
- Regional Assessment Area (Marine)
- Regional Assessment Area (Terrestrial)

Other Features
- Trans-Canada Highway
- Road
- Marine Bioregion (DFO)
- NAFO Unit
- Waterbody
- Forested Area

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(At original document size of 11x17)
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Stantec

Project Location
Port au Port Peninsula
NL

Prepared by AC on 2023-05-01
Revised by NW on 2023-07-06
QR by AW on 2023-07-07

Client/Project
121417233_058b

World Energy GH2
Project Nujio'qonik

Figure No.
7.1

Title
Federal Protected Areas within the Terrestrial and Marine RAA of Conservation Concern

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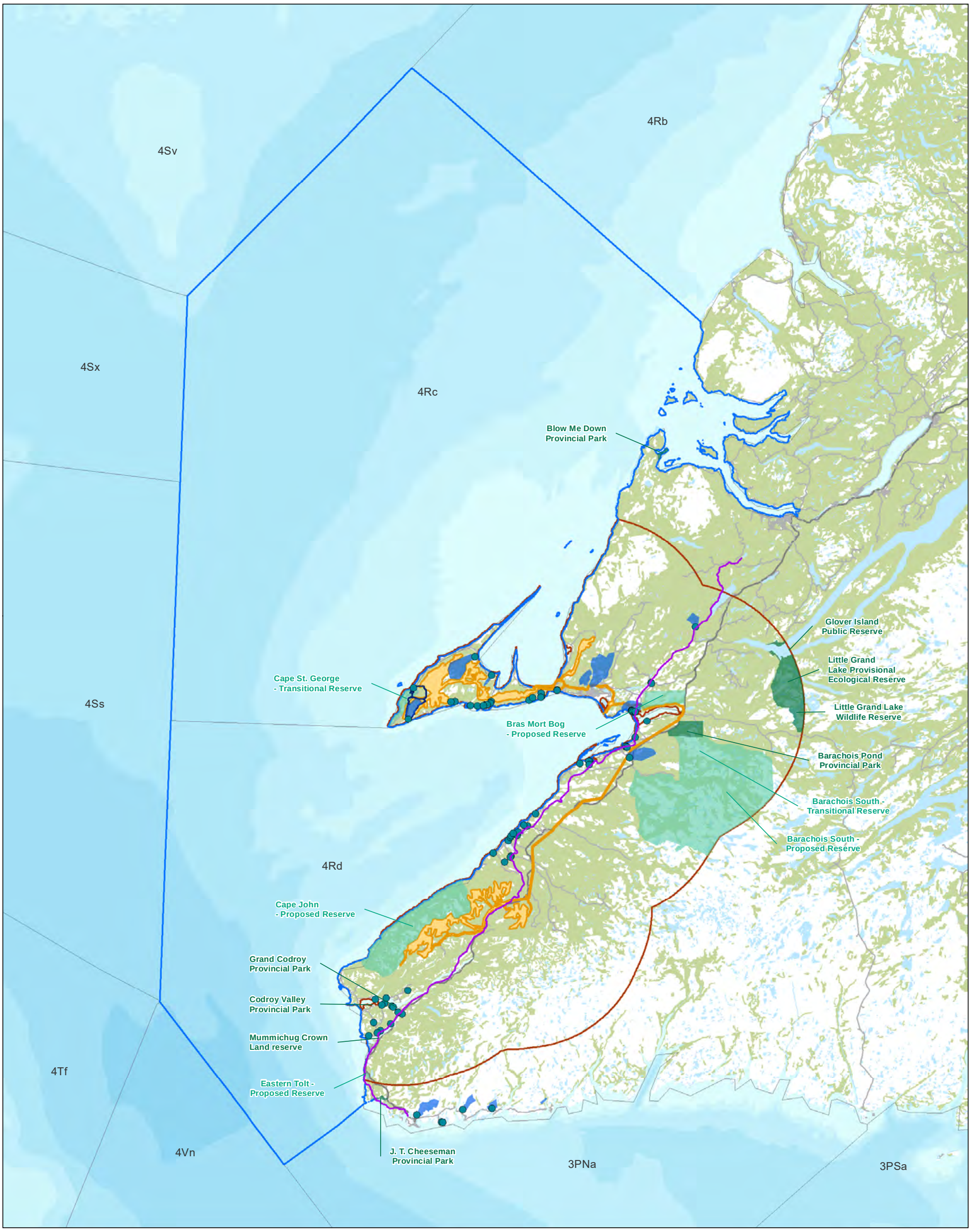

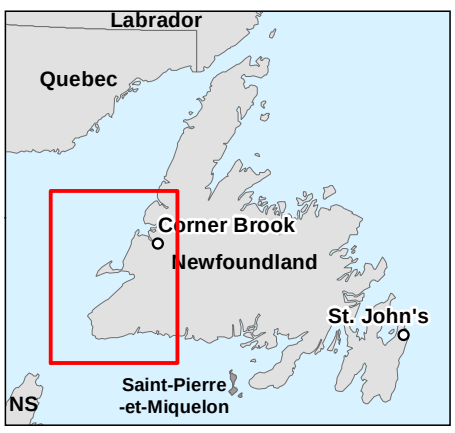

- Intakes & Wellheads
- NL T'Railway
- NL Public Water Supplies
- ILUC Water Supplies
- Provincial Protected Areas
- Provincial Protected Areas (Proposed)
- Project Area
- Regional Assessment Area (Marine)
- Regional Assessment Area (Terrestrial)

Other Features

- Trans-Canada Highway
- Road
- NAFO Unit
- Waterbody
- Forested Area

0 20 40 km

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N

Stantec

Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, Province of Newfoundland and Labrador, Stantec
3. Background: NRCan CanVec

Project Location
Port au Port Peninsula
NL

Prepared by AC on 2023-05-01
Revised by MB on 2023-08-01
QR by AW on 2023-07-07

Client/Project
121417233_058c

World Energy GH2
Project Nujio'qonik

Figure No.
7.2

Title
Provincial Protected Areas within the Marine and Terrestrial RAA of Conservation Concern

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7.3.1.7 J.T. Cheeseman Provincial Park

J.T. Cheeseman Provincial Park is located south of the Project within the South Coast Barrens subregion of the Maritime Barrens ecoregion. Approximately 237 ha of J.T. Cheeseman Provincial Park is within the Terrestrial RAA (Figure 7.2). The park contains a mixture of wetland and upland habitat and supports a diverse array of plant species. Forested areas typically contain balsam fir, pine species (*Pinus* spp.), tamarack and mountain ash (*Sorbus decora*). Sand dunes and beaches occur along coastal areas and are important habitat for many migratory bird species, including some of the largest variety of shorebirds in the province (PAANL 2008d). Habitat for Endangered Piping Plover is also found within the park. A variety of seashells, mussels, and clams can also be found in coastal areas, including some historically valued by Indigenous people for traditional uses (PAANL 2008d).

7.3.2 Nature Conservancy of Canada Designated Areas

7.3.2.1 Crabbes River Nature Reserve

The Crabbes River property is managed by the NCC and occurs adjacent to southern portions of the Project (Figure 7.2). The property is intersected by the Crabbes River and includes 245 ha of native forest, containing a mix of black spruce (*Picea mariana*), balsam fir and yellow birch. Along the Crabbe River, diverse riparian habitat occurs and supports a variety of rare plant species, both along the headwaters of the river as well as the lower estuary. The Crabbe River is a provincially scheduled salmon river (NCC 2023b).

7.3.2.2 Sandy Point Nature Reserve

Sandy Point Nature Reserve is located on an uninhabited island, located south of the Project (Figure 7.2). The NCC protects and conserves approximately 27 ha of land within this area. The island contains habitat such as tidal flats, salt marshes and sandy beaches, not commonly found on the Island of NL. Coastal, sandy areas on the island provide critical nesting habitat for a variety of bird species, including Piping Plover, an Endangered shorebird species. Provincially rare and uncommon plant species such as seaside lavender (*Limonium carolinianum*) and saltwater cordgrass (*Sporobolus alterniflorus*) also occur within low-lying salt marsh and tidal flat areas. Historical foundations, cemeteries, docks, breakwaters, and a lighthouse can still be found on the island (NCC 2023c).

7.3.2.3 The Grasses Nature Reserve

The Grasses Nature Reserve is situated along the Long Range Mountains and is located south, southeast of the Project Area (Figure 7.2). The NCC conserves approximately 1,570 ha of land within this area. The Grasses Nature Reserve contains some of the most extensive natural grasslands in NL. Large wetland area occurs along the Robinson's River within the reserve and contains habitat for several rare plant species. The reserve also supports populations of Newfoundland marten, woodland caribou and waterfowl such as Canada Geese, Black Ducks, Green-winged Teals, and Mergansers. Species considered uncommon in NL, such as Olive-sided flycatcher, Rusty Blackbird and Winter Wren, have also been documented in the reserve (NCC 2023d).

7.3.2.4 Barachois Brook Nature Reserve

Barachois Brook Nature Reserve borders Barachois Pond Provincial Park and is managed by the NCC. The reserve is located west of the Project and is approximately 79 ha in size (Figure 7.2). The nature reserve surrounds Barachois Brook, a river identified as an Atlantic salmon watercourse. Vegetation features within the reserve contain a mix of balsam fir, white spruce (*Picea glauca*) and black spruce, as well as various wetland types. Wildlife species such as red fox, American beaver, black bear and bird species such as Boreal Chickadee, Swainson's Thrush, and Black-and-White Warbler can also be found. The reserve also contains habitat for the Newfoundland marten (NCC 2023e).

7.3.3 Critical Habitat

7.3.3.1 Newfoundland Marten Critical Habitat

Newfoundland marten are genetically distinct populations of the subspecies *Martes americana atrata* and have been assessed as a Species of Special Concern under COSEWIC (COSEWIC 2022) and listed as Threatened under the NL ESA. Approximately 12,1130 ha of proposed critical habitat for Newfoundland marten is intersected by the Terrestrial RAA., however, there is limited direct interactions with the Project Area with a short section of the proposed transmission line, which parallels existing infrastructure corridors. The existing and proposed infrastructure near Stephenville Crossing and the outflow of South West Brook interact with critical habitats at the furthest extents of the known species range (Figure 7.2).

7.3.3.2 Piping Plover Critical Habitat

Environment and Climate Change Canada (ECCC) data indicate critical habitat for piping plover occurs at 13 points within the Terrestrial and Marine RAAs (Government of Canada 2023d). The closest known location of piping plover critical habitat occurs approximately 1.3 km from the Project Area, situated near the proposed transmission line ROW between Stephenville and Stephenville Crossing (Figure 7.2).

7.3.4 Protected and Proposed Water Supplies

The Terrestrial RAA intersects 79 water intakes or wellheads as well as 96 public water supplies (wells, brooks, and watersheds). However, only four occurrences of Indirect Land Use Changes (ILUC) Water Supplies intersect with the Terrestrial RAA at Rouzes Brook (Cape St. George), Caribou Brook (Mainland), #3 Well Robinson's (Gales) (Bay St. George South), and Cointres Brook (Cape St. George) (Government of NL 2023c). Rouzes Brook, Caribou Brook, Cointres Brook and several public water supplies are located within the Project Area near the Port au Port Wind Farm (Figure 7.2).

7.3.5 Sensitive Wildlife Areas – Plants

Sensitive wildlife areas as included in publicly available provincial land use datasets also identify sensitive areas where listed rare plants are known to occur. The Project Area avoids these sensitive areas, although the Terrestrial RAA intersects three sensitive wildlife areas for listed rare plants. Sensitive wildlife areas for listed rare plants cover a total of 6,441 ha within the Port au Port Peninsula and maintain surface level restrictions for development (Figure 7.2) (Government of NL 2023d).

7.3.6 Important Bird Areas

IBAs are designated by Birds Canada as areas of importance for the survival of bird species. Criteria used to identify IBAs include presence of SAR, species with restricted range, habitats holding representative species assemblages, or a congregation of an important proportion of a species' population during one or more season (Birds Canada 2023). The Terrestrial RAA intersects three IBAs: Grand Bay West to Cheeseman Provincial Park (NF038), Codroy Valley IBA (NF040), and Codroy Valley Estuary IBA (NF041). Codroy Valley Estuary is the closest IBA to the Project area, located approximately 9 km away (Figure 7.2).

Grand Bay West to Cheeseman Provincial Park (NF038) includes section of sand beach and rocky coastline and represents important nesting habitat for piping plover. The IBA is also an important fall migration stopover for shorebirds (Birds Canada 2023).

Codroy Valley IBA (NF040) is located between the Little Codroy River and the Grand Codroy River. Many forest bird species, including two species of restricted range, the ovenbird (*Seiurus aurocapilla*) and the red crossbill (*Loxia curvirostra*), have been documented within this area. Several species that are uncommon or absent elsewhere in Newfoundland have been documented within this IBA, including Ruby-throated Hummingbird (*Archilochus colubris*), Gray Catbird (*Dumetella carolinensis*), Red-eyed Vireo (*Vireo olivaceus*), and Rose-breasted Grosbeak (*Pheucticus ludovicianus*). The IBA is also a breeding ground for Bobolink (*Dolichonyx oryzivorus*) (Birds Canada 2023).

Codroy Valley Estuary IBA (NF041) is located at the mouth of the Grand Codroy River and is an important breeding and staging site for waterfowl. Rare ducks such as Eurasian wigeon (*Mareca penelope*) and tufted duck (*Aythya fuligula*) have been seen in this IBA as well as the first NL breeding record for northern shoveler (*Spatula clypeata*). Piping plover has also been documented within this IBA and nests on Grand Codroy Beach (Birds Canada 2023).

7.3.7 Community Nominated Priority Places

Community-nominated Priority Places (CNPP) for SAR is a multi-partner initiative that looks to fund opportunities to protect and recover species and the habitat they live in. CNPP intersecting the Terrestrial RAA include the "Long Range Biodiversity" area on the western coast of the Island of NL. Ecosystem conservation plans will focus on areas from Port aux Basques to Cape Norman at the tip of the Great Northern Peninsula, covering approximately 3,242,691 ha and targeting wildlife and plant SAR such as piping plover or Long's braya (*Braya longii*). The initiative aims to address key threats to SAR and their habitat such as human disturbance, by-catch, and resource extraction (Government of Canada 2023e).

7.3.8 Proposed Provincial Protected Areas

Proposed provincial protected areas are lands intended for protection as wilderness or ecological reserves. Transitional reserves are lands intended for future protection as wilderness or ecological reserves, where mineral or petroleum exploration will be allowed to continue for 10 years unless a significant discovery is made during that period. Lands are designated when a proposed area meets certain ecological criteria such as regions of large, undisturbed wilderness area, lands representative of the ecosystem or occurrence of a rare natural phenomena (WERAC 2020).

7.3.8.1 Cape John Proposed Reserve

The Cape John Proposed Reserve is one of 24 new proposed areas in the Protected Areas Plan for the Island of Newfoundland (WERAC 2020). The proposed ecological reserve is located in southwestern NL, north of the Codroy Valley. Approximately 21,270 ha of Cape John Proposed Reserve is within the Terrestrial RAA (Figure 7.2). The reserve is situated along a remote coastline encompassing the western portion of the Anguille Mountains. The reserve is known for rugged coastal valleys containing windswept forests dominated by balsam fir, with ferns and mosses along the forest floor. Deciduous forests of yellow birch and trembling aspen (*Populus tremuloides*) also occur within the reserve. Although the use of off-road vehicles has impacted the barrens in the upper regions of the watersheds, Cape John remains largely undeveloped and intact. This forested area serves as an accurate depiction of the Western Newfoundland Forest natural region. Cape John Proposed Reserve has been nominated as a representative forested habitat in western Newfoundland (WERAC 2020).

7.3.8.2 Cape St. George Transitional Reserve

The Cape St. George Transitional Reserve is located within the southwestern tip of the Port au Port Peninsula. Approximately 1,807 ha of Cape St. George Transitional Reserve is within the Terrestrial RAA (Figure 7.2). The area has been identified as a proposed transitional reserve due to the occurrence of the most southerly extent of rare limestone barren habitat in Newfoundland. Three NL ESA-listed plant species, Mackenzie's sweetvetch (*Hedysarum boreale* subsp*. Mackenzii*), rock-dwelling sedge (*Carex petricosa* var. *misandroides*), and wooly arnica (*Arnica angustifolia* ssp*. tomentosa*), are found within the reserve. Rare limestone barren habitat and rocky cliffs also support a wide variety of uncommon, though not provincially Endangered plant species, as well as three colonies of black-legged kittiwakes (WERAC 2020).

7.3.8.3 Bras Mort Bog Proposed Reserve

The Bras Mort Bog Proposed Reserve contains some of the largest, relatively undisturbed plateau bogs found in Newfoundland. The Bras Mort Proposed Reserve contains undulating terrain, dominated by black spruce and moss species that provide important habitat and forage for overwintering woodland caribou. Approximately 3,619 ha of Bras Mort Bog Proposed Reserve is intersected by the Terrestrial RAA (Figure 7.2) (WERAC 2020). The Bras Mort Bog Proposed Reserve also directly intersects with Project transmission line ROWs in sections near Stephenville Crossing.

7.3.8.4 Barachois South Proposed Ecological and Transitional Reserve

The Barachois South Proposed Area is both an ecological and transitional reserve. Approximately 42,276 ha of Barachois South Transitional Reserve and approximately 27,355 ha of the Barachois South Ecological Reserve is intersected by the Terrestrial RAA (Figure 7.2). Both areas are located along the southern Long Range Mountains, near St. George's Bay. These reserves represent ecologically important transition zones between the Western Newfoundland forest and the Long Range barrens and are considered representative of historical landscapes found occurring in the region. Wetlands and small ponds occur throughout the proposed reserves, as well as sections of relatively undisturbed habitat. The proposed reserves also provide habitat for uncommon species such as woodland caribou and Arctic hare. Mineral exploration is permitted to continue within the proposed transitional reserve for a 10-year period, after which the area will be protected as an ecological reserve (WERAC 2020).

7.3.8.5 Eastern Tolt Proposed Reserve

The Eastern Tolt Proposed Reserve is located south of the Project, north of the community of Cape Ray, NL. Approximately 81 ha of Eastern Tolt Proposed Reserve is intersected by the Terrestrial RAA (Figure 7.2). The reserve is ecologically unique due to the presence of high wind speeds, promoting the creation of globally rare wave forests, which are alternating bands of both living and dead balsam fir stands. The Eastern Tolt Proposed Reserve contains some of the most visible stands of wave forest in the world (WERAC 2020).

7.3.9 Newfoundland T'Railway

The Newfoundland T'Railway is a recreational trail to be developed from St. John's to Port aux Basques using a former Canadian National railway line. It is intended to allow multiple recreational uses including hiking, biking, cross-county skiing, and equestrian, snowmobile, and ATV use. The trail will be located in the Newfoundland T'Railway Provincial Park. The trail is intended to extend for up to 883 km and link urban, rural, and wilderness areas. The park will form the NL section of the Trans Canada Trail, stretching from St. John's, NL to Victoria, BC and to Tuktoyaktuk, NWT. When complete, the Trans Canada Trail will extend for more than 22,000 km, making it the longest continuous trail in the world (T'Railways Association 2023).

Approximately 204 km of the Newfoundland T'Railway is intersected by the Terrestrial RAA, with sections also directly intersecting with the Project Area near the Codroy Wind Farm, as well as proposed transmission line ROWs (Figure 7.2).

7.3.10 Marine Conservation Areas

7.3.10.1 Federal Marine Bioregions

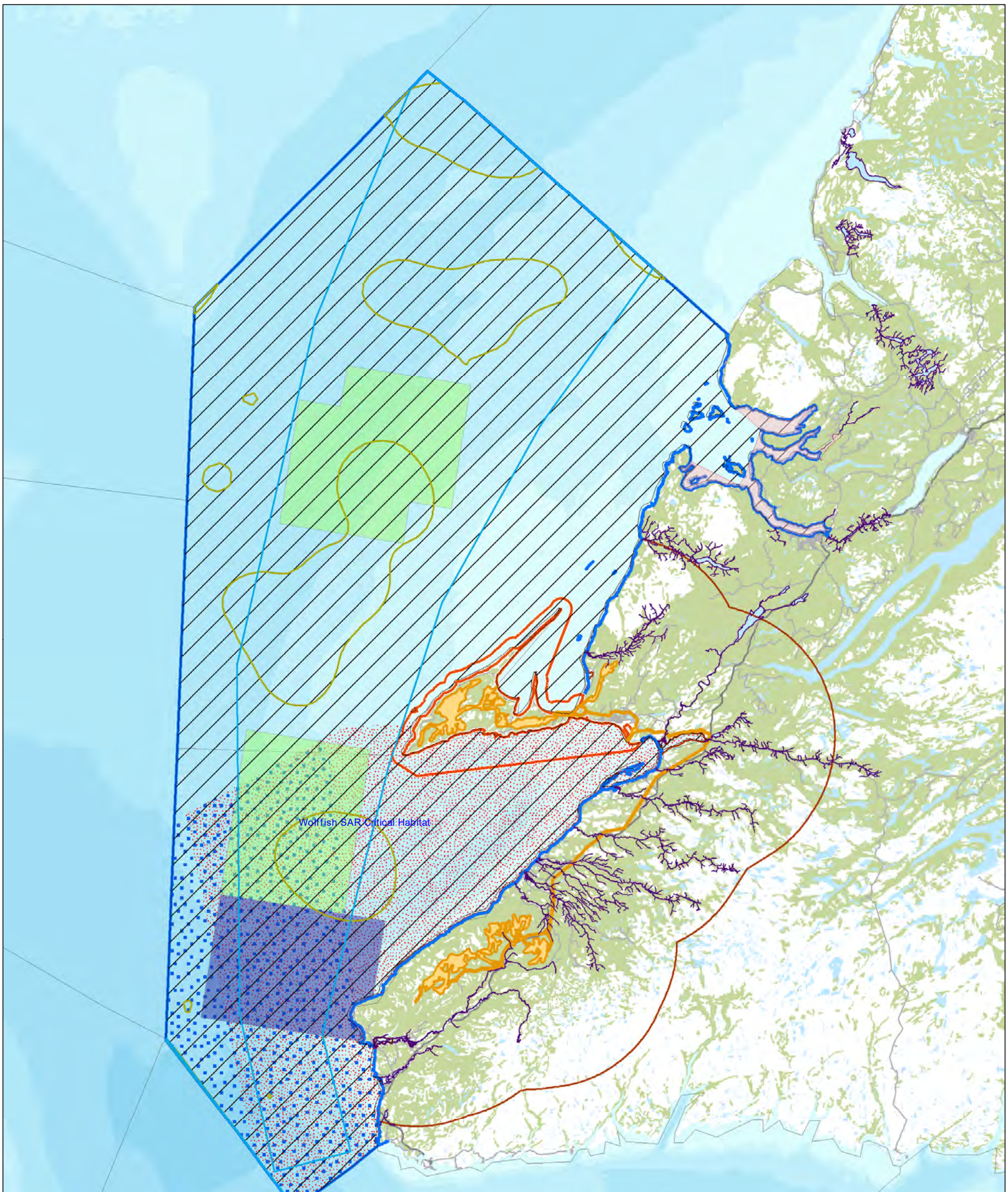
The Marine RAA is located in the Estuary and Gulf of St. Lawrence Marine Bioregion and intersects a total of 2,209,700 ha (Figure 7.3). The Estuary and Gulf of St. Lawrence Marine Bioregion is one of the largest and most productive estuarine / marine ecosystems in Canada and worldwide (Government of Canada 2023). The St. Lawrence marine ecosystem is exposed to a wide variety of human pressures that pose threats to its integrity and sustainable use, including fisheries and navigation (particularly as a transportation route to the Great Lakes via the St. Lawrence seaway and river), as well as mariculture (sea-farming) activities. Coastal development and recreational use (including marine mammal observation tourism) also represent important activities in the bioregion. Other activities in and around the bioregion include industrial and municipal activities, agriculture, and river damming (for water level control and hydropower). These activities have had effects on nutrient, organic matter, and contaminant inputs to the marine environment (Government of Canada 2023f).

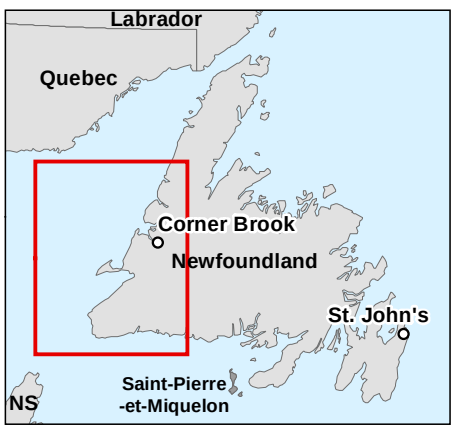
Withing the marine RAA/LAA there are several sensitive areas that are close to or within LAA boundaries: EBSAs, SiBAs, SAR Critical Habitat for northern and spotted wolffish, DFO Shellfish Harvesting Closures, Special Marine Areas (SMAs), and Important Areas for Blue Whales. SMAs were identified by The Canadian Parks and Wilderness Society (CPAWS) using information from academic, official, and community literature as well as input from governments, indigenous groups, academics, non-governmental organizations, and community members (CPAWS 2018). Two marine refuges are present outside of the LAA but are within RAA boundaries; the Shoal Point Lobster Closure and the Bay of Islands Salmon Migration Closure, which are approximately 76 km and 45 km from the Project, respectively.

7.3.10.2 Ecologically and Biologically Significant Areas

Ecologically and Biologically Significant Areas (EBSAs) are identified by DFO to designate marine areas with high ecological or biological activity relative to surrounding areas. Criteria for EBSA designation include uniqueness / distinctness compared with surrounding areas, species use in the area, and importance of the area to the life history of the species found within it (DFO 2005). The Marine RAA is located within the Estuary and Gulf of St. Lawrence (EGSL) Large Ocean Management Area (LOMA) and intersects one EBSA, the West Coast of Newfoundland EBSA. This EBSA is located approximately 5 km from the Project Area at its closest point. The Marine RAA intersects approximately 1,842,427 ha of the West Coast of Newfoundland EBSA (Figure 7.3).

The West Coast of Newfoundland EBSA is an important spawning area of Northern Gulf cod, is the only known overwintering area for Northern gulf herring and capelin, is a main migration corridor for demersal fish species, and serves as an important feeding area for many marine mammals observed in the region. Large quantities of fish larvae (particularly capelin and herring), as well as juveniles of northern Gulf cod, redfish, American plaice and Atlantic wolffish, can also be found within this EBSA (DFO 2009).





Notes
1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, Province of Newfoundland and Labrador, Fisheries and Oceans Canada, Stantec
3. Background: Natural Resources Canada CanVec

- Marine Refuges (Coastal Sites)
- Ecological and Biologically Significant Areas
- Significant Benthic Areas
- Federal Marine Bioregions
- Scheduled Salmon Rivers (2023-24)

Wolffish SAR Critical Habitat
- Northern Wolffish
- Spotted Wolffish

Important Areas for Blue Whale
- Feeding Area
- Migration Area

- Project Area
- Local Assessment Area (Marine)
- Regional Assessment Area (Marine)
- Regional Assessment Area (Terrestrial)

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Stantec

Project Location Stephenville, NL	Prepared by NW on 2023-04-28 Revised by MB on 2023-08-01 QR by AW on 2023-07-07
Client/Project	121417233_058g

World Energy GH2
Project Nujio'qonik

Figure No.
7.3

Title
Marine Protected Areas within the Marine and Terrestrial RAA of Conservation Concern

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7.3.10.3 National Marine Conservation Areas

Though the *National Marine Conservation Areas Act, 2002*, Parks Canada has been mandated to establish a network of National Marine Conservation Areas (NMCAs) within each of Canada's 29 marine regions (Parks Canada 2019). No NMCAs or candidate NMCAs have yet to be established or identified in the Marine RAA.

7.3.10.4 Marine Refuges

The Marine RAA intersects two Marine Refuges:Shoal Point Lobster Closure area and the Bay of Islands Salmon Migration Closure area (Figure 7.3). The Project is approximately 76 km from Shoal Point Lobster Closure area and approximately 45 km from the Bay of Islands Salmon Migration Closure area. The Marine RAA intersects approximately 3 ha of Shoal Point Lobster Closure area and approximately 21,731 ha of the Bay of Islands Salmon Migration Closure area.

The Shoal Point Lobster Closure area aims to protect spawning habitat, specifically, inshore shallow, and rocky areas in order to increase lobster egg production. Lobster fishing is prohibited in these closure areas. In addition, other human activities that could negatively affect lobster spawning are also prohibited (DFO 2019b). The Bay of Islands Salmon Migration Closure has been implemented to protect salmon migration habitat, which is an important part of the salmon's life cycle, linking marine and freshwater salmon environments. Pelagic fixed-gear fisheries are prohibited in the closure area. Other human activities that could negatively affect salmon migration in this closure area are also prohibited (DFO 2019d).

7.3.10.5 Significant Benthic Areas

SiBAs are defined in DFO's Ecological Risk Assessment Framework as "significant areas of cold-water corals and sponge dominated communities". These areas are not protected; however, they identify key marine species distribution and may indicate areas of future restoration activities (DFO 2013). Sea pens are feather-like, soft suspension feeders that anchor to soft bottom substrates. Sponges are found at depths of 3,000 m or less along continental shelves, slopes, canyons and deep fjords (DFO 2017).

The closest SiBA to the Project is located approximately 15 km away. Five SiBAs for small and large size gorgonian coral, sea pen and sponge dominated communities overlap with the Marine RAA. Approximately 336,388 ha of SiBAs are intersected by the Marine RAA (Figure 7.3).

7.3.10.6 Critical Habitat for Northern and Spotted Wolffish

Northern wolffish and spotted wolffish are listed as Threatened under Schedule 1 of SARA. These species have declined in abundance and size of range area since the 1970s or 1980s, when research surveys were initiated. Though some recovery has been recorded, the population of both species is low compared to initial research surveys. Limited information is available on northern and spotted wolffish habitats, particularly in offshore areas. However, the results of research surveys indicate that habitat preference may be related to sea bottom temperature and depth. Based on these criteria, critical habitat

areas have been defined. While the entire areas are not considered to be critical habitat, they contain sufficient habitat for survival or recovery (Government of Canada 2018).

Two critical habitat areas for spotted wolffish and one critical habitat area for northern wolffish occur within the Marine RAA. The closest identified spotted wolffish critical habitat occurs 5.4 km from the Project, while the closest identified northern wolffish critical habitat occurs approximately 36 km from the Project. An estimated 262,580 ha of spotted wolffish critical habitat and 117,235 ha of northern wolffish critical habitat are intersected by the Marine RAA (Figure 7.3).

7.3.10.7 Scheduled Salmon Rivers

Recreational angling / fishing is regulated Federally and Provincially by DFO through the *Newfoundland and Labrador Fishery Regulations*. Licenses, issued by the Government of Newfoundland and Labrador, are required by both residents and non-residents for salmon, and non-residents only for trout and other sport fish (such as arctic char and northern pike). Newfoundland and Labrador inland waters are divided into scheduled salmon rivers; scheduled rainbow and brown trout waters; and non-scheduled inland waters (DFO 2019c). Scheduled rivers are those listed on Schedule 1 and Schedule 2 of the *Newfoundland and Labrador Fishery Regulations*.

7.4 Discussion

Based on desktop review, several existing and proposed terrestrial and marine areas of conservation concern and public water supplies occur within the Terrestrial and Marine RAA; LAA and PA. The identified areas are:

- Bras Mort Bog Proposed Reserve
- Cape John Proposed Reserve
- Cape St. George Transitional Reserve
- Newfoundland marten Proposed Critical Habitat
- Newfoundland T'Railway
- ILUC water supplies including Rouzes Brook, Caribou Brook, and Cointres Brook
- Newfoundland Public Water Supplies including wells, brooks and watersheds within the Port au Port Region

While the above areas of conservation concern and water supplies overlap with the RAA, LAA or PA, future development of Port au Port Wind Farm, hydrogen / ammonia plant facility, and the Codroy Wind Farm will be designed to avoid these areas and their sensitive features to the extent possible; if avoidance is not possible, appropriate mitigation will be applied. In addition, some areas of conservation concern only intersect with associated transmission line ROWs, where smaller disturbance effects are anticipated.

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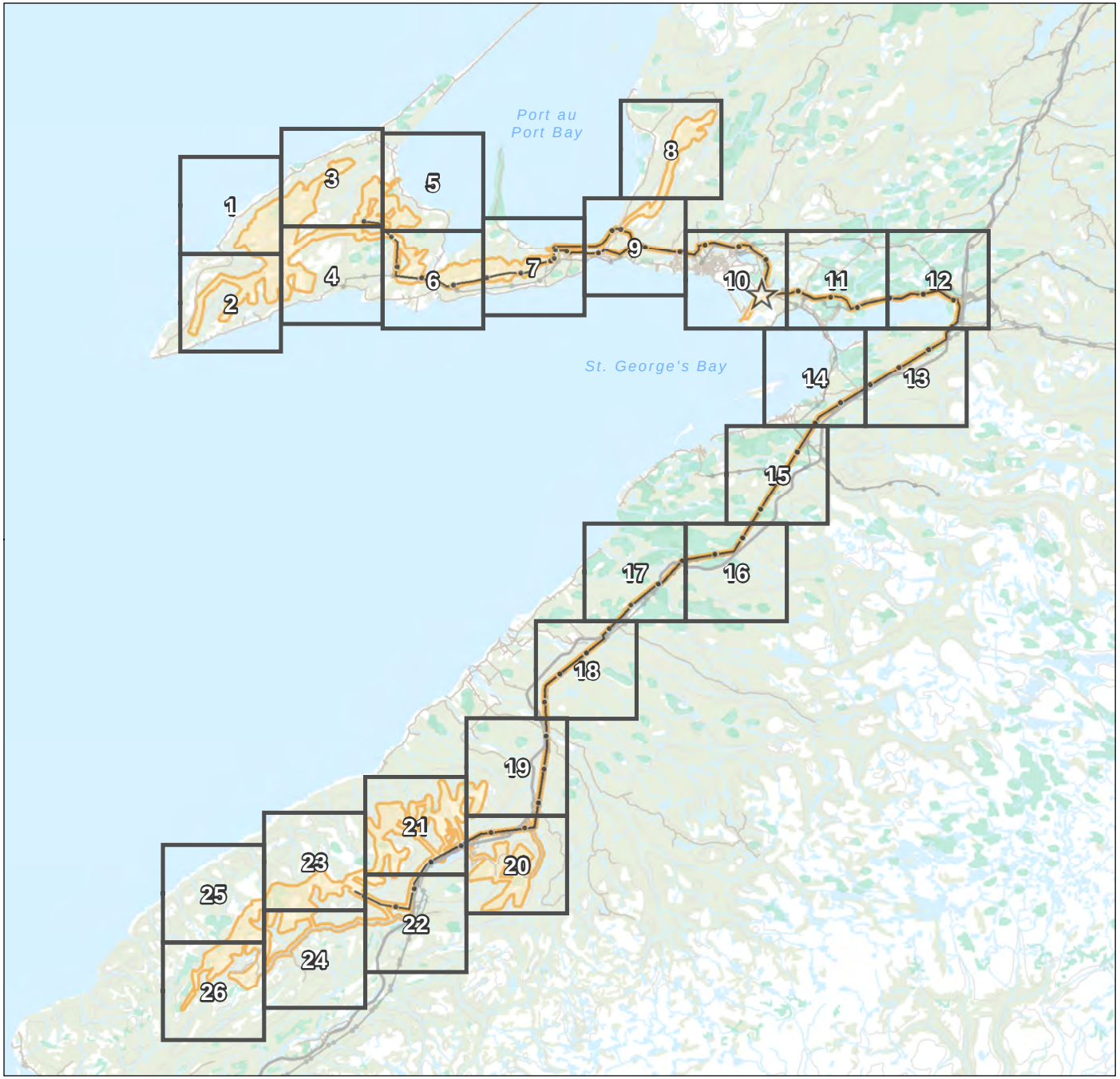
Appendix A

Land Cover in the Project Area Mapbook



Stantec

Proposed Project Features

- Hydrogen / Ammonia Plant Location
- Transmission Line 230 kV
- Project Area

Other Features

- Transmission Line, Existing
- Trans-Canada Highway
- Road
- Contour (100m)
- Watercourse
- Wetland
- Waterbody
- Forested Area

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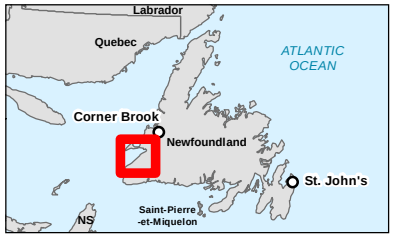
Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, Openstreetmap
3. Background: NRCan CanVec



Project Location
Stephenville
NL

Prepared by MB on 2023-08-02
QR by AW on 2023-08-02

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_000c

Figure No.
BSA-3 Appendix A

Map Index - Land Cover in the Project Area

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Stantec

Proposed Project Features

- Turbine Location
- Collector Line
- Access Road
- Project Area
- Local Assessment Area

Other Features

- Road
- Resource Road / Trail

Land Cover

- Anthropogenic
- Barren
- Coniferous Scrub
- Deciduous Scrub
- Mixedwood
- Softwood
- Unknown Forest
- Sand
- Small Island
- Water
- Wetland

N

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(At original document size of 8.5x11)
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Notes

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2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap, Government of NL Dept. of Fisheries, Forestry and Agriculture
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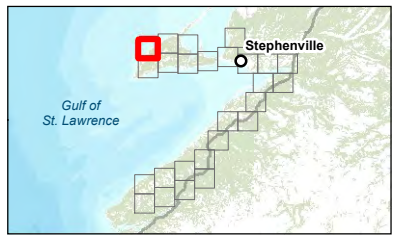

Project Location
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NL

Prepared by MB on 2023-08-03
QR by AW on 2023-08-02

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix A

Page 1 of 26

Land Cover in the Project Area

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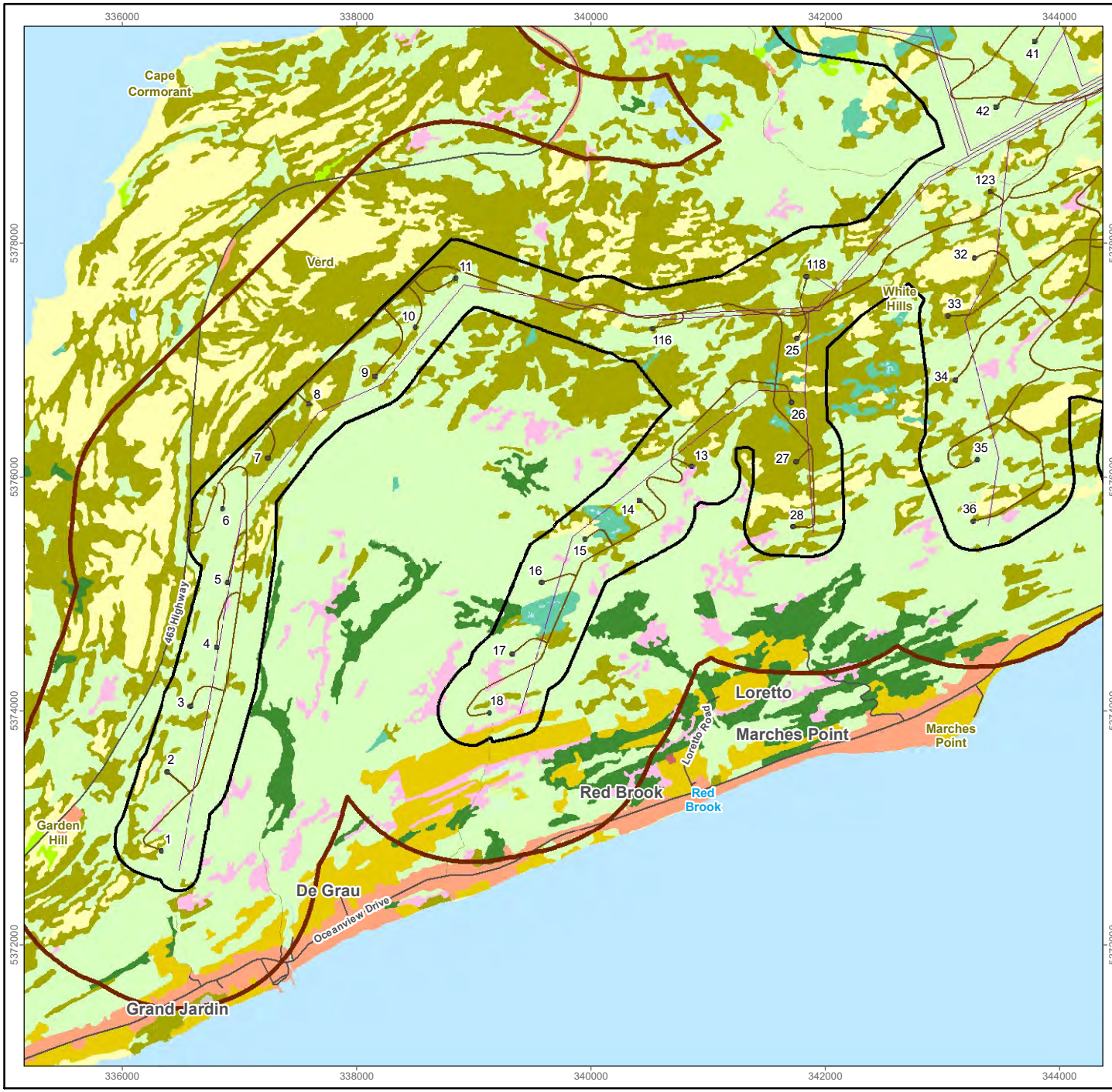

Stantec

Proposed Project Features

- Turbine Location
- Collector Line
- Access Road
- Project Area
- Local Assessment Area

Other Features

- Road
- Resource Road / Trail

Land Cover

- Agriculture
- Anthropogenic
- Barren
- Coniferous Scrub
- Deciduous Scrub
- Hardwood
- Mixedwood
- Softwood
- Unknown Forest
- Small Island
- Water
- Wetland

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Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
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3. Background: NRCan CanVec

Project Location
Stephenville
NL

Prepared by MB on 2023-08-03
QR by AW on 2023-08-02

Client/Project
World Energy GH2
Project Nujio'qonik

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Figure No.
BSA-3 Appendix A

Land Cover in the Project Area

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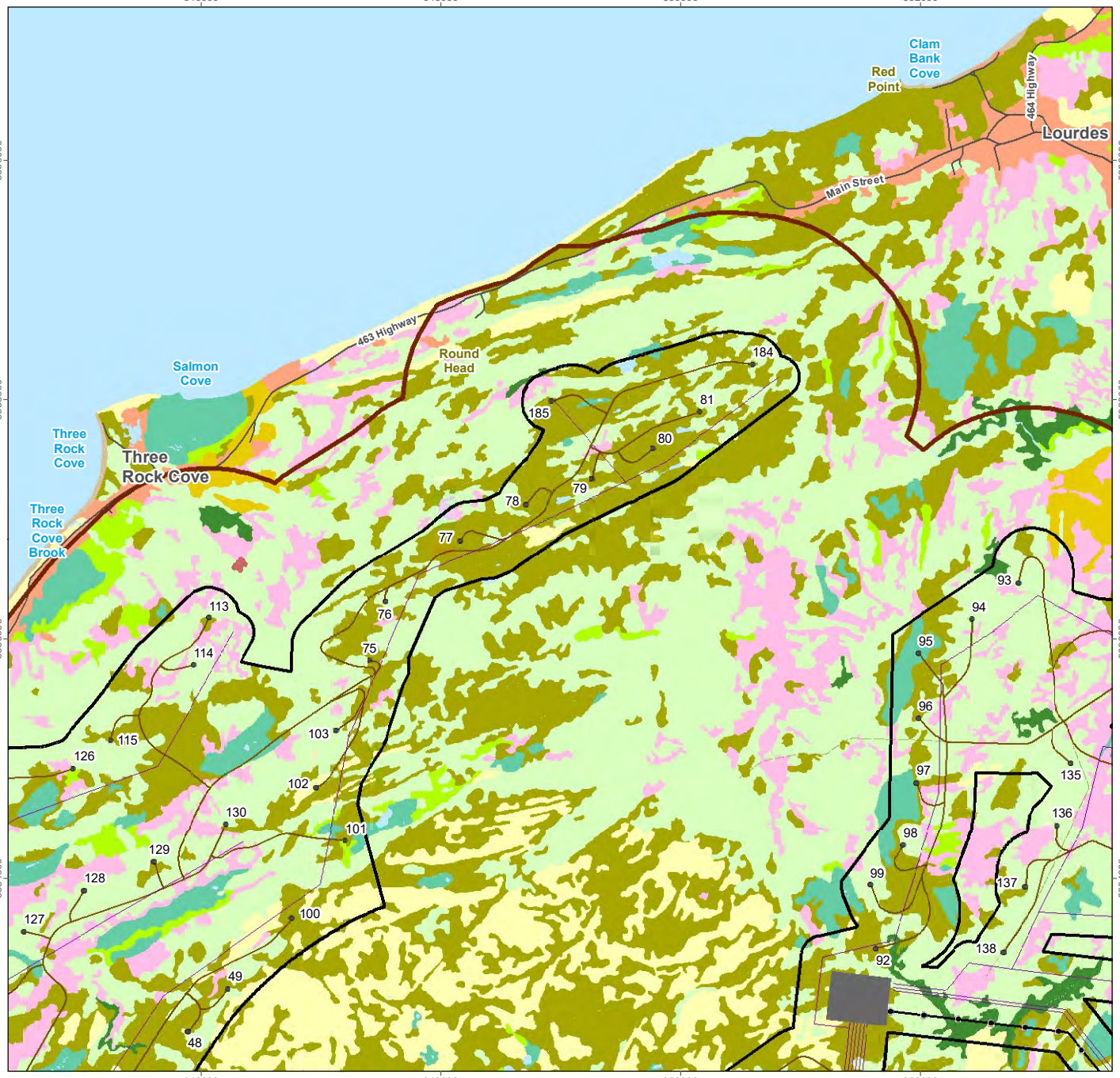

Stantec

Proposed Project Features

- Turbine Location
- Transmission Line 230 kV
- Collector Line
- Access Road
- Substation
- Project Area
- Local Assessment Area

Other Features

- Road
- Resource Road / Trail

Land Cover

- Agriculture
- Anthropogenic
- Barren
- Coniferous Scrub
- Deciduous Scrub
- Hardwood
- Mixedwood
- Softwood
- Unknown Forest
- Sand
- Small Island
- Water
- Wetland

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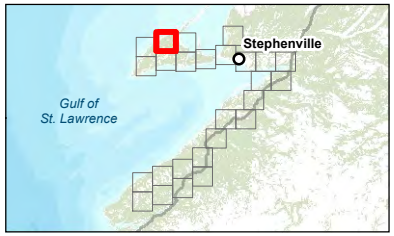

Project Location
Stephenville
NL

Prepared by MB on 2023-08-03
QR by AW on 2023-08-02

Client/Project
World Energy GH2
Project Nujio'qonik

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Figure No.
BSA-3 Appendix A

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Land Cover in the Project Area

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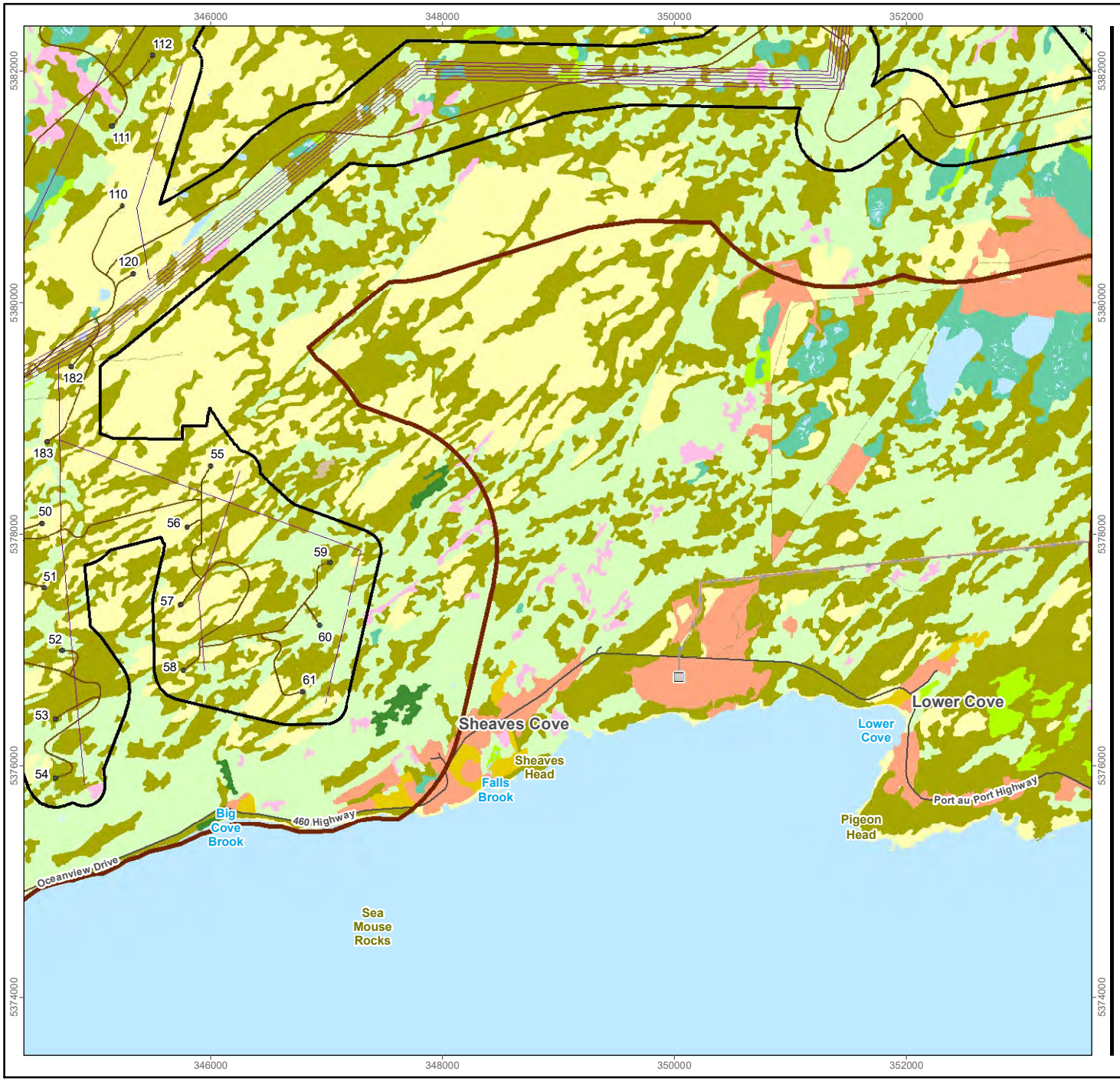

Stantec

Proposed Project Features

- Turbine Location
- Transmission Line 230 kV
- Collector Line
- Access Road
- Project Area
- Local Assessment Area

Other Features

- Substation
- Transmission Line, Existing
- Road
- Resource Road / Trail

Land Cover

- Agriculture
- Anthropogenic
- Barren
- Coniferous Scrub
- Deciduous Scrub
- Mixedwood
- Softwood
- Unknown Forest
- Sand
- Small Island
- Water
- Wetland

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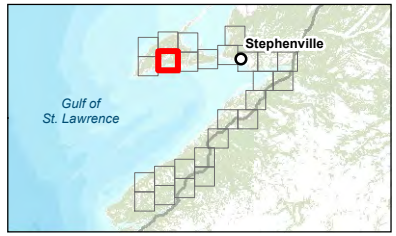
Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap, Government of NL Dept. of Fisheries, Forestry and Agriculture
3. Background: NRCan CanVec



Project Location
Stephenville
NL

Prepared by MB on 2023-08-03
QR by AW on 2023-08-02

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix A

Land Cover in the Project Area

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Stantec

Proposed Project Features

- Turbine Location
- Transmission Line 230 kV
- Collector Line
- Access Road
- Project Area
- Local Assessment Area

Other Features

- Road
- Resource Road / Trail

Land Cover

- Agriculture
- Anthropogenic
- Barren
- Coniferous Scrub
- Deciduous Scrub
- Mixedwood
- Softwood
- Unknown Forest
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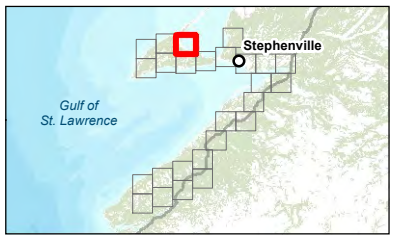

Project Location
Stephenville
NL

Prepared by MB on 2023-08-03
QR by AW on 2023-08-02

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix A

Land Cover in the Project Area

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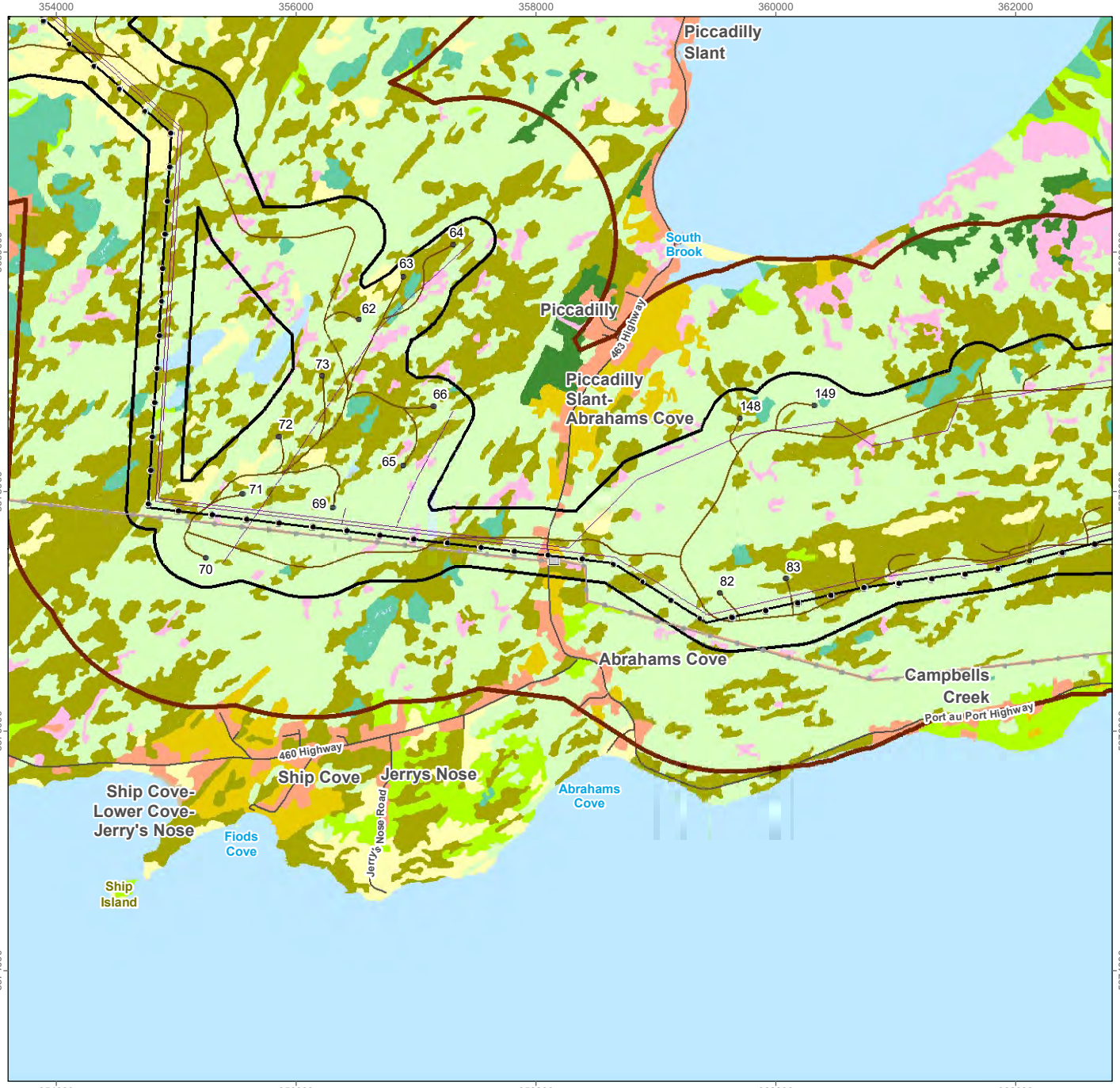

Stantec

Proposed Project Features

- Turbine Location
- Transmission Line 230 kV
- Collector Line
- Access Road
- Project Area
- Local Assessment Area

Other Features

- Substation
- Transmission Line, Existing
- Road
- Resource Road / Trail

Land Cover

- Agriculture
- Anthropogenic
- Barren
- Coniferous Scrub
- Deciduous Scrub
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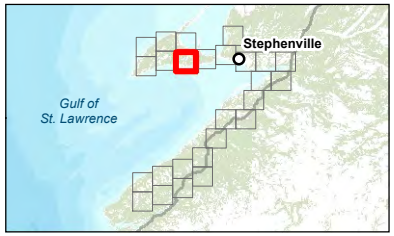

Project Location
Stephenville
NL

Prepared by MB on 2023-08-03
QR by AW on 2023-08-02

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix A

Land Cover in the Project Area

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Stantec

Proposed Project Features

- Transmission Line 230 kV
- Port au Port Interconnection
- Proposed Route
- Alternate Route
- Collector Line
- Access Road
- Substation
- Project Area
- Local Assessment Area

Other Features

- Transmission Line, Existing
- Road
- Resource Road / Trail

Land Cover

- Agriculture
- Anthropogenic
- Barren
- Coniferous Scrub
- Deciduous Scrub
- Mixedwood
- Softwood
- Unknown Forest
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- Wetland

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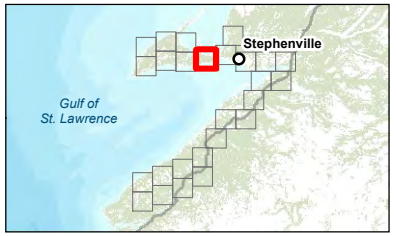

Project Location
Stephenville
NL

Prepared by MB on 2023-08-03
QR by AW on 2023-08-02

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix A

Land Cover in the Project Area

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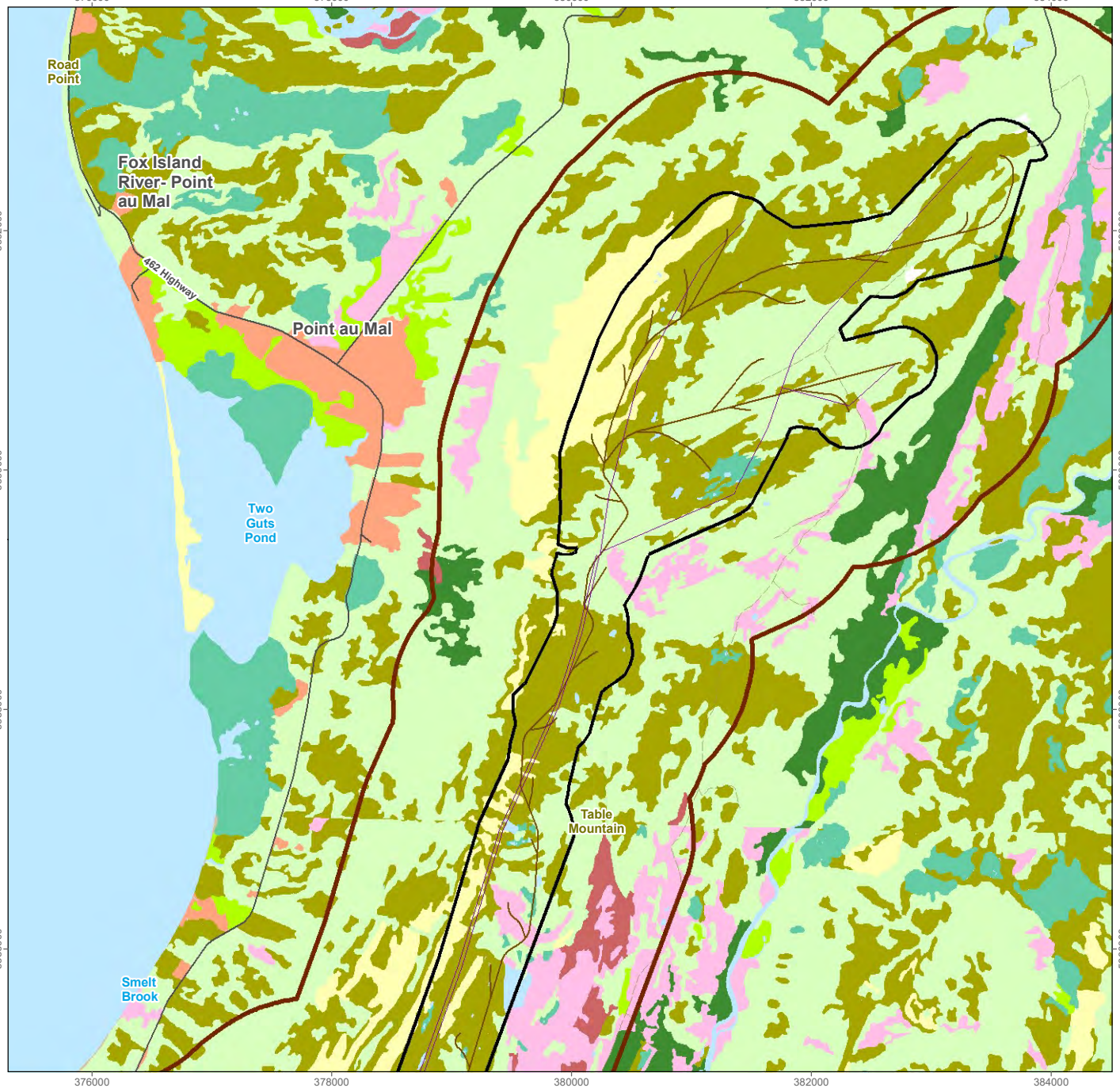

Stantec

Proposed Project Features

- Collector Line
- Access Road
- Project Area
- Local Assessment Area

Other Features

- Road
- Resource Road / Trail

Land Cover

- Anthropogenic
- Barren
- Coniferous Scrub
- Deciduous Scrub
- Hardwood
- Mixedwood
- Softwood
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- Wetland

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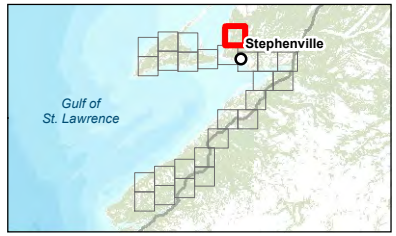

Project Location
Stephenville
NL

Prepared by MB on 2023-08-03
QR by AW on 2023-08-02

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix A

Land Cover in the Project Area

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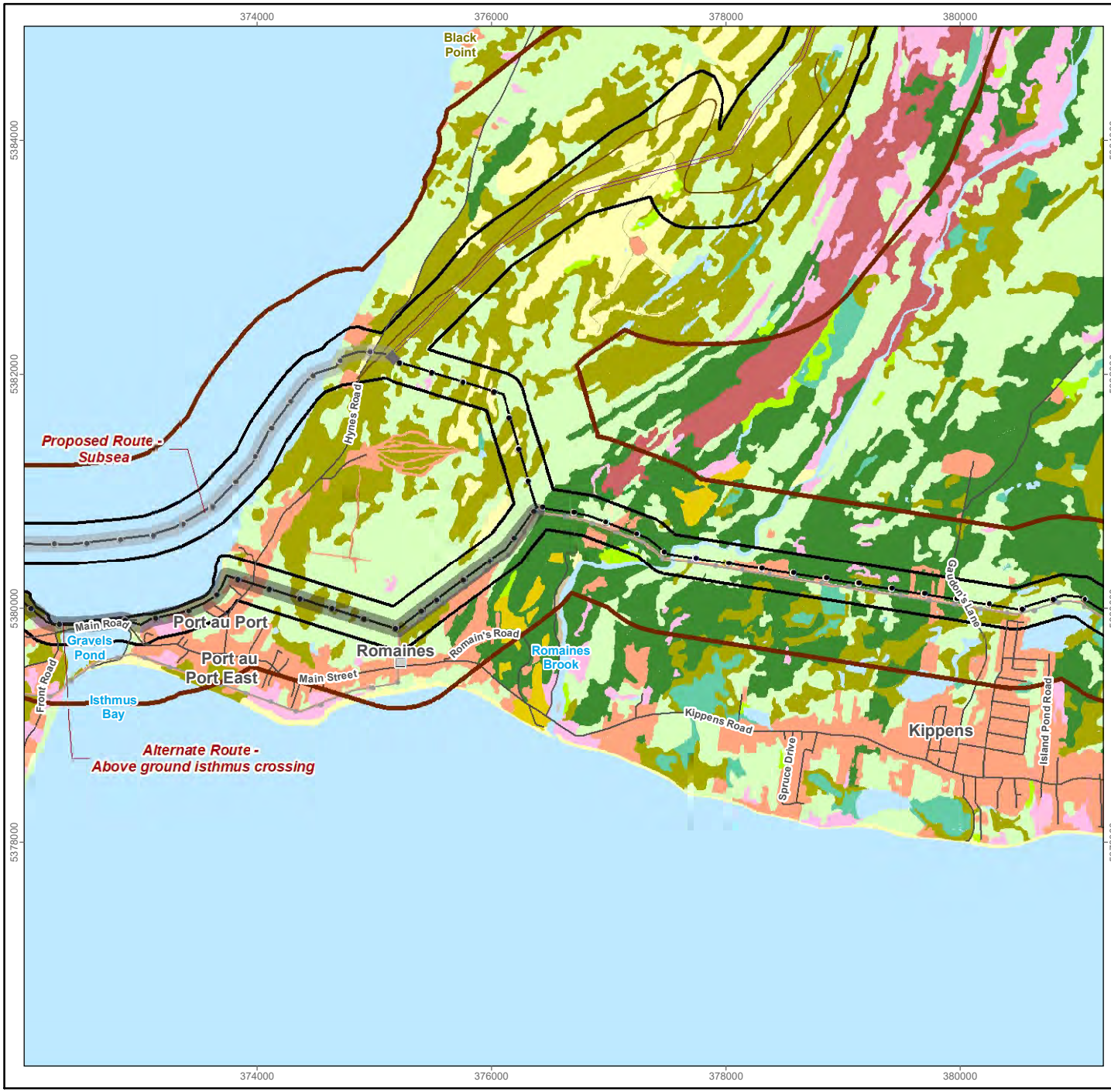

Stantec

Proposed Project Features

- Transmission Line 230 kV
- Port au Port Interconnection
- Proposed Route
- Alternate Route
- Collector Line
- Access Road
- Substation
- Project Area
- Local Assessment Area

Other Features

- Substation
- Transmission Line, Existing
- Road
- Resource Road / Trail

Land Cover

- Agriculture
- Anthropogenic
- Barren
- Coniferous Scrub
- Deciduous Scrub
- Hardwood
- Mixedwood
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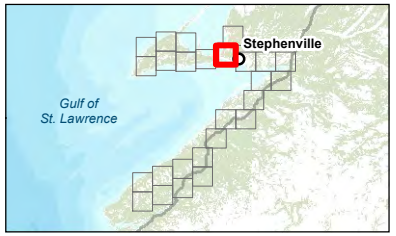

Project Location
Stephenville
NL

Prepared by MB on 2023-08-03
QR by AW on 2023-08-02

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix A

Land Cover in the Project Area

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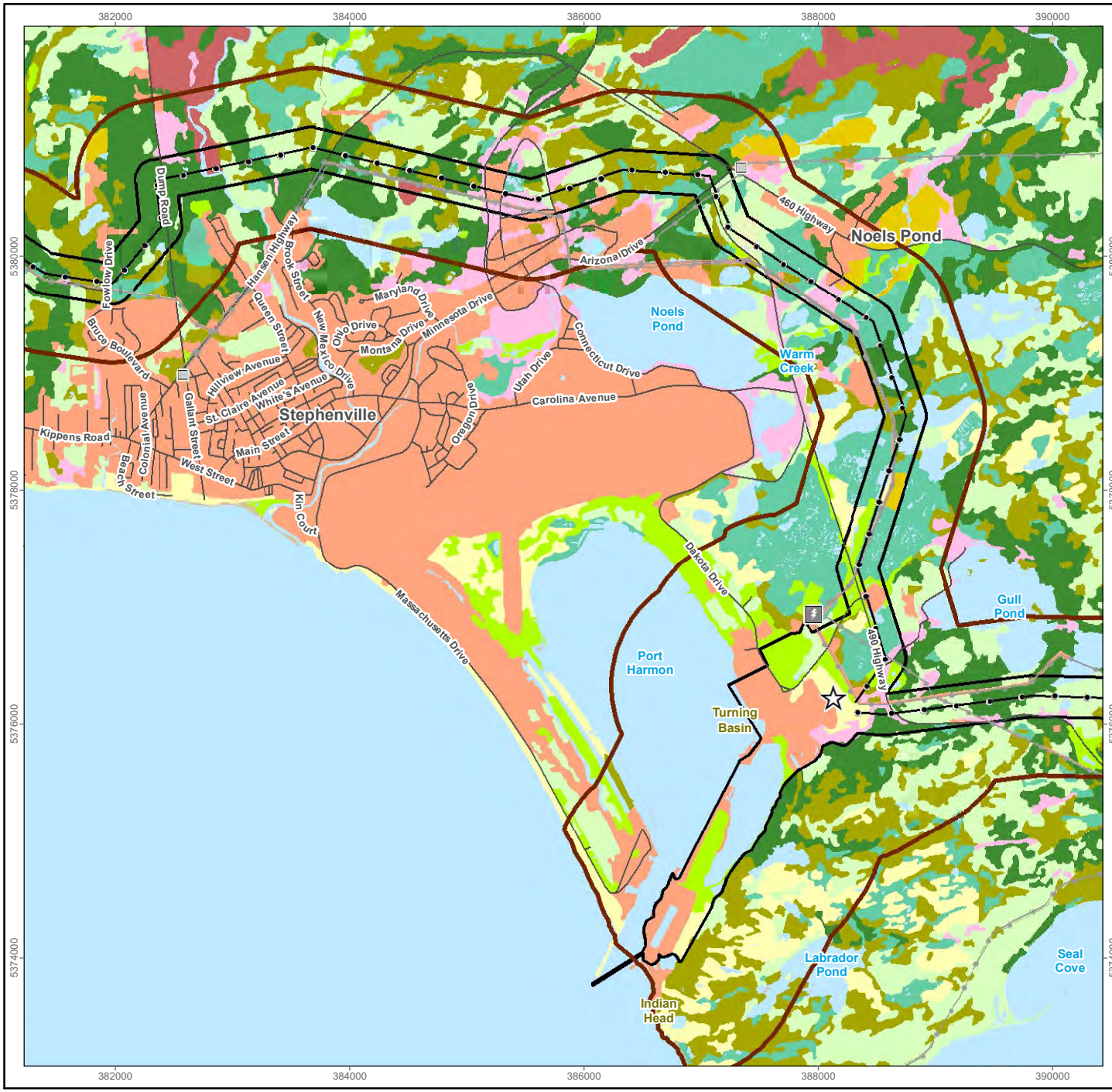

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Stantec

Proposed Project Features

- Hydrogen / Ammonia Plant Location
- Transmission Line 230 kV
- Project Area
- Local Assessment Area

Other Features

- Substation
- Electrical Generation
- Transmission Line, Existing
- Road
- Resource Road / Trail

Land Cover

- Agriculture
- Anthropogenic
- Barren
- Coniferous Scrub
- Deciduous Scrub
- Hardwood
- Mixedwood
- Softwood
- Unknown Forest
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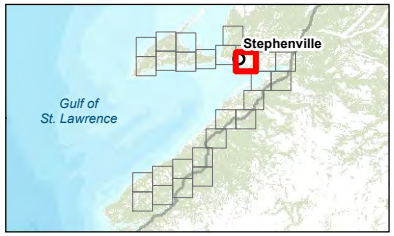


Project Location
Stephenville
NL

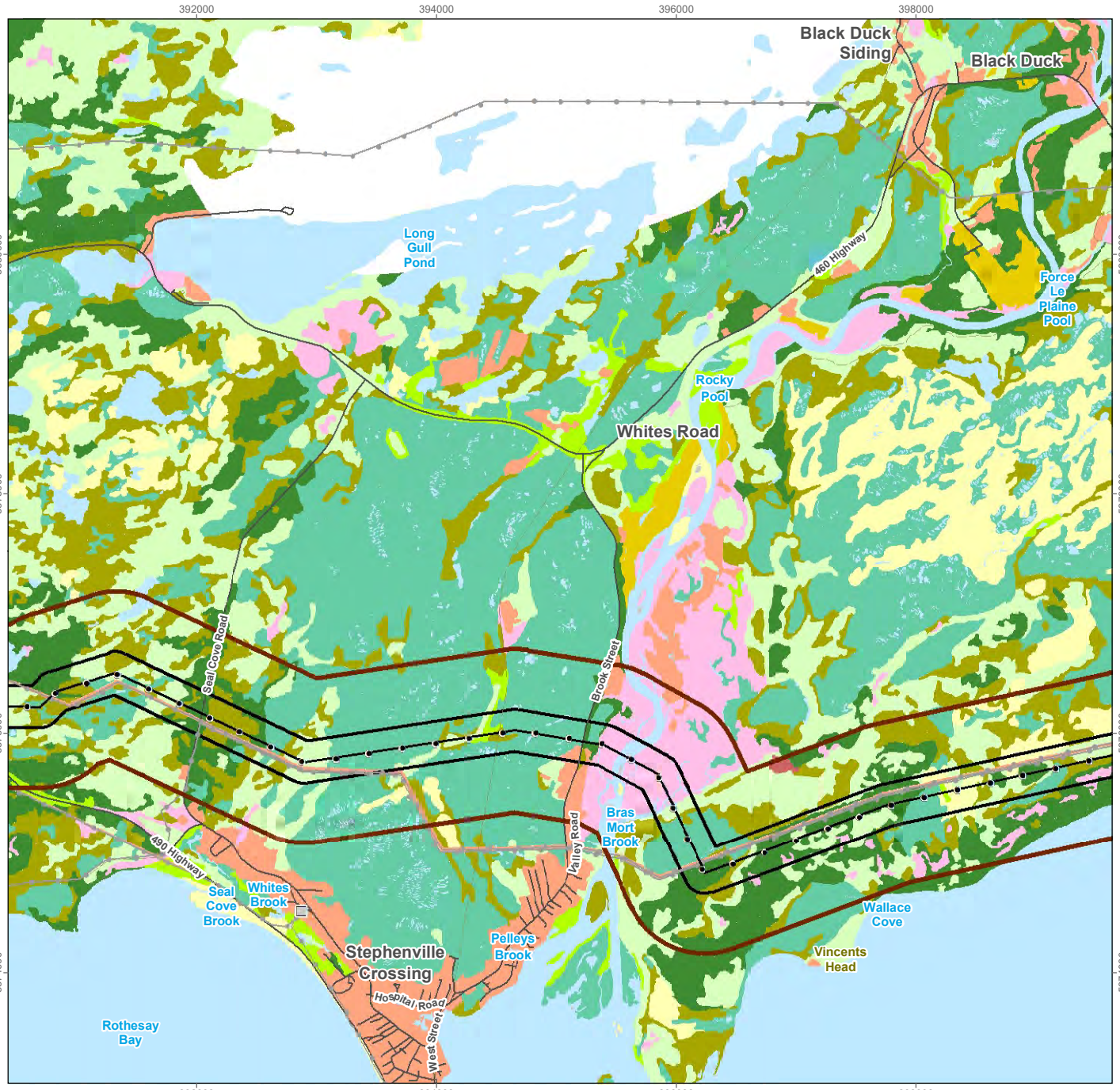
Prepared by MB on 2023-08-03
QR by AW on 2023-08-02

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix A

Land Cover in the Project Area



Stantec

Proposed Project Features

- Transmission Line 230 kV
- Project Area
- Local Assessment Area

Other Features

- Substation
- Transmission Line, Existing
- Road
- Resource Road / Trail

Land Cover

- Agriculture
- Anthropogenic
- Barren
- Coniferous Scrub
- Deciduous Scrub
- Hardwood
- Mixedwood
- Softwood
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- Wetland

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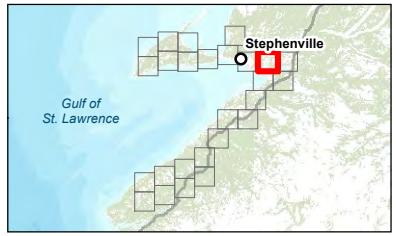

Project Location
Stephenville
NL

Prepared by MB on 2023-08-03
QR by AW on 2023-08-02

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix A

Land Cover in the Project Area

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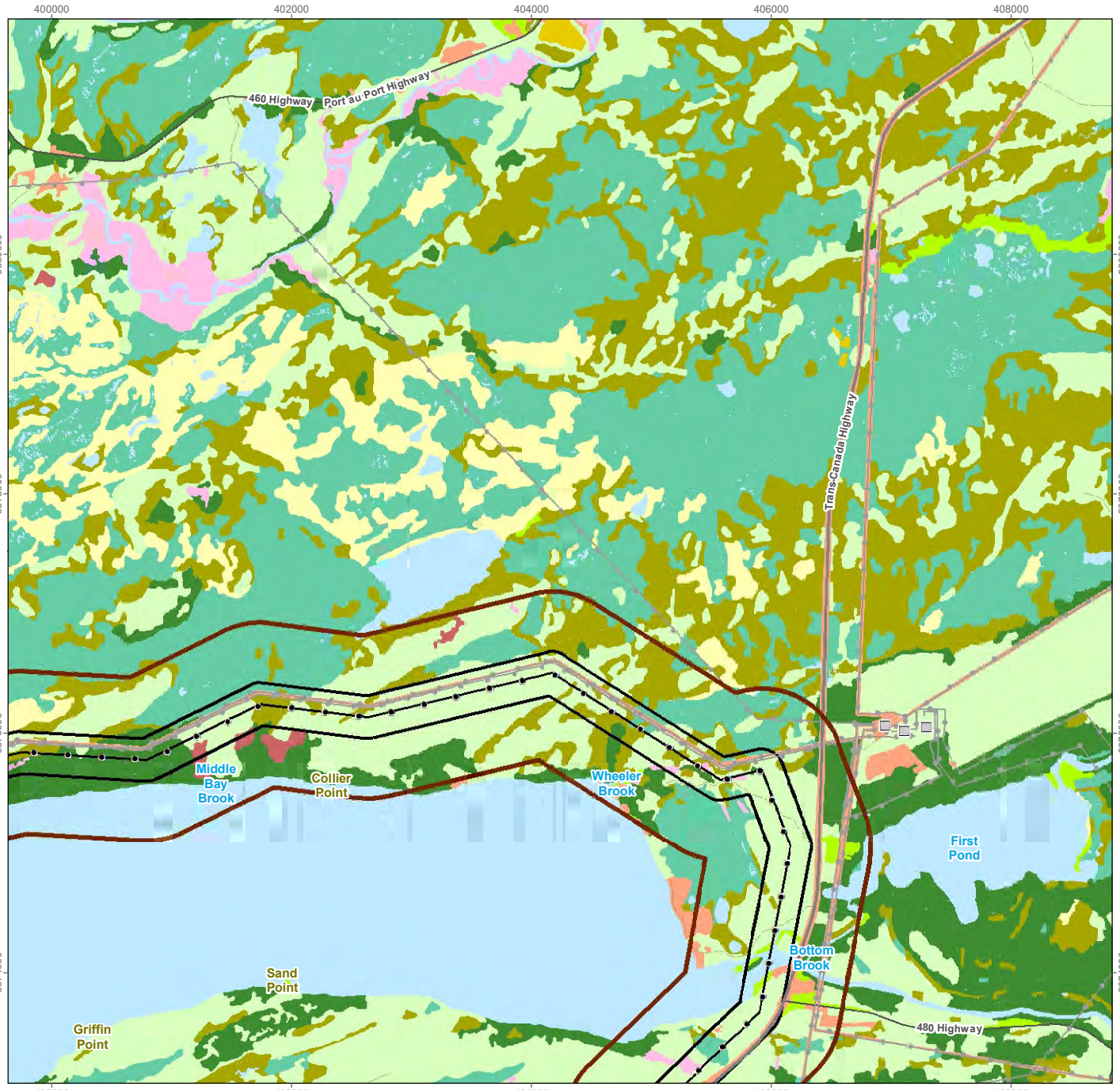

Stantec

Proposed Project Features

- Transmission Line 230 kV
- Project Area
- Local Assessment Area

Other Features

- Substation
- Transmission Line, Existing
- Trans-Canada Highway
- Road
- Resource Road / Trail

Land Cover

- Agriculture
- Anthropogenic
- Barren
- Coniferous Scrub
- Deciduous Scrub
- Hardwood
- Mixedwood
- Softwood
- Unknown Forest
- Sand
- Small Island
- Water
- Wetland

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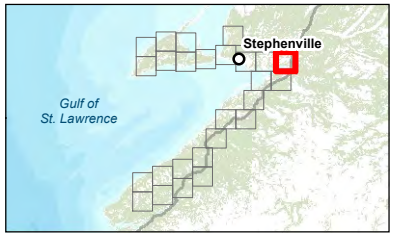

Project Location
Stephenville
NL

Prepared by MB on 2023-08-03
QR by AW on 2023-08-02

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix A

Land Cover in the Project Area

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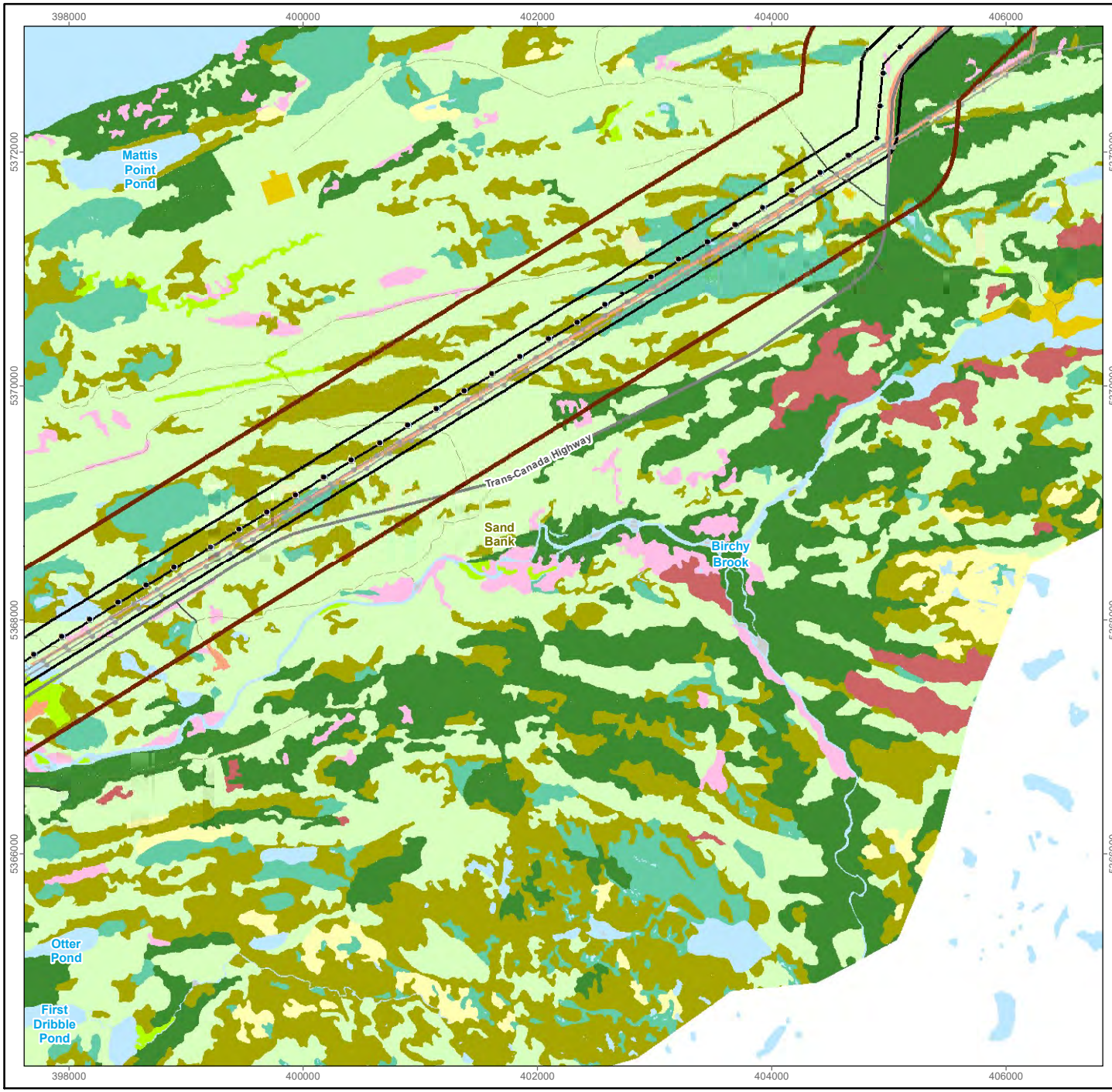

Stantec

Proposed Project Features

- Transmission Line 230 kV
- Project Area
- Local Assessment Area

Other Features

- Transmission Line, Existing
- Trans-Canada Highway
- Road
- Resource Road / Trail

Land Cover

- Agriculture
- Anthropogenic
- Barren
- Coniferous Scrub
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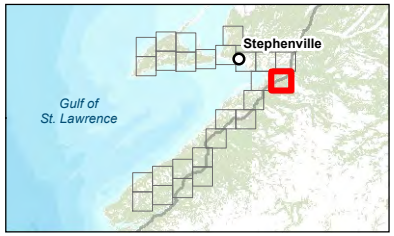

Project Location
Stephenville
NL

Prepared by MB on 2023-08-03
QR by AW on 2023-08-02

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix A

Land Cover in the Project Area

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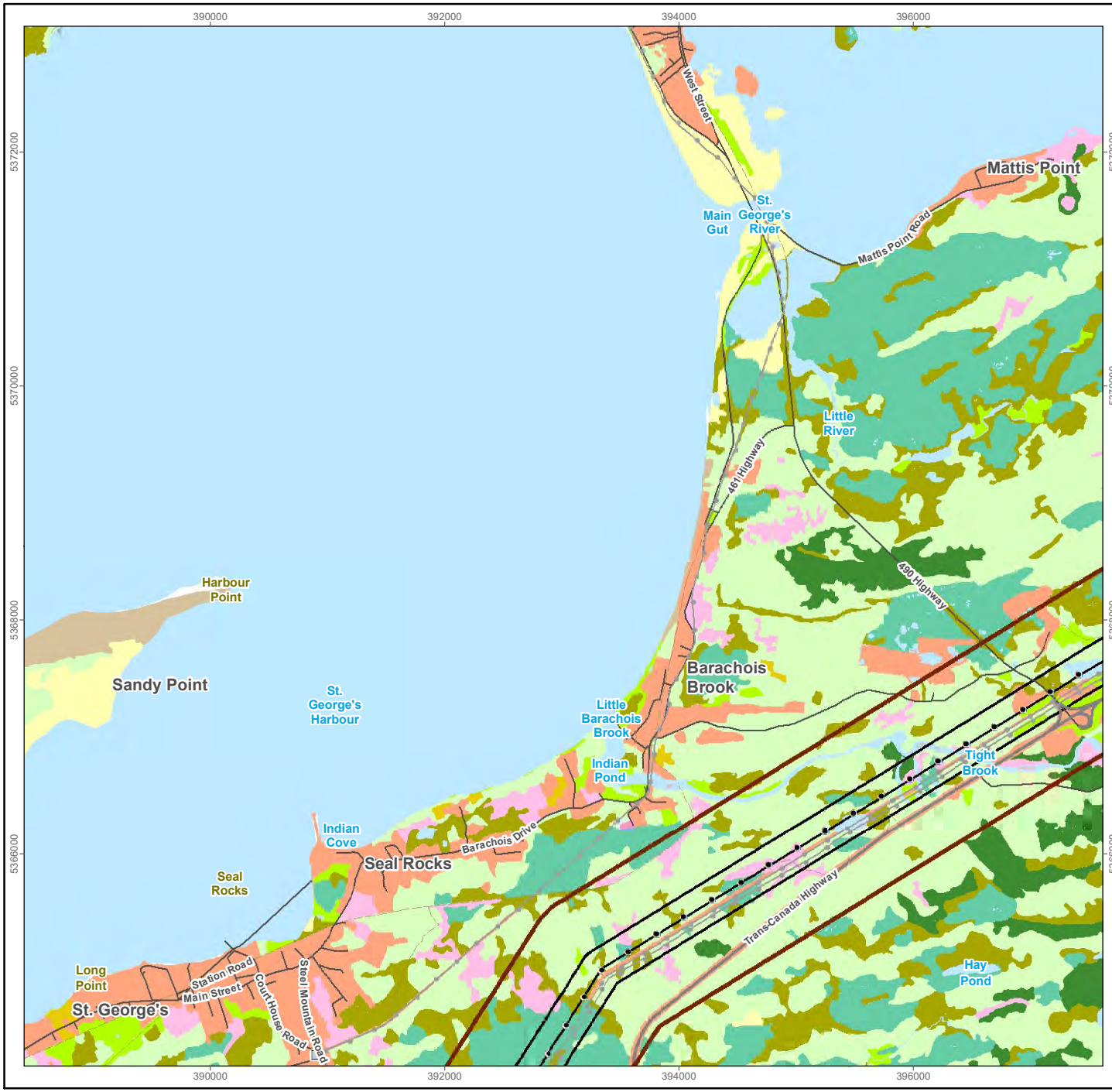

Stantec

Proposed Project Features

- Transmission Line 230 kV
- Project Area
- Local Assessment Area

Other Features

- Substation
- Transmission Line, Existing
- Trans-Canada Highway
- Road
- Resource Road / Trail

Land Cover

- Agriculture
- Anthropogenic
- Barren
- Coniferous Scrub
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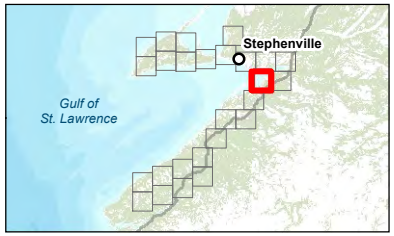

Project Location
Stephenville
NL

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QR by AW on 2023-08-02

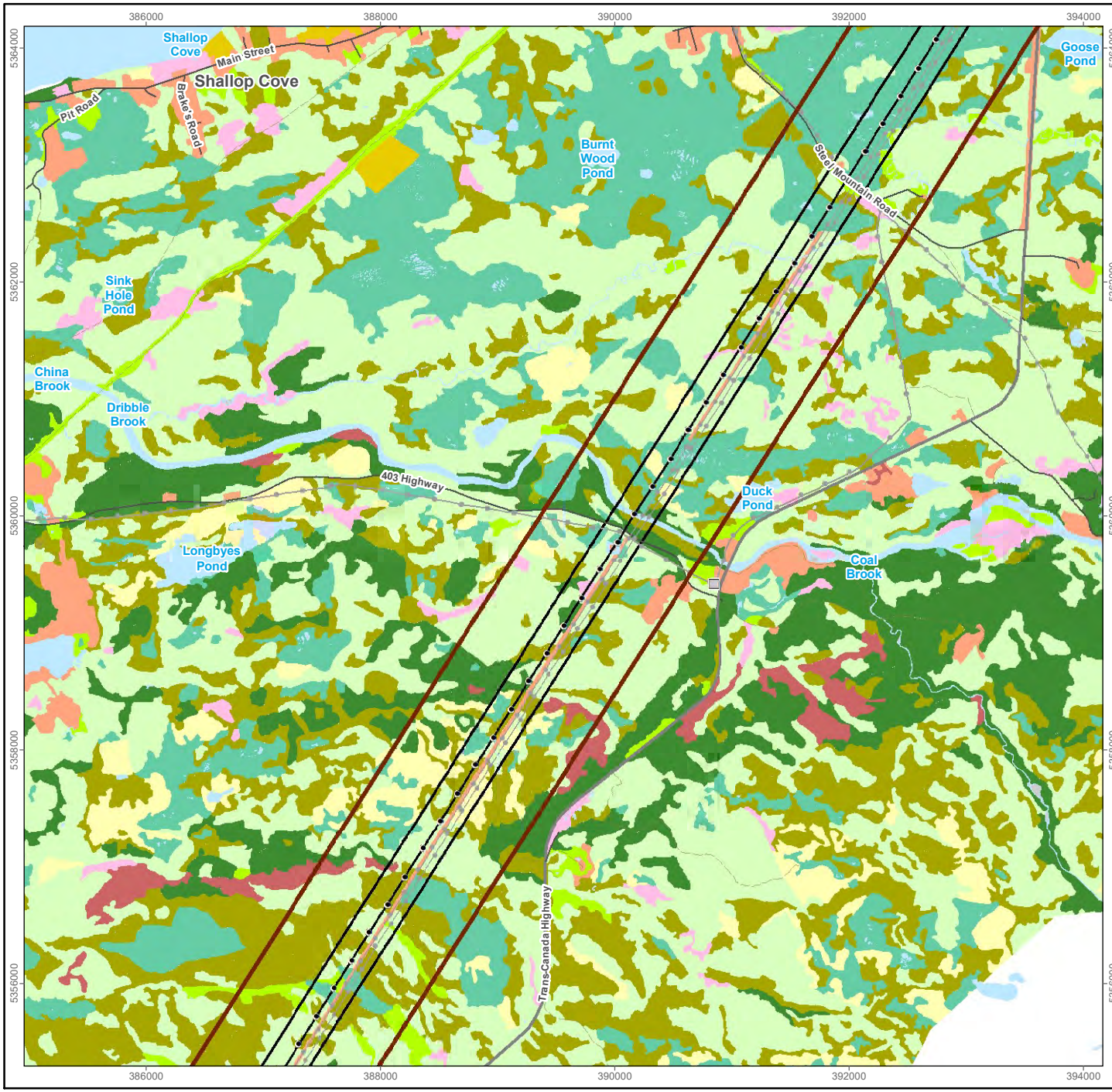
Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix A

Land Cover in the Project Area

V:\1214\active\121417233\03_data\gis_cad\gis_data\mapping\mxd\general\Bats_Veg_Other_Terr\121417233_081_Terr_Habitat_mapbook.mxd Revised: 2023-08-03 By: mblackwood



Stantec

Proposed Project Features

- Transmission Line 230 kV
- Project Area
- Local Assessment Area

Other Features

- Substation
- Transmission Line, Existing
- Trans-Canada Highway
- Road
- Resource Road / Trail

Land Cover

- Agriculture
- Anthropogenic
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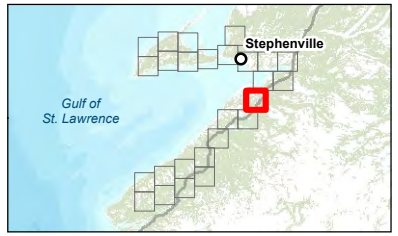

Project Location
Stephenville
NL

Prepared by MB on 2023-08-03
QR by AW on 2023-08-02

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix A

Land Cover in the Project Area

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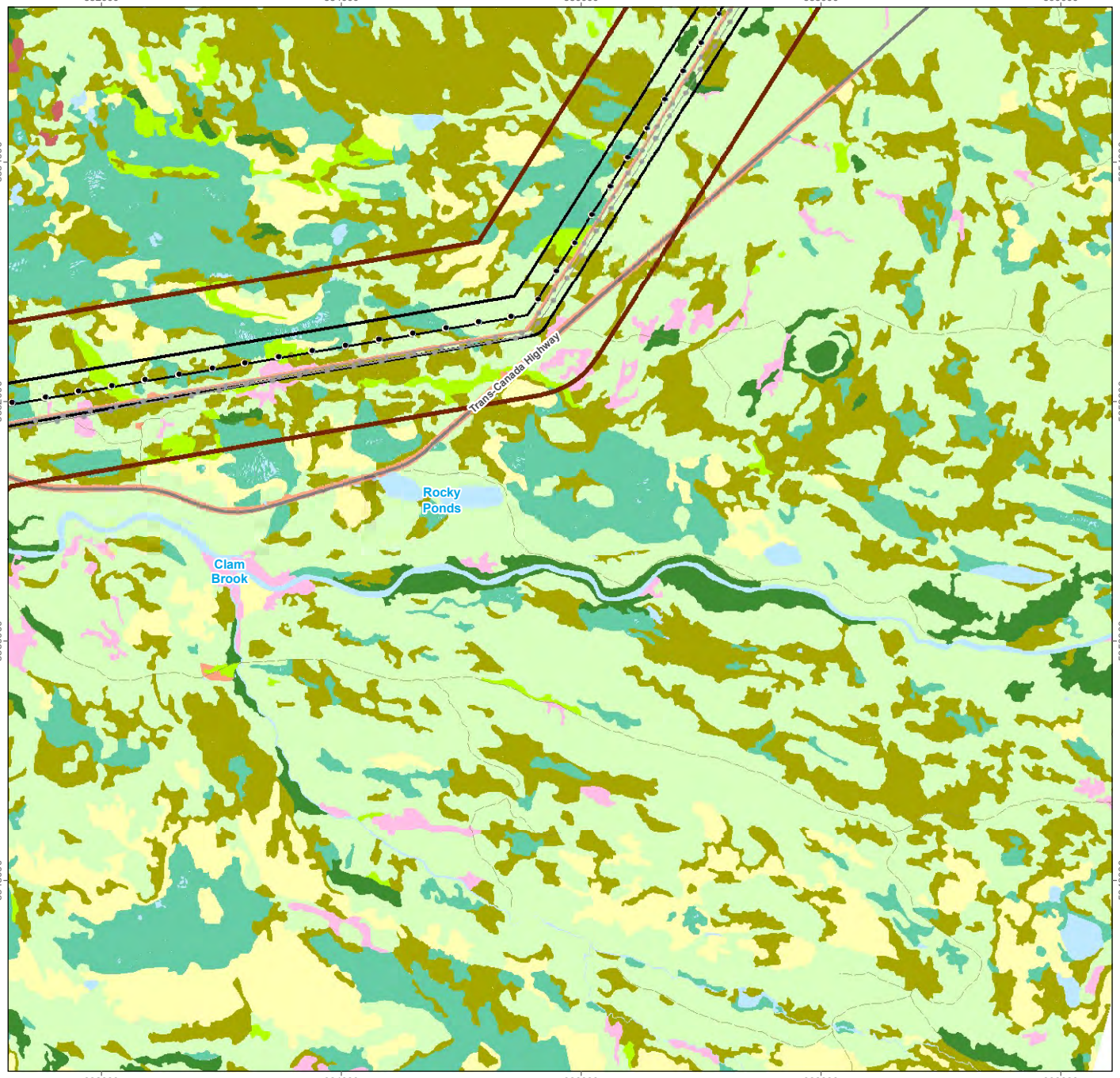

Stantec

Proposed Project Features

- Transmission Line 230 kV
- Project Area
- Local Assessment Area

Other Features

- Transmission Line, Existing
- Trans-Canada Highway
- Resource Road / Trail

Land Cover

- Anthropogenic
- Barren
- Coniferous Scrub
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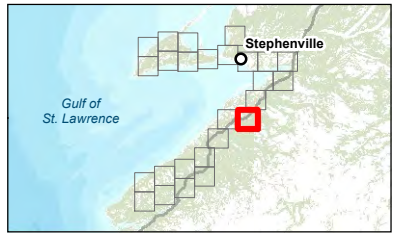

Project Location
Stephenville
NL

Prepared by MB on 2023-08-03
QR by AW on 2023-08-02

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix A

Land Cover in the Project Area

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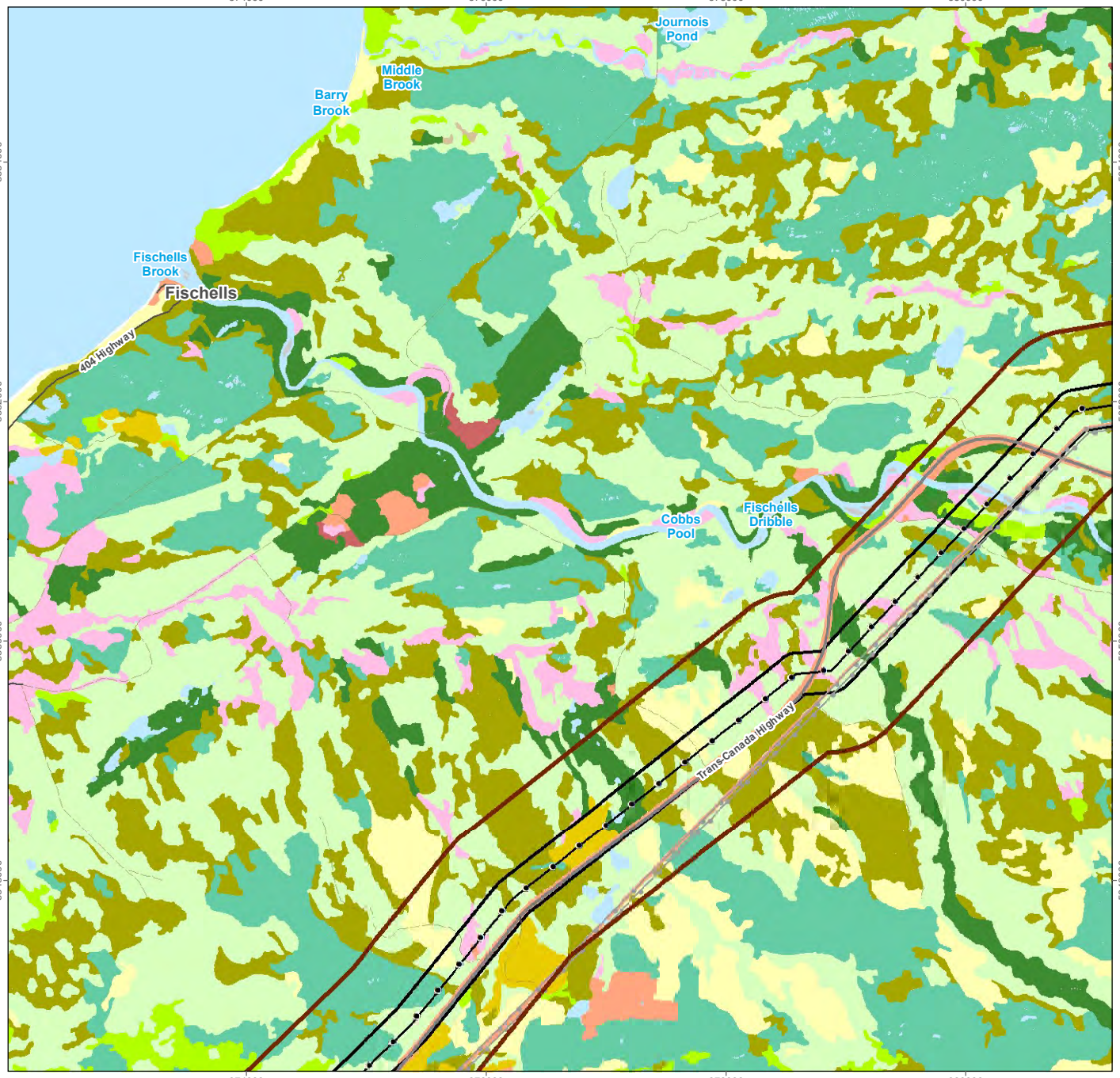


Stantec

Proposed Project Features

- Transmission Line 230 kV
- Project Area
- Local Assessment Area

Other Features

- Transmission Line, Existing
- Trans-Canada Highway
- Road
- Resource Road / Trail

Land Cover

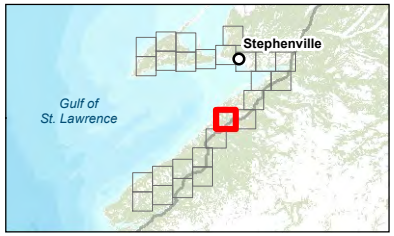
- Agriculture
- Anthropogenic
- Barren
- Coniferous Scrub
- Deciduous Scrub
- Hardwood
- Mixedwood
- Softwood
- Unknown Forest
- Sand
- Small Island
- Water
- Wetland

N

0 0.5 1 Kilometres
(At original document size of 8.5x11)
1:50,000

Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap, Government of NL Dept. of Fisheries, Forestry and Agriculture
3. Background: NRCan CanVec



Project Location
Stephenville
NL

Prepared by MB on 2023-08-03
QR by AW on 2023-08-02

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix A

Land Cover in the Project Area

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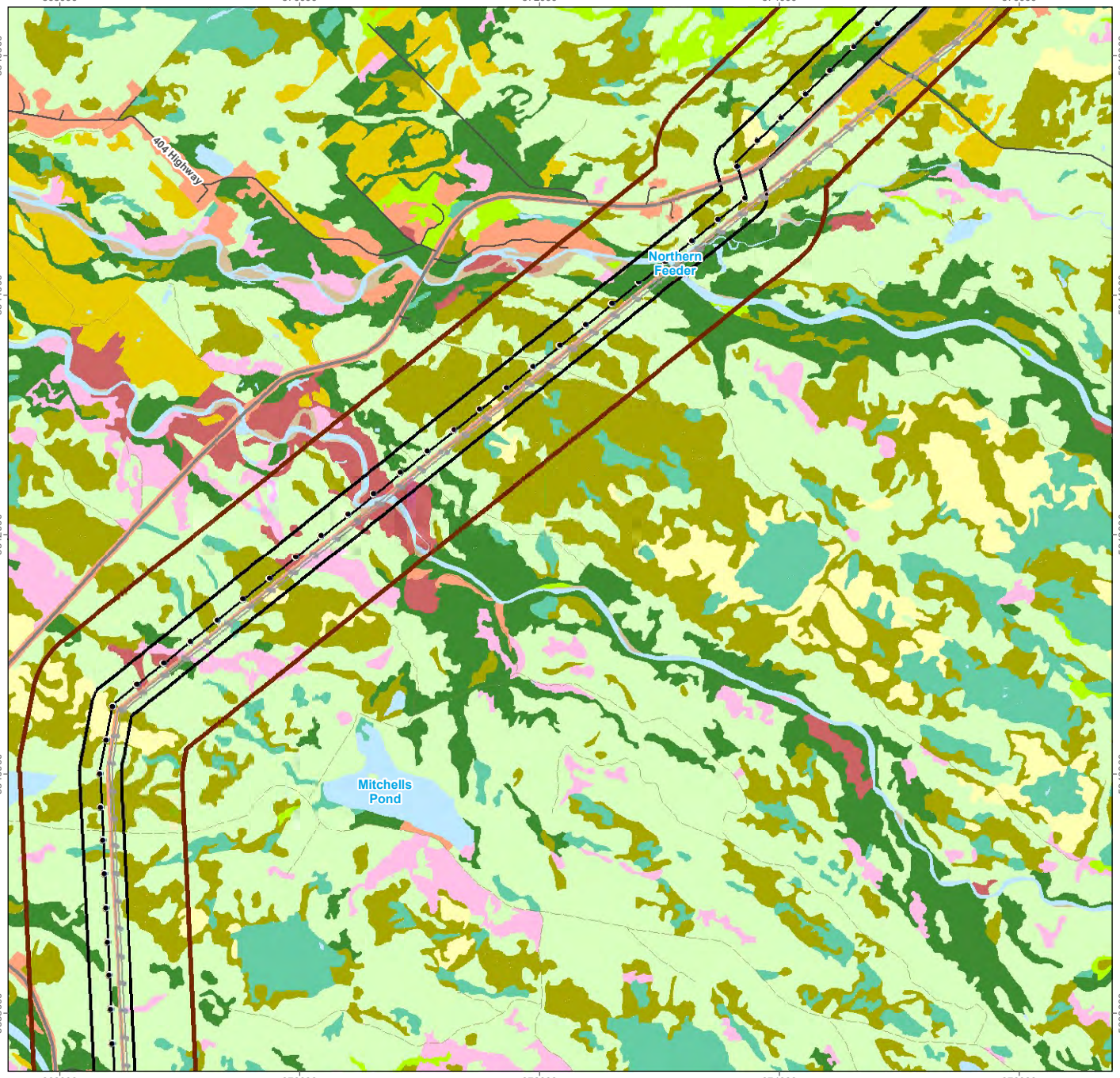

Stantec

Proposed Project Features

- Transmission Line 230 kV
- Project Area
- Local Assessment Area

Other Features

- Transmission Line, Existing
- Trans-Canada Highway
- Road
- Resource Road / Trail

Land Cover

- Agriculture
- Anthropogenic
- Barren
- Coniferous Scrub
- Deciduous Scrub
- Hardwood
- Mixedwood
- Softwood
- Unknown Forest
- Sand
- Small Island
- Water
- Wetland

N

0 0.5 1 Kilometres
(At original document size of 8.5x11)
1:50,000

Notes

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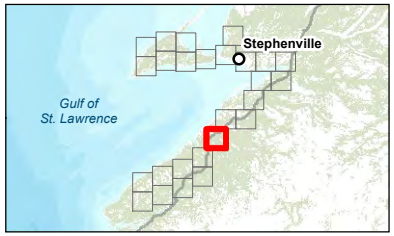
2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap, Government of NL Dept. of Fisheries, Forestry and Agriculture
3. Background: NRCan CanVec



Project Location
Stephenville
NL

Prepared by MB on 2023-08-03
QR by AW on 2023-08-02

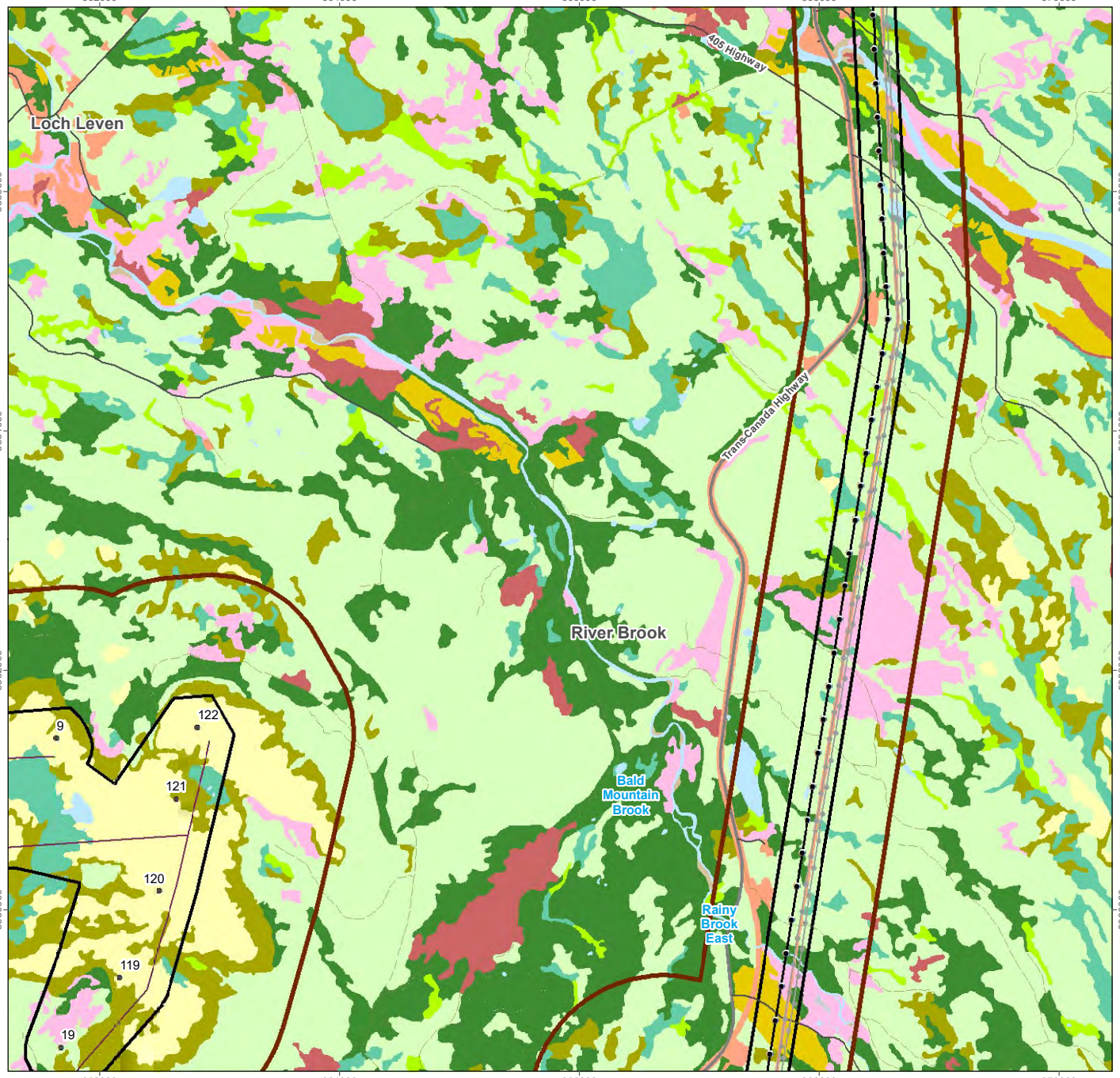
Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix A

Land Cover in the Project Area

V:\1214\active\121417233\03_data\gis_cad\gis_data\mapping\mxd\general\Bats_Veg_Other_Terr\121417233_081_Terr_Habitat_mapbook.mxd Revised: 2023-08-03 By: mblackwood



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Stantec

Proposed Project Features

- Turbine Location
- Transmission Line 230 kV
- Collector Line
- Access Road
- Project Area
- Local Assessment Area

Other Features

- Transmission Line, Existing
- Trans-Canada Highway
- Road
- Resource Road / Trail

Land Cover

- Agriculture
- Anthropogenic
- Barren
- Coniferous Scrub
- Deciduous Scrub
- Hardwood
- Mixedwood
- Softwood
- Unknown Forest
- Sand
- Small Island
- Water
- Wetland

N

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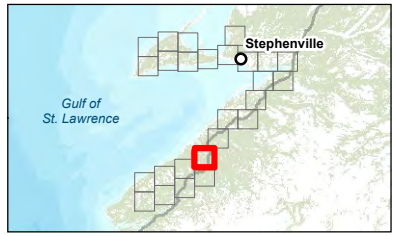
(At original document size of 8.5x11)
1:50,000

Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap, Government of NL Dept. of Fisheries, Forestry and Agriculture
3. Background: NRCan CanVec



Project Location
Stephenville
NL

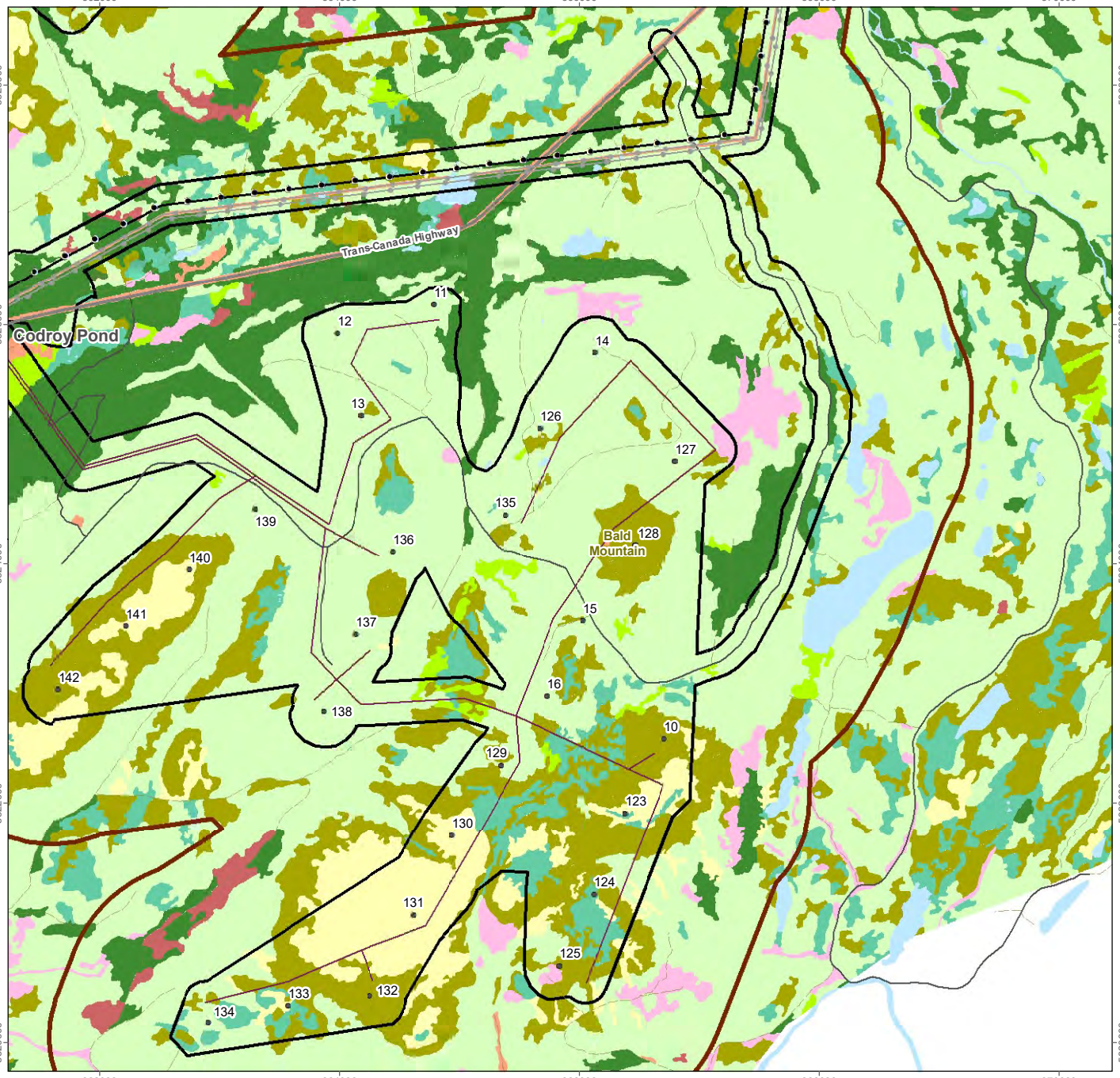
Prepared by MB on 2023-08-03
QR by AW on 2023-08-02

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix A

Land Cover in the Project Area



Stantec

Proposed Project Features

- Turbine Location
- Transmission Line 230 kV
- Collector Line
- Access Road
- Project Area
- Local Assessment Area

Other Features

- Transmission Line, Existing
- Trans-Canada Highway
- Road
- Resource Road / Trail

Land Cover

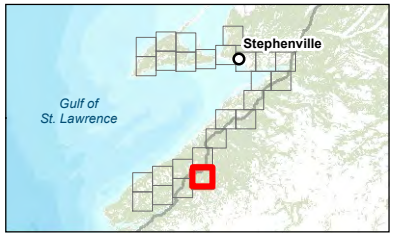
- Agriculture
- Anthropogenic
- Barren
- Coniferous Scrub
- Deciduous Scrub
- Hardwood
- Mixedwood
- Softwood
- Unknown Forest
- Sand
- Small Island
- Water
- Wetland

N

0 0.5 1 Kilometres
(At original document size of 8.5x11)
1:50,000

Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap, Government of NL Dept. of Fisheries, Forestry and Agriculture
3. Background: NRCan CanVec



Project Location
Stephenville
NL

Prepared by MB on 2023-08-03
QR by AW on 2023-08-02

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix A

Land Cover in the Project Area

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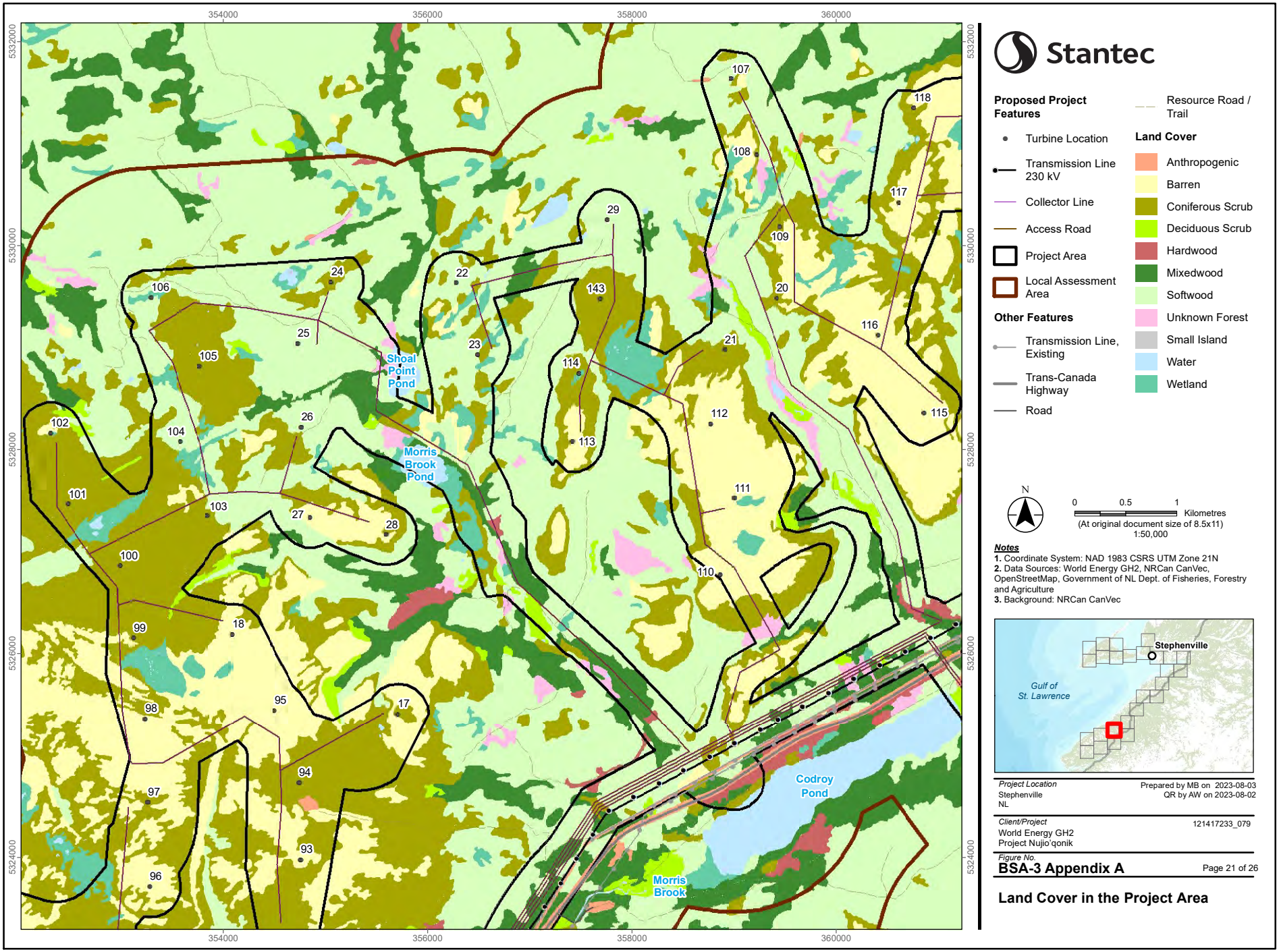

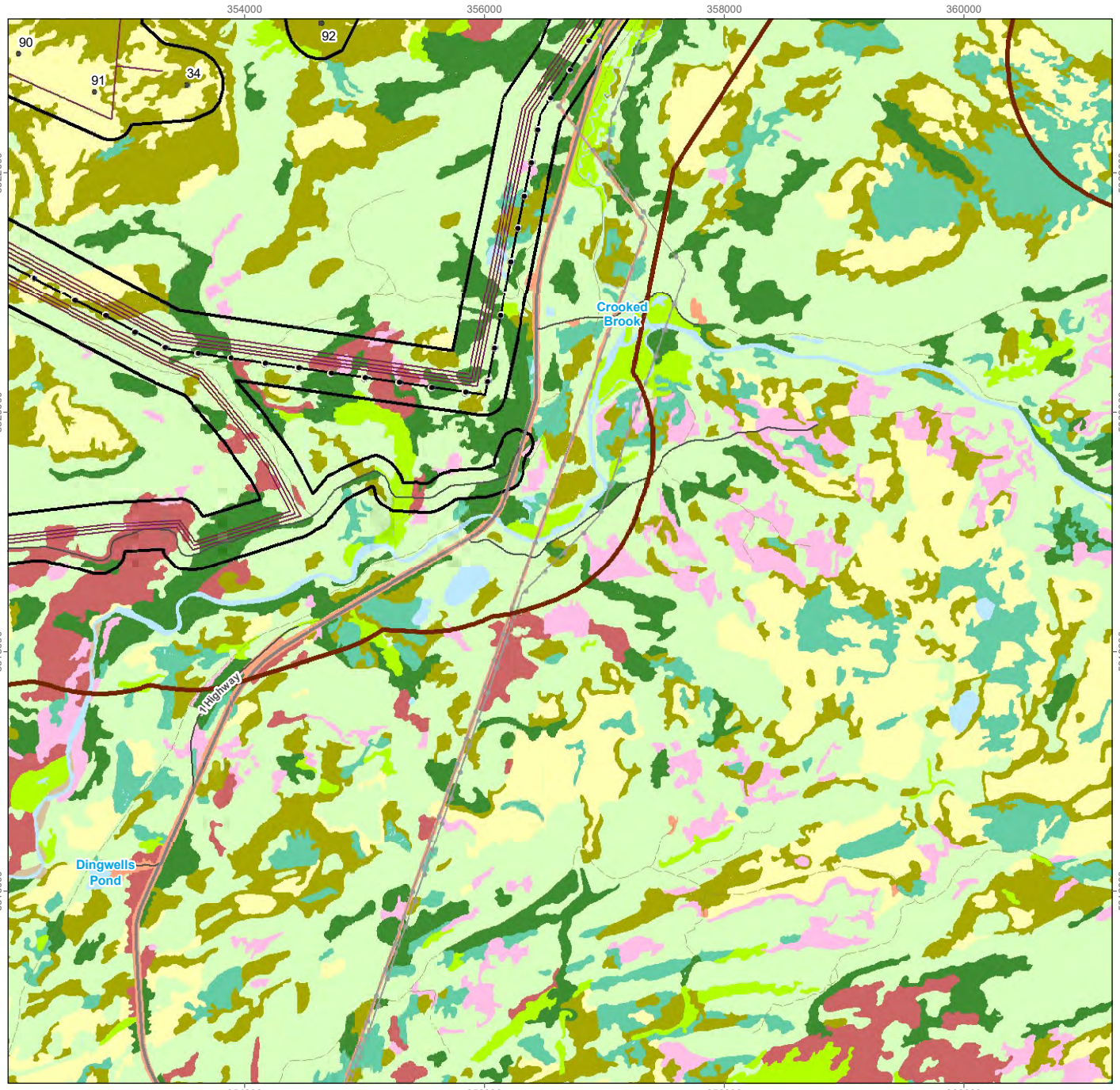

Stantec

Proposed Project Features

- Turbine Location
- Transmission Line 230 kV
- Collector Line
- Access Road
- Project Area
- Local Assessment Area

Other Features

- Transmission Line, Existing
- Trans-Canada Highway
- Road
- Resource Road / Trail

Land Cover

- Anthropogenic
- Barren
- Coniferous Scrub
- Deciduous Scrub
- Hardwood
- Mixedwood
- Softwood
- Unknown Forest
- Sand
- Small Island
- Water
- Wetland

N

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(At original document size of 8.5x11)
1:50,000

Notes

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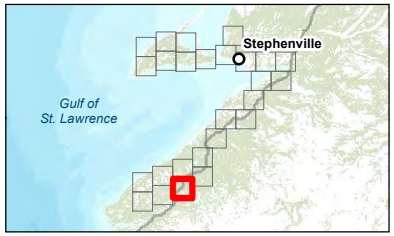
2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap, Government of NL Dept. of Fisheries, Forestry and Agriculture
3. Background: NRCan CanVec



Project Location
Stephenville
NL

Prepared by MB on 2023-08-03
QR by AW on 2023-08-02

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix A

Land Cover in the Project Area

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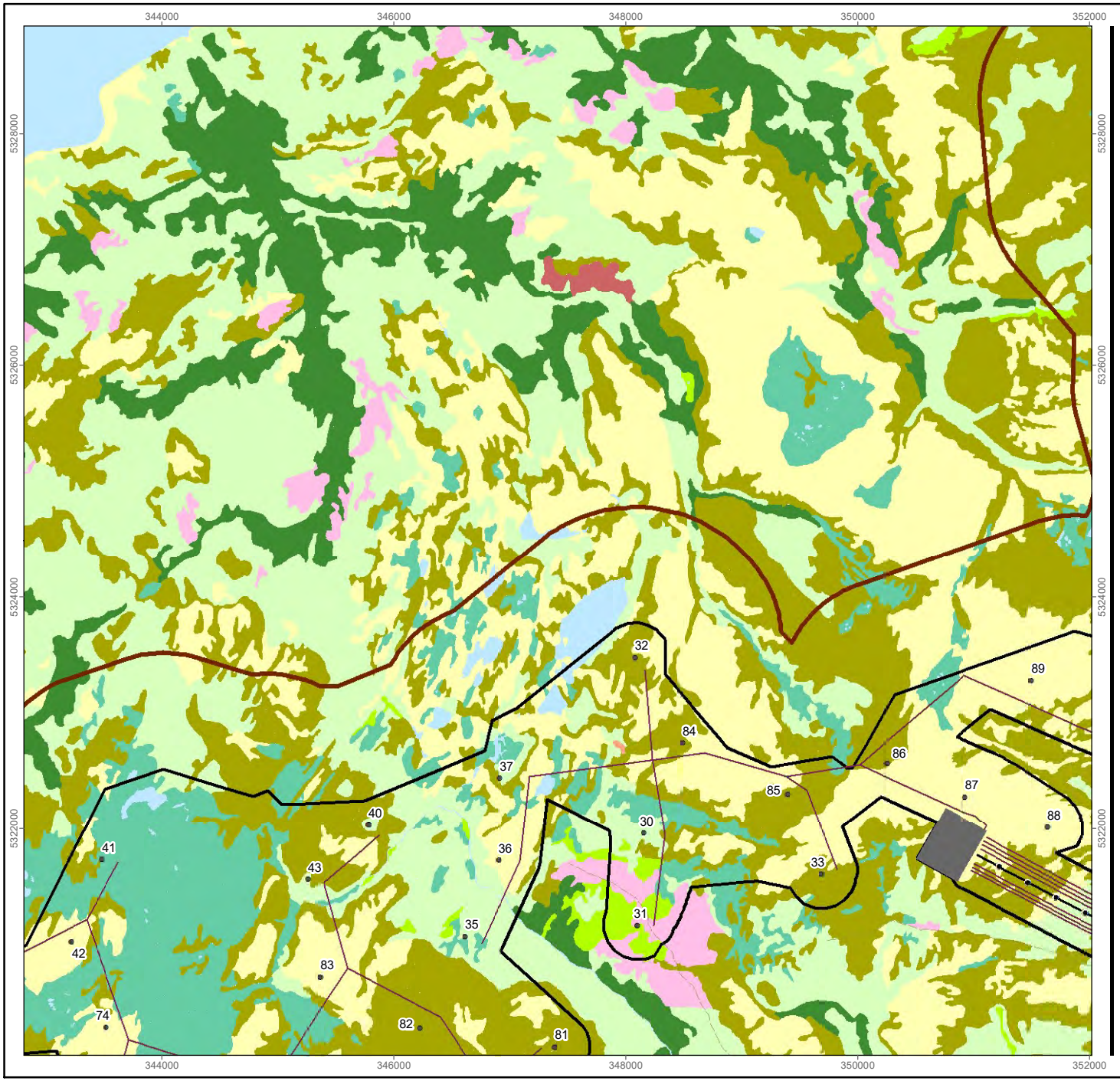

Stantec

Proposed Project Features

- Turbine Location
- Transmission Line 230 kV
- Collector Line
- Access Road
- Substation
- Project Area
- Local Assessment Area

Other Features

- Resource Road / Trail

Land Cover

- Anthropogenic
- Barren
- Coniferous Scrub
- Deciduous Scrub
- Hardwood
- Mixedwood
- Softwood
- Unknown Forest
- Water
- Wetland

N

0 0.5 1 Kilometres
(At original document size of 8.5x11)
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Notes

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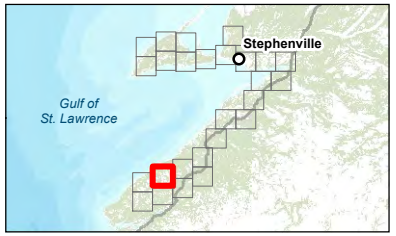

Project Location
Stephenville
NL

Prepared by MB on 2023-08-03
QR by AW on 2023-08-02

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix A

Land Cover in the Project Area

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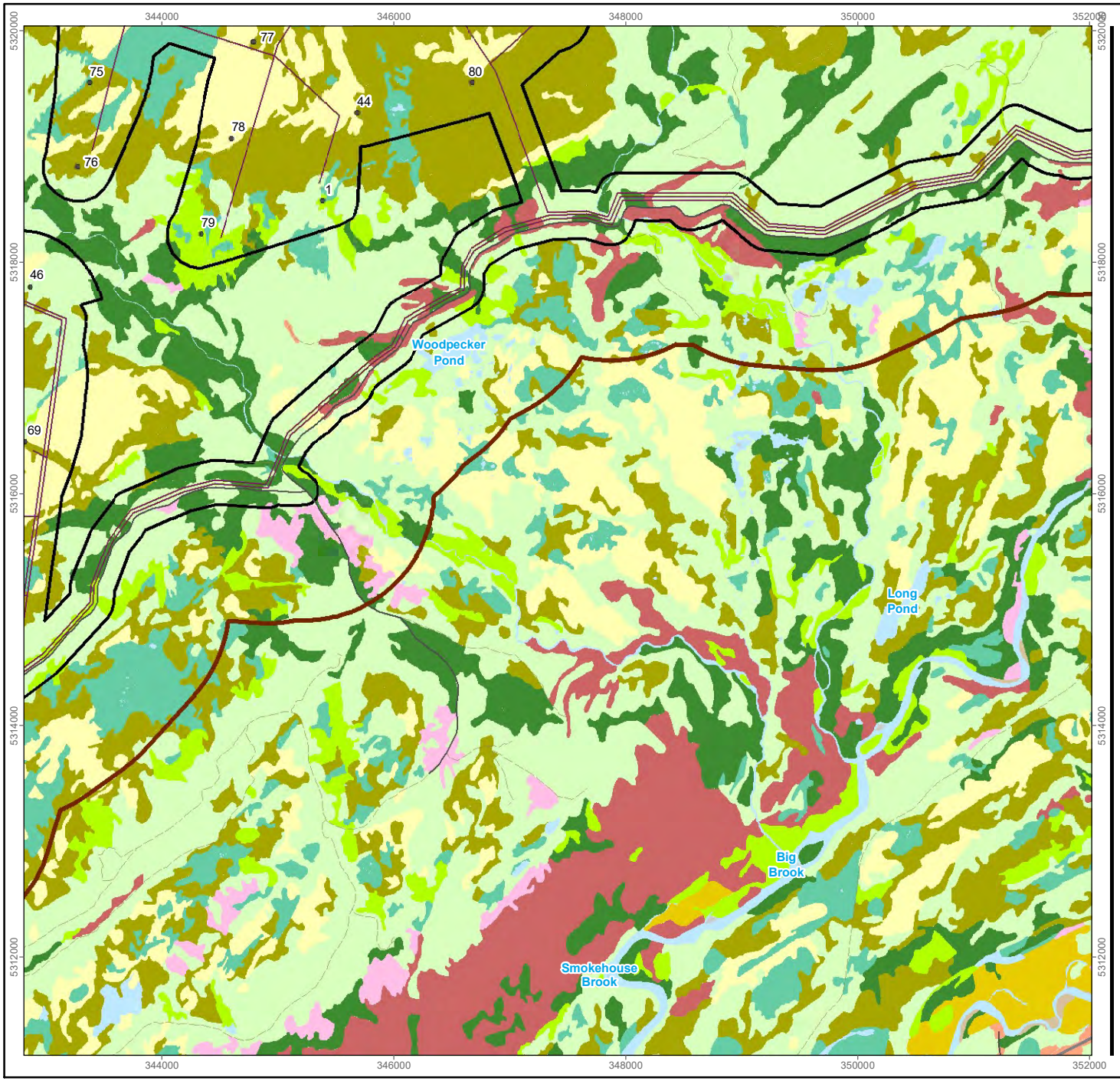

Stantec

Proposed Project Features

- Turbine Location
- Collector Line
- Access Road
- Project Area
- Local Assessment Area

Other Features

- Trans-Canada Highway
- Road
- Resource Road / Trail

Land Cover

- Agriculture
- Anthropogenic
- Barren
- Coniferous Scrub
- Deciduous Scrub
- Hardwood
- Mixedwood
- Softwood
- Unknown Forest
- Sand
- Small Island
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- Wetland

N

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(At original document size of 8.5x11)
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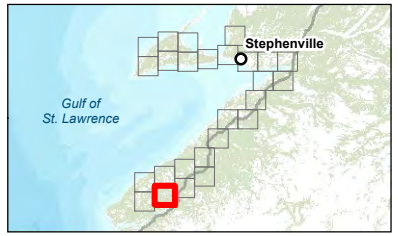
3. Background: NRCan CanVec



Project Location
Stephenville
NL

Prepared by MB on 2023-08-03
QR by AW on 2023-08-02

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix A

Land Cover in the Project Area

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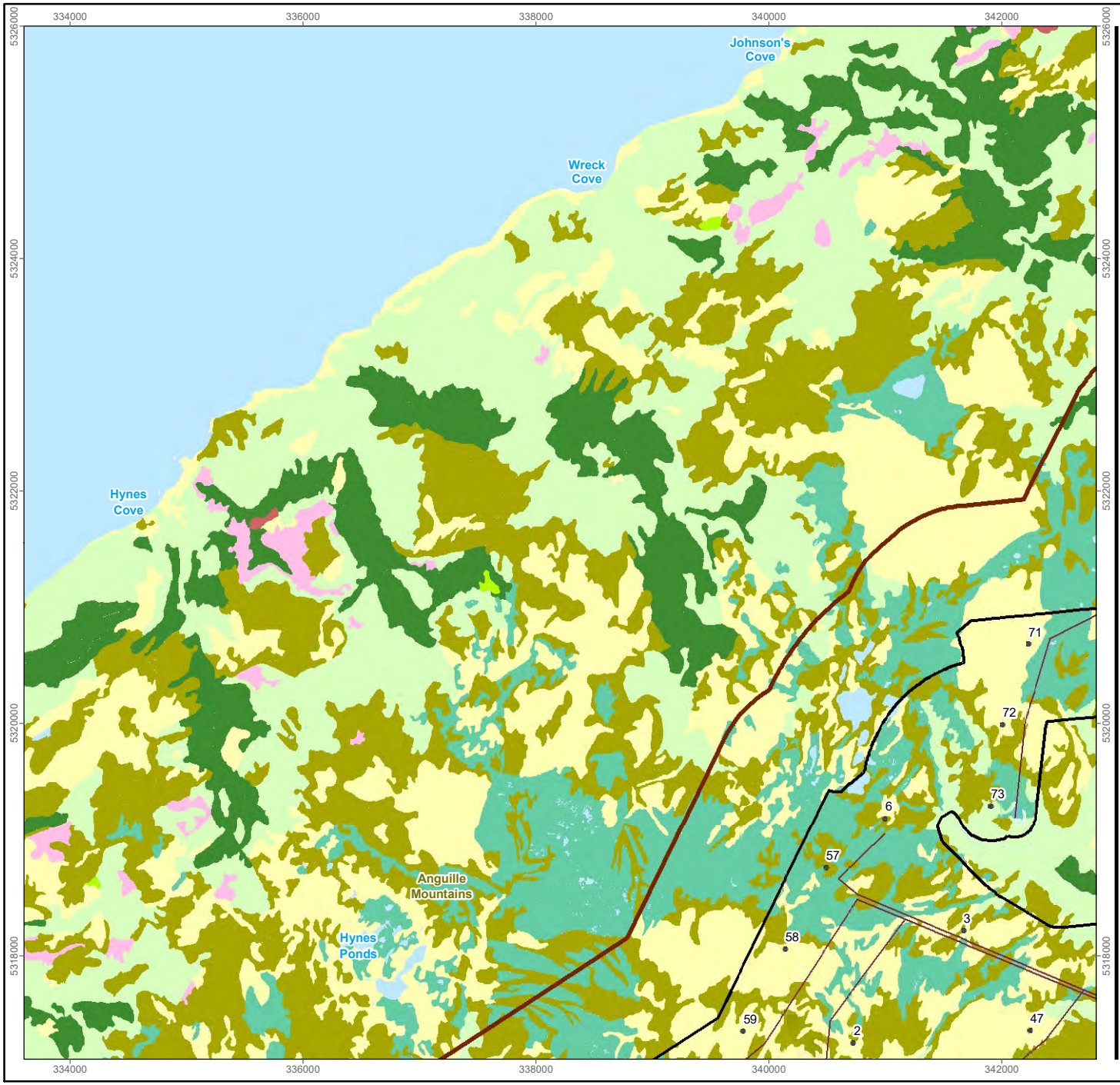

Stantec

Proposed Project Features

- Turbine Location
- Collector Line
- Access Road
- Project Area
- Local Assessment Area

Other Features

Land Cover

- Barren
- Coniferous Scrub
- Deciduous Scrub
- Hardwood
- Mixedwood
- Softwood
- Unknown Forest
- Small Island
- Water
- Wetland

N

0 0.5 1 Kilometres
(At original document size of 8.5x11)
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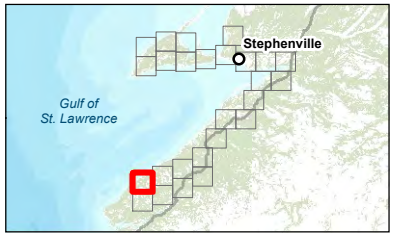
Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap, Government of NL Dept. of Fisheries, Forestry and Agriculture
3. Background: NRCan CanVec



Project Location
Stephenville
NL

Prepared by MB on 2023-08-03
QR by AW on 2023-08-02

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix A

Land Cover in the Project Area

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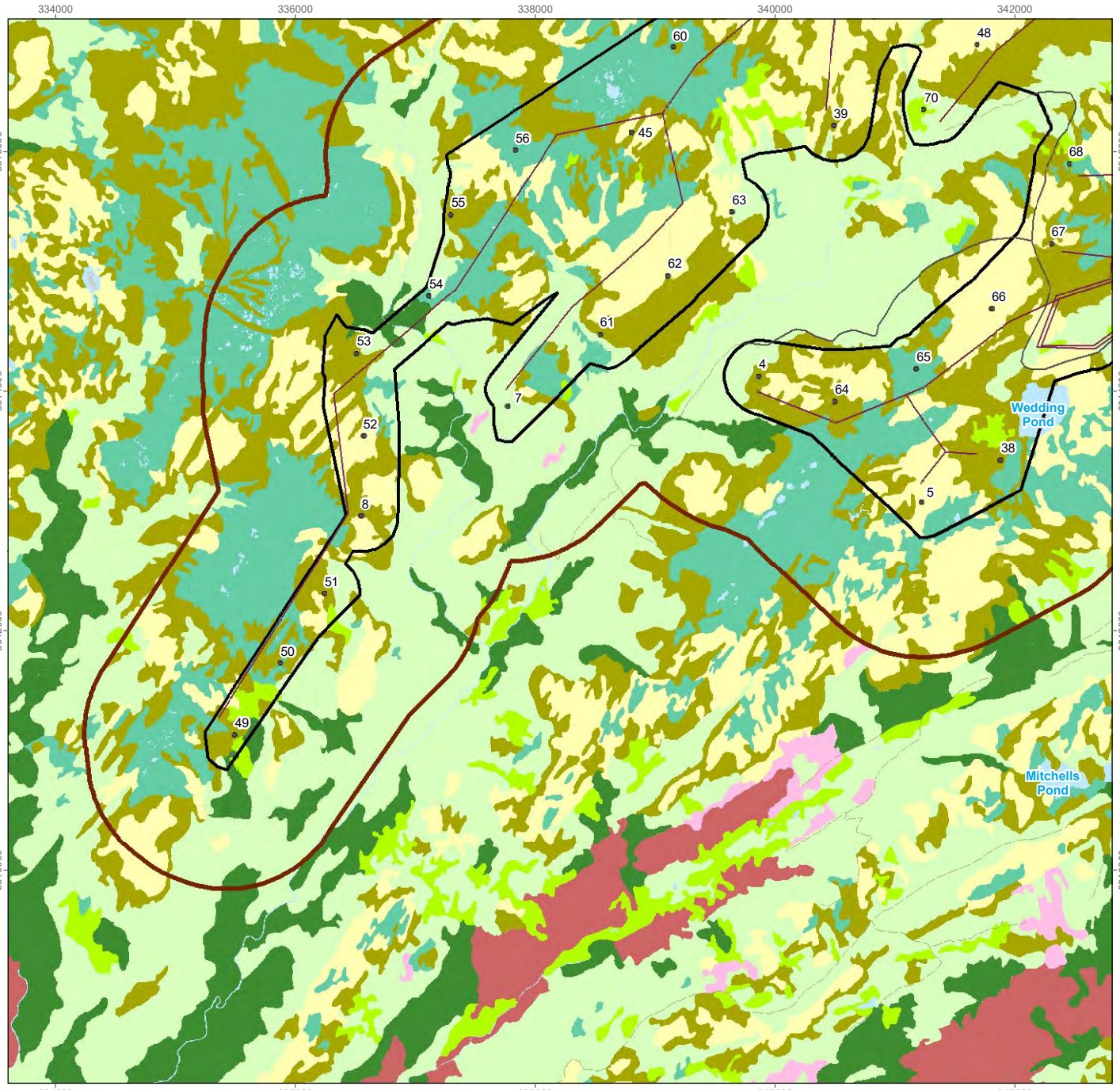

Stantec

Proposed Project Features

- Turbine Location
- Collector Line
- Access Road
- Project Area
- Local Assessment Area

Other Features

- Road
- Resource Road / Trail

Land Cover

- Barren
- Coniferous Scrub
- Deciduous Scrub
- Hardwood
- Mixedwood
- Softwood
- Unknown Forest
- Small Island
- Water
- Wetland

N

0 0.5 1 Kilometres
(At original document size of 8.5x11)
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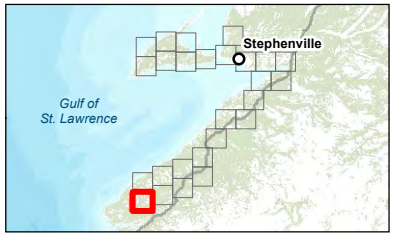
Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap, Government of NL Dept. of Fisheries, Forestry and Agriculture
3. Background: NRCan CanVec



Project Location
Stephenville
NL

Prepared by MB on 2023-08-03
QR by AW on 2023-08-02

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

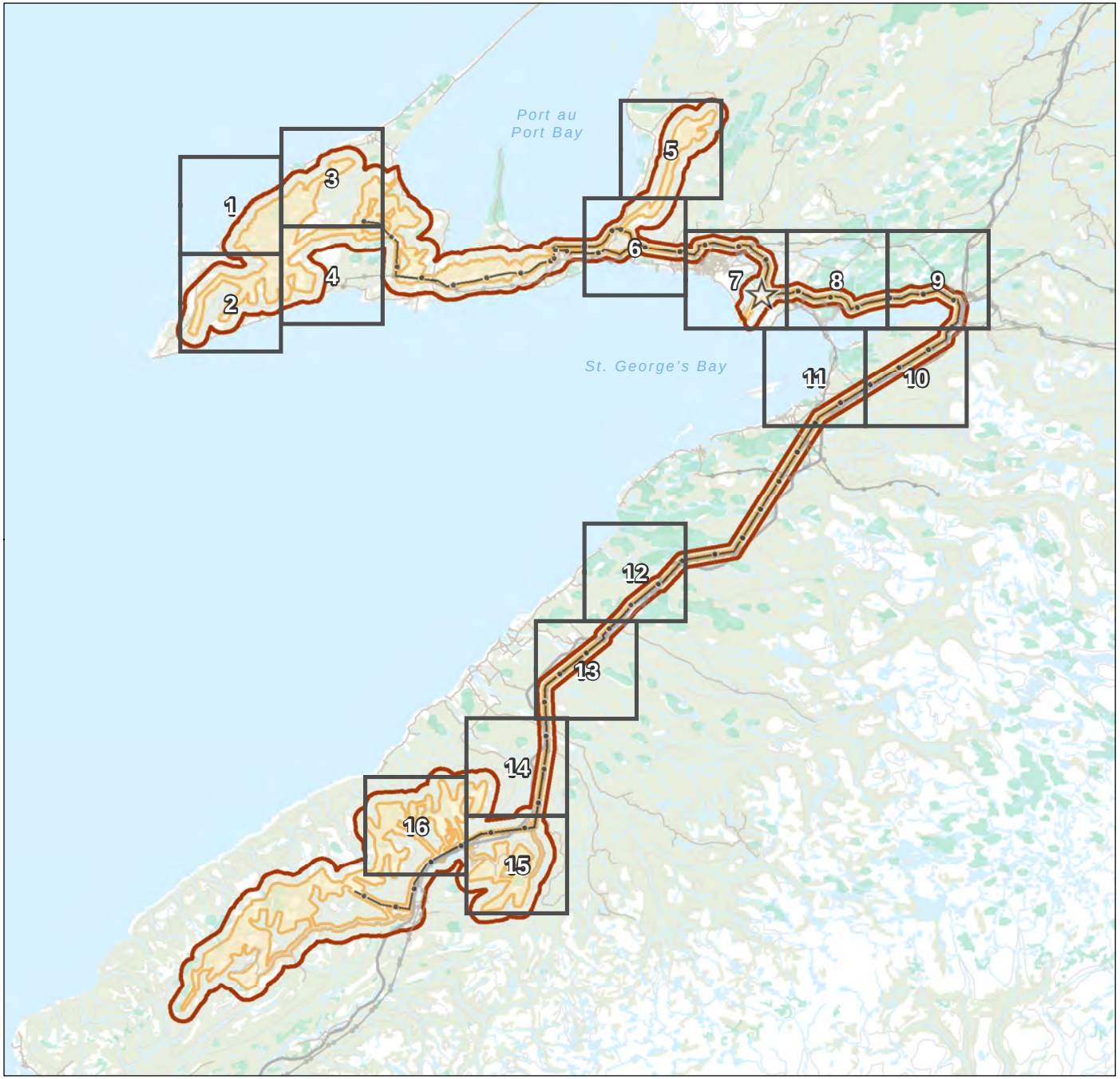
Figure No.
BSA-3 Appendix A

Land Cover in the Project Area

V:\1214\active\121417233\03_data\gis_cad\gis_data\mapping\mxd\general\Bats_Veg_Other_Terr\121417233_081_Terr_Habitat_mapbook.mxd Revised: 2023-08-03 By: mblackwood

Appendix B

Location of Known Occurrences of Vegetation Species at Risk / Species of Special Concern within Vegetation and Wetlands RAA Mapbook



Stantec

Proposed Project Features

- Hydrogen / Ammonia Plant Location
- Transmission Line 230 kV
- Project Area
- Local Assessment Area

Other Features

- Transmission Line, Existing
- Trans-Canada Highway
- Road
- Contour (100m)
- Watercourse
- Wetland
- Waterbody
- Forested Area

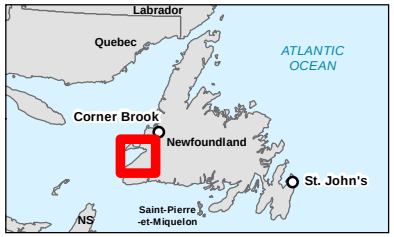
N

0 7 14 Kilometres

(At original document size of 8.5x11)
1:550,000

Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, Openstreetmap
3. Background: NRCan CanVec



Project Location
Stephenville
NL

Prepared by MB on 2023-06-30
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_074a

Figure No.
BSA-3 Appendix B

Map Index - Locations of Known Occurrences of Vegetation SAR and SOCC within the Vegetation and Wetlands RAA

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Stantec

Species at Risk (SAR)

- Lindley's Aster (*Symphyotrichum ciliolatum*)

Proposed Project Features

- Turbine Location
- Collector Line
- Access Road
- Project Area
- Local Assessment Area

N

0 0.5 1 Kilometres
(At original document size of 8.5x11)
1:50,000

Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap, ACCDC
3. Background: NRCan CanVec

Project Location Stephenville NL	Prepared by MB on 2023-08-02 QR by AW on 2023-07-06
Client/Project World Energy GH2 Project Nujio'qonik	121417233_074
Figure No. **BSA-3 Appendix B**	Page 1 of 16

Vascular Plant and Lichen SAR and SOCC within the Local Assessment Area

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Stantec

Species at Risk (SAR)

- Lindley's Aster *(Symphyotrichum ciliolatum)*
- Mackenzie's Sweetvetch *(Hedysarum boreale subsp. mackenziei)*
- Woolly Arnica *(Arnica angustifolia subsp. tomentosa)*
- Northern Rough Fescue *(Festuca altaica)*
- Slender-Leaved Sundew *(Drosera linearis)*
- Western Threadleaf Pondweed *(Stuckenia filiformis subsp. occidentalis)*

Species of Conservation Concern (SOCC)

- Drummond's Rockcress *(Boechera stricta)*
- Fairy Slipper *(Calypso bulbosa var. americana)*
- Hooker's Orchid *(Platanthera hookeri)*

Proposed Project Features

- Turbine Location
- Collector Line
- Access Road
- Project Area
- Local Assessment Area

N

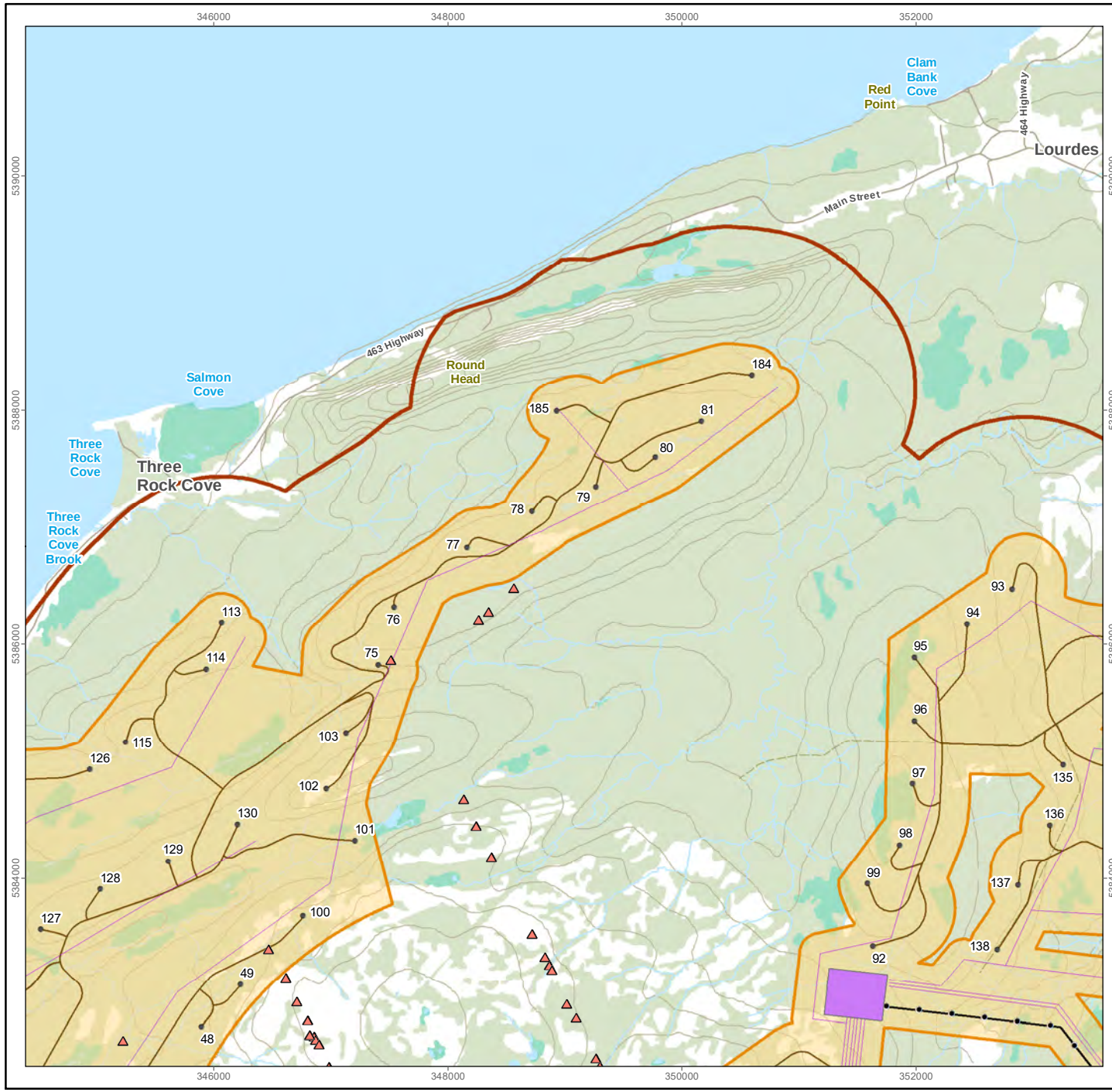
0 0.5 1 Kilometres
(At original document size of 8.5x11)
1:50,000

Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap, ACCDC
3. Background: NRCan CanVec

Project Location Stephenville NL	Prepared by MB on 2023-08-02 QR by AW on 2023-07-06
Client/Project World Energy GH2 Project Nujio'qonik	121417233_074
Figure No. **BSA-3 Appendix B**	Page 2 of 16

Vascular Plant and Lichen SAR and SOCC within the Local Assessment Area



Stantec

Species at Risk (SAR)

- Lindley's Aster *(Symphyotrichum ciliolatum)*

Proposed Project Features

- Turbine Location
- Transmission Line 230 kV
- Collector Line
- Access Road
- Substation
- Project Area
- Local Assessment Area

N

0 0.5 1 Kilometres
(At original document size of 8.5x11)
1:50,000

Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap, ACCDC
3. Background: NRCan CanVec

Project Location
Stephenville
NL

Prepared by MB on 2023-08-02
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_074

Figure No.
BSA-3 Appendix B

Vascular Plant and Lichen SAR and SOCC within the Local Assessment Area

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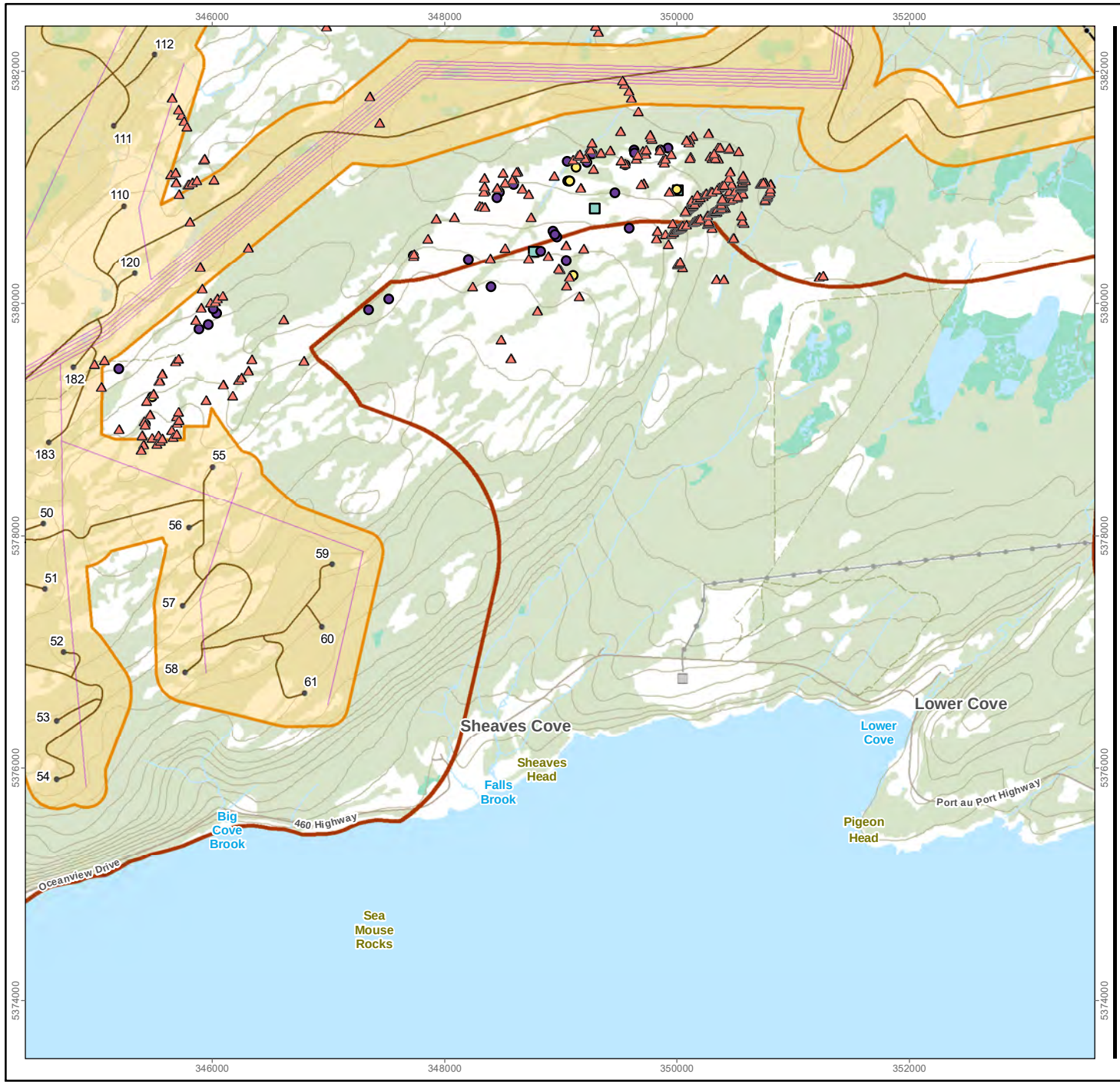

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Stantec

Species at Risk (SAR)

- Lindley's Aster *(Symphyotrichum ciliolatum)*

Species of Conservation Concern (SOCC)

- Beautiful Sedge *(Carex concinna)*
- Hidden Sedge *(Carex umbellata)*
- Hooker's Orchid *(Platanthera hookeri)*
- Laurentian Bladder Fern *(Cystopteris laurentiana)*

Proposed Project Features

- Turbine Location
- Transmission Line 230 kV
- Collector Line
- Access Road
- Project Area
- Local Assessment Area

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(At original document size of 8.5x11)
1:50,000

Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap, ACCDC
3. Background: NRCan CanVec

Project Location
Stephenville
NL

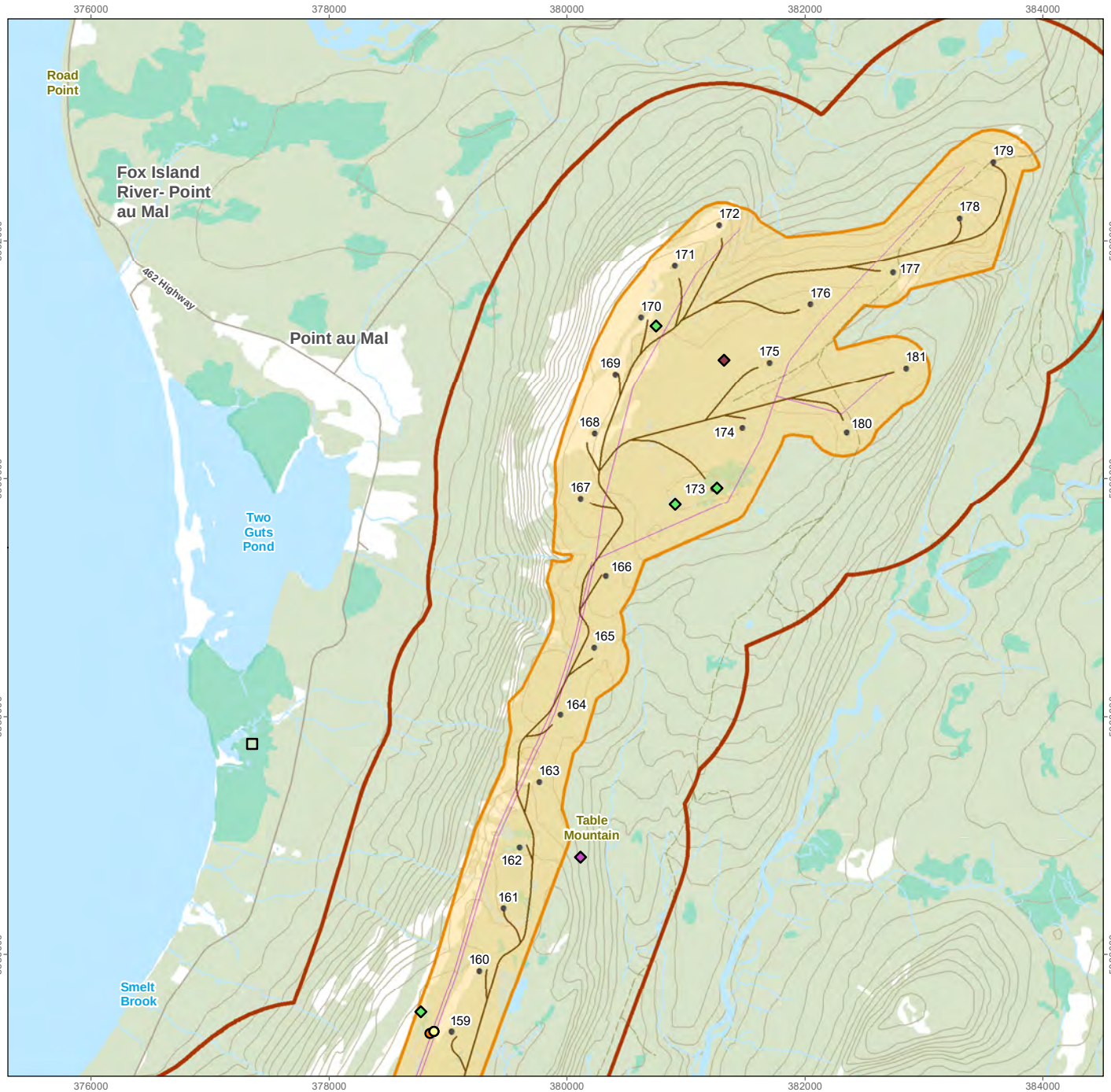
Prepared by MB on 2023-08-02
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_074

Figure No.
BSA-3 Appendix B

Vascular Plant and Lichen SAR and SOCC within the Local Assessment Area



Stantec

Species of Conservation Concern (SOCC)

- Host's Sedge *(Carex hostiana)*
- Knotted Rush Knotted Rush *(Juncus nodosus)*
- Saltmarsh Bulrush *(Bolboschoenus maritimus subsp. paludosus)*
- Slender-Leaved Sundew *(Drosera linearis)*
- St. John's Oxytrope *(Oxytropis campestris var. johannensis)*
- Stalked Bulrush *(Scirpus pedicellatus)*

Proposed Project Features

- Turbine Location
- Collector Line
- Access Road
- Project Area
- Local Assessment Area

N

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(At original document size of 8.5x11)
1:50,000

Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap, ACCDC
3. Background: NRCan CanVec

Project Location
Stephenville
NL

Prepared by MB on 2023-08-02
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_074

Figure No.
BSA-3 Appendix B

Vascular Plant and Lichen SAR and SOCC within the Local Assessment Area

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Stantec

Species at Risk (SAR)

- Lindley's Aster *(Symphyotrichum ciliolatum)*
- Low Northern Rockcress *(Braya humilis)*
- Rock Dwelling Sedge *(Carex petricosa var. misandroides)*
- Woolly Arnica *(Arnica angustifolia subsp. tomentosa)*
- Knotted Rush Knotted Rush *(Juncus nodosus)*
- Rocky Mountain Fescue *(Festuca saximontana var. saximontana)*
- Slender Wedge Grass *(Sphenopholis intermedia)*

Species of Conservation Concern (SOCC)

- Ball's Willow *(Salix ballii)*
- Dwarf Arctic Groundsel *(Packera cymbalaria)*
- Fernald Serviceberry *(Amelanchier fernaldii)*
- Fries' Pondweed *(Potamogeton friesii)*
- Hooked Crowfoot *(Ranunculus recurvatus)*
- Host's Sedge *(Carex hostiana)*

Proposed Project Features

- Turbine Location
- Transmission Line 230 kV

Port au Port Interconnection

- Proposed Route
- Alternate Route
- Collector Line
- Access Road
- Substation
- Project Area
- Local Assessment Area

N

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(At original document size of 8.5x11)
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Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap, ACCDC
3. Background: NRCan CanVec

Project Location
Stephenville
NL

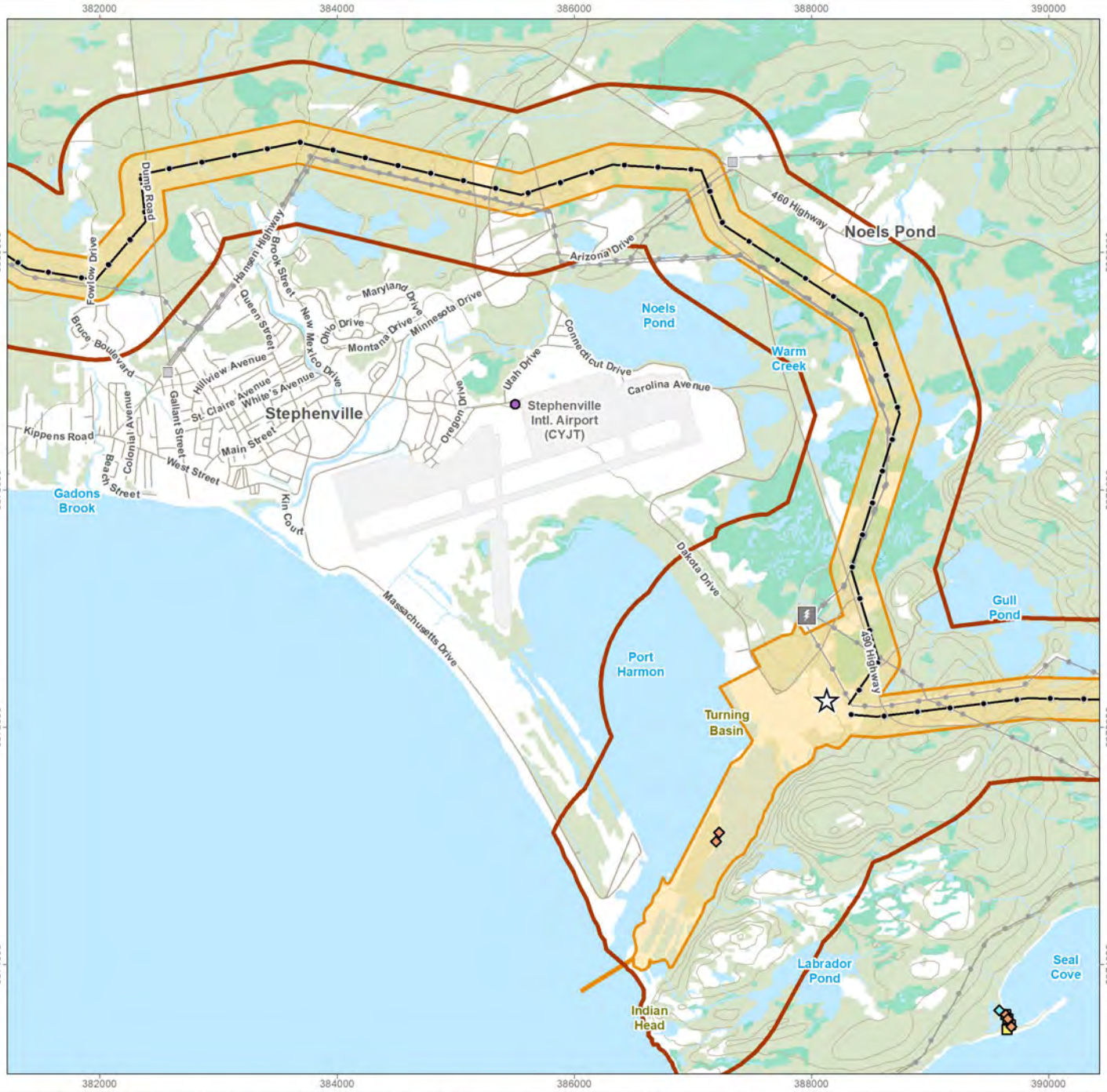
Prepared by MB on 2023-08-02
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_074

Figure No.
BSA-3 Appendix B

Vascular Plant and Lichen SAR and SOCC within the Local Assessment Area



Stantec

Species of Conservation Concern (SOCC)

- Fernald Serviceberry *(Amelanchier fernaldii)*
- Salt-Meadow Cordgrass *(Spartina patens)*
- Saltwater Cordgrass *(Sporobolus alterniflorus)*
- Soft-Stem Bulrush *(Schoenoplectus tabernaemontani)*

Proposed Project Features

- Hydrogen / Ammonia Plant Location
- Transmission Line 230 kV
- Project Area
- Local Assessment Area

N

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(At original document size of 8.5x11)
1:50,000

Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap, ACCDC
3. Background: NRCan CanVec

Project Location Stephenville NL	Prepared by MB on 2023-08-03 QR by AW on 2023-07-06
Client/Project World Energy GH2 Project Nujio'qonik	121417233_074
Figure No. **BSA-3 Appendix B**	Page 7 of 16

Vascular Plant and Lichen SAR and SOCC within the Local Assessment Area

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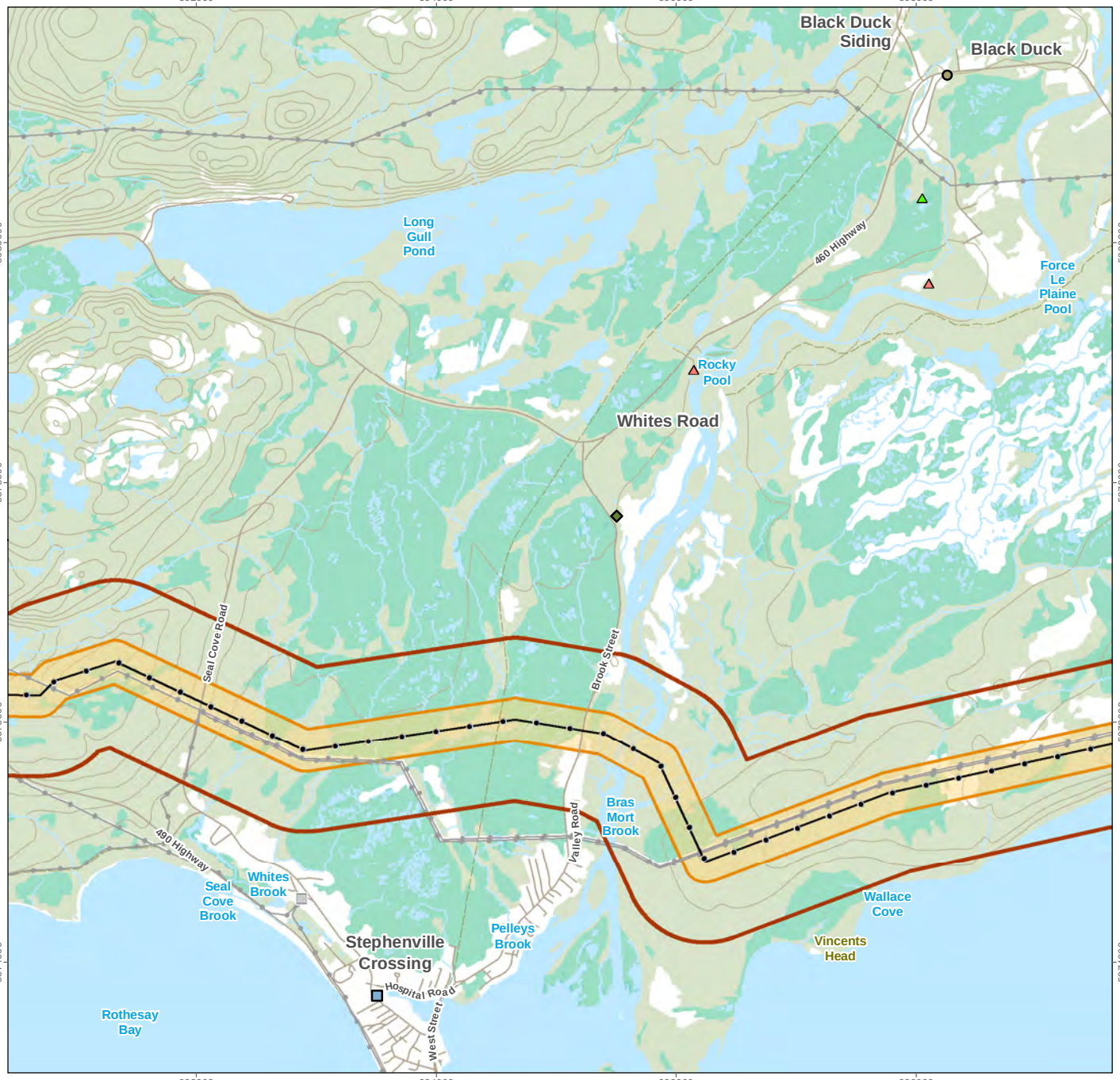

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Stantec

Species at Risk (SAR)

- Black Ash *(Fraxinus nigra)*
- Lindley's Aster *(Symphyotrichum ciliolatum)*

Species of Conservation Concern (SOCC)

- Auricled Twayblade *(Neottia auriculata)*
- Ray's Knotweed *(Polygonum oxyspermum subsp. raii)*
- Virginia Anemone *(Anemone virginiana var. alba)*

Proposed Project Features

- Transmission Line 230 kV
- Project Area
- Local Assessment Area

N

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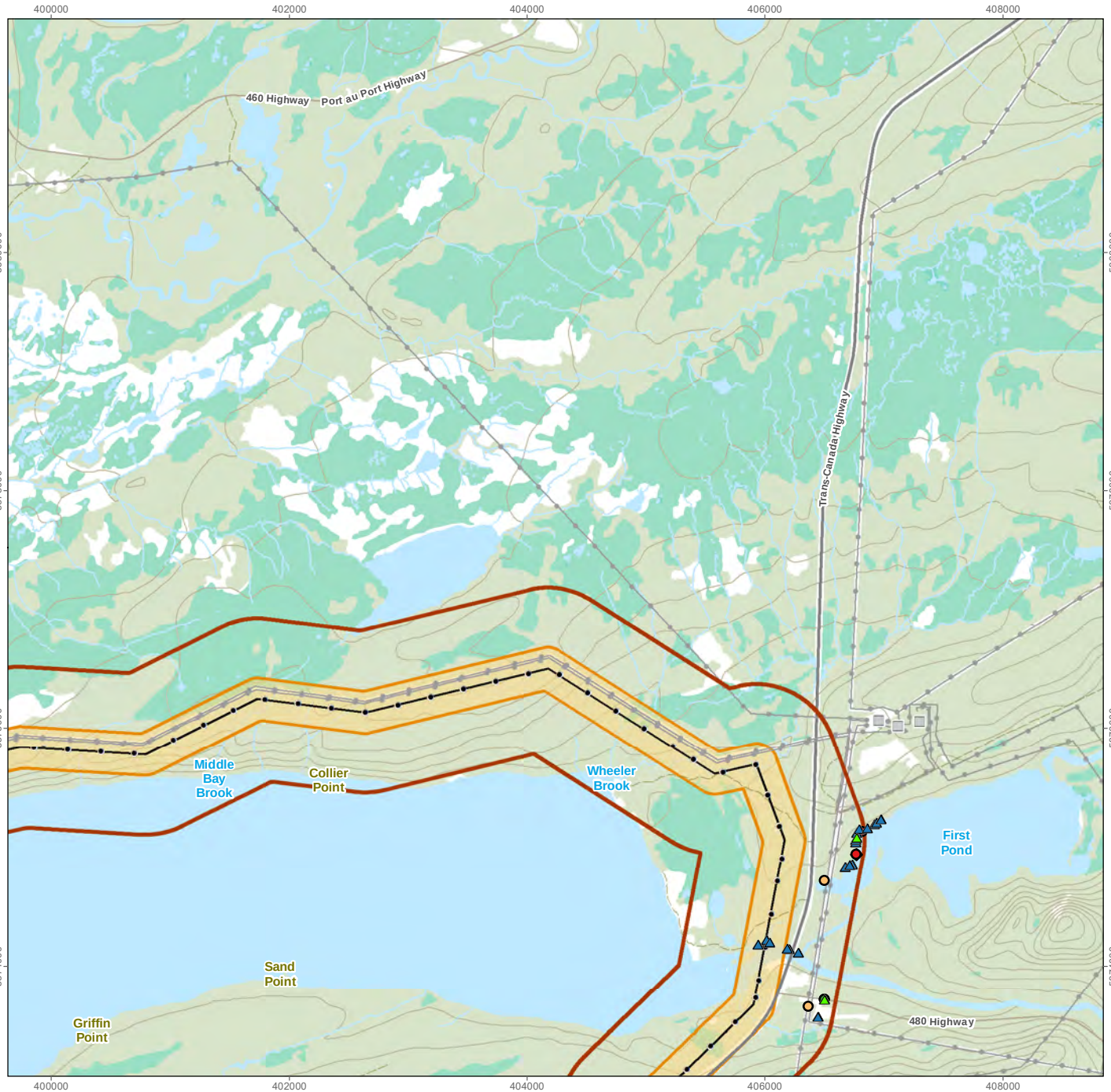
Notes
1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap, ACCDC
3. Background: NRCan CanVec

Project Location Stephenville NL	Prepared by MB on 2023-08-02 QR by AW on 2023-07-06
Client/Project World Energy GH2 Project Nujio'qonik	121417233_074
Figure No. **BSA-3 Appendix B**	Page 8 of 16

Vascular Plant and Lichen SAR and SOCC within the Local Assessment Area



Stantec

Species at Risk (SAR)

- Black Ash *(Fraxinus nigra)*
- Tradescant Aster *(Symphyotrichum tradescantii)*
- Hay-Scented Fern *(Dennstaedtia punctilobula)*
- Small Water-Wort *(Elatine minima)*

Species of Conservation Concern (SOCC)

- Fineberry Hawthorne *(Crataegus chrysocarpa var. chrysocarpa)*
- Greater Purple Bladderwort *(Utricularia purpurea)*

Proposed Project Features

- Transmission Line 230 kV
- Project Area
- Local Assessment Area

N

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(At original document size of 8.5x11)
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Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap, ACCDC
3. Background: NRCan CanVec

Project Location Stephenville NL	Prepared by MB on 2023-08-02 QR by AW on 2023-07-06
Client/Project World Energy GH2 Project Nujio'qonik	121417233_074
Figure No. **BSA-3 Appendix B**	Page 9 of 16

Vascular Plant and Lichen SAR and SOCC within the Local Assessment Area

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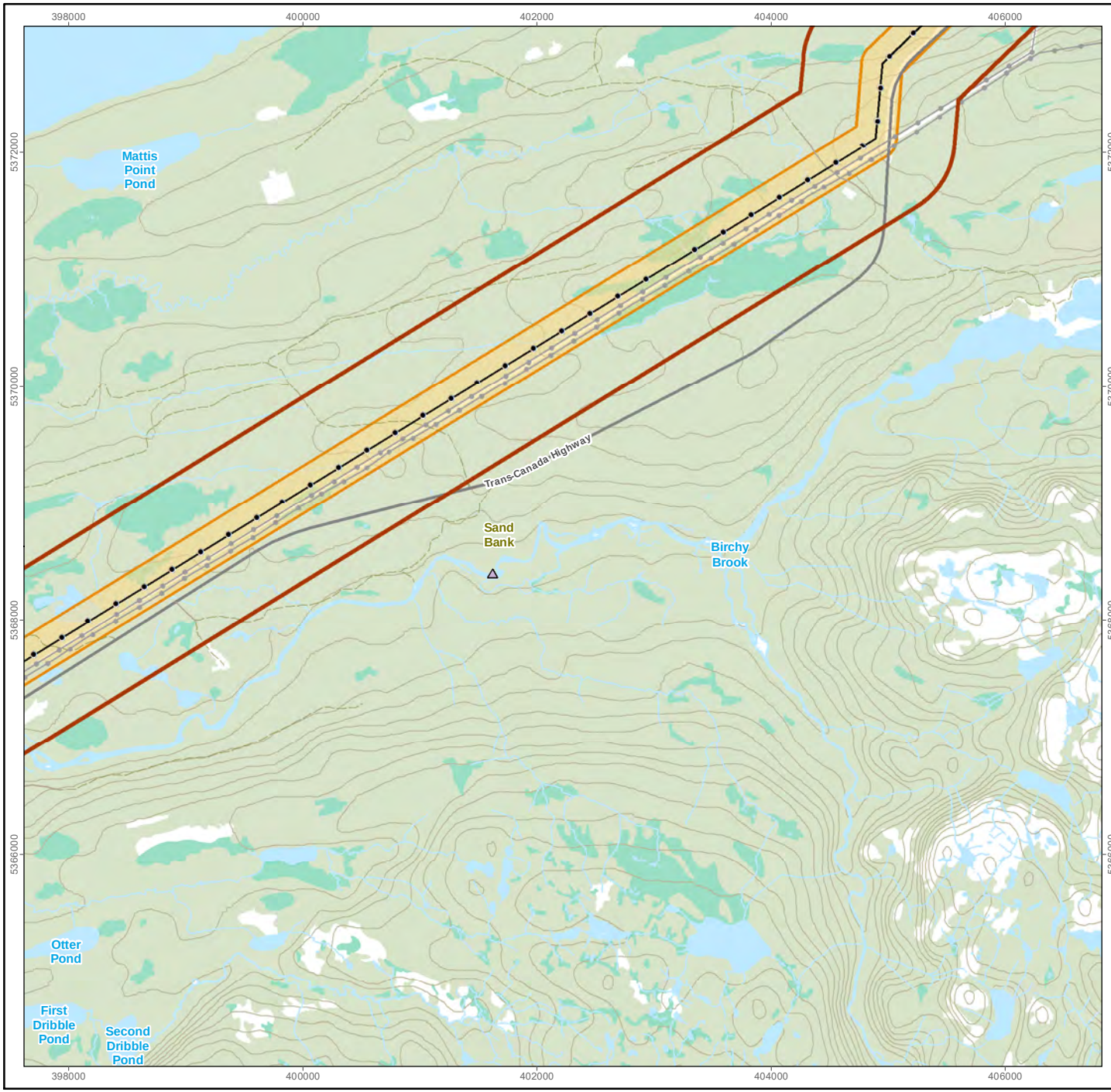

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Stantec

Species at Risk (SAR)

- Red Pine *(Pinus resinosa)*

Proposed Project Features

- Transmission Line 230 kV
- Project Area
- Local Assessment Area

N

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(At original document size of 8.5x11)
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Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap, ACCDC
3. Background: NRCan CanVec

Project Location
Stephenville
NL

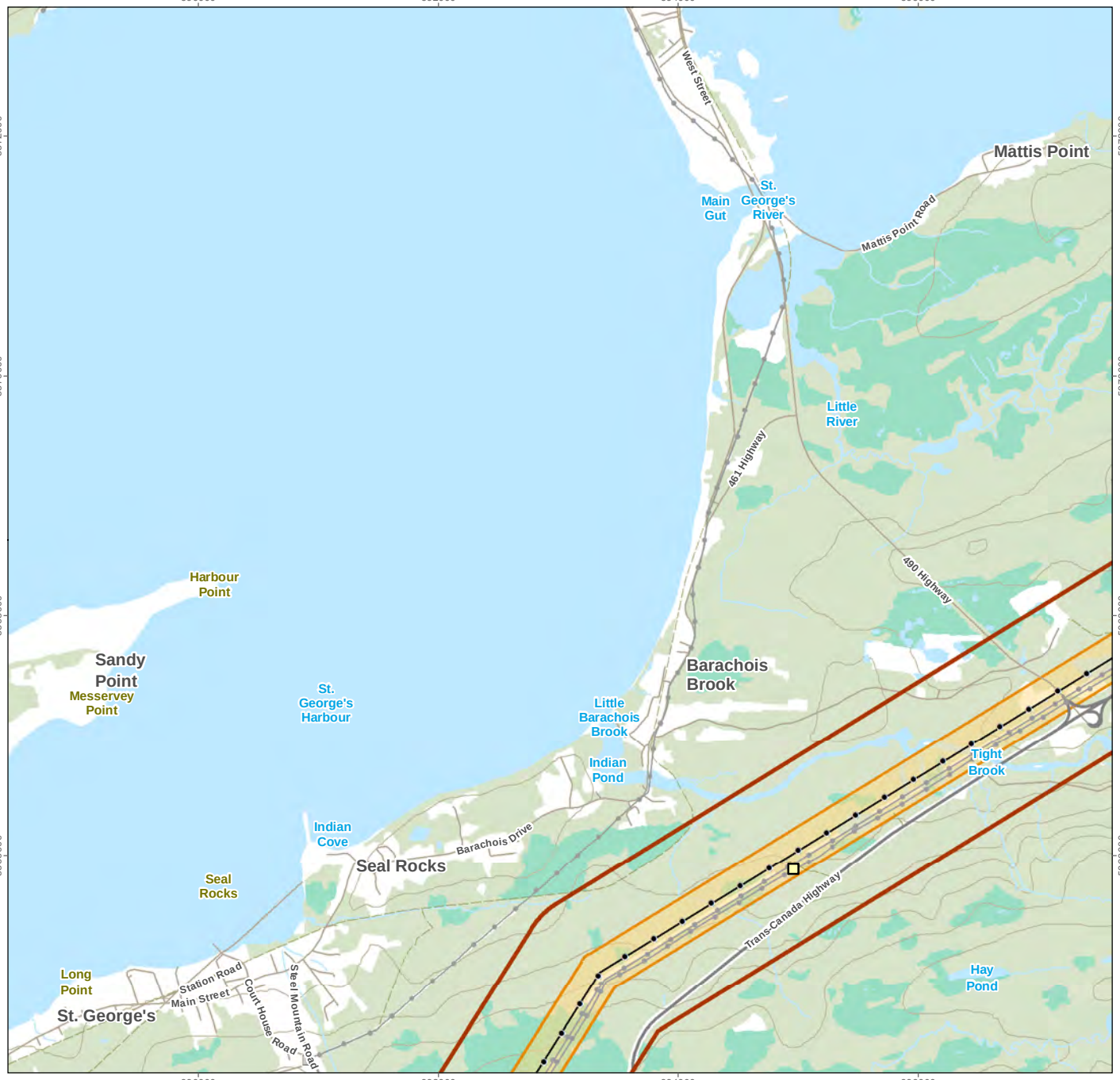
Prepared by MB on 2023-08-02
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_074

Figure No.
BSA-3 Appendix B

Vascular Plant and Lichen SAR and SOCC within the Local Assessment Area



Stantec

Species of Conservation Concern (SOCC)

- Marginal Wood Fern *(Dryopteris marginalis)*

Proposed Project Features

- Transmission Line 230 kV
- Project Area
- Local Assessment Area

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Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap, ACCDC
3. Background: NRCan CanVec

Project Location Stephenville NL	Prepared by MB on 2023-08-02 QR by AW on 2023-07-06
Client/Project World Energy GH2 Project Nujio'qonik	121417233_074
Figure No. **BSA-3 Appendix B**	Page 11 of 16

Vascular Plant and Lichen SAR and SOCC within the Local Assessment Area

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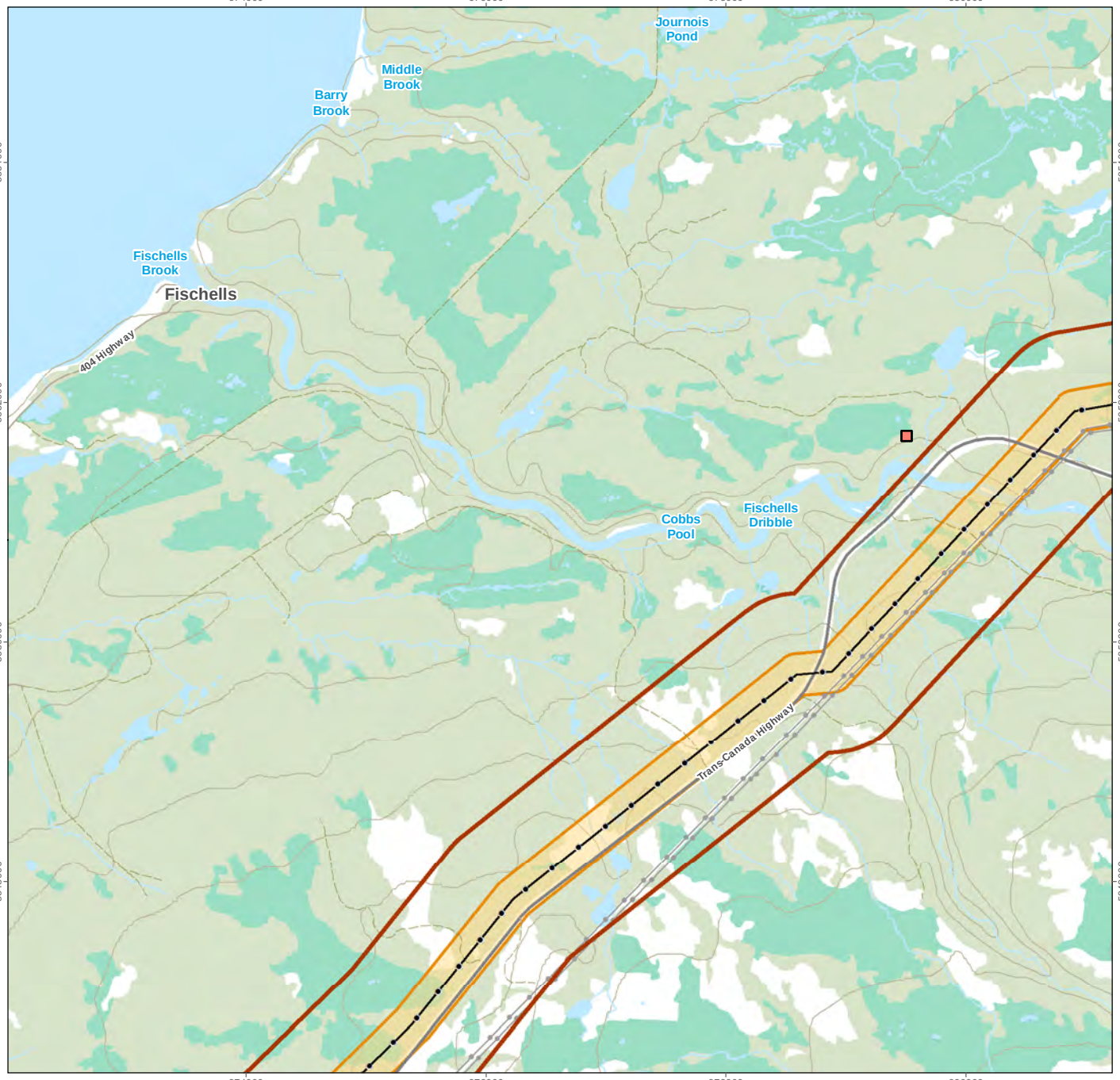

Stantec

Species of Conservation Concern (SOCC)

Panicled Aster
(Symphyotrichum lanceolatum var. lanceolatum)

Proposed Project Features

Transmission Line 230 kV

Project Area

Local Assessment Area

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Notes
1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap, ACCDC
3. Background: NRCan CanVec

Project Location
Stephenville
NL

Prepared by MB on 2023-08-02
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_074

Figure No.
BSA-3 Appendix B

Vascular Plant and Lichen SAR and SOCC within the Local Assessment Area

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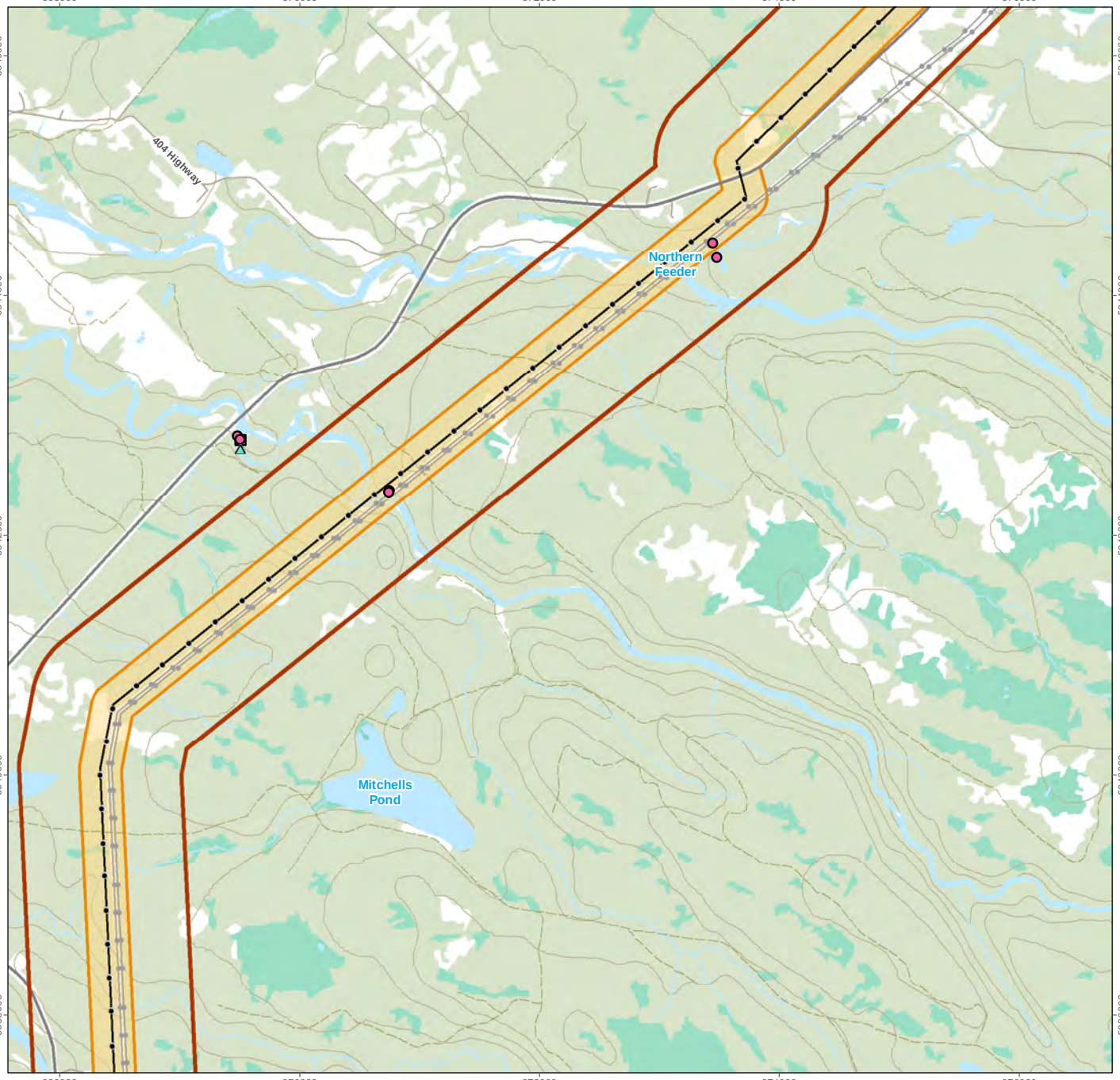

Stantec

Species at Risk (SAR)

- Small Yellow Water-Crowfoot *(Ranunculus gmelinii)*

Species of Conservation Concern (SOCC)

- Cyperus-Like Sedge *(Carex pseudocyperus)*
- Retrorse Sedge *(Carex retrorsa)*

Proposed Project Features

- Transmission Line 230 kV
- Project Area
- Local Assessment Area

N

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Notes
1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap, ACCDC
3. Background: NRCan CanVec

Project Location
Stephenville
NL

Prepared by MB on 2023-08-02
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_074

Figure No.
BSA-3 Appendix B

Vascular Plant and Lichen SAR and SOCC within the Local Assessment Area

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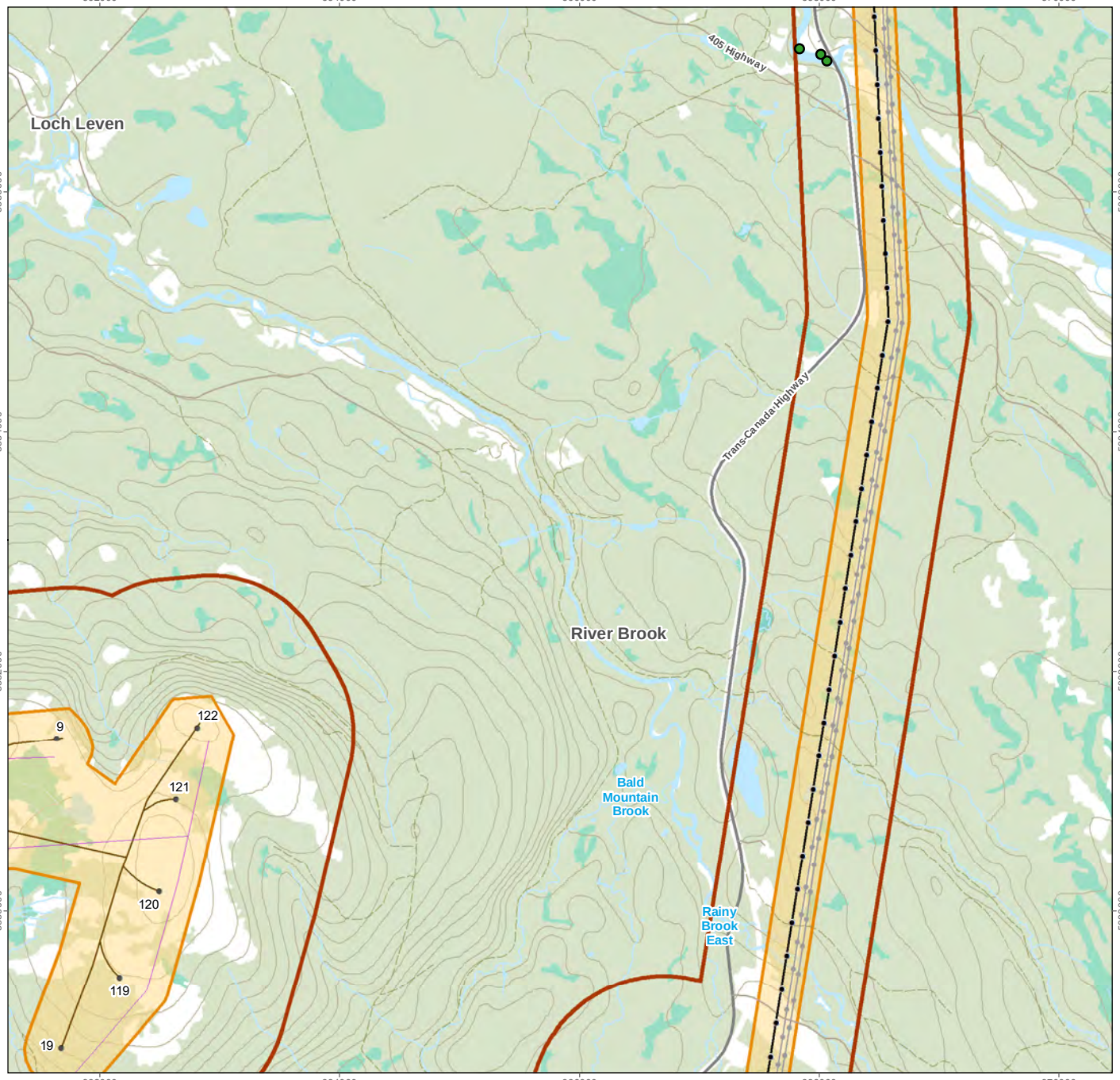

Stantec

Species of Conservation Concern (SOCC)

- Fineberry Hawthorne *(Crataegus chrysocarpa var. chrysocarpa)*

Proposed Project Features

- Turbine Location
- Transmission Line 230 kV
- Collector Line
- Access Road
- Project Area
- Local Assessment Area

N

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Notes
1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap, ACCDC
3. Background: NRCan CanVec

Project Location
Stephenville
NL

Prepared by MB on 2023-08-02
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_074

Figure No.
BSA-3 Appendix B

Vascular Plant and Lichen SAR and SOCC within the Local Assessment Area

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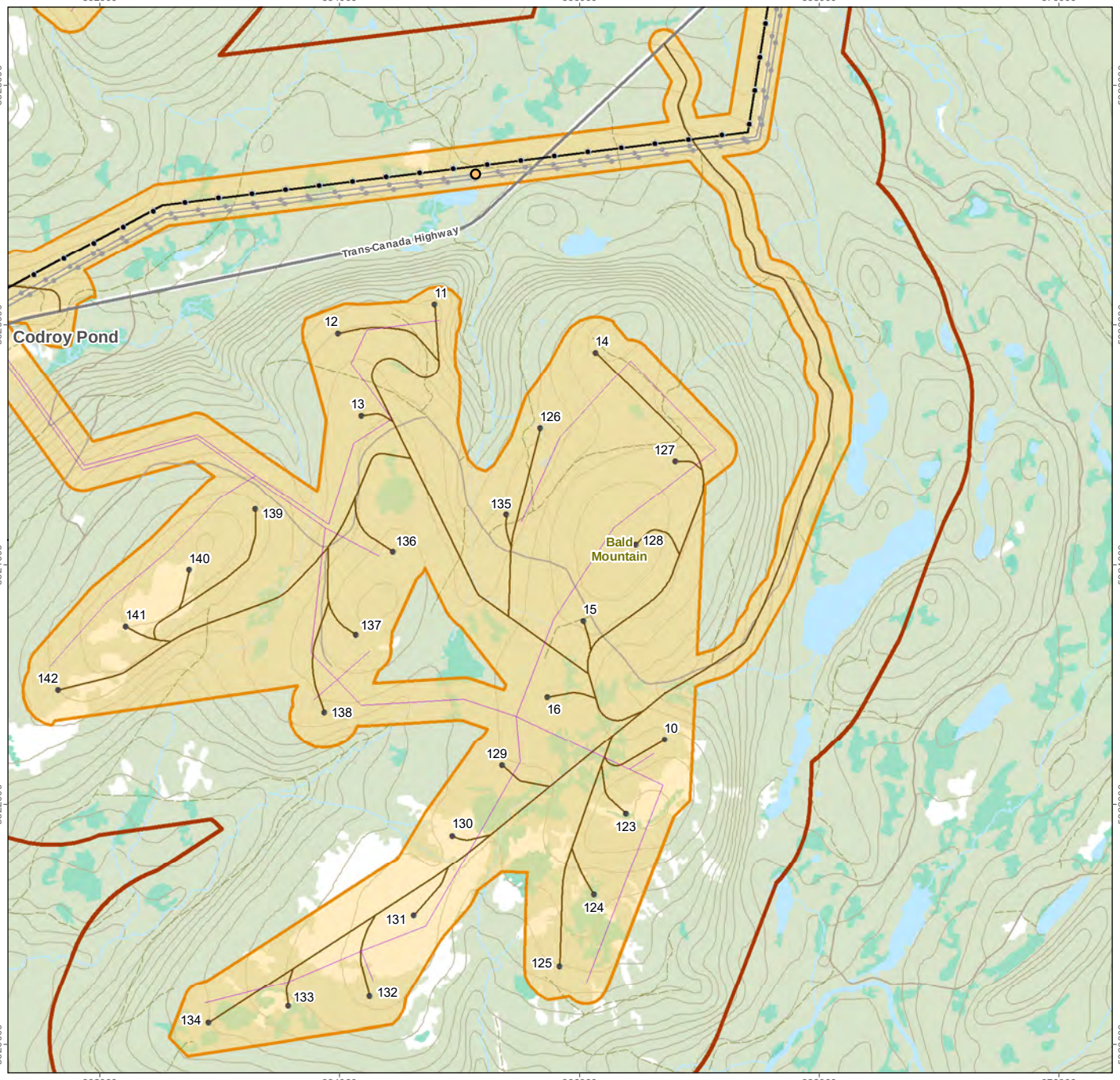

Stantec

Species of Conservation Concern (SOCC)

- Hay-Scented Fern *(Dennstaedtia punctilobula)*

Proposed Project Features

- Turbine Location
- Transmission Line 230 kV
- Collector Line
- Access Road
- Project Area
- Local Assessment Area

N

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Notes
1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap, ACCDC
3. Background: NRCan CanVec

Project Location Stephenville NL	Prepared by MB on 2023-08-02 QR by AW on 2023-07-06
Client/Project World Energy GH2 Project Nujio'qonik	121417233_074
Figure No. **BSA-3 Appendix B**	Page 15 of 16

Vascular Plant and Lichen SAR and SOCC within the Local Assessment Area

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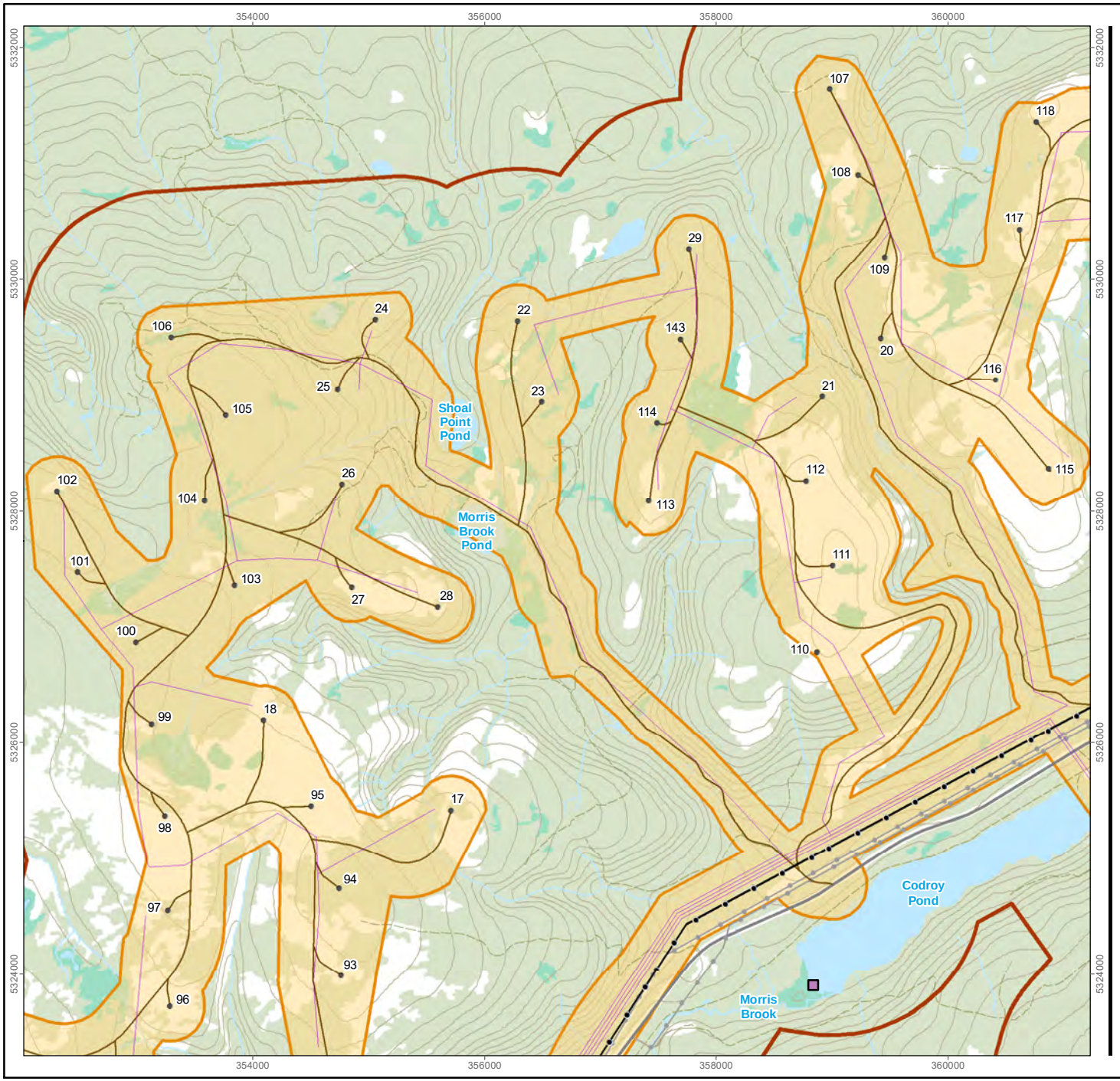

Stantec

Species of Conservation Concern (SOCC)

- Rough Horsetail *(Equisetum hyemale)*

Proposed Project Features

- Turbine Location
- Transmission Line 230 kV
- Collector Line
- Access Road
- Project Area
- Local Assessment Area

N

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(At original document size of 8.5x11)
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Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap, ACCDC
3. Background: NRCan CanVec

Project Location Stephenville NL	Prepared by MB on 2023-08-02 QR by AW on 2023-07-06
Client/Project World Energy GH2 Project Nujio'qonik	121417233_074
Figure No. **BSA-3 Appendix B**	Page 16 of 16

Vascular Plant and Lichen SAR and SOCC within the Local Assessment Area

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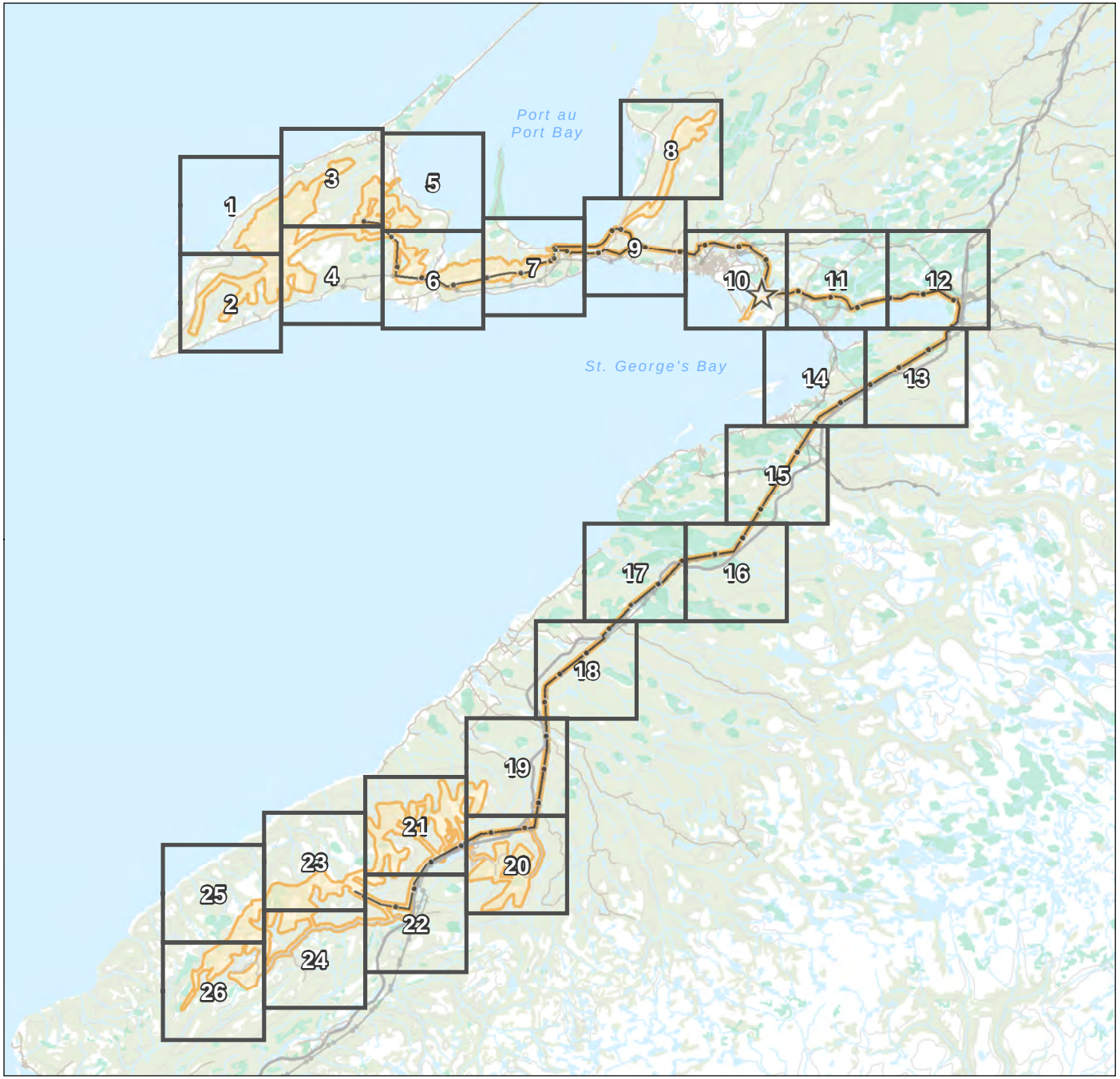
Appendix C

Suitable Bat Habitat for Roosting and Foraging Mapbook



Stantec

Proposed Project Features

- Hydrogen / Ammonia Plant Location
- Transmission Line 230 kV
- Project Area

Other Features

- Transmission Line, Existing
- Trans-Canada Highway
- Road
- Contour (100m)
- Watercourse
- Wetland
- Waterbody
- Forested Area

N

0 7 14 Kilometres
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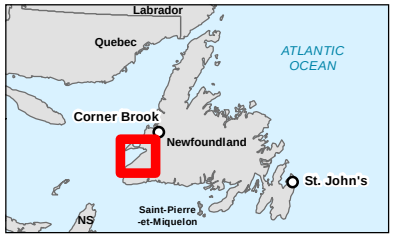
Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, Openstreetmap
3. Background: NRCan CanVec



Project Location
Stephenville
NL

Prepared by MB on 2023-06-30
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_080

Figure No.
BSA-3 Appendix C

Map Index - Suitable Bat Habitat for Roosting and Foraging

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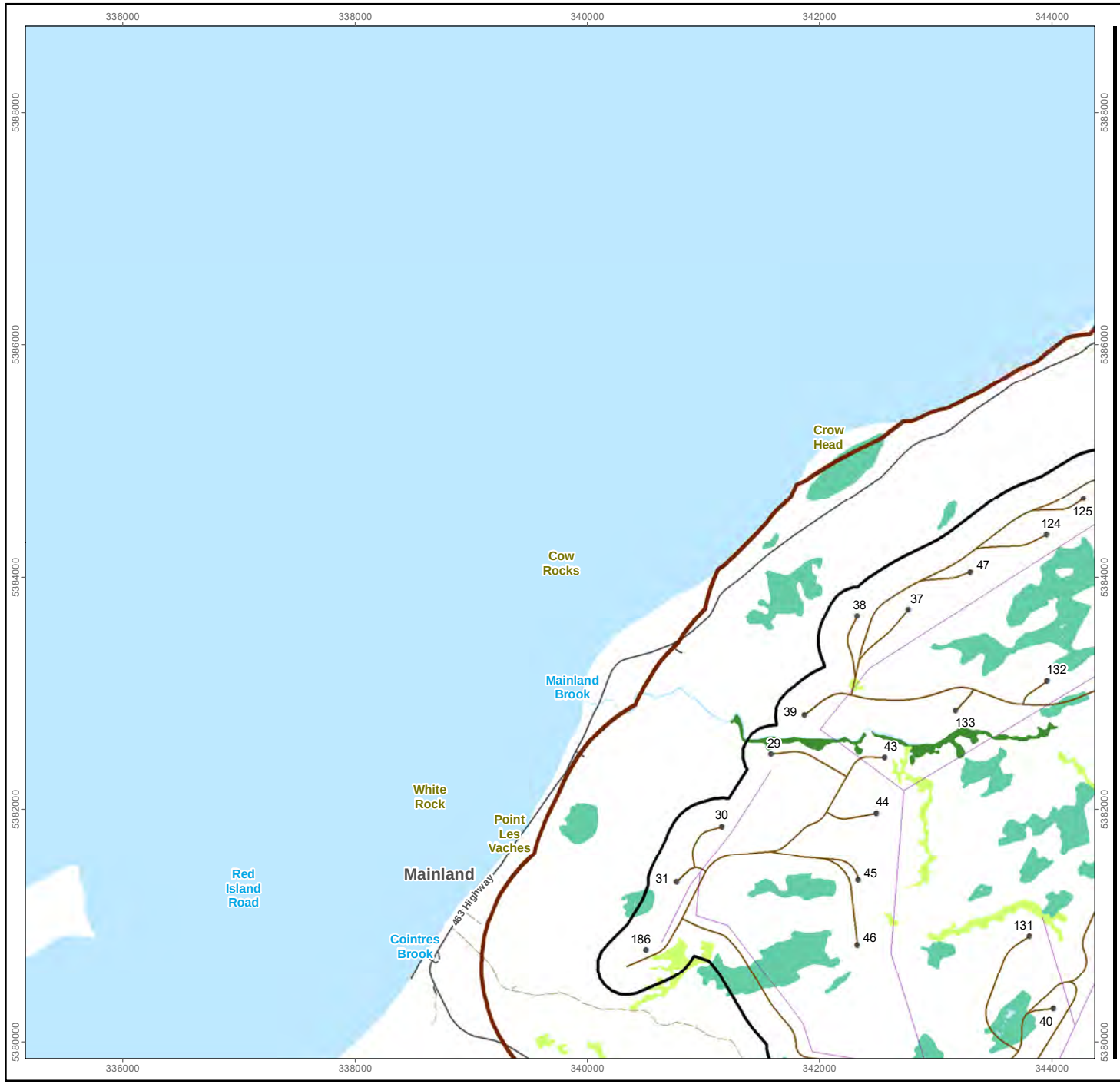


Stantec

Proposed Project Features

- Turbine Location
- Collector Line
- Access Road
- Project Area
- Local Assessment Area

Other Features

- Road
- Resource Road / Trail

Suitable Bat Habitat

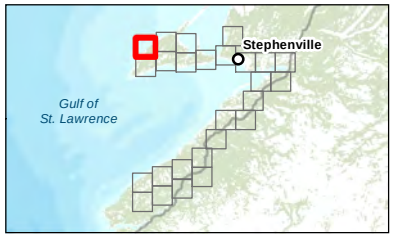
- Mixedwood
- Softwood
- Water
- Wetland

N

0 0.5 1 Kilometres
(At original document size of 8.5x11)
1:50,000

Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap, Government of NL Dept. of Fisheries, Forestry and Agriculture
3. Background: NRCan CanVec



Project Location
Stephenville
NL

Prepared by MB on 2023-06-30
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix C

Suitable Bat Habitat for Roosting and Foraging

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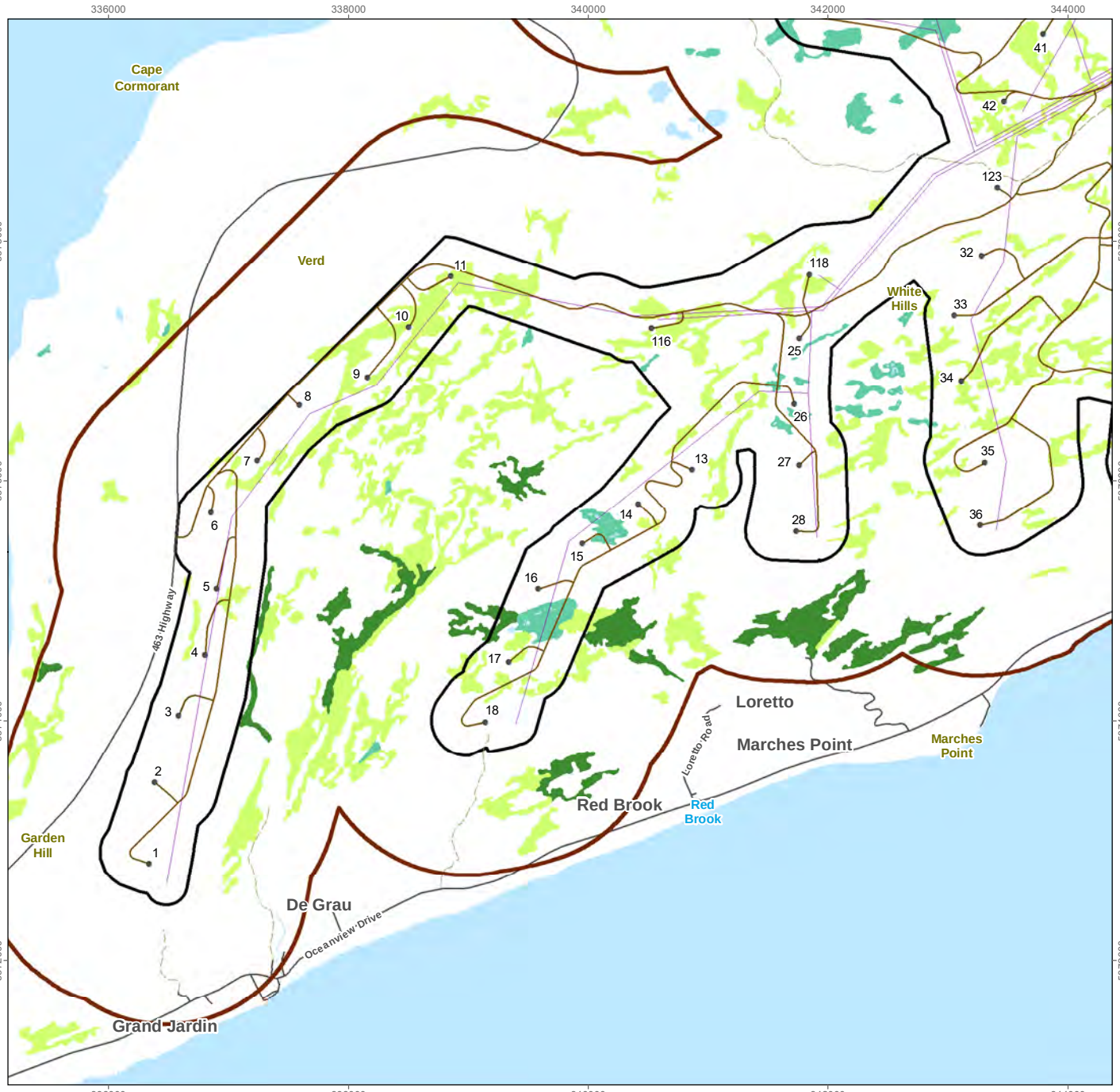


Stantec

Proposed Project Features

- Turbine Location
- Collector Line
- Access Road
- Project Area
- Local Assessment Area

Other Features

- Road
- Resource Road / Trail

Suitable Bat Habitat

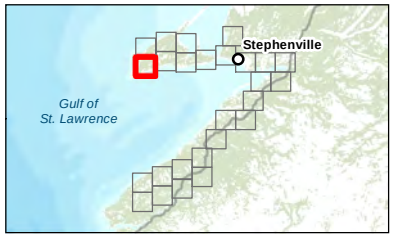
- Mixedwood
- Softwood
- Water
- Wetland

N

0 0.5 1 Kilometres
(At original document size of 8.5x11)
1:50,000

Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap, Government of NL Dept. of Fisheries, Forestry and Agriculture
3. Background: NRCan CanVec



Project Location
Stephenville
NL

Prepared by MB on 2023-06-30
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

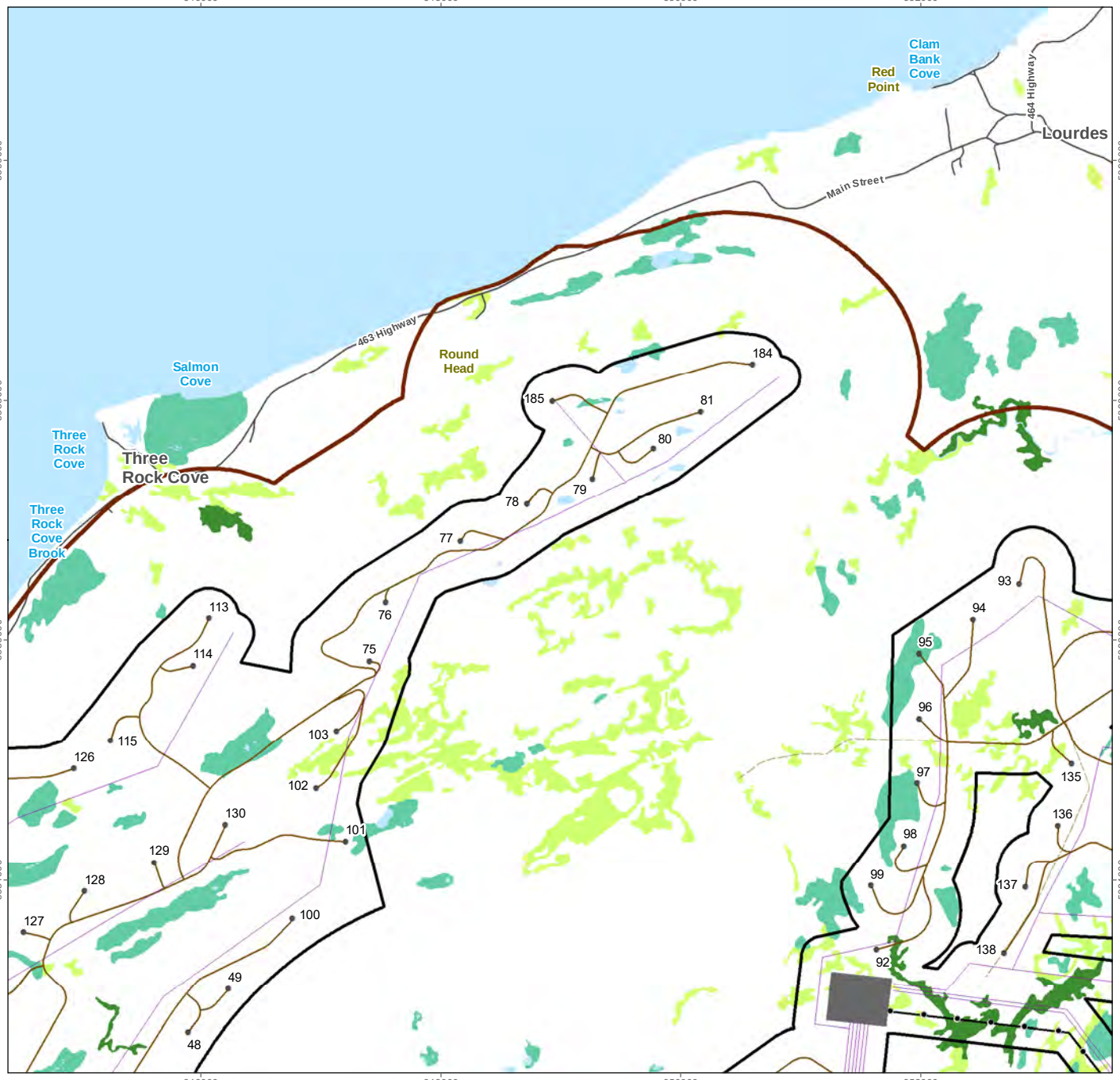
121417233_079

Figure No.
BSA-3 Appendix C

Page 2 of 26

Suitable Bat Habitat for Roosting and Foraging

V:\1214\active\121417233\03_data\gis_cad\gis_data\mapping\mxd\general\Bats_Veg_Other_Terr\121417233_079_Terr_suitable_Bat_Habitat_mapbook.mxd Revised: 2023-08-02 By: mblackwood



Stantec

Proposed Project Features

- Turbine Location
- Transmission Line 230 kV
- Collector Line
- Access Road
- Substation
- Project Area
- Local Assessment Area

Other Features

- Road
- Resource Road / Trail

Suitable Bat Habitat

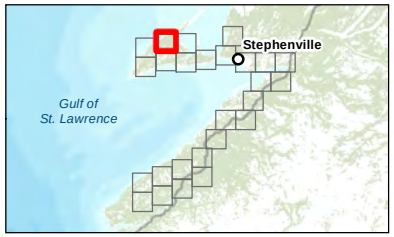
- Mixedwood
- Softwood
- Water
- Wetland

N

0 0.5 1 Kilometres
(At original document size of 8.5x11)
1:50,000

Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap, Government of NL Dept. of Fisheries, Forestry and Agriculture
3. Background: NRCan CanVec



Project Location
Stephenville
NL

Prepared by MB on 2023-06-30
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix C

Suitable Bat Habitat for Roosting and Foraging

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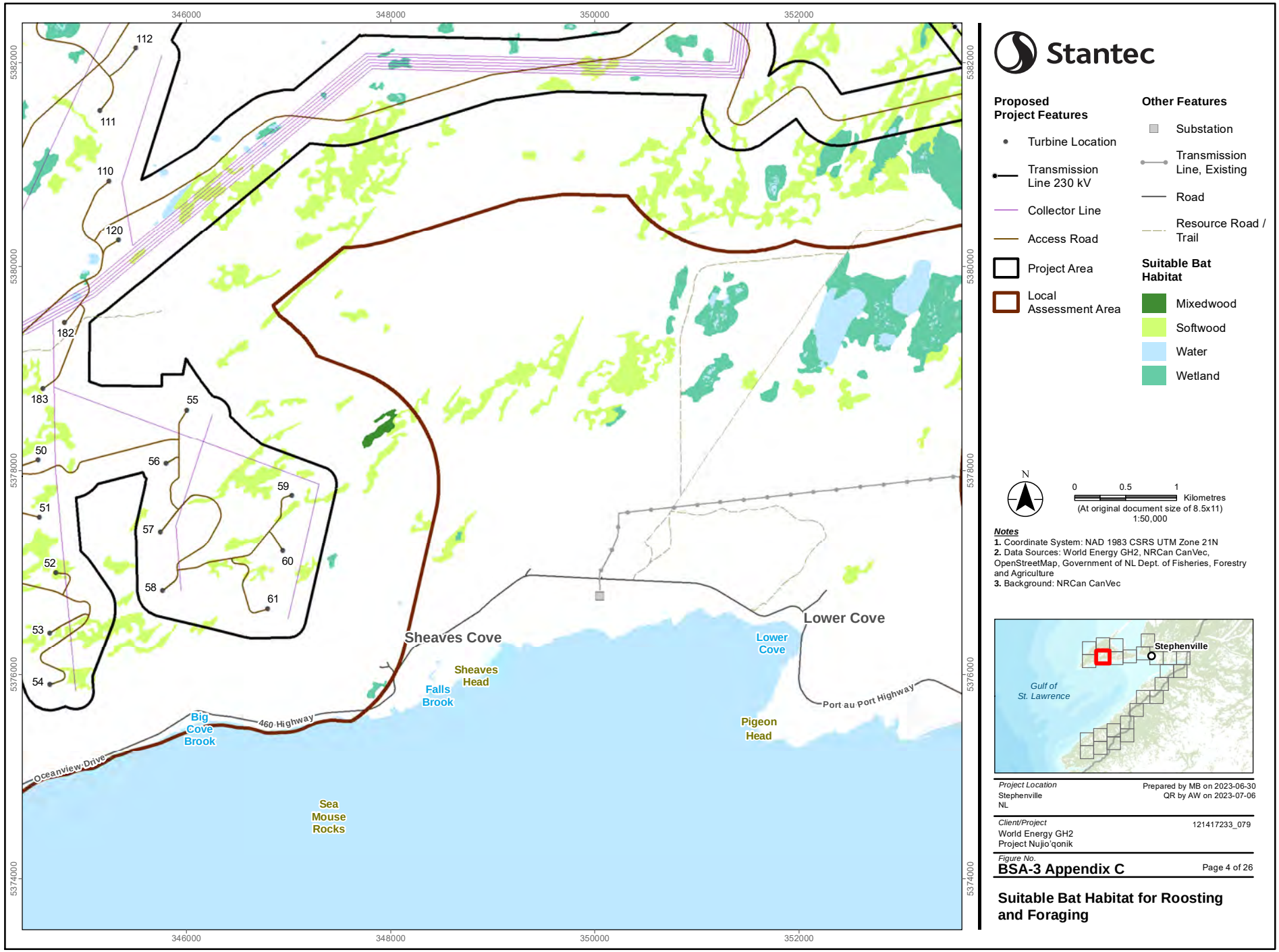

Stantec

Proposed Project Features

- Turbine Location
- Transmission Line 230 kV
- Collector Line
- Access Road
- Project Area
- Local Assessment Area

Other Features

- Substation
- Transmission Line, Existing
- Road
- Resource Road / Trail

Suitable Bat Habitat

- Mixedwood
- Softwood
- Water
- Wetland

N

0 0.5 1 Kilometres
(At original document size of 8.5x11)
1:50,000

Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap, Government of NL Dept. of Fisheries, Forestry and Agriculture
3. Background: NRCan CanVec

Project Location
Stephenville
NL

Prepared by MB on 2023-06-30
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix C

Suitable Bat Habitat for Roosting and Foraging

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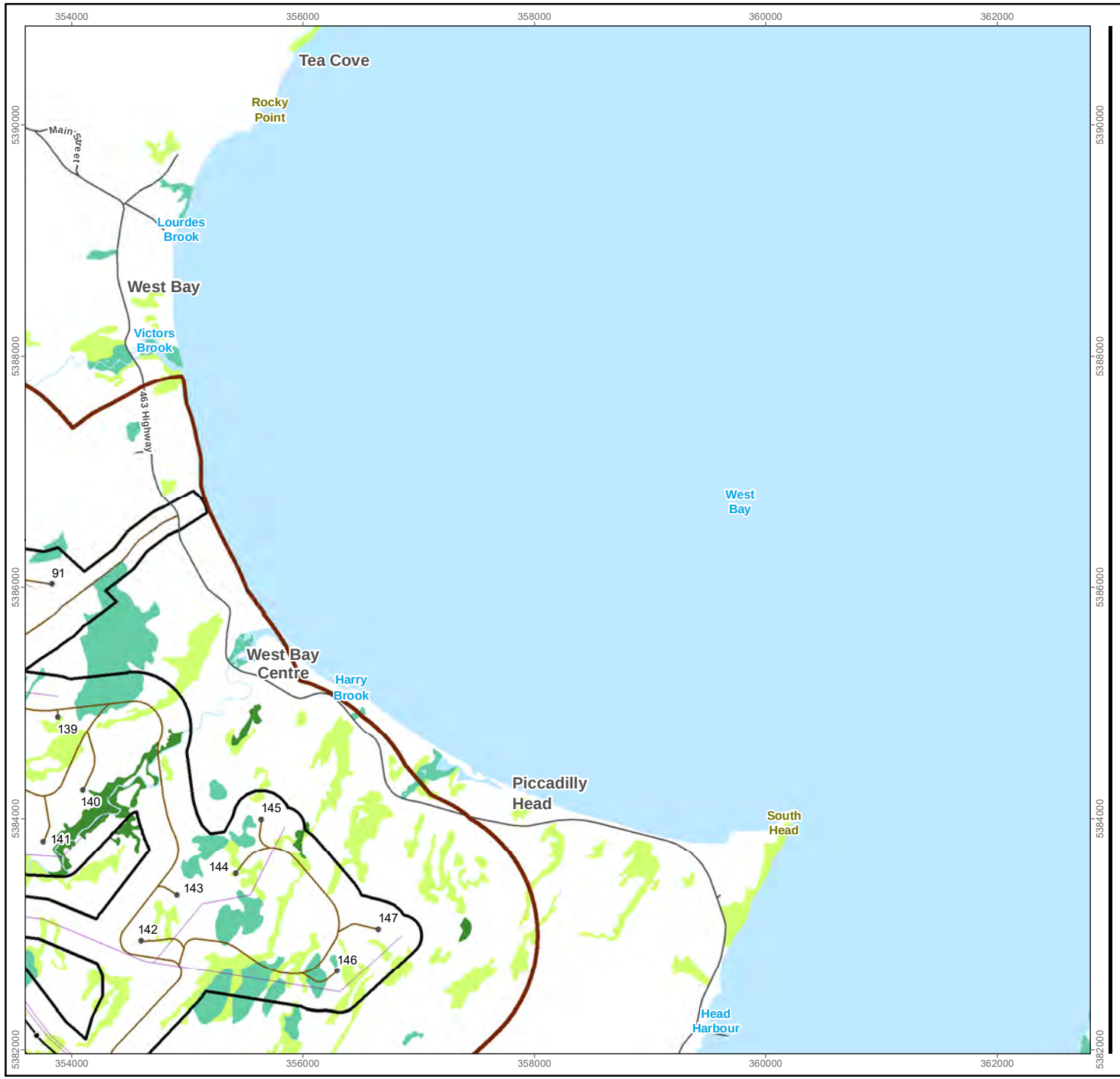


Stantec

Proposed Project Features

- Turbine Location
- Transmission Line 230 kV
- Collector Line
- Access Road
- Project Area
- Local Assessment Area

Other Features

- Road
- Resource Road / Trail

Suitable Bat Habitat

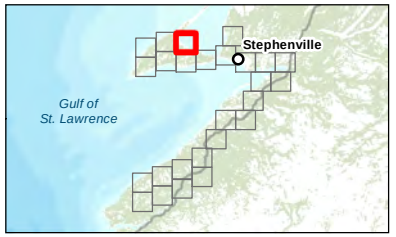
- Mixedwood
- Softwood
- Water
- Wetland

N

0 0.5 1 Kilometres
(At original document size of 8.5x11)
1:50,000

Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap, Government of NL Dept. of Fisheries, Forestry and Agriculture
3. Background: NRCan CanVec



Project Location
Stephenville
NL

Prepared by MB on 2023-06-30
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix C

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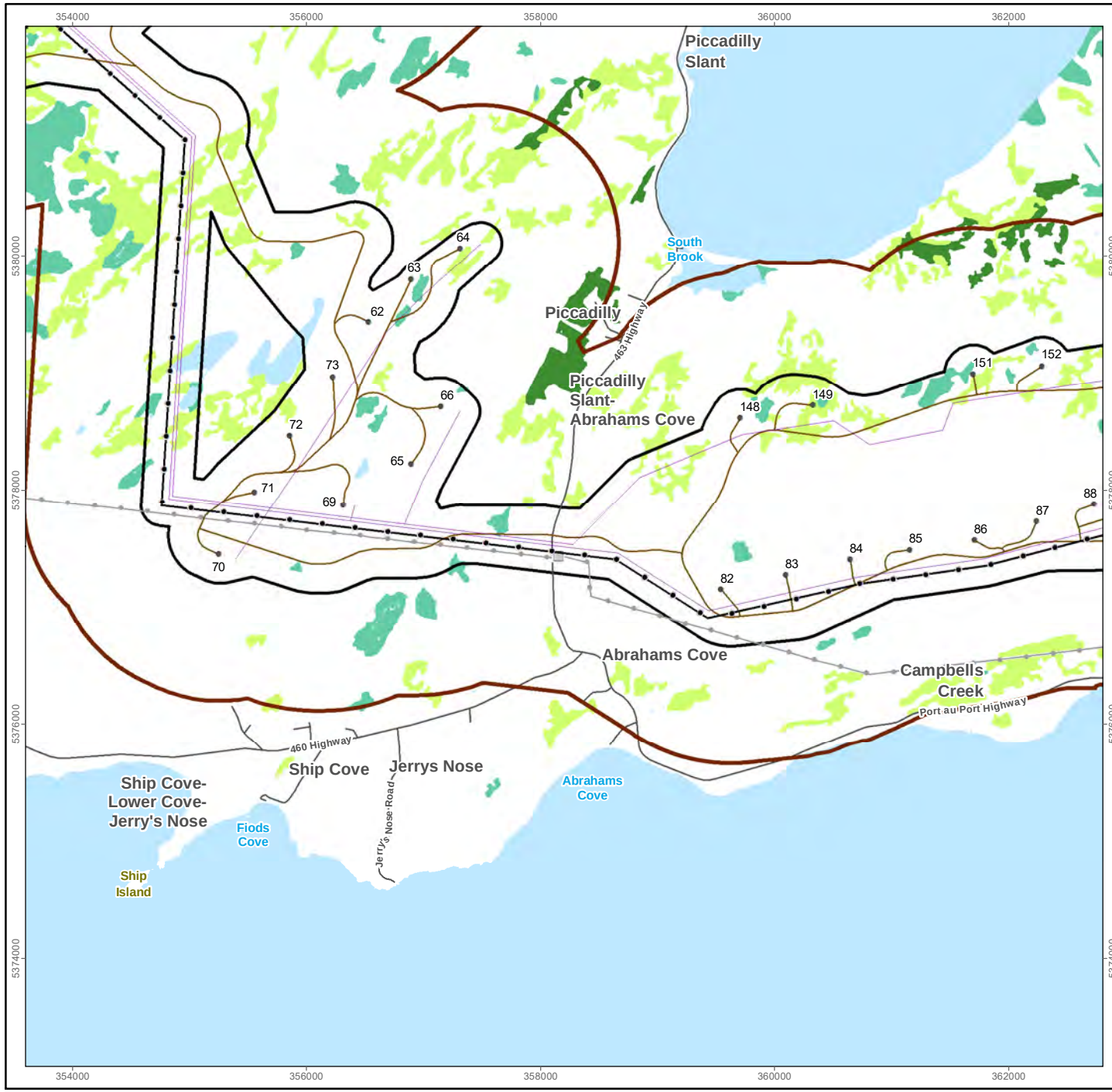
Suitable Bat Habitat for Roosting and Foraging

V:\1214\active\121417233\03_data\gis_cad\gis_data\mapping\mxd\general\Bats_Veg_Other_Terr\121417233_079_Terr_suitable_Bat_Habitat_mapbook.mxd Revised: 2023-08-02 By: mblackwood



Stantec

Proposed Project Features

- Turbine Location
- Transmission Line 230 kV
- Collector Line
- Access Road
- Project Area
- Local Assessment Area

Other Features

- Substation
- Transmission Line, Existing
- Road
- Resource Road / Trail

Suitable Bat Habitat

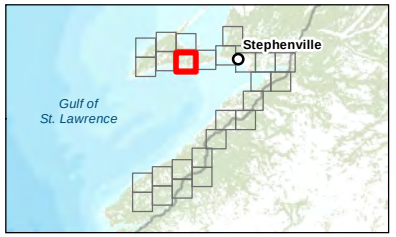
- Mixedwood
- Softwood
- Water
- Wetland

N

0 0.5 1 Kilometres
(At original document size of 8.5x11)
1:50,000

Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap, Government of NL Dept. of Fisheries, Forestry and Agriculture
3. Background: NRCan CanVec



Project Location
Stephenville
NL

Prepared by MB on 2023-06-30
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix C

Suitable Bat Habitat for Roosting and Foraging

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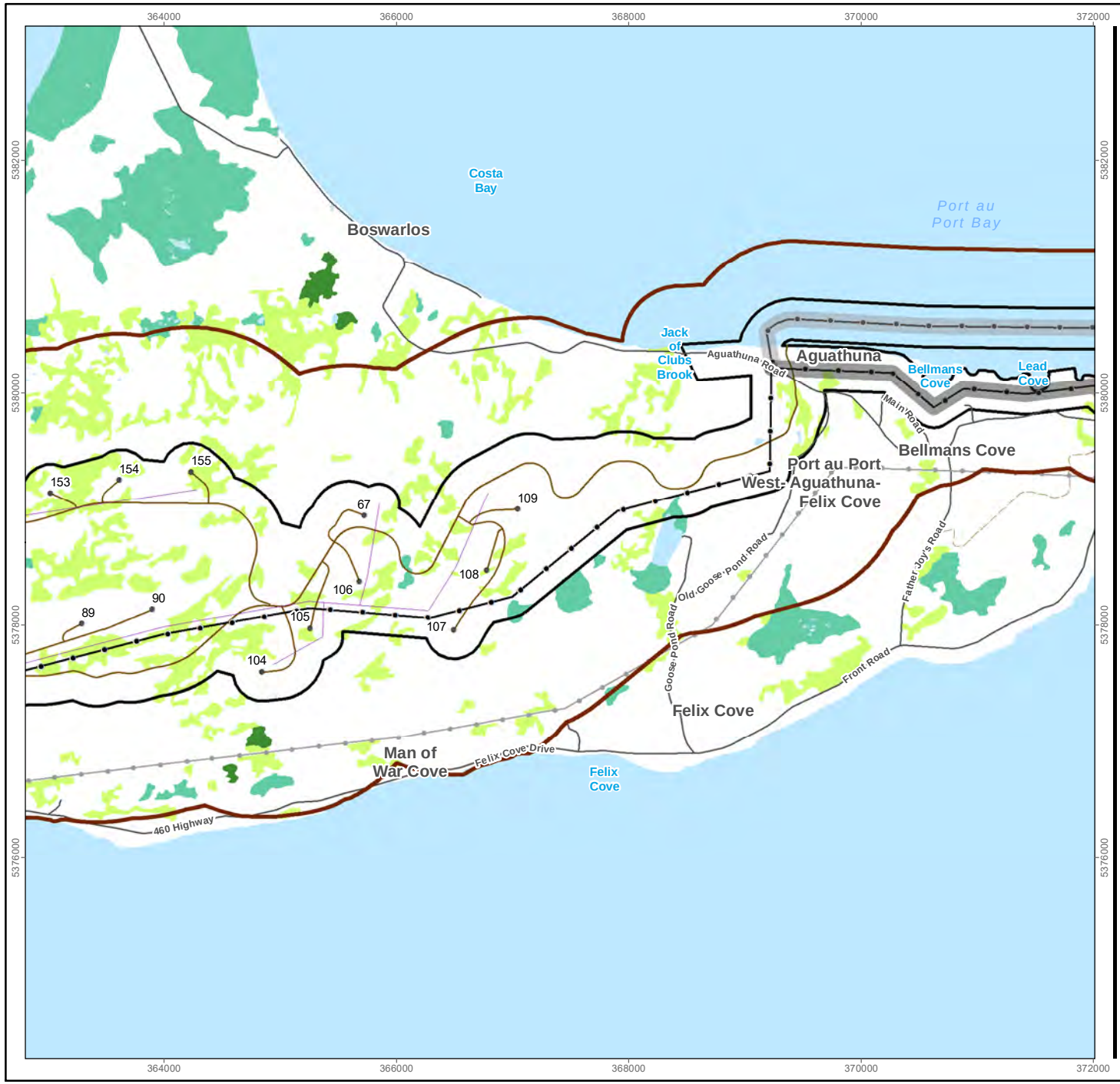

Stantec

Proposed Project Features

- Turbine Location
- Transmission Line 230 kV

Port au Port Interconnection

- Proposed Route
- Alternate Route
- Collector Line
- Access Road
- Substation
- Project Area
- Local Assessment Area

Other Features

- Transmission Line, Existing
- Road
- Resource Road / Trail

Suitable Bat Habitat

- Mixedwood
- Softwood
- Water
- Wetland

N

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(At original document size of 8.5x11)
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Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
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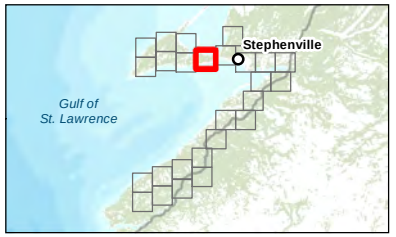
3. Background: NRCan CanVec



Project Location
Stephenville
NL

Prepared by MB on 2023-06-30
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix C

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Suitable Bat Habitat for Roosting and Foraging

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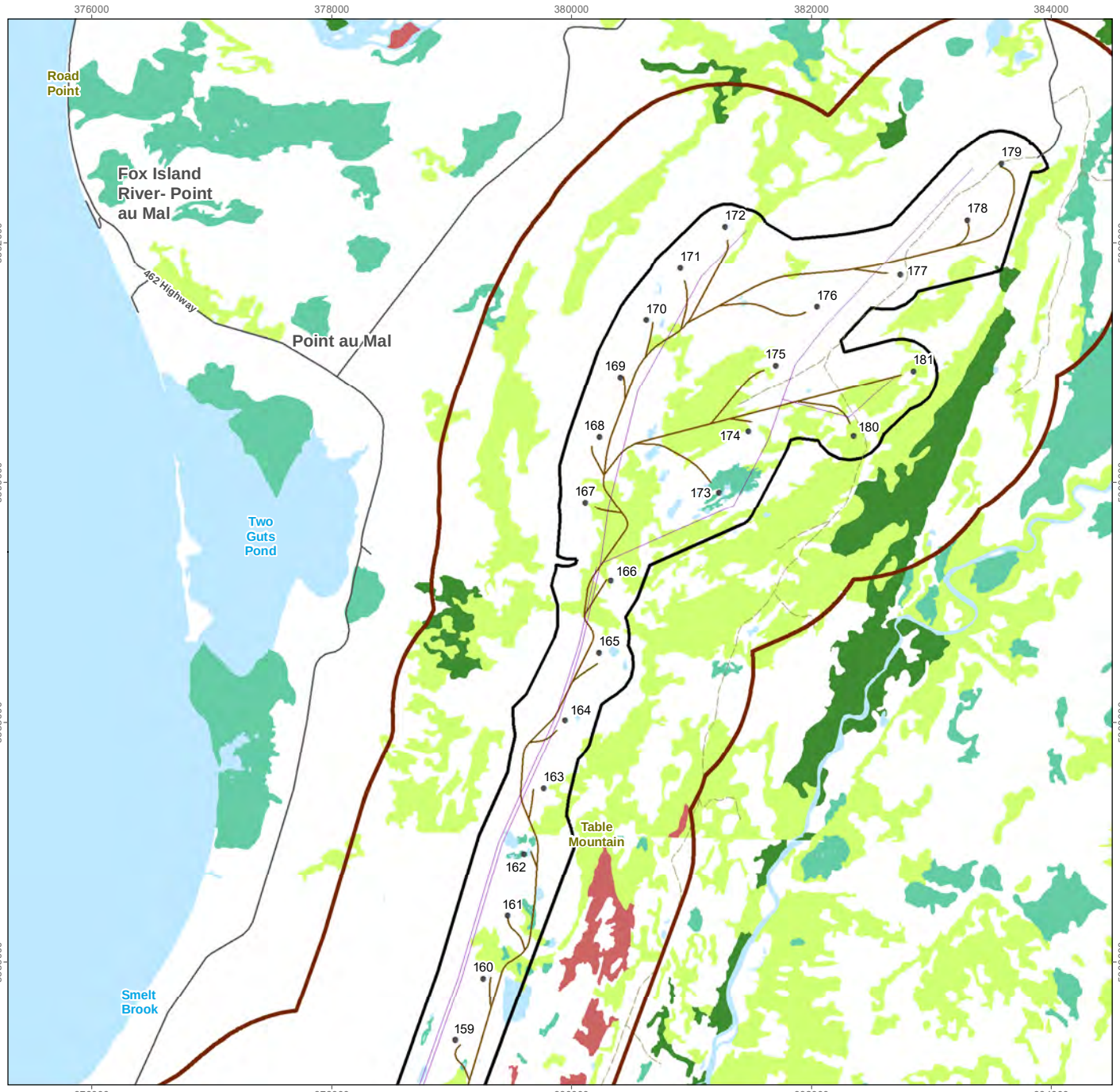

Stantec

Proposed Project Features

- Turbine Location
- Collector Line
- Access Road
- Project Area
- Local Assessment Area

Other Features

- Road
- Resource Road / Trail

Suitable Bat Habitat

- Hardwood
- Mixedwood
- Softwood
- Water
- Wetland

N

0 0.5 1 Kilometres
(At original document size of 8.5x11)
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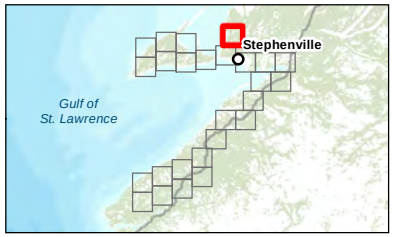
Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap, Government of NL Dept. of Fisheries, Forestry and Agriculture
3. Background: NRCan CanVec



Project Location
Stephenville
NL

Prepared by MB on 2023-06-30
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix C

Suitable Bat Habitat for Roosting and Foraging

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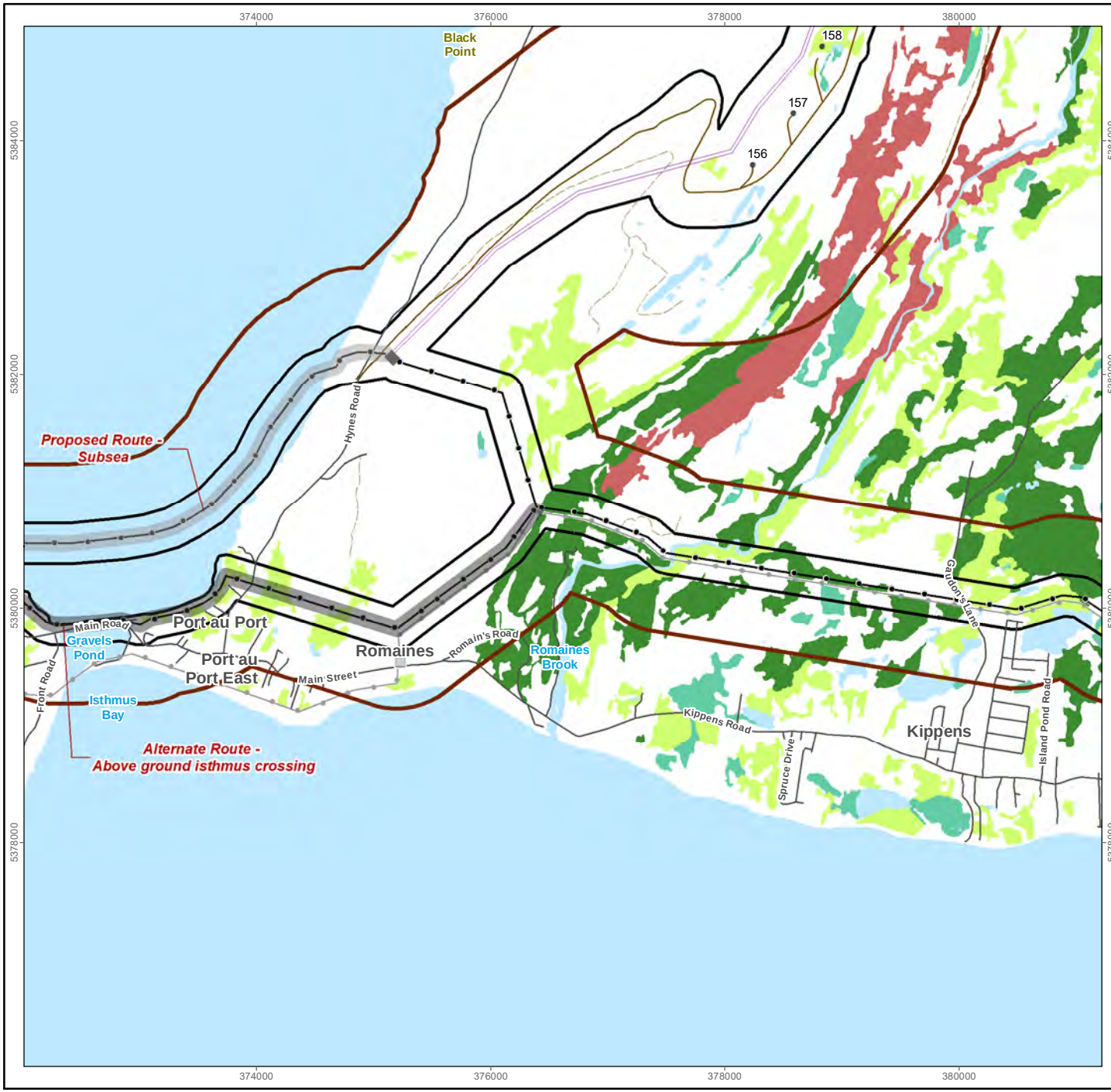

Stantec

Proposed Project Features

- Turbine Location
- Transmission Line 230 kV

Port au Port Interconnection

- Proposed Route
- Alternate Route
- Collector Line
- Access Road
- Substation
- Project Area
- Local Assessment Area

Other Features

- Substation
- Transmission Line, Existing
- Road
- Resource Road / Trail

Suitable Bat Habitat

- Hardwood
- Mixedwood
- Softwood
- Water
- Wetland

N

0 0.5 1 Kilometres
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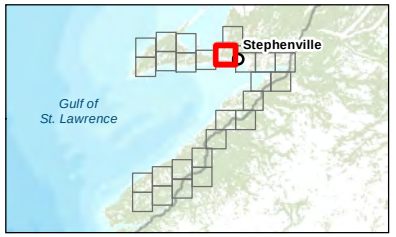
Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap, Government of NL Dept. of Fisheries, Forestry and Agriculture
3. Background: NRCan CanVec



Project Location
Stephenville
NL

Prepared by MB on 2023-06-30
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix C

Suitable Bat Habitat for Roosting and Foraging

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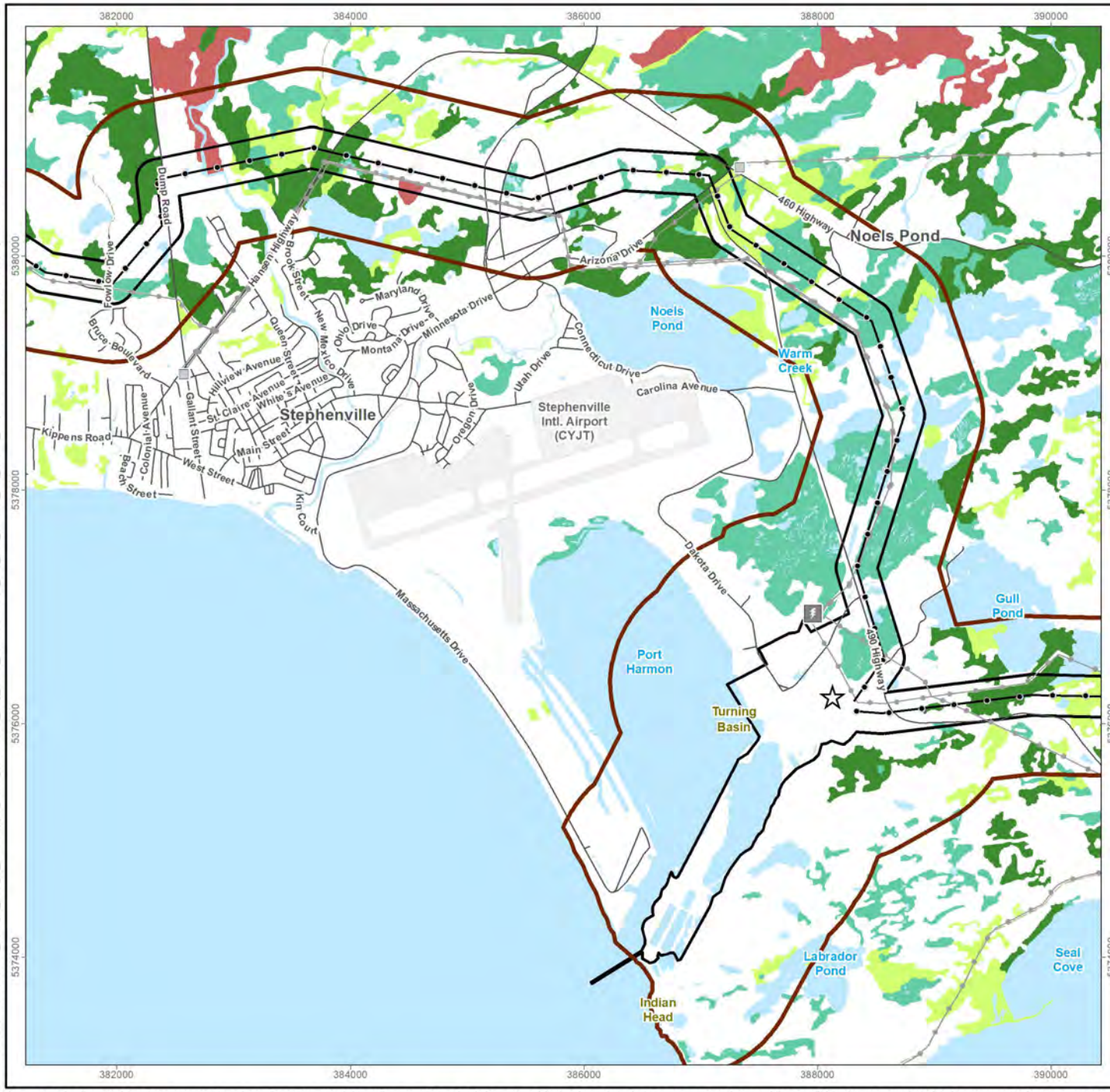

Stantec

Proposed Project Features

- Hydrogen / Ammonia Plant Location
- Transmission Line 230 kV
- Project Area
- Local Assessment Area

Other Features

- Substation
- Electrical Generation
- Transmission Line, Existing
- Road
- Resource Road / Trail

Suitable Bat Habitat

- Hardwood
- Mixedwood
- Softwood
- Water
- Wetland

N

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Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap, Government of NL Dept. of Fisheries, Forestry and Agriculture
3. Background: NRCan CanVec

Project Location
Stephenville
NL

Prepared by MB on 2023-06-30
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix C

Suitable Bat Habitat for Roosting and Foraging

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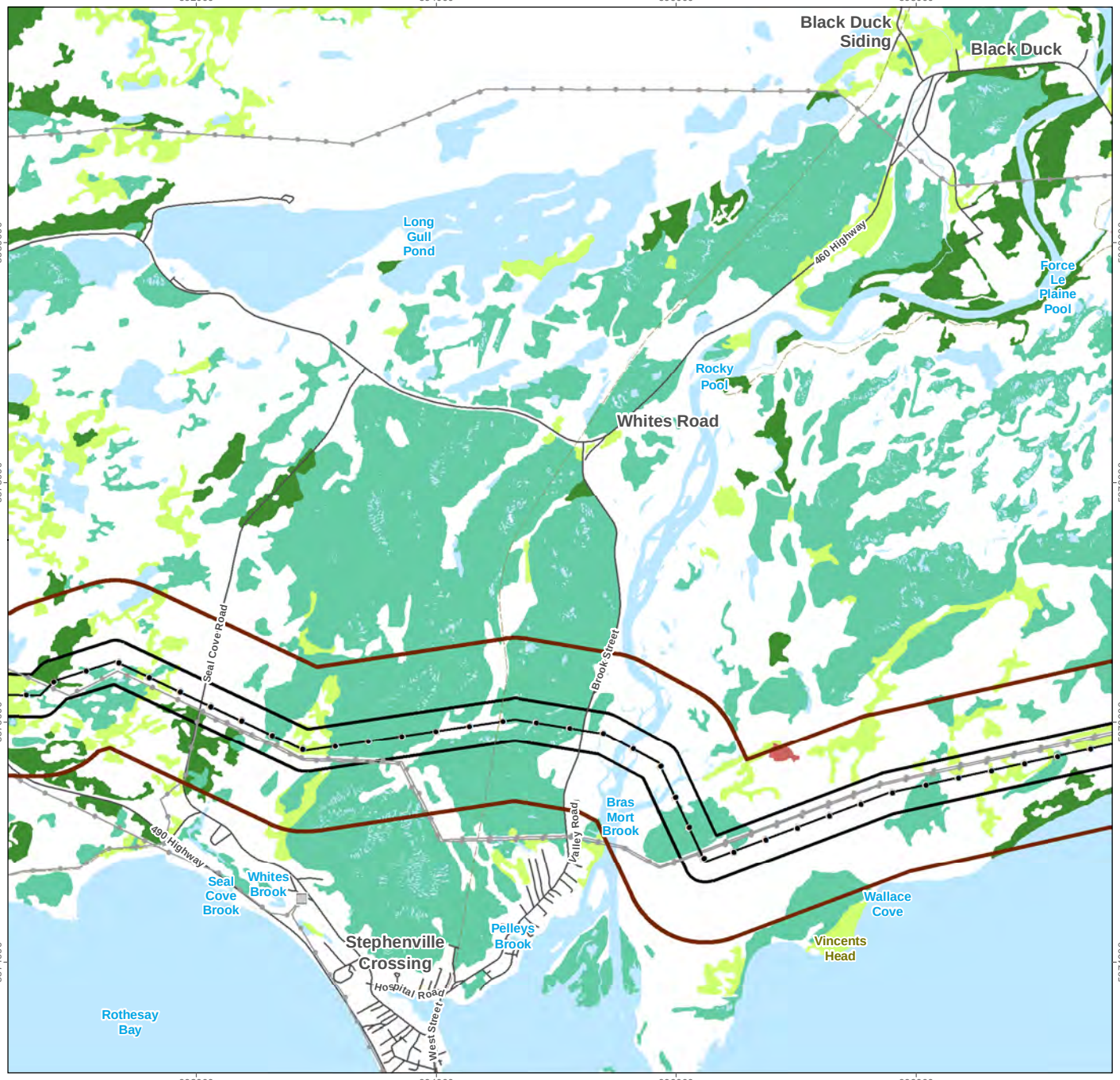

Stantec

Proposed Project Features

- Transmission Line 230 kV
- Project Area
- Local Assessment Area

Other Features

- Substation
- Transmission Line, Existing
- Road
- Resource Road / Trail

Suitable Bat Habitat

- Hardwood
- Mixedwood
- Softwood
- Water
- Wetland

N

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(At original document size of 8.5x11)
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Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
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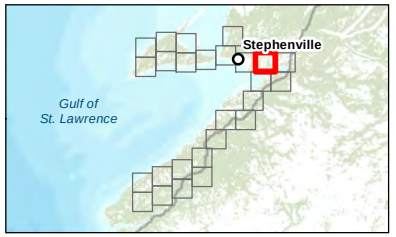
3. Background: NRCan CanVec



Project Location
Stephenville
NL

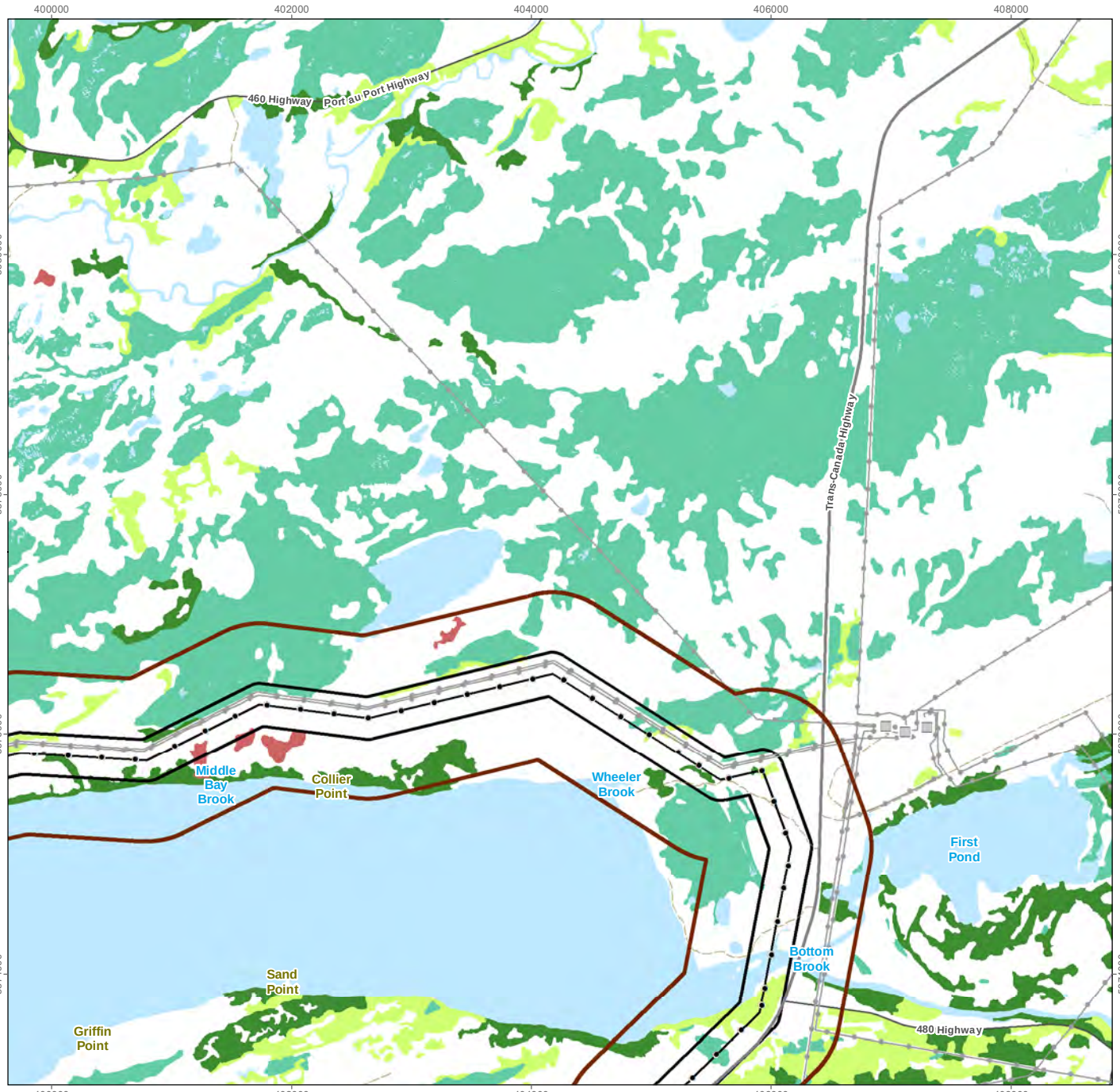
Prepared by MB on 2023-06-30
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix C

Suitable Bat Habitat for Roosting and Foraging



Stantec

Proposed Project Features

- Transmission Line 230 kV
- Project Area
- Local Assessment Area

Other Features

- Substation
- Transmission Line, Existing
- Trans-Canada Highway
- Road
- Resource Road / Trail

Suitable Bat Habitat

- Hardwood
- Mixedwood
- Softwood
- Water
- Wetland

N

0 0.5 1 Kilometres
(At original document size of 8.5x11)
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Notes

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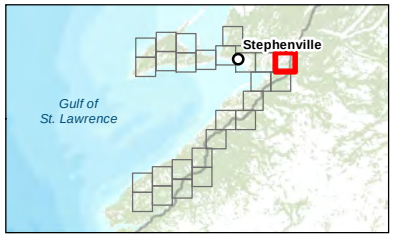
3. Background: NRCan CanVec



Project Location
Stephenville
NL

Prepared by MB on 2023-06-30
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix C

Suitable Bat Habitat for Roosting and Foraging

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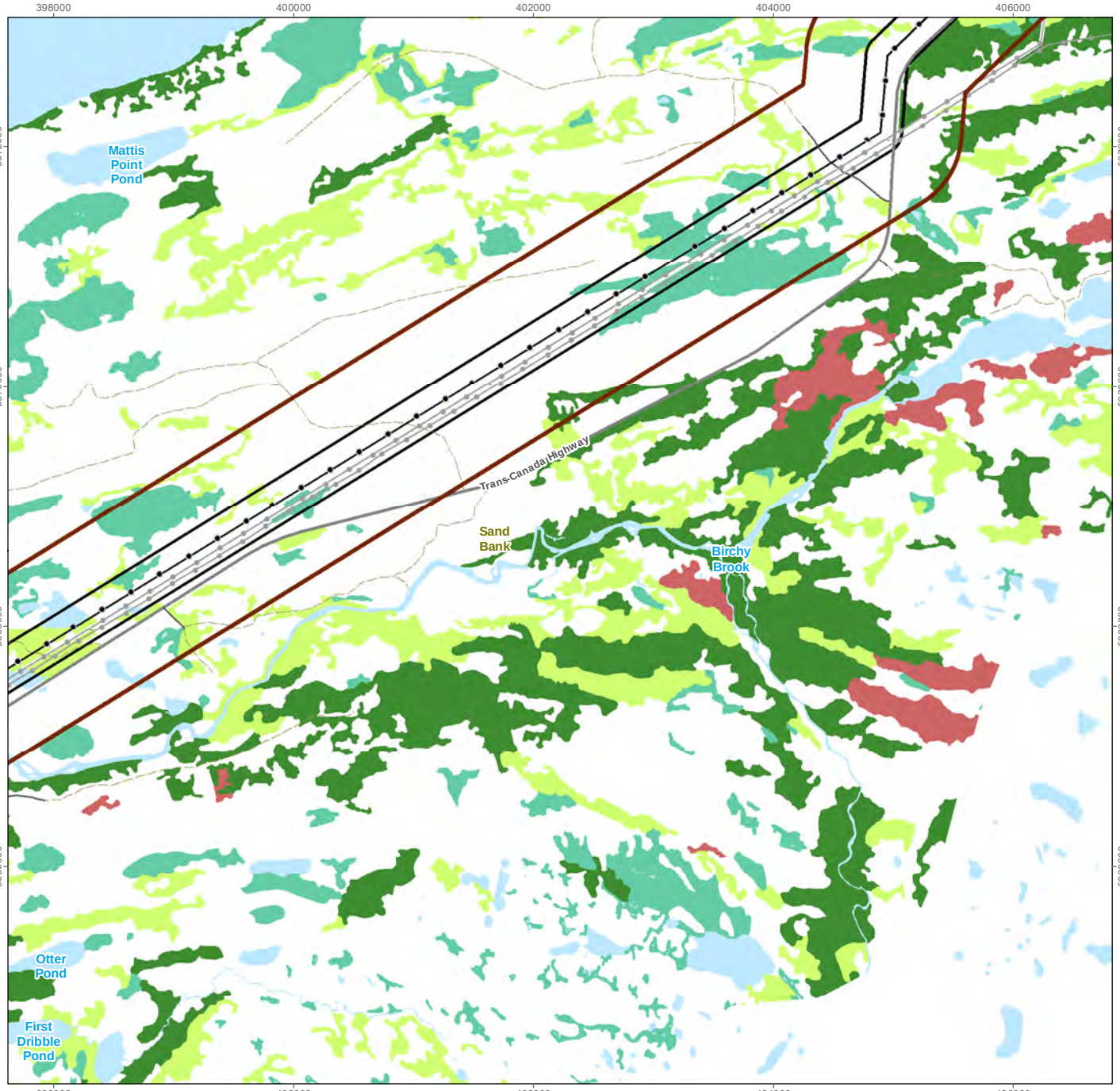

Stantec

Proposed Project Features

- Transmission Line 230 kV
- Project Area
- Local Assessment Area

Other Features

- Transmission Line, Existing
- Trans-Canada Highway
- Road
- Resource Road / Trail

Suitable Bat Habitat

- Hardwood
- Mixedwood
- Softwood
- Water
- Wetland

N

0 0.5 1 Kilometres
(At original document size of 8.5x11)
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Notes

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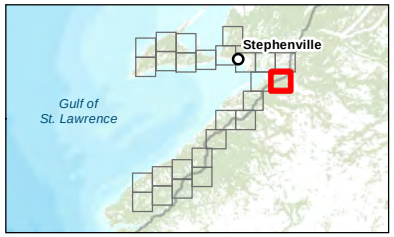

Project Location
Stephenville
NL

Prepared by MB on 2023-06-30
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix C

Suitable Bat Habitat for Roosting and Foraging

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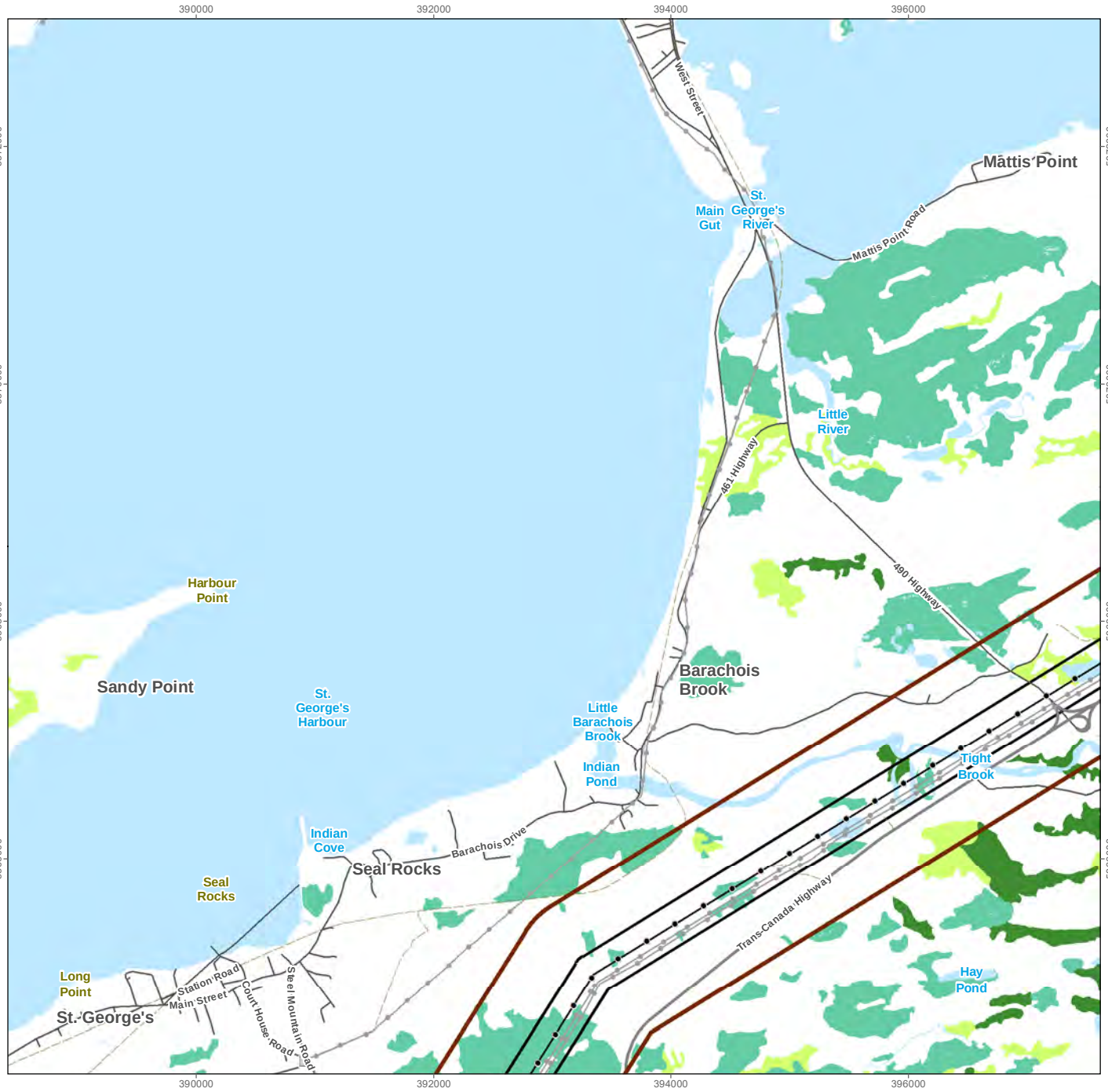

Stantec

Proposed Project Features

- Transmission Line 230 kV
- Project Area
- Local Assessment Area

Other Features

- Substation
- Transmission Line, Existing
- Trans-Canada Highway
- Road
- Resource Road / Trail

Suitable Bat Habitat

- Mixedwood
- Softwood
- Water
- Wetland

N

0 0.5 1 Kilometres
(At original document size of 8.5x11)
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Notes

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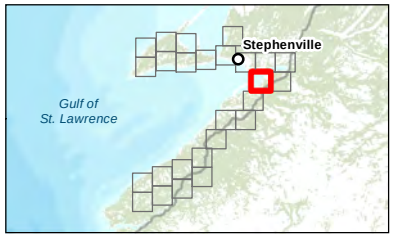
3. Background: NRCan CanVec



Project Location
Stephenville
NL

Prepared by MB on 2023-06-30
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix C

Suitable Bat Habitat for Roosting and Foraging

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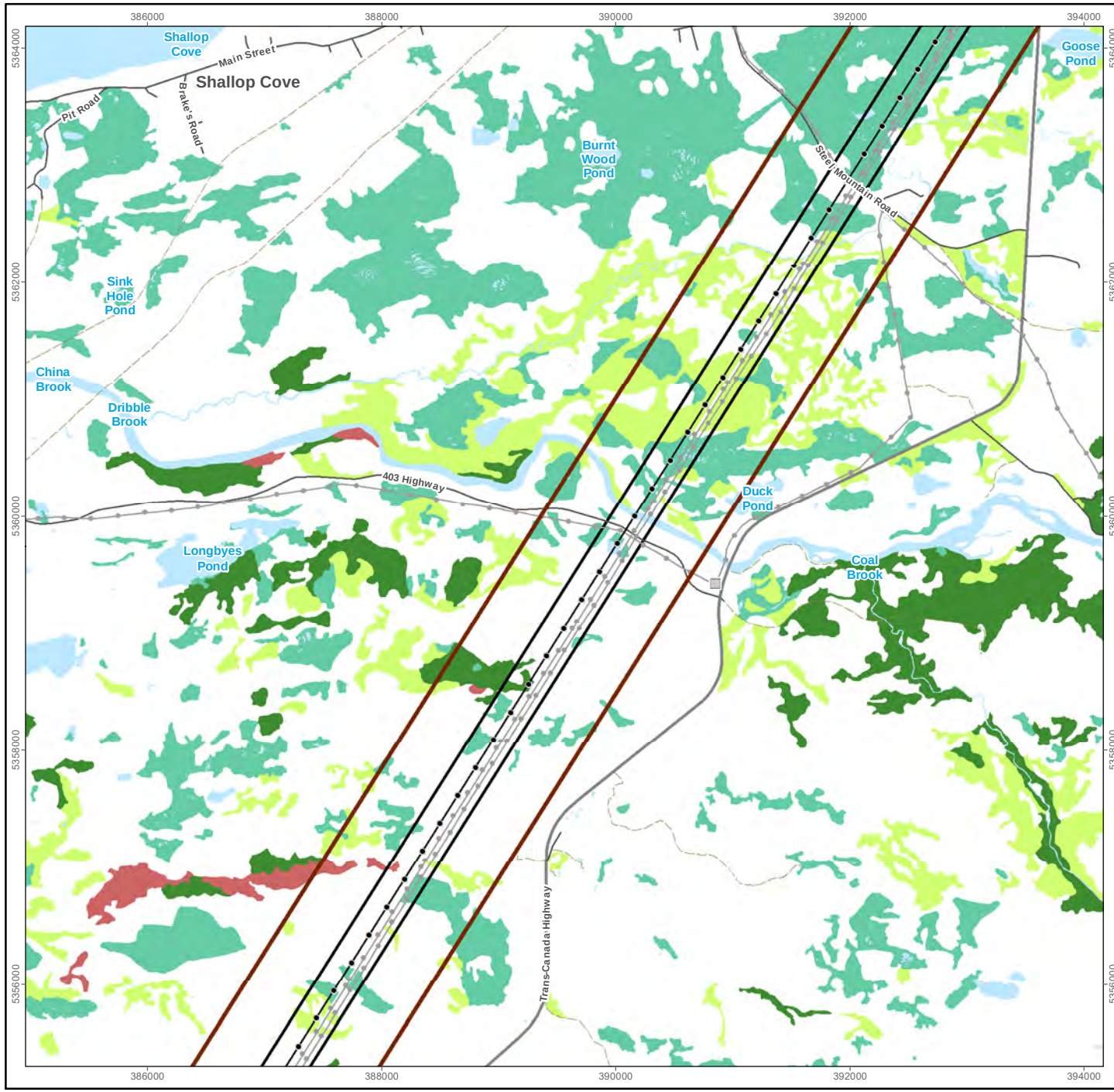

Stantec

Proposed Project Features

- Transmission Line 230 kV
- Project Area
- Local Assessment Area

Other Features

- Substation
- Transmission Line, Existing
- Trans-Canada Highway
- Road
- Resource Road / Trail

Suitable Bat Habitat

- Hardwood
- Mixedwood
- Softwood
- Water
- Wetland

N

0 0.5 1 Kilometres
(At original document size of 8.5x11)
1:50,000

Notes

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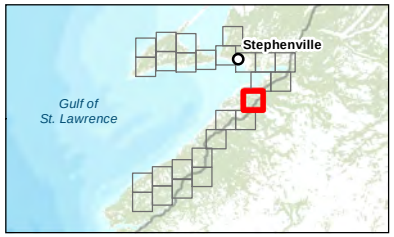
3. Background: NRCan CanVec



Project Location
Stephenville
NL

Prepared by MB on 2023-06-30
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix C

Suitable Bat Habitat for Roosting and Foraging

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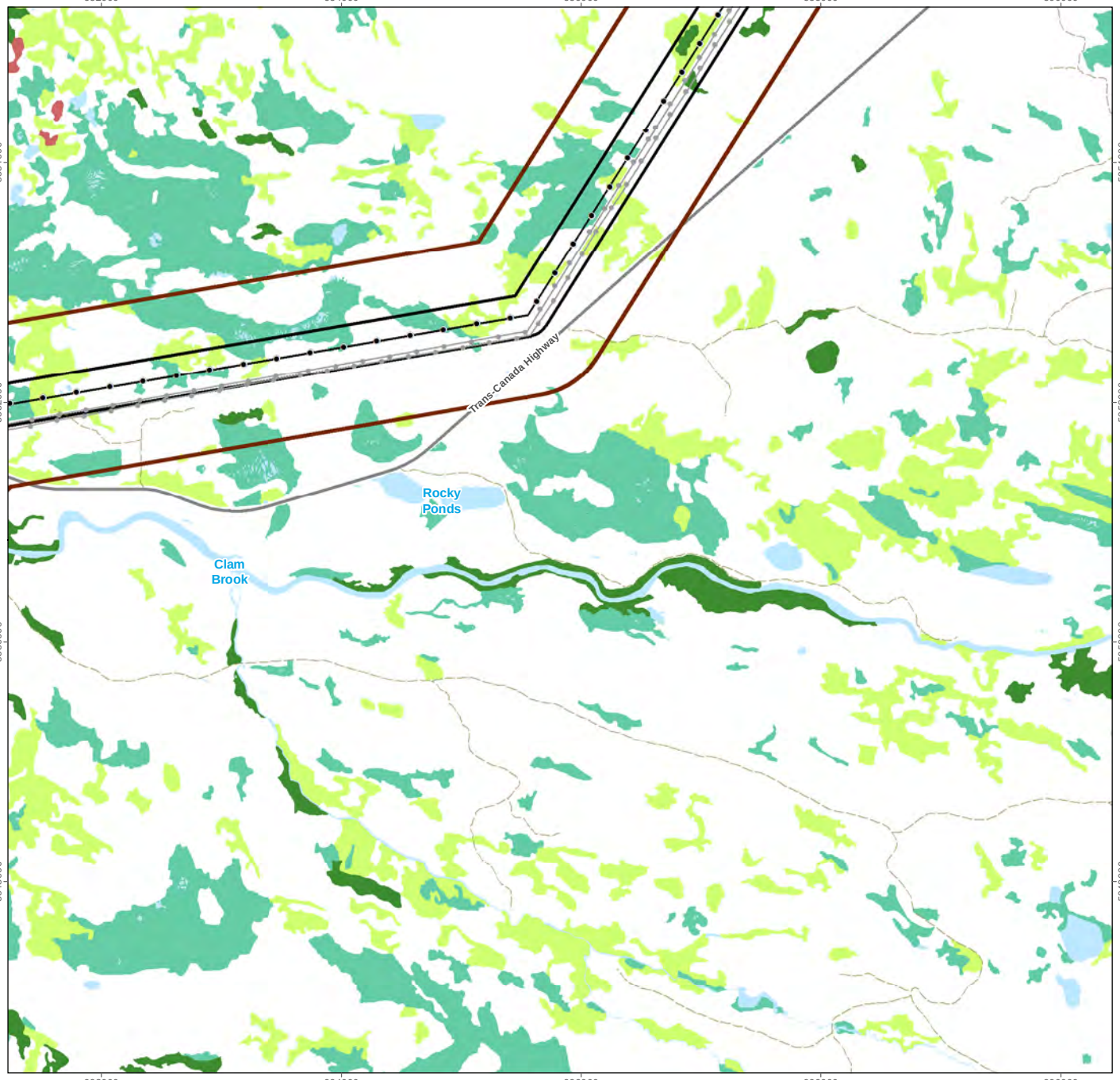


Stantec

Proposed Project Features

- Transmission Line 230 kV
- Project Area
- Local Assessment Area

Other Features

- Transmission Line, Existing
- Trans-Canada Highway
- Resource Road / Trail

Suitable Bat Habitat

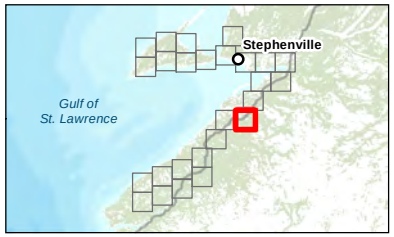
- Hardwood
- Mixedwood
- Softwood
- Water
- Wetland

N

0 0.5 1 Kilometres
(At original document size of 8.5x11)
1:50,000

Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
2. Data Sources: World Energy GH2, NRCan CanVec, OpenStreetMap, Government of NL Dept. of Fisheries, Forestry and Agriculture
3. Background: NRCan CanVec



Project Location
Stephenville
NL

Prepared by MB on 2023-06-30
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix C

Suitable Bat Habitat for Roosting and Foraging

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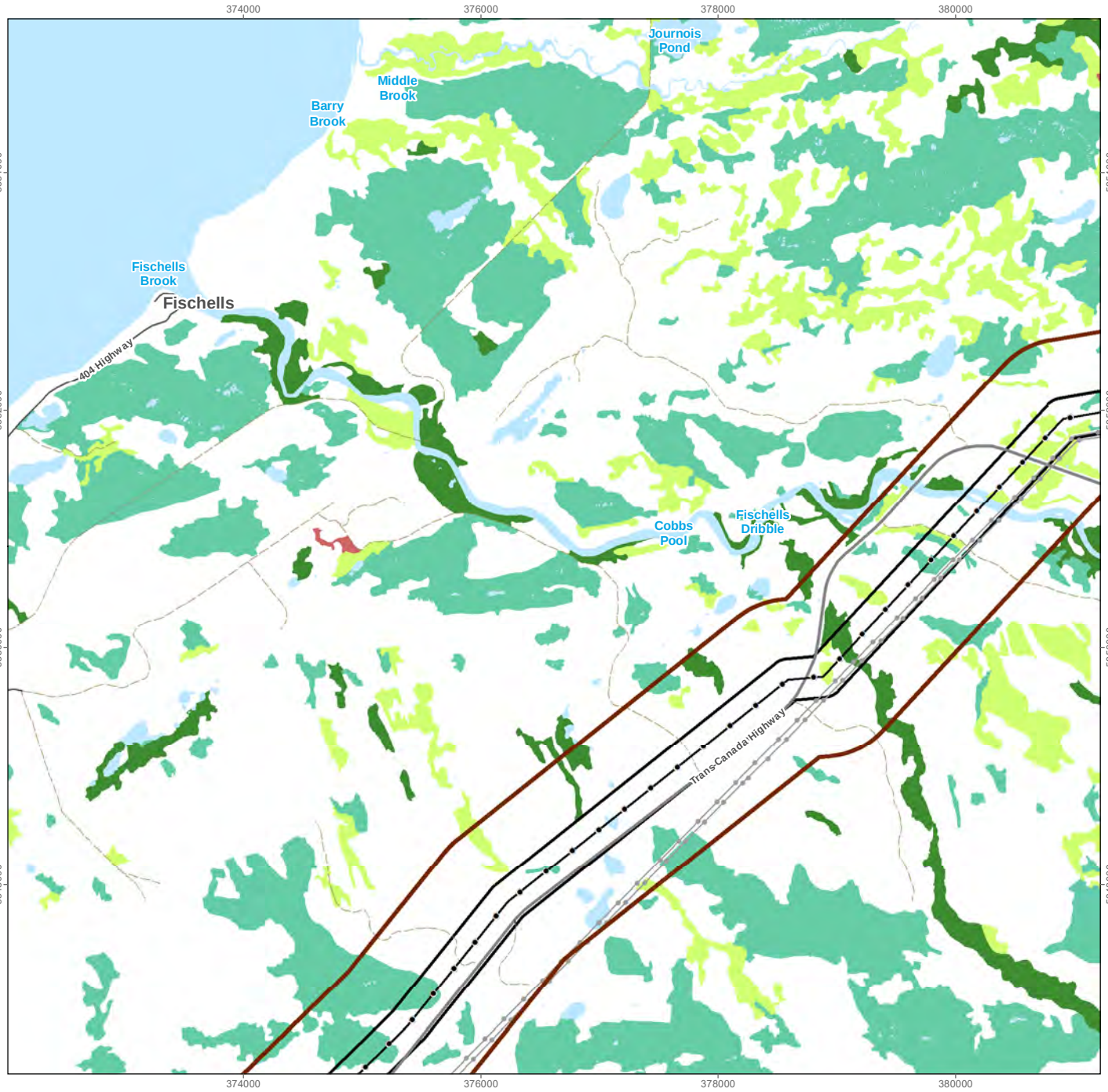

Stantec

Proposed Project Features

- Transmission Line 230 kV
- Project Area
- Local Assessment Area

Other Features

- Transmission Line, Existing
- Trans-Canada Highway
- Road
- Resource Road / Trail

Suitable Bat Habitat

- Hardwood
- Mixedwood
- Softwood
- Water
- Wetland

N

0 0.5 1 Kilometres
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Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
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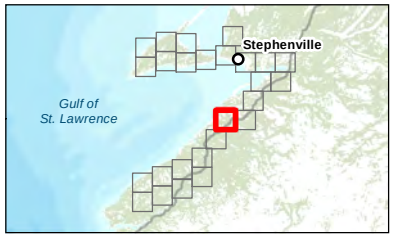
3. Background: NRCan CanVec



Project Location
Stephenville
NL

Prepared by MB on 2023-06-30
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix C

Suitable Bat Habitat for Roosting and Foraging

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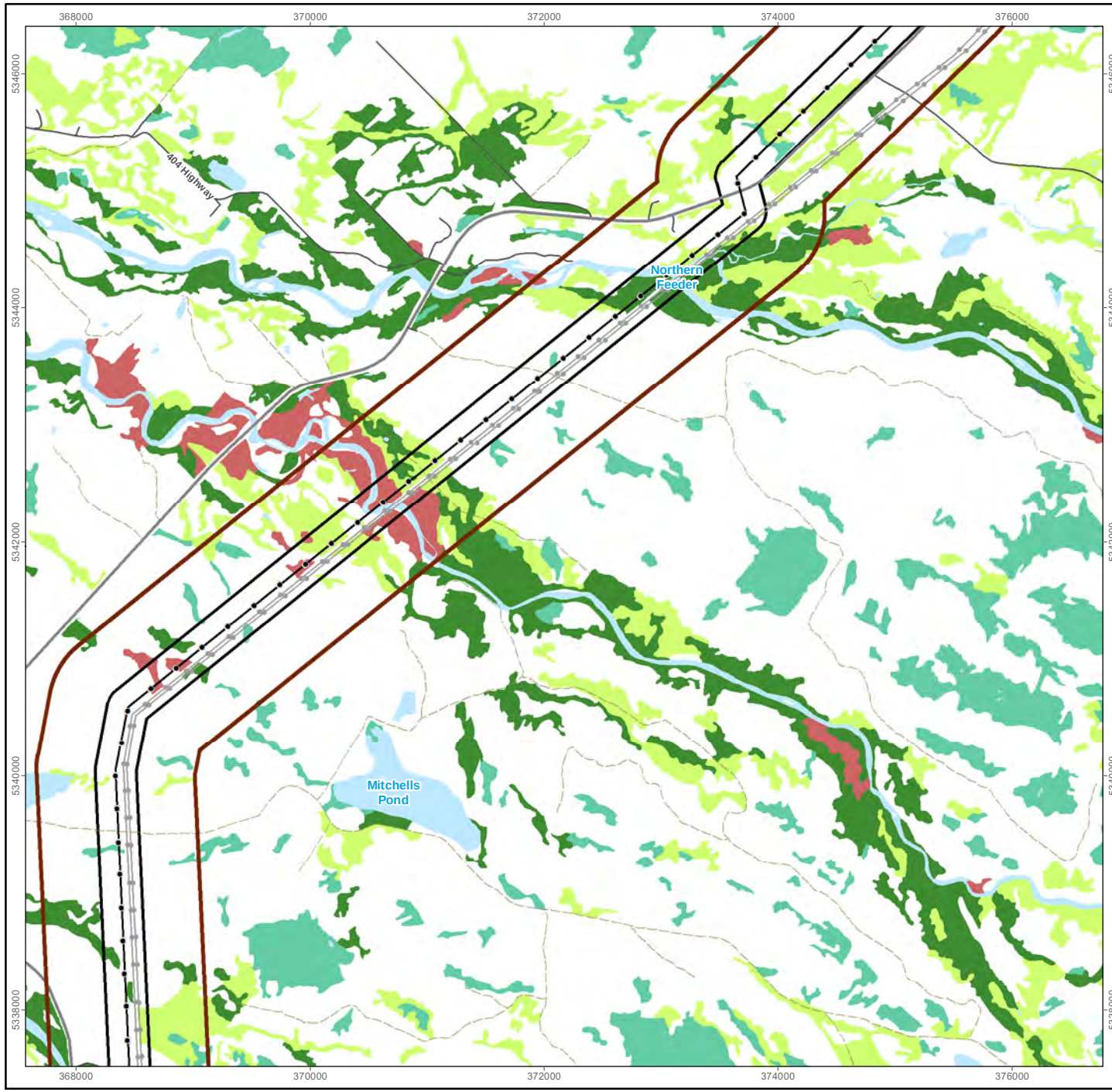

Stantec

Proposed Project Features

- Transmission Line 230 kV
- Project Area
- Local Assessment Area

Other Features

- Transmission Line, Existing
- Trans-Canada Highway
- Road
- Resource Road / Trail

Suitable Bat Habitat

- Hardwood
- Mixedwood
- Softwood
- Water
- Wetland

N

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Notes

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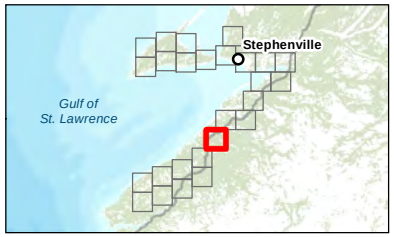
3. Background: NRCan CanVec



Project Location
Stephenville
NL

Prepared by MB on 2023-06-30
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix C

Suitable Bat Habitat for Roosting and Foraging

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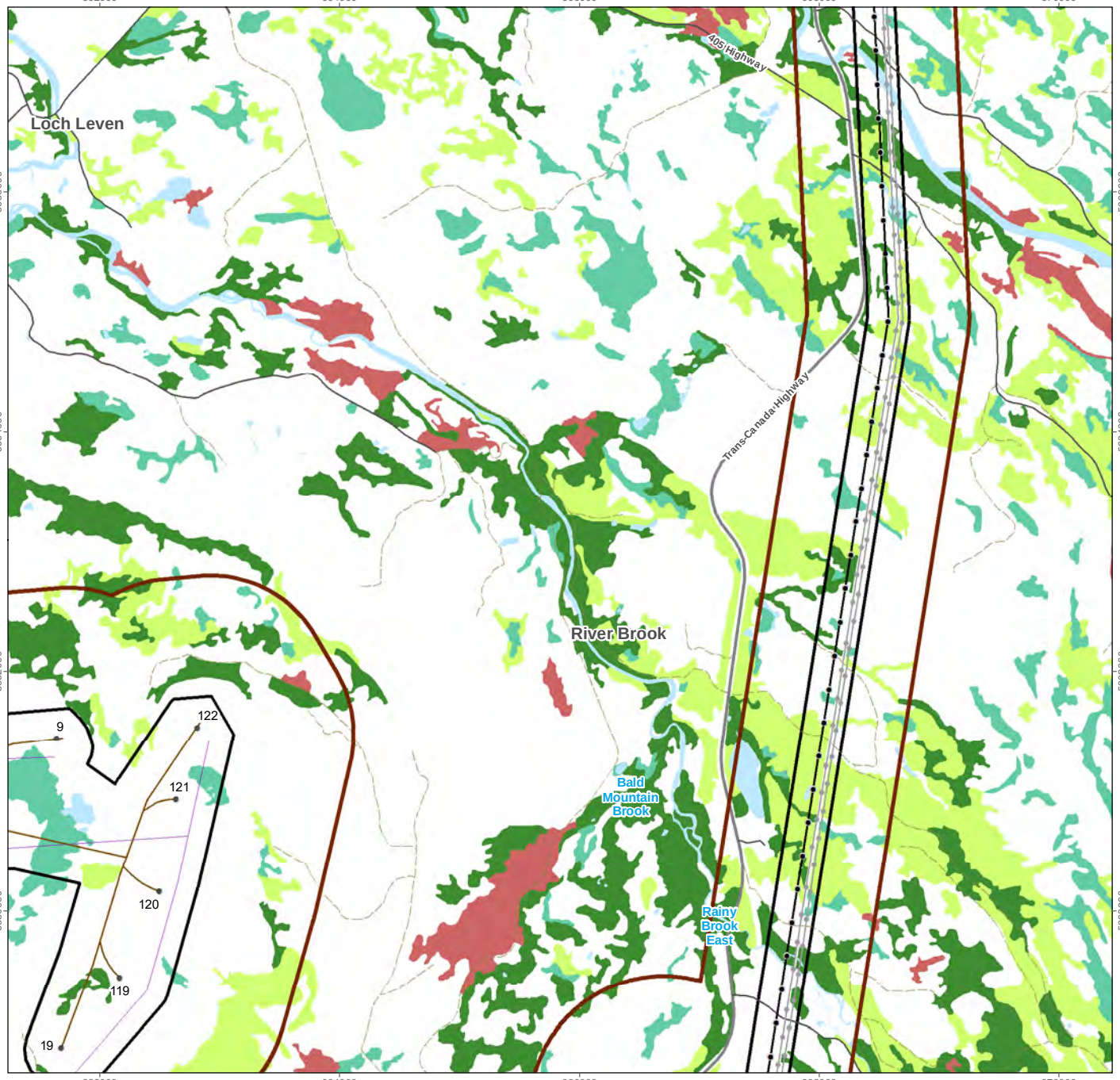

Stantec

Proposed Project Features

- Turbine Location
- Transmission Line 230 kV
- Collector Line
- Access Road
- Project Area
- Local Assessment Area

Other Features

- Transmission Line, Existing
- Trans-Canada Highway
- Road
- Resource Road / Trail

Suitable Bat Habitat

- Hardwood
- Mixedwood
- Softwood
- Water
- Wetland

N

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1:50,000

Notes

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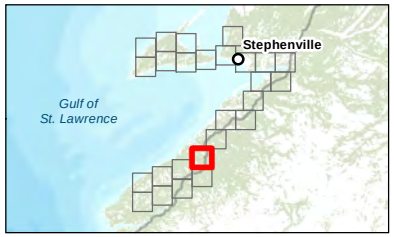
3. Background: NRCan CanVec



Project Location
Stephenville
NL

Prepared by MB on 2023-06-30
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix C

Suitable Bat Habitat for Roosting and Foraging

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Stantec

Proposed Project Features

- Turbine Location
- Transmission Line 230 kV
- Collector Line
- Access Road
- Project Area
- Local Assessment Area

Other Features

- Transmission Line, Existing
- Trans-Canada Highway
- Road
- Resource Road / Trail

Suitable Bat Habitat

- Hardwood
- Mixedwood
- Softwood
- Water
- Wetland

N

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Notes

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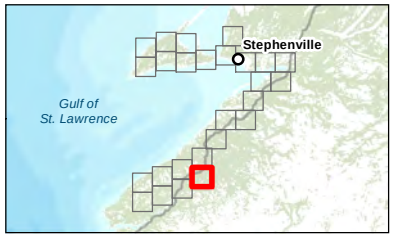
3. Background: NRCan CanVec



Project Location
Stephenville
NL

Prepared by MB on 2023-06-30
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix C

Suitable Bat Habitat for Roosting and Foraging

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Stantec

Proposed Project Features

- Turbine Location
- Transmission Line 230 kV
- Collector Line
- Access Road
- Project Area
- Local Assessment Area

Other Features

- Transmission Line, Existing
- Trans-Canada Highway
- Road
- Resource Road / Trail

Suitable Bat Habitat

- Hardwood
- Mixedwood
- Softwood
- Water
- Wetland

N

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(At original document size of 8.5x11)
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Notes

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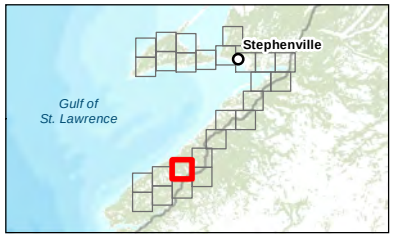
3. Background: NRCan CanVec



Project Location
Stephenville
NL

Prepared by MB on 2023-06-30
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix C

Suitable Bat Habitat for Roosting and Foraging

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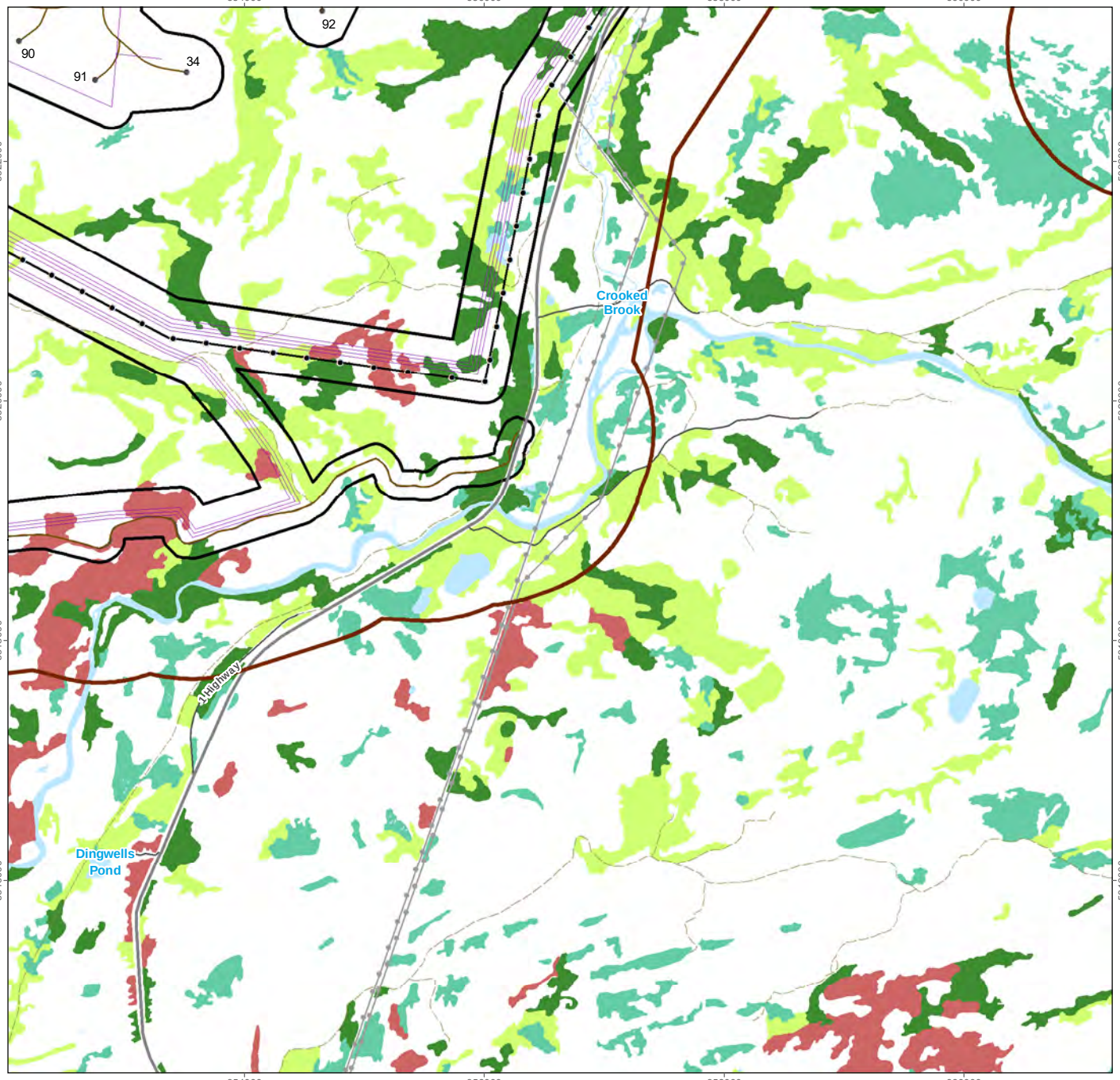

Stantec

Proposed Project Features

- Turbine Location
- Transmission Line 230 kV
- Collector Line
- Access Road
- Project Area
- Local Assessment Area

Other Features

- Transmission Line, Existing
- Trans-Canada Highway
- Road
- Resource Road / Trail

Suitable Bat Habitat

- Hardwood
- Mixedwood
- Softwood
- Water
- Wetland

N

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Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
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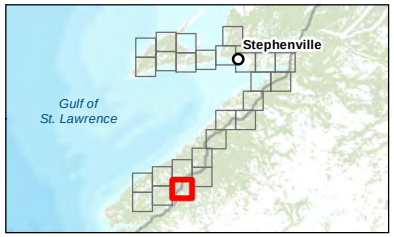
3. Background: NRCan CanVec



Project Location
Stephenville
NL

Prepared by MB on 2023-06-30
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix C

Suitable Bat Habitat for Roosting and Foraging

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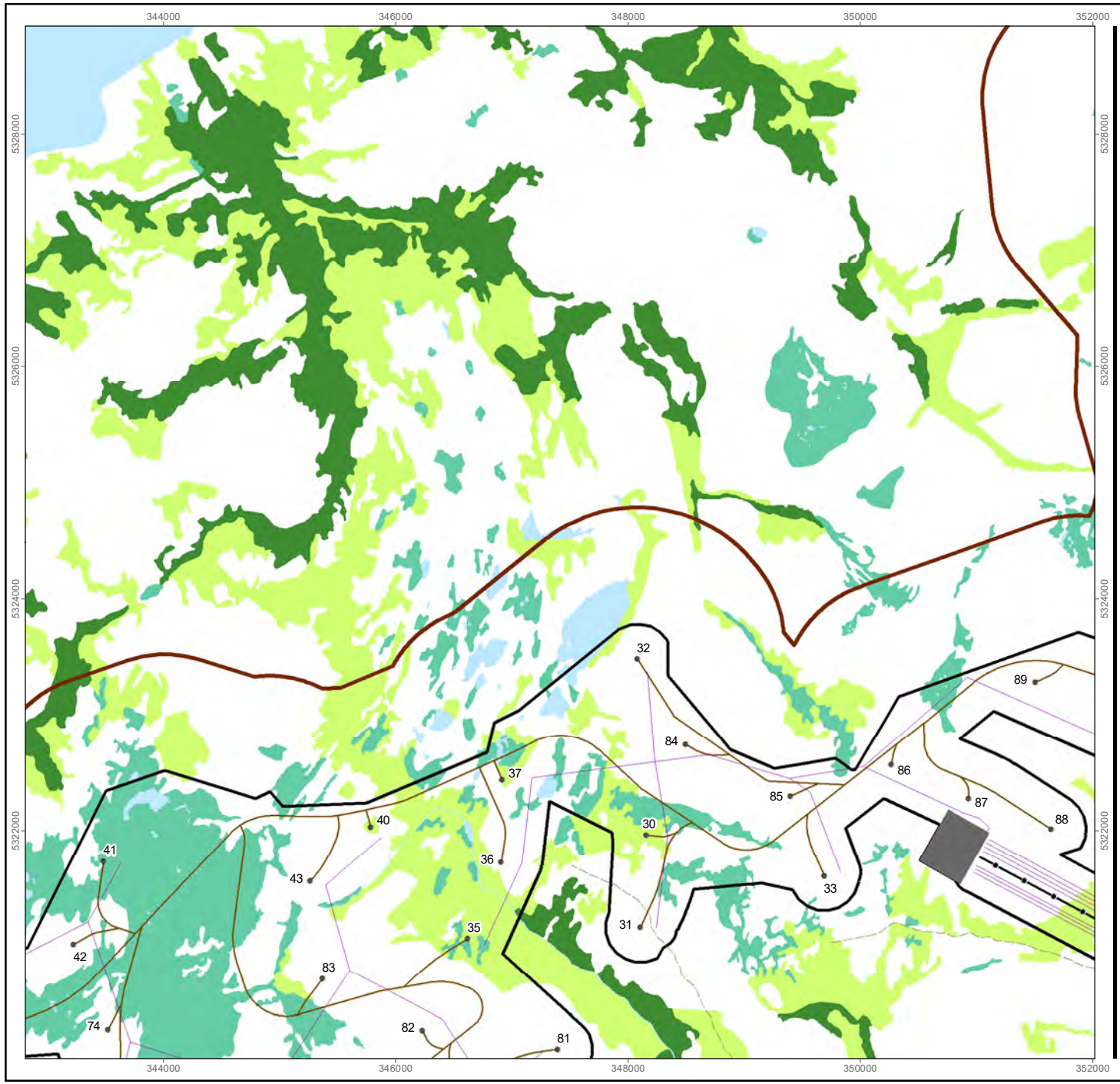

Stantec

Proposed Project Features

- Turbine Location
- Transmission Line 230 kV
- Collector Line
- Access Road
- Substation
- Project Area
- Local Assessment Area

Other Features

- Resource Road / Trail

Suitable Bat Habitat

- Mixedwood
- Softwood
- Water
- Wetland

N

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Notes

1. Coordinate System: NAD 1983 CSRS UTM Zone 21N
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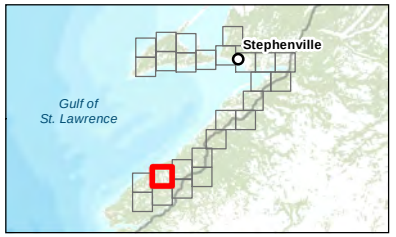
3. Background: NRCan CanVec



Project Location
Stephenville
NL

Prepared by MB on 2023-06-30
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix C

Suitable Bat Habitat for Roosting and Foraging

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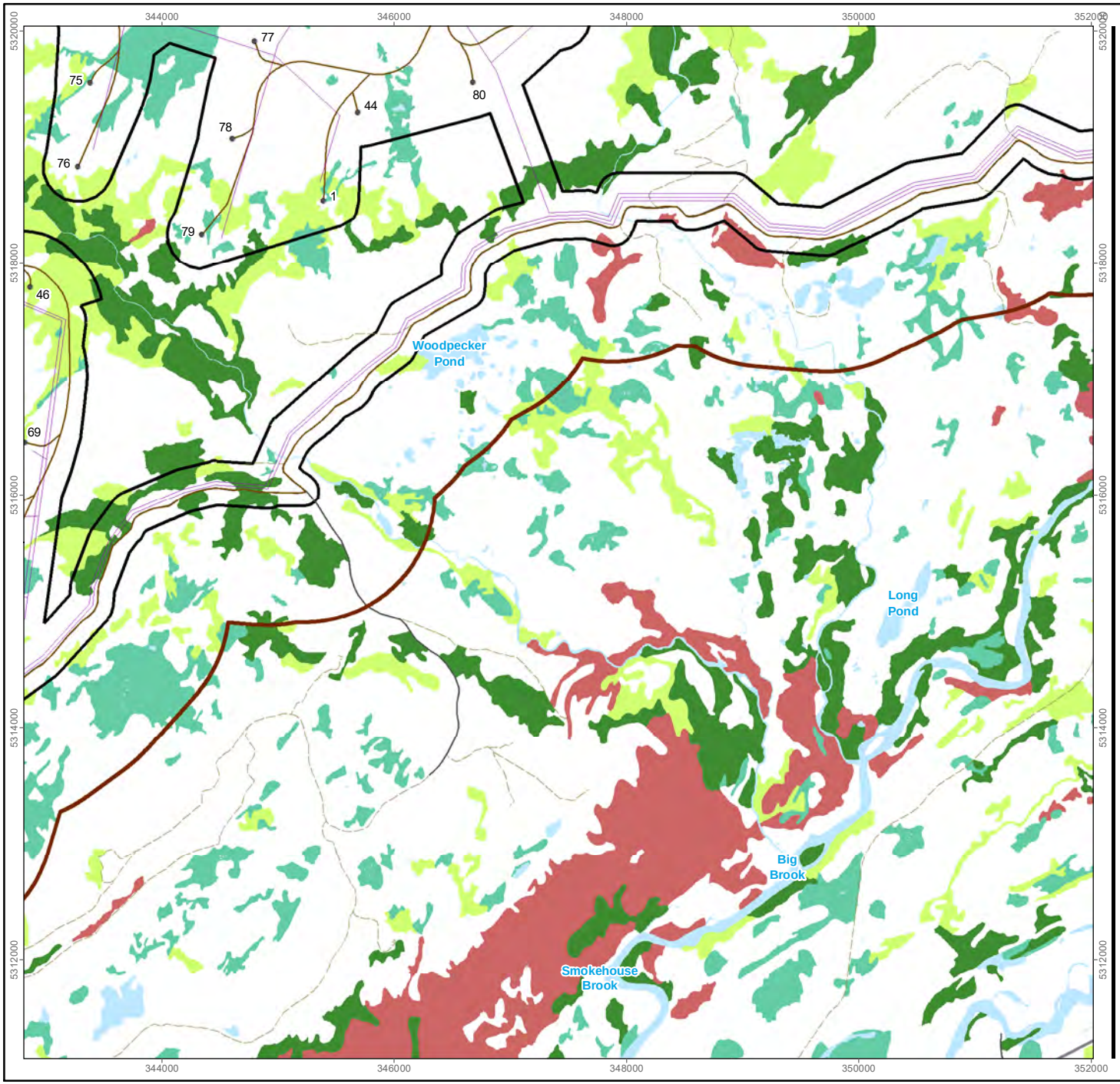

Stantec

Proposed Project Features

- Turbine Location
- Collector Line
- Access Road
- Project Area
- Local Assessment Area

Other Features

- Trans-Canada Highway
- Road
- Resource Road / Trail

Suitable Bat Habitat

- Hardwood
- Mixedwood
- Softwood
- Water
- Wetland

N

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Notes

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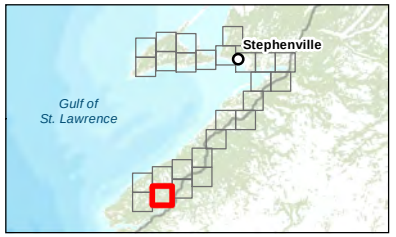
3. Background: NRCan CanVec



Project Location
Stephenville
NL

Prepared by MB on 2023-06-30
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix C

Suitable Bat Habitat for Roosting and Foraging

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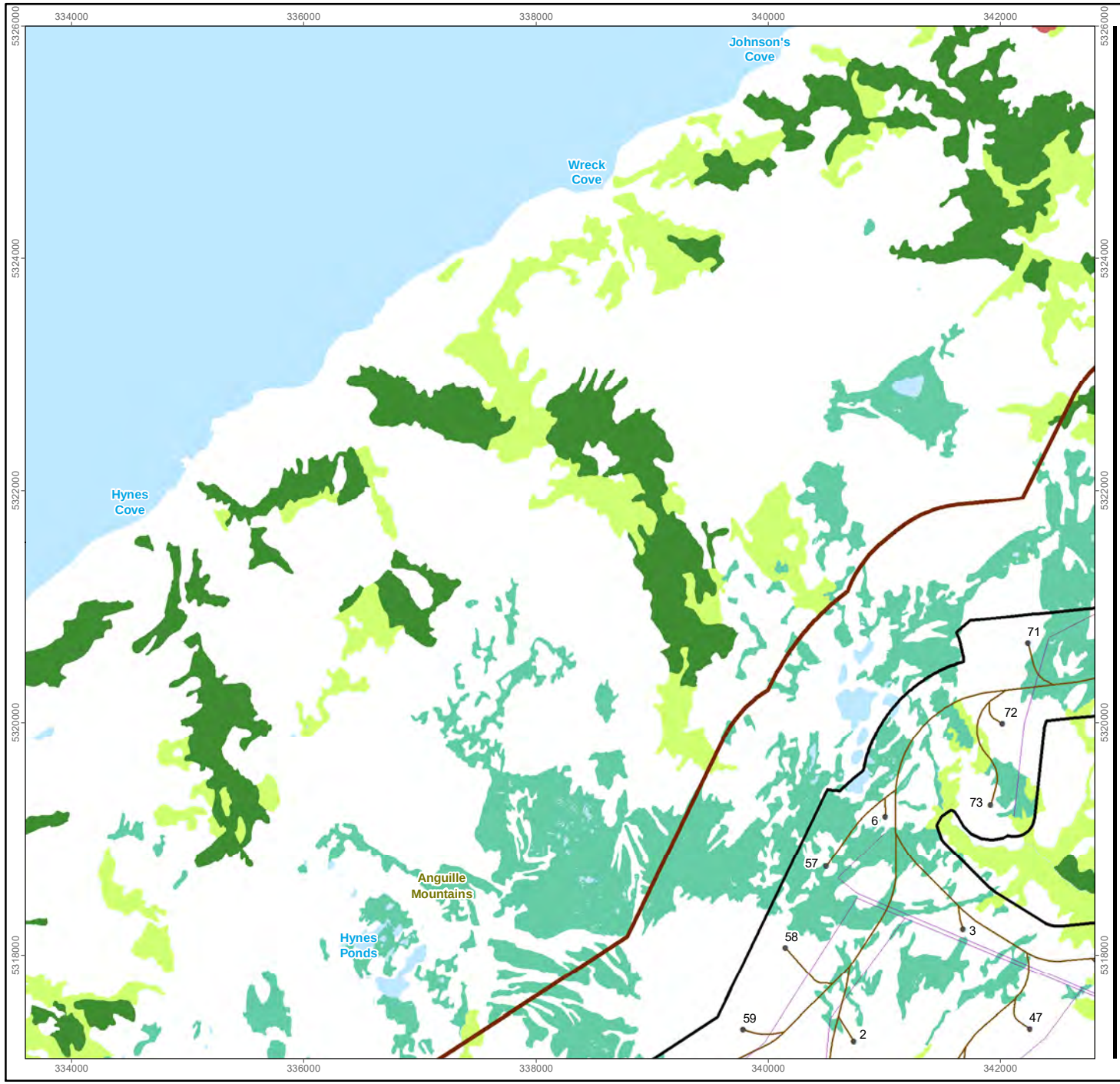

Stantec

Proposed Project Features

- Turbine Location
- Collector Line
- Access Road
- Project Area
- Local Assessment Area

Other Features

Suitable Bat Habitat

- Hardwood
- Mixedwood
- Softwood
- Water
- Wetland

N

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(At original document size of 8.5x11)
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Notes

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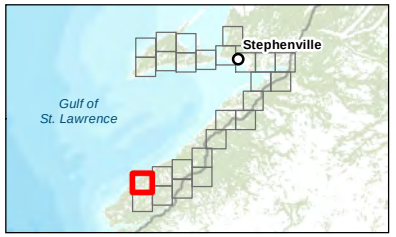

Project Location
Stephenville
NL

Prepared by MB on 2023-06-30
QR by AW on 2023-07-06

Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
BSA-3 Appendix C

Suitable Bat Habitat for Roosting and Foraging

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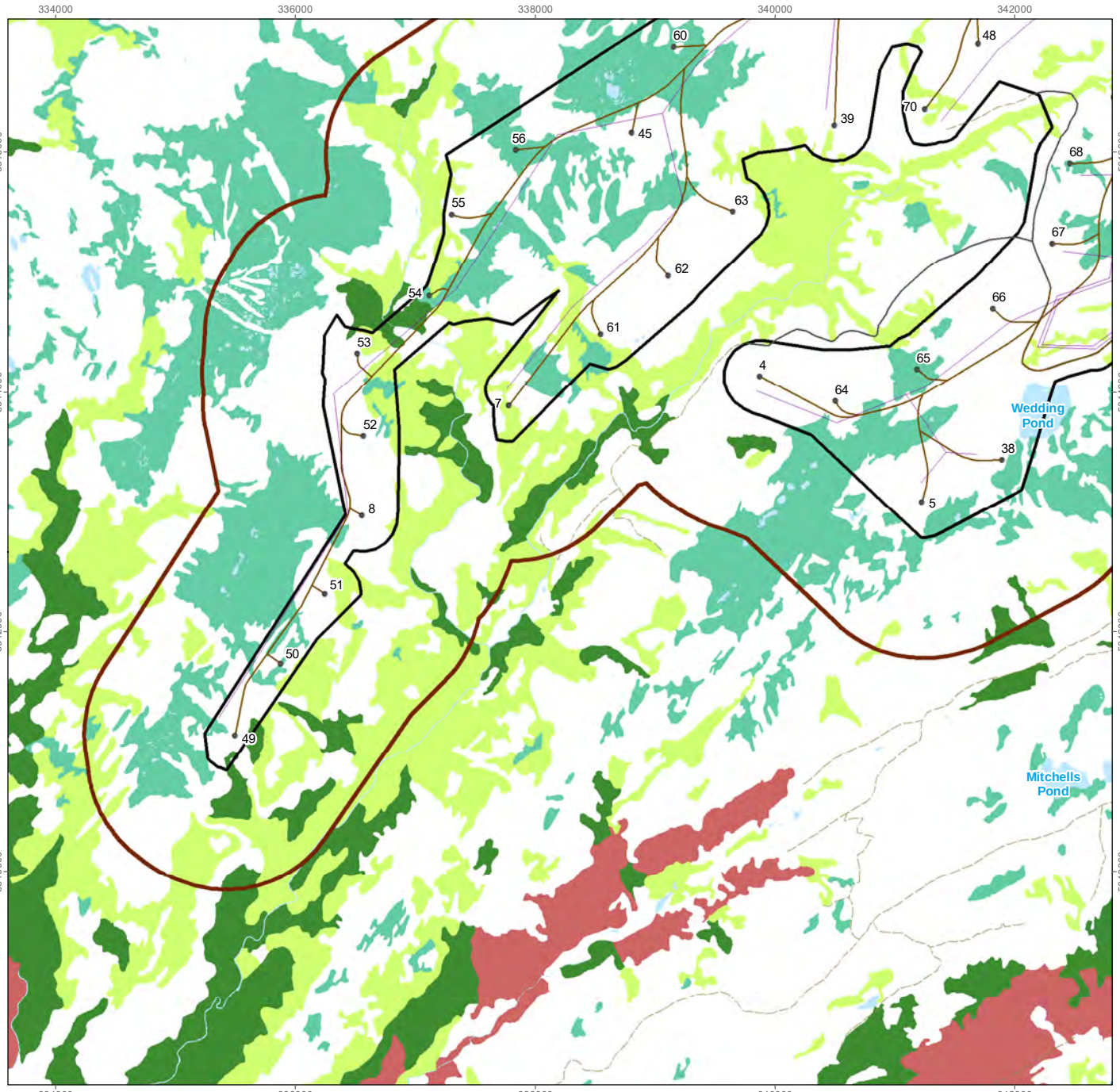

Stantec

Proposed Project Features

- Turbine Location
- Collector Line
- Access Road
- Project Area
- Local Assessment Area

Other Features

- Road
- Resource Road / Trail

Suitable Bat Habitat

- Hardwood
- Mixedwood
- Softwood
- Water
- Wetland

N

0 0.5 1 Kilometres
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Notes

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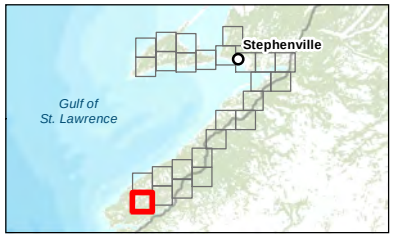

Project Location
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NL

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Client/Project
World Energy GH2
Project Nujio'qonik

121417233_079

Figure No.
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Suitable Bat Habitat for Roosting and Foraging

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