# EverWind Fuels

## Point Tupper Green Hydrogen/Ammonia Project

## Phase 1

December 2022

# Environmental Assessment Registration Document

# POINT TUPPER GREEN HYDROGEN/AMMONIA PROJECT
# Phase 1

# Environmental Assessment Registration Document

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December 2022

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December 2, 2022

Ms. Renata Mageste da Silva, Environmental Assessment Officer
Nova Scotia Department of Environment & Climate Change
Environmental Assessment Branch
1903 Barrington Street, Suite 2085
PO Box 442
Halifax, NS B3J 2P8

Re: Environmental Assessment Registration Document
EverWind Point Tupper Green Hydrogen/Ammonia Project – Phase 1

Ms. Mageste da Silva:

Please find enclosed the Environmental Assessment Registration Document for the EverWind Point Tupper Green Hydrogen/Ammonia Project – Phase 1.

The undersigned approves and accepts the contents, as submitted to Nova Scotia Environment & Climate Change, Environmental Assessment Branch. I am also confirming that we have not received any public funding for the development of the Project.

Sincerely,

Trent Vichie
Founder and CEO, EverWind Fuels

## EXECUTIVE SUMMARY

EverWind Fuels Company (EverWind) proposes to construct and operate the EverWind Point Tupper Green Hydrogen/Ammonia Project – Phase 1, a Certified Green energy hydrogen and ammonia production facility located on an industrial property near the Strait of Canso, within Port Hawkesbury, Cape Breton, Nova Scotia.

The Project will consist of:

- A 300-Megawatt (MW) hydrogen ($H_2$) electrolysis plant
- A 600 metric tonnes per day (MTPD) ammonia ($NH_3$) production plant
- A 230 kilovolt (kV) substation and power distribution system (i.e., Transmission Interconnection Line)
- A marine loading pipeline for liquid ammonia product distribution to shipping vessels

The purpose of the Project is to produce Certified Green hydrogen and ammonia to support the global demand for agricultural fertilizer products while reducing the carbon footprint of conventional ammonia production methods. In addition to producing ammonia for the worldwide market, the Project will be Nova Scotia's first green hydrogen and ammonia production facility and will help to unlock the province's green economy potential, demonstrate the region's leadership in developing environmentally friendly technologies, and make strides towards building a more sustainable future.

The Project is considered a Class I undertaking under the Nova Scotia Environment and Climate Change Assessment Regulations and as such, requires a registered Environmental Assessment as identified under Schedule A of the Regulations. The Environmental Assessment and the registration document have been completed according to the methodologies and requirements outlined in the document A Proponent's Guide to Environmental Assessment, as well as accepted best practices for conducting environmental assessments.

EverWind has, and will continue to engage and collaborate with, local communities, Mi'kmaq First Nations and Government representatives to ensure that any concerns identified in association with the Project are addressed and mitigated.

A number of Valued Components were evaluated as part of this assessment. Based on field data and associated research, valued components determined for the assessment were as follows:

- Acoustic Environment
- Ambient Air Quality
- Climate Change
- Freshwater Environment
- Geophysical Environment
- Terrestrial Environment
- Socioeconomic Considerations
- Archaeological Considerations

The results of this assessment indicated that, as a result of the Project's avoidance of sensitive features and application of mitigative and protective measures, adverse residual effects are not anticipated to be significant. The Project's residual effects of significance are limited to positive effects associated with economic prosperity and opportunity for local communities, First Nation partners, the region of Cape Breton and Nova Scotia as a whole.

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# 1.0 INTRODUCTION

EverWind Fuels Company (the "Proponent," EverWind) plans to develop and operate a Certified Green energy hydrogen and ammonia production facility (the "Industrial Facility") on an industrial property situated along the Strait of Canso, near Port Hawkesbury, Cape Breton, Nova Scotia (NS). The Project will consist of:

- A 300-Megawatt (MW) hydrogen ($H_2$) electrolysis plant
- A 600 metric tonnes per day (MTPD) ammonia (NH3) production plant
- A 230 kilovolt (kV) substation and power distribution system (i.e., Transmission Interconnection Line)
- A marine loading pipeline for liquid ammonia product distribution to shipping vessels

The green ammonia produced and sold is expected to be transported internationally (via ship), for use in decarbonizing various industrial processes, including the production of ammonia-based fertilizer. Other uses may include green ammonia as a substitute for grey ammonia in chemical processing, and as a petroleum substitute for transportation and power generation.

The Proponent has retained Strum Consulting (Strum, the "Consultant") to support with the development and submission of an Environmental Assessment (EA) Registration (the "EA Report") under the *Environment Act* (S.N.S 1994-95, c.1). Strum is an independent multi-disciplinary team with extensive experience with submission of EA Registration documents for undertakings within Atlantic Canada.

## 1.1 Project Name

The name of the undertaking is the EverWind Point Tupper Green Hydrogen/Ammonia Project – Phase 1 (the "Project").

## 1.2 Proponent Information

EverWind Fuels Company is a Nova Scotia based private developer of green hydrogen and ammonia production, storage facilities, and associated transportation assets. In early 2022, TDL Partners (the parent company to EverWind), acquired the (existing) Point Tupper Terminal, which operates as EverWind Fuels Company. EverWind is transforming the existing Point Tupper Terminal fuel storage asset into a green hydrogen and ammonia production facility. The Project is a +$1 billion investment and the first of its kind in Nova Scotia.

EverWind is a leader in producing green hydrogen and ammonia to reduce the world's carbon footprint and is set on harnessing natural renewable resources and converting them to clean net-zero energy. EverWind's world-class management team has made substantial progress across all key work streams including completion of pre-Front End Engineering Design (FEED), commencement of FEED with the contracted Engineering, Procurement,

and Construction (EPC) firm, and detailed negotiations around binding offtake agreements for green ammonia. EverWind has also worked diligently and with tremendous foresight to engage with, and garner support for the Project, from local stakeholders and Mi'kmaq First Nations. EverWind expects to reach financial close on the first part of the Project in 2023, representing green hydrogen produced by Certified Green grid-power, which is critical to ensure this billion-dollar Project is fully developed and construction commences.

Proponent and Consultant contact information is provided in Table 1.1.

**Table 1.1: Applicant and Consultant Information Summary**

| APPLICANT | |
|---|---|
| **Name** | EverWind Fuels Company |
| **Chief Executive Officer (CEO)** | Trent Vichie |
| **Address** | 1969 Upper Water Street, Suite 2101, Halifax, NS, B3J 2V1 |
| **Telephone** | 902.237.7321 |
| **Website** | https://www.everwindfuels.com/ |
| **APPLICANT CONTACT** | |
| **Name** | Mark Savory |
| **Official Title** | Vice President (VP) Project Deployment/Project Director |
| **Address** | 1969 Upper Water Street, Suite 2101, Halifax, NS |
| **Telephone** | 902.237.7321 |
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| **CONSULTANT CONTACT** | |
| **Name** | Shawn Duncan – Strum Consulting |
| **Title** | President |
| **Address** | 1355 Bedford Highway, NS, B4A 1C6 |
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## 1.3 Purpose & Need for Project

Ammonia ($NH_3$) is a key component in the production of agricultural fertilizers, with over 50% (Erisman et al., 2008) of the world's food crop farmers relying on it to keep their soils productive through improvement of crop nutrition, growth, and quality. In 2019, the global production of ammonia was approximately 235 million tonnes (Ghavam et al., 2021) and nearly 70% of all ammonia produced was, and continues to be, used for fertilizer production (IEA, 2021).

Although ammonia-based fertilizers are necessary to produce the food crops required to feed over 7 billion people worldwide, industrial ammonia production emits more $CO_2$ than any other chemical production process (Chemical & Engineering News, 2019). The direct emissions from ammonia production total approximately 450 metric tonnes of $CO_2$ per year (IEA, 2021). This makes ammonia production one of the most emissions-heavy chemical

commodities in the world.
To create the ammonia required to feed the world's growing population, the Haber-Bosch process (originally developed in 1909 by Fritz Haber and Carl Bosch) is used to combine nitrogen gas from the atmosphere with molecular hydrogen gas to synthesize ammonia. The process requires a high temperature and pressure to activate ammonia synthesis in the presence of a catalyst. As of 2020, worldwide ammonia production primarily relied on the following technologies (IEA, 2021):

- Natural gas-based steam reformation technologies, including steam methane reformation and auto-thermal reformation (72% of technologies used)
- Coal gasification (26%)
- Production through oil products (1%)
- Only a fraction of a percentage relied on electrolytic technologies

The principal goal for developing a Certified Green hydrogen and ammonia production facility in Point Tupper, NS is to supply green ammonia to support the global demand for agricultural fertilizer products while reducing the carbon footprint of conventional ammonia production methods. The Haber-Bosch process of ammonia production through electrolytic hydrogen (using renewable electricity resources) results in significantly lower greenhouse gas (GHG) emissions (3 g of $CO_2$ equivalent per megajoule of energy [$gCO_2e/MJ$]) compared to steam reformation technologies which produce between 46-99 $gCO_2e/MJ$ (Timmerberg et al., 2020).

Using green ammonia for fertilizer, fuel, and heat can reduce the carbon footprint associated with farming by as much as 90% for corn and small grain crops (Jones, 2022) and according to a report published by the International Energy Agency (2021), moving towards hydrogen-based fuels by 2050 could lower emissions to nearly zero.

In addition to producing ammonia for the worldwide market, the Project will be Nova Scotia's first green hydrogen and ammonia production facility and will help to unlock the province's green economy potential, demonstrate the region's leadership in developing environmentally friendly technologies, and make strides towards building a more sustainable future.

The Project will produce green hydrogen and green ammonia, complying with the European RED II Renewable Fuels of Non-Biological Origin (RFNBO) standards[1], which is the most stringent set of requirements globally. These standards outline specific requirements, which include that the green hydrogen and ammonia must be produced from renewable energy sources and achieve a GHG emissions intensity reduction of 70% from the applicable fossil-equivalent benchmark. In addition, RED II requires electricity transmitted through the grid to require additional sustainability criteria including direct commercial agreements with

[1]The European Commission published its 'Clean Energy for all Europeans' initiative and adopted a legislative proposal for a recast of the Renewable Energy Directive (RED). In December 2018, the revised renewable energy directive 2018/2001/EU entered into force (European Commission, u.d.)

renewable power producers, temporal correlations between the energy generation and production, and hourly record keeping of types of electricity consumed, among other requirements. For the purposes of the EA Report, RED II RFNBO compliance is referred to as "Certified Green." For the Project to be Certified Green, the electricity supplied for the Project will be supplied by Nova Scotia Power Inc. (NS Power) primarily from newly-built wind farms, supplemented by additional renewable, low impact sources which may include, wave, tide, run-of-the-river hydraulic, solar, or other acceptable renewable energy sources. The Proponent will enter into a commercial agreement with NS Power, such that the electricity supplied to the Project will be verified/certified to be originating from renewable energy sources.

## 1.4 Project Alternatives

As a component of the EA process, the Proponent considered multiple project alternatives. This section reviews and discusses alternative options for site layouts, production technologies, and water use options, as well as the decisions made concerning feasibility and sustainability.

EverWind retained the engineering firm Hatch to support with assessing Project alternatives through a Prefeasability Report (FEL 1) for the EverWind Fuels Point Tupper Green Ammonia Project (Hatch, 2022). Various project layouts, site infrastructure, technology, water demands, and siting considerations were assessed within the FEL1 Report, as well as a review of potential suppliers, procurement, supply chains, and project risks.

The following Project alternatives were considered:

- Project locations
- Project layouts
- Water withdrawal requirements,
- Hydrogen production technologies
- Ammonia production technologies
- Renewable Energy

### 1.4.1 Project Location

The Project will be located within a 172 hectare (ha) heavy industrial zone property. This decision will allow the Proponent to take advantage of operations associated with the existing Point Tupper Terminal and utilize existing infrastructure (i.e., transmission, rail, water, and pipelines) in proximity to the chosen location. In addition, the trans-shipment aspect of the Project requires a marine terminal to facilitate the transfer of liquid ammonia to shipping vessels. Currently, two pre-existing berths (Berth No. 1 and Berth No. 2) operate within the deepest port on the East Coast of North America, associated with the existing Point Tupper Terminal, owned and operated by the Proponent.

As the ammonia generated by the Project will be a Certified Green energy product, the chosen location is in proximity to Nova Scotia's renewable energy resources and existing

transmission infrastructure. In addition, the Industrial Facility is located adjacent to an existing wind farm, which the Proponent has considered procuring for Project use.

Alternative Project locations were considered; however, the lack of existing infrastructure, inoperable or non-existent marine terminal or marine access, lack of access to NS Power infrastructure, and limited land availability were not conducive to Project development, and would require significant capital expenditures, result in extensive environmental impacts, and would require additional permits and approvals in order to proceed. As such, the described Project location was selected as it incorporated all the necessary considerations the Proponent sought.

### 1.4.2 Project Layout

In deciding on the general Project location, desktop reviews and field reconnaissance revealed areas of special interest (i.e., watercourses, wetlands, species at risk) within the proposed Project's footprint. Developing the Project components (i.e., the Industrial Facility and Transmission Interconnection Line, described further below) within these sensitive areas would result in environmental impacts and extensive site preparation and, thusly, increased capital expenditures; therefore, the location, design, and layout for both the Industrial Facility and Transmission Interconnection Line were reconfigured to reduce these unfavourable environmental impacts, and reduce capital expenditure.

The Project layout has undergone multiple iterations and has been relocated and redesigned in order to avoid sensitive areas and minimize topographical or site preparation challenges. Refer to Drawing 1 for the finalized Project layout.

#### *1.4.2.1 Industrial Facility*

The Industrial Facility will be located adjacent to the existing Point Tupper Terminal. A desktop review and field studies were conducted between August and October 2022. During these field studies, wetlands and watercourses were encountered within the initially proposed Industrial Facility layout (see Drawing 2. With the help of environmental and process design consultants, the Proponent relocated and redesigned the Industrial Facility layout to avoid as many water features as possible and to shift the Industrial Facility footprint to be within an area which had experienced pre-existing anthropogenic disturbances, thus decreasing the impacts to discovered wetlands and watercourses and limiting disturbance to unimpacted forested areas.

In addition, the final chosen layout encourages the use of pre-existing site infrastructure (i.e., the ammonia pipeline corridor will be incorporated into the existing Point Tupper Terminal piping infrastructure), provides a shorter pipeline route to the Landrie Lake Water Utility (LLWU) pump station (which will supply the Project with its freshwater demands), and is placed in an elevated topographical location farther from the shore line (incorporating considerations for potential climate change impacts such as sea level rise and extreme weather events). The revised location also uses previously developed areas to avoid

unnecessary construction activities (i.e., cut and fill, clearing of vegetation), reducing the impacts of those activities and limiting Project expenditures.

#### *1.4.2.2 Transmission Interconnection Line*

Wherever possible, the Transmission Interconnection Line was developed to run parallel to the existing NS Power transmission line in Point Tupper to reduce the environmental impact of installing a new corridor. A desktop review and field studies were conducted between August and October 2022 along the 70 m Transmission Interconnection Line corridor. As only a 35 m right-of-way is required for the Transmission Interconnection Line, the assessment of the wider corridor provided additional opportunities for avoidance of sensitive features. Initially, the Transmission Interconnection Line ran within the Landrie Lake W-1 watershed protected area (refer to 7.2.1 for additional details) and crossed several wetlands of special significance and potential blue felt lichen habitat locations (Drawing 3). With the help of environmental consultants, the Proponent reworked the Transmission Interconnection Line layout to avoid many of these sensitive areas, decreasing and/or eliminating impacts to the watershed, wetlands, and watercourses in proximity to the Transmission Interconnection Line footprint. Remaining watercourses or wetlands within the Transmission Interconnection Line's footprint will be spanned during construction activities if/as applicable.

### 1.4.3 Water Withdrawal

Water is required for Project processes, cooling, potable water uses, and fire suppression activities. Therefore, two raw water sources were identified and evaluated: marine water (seawater) from the Strait of Canso and freshwater from Landrie Lake. The water sources were assessed, including a review to ensure the security of the long-term water supply to the Project by taking into consideration existing utility (or other) users.

The assessment of the seawater source for providing the raw water for the Project's operating requirements noted the following items:

- Requires further environmental assessment
- Requires a permit application for the withdrawal/consumption
- Requires vendor equipment to be designed for seawater service
- Operates at lower temperatures
- More capital expenditure (CapEX) intensive
- Least rapidly deployable
- Limitless withdrawal capacity
- Requires desalination prior to conventional demineralization treatment trains

A freshwater source was assessed to provide the raw water needs for the Project's operating requirements. The following items were noted:

- Operates at higher temperatures
- Less CapEX intensive

- More readily deployable
- Limited withdrawal capacity

The decision to use freshwater was preferred since the water utility already provides raw freshwater to the existing Point Tupper Terminal, northwest of the Project's Industrial Facility making the associated infrastructure readily available. As local freshwater utility (LLWU) owns and operates a water pumping station on the southwestern shore of Landrie Lake, a raw freshwater pipeline would be able to tie into the existing LLWU raw freshwater main infrastructure, and less intensive construction would be necessary, and marine assessment and environmental considerations would no longer be required.
The Proponent has engaged the LLWU and has an operating agreement to purchase the raw water from Landrie Lake; for additional information on the Project's raw water needs, refer to Section 5.2.1.

### 1.4.4 Process Technology

#### *1.4.4.1 Hydrogen Production Technology*

Various types of hydrogen production technologies exist, the most common of which are as follows (United States Department of Energy, u.d.):

- Natural Gas Reforming/Gasification
- Electrolysis
- Renewable Liquid Reforming
- Fermentation

*Natural Gas Reforming/Gasification*

Hydrogen can be produced through thermal processes such as steam methane reformation and partial oxidation of natural gases (such as methane). The steam methane reformation process typically employs two approaches: gas reformation and gasification. During gas reformation, methane reacts with steam under pressure in the presence of a catalyst producing a mixture of hydrogen, carbon monoxide, and carbon dioxide. Once produced, carbon monoxide and steam are further reacted to produce carbon dioxide and additional hydrogen. This process is one of the most common methods for producing hydrogen (United States Department of Energy, u.d).

Synthesis gas(es) can also be created by reacting coal or biomass products with high-temperature steam and oxygen using a pressurizer gasifier (partial oxidation). The resulting synthesis gas contains hydrogen, as well as carbon monoxide, which is further reacted with steam to separate the hydrogen and increase production. This method is popular but produces less hydrogen per unit of the input fuel than is obtained by using the steam reformation process (on the same fuel) (Energy Efficiency and Renewable Energy, u.d., a).

*Electrolysis*
Electrolysis produces hydrogen from renewable or nuclear resources by using electricity to split water into its hydrogen and oxygen components through an electrolyzer. If renewable sources produce the electricity used to facilitate the reaction, the resulting hydrogen is also considered renewable, and the emissions produced during the process are limited. Various technologies exist, including polymer electrolyte membrane or proton membrane exchange electrolyzers, alkaline electrolyzers, and solid oxide electrolyzers (Energy Efficiency and Renewable Energy, u.d., b).

*Renewable Liquid Reforming*
Similar to the process of natural gas reformation, renewable liquid fuels (i.e., ethanol, bio-oils) are reacted with high-temperature steam to produce hydrogen near the point of end-use and are therefore referred to as a mid-term technology pathways (Efficiency and Renewable Energy, u.d., c).

*Fermentation*
Through the process of biomass conversion, microorganisms consume and digest biomass by converting it into a sugar-rich feedstock that can be fermented to produce hydrogen; this is still a relatively new technology and is presently under development and not widely utilized (Efficiency and Renewable Energy, u.d., d)

In designing the Project, the various hydrogen production technologies available were considered however hydrogen electrolysis technology was the selected production method. This technology was favoured by the Project as a result of the Proponent’s commitment to reducing emissions and eliminating the need for hydrocarbons; as well as the abundant water resources available at the Project site and the proximity and access to renewable energy resources through NS Power. Once the technology was selected, multiple vendors for electrolysis hydrogen production technology were approached to support however, only two companies (Nel and Siemens) were considered in developing the final Project design.

*Nel ASA*
Nel ASA's (Nel) hydrogen technology relies on an atmospheric alkaline electrolysis process. While there are now numerous electrolyzer manufacturers globally, Nel has scaled up its manufacturing capacity ahead of the competition to match the anticipated growth in global demand. As a result, few manufacturers have, and can deliver, greater than 100 MW of electrolysis capacity annually, but Nel can do so with their modular 100 MW platform (which may be scaled up). NEL is one of the world's oldest and most established alkaline electrolyzer manufacturers, with installations including a 100 MW plant in Rjukan, Norway, which was later increased to 167 MW and operated from 1940 until 1988.

*Siemens Energy*

Siemens Energy (Siemens) is an advanced manufacturer of newer proton exchange membrane (PEM) technology. PEM units have a faster response time (ramp-up and ramp-down) than alkaline electrolysis. Another advantage over other electrolysis systems is that PEM systems only contain water, hydrogen, and oxygen. According to Siemens, when a renewable energy resource supplies PEM, emissions are free from $CO_2$, whereas traditional methods, such as Steam Methane Reforming, emit approximately 8 to 10 kg of $CO_2$ per kg of hydrogen produced (Siemens Energy, 2022). The Siemens PEM technology was ultimately selected as the preferred technology for hydrogen production as a result of their fast response time and the limited chemical components involved in the PEM system.

### 1.4.5 Ammonia Production Technology

The Proponent selected the preferred ammonia conversion technology vendor, Kellogg Brown & Root Inc. (KBR), due to a high technology readiness level and stated ability to deliver vendor engineering and equipment supply in alignment with the proposed Project timelines. KBR Inc. offers a proprietary ammonia converter, steam superheater and generator, and unitized chiller design. Alternative ammonia conversion technology vendors were not considered or engaged.

### 1.4.6 Green Ammonia Production

The Project's ammonia production is considered Certified Green through two components: the production process and the renewable energy supply.

Conventional means of producing ammonia primarily rely on the following technologies (IEA, 2021):

- Natural gas-based steam reformation technologies, including steam methane reformation and auto-thermal reformation
- Coal gasification
- Production through oil products

The well-established industrial Haber-Bosch process to be utilized by the Project combines molecular hydrogen gas with nitrogen gas to synthesize ammonia production. Hydrogen ($H_2$) will be generated using PEM electrolysis, and nitrogen ($N_2$) will be separated from atmospheric air using an air separation unit. The Haber-Bosch process requires high temperature and pressure conditions to combine hydrogen and nitrogen to produce ammonia.

By definition, Certified Green energy requires electricity supplied by NS Power to be generated through renewable, low-impact sources via wind, wave, tide, run-of-the-river hydraulic, biomass, solar, and/or landfill gas sources. As mentioned, the Proponent will enter a commercial agreement with NS Power, such that the electricity supplied to the Project will be verified/certified as originating from renewable energy sources.

Since NS Power will provide the electrical power through Certified Green energy supplied via the Project's Transmission Interconnection Line and associated northern and southern substations, the ammonia production process is cleaner than traditional production methods, and lower GHG emissions will be achieved.

## 2.0 SCOPE

An Environmental Assessment is a planning tool used to predict the environmental effects of a proposed Project, identify measures to mitigate any adverse environmental effects, and predict whether there will be significant adverse environmental effects after mitigations are implemented. The methodology used in this EA Report has been developed to meet the requirements of the *Environmental Assessment Regulations*, N.S. Reg. 221/2018 and the *Environment Act*, S.N.S 1994-95, c.1. This framework is based on a structured approach that:

- Focuses on issues of greatest concern
- Considers Mi'kmaq concerns, as well as concerns raised by the public and other stakeholders
- Integrates mitigative measures into Project design.

This EA Report provides an overview of the existing baseline conditions and individual Project components. Within the specified spatial and temporal boundaries, potential interactions between the Project and the environment are identified for the determination of Valued Components (VCs), which reflect key issues of concern.

For the purposes of this EA Report, a VC will be defined as a component of the physical, biophysical, and/or human environment which is considered of importance and, if altered by the Project, may be of concern to stakeholders. Throughout the EA Report, interactions between an identified VC and the Project's activities are evaluated to determine the nature of the effect and its significance.

Project effects on individual VCs are assessed using the results of preliminary investigations, guidance from regulators, and the collective knowledge and expertise of the Project team. The overall intent of the EA will be to review any residual environmental effects that remain after planned mitigations and protective measures have been applied.

This EA Report will consider all components of the Project, as referenced above under Section 1.0. This Project is being registered as a Class I undertaking as per Schedule A of the Environmental Assessment Regulations, N.S. Reg. 221/2018 under Section 49 of the *Environment Act,* S.N.S 1994-95, c.1.

For the purpose of this Project, a Property Boundary, Project Boundary, and Study Area have been defined throughout this EA Report as follows:

**Property Boundary:** the parcel identification numbers (PIDs) owned and associated with the EverWind Fuels Company, in Point Tupper, NS; as well as all PIDs associated with the Project site, including any potential PID locations that may be utilized for site access during construction, operations, and/or maintenance activities for both the Industrial Facility components and the Transmission Interconnection Line corridor (Drawing 4. For additional details, refer to Section 4.2.

**Project Boundary:** the physical footprint of the Industrial Facility, Transmission Interconnection Line and all associated works (i.e., raw freshwater pipeline and tie-in, Transmission Interconnection Line corridor, northern and southern substations, access roads, support facilities, water and wastewater treatment, hydrogen and ammonia plants, ammonia storage and associated pipeline, and portions of the pre-existing Point Tupper Terminal site where the Project will overlap) (Drawing 5).

**Study Area:** the assessment area for the field studies and desktop review (Drawing 6). The Study Area was developed by taking into consideration the various VCs assessed and the spatial boundaries considered when assessing Project and environmental interactions.

# 3.0 PROJECT OVERVIEW

## 3.1 Project Components

For ease of discussion throughout the EA Report, the Project will be referred to as having two components, the Industrial Facility and Transmission Interconnection Line.

Components included as part of the Industrial Facility are as follows:

- Access roads
- Air separation unit (ASU)
- Ammonia plant
- Ammonia storage and associated load out pipeline to jetty
- Common facility
- Electrical building (for southern substation within Industrial Facility footprint)
- Flare stacks (process flare and storage flare)
- Hydrogen plant
- Laydown areas
- Raw freshwater pipeline
- Raw freshwater treatment plant
- Sanitary wastewater treatment plant
- Stormwater pond
- Temporary construction facilities
- Wastewater treatment plant

Components included as part of the Transmission Interconnection Line are as follows:

- Access roads
- Laydown areas
- Transmission Interconnection Line corridor
- 230 kV Transmission Interconnection Line and associated infrastructure
- Northern switching substation (connection to the grid)
- Southern substation (connection to the Industrial Facility)

A detailed list of all Project components and the anticipated activities associated with Project development (i.e., construction, operations and maintenance phases, decommissioning) are summarized below in Table 3.1.

**Table 3.1: Project Components and Activities**

| Project Component | Activity Description |
|---|---|
| **Construction Phase** | |
| ***Industrial Facility*** | |
| Access Roads | Widen and resurface existing roads, develop additional road networks as needed |
| Air Separation Unit (ASU) | Install ASU and associated works to produce nitrogen |
| Ammonia Plant | Install plant and associated works to produce ammonia |
| Ammonia storage and load out pipeline | Install ammonia storage tanks; Install piping to transport ammonia to shipping vessels |
| Common Facility | Provide facilities for on-site workers |
| Electrical Building (for Southern Substation) | Install substation and associated works to supply power |
| Flare Stacks | Install ammonia and process flare stacks to manage Project emissions |
| Hydrogen Plant | Install plant and associated works to produce hydrogen |
| Laydown Areas | Provide temporary storage location and transfer zone for incoming equipment and infrastructure |
| Raw Freshwater Pipeline | Install pipeline to supply the Project's freshwater needs |
| Raw Freshwater Treatment Plant | Install plant and associated works to treat raw water |
| Sanitary Wastewater Treatment Plant | Install plant (skid unit) to treat human-produced waste products |
| Stormwater Pond | Install pond to manage surface water runoff |
| Temporary Construction Facilities | Install facilities needed to build/combine various Project components |
| Wastewater Treatment Plant | Install plant and associated works to treat process backwash, chemical wash, and blowdown |
| ***Transmission Interconnection Line*** | |
| Access Roads | Develop road networks to access the Transmission Interconnection Line corridor |
| Laydown Areas | Provide temporary storage areas and space for conductor stringing setups and rock anchor installations |
| Transmission Interconnection Line | Install infrastructure to generate electrical power for Project |
| Northern substation (Transmission | Northern switching station, connection point to the pre- |

| Project Component | Activity Description |
|---|---|
| Interconnection Line footprint) | existing NS Power transmission line substation (grid) |
| Southern Substation (Industrial Facility Footprint) | On-site Industrial Facility substation to connect the Transmission Interconnection Line to the Industrial Facility |
| **Project Component** | **Activity Description** |
| **Operations & Maintenance Phase** | |
| Hydrogen Plant Operations | Produce hydrogen |
| Ammonia Plant & ASU Operations | Produce nitrogen and ammonia |
| Ammonia Transfer and Product Shipment | Piping and loading arm to transfer product to shipping vessels for transport |
| Maintenance Activities | Standard infrastructure, access road, and equipment maintenance during operations |
| **Decommissioning** | |
| Industrial Facility | TBD |
| Transmission Interconnection Line | TBD |

As the Project life is anticipated to exceed 40 years, a detailed decommissioning phase has not been assessed within this EA Report. Prior to Project decommissioning, regulatory requirements will be reviewed and implemented accordingly, and a decommissioning program and associated plan will be developed and submitted to Nova Scotia Environment and Climate Change (NSECC) for approval. Decommissioning would be anticipated to commence within six to nine months after the final product shipment and if the Project location and infrastructure would no longer be of use, infrastructure would be removed and the site reclaimed.

## 3.2 Project Location

The Project is located within the Municipality of the County of Richmond (MCR), NS, situated near Port Hawkesbury in the community of Point Tupper and adjacent to the Strait of Canso.

The Industrial Facility will be developed just south of the existing Point Tupper Terminal (owned and operated by EverWind) and will be bordered by Industrial Park Road, Port Malcolm Road, and Bear Island Road (Drawing 7). The Industrial Facility will be in the Point Tupper Industrial Park, within PID 75006593 which is surrounded by treed forests, industrial activities, and the Landrie Lake watershed. The Industrial Facility will be located within development areas designated as I-2 and I-3 (MCR, 2000), which indicate industrial land use zoning and permit the construction of the hydrogen and ammonia production, storage, handling, and shipping infrastructure. Within the I-2 and I-3 industrial land use zones, a total area of 23.6 ha will be developed as part of the Industrial Facility component of the Project (Drawing 8).

The 230 kV Transmission Interconnection Line will span from the Industrial Facility north through the existing Point Tupper Terminal (within PID 75035725), and continue north and west towards NS Power's) transmission corridor near Highway 105 and Port Hastings, NS (Drawing 9). Along the Transmission Interconnection Line corridor, multiple Crown Land PIDs are crossed. Once the Transmission Interconnection Line passes through the existing Point Tupper Terminal property, the Transmission Interconnection Line corridor will be

primarily surrounded by treed forests and will pass through properties owned by Cape Breton & Central Nova Scotia Railway Limited, NS Economic Development, NS Public Works, the Municipality of the County of Richmond, NS Natural Resources and Renewables (NSNRR), NSECC, and the Richmond County-Port Hawkesbury Joint Development Corporation. A detailed list of all PIDs associated with the Project can be found below in Section 4.2 and are included on Drawing 4.

Where possible, the Transmission Interconnection Line corridor has been designed to run parallel to two existing NS Power transmission lines located in proximity to the existing Point Tupper Terminal; the first of these corridors is north of Point Tupper, NS and contains a 230 kV transmission line, 240 km in length and spanning from Lingan to Port Hastings, NS and onwards to Brushy Hill in Halifax; the second NS Power corridor is a 345 kV transmission line, 266 km in length and spanning from Woodbine to Onslow, near Truro (Figure 1).

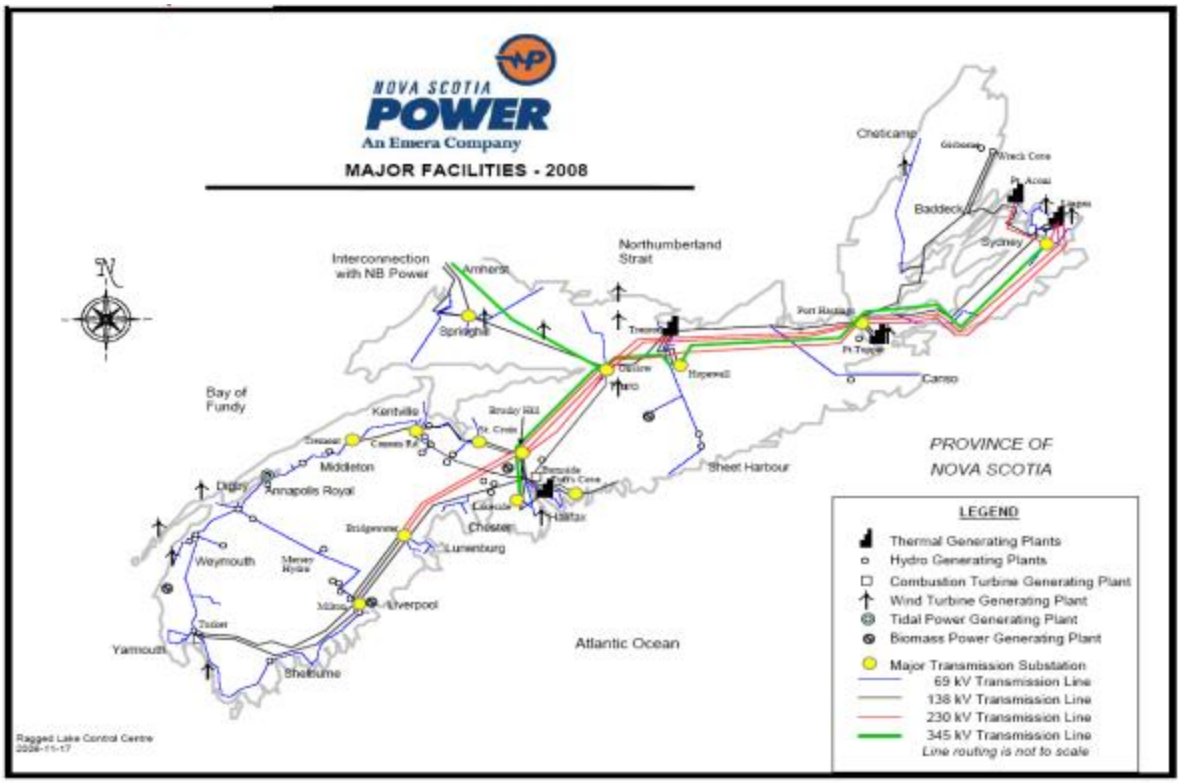



**Figure 1: Major NS Power Facilities – Bulk Transmission System Configuration**[2]

Refer to Drawing 8, for an overview of the Project's location, existing land use, Landrie Lake watershed protection zones, and surrounding features.

[2]Figure obtained from the *Transmission & System Operator Options for Nova Scotia Report*, prepared by SNC Lavalin for the Nova Scotia Department of Energy, December 2009.

## 3.3 Pre-Existing Operations

The existing Point Tupper Terminal (formerly owned by NuStar Energy) is operated as a 7.7-million-barrel storage terminal which provides petroleum storage, blending, and trans-shipping capability and serves North America's East Coast, South America, and Europe. The existing site was registered under the *Environment Act*, S.N.S 1994-95, c.1 in 1990. Multiple industrial approvals and associated permits are associated with the site's operations, and a list of these permits and approvals have been included as Appendix A.

The existing Point Tupper Terminal was initially developed in the late 1960's for industrial use as a refinery; and a gas fractionation plant was later added in the 1990's with storage and distribution terminals and auxiliary operations. The current operation is connected by a common transmission line operated by NS Power (see Figure 1). This transmission line supplies electricity to the existing Point Tupper Terminal, as well as Port Hawkesbury Paper (a manufacturer of supercalendered paper), and the Point Tupper NS Power Generating Station (which produces 150 MW of electricity through the coal-fired thermal generating station).

### 3.3.1 Storage Facility

The current infrastructure at the existing Point Tupper Terminal consists of storage tanks and pipeline systems including:

- 39 aboveground storage tanks (ASTs)
- A butane pressure tank
- Containment dykes
- Steel and concrete pipe racks
- Aboveground steel piping (from the ASTs to the jetty)

### 3.3.2 Marine Terminal

The marine terminal infrastructure associated with the existing Point Tupper Terminal consists of:

- An earthen berm causeway lined with armour stone which extends approximately 120 m into the Strait of Canso.
- Three trestle towers and a trestle bent, supporting a one-lane road, pipeway system, walkway, instrumentation, and electrical cable trays.
- A steel bridge trestle system which spans from the causeway, between the towers and to the trestle bent near the operator building at the Berth No. 1 loading platform.
- Berth No. 1 which supports a fendering system, quick release hooks (QRHs), capstan winches, two gantry cranes, operator's building, substation, fire pumps and suppression system, testing building, loading arms, gangway tower, and roadway.
- Berth No. 2 which supports a fendering system, QRHs, capstan winches, fire pumps and suppression system, loading arms and the access road, which terminates at the south side of the loading platform.
- The dock itself which contains eight hydraulic loading arms at Berth No. 1 and six

hydraulic loading arms at Berth No. 2.
- Two breasting dolphins at either side of Berth No. 1 which are equipped with a fendering system.
- Eleven mooring dolphins which are equipped with QRHs and capstan winches. All mooring dolphins are connected via steel truss walkways.

In addition, a floating barge anchored to land bollards provides a berth south of the main marine facility which houses three tugboats. There is a gangway to access the barge.

### 3.3.3 Effluent Treatment System

The effluent treatment system (see Figure 2) at the existing Point Tupper Facility consists of:

- American Petroleum Institute (API) Separator [Oil/Water (OW) Separator]
- Intermediate Pond
- Aeration Pond
- Settling Pond
- Effluent Discharge

Once the effluent reaches the settling ponds, the clarified liquid is decanted and directed to a natural drainage where it will eventually dissipate into the Strait of Canso.

**Figure 2: Overview of the effluent treatment system at the existing Point Tupper Terminal**

According to Canplan Consultants Limited (1975), the existing effluent system was designed to handle a design flow capacity of 20,000 barrels per hour (Bbl/hr) [3,175 cubic meters per hour ($m^3$/hr)], for the purposes of treating ballast water from oil tankers; however, the effluent treatment system is no longer used for this purpose.

The Proponent provided one year of historical daily outflow data from the system. The findings concluded that the average daily outflow within the data period did not exceed 500 $m^3$/hr.

### 3.3.4 Historical Data

A summary of previous work conducted at the existing Point Tupper Terminal has been included as Appendix B.

## 3.4 Regulatory Framework

To operate a green hydrogen/ammonia production facility, various approvals and permits from federal, provincial, and municipal regulators will be required.

A summary of the anticipated permitting and regulatory requirements for this Project is provided in Appendix C. Note that the required approvals and permits may not be fully scoped at this stage of the Project; however, these will be determined with greater certainty in future study phases.

### 3.4.1 Federal

The Project will be regulated by several Canadian Federal departments including Fisheries and Oceans Canada (DFO), Environment and Climate Change Canada (ECCC), Local Port Authority Natural Resources Canada (NRCan), Canadian Transport Commission, and Canadian Wildlife Services.

A Federal Impact Assessment (previously known as a Federal Environmental Assessment) is not required for the Project as the Project is not located on federal land and is not listed as a physical activity that constitutes a “designated project” under the Schedule for the Regulations Designating Physical Activities under the *Impact Assessment Act,* SOR/2019-285.

A list of the anticipated federal approvals and permits are provided in Appendix C.

### 3.4.2 Provincial

The Project is subject to a Class I EA per Section 11(3)(b) of the Environmental Assessment Regulations under the *Environment Act*, S.N.S 1994-95, c.1, as the amount of chemical storage capacity exceeds 5,000 $m^3$. As a result, the Proponent is required to register the Project with NSECC and comply with the EA process outlined in A Proponent's Guide to Environmental Assessment (NSECC, 2017).

A list of the anticipated provincial approvals and permits are provided in Appendix C and required approvals and permits will be obtained prior to the construction and operations phases, as applicable.

### 3.4.3 Municipal

Municipal approvals and/or permits may be applied to the Project for any development prescribed within the West Richmond municipal planning guidelines (MCR, 2000). In addition, Project components may be subject to provisions under the *Municipal Government Act,* S.N.S. 1998, c.18.

A list of the anticipated provincial approvals and permits are provided in Appendix C.

Project activities will also require the withdrawal of water from the Landrie Lake watershed. The Landrie Lake watershed has been split into a designated Watershed Protection (W-1) Zone and a Watershed Protection Periphery (W-2) Zone, per the West Richmond Land Use By-Law (MCR, 2000) (Drawing 8 A).

As prescribed in the West Richmond Land Use By-Law, no Development Permit will be issued in a Watershed Protection (W-1) Zone, except for institutional uses, public and private utilities, and passive recreational uses not involving structures other than accessory buildings.

The Watershed Protection Periphery (W-2) Zone permits limited development while ensuring that the remaining undesignated watershed lands area are protected. No Development Permit will be issued in a Watershed Protection Periphery (W-2) Zone, except for institutional uses, public and private utilities, passive recreational uses not involving structures other than accessory buildings, and expansions to existing industrial services will be permitted only by development agreement (MCR, 2000).

In addition to the criteria set out in the municipal by-laws (MCR, 2000) and per regulatory correspondence letter (Murphy, 2022) for ministerial permission, a written report related to the Project's development will be prepared by a qualified person, which will include the potential effects on air, soil, groundwater quality, and watercourses. The written report is in development and will be submitted under separate cover to the Minister of Environment and Climate Change for approval, following EA Registration.

The Project intends on making use of the pre-existing water utility infrastructure to transport water from Landrie Lake to the Industrial Facility Raw Freshwater Treatment Plant (RFWTP) (see Section 5.2 for additional details).

# 4.0 DESCRIPTION OF THE UNDERTAKING

## 4.1 Siting Considerations

When siting possible Project locations, adjacent to the existing Point Tupper Terminal location was ideally suited for the following reasons:

- Deepest ice-free port on the East Coast of North America
- Two pre-existing berths (Berth No. 1 and Berth No. 2) currently in operation
- 570 ha of available land
- Zoned Heavy Industrial and within the Point Tupper industrial Park
- Existing operations and infrastructure in place (associated with the existing Point Tupper Terminal)
- Existing utility infrastructure (i.e., transmission, rail, water line, and pipelines) in close proximity

The Project will also be in proximity to local wind energy suppliers and development companies. Through agreements with these suppliers and NS Power, the Project will benefit from Nova Scotia's available renewable resource and the power supplied will be Certified Green energy.

### 4.1.1 Setbacks & Separation Distances

The Industrial Facility and the Transmission Interconnection Line corridor will be constructed within the MCR. According to the West Richmond Land Use By-law (MCR, 2000), the Industrial Facility is located in a Port Industrial Zone (I-2). The Transmission Interconnection Line corridor is located in a Light (I-1), Port (I-2), and Heavy (I-3) Industrial Zones, as well as a Water Protection Periphery (W-2) Zone (MRC, 2000).

No development permit will be issued except in conformity with the following requirements:

**Table 4.1: West Richmond Setbacks and Lot Requirements**

| Requirement | I-1 | I-2 | I-3 | W-1 | W-2 |
|---|---|---|---|---|---|
| Minimum Lot Area ($m^2$) | 930 (Municipal Servicing)<br>2,700 (On-site Services)* | 2,700* | 2,700* | - | 2 ha |
| Maximum Height of Main Building (m) | 15 | - | 15 | - | 15 |
| Maximum Lot Coverage (%) | - | - | 50 | - | 30 |

*Adapted from MCR, 2000*
-: no data
*: subject to NSECC standards

In addition, current data on Nova Scotia's forests, wildlife, wetlands, Crown lands, and protected areas was reviewed to ensure the Project layout minimally impacts and/or avoids environmentally sensitive areas. The following databases were reviewed when siting the Project:

- Areas identified under the *Special Places Act*
- Canadian Heritage Rivers
- Designated Provincial Parks and Park Reserves
- Designated Water Supply Areas
- Forestry (Old Growth)
- Municipal Water Supply Areas
- National Historic Sites and Parks
- National Migratory Bird Sanctuaries
- National Parks and Adjuncts
- National Wildlife Areas
- Native Reserve Lands
- Nature Conservancy of Canada Lands
- Natural Watershed Municipal Surface Water Supply Areas
- Nesting Areas
- Non-designated Rail Corridors
- Operational Non-designated Parks and Reserves
- Over-wintering zones (Deer, Moose)
- Parkways
- Pipeline Corridors
- Protected Beaches
- Provincial Game Sanctuaries
- Provincial Wildlife Management Areas
- Ramsar Wetland Sites
- Sites of Ecological Significance
- Species of Concern Areas
- Trails Act Lands
- Wetland Inventory Areas (i.e., bog, fen, march, swamp, and water)
- Wilderness Areas

In addition to the above dataset considerations, in designing the Industrial Facility and Transmission Interconnection Line corridor, pre-screening field surveys were also completed to assess potential Project layouts (Drawings 2 and 3).

In assessing the Industrial Facility, field screening consisted of wetland and watercourse delineations, fish and fish habitat studies (i.e., electrofishing), as well as incidental observations of SOCI and their associated habitat.

In assessing the Transmission Interconnection Line, field screening consisted of assessing a select portion of Crown Land PIDs and field crews surveyed the areas with the following constraint considerations in mind:

- Transmission Interconnection Line poles can be placed a maximum distance of 160 m apart.

- Where possible, wetlands or watercourses will be spanned rather than constructing within them.
- If wetlands or watercourses are not able to be spanned (i.e., the water feature is >160 m across), the wetland and/or watercourse area will be avoided wherever possible.
- Existing NS Power transmission corridor right-of-ways were paralleled where practical.
- Wet Area Mapping was consulted, and where possible, areas with up to 0.5 m depth to water were avoided.
- The Project has adopted a buffer of up to 200 m near any Species at Risk and/or Protected Areas identified (species dependent).

## 4.2 Spatial & Temporal Boundaries

The Project activities pertaining to hydrogen and ammonia production, as well as the Transmission Interconnection Line, will be contained within the Project Boundary as described in Section 2, Drawing 5.

The Project components related to the hydrogen and ammonia production plants (i.e., the Industrial Facility) will be contained within PID 75006593, which is located within a property owned by the Proponent, adjacent to the existing Point Tupper Terminal (Drawing 7).

The activities related to the Transmission Interconnection Line corridor spans multiple PIDs and is primarily located on Crown Lands. An overview of the PIDs can be found in Drawing 4.

A summary of all of the PIDs that will be considered as part of the Project Boundary are provided in Table 4.2. The PIDs included below incorporate all Project activities associated with both the Industrial Facility and Transmission Interconnection Line corridor as well as those PIDs that may potentially be used for construction access and/or maintenance purposes.

**Table 4.2: Overview of PIDs Included as Part of the Property Boundary**

| PID # | PID Ownership Information | Project Component |
|---|---|---|
| 75125450 | EverWind Terminals Canada Co., EverWind Terminals Canada Holdings Co., and Point Tupper Marine Services Co. | Industrial Facility |
| 75006593 | EverWind Terminals Canada Co,, EverWind Terminals Canada Partnership, and Point Tupper Marine Services Co. | Industrial Facility |
| 75201434 | Cape Breton & Central Nova Scotia Railway Limited | Transmission Interconnection Line |
| 50001726 | Trade and Industry, Her Majesty the Queen in Right of the Province of Nova Scotia | Transmission Interconnection Line |
| 50176221 | Her Majesty the Queen in Right of the Province of Nova Scotia | Transmission Interconnection Line |

| PID # | PID Ownership Information | Project Component |
|---|---|---|
| 50124635 | Her Majesty the Queen in Right of the Province of Nova Scotia | Transmission Interconnection Line |
| 75108043 | Her Majesty the Queen in Right of the Province of Nova Scotia | Transmission Interconnection Line |
| 75107979 | Her Majesty the Queen in Right of the Province of Nova Scotia | Transmission Interconnection Line |
| 75108027 | Her Majesty the Queen in Right of the Province of Nova Scotia | Transmission Interconnection Line |
| 50006352 | Her Majesty the Queen in Right of the Province of Nova Scotia | Transmission Interconnection Line |
| 50176833 | Her Majesty the Queen in Right of the Province of Nova Scotia | Transmission Interconnection Line |
| 50007012 | Her Majesty the Queen in Right of the Province of Nova Scotia | Transmission Interconnection Line |
| 50176858 | Her Majesty the Queen in Right of the Province of Nova Scotia | Transmission Interconnection Line |
| 50176874 | Her Majesty the Queen in Right of the Province of Nova Scotia | Transmission Interconnection Line |
| 50176866 | Her Majesty the Queen in Right of the Province of Nova Scotia | Transmission Interconnection Line |
| 75107920 | Municipality of the County of Richmond | Transmission Interconnection Line |
| 50176643 | NS Department of Natural Resources and Renewables | Transmission Interconnection Line |
| 75125377 | NS Department of Transportation and Public Works | Transmission Interconnection Line |
| 50007814 | NS Department of Environment and Climate Change | Transmission Interconnection Line |
| 50007814 | NS Department of Environment and Climate Change | Transmission Interconnection Line |
| 50007061 | NS Department of Natural Resources and Renewables | Transmission Interconnection Line |
| 50006998 | NS Department of Natural Resources and Renewables | Transmission Interconnection Line |
| 50006949 | NS Department of Natural Resources and Renewables | Transmission Interconnection Line |
| 50006808 | NS Department of Natural Resources and Renewables | Transmission Interconnection Line |
| 50006964 | NS Department of Natural Resources and Renewables | Transmission Interconnection Line |
| 50006329 | NS Department of Natural Resources and Renewables | Transmission Interconnection Line |
| 50006923 | NS Department of Natural Resources and Renewables | Transmission Interconnection Line |
| 75035725 | Point Tupper Marine Services Co., EverWind Terminals Canada Co., EverWind Terminals Canada Holdings Co. | Transmission Interconnection Line |
| 75053447 | Richmond County-Port Hawkes Joint Dev Co | Transmission Interconnection Line |

The temporal boundaries for the Project encompass all Project phases, from construction, operations, maintenance, and decommissioning.

## 4.3 Project Phases

The Project phases will be separated into the following categories:

- Site Preparation and Construction
- Operations
- Maintenance
- Decommissioning
- Environmental Management & Protection.

The subsequent sections detail the key components within each phase of the Project, and will be modified (as required) as the phases and Project progress.

Accidents, malfunctions, and unplanned events are addressed separately in Section 17..

### 4.3.1 Site Preparation & Construction

Construction activities will not occur until the necessary Approvals, Permits and permissions are received (including procurement of an EA Approval and associated permitting requirements).
Site preparation and construction activities for the Industrial Facility component will be performed by Black and Veatch (B&V), an EPC contractor; the Transmission Interconnection Line corridor development will be completed by Connect Atlantic Utility Services (CAUS) (or selected contractors).

All construction staging areas are anticipated to occur within the proposed Project Boundary (Drawing 5).

#### *4.3.1.1 Industrial Facility*

The proposed Industrial Facility layout will cover approximately 23.6 ha, with a total of 3.3 ha footprint associated with the hydrogen plant development and 1.6 ha associated with the ammonia plant development; remaining area will be occupied by laydown areas, and other infrastructure, as indicated in Drawing 10. The Industrial Facility will be developed east of the existing Point Tupper Terminal and will require the use of the following equipment:

- Backhoes
- Bulldozers
- Compactors
- Compressors
- Cranes
- Dump Trucks
- Excavators
- Forklifts
- Generators
- Graders
- Loaders
- Manlifts
- Mixer Trucks
- Pickup Trucks
- Pile Boring Machines
- Pile Driving Machines
- Tractors/Trailers
- Tree Clearing and Harvesting Equipment
- Trenchers
- Vacuum Trucks

- Ground Heaters
- Heavy Haulers
- Welding Machines

*Site Preparation*

Site preparation will include geotechnical surveys, clearing, grubbing, and grading. A geotechnical survey will determine soil competency, as well as the potential for acid rock exposure and subsequent generation of acid rock drainage (ARD) in the area. If ARD material is encountered and exceeds regulatory limits, a management plan will be developed and submitted to NSECC for approval [this will be included as a component of the Project's Environmental Management Plan (EMP), see Appendix D for details]. The geotechnical investigation will ensure the area is able to support the various facilities and roads to be developed within the Project Boundary.

Following the geotechnical surveys, the Industrial Facility footprint will be cleared of vegetation (i.e., trees and shrubs) using tree clearing and harvesting equipment. Clearing activities are not anticipated to occur within 30 m of wetland or watercourse areas, should this be required, a Wetland and/or Watercourse Alteration Application (as applicable) will be submitted and Approval will be obtained from NSECC prior to proceeding. During this phase, the overburden (i.e., stumps, roots, downed timber, humus, and topsoil) will be removed (i.e., grubbed) to expose the compacted soil layer (i.e., hardpan) and/or underlying bedrock. Grubbed material will be transported to a disposal site and any material which may be used in successive phases will be retained on-site for re-use in landscaping and grading.

Grading of the Industrial Facility will require cut and fill activities. Generally finished grade elevations for roads and yards will be set at a minimum of 6 inches below the finished floor elevation of buildings, with local access ramps which will be provided at entrance doorways as required. Finished grading and stabling yard grading will be set to slope away from planned structures at 2% minimum, away from the building and followed by a minimum 0.5% slope from thereon. Site grading will drain to a stormwater collection system (see Section 5.9.3 for further details).

In the case of exposed bedrock during construction activities, blasting activities may be required to accommodate the Industrial Facility structural designs. In areas where rock blasting is required to achieve the proposed elevations, rock will be blasted to 500 mm below the bottom of the sub-base and then backfilled with crushed rock or granular material to allow for rock over-breaking and under-breaking. In the event blasting is required, a management plan will be developed and implemented to minimize potential impacts to the surrounding infrastructure and environment (this plan will be incorporated as part of the Project's EMP, refer to Section 4.3.5 for more details). Explosives will not be stored on-site and will be transported to the required location on the day of the scheduled blast. Blast monitoring will be carried out as required.

Compaction will be incorporated in the grading phase. Compaction methods will be in accordance with geotechnical specifications (e.g., 200 mm lifts compacted at 100% maximum dry density).

Access to the Project will be via the existing perimeter roads that are well established. In addition to the existing roadways, a network of new roads will be constructed within the Industrial Facility, to facilitate access to the various Facility components and streamline on-site transportation. On-site roads will be two-lane roads with a total roadway width of 6 m, and a 1 m wide shoulder on either side. The roads will be equipped with roadside drainage ditches and will have a minimum cross slope of 2% and a maximum longitudinal grade of 8%.

*Construction Activities*

Following site preparation, a survey team will locate and mark the Industrial Facility component locations. The survey data will be provided to the design engineer to confirm final elevations and infrastructure/building locations. Following the surveying activities, contractors will install the necessary footings and foundations. Footings and foundations will be constructed of concrete and reinforcing rebar (as per engineering designs). Where piles (i.e., timber and/or steel) are required, the penetration for any pile will not be less than 3 m in hard material, and not less than 30% the length of the pile, nor less than 6 m, in soft material. For foundation work, piling used to penetrate very soft material overlying hard material, will penetrate the hard material sufficiently to ensure the ends are fixed and rigid.

Prior to commencing the construction of the Industrial Facility and its associated works, construction laydowns and storage areas will be established for the temporary placement of equipment and construction materials. Following the formation of laydown and storage areas, the erection of the southern substation and associated infrastructure will be prioritized, as electricity will be required during the early phases of construction. The remaining Industrial Facility components (with the exception of the flare stacks) will be constructed as equipment and building materials are delivered and available, and will follow the sequencing determined during the Project's development and design phase. Once all Industrial Facility components and associated civil and structural works are constructed, the ammonia process and storage flare stacks will be erected. Various contractors will be responsible for erecting (framing) building walls, roofs, ammonia storage tanks and enclosures; and specialist contractors will be used to support with the various component installs.

Site drainage during construction will be managed through grading and a system of diversion ditches and open channels. Drainage diversion ditches will be designed for a 100-year storm return period and will generally be excavated to a depth of 1 m below ground level, with an aboveground berm approximately 0.5 m to 1.0 m high. The diversion ditches will be trapezoidal in shape with 2H:1V side slopes below ground and 1.5H:1V slopes above ground. Diversion ditch outlets will be lined with riprap (or equivalent) to minimize the risk of erosion.

Collection ditches will be designed for a 25-year storm return period and will be Trapezoidal in shape. The minimum depth for the ditches will be 300 mm. A 2H:1V side slope is assumed for the drainage ditches. Collection ditches will be assessed during storm events and lined with geotech (or equivalent) if/as needed.

A review of environmental considerations, mitigations and best management practices to be followed during Industrial Facility construction activities, can be found under Section 13.0, Environmental Effects Assessment.

#### *4.3.1.2 Transmission Interconnection Line Corridor*

The 230 Kv Transmission Interconnection Line consists of a 70 m wide corridor extending from Point Tupper to Melville, NS and covering approximately 14 km.

All construction will be completed by CAUS (or selected contractors) and equipment anticipated to be required during the Transmission Interconnection Line construction phase of the Project includes the following:

- Pickup Trucks
- ATVs
- Tree Clearing and Harvesting Equipment (Forwarders, etc.)
- Reel Stand
- Conductor Puller/Tensioner
- Tracked Radial Boom Derricks
- Tracked Bucket Machines
- Tracked Cranes
- Tracked Dump Decks
- Tracked Drilling Units
- Helicopter
- Excavators
- Loaders
- Trailers

*Site Preparation*

Prior to beginning construction activities, a site survey will be completed by CAUS (or selected contractors) to identify the best points of access for the various locations along the Transmission Interconnection Line corridor route. To complete the survey, desktop reviews, drone flights and on-site assessments will be conducted.

Once access is confirmed, a subcontractor will be hired to complete flagging, tree clearing, and development of the construction access route. A pre-clearing assessment will be completed by an environmental consultant. Once the proposed access route is approved (i.e., no environmental concerns are identified), clearing will take place. The tree clearing contractor will clear to the corridor boundary in accordance with all permits and the Project's EMP. Access will be constructed for the rock excavation subcontractor and CAUS (or selected contractor) by the tree clearing contractor during tree clearing. This will include the installation of temporary access roads to and within the Transmission Interconnection Line corridor, including brush matting, corduroy, and timber mats where necessary. This will also include development of laydown areas along the corridor for conductor stringing setups, rock anchor installations, and temporary storage areas.

To proceed with the clearing activities, topsoil, tree removal, and brushing will occur and temporary access roads will be built to provide access to the Transmission Interconnection Line corridor for construction vehicles and equipment. Clearing activities are not anticipated to occur within 30 m of wetland or watercourse areas, should this be required, a Wetland and/or Watercourse Alteration Application (as applicable) will be submitted and Approval will be obtained from NSECC prior to proceeding. Materials and equipment will be transported to site via flatbed trucks and floats. Wherever possible, existing roads and trails will be used for access, as well as the Transmission Interconnection Line corridor route itself. Additional access points/roads will only be considered in order to avoid water crossing areas, sensitive habitats, and/or undue travel along the corridor for some of the more remote areas along the route. The crew will work in a linear fashion from one end of the Transmission Interconnection Line to the other to allow the applicable trades to commence work in the same linear fashion prior to the completion of tree clearing throughout the corridor.

CAUS (or selected contractors) will hire a subcontractor to complete surveying and staking of the structure locations and other key points along the Transmission Interconnection Line route. The survey data will be returned to the engineer to confirm final elevations and structure locations. The survey crew will work intermittently in sections following the tree clearing contractor.

CAUS (or selected contractors) will hire a drilling subcontractor to complete probing, rock excavation, and rock anchor installation. The drill crew will mobilize its tracked drills to site along with the requisite rock anchors, grout, and miscellaneous supplies. The crew will go to every structure in a linear fashion to probe with its drill or excavator to confirm whether rock exists at the structure. If rock exists at the structure, it will be excavated to depth and backfilled with native materials and any rock anchors will be installed. If rock does not exist the drill crew will move to the next structure.

*Construction*

CAUS (or selected contractors) will perform pole setting and anchoring. Pole setting crews will work in a linear fashion following the rock excavation crews. The crews will excavate the pole holes to depth, install the poles, and backfill using native materials.

CAUS (or selected contractors) will also complete structure framing. Structure framing crews will work in a linear fashion following the pole-setting crews. The crews will install cross arms and braces, install hardware, and hang insulators and travellers.

Once pole setting, anchoring, and structure framing are in place, CAUS (or selected contractor) will utilize dedicated stringing crews to complete the installation of the new conductor. The stringing crew will complete the work linearly, unimpeded, section-by-section from one end of the line to the other. Following the Issued for Construction (IFC) design, these individual stringing sections will be identified based on the location of dead-ends and heavy angles. It is anticipated that the sections will average 3 km in length.

Work plans will be developed for each stringing section, including considerations for stringing over highway crossings, railroad crossings, protected wetlands, and watershed areas; these items, as well as numbers of dead ends in each section, holdoffs required, and other key considerations prior to construction will also be incorporated.

For each stringing section, the stringing crew will build bonded stringing pads for puller and tensioner sites. At one end of the section will be the tensioner and the new reels, and at the other end will be the puller and the rope reels. The stringing crew will send persons ahead to install travellers on existing conductors where travellers are not already installed. The crew will then prepare to pull the ropes through the travellers from the puller site to the tensioner site.

Based on the terrain, the crew will either pull the ropes using a helicopter or conventionally using a tracked machine. The conventional method of pulling ropes with a tracked machine will require the ability to traverse the entire length of the Transmission Interconnection Line corridor by land as the ropes need to be pulled linearly from structure to structure. Once the ropes are installed, the crews will attach the ropes to the conductors at the tensioner site and use the ropes to pull the conductors back to the puller site. Once installed, the crews will pull the conductors up to sag in accordance with the IFC design. Following this, the crew will break into clamping and dead-ending crews that will travel to each structure and complete them. During clamping and dead ending, the remainder of the crew members will ensure reels are delivered, pulling and tensioning locations are setup, and travellers are installed for the next section.

CAUS (or selected contractors) will complete walk-downs on a section-by-section basis as work is completed. As the walk-downs are completed, work areas will be cleaned-up, and the Transmission Interconnection Line corridor will be reinstated on a section-by-section basis in accordance with all permits. As construction is completed, close-out documentation, collection of any/all remaining materials and debris, and demobilization from the Project site will take place.

The construction of both the northern and southern substations will require laydowns of approximately, 130 m by 160 m. Within this cleared area a crushed stone/gravel laydown area will be constructed, and be graded to allow stormwater diversion. An accessory building to house the substation equipment will be erected within a fenced compound.

Site drainage during construction activities will be managed on a case by case basis and consideration will be given to working within proximity to wetland and watercourse locations. As necessary, materials used to manage site drainage during construction activities may include temporary drainage ditches, sandbags, matting, silt fencing, and/or other erosion control devices.

A review of environmental considerations, mitigations, and best management practices to be followed during the Transmission Interconnection Line construction activities, can be found under Section 13.0, Environmental Effects Assessment.

### 4.3.2 Operations

Operations at the Industrial Facility are anticipated to occur 24 hours/day, 7 days/week, with the exception of scheduled shutdowns and unscheduled outages (loss of power).

During the Operations Phase, ammonia will be produced from hydrogen and nitrogen through technologies provided from Siemens and KBR. The hydrogen and ammonia produced at the Facility will equate to approximately 38,000 tonnes of hydrogen ($tH_2$) per year and approximately 213,000 tonnes of ammonia ($tNH_3$) per year. Produced ammonia will be transferred from the ammonia storage tanks to the loading dock for transport via shipping vessel. The Project will utilize the existing Point Tupper Terminal jetty infrastructure to load the shipping vessels.

Shipping vessels to be utilized to transport the ammonia are under consideration. Preliminary discussions with ammonia shipping vessel fabricators indicate that the cargo capacity would likely be in the range of 23,000-28,000 $m^3$ of ammonia per trip. Depending on the final determination on the type and capacity of the ammonia shipping vessel to be used, the Proponent is anticipating approximately 5-8 trips per year.

Specialized personnel will operate and maintain the equipment necessary for the Project. Specialized facility operators will monitor the Industrial Facility shipping infrastructure to ensure proper function and efficiency is achieved.

The Transmission Interconnection Line operations, including associated infrastructure (i.e., poles, cables, etc.), maintenance, and equipment operations will be the responsibility of NS Power.

### 4.3.3 Maintenance

Maintenance activities will apply to the Project roadways and site infrastructure. Repair of roadways, structures, and other civil works typically do not require a shutdown and will be carried out during routine operations of the Industrial Facility. Routine maintenance requiring a shutdown includes scheduled catalyst change out, replacement of end-of-life process equipment, repair/replacement of damaged process or electrical components, etc. The length of a shutdown will vary but it is anticipated that the plant availability in the first year will be approximately 90%, resulting in approximately 5 weeks offline. During the anticipated shutdowns, routine maintenance of the Industrial Facility and associated works will be performed on equipment requiring a shutdown state and repairs will be completed concurrently whenever possible.

Ongoing equipment maintenance will include routine inspections of the equipment, piping, storage tanks, operating facilities, drainage ditches, stormwater pond, and other associated site infrastructure to maintain proper operations. If equipment or site infrastructure is found to be faulty or inoperable, site personnel will be responsible for identifying the issue and arranging for the repair and/or replacement of components or equipment as required.

Included in the maintenance procedures will be the monitoring of water quality entering the hydrogen plant. To produce hydrogen, water must meet pre-determined process specifications; therefore, operators and technicians will ensure the water treatment system is properly operating and that the raw freshwater (obtained from Landrie Lake) is meeting the necessary specifications prior to use in electrolyzer operations. The water pumping equipment and associated pipeline will be managed and monitored by the LLWU.

Note that in certain cases, third party specialized professionals and/or contractors will be hired and/or brought in to assist with maintenance activities, as applicable.

### 4.3.4 Decommissioning

Generally, the decommissioning phase will follow the same steps as the construction phase and include dismantling and removal of all equipment, facilities, and associated infrastructure, followed by site grading and reclamation through revegetation. Prior to Project decommissioning, regulatory requirements will be reviewed and implemented accordingly and a decommissioning plan will be developed and submitted to NSECC for approval.

### 4.3.5 Environmental Management & Protection

Environmental management and protection will be implemented throughout the various programs and activities that take place on the Project, and in accordance with the applicable regulatory guidelines and associated permits and approvals. An EMP will be developed upon EA Approval and prior to construction activities proceeding; Environmental Protection Plans (EPPs) will also be developed as needed/as applicable.

Refer to Appendix D, for additional details regarding the proposed Table of Contents for the EMP associated with the Project.

## 4.4 Project Schedule

Table 4.3 summarizes the Project schedule from the EA Registration through to decommissioning activities.

**Table 4.3: Proposed Project Schedule**

| Project Activity | Timeline |
|---|---|
| EA Registration | Fall 2022 |
| Site Preparation/Construction Phase | Spring 2023 |
| Commissioning | Fall 2023 |
| Operations/Maintenance | Fall 2025 |
| Decommissioning | Fall 2065 |

Note that the first product shipment anticipated for Fall 2025.

# 5.0 PROCESS DESCRIPTION

The Certified Green energy hydrogen and ammonia production facility Project will be developed east of the existing Point Tupper Terminal and will consist of the following components:

- A 300 MW hydrogen plant
- A 600 MTPD ammonia ($NH_3$) plant
- A 230 kV substation and power distribution system (i.e., Transmission Interconnection Line)
- A marine loading pipeline for liquid ammonia product distribution to shipping vessels

Hydrogen ($H_2$) will be generated from the Siemens S300 System. Through this technology, hydrogen will be produced by separating raw water into its molecular components ($H_2$ and $O_2$). Similarly, atmospheric air will be separated into its constituents to obtain nitrogen ($N_2$). The Haber-Bosch process will be used by the Project to combine molecular hydrogen gas ($H_2$) with nitrogen gas ($N_2$) under high temperature and pressure to synthesize the production of ammonia ($NH_3$). The power requirements for these processes will be provided by NS Power through Certified Green energy supplied via the Transmission Interconnection Line and associated substations.

By utilizing the Haber-Bosch process for ammonia production in conjunction with Certified Green energy supplied by NS Power, $CO_2$ emissions are significantly lowered compared to other ammonia production technologies (for additional details, refer to Section 1.3).

The following process flow diagram details the inputs and outputs of the ammonia generation train.

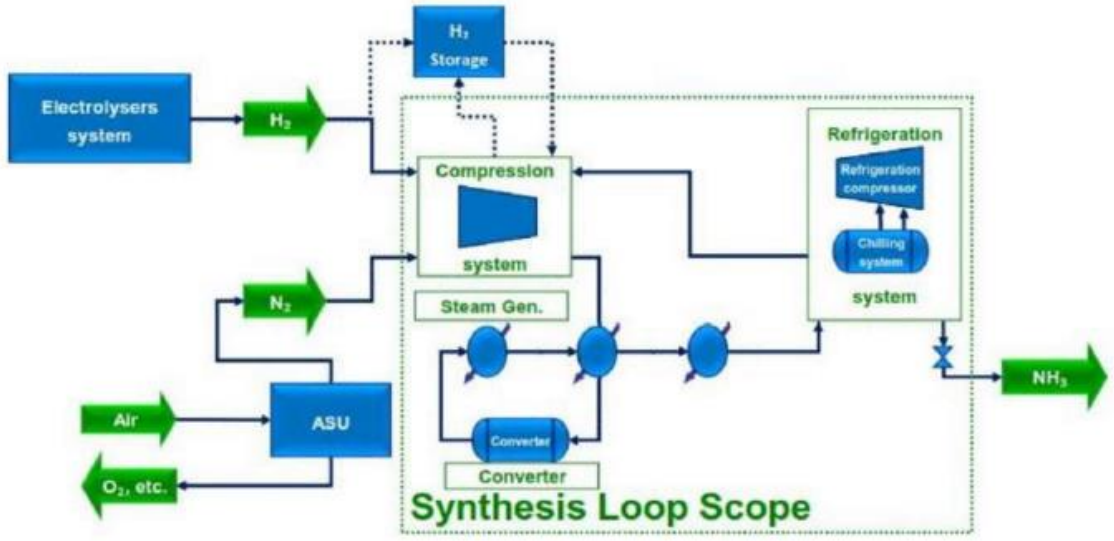



**Figure 3: Ammonia Production Block Flow Diagram**

## 5.1 Site Access, Hydrogen and Ammonia Plant Components

As previously mentioned in Section 4.3, access to the Industrial Facility will be via well-established existing perimeter roads. As necessary, a network of new roads will be constructed to facilitate access to the Project.

The Industrial Facility consists of the components required to produce green hydrogen and ammonia and all associated works. The following table summarizes the Industrial Facility components and their proposed footprint:

**Table 5.1: Industrial Facility Components and Proposed Footprint**

| Industrial Facility Component | Footprint |
|---|---|
| Air Separation Unit (ASU) | 32 m x 37 m |
| Ammonia (Synthesis) Plant | 70 m x 66 m |
| Ammonia Storage Area (i.e., tanks, refrigeration unit, forwarding unit) | 85 m x 130 m |
| Cooling Plant | Part of Hydrogen Plant |
| Common Facility (i.e., control rooms, offices, maintenance, storage, washrooms) | 50 m x 30 m |
| Electrical Building (for Southern Substation) | 20 m x 50 m |
| Flare Stack (Storage Flare) | TBD |
| Flare Stack (Process Flare) | TBD |
| Hydrogen Plant | 170m x 200 m |
| Hydrogen Buffer Tank Compressor & Pressure Reduction Station | TBD |
| Parking Lot | 100 m x 50 m |
| Raw Freshwater Treatment Plant | 70 m x 50 m |
| Wastewater Treatment Plant | 50 m x 70 m |
| Sanitary Wastewater Treatment Plant (Skid Unit) | 7 m x 15 m |

| Industrial Facility Component | Footprint |
|---|---|
| Stormwater Pond | 70 m x 165 m |
| Southern Substation | * |
| Temporary Construction Facilities | 75 m x 155 m |
| Temporary Laydown Area | 135 m x 500 m |
| (Raw) Water Line & Pump Station | TBD, developed by LLWU |

*Further details can be found under the Transmission Interconnection Line

The Industrial Facility location has been selected and oriented in such a way as to avoid any area of environmental significance (i.e., wetlands and watercourses), existing infrastructure (i.e., wind turbines, existing Point Tupper Terminal), incorporate pre-existing areas of disturbance (i.e., former borrow pit locations), and accommodate local topographical considerations.

The detailed engineering phase will finalize the layout prior to construction, at which point the layout will be reviewed and minor adjustments will be completed (as necessary) to confirm building locations, hydrogen and ammonia setback/safety considerations, building code requirements, roadway access, earthworks optimization, and other layout considerations and/or requirements determined during the final design stage.

A preliminary design layout of the Industrial Facility and associated Project components is supplied as Drawing 10.

## 5.2 Freshwater Requirements

### 5.2.1 Raw Freshwater Intake

The Project is expected to require an approximate daily average of 8.3 mega litres per day (ML/day) [equivalent to 345 cubic metres per hour ($m^3$/hr)] of raw freshwater, which includes water consumption demands for hydrogen production via electrolysis, cooling water system make-up, fire suppression systems, and potable water as summarized in Table 5.2.

**Table 5.2: Raw Freshwater Treatment Plant Capacities**

| Water Use Case | Nominal Flow Rate ($m^3$/hr) | Design Flow Rate ($m^3$/hr) |
|---|---|---|
| **Demineralized Water** | | |
| Electrolysis | 268.2 | 318.6 |
| Condensate Polisher Make-up | 0.8 | 1.0 |
| **Demineralized Water (Subtotal)** | **269** | **319.6** |
| **Potable Water** | | |
| Hydrogen plant utilities | N/A | - |
| Ammonia plant utilities | 1 | - |

| Water Use Case | Nominal Flow Rate ($m^3$/hr) | Design Flow Rate ($m^3$/hr) |
|---|---|---|
| Common buildings/facilities (Estimating 40-50 persons) | 0.5 | - |
| **Potable Water (Subtotal)** | **1.5** | **20** |
| **Condensate Polisher** | | |
| Condenser Return (in) | 21.8 | 24.0 |
| Condensate Polisher make-up | 0.8 | 1.0 |
| **Condensate Polisher (Total)** | **22.6** | **25.0** |
| **Other Requirements** | | |
| Mineralized Water make-up | **14.2** | **19.3** |
| Cooling Water | **60.5** | **68.5** |
| Raw Water Demand | **367.8** | **452.4** |

The LLWU owns and operates a pumphouse on the southwestern shore of Landrie Lake, the location of this pumphouse can be viewed in Drawing 7. The pumphouse currently has a total maximum capacity of 36.6 ML/day, and an existing average customer demand of 5.8 ML/day. Existing customers include NS Power, Sable Offshore, Town of Port Hawkesbury, the Point Tupper Industrial Development, and New Page (Stora) (NSUARB, 2019).

LLWU has evaluated and confirmed their ability to satisfy the Proponent's raw freshwater needs. A memorandum of understanding (MOU) has been executed between the Proponent and the LLWU for the withdrawal of 9.5 ML/day [2.5 million US gallons per day (MG/day)] from Landrie Lake. This quantity exceeds the Project's known water requirements (of 8.3 ML/day), but is intended to provide contingency capacity for potential future water demands.

The installation of a new raw freshwater supply pipeline is proposed from the existing LLWU Pumphouse (northeast of the Industrial Facility), to the on-site RFWTP; the raw freshwater pipeline is expected to be approximately 2.4 km in length. The raw freshwater pipeline will follow the existing road network and travel along pre-existing right-of-ways; see Drawing 7 for additional details. The pipeline will be 24" (610 mm) in diameter and constructed of high-density polyethylene (HDPE) piping designed to accommodate the 9.5 ML/day withdrawal volume to account for potential future water draw needs.

Note that LLWU will be responsible for determining the design requirements for construction and maintenance of the pump station and raw freshwater supply line connection for the Project.

### 5.2.2 Raw Freshwater Treatment

The on-site RFWTP will receive and treat the raw water obtained from Landrie Lake. The raw water will be treated via ultrafiltration (UF), reverse osmosis (RO) and electro-deionization

(EDI); additional details regarding each of these treatment processes can be found in subsequent sections.

Once treated, the raw water is effectively demineralized and will be supplied to the electrolyzers and the ammonia plant boiler feedwater pumps (discussed further in Sections 5.3 and 5.4, respectively).

In addition, the RFWTP will supply potable water to the potable water distribution system. The potable water distribution system provides treated water for drinking and greywater uses to the common facilities (e.g., offices, washrooms), as well as for intermittent service/utility use in the process facilities for washing and/or flushing purposes. All potable water will be treated to meet the Health Canada Guidelines for Canadian Drinking Water Quality (2020).

The following flow diagram summarizes the raw water treatment process.

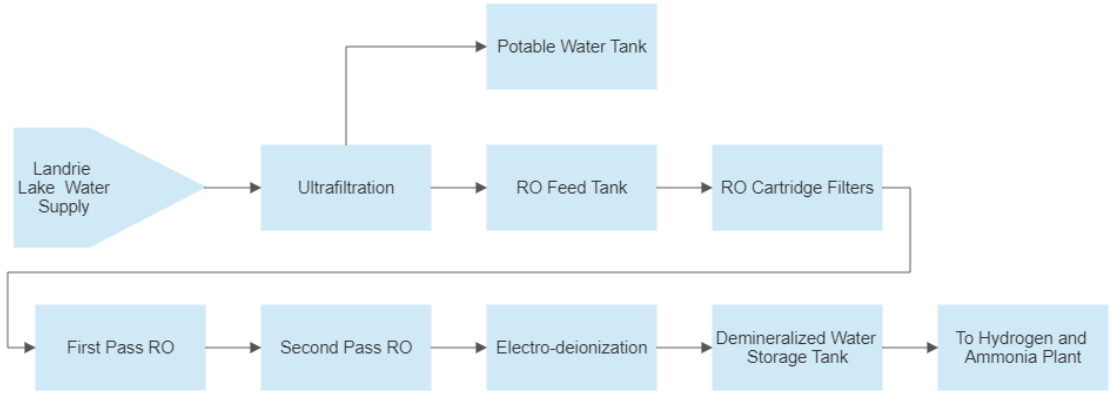



**Figure 4: Raw Water Treatment Flow Diagram**

At present, the Landrie Lake water quality is considered acceptable for direct makeup to evaporative freshwater cooling towers and facility fire suppression systems without any substantial treatment. Recent water quality data from the Landrie Lake Watershed has been included in Appendix E for reference.

#### *5.2.2.1 Ultrafiltration System*

The raw water will feed the UF system which removes fine colloidal (insoluble) particles suspended in the raw water by forcing raw water through a semi-impermeable membrane. The UF system will be designed to treat raw water for both process and potable water supply to the Industrial Facility. The UF system consists of a feed pump, basket strainer, and UF membrane modules.

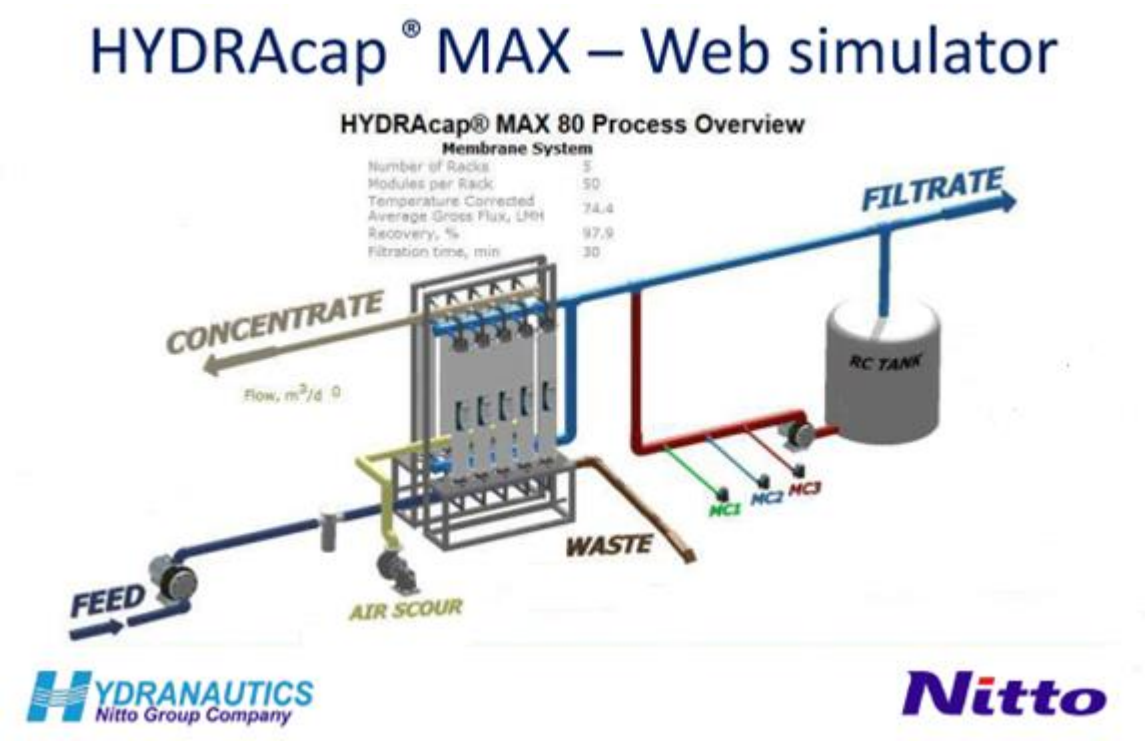



**Figure 5: Overview of the Ultrafiltration Treatment Process (Nitto, 2022)**

Based on the most recent water quality analysis for Landrie Lake (see Appendix E), the raw water contains elevated levels of iron, manganese, and total organic carbon (TOC). These contaminants will be reduced by the addition of an oxidant [i.e., chlorine (Cl) and/or potassium permanganate ($KmnO_4$)] and a coagulant ($FeCl_3$) ahead of the UF system. A portion of the UF filtrate will be sent to a potable water supply tank to supply the Project's potable water distribution system, while the remaining quantity will be directed to the RO Feed Tank to supply the reverse osmosis (RO) system. The potable water will be chlorinated (to sterilize and disinfect), and the pH and alkalinity will be adjusted with sodium carbonate ($NaCO_3$), which will control corrosion.

The UF membranes will be periodically subjected to a Chemical Enhanced Backwash (CEB) to remove foulants from the membranes and enhance the performance of the system. The CEB will be performed using UF filtrate with an acid, base, or oxidant added to effectively clean contaminants from the membrane surface. The cleaning chemicals will be selected based on the expected type of membrane fouling.

The UF membranes will also be periodically subjected to a clean in place (CIP) procedure, which includes backwash and chemical recycling processes to clean the membranes. UF filtrate will be used for CIP makeup and cleaning. The UF chemical (CEB and CIP) waste and concentrate will be sent to the Wastewater Treatment Plant (WWTP) prior to discharge to the on-site stormwater pond (see Section 5.9.3).

#### *5.2.2.2 Reverse Osmosis System*

Filtrate from the UF system is collected in an RO Feed Tank, which will serve as a source of backwash water for the UF system and a feed source for the RO system. The RO system is further divided into two sub-systems: First Pass RO (FPRO) and Second Pass RO (SPRO). RO is a high-pressured process which forces the raw water though a semi-impermeable membrane, removing unwanted contaminants (i.e., salts, bacteria, metals, etc.).

A set of pumps feed the FPRO system. The FPRO system consists of a single pass, two-stage system equipped with a cartridge filter, booster pump, and membrane pressure vessels. The filtrate streams from each FPRO stage will be combined and sent to the SPRO system for further removal of dissolved solids. The waste concentrate produced from the SPRO will be directed to the WWTP prior to discharge to the on-site stormwater pond (see Section 5.9.3).

An anti-scalant (product still to be determined) will be continuously fed to the RO feed pump to protect the RO membranes from scaling. DBNPA (2,2-dibromo-3-nitrilopropionamide), a biocide/microbiological inhibitor, and sodium bisulfite ($NaHSO_3$), a dechlorinator, are added to the water feed following the cartridge filters to remove any microbiological growth and residual chlorine, which can damage the RO membranes. In addition, sodium hydroxide (NaOH) is added following the FPRO to remove carbon dioxide ($CO_2$) present in the feed by converting it to bicarbonates which are then rejected by the RO membranes and processed at the WWTP.

Over time, the RO membrane elements are subjected to potential fouling by suspended material, bio-growth, or soluble contaminants. Once performance drops below a predetermined threshold, the RO membranes will be taken offline one bank at a time for on-site CIP processing. A skid-mounted CIP system will be provided. Chemical solutions such as hydrochloric acid (HCl), sodium hydroxide (NaOH), citric acid ($C_6H_8O_7$), or vendor specified specialty chemicals, will be utilized for cleaning the RO to recover membrane permeability and salt rejection capability. The spent cleaning solution will be discharged to the WWTP prior to discharge to on-site stormwater pond (see Section 5.9.3).

#### *5.2.2.3 Electro-Deionization System*

The SPRO filtrate water will be fed to the EDI system for further polishing to produce high purity water. EDI is the process of removing ionized or ionizable substances from water using ion exchange membranes, electrically active media (ion exchange resin), and a direct current (DC) electric potential. This is achieved by applying an electrical current to the water stream to force the ions to move through a resin and across a membrane. The EDI system will consist of two parallel skids, one operating and one spare. The deionized water from each skid will be combined and directed to the Demineralized Water Storage Tank. A set of demineralized water distribution pumps (operating and spare) will supply demineralized water to the various downstream processes. The spent cleaning solution and concentrate from each EDI skid will be combined and sent to the RO Feed Tank.

Note that a common CIP system will be used for UF, RO, and EDI systems.

## 5.3 Hydrogen Plant

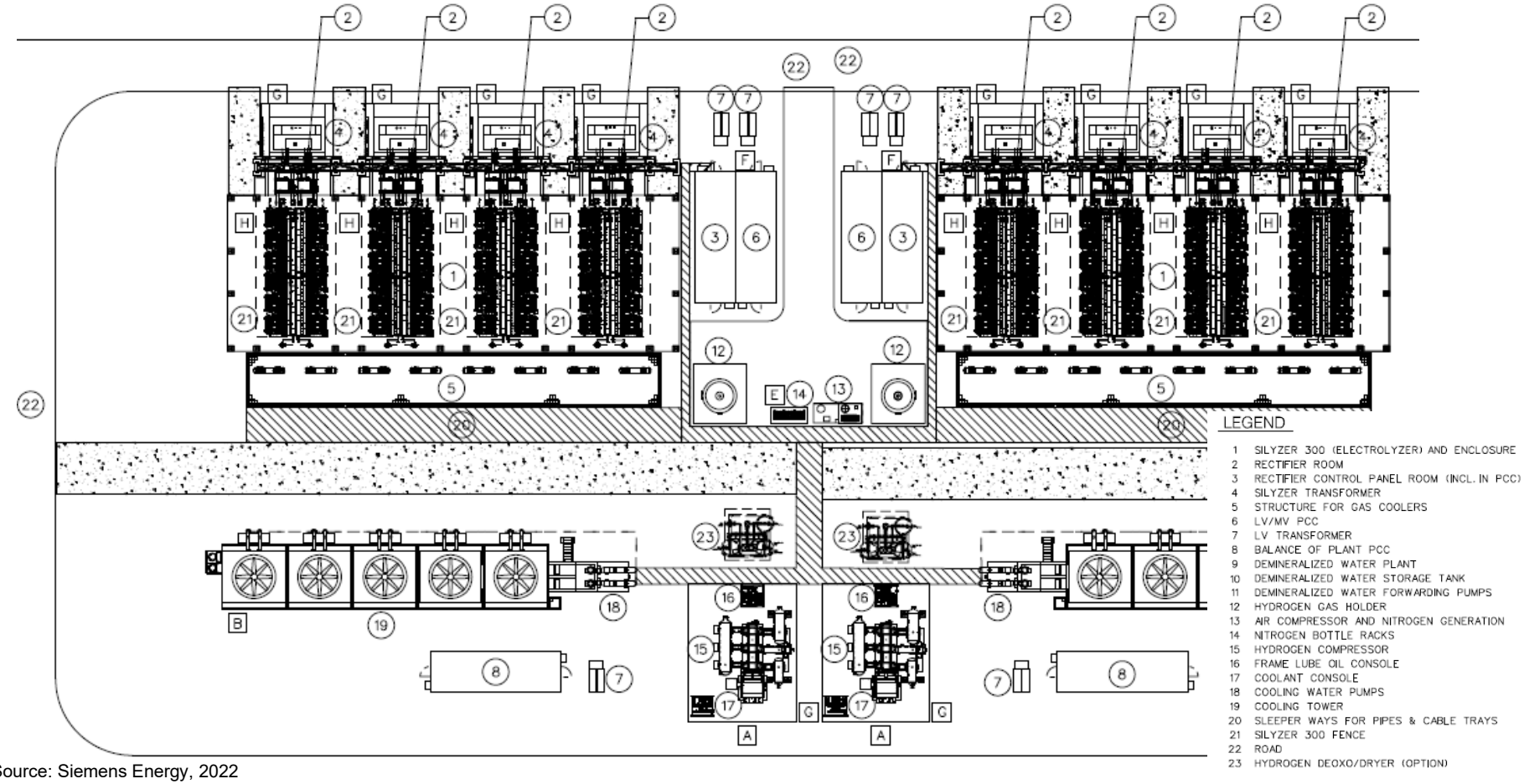
The Project's hydrogen plant comprises a 300 MW facility with a 3.3 ha footprint. The hydrogen plant is configured with two blocks, each containing eight Siemens Energy Silyzer 300 (S300) Systems resulting in a 16-array configuration. Within each S300 System, there are 24 PEM electrolysis modules. The hydrogen plant design parameters are stated in the following table.

**Table 5.3: Hydrogen Production Plant Design Basis Parameters***

| Parameter | Value |
|---|---|
| Product | Hydrogen ($H_2$) |
| Design Production Rate | 127.8 $tH_2$/day |
| Operating Production Rate | 107.5 $tH_2$/day |
| Product purity | 99.99 %vol<br>5 ppm(v) $H_2O$<br>2 ppm(v) $O_2$<br>Remainder $N_2$ |
| Delivery pressure | 8.0 bar(a) |
| Delivery temperature | 30°C |

*These conditions correspond to Point 6, shown below in Figure 7 (Hydrogen Plant Process Flow Diagram)
$tH_2$/day = tonnes of hydrogen per day
ppm (v) = parts per million (volume)

An overview of the Hydrogen plant layout is provided in the following figure. Additional layout details can be observed in Appendix F.




Source: Siemens Energy, 2022

**Figure 6: Hydrogen Plant Concept Overview**

The subsequent sections detail the process components and design of the hydrogen plant.

### 5.3.1 Process Overview

The hydrogen plant will generate hydrogen gas from the Siemens S300 System. Through this technology, hydrogen will be produced using PEM electrolysis technology. Electrolysis is defined as the "breakdown (lysis) via electricity," and the process uses direct current (DC) to drive a chemical reaction whereby $H_2O$ is converted to hydrogen ($H_2$) and oxygen ($O_2$). When the power used to drive the process utilizes a renewable power source such as sun or wind, this process produces zero-carbon hydrogen and oxygen and is therefore considered "green". The Certified Green power supply provided by NS Power ensures that the Project will meet this criterion.

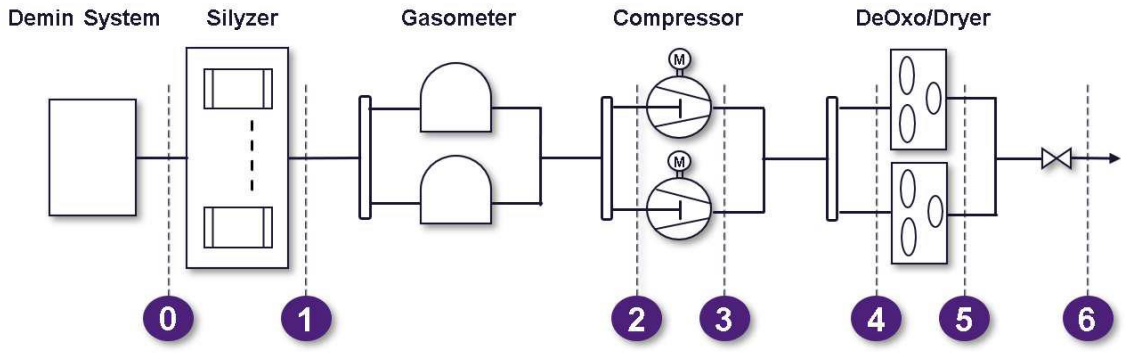
The Siemens S300 System array includes the following equipment and services, as discussed in subsequent sections:

- DC supply (including transformer, rectifier and aluminum bus bars)
- PEM modules (each composed of several electrolysis cells)
- Gas separators
- Gas coolers
- Water refinement loop
- System Controls

Additional hydrogen plant components supplied as part of the Balance of Plant (BoP) include the:

- Gas management system (including hydrogen buffer (gasometer), compressor, DeOxo and Dryer)
- Fire Suppression System

The following figure describes the hydrogen plant process flow.




Source: Siemens Energy, 2022

**Figure 7: Hydrogen Plant Process Flow Diagram**

### 5.3.2 DC Supply

NS Power owns and operates the electrical grid in Cape Breton. There are 230kV transmission lines to the northwest of the Property Boundary. NS Power has been engaged by the Proponent to supply the Project with electrical power.

A DC supply will facilitate the connection between the S300 Siemens Systems and the on-site (southern) substation and power distribution system. Within the hydrogen plant, transformers will be used to transfer the electrical energy from the electrical power source to the rectifiers. The transformer (one per S300 System) converts the medium voltage AC supply down to the low voltage required by the electrolysis plant. Each transformer consists of one autotransformer with an onload-tap-changer at the primary side and four LV (low voltage) winding systems at the secondary side. Each secondary winding system is connected to one regulated 6-pulse rectifier. This arrangement results in a 24-pulse rectifier system to minimize the harmonic perturbations at the connected supply grid. A typical operation voltage of 500-700 V DC will be required.

A DC load switch separates the S300 System from the grid in the event of an emergency shutdown and a disconnector allows for disconnection during maintenance procedures. The DC connection to the S300 System module series is completed via aluminum bus bars.

Source: Siemens Energy, 2022

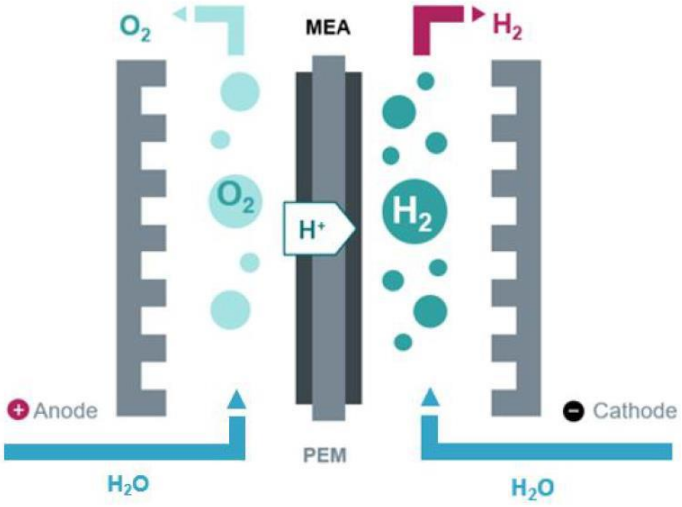
**Figure 8: Main Components of the DC Supply. Left to right – transformer, AC busbar, rectifier**

### 5.3.3 PEM Modules

The Siemens PEM electrozer modules are comprised of several electrolysis cells, where the electrolytic production of hydrogen and oxygen occurs.

Each electrolysis cell is equipped with an impermeable proton-conductive membrane and two electrodes: a cathode (positive) and an anode (negative) (Figure 9). The positive and negative electrodes are submerged in demineralized water, and when an electrical current is applied, the hydroxide ions move from the cathode to the anode. During this transfer, hydrogen gas bubbles are generated on the cathode side, and oxygen gas bubbles are generated on the anode side. The generated hydrogen and oxygen gas rise and are collected through flow piping.

The membrane's impermeability ensures that the raw hydrogen produced through the cell is very clean, with only trace amounts of oxygen.

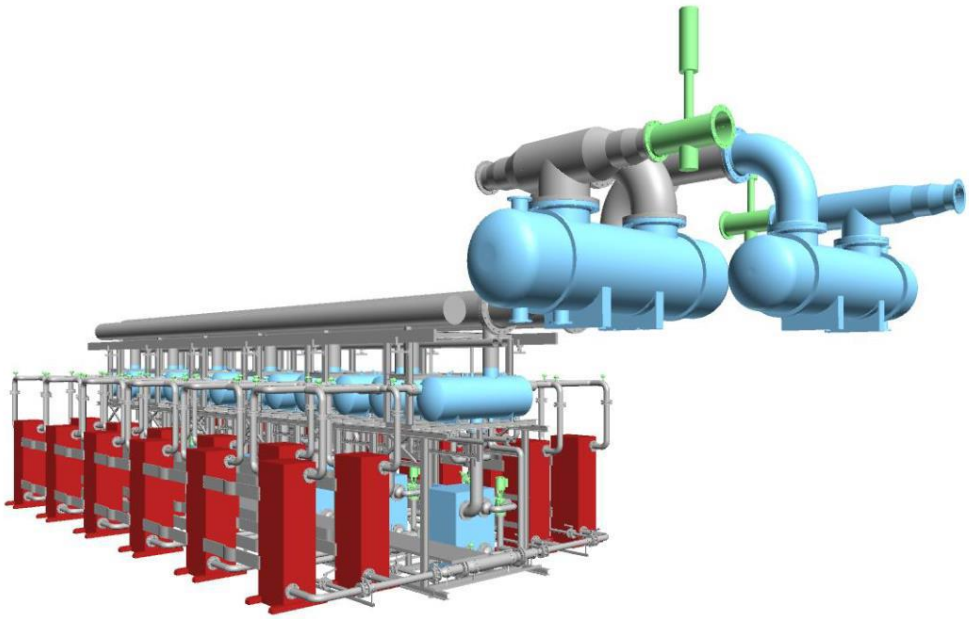



Source: Siemens Energy, 2022

**Figure 9: Generic layout of a PEM electrolysis cell**

The S300 System is the key element of the electrolysis (hydrogen production) plant and consists of the following components, which are further described in Figure 10, below:

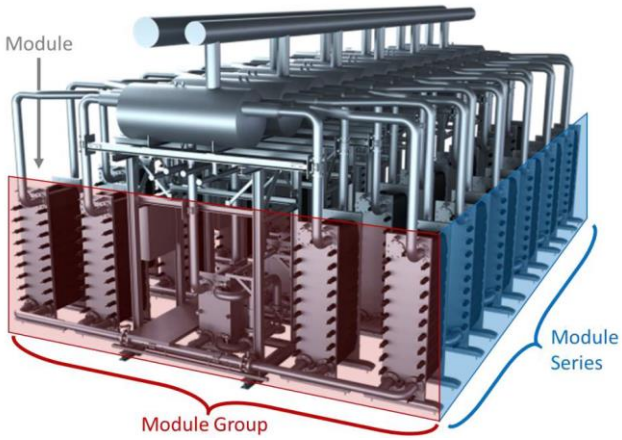
- 24 PEM modules (red)
- 6 heat exchangers (blue)
- 12 gas separators (blue)
- 2 gas coolers (blue)
- Overpressure protection valves (green)
- Control valves (not shown)
- Instrumentation (green)
- 1 water refinement loop (not shown)
- 1 gas analysis cabinet (not shown)
- Internal piping (gray)
- Steel structure (gray)



Source: Siemens Energy, 2022

**Figure 10: General layout of an S300 with 24 PEM modules**

The combination of PEM Modules comprises the S300 system overall. In summary, the S300 is comprised of four modules per group; and there are a total of six module groups per series, for an arrangement of 24 PEM modules in total comprising each S300 system. A figure describing the layout in more detail can be observed below.




Source: Siemens Energy, 2022

**Figure 11: S300 Terminology**

Through the electrolysis process, running at approximately 85% capacity (the assumed annual operational capacity factor), approximately 4,480 kilograms of hydrogen per hour ($kgH_2/hr$) is produced.

### 5.3.4 Gas Separators

The collected gas-water mixtures from the hydrogen and oxygen sides of the electrolysis cells will rise to the respective gas-water separators, which will be installed on top of the modules. This rising occurs naturally and does not require any mechanical pumping. Once in the separator, gravity separation will occur and the gases are collected into hydrogen and oxygen header pipes (+ compensators), which connect to the gas coolers and gas management plant.

### 5.3.5 Gas Cooling

The cooling system provides cooling water for the internal cooling circuit of the electrolyzer, transformers, rectifiers, and gas management.

Once the gas-water mixtures are separated, the gases are collected in the header pipes, which connect to the gas coolers and gas management plant. Hydrogen and oxygen flows collected in their respective header pipes are cooled down from the electrolysis operating temperature using gas coolers which are cooled by water and integrated into the electrolyzer cooling medium circuit. Condensate recovered from the gas cooler is directly recycled into the process water circuits.

Any remaining moisture in the hydrogen stream is recovered in the downstream compressor interstage coolers and cooling system for the DeOxo/Dryer (see Section 5.3.7); oxygen is vented to the atmosphere.

### 5.3.6 Water Refinement Loop

Since the electrolysis process consumes water, de-ionized process water needs to be added according to consumption; this water is fed into the oxygen gas-water separator.

A certain percentage of the process water is constantly supplied to a small water treatment package to maintain the process water inventory at the required water quality specifications. This stream is circulated back to the hydrogen gas-water separator and the process is referred to as the *Water Refinement Loop*.

### 5.3.7 Gas Management System

The gas management system transports the product gas (hydrogen) directly from the electrolyzer and prepares it to the required specifications for uptake (within the ammonia plant) and/or directs it to the hydrogen buffer tank. The gas management system will be engineered to meet the Project's specifications.

#### *5.3.7.1 Hydrogen Buffer Tank*

The hydrogen buffer tank will serve as a "flexible coupling" between the electrolysis system, where the hydrogen is produced, and the rest of the gas management plant, where the hydrogen is processed for ammonia production.

The intent of the tank is to provide a buffer to even out any operational fluctuations due to upsets/minor maintenance activities, assist in maintaining a constant pressure, and protect the S300 System against the compression system drawing a vacuum.

The hydrogen buffer tank will be fabricated from steel with a membrane inside, acting as the flexible element allowing volume changes. Pressure will be maintained with a respective ballast weight on the membrane.

A hydrogen gas compressor will be used to take the supply from the electrolyzer output (at near atmospheric pressure) and adjust it to the required offtake pressure for the buffer tank.

#### *5.3.7.2 DeOxo and Dryer*

The produced hydrogen may contain trace amounts of oxygen and moisture; therefore, the hydrogen will require cleaning and drying to achieve a high purity level of hydrogen (99.99%). The hydrogen cleaning and drying (DeOxo/Dryer) process is divided into a catalytic (cleaning) and adsorption (drying) reaction which takes place in the DeOxo/Dryer process unit.

### 5.3.8 System Controls

The control and instrumentation of the S300 System consists of process monitoring and automation controls, as well as the necessary safety components required, such as:

- Current, voltage, and power at the rectifier output
- Cell voltage
- Process temperature
- Gas monitoring
- Water level monitoring in the gas separators
- Gas pressure ($H_2$ and $O_2$)
- Process value monitoring of the cooling circuit

### 5.3.9 Fire Suppression System

The main raw freshwater supply and on-site fire water reservoir tank will provide fire protection water for fire emergencies. A fire water design flow of 9,450 litres per minute (Lpm) for two hours has been estimated/assumed based on a hazard classification of Extra Hazard (Group 2) requiring 0.1 Lpm/$m^2$ coverage density and a 464.5 $m^2$ sprinkler protection area, +30% margin, plus 132 Lpm hose/standpipe allowance [NFPA 13 – Installation of Sprinkler Systems (NFPA, 2007)].

For a detailed discussion regarding the potential explosion and fire scenarios related to a hydrogen release event, refer to the Consequence Impact Assessment conducted by Hatch (Appendix G).

## 5.4 Ammonia Plant

The Project's ammonia plant consists of a 600 MTPD production plant with a 1.6 ha footprint. The ammonia plant will accept the produced hydrogen from the hydrogen storage vessel (i.e., electrolyzer process) and the nitrogen produced from the ASU. The plant will use the Haber-Bosch conversion process to combine the compressed and refrigerated hydrogen gas and the atmospheric nitrogen into anhydrous ammonia. The ammonia plant design parameters are stated in the following table.

**Table 5.4: Ammonia Plant Production Properties**

| Parameter | Value |
|---|---|
| Product | Ammonia ($NH_3$) |
| Plant Design Production Rate | 600 (metric) $tNH_3$/day |
| Product quality | Ammonia – 99.9 %wt<br>Water – 0.1 %wt<br>Oil 5 ppm (w) |
| Delivery pressure | 5 bar(g) |
| Delivery temperature | -33.5°C |

tNH3/day = tonnes of ammonia per day
ppm (w) = parts per million (weight)

An overview of an ammonia production can be seen in the following figure.

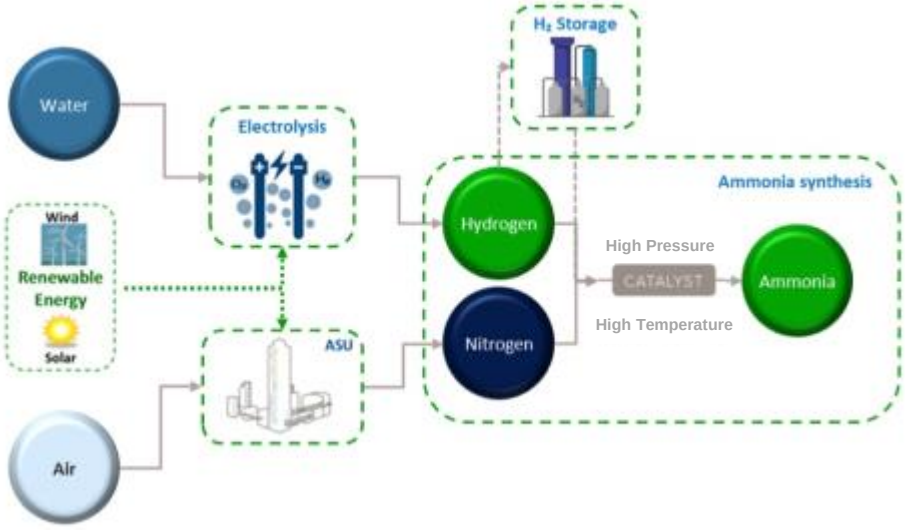



**Figure 12: Ammonia Production Overview (KBR – K-GreeN™ technology)**

The subsequent sections detail the process components and design of the ammonia plant and associated ASU.

### 5.4.1 Process Overview

KBR has developed the K-GreeN™ technology package, which consists of a fully integrated solution for the separation of air to produce nitrogen which is then combined with a source of hydrogen (through the Haber-Bosch process) to facilitate the synthesis of ammonia. The ammonia generation process will follow the indicated series of processes, which are further discussed in the subsequent sections:

- Nitrogen Production
- Nitrogen Storage
- Ammonia Synthesis (through Haber-Bosch)
- Ammonia Refrigeration
- Ammonia Storage

The following figure describes the Ammonia plant process flow.

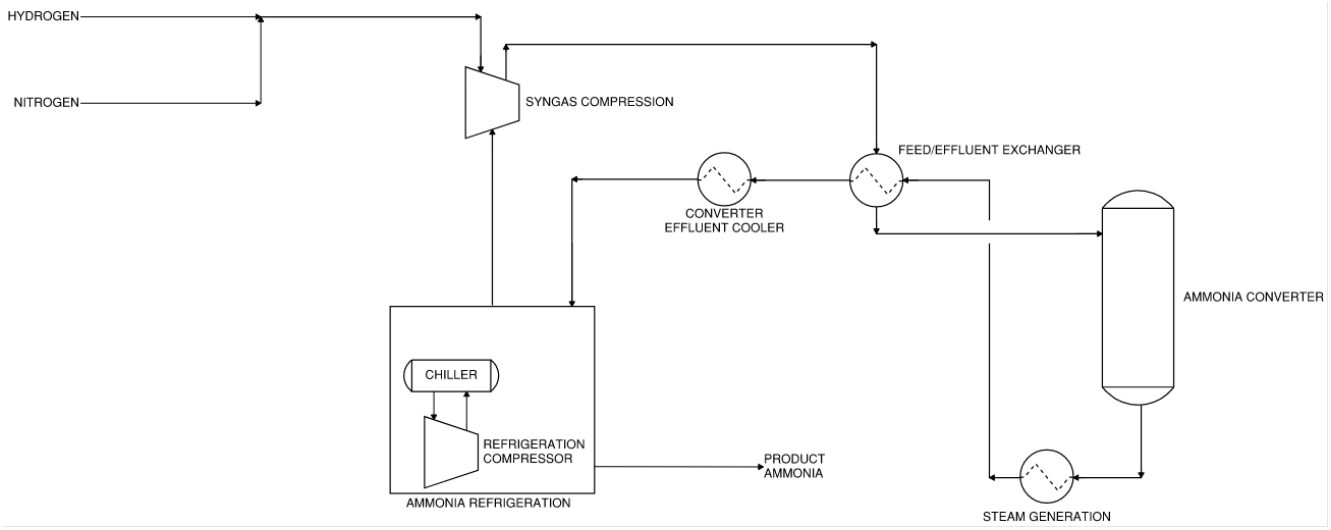



**Figure 13: Ammonia plant process flow diagram**

### 5.4.2 Nitrogen Production (Air Separation Unit)

Nitrogen is produced in the ASU by purifying atmospheric air via standard cryogenic distillation technology which facilitates the separation of air molecules through the use of very low temperatures.

The ASU separates the air into pure nitrogen and “waste gases”. The pure nitrogen ($N_2$) is compressed and sent to be used in the downstream process, whereas, the waste gases (comprised of nitrogen, oxygen, and argon) are used to regenerate the ASU before eventually being vented to the atmosphere.

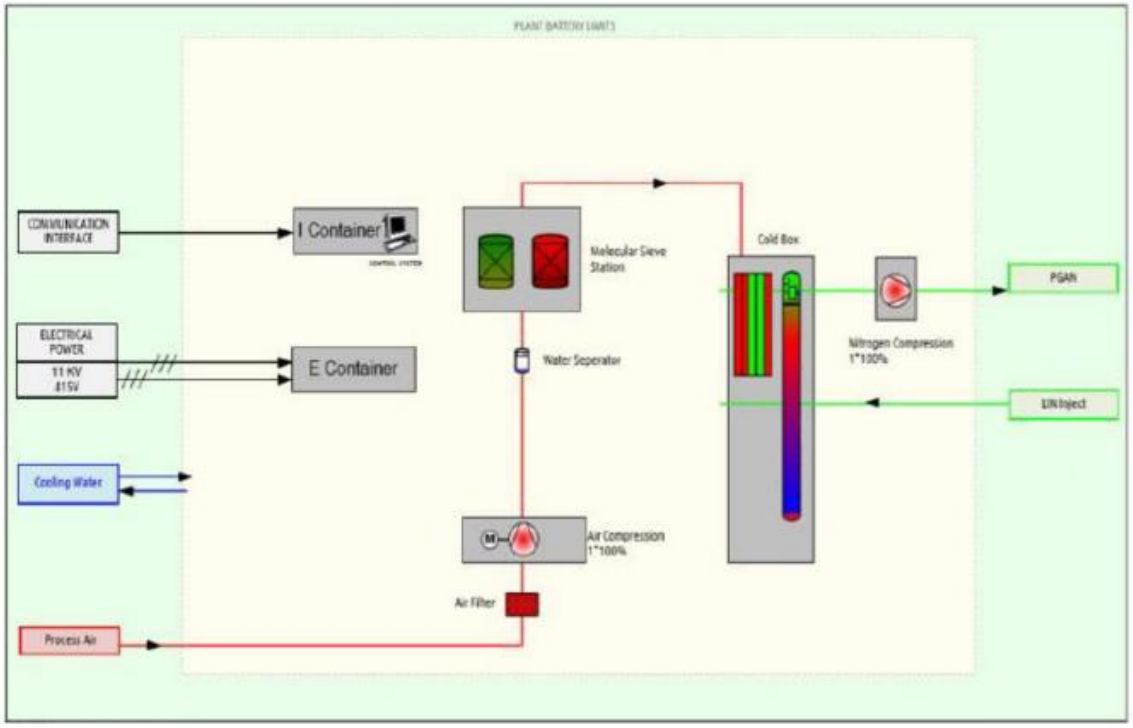



**Figure 14: Air Separation Unit Overview**

Note that the ASU is capable of producing both liquid and gaseous nitrogen states. The gaseous nitrogen will be used as a component of the Haber-Bosch process and the liquid nitrogen will be stored and used to refrigerate equipment and for system purging during start-up and shutdown activities.

**Table 5.5: Nitrogen Demands**

| Demand/Consumer | Nominal Flow Rate ($Nm^3/hr$) | Design Flow Rate[1] ($Nm^3/hr$) |
|---|---|---|
| Hydrogen plant (utility) | 24 | 500 |
| Ammonia plant (process) | 16,593 | 16,593 |
| Ammonia plant (utility) | 50 | 500 |
| **Total** | **16,667** | **17,593** |

[1]Design flow rate shown for ammonia plant considers simultaneous 600 $tNH_3$/day ammonia production rate and hydrogen plant purge flow.

### 5.4.3 Ammonia Synthesis

The ammonia plant will accept the purified hydrogen from the hydrogen plant and the purified nitrogen from the ASU. To ensure proper operational conditions, the purified hydrogen and nitrogen must be delivered at 7 bar (25-30°C).

The nitrogen and hydrogen are inputs to the ammonia plant synthesis loop (“synloop”), where the nitrogen and hydrogen are first compressed, then heated, and fed into the converter. The hydrogen and nitrogen are partially converted to ammonia via the exothermic

Haber-Bosch reaction at high temperature (236°C – 453°C) and pressure (147.5 bar(a)):

$$3H_2 + N_2 = 2NH_3 + heat$$

The Haber-Bosch process is equilibrium limited in that not all hydrogen and nitrogen fed into the reactor will react to produce ammonia; as such, the discharge stream from the converter contains ammonia, and unreacted hydrogen and nitrogen. The hot discharge enters steam producing boilers, and then through a refrigeration system, where the unreacted hydrogen and nitrogen are recycled and sent back to the compression system; further details on this process are discussed in Section 5.4.4.

The steam produced by the boilers downstream of the converter, will be recovered and used to produce electricity via a small steam turbine generator. The steam turbine outlet will discharge to a condenser cooled with cooling water (supplied by Landrie Lake, per Section 5.2.1). The condensate discharge from the condenser will be routed to a condensate polisher prior to pumping back into the steam generation system.

### 5.4.4 Ammonia Refrigeration

A three-stage ammonia refrigeration system is provided for condensation of the gaseous ammonia produced in the converter.

The effluent from the converter system is chilled and condensed in a unitized chiller by using two levels of ammonia refrigerant. Ammonia liquid from the first level of the unitized chiller is cooled to -33°C in an ammonia atmospheric flash drum and is then pumped to the ammonia storage tank.

In this closed-loop system, the flashed vapour created as a result of the flash drum process is sent to the ammonia refrigerant compressor, to be converted to a liquid, and held in a receiver. Liquid ammonia from the bottom of the receiver is routed to the second level of the unitized chiller to be used as refrigerant.

### 5.4.5 Ammonia Boil-Off Management and Venting

Ammonia at 1 bar (atm) has a saturation temperature of -33.5°C. At 25°C, the saturation pressure of ammonia is 10 bar. Since the ammonia temperature must be held below -33°C to remain in liquid form at atmospheric pressure, the ammonia storage tanks must be insulated and fitted with an actively refrigerated boil-off management system. Although the storage tanks are insulated, a small amount of warming occurs, causing the liquid ammonia to evaporate. This phenomenon is referred to as boil-off, and must be managed.

During normal operations, any ammonia vapour boiled-off (evaporated) within the tank is routed back to the ammonia refrigerant compressor system. During overpressure scenarios, or if the compressor system is down, the local boil-off management system will capture any ammonia vapour that has boiled off within the tank, recompress it, cool it, and return it to the

tank as a cold liquid. In the event of boil-off system failures, power outage, or downtime the local boil-off management system will process boil-off to a process flare stack (discussed further in Section 5.5) to combust (burn) off-gassed ammonia with oxygen, which will produce nitrogen and water (see Section 5.5.1 for more details).

### 5.4.6 Ammonia Storage

The developed liquid ammonia product will be stored in refrigerated ammonia storage tanks at near-atmospheric pressure. Generally, the tanks will be double-walled, with a dome roof and operate at a positive pressure [i.e., 300 millimeters water column (mmwc)]. Relief valves will protect the ammonia tanks from overpressure or vacuum conditions. Double-walled tanks are a widely accepted method of ammonia storage and provide minimum risk of leakage.

Adjacent to the ammonia storage tanks, liquid ammonia forwarding pumps will be included to transport the liquid ammonia through the ammonia pipeline to the jetty, where ammonia will be loaded out to the shipping vessel(s).

While stored in the tanks, ammonia vapours may be generated due to:

- Heat introduced in the refrigerated tanks and/or cold ammonia piping
- Vapour displacement in tanks
- Flash during the transfer of ammonia from tank to piping

During normal operations, any ammonia vapour generated will be directed to the ammonia refrigeration system to be re-compressed and re-condensed. The condensed ammonia will be returned to the ammonia storage tanks.

During shut-downs (planned and unplanned), any ammonia vapour generated will be directed to the ammonia storage flare stack (discussed in Section 5.5.2). The ammonia storage flare stack will provide a safe method of incinerating ammonia vapours when redirection to the ammonia refrigeration system is not available.

## 5.5 Flare Stacks

Flare stacks will be required to mitigate/prevent/disperse releases of hazardous off-gases from the ammonia production and storage areas. KBR has set forth a requirement for two flares in the plant design: a flare for the ammonia process plant (process flare) and a flare at the ammonia storage tank (storage flare).

The process and storage flare stacks will require a source of combustible fuel to ensure complete combustion of the gaseous effluents. Compressed natural gas (CNG), liquefied natural gas (LNG), butane ($C_4H_{10}$), propane ($C_3H_8$), or hydrogen may be feasible options. The specifications of the proposed flare stack fuels are still being determined; however, for this EA Report, emissions estimates from combustible fuel were modelled using propane and hydrogen only (see Section 13.1 for modelling details).

### 5.5.1 Ammonia Process Flare

The process flare will be located adjacent to the ammonia plant. The purpose of the process flare is to combust/destroy any continuous and intermittent harmful off-gases from the ammonia synthesis plant production process. The continuous loads expected to result from the process flare will consist of:

- Continuous purging from the nitrogen system
- LP off-gassing from the ammonia synloop inert purge
- Compressor dry gas seals from the synloop compressors
- Pilot Fuel (i.e., hydrogen, propane)

The intermittent loads expected to result from the process flare will consist of:

- Venting from the syngas compressors
- Venting from the ammonia refrigerant compressor

The estimated process flare loads expected are summarized and discussed in Section 13.1.

Based on the estimated flare loads, the process flare will be a minimum of 70 ft (21 m) in height with a 36” (914 mm) diameter, and will be equipped with a three-pilot burner at the base of the stack. For modelling purposes, a 180 m diameter flare radius will be assumed; however, details will be confirmed in future engineering plans.

### 5.5.2 Ammonia Storage Flare

The storage flare will be located adjacent to the ammonia storage area. The purpose of the storage flare is to combust/destroy any continuous and intermittent harmful off-gases from the ammonia storage tank holding area. The continuous loads expected to result from the storage flare will consist of:

- Continuous purging from the nitrogen system
- Pilot Fuel (i.e., hydrogen, propane, etc.)

The intermittent loads expected to result from the storage flare will consist of ammonia vapourization from the storage tank.

The estimated storage flare loads expected are summarized and discussed in Section 13.1.

Based on these estimated flare loads, the process flare will be a minimum of 30 ft (9 m) in height with a 14 in (356 mm) diameter, and will be equipped with a two-pilot burner at the base of the stack. For modelling purposes, a 180 m diameter flare radius will be assumed; however, details will be confirmed in future engineering plans.

## 5.6 Air Systems (Facility-wide)

Throughout the Industrial Facility compressed air systems are required primarily for the purposes of valve actuation, or general utility use (e.g., for maintenance). The instrument air system will provide high quality dry air (-40°C pressure dew point) at 7.0 bar(g) for the various industrial uses, as required. In addition, compressed air will provide saturated air at 7.0 bar(g) for utility/maintenance purposes only.

Based on the KBR (2022) design, the air compressors included on the ASU shall simultaneously supply and satisfy both the air required for nitrogen production, and the instrument and plant air demands for both the hydrogen and ammonia processes (and potentially any additional air demands for the RFWTP).

**Table 5.6: Plant and Instrument Air Demands**

| Facility/Consumer | Nominal Demand ($Nm^3/hr$) | Peak Demand ($Nm^3/hr$) |
|---|---|---|
| **Plant Air** | | |
| Ammonia Synthesis Plant | 100 | 200 |
| **Instrument Air** | | |
| Hydrogen Plant | 125 | 160 |
| Ammonia Plant | 460 | 600 |
| **Total Required Air Demands** | **685** | **960** |

## 5.7 Thermal Management (Facility-wide)

To cool the equipment within the Industrial Facility, an evaporative freshwater cooling tower will be implemented.

The hydrogen plant requires a steady supply of cooling water for the electrolyzers, the $H_2$ and $O_2$ gas coolers, and the high pressure $H_2$ compressors.

The ammonia plant requires cooling water to cool the ammonia converter effluent and condense ammonia vapour, as well as for the cooling of ammonia during storage.

The following tables summarizes the cooling loads required for the ammonia production process.

**Table 5.7: Plant Cooling Loads for ammonia production process**

| Load Description | Nominal Cooling Load (MWth[1]) | Max Cooling Load (MWth) | Max Cooling Water Temperature[2] (°C) |
|---|---|---|---|
| Hydrogen Plant | 120.7 | 143.3 | 20 |
| Ammonia Plant | 38.8 | 46.6 | 24 |
| Air Separation Unit | 6.2 | --- | 24 |
| Ammonia Storage | 6.9 | --- | 24 |
| **Total** | **172.6** | **203.0** | |

[1]MWth = megawatt thermal
[2]Siemens Energy and KBR pre-feed reports identify a maximum allowable supply temperature of 20°C and 24°C, respectively, however, during project meetings, both vendors indicated that 25°C or higher will be acceptable with adjustment of heat exchanger sizes and CapEX. Cooling water process design basis must be revised prior to further vendor engineering and is presently under consideration using the 25°C limit.

## 5.8 Jetty Operation

### 5.8.1 Pipeline to Jetty from Ammonia Storage

Adjacent to the ammonia storage tanks, liquid ammonia forwarding pumps will transport the liquid ammonia through a loadout pipeline to the jetty, where ammonia will be loaded out to a shipping vessel docked at Berth No. 2.

The insulated ammonia loadout line from the forwarding pumps to the jetty loading arms must be a minimum nominal pipe size (NPS) of 864 mm (34”) diameter for one single line to accommodate 4,000 $m^3$/hr, or two NPS 610 mm (24”) lines if required due to layout constraints on the existing jetty pipe rack.

A vapour return line from the loadout point will also be required and must be sized appropriately to maintain pressure equalization between the ammonia storage tanks and the shipping vessel’s cargo tanks. Alternatively, a local vapourizer at the storage tank would be required for vapour make-up within the storage tank. A supply of nitrogen from the ASU may also be required if purging of the ammonia lines is necessary between shipments.

The proposed pipeline route along the jetty from the shore to Berth No. 2 is shown in Figure 15.

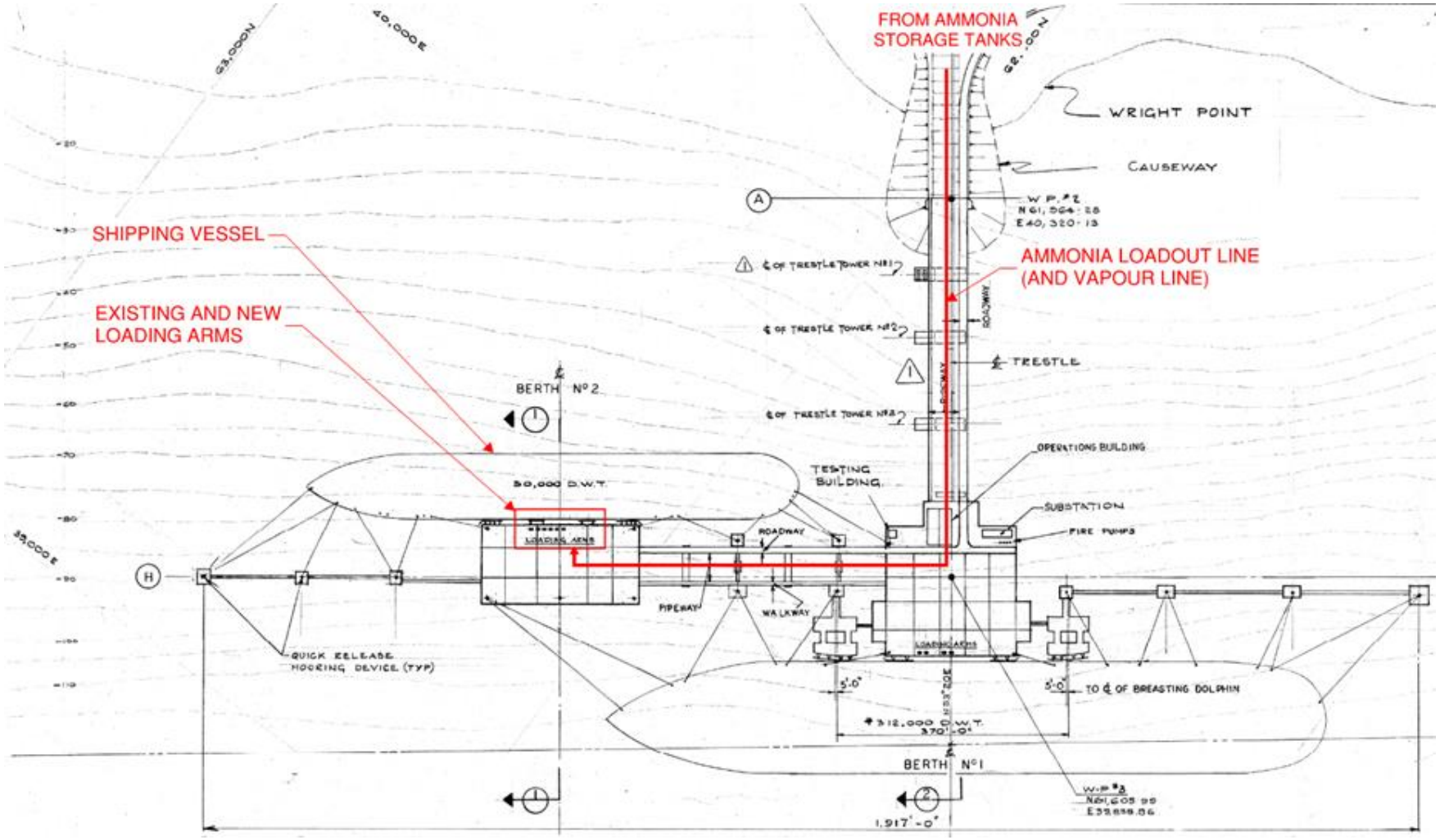



**Figure 15: Proposed Piping Route Along the Jetty to Berth No. 2**

### 5.8.2 Loading of the Ammonia to Ship Carrier

Conservatively, the ammonia forwarding system will be designed and sized to transfer up to 4,000 $m^3$/hr (67,000 Lpm) to a shipping vessel with an anticipated cargo tank capacity of approximately 80,000 $m^3$ (55,000 $tNH_3$). The active transfer will occur within a 20-hour period, but a total of 30-hours of docking time will be anticipated to allow for approximately 10 hours of buffer for pre-cooling, mooring, etc. The prescribed ammonia forwarding system design will offer sufficient flow for a very large gas carrier (VLGC) mooring at Berth No. 2; as ammonia markets mature the ammonia shipping vessel capacities will likely move towards standardization.

Two 12" (305 mm) marine loading arms will satisfy the preliminary liquid design flow rate of 4,000 $m^3$/hr. The loading arms will be designed specifically for anhydrous ammonia with a design temperature of -37°C (-35°F), a design pressure of 25 bar(g), and will be designed in accordance with the ASME B31.3 (2022) and applicable Oil Companies International Marine Forum (OCIMF) standards.

Any residual ammonia liquid and/or vapour in the loading arm will be drained of liquid and the lines will be purged with inert gas (i.e., nitrogen) to prevent any ammonia from being released to the environment. The loading arms will be designed with purge and drain connections for this purpose. The source of inert gas may be supplied by the ASU or potentially supplied from an onboard nitrogen generator on the shipping vessel.

## 5.9 Wastewater Treatment

Effluent streams from the various Industrial Facility components will be collected and treated (as necessary) to achieve regulatory discharge standards. The potential effluents and assumed treatment approaches are summarized in Table 5.8.

**Table 5.8: Summary of Effluents and Discharges**

| Wastewater Source | Nominal [$m^3$/hr] | Design [$m^3$/hr] | Destination |
|---|---|---|---|
| Demineralized/potable water system waste | 14.2 | 19.3 | WWTP/Discharge |
| Ammonia plant blowdown | 0.2 | 1 | |
| Service water drains | 1 | 10 | |
| Cooling tower blowdown | 55 | 64 | Direct Discharge |
| Sanitary wastewater | 0.5 | 10 | SWWTP/Discharge |
| **Total** | **71** | **104** | |

### 5.9.1 Wastewater Treatment Plant

Any process effluents requiring treatment will be conveyed to the WWTP which is expected to consist primarily of neutralization, clarification, and filtration processes. The anticipated sources of wastewater which will be treated in the WWTP include the following:

- **Demineralized/potable water system wastewater:** Wastewater generated from the demineralized/potable water treatment system will consist of UF backwash, dilute acid/caustic from CEB and CIP activities, and brine reject from the RO and EDI systems.

- **Hydrogen plant blowdown:** Process effluents from the hydrogen plant include water that will be discharged intermittently. This wastewater will be collected in a dedicated drainage system and sent to the WWTP for processing.

- **Ammonia plant blowdown:** The ammonia plant will discharge a boiler feedwater blowdown from the medium pressure steam blowdown drum, which will be recovered to the cooling tower system (if feasible). The provision to treat this blowdown in the WWTP is included in the event that the blowdown cannot be sent to the cooling towers.

- **Service water drains:** Drainage from the process areas will be conveyed to the WWTP, which is expected to consist primarily of intermittent washdown water and seal water (water used to cool and lubricate seals) from pump and compressors.

The above wastewater sources will be conveyed to the WWTP, where the streams will be combined in a neuralization tank. Acid and caustic feed systems will supply the necessary reagents to the neutralization tank. The ability to add additional chemicals, such as coagulants and metal precipitants, will be available if required to meet effluent discharge standards.

The overflow from the neutralization tank will flow to an inclined plate (Lamella) clarifier, where suspended solids will settle by gravity. To improve sedimentation, a polymeric flocculant will be added to an integral mix tank on the clarifier inlet. The clarifier overflow will be collected in a tank where additional pH adjustment will be accomplished if necessary. The treated water will then be pumped through multimedia filters (MMF) to remove fine particulates prior to discharge to the on-site stormwater pond (discussed further in Section 5.9.3).

Solids removed in the clarifier will accumulate as sludge and be pumped to a sludge thickening tank along with MMF backwash waste. The settled and concentrated sludge in the thickener will be pumped into a plate-and-frame filter press to be dewatered. The filter press sludge cake will be collected in a designated container for off-site disposal at an approved facility, while the clarified effluent will discharge to the on-site stormwater pond (see Section 5.9.3).

### 5.9.2 Sanitary Wastewater Treatment Plant

Wastewater produced from human-occupied buildings will be collected and conveyed to an on-site sanitary wastewater treatment plant (SWWTP) (skid unit) to be located within the

Common Facility footprint (Drawing 10). The skid unit will consist of flow equalization followed by an aeration tank (activated sludge), clarifier, chlorination/disinfection tank, effluent tank, and sludge digester/holding tank. The treatment system will consist of a conventional biological process which uses microorganisms to consume dissolved organic contaminates in the wastewater.

After aeration, the mixture of microorganisms and water (mixed liquor) flows to a clarifier where the solid organic contaminates, and microorganisms settle. A portion of the sludge is returned to the aeration tank, and excess waste sludge is sent to an aerobic digester to reduce the sludge volume. The waste sludge is anticipated to be periodically hauled for disposal at the local municipal sewage plant. The clarified effluent will flow through a disinfection tank where chlorine will be added to disinfect the treated water prior to discharge to the WWTP (see Section 5.9.1).

### 5.9.3 Stormwater

Drainage from the Project Boundary and/or upstream areas will be intercepted and diverted away from the Project facilities, infrastructure, and equipment via diversion ditches, berms, and swales. Two categories of drainage management systems will be considered for the Project site: external and internal drainage.

*External Stormwater Drainage*

External drainage refers to the drainage from upstream external areas that naturally drain onto the Industrial Facility property due to the existing topography. To minimize the risk of flooding the new infrastructure and the quantity of water potentially requiring treatment, external drainage will be intercepted and diverted away from the Industrial Facility and back to the natural environment via diversion ditches.

*Internal Stormwater Drainage*

Internal site drainage will be achieved through surface collection via finished surface grading and open channels (ditches). The Industrial Facility will be graded to drain towards the stormwater collection ditches and will be divided into catchment areas to pass the runoff efficiently. Each catchment area will have a network of drainage ditches and swales to collect runoff and will be diverted or pumped to the on-site stormwater pond. The stormwater pond will also accept treated discharge from the WWTP and blowdown from the cooling water systems. From here, the collected stormwater drainage, WWTP discharge and blowdown from the cooling water systems may be used for fire water, and/or pumped over to the existing Point Tupper Terminal effluent treatment system for further treatment (see Section 3.3.3).

### 5.9.4 Cooling Tower Blowdown

Blowdown from the cooling water systems will be dechlorinated prior to discharge to the on-site stormwater pond (see Section 5.9.3).

Ammonia plant blowdown (from boilers) will, to the extent feasible, be recovered to the cooling water system and then discharged to the on-site stormwater pond (see Section 5.9.3). If the ammonia plant blowdown requires treatment, it will be sent to the WWTP prior to discharge to the on-site stormwater pond.

### 5.9.5 Summary of Wastewater Treatment

The existing usage and design capacity, as well as the proposed usage from the Industrial Facility, are summarized in the following table.

**Table 5.9: Effluent Treatment System Design Data**

| | Flow ($m^3$/hr) |
|---|---|
| Existing Usage | <500 |
| Proposed Industrial Facility Usage | <100 |
| Total Proposed Usage | <600 |
| Design Capacity | 3,175 |

The existing effluent treatment system is expected to be sufficiently sized to accept the on-site stormwater pond discharge (if required). However, this should be validated through additional field verification in the subsequent phases of engineering.

## 5.10 Process Inputs & Outputs

The process inputs and outputs stated in the following tables are calculated and/or estimated based on the conceptual/pre-feasibility level (FEL1) engineering plan completed by Hatch (2022), and confirmed by B&V. The quantities stated are subject to change in future engineering phases as the level of Project definition matures however, these values are not expected to vary by more or less than 25%.

### 5.10.1 Inputs

**Table 5.10: Inputs**

| Input | Source | Estimated Quantity | Notes |
|---|---|---|---|
| **Water Supply** | | | |
| Raw freshwater | Landrie Lake | Expected: 8.3 ML/day<br>Design: 9.5 ML/day | Estimated quantity during peak cooling days (summer season). Daily consumption will be reduced in shoulder seasons and winter. |
| **Electrical Power Supply** | | | |
| Electrical power | Nova Scotia Power Grid | 4,500-5,000 MWh/day | Estimated average daily power consumption.<br><br>Estimated 8,400 MWh/day at peak capacity. |

| Input | Source | Estimated Quantity | Notes |
|---|---|---|---|
| **Water Treatment** | | | |
| Sodium Hypochlorite (NaOCl) – 12.5% Sol. | Vendor (TBD) | Nominal: 700 kg/yr<br>Design: 7,500 kg/yr | For raw water treatment (disinfection) |
| Soda Ash ($Na_2CO_3$) – 100% Dry | Vendor (TBD) | Nominal: 700 kg/yr<br>Design: 9,000 kg/yr | Increase pH |
| Ferric Chloride ($FeCl_3$) – 36% Sol. | Vendor (TBD) | Nominal: 16,000 kg/yr<br>Design: 18,000 kg/yr | Coagulant |
| Hydrochloric Acid (HCl) – 30% Sol. | Vendor (TBD) | Nominal: 60 kg/yr<br>Design: 120 kg/yr | CIP |
| Antiscalant – 100% Sol. | Vendor (TBD) | Nominal: 1,600 kg/yr<br>Design: 2,300 kg/yr | CEB |
| DBNPA Flush – 100% Sol. | Vendor (TBD) | Nominal: 6,400 kg/yr<br>Design: 9,200 kg/yr | For raw water treatment (biocide) |
| Sodium Bisulfite ($NaHSO_3$) – 38% Sol. | Vendor (TBD) | Nominal: 4,200 kg/yr<br>Design: 6,000 kg/yr | For raw water treatment (chlorination) |
| Sodium Hydroxide (NaOH) – 50% Sol. | Vendor (TBD) | Nominal: 20,000 kg/yr<br>Design: 36,000 kg/yr | For raw water treatment (removes carbon dioxide) |
| Sulfuric Acid ($H_2SO_4$) – 93% Sol. | Vendor (TBD) | Nominal: 6,400 kg/yr<br>Design: 12,800 kg/yr | For raw water treatment (pH adjustment and CIP) |
| Flocculant – 100% Sol. | Vendor (TBD) | Nominal: 200 kg/yr<br>Design: 500 kg/yr | For raw water treatment |
| **Cooling Tower Treatment** | | | |
| Corrosion Inhibitor – 100% | Vendor (TBD) | Nominal: <400 kg/yr<br>Design: 400 kg/yr | Corrosion inhibitor |
| Sodium Hypochlorite (NaOCl) – 12.5% Sol. | Vendor (TBD) | Nominal: 16,000 kg/yr<br>Design: 16,000 kg/yr | Disinfection |
| Dispersant – 100% Sol. | Vendor (TBD) | Nominal: 8,000 kg/yr<br>Design: 8,000 kg/yr | Dispersant |
| Sodium Bisulfite ($NaHSO_3$) – 38% Sol. | Vendor (TBD) | Nominal: 2,600 kg/yr<br>Design: 5,200 kg/yr | Dechlorination (Blowdown) |
| **Other** | | | |
| Machine oils/lubricants | Vendor (TBD) | TBD | For moving machinery requiring oil or lubricants (e.g., pumps, compressors) |
| Air | Atmosphere | TBD | For plant/instrument air and air separation for nitrogen supply. |
| Propane | Vendor (TBD) | TBD | Back-up fuel for flare stack, only used in upset conditions |
| Diesel | Vendor (TBD) | TBD | Fuel for back-up electrical generator |
| Stormwater | Rainfall | TBD | Collected rainwater is diverted to the Stormwater Pond |

### 5.10.2 Outputs

**Table 5.11: Outputs**

| Output | Destination | Quantity | Notes |
|---|---|---|---|
| **Products** | | | |
| Anhydrous liquid ammonia | Marine shipping vessel | Nominal : 213,000 t/yr<br>Design : 600 t/day | Primary plant product |
| **Air Emissions** | | | |
| Oxygen | Atmosphere | Nominal : 300,000 t/yr<br>Design : 999 t/day | Vented to the atmosphere, it will contain trace amounts of aqueous product. |
| Hydrogen | Atmosphere | TBD | Hydrogen vents in the event of upset conditions (e.g., emergency shutdown purge), overpressure, start-up/shutdown, and during purges. |
| Waste Gas from Air Separation Unit (ASU) | Atmosphere | TBD | Products of air separation (nitrogen removal): oxygen, argon, $CO_2$, and other non-hazardous gases. |
| Nitrogen | Atmosphere | TBD | Intermittent releases during purges, start-up, and shutdown. |
| Steam | Atmosphere | Nominal: 500 kg/hr | Steam system deaerator vent |
| *Gaseous Ammonia from Flare Stacks | Atmosphere | 9.1 µg/$m^3$ | Combustion product from the process and storage flares. |
| Hydrocarbon combustion products | Atmosphere | TBD | Combustion products of propane/diesel for flare stack back-up fuels and back-up electrical generator. |
| Gaseous Ammonia (Loading Arm) | Atmosphere | N/A | Potential release to atmosphere during marine loading arm connection emergency decoupling. |
| Water vapour | Atmosphere | 227 $m^3$/hr | Freshwater, estimated evaporative losses from cooling tower during peak cooling days (summer) |
| Water (Cooling water drift) | Atmosphere | 2 $m^3$/hr | Freshwater drift losses from the cooling tower during peak cooling days (summer) |
| **Spills** | | | |
| Machine oils/lubricants (spills) | TBD | TBD | For equipment requiring lubrication (e.g., compressors, pumps, motors). The spill management plan will be developed as part of the EMP. |
| Water treatment chemicals (spills) | TBD | TBD | Water treatment chemical spills will be collected in secondary containment and/or collected in sumps and pumped to the wastewater treatment plant where appropriate. The spill management plan will be developed as part of the EMP. |

| Output | Destination | Quantity | Notes |
|---|---|---|---|
| **Waste Residuals** | | | |
| Treated Wastewater | Stormwater Pond | Nominal: 71 $m^3$/hr<br>Design: 104 $m^3$/hr | Includes:<br>- Demineralized/potable water waste system (14.2 $m^3$/hr)<br>- Ammonia Plant Blowdown (0.2 $m^3$/hr)<br>- Service water drains (1 $m^3$/hr)<br>- Cooling tower blowdown (50 $m^3$/hr)<br>- Sanitary wastewater (0.5 $m^3$/hr)<br><br>Estimated nominal quantity during peak cooling days (summer season). Daily consumption will be reduced in shoulder seasons and winter. |
| Wastewater Treatment sludge | Offsite disposal | Nominal : 50 t/yr<br>Design : 100 t/yr | From wastewater treatment plant |
| Collected Stormwater | Natural Environment and Existing Effluent Treatment System | TBD | External stormwater drainage is directed to the natural environment. Internal stormwater drainage may be directed to the existing effluent treatment system at the existing Point Tupper Terminal. |

*Gaseous ammonia is the maximum modelled concentration (represents the worst-case scenario) found in flare emissions. Further details on the scenarios are provided in Section 13.1.

## 5.11 Transmission Interconnection Line

The Transmission Interconnection Line consists of the components required to span electrical conduits from the Industrial Facility to the NS Power (northern) substation. The following table summarizes the components and the proposed footprint:

**Table 5.12: Summary of the Transmission Interconnection Line Components**

| Facility Component | Footprint |
|---|---|
| Northern switching substation (connection to the NS Power grid) | 130 m x160 m |
| Southern substation (connection to the Industrial Facility) | 195 m x 75 m |
| Transmission Interconnection Line | 70 m x 14 km |

The Transmission Interconnection Line will consist of a high voltage 230 kV line which will deliver power to the Industrial Facility's on-site (southern) substation, adjacent to the hydrogen plant. Wood pole structures will be installed to support the lines. Support poles and lattices will also be installed, as necessary, to provide additional structural support to the wood pole structures, support poles, and lines.

The wood pole structures will be approximately 22 m tall and spanned approximately 160 m apart. The cables will be Beaumont-type wire, approximately 1,113 mcm (thousands of circular mils) thick. The Transmission Interconnection Line conductor specifications are as follows:

- Conductor name: Beaumont
- Conductor type: ACSR, steel-reinforced aluminum conductor
- Conductor construction: 42 strands of aluminum, 7 strands of steel [1,113 thousand circular mils (kcmil)]
- Conductor diameter: 3.175 cm (1.25 in)

*NS Power Switching Substation*

The Transmission Interconnection Line will connect the NS Power (northern) substation (Crandall Road) to the Industrial Facility (NS Power operated on-site southern) substation. The dimensions of the northern NS Power substation are to be determined through the detailed design phase; however, an anticipated clearing footprint will be approximately 130 m by 160 m. The northern NS Power substation will be accessible from Crandall Road and surrounded by chain link fencing; within the compound, there will be crushed stone/gravel topping. A vehicle barrier may be placed across the substation driveway adjacent to the highway to limit unwanted access (if/as necessary).

The northern NS Power switching substation will employ a three-breaker ring arrangement with associated outdoor circuit breakers connected with isolation switches. Generally, a rigid pipe work bus network connects the three breakers to the interconnecting lines. This arrangement will allow the NS Power Port Hastings to Lingan main line to remain in service should an issue occur on the line tap to the Project. The three circuit breakers, disconnect isolation switches, associated Project high voltage metering equipment, and line flow monitoring/line protection-related apparatus will be visible from the substation fence line.

The control building within the fence line will house the related breaker controls, electronic communication/line protection relay equipment, as well as a backup battery supply.
NS Power may also request the installation of an outdoor generator [approximately 1 to 2 kilowatt (kW)] to supplement the battery bank if necessary (this will be confirmed through the design phase).

Note that there will be no power transformers associated with this switching substation's location.

*On-site Substation*

The on-site (Industrial Facility southern) substation will consist of a transformer yard and a 60 m by 30 m accessory building. The Transmission Interconnection Line will enter the southern substation yard and pass through a single circuit breaker (likely a similar model to that located at the NS Power switching substation). The on-site southern substation will be equipped with high-voltage line metering and protection-related equipment. In addition, two 150 megavolt ampere (MVA) power transformers will be stepping the voltage down from 230 kV to 34.5 kV. These transformers will be located within separate containment structures capable of holding the total amount of transformer oil contained in each unit. Each transformer will have a circuit breaker on both the 230 kV and 34.5 kV sides.

There will also be a small 1.5 MVA – 34.5 kV 600-volt (V) transformer on-site to supply the ongoing electrical requirements of the southern substation equipment and other local auxiliary services. In addition, 34.5 kV capacitor banks will be located on-site. These are commonly used in the electrical industry as power factor correction devices and harmonic filters to ensure the quality of the supplied electrical energy remains within the regulated industrial standards.

As mentioned, the on-site southern substation will contain an accessory building, which will house the breaker/transformer control equipment, as well as the protection/metering-related relays/equipment. In addition, a battery bank will be installed for backup supply to the breakers and relay equipment.

From each of the two 34.5 kV transformer circuit breakers, power bus networks will extend to the hydrogen and ammonium plants. At the plant buildings, there will be multiple combinations (16) of 34.5 kV circuit breakers and 35.4 kV to 900 V transformers to supply the primary hydrogen process equipment. Additional transformers, having a 34.5kV primary voltage, will supply the ammonia plant and other BOP auxiliary equipment. This equipment is associated with supplying power to the hydrogen electrolysis and ammonia production processes.

## 6.0 PHYSICAL ENVIRONMENT

The assessment of the existing Physical Environment for the Project considers both the Industrial Facility and Transmission Interconnection Line under the same regional scale. In the context of this EA Report, the assessment will review atmosphere, climate change, and geology considerations.

The Industrial Facility is located within land zoned for industrial activity, and therefore, the Physical Environment associated with this component of the Project has generally been subjected to historic anthropogenic disturbance/alteration activities. The Industrial Facility will be located east of the existing Point Tupper Terminal (Drawing 10) and includes the following components:

- Access roads
- Air separation unit (ASU)
- Ammonia plant
- Ammonia storage and associated load out pipeline to jetty
- Common facility
- Electrical building (for southern substation within Industrial Facility footprint)
- Flare stacks (process flare and storage flare)
- Hydrogen plant
- Laydown areas
- Raw freshwater pipeline

- Raw freshwater treatment plant
- Sanitary wastewater treatment plant
- Stormwater pond
- Temporary construction facilities
- Wastewater treatment plant

The Transmission Interconnection Line is located within Crown land that has retained a relatively natural/unaltered environment. The Transmission Interconnection Line corridor will be approximately 14 km in length, travelling along the northern extent of the existing Point Tupper Terminal and then continuing north and west towards the NS Power transmission line corridor near Highway 105 and Port Hastings, NS (Drawing 9). The Transmission Interconnection Line will include the following components:

- Access roads
- Laydown areas
- Transmission Interconnection Line corridor
- 230 kV Transmission Interconnection Line and associated infrastructure
- Northern switching substation (connection to the grid)
- Southern substation (connection to the Industrial Facility)

An assessment of the Physical Environment for the Project, including both the Industrial Facility and Transmission Interconnection Line components, was completed using various desktop studies and resources, including historical information available for the existing Point Tupper Terminal.

In the following sections, consideration has been given to both the Industrial Facility and Transmission Interconnection Line components of the Project and, where relevant, the Project components are addressed separately with respect to the most applicable baseline conditions, given their physical footprint.

## 6.1 Atmospheric Environment

For the purpose of this EA Report, the atmospheric climate will incorporate weather and climate, ambient air quality, and sound considerations. Weather and climate baseline conditions have been obtained from regionally available meteorological data. Air quality baseline data has been collected from the local ambient air quality monitoring station. Baseline acoustic data will consider natural and anthropogenic activities within proximity to the Project Boundary.

### 6.1.1 Weather & Climate

Given the regional proximity of the Industrial Facility and Transmission Interconnection Line, baseline weather and climate data conditions across the span of the Project are anticipated to be similar, and Project components have been considered jointly under this section.

Nova Scotia's climate is quite varied and is largely governed by coastal influences and elevation (Davis & Browne 1996). The Project is located within the Cape Breton Coastal (810), Bras d'Or Lowlands (510), and Cape Breton Hills (310) Ecodistricts (Neily et al., 2017), see Drawing 11. The weather in the areas nearing the coast tend to be cool and moist, whereas the inland portions are sheltered by the hills, and the weather tends to be moderate.

The nearest temperature and precipitation data were obtained from the Port Hawkesbury meteorological station (Climate ID 8204495) located approximately 10 km northwest of the existing Point Tupper Terminal at 45°39'24.000" N, 61°22'05.000" W (Drawing 12). While the meteorological station is in proximity to the Project, this data may not exactly represent the conditions observed within the Project Boundary.

The following table summarizes the temperature and precipitation data available from the Port Hawkesbury weather station.

**Table 6.1: Climate Data from the Port Hawkesbury Weather Station (2011-2021)**

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Temperature** | | | | | | | | | | | | | |
| **Daily Avg. (°C)** | -4.6 | -5.3 | -2.5 | 3.1 | 8.5 | 13.3 | 18.0 | 18.7 | 14.7 | 9.4 | 4.1 | -0.7 | 6.4 |
| **Daily Max. (°C)** | -0.7 | -1.1 | 1.8 | 7.5 | 13.8 | 18.3 | 23.2 | 24.1 | 20.0 | 13.9 | 8.1 | 2.8 | 11.0 |
| **Daily Min. (°C)** | -8.6 | -9.5 | -6.9 | -1.4 | 3.1 | 8.2 | 12.8 | 13.4 | 9.4 | 4.8 | 0.0 | -4.2 | 1.8 |
| **Extreme Max. (°C)** | 12.8 | 13.6 | 23.7 | 20 | 31 | 32.5 | 33 | 32.7 | 30 | 24.4 | 23.2 | 15.6 | - |
| **Extreme Min. (°C)** | -21.4 | -24.3 | -21.7 | -11.1 | -4 | -1.5 | 4.6 | 4.2 | -1.1 | -3.6 | -13.1 | -18.5 | - |
| **Precipitation** | | | | | | | | | | | | | |
| **Precipitation (mm)** | 90.4 | 91.3 | 72.1 | 123.5 | 82.0 | 106.6 | 78.6 | 77.6 | 85.9 | 129.8 | 145.6 | 119.9 | 1,203.4 |

Source: ECCC, 2022a

For the period from 2011 to 2021, the mean annual temperature was 6.4°C, with a mean daily maximum of 11.0°C and a mean daily minimum of 1.8°C (ECCC, 2022a). January and February were the coldest months (mean daily average of -4.6°C and -5.3°C, respectively), while the warmest months were July and August (mean daily average of 18.0°C and 18.7°C, respectively) (ECCC, 2022a).

From 2011 to 2021, mean annual snowfall and mean annual rainfall was not recorded for the weather station. However, data was recorded in terms of precipitation, with most occurring in October and November (129.8 mm and 145.6 mm, respectively) (ECCC, 2022a).

The wind speed and direction data were also obtained from the Port Hawkesbury meteorological station (Drawing 12). The following table summarizes the wind speed and direction data from the Port Hawkesbury meteorological station.

**Table 6.2: Wind Data from the Port Hawkesbury Meteorological Station (2011-2021)**

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Hourly Speed (km/h)** | 98 | 105 | 109 | 94 | 78 | 78 | 76 | 91 | 84 | 98 | 102 | 117 |
| **Most Frequent Direction** | NW | NW | NW | NW | NW | NW | NW | NW | NW | NW | NW | NW |

Source: ECCC, 2022a

The maximum hourly wind speeds recorded at the Port Hawkesbury weather station between 2011 and 2021 ranged from 76 km/h to 117km/h. The wind direction observed at the weather station is from the northwest. Note that wind directions may occur in all directions, however during calm wind flows, direction is not recorded at the weather station (ECCC, 2022a). A windrose plot provided for the Port Hawkesbury weather station by Iowa State University (2022), demonstrates the wind directions from 2011 to 2021.

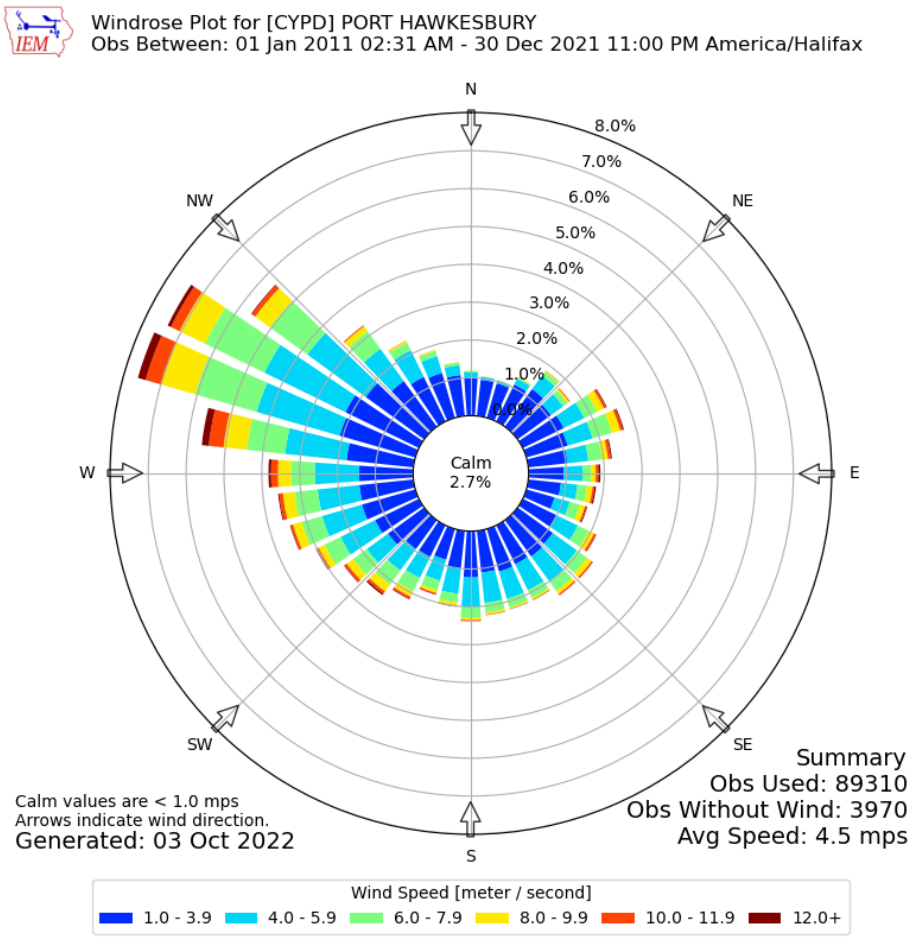



**Figure 16: Windrose Plot for Port Hawkesbury Weather Station – Jan 1, 2011 through December 30, 2021**

In addition to the Port Hawkesbury data, wind speeds and directions for 2021-22 were analyzed from the existing Point Tupper Terminal meteorological station located on the EverWind Jetty at 45°34’25.140” N, 61°20’36.708” W (Drawing 12). The observations are summarized in the following table.

**Table 6.3: 2021-22 Wind Data from the EverWind Jetty, existing Point Tupper Terminal**

| | 2021 | | | | 2022 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
| **Average Speed (km/h)** | 7.7 | 8.4 | 12.1 | 13.7 | 13.0 | 11.8 | 11.3 | 12.3 | 9.4 | 8.4 | 8.4 | 6.4 | 7.8 |
| **Maximum Speed (km/h)** | 30.0 | 33.0 | 53.0 | 50.0 | 65.0 | 65.0 | 57.0 | 53.0 | 38.0 | 43.0 | 42.0 | 24.0 | 36.0 |
| **Most Frequent Direction** | SE | NW | NW | NW | NW | NW | NW | NE | SE | SW | SW | SE | NE |

Note: Data provided by in-situ monitors at the existing Point Tupper Terminal from September 12, 2021 to September 12, 2022. Wind directions established from daily measurements collected every 4 hours.

A windrose plot provided for the EverWind Jetty meteorological station summarizes the wind directions from September 12, 2021 to September 12, 2022.

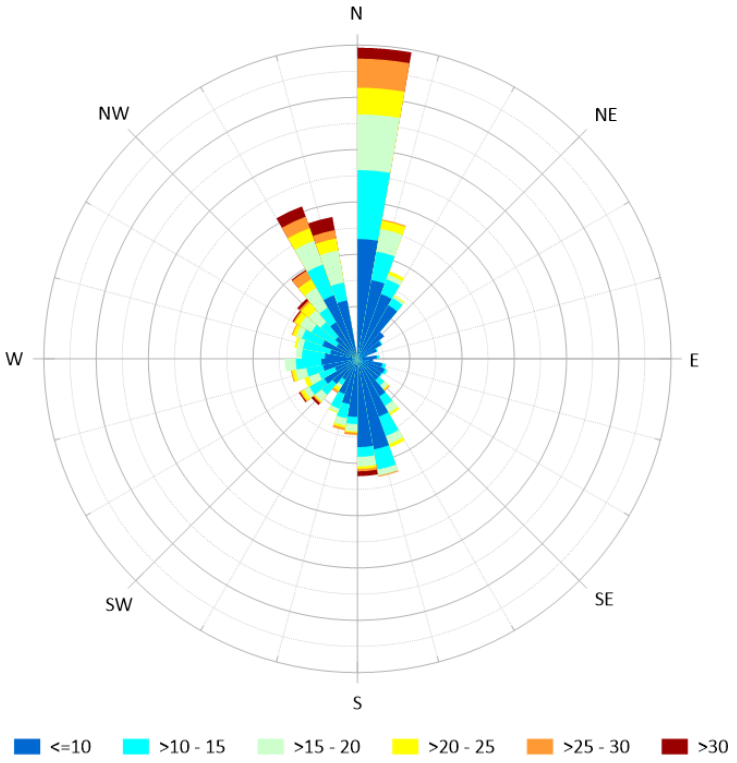



**Figure 17: Windrose Plot for the EverWind Jetty Meteorological Station**

Figure 17 demonstrates that wind speeds above 30 km/h occurred the most frequently to the northeast and northwest, rarely from the east.

### 6.1.2 Air Quality

The Canadian Council of Ministers of the Environment (CCME) has established Canadian Ambient Air Quality Standards (CAAQS) for fine particulate matter [≤2.5 micrometres (µm) ($PM_{2.5}$) or ≤10 µm ($PM_{10}$) in size], ozone ($O_3$), sulphur dioxide ($SO_2$), and nitrogen dioxide ($NO_2$) over select averaging time periods (CCME, u.d.), while the Government of Nova Scotia has legislated Air Quality Regulations (NSAQR), N.S. Reg. 8/2020 under the *Environment Act,* SNS 1994-95, c.1 (Table 6.4).

The ambient air quality standards published in the NSAQR shall set the maximum permissible ground level concentration limits. Proposed changes to the current NSAQR are underway, and will govern future air quality criteria once implemented (NSECC, 2022a).

Ambient air quality criteria provided by the NSAQR is detailed below.

**Table 6.4: Summary of Regulations Pertaining to Ambient Air Quality in Nova Scotia**

| Contaminant | Averaging Period | Regulatory Threshold (µg/m$^3$) | |
|---|---|---|---|
| | | Existing Provincial[1] | Proposed Provincial[2] |
| Carbon Monoxide (CO) | 1-hour | 34,600 | 35,000 |
| | 8-hour | 12,700 | 10,000 |
| Nitrogen Dioxide ($NO_2$) | 1-hour | 400 | 200 |
| | 24-hour | - | 25 |
| | Annual | 100 | 10 |
| Ozone ($O_3$) | 1-hour | 160 | -[4] |
| $PM_{2.5}$ | 24-hour | - | 15 |
| | Annual | - | 5 |
| $PM_{10}$ | 24-hour | - | 45 |
| | Annual | - | 15 |
| Sulphur Dioxide ($SO_2$) | 1-hour | 900 | - |
| | 24-hour | 300 | 40 |
| | Annual | 60 | - |
| Total Suspended Particulate (TSP) | 24-hour | 120 | 100 |
| | Annual | 70[3] | 60 |

[1] Current Ambient Air Quality Standards (NS AAQS) [Nova Scotia Air Quality Regulations, N.S. Reg. 8/2020].
[2] Proposed Ambient Air Quality Standards (subject to change) (NSECC, 2022a).
[3] Geometric mean.
[4] Ozone is no longer included as an ambient air quality standard in the Proposed Provincial Guidelines.

Nova Scotia monitors air quality at eight ambient air quality monitoring stations located throughout the province (NSECC, 2022b). Measured parameters at these air quality monitoring stations may include the following:

- carbon monoxide (CO)
- ground-level ozone ($O_3$)
- nitrogen oxides ($NO_x$)
- nitric oxide (NO)
- nitrogen dioxide ($NO_2$)
- particulate matter ($PM_{2.5}$)
- sulphur dioxide ($SO_2$)
- total reduced sulphur (TRS)

The $NO_2$, $O_3$, and $PM_{2.5}$ values from seven of the eight air quality monitoring stations are used to calculate a score on the Air Quality Health Index (AQHI) (ECCC, 2022b; NSECC, 2022b). The AQHI is a scale from 1-10+, in which scores represent the following health risk categories: Low (1-3), Moderate (4-6), High (7-10), and Very High (10+) (ECCC, 2021).

The air quality monitoring station closest to the Project is located in Port Hawkesbury, NS, approximately 5 km northwest of the existing Point Tupper Terminal at 45°36'50.501" N, 61°21'43.639" W (Drawing 12).

The following tables summarizes the current (baseline) maximum ambient air quality conditions observed at the Port Hawkesbury air quality monitoring station. The monitored parameters have been compared to the current NSAQR, N.S. Reg. 8/2020. For completeness, the table also displays the Ontario Ambient Air Quality Criteria (AAQC) (MECP, 2020) for $PM_{2.5}$ (which is monitored, but has no corresponding NS AAQS) and $NH_3$ (which is not monitored at the air quality monitoring station but, for the purpose of this EA Report, will be a parameter of interest).

**Table 6.5: Current (Baseline) Maximum Ambient Air Quality Conditions in Proximity to the Project**

| Parameter | Averaging Period | $O_3$ (ppb) | $SO_2$ (ppb) | $NO_X$ (ppb) | NO (ppb) | $NO_2$ (ppb) | $PM_{2.5}$ ($ug/m^3$) | TSP ($ug/m^3$) | CO (ppb) | $H_2S$ (ppb) | $NH_3$ ($ug/m^3$) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Port Hawkesbury Ambient Monitoring 2017-2021 | 1 hour | 68.5 | 61.2 | 153.5 | 94.5 | 59.1 | 64.0 | - | - | - | - |
| | 24 hours | 47.8 | 15.0 | 50.0 | 25.3 | 24.6 | 21.8 | - | - | - | - |
| | Annual | 29.6 | 0.7 | 4.1 | 1.4 | 2.7 | 5.5 | - | - | - | - |
| NS AAQS Schedule A (ON AAQC) | 1 hour | 82 | 340 | - | - | 210 | - | - | 30,000 | 30 | - |
| | 24 hours | - | 110 | - | - | - | (27) | 120 | - | 6 | (100) |
| | Annual | - | 20 | - | - | 50 | (8.8) | 70* | - | - | - |
| Fraction of NS AAQS Schedule A (ON AAQC) | 1 hour | 84% | 18% | - | - | 28% | - | - | - | - | - |
| | 24 hours | - | 14% | - | - | - | (81%) | - | - | - | - |
| | Annual | - | 4% | - | - | 5% | (63%) | - | - | - | - |

Source: NSECC, 2022a
Values in () represent Ontario AAQC
*geometric mean

As seen in Table 6.5, existing air quality conditions (i.e., baseline data) observed in proximity to the Project indicate that most of the measured contaminants are well below their respective NS AAQC Schedule A limits with the exception of $O_3$ which is at 84% of the limit. $PM_{2.5}$ is also at the higher end, at 81% for the 24-hour averaging period and 63% for the Annual averaging period. There is no monitoring data available for $NH_3$. In reviewing the available data for the Port Hawkesbury air quality monitoring station, the reported AQHI at this location is typically scored 'low' at all times of the year (ECCC, 2022b).

Emission rates for the existing Point Tupper Terminal have been captured annually through Canada's National Pollutant Release Inventory (NPRI) program. The NPRI program assists

in tracking pollution trends nationally and has been in existence since 1993. Details from the last two years of data for the existing Point Tupper Terminal are supplied in Table 6.6 below.

**Table 6.6: NPRI Data – Existing Point Tupper Terminal**

| Parameter | 2021 | 2020 |
|---|---|---|
| | Tonnes/year | |
| Carbon Monoxide (CO) | - | - |
| Oxides of Nitrogen (expressed as $NO_2$) | - | - |
| Particulate Matter (PM) | 59.78 | 39.98 |
| $PM_{2.5}$ (PM ≤2.5 µm) | 1.61 | 1.08 |
| $PM_{10}$ (PM ≤10 µm) | 16.14 | 10.79 |
| Sulphur Dioxide ($SO_2$) | - | - |
| Volatile Organic Compounds (VOC) | 26.62 | 64.97 |

Source: Golder Associates LTD., 2020; Golder Associates LTD., 2021
'-': substance less than threshold

As seen in Table 6.6, the measured emissions at the existing Point Tupper Terminal include PM, $PM_{2.5}$, $PM_{10}$, and VOCs. CO, $SO_2$, and $NO_2$ emissions are not presently of concern and have not been recorded at the existing Point Tupper Terminal for the past two years.

The Industrial Facility's proximity to zoned industrial activities indicates that baseline emissions relevant to this component of the Project will likely be more reflective of the existing on-site Point Tupper Terminal emissions.

In contrast, the location of the Transmission Interconnection Line in natural area and in closer proximity to residential communities is likely to be indicative of a lower emissions baseline, and more reflective of the values associated with the Port Hawkesbury air quality monitoring station.

## 6.2 Acoustic Environment

Ambient sound refers to baseline sound levels experienced within the Project Boundary prior to Project activities taking place. This includes sources of existing sound from both the natural and anthropogenic environment and could include such things as wind, vehicular traffic, industrial and residential activities.

Noise is defined as nuisance or un-wanted sound that is typically measured in 'A' weighted decibels (dBA), an imperial measurement of sound pressure as perceived by the human ear. Noise is typically the terminology used within legislation and associated regulatory guidelines/thresholds; for the purpose of this assessment, sound will be the terminology used to describe the existing environment (with the exception of the term 'noise', as used and referenced when speaking to regulatory requirements). Occupational exposure limits for workplace noise (as per the Workplace Health and Safety Regulations, NS Reg 52/2013, Part 2, s. 2.1-2.3) indicate a baseline exposure limit of 85 dBA for a maximum permitted daily duration of 8 hours.

The Town of Port Hawkesbury has established a Noise Control Bylaw (N-1 Town of Port Hawkesbury, 2002). The peace and tranquility of Town residents is considered to be disturbed in the event that a noise, or combination of noises, exceed(s) the applicable A-weighted continuous noise levels, as provided in Table 6.7 below.

**Table 6.7: A-weighted Continuous Noise Level Limit – Town of Port Hawkesbury**

| Time | Noise Limit (not to be exceeded) |
|---|---|
| 7:00 am – 10:00 pm | 65 dBA |
| 10:00 pm – 7:00 am | 55 dBA |

Source: *Workplace Health and Safety Regulations*, N.S. Reg. 52/2013, Part 2, s. 2.1-2.3

Exceptions to the Noise Control Bylaw indicate that the Bylaw will not apply in cases where machinery or equipment is used by employees (*specific companies are listed within the Bylaw to whom the exception is made*) when acting in the reasonable execution of their duties. No mention of the Port Tupper Industrial Park, or noise control bylaws associated with this particular area, is made.

The Industrial Facility is situated within an existing industrial area that is frequented by heavy equipment and vehicular traffic; industrial activities are currently ongoing in the area. Daily ambient sound levels are predominantly a result of anthropogenic sources rather than the natural environment.

Existing sources of industrial sound within proximity to the Project's Industrial Facility includes industrial activities associated with concrete production, steel fabrication, the existing Point Tupper Terminal operations, Port Hawkesbury Paper pulp and paper mill, Strait of Canso Superport, Cabot gypsum plant, wind turbines, and the NS Power generation station. Sounds emitted by machinery and equipment likely to be already in existence in proximity to the Industrial Facility are supplied in Tables 6.8 and 6.9 below.

**Table 6.8: Decibel Limits of Common Industrial Equipment Types**

| Type of Equipment | Average Sound Level Ranges (in dBA) |
|---|---|
| Backhoe | 85-104[1] |
| Chainsaw | 100-115[2] |
| Compressor | 85-104[2] |
| Crane | 78-103[1] |
| Dozer | 89-103[1] |
| Dump Truck | 84-88[1] |
| Fire suppression (ladders/water pumps) | 89-91[2] |
| Grinder | 106-110[1] |
| Jackhammer | 100-115[1] |
| Loader | 77-106[2] |
| Loader-dumper | 97-102[2] |
| Pile Driver | 119-125[1] |

Source: [1]WorkSafe BC u.d.
[2]Government of Ontario 2021

**Table 6.9: Decibel Limit Ranges associated with Various Industrial Facilities in Project Proximity**

| Type of Industry & Associated Activity | Approximate Sound Level Ranges (in dBA) |
|---|---|
| **Concrete Industry** | |
| Flat products using vibrating tables or conveyors | 86-102[1] |
| Concrete blocks, tiles, slabs | 71-110[1] |
| Reinforced concrete Products | 85-105[1] |
| Extruded Tiles | 82-93[1] |
| **Gypsum Plant** | |
| Loading Area | 83[2] |
| Packing Unit | 88[2] |
| Stone Crushing Unit | 92[2] |
| **Power Plant** | |
| Combustion Systems | 87[3] |
| Thermal Systems | 89[3] |
| Ash Handling Systems | 89[3] |
| **Pulp & Paper Mill** | |
| Converting | 82-85[4] |
| Papermaking | 88-92[4] |
| Pulping | 82-88[4] |
| **Railway** | |
| Locomotive | 85[5] |
| Horn | 96-110[6] |
| **Steel Industry** | |
| Pipe Cutting | 88-91[7] |
| Steel fabrication | 80-82[7] |
| Welding | 88-94[7] |
| **Waste Management** | |
| Garbage Truck | 88[8] |
| Glass, Bottle Manufacturing | 88[8] |
| Hammermill | 101[8] |
| Metal Recycling | 95[8] |
| Paper Recycling | 95[8] |
| **Wind Farm** | 43[9] |

Source: [1]HSE u.d.
[2]Duran et al. 2018
[3]Wang et al. 2020
[4]Neitzel et al. 2016
[5]Power 2018
[6]WorldwideRails 2022
[7]Ahmed 2012
[8]Workers' Compensation Board of British Columbia, u.d.
[9]General Electric, 2014

The Transmission Interconnection Line travels through various natural and industrial areas between the northern substation (connection to the grid) and southern substation (connection to the Industrial Facility) resulting in ambient sound being a collection of natural and anthropogenic sources. A summary of sources has been provided below.

**Table 6.10: Anticipated Sources of Ambient Sound along the Transmission Interconnection Line**

| Type of Sound | Source(s) of Sound/Noise |
|---|---|
| Industrial | Existing Point Tupper Terminal and other Industrial Facilities within proximity to the Project. See Table 6.8: Decibel Limits of Common Industrial Equipment Types & Table 6.9: Decibel Limit Ranges associated with Various Industrial Facilities in Project Proximity |
| Residential | Town of Port Hawkesbury – limits anticipated to be below the supplied Bylaw Limits (Table 6.7) |
| Transportation | Aircrafts (Port Hawkesbury Airport)<br>Highways (NS 104, Highway 4)<br>Secondary Roads (Port Malcom Road, Bear Island Road, Industrial Park Road) |
| Natural | Wind, vegetation, wildlife, birds, waterflow, tides/waves, etc. |

Industrial and residential sounds expected in proximity to the Transmission Interconnection Line are further described above in Tables 6.8 and 6.9.

For ambient sounds associated with transportation, (i.e., aircrafts, highways and secondary roads) information from a desktop review has been supplied; this data will be most applicable to the Transmission Interconnection Line given the proximity of this Project component to these sources of sound activities.
The Port Hawkesbury Airport is located approximately 5 km northwest of the Town of Port Hawkesbury at latitude 45.6567, longitude -61.368099 at an elevation of approximately 115 m above sea level (masl) (Airport Guide, 2022). The longest runway is approximately 1,500 m in length and can accommodate smaller regional aircraft such as some turboprop (ATR-72-600) and jet aircraft (Airbus A220-100) models (Simple Flying, 2022). The Effective Perceived Noise Level (EPNLdB) of an ATR model is approximately 90 EPNLdB in flight overhead, and the Airbus 220 is approximately 79.9 EPNLdB during flyover (AINonline, 2008; EASA, 2022).

Sound produced by highway traffic ranges from approximately 70-80 dBA at a distance of 15 m from the highway (U.S. Department of Transportation, 2003). The Transmission Interconnection Line travels in proximity to Highway 4 and Highway 104, crossing them at multiple locations (i.e., one crossing of Highway 4 and two crossings of Highway 104). Sound levels produced by traffic along secondary roads are anticipated to be well below the 70-80 dBA range, given the lower volume of traffic and intermittent use.

Sound produced by the natural environment can range between <20 dBA to approximately 40 dBA, depending on several environmental characteristics such as topography, presence of flowing water, vegetation, wildlife, etc. (US National Park Service, 2021). Typically, higher ambient sound levels are found along the coast (as a result of wave noise), in areas that experience high winds, and in wetter regions as a result of vegetation, flowing water, and abundance of wildlife (U.S. National Park Service, 2021).

## 6.3 Climate Change

For the purpose of this EA Report, climate change data has been collected through regionally (provincial and federal sources) available online data portals, historical data, and future climate projections. This data will help characterize current climate change trends and future projections, which may affect, or be affected by, the Project. The potential climate change impacts to and from the Project will be reviewed following the Guide to Considering Climate Change in Project Development in Nova Scotia (NSECC, 2011). This review will consider the Project's anticipated carbon footprint and the possible options to reduce GHG emissions, through mitigation controls. In addition, the review will consider the baseline conditions and projections to identify whether or not there are potential hazards from climate change that could affect the Project.

Climate change is a long-term alteration of weather patterns and conditions strongly impacted by changes in temperature and precipitation. Climate change typically involves changes in average conditions, as well as changes in variability. The main contributor to climate change is attributed to GHGs from anthropogenic sources. Since GHGs disrupt the natural heat transfer processes within the Earth's atmosphere, a build-up of these gases has enhanced the natural greenhouse effect. These human-induced enhancements are especially of concern since ongoing GHG emissions have the potential to warm the planet to levels that have yet to be experienced (Government of Canada, 2019a).

Given the proximity of the Industrial Facility and Transmission Interconnection Line Project components, baseline climate change data is not considered to vary significantly between these Project components and therefore has been considered jointly within this section.

### 6.3.1 Temperature & Precipitation

Temperature and precipitation are key climate variables which have the most significant influence on human society and the natural environment. Temperature and precipitation variables may influence decisions regarding the types of vegetation to incorporate post-construction, contribute to the Project's heating and cooling requirements, and factor into the size and design of stormwater collection systems or culverts (Government of Canada, 2019b).

The regional forecasts for Atlantic Canada show an overall increase in mean annual temperature and precipitation as a result of climate change (NRCan, 2015). It is projected that by 2050, summer temperatures will increase between 2°C to 4°C in the summer, and

1.5°C to 6°C in the winter, depending on geographical location and distance from the ocean. Coastal areas are expected to see smaller changes in temperature compared to inland regions.

Precipitation in Atlantic Canada is anticipated to increase in the future, with seasonal and yearly variations becoming more evident. Drier summer conditions may characterize inland regions. For these areas, the change in rainfall may not offset the increase in evapotranspiration caused by higher summer temperatures (NRCan, 2015).

Climate change data for Port Hawkesbury and surrounding communities is provided by Environment Canada and Climate Change (ECCC). The available data reflects values from 10 km by 6 km grid cells, and as the Project resides within multiple grids, data is variable. Historically, the annual average temperature and precipitation were 5.6°C and 1,338 mm, respectively. According to the climate data, annual average temperatures are projected to increase from approximately 5.6°C (1981 – 2010) to 8.1°C (2021 – 2050) under a high emissions scenario (ECCC, 2022c), an increase of almost 3°C. Additionally, average annual precipitation is predicted to increase from 1,338 mm (1950 – 1980) to 1,450 mm[3] (2021 - 2050) under the same high emissions scenario (ECCC, 2022c).

Extreme weather events, such as tropical storms, cyclones, or summer drought, are predicted to increase in both frequency and severity (NRCan, 2015). Precipitation extremes may also result in frequent and intense rainfalls, such as downpours from thunderstorms, more instances of rain falling as snow, and new storm patterns (Government of Canada, 2019c).

### 6.3.2 Sea Ice

Sea ice is prevalently found in the Earth's polar regions, but its influence on climate can be felt globally. This is because sea ice serves as a reflector for incoming sunlight and reflects the sun's rays back into the atmosphere. Since the solar energy is reflected, it is not absorbed into the ocean, resulting in relatively cool temperatures near the poles [National Ocean Services (NOS), 2021].

As global warming increases, the increased temperatures gradually melt sea ice, leaving fewer surfaces available to reflect sunlight back into the atmosphere. With fewer reflective ice surfaces, solar energy is absorbed at the earth's surface resulting in atmospheric and oceanic temperatures rising (NOS, 2021).

Sea level in the Atlantic region has risen approximately 0.3 m in the last century, and is anticipated to rise between 0.75 m and 1.00 m by 2100 (Lemmen et al., 2016; NRCan, 2015). Sections of the Atlantic coastline have been highlighted as some of Canada's most severely threatened areas from sea level rise and resulting impacts. Rising sea levels are

[3]These values reflect those of the ~10 km x 6 km grid cell that Port Hawkesbury lies within and do not necessarily reflect the exact Project location, which may experience varying microclimates.

anticipated to amplify coastal flooding, coastal erosion, and storm surges across the Atlantic region (NRCan, 2015).

### 6.3.3 Snow

Climate changes impact the amount of winter snow in Canada, more specifically, the northern hemisphere. Snow is an essential aspect of winter since people, animals, and plants depend on snowmelt to provide water in the spring (US EPA, 2021).

Similar to sea ice, snowpack serves as a reflector for incoming sunlight. Thus, as atmospheric temperatures increase, snowfall events and snow cover periods decrease, leaving radiative energy to be absorbed by the Earth's surface.

Overall, the climate changes induced by human activity have led to a decrease in snow cover duration across most of Canada over recent decades. The number of days per season with snow cover has decreased by 5-10% per decade in most Canadian regions (Government of Canada, 2019d). This can be attributed to later snowfall events and earlier snowmelt during the year. With increasing temperature projections, snow cover duration will decrease accordingly (Government of Canada, 2019d).

Similarly, snow water equivalent (i.e., amount of water released from the snowpack when it melts) has decreased by 5-10% across much of Canada in the last four decades. Reductions in snow water equivalent are projected to fall between 5-10% per decade by 2050 across Canada. As a result, coastal provinces (i.e., Atlantic provinces and British Columbia) are expected to experience significant changes (Government of Canada, 2019d).

## 6.4 Geophysical Environment

For the purpose of this EA Report, the geophysical environment will incorporate topography, surficial and bedrock geology, along with groundwater resources. The baseline geophysical environment was characterized using a combination of desktop resources and historical data (sourced from geotechnical assessments completed within proximity to the Project). Geophysical environment considerations will vary for the different components of the Project; as such, each of the following sections details both the Industrial Facility geophysical environment characteristics followed by the Transmission Interconnection Line geophysical environment characteristics. Further information regarding the approach to each assessment area is supplied below.

Within the Industrial Facility, the geophysical environment assessment is scoped based on localized variability of geological compositions and conditions; with the exception of groundwater resources (i.e., wells) which will extend up to 2 km from the Industrial Facility to account for potential impacts on nearby groundwater wells. Detailed geotechnical investigations are scheduled to be completed within the Industrial Facility, consisting of a rotary core drilling program to identify any potential geologic hazards.

Within the Transmission Interconnection Line the geophysical environment assessment is scoped based on localized variability of geological compositions and conditions; with the exception of groundwater resources (i.e., wells) which will extend up to 2 km from the Transmission Interconnection Line to account for potential impacts on nearby groundwater wells. Detailed geotechnical investigations are scheduled to be completed along the Transmission Interconnection Line corridor, consisting of a shallow pit program (dug to refusal from bedrock or maximum reach of an excavator) to identify any potential geologic hazards.

### 6.4.1 Topography

The Industrial Facility is located within the Cape Breton Coastal Ecodistrict (810) of the Atlantic Coastal Ecoregion (8) (Neily et al., 2017), see Drawing 11. The Cape Breton Coastal Ecodistrict is a long and narrow landscape that encompasses a range of coastal features (e.g., coastal cliffs or islands) along with adjacent low-lying areas further inland. Along the coastline where the Industrial Facility is located, there are knobs and knolls with few surface boulders and little to no bedrock outcropping. Elevations range between approximately 55 and 80 masl within the Industrial Facility, see Drawing13 (Neily et al., 2017).

The Transmission Interconnection Line is located within the Bras d'Or Lowlands Ecodistrict (510) and the Cape Breton Hills Ecodistrict (310) (Neily et al., 2017), see Drawing 11. The Bras d'Or Lowlands capture the lowland areas along the length of Cape Breton Island and contain some of the most undisturbed and dramatic karst topography in Nova Scotia. Within this Ecodistrict is a rigid to hummocky topography with many surface boulders scattered throughout the landscape (NSNRR, 2021). In comparison, the Cape Breton Hills Ecodistrict is characterized by it's slopes and hills reaching 150 to 300 masl along with the prevalence of deep and steep ravines along watercourses. Karst topography is also found throughout this Ecodistrict, primarily in areas of lower elevation (Neily et al., 2017).

### 6.4.2 Surficial

Surficial geology associated with the Industrial Facility is characterized by ground moraines and streamlined drifts dating back to the Quaternary period, see Drawing 14 (NSNRR, 2021a). Along the coastline where the Industrial Facility is located, ground moraines and streamlined drifts consist of silty compact till material ranging between approximately 3 m to 30 m in thickness. These surficial features provide moderate drainage along with acid rain buffering as a result of calcareous bedrock.

Along the Transmission Interconnection Line are ground moraines and streamlined drifts consisting of a stony/sandy till material approximately 2 m to 20 m in thickness, see Drawing 14. These surficial characteristics may affect use for construction as a result of the surficial layers shallowness, stoniness, high water table, and poor capacity for acid rain buffering (NSNRR, 2021a).

### 6.4.3 Bedrock

The bedrock underlaying the Industrial Facility consists primarily of the Cumberland Group, with a pocket of the Mabou Group within the northern extent of the site (Keppie, 2000), see Drawing 15. The Cumberland Group is characterized as sedimentary bedrock dating back to the Late Carboniferous era and consists of fluvial sandstone, coal, shale, siltstone, conglomerate, limestone, and mudstone. The Mabou Group is characterized as Early-Late Carboniferous sedimentary bedrock composed of sandstone, fluvial siltstone, anhydrite, limestone, shale, gypsum, and conglomerate (Keppie, 2000). The Cumberland and Mabou Groups are divided by an east-west trending fault line.

A previous geotechnical investigation was completed within approximately 1 km of the Industrial Facility by Anderson Magee in 1995. This investigation found that bedrock was encountered between 1.5 m and 1.9 m below ground level and consisted of sandstone, siltstone, and shale. The quality of the bedrock was considered to be poor based on its highly fractured and seamy composition (Hatch, 2022b).

The bedrock underlaying the Transmission Interconnection Line primarily belongs to the Cumberland Group (Keppie, 2000), see Drawing 15. As previously noted, the Cumberland Group is sedimentary bedrock dating back to the Late Carboniferous era that consists of fluvial sandstone, coal, shale, siltstone, conglomerate, limestone, and mudstone (Keppie, 2000).

### 6.4.4 Groundwater

The bedrock underneath the Industrial Facility belongs to the Sedimentary Bedrock Groundwater Region (NSNRR, 2008). Sedimentary aquifers are generally highly porous and permeable, meaning water flows readily through pores in the bedrock. Based on groundwater risk mapping, the bedrock is considered a low to high risk for arsenic and low risk for uranium (NSECC & NSNRR, 2009). The previous geotechnical investigation completed by Anderson Magee in 1995 within approximately 1 km of the Industrial Facility observed the groundwater table at approximately 1.5 m below the surface on average (Hatch, 2022b).

A review of the NSECC Well Logs Database (2020) identified nine water wells within 2 km of the Industrial Facility (excluding wells located in mainland Nova Scotia), see Table 6.11 below for details. Based on the well records, the average water well depth is 51.50 m where bedrock was found between 0.91 and 11.57 m from the surface. The average static water level was 4.03 m while the average yield is 64.06 Lpm (NSECC, 2020). Water use for these wells was identified as either for domestic (4), industrial (3), or not available (2).

**Table 6.11: Water Wells within 2 km of the Industrial Facility**

| Well ID | Community | Use | Depth (m) | Casing (m) | Bedrock (m) | Static (m) | Yield (Lpm) | Easting | Northing |
|---|---|---|---|---|---|---|---|---|---|
| 670616 | Point Tupper | Industrial *Point Tupper Generating Station* | 60.90 | 12.79 | 9.14 | 6.09 | 227.00 | 628892 | 5049452 |
| 680737 | Point Tupper | Domestic | 16.75 | 6.09 | 3.04 | 4.57 | 22.70 | 632901 | 5048609 |
| 690113 | Port Hawkesbury | Domestic | 49.33 | 6.09 | 3.04 | 4.57 | 27.24 | 632753 | 5048424 |
| 740199 | Port Hawkesbury | Domestic | 90.13 | 13.09 | 11.57 | 3.96 | 13.62 | 632499 | 5048438 |
| 750244 | Point Tupper | Industrial *Existing Point Tupper Terminal* | 22.23 | 12.18 | 0.91 | 0.91 | 68.10 | 630224 | 5048363 |
| 750246 | Point Tupper | Industrial *Existing Point Tupper Terminal* | 29.54 | 13.4 | 1.52 | 3.04 | 45.40 | 630614 | 5048189 |
| 780761 | Port Hawkesbury | Domestic | 9.44 | 7.00 | 0.91 | 0.91 | 36.32 | 629190 | 5049860 |
| 980545 | Point Tupper | n/a | 92.57 | 12.18 | 2.44 | n/a | 68.10 | 629500 | 5050500 |
| 981912 | Point Tupper | n/a | 92.57 | 12.18 | n/a | 12.18 | 68.10 | 629500 | 5050500 |

Source: NSECC 2020

None of the identified wells are located within the footprint of the Industrial Facility; however, two of the identified water wells are located within the larger Property Boundary (Well IDs 750244 and 750246) and are associated with the existing Point Tupper Terminal (Drawing 16). Both of these industrial wells were drilled in 1975 for Gulf Oil Ltd. through approximately 1.0 m to 1.5 m of red clay underlain by grey/red shale. Water bearing fractures were encountered at 13 and 23 m below the surface.

The bedrock underlying the Transmission Interconnection Line also belongs to the Sedimentary Bedrock Groundwater Region (NSNRR, 2008). As previously discussed, sedimentary aquifers are generally highly porous and permeable, meaning water flows readily through pores in the bedrock. Based on groundwater risk mapping, the bedrock where the Transmission Interconnection Line is located is considered a predominantly low risk for arsenic (except for a 1.2 km section of high risk near the Industrial Facility) and a low risk for uranium (NSECC & NSNRR, 2009).

A review of the NSECC Well Logs Database (2020) identified 155 wells within 2 km of the Transmission Interconnection Line, see Appendix H for a complete well list and characterization. Based on the well records, the average water well depth is 34.60 m where bedrock was found between 0.61 m and 33.50 m from the surface. The average static was 5.14 m while the average yield is 49.21 Lpm (NSECC, 2020). Water use for the 155 wells was identified as heat pump (1), commercial (2), municipal (3), industrial (9), domestic (117), or unspecified (23) purposes.

One of the identified wells (Well # 800157) is within the Transmission Interconnection Line corridor, located east of Port Hawkesbury on Crown land PID 75108043. This domestic water well was drilled in 1980 to a depth of approximately 37.15 m through clay (0-9 m), shale (9-27 m), and sandstone (27-37 m). Bedrock was encountered at approximately 8.83 m, and the well casing was extended to 12.18 m below the surface. Static was measured at 4.57 m with a yield of 13.62 Lpm (NSECC, 2020).

The location of all identified groundwater wells within 2 km of the Project can be found on Drawing 16.

## 7.0 BIOPHYSICAL ENVIRONMENT

The assessment of the biophysical environment will include the following:

- Freshwater Aquatic Environment
    - Watersheds
    - Waterbodies
    - Watercourses
    - Fish and fish habitat
    - Wetlands

- Terrestrial Environment
    - Terrestrial habitat
    - Flora
    - Fauna
    - Bats
    - Avifauna

The assessment is divided into two separate components, the Industrial Facility and the Transmission Interconnection Line. As the biophysical considerations differ between the two components, they are assessed under separate sections to better describe the varying baseline data.

The Industrial Facility is located within a zoned industrial area, and therefore, the biophysical environment has been subject to significant previous anthropogenic disturbance/alteration.

The Industrial Facility will be located within the Property Boundary of the existing Point Tupper Terminal (Drawing 10) and will include the following components:

- Access roads
- ASU
- Ammonia plant
- Ammonia storage and associated load out pipeline to jetty
- Common facility
- Electrical building (for southern substation within Industrial Facility footprint)
- Flare stacks (process flare and storage flare)
- Hydrogen plant
- Laydown areas
- Raw freshwater pipeline
- Raw freshwater treatment plant
- Sanitary wastewater treatment plant
- Stormwater pond
- Temporary construction facilities
- Wastewater treatment plant

The majority of the Transmission Interconnection Line is located within Crown land which exhibits a relatively natural environment without significant alteration. Select sections near the southeastern end of the Transmission Interconnection Line, where it connects to the Industrial Facility, are located within the existing Point Tupper Terminal property (PID). The Transmission Interconnection Line is approximately 14 km in length and will include the following components (Drawing 9):

- Access roads
- Laydown areas
- Transmission Interconnection Line corridor
- 230 kV Transmission Interconnection Line and associated infrastructure
- Northern switching substation (connection to the grid)
- Southern substation (connection to the Industrial Facility)

The assessment was completed using various desktop resources to determine baseline conditions and scope subsequent field studies. The approach of the field assessment was to evaluate the biophysical environment (freshwater aquatic and terrestrial) within all proposed (and alternative) layouts of the Industrial Facility and proposed (and alternative) routes of the Transmission Interconnection Line within the Study Area. The field assessment included targeted freshwater surveys, during which, incidental observations of terrestrial flora and fauna Species of Conservation Interest (SOCI) were recorded (see below for SOCI definition). Targeted and comprehensive flora and fauna surveys were not completed based on the Project's location in a zoned industrial area, history of anthropogenic disturbance/alteration, limited disturbance area, and thoroughness of the desktop resources.

The overall goal of the field assessment was to review the proposed locations of Project components and to assess proximity of local receptors and environmental constraints. As a result of the identified biophysical constraints, the layout of the Industrial Facility and route of the Transmission Interconnection Line both underwent several iterations to avoid sensitive biophysical features. Detailed field survey methodologies can be found in Appendix I.

All species identified through desktop resources within the Study Area were screened against the criteria outlined in the Guide to Addressing Wildlife Species and Habitat in an EA Registration Document (NSECC, 2009) to develop a list of SOCI, that may be present. In the context of this EA, SOCI species are characterized as follows:

- Species listed under *SARA* as “Endangered”, “Threatened”, or “Special Concern” (Government of Canada, 2022).
- Species listed under COSEWIC as “Endangered”, “Threatened”, or “Special Concern” (Government of Canada, 2022).
- Species listed under NS *ESA* as “Endangered”, “Threatened” or “Vulnerable” (Government of NS, 2022a).
- Species having a subnational (provincial) rank (S-Rank) of “S1”, “S2”, or “S3” (ACCDC, 2022a).

Previously the Nova Scotia General Status Ranks of Wild Species database designated Species of Conservation Concern as “Red” or “Yellow”; this approach is no longer used, with preference now being given to the S-Rank identification system (Government of NS, 2021).

## 7.1 Freshwater Aquatic Environment – Industrial Facility

Freshwater resources were assessed using desktop sources within 5 km of the Industrial Facility, excluding freshwater resources located on mainland Nova Scotia.

Field studies focusing on watercourse and wetland delineation and/or characterization were also completed within the Industrial Facility, as well as within alternative layouts that were considered but not selected. For additional details on all the considered layouts assessed, refer to Section 1.4 and Drawing 2. The overall goal of the field studies was to characterize the existing freshwater environment to inform the design/layout of the Industrial Facility and avoid sensitive freshwater features (i.e., watercourses and wetlands) while maintaining constructability and providing consideration to land features and topography.

Within and surrounding the Industrial Facility, previous developments have resulted in a severely altered and unnatural hydrological regime (Drawing 8) influenced/controlled by:

- The existing Point Tupper Terminal (west)
- Sloping/ditching/culverts for Port Malcom Road (west)
- Sloping/ditching/culverts for Bear Island Road (south).
- Sloping/ditching/culverts for the LNG pipeline (south)

- Sloping/ditching/culverts for the LLWU access road (north)
- Sloping/ditching for wind turbine pads and associated access roads (north and east)
- Graded and excavated areas for historical borrow pits (within the Project Boundary)
- Pre-existing/overgrown road networks used for historical borrow pit access (within Project Boundary)

Surficial drainage features that have developed as a result of these aforementioned activities are presented in Drawing 2 as "human influenced drainage features" and are not considered natural freshwater resources/features. Further information regarding historical borrow pits can be found in Section 8.5 (Drawing 8).

### 7.1.1 Watersheds

The Industrial Facility is located within the River Inhabitants Primary Watershed (1FA) which encompasses approximately 1,196 km$^2$ of Cape Breton's southwestern shores and adjacent inland (NSECC & NSNRR, 2009). This watershed primarily drains towards and into the Gulf of the St. Lawrence.

The Industrial Facility is also primarily located within the 1FA-SD7 Secondary Watershed which stretches along the coastline from Bear Island Cove to Port Hastings, covering an area of approximately 38 km$^2$. This secondary watershed controls local drainage within the Industrial Facility, directing freshwater flow west into the Strait of Canso (NSECC & NSNRR, 2009). The remainder of the Industrial Facility (i.e., laydown area and raw freshwater pipeline) are located within the 1FD-SD6 Secondary Watershed which directs flow towards/into Landrie Lake. Locations and boundaries of these primary and secondary watersheds can be found in Drawing 17.

North of the Industrial Facility are the Port Hawkesbury Protected Water Area and the Landrie Lake Watershed Protection Zone. The Industrial Facility is not located within the two protected watersheds, with the exception of the raw freshwater pipeline. The raw freshwater pipeline will travel through the protected watersheds, along existing right-of-way's, from the LLWU pumping station (on the southwest shore of Landrie Lake) to the Project's RFWTP (Drawing 18). For additional details regarding protected watersheds, refer to Section 3.4.3.

### 7.1.2 Waterbodies

Based on aerial imagery, there are five waterbodies located within 5 km of the Industrial Facility (excluding mainland Nova Scotia) (Table 7.1).

**Table 7.1: Waterbodies within 5 km of the Industrial Facility**

| Waterbody Name | Distance and Direction* |
|---|---|
| Grant's Pond | 4.9 km N |
| Hines Lake | 4.4 km E |
| Landrie Lake | 1.1 km N |
| Little River Reservoir | 3.9 km NE |
| Peebles Pond | 3.4 km N |

*Distance and direction are from the nearest point of the Industrial Facility.

The closest waterbody (1.1 km north) is Landrie Lake, a constructed reservoir system consisting of two embankment dams and an associated spillway. The embankment dams and spillway were constructed in the late 1960s with the goal of attracting a paper mill to Point Tupper/Strait of Canso (Hatch, 2022b). As a result of the dam, Landrie Lake and the surrounding forested upland were flooded, increasing the size of the lake from 30 ha to 260 ha (Figure 18).

**Figure 18: Landrie Lake in 1961 (left); Landrie Lake in 1970 (right) (Hatch, 2022)**

Landrie Lake is now a provincially and municipally protected source of drinking water for the Town of Port Hawkesbury and community of Point Tupper, which also supplies necessary water demands for nearby industrial activities. The LLWU pumphouse has a maximum pumping capacity of 35.9 ML/day, of which 5.8 ML/day is used to meet current customer demands (municipal, residential, and industrial). The existing Point Tupper Terminal is supplied raw water by the LLWU pumphouse through an existing water pipeline (not part of this Project) that travels west of the pumphouse, entering the existing Point Tupper Terminal along its northern boundary. Water quality measurements from Landrie Lake are provided in Appendix E.

The Industrial Facility will require raw freshwater for various purposes (cooling, potable, process water, etc.) during its operations. To accommodate the water demands for the Project, a new approximately 2.4 km raw freshwater pipeline will be constructed with the capacity to accommodate 9.5 ML/day to account for the Project's known water requirements and potential future water demands. For additional details on the Project's freshwater requirements refer to Section 5.2.1.

### 7.1.3 Watercourses

*Desktop Studies*
A total of 124 watercourses (definite and indefinite) were identified within 5 km of the Industrial Facility through the Nova Scotia Topographic Database - Water Features (GeoNova, 2022) (Table 7.2 below and Appendix J). None of the 124 watercourses are located within the Industrial Facility; the nearest record is a definite unnamed watercourse feature approximately 0.2 km north of the Industrial Facility.

**Table 7.2: Named Watercourses within 5 km of the Industrial Facility**

| Named Watercourses | Distance to Industrial Facility* |
|---|---|
| Seacoal Brook | 1.6 km |
| Little River | 4.9 km |

*Distance to nearest point of the Industrial Facility.

The results of the desktop review for watercourse features (along with WAM) were used to guide field studies within the Industrial Facility as discussed below.

*Field Studies*
Field studies for watercourses were completed within the Industrial Facility (and all considered alternative layouts) between August and October 2022. Surveys included complete delineations along with an assessment of the watercourse's physical and habitat characteristics. The priority during design and development of the Project was to review the proposed and alternative locations of the Industrial Facility for watercourses, and determine the location which would best avoid these sensitive biophysical features.

Several watercourses were identified within considered alternative layouts of the Industrial Facility and are presented on Drawing 2 to illustrate the local hydrology. The watercourses identified during field studies are all located south of the Industrial Facility, draining south/west through a series of channels and culverts into the Strait of Canso. The hydrology and channelization of these watercourses have all undergone historical disturbance/ alteration from the construction of Bear Island Road and an LNG pipeline, which both travel perpendicular to the direction of drainage. Characterizations of these watercourses can be found in Appendix K.

With the exception of the raw freshwater pipeline right-of-way, no watercourses are located within the Industrial Facility, as avoidance of these features was the priority during design and development of the Project. The proposed raw freshwater pipeline does transect three watercourses within the LLWU access road right-of-way. Two of the watercourses (WC7 and WC8) are constructed drainage ditches developed by the existing Point Tupper Terminal and are not considered natural watercourses. The third watercourse (WC10) is a naturally occurring permanent watercourse, fed by seasonal overland flow/surficial drainage and a wetland (WL39) upstream. All three watercourses have established crossings/culverts underneath the LLWU access road, see Drawing 19 for locations and Figure 19 below.

**Figure 19: Watercourse crossings along the LLWU access road right-of-way and the raw freshwater pipeline. WC7 and WC8 join (via ditching) and flow through a metal culvert (left), while WC10 flows through a separate culvert (right).**

All three watercourses are characterized further in Section 7.2.3 as they are also crossed by the Transmission Interconnection Line within the existing Point Tupper Terminal property (PID).

### 7.1.4 Fish & Fish Habitat

*Desktop Studies*
A desktop review of freshwater fish and fish habitat (including freshwater aquatic invertebrates) was conducted within 5 km of the Industrial Facility using the following resources:

- Aquatic Species at Risk Map (DFO, 2022)
- ACCDC Data Report (ACCDC, 2022b)
- Significant Species and Habitats Database (NSNRR, 2018)

Based on the desktop review, there are no freshwater fish SOCI or their associated habitat identified within 5 km of the Industrial Facility. A complete list of fish SOCI up to 100 km from the Industrial Facility can be found in the ACCDC Data Report in Appendix L.

*Field Studies*

Fish presence and suitable fish habitat were documented as part of the watercourse surveys conducted within all considered layouts of the Industrial Facility. Notes on the visual observance of fish were recorded along with ideal fish habitat characteristics such as pool/rifle sequences, gravel substrates, etc.

South of the Industrial Facility, several watercourses were identified and assessed for fish/fish habitat. These watercourses have headwaters originating in either wetlands or overland flow/drainage channels located upslope, all draining into the Strait of Canso through a series of culverts underneath Bear Island Road and an LNG pipeline. Electrofishing was completed for one watercourse (WC-VI[4]) located south of the Industrial Facility to assess the potential for fish bearing streams/habitat downstream of the Project (Drawing 20). This watercourse was selected for electrofishing because it was the most significant watercourse identified during field surveys and was suspected to contain fish based on the permanence of flow and presence of adequate fish habitat (deep pools, gravel substrate, etc.). Water quality measurements and habitat descriptions were recorded (at 0 m, 100 m, and 200 m) along the electrofished area (Table 7.3). No fish were observed or caught during the electrofishing survey.

**Table 7.3: Habitat and Water Quality Results of the Electrofishing Survey for WC-VI**

| Distance Upstream | Fish Caught (Yes/No) | Fish Habitat (Poor, Moderate, High) | | | Water Quality | | | |
|---|---|---|---|---|---|---|---|---|
| | | Spawning | Rearing | Overwintering | Temp (°C) | Cond[1] (mS/cm) | DO[2] (%, mg/L) | pH |
| 0 m | No | Moderate | High | Poor | 13.1 | 0.063 | 85.5% 8.99 mg/L | 6.52 |
| 100 m | No | High | High | High | 13.2 | 0.062 | 92% 9.65 mg/L | 6.67 |
| 200 m | No | High | High | Poor | 13.2 | 0.010 | 95.1% 9.97 mg/L | 6.25 |

[1]Cond = Conductivity (mS/cm)
[2]DO = Dissolved Oxygen (% and mg/L)

The electrofished watercourse (WC-VI) is fed by a combination of wetlands and small drainage features for overland flow (no connection to waterbodies), draining south into the Strait of Canso through a series of two culverts. One culvert directs flow underneath an LNG pipeline, which is followed by a second culvert directing flow underneath Bear Island Road.

[4]Note – Watercourses identified within considered alternative layouts of the Industrial Facility were given ID's containing roman numerals to distinguish them from watercourses delineated within the Transmission Interconnection Line (and its considered alternative routings).

During the electrofishing survey, an elevated culvert was discovered where the watercourse crosses the LNG pipeline on the downstream side (Drawing 20).

With the exception of the raw freshwater pipeline, no watercourses (i.e., no fish/habitat) were identified within the Industrial Facility. Fish habitat within the raw freshwater pipeline right-of-way is further assessed below, as these watercourses also cross the Transmission Interconnection Line. Characterizations of watercourses outside of the Industrial Facility (but within the Study Area) can be found in Appendix K.

### 7.1.5 Wetlands

*Desktop Studies*
A desktop review of the location and extent of potential wetlands within 5 km of the Industrial Facility was completed by reviewing the following information sources:

- Wetlands Inventory (NSNRR, 2021b)
- Wetlands of Special Significance (NSNRR, 2014)
- NS Wet Areas Mapping Database (NSLF, 2012)

Based on the desktop review of the NSNRR Wetlands Inventory, a total of 93 wetland features were identified within 5 km of the Industrial Facility. Wetlands identified are comprised of bogs or fens (8), marshes (7), swamps (77), and a salt marsh (1). The majority of these wetlands are located north of the Industrial Facility within the Port Hawkesbury Protected Water Area and Landrie Lake Watershed Protection Zone (Drawing 21).

The Wetlands of Special Significance (WSS) Database identified 58 WSS within 5 km of the Industrial Facility. WSS are defined and receive additional protection measures under the Nova Scotia Wetland Conservation Policy (NSECC, 2019). Wetlands are designated as WSS based on the presence of SAR (48), a salt marsh (1), or are located within a protected watershed zone (9). All of these WSS are located outside of the Industrial Facility; with the closest WSS located approximately 40 m east of the raw freshwater pipeline and 900 m north of the laydown area (Drawing 22).

Wet Areas Mapping (WAM) shows the water table within 0 m and 10 m from the surface within the Industrial Facility and considered alternative layouts (Drawing 23) (NSLF, 2012). Areas where the water table exists near/at the surface were flagged as potential wetlands and subsequently verified during field studies.

*Field Studies*
Field studies for wetlands were completed within the Industrial Facility (and all considered alternative layouts) between August and October 2022. Surveys included complete delineations along with an assessment of each wetland's vegetation, soils, and hydrologic indicators. The overall goal of the field assessment was to review the proposed

locations/alternatives of the Industrial Facility for wetlands, and subsequently avoid these sensitive biophysical features.

Several wetlands were identified across the Study Area within considered alternative layouts and are presented on Drawing 2 to illustrate local hydrology. The wetlands identified within the alternative layouts during field studies were primarily shrub and treed swamps ranging in size up to approximately 2.2 ha. Characteristics and details of these wetlands can be found in Appendix K.

Field studies did not identify any wetlands within the Industrial Facility as avoidance of these features was the priority during design and development of the Project. Several design iterations and adjustments were made to the Industrial Facility to avoid wetland features identified within the Study Area.

## 7.2 Freshwater Aquatic Environment – Transmission Interconnection Line

Freshwater resources were assessed using desktop resources within 5 km of the Transmission Interconnection Line (and associated substations), excluding freshwater resources located on mainland Nova Scotia. Field studies focusing on wetland and watercourse delineation and/or characterization were also completed along the Transmission Interconnection Line, along with considered alternative routes. For additional details on the considered alternative routes, refer to Section 1.4 and Drawing 3. The intent of the field studies was to inform the routing of the Transmission Interconnection Line to avoid sensitive freshwater features (i.e., watercourses and wetlands) and/or span them (to avoid disturbance), as applicable.

### 7.2.1 Watersheds

The Transmission Interconnection Line (and associated substations) is also located within the River Inhabitants Primary Watershed (1FA) (NSECC & NSNRR, 2009). The Transmission Interconnection Line also crosses several secondary watersheds that control drainage at a finer scale, including 1FA-2 (Little River), 1FA-SD7, and 1FD-SD6 (Landrie Lake) (Drawing 17).

There are two protected watersheds within the Transmission Interconnection Line including:

- Port Hawkesbury Protected Water Area
- Landrie Lake Watershed Water Protection Zone

The Port Hawkesbury Protected Water Area is provincially designated, delineated, and protected under the Nova Scotia *Environment Act.* This Protected Water Area covers approximately 52 km$^2$ and is composed of two sections (A and B) divided by Trunk Highway 4 and Barberton Road in Richmond County, NS. Section ‘A’ is located north/northwest of the aforementioned roadways while Section ‘B’ is located to the south/southwest (Drawing 18). Both Section ‘A’ and ‘B’ have a set of prohibited activities as

defined in the *Port Hawkesbury Watershed Protected Water Area Designation and Regulations*, *NS Reg 149/82*. Under these regulations, the construction and maintenance of power lines is permitted with permission from NSECC.

Landrie Lake Watershed is also a Municipal Water Protection Zone designated under the Municipality of the County of Richmond *West Richmond Planning Area Land Use By-law*, *2000*. This water protection zone spans approximately 9.9 $km^2$ and is a source of drinking and industrial water for West Richmond and the Town of Port Hawkesbury. The water protection zone is divided into two sub-zones including Watershed Protection W-1 and Watershed Protection Periphery W-2 (Drawing 18). Watershed Protection W-1 overlaps with the provincially managed Port Hawkesbury Protected Water Area (Section 'B' specifically), and therefore, both municipal by-laws and provincial regulations apply in this area. Watershed Protection Periphery W-2 is only managed at the municipal level and is not part of the provincial Protected Water Area. Under the aforementioned by-law, development within Water Protection Zones W-1 and W-2 is prohibited, except for activities concerning public/private utilities, institutional uses, and passive recreational use. Within Zone W-2 only, the expansion of pre-existing industrial activities may be permitted, pending approval of the NS Minister of Environment and Climate Change.

### 7.2.2 Waterbodies

The primary freshwater waterbody within 5 km of the Transmission Interconnection Line is Landrie Lake. A summary of all freshwater waterbodies identified within 5 km of the Transmission Interconnection Line is provided in Table 7.4.

**Table 7.4: Waterbodies within 5 km of the Transmission Interconnection Line**

| Waterbody Name | Distance and Direction* |
|---|---|
| Beaver Dam Lake | 2.3 km E |
| Grant's Pond | 1.5 km W |
| Hector Lake | 1.8 km W |
| Hines Lake | 3.6 km E |
| Horton Lake | 3.5 km NW |
| Lake Murray | 4.8 km N |
| Landrie Lake | 0.1 km E |
| Little River Reservoir | 2.7 km E |
| MacGregors Lake | 4.1 km NE |
| MacIntyre Lake | 2.9 km E |
| Peebles Pond | 0.7 km W |

*Distance and Direction to nearest point on the Transmission Interconnection Line corridor

### 7.2.3 Watercourses

*Desktop Studies*

A desktop review of the Nova Scotia Topographic Database - Water Features (GeoNova, 2022) identified 508 watercourse features (definite and indefinite) within 5 km of the Transmission Interconnection Line (and associated substations), see Table 7.5 below for a summary and Appendix J). Of the 508 watercourses, 11 are located within the Transmission Interconnection Line consisting of 10 definite unnamed watercourse features and one indefinite feature associated with Seacoal Brook. Seacoal Brook has headwaters east of Port Hawkesbury near the intersection of Trunk Highway 4 and Highway 104, flowing south into Landrie Lake and eventually into Seacoal Cove (i.e., Atlantic Ocean).

**Table 7.5: Named Watercourses within 5 km of the Transmission Interconnection Line**

| Named Watercourses | Distance to Transmission Interconnection Line* |
|---|---|
| Black Brook | 3.1 km |
| Brown Brook | 4.1 km |
| Byers Brook | 3.1 km |
| East Brook | 3.4 km |
| Embrees Brook | 1.3 km |
| Horton Brook | 5.0 km |
| Little River | 0.3 km |
| McNairs Brook | 4.4 km |
| Melford Brook | 4.5 km |
| Mill Brook | 3.9 km |
| Murray Brook | 4.4 km |
| North Little River | 0.6 km |
| Seacoal Brook | Within Project Boundary (indefinite feature) |
| Steep Creek | 2.8 km |
| Sugar Camp Brook | 3.8 km |
| West Brook | 3.9 km |

*Distance to nearest point of the Transmission Interconnection Line.

These results, along with WAM, were used to guide field studies to verify the existence and characterize the watercourses located within the Transmission Interconnection Line (and associated substations).

*Field Studies*

Field studies were conducted between August and October 2022 along the Transmission Interconnection Line (70 m wide corridor) and all considered alternative routes; from the location of the northern switching substation (grid connection) to the southern substation (connection to Industrial Facility). Watercourses identified within the Transmission Interconnection Line were delineated (until the 70 m corridor boundary was reached or the

watercourse terminated) and assessed for general watercourse characteristics. Supplementary information regarding fish and fish habitat was also recorded during the surveys (Section 7.2.4).

A total of 11 watercourses were identified within the Transmission Interconnection Line corridor during field studies (Table 7.6 and Drawing 22). For detailed characterizations of the identified watercourses, see Appendix M.

**Table 7.6: Field Identified Watercourses within the Transmission Interconnection Line**

| ID | Type | Flow | Habitat | Channel Width | Wetted Width | Water Depth | Dominant Substrate | Secondary Watershed |
|---|---|---|---|---|---|---|---|---|
| WC1 | Small Permanent | East | Run, Flat, Riffle, Pool | 0.96 m | 0.82 m | 0.08 m | Cobble / Gravel | Little River (1FA-2) |
| WC2 | Large Permanent | East | Flat, Run, Pool | 4.00 m | 3.00 m | 0.40 m | Sand / Fines | Little River (1FA-2) |
| WC3 | Small Permanent | East | Riffle, Run, Flat, Pool | 1.15 m | 0.90 m | 0.10 m | Sand / Fines | Little River (1FA-2) |
| WC4 | Small Permanent | North | Riffle, Run, Pool | 0.50 m | 0.45 m | 0.08 m | Sand | Little River (1FA-2) |
| WC5 | Small Permanent | South | Riffle, Run, Pool, Flat | 1.50 m | 1.00 m | 0.15 m | Boulder / Rubble | Landrie Lake (1FD-SD6) |
| WC6 | Small Permanent | East | Riffle, Run, Pool | 0.80 m | 0.70 m | 0.10 m | Fines / Muck | Landrie Lake (1FD-SD6) |
| WC7* | Small Permanent – Drainage Ditch | East | Run, Riffle | 1.25 m | 0.45 m | 0.10 | Gravel / Sand | Landrie Lake (1FD-SD6) |
| WC8* | Small Permanent – Drainage Ditch | East | Run, Riffle | 1.50 m | 0.50 m | 0.10 m | Gravel / Sand | Landrie Lake (1FD-SD6) |
| WC9 | Intermittent | North | Flat, Run, Riffle | 0.50 m | 0.50 m | 0.15 m | Fines / Muck | Landrie Lake (1FD-SD6) |
| WC10* | Small Permanent | North | Riffle, Run | 1.20 m | 0.90 m | 0.15 m | Gravel / Fines | Landrie Lake (1FD-SD6) |
| WC11 | Intermittent | East | Riffle, Run | 0.75 m | 0.75 m | 0.10 m | Fines / Muck | Landrie Lake (1FD-SD6) |

*The raw freshwater pipeline also crosses WC7, WC8, and WC10 along the LLWU access road right-of-way.

The majority of watercourses identified within the Transmission Interconnection Line were small permanent features with substrates dominated by gravel/sands to fines. Few watercourses (WC1 to WC4) along the most northern extent of the Transmission Interconnection Line belong to the Little River Secondary Watershed, and as a result, drain

southeast into the Atlantic Ocean (i.e., near Murray Cove). The remainder of the watercourses (WC5 to WC11) are located within the Landrie Lake Secondary Watershed and subsequently drain into Landrie Lake (the outflow of which drains into the Atlantic Ocean).

The three watercourses along the existing LLWU access road right-of-way, which also overlaps with the Industrial Facility's raw freshwater pipeline right-of-way, are WC7, WC8, and WC10. Two of the identified watercourses (WC7 and WC8) are constructed drainage ditches associated with the existing Point Tupper Terminal. These drainage ditches are not natural watercourse features and contain significant sloping/berms and straight dug channels (no meanders or natural bends). WC10 was identified as a permanent watercourse that flows north, through a culvert underneath the LLWU access road, into Landrie Lake. This watercourse is fed by overland flow (several drainage channels) within the existing Point Tupper Terminal and also a shrub swamp (WL39). As the watercourse passes through WL39, it is irregular, dispersed, and not confined to a single channel due to the water table being at the surface periodically throughout the wetland (has resulted in several pools, underground flow, etc.). Downstream of WL39 and towards the LLWU access road culvert, the watercourse becomes a defined channel that has intermittent flow with substrates dominated by gravel and fines.

Alternative routes considered for the Project were also assessed for watercourses which are presented in Drawing 3 to demonstrate local drainage and hydrology; further information and characterization of watercourses can be found in Appendix K. The Transmission Interconnection Line route selected for the Project was chosen based on fewer watercourse crossings than the considered alternative routes.

### 7.2.4 Fish & Fish Habitat

*Desktop Studies*
A desktop review of the following resources and databases was completed to identify freshwater fish and fish habitat within 5 km of the Transmission Interconnection Line (and associated substations):

- ACCDC Data Report (ACCDC, 2022b)
- Aquatic Species at Risk Map (DFO, 2022a)
- Significant Species and Habitats Database (NSNRR, 2018)

One record of Eastern pearlshell (*Margaritifera margaritifera*) was identified within 5 km of the Transmission Interconnection Line (ACCDC, 2022b), approximately 1.9 km north of the northern switching substation (grid connection) near the community of Mackdale, NS (Drawing 24).

Eastern pearlshell is a freshwater mussel that has an S-Rank of “S2” within Nova Scotia (ACCDC, 2022c). This species of mussel can be found in Canada throughout the maritime provinces and is typically located in central and northern areas of Nova Scotia. Ideal habitat for the Eastern pearlshell is permanent watercourses containing muddy or sandy-stony substrates (Davis, 2007). Note, that the Eastern pearlshell ACCDC record is located outside the secondary watersheds the Transmission Interconnection Line crosses.

In addition, the ACCDC Data Report (2022c) identified two watercourse systems (Upper River Inhabitants and Lower River Inhabitants) that contain Atlantic salmon - *Gaspe Southern Gulf of St. Lawrence population* (*Salmo salar pop. 12*) (Drawing 24). All identified Atlantic salmon bearing watercourses are located outside the secondary watersheds containing the Transmission Interconnection Line. The nearest salmon bearing watercourse is located approximately 1.4 km north of the northern switching substation (grid connection).

Atlantic salmon - *Gaspe Southern Gulf of St. Lawrence population* is a subspecies of Atlantic salmon that has breeding populations from the Gaspé Peninsula to the northern region of Cape Breton. This species requires cool, clear, and well-oxygenated rivers for rearing, as juveniles, and during reproduction, but undertake extensive feeding migrations into the Atlantic Ocean as adults/older juveniles (COSEWIC, 2010a).

A complete list of fish/aquatic invertebrate SOCI up to 100 km from the Transmission Interconnection Line can be found in the ACCDC Data Report in Appendix N.

A review of the Aquatic Species at Risk Map and the Significant Species and Habitats Database identified no records pertaining to freshwater fish (including aquatic invertebrates) within the Transmission Interconnection Line (DFO, 2022; NSNRR, 2018).

*Field Studies*

Fish presence and existing habitat were documented as part of the watercourse survey conducted along the Transmission Interconnection Line (Section 7.2.3). During the watercourse assessment, notes on the visual observance of fish were recorded along with ideal fish habitat characteristics such as pool/rifle sequences, substrate, etc. Barriers to fish passage were also noted (e.g., elevated culverts), along with observations of ideal habitat, or confirmation of fish presence (Table 7.7). Detailed descriptions and characterization parameters of each watercourse can be found in Appendix K.

**Table 7.7: Fish and Fish Habitat within the Transmission Interconnection Line**

| ID | Secondary Watershed Containing SAR* | Possible Barriers to Passage | Fish Seen | Habitat Characteristics | | | Ranking of Fish Presence |
|---|---|---|---|---|---|---|---|
| | | | | Overwintering[1] | Spawning[2] | Rearing[3] | |
| WC1 | No | No | No | Yes | Yes | Yes | Possible |
| WC2 | No | No | No | Yes | No | Yes | Possible |
| WC3 | No | No | No | No | No | Yes | Possible |
| WC4 | No | Yes | No | No | Yes | Yes | Unlikely |
| WC5 | No | No | No | No | No | Yes | Possible |
| WC6 | No | No | No | No | Yes | Yes | Possible |
| WC7 | No | No | No | No | Yes | No | Possible |
| WC8 | No | No | No | No | Yes | No | Possible |
| WC9 | No | Yes | No | No | No | No | Unlikely |
| WC10 | No | Yes | No | No | No | No | Unlikely |
| WC11 | No | No | No | No | No | No | Possible |

*Watercourse is located in a Secondary Watershed known to contain SAR based on ACCDC Data Report (2022b) and Aquatic Species at Risk Map (DFO, 2022)
[1]Overwintering Habitat = contains deep pools
[2]Spawning Habitat = gravel to cobble dominant substrates
[3]Rearing Habitat = riffle-pool sequences

Electrofishing studies were not completed along the Transmission Interconnection Line due to difficult and partially restricted access.

### 7.2.5 Wetlands

*Desktop Studies*
A desktop identification of the location and extent of potential wetlands within 5 km of the Transmission Interconnection Line was completed by reviewing the following information sources:

- Wetlands Inventory (NSNRR, 2021b)
- Wetlands of Special Significance (NSNRR, 2014)
- NS Wet Areas Mapping Database (WAM) (NSLF, 2012)

Based on the desktop review of the NSNRR Wetlands Inventory (2021b), 211 wetland features were identified within 5 km of the Transmission Interconnection Line. The wetlands consist of bogs or fens (29), fens (6), marshes (14), salt marshes (3), and swamps (159) ranging in size between 0.17 ha and 19.81 ha (Drawing 21).

The WSS Database identified 127 WSS within 5 km of the Transmission Interconnection Line. These wetlands are designated as WSS based on the presence of SAR (96), due to characterization as a salt marsh (3), or due to their location within a protected area (one

wetland located within the River Inhabitants Nature Reserve), and 27 located within a Protected Water Area. Several WSS were identified within the Transmission Interconnection Line and are discussed further within the *Field Studies* section below.

WAM shows the water table within 0 m and 10 m from the surface within the Transmission Interconnection Line and considered alternative routes (Drawing 23); areas where the water table exists near/at the surface were flagged as having potential for wetlands, which were subsequently verified during field studies (see below).

The results of the desktop review were used to guide field studies to verify the existence and delineate/characterize wetlands located within the Transmission Interconnection Line as well as other considered alternative routes.

*Field Studies*

Field studies were conducted between August and October 2022 along the Transmission Interconnection Line (70 m wide corridor) from the location of the northern switching substation (grid connection) to the southern substation (connection to the Industrial Facility) (Drawing 22). Wetlands identified within the Transmission Interconnection Line were delineated (until the 70 m corridor boundary was reached or the watercourse terminated) and assessed for general wetland characteristics (vegetation, hydrology, and soils). Incidental observations of flora and fauna SOCI were also recorded during the surveys and are discussed further in Section 7.4.

A total of 40 wetlands were identified within the Transmission Interconnection Line (Table 7.8). A complete characterization table of the field identified wetlands can be found in Appendix M.

**Table 7.8: Summary of Field Identified Wetlands within the Transmission Interconnection Line**

| Wetland Type[1] | # of Wetlands | Wetland ID(s) | WSS[2] |
|---|---|---|---|
| Bog | 11 | WL2, WL7, WL10, WL23, WL26, WL27, WL29, WL32, WL33, WL35, WL37 | WL2, WL7, WL10, WL26, |
| Fen | 1 | WL3 | WL3 |
| Floodplain / Fringe | 1 | WL36 | WL36 |
| Shrub Swamp | 5 | WL13, WL19, WL38, WL39, WL40 | WL13, WL19 |
| Treed Swamp | 22 | WL1, WL4 WL5, WL6, WL8, WL9, WL11, WL12, WL14, WL15, WL16, WL17, WL18, WL20, WL21, WL22, WL24, WL25, WL28, WL30, WL31, WL34 | WL11, WL12 |

[1]If multiple wetland types exist (i.e., mosaics), the wetland was categorized according to its most dominant type.
[2]Wetlands that overlap (partially or completely) with WSS identified in the WSS Database (NSNRR, 2014).

Considered alternative routes for the Transmission Interconnection Line were also assessed for wetlands, and are presented in Drawing 3 to demonstrate local drainage and hydrology. Further information/characterization of wetlands along alternative routes can be found in Appendix K. The presence and extent of wetland habitat was considered in the assessment of alternative Transmission Interconnection Line routes. The preferred route was selected, in part, to maximize the avoidance of wetlands and WSS.

Wetlands are abundant along the Transmission Interconnection Line, which is to be expected based on the its location within a protected watershed and its proximity to Landrie Lake. The abundance of topographical depressions and depth to water table provide environmental features conducive to wetland development and as a result of the protected watershed area, a large number of WSS are found here as well.

Treed swamps were the most prominent wetland type identified along the Transmission Interconnection Line, comprising 55% of field identified wetlands. Typical species composition within the treed swamps included: black spruce (*Picea mariana*), balsam fir (*Abies balsame*), eastern tamarack (*Larix laricina*), red maple (*Acer rubrum*), wild raisin (*Viburnum nudum*), and cinnamon fern (*Osmunda cinnamomea*). Surface water was observed in several treed swamps; however, the most frequently recorded hydrological indicators were saturation, drainage patterns, and water-stained leaves. Hydric soils found within the treed swamps ranged in depth between <0.2 m to 0.4 m.

Bogs were the second most prominent wetland type identified along the Transmission Interconnection Line. Bogs are characterized by their poor drainage, accumulation of peat, and dense coverage of either sphagnum moss or grass-like sedges (NSLF, 2011). Typical species composition observed include: black spruce, eastern tamarack, cinnamon fern, labrador tea (*Rhododendron groenlandicum*), and sheep laurel (*Kalmia angustifolia*). Saturation and a high water table were the most frequently recorded hydrologic indicators in bogs recorded within the Transmission Interconnection Line. Hydric soils found in the bogs ranged in depth between <0.2 m to 0.4 m.

Other wetland types observed during field surveys along the Transmission Interconnection Line included shrub swamps (5), a fen (1), and a floodplain/fringe wetland (1). Shrub swamps were typically dominated by speckled alder (*Alnus incana*) and cinnamon fern, with an abundance of surface water and saturation. The fen contained areas of open surface water and regions concentrated with specked alder, sphagnum moss, and New York fern (*Amauropelta noveboracensis*). Lastly, the floodplain/fringe wetland was dominated by broad-leaved cattail (*Typha latifolia*) and sensitive fern (*Onoclea sensibilis*), containing hydrologic features such as hydrogen sulphide odor, surface water, and saturation.

## 7.3 Terrestrial Environment – Industrial Facility

Terrestrial resources were assessed within 5 km of the Industrial Facility (excluding terrestrial resources located on mainland Nova Scotia) using various desktop resources. Field studies were completed at the Industrial Facility, as well as in areas where alternative layouts were considered. These field studies consisted of incidental observations of terrestrial flora and fauna SOCI along with their associated habitat. For additional information regarding considered alternative layouts, refer to Section 1.4 and Drawing 2.

The terrestrial environment within the Industrial Facility has undergone significant anthropogenic alteration/disturbance as a result of historic and existing industrial activities in the area. Historical borrow pits along with the installation of wind turbines within the Industrial Facility and larger Property Boundary have resulted in widespread vegetation/habitat removal (Drawing 8). Furthermore, the Property Boundary borders a coastline to the southwest and is highly fragmented from natural/undisturbed habitats to the north and east by surrounding developments such as roads, powerlines, and other industrial facilities.

### 7.3.1 Terrestrial Habitat

Multiple approaches were taken to fulfill the assessment of terrestrial habitat within the Industrial Facility, which primarily focused on desktop reviews. To assess the terrestrial habitat, an in-depth desktop review was undertaken, in which the results were used to inform/guide incidental observations during field studies completed for the freshwater aquatic environment (i.e., watercourse, fish/habitat, and wetland surveys). Incidental observations of important and/or sensitive terrestrial habitats were included as a component of the freshwater assessment, as provincial forest inventories are not always accurate in determining habitat features and/or the extent of these features. Additional targeted surveys for significant terrestrial habitat were not completed within the Industrial Facility based on:

- The Industrial Facility's location in a zoned industrial area.
- Previous habitat disturbance, alteration, and removal by historical developments.
- Results of the desktop review (see below, no known/potential areas of significance identified).
- Observations of significant habitat during the freshwater aquatic environment assessments (see below, no observations of significant habitat identified).

The overall objective of the desktop review and incidental field observations was to identify and ultimately avoid sensitive habitat features, as well as inform targeted mitigation/best management practices for areas proposed for development.

Terrestrial habitat within 5 km of the Industrial Facility was assessed through a desktop analysis of the following resources:

- Provincial Landscape Viewer (NSLF, 2015)
- Ecological Land Classification of Nova Scotia (Neily et al., 2017)

- Significant Species and Habitats Database (NSNRR, 2018)
- Parks and Protected Areas Interactive Map (NSECC, 2022c)
- Old Forest Policy Lands Layer – per Provincial Landscape Viewer (NSLF, 2015)
- Potential Boreal Felt Lichen Habitat Layer (NSNRR, 2010)

The Industrial Facility is located within the Atlantic Coastal Ecoregion, and more specifically the Cape Breton Coastal Ecodistrict (810) (Drawing 11) (NSLF, 2015). The Cape Breton Coastal Ecodistrict spans 1,178 km$^2$ extending along the Atlantic shoreline of Cape Breton Island between Chedabucto Bay and Scatarie Island. This Ecodistrict is characterized by its coastal features, adjacent low-lying inlands, and large islands that experience a cool climate dominated by strong wind, rain, and fog. Forests are considered maritime boreal coastal stands comprised of balsam fir, white spruce (*Picea glauca*), and black spruce that undergo frequent disturbance from coastal storms and wind (Neily et al., 2017).

The Industrial Facility is within a zoned industrial area, and as a result, terrestrial habitat in this area has undergone significant disturbance and alteration to support industrial activities (e.g., historical borrow pits, road networks, etc.). According to the Provincial Landscape Viewer, areas of the Industrial Facility that have remained undeveloped primarily consist of mixedwood forests with pockets of brush and harvests, see Table 7.9 below for land cover results (Drawing 25) (NSLF, 2015).

**Table 7.9: Land Cover within the Industrial Facility**

| Land Cover Type | Area (ha) within Industrial Facility | Percent Cover within Industrial Facility |
|---|---|---|
| Brush | 1.23 | 5 % |
| Hardwood | 3.86 | 14 % |
| Mixedwood | 12.98 | 48 % |
| Urban, Landfill, Quarry (Borrow Pit), Transport Corridor | 8.89 | 33 % |
| **Total** | **26.96** | **100%** |

Source: NSLF 2015

During freshwater field surveys, the majority of the Industrial Facility was verified to have already undergone significant vegetation clearing and grading which has permanently altered habitats to dry open areas dominated by grasses and mosses. Remaining forests within the Industrial Facility are primarily mixedwood stands dominated by yellow birch (*Betula alleghaniensis*), red maple, and white birch (*Betula papyrifera*). Areas of transition between open and forested areas consisted of brush dominated by speckled alder.

The Significant Species and Habitats Database contained no significant habitat records within 5 km of the Industrial Facility (NSNRR, 2018).

*Parks & Protected Areas*
Other than the two protected watersheds associated with Landrie Lake (Section 7.2.1), there are no parks or protected areas (designated or pending designation) located within 5 km of the Industrial Facility (NSNRR, 2018; NSECC, 2022b). There are also no Special Management Practice Zones located within 5 km of the Industrial Facility.

*Old Growth Habitat*
Mapping of designated provincial Old Forest Policy Lands was completed within 5 km of the Industrial Facility to identify areas of old growth habitat/stands (NSLF, 2015). No areas of Old Forest Policy Lands were identified within 5 km of the Industrial Facility. In addition to mapping, potential old growth forests were searched for during field studies conducted within the Industrial Facility; no areas of old growth were identified during these assessments.

*Potential Boreal Felt Lichen Habitat*
The NSNRR Boreal Felt Lichen Habitat Layer (2010) was reviewed to identify potential suitable habitat for boreal felt lichen (*Erioderma pedicellatum – Atlantic pop*.). Potential boreal felt lichen habitat was identified within 5 km of the Industrial Facility, however, none of these habitat locations are located within the Industrial Facility (NSNRR, 2010). The closest potential habitat record is approximately 790 km north of the Industrial Facility laydown area (Drawing 6).

Boreal felt lichen is listed as “Endangered” under both provincial and federal legislation and has an S-rank of “S1.” In Nova Scotia, boreal felt lichen receives special management practices, requiring a 200 m buffer around all occurrences. Within Nova Scotia, this species is known to occur in humid, cool forests, growing on mature balsam fir located in/near wetlands, at elevations <200 masl, and within 25 km of the coastline (Government of Canada, 2020).

During field studies completed for the freshwater aquatic environment within the Industrial Facility, qualified field biologists were notified of potential boreal felt lichen habitat within the larger Study Area; during wetland delineations/assessments, this species was searched for (as wetlands are considered ideal habitat), however, none were observed.

### 7.3.2 Terrestrial Flora
The assessment of terrestrial flora (vascular plants and lichens) was completed using multiple resources, primarily consisting of desktop reviews supplemented by incidental observations during field assessments completed for the freshwater aquatic environment (i.e., watercourse, fish/habitat, and wetland surveys). Qualified biologists were briefed on known flora SOCI occurring within the Study Area to aid in identification of flora SOCI and associated potential habitat during freshwater surveys. Additional targeted flora surveys were not completed within the Industrial Facility based on:

- The Industrial Facility's location in a zoned industrial area.
- Previous habitat disturbance, alteration, and removal from historical developments.
- Results of the desktop review (see below, nearest SOCI is 1.6 km southeast).
- Results of the terrestrial habitat assessment (see Section 7.3.1 above) which identified no known or potential significant habitats for flora SOCI.
- Results of the incidental observations of flora SOCI during watercourse/wetland surveys (see below, no observations of flora SOCI).

The assessment of terrestrial flora within 5 km of the Industrial Facility was completed using the following resources:

- ACCDC Data Report (ACCDC, 2022a)
- Significant Species and Habitats Database (NSNRR, 2018)

The desktop review identified two vascular plants and one lichen SOCI within 5 km of the Industrial Facility (excluding records located on mainland Nova Scotia) (Table 7.10). None of these records are located within the Industrial Facility. A complete list of flora SOCI up to 100 km from the Industrial Facility can be found in the ACCDC Data Report provided in Appendix L.

**Table 7.10: ACCDC Flora SOCI Identified within 5 km of the Industrial Facility**

| Common Name | Scientific Name | # | Distance from Facility | COSEWIC[1] | *SARA*[2] | NS *ESA*[3] | S-Rank[4] |
|---|---|---|---|---|---|---|---|
| **Vascular Plants** | | | | | | | |
| Northern comandra | *Geocaulon lividum* | 1 | 1.6 km SE | --- | --- | --- | S3S4 |
| Southern twayblade | Neottia bifolia | 2 | 1.8 km SE | --- | --- | --- | S3 |
| **Lichens** | | | | | | | |
| Blue felt lichen | *Pectenia plumbea* | 1 | 3.2 km E | Special Concern | Special Concern | Vulnerable | S3 |

Source: ACCDC 2022b; [1] Government of Canada 2022; [2] Government of Canada 2022; [3] Government of NS, 2022; [4]ACCDC 2022a

Northern comandra (*Geocaulon lividum*) is a parasitic plant found across Canada and the northern US that attaches to the roots of various host plants such as birch, spruce, and pine. It prefers shaded habitats with dry to moist sandy/rocky soil, often found in bogs, boreal forests, and thickets (Minnesota Wildflowers, 2022). The ACCDC northern comandra record is located outside the Project's Property Boundary approximately 1.6 km southeast of the Industrial Facility near an unnamed watercourse/drainage feature (ACCDC, 2022a) (Drawing 27).

Southern twayblade (*Neottia bifolia*) is a species of orchid found across eastern Canada and down the eastern/southern US coast. This species is highly affiliated with wetland habitats,

often being found in forested or open peat bogs (Go Botany, 2022). The two ACCDC records are both located outside the Property Boundary, approximately 1.8 km southeast of the Industrial Facility near the same watercourse/drainage feature as the northern comandra (ACCDC, 2022b) (Drawing 27).

Blue felt lichen (*Pectenia plumbea*) is a large blue/grey leafy lichen that is found across eastern North America, but is restricted to three provinces in Canada: Nova Scotia, New Brunswick, and Newfoundland and Labrador. This lichen species grows on the trunks of mature hardwood trees in highly humid and cool habitats, often within coastal suboceanic areas, wetlands, valleys, watercourses, lakes, etc. (COSEWIC, 2010a). The closest ACCDC record of blue felt lichen to the Industrial Facility is 3.2 km east near the community of Port Malcom (ACCDC, 2022b) (Drawing 27).

A review of the NSNRR Significant Species and Habitats Database (2018) identified no records of significant habitat relating to vascular plants or lichens within 5 km of the Industrial Facility.

There were no incidental observations of flora SOCI during freshwater field studies (i.e., watercourse, fish/habitat, and wetland surveys) completed within the Industrial Facility. Qualified biologists were briefed on all three known SOCI within proximity to the Industrial Facility prior to the freshwater field studies to aid incidental observations of these species. All desktop-identified flora SOCI are associated with wetland, watercourse, and riparian habitats which underwent comprehensive delineations and assessments as the overall priority was to avoid these sensitive habitat features; and as a result, ideal habitats for the flora SOCI will also be avoided. Similarly, searches were conducted for old growth stands during freshwater field studies to identify potential habitat for the lichen SOCI (i.e., blue felt lichen) as this species is known to grow on the trunks of old/mature hardwood trees; no old growth stands/trees were identified during freshwater field studies.

In conclusion, habitat required to support desktop-identified flora SOCI was not identified within the Industrial Facility.

### 7.3.3 Terrestrial Fauna

Terrestrial fauna was assessed primarily through desktop reviews, supported by incidental observations during freshwater field studies completed for watercourses, fish/habitat, and wetlands. Qualified biologists were briefed on known fauna SOCI occurring within proximity to the Industrial Facility to aid in identification of fauna SOCI and associated potential habitat during freshwater surveys. Additional targeted fauna surveys were not completed within the Industrial Facility based on:

- The Industrial Facility's location in a zoned industrial area.
- Previous habitat disturbance, alteration, and removal from historical developments.
- The Industrial Facility's location on the island of Cape Breton (no concerns regarding Mainland Moose).

- Results of the desktop review (see below).
- Results of the terrestrial habitat assessment (Section 7.3.1 above) which identified no known or potential significant habitats for fauna SOCI.
- Field survey coverage/results of important habitat types (i.e., watercourses, wetlands, and riparian areas).

Terrestrial fauna (mammals, herpetofauna, butterflies & *Odonates*) within 5 km of the Industrial Facility were assessed through a desktop review of the following resources:

- ACCDC Data Report (ACCDC, 2022b)
- Significant Species and Habitats Database (NSNRR, 2018)

*Mammals*
A review of the aforementioned databases identified no records of mammal SOCI or their habitat within 5 km of the Industrial Facility. The closest record of a mammal SOCI to the Industrial Facility is a Canada lynx (*Lynx canadensis*) over 20 km away (direction not provided by ACCDC). A complete list of mammal SOCI up to 100 km from the Industrial Facility can be found in the ACCDC Data Report (2022b) (Appendix L).

There were no incidental observations of mammal SOCI during field studies completed within the Industrial Facility. Evidence (i.e., tracks and scat) of White-tailed deer (*Odocoileus virginianus*) and Snowshoe hare (*Lepus americanus*) were noted throughout the area. White-tailed deer and Snowshoe hare are not SOCI as they both have an S-Rank of “S5” and do not receive protection under federal/provincial legislation.

*Herpetofauna*
The ACCDC Data Report (2022b) identified Wood turtle (*Glyptemys insculpta*) as ‘known to occur’ within 5 km of the Industrial Facility. The nearest Wood turtle record is located approximately 2.2 km from the Industrial Facility; the precise locations of these records have not been provided as this is a “location-sensitive species” within Nova Scotia, per NSNRR. A complete list of herpetofauna SOCI up to 100 km from the Industrial Facility can be found in the ACCDC Data Report (2022b) (Appendix L).

Wood turtle is a semi-aquatic freshwater turtle that is listed as “Threatened” under COSEWIC, federal (*SARA*), and provincial (*NS ESA*) legislation, and has an S-Rank of “S2” (ACCDC, 2022b). This species of turtle is restricted within Canada to Nova Scotia, New Brunswick, Quebec, and Ontario (NSLF, 2020). The Wood turtle has an affinity for clear year-round freshwater streams (> 2 m wide) containing sandy substrates, sand or gravel bars, deep pools, and associated floodplains; this species has also been documented in bogs, meadows, and riparian areas. Specific habitat requirements vary depending on the life stage of the turtle (overwintering, mating, nesting, thermoregulating, etc.) which influence whether they are found in terrestrial or aquatic environments (NSLF, 2020).

There were no incidental observations of herpetofauna SOCI during field studies completed within the Industrial Facility. Qualified biologists were briefed on Wood turtles and their associated habitat prior to freshwater field studies to aid incidental observations of these species. Several watercourses were delineated and characterized south of the Industrial Facility; however, none were determined to contain adequate Wood turtle habitat. Watercourses were generally shallow with little to no pools or sandy/gravel banks, and had been impacted by the development of Bear Island Road and an LNG pipeline. Further, no watercourses or wetlands were identified within the Industrial Facility.

*Butterflies & Odonates*

A review of the aforementioned databases identified no records of butterfly and *Odonates* (i.e., dragonfly) SOCI or their habitat within 5 km of the Industrial Facility. The closest record to the Industrial Facility is a Harlequin darner (*Gomphaeschna furcillata*) over 12 km away (direction not provided by ACCDC). A list of butterfly and *Odonates* SOCI up to 100 km from the Industrial Facility can be found in the ACCDC Data Report (2022b) (Appendix L).

There were no incidental observations of butterfly or *Odonate* SOCI during field studies completed within the Industrial Facility.

### 7.3.4 Bats

A review of the ACCDC Data Report (2022b), Significant Species and Habitats Database (NSNRR, 2018), and of known bat hibernacula in Nova Scotia (Moseley, 2007) identified no records of bat SOCI or their habitat within 5 km of the Industrial Facility. Just outside the 5 km buffer, ACCDC did have records of several bat species which included the following:

- Little brown myotis (*Myotis lucifugus*) 6.2 km away (direction not provided – location sensitive species)
- Unidentified bat species (*Vespertilionidae sp.*) 5.1 km away (direction not provided – location sensitive species)

Little brown myotis (*Myotis lucifugus*) is listed as Endangered under both federal (*SARA*) and provincial (*NS ESA*) legislation. The Little brown myotis is the most common bat species in Nova Scotia, and is likely ubiquitous in the province (Broders et al., 2004; COSEWIC, 2013a). During the day, the Little brown myotis will roost in buildings, trees, under rocks, and in caves, congregating in tight spaces to roost at night. As a non-migratory species, Little brown myotis hibernates between September and early to mid-May in abandoned mines or caves. This species is suspected to have been most severely affected by a deadly disease known as White-nose Syndrome which decimated bat populations across eastern North America starting in 2010 (COSEWIC, 2013a; Moseley, 2007). A complete list of bat SOCI up to 100 km from the Industrial Facility can be found in the ACCDC Data Report (Appendix L).

There are no known hibernacula located within proximity to the Industrial Facility; the nearest hibernaculum is located approximately 70 km southwest near Glenelg on mainland Nova

Scotia. There are, however, 15 documented abandoned mines approximately 1.8 km east of the Industrial Facility (near Seacoal Bay) that have the potential to support overwintering bats. These abandoned mines are predominantly coal shafts situated on either private or Crown land (NSNRR, 2021a).

There were no incidental observations of bat SOCI or associated significant habitat (i.e., hibernacula or maternity colonies) during freshwater field studies within the Industrial Facility. Suitable habitats searched for by qualified biologists included large diameter (>25 cm) snags and downed trees, cliffs, caves, and rock outcrops which may serve as potential roosting or over-day habitat.

### 7.3.5 Avifauna

Avifauna within 5 km of the Industrial Facility were assessed through a desktop review of the following resources:

- Canada Important Bird Areas Interactive Map (Birds Canada, 2022)
- Significant Species and Habitats Database (NSNRR, 2018)
- ACCDC Data Report (ACCDC, 2022b)

The nearest Important Bird Area (IBA) to the Project is known as the Pomquet Beach Region (NS009) and is located on the Nova Scotia mainland near Pomquet, approximately 35 km west of the Project Boundary (Birds Canada, 2022).

The Significant Species and Habitats Database contained no records of avian SOCI/habitat within 5 km of the Industrial Facility (NSNRR, 2018).

The desktop review identified 27 avian SOCI within 5 km of the Industrial Facility (excluding records located on mainland Nova Scotia – for these records see Appendix L). The 27 avian SOCI have been summarized below in Table 7.11 with locations presented in Drawing 27.

**Table 7.11: ACCDC Avian SOCI Identified within 5 km of the Industrial Facility**

| Common Name | Scientific Name | COSEWIC[1] | *SARA*[2] | NS *ESA*[3] | S-Rank[4] |
|---|---|---|---|---|---|
| American Bittern | *Botaurus lentiginosus* | --- | --- | --- | S3S4B, S4S5M |
| American Kestrel | *Falco sparverius* | --- | --- | --- | S3B, S4S5M |
| Barn Swallow | *Hirundo rustica* | Special Concern | Threatened | Endangered | S3B |
| Bay-breasted Warbler | *Setophaga castanea* | --- | --- | --- | S3S4B, S4S5M |
| Black-headed Gull | *Larus ridibundus* | --- | --- | --- | S2M,S1N |

| Common Name | Scientific Name | COSEWIC[1] | *SARA*[2] | NS *ESA*[3] | S-Rank[4] |
|---|---|---|---|---|---|
| Blackpoll Warbler | *Setophaga striata* | --- | --- | --- | S3B, S5M |
| Blue-winged Teal | *Spatula discors* | --- | --- | --- | S3B |
| Boreal Chickadee | *Poecile hudsonicus* | --- | --- | --- | S3 |
| Canada Jay | *Perisoreus canadensis* | --- | --- | --- | S3 |
| Canada Warbler | *Cardellina canadensis* | Special Concern | Threatened | Endangered | S3B |
| Common Goldeneye | *Bucephala clangula* | --- | --- | --- | S2S3B, S5N, S5M |
| Common Nighthawk | *Chordeiles minor* | Special Concern | Threatened | Threatened | S3B |
| Common Tern | *Sterna hirundo* | Not At Risk | --- | --- | S3B |
| Evening Grosbeak | *Coccothraustes vespertinus* | Special Concern | Special Concern | Vulnerable | S3B, S3N, S3M |
| Killdeer | *Charadrius vociferus* | --- | --- | --- | S3B |
| Olive-sided Flycatcher | *Contopus cooperi* | Special Concern | Threatened | Threatened | S3B |
| Pine Grosbeak | *Pinicola enucleator* | --- | --- | --- | S3B, S5N, S5M |
| Pine Siskin | *Spinus pinus* | --- | --- | --- | S3 |
| Purple Sandpiper | *Calidris maritima* | --- | --- | --- | S3S4N |
| Rose-breasted Grosbeak | *Pheucticus ludovicianus* | --- | --- | --- | S3B |
| Spotted Sandpiper | *Actitis macularius* | --- | --- | --- | S3S4B, S5M |
| Tennessee Warbler | *Leiothlypis peregrina* | --- | --- | --- | S3S4B, S5M |
| Thick-billed Murre | *Uria lomvia* | --- | --- | --- | S2S3N |
| Virginia Rail | *Rallus limicola* | --- | --- | --- | S2S3B |
| Willet | *Tringa semipalmata* | --- | --- | --- | S3B |

| Common Name | Scientific Name | COSEWIC[1] | *SARA*[2] | NS *ESA*[3] | S-Rank[4] |
|---|---|---|---|---|---|
| Wilson's Snipe | *Gallinago delicata* | --- | --- | --- | S3B, S5M |
| Wilson's Warbler | *Cardellina pusilla* | --- | --- | --- | S3B, S5M |

Source: ACCDC 2022b; [1] Government of Canada 2022; [2] Government of Canada 2022; [3] Government of NS, 2022; [4]ACCDC 2022a

Of the 27 avian SOCI species identified above, five are SAR protected under federal (*SARA*) and provincial (NS *ESA*) legislation, and therefore, are considered a priority for this Project: Barn Swallow, Canada Warbler, Common Nighthawk, Evening Grosbeak, and Olive-sided Flycatcher.

Barn Swallows (*Hirundo rustica*) have breeding ranges in Nova Scotia during the summer months, migrating to South America during the winters (COSEWIC, 2011). This species is typically found nesting in anthropogenic structures/buildings but can also be found in natural structures such as caves, crevices, and ledges. Foraging grounds are often associated with nearby open habitats such as farmland, right-of-ways, and forest clearings (COSEWIC, 2011). The nearest ACCDC observation of a Barn Swallow is approximately 4.5 km south of the Industrial Facility along the Strait of Canso (ACCDC, 2022b).

The Canada Warbler (*Cardellina canadensis*) is a small songbird with summer breeding ranges across Canada, including Nova Scotia (COSEWIC, 2020). This species is typically found in moist mixedwood forests (dominated by red maple) that have well a developed shrub layer to allow nesting near the ground. Other habitats preferred by this species include riparian areas, treed swamps, riparian habitats/woodlands brushy slopes, and densely vegetated ravines (COSEWIC, 2020). The nearest ACCDC observation of a Canada Warbler is approximately 4.5 km south of the Industrial Facility along the Strait of Canso (ACCDC, 2022b).

Common Nighthawks (*Chordeiles minor*) are found across Canada during the summer breeding season (COSEWIC, 2018a). This species is most commonly associated with open/disturbed habitats but can also be found in mixedwood to coniferous stands. Open/disturbed habitats the Common Nighthawk prefers include clear cuts, meadows, wetlands, waterbodies/beaches, and riparian areas (COSEWIC, 2018a). The nearest ACCDC observation of a Common Nighthawk is approximately 0.2 km north of the Industrial Facility along Port Malcom Road (ACCDC, 2022b).

The Evening Grosbeak (*Coccothraustes vespertinus*) can be found during the summer months across all Canadian provinces and territories (except Nunavut) (COSEWIC, 2016). Optimal habitat for this species includes mature open mixedwood forests dominated by white spruce or fir where the spruce bugworm is abundant (COSEWIC, 2016). The nearest

ACCDC observation of a Common Nighthawk is approximately 4.5 km south of the Industrial Facility along the Strait of Canso (ACCDC, 2022b).

The Olive-sided Flycatcher (*Contopus cooperi*) is sporadically located across Canada during the summer breeding months (COSEWIC, 2018b). This species can be found in open areas, such as wetlands, and clearings, or perching on large trees or snags (vantage points for foraging). The Olive-sided Flycatcher has also been found to have a high affinity for old growth stands with openings and a large number of snags/dead trees (COSEWIC, 2018b). The nearest ACCDC observation of an Olive-sided Flycatcher is approximately 0.5 km south of the Industrial Facility near Bear Island Road (ACCDC, 2022b).

There were no incidental observations of avian SOCI during freshwater field studies completed within the Industrial Facility or considered alternative layouts.

## 7.4 Terrestrial Environment – Transmission Interconnection Line

Terrestrial resources were assessed within 5 km of the Transmission Interconnection Line (and associated substations) using various desktop resources (and excluding terrestrial resources located on mainland Nova Scotia). Field studies were also completed along the Transmission Interconnection Line, as well as along alternative routes that were previously considered. Field studies completed for freshwater resources included incidental observations of terrestrial flora and fauna SOCI along with their associated habitat. Qualified field biologists were briefed on SOCI and associated habitat types prior to the completion of freshwater field surveys to aid in the identification of significant habitats, flora, fauna, bats, and avifauna.

For additional details on all considered alternative Transmission Interconnection Line routings assessed, refer to Section 1.4.

### 7.4.1 Terrestrial Habitat

Multiple approaches were taken to assess terrestrial habitat within the Transmission Interconnection Line. To assess the terrestrial habitat, an in-depth desktop review was undertaken, in which the results were used to inform/guide incidental observations during field studies completed for the freshwater environment (i.e., watercourse, fish/habitat, and wetland surveys). Incidental observations of important and/or sensitive terrestrial habitats were included as a component as a component of the freshwater assessment, as provincial forest inventories are not always accurate in determining habitat features and/or the extent of these features. Additional targeted surveys for significant habitat were not completed within the Transmission Interconnection Line based on:

- Results of the desktop review (see below, known/potential areas avoided).
- Avoidance of WSS (and no disturbance to WSS that do overlap with the Transmission Interconnection Line).
- Survey coverage of the entire Transmission Interconnection Line during freshwater studies and subsequent results (see below, no observations of significant habitat).

Terrestrial habitat within 5 km of the Transmission Interconnection Line was assessed through a desktop analysis of the following resources:

- Provincial Landscape Viewer (NSLF, 2015)
- Ecological Land Classification of Nova Scotia (Neily et al., 2017)
- Significant Species and Habitats Database (NSNRR, 2018)
- Parks and Protected Areas Interactive Map (NSECC, 2022c)
- Old Forest Policy Lands Layer – per Provincial Landscape Viewer (NSLF, 2015)
- Potential Boreal Felt Lichen Habitat Layer (NSNRR, 2010)

The Transmission Interconnection Line (and associated substations) is located within the Bras d'Or Lowlands Ecodistrict (510) and the Cape Breton Hills Ecodistrict (310) (NSLF, 2015) (Drawing 11).

Forests within the Bras d'Or Lowlands Ecodistrict, where the southern portion of the Transmission Interconnection Line is located, are predominantly early successional hardwood and softwood stands due to the significant influence from human settlement and forestry (Neily et al., 2017). Hardwood forests are typically found in hillier terrain/steep slopes and are dominated by shade tolerant species such as red maple, sugar maple (*Acer saccharum*), American beech (*Fagus grandifolia*), and yellow birch. There are also large areas of softwood forests dominated by black spruce, with some white pine (*Pinus strobus*), eastern tamarack, and balsam fir; typically found within hummocky terrain in moist nutrient poor soils (Neily et al., 2017).

Forests within the Cape Breton Hills Ecodistrict (310), where the northern portion of the Transmission Interconnection Line is located, are predominantly Acadian hardwood forests consisting of red maple, sugar maple, white ash (*Fraxinus americana*), and yellow birch (Neily et al., 2017). Black spruce dominated forests can also be found at the tops of hills where terrain is hummocky and soils are imperfectly drained. In addition, small areas of mixedwood forests are found within steep ravines along river valleys. Primary sources of forest disturbance in this Ecodistrict are a result of wind, hurricanes, and disease/insects (Neily et al., 2017).

Forestry mapping identified softwood, hardwood, and mixedwood stands of various ages and species along the Transmission Interconnection Line, see Table 7.12 below for a summary of land cover and Drawing 28 for locations (NSLF, 2015). Leading forest species include black spruce, yellow birch, red maple, and white spruce.

**Table 7.12: Land Cover within the Transmission Interconnection Line**

| Land Cover Type | Area (ha) within Transmission Interconnection Line | Percent Cover within Transmission Interconnection Line |
|---|---|---|
| Softwood | 37.72 | 41 % |
| Mixedwood | 22.29 | 24 % |
| Hardwood | 23.14 | 25 % |
| Harvests | 0.78 | 1 % |
| Brush | 0.08 | <1 % |
| Bogs, Wetlands, Water | 5.30 | 6 % |
| Utility Corridor, Urban, Landfill, Quarry (Borrow Pit), Transport Corridor | 2.13 | 2 % |
| **Total** | **91.44** | **100 %** |

Source: NSLF 2015

The Significant Species and Habitats Database contained several significant habitat records within 5 km of the Transmission Interconnection Line, all of which relate to talus slopes located outside of the Project Boundary (Drawing 29) (NSNRR, 2018).

*Parks & Protected Areas*
Apart from Landrie Lake and its two protected watershed areas (Section 7.2.1), there are two other parks/protected areas located within 5 km of the Transmission Interconnection Line including (NSECC, 2022c):

- River Inhabitants Nature Reserve
- River Inhabitants Nature Reserve Addition (*Pending Designation*)

The River Inhabitants Nature Reserve is an 892 ha provincial nature reserve providing protection for approximately 10 km of the River Inhabitants. The River Inhabitants contains known habitat for Wood turtle, Atlantic salmon, Brook trout (*Salvelinus fontinalis*), and at least nine rare plant species. This landscape is complex and comprised of various habitats such as wetlands, old hardwood forests, floodplain meadows, sand bars, and marshes (Government of Nova Scotia, 2022b). The pending addition to the River Inhabitants Nature Reserve is approximately 325 ha and is located along the western boundary of the existing nature reserve and north of MacIntyre Lake. There are no proposed works located within or adjacent to the River Inhabitants Nature Reserve. The nearest point on the Transmission Interconnection Line to the River Inhabitants Nature Reserve (and proposed addition) is approximately 4.8 km northeast (Drawing 30).

There are no Special Management Practice Zones located within 5 km of the Transmission Interconnection Line (NSLF, 2015).

*Old Growth Habitat*

Mapping of designated provincial Old Forest Policy Lands was completed within 5 km of the Transmission Interconnection Line to identify areas of old growth habitat/stands (NSLF, 2015). A total of 10 areas of Old Forest Policy Lands were identified (Drawing 29). None of the identified Old Forest Policy Lands overlap with the Project Boundary, with the nearest designated area located approximately 0.3 km east of the Transmission Interconnection Line. In addition to mapping, potential old growth forests were searched for during field studies conducted within the Transmission Interconnection Line; no areas of old growth were identified during these assessments.

*Potential Boreal Felt Lichen Habitat*

There were several occurrences of potential boreal felt lichen habitat identified within 5 km of the Transmission Interconnection Line, none of which are located within the Transmission Interconnection Line corridor (NSNRR, 2010). The closest potential habitat record is approximately 0.06 km west of the Transmission Interconnection Line (Drawing 26). For additional details on boreal felt lichen, refer to Section 7.3.1 above.

During the Project design phase, alternative Transmission Interconnection Line routings were considered. One iteration proposed originally overlapped several areas of potential boreal felt lichen habitat. Following identification of this habitat, the Project was re-routed to avoid these potentially sensitive locations. For additional details on considered alternative routings, refer to Section 1.4.

### 7.4.2 Terrestrial Flora

The assessment of terrestrial flora (vascular plants and lichens) was completed using multiple resources, primarily consisting of desktop reviews supplemented by incidental observations during field assessments completed for the freshwater aquatic environment (i.e., watercourse, fish/habitat, and wetland surveys). Qualified biologists were briefed on known flora SOCI occurring within the Study Area to aid in the identification of flora SOCI and associated potential habitat during freshwater surveys. Additional targeted flora surveys were not completed within the Transmission Interconnection Line based on:

- The Project's avoidance of wetlands, WSS, watercourses, and riparian habitats which typically support rare species.
- Stationary nature of flora and Transmission Interconnection Line's ability to span SOCI identified.
- Results of the desktop review (see below, SOCI location notes and avoided to the greatest extent possible).
- Results of the terrestrial habitat assessment (Section 7.4.1 above) which identified no known or potential significant habitats for flora SOCI within the Transmission Interconnection Line.
- Survey coverage of the entire Transmission Interconnection Line and subsequent results of the watercourse/wetland surveys (see below, no observances of flora SOCI).

The assessment of terrestrial flora (vascular plants and lichen) within 5 km of the Transmission Interconnection Line was completed using the following resources:

- ACCDC Data Report (ACCDC, 2022c)
- Significant Species and Habitats Database (NSNRR, 2018)

The desktop review identified two vascular plants and one lichen SOCI within 5 km of the Transmission Interconnection Line (Table 7.13, Drawing 27). A complete list of flora SOCI up to 100 km from the Transmission Interconnection Line is in the ACCDC Data Report in Appendix N.

**Table 7.13: ACCDC Flora SOCI Identified within 5 km of the Transmission Interconnection Line**

| Common Name | Scientific Name | # | Distance & Direction* | COSEWIC[1] | *SARA*[2] | NS *ESA*[3] | S-Rank[4] |
|---|---|---|---|---|---|---|---|
| **Vascular Plants** | | | | | | | |
| Southern twayblade | *Neottia bifolia* | 24 | 0.0 - 0.4 km E & W | --- | --- | --- | S3 |
| Water blinks | *Montia fontana* | 2 | 2.0 km E | --- | --- | --- | S1 |
| **Lichens** | | | | | | | |
| Eastern waterfan | *Peltigera hydrothyria* | 2 | 0.5 km W<br>1.5 km W | Threatened | Threatened | Threatened | S1 |

*Distance (and direction) to the nearest point on the Transmission Interconnection Line.
Source: ACCDC 2022c; [1] Government of Canada 2022; [2] Government of Canada 2022; [3] Government of NS, 2022a; [4]ACCDC 2022a

Southern twayblade is a species of orchid found across eastern Canada and down the eastern/southern US coast. Three of the 24 records identified are within the Transmission Interconnection Line (Drawing 27). Outside of the Transmission Interconnection Line, the nearest record is located approximately 0.02 km east (ACCDC, 2022c). For additional details on southern twayblade, refer to Section 7.3.2.

Water blinks (*Montia fontana*) is a herbaceous plant that can be found across the globe from the tropics to the arctic (iNaturalist, 2022). It is typically associated with wet habitats such as springs and riparian areas. The closest record of water blinks is 2.0 km east of the Transmission Interconnection Line, see Drawing 27 (ACCDC, 2022c).

Eastern waterfan (*Peltigera hydrothyria*) is a leafy lichen that is localized within Canada to the provinces of Nova Scotia, New Brunswick, and Quebec (COSEWIC, 2013b). This species of lichen grows on rocks within cool, clear, shaded streams either at or below the water level. Water quality and temperature (species requires <18°C) appear to be an important determinant of suitable habitat, limiting the range and success of this species (COSEWIC, 2013b). The closest record of eastern waterfan is 0.5 km west of the Transmission Interconnection Line, see Drawing 27 (ACCDC, 2022c).

The Significant Species and Habitats Database did not identify any significant habitat related to flora within 5 km of the Transmission Interconnection Line.

There were no incidental observations of flora (vascular plant or lichen) SOCI during freshwater field studies (i.e., watercourse, fish/habitat, and wetland surveys) completed for along the Transmission Interconnection Line (and the associated substations). Qualified biologists were briefed on all three known SOCI within proximity to the Transmission Interconnection Line prior to the freshwater field studies to aid incidental observations of these species. Further, all desktop-identified flora SOCI are associated with wetland, watercourse, and riparian habitats which underwent comprehensive delineations and assessments as the overall priority was to avoid these sensitive habitat features; and as a result, ideal habitats for the flora SOCI will also be avoided to the greatest extent possible.

### 7.4.3 Terrestrial Fauna

Terrestrial fauna was assessed primary through desktop reviews, supported by incidental observations during field studies completed for watercourses, fish/habitat, and wetlands. Qualified biologists were briefed on known fauna SOCI occurring within proximity to the Transmission Interconnection Line to aid in identification of fauna SOCI and associated potential habitat during freshwater surveys. Additional targeted fauna surveys were not completed within the Transmission Interconnection Line based on:

- The Transmission Interconnection Line's location on the island of Cape Breton (no concerns regarding Mainland Moose).
- Results of the desktop review (see below, no SOCI identified within Transmission Interconnection Line corridor).
- Results of the terrestrial habitat assessment (Section 7.4.1 above) which identified no known or potential significant habitats for fauna SOCI within the Transmission Interconnection Line.
- Avoidance of disturbance to wetlands, WSS, watercourses, and riparian habitats which typically support rare species.
- Survey coverage and results of important habitat types (i.e., watercourses, wetlands, and riparian areas).

*Mammals*

A review of the ACCDC Data Report (2022c) and Significant Species and Habitats Database did not identify any mammals within 5 km of the Transmission Interconnection Line, with the exception of several areas classified as "Deer Wintering" habitat for White-tailed deer which are not considered SOCI (Drawing 29) (NSNRR, 2018). In addition, no mammal SOCI were observed or identified during field studies completed along the Transmission Interconnection Line (and associated substations). Evidence of American black bear (*Ursus americanus*) and White-tailed deer was frequently observed along the Transmission Interconnection Line corridor during field surveys; however, these species are not considered to be SOCI and both have an S-ranking of S5.

*Herpetofauna*

A review of the ACCDC Data Report (2022c) identified Wood turtle as existing within 5 km of the Transmission Interconnection Line. Exact locations of these records have not been provided as Wood turtle is a location sensitive species per NSNRR. In addition, the Significant Species and Habitats Database contained 30 "Species at Risk" records relating to Wood turtle. These records are associated with River Inhabitants, Hortan Lake, MacGregors Lake, Lake Murray and their associated tributaries (NSNRR, 2018). The nearest habitat record for Wood turtle is located approximately 1.2 km west of the northern switching substation (grid connection).

Qualified biologists were briefed on Wood turtles and their associated habitat prior to freshwater field studies to aid incidental observations of these species. Several watercourses were delineated and characterized within the Transmission Interconnection Line; in which, suitable Wood turtle habitat was identified along Watercourse 2 (WC2), see Drawing 22. WC2 is a large permanent watercourse that contains flat, run, and pool sequences along with sandy-fine substrates and bars (see Appendix M for detailed characteristics).

*Butterflies & Odonates*

Butterflies and *Odonates* were assessed using data provided in the NSNRR Significant Species and Habitats Database (2018) and ACCDC Data Report (2022c). The Significant Species and Habitats Database identified no records of butterfly and *Odonates* SOCI within 5 km of the Transmission Interconnection Line; however, the ACCDC Data Report (2022c) identified two *Odonates* SOCI within 5 km of the Transmission Interconnection Line including the following:

- Elfin skimmer (*Nannothemis bella*) – "S3S4" (ACCDC)
- Harlequin darner (*Gomphaeschna furcillata*) – "S3S4" (ACCDC)

Within North America, the Elfin skimmer (*Nannothemis bella*) is the smallest dragonfly that can be found across eastern Canada and the US. This species is found between the months of May and August in wetland habitats (iNaturalist, 2022). Both records of this species are located approximately 2.1 km northwest of the northern switching substation (grid connection), see Drawing 27 for location (ACCDC, 2022c).

The Harlequin darner (*Gomphaeschna furcillata*) is a species of dragonfly that can be found across Canada and the US between the months of April and July (iNaturalist, 2022). Typically, this species is found within bogs or wooded swamps. Both records of this species are located approximately 2.1 km northwest of the northern switching substation (grid connection) in the same location as the Elfin skimmer, discussed above (ACCDC, 2022b).

There were no incidental observations of butterfly or *Odonate* SOCI during field studies completed within the Transmission Interconnection Line or alternative routes.

### 7.4.4 Bats

A review of the Significant Species and Habitats Database contained no records of bat SOCI or their habitat within 5 km of the Transmission Interconnection Line (NSNRR, 2018). The ACCDC Data Report (2022c) did however identify records of Little brown myotis located approximately 3.2 km (direction not provided) from the Transmission Interconnection Line. For additional details on Little brown myotis, refer to Section 7.3.4.

A complete list of bat SOCI up to 100 km from the Transmission Interconnection Line can also be found in the ACCDC Data Report (2022c) (Appendix N).

There are no known hibernacula located within proximity to the Transmission Interconnection Line. The nearest hibernaculum is approximately 70 km southwest near Glenelg on mainland Nova Scotia. There are, however, two clusters of abandoned mines within 5 km including the 15 coal mines near Seacoal Bay (discussed above in Section 7.3.4) along with eight coal shafts near Little River Reservoir approximately 3.1 km east of the Transmission Interconnection Line (NSNRR, 2021a). These abandoned mines are predominantly coal shafts located on either private or Crown land which have the potential to support overwintering bats.

There were no incidental observations of bat SOCI or their associated significant habitat (i.e., hibernacula or maternity colonies) during field studies conducted along the Transmission Interconnection Line (and substations) or other considered routings. Suitable habitats searched for by qualified biologists included large diameter (>25 cm) snags and downed trees, cliffs, caves, and rock outcrops which may serve as potential roosting or over-day habitat.

### 7.4.5 Avifauna

Avifauna within 5 km of the Transmission Interconnection Line were assessed through a desktop review of the following resources:

- Canada Important Bird Areas Interactive Map (Birds Canada, 2022)
- Significant Species and Habitats Database (NSNRR, 2018)
- ACCDC Data Report (ACCDC, 2022b)

The nearest Important Bird Area (IBA), known as the Pomquet Beach Region (NS009), is approximately 35 km west of the Project and is described further above in Section 7.3.5 (Birds Canada, 2022).

According to the Significant Species and Habitats Database, no records pertaining to avian SOCI/habitat were identified (NSNRR, 2018).

The desktop review identified 24 avian SOCI within 5 km of the Transmission Interconnection Line (Table 7.14, Drawing 27). A complete list of avian species within 100 km of the Transmission Interconnection Line can be found in Appendix N.

**Table 7.14: ACCDC Avian SOCI Identified within 5 km of the Transmission Interconnection Line**

| Common Name | Scientific Name | COSEWIC[1] | *SARA*[2] | NS *ESA*[3] | S-Rank[4] |
|---|---|---|---|---|---|
| American Bittern | *Botaurus lentiginosus* | --- | --- | --- | S3S4B, S4S5M |
| Barn Swallow | *Hirundo rustica* | Special Concern | Threatened | Endangered | S3B |
| Brown-headed Cowbird | *Molothrus ater* | --- | --- | --- | S2B |
| Black-legged Kittiwake | *Rissa tridactyla* | --- | --- | --- | S2S3B |
| Baltimore Oriole | *Icterus galbula* | --- | --- | --- | S2S3B, SUM |
| Boreal Chickadee | *Poecile hudsonicus* | --- | --- | --- | S3 |
| Canada Jay | *Perisoreus canadensis* | --- | --- | --- | S3 |
| Canada Warbler | *Cardellina canadensis* | Special Concern | Threatened | Endangered | S3B |
| Common Nighthawk | *Chordeiles minor* | Special Concern | Threatened | Threatened | S3B |
| Evening Grosbeak | *Coccothraustes vespertinus* | Special Concern | Special Concern | Vulnerable | S3B, S3N, S3M |
| Fox Sparrow | *Passerella iliaca* | --- | --- | --- | S3S4B, S5M |
| Great Cormorant | *Phalacrocorax carbo* | --- | --- | --- | S2S3B, S2S3N |
| Long-eared Owl | *Asio otus* | --- | --- | --- | S2S3 |
| Northern Goshawk | *Accipiter gentilis* | Not At Risk | --- | --- | S3S4 |
| Northern Mockingbird | *Mimus polyglottos* | --- | --- | --- | S1B |
| Olive-sided Flycatcher | *Contopus cooperi* | Special Concern | Threatened | Threatened | S3B |
| Pine Grosbeak | *Pinicola enucleator* | --- | --- | --- | S3B, S5N, S5M |
| Pine Siskin | *Spinus pinus* | --- | --- | --- | S3 |
| Pine Warbler | *Setophaga pinus* | --- | --- | --- | S2S3B, S4S5M |
| Purple Sandpiper | *Calidris maritima* | --- | --- | --- | S3S4N |
| Red Crossbill | *Loxia curvirostra* | --- | --- | --- | S3S4 |

| Common Name | Scientific Name | COSEWIC[1] | *SARA*[2] | NS *ESA*[3] | S-Rank[4] |
|---|---|---|---|---|---|
| Rose-breasted Grosbeak | *Pheucticus ludovicianus* | --- | --- | --- | S3B |
| Rusty Blackbird | *Euphagus carolinus* | Special Concern | Special Concern | Endangered | S2B |
| Spotted Sandpiper | *Actitis macularius* | --- | --- | --- | S3S4B, S5M |

Source: ACCDC 2022c; [1] Government of Canada 2022; [2] Government of Canada 2022; [3] Government of NS, 2022; [4]ACCDC 2022a

Of the 24 SOCI, six are considered SAR and are protected under federal (*SARA*) and provincial (NS *ESA*) legislation: Barn Swallow, Canada Warbler, Common Nighthawk, Evening Grosbeak, Olive-sided Flycatcher, and Rusty Blackbird.

Barn Swallow (4.3 km east of the Transmission Interconnection Line), Canada Warbler (0.3 km west), Common Nighthawk (4.3 km east), Evening Grosbeak (4.3 km east), and Olive-sided Flycatcher (1.6 km west) have all been characterized/discussed above in Section 7.3.5 as these species are also found in proximity to the Industrial Facility.

The Rusty Blackbird (*Euphagus carolinus*) is found within Canada during the summer breeding months, in which 87% of the global breeding population is within Canada (COSEWIC, 2017). This species prefers coniferous dominated stands adjacent to wetlands and/or slow-moving streams during breeding. During the migration period, the Rusty Blackbird is often found in treed wetlands (COSEWIC, 2017). The nearest observation of a Rusty Blackbird to the Transmission Interconnection Line is approximately 4.3 km east near Beaver Dam Lake.

Incidental observations of avian SOCI were recorded during field studies completed within the Transmission Interconnection Line and considered alterative routings. No avian SOCI were observed within the Transmission Interconnection Line; however, osprey calls were heard during field studies (Drawing 22).

During field assessments within the Study Area along alternative Transmission Interconnection Line routes, one active osprey nest (containing two adult ospreys) was identified on the northwestern shoreline of Landrie Lake and repeated calls from a Common Loon were documented in this area as well. Suitable nesting habitat was suspected to be in close proximity. As a result, these areas were avoided when selecting the final Transmission Interconnection Line route. Avian observations during field studies are shown on Drawing 22.

# 8.0 SOCIOECONOMIC CONSIDERATIONS

## 8.1 Local Demographics

The Project is located within the MCR [population of 8,914 (2021)], near the community of Port Hawkesbury [population of 2,998 (2021)], located approximately 5 km northwest of the Project. Port Hawkesbury is the most populated community in the MCR and is located on the island of Cape Breton, adjacent to the Strait of Canso.

The MCR is made up of approximately 50 communities and is bordered by Inverness County to the northwest, Cape Breton County to the northeast, and Guysborough County (Mainland Nova Scotia) to the southwest (MCR, 2022). The MCR covers a land area of approximately 1,246 km$^2$ (Statistics Canada, 2022) and includes extensive coastlines.

### 8.1.1 Demography

Population statistics for the MCR and province of Nova Scotia derived from 2011, 2016 and 2021 Census of Population are summarized in Table 8.1.

**Table 8.1: Population Profile for the Municipality of the County of Richmond**

| Population Statistics | Richmond County | Nova Scotia |
|---|---|---|
| Population in 2021 | 8,914 | 969,383 |
| Population in 2016 | 8,964 | 923,598 |
| Population in 2011 | 9,293 | 921,727 |
| Population change from 2016-2021 (%) | -0.6[1] | 5.0[1] |
| Population change from 2011-2016 (%) | -3.5[2] | 0.2[2] |
| Total private dwellings 2021 | 5,230 | 476,007 |
| Total private dwellings 2016 | 5,122 | 458,568 |
| Private dwellings occupied by usual residents[3] in 2021 | 4,100 | 428,228 |
| Private dwellings occupied by usual residents[3] in 2016 | 3,983 | 401,990 |
| Population density (per km$^2$) 2021 | 7.2 | 18.4 |
| Population density (per km$^2$) 2016 | 7.2 | 17.4 |
| Land area (km$^2$) | 1,246 | 52,824.71 |

Adapted from Statistics Canada 2021; Statistics Canada 2022
[1]Provided by the 2021 Census.
[2]Provided by the 2016 Census.
[3]Private dwelling occupied by usual residents refers to a private dwelling in which a person or a group of persons is permanently residing. Also included are private dwellings whose usual residents are temporarily absent (e.g., cottage season, international residents).

The MCR has recently seen a minor population decrease (-0.6% from 2016-2021). This recent population change is much smaller than the decrease from 2011-2016 (-3.5%). When comparing the population change with that of the province of Nova Scotia, the marginal growth rate for the MCR is below the provincial population growth rate of 5% (2016-2021).

The MCR's minor decrease (nearly negligible) indicates that residents either remain in the region and/or the number of residents leaving and those entering occurs at a relatively stable rate.

The age distribution in the MCR from the 2021 census reveals a median age of 54.4 years, slightly older than the provincial median age of 45.6 (Statistics Canada, 2022). An overview of the age distribution for 2021 in Richmond County is outlined in Table 8.2 below.

**Table 8.2: Age Distribution in the Municipality of the County of Richmond**

| Age Statistics | Richmond County |
|---|---|
| 0 - 14 years | 1,025 (11.5%) |
| 15 - 64 years | 5,090 (57.1%) |
| 65 years and over | 2,800 (31.4%) |
| **Total Population** | **8,915 (100%)** |

Source: Statistics Canada, 2022

The vast majority of residents in the MCR know the English language (Table 8.3). However, more than a quarter of the population is bilingual in English and French, with a select few speaking French only. An overview of the official languages for 2021 in Richmond County is outlined in Table 8.3 below.

**Table 8.3: Knowledge of Official Languages in the Municipality of the County of Richmond**

| Language(s) | Total |
|---|---|
| English only | 6,045 (68.6%) |
| French only | 10 (0.1%) |
| English and French | 2,750 (31.2%) |
| Neither English nor French | 5 (0.1%) |
| Total respondents (excludes institutional residents) | 8,810 (100%) |

Source: Statistics Canada, 2022

## 8.2 Regional Economy

From 2015 to 2020, the median household income within the MCR increased from $53,099 to $60,800; the employment rate within the MCR was 43.5% in 2015, which was lower than the provincial rate of 55.2% (Statistics Canada, 2021). In addition, the unemployment rate within the MCR was 16.4% in 2015, which was higher than the provincial unemployment rate of 10.0% (Statistics Canada, 2021).

A breakdown of the 10 most common industries of the labour force in the MCR is provided in Table 8.4. Health care and social assistance is the most significant industry in the MCR, with 520 people (13% of the population) working in this sector. Strait Richmond Hospital is located in Cleveland, NS (approximately 12 km northeast of Port Hawkesbury) and serves the health care needs of the residents of communities in Richmond County and the southern portion of Inverness County (Nova Scotia Health Authority, 2022).

Manufacturing and agriculture/forestry/fishing/hunting industries within MCR are more Manufacturing and agriculture/forestry/fishing/hunting industries within MCR are more prevalent than in the rest of the province. Cape Breton Island is very dependent on the fishing industry, with most rural communities with an economic base being built solely around this trade (DFO, 1989). According to the Honourable Bernadette Jordan (Minister of Fisheries, Oceans and the Canadian Coast Guard), Nova Scotia exports more seafood than any other province in Canada, and Cape Breton is a vital part of that fishery (Government of Canada, 2021). During a press release on July 16, 2021, Fisheries and Oceans Canada (DFO) discussed funding to invest $400 million to support Atlantic Canada's fish and seafood sector (Government of Canada, 2021).

The Strait of Canso (Super) Port is a natural deep-water harbour on the eastern seaboard of North America, located between mainland Nova Scotia and Cape Breton Island. The Port handles approximately 61% of Nova Scotia's international and domestic cargo. In addition, local businesses along the Strait (i.e., within Point Tupper Industrial Park) depend on the Port to export their finished products to market, as well as import raw materials, supplies, and equipment for local manufacturing (Strait Superport, 2022). According to the 2018 Gardner Pinfold Economic Impact Study of Independent Marine Ports in Atlantic Canada, port-dependent businesses along the Strait of Canso create 3,753 full-time equivalent jobs, $22 million in tax revenues to the Atlantic provinces, $38 million in tax revenues to the federal government, and $368 million for final goods and services annually. In addition, Port operations and related business activities represent a significant source of revenue and employment in the surrounding communities of Guysborough County, Richmond County, Inverness County, Port Hawkesbury, Port Hastings, and Mulgrave (Gardner Pinfold, 2018).

The Point Tupper Industrial Park is home to more than two dozen companies including a large pulp and paper mill, one of NS Power's thermal generating stations, and the existing Point Tupper Terminal oil and gas storage facility and large gas fractionation facility. The diverse array of businesses makes the Point Tupper Industrial Park the industrial center of Cape Breton Island.

**Table 8.4: Top 10 Industries for Labour Force Population Over 15 Years of Age, 2016**

| Industry | Richmond County | Nova Scotia |
|---|---|---|
| Accommodation and Food Services | 235 (6.0%) | 33,115 (7.1%) |
| Agriculture, Forestry, Fishing and Hunting | 370 (9.4%) | 17,775 (3.8%) |
| Construction | 365 (9.3%) | 33,555 (7.2%) |
| Educational Services | 310 (7.9%) | 35,480 (7.6%) |
| Health Care and Social Assistance | 520 (13.2%) | 64,390 (13.8%) |
| Manufacturing | 430 (10.9%) | 32,375 (7.0%) |
| Other Services (Except Public Administration) | 190 (4.8%) | 19,195 (4.1%) |
| Public Administration | 220 (5.6%) | 40,225 (8.6%) |
| Retail Trade | 485 (12.3%) | 59,570 (12.8%) |
| Transportation and Warehousing | 160 (4.1%) | 19,660 (4.2%) |

Adapted from Statistics Canada 2021
Total does not add up to 100% as it is not an exhaustive list of industries from the census.
Labour force data is not available in the 2021 census, so only the 2016 census is referenced at this time.

The Town of Port Hawkesbury and the Point Tupper Industrial Park are within 5 km of the Project and offer a range of businesses and services (Drawing 31). A review of the businesses and activities located within the Point Tupper Industrial Park is provided in Table 8.5.

**Table 8.5: Local Businesses Within the Point Tupper Industrial Park**

| Business | Distance and direction from the Project* |
|---|---|
| Bear Head Energy Inc. | 3.4 km southeast, on Bear Island Road |
| Cabot Gypsum ULC | 6.6 km northwest, on Henry Paint Street |
| Georgia Pacific Canada Inc. | 6.2 km northwest, on Henry Paint Street |
| GFL Port Hawkesbury Site | 4.8 km northwest, on Heavy Water Road |
| Ideal Concrete | 4.5 km northwest, on Heavy Water Road |
| NS Power Point Tupper Generation Station | 3.2 km northwest, on Industrial Park Road |
| EverWind (existing) Point Tupper Terminal | 0.05 km northwest, on Port Malcolm Road |
| Marine Services Co. | 2.0 km northwest, on Port Malcolm Road |
| Port Hawkesbury Paper Ltd. | 5.7 km northwest, on Pulp Mill Road |
| Strait Supplies Limited | 5.9 km northwest, on Langley Lane |

*All distances measured from the approximate Project Boundary, using the most direct route.

The Town of Port Hawkesbury is home to various services, including accommodations, banks, restaurants, shopping malls, liquor stores, and museums. A summary of services is provided in Table 8.6.

**Table 8.6: Services within the Town of Port Hawkesbury**

| Industry | Approximate Services |
|---|---|
| Accommodation and Food Services | 13 |
| Construction | 1 |
| Educational Services | 4 |
| Health Care and Social Assistance | 6 |
| Other Services (Except Public Administration) | 31 |
| Public Administration | 6 |
| Retail Trade | 26 |

Currently, the Project employs over 100 personnel (from the local community), mainly at the existing Point Tupper Terminal, including employees, contractors, and consultants working directly on the Project.

## 8.3 Land Use and Value

The Project (i.e., Industrial Facility) will be primarily located on an existing industrial property within the Point Tupper Industrial Park in Point Tupper, NS; with additional land use southeast and northwest of the Industrial Facility varying and including commercial and Crown land for the Transmission Interconnection Line component. To the southwest, the Project is adjacent to the Strait of Canso, a shipping port for 61% of Nova Scotia's international and domestic cargo tonnage (Strait of Canso Superport Corporation, u.d.).

Based on available mapping and aerial photography, the closest residential development is 2.51 km from the Project Boundary, and is located on the shoreline of the Strait of Canso (Mainland Nova Scotia) (Drawing 32). Additional residential dwellings are near Port Hawkesbury (4.52 km and 4.68 km) and Port Malcolm (3.19 km). Similarly, industrial/commercial businesses were identified in the vicinity of the Project Boundary, which are associated with the Point Tupper Industrial Park.

The existing Point Tupper Terminal property was developed in the late 1960s for industrial use, specifically as a gas fractionation plant, storage and distribution terminal, with associated auxiliary operations. According to the Phase I Environmental Site Assessment (ESA) conducted by Hatch (2022b), numerous potentially contaminating activities (PCAs) were identified in association with the existing Point Tupper Terminal. Based on this study, Hatch identified 41 areas of potential environmental concerns (APECs) with the potential to impact soil and groundwater (Appendix O).

Contaminants of Potential Concern (COPCs) associated with the APECs include benzene, toluene, ethylbenzene and xylene (BTEX), metals and inorganics, organochlorine pesticides (OCP), polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCB), petroleum hydrocarbons (PHC), and volatile organic compounds (VOC). The existing Point Tupper Terminal contains a network of 25 groundwater monitoring wells (Appendix O), and historical analytical reports did not demonstrate any exceedances of the concentrations of

contaminants listed above. In addition, Hatch (2022b) reported an asbestos-containing material (ACM) burial site near the existing Point Tupper Terminal, north of the adjacent windfarm development (Appendix O).

A Phase II ESA was completed by Golder for the existing Point Tupper Terminal, on a section of property associated with PID 75035725 (which overlaps with the Industrial Facility footprint) in March 2021 during the decommissioning of the ExxonMobil (past property owner) fractionation plant. Concentrations of BTEX, mTPH, PAH, VOC, and metals in the analyzed soil and groundwater samples met the applicable compliance standards.

Currently, the existing Point Tupper Terminal property is monitored under a separate program prescribed in the existing Industrial Approval (#2008-065540-06). Additional details and monitoring programs for the existing Point Tupper Terminal property can be found under separate cover, and updates are submitted to NSECC annually.

Note that the footprint of the Project's Industrial Facility will not be located within any (historically) un-remediated areas.

### 8.4 Mi'kmaq of Nova Scotia

The Project is located in the Unama'kik District of the Mi'kmaq. The Mi'kmaq reserve lands within this district consist of Potlotek (Chapel Island), Eskasoni, Membertou, Wagmatcook, and Waycobah First Nations (Drawing 33).

Potlotek comprises 592 ha on Cape Breton Island along Highway 104, approximately 10 km east of St. Peter's. In addition, Potlotek includes an island off the Bras d'Or Lakes named Chapel Island. Chapel Island is considered the capital of Mi'kma'ki and has been designated a National Heritage Site. This Heritage Site is home to the St. Anne's Mission and has been a gathering place for the Mi'kmaq for centuries. The population of Potlotek is approximately 715 individuals, with an on-reserve population of 552 (Tui'kn Partnership, u.d., a).

The Eskasoni First Nation is the largest Mi'kmaq community in the world and is located on the Bras d'Or Lake in Eastern Cape Breton Island. The community consists of a community-operated school system from kindergarten to grade 12, a supermarket, a community rink, and a cultural centre. The Eskasoni community comprises approximately 4,359 members (Tui'kn Partnership, u.d., b).

Membertou is an urban First Nation community situated 3 km from Sydney, Nova Scotia, with over 1,443 individuals. Membertou (formally known as the Kings Road Reserve) was initially located just off of Kings Road, along the Sydney Harbor. In 1916, 125 Mi'kmaq were ordered by the Exchequer Court of Canada to relocate. In 1926, the Membertou Community was officially moved to its present-day location (Tui'kn Partnership, u.d., c).

Wagmatcook First Nation is a small village near the Bras D'or Lakes and consists of 820 individuals. In recent years the Wagmatcook Chief and Council has increased the quality of community services through the development of the Wagmatcook Health Centre. Approximately 210 full- and part-time staff are in the community throughout the calendar year (Tui'kn Partnership, u.d., d).

Waycobah First Nation is a historic Mi'kmaq community located along the shores of the Bras d'Or Lakes, with a population of 974 individuals. Waycobah Community comprises a state-of-the-art school and health centre, private businesses catering to Cape Breton Island tourists and residents, and a vibrant cultural environment (Tui'kn Partnership, u.d., e).

Further consideration of First Nation communities and the Project's engagement activities have been included under Section 11.0.

### 8.5 Natural Resource Activities (Mining, Forestry)

The largest consumer of forests in the MCR is Port Hawkesbury Paper (PHP). PHP maintains a Crown license agreement with the province of Nova Scotia to sustainably manage an estimated 523,000 ha of Crown and public land (PHP, 2022). The wood used for paper production is supplied from the seven eastern counties of Nova Scotia (PHP, 2018) and the PHP Woodlands Department plants approximately 3 million native tree seedlings annually (PHP, 2022).

According to the NSNRR Harvest Plans Map Viewer (2021c), Crown Land Harvest plans (submitted and prescribed) were identified to the northeast of St Peter's, NS (58.32 ha and 8.11 ha). Therefore, the Project is not anticipated to impact the forestry sector within the MCR or any other municipality.

No mineral occurrences [industrial and/or metallic (non-coal)] were identified within the Project Boundary; however, gypsum occurrences were identified within the Port Hawkesbury and Landrie Lake Watershed Zones. Similarly, the Project Boundary did not identify mineral occurrences (coal). However, instances were identified to the northeast within the Port Hawkesbury and Landrie Lake Watershed Zones and to the northeast near Seacoal Cove (NSNRR, 2002). The Project is not anticipated to impact the mining sector.

Per the Nova Scotia Topographic Database (NSTDB, 2020), aerial photography identified three historical borrow pits within the Industrial Facility footprint (Drawing 8). Additional information for each borrow pit site was not available; however, discussions with EverWind personnel indicated that the borrow pit located to the southwest consisted of a shale deposit, which was used for the construction of the existing Point Tupper Terminal. The borrow pits located north/northeast consisted of clay deposits which were used as capping material for the existing ATS area (B. MacDonnell, personal communication, October 19, 2022).

Additional quarries/borrow pits were identified within an approximate 10 km radius of the Project Boundary, near Port Hawkesbury, Aulds Cove, and Pirate Harbour (NSNRR, 2002). No additional aggregate resources were identified within the Project Boundary; however, an unknown surficial deposit was identified near Pirate Harbour on mainland Nova Scotia, approximately 5.5 km southeast of the Project Boundary (NSNRR, 2002). The Project is not anticipated to impact active quarry/borrow pit activities.

Based on the NSNRR Mineral Resource Land Use Altas (2002), abandoned underground mines are not present within the Project Boundary, but there are abandoned mines observed within the Point Tupper Industrial Park. Petroleum wells were also identified approximately 2 km northeast of the Project Boundary, near Seacoal Cove. Much of the MCR coastline, including the Project Boundary and surrounding property, lie within a historic coal mining area (NSNRR, 2002). The Project is not anticipated to impact these sectors.
Exploration and tendered licenses were not identified within the Project Boundary but were found within the Port Hawkesbury and Landrie Lake Watershed zones (NSNRR, 2002).

In summary, with the exception of the three historical borrow pits identified within the Project Boundary, no Natural Resource Activities are expected to be impacted by the Project's development.

## 8.6 Transportation

The Project's Industrial Facility will be located approximately 4 km south of Highway 4 and Highway 104 (Trans Canada) along Industrial Park Road near the Town of Port Hawkesbury. Industrial Park Road is a well-developed and trafficked roadway utilized by several industrial sites, including the PHP pulp and paper mill, NS Power Point Tupper Generating Station, the existing Point Tupper Terminal, GFL's Port Hawkesbury Waste Management site, and the proposed Bear Head development. Port Malcolm Road provides access to Port Malcolm via Industrial Park Road, and this route can also be followed to access the community of Lower River Inhabitants, approximately 10 km east of the existing Point Tupper Terminal location.

The existing Point Tupper Terminal property is bordered by Industrial Park Road and Port Malcolm Road, with multiple private access roads located within the existing Point Tupper Terminal footprint that provide access to the industrial facilities and tank farms. The existing Point Tupper Terminal property is fenced off (for safety-related purposes), and access is through a gated and controlled access point located along Industrial Park Road.

Road networks within proximity to the Industrial Facility Project Boundary are well-developed and include Port Malcolm Road and Bear Island Road. Port Malcolm Road travels east from Industrial Park Road (south of the existing Point Tupper Terminal storage tanks) towards the community of Port Malcolm, NS. Port Malcolm Road also contains several unnamed offshoot road networks providing access to the LLWU, north of the existing Point Tupper Terminal and the existing wind turbines towards the east. Bear Island Road travels south/southeast along the coastline from the intersection of Industrial Park Road and Port Malcolm Road

towards Bear Island Cove. Bear Island Road also contains several offshoot road networks for the existing wind turbines within proximity (north and east) to the Project Boundary. Overall, the established road networks to and within the Property Boundary are easily accessible for various-sized vehicles, machinery, and equipment as required for the operation of the pre-existing industrial site(s) and shipping terminal.

## 8.7 Recreation and Tourism

The Town of Port Hawkesbury is located near the Project and provides various recreational services, including museums, theatres, dining, hospitality, and parks.

Within the vicinity of the Project, outdoor recreation includes ATV-use, snowmobiling, fishing, hunting, camping, hiking, and golfing. Recreational and tourist areas near the Project include:

- Balache Point Lighthouse
- Centennial Trails
- Jerome Point Lighthouse
- Granville Green
- Hartley's Fall Trailhead
- Hemlock Trail
- Maple Trail
- Mulgrave Heritage Centre
- Port Hastings Museum & Archives
- Port Hawkesbury Community Park
- Spruce Trail
- Strait Area Museum
- Strait Area Trails
- Tamarac Trail
- The Scotia Trail
- Venus Cove Marine Parkway

The 2019 Nova Scotia Visitor Exit Survey Community Report details tourism within the province at a regional and community scale (Tourism Nova Scotia, 2019). The Cape Breton tourism region is the closest to the Project, and the assessed communities are summarized in Table 8.7.

**Table 8.7: Cape Breton Communities Visited**

| Community | Total Trips (% of visitors who stopped or stayed in a given community) | Capture Rate (%) |
|---|---|---|
| Arichat | 1 | 4 |
| Baddeck | 7 | 40 |
| Cape Breton Highlands National Park | 4 | 22 |
| Cape North | 2 | 11 |

| Community | Total Trips (% of visitors who stopped or stayed in a given community) | Capture Rate (%) |
|---|---|---|
| Chéticamp | 6 | 33 |
| Glace Bay | 1 | 8 |
| Ingonish | 5 | 28 |
| Inverness | 3 | 16 |
| Iona | 1 | 5 |
| Louisbourg | 3 | 17 |
| Mabou | 2 | 9 |
| Margaree | 2 | 12 |
| North Sydney | 2 | 13 |
| Pleasant bay | 3 | 15 |
| Port Hastings | 1 | 8 |
| Port Hawkesbury | 2 | 10 |
| St Peter's | 2 | 9 |
| Sydney | 6 | 32 |
| Whycocomagh | 2 | 9 |

Adapted from Tourism Nova Scotia, 2019
Capture rate identifies where visitors go within a particular region, only among those who visited the region.

The relatively moderate capture rates and percentage of total trips in the area suggest tourism is a significant economic driver for the region, especially in Baddeck, Cheticamp, Ingonish, and Sydney communities.

## 9.0 ARCHAEOLOGICAL, CULTURAL & HERITAGE RESOURCES

Boreas Heritage Consulting Inc. (Boreas Heritage) was contracted to conduct an Archaeological Resource Impact Assessment (ARIA) for the Project in 2022. The ARIA was directed by Sara Beanlands and included a historical background study and reconnaissance of the Project Boundary to determine the potential for archaeological, cultural, and/or heritage resources.

As archaeological work can often result in findings or information of a confidential or sensitive nature, a summary of the findings is provided in the EA, with the detailed findings being provided directly to Nova Scotia Communities, Culture, Tourism, and Heritage (NSCCTH) – Special Places Program, under separate cover, for review. It is understood that the findings and recommendations of the ARIA are considered “draft” until the report is accepted by NSCCTH.

To complete the ARIA, Boreas Heritage designed an assessment strategy consisting of a desktop component (background screening) and a field component (archaeological reconnaissance). The desktop component examined three elements: the environmental context, the archaeological context, and the historical context of the Project Boundary.

The environmental context was examined to identify past and current environmental influences or conditions that may elevate archaeological potential (e.g., topography, local resources, and potential for agriculture). The archaeological context was examined to identify how people used and occupied the surrounding landscape based on evidence from previously registered archaeological sites and past archaeological work conducted near the Project. The historical context was examined to identify how people used and occupied the local area based on evidence from published archival documents, ethno-historic records, local oral traditions, historic maps, local and/or regional histories, scholarly texts, and available property records.

Additionally, the desktop component involved a general review of topographic maps, coastal charts, and aerial photographs to identify topographical and hydrological attributes that correlate with high archaeological potential (e.g., waterfalls/rapids as focal points for fishing or requiring portage, submerged marine terraces representing former coastline). These attributes are also incorporated into the archaeological potential model, developed by Boreas Heritage.

The field component involved an on-site visual examination of the archaeological study area (Drawing 34) and was carried out on November 3 and 4, 2022. Parallel pedestrian transects were completed, at intervals of 20 m to 30 m (maximum of 50 m), across the archaeological study area to visually assess archaeological potential. These transects assist in maintaining effective coverage. Structured pedestrian transects assist in the recognition of topographic and/or vegetative anomalies that may inform the extent and nature of previous disturbance factors in the studied area (e.g., clear-cutting, ploughing, construction earthworks), or suggest an elevation in archaeological potential, including evidence of buried archaeological resources (e.g., small knolls, apple trees in the forest, overgrown depressions or abandoned roads).

In Nova Scotia, the Maritime Archaeological Resource Inventory (MARI) is maintained by the Nova Scotia Museum, on behalf of NSCCTH. Reports from past archaeological assessments and academic research conducted near the Project provide archaeological context, which informs the interpretation and evaluation of any potential archaeological resources identified during the field component of the ARIA.

Upon completion of field activities, analysis, and interpretation, the results of the archaeological assessment were summarized in a report, including recommendations for appropriate resource management strategies. Photos, detailed plans, and GIS-based mapping of the testing area and specific find locations (as applicable) were incorporated into the report. This report was submitted on behalf of the Proponent by Boreas Heritage to NSCCTH under separate cover.

The overall goal of the ARIA was to evaluate the archaeological potential within the Project Boundary and identify and delineate any areas considered to exhibit high potential for

encountering archaeological resources; this information was then used to inform the design/layout of the Project, and subsequently avoid these sensitive features.

### 9.1 Archaeological Assessment

Based on the results of the ARIA completed in November 2022, Boreas Heritage identified three areas considered to exhibit high potential for encountering archaeological resources; and one previously registered archaeological site. All of the identified areas, as well as the previously registered archaeological site were located outside of the Project Boundary.

Two of the three areas identified as high potential were associated with watercourses located within the archaeological study area (both of which were located outside of the Project Boundary). These locations may have historically been used by the Mi'kmaq of Nova Scotia and the potential for buried archaeological resources is high. The third high potential area is representative of the remains of a historic occupation.

The previously registered archaeological site (BjCi-05) was initially identified during an archaeological assessment associated with the Sable Offshore Energy Project Natural Gas Liquid Pipeline Project and findings from this (2022) assessment confirmed its location and characterization as a "Ship Point Site".

The Project has been designed to avoid any interactions with the high potential locations and previously registered archaeological site that were identified; details regarding Project design iterations and adjustments can be found in Section 1.4.
All remaining portions of the archaeological assessment area are considered to exhibit low potential for encountering archaeological resources. As a result, Boreas Heritage recommends that these areas be cleared by NSCCTH of any further requirement for future archaeological assessment.

## 10.0 OTHER CONSIDERATIONS

### 10.1 Human Health

A review of potential human health and safety-related concerns was completed by Hatch (2022c). Potential human health impacts associated with the construction, operations, and decommissioning phases of the Project include air quality impacts, sound, climate change considerations, explosion and fire hazards, and toxic hazards. These potential impacts are assessed in the following sections:

- Section 6.1.2 and Section 13.1 – Air Quality and VC Assessment
- Section 6.2 and Section 13.2 – Acoustic Environment and VC Assessment
- Section 6.3 and Section 13.3 – Climate Change and VC Assessment
- Section 17 – Accidents, Malfunctions, and Unplanned Events

Construction, operations, and decommissioning phases of the Project will be completed in the safest manner possible and in conformance with all applicable health and safety-related standards and requirements. Process technologies from Siemens and KBR were chosen for this Project to ensure compliance with international standards and incorporate safety features to reduce potential risks to humans and the environment. In addition, process infrastructure siting considerations were incorporated into the Project's design to reduce potential impacts to nearby receptors in the event of accidents, malfunctions, and unplanned events.

### 10.2 Other Undertakings in the Area

Concerns are often raised regarding the long-term implications of multiple undertakings actively operating in a localized area. While a single undertaking might not cause significant adverse effects, multiple undertakings may result in incremental impacts, referred to as cumulative effects. These cumulative effects may potentially result in an overall impact to a VC of interest.

A review of the other undertakings identified in proximity to the Project as well as the potential for cumulative impacts has been assessment under Section 16 – Cumulative Effects Assessment.

## 11.0 ENGAGEMENT

The Proponent recognizes the importance of building meaningful relationships based on a foundation of transparency and mutual respect. Prior to the acquisition of the existing Point Tupper Terminal, the Proponent initiated early informal engagement to assess the community's level of interest and acceptance in transitioning the existing petroleum storage, blending and transhipping facility, towards green fuel production, specifically, hydrogen and ammonia.

The Proponent has met and exceeded, regulator, rightsholder, and stakeholder engagement requirements outlined in NSECC's A Proponent's Guide to Environmental Assessment (2017) and the Office of L'nu Affairs Proponent's Guide: The Role of Proponents in Crown Consultations with the Mi'kmaq of Nova Scotia (2012).

Recognizing the broader regional impacts on term project planning, including matters such as supply chain and workforce needs, the Proponent has extended early engagement activities beyond the Strait of Canso region to include all of Cape Breton and the Municipality of the District of Guysborough.

To date, the Project team has participated in meetings, delivered presentations, and hosted five Open House events in Port Hawkesbury (2), Arichat (1), St. Peter's (1), and Polotek First Nation (1).

All associated presentations, posters, available meeting agendas and minutes, advertisements, letters of support, and feedback referenced throughout this section are provided in Appendix P.

## 11.1 Engagement with Government Departments, Agencies and Regulators

The Project team has been involved in engagement activities with government entities and officials since April 2022 to ensure that the various departments, agencies, and regulators were made aware of the Project and given an opportunity to ask questions and provide feedback, prior to the EA Registration.

The Proponent's engagement activities are ongoing and their objectives are as follows:

- To increase regulatory awareness and understanding of the Project.
- To identify and address concerns.
- To actively engage in dialogue throughout the initial Project planning stages and to better understand the necessary permitting, construction/development, operations, and decommissioning requirements that future phases of the Project will undergo.

The Project team has met with government entities and officials representing federal, provincial, and municipal jurisdictions to open lines of communication about the Project and ensure all regulatory requirements are met. Detailed information regarding meetings and events that have taken place with the various jurisdictions are provided below in Tables 11.1, 11.2, and 11.3.

As reflected in Tables 11.1 and 11.2, the Project team participated in a "One Window" session that included provincial and federal government departments, agencies, and regulators relevant to the development of the Project in Point Tupper, Nova Scotia.

**Table 11.1: Provincial Government Meetings and Events**

| Provincial Government Department or Agency | Representative(s) | Engagement Activities |
|---|---|---|
| **Nova Scotia Environment & Climate Change** | | |
| NSECC - Environmental Assessment Division | • Supervisor<br>• Director<br>• EA Officers | One Window Meeting – April 21, 2022<br>Sent the Project Description for the proposed Hydrogen & Ammonia Production Facility in Point Tupper for evaluation on May 31, 2022.<br>Project was assessed as requiring a Class 1 EA Registration Document.<br><br>EA pre-registration meeting – September 21, 2022.<br>Provided scope for the upcoming Project EA registration, as well as future phases (not covered under the scope of Phase 1). Discussed main |

| Provincial Government Department or Agency | Representative(s) | Engagement Activities |
|---|---|---|
| | | findings of the EA, air quality modelling, proposed mitigations, and public/Mi'kmaq engagement. |
| NSECC – Protected Areas and Ecosystems (PAE) Division | • Director of Air Quality and Resource Management | One Window Meeting – April 21, 2022 |
| NSECC – Inspection Compliance and Enforcement (ICE) Division | • Regional District Manager | One Window Meeting – April 21, 2022 |
| NSECC – Sustainability & Applied Science (SAS) Division | • Senior Engineering Advisor<br>• Executive Director (ED) | One Window Meeting – April 21, 2022<br><br>Meeting – August 25, 2022. No formal agenda. |
| NSECC – Water & Industrial Facilities | • Manager | One Window Meeting – April 21, 2022 |
| NSECC – Minister & Executive Minister of Environment and Climate Change, Chair of Treasury and Policy Board, Member of the Legislative Assembly (MLA) - Dartmouth East | • Timothy Halman, Minister & MLA<br>• Deputy Minister<br>• ED | Meeting at Minister's Office – August 25, 2022<br>Provided the Minister with an overview of the proposed Project. |
| **NS Natural Resources & Renewables (NSNRR)** | | |
| NSNRR Minister & Executive, MLA - Cumberland South | • Tory Rushton, Minister & MLA<br>• Deputy Minister | March 16, 2022 - Introduce department to Project, open lines of communication, and obtain feedback on land applications. Also discussed how Proponent can ensure that the hydrogen produced is "green," how the department is working to streamline application and processes as much as possible while building a team that will be integrated with NSECC. Minister also inquired about Project's reliance on federal Net Zero Grant approval.<br><br>September 13, 2022 – Virtual Meeting<br>Provided a status update on the proposed project. No formal agenda. |
| NSNRR Minister & Executive | • Steve Craig, Minister of Fisheries and Aquaculture | March 16, 2022 – Meeting<br>Introduce department to Project and opened line of communication. No formal agenda. |

| Provincial Government Department or Agency | Representative(s) | Engagement Activities |
|---|---|---|
| NSNRR Business Development & Strategic Priorities | • Director & One Window Chair<br>• ED<br>• Director<br>• Manager Strategic Priorities<br>• Research & Statistics Officer<br>• Director, Business Investment & Export Development | One Window Meeting – April 21, 2022<br>Provided overview of the Project, Project team, site details and shared background information about the proposed project for developing green hydrogen and ammonia. Phase 1 – Updates at the existing Point Tupper Terminal, involves taking power from the grid, then in future phases (to be permitted separately) the Proponent will add additional green energy to enable more green fuels' production. |
| NSNRR Clean Energy (Electricity) | • Director of Electricity Policy & Programs | One Window Meeting – April 21, 2022 |
| NSNRR Energy | • Manager, Petroleum Operations | One Window Meeting – April 21, 2022<br>The proposed Project will be located in proximity to the existing Point Tupper Terminal; the existing Point Tupper Terminal will maintain current petroleum operations until a full transition to hydrogen and ammonia production is possible. |
| NSNRR Geoscience and Mines | • Registrar | One Window Meeting – April 21, 2022<br>There are no mining related matters. |
| NSNRR Indigenous Consultation and Engagement | • Senior Policy Analyst | One Window Meeting – April 21, 2022 |
| NSNRR Land Administration | • Director of Surveys | One Window Meeting – April 21, 2022<br>Meeting at Founders Square - August 10, 2022<br>No formal agenda |
| NSNRR Regional Services | • Regional Biologist, Sydney | One Window Meeting – April 21, 2022 |
| NSNRR Wildlife | • Director of Wildlife Species at Risk Biologist<br>• Manager of Ecosystems & Habitats<br>• Manager of Biodiversity | One Window Meeting – April 21, 2022 |

| Provincial Government Department or Agency | Representative(s) | Engagement Activities |
|---|---|---|
| **Other Provincial Government Departments & Agencies** | | |
| Department of Economic Development, Nova Scotia Business Incorporated (responsible for the Innovation Corporation Act) | • Susan Corkum-Greek, Minister | Meetings February 11, 2022 and August 11, 2022. No formal agendas. |
| Office of L'nu Affairs | • Senior Consultation Advisor | Introductory meeting – March 2, 2022. No formal agenda.<br><br>One Window Meeting – April 21, 2022<br><br>Meeting at L'nu Affairs with CEO of Bayside (Paqtnkek's business arm) – August 10, 2022. Discuss partnership opportunities. |
| Chief Regulatory Officer of the Office of Regulatory Affairs and Service | • Deputy Minister | Introductory meeting – April 20, 2022. Introductions, overview of regulatory affairs, Project overview and discussion. |
| Department of Economic Development (Major Projects Coordination Initiative) | • Major Projects Coordination Initiative Lead | One Window Meeting – April 21, 2022 |
| MLA – Digby-Annapolis, Minister of Labour, Skills, and Immigration | • Jill Balser, Minister & MLA | Meeting – May 25, 2022. No formal agenda. |
| MLA – Inverness Deputy Premier, Deputy President of the Executive Council, Minister of Finance and Treasury Board, Minister of Labour Relations | • Allan MacMaster Deputy Premier, MLA | Introductory meeting with EverWind's CEO – July 2, 2022. No formal agenda.<br><br>While the proposed Project is not located within the County of Inverness, the Proponent expects positive workforce and business opportunities throughout Cape Breton. |

| Provincial Government Department or Agency | Representative(s) | Engagement Activities |
|---|---|---|
| MLA – Guysborough Tracadie<br>Minister of Agriculture | • Greg Morrow, Minister & MLA | Introductory meeting with EverWind's CEO – July 27, 2022. No formal agenda.<br>While the proposed project is not located within Guysborough County, EverWind expects positive workforce and business opportunities throughout the region.<br><br>One of the longer-term opportunities for the development of green ammonia in Nova Scotia could be the replacement of current industrial fertilizers with a net-zero option. |
| MLA - Richmond | • Trevor Boudreau, MLA | Introductory meeting with EverWind's CEO – July 27<br>Provided overview of the Project.<br><br>Attended EverWind presentation to Chamber of Commerce and Community Leaders – September 2022 |

In addition to the above, on August 23, 2022 EverWind's CEO participated in the Atlantic Premier's Round Table on Green Hydrogen; a round table discussion about the importance of developing a Green Hydrogen industry in Atlantic Canada and how the Atlantic Provinces could work collaboratively to advance the industry. Tim Houston, Premier of Nova Scotia; Andrew Furey, Premier of Newfoundland & Labrador; Blaine Higgs, Premier of New Brunswick; and Dennis King, Premier of Prince Edward Island were in attendance.

**Table 11.2: Federal Government Meetings and Events**

| Federal Government Department or Agency | Representative(s) | Engagement Activities |
|---|---|---|
| Department of Fisheries & Oceans (Fisheries Protection) | • Senior Fisheries Protection Biologist | One Window Meeting – April 21, 2022<br>There are no fisheries related matters associated with the proposed Project. |
| Impact Assessment Agency of Canada | • Lachlan Maclean, Project Manager | One Window Meeting – April 21, 2022 |
| Privy Council | • Honourable Justin Trudeau, Prime Minister of Canada | In August 2022, EverWind's CEO attended a dinner in Toronto hosted by the Prime Minister of Canada. No formal agenda. |

| Federal Government Department or Agency | Representative(s) | Engagement Activities |
|---|---|---|
| Transport Canada | • Senior Program Officer<br>• Regional Environmental Advisor<br>• Navigable Water Protection Officer<br>• Senior Marine Surveyor | One Window Meeting – April 21, 2022<br>Project description sent June 2, 2022<br>The proposed Project does not impact navigable waters or other matters within the jurisdiction of Transport Canada. |
| Department of Innovation, Science and Industry | • Francois-Philippe Champagne, Minister | Meeting with EverWind's CEO – July 19, 2022<br>No formal agenda |

**Table 11.3: Municipal Meetings and Events**

| Department or Agency | Representative(s) | Engagement Activities |
|---|---|---|
| Municipality of the County of Richmond | • Amanda Mombourquette (Richmond County Warden) | March 22, 2022 – Council provided a letter of support for the Project.<br>Meetings August 18, 2022 and September 15, 2022<br>No formal agendas<br><br>Frequent communications are ongoing and Richmond Council has a representative on the Project's Community Liaison Committee (CLC). |
| Town of Mulgrave | Various | May 12, 2022 - Provided the Mulgrave Town Council with a Project presentation/overview and an opportunity for Q&A. |
| Town of Port Hawkesbury | • Brenda Chisholm, Mayor | Meeting – May 10, 2022<br>Following the meeting the Mayor and Town Council provided a letter of support for the Project.<br><br>The Town of Port Hawkesbury has a representative on the Project's CLC. |

## 11.2 Stakeholder & Public Engagement

The Project team has been involved in engagement activities with the public and stakeholders since March 2022 to ensure that local and surrounding communities were made aware of the Project and given ample opportunity to receive information, ask questions, and share local knowledge.

The Proponent's engagement activities are ongoing and their objectives are as follows:

- To increase public awareness and understanding of the Project.
- To identify and address public and stakeholder concerns.
- To actively engage in dialogue throughout permitting, development/construction, operations, and decommissioning phases of the Project.

Detailed information regarding the meetings and events that have taken place are supplied below.

### 11.2.1 Stakeholder Engagement

A review of stakeholder meetings and events to date have been included in Table 11.4.

**Table 11.4: Stakeholder Meetings and Events**

| Community / Stakeholder Organization | Representative(s) or Main Contact | Engagement Activities |
|---|---|---|
| **Nova Scotia Community College (NSCC)**<br><br>The NSCC Strait Area Campus includes Ocean Innovation Centre and nautical training infrastructure which provides Transport Canada-approved marine training (NSCC, 2022) | • Amanda Mombourquette (Richmond County Warden) | EverWind is in active discussions with the NSCC Strait Area campus regarding workforce training to support the green fuels industry.<br><br>Staff at the existing Point Tupper Terminal, have well-established relationships with NSCC.<br><br>NSCC has a representative on the CLC. |
| **Strait Area Chamber of Commerce**<br><br>The Strait Area Chamber of Commerce is a business development organization that promotes, improves, and protects trade and commerce.<br><br>"We envision the Strait Area as one of the best places in which you can invest, live, work and conduct business. Through our leadership and advocacy, we proactively | • Misty MacDonald, ED | March 30, 2022 – EverWind's CEO presented on the plan for Point Tupper's Clean Energy Project at the State of the Strait Business Update. This event was attended by the local Chamber of Commerce and business members. EverWind's CEO served as a panelist on the discussion of the local shift to green energy. |

| Community / Stakeholder Organization | Representative(s) or Main Contact | Engagement Activities |
|---|---|---|
| address business related issues and opportunities through a united voice. We value the opinions and diversity of our business community and encourage participation, inclusion, and collaboration" (Straight Area Chamber of Commerce, u.d.). | | In September 2022, EverWind's CEO hosted an information session specifically for members of the Chamber of Commerce and other community leaders. Approximately 25 people attended.<br><br>The Strait Area Chamber of Commerce has a representative on the CLC.<br><br>This organization is also represented on the Strait of Canso Offshore Wind Task Force. |
| **Eastern District Planning Commission**<br><br>"The Eastern District Planning Commission provides planning, subdivision and building inspection services in eastern Nova Scotia for the County of Antigonish, Inverness, Richmond, and Victoria and the Towns of Port Hawkesbury and Antigonish" (EDPC, 2015). | • John Bain, Director | April 30, 2022 – EverWind's CEO had introductory meeting with John Bain, Director.<br><br>Eastern District Planning Commission has a representative on the CLC |
| **Strait of Canso Offshore Wind Task Force**<br><br>The Strait of Canso Offshore Wind Task Force was established to inform community and business leaders in the region about opportunities in Wind Energy development. | • Kevin MacEachern | EverWind is represented on the Offshore Wind Taskforce which meets once monthly, and proactively shares information on a weekly basis.<br><br>The Offshore Wind Taskforce has a representative on the CLC. |
| **Nova Scotia Business Incorporated**<br><br>The mandate of NSBI is "to work with Nova Scotia businesses across the province to grow through export by providing business advisory services, skill development and training, market intelligence, financing, and support in accessing global markets… focus on helping Nova Scotia businesses grow and create new, high-value jobs and on attracting innovative, globally competitive companies to establish a business location in Nova Scotia." (Nova Scotia Business Inc., 2022) | • Laurel Broten, President and CEO<br>• Wanda MacLean, Strait Area representative<br>• Virginia Bonn, Manager Business Development & Industrial properties | The Proponent had an introductory meeting with NSBI on March 1, 2022. No formal agenda.<br><br>The Proponent has continued to actively engage with representatives of NSBI regarding short- and long-term matters to support the production of Green Hydrogen and Ammonia at the Point Tupper Facility. |

| Community / Stakeholder Organization | Representative(s) or Main Contact | Engagement Activities |
|---|---|---|
| **Strait of Canso Superport Corporation**<br><br>"The Strait Superport strives to globally promote the benefits of the Strait of Canso as the port of choice for moving product to and from North American markets. We continue to pursue new ways to expand our business and infrastructure that will in turn sustain our local marine industry and nearby communities."<br>(Strait Superport, u.d.) | • Tim Gilfoy, CEO | In August 2022, EverWind's CEO presented at the annual SuperPort Days Conference which included registration from community and business leaders throughout the region, as well as government representatives and industry associations. |
| **Cape Breton Regional Chamber of Commerce (CBRCC)**<br><br>The CBRCC is a private-sector-led, not-for-profit, non-partisan organization. With a membership of 350, it is the second largest Chamber in the province. (Cape Breton Regional Chamber of Commerce, 2022). | • Jenna Lahey, CEO | EverWind held an introductory meeting with the CBRCC on March 11, 2022. Opportunities for Nova Scotia residents and business were discussed.<br><br>EverWind expects to attract people throughout Cape Breton for job opportunities associated with the Project's construction and operations activities.<br><br>EverWind is also committed to supporting local businesses and contributing to the expansion of the regional supply chain. |
| **Landrie Lake Water Utility Board**<br><br>The Landrie Lake Water Utility Board is responsible for the administration of the industrial water supply for the Point Tupper Heavy Industrial area. | **Board Members**<br>• Councillor S. Samson, Richmond<br>• Councillor Diggdon, Richmond<br>• Councillor Mark MacIver (Chair) Port Hawkesbury<br>• Councillor Hughie MacDougall, Port Hawkesbury<br>• Troy MacCulloch, Chief Administrative Officer (CAO) Richmond<br>• Terry Doyle, CAO, Port Hawkesbury | EverWind and the LLWU Board signed a MOU on September 9, 2022, to negotiate the terms of industrial water use for the Project. |

| Community / Stakeholder Organization | Representative(s) or Main Contact | Engagement Activities |
|---|---|---|
| **NetZero Atlantic**<br><br>Mission: "To lead applied research and contribute to projects that enable the transition of Atlantic Canada's energy system to a carbon-neutral future through collaboration with academia, governments, private sector, Indigenous Peoples and other non-government organizations." (Net Zero Atlantic, 2022) | • Alisdair McLean, ED | On August 23, NetZero Atlantic, in partnership with the German Embassy in Canada, hosted the Canada-Germany Hydrogen event in Stephenville, NL, where the Prime Minister of Canada and the Chancellor of Germany signed a Declaration of Intent to establish a Canada-Germany Hydrogen Alliance.<br><br>EverWind was well represented by the CEO and Project team and was joined by Indigenous Equity Partners from Membertou and Bayside Development Corporation. |
| **Marine Renewables Canada**<br><br>"Marine Renewables Canada is the national association for tidal, offshore wind, wave and river current energy, representing a membership of technology and project developers, suppliers, utilities, Indigenous organizations, researchers, and communities." (Marine Renewables Canada, 2022) | • Elisa Oberman, ED | Initial meeting May 27, 2022.<br><br>On September 30, 2022, EverWind's CEO presented at a session hosted by Marine Renewables Canada and the Government of Nova Scotia in Hamburg Germany. |
| **COVE (Centre for Ocean Ventures & Entrepreneurship)**<br><br>"COVE is an expanding community of ocean tech companies and private and public partners working together to create the solutions and sustainable growth that propel Canada's ocean economy." (CWOIL, 2022) | • Jim Hanlon, CEO<br>• Dr. Sherry Scully, ED, COVE Workforce Initiative | Meeting held May 5, 2022 at COVE in partnership with Ulnooweg (see details above in section regarding engagement with Ulnooweg) – no formal agenda |

### 11.2.2 Public Engagement

To provide the public with opportunities to review and discuss the Project as well as engage with the Project team and its consultants, several Open House events were organized within local communities.

#### *11.2.2.1 Public Open House Events*

Four public Open Houses took place prior to EA Registration. Proponent representatives and Strum Consulting representatives were present at all events to provide information on the Project and answer any questions or concerns brought forward by community members. All events featured posters sharing information on the Project, which included information on anticipated benefits to the area, details on the EA process, an overview of Project's ammonia/hydrogen production process, and preliminary EA findings.

Open House #1 took place on September 6, 2022 from 4-7 pm in the Hawkesbury Room of the Maritime Inn Port Hawkesbury. This event was advertised on 101.5 "The Hawk" radio station as well as on the radio station's Facebook page.

Open House #2 was held on September 22, 2022 from 5-8 pm in the Shannon Studio Room of the Port Hawkesbury Civic Centre. This event was advertised on the 101.5 "The Hawk" radio station and an ad for the event was also run in the Port Hawkesbury Reporter.

Open House #3 was held on November 1, 2022 from 2-4 pm in St. Peter's United Church Hall in Richmond County. This event was advertised on the 101.5 "The Hawk" radio station and in the St. Peter's United Church bulletin.

Open House #4 was also held on November 1, 2022 from 6-8 pm in the Isle Madame New Horizons Senior Citizens Club in Arichat within Richmond County. This event was advertised on the 101.5 "The Hawk" radio station.

Over 50 people attended the first open house (Figure 20), over 25 attended the second event (Figure 21), nearly 20 attended the third (Figure 22), and nearly 15 attended the fourth (Figure 23).

Open House attendees had the opportunity to speak one-on-one with Project team members regarding any questions or concerns they had about the Project, and were also provided with an opportunity to supply written feedback through the use of an exit survey. Attendees were also encouraged to supply their contact information to receive future updates on the Project and its progress. The results of the comments and feedback received from completed Open House exit surveys can be found in Section 11.3.

**Figure 20: Open House #1 held in the Maritime Inn Port Hawkesbury, September 6, 2022**

**Figure 21: Open House #2 held in the Shannon Studio Room of the Port Hawkesbury Civic Centre, September 22, 2022**

**Figure 22: Open House #3 held in St. Peter's United Church Hall, November 1, 2022**


**Figure 23: Open House #4 held in Isle Madame New Horizons Senior Citizens Club, Arichat, November 1, 2022**

#### *11.2.2.2 Review of Public Concerns*

Issues and concerns raised by the public (as a result of the feedback received from Open House exit surveys) can be grouped into broader categories which have been assessed throughout the EA (Table 11.5). Responses to the concerns and reference to the relevant EA section which provides additional details has been provided as part of Table 11.5, below; copies of the original feedback received is supplied in Appendix P.

**Table 11.5: Comments Received from the Public**

| Comment Received | Proponent Response | Applicable EA Section |
|---|---|---|
| **General Comments** | | |
| What is the project timeline? | EA Registration: Fall 2022<br>Site Preparation/Construction Phase: Spring 2023<br>Commissioning: Fall 2023<br>Operations/Maintenance Fall 2025<br>Decommissioning: Fall 2065 | 4.4 Project Schedule |
| Comments were received requesting information on economic and environmental, impacts, as well as mitigative and protective measures. | Economic details can be found under the Socioeconomic section.<br><br>Environmental impacts can be found under Physical and Biophysical sections.<br><br>Mitigative and Protective measures for all VCs associated with the Project can be found under the Environmental Effects Assessment. | 8.0 Socioeconomic<br><br>6.0 Physical Environment<br><br>7.0 Biophysical Environment<br><br>13.0 Environmental Effects Assessment |
| What are the Marine Impacts? | No impacts to the marine environment are anticipated as part of this Project. The Project will utilize infrastructure associated with the existing Point Tupper Terminal. | N/A |
| **Comments Related to Project Components** | | |
| Is the jetty and loading area being upgraded? | Liquid ammonia forwarding pumps will be required to transport the liquid ammonia through a loadout pipeline to the jetty.<br><br>Loading arms, specific to ammonia loadout, will be installed within the existing jetty pipe rack. | 5.8 Jetty Operations |

| Comment Received | Proponent Response | Applicable EA Section |
|---|---|---|
| | A vapour return line from the loadout point will also be required and must be sized appropriately to maintain pressure equalization between the storage tanks and the transport vessel's cargo tanks. | |
| Will the infrastructure ever need to be fully replaced and will that compromise the land it's built on? | The Project life is anticipated to exceed 40 years. Prior to Project decommissioning, regulatory requirements will be reviewed and implemented accordingly, and a decommissioning plan will be developed. | 4.3.4 Decommissioning |
| **Comments Related to the Project's Energy Source** | | |
| What renewable energy will be used? | The power requirements for the Project will be supplied by NS Power via renewable, low impact sources generated from wind, wave, tide, run-of-the-river hydraulic, solar and landfill gas sources.<br><br>The Proponent will enter into a commercial agreement with NS Power, such that the electricity supplied to the Project will be verified/certified to be originating from renewable energy sources. | 1.3 Purpose and Need for the Project |
| **Comments Related to the Project Inputs/Outputs** | | |
| What is the source of water? | The Project is expected to require an approximate daily average of 8.3 mega litres per day (ML/day) raw freshwater.<br><br>The Proponent has engaged the LLWU and has an operating agreement in place to purchase the raw freshwater from Landrie Lake, utilizing the existing freshwater pumping station. | 5.2.1 Raw Freshwater Intake |
| What are by-products, contaminants, disposal? | A summary of the Project's process inputs and outputs are supplied in Section 5.10 in Tables 5.10 and 5.11. | 5.10 Process Inputs & Outputs |
| What is the lye used for / how much and what is the source? | Early in the Project's development the Proponent was considering the use of | 1.4.4.1 Hydrogen Production Technology |

| Comment Received | Proponent Response | Applicable EA Section |
|---|---|---|
| | hydrogen technology which relied on an atmospheric alkaline electrolysis process; this technology utilized lye as part of its production process.<br><br>The Project has since moved towards the use of proton exchange membrane (PEM) technology and, as such, lye will no longer be required as part of the process. | 5.3.3 PEM Modules |

## 11.3 Engagement with the Mi'kmaq of Nova Scotia

Since acquiring the existing Point Tupper Terminal, EverWind has been actively engaging with Mi'kmaq communities and organizations to solicit feedback and guidance with respect to embracing traditional knowledge and "two-eyed" seeing.

Prior to the announcement of the Point Tupper Terminal acquisition by the Proponent in February 2022, opportunities for engagement were extended to all 13 Mi'kmaq bands and the Kwilmu'kw Maw-klusuaqn Negotiation Office (KMKNO) with offers for calls and video conferences (due to COVID restrictions). Calls with six communities were held ahead of any public announcement regarding the purchase.

EverWind acknowledges the ancestral and unceded territory of the Mi'kmaq people, and recognizes them as the past, present, and future caretakers of Mi'kma'ki. The Project team is committed to working with the Mi'kmaq of Nova Scotia in a way that respects their cultural practices and ensures opportunities for social and economic benefits. EverWind is committed to fulling all requirements set out in *the Proponent's Guide: The Role of Proponents in Crown Consultation with the Mi'kmaq of Nova Scotia* (Office of L'nu Affairs, 2012).

EverWind is committed to transparency throughout the Project's development and intends to communicate openly and supply timely, accurate, and clear information regarding the Project's progress. Any concerns brought forward will be documented, considered, and addressed throughout the Project's planning process. EverWind will seek insight and opportunities for a collaborative approach to addressing issues wherever possible.

Engagement is an important opportunity to consider different perspectives, interests, understandings, concerns and cultural values. Engagement efforts will be carried out in good faith and in the spirit of mutual trust and reconciliation. The Proponent recognizes its responsibility toward the advancement of Reconciliation, in particular Call to Action #92 of the *Truth & Reconciliation Commission of Canada: Calls to Action,* which focuses on Business and Reconciliation (Truth & Reconciliation Commission of Canada, 2012).

A summary of the engagement activities to date completed by EverWind with the Mi'kmaq of Nova Scotia is supplied in Table 11.6 below. Please note that early engagement efforts focused on Mi'kmaq communities on and near Cape Breton Island (Unama'ki) due to proximity to the Project (Drawing 33).

**Table 11.6: Engagement with the Mi'kmaq of Nova Scotia**

| First Nation Community & Representatives | Contact & Engagement |
|---|---|
| **Potlotek First Nation**<br><br>• Chief Wilbert Marshall<br>CEO Crystal | Initial meeting held Feb 10, 2022 with Chief & CEO – no formal agenda<br>Follow up email sent May 1, 2022.<br>EverWind CEO meeting with Chief & Council September 2022 – no formal agenda<br>Meeting with EverWind VP Corporate Affairs & Potlotek CEO September 22, 2022 – no formal agenda<br>Ongoing phone calls & email exchanges between EverWind CEO & Chief<br>Open House (#5) Community Information Session was held on November 10, 2022. |
| **Paqtnkek Mi'kmaw Nation**<br><br>• The late Chief Tma Francis & Council<br>• Chief Cory Julian<br>• Rose Paul, CEO Bayside Development Corporation<br>• Darryl McDonald, Director of Administration | Feb 14, 2022: Initial meeting with Chief & Council to introduce the Proponent and provide a project overview.<br><br>May 1, 2022: EverWind's CEO sends Chief Tma Francis and Darryl McDonald an update email.<br><br>May 5, 2022: Rose Paul, and AJ Bird, Council Member, participated in meeting at COVE organized by Ulnooweg<br><br>June 13, 2022: Meeting in Paqtnkek with Chief & Council<br><br>June 27, 2022: EverWind representatives participated in the Paqtnkek Trades Fair<br><br>August 10, 2022: Meeting with Rose Paul – no formal agenda<br><br>Sept 9, 2022: Bayside Projects Roundtable Info Session<br><br>August 23, 2022: In an act of partnership, a MOU was signed between the Proponent and Paqtnkek's Bayside Development Corporation.<br><br>August 24, 2022: Rose Paul and Darryl McDonald joined the EverWind team at an event in Stephenville, NL. Prime Minister Trudeau and Chancellor Scholz also met with Premier Andrew Furey of Newfoundland and Labrador, Premier Blaine Higgs of New Brunswick, Premier Tim Houston of Nova Scotia, and Premier Dennis King of Prince Edward Island. Together, they discussed energy exports and the development of renewable energy in Atlantic Canada, and the |

| First Nation Community & Representatives | Contact & Engagement |
|---|---|
| | region's transition toward net-zero. The Premiers also signed a statement in support of the proposed Canada-Germany Hydrogen Alliance.<br><br>September 27-30, 2022: CEO of Bayside Development Corporation, Rose Paul, travelled with the EverWind team to participate in the H2 Expo and Wind Energy Conference and related meetings in Hamburg Germany. |
| **Membertou First Nation**<br><br>• Chief Terry Paul & CEO Membertou<br>• Jennifer Deleskie VP Business Development & Public Affairs | Initial meeting held on February 23, 2022, no formal agenda<br><br>Since February 2022, EverWind and Membertou have developed a respectful and mutually beneficial relationship.<br><br>On August 23, 2022, in an act of partnership, a MOU was signed between the Proponent and Membertou Development.<br><br>August 24, 2022, Chief Terry Paul and Jennifer Deleskie joined the EverWind team at an event in Stephenville, NL.<br><br>September 27-30, 2022 Jennifer Deleskie travelled with the EverWind team to participate in the H2 Expo and Wind Energy Conference and related meetings in Hamburg Germany.<br><br>Note: EverWind recognizes that Membertou First Nation is not represented by KMKNO for the purposes of engagement and consultation and will direct conversations on related matters directly to the Chief and Council. |
| **Polotek First Nation**<br><br>• Chief Wilbert Marshall<br>• Crystal Nicholas, CEO Polotek Development Corporation | The Proponent held an Open House community information session on November 10, 2022.<br><br>On November 14, 2022, an MOU was signed after receiving unanimous support from the Band Council. |
| **Millbrook First Nation**<br><br>• Chief Robert Gloade<br>James Stevens, Director of Commercial Operations | James Stevens, Director of Commercial Operations, was invited to a meeting organized by Ulnooweg on May 5, 2022 but was unable to attend.<br><br>Note: EverWind recognizes that Millbrook First Nation is not represented by KMKNO for the purposes of engagement and consultation and will pursue direct conversations on related matters. |

| First Nation Community & Representatives | Contact & Engagement |
|---|---|
| **Sipekne'katik First Nation**<br><br>• Chief Mike Sack<br>• Brian Dorey, Director of Operations<br>Sosep Hatfield, Economic Development Officer | May 5, 2022: Brian Dorey, Director of Operations and Sosep Hatfield, Economic Development Officer attended Ulnooweg event at COVE. |

In addition to the above, EverWind has also engaged with Indigenous-led companies and events through the following activities:

- Indigenous Treaty Partners was engaged to undertake cultural training for the EverWind management team and staff; contributions to fund training for various Nova Scotia not-for-profits has also been provided.
- President and CEO of Indigevisor Advisory and Consulting was engaged to provide the Project team with cultural competence training and guidance for building relationships with Indigenous communities.
- Working closely with 3D Wave – an Indigenous owned firm supplying 3D LIDAR-based flyover modelling – and supporting their climate modelling initiatives through funding.
- Collaborating with Ulnooweg on development of educational materials on green hydrogen, the Hydrogen Fuel cell marine pilot project, and funding for the Ulnooweg Summer Solstice Run and 11th Indigenous Entrepreneur Awards Show.

### 11.3.1 Open House Event

An Open House event (Open House #5) was held in the Polotek First Nation community on November 10, 2022. Proponent representatives and Strum Consulting representatives were present at the event to provide information on the Project and answer any questions or concerns brought forward by Polotek community members. The event featured posters sharing information on the Project, including anticipated benefits to the community, details on the EA process, preliminary findings, and an overview of the Project's ammonia/hydrogen production process.

The event was advertised on Polotek's social media and over 15 community members attended.


**Figure 24: Open House #5 held in Polotek First Nation Community Hall, November 10, 2022**


**Figure 25: Feedback being collected at Open House #5 held in Polotek First Nation Community Hall, November 10, 2022**

### 11.3.2 Review of Concerns

As with the other Open House events held by the Proponent, community members were encouraged to supply their contact information to receive future Project updates. Exit surveys were made available, but no feedback was collected from this approach. Instead, Project team members captured feedback received verbally (Figure x). A summary of the verbal comments received from attendees is provided below:

- Community members indicated their interest in receiving a tour of the Project facility, once built.
- The presentation provided was 'great'.
- Community members are looking for economic development and job opportunities in association with the Project.
- One attendee indicated that they would like to see the Project use less energy and be more green.
- One attendee indicated that they saw the post on Facebook (advertising the Open House event) and chose to attend to show their support for the Project.

### 11.3.3 Memorandums of Understanding

As described in the above Table (11.6), in August 2022, MOUs were entered into with Paqtnkek and Membertou First Nations, which included equity participation in the Project. In November 2022, an MOU was also entered into with Potlokek First Nation.

A meeting is being scheduled, with the assistance of Paqtnkek, Membertou and Potlokek First Nations, to discuss a broader benefits package with all the 13 Mi'kmaq bands in Nova Scotia.

## 11.4 Digital Communications

The EverWind Fuels Company Website launched on April 30, 2022 (https://www.everwindfuels.com). It includes information about the Project and Proponent, is publicly accessible, and updated regularly.

Upon receipt of EA Approval, the Proponent intends to create a community email list (using information collected from the Open House events) to supply Project updates to interested stakeholders and community members, as well as provide information on upcoming Project employment opportunities.

## 11.5 Community Liaison Committee

As part of EverWind's ongoing commitment to community engagement and open dialogue, a CLC is being established.

The CLC is an advisory group that will:

- Represent community interests by providing an opportunity for a mutual exchange of

information between EverWind and the community.
- Provide a forum where CLC members can bring any issues of public concern to the attention of EverWind, including any impacts or perceived impacts on the environment.
- Keep constituent organizations abreast of project plans, progress, and activities.
- Convey community perspectives and information to Project representatives.
- Provide recommendations on how to prioritize, enhance, and communicate the Project's socioeconomic benefits.

The CLC will bring together community members, economic development groups, local government representatives, and other key stakeholders to provide advice and guidance on community impacts and opportunities for the development of the Project. CLC members will be instrumental in assisting EverWind in identifying community interests, questions, and concerns as the Project progresses.

The CLC's "Terms of Reference" can be found in in Appendix P.

**Table 11.6: Community Liaison Committee Member Representation**

| Represented Group | Committee Member |
|---|---|
| Municipality of Richmond | County Warden representative |
| Town of Port Hawkesbury | Mayor |
| Potlotek First Nation | CEO |
| Nova Scotia Community College | Academic Chair |
| High School Education Representative | Richmond Education Centre/Academy representative |
| Accessibility Representative | TBD |
| Strait Area Chamber of Commerce | Treasurer |
| Eastern District Planning Commission | Director of Planning |
| Cape Breton Partnership | Director of Communications |
| Offshore Wind Task Force | TBD |
| Richmond County Inshore Fisherman's Association | Director; VP |
| Supplier Representative | TBD |
| EverWind Fuels Representatives | VP Corporate Affairs;<br>VP Project Deployment;<br>Chief Commercial Officer |

The CLC will also be instrumental in supporting EverWind with the development of Community Benefits Agreements. Potential benefits may include, but are not limited to:

- Targeted measures for local recruitment and employment at both at the construction and operational stages of the Project by collaborating to assess local labour market training and employment opportunities.

- Working with contractors and suppliers to identify opportunities to hire locally and support business activities in the Municipality, including procurement and service opportunities with the Project.
- Contribution of annual grants for community groups, organizations, and community projects within the region.
- Establishment of bursaries for local high school students.
- Development of co-op work term opportunities for students and apprenticeship placements.

These considerations will be reviewed as part of the CLC. Other community benefit programs or agreements will also be considered as part of the committee's undertakings.

### 11.6 Ongoing Engagement

Engagement activities are ongoing. The Project team will continue to review and address any concerns raised by government representatives, stakeholders, members of the public and the Mi'kmaq of Nova Scotia throughout the duration of the Project.

## 12.0 ENVIRONMENTAL EFFECTS ASSESSMENT METHODOLOGY

This EA Report focuses on specific components of the physical, biophysical, and human environments referred to as Valued Components (VCs) which are considered of importance and, if altered by the Project, may be of concern to regulatory agencies, Indigenous peoples, resource managers, scientists, and/or the general public.

Throughout the EA Report, interactions between an identified VC and the Project's activities are evaluated to determine the nature of the effect and its significance. To undertake this evaluation, the following steps are applied:

1. A description of the existing physical, biophysical, and human environments in, and within proximity to the Project, are described (Sections 6 to 9).
2. Interactions between the Project's activities and the existing physical, biophysical, and human environments are identified (Section 13).
3. Effects that could occur from the interaction are evaluated and assessed within established spatial and temporal boundaries (Section 13).
4. Where (adverse) Project effects are identified, mitigative and protective measures are applied (Section 13).
5. The efficacy of the applied mitigations and protections are reviewed, and a characterization of the significance of any residual (post-mitigation) effects are determined (Section 13).
6. For VCs with any residual effects remaining post-mitigation, follow-up and/or monitoring programs are established (Section 13).

The determination of the significance of a Project's interaction is based on post-mitigation (residual) effects, rather than unmitigated potential effects. The intent of this section is to provide a strategy to evaluate the Project's effect on the surrounding environment and assess the significance of any residual effects that may remain, after planned mitigations and protective measures have been applied.

## 12.1 Selection of Valued Components

VCs were selected based on regulatory and legislative requirements, as well as the results of desktop reviews, field studies, stakeholder engagement activities, and the professional judgment and experience of Strum (Table 12.1).

**Table 12.1: Valued Components Assessed within this EA Report**

| VC | Components Considered | EA Report Section |
|---|---|---|
| **Physical Environment** | | |
| Atmospheric | Weather & Climate | Section 6 |
| | Air Quality | Section 6 |
| Acoustic Environment | Sound | Section 6 |
| Climate Change | Temperature & Precipitation | Section 6 |
| | Sea Ice | Section 6 |
| | Snow | Section 6 |
| Geophysical | Topography | Section 6 |
| | Surficial | Section 6 |
| | Bedrock | Section 6 |
| | Groundwater | Section 6 |
| **Biophysical Environment** | | |
| Freshwater Aquatic | Watersheds | Section 7 |
| | Waterbodies | Section 7 |
| | Watercourses | Section 7 |
| | Fish & Fish Habitat | Section 7 |
| | Wetlands | Section 7 |
| Terrestrial | Habitat | Section 7 |
| | Flora | Section 7 |
| | Fauna | Section 7 |
| | Bats | Section 7 |
| | Avifauna | Section 7 |
| **Human Environment** | | |
| Socioeconomic | Local Demographics | Section 8 |
| | Economy | Section 8 |
| | Land Use and Value | Section 8 |
| | Recreation and Tourism | Section 8 |
| | Transportation | Section 8 |
| Archaeological, Cultural & Heritage Resources | | Section 9 |
| Other Considerations | Human Health | Section 10 |
| | Other Undertakings | Section 10 |
| Accidents, Malfunctions, and Unplanned Events | | Section 17 |

## 12.2 Baseline Conditions & Potential Project-VC Interactions

For each VC, an overview of the baseline conditions is described, as per the EA Report section identified in Table 12.1. For the Project to have an effect on a given VC, the Project component or activity must directly interact with the physical, biophysical, or human environment associated with that VC.

The potential interactions between the Project and each VC are discussed and evaluated in detail by Project phase, within Section 13; with the exception of accidents, malfunctions, and unplanned events which is reviewed within Section 17. Where there is potential for Project-related environmental effects, each effect is assessed using the results of desktop and field investigations, guidance from regulators, and the collective knowledge and expertise of the Project team and its consultants.

At the conclusion of each VC interaction assessment, a summary table of the findings specific to the VC and the potential Project interactions is provided.

## 12.3 Potential Interactions & Effects Assessment

The potential interactions and effects (pre-mitigation) are determined using defined criteria. Most criteria will be the same for all VCs (Table 12.2); however, the magnitude criteria will be VC-specific and provided in each individual VC-section.

Where VC criteria (other than magnitude) differ from that supplied in Table 12.2, further clarification will be supplied in the relevant VC section.

**Table 12.2: Criteria for Identification and Definition of Effects**

| Rating Criteria | Rating |
|---|---|
| **Geographic Extent**<br>The geographic area in which an effect occurs | **Project boundary –** effects are restricted to the Project Boundary<br>**Local assessment area (LAA)–** effects extend into the Property Boundary (i.e., PID) within which the applicable Project component is located.<br>**Regional assessment area (RAA)–** effects extend into the Study Area and may interact with other projects found in the area.<br><br>**Some VCs may not be defined by these categories; where this is the case, additional details and an alternate Geographic Extent definition is supplied in the respective VC section.* |
| **Timing**<br>Considers when the residual effect is expected to occur | **Not applicable –** seasonal aspects are unlikely to affect the VC<br>**Applicable –** seasonal aspects are likely to affect the VC |

| Rating Criteria | Rating |
|---|---|
| **Duration**<br>The time required until the measurable parameter or VC returns to its pre-existing condition, or the effect can no longer be measured or otherwise perceived | **Short-term –** effect restricted to no more than the duration of the construction phase<br>**Medium-term –** effect extends through the construction, operations, and maintenance phases<br>**Long-term –** effect extends beyond the operations and maintenance phase |
| **Frequency**<br>Identifies how often the effect occurs and how often in a specific phase | **Single event –** occurs once during any phase of the Project<br>**Intermittent –** occurs occasionally or intermittently during one or more phases of the Project<br>**Continuous –** occurs continuously during one or more phases of the Project |
| **Reversibility**<br>Describes whether a measurable parameter or the VC can return to its pre-existing condition after the activity ceases | **Reversible –** the effect is likely to return its pre-existing condition after the activity is completed<br>**Irreversible –** the effect is unlikely to return to its pre-existing condition after the activity is completed |
| **Magnitude**<br>The amount of change in measurable parameters or the VC, relative to existing conditions | VC-specific, as outlined in Section 13. |

## 12.4 Mitigative & Protective Measures

Where an adverse effect on a VC is identified, strategies for mitigation, protection, avoidance, or compensation are proposed. Where possible, mitigation measures will be incorporated into Project design to eliminate or reduce potential adverse effects.

## 12.5 Residual Effects Analysis

The significance of effects remaining, post-mitigation, are determined using the criteria defined below. If, based on the criteria in Table 12.2 (above) and following the application of mitigative and protective measures, a residual effect is identified, the significance of the residual effect is then evaluated against the criteria outlined in Table 12.3 (below).

**Table 12.3: Definition of Significant Residual Environmental Effect**

| Significance Level | Definition |
|---|---|
| Significant | The potential residual effect could threaten sustainability of a resource or result in a change in baseline levels within the Project Boundary, Local or Regional Assessment Area. The effect is anticipated to last for a medium to long-term duration and will occur on a continuous basis. Research, monitoring, and/or recovery initiatives should be considered and may be required. |
| Not Significant | The potential residual effect may result in a change in a resource or condition within the Project Boundary, Local, or Regional Assessment Area but should return to baseline levels within the short-term and occur only once or on an intermittent basis. Research, monitoring, and/or recovery initiatives are not recommended. |

## 12.6 Recommended Monitoring and Follow-up

Follow-up research, monitoring and/or recovery initiatives, in some cases developed in conjunction with regulators, may be recommended to verify predictions and/or assess effectiveness of mitigation measures and the need to implement adaptive management. Follow-up programs and monitoring are presented, as necessary, at the end of each individual VC discussion in Section 13.

# 13.0 ENVIRONMENTAL EFFECTS ASSESSMENT

## 13.1 Ambient Air

### 13.1.1 Overview

Baseline ambient air quality data was captured from the Port Hawkesbury air quality monitoring station and the existing Point Tupper Terminal NPRI data (Section 6.1). From this ambient air quality baseline, anticipated Project-related impacts were assessed to determine the potential effects that the Project may have.

The ambient air VC considers the potential effects Project activities may have on ambient air quality during construction and operations; Project-related process emissions, fugitive dust, and exhaust emissions are considered.

The Industrial Facility is situated within an existing industrial area, where heavy equipment, vehicular traffic, and other industrial activities are present. As a result, baseline ambient air quality varies and depends on anthropogenic activities in the vicinity. Existing sources of air emissions within the general Project area include concrete production, steel fabrication, the existing Point Tupper Terminal petroleum product shipment, Port Hawkesbury Paper pulp and paper mill, Strait of Canso Superport vessel activities, Cabot gypsum plant, and the NS Power coal-fired Point Tupper Generating Station (Drawing 31).

The Transmission Interconnection Line corridor crosses through various natural and industrial areas between the Industrial Facility and the end point of the corridor at the northern switching station. Existing ambient air quality associated with the Transmission Interconnection Line is generally represented by the natural environment; however, it may be impacted by anthropogenic sources in areas where the Transmissions Interconnection Line is in proximity to industrial areas.

The closest receptors to the Project Boundary are identified in Drawings 32 and 35.

### 13.1.2 Boundaries and Assessment Criteria

#### *13.1.2.1 Spatial Boundary*

The spatial boundary for ambient air impacts includes a 5 km radius from the Industrial Facility.

#### *13.1.2.2 Temporal Boundary*

The temporal boundary includes short-term construction and medium-term (Project lifespan) operational activities.

#### *13.1.2.3 Applicable Regulations*

The following legislation and policies are applicable regarding potential impacts on the ambient air environment as a result of Project activities:

- *Environment Act*, S.N.S. 1994-95, c.1
- Air Quality Regulations, N.S. Reg. 8/2020
- *Environmental Protection Act*, R.S.O. 1990, c. E. 19
- Air Pollution – Local Air Quality Regulation, O. Reg. 419/05

Note that the Air Quality Regulations, N.S. Reg. 8/2020 do not provide guidance limits for ammonia; therefore, ammonia limits have been referenced from *Ontario's Air Pollution – Local Air Quality Regulation,* O. Reg. 419/05.

#### *13.1.2.4 Assessment Criteria*

As per Section 12.3, where there is potential for Project-related effects, the significance of the effect is determined using defined criteria. To assess the ambient air environment, all criteria for identification and definition of an adverse effect, as presented in Table 12.2, will apply. In addition, the VC-specific definition for magnitude is as follows:

*Magnitude*

- Negligible – no changes are expected to ambient air quality; air emissions are non-detect at the nearest identified receptor.
- Low – minimal changes are expected to ambient air quality; air emissions are detectable, but do not exceed the regulatory threshold at the nearest identified receptor.
- Medium – some changes are expected to ambient air quality; air emissions are detectable, and one of the parameters exceeds the threshold at the nearest identified receptor.
- High – widespread changes are expected to ambient air quality; air emissions are detectable, and more than one parameter exceeds the regulatory threshold at the nearest identified receptor.

### 13.1.3 Assessment Methodology

This section discusses the methods used to assess and/or determine the impacts on ambient air from Project-related process emissions, fugitive dust, and exhaust emissions.

The objectives of this analysis aim to achieve the following:

- Qualitatively assess fugitive dust and exhaust emissions produced by Project activities
- Use the preliminary process emission estimates to evaluate the potential impacts from the Project's two flare sources.
- Compare estimated ground level concentrations to the relevant ambient air quality standards.
- Mitigate and minimize ambient air quality impacts on surrounding receptors.

Additional details on the methodologies used to assess fugitive dust/exhaust emissions and the process-related emissions are described below.

#### *13.1.3.1 Fugitive Dust/Exhaust*

A literature review of similar projects and environments was completed to understand Project-related impacts on air quality from fugitive dust and exhaust emissions. Through the qualitative review, the potential Project activities contributing to fugitive dust and exhaust emissions, as well as the contaminants of concern, were identified.

#### *13.1.3.2 Process Emissions Modelling*

To understand Project-related impacts on air quality from the process emissions, an air quality screening was completed by Ramboll Canada Inc. (Ramboll) in 2022 which was developed from a Preliminary Flare Load and Emissions Estimate evaluation report prepared by Hatch (2022d).

The air quality screening was performed using screening software developed by the United States Environmental Protection Agency (US EPA), known as SCREEN3. The model can predict short-term concentrations (1-hr average) downwind from a single source for various wind speeds and stability classes. Many United States and Canadian jurisdictions have approved this software for regulatory modelling.

The methodology employed to model the estimated impacts included the following:

- The process and storage flare emissions sources were modelled individually.
- The individual modelled impacts were superimposed to estimate long-term averaging periods (i.e., 8-hour, 24-hour, annual).
- The flare stack height and flare heat load were input into the software.
- Separate runs were performed for each operating mode (intermittent and continuous) to account for variability in emission rates and dispersion characteristics.
- The complete list of SCREEN3 input parameters is provided in Appendix Q.
- Stack building downwash was considered for the process flare, as the hydrogen

plant building was within its zone of influence[5].
- Stack building downwash was not considered for the storage flare, as no structures were within its zone of influence[1].
- The flares were modelled for all applicable terrain scenarios (complex, simple elevated, flat).
- The flare concentrations were modelled from the closest distance of the source to the Property Boundary (LAA) and up to 5 km from the source (RAA). Refer to Drawing 36 for details.
- The concentrations at all distances were modelled at ground level (0 m flagpole).
- Meteorological data with a range of stability classes and wind speeds were used for the modelling.

The assumptions made for the screening model were as follows:

- The intermittent releases from both flares co-occur (same day and hour).
- The $NO_x$ emissions are modelled as $NO_2$ ($NO_2/NO_x$ in-stack ratio expected to be significantly lower than 1).
- The process and storage flare heights are 21.3 m (70 ft) and 9.1 m (30 ft), respectively.
- The flare heat loads are set to be equal to the flare input loads for the intermittent releases, as estimated by Hatch.
- The hydrogen plant dimensions used in the model were 25.2 m in height, with an area of 223 m by 246 m.
- The fumigation phenomenon was not used as it is only recommended for stacks taller than 50 m.

#### *13.1.3.3 Ozone Screening*

Ozone is a secondary pollutant formed by Nonmethane Organic Volatile Compounds (NMOC) and $NO_x$ precursors. As a result, ozone concentrations could not be modelled using SCREEN3 or with more complex regulatory models (e.g., AERMOD). Instead, ozone concentrations generated from Project activities were estimated using the USEPA VOC/NOx Point Source Screening Tables (US EPA, 1988), which estimates the increase in ozone concentration above an ambient background value as a function of short- and long-term NMOC and NOx emissions and their ratios.

### 13.1.4 Potential Interactions & Effects Assessment

Project activities have the potential to cause an adverse effect on the ambient air environment during the following construction and operations activities (Table 13.1).

[5]A building or structure influence zone represents wind direction-specific distance from the building within which building wake effects are assumed to occur and is estimated as a function of the building dimensions and projections relative to an incoming wind front.

**Table 13.1: Project Phases and Potential for Interaction with the Ambient Air Environment**

| Project Phase | Project Component | |
|---|---|---|
| | Industrial Facility | Transmission Interconnection Line |
| **Construction** | | |
| Site Preparation & Construction | X | X |
| Installation and Assembly of Site Infrastructure | O | O |
| Removal of Temporary Works & Site Restoration | X | X |
| Commissioning | X | O |
| **Operations** | | |
| Delivery of Power | --- | O |
| Production of Hydrogen | O | --- |
| Production of Ammonia | X | --- |
| Ship Loading for Transport | X | --- |

X: indicates potential interaction with the ambient air environment
O: indicates that an interaction with the ambient air environment is not anticipated
--- indicates that the phase is not applicable (i.e., would not apply to the Industrial Facility and/or Transmission Interconnection Line component)

Note that the release of GHG emissions to the atmosphere is discussed further in Section 13.3, Climate Change and is not captured as part of this discussion.

#### *13.1.4.1 Fugitive Dust Emissions*

Fugitive dust emissions consist of particulate matter (PM) and may be generated from open-air activities (e.g., moving earth/disturbing soil, wind erosion, increase in traffic). Fugitive dust emissions are composed mainly of soil minerals, but can also contain salt, pollen, spores, and tire particles. There are two forms of PM which pose the greatest concern for human health: PM with a diameter of 10 microns (µm) or less ($PM_{10}$) and PM with a diameter of 2.5 µm or less ($PM_{2.5}$). PM is measured by Total Suspended Particles (TSP) and is defined as the mass of airborne particles having a diameter of less than 44 microns (µm).

When fugitive dust enters the atmosphere, it may potentially affect lung and heart functions. Particulate matter has been linked to premature death (people with lung and heart disease), non-fatal heart attacks, irregular heartbeat, aggravated asthma, decreased lung function, and increased respiratory symptoms such as irritation of the airways, coughing, or difficulty breathing. People with underlying lung and heart disease, children, and the elderly are the most susceptible to particulate pollution exposure (USEPA, 2022).

Fugitive dust may also affect the environment through visibility impairment and environmental damage. Fine particles are the leading cause of reduced visibility in many cities, national parks, and wilderness areas. In addition, fugitive dust particles can be carried over long distances (via wind), deposited in other locations, and within surface water features. Some of the effects of particulate deposition may include the following (USEPA, 2022):

- Increasing lake and stream acidity.
- Altering the nutrient balance in coastal waters and large river basins.
- Depleting the nutrients in the soil.
- Damaging sensitive forests and farm crops.
- Affecting the diversity of ecosystems.
- Contributing to acid rain effects.

Anticipated sources of fugitive dust emissions from the Project will be associated with the construction and operations phases of the Project and may include the following activities:

- Soil disturbance during site preparation (i.e., clearing/grubbing, grading, blasting).
- Wind erosion from soil or rock stockpiles during grading.
- Increase in traffic on roadways from travel by Project personnel (to/from site).
- Management of on-site materials transfers (i.e., loading/unloading, storage, shipping).

To determine environmental impacts on ambient air quality as a result of fugitive dust emissions, the interaction with local receptors was assessed. The closest residential receptors are located 2.1 km from the Industrial Facility and 0.1 km from the Transmission Interconnection Line Drawings 32 and 35, respectively).

Construction activities (such as clearing and grubbing) within the Industrial Facility will be completed throughout the Project Boundary. The Industrial Facility is located in an industrially zoned area, and the closest residential receptor is located 2.1 km away, across the Strait of Canso. As a result of the distance between the residential receptor and the area of disturbance (i.e., the Project Boundary) fugitive emissions impacts on the local receptor are not anticipated.

Construction activities (such as clearing and grubbing) along the Transmission Interconnection Line will be completed sequentially and proceed in a linear fashion within the Project Boundary, disturbance will not extend beyond the Project Boundary and as such, all vegetation surrounding the Transmission Interconnection Line corridor will remain in place. Given that the residential receptor is located 0.1 km away from the area to be disturbed and vegetation will remain in place between the receptor and the Project Boundary, fugitive emissions impacts on the local receptor are not anticipated.

During operations, fugitive dust emissions will only be produced within the Industrial Facility Project Boundary as a result of local traffic; given the distance to the local receptor, impacts are not anticipated.

In summary, both receptors are located beyond the extent to which fugitive dust emissions are expected to travel and, as a result, no impacts are anticipated and fugitive dust emissions are considered short-term (construction) to medium-term (operations), intermittent, and localized.

#### *13.1.4.2 Tailpipe/Diesel Exhaust Emissions*

Construction of the Industrial Facility, as well as the Transmission Interconnection Line, may result in an increase of combustion residuals and/or tailpipe emissions, primarily PM, $NO_x$, $SO_2$, and CO from vehicles (i.e., travel by Project personnel, transport/delivery activities) and heavy equipment. As above, the closest residential receptors are located 2.1 km from the Industrial Facility and 0.1 km from the Transmission Interconnection Line (Drawings 32 and 35, respectively). Exhaust emissions are primarily anticipated to be associated with local roadways and roads developed by the Project within the Project Boundary, exhaust emission are not anticipated to travel beyond the extent of the Project Boundary, and as such, impacts to local residential receptors are not anticipated. Overall exhaust emissions are considered short-term, intermittent and localized.

During the operations phase of the Project, Industrial Facility combustion residuals and/or tailpipe emissions may result from on-site vehicles, transport/delivery services, and heavy equipment. These emissions are considered to be medium-term, localized, and remain intermittent. The exhaust emissions will be limited to the Industrial Facility, which resides within an industrial zone where industrial activities are permitted. The expected exhaust emissions are not anticipated to travel beyond the Project Boundary, and no residential receptors are within proximity to the Project Boundary.

Tailpipe/diesel exhaust emission contributions along the Transmission Interconnection Line are considered negligible during the operations phase, as travel along the corridor will be completed for maintenance purposes only and anticipated to be minimal, if at all.

#### *13.1.4.3 Process Emissions*

During the operations phase of the Project, no process emissions are anticipated in association with the Transmission Interconnection Line; however, the ammonia production plant and storage system (associated with the Industrial Facility) will require dedicated flare stacks to control any off-gassed ammonia from the process and the storage area. The anticipated releases from the process flare and the storage flare during regular operations and upset conditions are discussed in greater detail in the Hatch Flare Memo (Appendix R).

Under normal operating conditions, the process flare will continuously release low-pressure off-gas associated with inert gas purging. However, the flare will be designed to handle potential upset events with much larger volumes of ammonia. The probability and frequency of these upset conditions cannot be accurately predicted at this stage of the Project design, but for the purposes of the air quality screening assessment, one event per year with a 15-minute duration has been assumed for the process flare.

For the ammonia storage flare system, there will be no ammonia releases during normal operations. However, the flare will be designed to handle large ammonia volumes from unplanned events, such as boil-off system failures or power outages. Therefore, one event per year with a one-hour duration has been assumed for the screening assessment.

*Modelling Results*

The only combustion emissions from the Project are from the ammonia process and storage flare stacks (see Section 5.5). Emissions from the Project were estimated using the flare loads and emission rates provided by Hatch (2022d) and are presented in Ramboll's air quality modelling report (refer to Appendix Q).

The model generated results for the closest distance from the centre of each flare stack to the Property Boundary and up to a 5 km radius beyond the Property Boundary (in proximity to the flares). The maximum modelled concentrations (for all distances) for 1-hour, 8-hour, 24-hour, and the annual average are summarized in Table 13.2 and are compared with the limits set in the Nova Scotia AAQS and Ontario AAQC, as well as monitoring data from the Port Hawkesbury monitoring station.

**Table 13.2: Summary of Modelled Emission Concentrations**

| Contaminant | Average Period | Schedule A Maximum Permissible Ground Level Concentration (µg/m$^3$) | Port Hawkesbury Average Ambient Monitoring Concentrations from 2017-2021 (µg/m$^3$) | Maximum Modelled Ground Level Concentration (µg/m$^3$) | Fraction of NS AAQS and ON AAQC (%) |
|---|---|---|---|---|---|
| Carbon Monoxide (CO) | 1 hour | 34,600 | --- | 121 | 0.35 |
| | 8 hours | 12,700 | --- | 36 | 0.28 |
| Nitrogen Dioxide ($NO_2$) | 1 hour | 400 | 111 | 73 | 18 |
| | Annual | 100 | 5.1 | 0.76 | 0.76 |
| Ammonia ($NH_3$)[1] | 24 hour | 100 | --- | 9.1 | 9.1 |
| Ozone ($O_3$) | 1 hour | 160 | 134 | (i) | (i) |
| Total Suspended Particulate (TSP) | 24 hours | 120 | --- | 0.2 | 0.17 |
| | Annual | 70[2] | --- | 0.04 | 0.057 |
| Particulate Matter Fine Fraction ($PM_{2.5}$)[1] | 24 hour | 27 | 21.8 | 0.2 | 0.74 |
| | Annual | 8.8 | 5.5 | 0.04 | 0.45 |

'---': not monitored
Due to the negligible amounts of sulphur in the type of fuels considered for pilots (hydrogen and/or commercially available propane), sulphur dioxide emissions were assumed to be negligible and were not evaluated.
Particulate matter (PM) emissions are estimated by Ramboll using the US EPA AP-42 emission factor for landfill flares.
[1] Ontario AAQC.
[2] Geometric mean.
(i) Insignificant. Estimated Project NMOC emissions at 3 tons/year (short tons per year) are significantly below the minimum screening threshold of 50 tons/year; therefore, the estimated ozone increment is considered insignificant.

The air quality screening indicates that the predicted impacts on air emissions from the process flare and storage flare activities will be well below the applicable limits under a conservative[6] modelling approach. Of the parameters modelled, the 1-hour $NO_x$ had the highest fraction of the limit at 18% (value assumes the intermittent release at the process and storage flare co-occur); however, this is still well below the applicable 1-hour limit

[6] Modelling approach based on conservative assumptions, including the simultaneous release of intermittent emissions from the process and storage flares, all $NO_x$ was released as $NO_2$, and the flares are located on buildings.

supplied within the NSAQR. For longer averaging periods (i.e., 8-hour, 24-hour, annual), ammonia concentrations were less than 10% of the NSAAQS limit and all other modelled contaminants observed were less than 1%, with modelled ozone emissions being insignificant.

A comparison of the maximum predicted concentrations presented in Table 13.3 and the baseline concentrations retrieved from the Port Hawkesbury monitoring station suggests that under the operating scenarios considered, the Project alone or cumulatively is not expected to contribute to the exceedance of the applicable NSAQR Schedule A limits.

### 13.1.5 Summary of Effects

The following table summarizes the VC findings and significance related to the ambient air environment resulting from the Project.

**Table 13.3: Ambient Air Quality VC**

| VC Considered | Geographic Extent | Timing | Duration | Frequency | Reversibility | Magnitude |
|---|---|---|---|---|---|---|
| **Construction Phase** | | | | | | |
| Fugitive Dust | LAA | Not Applicable | Short-term | Intermittent | Reversible | Low |
| Exhaust Emissions | LAA | Not Applicable | Short-term | Intermittent | Irreversible | Low |
| **Operations Phase** | | | | | | |
| Fugitive Dust | LAA | Not Applicable | Medium-term | Intermittent | Reversible | Low |
| Exhaust Emissions | LAA | Not Applicable | Medium-term | Intermittent | Irreversible | Low |
| Process Emissions | RAA | Not Applicable | Medium-term | Intermittent/ Continuous | Irreversible | Low |

The short-term Project construction activities are not anticipated to impact the ambient air quality at regional levels, impacts are anticipated to be minimal, short-term to medium-term, intermittent and localized. As for medium-term Project operational activities, anticipated impacts on ambient air quality at the local or regional levels are anticipated to be low, with no values exceeding the applicable regulatory thresholds.

### 13.1.6 Mitigative & Protective Measures

An Air Quality and Dust Management (AQDM) Plan will be developed as a component of the EMP to define measures to be employed to minimize and mitigate the creation and emission of pollutants, including dust, fugitive emissions, and process and flare stack emissions during the construction and operations phases of the Project.

In addition, general mitigation measures for fugitive (dust) emissions are provided below:

- Conduct grading and site preparation in phases to minimize disturbed soil areas until just prior to construction activities.
- Stabilize exposed soil surfaces by sloping or using vegetation; stone, soil, or geotextiles to prevent dust and airborne particles.
- Compact and/or ridge disturbed soil to prevent dust formation.
- Cease dust-generating construction activities during periods of excessive wind.
- Enclose or cover soil storage and/or stockpile areas.
- Wet (with water) aggregate and soil stockpiles to control dust.
- Design storage areas and material stockpiles with prevailing wind directions in mind.
- Wet roadways and heavy traffic areas with water or dust suppressant technologies to minimize airborne emissions.
- Tie down, cover, and/or store loose site materials and/or products prior to inclement weather and wind events to prevent materials from becoming airborne.
- Wash down vehicles and equipment using hoses and water to remove accumulated mud/dirt on undercarriages, tracks, or wheel wells.
- Project personnel will adhere to all safety protocols and don appropriate personal protective equipment (PPE) in the event of significant fugitive emissions events (i.e., wind storms, dust storms).

General mitigation measures for exhaust emissions are provided below:

- Ensure equipment meets all applicable provincial and air quality regulations and emissions standards.
- Ensure equipment is fueled using low-sulphur diesel (to reduce $SO_x$ air emissions).
- Maintain engines and exhaust systems according to the manufacturer's specifications and the recommended maintenance schedule.
- Remove from service malfunctioning equipment and/or equipment generating excess amounts of smoke, odour, or noise, until an assessment and necessary repairs can be completed.
- Remove from service construction equipment with improperly functioning emissions control systems.
- Restrict the idling of equipment where feasible.

General mitigation measures for process emissions are provided below:

- Maintain flare equipment in accordance with OEM recommendations and monitor/adhere to air quality regulations.
- Ensure fuel gas strainers, inspirators, and jets are free of debris and blockages.
- Ensure the flares are located in an area distant from on-site and off-site receptors.
- Ensure personnel are adequately trained and specialized to perform daily inspections and maintenance on the flare equipment.

### 13.1.7 Residual Effects Analysis

**Table 13.4: Summary of VC-Project Interaction**

| VC Project Components | Potential Effect | Mitigations | Residual Effect (Yes/No) | Significance? (S/NS) |
|---|---|---|---|---|
| Ambient Air | Fugitive Dust<br><br>Exhaust Emissions<br><br>Process Emissions | Stabilize, cover, and apply dust suppressant where required for loose material.<br><br>Maintain equipment and implement emission control devices.<br><br>Maintain flare equipment and monitor/adhere to air quality regulations. | Yes* | NS |

*Emissions to the ambient air and changes in the surrounding air quality will be observed; however, the changes will not exceed the applicable regulatory thresholds, are negligible and are not significant.
S = Significant
NS = Not Significant

The Project is anticipated to have minor impacts on the ambient air quality; however, with the implementation of the recommended mitigation measures outlined in Section 13.1.9, the Project activities will not have significant residual effects on the ambient air environment.

### 13.1.8 Recommended Monitoring & Follow-Up

An Air Quality Monitoring Plan will be developed and submitted to NSECC for approval prior to Project commissioning. Pre-operation ambient air quality levels will be measured to establish baseline conditions; upon commissioning, operational air quality monitoring shall be conducted on a quarterly basis at the Industrial Facility site for the first year of operation to verify modelling results and ensure compliance with the ambient air quality levels. The quarterly monitoring results will be reviewed, and depending on the findings, ongoing operational monitoring may be required.

Note that the air quality screening completed by Ramboll is based on early engineering and screening-level analysis and should be revisited if any changes are made to the Project's design related to Project emissions and source configurations.

## 13.2 Acoustic Environment

### 13.2.1 Overview

The sound VC considers the potential effects to the surrounding acoustic environment that may result from sound generated by the Project during construction and operations activities.

### 13.2.2 Boundaries & Assessment Criteria

#### *13.2.2.1 Spatial Boundary*

The spatial boundary for the acoustic environment includes residential receptors within 2 km of the Project Boundary.

#### *13.2.2.2 Temporal Boundary*

The temporal boundary includes short-term construction and medium-term (Project lifespan) operational activities.

#### *13.2.2.3 Applicable Regulations*

Changes to the acoustic environment during industrial activities could result in displacement, annoyance, and interference of communication, sleep, and/or working efficiency (Health Canada, 2017). As such, sound levels are regulated at the various government levels to protect public and occupational health/safety at the relevant receptor locations (Table 13.5).

**Table 13.5: Summary of Sound Levels Guidelines**

| Regulated By | Regulation/Guidance | Sound Level (dBA) | Hours / Duration |
|---|---|---|---|
| **For Residents** | | | |
| NSECC | Guidelines for Environmental Noise Measurement and Assessment (NSECC, 1990)* | ≤ 65 | 0700 to 1900 |
| | | ≤ 60 | 1900 to 2300 |
| | | ≤ 55 | 2300 to 0700 |
| Town of Port Hawkesbury | Town of Port Hawkesbury Noise Control By-Law N-1 | <65 | 0700 to 2200 |
| | | <55 | 2200 to 0700 |
| **For Occupational Safety** | | | |
| Workplace Health and Safety Regulations & Canadian Centre for Occupational Health and Safety (CCOHS) | Noise – Occupational Exposure Limits in Canada (CCOHS, 2022) | 85 | 8-hour maximum |

*Note: NSECC is in the process of updating these guidelines (NSECC, 2022d) which are currently in consultation phase. Any changes to the guidelines as a result of this update will be referenced/incorporated as part of the Project's EMP.

#### *13.2.2.4 Assessment Criteria*

As per Section 12.3, where there is potential for Project-related effects, the significance of the effect is determined using defined criteria. For the purposes of assessing sound, all criteria for identification and definition of an adverse effect, as presented in Table 12.2 will apply.

In addition, in applying the limits recommended by the applicable legislation and regulatory requirements, the VC-specific definition for magnitude is as follows:

- Negligible – sound levels from Project activities are expected to be ≤55 dBA at residential and sensitive receptor locations.
- Low – sound levels from Project activities may measure between 55-65 dBA at residential and sensitive receptor locations.
- Moderate – sound levels from Project activities may exceed 65 dBA at residential and sensitive receptor locations, but only during high-impact activities (intermittently).
- High – sound levels from Project activities are expected to exceed 65 dBA at residential and sensitive receptor locations during multiple activities (continuously).

### 13.2.3 Assessment Methodology

The assessment of sound is based on desktop studies and addresses Project-related effects on human receptors. The objectives aim to achieve the following:

- Establish the sound levels generated by the Project.
- Identify nearby receptors that may be exposed to sound generated by the Project.
- Determine if the applicable guidelines are met/exceeded.
- Mitigate and minimize any impacts experienced by nearby receptors.

Receptors located within 2 km of the Project Boundary were identified using GIS data from the Nova Scotia Geomatics Centre and aerial imagery. Sensitive receptors (i.e., schools, daycares, senior's residence, etc.) were also identified within 2 km of the Project Boundary.

### 13.2.4 Potential Interactions and Effects Assessment

Project activities have the potential to cause an adverse effect on sound levels during construction and operations activities (Table 13.6).

**Table 13.6: Project Phases and Potential for Interaction with the Acoustic Environment**

| Project Phase | Project Component | |
|---|---|---|
| | Industrial Facility | Transmission Interconnection Line |
| **Construction** | | |
| Site Preparation & Construction | X | X |
| Installation and Assembly of Site Infrastructure | X | X |
| Removal of Temporary Works & Site Restoration | X | X |
| Commissioning | X | X |
| **Operations** | | |
| Delivery of Power | O | O |
| Production of Hydrogen | O | --- |
| Production of Ammonia | X | --- |
| Ship Loading for Transport | O | --- |

X: indicates potential interaction with acoustic environment
O: indicates that an interaction with the acoustic environment is not anticipated
--- indicates that the phase is not applicable (i.e., would not apply to the Industrial Facility and/or Transmission Interconnection Line component)

#### *13.2.4.1 Construction Phase*

During construction activities, sound will predominantly be generated through the operation of construction equipment and heavy machinery such as cranes, backhoes, excavators, drill rigs, dump trucks, graders, transportation vehicles, and specific construction activities such as blasting, pile driving, etc. A summary of sources and anticipated volumes of sound produced during the Project's construction activities have been provided in Table 13.7.

**Table 13.7: Decibel Limits of Construction Equipment Required for Project Activities**

| Equipment | Average Sound Level Ranges (in dBA) |
|---|---|
| **Industrial Facility** | |
| Backhoe | 85-104[1] |
| Compressor (drilling, pneumatic tools, etc.) | 85-104[2] |
| Concrete Truck/Pump | 103-108[3] |
| Crane | 78-103[1] |
| Dozer | 89-103[1] |
| Dump Truck | 84-88[1] |
| Excavator | 97-106[3] |
| Hand Held Air Tools | 115[3] |
| Piling Rig/Driver | 119–125[1] |
| Road Paver | 103[3] |
| Roller | 95-108[3] |
| **Transmission Interconnection Line** | |
| ATV | 97[4] |
| Excavators | 97-106[3] |
| Harvesting Equipment (log truck, manual faller, dozer, etc.) | 85-103[5] |
| Helicopter | 87[6] (at altitude of 500 feet) |
| Loaders | 88[5] |
| Pickup Trucks | 95[4] |
| Tracked Drilling Units | 91-107[7] |
| Tracked Dump Truck/Decks | 91[8] |
| Tracked Man Lift/Bucket Machines | 85[8] |
| Tracked Radial Boom Derricks/Cranes | 93-98[3/8] |

Note that measurements shown are relevant to the decibel level ranges within close proximity (i.e., less than 15 m of distance) between a receptor and the relevant piece of equipment.

Sources: [1]WorkSafe BC u.d
[2]Government of Ontario 2021
[3]Transport Scotland u.d
[4]Government of Oregon u.d
[5]WorkSafe BC 2016
[6]AeroCorner 2022
[7]The Driller 2005
[8]SCE 2016

The range of decibels anticipated for the Industrial Facility construction activities will be 78 to 125 dBA (from a single piece of equipment within 15 m from the source) and construction activities will take approximately 24-30 months. For the Transmission Interconnection Line, the range will be between 85 to 107 dBA (from a single piece of equipment within 15 m from the source) and the anticipated duration will be across 24 months through the construction months.

Assuming that sound attenuates at the standard rate of 6 dBA per doubling in distance from a given point source, approximate sound levels experienced at incremental distances during construction activities for the Project are provided in Table 13.8. The attenuation rate of sound presented below does not consider local landscape/topography or buildings, and therefore, is considered a "worst-case" scenario for sound levels produced by a single piece of equipment.

**Table 13.8: Attenuation of Construction Related Sounds**

| Case | Example Equipment Type | Sound Level @ 15 m (dBA)* | Point Source Sound Levels (dBA) at Incremental Distances | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 50 m | 100 m | 200 m | 500 m | 1,000 m | 2,000 m |
| **Industrial Facility** | | | | | | | | |
| Minimum | Crane | 78 | 67.5 | 61.5 | 55.5 | 47.5 | 41.5 | 35.5 |
| Median | Dozer | 103 | 92.5 | 86.5 | 80.5 | 72.5 | 66.5 | 60.5 |
| Maximum | Pilling Rig | 125 | 114.5 | 108.5 | 102.5 | 94.5 | 88.5 | 82.5 |
| **Transmission Interconnection Line** | | | | | | | | |
| Minimum | Man Lift | 85 | 74.5 | 68.5 | 62.5 | 54.5 | 48.5 | 42.5 |
| Median | Tracked Crane | 94 | 83.5 | 77.5 | 71.5 | 63.5 | 57.5 | 51.5 |
| Maximum | Tracked Drilling Unit | 107 | 96.5 | 90.5 | 84.5 | 76.5 | 70.5 | 64.5 |

*Approximate point source sound levels, based on data collected in Table 13.8 above. Combined sound levels produced by multiple pieces of equipment operating simultaneously has not been included in the assessment.

There are no residential receptors located within 2 km of the Industrial Facility, the closest receptor is located approximately 2.5 km across the Strait of Canso and has been scoped out of this assessment. Based on the distance to nearby receptors, sound levels may exceed the 55 dBA (nighttime) and 65 dBA (daytime) limits but only during select high impact/impulse construction activities such as pilling; these activities will be conducted infrequently and for short durations. Continuous sources of sound (i.e., median case in Table 13.8) are anticipated to remain below the 65 dBA daytime limit.

From Drawing 35, the closest residential receptor to the Transmission Interconnection Line is approximately 0.1 km west of the 70 m corridor within the Town of Port Hawkesbury. As a result of the distance from this receptor to the Transmission Interconnection Line construction activities, the resulting sound levels may exceed the 55 dBA (nighttime) and 65 dBA (daytime) limits during select high impact/impulse construction activities (e.g., drilling); however, these activities will be conducted infrequently and for short duration (if at all, during nighttime hours). Continuous sources of sound (i.e., median case in Table 13.8) are anticipated to remain below the 65 dBA daytime limit at a distance of ≥ 0.5 km. Several sensitive receptors (seven total) were also identified within 2 km, with the nearest located approximately 0.5 km west of the Transmission Interconnection Line. These sensitive receptors may be additionally impacted by elevated sound levels during daytime (or school) hours as a result of disruption to learning, communication, and recreational activities.

In summary, due to the proximity, residential receptors may be subjected to potentially disruptive sound levels during daytime working hours (7:00 am to 10:00 pm) associated with the construction of the Transmission Interconnection Line and Industrial Facility; however, construction is anticipated to be restricted to daylight hours and activities will be temporary and intermittent.

#### *13.2.4.2 Operations Phase*

During the operations phase, sound will predominantly be generated by operations at the Industrial Facility, specifically associated with the ammonia plant. Sound production from the Transmission Interconnection Line is not anticipated once construction activities are complete.

A study conducted at an existing ammonia plant reported sound levels higher than the standard for industrial areas (75 dBA) (Sultana et al., 2011). A summary of sources and anticipated sound levels produced during operations have been provided in Table 13.9.

**Table 13.9: Decibel Limits of Operation Activities for the Project**

| Source | Average Sound Level Ranges (in dBA) |
|---|---|
| **Transmission Interconnection Line** | |
| Transmission Interconnection Line | Not anticipated[1] |
| **Industrial Facility** | |
| Hydrogen Plant* | Electric Process – Not anticipated[2]<br>Compressors (Cooling/Storage) – 85[3] on average |
| Ammonia Plant* | 79-93[4] |

*Note – Sound levels presented were measured at the point source (inside plant).
Source: [1] ATCO Electric u.d
[2] Plug Power u.d
[3] Atlas Copco 2022
[4] Sultana et al. 2011

The range of decibels anticipated for the Industrial Facility operations activities will be 79 dBA to 93 dBA. The Project will be operating 24 hours/day, 7 days/week, with the exception of scheduled shutdowns and unscheduled outages (loss of power). Table 13.10 shows sound levels at incremental distances from the Industrial Facility, based on the standard attenuation rate of 6 dBA per doubling of distance from a point source. The attenuation rate of sound presented below does not consider local landscape/topography or buildings, and therefore, is considered a "worst-case" scenario for sound levels produced by a single piece of equipment.

**Table 13.10: Attenuation of Operation Related Sounds**

| Component | Sound Level at Point Source (dBA)* | Sound Levels (dBA) at Incremental Distances | | | | | |
|---|---|---|---|---|---|---|---|
| | | 50 m | 100 m | 200 m | 500 m | 1,000 m | 2,000 m |
| **Transmission Interconnection Line** | | | | | | | |
| Transmission Interconnection Line | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| **Hydrogen Plant** | | | | | | | |
| Electrolyzes | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Compressors (average) | 85 | 51 | 45 | 39 | 31 | 25 | 19 |
| **Ammonia Plant** | | | | | | | |
| $NH_3$ Plant (min) | 79 | 45 | 39 | 33 | 25 | 19 | 13 |
| $NH_3$ Plant (max) | 93 | 59 | 53 | 47 | 39 | 33 | 27 |

*Note – sound levels are presented at the point source inside the plant (within 1 m). Combined sound levels produced by multiple facilities/equipment operating simultaneously have not been included in the assessment.

The closest residential receptor to the Industrial Facility is located 2.1 km west across the Strait of Canso, and therefore, has been scoped outside of this assessment. Based on the distance of the receptor to the Industrial Facility, the resulting operational sound levels will be below the recommended 55 dBA limit and the magnitude of change to the local sound level is anticipated to be negligible.

### 13.2.5 Summary of Effects

The Industrial Facility is situated within a zoned industrial area that is frequented by heavy equipment, vehicular traffic, and other industrial activities. Existing sound levels (standard of 75 dB for industrial areas – Sultana et al., 2011) are predominantly a result of anthropogenic sources including concrete production, steel fabrication, shipment and transport activities,

pulp and paper mill production activities, vessel traffic and shipping operations at the Strait of Canso Superport, and a coal-powered generating station and associated marine coal terminal operated by NS Power (Drawing 31). Outside of the industrial area, there is the Landrie Lake protected watershed to the north and the Town of Port Hawkesbury to the west.

The Transmission Interconnection Line is located within various natural and industrial areas, travelling between the Industrial Facility (southern substation) and existing NS Power transmission line (northern switching substation). Existing sound levels along the Transmission Interconnection Line corridor are a collection of natural and anthropogenic sources.

Based on the assessment of potential sources and levels of Project generated sound, the Project will align with the sound types and levels already experienced within the area. A total of 958 residential receptors were identified within 2 km of the Project Boundary, of which seven are sensitive receptors:

- Port Hawkesbury Nautical School
- Port Hawkesbury Town Hall
- Strait Area Community Curling Club and Memorial Arena
- Tamarac Education Centre
- Strait Area Education and Recreation Centre and Daycare
- Port Hawkesbury Community Park
- Port Hawkesbury Nursing Home

For residential receptors, decibel limits above 55 dBA can result in disruptions of sleep during nighttime hours while sounds above 65 dBA may cause annoyance during daytime hours. During construction, sound levels may exceed the 65 dBA threshold at residential and sensitive receptors during select high impact/impulse activities (e.g., pilling or drilling); however, these activities will be conducted infrequently, for short durations, and will be restricted to daytime hours. Continuous sources of sound are anticipated to remain below the 65 dBA daytime limit. During operations, sound levels are anticipated to remain below the 55 dBA threshold at all identified receptors.

The following table reviews the VC findings and significance related to changes in sound from the Project.

**Table 13.11: Sound VC**

| Sound VC – By Phase | Geographic Extent | Timing | Duration | Frequency | Reversibility | Magnitude |
|---|---|---|---|---|---|---|
| Construction | RAA | Not Applicable | Short-term | Single Event & Continuous* | Reversible | Moderate |
| Operation | RAA | Not Applicable | Medium-term | Continuous** | Reversible | Negligible |

*Single event for high impact/impulse activities; continuous for low impact activities during construction.
**Continuous sound emission will only apply to the operations at the Industrial Facility, not the Transmission Interconnection Line.

### 13.2.6 Mitigative & Protective Measures

As a result of sound levels during construction of the Project potentially exceeding the recommended 55 dBA guideline (intermittently and dependent on activities required, e.g., drilling) in proximity to residential receptors, the following general mitigation/protective measures will be implemented:

- Noise suppressants (e.g., mufflers) will be utilized on vehicles/equipment.
- Vehicle idling will be limited.
- High-impact activities (e.g., blasting – as required) will be completed within the recommended daytime hours of 7:00 am to 10:00 pm.

As a result of sound levels during operations remaining below the recommended 55 dBA limit in proximity to residential receptors, no further mitigative or protective measures are recommended during the Project's operational phase.

Throughout the entirety of the Project, all activities will be conducted within occupational health and safety guidelines and regulations related to sound levels and applicable exposure limits.

### 13.2.7 Residual Effects Analysis

**Table 13.12: Summary of VC-Project Interaction**

| VC Project Components | Potential Effect | Mitigations | Residual Effect (Yes/No) | Significance? (S/NS) |
|---|---|---|---|---|
| Sound | Annoyance and/or interference of communication, sleep, and/or working efficiency. | Adherence to regulatory standards/guidelines for sound levels. | No | NS |

S = Significant
NS = Not Significant

#### 13.2.8 Recommended Monitoring and Follow-Up

No further mitigation, monitoring, or follow-up measures are recommended based on the findings of this assessment.

A complaint resolution/response protocol will be developed to address any concerns regarding sound levels during the construction phase as part of the Project's EMP. Pre-construction sound levels at key receptor locations will be measured as part of this process to establish baseline conditions for future reference (if needed). The Project's EMP will also develop and incorporate targeted mitigation measures for construction activities located within close proximity to sensitive receptors.

## 13.3 Climate Change

#### 13.3.1 Overview

The climate change VC assessment considers the impacts of Project-generated GHG on the natural environment and vulnerable receptors. A desktop assessment of GHG in proximity to the Project was captured through regionally available online data portals, historical data, and anticipated future climate projections (Section 6.3). From this baseline information, anticipated Project-related GHG emissions may be identified and mitigated.

Note that the impacts of climate change on the Project are assessed separately under Section 15 and are not captured here.

#### 13.3.2 Boundaries and Assessment Criteria

##### *13.3.2.1 Spatial Boundary*

The spatial boundary for this assessment is within the Study Area.

##### *13.3.2.2 Temporal Boundary*

The temporal boundary includes short-term construction and medium-term (Project lifespan) operational activities.

##### *13.3.2.3 Applicable Regulations*

The climate change VC assessment was reviewed in combination with applicable legislation, including (but not limited to) the following:

- Nova Scotia *Environment Act*
  - Greenhouse Gas Emissions Regulations
- Nova Scotia *Environmental Goals and Sustainable Prosperity Act*
- *Canadian Environmental Protection Act*
  - Passenger Automobile and Light Truck Greenhouse Gas Emission Regulations
  - Heavy-duty Vehicle and Engine Greenhouse Gas Emission Regulations

- Canadian Halocarbon Regulations
- Canadian Ozone-depleting Substances Regulations

#### *13.3.2.4 Assessment Criteria*

As per Section 12.3, where there is potential for Project-related effects, the significance of the effect is determined using defined criteria. To assess climate change, all criteria for identification and definition of an adverse effect, as presented in Table 12.2, will apply.

In addition, the VC-specific definitions for magnitude are as follows:

*Magnitude - Other GHG Sources (separate from $CO_{2e}$)*

- Negligible – no changes to the environment are expected from GHG emissions.
- Low – minor changes to the environment are expected from GHG emissions.
- Medium – moderate changes to the environment are expected from GHG emissions.
- High – widespread changes to the environment are expected from GHG emissions.

*Magnitude - $CO_2e$*

To quantify the carbon dioxide equivalent ($CO_2e$) magnitude, the 2020 GHG emissions for NS were consulted; in 2020, approximately 14.6 megatonnes (MT) of $CO_2e$ were emitted across NS (Canada Energy Regulator, 2022). Based on these emissions, the $CO_2e$ produced by the Project will be compared to the $CO_2e$ published by the province in the form of a %. VC-specific definition of magnitude is as follows:

- Negligible – GHG emissions are expected to be < 0.25% of the 2020 NS GHG Emissions.
- Low – GHG emissions are expected to be ≥ 0.25% and < 0.5% of the 2020 NS GHG Emissions.
- Medium – GHG emissions are expected to be ≥ 0.5% and < 0.75% of the 2020 NS GHG Emissions.
- High – GHG emissions are expected to be ≥ 0.75% of the 2020 NS GHG Emissions.

### 13.3.3 Assessment Methodology

The assessment of climate change is based on published literature and addresses the Project-environment impacts. The objectives of this assessment aim to achieve the following:

- Establish the sources of GHG contributions from the Project.
- Identify the receptors at risk from Project-generated GHGs.
- Mitigate and minimize GHG generation from Project-related activities.

### 13.3.4 Potential Interactions and Effects Assessment

The project may adversely impact climate change from GHG contributions during construction and operations. For the EA Report, GHGs produced by the Project will be

limited to carbon dioxide ($CO_2$), methane ($CH_4$), nitrous oxides ($NO_x$), halocarbons, and water vapour. Potential interactions are included in Table 13.13.

**Table 13.13: Project Phases and Potential for Interaction with the Climate Change Environment**

| Project Phase | Project Component | |
|---|---|---|
| | Industrial Facility | Transmission Interconnection Line |
| **Construction** | | |
| Site Preparation & Construction | X | X |
| Installation and Assembly of Site Infrastructure | X | X |
| Removal of Temporary Works & Site Restoration | X | X |
| Commissioning | X | O |
| **Operations** | | |
| Delivery of Power | O | O |
| Production of Hydrogen | O | --- |
| Production of Ammonia | X | --- |
| Ship Loading for Transport | O | --- |

X: indicates potential interaction with the climate change environment
O: indicates that an interaction with the climate change environment is not anticipated
--- indicates that the phase is not applicable (i.e., would not apply to the Industrial Facility and/or Transmission Interconnection Line component)

#### *13.3.4.1 Carbon Dioxide*

The primary sources of atmospheric $CO_2$ results from the burning of carbon-containing fossil fuels in the ammonia flare stack and site construction vehicles; and from deforestation/land clearing activities which release stored carbon.

Site preparation will include several activities that are likely to produce $CO_2$, including, but not limited to:

- Use of heavy equipment (excavators, dozers, cranes, etc.).
- Use of light-duty vehicles and equipment (pick-up trucks, light plants, generators, etc.).
- Land clearing, including burning or the decay of cut foliage (which releases $CO_2$ slowly).
- Cement production - heating of the limestone releases $CO_2$ (Government of Canada, 2019a).

During the operations phase, $CO_2$ emissions will be produced by light- and heavy-duty vehicles and equipment for material handling, as well as from the ammonia production process. In normal circumstances, $CO_2$ emissions would result from the power generated to supply the Project's hydrogen process [traditional methods of hydrogen production, such as Steam Methane Reforming, emit approximately 8 to 10 kg of $CO_2$ per kg of hydrogen

produced (Siemens Energy, 2022)]; however, as a renewable energy resource supplies the hydrogen electrolyzers, $CO_2$ emissions will be negligible.

Overall, $CO_2$ contributions are expected to be localized, intermittent, and insignificant.

#### *13.3.4.2 Methane*

Methane is produced when fossil fuels and trees are burned with insufficient oxygen to complete combustion (Government of Canada, 2019a). Another source of methane is the decay of organic solid wastes, and indirectly, methane can also be released due to disturbances of wetlands (which act as methane sinks).

The Project's construction phase will rely on different light- and heavy-duty equipment (which produce methane) and will result in the decay of waste (i.e., decomposing cleared vegetation, workforce waste production), both of which will result in methane contributions. Although a more prominent source of methane production is the release of methane from disturbance to wetlands, this methane emission source will not apply to the Project as the Proponent intends to avoid altering wetlands during the construction of the Industrial Facility and Transmission Interconnection Line components.

During the operations phase, methane emissions will be limited to using light- and heavy-duty vehicles and equipment for material handling and transport.

Overall, methane contributions are expected to be localized, intermittent, and insignificant.

#### *13.3.4.3 Nitrous Oxides*

The primary sources of $NO_X$ are related to the use of nitrogen-based synthetic fertilizers and manure. These sources have added significant amounts of reactive nitrogen to the Earth's ecosystems. Other contributors include the release of nitrous oxides into the atmosphere during the combustion of fossil fuels and biomass (e.g., trees or wood-based fuels) and from some industrial sources (Government of Canada, 2019a).

The Project's construction phase will rely on different heavy- and light-duty equipment, which can contribute to nitrous oxide emissions. While these sources may contribute to emissions, the primary contributor will likely relate to land restoration activities (i.e., soil amendments and reclamation) following construction. Overall, the production of NOx in association with this Project is anticipated to be relatively minimal as the need for synthetic fertilizer and manure applications will be considered on a case-by-case basis. In addition, consideration may be given to repurposing the Project's cleared (Industrial Facility) footprint for other uses upon Project completion.

During the operations phase, NOx emissions will be limited to the use of light- and heavy-duty vehicles and equipment for material handling and transportation.

Overall, nitrous oxide emissions are expected to be localized, intermittent, and insignificant.

#### *13.3.4.4 Halocarbons*

Halocarbons are a group of synthetic chemicals containing a halogen group (e.g., fluorine, chlorine, and bromine) and carbon (Government of Canada, 2019a). They are typically used in refrigerants, fire-extinguishing agents, solvents, foam-blowing agents and fumigants (Government of Canada, 2013). There are various industrial sources, but the main contributor relates to the production of aluminum (US EPA, 2021).

The primary source of halocarbon emissions from the Project will be coolants in air conditioning units found in vehicles, portable construction buildings (i.e., trailers), Industrial Facility buildings (i.e., office building) and equipment. Air conditioning units will be used during the project's construction and operations phases. Fire-extinguishing agents (containing halocarbons) may also be used at the Project in the event of an emergency situation which requires a fire-fighting response (for further details, refer to Section 17.5).

Overall, the contribution of halocarbons anticipated to be produced by air conditioning units and fire-fighting response activities are expected to be localized, intermittent, and not significant.

*Water Vapour*

Water vapour is the most important naturally occurring GHG. Human activities do not directly influence the amount of water vapour in the atmosphere to any significant degree. Instead, the amount of water vapour in the atmosphere is a function of the atmosphere's temperature. The atmosphere can hold approximately 7% more water vapour for every additional degree Celsius in air temperature. When the air becomes saturated with water vapour, the water vapour condenses and falls as rain or snow, leading to climate change effects (i.e., variances in weather patterns).

As climate warming gases (i.e., $CO_2$, $CH_4$, NOx) increase in the atmosphere, the temperature rise increases water evaporation from the Earth's surface and increases the atmospheric water vapour concentrations. This increased water vapour, in turn, amplifies the warming effect caused by the GHGs, resulting in the cycle repeating and temperatures continuing to rise (Government of Canada, 2019a).

Although a direct effect on water vapour concentration by the Project is not anticipated, the Project activities contributing to GHG emissions may indirectly affect water vapour concentrations in the atmosphere; however, the impact is expected to be negligible.

#### *13.3.4.5 Carbon Dioxide Equivalent ($CO_2e$)*

Carbon dioxide equivalent ($CO_2e$) is a measurement used to compare the emissions from various GHGs and their global-warming potential. According to Canada Energy Regulator (2022), Nova Scotia's 2020 GHG emissions were approximately 14.6 $MTCO_2e$.

Anticipated sources of $CO_2e$ for the Project will primarily be associated with the emissions produced by the Industrial Facility during operations. The Project's 300 MW Industrial Facility process is expected to emit 3 gCO2e/MJ (Section 1.3), which totals approximately 0.0.028 $MTCO_2e$/yr. Comparing this to the overall total of the NS GHG Emissions produced in 2020, the project will be expected to contribute approximately 0.19% of the total provincial emissions, a value which is considered negligible.

In addition, the green hydrogen/ammonia produced by the Project will contribute significantly to Nova Scotia and Canada's GHG emission reduction goals by reducing GHG emissions by an expected 1.5 million tonnes per year by 2030. GHG reductions will be realized through the following commitments:

- Developing a plan for green hydrogen and green fuel supply to the province.
- MOU with NS Power for the provision of green hydrogen to reduce $CO_2$ emissions.

### 13.3.5 Summary of Effects

The following table summarizes the VC findings and significance related to climate change and the Projects' effect on the environment.

**Table 13.14: Climate Change VC from Project-Environment Effects**

| VC Considered | Geographic Extent | Timing | Duration | Frequency | Reversibility | Magnitude |
|---|---|---|---|---|---|---|
| **Construction Phase** | | | | | | |
| Greenhouse Gas | LAA | Not Applicable | Short-term | Intermittent | Reversible | Negligible |
| **Operations Phase** | | | | | | |
| Greenhouse Gas | LAA | Not Applicable | Medium-term | Intermittent, Continuous* | Reversible | Negligible |

*Intermittent use references equipment activities; continuous use references the Project's process GHGs

Project-related GHG emissions are expected to be intermittent, localized, and mitigatable (to a degree). Therefore, measurable changes to the local or regional climate or atmospheric environment are not anticipated.

### 13.3.6 Mitigative & Protective Measures

The mitigation strategies provided below represent possible ways the Project may reduce contributions to GHG emissions, thus reducing the overall impact of climate change.

- Use locally sourced materials, where possible, to reduce $CO_2$, $CH_4$, and NOx emissions associated with transport.
- Incorporate the shortest construction/transport routes where possible to minimize the use of fossil fuels during construction.
- Recover and recycle construction and demolition waste, where possible.

- Recycle and compost workforce waste (i.e., food waste). Diverting this waste will reduce methane generated in landfills as it decomposes.
- Minimize deforestation during land clearing by only clearing the area that will be needed; this will reduce $CH_4$ and NOx emissions associated with soil disturbance and limit the use of equipment (lowering emissions produced during equipment operations).
- Plan construction activities to reduce the double handling of materials, reducing GHG emissions associated with heavy equipment operations.
- Use recycled or repurposed materials where possible to reduce GHG emissions associated with embodied energy (i.e., the energy associated with manufacturing a product or service).
- Ensure Project equipment meets all applicable provincial and air quality regulations and emissions standards.
- Maintain engine and exhaust systems according to the manufacturer's specifications and applicable maintenance schedule.
- Remove from service malfunctioning equipment or equipment generating excess amounts of smoke, odour, or noise until an assessment and necessary repairs can be completed.
- Ensure construction equipment with an improperly functioning emission control system is not operated.
- Ensure regular equipment maintenance is undertaken to maintain good operations and fuel efficiency.
- Ensure equipment containing coolant (i.e., air conditioning units) undergo preventative maintenance and inspections (i.e., leak testing).
- Train Project personnel (as appropriate) in the proper disposal of halocarbon-containing substances.
- Dispose of halocarbon-containing substances at an approved hazardous waste facility per applicable regulations and in compliance with local requirements.
- Ensure trucks removing waste from, or bringing materials to, the Project site are filled to the maximum allowable capacity where practical (dependent on the truck size and load weight) to reduce transportation requirements and limit number of trips, where practical.
- Implement an anti-idling policy to limit GHG emissions from vehicles and equipment and limit the use of fossil fuels.
- Incorporate energy efficient infrastructure (i.e., solar panels) where feasible to limit GHG emissions and use of fossil fuels resulting from standard equipment (e.g., diesel powered generators or light stands).

### 13.3.7 Residual Effects Analysis

**Table 13.15: Summary of VC-Project Interaction**

| Project VC Considered | Potential Effect | Mitigations | Residual Effect (Yes/No) | Significance? (S/NS) |
|---|---|---|---|---|
| **Project-Environment** | | | | |
| Climate Change | Increase in greenhouse gas | Implementation of emission suppression devices.<br><br>Strategic planning for sustainable materials and best management practices. | Yes* | NS |

*GHG emissions to the environment will be observed; however, the changes are negligible and not significant.
S = Significant
NS = Not Significant

The Project's construction and operations phases are anticipated to contribute (in small quantities) to GHG generation; however, residual impacts are considered not significant.

Compared to the province's 2020 GHG emissions of 14.6 MT, the GHGs generated from Project activities are negligible; coupled with the green process and certification, the Project as a whole will help offset GHG emissions within the province and will assist in achieving provincial and national climate change targets.

### 13.3.8 Recommended Monitoring & Follow-Up

Monitoring and follow-ups are not recommended.

## 13.4 Geophysical Environment

### 13.4.1 Overview

The geophysical environment VC considers the potential effects on local topography, surficial geology, bedrock geology, and groundwater as a result of Project activities during construction and operations.

### 13.4.2 Boundaries & Assessment Criteria

#### *13.4.2.1 Spatial Boundary*

The spatial boundary for this assessment is within 2 km of the Project Boundary.

#### *13.4.2.2 Temporal Boundary*

The temporal boundary includes short-term construction and medium-term (Project lifespan) operational activities.

#### *13.4.2.3 Applicable Regulations*

The following regulations and guidelines are applicable regarding potential impacts to the geophysical environment as a result of Project activities:

- Sulphide Bearing Material Disposal Regulations, NS Reg 57/95.
- Procedure for Conducting a Pre-Blast Survey (NSECC,1993).

#### *13.4.2.4 Assessment Criteria*

As per Section 12.3, where there is potential for Project-related effects, the significance of the effect is determined using defined criteria. For the purposes of assessing the geophysical environment, all criteria for identification and definition of an adverse effect, as presented in Table 12.2 will apply.

In addition, the VC-specific definition for magnitude is as follows:

- Negligible – no expected changes to local topography or geology; no anticipated impacts to the quality/output of groundwater wells and/or no wells exist within 2 km of the Project Boundary.
- Low – changes to local topography/geology are possible but not anticipated as geologic hazards are not present within the Study Area; impacts to the quality/output of groundwater wells are possible but not anticipated and/or wells exist between 800 m and 2 km of the Project Boundary.
- Moderate – changes to local topography/geology are possible as geologic hazards exist within proximity to the Project Boundary; impacts to the quality/output of groundwater wells are possible and/or wells exist <800 m from the Project Boundary.
- High – changes to local topography or geology are anticipated due to the presence of geologic hazards within the Project Boundary; impacts to the quality/output of groundwater wells are anticipated and wells exist within the Project Boundary.

The aforementioned definition of magnitude for groundwater was based on the requirement for pre-construction well monitoring within 800 m of blasting activities and the recommended 2 km buffer to be applied for water well assessment during an EA (as per NSECC, 2021).

### 13.4.3 Assessment Methodology

The assessment of the geophysical environment is based on desktop studies and addresses Project-related effects on local topography, surficial geology, bedrock geology, and groundwater wells. The objectives aim to achieve the following:

- Identify geologic hazards that may be disrupted or encountered during Project activities.
- Identify nearby groundwater wells that may be impacted by Project activities.
- Mitigate and minimize impacts.
- Determine if monitoring is required per applicable guidelines.

For information regarding baseline geophysical conditions, see Section 6.4. Groundwater wells within 2 km of the Project Boundary were identified using the Nova Scotia Well Logs Database (NSECC, 2020).

### 13.4.4 Potential Interactions and Effects Assessment

Project activities have the potential to cause an adverse effect on the geophysical environment during construction and operations activities (Table 13.16).

**Table 13.16: Project Phases and Potential for Interaction with the Geophysical Environment**

| Project Phase | Project Component | |
|---|---|---|
| | Industrial Facility | Transmission Interconnection Line |
| **Construction** | | |
| Site Preparation & Construction | X | X |
| Installation and Assembly of Site Infrastructure | O | O |
| Removal of Temporary Works & Site Restoration | O | O |
| Commissioning | O | O |
| **Operations** | | |
| Delivery of Power | --- | O |
| Production of Hydrogen | O | --- |
| Production of Ammonia | O | --- |
| Ship Loading for Transport | O | --- |

X: indicates potential interaction with geophysical environment
O: indicates that an interaction with the geophysical environment is not anticipated
--- indicates that the phase is not applicable (i.e., would not apply to the Industrial Facility and/or Transmission Interconnection Line component)

#### *13.4.4.1 Construction Phase*

During construction activities, the geophysical environment may be impacted by changes to local topography, surficial and bedrock geology, along with the quality and quantity of groundwater. Activities that may result in changes or effects to the geophysical environment include:

- Clearing and grubbing
- Grading
- Blasting (as required)

*Local Topography, Surficial, and Bedrock Geology*
During construction, impacts are primarily related to the removal of vegetation/disturbance of topsoil during clearing and grubbing activities, as well as the potential presence and/or disturbance of the following geologic hazards:

- Acid generating rock
- Karst topography and/or naturally occurring sinkholes
- Colluvial deposit slopes

Clearing activities will take place throughout the Project Boundary to provide access for equipment to complete installation and construction activities. Removal of vegetation/disturbance of topsoil during clearing and grubbing activities can result in erosion or sedimentation control issues and increased flooding risk if not effectively managed or considered during the design phase.

In Nova Scotia, several bedrock formations are known to contain acid generating rock that, when disturbed, can result in acid rock drainage. Acid rock drainage occurs when sulphide-bearing rocks are exposed to air or water, producing sulphuric acid and metal oxides that are subsequently mobilized through runoff. Resulting impacts include degradation of nearby groundwater wells and environmental receptors. Based on provincial risk mapping, there are no records of sulphide-bearing slates within 2 km of the Project Boundary (NSNRR, 2002). The presence or absence of acid generating rock, and associated acid rock drainage potential, will be confirmed during geotechnical assessments.

Karst topography is characterized by caves, sinkholes, underground streams, and fissures formed by the dissolution of soluble bedrock (i.e., carbonate-rich rock such as dolomite, limestone, or gypsum). The presence of karst terrain can result in extensive damage to infrastructure and local topography as a result of sudden catastrophic subsidence. According to provincial risk mapping, the Project Boundary and its 2 km buffer are primarily within a ‘Low Risk’ zone for karst topography; with a small area of “Medium Risk” existing between the northern extent of the Industrial Facility to the southern edge of Landrie Lake (NSNRR, 2019). The presence or absence of karst terrain will be confirmed during geotechnical assessments.

No colluvial slopes were identified during desktop reviews within 2 km of the Project Boundary; however, this will be confirmed during geotechnical assessments completed for the Project.

*Groundwater*
Construction activities, primarily blasting (as required), have the potential to impact the quantity and quality of nearby groundwater wells depending on the well’s proximity, characteristics of the bedrock, and extent of disturbance.

Groundwater quantity can potentially be impacted if blasting activities alter local hydrogeological flow regimes, resulting in groundwater draining from or flowing towards existing wells. Groundwater quality may also be impacted through the release of sediment/metals (i.e., uranium, arsenic, or acid rock drainage) present within the bedrock during blasting activities and/or by the accidental release of hazardous substances during construction (e.g., fuels, nitrate from explosives, etc.). For information regarding accidents, malfunctions, and unplanned events see Section 17.

Blasting activities may be required for the construction of the Industrial Facility depending on the results of the Project's geotechnical investigation. Therefore, wells within 800 m and 2 km of the Industrial Facility have been assessed. Nine receptors were identified within 2 km of the Industrial Facility, of which only two are located within 800 m (Well IDs 750244 and 750246). Both wells are drilled industrial water wells which are located within the existing Point Tupper Terminal (owned by Everwind Fuels), and therefore, are not considered further within this assessment.

In addition to well proximity to the Project, the disruption (i.e., blasting) of bedrock containing arsenic or uranium can result in well contamination/degradation of well water quality. Based on groundwater risk mapping, the majority of the Project Boundary (and its 2 km buffer) is located in a "Low Risk" zone for arsenic containing bedrock, with an area of "High Risk" along the northern extent of the Industrial Facility to Landrie Lake. This "High Risk" area underlays the existing Point Tupper Facility and their two industrial water wells. In addition, the entire 2 km buffer of the Project Boundary is located in a "Low Risk" zone for uranium containing bedrock. Potential impacts to groundwater quantity and quality during construction of the Project will be further evaluated following the completion of geotechnical assessments.

Blasting activities are not anticipated to be required for the construction of the Transmission Interconnection Line (see Section 6.4.4 for further information regarding groundwater wells) and therefore impacts to nearby groundwater wells are not expected.

Of note, one well was identified within the Project Boundary of the Transmission Interconnection Line corridor (Well ID 800157). Field activities attempted to locate this well but it could not be found at the time of the assessment. As part of site preparation activities, CAUS or selected transmission construction contractor survey team and pre-clearing assessment team will be supplied with the well's location so that an additional attempt to locate the well can take place. Should the well be identified during these preliminary assessments, a site-specific management plan will be developed and the well will be appropriately buffered to prevent water quality impacts during construction activities.

#### *13.4.4.2 Operations Phase*

During operations, no activities require or involve the disturbance of the local topography, surficial, and bedrock geology, and therefore, impacts from the Project are not anticipated.

Potential impacts to groundwater only exist as a result of accidents, malfunctions, and unplanned events; see Section 17 for spill response and contingency planning for further details.

### 13.4.5 Summary of Effects

Based on the assessment of the geophysical environment, impacts to local topography, surficial, and bedrock geology are not anticipated and will be confirmed through pre-construction geotechnical investigations, site surveys, and pre-clearing assessments. Potential impacts to nearby groundwater wells are possible only during blasting activities (as required) for the construction of the Industrial Facility and as a result of accidents, malfunctions, and unplanned events (addressed separately in Section 17.

The following table reviews the VC findings related to impacts on the geophysical environment as a result of the Project.

**Table 13.17: Geophysical Environment VCs**

| VC Considered | Geographic Extent | Timing | Duration | Frequency | Reversibility | Magnitude |
|---|---|---|---|---|---|---|
| **Construction Phase*** | | | | | | |
| **Industrial Facility** | | | | | | |
| Topography, Surficial, and Bedrock Geology | Project Boundary | Not Applicable | Short-term | Single Event | Irreversible | Negligible |
| Groundwater | LAA | Not Applicable | Short-term | Single Event | Irreversible | Low |
| **Transmission Interconnection Line** | | | | | | |
| Topography, Surficial, and Bedrock Geology | Project Boundary | Not Applicable | Short-term | Single Event | Irreversible | Negligible |
| Groundwater | LAA | Not Applicable | Short-term | Single Event | Irreversible | Low** |

*Earthworks activities are not proposed during the operations phase and maintenance.
**One water well was identified within the Transmission Interconnection Line corridor which is not considered here within the VC assessment because it could not be located during field activities. An additional search for the water well will occur prior to construction, if located, it will be addressed in a site-specific management plan.

### 13.4.6 Mitigative and Protective Measures

*Topography, Surficial, and Bedrock Geology*
Contractors will use the erosion and sedimentation control measures listed below at all sites where soil or sub-soil will be exposed and there is potential for erosion:

- Develop a site-specific erosion and sedimentation control plan during the design phase of the Project.
- Minimize and limit the area of exposed soil and the length of time soil is exposed without mitigation (e.g., mulching, seeding, rock cover) through scheduled work progression.
- Maintain and inspect erosion and sedimentation control structures regularly with particular emphasis before and after forecasted heavy rain events, and with consideration of the timing and types of activities involved.
- Use existing roads and access routes to the extent feasible.
- Travel through wetlands and within watercourse buffers with machinery will be avoided, with the exception of temporary water crossing locations. If travel through a wetland is required, the appropriate mitigation measures will be employed (e.g., geotextile matting, work timed to occur during frozen ground conditions, and travel routed through drier portions of the wetland). For addition details regarding wetland/watercourse mitigations refer to Section 13.5.6.
- Care will be taken to ensure that the potential for surface run-off containing suspended materials or other harmful substances is minimized.
- Removal of all temporary erosion and sedimentation control materials from the construction site upon completion of work and/or vegetation recovery. Where necessary, erosion and sedimentation control measures will remain in place after work is completed, areas have stabilized, and natural re-vegetation occurs.
- Keep permits/approvals related to site construction on-site.

The presence or absence of acid generating rock and other geologic hazards will be confirmed during geotechnical assessments. Geotechnical assessments will consist of a shallow pit program (dug to refusal from bedrock or maximum reach of an excavator) for the Transmission Interconnection Line and raw freshwater pipeline; and a rotary core drilling program for the Industrial Facility. Areas found to contain geological hazards such as acid generating rock, uranium, karst topography, or colluvial deposits will be avoided where possible. If avoidance of geologic hazards is not possible, then a specific management and mitigation plan will be developed. General mitigation measures include:

- Ensure all slate testing and handling activities completed during construction activities are in accordance with the Nova Scotia Sulphide Bearing Material Disposal Regulations, NS Reg 57/95.
- Plan all site work to minimize disturbance of slate bedrock and exposure of disturbed slate bedrock to precipitation.

- Avoid locating any disturbed or stockpiled slate bedrock within or near wetlands, watercourses, and/or waterbodies.

*Groundwater*
General mitigation measures to protect groundwater quantity and quality during construction activities may include:

- Conduct blasting (as required) in accordance with provincial legislation and subject to terms and conditions of applicable permits.
- Ensure all blasts are conducted and monitored by certified professionals.
- Notify landowners prior to any blasting activities.
- Conduct a pre-blast survey for wells within 800 m of the point of blast in accordance with NSECC's Procedure for Conducting a Pre-Blast Survey (1993) to monitor for changes in well quality or quantity.

To mitigate potential impacts to groundwater wells during operations (as a result of accidental releases of controlled substances), spill response and management protocols will be implemented.

### 13.4.7 Residual Effects Analysis

**Table 13.18: Summary of VC-Project Interaction**

| VC Project Components | Potential Effect | Mitigations | Residual Effect (Yes/No) | Significance? (S/NS) |
|---|---|---|---|---|
| Geophysical Environment | Disturbance of topography/surficial soils resulting in erosion/sedimentation/run-off. | Erosions and sedimentation controls, best management practices and mitigations during construction activities. | No | NS |
| | Disruption of geologic hazards (acid generating rock, karst topography, colluvial slopes). | Pre-construction geotechnical investigations and avoidance. | | |
| | Degradation of groundwater quality/quantity. | Adherence to regulatory standards/guidelines and all applicable permits. | | |

S = Significant
NS = Not Significant

### 13.4.8 Recommended Monitoring & Follow-Up

*Topography, Surficial, and Bedrock Geology*
No further monitoring or follow-up surveys are recommended at this time, beyond the pre-construction geotechnical assessments for potential geologic hazards and pre-clearing assessments associated with the Transmission Interconnection Line and Industrial Facility.

*Groundwater*
The existing Point Tupper Terminal groundwater monitoring program will be expanded to monitor for potential impacts to groundwater quality and quantity as a result of any accidents, malfunctions, and unplanned events within the Industrial Facility.

## 13.5 Freshwater Aquatic Environment

### 13.5.1 Overview

The freshwater aquatic environment VC considers the potential effects Project activities may have during construction and operations on the following freshwater systems:

- Watersheds
- Waterbodies
- Watercourses
- Fish and fish habitat
- Wetlands

### 13.5.2 Boundaries & Assessment Criteria

#### *13.5.2.1 Spatial Boundary*

The spatial boundary includes freshwater resources within the Project Boundary and the secondary watersheds it crosses.

#### *13.5.2.2 Temporal Boundary*

The temporal boundary includes short-term construction and medium-term (Project lifespan) operational activities.

#### *13.5.2.3 Applicable Regulations*

The following legislation and policies are applicable regarding potential impacts to the freshwater aquatic environment as a result of Project activities:

- *Canada Navigable Waters Act*
- *Canadian Environmental Protection Act (CEPA), S.C. 1999, c. 33*
- *Fisheries Act, R.S.C., 1985, c. F-14*
- *Environment Act, S.N.S. 1994-95, c. 1*

- Nova Scotia Wetland Conservation Policy (NSECC, 2019)
- *ESA, S.N.S. 1998, c. 11*
- *Port Hawkesbury Watershed,* N.S. Reg. 149/82
- *SARA, S.C. 2002, c. 29*
- *West Richmond Planning Area Land Use By-law* (MCR, 2000)

#### *13.5.2.4 Assessment Criteria*

As per Section 12.3, where there is potential for Project-related effects, the significance of the effect is determined using defined criteria. For the purposes of assessing the freshwater aquatic environment, all criteria for identification and definition of an adverse effect, as presented in Table 12.2, will apply.

In addition, the VC-specific definitions for magnitude:

Protected Watersheds

- Negligible – No activities will occur within the protected watersheds.
- Low – Activities are within the protected watersheds but are restricted to peripheral zones (W-2 and/or Section A).
- Moderate – Activities are within the protected watersheds in both peripheral (W-2 and/or Section A) and central zones (W-1 and/or Section B). Activities required within these zones are considered low impact and may be permitted under governing regulations if approved by the NS Minister of Environment and Climate Change.
- High – Activities are within the protected watersheds central zones (W-1 and/or Section B) and/or are considered high impact activities and will not be permitted or approved.

Waterbodies, Watercourses, and Fish/Fish Habitat

- Negligible – no measurable loss of aquatic habitat with no expectations of altered hydrology.
- Low – no measurable loss of aquatic habitat, with minimal potential of altered hydrology.
- Moderate – measurable loss of aquatic habitat with altered hydrology expected, but can be managed with routine measures.
- High – measurable loss of aquatic habitat with altered hydrology expected that would not be managed with routine measures.

Wetlands

- Negligible – no measurable/direct loss of wetland habitat or alteration to wetland functions expected.
- Low – measurable/direct loss of wetland habitat, but overall wetland functions remain intact.

- Moderate – measurable/direct loss of wetland habitat and impact to wetland functions, but wetland area loss will not impact the hydrology of the wetland's watershed and/or the impacted wetland areas are not part of a WSS.
- High – measurable/direct loss of wetland habitat and impact to wetland functions; and/or wetland area loss will affect the hydrology of the wetland's watershed; and/or the impacted wetland areas are part of a WSS.

### 13.5.3 Assessment Methodology

The assessment of the freshwater aquatic environment is based on desktop and field evaluations and addresses Project-related impacts on watersheds, waterbodies, watercourses, fish/fish habitat, and wetlands. The objectives aim to achieve the following:

- Identify freshwater resources within the Project Boundary.
- Establish what Project activities/components may impact freshwater resources.
- Mitigate and minimize impacts to freshwater resources.
- Determine the need for additional approvals/permitting.

### 13.5.4 Potential Interactions & Effects Assessment

Project activities have the potential to cause an adverse effect on the freshwater aquatic environment during the following construction and operations activities (Table 13.19).

**Table 13.19: Project Phases and Potential for Interaction with the Freshwater Aquatic Environment**

| Project Phase | Project Component | |
|---|---|---|
| | Industrial Facility | Transmission Interconnection Line |
| **Construction** | | |
| Site Preparation & Construction | X | X |
| Installation and Assembly of Site Infrastructure | X | X |
| Removal of Temporary Works & Site Restoration | X | X |
| Commissioning | O | O |
| **Operations** | | |
| Delivery of Power | --- | O |
| Production of Hydrogen | O | --- |
| Production of Ammonia | O | --- |
| Ship Loading for Transport | O | --- |

X: indicates potential interaction with the freshwater aquatic environment
O: indicates that an interaction with the freshwater aquatic environment is not anticipated
--- indicates that the phase is not applicable (i.e., would not apply to the Industrial Facility and/or Transmission Interconnection Line component)

#### *13.5.4.1 Construction Phase*

As a result of the Project's construction phase for the Industrial Facility and Transmission Interconnection Line, the following potential effects are discussed:

- Alteration of the hydrologic regime
- Degradation of water quality
- Damage or loss of aquatic habitat
- Erosion and sedimentation
- Mortality or displacement of aquatic species

*Protected Watersheds*

The Project Boundary is partially located within provincial and municipal protected watershed areas, and therefore, the Project has the potential to impact drinking water quality and/or quantity. Project components requiring construction within the protected watershed include the raw freshwater pipeline (part of the Industrial Facility – within existing right-of-way's), Transmission Interconnection Line, and northern substation (grid connection). The construction of all other Project components will be completed outside of the protected watershed.

During the construction within the protected watersheds, disturbance of surface soils may result in the release and mobilization of soils by wind or water. This is most likely to occur during activities requiring the disturbance/exposure of surficial soils (e.g., grading, clearing, etc.) or stockpiling of material. Clearing of vegetation for Project infrastructure also has the potential to indirectly result in hydrologic alterations, sedimentation, and erosion which can degrade the quality and quantity of freshwater resources within the identified watersheds. Use of machinery and vehicles could also potentially result in contamination via accidental spills and leaks.

Where the raw freshwater pipeline is within the protected watershed areas, construction will be restricted to existing cleared right-of-ways along the LLWU access road; and therefore, impacts to the protected watershed is not anticipated.

The construction of the Transmission Interconnection Line is within permitted developments/activities listed under the protected watersheds governing regulations, but requires approval from the NS Minister of Environment and Climate Change. A letter requesting permission to construct the Transmission Interconnection Line (and associated northern switching substation) within the Protected Water Area and Water Protection Zone was submitted to the Minister on July 8, 2022 (Strum Consulting, 2022).

The Minister's acknowledgement of the letter was received on August 10, 2022 and indicated that the Proponent was to develop and submit a report detailing any potential effects and associated mitigations that would be applied as a result of Project development within the protected watershed. This report is in progress and will be submitted under separate cover, post-EA Registration, as committed to in subsequent correspondence.
Impacts to the protected watershed would be indirect in nature and are not anticipated to be significant based on the following:

- Small footprint of the Transmission Interconnection Line within central zones (W-1 and/or Section B).
- Project's avoidance of waterbodies, watercourses, fish/habitat, and wetlands.
- Applied mitigation and monitoring required for activities within the Protected Water Area and Water Protection Zone (Sections 13.5.6 and 13.5.8).

*Waterbodies*
The Project Boundary does not contain any identified crossings of Landrie Lake directly; however, the raw freshwater pipeline and Transmission Interconnection Line travel within close proximity to its shoreline and/or cross several tributaries of Landrie Lake. Water quality within Landrie Lake may potentially be indirectly impacted as a result of sediment transport, erosion, and sedimentation generated by vegetation clearing and soil disturbance activities during construction. The use of heavy machinery and equipment within proximity to Landrie Lake may also result in accidental spills or leaks of controlled substances into tributaries of Landrie Lake.

The aforementioned potential impacts to Landrie Lake (i.e., the Protected Water Area/Protected Water Zone) are indirect in nature and are not anticipated to be significant based on the following:

- Small footprint of the Transmission Interconnection Line and raw freshwater pipeline within close proximity to Landrie Lake.
- Avoidance of tributaries to Landrie Lake (the Transmission Interconnection Line and raw freshwater pipeline will span these).
- Mitigation and monitoring activities required for the protected watersheds will also provide protection for Landrie Lake.

*Watercourses*
A total of 11 watercourses were identified within the Project Boundary, all of which are located within the footprint of the Transmission Interconnection Line and raw freshwater pipeline. The construction of the Industrial Facility will not directly impact or require the alteration of any watercourses as the layout of the Industrial Facility was strategically designed to avoid these features (for information regarding previously considered layouts, see Section 1.4).

Along the raw freshwater pipeline (within the LLWU access road right-of-way), there are three existing watercourses. Two of the three watercourses (WC7 and WC8) are constructed drainage ditches from the existing Point Tupper Terminal that have straight dug channels, berms/sloping on banks, and both flow into the same culvert underneath the LLWU access road (towards Landrie Lake). The third watercourse (WC10) is a permanent watercourse fed by surficial drainage within the existing Point Tupper Terminal and a wetland (WL39). WC10 drains into Landrie Lake through a culvert underneath the LLWU access road. Direct impacts to these watercourses are not anticipated as the existing crossings/culverts associated with

the LLWU access road will be utilized/unaltered and the raw freshwater pipeline will span the watercourses and remain within the existing LLWU access road right-of-way. Alteration or disturbance of the watercourses' flow, channel, banks, and substrates are not required or anticipated during the construction of the raw freshwater pipeline.

Similarly, the construction of the Transmission Interconnection Line will not directly impact or require the alteration of any watercourses as the selected route and pole spacing (160 m) allows watercourses to be spanned in their entirety. In addition, access for construction crews/equipment was assessed and it was determined that there are no identified watercourses that will need to be crossed (i.e., forded) to access/construct the Transmission Interconnection Line.

Watercourses within proximity to construction activities have the potential to be indirectly impacted through the release and/or mobilization of soils by wind or runoff into nearby watercourses. This is most likely to occur during activities that expose, stockpile, or disturb surface soils such as vegetation clearing and grading. Vegetation clearing and grading may also disrupt local hydrology, potentially affecting watercourse flow volumes, channel morphology, and aquatic habitat suitability. Lastly, vehicles and machinery working near watercourses carry the risk of potential contamination through accidental spills and leaks.

The aforementioned impacts are indirect in nature and are not anticipated to be significant based on:

- No watercourses are identified within the Industrial Facility footprint.
- Setbacks/spanning of watercourses by the Transmission Interconnection Line and raw freshwater pipeline infrastructure will be undertaken.
- Erosion and sedimentation controls will be applied (further details to be provided in Project's EMP).
- Mitigation and monitoring activities required for the protected watersheds will also provide protection for watercourses.
- Fording is not anticipated for the construction of the Project, and therefore, potential impacts associated with in-water works and substrate/bank disturbance do not apply[7].

*Fish and Fish Habitat*

Alterations to fish and fish habitat (waterbodies/watercourses) are not required for the construction of the Project, and therefore, direct impacts to freshwater fish and associated habitat are not anticipated. Freshwater fish/habitat does have the potential to be indirectly impacted by the Project due to the disturbance and migration of sediment into nearby

[7]Fording is not anticipated to be required to access the corridor of the Transmission Interconnection Line. If fording is determined to be required as part of CAUS (or selected contractor's) Detailed Execution Plan, additional mitigation/BMPs/monitoring for watercourses will be incorporated as part of the Project's EMP, and alteration applications will be provided to NSECC as required.

freshwater systems and/or accidental release of controlled substances from construction equipment.

No fish or aquatic invertebrate SOCI are known to occur within the Project Boundary based on desktop and field studies (Section 7). There are records of Atlantic salmon - *Gaspe Southern Gulf of St Lawrence pop* and Eastern pearlshell within the larger Study Area; however, these records are located within the River Inhabitants Secondary Watershed which flows east and south away from the Project. No components or activities associated with the Project are located within the River Inhabitants Secondary Watershed or watercourses known to contain Atlantic salmon or Eastern pearlshell, and therefore, impacts to these species/populations are not anticipated.

The aforementioned impacts are indirect in nature and are not anticipated to be significant based on:

- No fish habitat located within the Industrial Facility footprint.
- Setbacks/spanning of fish habitat (waterbodies, watercourses, and wetlands) by Transmission Interconnection Line and raw freshwater pipeline infrastructure.
- Erosion and sedimentation controls will be applied (further details to be provided in Project's EMP).
- Mitigation and monitoring activities required for the protected watersheds will also provide protection for fish habitat (waterbodies, watercourses, and wetlands).
- Fording will not be required for the construction of the Project, and therefore, potential impacts associated with in-water works and substrate/bank disturbance do not apply[1].

*Wetlands*
The construction of the Industrial Facility will not directly impact or require the alteration of any wetlands as the layout of the Industrial Facility was strategically designed to avoid these features.

A total of 40 wetlands were identified within the Transmission Interconnection Line (70 m wide corridor). Of the 40 wetlands identified, 10 are WSS that receive additional protection under the Nova Scotia Wetlands Conservation Policy (NSECC, 2019). The construction of the Transmission Interconnection Line will not directly impact or require the alteration of any wetlands as the selected route and pole spacing (160 m) allows wetlands to be spanned in their entirety.

During construction, Project activities have the potential to indirectly impact nearby wetlands primarily during vegetation clearing and soil disturbance activities. Vegetation clearing can alter the local hydrological regime resulting in water being drained from, or directed towards, a wetland. Soil disturbance during grubbing and grading activities can also result in increased sediment transport (via wind and runoff) into wetlands, degrading habitat and

water quality. Vehicles and machinery working near wetlands can also carry the risk of contamination through accidental spills and leaks.

The aforementioned impacts are not anticipated to be significant based on:

- No wetlands located within the Industrial Facility footprint.
- Spanning of wetlands (and WSS) along the Transmission Interconnection Line.
- Vegetation clearing will not occur in WSS.
- Mitigation and monitoring activities required for the protected watersheds will also provide protection for wetlands.

#### *13.5.4.2 Operations Phase*

*Stormwater Management*
During operations the Project will manage precipitation and run off through both an external and internal drainage system (Section 5.9.3). External drainage from the Industrial Facility will direct runoff and overland flow from the surrounding areas towards the peripheral of the Project Boundary, preventing interaction with on-site structures and facilities, and thus limiting indirect impacts to surface run off which could accumulate sedimentation or potential contaminants from accidental spills and leaks. Internal drainage from the Industrial Facility, i.e., surface runoff which is contained within the Project Boundary and could be affected by an accumulation of sediment or potential contaminants from accidental spills and leaks, will be directed to the Project's on-site Stormwater Pond. As part of site operations, protocols will be in place to assess the stormwater contained within the Stormwater Pond prior to discharge. If all applicable water criteria are met, water will be discharged to the surrounding environment, if criteria are not met, the Stormwater Pond will be redirected to the existing Point Tupper Terminal effluent treatment system. Control of runoff from Project operations will prevent impacts to watersheds, waterbodies, watercourses, wetlands and fish/fish habitat. Further details on stormwater management, mitigations and the potential for untreated effluent releases can be found in Section 17.3.

*Protected Watersheds*
No activities during the operations phase of the Project will occur within the protected watershed areas other than the maintenance of the raw freshwater pipeline and Transmission Interconnection Line. The raw freshwater pipeline will be owned, operated, and maintained by LLWU according to their internal protocols and management systems; similarly, the Transmission Interconnection Line will be owned, operated, and maintained by NS Power according to their internal protocols and management systems. Transmission Interconnection Line maintenance activities will be conducted in accordance with NS Power's environmental management practices, and inspections can be performed by either drone or small ATV vehicles.

All other operational activities associated with the Project (i.e., Industrial Facility) will take place outside of the protected watershed.

*Waterbodies*

Landrie Lake is a municipal drinking water source for the communities of Port Hawkesbury and Point Tupper that will also provide raw water to the Project during its operations phase. The Project requires raw water for the purposes of cooling water, process water, potable water, and fire suppression.

During operations, the Project will not impact the quality of water within Landrie Lake, as water is only being sourced/drawn from Landrie Lake (not disposed of or discharged into it). Water will be drawn and provided to the Industrial Facility by the LLWU through the raw freshwater pipeline that will travel along existing LLWU access road right-of-way's.

Impacts to the quantity of water within/supplied by Landrie Lake are not anticipated, as the predicted raw water demand for the Project is well within the approved Landrie Lake water withdrawal limit and maximum capacity of the existing LLWU pumphouse. A summary of current water use and Project water demands is provided in Table 13.20.

**Table 13.20: Summary of Landrie Lake Water Supply**

| Source | Raw Water Demand | LLWU Pumphouse Maximum Capacity |
|---|---|---|
| Project (approved withdrawal) | 9.5 ML/day* | 35.9 ML/day |
| Consumer (NS Power, Sable Offshore, Town of Port Hawkesbury, Tupper Industrial Development, and Port Hawkesbury Paper). | 5.8 ML/day** | |
| Total | 15.3 ML/day | |

Source: HATCH (2022)
*Approved ML/day per agreements with the LLWU.
**Average existing demand.

*Watercourses*

No activities or components associated with the operations phase of the Project will require the alteration/disturbance of watercourses, and therefore, impacts are not anticipated. Indirect effects on watercourses within proximity to the Project are possible during the Project's operation as a result of accidents, malfunctions, and unplanned events (Section 17).

*Fish and Fish Habitat*

Potential impacts to freshwater fish and fish habitat during the operations phase of the Project are not anticipated as no activities or components will be located within waterbodies or watercourses, and disturbance or alteration of these features will not be required. Indirect effects on fish/fish habitat within proximity to the Project are possible during the Project's operation as a result of accidents, malfunctions, and unplanned events (Section 17).

*Wetlands*

No activities or components associated with the operations phase of the Project will require the alteration or disturbance of wetland habitat, and therefore, impacts are not anticipated. Indirect effects on wetlands within proximity to the Project are possible during the Project's operations phase as a result of accidents, malfunctions, and unplanned events (Section 17).

### 13.5.5 Summary of Effects

The existing freshwater aquatic environment significantly influenced the Project design (for both the Industrial Facility and Transmission Interconnection Line) as the Project is committed to avoiding alternations and disturbance to these features. Several layouts were considered which all underwent field assessments to map and characterize the existing freshwater environment; as a result of these assessments the Project Boundary was adjusted to avoid sensitive water features wherever possible.

The selected layout of the Industrial Facility was chosen based on the absence of watercourses and wetlands, along with areas of historical development and anthropogenic alteration. Historical developments have resulted in a severely altered and unnatural hydrological regime influenced by clearing, grading, sloping, and ditching for the:

- Existing Point Tupper Terminal (west)
- Port Malcom Road (west)
- Bear Island Road (south and east)
- LNG pipeline (south)
- LLWU access road (north and west)
- Wind turbine pads and associated access roads (north and east)
- Historical borrow pits and infrastructure (within Project Boundary)

The existing freshwater aquatic environment within the Transmission Interconnection Line significantly differs from the Industrial Facility as it is in a relatively natural environment that has experienced limited disturbance. The selected Transmission Interconnection Line route was chosen because it:

- Maximizes travel along existing utility corridors and roads within the protected watersheds.
- Avoids development within the central protected watershed area/zone as much as possible.
- Avoids direct crossings of Landrie Lake and its shorelines.
- Spans identified freshwater resources (i.e., watercourses, fish/fish habitat, wetlands).
- Avoids freshwater resources that cannot be spanned (>160 m at crossing point).

In conclusion, there will be no alterations of waterbodies, watercourses, fish/fish habitat, or wetlands associated with the construction and operations of the Project. The following table

reviews the VC findings related to changes to the freshwater aquatic environment from the Project.

**Table 13.21: Freshwater Aquatic Environment VCs**

| VC Considered | Geographic Extent | Timing | Duration | Frequency | Reversibility | Magnitude |
|---|---|---|---|---|---|---|
| **Construction Phase** | | | | | | |
| Protected Watersheds | RAA | Not Applicable | Short-term | Single Event | Reversible | Moderate |
| Waterbodies (i.e., Landrie Lake) | RAA | Not Applicable | n/a | n/a | n/a | Negligible |
| Watercourses | LAA | Applicable | n/a | n/a | n/a | Negligible |
| Fish/Fish Habitat | LAA | Applicable | n/a | n/a | n/a | Negligible |
| Wetlands | LAA | Applicable | n/a | n/a | n/a | Negligible |
| **Operations Phase and Maintenance** | | | | | | |
| Protected Watersheds | RAA | Not Applicable | Medium-term | Intermittent | Reversible | Negligible |
| Waterbodies (i.e., Landrie Lake)* | RAA | Not Applicable | Medium-term | Continuous | Reversible | Negligible |
| Watercourses | LAA | Applicable | n/a | n/a | n/a | Negligible |
| Fish/Fish Habitat | LAA | Applicable | n/a | n/a | n/a | Negligible |
| Wetlands | LAA | Applicable | n/a | n/a | n/a | Negligible |

*Water use from Landrie Lake is required for Project operations and is within LLWU approved withdrawal limits.

### 13.5.6 Mitigative & Protective Measures

General mitigation measures and best management practices will be applied to all freshwater aquatic environments within/adjacent to protected watersheds, waterbodies, watercourses, fish/fish habitat, and wetlands which will include the following:

- Avoid entering waterbodies or watercourses.
- Maximize use of existing access roads and right-of-ways for site access.
- Minimize clearing of vegetation adjacent to wetlands and watercourses, wherever possible.
- Avoid disturbing or removing aquatic vegetation, natural wood debris, rocks, sand or other materials from the banks, shorelines or the bed of a waterbody.
- Stabilize and/or re-vegetate (using non-invasive grasses, legumes, and low shrubs) disturbed areas immediately after construction.
- Use brush matting and corduroy roads/timber mats for crossings of treed swamps and bogs.
- Ensure run-off from exposed upland sources, and that which is collected along roadways, is not directly discharged into any waterbody or watercourses through use of the stormwater pond and existing effluent treatment pond.
- Store all fuel, oil, chemicals, and hazardous materials in a designated location at least 30 m away from watercourses/wetlands.
- Ensure that refuelling and maintenance is completed at a designated location at least 30 m away from watercourses/wetlands.
- Ensure all equipment used is mechanically sound, with no fuel or oil leaks.
- Keep an emergency spill-kit at the work site that is well stocked and in close proximity to workers.
- Position equipment on stable ground during operation and on level laydown areas when not in use.
- Adhere to erosion and sedimentation controls (to be detailed in the Project's EMP).

*Protected Watersheds*

Construction and operation of the Transmission Interconnection Line within the Port Hawkesbury Protected Water Area and Landrie Lake Watershed Water Protection Zone will adhere to:

- Approval and associated conditions as required by the NS Minister of Environment and Climate Change.
- NS Power guidelines and best management practices for constructing within protected areas and near watercourses/wetlands.

In addition to the above, CAUS (or selected contractor for the construction of the Transmission Interconnection Line) will have demonstrated experience and internal protocols for working within protected watershed areas, these will be implemented throughout all construction activities. Following the completion of construction, the Transmission Interconnection Line will be owned, operated, and maintained by NS Power.

*Wetlands of Special Significance*

The alteration of WSS is prohibited under the Nova Scotia Wetlands Conservation Policy (NSECC, 2019), and therefore, no activities will occur within WSS identified within the

Project Boundary. Structures/poles associated with the Transmission Interconnection Line will be placed in a way that will span all WSS to avoid disturbance/alteration and site preparation activities (such as vegetation clearing) will not occur within WSS. In addition, CAUS (or selected contractor for the construction of the Transmission Interconnection Line) will have demonstrated experience and internal protocols for working near protected wetland areas, these protocols will be implemented during all construction activities completed in the vicinity of these locations.

### 13.5.7 Residual Effects

**Table 13.22: Summary of VC-Project Interaction**

| VC Project Components | Potential Effect | Mitigations | Residual Effect (Yes/No) | Significance? (S/NS) |
|---|---|---|---|---|
| Freshwater Aquatic Environment | No direct impact (alterations) to freshwater resources.<br><br>Indirect impacts on nearby freshwater resources include:<br>• Erosion and sedimentation<br>• Changes to surface runoff/hydrology<br>• Degradation of water quality<br>• Damage or loss of aquatic habitat/species. | Avoidance of freshwater aquatic resources.<br><br>Sedimentation and erosion controls (as part of EMP).<br><br>Mitigations committed by NS Power and CAUS (or selected contractor). | No | NS |

S = Significant
NS = Not Significant

### 13.5.8 Recommended Monitoring & Follow-Up

Based on the extent of Project activities, significance of the freshwater resource and associated public use, additional monitoring and follow-up surveys are recommended for activities within the following locations:

- Port Hawkesbury Protected Water Area.
- Landrie Lake Watershed Water Protection Zone.

A report regarding Project activities to be completed within the protected watershed areas is currently under development for submission to the NS Minister of Environment and Climate

Change (see Appendix S for draft table of contents). Upon review and approval, the construction of the Transmission Interconnection Line in these protected areas may proceed.

No additional monitoring or follow-up is recommended for waterbodies, watercourses, fish/fish habitat, or wetlands as Project activities will not occur within or directly impact these features.

## 13.6 Terrestrial Environment

### 13.6.1 Overview

The terrestrial environment VC considers potential effects on significant habitat, flora, fauna, bats, and avifauna as a result of Project activities during construction and operations.

### 13.6.2 Boundaries & Assessment Criteria

#### *13.6.2.1 Spatial Boundary*

The spatial boundary for this assessment is within the Study Area.

#### *13.6.2.2 Temporal Boundary*

The temporal boundary includes short-term construction and medium-term (Project lifespan) operational activities.

#### *13.6.2.3 Applicable Regulations*

The following legislation and their associated regulations are applicable regarding potential impacts to the terrestrial environment:

- *Canada Wildlife Act,* R.S.C. 1985, c. W-9
- *CEPA*, S.C 1999, c. 33
- *Migratory Birds Convention Act (MBCA),* S.C. 1994, c. 22
- Bill NO. 4, *Biodiversity Act*, 3rd Session, 63rd General Assembly, 2021
- *Environment Act*, S.N.S. 1994-95, c. 1
- *Wildlife Act*, R.S.N.S. 1989, c. 504
- *ESA*, S.N.S 1998, c. 11
- *SARA*, S.C. 2002, c. 29

#### *13.6.2.4 Assessment Criteria*

As per Section 12.3, where there is potential for Project-related effects, the significance of the effect is determined using defined criteria. For the purposes of assessing the terrestrial environment, all criteria for identification and definition of an adverse effect, as presented in Table 12.2, will apply.

In addition, the VC-specific definition for magnitude:

- Negligible – no measurable loss of significant habitat or alteration to habitat function; no SOCI identified within the Study Area.
- Low – no measurable loss of significant habitat, minor alteration to habitat but habitat functions remain intact; SOCI are present within the Study Area, but no impacts are anticipated.
- Moderate – measurable loss of significant habitat, and/or loss of key habitat functions; SOCI are present within the Study Area and minor (i.e., temporary) impacts are anticipated.
- High – complete loss of significant habitat and/or key habitat functions; SOCI are present within the Study Area and significant (permanent) impacts are anticipated.

### 13.6.3 Assessment Methodology

The assessment of the terrestrial environment is based on desktop and field studies, and addresses Project-related effects on significant habitat, flora, fauna, bats, and avifauna. The objectives aim to achieve the following:

- Identify SOCI and significant habitat within the Project Boundary.
- Assess impacts to terrestrial resources from Project activities.
- Mitigate and minimize impacts.
- Determine if monitoring is required, per applicable guidelines.

For information regarding baseline terrestrial conditions, see Section 7.

### 13.6.4 Potential Interactions and Effects Assessment

Project activities have the potential to cause an adverse effect on the terrestrial environment during construction and operations activities (Table 13.23).

**Table 13.23: Project Phases and Potential for Interaction with the Terrestrial Environment**

| Project Phase | Project Component | |
|---|---|---|
| | Industrial Facility | Transmission Interconnection Line |
| **Construction** | | |
| Site Preparation & Construction | X | X |
| Installation and Assembly of Site Infrastructure | X | X |
| Removal of Temporary Works & Site Restoration | X | X |
| Commissioning | O | O |
| **Operations** | | |
| Delivery of Power | --- | O |
| Production of Hydrogen | O | --- |
| Production of Ammonia | O | --- |
| Ship Loading for Transport | O | --- |

X: indicates potential interaction with terrestrial environment
O: indicates that an interaction with the terrestrial environment is not anticipated
--- indicates that the phase is not applicable (i.e., would not apply to the Industrial Facility and/or Transmission Interconnection Line component)

#### *13.6.4.1 Construction Phase*

Project activities have the potential to impact the terrestrial environment within the Project Boundary and potentially indirectly effect resources within the larger Study Area through:

- Degradation and/or destruction of habitat.
- Destruction of flora SOCI.
- Displacement and/or accidental injury/mortality of fauna SOCI.
- Introduction of invasive/exotic species.
- Disturbance (noise, lighting, etc.).

*Significant Habitat*

Within the Study Area, there are several areas considered (or which have the potential) to be significant habitat including protected areas, old growth forest policy lands, and potential boreal felt lichen habitat. Direct impacts on these significant habitat features are not anticipated as none have been identified within the Project Boundary, with the exception of the Transmission Interconnection Line and raw freshwater pipeline which are partially located within the Protected Water Areas (see Section 13.5.4.1 for further details). While construction activities do have the potential to indirectly impact these areas and the species they support (e.g., noise disturbance, lighting, transportation of sediment/contaminants into sensitive habitats via wind or water, etc.), this is considered unlikely because of the distance between the Project Boundary and the significant habitat locations; as well, indirect effects will be managed and mitigated through the implementation of best management practices as described in Section 13.6.5.

*Terrestrial Flora*

Terrestrial flora SOCI documented within the Study Area during desktop and/or field studies that may be impacted by Project activities include:

- Blue felt lichen
- Eastern waterfan
- Northern comandra
- Southern twayblade
- Water blinks

Potential impacts on flora SOCI could occur through destruction and/or degradation of SOCI along with the introduction of invasive/exotic species. This is most likely to occur during vegetation clearing, grubbing, and grading activities during the construction of the Project. Indirect impacts to lakes, watercourses, and wetlands during construction activities may also impact flora SOCI present within these freshwater habitats; see Section 13.5 for further details regarding the freshwater environment.

No flora SOCI were identified within the Industrial Facility, and consequently, mitigations for SOCI and/or significant habitat have not been considered.

Within the Transmission Interconnection Line, there are three documented occurrences of flora SOCI, all of which are southern twayblade. Direct impacts to these species are not anticipated because the Transmission Interconnection Line routing was modified to ensure areas containing flora SOCI would be avoided and/or spanned. In addition, southern twayblade (and all other SOCI identified within the Study Area) have an affinity for habitats associated with watercourse, wetland, and riparian areas which underwent comprehensive delineation and characterization during freshwater surveys to ensure these habitats are avoided during Project activities. Avoidance and additional mitigation for freshwater environments (such as buffering and spanning) will also avoid/mitigate impacts to flora SOCI identified within these sensitive locations.

Impacts to flora SOCI are considered to be highly manageable (due to their stationary nature) through siting considerations, avoidance, and applied mitigation.

Observations of the remaining SOCI within the Study Area (i.e., blue felt lichen, eastern waterfan, northern comandra, and water blinks) did not have documented occurrences within the Project Boundary as they were avoided during Project design/development. Potential indirect impacts on flora SOCI (e.g., as a result of invasive species) will be minimized through applied mitigated, see Section 13.6.5 below for details.

*Terrestrial Fauna*

Terrestrial fauna SOCI that have been documented within the Study Area during desktop and/or field studies are also considered priority species and include the following:

- Elfin skimmer
- Harlequin darner
- Wood turtle

Potential impacts to faun SOCI could occur during construction activities, fauna SOCI may be disrupted or distressed due to noise emitted by heavy equipment/machinery or as a result of encounters with Project personnel. Clearing and grading activities associated with road development, the Industrial Facility and Transmission Interconnection Line infrastructure development, and creation of laydown areas may also degrade or destroy SOCI associated habitat along with impeding species movement/migration. Indirect impacts to lakes, watercourses, and wetlands during construction activities may also impact fauna SOCI present within these freshwater habitats; see Section 13.5 for further details regarding the freshwater environment.

None of the aforementioned species were documented within the Project Boundary (Industrial Facility and Transmission Interconnection Line) during field or desktop assessments; however, these species were identified within the larger Study Area adjacent to freshwater habitats. Due to the transient nature of wildlife, these species may pass through or reside within the Project Boundary seasonally and/or periodically. As a result, all freshwater habitats which could contain these species are being avoided by the Industrial Facility and avoided/spanned by Transmission Interconnection Line. In addition, a watercourse (WC2) along the Transmission Interconnection Line was found to contain adequate Wood turtle habitat based on its permanence of flow, sandy/mucky substrates and banks, and riparian wetland habitat. Direct impacts to this watercourse and subsequent potential Wood turtle habitat are not anticipated as this watercourse and the surrounding wetland habitat will be avoided/spanned during Project activities. Indirect impacts to SOCI fauna habitat from erosion and sedimentation could occur as a result of construction activities, but mitigations will be in place to prevent erosion and sedimentation loss during construction activities and activities will be completed outside of sensitive timing windows for Wood turtle.

*Bats*
Bat SOCI documented within the Study Area during desktop review include Little brown myotis and an unidentified bat species. The construction of the Project is not anticipated to directly impact bat SOCI or their associated significant habitat features (i.e., hibernacula and maternity colonies) as these species were not found within the Project Boundary and significant habitat features were not identified during field assessment. Vegetation removal during construction activities may result in the removal of snags or downed trees utilized as over-day habitat for bats; however, care will be taken to work around these habitat features during clearing when possible.

*Avifauna*

Primary impacts to avian species/habitat during the Project's construction include habitat loss/degradation and sensory disturbance. A total of 38 avian SOCI were identified within the Study Area, of which, six are SAR including Barn Swallow, Canada Warbler, Common Nighthawk, Evening Grosbeak, Olive-sided Flycatcher, and Rusty Blackbird.

Construction of the Industrial Facility will require vegetation clearing, grubbing, and grading, resulting in the permanent removal of habitat. Existing habitat within the Industrial Facility is predominantly open/cleared areas dominated by grasses and shrubs (from historical borrow pits) along with young and establishment (new growth following disturbance) forests dominated by red maple and yellow birch. These habitat types are preferred by several avifauna SOCI identified near the Industrial Facility including Barn Swallow, Common Nighthawk, and Olive-sided Flycatcher. Removal of these habitat types during construction of the Industrial Facility is not anticipated to impact the range or habitat function of SAR based on the:

- Removal is limited to approximately 27 ha.
- Habitat is located in an active industrial area.
- Habitat is highly fragmented from nearby natural/undisturbed areas by existing roadways, pipelines, and industrial developments.

Construction of the Transmission Interconnection Line will require partial vegetation clearing within the corridor and along temporary roadways required to access the corridor. Habitat will not be permanently removed (as is required for the construction of the Industrial Facility) but will be altered to accommodate the Transmission Interconnection Line infrastructure and associated safety requirements. The Transmission Connection Line will be partially cleared to complete construction activities, but vegetation will be allowed to regrow within safety/height restrictions. Overall, the mixed habitat types present within the Transmission Interconnection Line will be altered/allowed to regenerate with shrubs and brush (except in areas identified to contain important freshwater resources which will remain unaltered/avoided). Impacts to avifauna SAR range and habitat function/connectivity are not anticipated during construction of the Transmission Interconnection Line based on:

- Partial vegetative clearing only.
- Permitted regrowth of vegetation along the Transmission Interconnection Line corridor following construction.
- Avoidance of wetland, watercourse, waterbody, and riparian habitats (preferred by Canada Warbler, Common Nighthawk, Olive-sided Flycatcher).
- Avoidance of old growth/Old Forest Policy Lands (used by Olive-sided Flycatcher).

During field surveys along alternative routes/layouts, nesting was confirmed for Osprey and suspected for Common Loon along the northern shoreline of Landrie Lake. As a result of the presence of nesting raptors/waterfowl, the Transmission Interconnection Line was re-routed

to avoid crossings of Landrie Lake and its shoreline; however, given the confirmed presence of Osprey within proximity to the Transmission Interconnection Line corridor, details on mitigation and buffering requirements for this species will be incorporated into the Project's EMP (see Section4.3.5 for details).

Construction of the substations associated with the Transmission Interconnection Line will require vegetation clearing, grubbing, and grading, resulting in the permanent removal of habitat within their footprints. The northern switching substation (which provides connection to the grid) is located in a multi-aged tree stand dominated by red maple, and is adjacent to an existing high voltage transmission line (operated by NS Power). The southern substation (which provides the connection to the Industrial Facility) is located in a young to mature tree stand dominated by red maple, adjacent to/overlapping an existing turbine pad and associated access road. Based on the small footprint of the two substations and adjacent pre-existing infrastructure, permanent removal of these habitats is not anticipated to significantly impact avian species/habitat within the area.

Avifauna may experience temporary sensory disruption as a result of noise and lighting generated by construction activities however, these disturbances will be mitigated as described in Section 13.6.5 below.

#### *13.6.4.2 Operations Phase*

*Significant Habitat*
Impacts to significant habitat during the operations phase of the Project are not anticipated as no operational activities occur within significant areas (parks/protected areas, old forest policy lands, and potential boreal felt lichen habitat).

General maintenance activities will occur along the raw freshwater pipeline and Transmission Interconnection Line and will be the responsibility of LLWU and NS Power respectively. Maintenance activities will fall under the LLWU and NS Power internal operating procedures for working within Protected Water Areas and further consideration of these activities are outside the scope of this Project.

*Terrestrial Flora*
Impacts to terrestrial flora during the operations phase of the Project are not anticipated as the Project's location was strategically chosen to avoid flora SOCI and their preferred habitats (i.e., watercourse, wetland, and riparian areas). Further, disturbance of vegetation is not required for normal operation.

General maintenance of the Transmission Interconnection Line will likely involve intermittent grooming/clearing of vegetation within the Transmission Interconnection Line corridor to ensure safety standards are achieved. During maintenance activities, there is the potential to impact flora species/habitat through the introduction of invasive species along with temporary

habitat loss/degradation as a result of tree/shrub removal (which will be allowed to regrow within safety considerations).

*Terrestrial Fauna*

Operation and maintenance of the Project is not anticipated to impact terrestrial fauna or their associated habitat, other than through potential sensory disturbance as a result of operational noise and lighting at the Industrial Facility. These impacts are not considered a change to the existing environment for terrestrial fauna as the Industrial Facility is in an active industrial area and disturbances produced by the Project will be similar to those already in existence within the surrounding (industrial) environment.

*Bats*

During operations, impacts to bats/habitat are not anticipated, other than potential sensory disruptions or behavioral changes as a result of Project generated noise and lighting. Operation of the Industrial Facility during the night may deter bats from foraging, roosting, or travelling within close proximity; and lighting associated with the Industrial Facility may attract insects, and subsequently, bats to the area. Noise and lighting generated by the Industrial Facility during operation is not considered a change to the existing environment as the Industrial Facility is in an active industrial area and the noise/lighting produced by the Project will be similar to that which is already in existence within the surrounding (industrial) environment.

Impacts to significant bat habitat (i.e., hibernacula or maternity colonies) are not anticipated as no records were identified within proximity (i.e., within 25 km) of the Project Boundary (see Sections 7.3.4 and 7.4.4 for details).

*Avifauna*

Operational activities are not anticipated to impact avifauna or their associated habitat, other than potential sensory disturbance from Project generated light and noise. Project generated light/noise will align with existing conditions as the Project is located within an active industrial area.

As part of the operations of the Industrial Facility, two flares are required for off-gassing from the ammonia plant and ammonia storage tanks. Use of the flares will be both continuous (purging of inert gas and pilot fuel) and intermittent (during boil-off system failures, power outages, or downtime). These flares are not anticipated to impact avifauna as the pilot light/flame is located at the bottom of the flare stack.

Lastly, general maintenance of the Transmission Interconnection Line will likely involve intermittent grooming/clearing of vegetation along the right-of-way which may temporarily displace avian species and/or their habitat or cause accidental injury/mortality.

### 13.6.5 Summary of Effects

The terrestrial environment within the Industrial Facility has undergone significant alteration and disturbance as a result of historical and current industrial activities within the area. Historical borrow pits and wind turbines within the Industrial Facility have resulted in widespread vegetation and habitat removal. Further, the landscape borders a coastline to the southwest and is highly fragmented to the north and east by surrounding developments (roads, powerlines, etc.).

The following table reviews the VC findings and significance related to impacts on the terrestrial environment as a result of the Project.

**Table 13.24: Terrestrial Environment VCs**

| VC Considered | Geographic Extent | Timing | Duration | Frequency | Reversibility | Magnitude |
|---|---|---|---|---|---|---|
| **Construction Phase** | | | | | | |
| **Industrial Facility** | | | | | | |
| Significant Habitat | Project Boundary | Not Applicable | Medium-term | Single Event | Irreversible | Low |
| Terrestrial Flora | Project Boundary | Not Applicable | Medium-term | Single Event | Irreversible | Low |
| Terrestrial Fauna | RAA | Applicable | Medium-term | Single Event | Irreversible | Low |
| Bats | RAA | Applicable | Medium-term | Single Event | Irreversible | Low |
| Avifauna | RAA | Applicable | Medium-term | Single Event | Irreversible | Low |
| **Transmission Interconnection Line** | | | | | | |
| Significant Habitat | Project Boundary | Not Applicable | Short-term | Single Event | Reversible | Low |
| Terrestrial Flora | Project Boundary | Not Applicable | Short-term | Single Event | Reversible | Low |
| Terrestrial Fauna | RAA | Applicable | Short-term | Single Event | Reversible | Low |
| Bats | RAA | Applicable | Short-term | Single Event | Reversible | Low |
| Avifauna | RAA | Applicable | Short-term | Single Event | Reversible | Low |
| **Operation Phase and Maintenance** | | | | | | |
| **Industrial Facility** | | | | | | |
| Significant Habitat | Project Boundary | Not Applicable | Medium-term | Continuous* | Reversible | Low |

| VC Considered | Geographic Extent | Timing | Duration | Frequency | Reversibility | Magnitude |
|---|---|---|---|---|---|---|
| Terrestrial Flora | Project Boundary | Not Applicable | Medium-term | Continuous* | Reversible | Low |
| Terrestrial Fauna | RAA | Applicable | Medium-term | Continuous* | Reversible | Low |
| Bats | RAA | Applicable | Medium-term | Continuous* | Reversible | Low |
| Avifauna | RAA | Applicable | Medium-term | Continuous* | Reversible | Low |
| **Transmission Interconnection Line** | | | | | | |
| Significant Habitat | Project Boundary | Not Applicable | Medium-term | Intermittent** | Reversible | Low |
| Terrestrial Flora | Project Boundary | Not Applicable | Medium-term | Intermittent** | Reversible | Low |
| Terrestrial Fauna | RAA | Applicable | Medium-term | Intermittent** | Reversible | Low |
| Bats | RAA | Applicable | Medium-term | Intermittent** | Reversible | Low |
| Avifauna | RAA | Applicable | Medium-term | Intermittent** | Reversible | Low |

*Sensory disturbance (from noise and lighting) will occur continuously throughout operations at the Industrial Facility. Intermittent impacts to habitat along the raw freshwater pipeline may also occur during general maintenance activities.
**Only during general maintenance activities along the Transmission Interconnection Line.

### 13.6.6 Mitigative & Protective Measures

Avoidance of significant habitat and SOCI was the priority during the design and development phases of the Project. Several Project layouts were considered, all of which underwent field assessments to map and characterize the existing terrestrial environment; as a result of these assessments the Project Boundary was adjusted to avoid sensitive terrestrial species and habitats wherever possible.

In addition to avoidance and remaining within the Project Boundary during all Project activities, general mitigation measures for the conservation of flora, fauna, bat, and avian species within the Project Boundary are provided below.

*Flora SOCI*

- Avoid/minimize construction and clearing activities during the growing season (June 15 to August 31); pre-clearing assessments will be conducted in the event clearing takes place during the growing season.
- Clean vehicles and machinery prior to use to prevent the introduction of invasive species.
- Re-vegetate disturbed areas as soon as practical to prevent habitat alteration by

invasive species. Revegetation of reclaimed areas will be completed using native plant species and high-quality commercial seed mixes (to prevent invasive species).
- Prior to grubbing and grading, construction crews will be notified of locations of rare plant and lichen species in/within close proximity to the Project Boundary to ensure avoidance.

Mitigation measures listed for the protection of freshwater resources (Section 13.5.6) will also apply to the protection of flora SOCI including: blue felt lichen, eastern waterfan, northern comandra, southern twayblade, and water blinks.

*Fauna SOCI*
- Maintain all equipment and machinery to ensure they are kept in working condition to reduce noise and vibration emissions that may disrupt wildlife.
- Ensure workers, machinery, and heavy equipment stay within the Project Boundary during construction and operational activities.
- Restrict lighting to the minimum levels required for safety.
- Educate Project personnel about the potential wildlife in the area to prevent harassment, feeding, and habituation.
- Report any sightings of fauna SOCI with GPS locations and photos (as possible). Further information regarding the documentation and reporting of SOCI/SAR will be addressed as part of the Project's EMP.

Avoidance of freshwater resources and additional freshwater mitigations (Section 13.5.6) will also apply to the protection of fauna SOCI: Elfin skimmer, Harlequin darner, and Wood turtle. For WC2 where potential wood turtle habitat was identified, in addition to avoidance the following mitigation measures will also apply:

- Ensure adequate vegetation buffers (minimum of 30 m) composed of shrubs and trees are left around identified potential Wood turtle habitat.
- Avoid/minimize removal of vegetation during the active Wood turtle season (April to mid-October).
- Restrict motorized vehicle use within 100 m (on either side) of watercourses known/suspected to contain Wood turtle during the months of April, May, and October and 150 m between June and September.
- Adhere to appropriate sedimentation and erosion controls to mitigate adverse impacts to potential turtle overwintering and nesting sites (further details to be supplied within the EMP).

*Bats*
- Avoid and minimize the removal of large snags/downed trees to preserve roosting habitat.
- Complete vegetation clearing during daylight and winter months (where possible) to limit impacts to bats and associated over-day roosting habitat.

- Maintain avoidance of caves and abandoned mine shafts that have the potential to support overwintering habitat (none documented in the Project Boundary).
- Restrict lighting (within safety requirements) to prevent bats from being attracted to active work areas.

*Avifauna*

- Conduct clearing activities outside the sensitive timing window for avian species (April 15 – August 31). If clearing is required during this time, CWS will be consulted to ensure compliance with the MBCA.

### 13.6.7 Residual Effects Analysis

**Table 13.25: Summary of VC-Project Interaction**

| VC Project Components | Potential Effect | Mitigations | Residual Effect (Yes/No) | Significance? (S/NS) |
|---|---|---|---|---|
| Terrestrial Environment | • Degradation and/or destruction of habitat<br>• Destruction of flora SOCI<br>• Displacement, and/or accidental mortality of fauna SOCI<br>• Introduction of invasive/exotic species<br>• Disturbance (noise, lighting) | • Avoidance of SOCI and associated habitat<br>• Adherence to regulatory standards and guidelines (comply with MBCA).<br>• Restricting clearing/alterations to take place outside of sensitive timing windows.<br>• Controls for introduction of invasive species (equipment cleaning, revegetation of disturbed areas).<br>• Controls for noise/lighting (maintain equipment and restrict lighting to within required safety limits) | Yes* | NS |

*Permanent removal of habitat within the Industrial Facility footprint.
S = Significant
NS = Not Significant

### 13.6.8 Recommended Monitoring & Follow-Up

No further monitoring is recommended for the terrestrial environment at this time as direct impacts to significant areas/habitat and SOCI will be avoided and/or mitigated.

## 13.7 Socioeconomic

### 13.7.1 Overview

The socioeconomic assessment considers the Project-related impacts on the surrounding social and economic environment, including the local demographic, economy, land use and value, transportation, and recreation and tourism for the MCR and parts of Cape Breton and mainland Nova Scotia.

### 13.7.2 Boundaries and Assessment Criteria

#### *13.7.2.1 Spatial Boundary*

The spatial boundaries for socioeconomic impacts have been organized into three areas which include communities surrounding the Study Area (LAA), Cape Breton Island (RAA), and the province of Nova Scotia (provincial assessment area).

#### *13.7.2.2 Temporal Boundary*

The socioeconomic VC considers the potential effects on the surrounding social and economic environment during the construction and operational phases of the Project.

#### *13.7.2.3 Applicable Regulations*

There are no relevant applicable regulations.

#### *13.7.2.4 Assessment Criteria*

As per Section 12.3, where there is potential for Project-related effects, the significance of the effect is determined using defined criteria. To assess the socioeconomic environment, all criteria for identification and definition of an adverse effect, as presented in Table 12.2, will apply, except VC-specific definitions for geographic extent and magnitude, which are defined as follows:

*Geographic Extent*

- Local Assessment Area – socioeconomic considerations extend into the Study Area and impact communities in the surrounding area.
- Regional Assessment Area – socioeconomic considerations extend across Cape Breton Island and impact Cape Breton's economy and society.
- Provincial Assessment Area – socioeconomic considerations extend to the province of Nova Scotia and impact Nova Scotia's economy and society.

*Magnitude*

- Negligible – no expected changes to demographics, economy, land use and value, recreation and tourism, and transportation.

- Low – minor (i.e., not statistically measurable [8]) changes expected to the demographics, economy, land use and value, recreation and tourism, and transportation.
- Medium – moderate (i.e., statistically measurable[1]) changes expected to the demographics, economy, land use and value, recreation and tourism, and transportation.
- High – widespread (i.e., statistically measurable[1] and >10%) changes to the demographics, economy, land use and value, recreation and tourism, and transportation.

### 13.7.3 Assessment Methodology

The assessment of the socioeconomic environment is based on desktop studies and addresses Project-related effects on population variances, employment opportunities, the labour force, the housing market, recreation and tourism, transportation, and regional and provincial economy. The objectives of the assessment aim to achieve the following:

- Establish the social and economic impacts created by the Project.
- Assess impacts to communities or regions that may result from social and economic changes.
- Determine the extent of the socioeconomic impacts and whether mitigation or minimization of impacts is necessary.

For information regarding baseline socioeconomic conditions, see Section 8.

### 13.7.4 Potential Interactions and Effects Assessment

Project activities may potentially have positive and/or negative (adverse) effects on the socioeconomic environment during construction and operations activities (Table 13.26).

[8]Statistically measurable indicates that the change would be captured in Census or Statistics Canada data, as applicable.

**Table 13.26: Project Phases and Potential for Interaction with the Socioeconomic Environment**

| Project Phase | Project Component | |
|---|---|---|
| | Industrial Facility | Transmission Interconnection Line |
| **Construction** | | |
| Site Preparation & Construction | X | X |
| Installation and Assembly of Site Infrastructure | X | X |
| Removal of Temporary Works & Site Restoration | X | X |
| Commissioning | X | X |
| **Operations** | | |
| Delivery of Power | --- | X |
| Production of Hydrogen | X | --- |
| Production of Ammonia | X | --- |
| Ship Loading for Transport | X | --- |

X: indicates potential interaction with the socioeconomic environment
O: indicates that an interaction with the socioeconomic environment is not anticipated
--- indicates that the phase is not applicable (i.e., would not apply to the Industrial Facility and/or Transmission Interconnection Line component)

#### *13.7.4.1 Construction Phase*

During the construction phase, the Project will employ a dedicated temporary crew of approximately 900 full-time equivalent (FTE) positions for the construction and on-site assembly work. This crew will include contractors, suppliers, labourers, engineering resources, as well as other disciplinary teams.

The following subsections discuss the components of concern with the anticipated effects from the Project's construction phase.

*Local Demographics*

Local demography assesses the effect the Project will have on the population profile, number of dwellings, age distribution within the community, language or community characteristics changes, and increases or decreases in the overall population.

As a result of construction activities, the following effects are anticipated:

- An influx of (temporary) residents may affect the MCR community and surrounding areas as a result of workers temporarily relocating for short-term employment.
- A temporary increase in the number of dwellings required to house the incoming labour force within MCR and surrounding areas.
- A temporary decrease in the median age distribution within MCR and surrounding areas to account for the influx of working-age personnel.
- Potential temporary changes to the language distribution within MCR and surrounding communities, including the potential increase in additional languages

(outside of English and French) depending on the origin of temporary workers.
- Temporary increase in the overall population within MCR and surrounding communities.

*Economy*
The economy assesses the employment rate, income of residents, industry characteristics and services offered within a given area.

As a result of construction activities, the following effects are anticipated:

- An increase in employment opportunities for the local community, First Nation communities, and equity-seeking groups.
- Support for economic reconciliation through a meaningful partnership between the Project and First Nation communities.
- An increase in economic prosperity within First Nation communities.
- Local businesses may experience increased sales and/or patronage.
- An increased demand for short-term accommodations.
- An increased demand in the food services, construction, health care and social assistance, and retail trade industries.
- An increase in essential services to meet demand.
- An increase in employment opportunities, especially in the areas of accommodation and food services, education and health care and social assistance sectors.
- Anticipated generation of as much as $549 million in direct household income

EverWind is unique in that the Proponent has delivered substantial benefits to communities today and has the potential to provide the greatest benefits to the region in the future. These include the following:

- Benefit plans are in place with significant opportunities being delivered to Nova Scotia as a whole, with a particular emphasis on the Strait of Canso Area and the nearby municipalities, including:
    - Equity partnership with First Nations.
    - Signed Community Benefits Agreement with the Municipality of District of Guysborough.
- Substantial environmental, economic (financial and employment), and social benefits supported by analysis conducted by leading third-party economic consulting firm Group ATN (2022):
    - Environmental: "*The hydrogen/ammonia produced [by the Project] can contribute significantly to 'Canada's GHG emission reduction goals by reducing GHG emissions by an expected 1.5 million tonnes per year by 2030.*
    - Economic: *"The economic benefits that accrue from green economy developments at this scale creates a cascade of opportunity in supporting industrial and innovation ecosystem development."*

- Social: *"This project offers significant social impacts by supporting labour market development and training. It will provide an opportunity to build and diversify a new energy transition skilled workforce. This will create enhanced labour supply in a sector that holds significant potential for exponential growth going forward."*

*Land Use and Value*
Land use and value assesses the existing property that the Project will reside within and the impacts its development may have on neighbouring properties and/or surrounding developments.

As a result of construction activities, the following effects are anticipated:

- An increase in development opportunities as a result of the influx of employment opportunities and people relocating to the area for Project work.
- An increase in home market value based on demand.
- An increase in short-term rentals and commercial space leases.

Note that as the Project's Industrial Facility will be located within an industrial zoning area, Project activities will comply with the municipal requirements for land use (i.e., associated Municipal bylaws) and land use permit alterations and/or re-zoning applications will not be required.

*Transportation*
Transportation assesses the use of existing road networks and Highways within proximity to the Project to determine whether Project activities will affect these resources.

As a result of construction activities, the following effects are anticipated:

- Vehicular traffic may increase due to the influx of temporary workers, resulting in potential delays and congestion on existing road networks.
- Oversized loads (component and equipment deliveries) will be required, likely resulting in temporary traffic delays.
- Road conditions may be impacted by Project-related vehicle traffic resulting from increased traffic and tonnage transports, tracked debris and general wear and tear.

*Recreation and Tourism*
Recreation and tourism assesses the potential impact that the Project will have on tourist capture rate and recreational activities. The Town of Port Hawkesbury is located within proximity to the Project and provides various recreational and tourist services, including activities such as ATV use, snowmobiling, fishing, hunting, camping, hiking and golfing, as well as trails and museums associated with the Town.

The Town of Port Hawkesbury is also located near the Strait of Canso causeway, which is the 'gateway to Cape Breton' from mainland Nova Scotia; as a result, the Town attracts visitors on route to the more northern Cape Breton communities of Baddeck, Cheticamp, Ingonish, and Sydney. However, the regional capture rate for Port Hawkesbury remains relatively low (10%) compared to other popular tourist destinations within Cape Breton (Baddeck, 40%; Cheticamp, 33%; Ingonish, 28%; and Sydney, 32%); see Section 8.7 for further details.

As a result of construction activities, the following effects are anticipated:

- Outdoor recreational activities such as snowmobiling, ATV use, fishing and hunting are unlikely to be impacted by the Project as the Project Boundary will not overlap with any areas associated with these activities; [i.e., no major watercourses, lakes (note that Landrie Lake is a Town water supply and fishing is not permitted) or trails were identified within the Project Boundary].
- Construction activities will be temporary, and any incidental encounters with recreational users (i.e., potential hunting activities within the Transmission Interconnection Line corridor) will be short-term and temporary.
- The Industrial Facility is located within an industrial zone, and recreational activities are not permitted within this area.
- An increase in the number of local outdoor recreational users may be experienced (as a result of the influx of personnel associated with the Project).
- Local tourism capture rates are expected to remain the same.

#### 13.7.4.2 *Operations Phase*

During the operations phase, the Project will require a dedicated permanent workforce of approximately 60 FTE employees for the direct operation of the activities at the Industrial Facility, and an incremental 10-30 FTE positions will be required for maintenance personnel and suppliers.

The following subsections discuss the components of concern and the anticipated effects from the Project's operations phase.

*Local Demographic*

As a result of operational activities, the following effects are anticipated:

- An influx of (permanent) residents may positively affect the MCR community and surrounding areas due to people relocating to the area for medium-term employment.
- An increase in the number of dwellings required to house the incoming labour force within MCR and surrounding areas.
- A potential decrease in the median age distribution within MCR and surrounding areas to account for the influx of working-age personnel.
- Potential changes to the language distribution within MCR and surrounding

communities, including the potential increase in additional languages (outside of English and French) depending on the origin of workers.
- A potential increase in the overall population within MCR and surrounding communities.

*Economy*

As a result of operational activities, the following effects are anticipated:

- An increase in employment opportunities for the local community, First Nation communities, and equity-seeking groups.
- Project-generated employment opportunities may also provide an opportunity for repatriating workers who may have moved away to secure well-paying jobs elsewhere (outside of Cape Breton/Nova Scotia).
- Support for economic reconciliation through a meaningful partnership between the Project and First Nation communities.
- An increase in economic prosperity within First Nation communities.
- An increase in high-paying jobs enabling local, regional and provincial youth to engage and excel in meaningful careers.
- Increased opportunities for workers interested in upskilling to expand their capabilities to better align with the emerging sector and green economy.
- Local businesses may experience increased sales and/or patronage.
- An increased demand/patronage in the food services, construction, health care and social assistance and retail trade industries.
- An increase in essential services to meet demand.
- An increase in employment opportunities, especially in the areas of accommodation and food services, education and health care and social assistance sectors.
- Expansion of Nova Scotia's green energy market.
- Increased publicity for the province of Nova Scotia and the formation of international trade relationships.
- An increase in investments in the regional (Cape Breton) economy and employment opportunities.
- An increase in tax revenues for the regional economy, with an estimated corporate tax of $850 million (CAD) over the life of the Project.

As the economic market increases, more money will be dispersed within the province of Nova Scotia and, more importantly, to the local municipalities and the region of Cape Breton (which experiences lower household incomes and employment rates compared to the province as a whole, Section 8.2). The Project is anticipated to generate billions in new money and economic impact through a largely export-focused industry, new to Atlantic Canada. Additional employment opportunities will also increase expendable income within local communities, potentially increasing average local (MCR) earnings and decreasing the unemployment rate.

*Land Use and Value*
As a result of operational activities, the following effects are anticipated:

- An increase in development opportunities as a result of the influx of employment opportunities and people relocating to the area for Project work.
- An increase in home market value based on demand.

*Transportation*
As a result of operational activities, the following effects are anticipated:

- Traffic volumes may increase slightly compared to existing conditions to accommodate the required workforce and occasional equipment and maintenance deliveries to the Industrial Facility.

*Recreation and Tourism*
As a result of operational activities, the following effects are anticipated:

- Outdoor recreational activities such as snowmobiling, ATV use, fishing, and hunting Project are unlikely to be impacted by the Project as the Project Boundary will not overlap with any areas associated with these activities [i.e., no major watercourses, lakes (note that Landrie Lake is a Town water supply and fishing is not permitted) or trails were identified within the Project Boundary].
- The Industrial Facility is located within an industrial zone, and recreational activities are not permitted within this area.
- An increase in the number of local outdoor recreational users may be experienced (as a result of the influx of personnel associated with the Project).
- Local tourism capture rates may increase due to international trade relationships and out-of-province publicity for the area.

### 13.7.5 Summary of Effects

The following table reviews the VC findings and significance related to impacts on the socioeconomic environment as a result of the Project.

**Table 13.27: Socioeconomic VCs**

| VC Considered | Geographic Extent | Timing | Duration | Frequency | Reversibility | Magnitude |
|---|---|---|---|---|---|---|
| **Construction Phase** | | | | | | |
| Local Demographic | Regional | Not Applicable | Short-term | Intermittent | Reversible | Moderate/High (+) |
| Economy | Regional, Provincial | Not Applicable | Short-term | Intermittent | Irreversible | High (+) |
| Land Use and Value | Local | Not Applicable | Short-term | - | Reversible | Low (+) |

| VC Considered | Geographic Extent | Timing | Duration | Frequency | Reversibility | Magnitude |
|---|---|---|---|---|---|---|
| Recreation and Tourism | Local | Not Applicable | Short-term | - | - | Low (+) |
| Transportation | Local | Not Applicable | Short-term | Intermittent | Reversible | Low |
| **Operations Phase and Maintenance** | | | | | | |
| Local Demographic | Regional | Not Applicable | Medium-term | Intermittent/Continuous | Irreversible | Moderate (+) |
| Economy | Regional, Provincial | Not Applicable | Medium-term | Continuous | Irreversible | High (+) |
| Land Use and Value | Local | Not Applicable | Medium-term | Intermittent | Irreversible | Moderate (+) |
| Recreation and Tourism | Regional | Not Applicable | Medium-term | Continuous | Irreversible | Low (+) |
| Transportation | Local | Not Applicable | Medium-term | Intermittent | Reversible | Low |

+ = Positive Effect

The Project intends to support the economic prosperity of communities neighbouring the Project, as well as throughout the Cape Breton region and province of Nova Scotia as a whole, through increased demand for skilled and unskilled labour associated with the Project's construction and operations activities. The Project has also begun collaborating with local trade schools and community colleges to assist in developing and training a new energy-skilled workforce in a sector with exponential growth potential. The benefits of creating labour-related opportunities will range across the province and northeastern Nova Scotia, and Cape Breton Island.

As forecasted by Patricia Jreige (communication advisor, NSNRR), the Project will provide the local community with new clean energy jobs, shift the province's carbon emissions, and establish Nova Scotia as a global leader in the production of green hydrogen for domestic and export markets (Lantz, 2022).

In addition, the Project will provide options for Environmental, Social, and Governance (ESG) impact reporting and investing.

### 13.7.6 Mitigative and Protective Measures

The impact on the local demographic, economy, land use, and tourism and recreation resulting from the project is positive. Therefore, mitigation measures are not required.

To minimize uncertainty and concerns from local/regional residents, the Project is committed to continuing to engage with these communities to solicit feedback and will assess any potential impacts brought forward as the Project progresses. At present, the Project team is

not aware of any concerns that have not yet been addressed (refer to Section 11); however, the Proponent is committed to working collaboratively with local and regional community members to mitigate any impacts identified going forward. The Proponent has committed to developing a CLC to facilitate this process (see Section 11.5 for further details).

The Project has not engaged a Mi'kmaq Ecological Knowledge Study (MEKS) as the Project Boundary is located primarily on private land, with a limited Crown land footprint associated with the Transmission Interconnection Line. The Proponent has also engaged with the Mi'kmaq of Nova Scotia and signed MOUs with three Mi'kmaq First Nation communities – Membertou, Paqtnkek, and Potlotek – these partners remain engaged and apprised of the Project's development, and any concerns raised related to cultural, traditional, or recreational practices will continue to be assessed as the Project progresses.

Concerns that were previously raised during engagement activities are discussed in Sections 11.2.2.2 and 11.3.2 and are addressed on a case-by-case basis; going forward, any new concerns identified during ongoing engagement activities will be managed in a similar fashion, and specific mitigations will be developed and incorporated on a case-by-case basis, if/as necessary.

To reduce the impacts on transportation (traffic volumes, etc.) during Project phases, the following mitigation measures will be applied:

- Obtain all permits and approvals for special moves (if applicable) on public roadways.
- Ensure adherence to posted speed limits and signage.
- Schedule transport outside of peak traffic times, whenever possible.
- Maintain the cleanliness of trucks and heavy equipment when transporting materials on- and off-site.
- Avoid transportation through Port Hawkesbury during peak traffic hours (i.e., 7-9 am and 3- 6 pm, Monday to Friday) when possible.
- Conduct all travel using safe work practices for transporting oversized loads.
- Plan Project transport needs to maximize available cargo space and minimize the number of vehicles required to mitigate roadway flow impacts.

### 13.7.7 Residual Effects Analysis

**Table 13.28: Summary of VC Project-Interaction**

| VC Project Components | Potential Effect | Mitigations | Residual Effect (Yes/No) | Significance? (S/NS) |
|---|---|---|---|---|
| Local Demographic | • Increase in temporary/ permanent residents | Continued Public/Mi'kmaq Engagement | Yes | S (+) |
| Economy | • Increase in employment<br>• Increase in expenditures in local communities<br>• Increase in services (i.e., social, health, education, etc.) | | Yes | S (+) |
| Land Use and Value | • Increase in residences<br>• Increase in market value | | Yes | S (+) |
| Recreation and Tourism | • Increase in users<br>• Increase in tourism capture rates | | Yes | NS |
| Transportation | • Increase in local traffic | • Schedule outside peak hours<br>• Use of existing industrial road infrastructure | Yes | NS |

S = Significant
NS = Not Significant
+ = Positive Effect

### 13.7.8 Recommended Monitoring and Follow-Up

Based on the extent of Project activities, monitoring is not recommended for the socioeconomic environment at this time. Follow-up and continuous engagement with the public and Mi'kmaq First Nations will continue for the duration of the Project; the CLC and MOU partnerships will assist in facilitating ongoing communication.

## 13.8 Archaeological Resource Impact Assessment

### 13.8.1 Overview

The archaeological environment VC considers the potential archaeological sensitivity associated with Project activities during construction.

### 13.8.2 Boundaries & Assessment Criteria

#### *13.8.2.1 Spatial Boundary*

The LAA for the ARIA is supplied in Drawing 34.

Ground disturbance associated with the Transmission Interconnection Line is expected to be minimal and specific to the placement of power poles. Once the detailed design phase identifies the areas of disturbance, these areas will be investigated under a separate permit from NSCCTH, prior to the construction of the Transmission Interconnection Line. Should archaeological resources be identified, the design will be modified to ensure avoidance is achieved. The EA Branch and NSCCTH will be engaged throughout this process. No ground disturbance associated with the Transmission Interconnection Line will occur until a separate ARIA is completed and accepted by NSCCTH.

The RAA is not applicable.

#### *13.8.2.2 Temporal Boundary*

The temporal boundary includes the construction phase of the Project. The operations and maintenance phase is not considered.

#### *13.8.2.3 Applicable Regulations*

The *Special Places Protection Act* provides the Province of Nova Scotia with a mandate to protect important archaeological, historical, and paleontological sites and remains, including those underwater. A permit is required for any archaeological or paleontological exploration or excavation in Nova Scotia. The permit system ensures that work is completed based on established standards by qualified applicants.

The Project's ARIA was conducted in accordance with the terms of Heritage Research Permit A2022NS188, issued by NSCCTH – Special Places Program.

#### *13.8.2.4 Assessment Criteria*

As per Section 12.3, where there is potential for Project-related effects, the significance of the effect is determined using defined criteria. To assess the archaeological environment, all criteria for identification and definition of an adverse effect, as presented in Table 12.2, will apply, except for VC-specific definitions for geographic extent and magnitude, which are defined as follows:

*Geographic Extent*

- Project Boundary – effects are restricted to the Project Boundary
- Local Assessment Area – effects are restricted to the LAA, as defined in Drawing 34
- Regional Assessment Area – Will not apply.

*Magnitude*

- Negligible – activities have no potential for encountering archaeological resources during ground disturbance
- Low – activities have a low potential for encountering archaeological resources during ground disturbance
- Moderate – activities have a moderate potential for encountering archaeological resources during ground disturbance
- High – activities have a high potential for encountering archaeological resources during ground disturbance

### 13.8.3 Assessment Methodology

The assessment of the archaeological environment is completed through an ARIA. The objectives of the ARIA were to:

- Evaluate archaeological potential within the Project Boundary.
- Identify and delineate areas considered to exhibit high potential for encountering archaeological resources.
- Provide detailed and accurate information on the results of the survey.
- Provide comprehensive recommendations so that appropriate archaeological resource management strategies can be devised.

For additional information and context associated with the completion of the ARIA for the Project, refer to Section 9.

### 13.8.4 Potential Interactions & Effects Assessment

Project activities have the potential to cause an adverse effect on the archaeological environment during construction activities (Table 13.29).

**Table 13.29: Project Phases and Potential for Interaction with the Archaeological Environment**

| Project Phase | Project Component | |
|---|---|---|
| | Industrial Facility | Transmission Interconnection Line |
| **Construction** | | |
| Site Preparation & Construction | X | * |
| Installation and Assembly of Site Infrastructure | O | O |
| Removal of Temporary Works & Site Restoration | O | O |
| Commissioning | O | O |

X: indicates potential interaction with archaeological environment
O: indicates that an interaction with the archaeological environment is not anticipated

*Refer to Section 13.8.1 for additional context on Transmission Interconnection Line considerations.

#### *13.8.4.1 Construction Phase*

Project activities that may result in changes or effects to the archaeological environment within the Project Boundary include:

- Clearing and grubbing
- Geotechnical investigations
- Grading
- Blasting (as required)

The ARIA resulted in the identification of three areas considered to exhibit high potential for encountering archaeological resources, including the remains of one historic period occupation. In addition, one previously registered archaeological site was revisited within the archaeological assessment area and its location and characterization were confirmed.

All identified archaeological areas were located outside of the Project Boundary and the remaining portions of the archaeological assessment area are considered to exhibit low potential for encountering archaeological resources. Additional mitigation for archaeological sites (such as buffering) will also avoid/mitigate any impacts within these sensitive locations.

### 13.8.5 Summary of Effects

Project activities could interact with archaeological resources during earth moving activities in the construction phase (Table 13.30). Based on the assessment of the archaeological environment, impacts are not anticipated, as the Project has been designed to avoid any interactions with the registered archaeological site and high potential areas that were identified.

The following table reviews the VC findings related to impacts on the archaeological environment from the Project.

**Table 13.30: Archaeological Environment VCs**

| VC Considered | Geographic Extent | Timing | Duration | Frequency | Reversibility | Magnitude |
|---|---|---|---|---|---|---|
| **Construction Phase** | | | | | | |
| **Industrial Facility** | | | | | | |
| Archaeology | Project Boundary | Not Applicable | Short-term | Single Event | Non-reversible | Low |
| **Transmission Interconnection Line** | | | | | | |
| Archaeology | Project Boundary | Not Applicable | Short-term | Single Event | Non-reversible | * |

*Refer to Section 13.8.1 for additional context on Transmission Interconnection Line considerations.

### 13.8.6 Mitigative and Protective Measures

Avoidance of archaeological resources was a priority during the design and development phase of the Project. Several Project layouts were considered, all of which underwent field assessment to map and characterize the existing archaeological environment; as a result of these assessments, the Project Boundary was adjusted to avoid sensitive archaeological features.

In addition to avoidance, general mitigation measures for the protection of archaeological resources are provided below:

- Develop procedures in the EMP related to the potential for an unexpected discovery of archaeological items or sites during construction. This would include halting any work immediately upon discovery of suspected resources and contacting NSCCTH. If the archaeological discovery is suspected to be of Mi'kmaq origin, the Executive Director of KMKNO would also be contacted.
- Maintain avoidance of the previously registered archaeological site as well as those areas identified as high potential for archaeological resources.
- Adhere to the recommended 30 m buffers on either side of the two identified watercourses (as per the submitted ARIA Report).
- Conduct additional archaeological assessment if, during the detailed design phase, it is determined that ground disturbance is required in areas not previously assessed. The EA Branch will be notified in advance and will be provided with the acceptance letter from NSCCTH prior to completion of any disturbance in those areas.
- Conduct an archaeological assessment of the Transmission Interconnection Line (under separate NSCCTH permit) once the areas of disturbance are known.

### 13.8.7 Residual Effects Analysis

**Table 13.31: Summary of VC-Project Interaction**

| VC Project Components | Potential Effect | Mitigations | Residual Effect (Yes/No) | Significance? (S/NS) |
|---|---|---|---|---|
| Archaeological Environment | Disturbance of sensitive archaeological resources during earth moving activities. | Develop procedures related to the potential for an unexpected discovery of archaeological items or sites during construction.<br><br>Maintain avoidance of areas identified as high potential for archaeological resources.<br><br>Maintain buffers (for high potential watercourse areas) as recommended in the submitted ARIA. | No | NS |

S = Significant
NS = Not Significant

### 13.8.8 Recommended Monitoring & Follow-Up

No further monitoring is recommended for the archaeological environment at this time as direct impacts to archaeological resources will be avoided and/or mitigated.

An ARIA of the Transmission Interconnection Line will be completed (under separate NSCCTH permit) once the detailed design phase identifies the areas of disturbance.

## 14.0 EFFECTS OF THE PROJECT ON THE ENVIRONMENT

From the assessment of VCs, the effects of the Project on the environment have been evaluated and a summary is supplied in Table 14.1.

Criteria that have been applied are as follows:

- **Component:** Description of the assessed VC and relevant environment
- **Potential Effect:** Description of the potential effect on the environment that could take place (without mitigations)
- **Mitigations:** Mitigations applied to reduce or eliminate any effect from taking place
- **Residual Effect:** Determination of whether an effect remains (i.e., residual effect exists) post-mitigation
- **Significance:** Determination of the significance of the residual effect (post-mitigation) that remains (if any); categories of Significant or Not Significant are applied; where a significant effect exists, it is further described as a positive (+) or (-) impact.

**Table 13.32: Assessment the Residual Effects of the Project on the Environment (VCs)**

| VC Project Components | Potential Effect | Mitigations | Residual Effect (Yes/No) | Significance? (S/NS) |
|---|---|---|---|---|
| Acoustic Environment | Annoyance and/or interference of communication, sleep, and/or working efficiency. | Adherence to regulatory standards/guidelines for sound levels. | No | NS |
| Archaeological Environment | Disturbance of sensitive archaeological resources during earth moving activities. | Develop procedures related to the potential for an unexpected discovery of archaeological items or sites during construction.<br><br>Maintain avoidance of areas identified as high potential for archaeological resources.<br><br>Maintain buffers (for high potential watercourse areas) as recommended in the submitted ARIA. | No | NS |
| Ambient Air | Fugitive Dust<br><br>Exhaust Emissions<br><br>Process Emissions | Stabilize, cover, and apply dust suppressant where required for loose material.<br><br>Maintain equipment and implement emission control devices.<br><br>Maintain flare equipment and monitor/adhere to air quality regulations. | Yes[1] | NS |
| Climate Change | Increase in greenhouse gas | Implementation of emission suppression devices.<br><br>Strategic planning for sustainable materials and best management practices. | Yes[2] | NS |

| VC Project Components | Potential Effect | | Mitigations | Residual Effect (Yes/No) | Significance? (S/NS) |
|---|---|---|---|---|---|
| Freshwater Aquatic Environment | No direct impact (alterations) to freshwater resources.<br><br>Indirect impacts on nearby freshwater resources include:<br>• Erosion and sedimentation<br>• Changes to surface runoff/hydrology<br>• Degradation of water quality<br>• Damage or loss of aquatic habitat/species. | | Avoidance of freshwater aquatic resources.<br><br>Sedimentation and erosion controls (as part of EMP).<br><br>Mitigations committed by NS Power and CAUS (or selected contractor). | No | NS |
| Geophysical Environment | Disturbance of topography/surficial soils resulting in erosion/sedimentation/run-off.<br><br>Disruption of geologic hazards (acid generating rock, karst topography, colluvial slopes).<br><br>Degradation of groundwater quality/quantity. | | Erosions and sedimentation controls, best management practices and mitigations during construction activities.<br><br>Pre-construction geotechnical investigations and avoidance.<br><br>Adherence to regulatory standards/guidelines and all applicable permits. | No | NS |
| Socioeconomic Environment | Local Demographic | • Increase in temporary/ permanent residents | Continued Public/Mi'kmaq Engagement | Yes[3] | S (+) |
| | Economy | • Increase in employment<br>• Increase in expenditures in local communities<br>• Increase in services (i.e., social, health, education, etc.) | | Yes[3] | S (+) |

| VC Project Components | Potential Effect | | Mitigations | Residual Effect (Yes/No) | Significance? (S/NS) |
|---|---|---|---|---|---|
| | Land Use and Value | • Increase in residences<br>• Increase in market value | | Yes[3] | S (+) |
| | Recreation and Tourism | • Increase in users<br>• Increase in tourism capture rates | | Yes[3] | NS |
| | Transportation | • Increase in local traffic | • Schedule outside peak hours.<br>• Use of existing industrial road infrastructure. | Yes[4] | NS |
| Terrestrial Environment | • Degradation and/or destruction of habitat<br>• Destruction of flora SOCI<br>• Displacement, and/or accidental mortality of fauna SOCI<br>• Introduction of invasive/exotic species<br>• Disturbance (noise, lighting) | | • Avoidance of SOCI and associated habitat<br>• Adherence to regulatory standards and guidelines (comply with MBCA).<br>• Restricting clearing/alterations to take place outside of sensitive timing windows.<br>• Controls for introduction of invasive species (equipment cleaning, revegetation of disturbed areas).<br>• Controls for noise/lighting (maintain equipment and restrict lighting to within required safety limits) | Yes[5] | NS |

S = Significant
NS = Not Significant
[1]Emissions to the ambient air and changes in the surrounding air quality will be observed; however, the changes will not exceed the applicable regulatory thresholds, are anticipated to be negligible and are not significant.
[2]GHG emissions to the environment will be observed; however, the changes are anticipated to be negligible and not significant.
[3]Socioeconomic impacts to the environment will be observed and are significant, however, the changes are anticipated to be positive and are generally associated with improving economic prosperity, growing the local work force and skill sets, and the establishment of Nova Scotia as a global leader in the production of green hydrogen for domestic and export markets (Lantz, 2022).
[4]Increases to transportation are expected to be observed; however, the changes are anticipated to be low and not significant.
[5]Permanent removal of habitat within the Industrial Facility footprint is anticipated, however, the impacts are anticipated to be low and not significant

In conclusion, as a result of the Project's mitigative and protection measures, adverse residual effects are not anticipated to be significant; and the Project's only residual effect of significance is associated with the positive significant effects associated with the Socioeconomic VC.

# 15.0 EFFECTS OF THE ENVIRONMENT ON THE PROJECT

This section assesses the impacts of the environment on the Project with consideration given to the projected effects of climate change, including:

- Temperature
- Precipitation
- Sea Ice

For information regarding climate change projections, see Section 6.3.

Note that the potential effect to climate change that the Project may have on the environment (i.e., GHG emissions produced during the Project's duration) are reviewed separately under Section 13.3 and are not considered within this Section under the context of the environment's effect on the Project.

## 15.1 Climate Change

Climate change data was captured from regionally available online data portals, historical data, and anticipated future climate projections (Section 6.3).

Climate change may impact the Project through increased occurrences of extreme weather, precipitation, and subsequent flooding. Extreme weather events such as hurricanes, high winds, precipitation (i.e., rain and snow), and/or ice formation may damage the Industrial Facility and Transmission Interconnection Line infrastructure and associated works. In addition, increased weather extremes due to climate change and sea level rise may impact Project buildings, powerlines, roadways, and/or the jetty causing washouts and/or damage to infrastructure.

Damage to roadways and/or powerlines would be quickly repaired; however, damage to the marine terminal, aboveground storage tanks (ATS), and/or Project facilities may result in significant costs and require extensive effort to repair.

### 15.1.1 Temperature

The projected rising temperatures may impact many phases of the Project and on-site personnel. For example, longer and more intense heat waves may increase heat-related illnesses and deaths and increase the risk of food and water-borne contamination. Additionally, extended periods of heat would also increase the demand for cooling (and subsequently increase halocarbon emissions) and increase electricity use in the summer months.

Warmer temperatures can also spread forest and agricultural pests and disease vectors (i.e., ticks) to the Project location. Hotter and drier conditions also increase the risk of droughts and wildfires during construction and operations activities (Government of Canada, 2019e).

### 15.1.2 Precipitation

The projected increase in precipitation extremes may contribute to flooding, which could overwhelm Project infrastructure and cause severe impacts on the environment, human health, and operational activities. In addition, precipitation extremes may impact transportation networks (i.e., cargo ships and trains), disrupting access and supply chains. Precipitation extremes may also affect local water supplies, contaminating and limiting potable water resources.

More frequent and intense droughts would decrease water availability and quality. Shortages can lead to increased water costs and competition for access to quality water for drinking. Droughts also have impacts on surrounding agriculture, ecosystems, and wildlife; droughts may result in food shortages and attract nuisance wildlife to the Project, where resource availability is limited.

Even relatively small changes in precipitation patterns and amounts can have significant impacts, especially if these changes persist over time. For example, some vegetation (i.e., plants) is susceptible to changes in available moisture. Thus, changing patterns and precipitation amounts can result in significant shifts (over time) in the habitat characterization of the surrounding ecosystems (Government of Canada, 2019c).

### 15.1.3 Sea Ice

The projected decrease in sea ice may disrupt atmospheric and oceanic temperatures, thereby leading to changes in global climate. Even a small increase in temperature can lead to greater warming over time (NOS, 2021). While these projections may not significantly impact the Project, sea-level rise attributed to the ice melting may negatively impact infrastructure, shipping routes, adjacent terrestrial land (i.e., shoreline erosion), and ecosystems (Government of Canada, 2019f). The decreasing sea ice may also affect the Project in areas where shorelines are more exposed to waves and storm surges and are more prone to erosion and flooding.

In contrast, reduced sea ice increases opportunities for shipping, tourism, resource exploration, and industrial activities. This may benefit the Project; however, these activities bring new risks of accidents and spills under harsher conditions, including floating ice, changing sea ice cover and extreme weather. These factors can put people and ecosystems in danger and, in extreme circumstances, can limit the availability of search and rescue support services due to increased demand on their disaster response capacity (Government of Canada, 2019f).

### 15.1.4 Snow

Changes in snow conditions may affect wildlife habitat, overland travel, and access to food sources. Changes in seasonal snow patterns may also pose risks for Project infrastructure. For example, an increased snowfall accumulation over a short period of time can lead to potential infrastructure damage (e.g., roof collapse) associated with Project facilities. In addition, areas of Canada that experience significant decreases in snow-water equivalent may also see a reduction in freshwater availability. This can impact vegetation growth, limit water supplies and increase the risk of forest fires surrounding the Project (GOC, 2019f).

## 15.2 Mitigative & Protective Measures

Understanding climate projections leads to better planning and adaptation measures during each phase of the Project's development. Therefore, the projected increases in temperature, precipitation and potential sea level rise were considered during Project design to ensure that infrastructure would be able to manage the predicted precipitation, temperature, and sea level increases. This includes the following:

- The Industrial Facility was relocated farther from the shoreline and on elevated topography to accommodate potential sea level rise (and other considerations as further described in Section 1.4)
- Stormwater management systems will be designed to manage predicted volumes for the next 50 years by considering the most conservative scenario precipitation projections.
- Infrastructure will be developed to withstand more intense storms and weather events.
- Purchase of more robust/weather considerate materials or equipment to minimize wear and tear from climate-related events (i.e., rain, snow, heat, ice) will be considered and implemented where feasible.
- Design modifications to the EverWind marine terminal will be assessed during upgrading, maintenance and repair programs; where practical, existing infrastructure will incorporate design strategies to moderate the effects of sea level rise.
- The fire response plan will include practices to be followed in the event of a wildfire.

In addition to Project design considerations, health and wellness mitigations to protect site personnel will also be implemented. These may include:

- Installation of additional break rooms or water stations to ensure personnel remain cool and hydrated during all Project phases.
- Ensure water need considerations account for drought-like circumstances, and that mitigation plans are available for limited water usage scenarios.
- Develop and implement response plans and evacuation or muster programs for extreme weather events (i.e., wildfire, flooding).
- Educate personnel on potential pests and disease vectors that the Project may be exposed to through on-site training programs.

### 15.3 Potential Residual Effects

Climate Change may result in a potentially significant effect on the Project; however, implementing mitigative and adaptive strategies would reduce and limit the likelihood of impacts on all phases of the Project. Therefore, the residual effects associated with climate change are considered low.

## 16.0 CUMULATIVE EFFECTS & OTHER UNDERTAKINGS IN THE AREA

### 16.1 Overview

Cumulative effects are changes to environmental, social, and economic values caused by the combined effect of past, present, and potential future human activities and natural processes (Government of British Columbia, u.d). Concerns are often raised about long-term changes that may occur not only as a result of a single action but of the combined effects of each successive action on the environment (Hegman et al., 1999). While a single undertaking might not cause significant adverse effects, multiple undertakings may result in incremental impacts, referred to as cumulative effects. These cumulative effects may potentially result in an overall impact to a VC of interest.

### 16.2 Assessment Criteria

Where there is potential for Cumulative Effects, the significance of the effects will be determined using the following criteria:

- Not Significant – A cumulative effect exceeding the relevant VC criteria is not anticipated.
- Significant – A cumulative effect exceeding the relevant VC criteria is anticipated.

### 16.3 Assessment Methodology

Cumulative effects were assessed for the Project by taking into consideration the potential residual effects of significance, as identified in Section 13, in relation to the activities that have taken place in the past, those that currently exist, and those that can be reasonably expected to be developed within the area surrounding the Project (i.e., undergoing regulatory approval/nearing constructoin).

### 16.4 Cumulative Effects Assessment

#### 16.4.1 Other Undertakings in the Area

The Project is primarily located in an industrial zone within the Point Tupper Industrial Park which is in proximity to other projects and receptors in the area (i.e., residential communities, industrial activities, marine activities, and protected watersheds). The nearest town to the Project Boundary is Port Hawkesbury and the closest residential properties are located within the town and across the Strait of Canso on mainland Nova Scotia (Drawings 32 and 35). The following table summarizes the industrial activities surrounding the Project which could potentially interact with Project activities to produce a cumulative effect.

**Table 16.1: Industrial Activities near the Project that could Potentially Interact with the Project**

| Development Name | Development Activity | Status of Activity | Activity Location* |
|---|---|---|---|
| Bear Head Energy | LNG Production & Export Facility | Planning & Approvals Phase | 3.4 km southeast of the Project Boundary |
| Cabot Gypsum ULC | Gypsum manufacturing | Operational | 6.6 km northwest of the Project Boundary |
| Georgia Pacific Canada Inc. | Tissue, pulp, packaging and building products | Operational | 6.2 km northwest of the Project Boundary |
| GFL Port Hawkesbury Site | Waste Management Services | Operational | 4.8 km northwest of the Project Boundary |
| Ideal Concrete Ltd. | Ready Mix Concrete Production | Operational | 4.5 km northwest of the Project Boundary |
| NS Power Point Tupper Generation Station | Point Tupper Power Generation Station | Operational | 3.2 km northwest of the Project Boundary |
| EverWind Point Tupper Terminal (Owned by Proponent) | Existing Point Tupper Terminal - Oil/Gas Retail/Manufacturer | Operational | 0.05 km northwest of the Project Boundary |
| Renewable Energy Services Ltd. & NS Power | Wind Turbines | Operational | Adjacent to the Project Boundary |
| Port Hawkesbury Paper LP | Producer of supercalendered paper | Operational | 3.5 km northwest from the Project Boundary |

*All distances measured from the approximate Project Boundary, using the most direct route.

### 16.4.2 Residual Project VCs and Cumulative Effects

As a result of the Project's mitigative and protection measures, adverse residual effects are not anticipated to be significant; and the Project's residual effects of significance are limited to the positive effects associated with the Socioeconomic VC (Section 13.7).

Although no adverse residual effects of significance were identified for the remaining Project VCs, an adverse effect of significance may result when the Project's interaction with the surrounding environment is considered cumulatively.

Acoustic, archaeological, freshwater (i.e., wetlands, watercourses), and geophysical VCs are not considered cumulatively as residual effects were not identified during the Project's environmental effects assessment.

The following VCs noting residual effects (that were not significant at the Project level) are reviewed further below under consideration at the cumulative level:

- Ambient Air
- Climate Change
- Terrestrial Environment

In addition to the above, the potential for a cumulative effect related to the Project's raw freshwater needs is noted, and is also further addressed below.

*Ambient Air*
The Project will produce fugitive dust emissions, exhaust emissions and process emissions throughout the Project phases. Fugitive dust and exhaust emissions will not travel beyond the extent of the Project Boundary. Local activities (i.e., directly adjacent to the Project Boundary) are already operational (existing Point Tupper Terminal, wind turbines) and/or are still in the planning/approvals phase (Bear Head Energy); as such, cumulative effects from the dust emissions and exhaust emissions (most typically produced in larger amounts during the construction phase of a project) are not anticipated.

Process emissions are expected to travel outside the Project Boundary; however, as per Table 13.2 in Section 13.1.7.1, the resulting emissions will be well below the applicable limits under a conservative modelling approach and as a result, any cumulative atmospheric effects with surrounding industries are still expected to be well below the applicable air quality limits and no cumulative effect is anticipated.

*Climate Change*
With respect to climate change, as per Section 13.3.4.5, the Project will be contributing less than 0.19% to total provincial GHG emissions and as a result, any cumulative effect within the Point Tupper Industrial Park would also be considered negligible. The Project will also have a net positive effect on Canada's GHG emission reduction goals by reducing GHG emissions by an expected 1.5 million tonnes per year by 2030, having an overall net reduction of GHG emissions. As such a cumulative effect on climate change is not anticipated, or possibly results in a positive net change.

*Terrestrial Environment*
With respect to the terrestrial environment, as per Section 13.6 there will be permanent removal of terrestrial habitat within the Industrial Facility footprint. Concerns associated with a cumulative effect on terrestrial habitat are generally associated with habitat fragmentation and edge habitat creation which may be caused by a reduction in available habitat and increased isolation (through distance or intervening land uses) between habitat patches.

The area that the Project is being developed is within an active industrial zone (Point Tupper Industrial Park) bordered by the Strait of Canso. As such, anthropogenic disturbances are

extensive and silo habitat(s) within the industrial area is unlikely to be suitable for terrestrial species as disturbances such as noise, light, and industrial activity (i.e., presence of equipment, vehicles and personnel) will be ongoing within the area at all times. As a result of these activities, silo habitat is not likely to be occupied and therefore fragmentation and edge habitat creation are not of concern.

In addition, the Project is located in proximity to the Landrie Lake Watershed Protection Zone (Section 3.4.3). As prescribed in the West Richmond Land Use By-Law no development permit will be issued in a Watershed Protection (W-1) Zone and as such, the area contains undisturbed habitat, exclusive of industrial developments; it is anticipated that wildlife will prefer this habitat over any industrially zoned habitat and in this area, habitat fragmentation and edge habitat creation will not be observed.

Overall, a cumulative effect on terrestrial habitat is not anticipated.

*Raw Freshwater*
With respect to the Project's raw freshwater needs, each development located in the Point Tupper Industrial Park requires water (supplied by Landrie Lake) to feed their individual processes. According to the Nova Scotia Utility and Review Board (2019), water is supplied to the following entities:

- NS Power Point Tupper Generation Station
- Existing EverWind developments
- Sable Offshore
- Town of Hawkesbury
- Tupper Industrial Development
- Port Hawkesbury Paper

A review of the Project's freshwater need (maximum of 9.5 ML/day) in relation to other users of the LLWU was provided in Section 5.2.1 and it was confirmed that the cumulative need (25.3 ML/day) would still be well below the LLWU's water draw limit (36.6 ML/day) and therefore a cumulative effect is not anticipated.

## 16.5 Summary of Cumulative Effects

The cumulative effect of the Project and nearby (industrial) developments may result in interactions with ambient air, climate change and the terrestrial environment, however, the significance of these cumulative effects is expected to be negligible and no significant residual cumulative effects were identified.

# 17.0 ACCIDENTS, MALFUNCTIONS, AND UNPLANNED EVENTS

Accidents, malfunctions, and unplanned events are precisely that, events that are not planned or anticipated to be part of any phase of the Project but could cause a significant adverse environmental effect to many, if not all, of the VCs identified in Section 12.1, Table 12.1.

Accidents, malfunctions, and unplanned events that are considered as part of this EA Report include the following:

- Ammonia Release (Toxic Hazard)
- Hydrogen Release (Fire or Explosion Hazard)
- Effluent Release
- Erosion and Sediment Control Failure
- Fire
- General Hazardous Material Spill

Generally, these events are considered to have a low probability of occurrence. However, safe work procedures, best management practices, and ongoing assessment of the Project's Environmental, Occupational, Health & Safety Programs will aim to prevent/minimize these events and mitigate and manage an event should it occur.

The existing Point Tupper Terminal (owned by EverWind and in proximity to the Project) operates under an existing Health, Safety, Security, and Environmental Management System (Appendix T), which will be updated to incorporate the Project's Industrial Facility and Transmission Interconnection Line components.

Project personnel will be onboarded and informed of the existing Health, Safety, Security, and Environmental Management System associated with the existing Point Tupper Terminal site; and the existing Point Tupper Terminal processes and safety procedures will be revised to accommodate the new Project’s requirements and the change in site conditions. Although this Project will be standalone from the existing Point Tupper Terminal, resources, such as emergency response equipment and personnel associated with emergency response activities, will be shared between the two operations.

The safety of on-site personnel is a vital Project component and workplace occupational health and safety will be regulated by the policies, procedures, plans, and codes of practice set forth in the Nova Scotia *Occupational Health and Safety Act*, S.N.S. 1996, c. 7. Although safety considerations are not assessed in detail within this EA Report, the Project will comply with the Nova Scotia *Occupational Health and Safety Act*, S.N.S. 1996, c. 7 and adopt all relevant safety programs currently in practice at the existing Point Tupper Terminal, and in alignment with the Proponent's corporate safety standards and policies. As well, during the detailed engineering phases, safety considerations will be continuously reviewed and incorporated into the Project’s design.

## 17.1 Ammonia Release (Toxic Hazard)

A self-assessment methodology was used to identify and screen process risks (associated with the Project) which could result in an ammonia release during the Project's operations phase. According to the Emergency Response Planning Guidelines (ERPG) and the American Industrial Hygiene Association Standards, toxic limits for ammonia range as follows:

- ERPG-1 level ranges from 25-200 ppm
- ERPG-2 level ranges from 200-1,000 ppm
- ERPG-3 level is >1,000 ppm.

Ammonia release scenarios were assessed under the Hatch CIAR (Appendix C) and could be considered to fall within one of the applicable ERPG level ranges, in the event of the following:

- Ammonia storage tank release
- Transfer pipeline release
- Loading arm release (at the dock)

The consequences of a toxic ammonia release depend on the dilution rate and dispersion (of the ammonia cloud) to safe levels in the atmosphere. Liquid releases rely heavily on the pooled surface area within the release area. The evaporation rate of the chemical pool determines the toxic gas cloud volume, hazard zone, and/or impact radius.

Based on the results and modelling conducted as a component of Hatch's CIAR, ammonia off-loading to ship vessels poses the highest risk for the generation of an ammonia cloud. An ammonia cloud may be generated through a 25 mm opening in the ship's flange gasket. The vapour release flow rate through a 25 mm opening at -33°C and 4 kPa was estimated to be 9.23 kg/s. The ammonia cloud from such a release indicates that an ERPG-2 value (200 ppm) under calm wind (1.5 m/s) weather classification over one hour could reach a distance of approximately 3,371 m. The resulting ammonia cloud from such a release could affect the air quality surrounding the Project, neighbouring Point Tupper Industrial Park users, and residential dwellings; approximately 70 residential dwellings are within 3,371 m of the Industrial Facility (see Drawings 32 and 35, for residential dwellings located nearest to the Project Boundary).

Liquid ammonia releases from the off-loading arms also have the potential to occur. The ammonia cloud generated from a large liquid ammonia leak, [defined in the Hatch CIAR as a release from 10% of the cross-sectional area of a 508 mm (20") diameter off-loading arm], may produce an ERPG-2 value (200 ppm) under a calm wind (1.5 m/s) weather classification and result in an ammonia cloud capable of reaching a distance of 361 m. Note that a liquid ammonia release will result in a significantly smaller vapour cloud than an ammonia vapour release.

For the purposes of the CIAR, Hatch considered an improbable event, under a conservative (i.e., calm wind) scenario to provide an ERPG-2 level scenario for modelling consideration. In the unlikely event of a toxic ammonia release, natural weather and wind conditions may differ from the modelling values considered in the risk assessment scenarios developed by Hatch (2022c) (Appendix G). That said, the degree of atmospheric turbulence will affect the ammonia cloud's behaviour; and increased atmospheric turbulence will induce the entrainment and mixing of unpolluted air into the ammonia cloud and reduce the concentration of pollutants in the cloud (i.e., enhancing plume dispersion and dissipating the toxic ammonia).

### 17.1.1 Mitigation

The following mitigations will be implemented to minimize the impacts of a potential ammonia release.

Administrative Controls:

- Develop and implement a Project-specific on-site and off-site emergency response plan.
- Update the existing Point Tupper Terminal off-site emergency response plans to include the potential risk of an ammonia cloud and how to manage the response in the event of an emergency.

Engineered Controls:

- Equip and automate shut-off valves on the connection point of the ammonia transfer liquid and gas pipeline feed. For example, include a signal indicating pressure loss or leak detection, which would result in shut-off valve closure and assist in minimizing the gas cloud volume in the event of a leak.
- Equip and automate emergency stops integrated and controlled through gas detection systems (monitors).
- Ensure that the ammonia tank is located outside the 20 kPa explosion zone (not closer than 60 m) from the hydrogen plant to minimize secondary risks (i.e., explosions) and domino events.
- Ensure ammonia storage/piping areas are cool, dry, and out of direct sunlight (where possible) to minimize wear and tear and prevent damage.
- Ensure ammonia storage/piping areas are developed away from heat and ignition sources.
- Install hard arms to perform loading operations to ship vessels. Loading arms will be continually assessed during routine operations and in the event that wear and tear or damage is identified, the effected loading arm will be tagged out of service until maintenance and/or repairs can be completed.
- Select and purchase pumps, motors, instrumentation, and other electrical components associated with, or in proximity to, the Hydrogen and Ammonia Plants to

comply with the applicable electrical hazard zone, which will minimize the probability of ignition and avoid domino events.
- Ensure engineering controls (e.g., automatic shut-off valves, sensors) are implemented into the design and are able to identify an ammonia leak within 15 minutes, allowing for prompt response and isolation controls to engage.
- Install positive pressure and blast-safe enclosures and control rooms to protect operations personnel from the effects of toxic release, explosions, and fire events, as well as to provide safe routes of egress in the event of an emergency.

Operations and maintenance personnel may be exposed to ammonia while working within the Industrial Facility. Workers performing activities in a hazardous area or who have the potential to be exposed to ammonia during daily operations will be trained accordingly and provided with the appropriate PPE (e.g., gloves, eye/skin protection) to ensure their safety during any non-routine servicing or repair scenarios. In addition, the ammonia plant will apply maintenance strategies, integrity evaluations, and safe operating procedures to minimize and maintain a very low probability of loss of containment of ammonia. In an emergency situation, workers will have access to additional PPE (e.g., chemical protective clothing, chemical cartridge respirator, supplied-air respirator) to protect themselves from respiratory hazards and must follow the Project's on-site emergency response plan to ensure their own safety and that of their colleagues.

### 17.1.2 Potential Residual Environmental Effects

Based on a worst-case scenario, a toxic ammonia release could result in a potentially significant effect on the surrounding air quality. However, implementing emergency response plans and contingency measures will significantly limit potential environmental impact. In addition, the application of the above mitigations, as well as the implementation of best management practices and procedures, will reduce the likelihood of an accident or malfunction occurring. Therefore, residual environmental effects associated with an ammonia release are considered significant but unlikely.

## 17.2 Hydrogen Release (Fire or Explosion Hazard)

Potential confined vapour cloud explosion (cVCE), as well as unconfined vapour cloud explosion (uVCE), and fireball hazard events may occur (although they are unlikely) during the Project's process operations and were assessed by Hatch (2022c) as part of their CIAR (Appendix G).

Qualitative judgement was used by Hatch, based on their extensive experience, to predict the potential nature of fire and explosion scenarios based on the Project's operating conditions and external environment (e.g., extent of congestion/confinement) into which the hydrogen gas would be released. As a result, the fire thermal radiation and explosion potential scenarios assessed in the Hatch CIAR (2022c) (Appendix G) were limited to potential loss of containment events.

Hydrogen release scenarios considered to be the most probable emergency event scenarios for potential loss of containment include the following:

- Explosion event due to a connection leak at an electrolyzer stack.
- Explosion event due to a connection leak within the hydrogen compressor enclosure (on the high-pressure discharge line).
- Fireball event due to a connection leak on a hydrogen main manifold.

Additional details on the described scenarios can be found in Hatch's CIAR (2022c) (Appendix G).

A cVCE event from the hydrogen electrolyzer stacks would represent the greatest consequence impact. This cVCE event may result from an overpressure of 2 kPa and reach a distance of 450 m. Sensitivity explosion impact calculations indicate that a blast wave of 7 kPa could reach 147 m, and an overpressure blast wave of 20 kPa could reach a distance of 61 m (Appendix G). In addition, a release could affect the environment surrounding the Project and neighbouring Point Tupper Industrial Park users located within the cloud and blast distances (Drawing 32); however, this is unlikely, and the extent of the cloud and blast distances would generally remain within the Project Boundary and neighbouring property (i.e., the existing Point Tupper Terminal). The most significant concern would be to site personnel at these locations, all of which would be required to follow applicable emergency response protocols in the unlikely event of this occurrence.

With regard to explosion scenarios, projectiles are typically part of explosion events and may significantly impact infrastructure and/or the integrity of process buildings which may compromise the safety of Project personnel. Projectile assessments were not conducted as a component of the explosion scenarios modelled by Hatch during the CIAR; however, mitigations to protect personnel and respond to damage from projectiles during an emergency event will be included in the Project's emergency response plan and mitigations.

A fire impact assessment was also conducted by Hatch (2022c) (Appendix G). A large leak (defined by Hatch in the CIAR as a 10% cross-sectional area of pipe) on the 1,100 mm (43.3" hydrogen pipe header connected to the $H_2$ scrubber) would present the greatest consequence impact for a fireball scenario. Regarding fireball events, an unignited release of hydrogen will form a flammable gas cloud and eventually disperse until the gas concentration is below the lower flammable limit and can no longer be ignited. Where an event may occur, a thermal heat radiation of 37.5 kW/m$^2$ zone could reach 43 m, and a thermal heat radiation of 12.5 kW/m$^2$ could reach 53 m. A fireball event could affect the neighbouring Point Tupper Industrial Park users located within the heat radiation zones (Drawing 32) depending on the location of the explosion; however, this is unlikely, and the extent is anticipated to remain within the Project Boundary. The most significant concern would be to site personnel.

### 17.2.1 Mitigation

The following mitigations will be implemented to minimize the impacts of a potential hydrogen release:

Administrative Controls:

- Develop and implement a Project-specific on-site and off-site emergency response plan.
- Update the existing Point Tupper Terminal off-site emergency response plans to include the potential risk of hydrogen release and how to manage the response in the event of an emergency.
- Provide Project personnel with emergency evacuation procedures and instruct them to muster to a safe area outside a potential blast radius.

Engineered Controls:

- Ensure that critical equipment is located outside the heat radiation zone of concern (e.g., electrical and instrument cables to be located outside the 12.5 $kW/m^2$ zone, or ≥54 m away), or the provision of passive fire protection should be included in the design requirements.
- Ensure that the selection of pumps, motors, instrumentation, and other electrical components shall comply with the applicable electrical hazard zone, which will minimize the probability of ignition at the hydrogen plant.
- Install positive pressure and blast-safe enclosures and control rooms to protect operations personnel from the effects of toxic release, explosions, and fire events, as well as to provide safe routes of egress in the event of an emergency.
- Design and reinforce buildings (where practical) to protect from potential projectiles in the event of an explosion; include explosion propagation routes and exterior explosion panels to direct projectiles away from critical equipment and/or personnel.

The hydrogen plant will apply maintenance strategies, integrity evaluations, and safe operating procedures to minimize and maintain a very low probability of loss of containment of hydrogen. In addition, workers must follow the Project's on-site emergency response plan to ensure their own safety and that of their colleagues in the event of an emergency.

### 17.2.2 Potential Residual Environmental Effects

Based on a worst-case scenario, a hydrogen fire and explosion event could result in a potentially significant effect on Project personnel and infrastructure. However, implementing emergency response plans and contingency measures will limit potential environmental impact. In addition, the application of the above mitigations, as well as the implementation of best management practices and procedures, will reduce the likelihood of an accident or malfunction occurring. Therefore, residual environmental effects associated with a hydrogen

release are considered potentially significant (depending on the severity of the event) but unlikely.

## 17.3 Untreated Effluent Releases

Untreated Effluent releases from the Project may potentially cause adverse environmental effects. Untreated effluent may be introduced into the environment by exceeding the holding pond capacity (overflow) or malfunction of the treatment system. Where holding pond capacities are exceeded, untreated effluent may overflow the containment system and flow into the environment.

A malfunctioning treatment system will fail to effectively treat process wastewater and stormwater, which will lead to the discharge of contaminated effluent into the environment. The discharge of untreated and/or poorly treated effluent may result in the following impacts:

- Eutrophication of marine and freshwater sources
- Degradation of water quality
- Endangerment of aquatic species and habitat
- Contamination of soils
- Contamination of groundwater; impacts to residential potable groundwater

Effluent sources that have the potential to impact the surrounding area adversely include:

- Raw Freshwater Treatment Plant (RFWTP)
    - Chemical Enhanced Backwash, CIP, and concentrate from the UF, RO, and EDI treatment trains

- Wastewater Treatment Plant (WWTP)
    - Treated RFWTP effluent
    - Treated Hydrogen Plant blowdown
    - Treated Ammonia Plant blowdown
    - Treated service water from drains

- Sanitary Wastewater Treatment Plant (SWWTP)
- Stormwater (internal and external)
- Cooling Tower Blowdown

Effluent from the RFWTP will be directed to the WWTP, along with the Project's process effluent (i.e., blowdown). The effluent from the WWTP, SWWTP, and the internal stormwater system will be directed into the effluent treatment ponds at the existing Point Tupper Terminal for processing, prior to discharge towards the Strait of Canso.

The external stormwater and cooling tower blowdown water will be discharged into the environment.

### 17.3.1 Mitigation

The following mitigations will be implemented to minimize the impacts of an effluent release:

- Ensure all internal stormwater drainage originating from the Industrial Facility is directed to the effluent treatment ponds at the existing Point Tupper Terminal.
- Ensure all internal stormwater drainage is directed to an oil/water separator for processing in the event of a spill or release.
- Ensure that the Stormwater Pond is designed with a conservative freeboard to accommodate unexpected flows.
- Ensure that any Stormwater Pond is equipped with a pumping system of sufficient capacity to handle all water directed to it.
- Ensure the final effluent from the effluent treatment at the existing Point Tupper Terminal is sampled to confirm that it meets all parameter limits (per regulatory requirements) prior to discharge.
- Continually assess the Stormwater Pond (and existing Point Tupper Terminal effluent treatment system) during routine operations; in the event that damage is identified or maintenance is required, the affected area will be repaired as soon as possible and all efforts will be made to redirect effluent away from the damaged location until repairs can be completed.

### 17.3.2 Potential Residual Environmental Effects

An untreated effluent release may result in a potentially significant effect on the surrounding environment. However, implementing the above mitigations, as well as best management practices and procedures, will reduce the likelihood of an accident or malfunction from occurring. Therefore, residual environmental effects associated with an untreated effluent release are considered unlikely; however, they are potentially significant if releases are to occur near the Strait of Canso and/or the local watershed.

## 17.4 Erosion and Sediment Control Failures

Failure of erosion and sedimentation controls implemented by the Project may result in potential adverse effects on the surrounding terrestrial and freshwater environment. Erosion and sedimentation controls are typically implemented to minimize impacts to watercourses from the migration of fine sediment from disturbed soils (i.e., grubbing, excavation), stockpiled material (i.e., removed fill), and former infill and sand during all phases of the Project.

Erosion and sedimentation controls may fail due to extreme weather conditions (e.g., flooding), improper installation, improper maintenance, and unforeseen accidents (e.g., on-site vehicle or equipment collisions with silt fences). Failure of these control measures may release sediment into the environment, impacting water quality and aquatic and terrestrial habitats.

### 17.4.1 Mitigation

The mitigation strategies below will be implemented to minimize the impacts of erosion and sediment control failures. Note that the Project's EMP will also include an Erosion and Sediment Control Plan (ESCP), which will set out best management practices and procedures to be applied during the construction and operational phases of the Project.

- Develop and implement an ESCP for all phases of the Project.
- Ensure erosion and sediment controls are installed per the manufacturer's specifications.
- Heed Environment Canada's special weather warnings to ensure proper care is given to stabilize erosion and sediment controls in advance of, and following, extreme weather events (i.e., precipitation).
- Conduct regular monitoring of all the erosion and sediment controls and repair or replace them as necessary.
- Ensure erosion and sediment controls are functioning effectively and that additional supports or controls are able to be applied and are available on hand to support with repair or reinforcement efforts, as needed.

### 17.4.2 Potential Residual Environmental Effects

An erosion and sediment control failure may result in a potentially significant effect on the surrounding environment. However, implementing the above mitigations, as well as best management practices and procedures, will reduce the likelihood of an accident or malfunction occurring. Therefore, the residual environmental effects associated with an erosion and sediment control failure are considered unlikely; however, they are potentially significant if a release was to occur near sensitive areas (i.e., WSS, protected watersheds) or in proximity to fish-bearing water features (for further details on freshwater considerations, see Section 13.5).

## 17.5 Fires

An accidental fire may occur as a result of Project activities which could lead to larger events (explosions) and potentially adversely affect the atmospheric environment (emissions), the natural environment, Project infrastructure, and neighbouring communities. Note that this section does not consider fires as a result of accidental ammonia and/or hydrogen release (refer to Sections 17.1 and 17.2, respectively, for additional information on these scenarios).

Fires may occur from overheated equipment, hot work, fuel storage facilities and buildings, dry conditions, and mechanical shops. Of these potential sources, fires originating from, or in proximity to, fuel sources are inherently dangerous as fuel may sustain a fire for longer periods and lead to explosions and/or extensive damage. In addition, fires may release hazardous materials, which could impact air quality and cause adverse effects on the surrounding environment (i.e., terrestrial or aquatic habitat).

In the unlikely event of a fire, the immediate concern will be human health and the surrounding environment. Where the Project is located within the Point Tupper Industrial Park, a fire will be segregated from residential communities, but may pose a serious threat to neighbouring (industrial) properties.

### 17.5.1 Mitigation

All personnel will take all precautions necessary to prevent fire hazards. These precautions include, but are not limited to, the following measures:

- Implement fire detection and protection systems in vulnerable areas (e.g., fuel storage areas).
- Dispose of all flammable waste regularly at an approved facility.
- Smoke in designated areas only.
- Prohibit burning (of any material) on-site during Project activities.
- Ensure sufficient firefighting equipment to handle on-site fires is adequately maintained and readily accessible.
- Ensure that on-site personnel are trained in the use of firefighting equipment.

In addition to the above, the existing Point Tupper Terminal Health, Safety, Security, and Environmental Management System will be amended to include an Emergency Response and Contingency Plan for fire events associated with the Project and will set out fire prevention and response procedures to be implemented during the construction and operational phases.

Of note, the existing Point Tupper Terminal site is an NSECC Approved Fire Training Facility and employs 32 National Fire Protection Association (NFPA) 1081 Industrial Firefighters, 24 Medical First Responders and 40 Employee Emergency Response Team (ERT) members. The existing Point Tupper Terminal site also holds training and certification for basic and advanced industrial firefighting and National Fire Protection Agency (NFPA) 1081 Industrial firefighting (Standard for Facility Fire Brigade Member Professional Qualifications). As such, firefighting resources are in close proximity to the Project and will be utilized in the event of an emergency.

The ERT at the existing Point Tupper Terminal is equipped with the following:

- Two high-capacity Industrial Fire Apparatuses.
- One Rapid Attack Fire Apparatus.
- One Heavy Rescue Apparatus (Medical & Rescue).
- A large inventory of ancillary firefighting equipment.

These resources will also be available to the Project in the event of an emergency.

### 17.5.2 Potential Residual Environmental Effects

Although unlikely, a fire event with the possibility to cause an explosion event could have a potentially significant effect on the Project's personnel, infrastructure, and the surrounding environment. However, implementing emergency response plans and contingency measures would limit potential environmental impacts. In addition, the application of the above mitigations and proximity of a well-equipped and highly trained ERT will reduce the likelihood of a significant fire event from taking place. Therefore, the residual environmental effects of a fire and/or explosion are considered potentially significant, but unlikely to occur.

## 17.6 General Hazardous Material Spills

Hazardous spills resulting from the use of fuel (i.e., storage, refuelling, operation of combustion vehicles) and other on-site chemicals may occur during the Project's construction and operations activities. Hazardous spills can adversely impact air, soil, surface water, groundwater quality, human health, and safety. In addition, hazardous spills may risk the health of aquatic, avian, and terrestrial wildlife. The severity of the impacts will depend on the nature of the hazardous material and the quantity spilled.

### 17.6.1 Mitigation

The following mitigations will be implemented to reduce the impact of hazardous spills:

- Ensure all fuels, lubricants, and chemicals are stored in designated containers and areas.
- Provide secondary containment for all hazardous products placed in storage areas.
- Ensure equipment in use is inspected and free of fluid leaks.
- Ensure fuel storage areas, refuelling, and/or equipment lubrication are located a minimum of 30 m from any surface and groundwater feature (i.e., watercourse, well).
- Ensure refuelling of machinery and equipment is conducted on an impervious surface and/or that secondary containment is in place during product transfer.
- Ensure the storage of all dangerous goods comply with the Workplace Hazardous Material Information System (WHMIS).
- Ensure all mobile equipment (including heavy equipment, welders, light plants, etc.) have spill kits stocked with soaker pads, oil-absorbing materials, and containment booms.
- Locate stationary spill kits or spill drums at work areas utilizing mobile equipment, hazardous fluids and/or in proximity to sensitive environmental features (i.e., wetlands or watercourses).
- Stock spill kits with the appropriate quantity and type of material for the anticipated product type(s) and volume(s) in use.

In addition to the above, the Project's EMP will include a Spill Prevention and Response Plan for products being produced, stored, and transported by the Project, this plan will set out spill prevention and response procedures and best management practices to be implemented during Project activities.

For Project activities with the potential for a spill of a larger magnitude (≥200 L), ensure vacuum truck contractors (or equivalent) are available for emergency response in the event of a release. Note that two NS Department of Transportation (NSDOT) certified vacuum trucks are available at the existing Point Tupper Terminal for emergency spill response; this equipment will also be made available to the Project if/as needed.

### 17.6.2 Potential Residual Environmental Effects

A hazardous spill event could result in a potentially significant effect on the surrounding Project environment. However, implementing emergency response plans and contingency measures would limit potential environmental impact. In addition, the application of the above mitigations, as well as the implementation of best management practices and procedures, and proximity of emergency response equipment (i.e., NSDOT certified vacuum trucks) will reduce the likelihood of a significant spill or release occurring. Therefore, the residual environmental effects associated with hazardous spills are considered potentially significant but unlikely.

## 18.0 OTHER APPROVALS

In addition to the EA Approval, a summary of the anticipated regulatory permits and/or approvals that may be required for the Project is included as Appendix C.

## 19.0 FUNDING

No government funding has been secured for the Project; the Proponent will fully fund the Project through equity and project financing.

## 20.0 ADDITIONAL INFORMATION

No additional information is required – all necessary information has been included within this EA Report and supplemental appendices.

## 21.0 CONCLUSION

In accordance with A Proponent's Guide to Environmental Assessment (NSECC, 2017), the studies, regulatory assessments and VC evaluations described within this EA Report have been considered both singularly and cumulatively, for all phases of the Project.

The results of this assessment indicate that, as a result of the Project's mitigative and protection measures, adverse residual effects are not anticipated to be significant; and the Project's only residual effect of significance is associated with the positive significant effect on economic prosperity and opportunity for local communities, First Nation partners, the region of Cape Breton and Nova Scotia as a whole.

## 22.0 CLOSURE

This EA Report was completed by Strum Consulting, an independent, multi-disciplinary team of consultants with extensive experience with submission of EA Registration documents for undertakings within Atlantic Canada (Project Team curriculum vitae provided in Appendix U).

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