Argentia Renewables Environmental Assessment Registration Document



Pattern | Argentia Renewables

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List of Abbreviations and Acronyms

Abbreviation	Description
°C	degrees Celsius
µcd	microcandela
µg	microgram
µm	micron
3-D	Three-Dimensional
AADT	Annual Average Daily Traffic
AAQM	Ambient Air Quality Monitoring
AAQS	Ambient Air Quality Standards
AC	Alternating Current
AC CDC	Atlantic Canada Conservation Data Centre
ACI	Aquatic Conservation Initiative (formerly Northeast Avalon Atlantic Coastal Action Program)
AES-L	Advanced Education, Skills, and Labour
AET	Actual Evapotranspiration
AIHTS	Agreement on International Humane Trapping Standards
AIS	Aquatic Invasive Species
AMA	Argentia Management Authority
APCR	Air Pollution Control Regulations, 2022
AQS	Air Quality Standards
Ar	argon
arcsec^2	square arcseconds
ARG	AL-PRO GmbH & Co. KG
ARU	Autonomous Recording Units
ASMFC	Atlantic States Marine Fisheries Commission
ASU	Air Separation Unit
ATV	All Terrain Vehicle
BBMA	Black Bear Management Area
BCR	Bird Conservation Region
BESS	Battery Energy Storage System
BFL	Boreal Felt Lichen
BLFL	Blue Felt Lichen
BOL	Beginning-Of-Life
BP	Before Present
BTU	British thermal unit
BV	Bureau Veritas
CA	California
CAAQS	Canadian Ambient Air Quality Standards
CAPEX	Capital Expenditure
CBC	Christmas Bird Count
CC	Average Carbon Content of Flare Gas
CCG	Canadian Coast Guard
CCG-MCTS	Canadian Coast Guard Marine Communications and Traffic Services

CCME	Canadian Council of Ministers of the Environment
CCRI	Community-Based Coastal Resource Inventory
CD	Census Division
CDWQG	Canadian Drinking Water Quality Guidelines
CE	Combustion Efficiency / Common Era
CEM	Continuous Emissions Measurement
CEPA	Canadian Environmental Protection Act, 1999
CEQG	Canadian Environmental Quality Guidelines
CH	Contractor Hires
CH_4	methane
CHE	Committee on Health and the Environment
CHP	Conservation Harvesting Plan
CHS	Canadian Hydrographic Services
cm	centimetres
CMA	Caribou Management Area / Census Metropolitan Area
CNWA	Canadian Navigable Waters Act
C^o	Celsius degrees (temperature differential)
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CP	Carcass Persistence
CPAWS	Canadian Parks and Wilderness Society
CPL	Canadian Projects Limited
CPPIB	Canada Pension Plan Investment Board
CSAS	Canadian Science Advisory Secretariat
CSD	Canadian Census subdivision
Cu	World Health Organization
CWCS	Canadian Wetland Classification System
CWS	Canadian Wildlife Service
dB	decibel
dBA	A-weighted decibels
dBC	C-weighted decibel
DBH	Diameter at Breast Height
DD	Data Deficient
DEI	Diversity, Equity, and Inclusion
DFO	Department of Fisheries and Oceans Canada
DH	Direct Hires
dioxin	polychlorinated dibenzo-p-dioxins
DWCP	Domestic Woodcutting Consultation Plan
dwt	Deadweight Tonnage
E	Endangered
EA	Environmental Assessment
EAR	Environmental Assessment Registration
EAR-G	Environmental Assessment Registration Guidelines

EBSA	Ecologically and Biologically Significant Area
ECCC	Environment and Climate Change Canada
EEMP	Environmental Effects Monitoring Programs
EF	Emission Factor
EHS	Environment, Health, and Safety
ELC	Ecological Land Classification
EMF	Environmental Management Framework
EMS	Environmental Management System
EOL	End-Of-Life
EOR	Engineer of Record
EPA	Environmental Protection Act
EPP	Environmental Protection Plan
ERP	Emergency Response Plan
ERT	Emergency Response Team
FEL	Front-End Loading
FFAW	Fish, Food & Allied Workers
FMD	Forest Management Districts
FPSO	Floating Production, Storage and Offloading
FPT	Federal-Provincial-Territorial
FSC	Food, Social or Ceremonial
FT	Full-Time
FTE	Full-Time Equivalent
g	gram
GBS	Gravity Base Structure
GDP	Gross Domestic Product
GHD	GHD Limited
GHG	greenhouse gas
GIS	Geographic Information System
GJ	gigajoule
GPPA	Greenhouse Gas Pollution Pricing Act
GPS	Global Positioning System
GPX	GPS Exchange Format
GRP	Glass-Reinforced Plastic
GW	gigawatt
GWH	gigawatt-hour
GWP	Global Warming Potential
H_2	hydrogen
H_2O	water
H_2S	hydrogen sulfide
HADD	Harmful Alteration, Disruption or Destruction
HFC	hydrofluorocarbons
HIWEC	Henvey Inlet Wind Energy Centre
HMDC	Hibernia Management & Development Company
hp	horsepower
hr	hour

HRDEM	High Resolution Digital Elevation Model
HRIA	Historic Resources Impact Assessment
HROA	Historic Resources Overview Assessment
HSE	Health, Safety and Environment
Hz	hertz
IAAC	Impact Assessment Agency of Canada
ILE	Institution of Lighting Engineers
IMA	Integrated Management Area
IMMP	Impacts Mitigation and Monitoring Plan
IMN	Industrial Monitoring Network
IPCC	International Panel on Climate Change
ISO	International Organization for Standardization
IUCN	International Union for Conservation of Nature
kg	kilogram
kHz	kilohertz
km	kilometres
KOH	potassium hydroxide
kWh	kilowatt hour
L	litre
LAA	Local Assessment Area
L_{Aeq}	A-Weighted Noise Level
L_d	Daytime Sound Equivalent Level
L_{dn}	Day-Night Average Sound Level
L_{eq}	Equivalent Sound Level
LFN	Low Frequency Noise
LHNPP	Long Harbour Nickel Processing Plant
LiDAR	Laser Imaging, Detection, and Ranging
LLP	Limited Liability partnership
LN	Laurentian North
L_n	Nighttime Sound Equivalent Level
LNG	liquified natural gas
LOMA	Large Oceans Management Area
LP	Limited Partnership
LPG	Liquefied Petroleum Gas
LRU	Land and Resource Use
m	metre
m^2	square metre
m^3	cubic metre
mag	magnitude
MAL	Maximum Allowable Level
mASL	metres Above Sea Level
MBCA	Migratory Birds Convention Act
MBCR	Migratory Bird Convention Regulations
MBU	Marine Biogeographic Unit
mcd	millicandela

MET	Meteorological Evaluation Tower
MFN	Miawpukek First Nation
Mg	megagram
MGGA	Newfoundland and Labrador Management of Greenhouse Gas Act
mm	millimetres
MMA	Moose Management Area
MOU	Memorandum of Understanding
MPA	Marine Protected Area
MT	metric ton
MTPD	metric tonnes per day
MW	megawatt
N_2	nitrogen
N_2O	nitrous oxide
NABCI	North American Bird Conservation Initiative
NAFC	North Atlantic Fishery Centre
NAFO	Northwest Atlantic Fisheries Organization
NAICS	North American Industry Classification System
NAISS	Northwest Atlantic International Sightings Survey
NaOH	sodium hydroxide
NAPS	National Air Pollutant Surveillance Program
NAR	Not At Risk
NCC	Nature Conservancy Canada
ND	Not Detected
NE	Northeast
NFPA	National Fire Protection Association
NH_3	ammonia
Ni	nickel
NL	Newfoundland and Labrador
NL AAQS	Newfoundland and Labrador Ambient Air Quality Standards
NL DECC	Newfoundland and Labrador Department of Environment and Climate Change
NL DIET	Newfoundland and Labrador Department of Industry, Energy and Technology
NL DTI	Newfoundland and Labrador Department of Transportation and Infrastructure
NL EAD	Newfoundland and Labrador Environmental Assessment Division
NL ESA	Newfoundland and Labrador Endangered Species Act
NL FFA	Newfoundland and Labrador Department of Fisheries, Forestry, and Agriculture
NL WD	Newfoundland and Labrador Wildlife Division
NLH	Newfoundland and Labrador Hydro
NLNFB	Newfoundland and Labrador Nutritious Food Basket
NLOWE	Newfoundland and Labrador Organization for Women Entrepreneurs
nm	nautical mile
NO	nitric oxide
NO_2	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NOC	National Occupation Classification
NOx	nitric oxides

NPRI	National Pollutant Release Inventory
NRCan	Natural Resources Canada
NS	Nova Scotia
NTS	National Topography System
O_2	oxygen
O_3	ozone
OAWA	Office to Advance Women Apprentices
OH^-	hydroxide ion
OH&S	Occupational Health and Safety
ON	Ontario
OSW	Office for the Status of Women
PA	Potential Area
PAANL	Protected Areas Association of Newfoundland and Labrador
PAH	polycyclic aromatic hydrocarbon
PAO	Provincial Archaeology Office
PASS	Passive Air Sampling System
Pattern	Pattern Energy Group LP
Pb	lead
PBGB	Placentia Bay/Grand Banks
PBS	Pilot Boarding Station
PCB	polychlorinated biphenyl
PCDD	polychlorinated dibenzo-p-dioxins
PCDF	polychlorinated dibenzo furans
PCIC	Prairie Climate Impacts Consortium
PCM	Post Construction Monitoring
PCMP	Post Construction Monitoring Plan
PDAC	Prospectors & Developers Association of Canada
PEC	Progressive Engineering & Consulting Incorporated
PEGNL	Professional Engineers and Geoscientists of Newfoundland and Labrador
PEM	Proton Exchange Membrane
PEMS	Predictive Emission Monitoring Systems
PET	Potential Evapotranspiration
PETP	polyethylene terephthalate
PIL	Project Interconnect Line
PFC	perfluorocarbons
PM	particulate matter
PM_{10}	particulate matter less than 10 microns
$PM_{2.5}$	particulate matter less than 2.5 microns
POA	Port of Argentia
ppb	parts per billion
PPE	Personnel Protective Equipment
PPP	Public Participation Plan
PPWSA	Protected Public Water Supply Area
PSA	Public Service Announcement
PSPC	Public Service and Procurement Canada

PT	Part-Time
PWGSC	Public Works and Government Services Canada
QFN	Qalipu Mi'kmaq First Nation
RAA	Regional Assessment Area
RCMP	Royal Canadian Mounted Police
RCP	Rehabilitation and Closure Plan
RDL	Reportable Detection Limit
ROV	Remote-Operated Vehicle
ROW	Right-of-Way
RPAS	Remotely Piloted Aircraft System
RV	Recreation Vehicle
SAR	Species at Risk
SARA	Species at Risk Act
SCADA	Supervisory Control and Data Acquisition
SCC	Species of Conservation Concern
SE	Southeast
SEEF	Searcher Efficiency
SEM	Sikumiut Environmental Management Ltd.
SF_6	Sulfur Hexafluoride
SFA	Salmon Fishing Areas
SiBA	Significant Benthic Area
SM	Song Meter
SMB-PB	St. Mary's Bay-Placentia Bay
SNC	AtkinsRéalis (formally SNC-Lavalin Group)
SO_2	Sulfur Dioxide
SOEC	Solid Oxide Electrolyzer Cell
SRF	Site Record Forms
SSAC	Species Status Advisory Committee
T	Threatened
t	metric tonnes
TAT	Tree to Above Tree Height (<60 m altitude)
TBD	To Be Determined
TC	Transport Canada
TCH	Trans-Canada Highway
TDG	Transportation of Dangerous Goods
TDS	total dissolved solids
TEK	Traditional Ecological Knowledge
TIS	Transportation Impact Study
TMP	Traffic Management Plan
TOC	Top Of Concrete
TPY	Trips Per Year
TSP	total suspended particulate
TX	Texas
US	United States (of America)
USD	United States Dollar

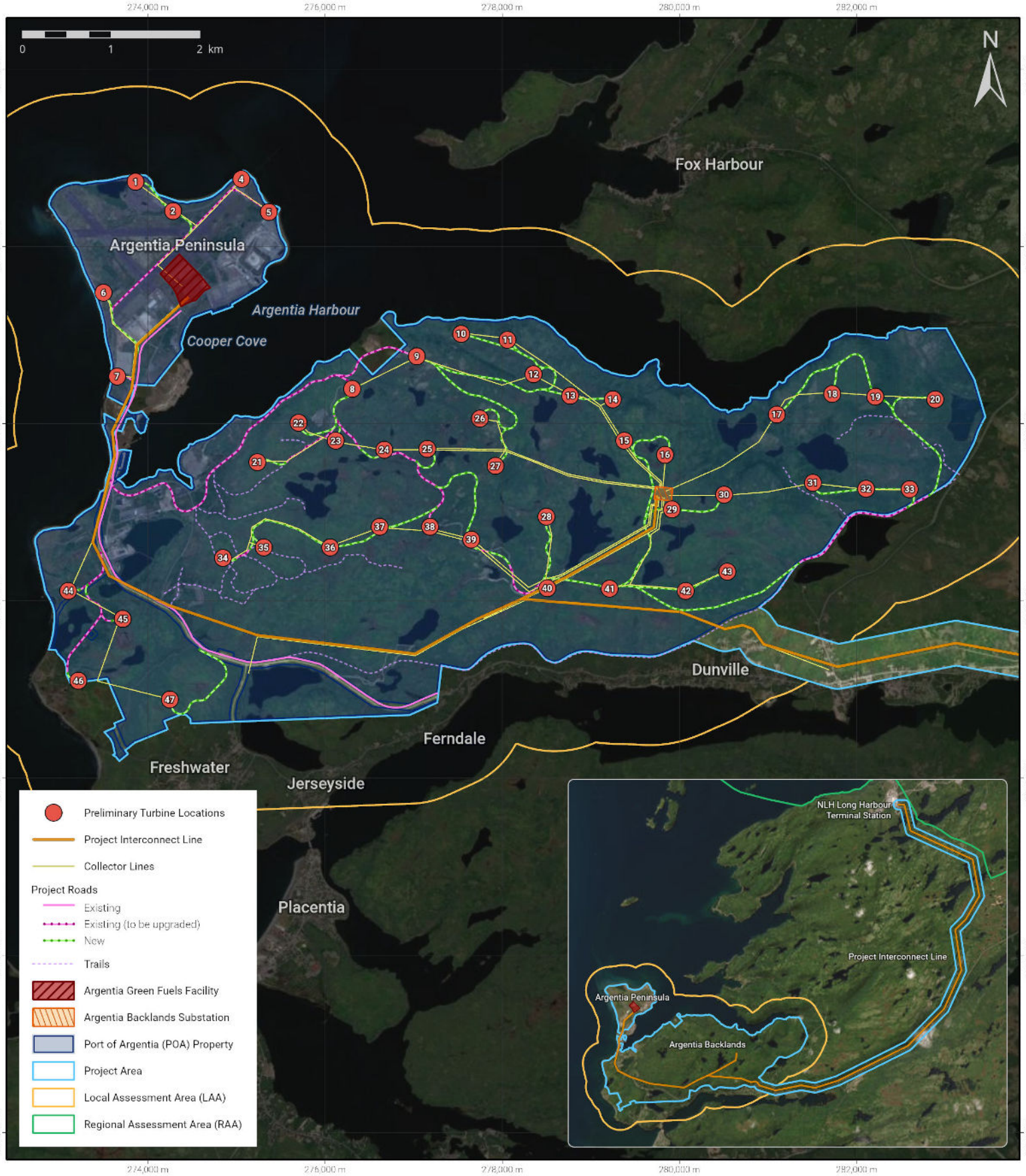
UTM	Universal Transverse Mercator
V	vanadium
Vale	Vale Newfoundland and Labrador
VBNC	Voisey's Bay Nickel Company
VC	Valued Component
VKT	Vehicle Kilometre Travelled
VOC	volatile organic compound
VT	Vessel Tonnage
WAT	Well Above Tree Height (60-140 m altitude)
WCAREG	Eastern Canada Vessel Traffic Services Zone
WDF	Waste Designation Forms
WDNR	Wisconsin Department of Natural Resources
WEP	Workforce and Employment Plan
WHMIS	Workplace Hazardous Materials Information System
WHO	World Health Organization
WISE	Women in Science and Engineering Newfoundland and Labrador
WMP	Waste Management Plan
WNS	White-Nose Syndrome
WRDC	Women in Resource Development Corporation
WRF	Weather Research Forecasting
WSC	Water Survey of Canada
WWII	World War II
X	Extinct
XT	Extirpated
Zn	zinc

Executive Summary

Argentia Renewables Wind LP (Argentia Renewables), an affiliate of Pattern Energy Group LP (Pattern), in partnership with the Port of Argentia (POA), is proposing to develop, construct, operate, and, at the end of the project life, decommission and rehabilitate a renewable energy infrastructure project (the Project) in eastern Newfoundland and Labrador (NL). The Project will consist of a 300-megawatt (MW) onshore wind generation facility powering a new green hydrogen and ammonia production, storage and export facility at the POA. The purpose of the Project is to produce hydrogen through the electrolysis of water using wind-generated electricity; subsequently the hydrogen will be combined with nitrogen from the air to produce ammonia for sale internationally. The ammonia will be produced at the Argentia Green Fuels Facility on the Argentia Peninsula in Placentia Bay, where it will also be exported from the existing marine terminal in Argentia Harbour.

As an important step in the Project's planning and approval process, this document has been prepared in accordance with the NL **Environmental Protection Act** (Part X) and the **Environmental Assessment Regulations**. This Environmental Assessment (EA) Registration Document has been prepared by Argentia Renewables with assistance from Sikumiut Environmental Management Limited (SEM). The format of this submission is consistent with the "Guidance for Registration of Onshore Wind Energy Generation and Green Hydrogen Production Projects" as well as the "Environmental Assessment Act: A Guide to the Process". The Project does not include any activities requiring federal assessment as listed in the **Physical Activities Regulations** under the **Impact Assessment Act, 2019**.

A defining feature of the Project is that all energy generation and green fuels synthesis and export infrastructure will be situated on private, mixed-use lands owned by the POA and within the municipal boundaries of the Town of Placentia. The POA Property spans 3,500 hectares (ha) (9,000 acres) and encompasses both the brownfield industrial area of the Argentia Peninsula and the rural locally named "Backlands". The Argentia Wind Facility will be principally located on the Argentia Backlands, with several wind turbines and Project electrical infrastructure also proposed on the brownfield portion of the Argentia Peninsula, adjacent to the port. The Project, as proposed, will avoid the use of Crown Lands for wind energy generation. A portion of the Project Interconnect Line, which is the transmission line that will connect to the Newfoundland and Labrador Hydro (NLH) electrical grid at the Long Harbour Terminal Station, is the only part of the Project that involves Crown Land. The Project will rely on existing services and facilities available from the Port of Argentia, including dock space, laydown areas, port services and road infrastructure. An overview of the Project Area is provided below, which also appears in Section 1.2.



Pattern | Argentia Renewables	FIGURE NUMBER: 0 - ES	COORDINATE SYSTEM: NAD 1983 CSRS UTM Zone 22N	PREPARED BY: C. Burke	DATE: 24/07/26
	FIGURE TITLE: Proposed Infrastructure	NOTES: The location of proposed project infrastructure is considered preliminary and is subject to change.	REVIEWED BY:	
	PROJECT TITLE: Argentia Renewables		APPROVED BY:	sem

SEM MAP ID: 238-005-GIS-043-Rev0

The Project will generate approximately 300 MW of wind energy, powering a hydrogen electrolyzer system with an installed capacity of an estimated 160 MW. The hydrogen will be directed to the Argentia Green Fuels Facility along with nitrogen separated from the air, whereby hydrogen will be converted into ammonia for more efficient storage and transportation. The facility footprint will be approximately 16 ha and will produce an estimated 400 metric tonnes (t) of green ammonia daily (135,000-150,000 t annually), requiring 1,185 cubic metres (m^3) of freshwater per day. Liquified ammonia will be stored in an above-ground tank with sufficient capacity to align with a once per 30-day shipping schedule. Maritime traffic during Operation will therefore be limited to one vessel per month. The current wind turbine design for the Project is expected to have a nominal power with an anticipated range of 6.8-7.2 MW, a hub height of 100-119 m and a rotor diameter of up to 170 m.

The Project scope will encompass all standard components required to operate a renewable energy project of this kind, including civil works and associated infrastructure. Electrical collection infrastructure will transport energy from the wind turbines to the Argentia Green Fuels Facility and comprise approximately 47 kilometres (km) of new overhead and underground low-voltage (34.5 kilovolt [kV]) power lines. A 35 km long high-voltage (230 kV) transmission line (the Project Interconnect Line) will connect to the NL Hydro grid at the Long Harbour Terminal Station. Given the intermittent nature of wind power, when the energy generated by the Argentia Wind Facility is insufficient to continue operation of the plant, electricity will be drawn from the grid. Freshwater will be supplied to the Project by the Town of Placentia municipal water supply system, which draws from the Protected Public Water Supply Area (PPWSA) that encompasses Clarke's Pond and Larkins Pond, with Barrows Pond and Gull Pond as reserves. Availability of water for both municipal and Project requirements was confirmed by a water balance analysis and infrastructure assessment.

The Argentia Wind Facility will consist of up to 46 wind turbines and necessitates the establishment of a network of access roads for the transportation of Project components and equipment, as well as connect the various wind turbine locations. Approximately 42 km of new gravel roads will be constructed, and 6.5 km of existing gravel roads and 1.5 km of an existing paved road will be upgraded.

During Construction, major components will be transported from manufacturers utilizing marine vessels and will be staged at the Port of Argentia for delivery to the designated construction sites. Pending the necessary approvals, construction and associated works of the Argentia Green Fuels Facility is currently scheduled to commence in summer 2025 and is expected to be complete in 2027. Commissioning of the facility is expected to take approximately six to 12 months. Construction of the Argentia Wind Facility, inclusive of tree clearing and grubbing, road construction, foundation works, turbine installation, and mechanical completion, is also scheduled to commence in summer of 2025 and is anticipated to finish by spring of 2027. Turbine commissioning is set to occur from fall 2026 to winter 2027. Although the

Argentia Green Fuels Facility and the Argentia Wind Facility are expected to operate for 30 years, Project components could be repaired or replaced to extend the design life. Decommissioning and rehabilitation of the Project will require an estimated 12 months and entail the removal of Project infrastructure and restoration of the land to its prior state at the discretion of the landowner.

The Project is expected to require capital investment in excess of $1.5 billion CAD, representing one of the largest renewable energy investments in Canadian history. The Project will provide opportunities for workers and businesses to establish long-term careers and relationships within a sector that has the potential to decarbonize challenging global industries and spearhead the creation of a new long-term industry in NL. Argentia Renewables intends to finance the Project through project financing, with the debt sourced from commercial banks and/or institutional lenders.

The failure or withdrawal of a proposal to construct a green energy project on private land would likely be viewed as a shortfall in the implementation of the Province's Renewable Energy Strategy. While the potential negative effects on both the biophysical and socio-economic environments of the Placentia area would be avoided, so too would be the potential benefits, especially to the socio-economic environment. For Argentia Renewables, a decision to cancel this Project would be unlikely to trigger a search for another suitable site within the province; consequently, there is no "other location" alternative for the Project.

Argentia Renewables is well-suited and equipped to carry out the proposed Project in a manner that ensures minimal environmental disruption and optimal socio-economic benefits. Argentia Renewables utilizes a "designed in" approach to mitigation measures: i.e., rather than developing a project and then adding in mitigation and monitoring measures as required to satisfy regulatory requirements, the approach is one of integrating such measures as early as possible in the planning cycle. To this effect, Argentia Renewables considered several design options and technologies as an alternative means for undertaking the Project. Alternatives to the Project which were evaluated included:

- Electrolyzer capacity and type;
- Plant capacity and size;
- Plant water supply including source selection and delivery infrastructure;
- Feedwater treatment technology;
- Plant cooling system technology;
- Wastewater treatment system and selection of effluent discharge location;
- Product storage, transfer, and shipping arrangements;
- Selection of wind turbine sizes and models;

- Siting of wind turbines, linear features such as power lines and access roads, substations, and construction laydowns;
- Wind turbine foundation options; and
- Construction labour force accommodations.

The evaluation of alternatives encompassed technical feasibility, economic feasibility, schedule risk, social effects, and environmental effects. Preferred options for each alternative were carried forward in planning and assessment. Where decisions have yet to be made on viable alternatives, these choices have been identified and described, and the effects assessment included in this EA Registration has been based on conservative assumptions (i.e. by assessing the alternative with the potentially greater environmental footprint). Where a feasible opportunity was presented to utilize existing infrastructure or already disturbed areas, Argentia Renewables incorporated such options into Project design. This is demonstrated, for example, by the access road routing which maximizes the use of existing gravel roads in the Argentia Backlands or siting the ammonia loading facility at the existing POA dockside.

The Argentia Renewables commitment to clear and transparent consultation with stakeholder and Indigenous groups started at the earliest stages of planning for the Project and will continue throughout the duration of all Project phases. Early engagement with the local public, key stakeholders, Indigenous groups, and departments/ agencies of municipal, provincial, and federal government informed the risks and opportunities assessments, and has been an important contribution to the Project design and alternatives development process. Engagement efforts have been ongoing since August 2022. In addition to an extensive series of meetings and stakeholder correspondence, Argentia Renewables has held four public information sessions in the Town of Placentia as of June 2024. Issues and concerns raised during consultation have been collected and inventoried throughout the Project planning process, and summary listings to demonstrate how each item was addressed are presented in this EA Registration.

An effects assessment was conducted following standard methods for describing Project interactions with the biophysical and socio-economic environment and for determining the potential environmental effects associated with the Project during all phases. The environmental effects predictions are based on conservative assumptions, with the objective of avoiding any underestimation of potential adverse effects. The assessment focused on valued components (VCs), which were selected based on several factors, including requirements of the Provincial Guidelines, results of engagement, the role of the VC in the ecosystem, and the importance placed on it as indicated in consultation records. The following table presents the VCs and associated Key Indicators (KIs) that were assessed.

Table 1 Index of Key Indicators Utilized in Effects Assessment.

Valued Component	Key Indicator
Atmospheric Environment	Greenhouse Gas (GHG) Emissions
	Air Quality
	Light
	Sound Quality (Noise)
	Vibration
Aquatic Environment	Surface Water Resources
	Ground Water Resources
	Freshwater Environment (Fish and Fish Habitat)
	Marine Environment (Fish and Fish Habitat)
	Fisheries and Aquaculture
	Species at Risk
	Habitats of Conservation Concern
	Marine Biosecurity
Terrestrial Environment	Flora
	Wetlands
	Fauna (Mammals)
	Avifauna
	Species at Risk
	Habitats of Conservation Concern[1]
Land and Resource Use	Zoning
	Commercial and Industrial Resource Use
	Recreational and Subsistence Resource Use
	Protected, Special and Sensitive Areas
	Indigenous Land Use
Heritage and Cultural Resources	Historic and Archaeological Resources
	Architectural Resources
Socio-Economic Environment	Population Demographics
	Community Health and Wellbeing
	Infrastructure and Services
	Economy
	Employment
	Business
Human Health and Quality of Life	Air Quality[2]
	Light[2]
	Sound Quality (Noise)[2]
	Vibration[2]
	Shadow Flicker
	Ice Throw
	Recreational and Subsistence Resource Use[3]
	Indigenous Land Use[3]

[1]Assessed under Land and Resource Use – "Protected, Special and Sensitive Areas"
[2]Assessed under Atmospheric Environment.
[3]Assessed under Land and Resource Use.

The assessment examined the potential effects of both routine Project activities and accidental events on each VC, as well as potential cumulative effects resulting from the combination of Project effects and other past, present, or likely future activities in the area. To help understand the existing conditions for each VC, numerous baseline studies were conducted between 2022 and 2024, standalone reports for which are appended to this submission.

Residual effects are those adverse environmental effects which cannot be avoided or mitigated, or that remain after the application of environmental control technologies and best management practices. The significance of adverse residual environmental effects was determined using criteria developed for each VC. Effects of the environment (such as due to climate change) on the Project were also assessed. For each VC, mitigation measures were proposed to reduce or eliminate potential adverse effects that may result from the Project. Many of the potential adverse environmental effects can be managed by following accepted procedures and best management practices. In addition to VC-specific mitigation measures presented in the effects assessment sections (Sections 4.2.1-4.2.7), the EA Registration includes:

- Risk assessment for accidents and malfunctions (Section 4.3);
- Standard environmental mitigation measures and best management practices (Section 4.5);
- An environmental management framework which establishes the Project policies on reducing potential negative environmental effects, tracking environmental performance, and advancing long-term environmental sustainability (Section 4.6); and
- A suite of plans for monitoring, management, and emergency response including:
    - Environmental Protection Plan (annotated table of contents, Section 9.0);
    - Transportation Impact Study and Traffic Management Plan (Appendix E);
    - Emergency Response / Contingency Plan (Appendix M);
    - Waste Management Plan (Appendix N);
    - Hazardous Materials Response and Training Plan (Appendix O);
    - Public Participation Plan (Appendix P);
    - Workforce and Employment Plan (Appendix Q);
    - Species at Risk Impact Mitigation and Monitoring Plan (SAR IMMP) (Appendix R);
    - Post-Construction Monitoring Plan (Appendix S); and
    - Domestic Wood Cutting Plan (Appendix T).

Argentia Renewables predicts that routine Project activities will not cause significant adverse environmental effects on any of the VCs. Potential negative effects will be managed by incorporating avoidance and mitigation measures throughout all Project phases. Special attention has focused on

Species at Risk (SAR) as evidenced in the SAR Impact, Mitigation, and Monitoring Plan (SAR IMMP). Argentia Renewables is continuing to work with regulators and resource managers to conduct continuing field surveys and plans to continue monitoring programs over the life of the Project. Follow-up (environmental effects monitoring) programs are proposed to verify key environmental effects predictions, to measure the effectiveness of mitigation measures, and to provide feedback on necessary modifications of such measures.

The risk of a significant negative environmental effect resulting from an accidental or unplanned event (such as a large spill of hazardous materials) is low, given the Project design, maintenance, and monitoring measures that will be in place to reduce the probability and consequences of such an incident. In addition, emergency response plans and contingency measures will be in place to limit the extent and nature of potential environmental interactions in the event of an accident or malfunction.

The detailed layout of the Argentia Wind Facility and supporting infrastructure will be dependent on results of the ongoing meteorological data collection campaign, geotechnical studies, field investigations, and local engagement. Should these ongoing efforts result in changes to the preliminary layout, micro-siting will be conducted in consideration of the mitigation measures presented in this EA Registration, in compliance with all relevant legislation, regulations, and conditions associated with EA release, and such that the conclusions of the effects assessment do not change. Argentia Renewables will continue to consult with all relevant government, community, and Indigenous organizations throughout Project planning, and will continue throughout all Project phases.

Argentia Renewables strives to sustainably develop, construct, and operate clean, renewable energy projects in a safe and responsible manner and with respect for communities, cultures, and the environment. The Project will be developed with the intention of being a part of a community for decades. This Project represents a watershed moment in the mission to transition the world to renewable energy: Argentia Renewables will contribute to the global need to decarbonize the global economy.

1.0 Introduction

Argentia Renewables Wind LP (Argentia Renewables), an affiliate of Pattern Energy Group LP (Pattern), is proposing to develop, construct, operate, and, at the end of the project life, decommission and rehabilitate a renewable energy infrastructure project in eastern Newfoundland and Labrador. The undertaking will consist of a new, dedicated 300 megawatt (MW) onshore wind generation facility (Argentia Wind Facility) powering a new green hydrogen and ammonia production, storage and export facility (Argentia Green Fuels Facility) at the Port of Argentia, collectively, the Argentia Renewables Project (the "Project").

The Argentia Renewables Project will produce green hydrogen using locally produced wind-generated electricity. The hydrogen will be produced at the Argentia Green Fuels Facility on the Argentia Peninsula where it will also be converted to ammonia for shipment by vessels. The location of the Project is on the Avalon Peninsula near Placentia Bay, Newfoundland and Labrador (NL) at approximately 47°18'26.03"N 53°59'4.96"W (Figure 1.0-1). A defining feature of the Project is that all energy generation and green fuels synthesis and export infrastructure will be situated on private, mixed-use lands owned by the Port of Argentia (POA). The POA Property spans 3,500 hectares (ha) (9,000 acres) and encompasses both the brownfield industrial area of the Argentia Peninsula and the rural locally named "Backlands" (hereon referred to as the Argentia Backlands). The Argentia Wind Facility will be principally located on the Argentia Backlands, with several wind turbines and Project electrical infrastructure also proposed on the brownfield portion of the Argentia Peninsula.

The POA is an active heavy industrial seaport located on the southeastern portion of the island of Newfoundland. Formerly the site of a U.S. Naval Base, inclusive of the Argentia Backlands, the POA is being redeveloped with a diverse group of port users and tenants providing support services to key industry sectors, such as marine transportation, renewable energy, aquaculture, offshore oil and gas, and mining. The POA is North America's first monopile marshalling port in support of US energy transition. The POA private land assets on the Argentia Peninsula comprise 3,000 acres of developed, flat land, zoned industrial, adjacent to the port.

POA is planning a major dock expansion project at Cooper Cove in Argentia Harbour. This $100 million infrastructure investment will see the port's quayside capacity add approximately 425 metres (m) of dock facilities alongside more than approximately 12 m water depth at three berths, including a roll-on roll-off feature. Additionally, this development will add approximately 10 hectares of valuable laydown space adjacent to the new dock. The new facility will feature the latest innovations to maximize decarbonization and port electrification. The Cooper Cove Marine Terminal Expansion project has been addressed as part of EA Registration number 2279 and released from Environmental Assessment as of January 18, 2024, subject to conditions.



Pattern | Argentia Renewables	FIGURE NUMBER: 1.0 - 1	COORDINATE SYSTEM: NAD 1983 CSRS UTM Zone 22N	PREPARED BY: C. Burke	DATE: 24/07/28
	FIGURE TITLE: Project Location	NOTES:	REVIEWED BY:	
	PROJECT TITLE: Argentia Renewables		APPROVED BY:	sem

SEM MAP ID: 238-005-GIS-C01-Rev1

Additionally, the project was registered under the Canadian **Impact Assessment Act, 2019,** and on April 8, 2024, the Impact Assessment Agency of Canada (IAAC) determined that an impact assessment was not required for the Cooper Cove Marine Terminal Expansion Project.

The Project will be designed to generate approximately 300 MW of wind energy, powering a hydrogen electrolyzer system with an installed capacity of approximately 160 MW. The produced hydrogen will be combined with nitrogen extracted from the air, and the synthesis process will produce up to 146,000 metric tonnes (t) of green ammonia annually, which will be stored and exported to international markets by ship from a marine terminal at the POA. “Green ammonia” refers to ammonia produced using green hydrogen, which is hydrogen produced from the electrolysis of water that is powered by renewable and low-carbon energy sources.

The primary design thesis of the Project is to size the capacity and production output of the Project, including wind energy generation and hydrogen electrolysis capacity, in accordance with the land, power and water resources available at the private land site afforded by the POA. The Project, as proposed, will avoid the use of Crown Lands for wind energy generation. A portion of the Project Interconnect Line, which is the transmission line that will connect to the Newfoundland and Labrador Hydro (NLH) electrical grid at the Long Harbour Terminal Station, is the only part of the Project that involves Crown Land. None of the other material Project components will be located on lands other than those owned and controlled by the POA. The objective underlying the Project’s design is to minimize usage of Crown Lands, focusing all material development, Construction Phase, and Operation and Maintenance Phase activities on POA Property.

The Project also includes civil works, associated infrastructure, and facilities associated with the Argentia Wind Project, as well as green fuels storage and export facilities associated with the Argentia Green Fuels Facility. The Project will provide opportunities for workers and businesses to establish long-term careers and relationships within a sector that has the potential to decarbonize challenging global industries and spearhead the creation of a new long-term industry in NL. The Project’s principal design features, including its use of private land, its size, and overall execution plan, positions it to be an early-moving project.

As an important step in the Project’s planning and approval process, this Environmental Assessment Registration document (Registration) has been prepared in accordance with the Province of NL **Environmental Protection Act** (Part X) and the **Environmental Assessment Regulations**. The format of this submission is consistent with the “*Guidance for Registration of Onshore Wind Energy Generation and Green Hydrogen Production Projects*” (Doc-2022-1022 issued by Department of Environment and Climate Change, Province of NL April 2023) as well as the “*Environmental Assessment Act: A Guide to the Process”*. The Project does not include any activities requiring federal assessment as listed in the **Physical Activities Regulations** under the **Impact Assessment Act, 2019**.

1.1 Proponent

The Proponent for this undertaking is an affiliate of Pattern, one of the most established, experienced, and leading renewable energy infrastructure developers, constructors, and operators in the world. Pattern, founded in 2009, operates a fleet of utility-scale wind, solar, and transmission assets across North America. In 2020, a majority share of Pattern was acquired by the Canada Pension Plan Investment Board (CPPIB). Pattern's corporate headquarters are based in San Francisco, CA, with North American offices in San Diego, CA, Houston, TX, and Toronto, ON. With more than 30 operating facilities totaling approximately six gigawatts (GW) installed capacity, Pattern's world-class capabilities, operating assets, and development projects are backed by some of the world's largest and most knowledgeable investors. As such, Pattern is securely positioned to advance their mission of transitioning the world to renewable energy.

Contact information for the Proponent, and the primary Proponent contact for the environmental assessment, is provided in Table 1.1-1. A list of key personnel responsible for preparing the Registration, including their roles and qualifications, is provided in Chapter 11. Contact for the environmental assessment study team is provided in Table 1.1-2.

Table 1.1-1 Proponent Information.

Corporate Body Name	Argentia Renewables Wind LP
Proponent Address	1088 Sansome Street, San Francisco, CA 94111
Vice President	Frank Davis[1]
Principal Contact for Environmental Assessment	Adam Cernea Clark Adam.CerneaClark@patternenergy.com
[1]this position relates to Argentia Renewables Wind GP Inc., the general partner of Argentia Renewables Wind LP	

Table 1.1-2 Environmental Consultant Information.

Consultant Name	Sikumiut Environmental Management Limited (SEM)
Consultant Address	2nd Floor, 79 Mews Place, St. John's, NL A1B 4N2
Project Manager	Steve Gullage steve.gullage@semltd.ca

In addition to those provided for regulatory review, physical copies of the Registration have been provided to the Town of Placentia and the POA for public review.

Among its most recent projects, Pattern developed, constructed, and currently operates Western Spirit Wind, a wind project with 1,050 MW of installed capacity at four wind energy sites in New Mexico. Western Spirit Wind represents the most wind power ever constructed as a single phase in the Americas. The project reached operations at the end of 2021. During its 15-month Construction Phase period, Western Spirit Wind and its accompanying transmission line created 1,000 jobs. Currently, there are 35 full-time, permanent employees who maintain the wind facilities; however, the number of workers onsite nearly doubles when supplemental maintenance is required. Western Spirit's annual production

conserves more than two billion gallons of water and avoids four million metric tonnes of carbon dioxide emissions compared to coal-fired generation. The project's annual electricity production meets the needs of 900,000 people and is sold through various power purchase agreements. Western Spirit Wind is expected to provide approximately $3 million per year in increased property tax revenues for communities near the project sites, while its affiliated transmission line will add approximately $1 million per year in addition property tax revenues over the next 40 years.

Pattern is one of the largest wind power operators in Canada and has developed and financed 11 wind energy projects in five provinces. Pattern maintains and operates a portfolio of six wind projects in Ontario in partnership with Samsung Renewable Energy: South Kent Wind (270 MW), North Kent Wind 1 (100 MW), Grand Renewable Wind (149 MW), Belle River Wind (100 MW), Armshow Wind (180 MW), and K2 Wind (270 MW). These projects represent some of the largest wind facilities in the province of Ontario. Development for the projects began in 2013 with the construction of South Kent Wind, Grand Renewables Wind, and K2 Wind, and finished in 2018 with the completion of North Kent Wind. All the projects are currently operational. In total, the projects employed more than 2,000 workers during the Construction Phase, with more than 98% of the workforce being from Ontario. The turbines used were built locally using steel sourced from Ontario. The projects continue to employ local contractors to keep the facilities operational. Ontario committed to phasing out coal-fired generation in 2002 and met this target in 2014 with the help of wind energy. The electricity produced by each project is enough to satisfy the needs of more than 1 million Ontarians and is sold under various power purchase agreements. Each project brings substantial economic benefits to local communities, including more than tens of millions of dollars in property taxes over the first 20 years of the projects' operation, and injecting millions more into the local economy. Furthermore, Pattern remains active in local communities and sponsors many local organizations.

Similar in scale and topography to the Argentia Wind Facility proposed for the Project, Pattern partnered with the Henvey Inlet First Nation, through its subsidiary Nigig Power Corporation, on the Henvey Inlet Wind Project, which is a 300 MW wind power development located on Hevey Inlet First Nation Reserve No. 2 lands along Georgian Bay's northeast shore in Ontario. The Henvey Inlet Wind Energy Centre (HIWEC) study area lies within the Georgian Bay Fringe physiographic region, which is characterized by a gentle plain that inclines gradually from the shores of Georgian Bay to the Algonquin Highlands. The HIWEC study area contains a considerable number of unaltered forested regions with old growth and mature forests. Construction commenced in September 2017, and commercial operation was achieved in December 2019. Henvey Inlet First Nation designed and implemented an Environmental Stewardship Regime under the federal First Nations Land Management Act. Henvey Inlet Wind is the first project to adopt and implement such a regime. The project also required extensive consultation and permitting with the Canadian Wildlife Service (CWS). To enhance the region's biodiversity, Henvey Inlet First Nation and Canadian Wildlife Service (CWS) created the Eastern Georgian Bay Initiative, which will receive $1 million in funding from the facility each year of operation.

1.1.1 Funding

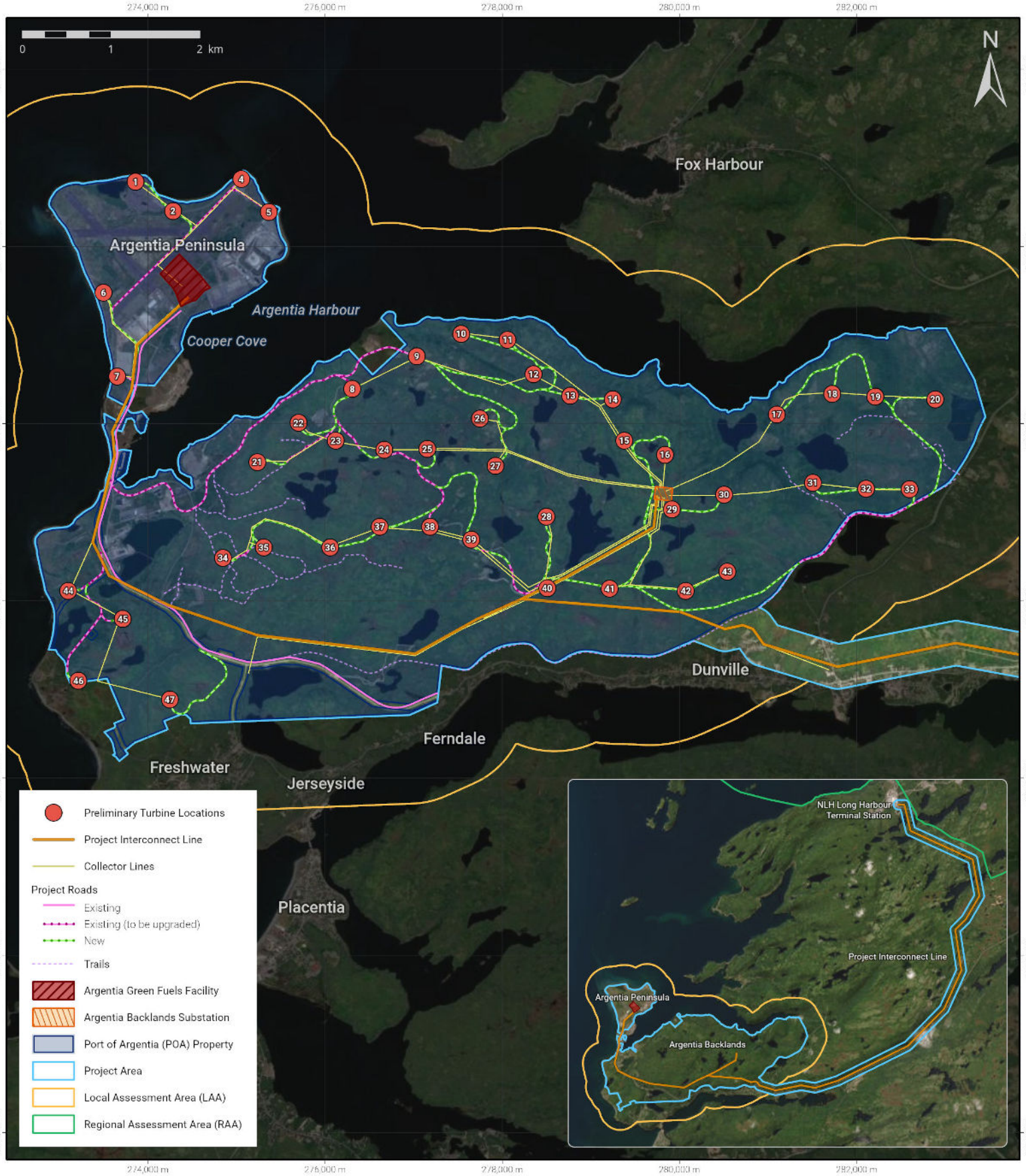
Pattern has led the industry in project financings for more than a decade, securing billions of dollars for renewables and transmission projects through various structures, including experience financing Canadian assets. As a major wind power operator in Canada, Pattern has successfully developed and financed 11 wind energy projects spanning five provinces. Pattern recently closed an $11 billion (USD) construction financing for the SunZia Wind and Transmission Project, an approximately 850-kilometre (km) high-voltage transmission project and 3,500 MW wind project, representing the largest renewable energy financing to date in North America.

The proponent intends to finance the Project through project financing, with the debt sourced from commercial banks and/or institutional lenders. These loans are projected to cover a substantial portion of the Project's capital costs, which will be sized based on the projected operating cashflows, with suitable coverage ratios enabling periodic payment of the loan service and distribution of excess cash flows to equity. The Project's development costs and remaining Construction Phase costs will be covered through Project sponsor equity. Pattern utilizes distributions from its operational assets to reinvest into new projects and receives support from its majority shareholder, the Canada Pension Plan Investment Board.

1.2 Overview of Undertaking

The following is an overview of Project components, activities, and schedule. A complete Project description is provided in Proposed Undertaking (Chapter 2). The Project is a renewable energy project using wind-generated electricity to power an electrolysis process that extracts hydrogen from water. The electrolytic-produced hydrogen will be directed to the Argentia Green Fuels Facility along with nitrogen separated from the air, where ammonia synthesis will occur through the Haber-Bosch process. Hydrogen will be converted into ammonia for more efficient storage and transportation.

The electricity source will be an array of wind turbines comprising approximately 300 MW of installed capacity located throughout the POA Property (Figure 1.2-1). The Argentia Green Fuels Facility will be located at the northern end of the Argentia Peninsula, near the Argentia Graving Dock. The Project is expected to produce up to 400 metric tonnes per day (tpd) of green ammonia, equivalent to up to 146,000 metric tonnes (t) of ammonia per year. The Project will require between 170 to 200 MW of renewable energy and 1,185 cubic metres (m^3) of freshwater daily. The Argentia Green Fuels Facility will have an installed electrolyzer capacity of approximately 160 MW. The product will be exported by third-party marine vessels to international markets.



Pattern | Argentia Renewables	FIGURE NUMBER: 1.2 - 1	COORDINATE SYSTEM: NAD 1983 CSRS UTM Zone 22N	PREPARED BY: C. Burke	DATE: 24/07/26
	FIGURE TITLE: Proposed Infrastructure	NOTES: The location of proposed project infrastructure is considered preliminary and is subject to change.	REVIEWED BY:	
	PROJECT TITLE: Argentia Renewables		APPROVED BY:	sem

SEM MAP ID: 238-005-GIS-002-Rev1

The Project will encompass all standard components required to operate a renewable project of this kind, including wind turbines, electricity transmission systems, substation(s), water collection and treatment systems, access roads and staging areas, hydrogen electrolyzers and storage, ammonia synthesizers and storage, ammonia vessel loading, and maintenance buildings. Electrical collection infrastructure will be needed to transport energy from the wind turbines to the Argentia Green Fuels Facility. These low-voltage Collector Lines will transfer energy generated by the turbines to a substation in the Argentia Backlands, where it will be stepped up to transmission (high) voltage. The Project Green Fuels Generation Interconnect Line (Project Gen-Tie) will connect the Argentia Backlands Substation to a second substation on the Argentia Peninsula. The Argentia Peninsula Substation will be required to step down to lower voltage for distribution in the adjacent Argentia Green Fuels Facility. This will require approximately 47 km of new overhead and underground Collector Lines. The Project Interconnect Line will span approximately 35 km to connect to the provincial electricity system at the Long Harbour Terminal Station. The Argentia Wind Facility necessitates the establishment of a network of access roads. These roads will facilitate the transportation of Project components and equipment as well as connect the various wind turbine locations. Approximately 42 km of new gravel roads will be constructed, and 6.5 km of existing gravel roads and 1.5 km of an existing paved road will be upgraded.

The Construction Phase of the Argentia Green Fuels Facility and associated works is currently scheduled to commence in summer 2025 and is expected to be complete in 2027. Commissioning of the facility is expected to take approximately six to 12 months. The Construction Phase of the Argentia Wind Facility, inclusive of tree clearing and grubbing, road construction, foundation works, turbine installation, and mechanical completion, is scheduled to commence in summer of 2025 and is expected to be complete by spring of 2027. Turbine commissioning is set to occur from fall 2026 to winter 2027. The Construction Phase will begin following receipt of Authorization to Proceed (including release from the environmental assessment process) and the Final Investment Decision. Although the Argentia Green Fuels Facility and the Argentia Wind Facility are expected to operate for 30 years, Project components could be repaired or replaced prior to considering any Decommissioning and Rehabilitation Phase activities to extend the design life. Alternatively, the Project could begin Decommissioning and Rehabilitation Phase after an estimated 30-year operation. This will entail the removal of Project infrastructure and restoration of the land to its prior state at the discretion of the landowner, which will require approximately 12 months.

1.3 Project Benefits

As one of the largest independent renewable energy companies in North America, Pattern brings a wealth of experience working in communities as a long-term partner. As an affiliate of Argentia Renewables, Pattern is committed to forging partnerships, establishing trust, accountability, and transparency at all its projects. Pattern strives to sustainably develop, construct, and operate clean, renewable energy projects in a safe and responsible manner and with respect for communities and cultures. Pattern is more than an energy developer because it develops projects with the intention of being a part of a community for decades. Pattern's mission statement is to transition the world to renewable energy. This Project

represents a watershed moment in that mission: Pattern will go beyond the electrical grid to begin decarbonizing other sectors of the global economy.

Pioneering an internationally recognized initiative, the first of its kind in Canada, through the Hydrogen Alliance between Canada and Germany: The Memorandum of Understanding ("MOU") signed on March 18, 2024, by the Canadian Minister of Energy and Natural Resources and the German Vice-Chancellor and Minister of Economic Affairs and Climate Action, will catalyze the global hydrogen trade between Germany and Canada and ensure early access to clean hydrogen projects. Concurrently, two additional agreements were inked in Germany to bolster the Canadian-German hydrogen trade alliance:

- Canada's POA and Germany's Hamburg Port Authority signed a Letter of Intent to collaborate on the export and import of green hydrogen from Canada to Germany.
- Pattern and Mabanaft GmbH & Co. KG (Mabanaft) also signed a Letter of Intent, further solidifying the foundations of the Canada Germany Hydrogen Alliance.

Argentia Renewables is committed to maximizing long-term benefits for the Placentia area, its surrounding regions, the Province of Newfoundland and Labrador, and Canada as a whole. The Project offers a myriad of economic, social, and environmental benefits, including the following:

1. **Positively contributing to the Province's objective to implement initiatives to achieve clean economic growth, as per the Province's Way Forward on Climate Change in NL**:

    a. Ammonia is the foundation for nitrogen fertilizers, which help sustain agriculture around the world. Ammonia is also used in chemical manufacturing, as a source of energy in fuel cells, or as a hydrogen carrier in hydrogen storage and transportation systems. Ammonia produced from renewable generation minimizes or eliminates the carbon emissions associated with fossil fuel-based production methods. Climate change is a shared challenge, and the Project, in partnership with the POA, will play an important early leader role in decarbonizing ammonia production.

    b. The Project will stimulate a new clean energy economy and ensure that the Placentia area is part of this emerging sector in NL. The Project will drive growth by creating local jobs in the Placentia area during the Construction Phase and Operation and Maintenance Phase of wind turbines and hydrogen and ammonia production facilities.

    c. The Project will attract investment to the Placentia area and broader region and will help drive economic activity in related industries and local businesses.

    d. The Project represents a new direction for an economy that has heavily relied on oil and gas, fishery, and mining projects. Engaging in the clean energy sector may help provide long-term sustainability and a more diversified suite of economic drivers.

2. **Providing direct economic benefits to the Placentia area and region:** This Project will generate revenue for the Placentia region through taxes and financial agreements, contributing

to municipal and provincial revenues. These funds may be reinvested into community development initiatives, infrastructure upgrades, and public services.

3. **Fostering pride for the Project in the community:** The Project will offer many benefits to society in the area, including:

    a. Pattern has prided itself on regular and open public engagement since the inception of this Project. Pattern has welcomed all community members to engage with Pattern on the Project, to foster a culture of transparency and trust between Pattern and the Placentia region. This commitment will be implemented for the life of the Project.

    b. The Project provides a wealth of opportunities for educational outreach and environmental awareness programs. Local organizations and schools can collaborate with Pattern to educate local community members and visitors about renewable energy technologies and their importance in mitigating climate change.

4. **Locally and regionally tailored community benefits programs:** Pattern prides itself in its commitment to community and environmental stewardship. A dedicated budget has been allocated for a comprehensive Community Benefits Program in Placentia as well as an Environmental Stewardship Program. These commitments align with the Argentia Renewables Statement of Community and Cultural Commitments (Chapter 12), ensuring support for causes that are significant to the community and economy of the Project area, with a focus on creating lasting benefits for the region. Pattern actively contributes to building strong and vibrant communities in their project areas through donations and sponsorships. These contributions not only offer local branding opportunities but also support various facilities, programs, and events by covering capital, operating, or special one-time costs. Pattern develops community and environmental stewardship commitments collaboratively with local and regional stakeholders to ensure benefits match the communities and environment in which we are located.