Department of National Defence

Environmental Effects Determination Report

Construction of a Land Based Test Facility, Hartlen Point, Canadian Forces Base Halifax, Nova Scotia

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Executive Summary

The Department of National Defence (DND) plans to construct a Land Based Test Facility (LBTF) at Hartlen Point, Eastern Passage, Nova Scotia in support of the Canadian Surface Combatant (CSC) project. The project requires an Environmental Effects Determination (EED) under s. 82/83 of the *Impact Assessment Act* (2019) before the project can proceed with construction. The EED examines the project components and the interactions with the environment to determine whether there are significant residual impacts from the undertaking as well as corresponding mitigations.

The facility will provide the CSC project with an on-land capability to support the early integration, evaluation and validation of the modern command and control systems to be installed in CSC ships. This reduces risk for the design and build phases and enables the test and acceptance strategies for the ships, which are essential to delivering and maintaining warships in Canada through-life. The facility will allow for the test and evaluation of the ship system suite of equipment in a control environment adjacent to real-time maritime environmental conditions. In previous projects, the majority of the test and evaluation program was conducted after the equipment was installed in the ship and the ship had to be at sea to obtain valid data. The latter approach results in higher costs, greater demands on personnel and equipment, less control of the test environment and increased energy usage.

The use of a LBTF is consistent with the approach taken by Canada's allies on their complex warship acquisition programs. The United States, United Kingdom, and Australia have already built, or are in the process of building, land based testing facilities, although facility features (such as site location) are specific to unique program parameters. The facility is envisioned to be divided into two principal areas; a test area, to house all the shipboard and test equipment, and an administrative area, to support the test and evaluation program. It is expected to house up to 150 personnel amongst the various facility spaces. No shipboard weapon systems, or associated munitions, shall be utilized or stored at the LBTF.

The Project Area consists of the space that will be fenced off around the LBTF for operational and security purposes. The Project Area is approximately 62, 468m². The LBTF building itself will be approximately 11, 500m² within this fenced area. The construction of the LBTF will occur within the Project Area to avoid environmentally sensitive areas (e.g., wetlands), as much as possible.

The Project Area is largely a greenfield area of wetlands, grass areas, and woodland habitat. The site is owned by the Government of Canada, administered by DND, and is surrounded by other DND properties such as a golf course that is open to the public, as well as a DND antenna field.

Eight species at risk and thirty-eight species of conservation concern have been identified at Hartlen Point from field surveys conducted since 2017 by WSP and CBCL. There is also one wetland located within the Project Area, and two additional wetlands near the access road approaching the site. Wetlands are located near but not within the LBTF building footprint.

Standard mitigation measures will be employed during the construction and operation of the facility to reduce impacts from construction activities and routine operations, as well as to prevent and manage spills (e.g., fuel sources) and accidents (e.g., collisions) that may occur.

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The Project will design and construct in a manner that will avoid negative impact to wetlands and will offset where necessary. DND will comply with the Federal Policy on Wetland Conservation to ensure there is no net loss of wetland function on federal-administered land. Other mitigation measures include clearing and grubbing to occur outside of the breeding bird season (April 15 to August 15) and the bat roosting season (mid-April to late October), stormwater management plans, erosion and sedimentation controls, offsetting for loss of wetland function, and two Green Globes based on the Green Globes Building Certification. Residual effects from the Project were evaluated for the following valued components (VCs):

- Atmosphere
- Surface water
- Groundwater
- Soils and geology
- Ambient noise and light
- Terrestrial wildlife (including avifauna) and habitat
- Aquatic wildlife and habitat
- Vegetation and wetland
- Species at risk and of conservation concern
- Land and marine use
- Cultural resources
- Transportation infrastructure
- Human Health

Residual effects are predicted to be not significant for the evaluated VCs.

Abbreviations

ARIA	Archeological Resource Impact Assessment
ARUs	Autonomous Recording Units
CAF	Canadian Armed Forces
CCME	Canadian Council of Ministers of the Environment
CFB	Canadian Forces Base
CIAR	Canadian Impact Assessment Registry
СО	carbon monoxide
COPC	contaminants of potential concern
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CSC	Canadian Surface Combatant
CVRA	Climate Vulnerability and Risk Assessment
DBH	diameter at breast height
DCC	Defence Construction Canada
DFO	Fisheries and Oceans Canada
DND	Department of National Defence
DNR	Nova Scotia Department of Natural Resources and Renewables
ECCC-CWS	Environment and Climate Change Canada – Canadian Wildlife Service
EED	Environmental Effects Determination
EOD	Explosive ordnance disposal
HRM	Halifax Regional Municipality
IAA	Impact Assessment Act
IPCC	Intergovernmental Panel on Climate Change
ISEC	Innovation, Science and Economic Development Canada
KMKNO-ARD	Kwilmu'kw Maw-klusuaqn Negotiation Office – Archeology Research Division

LBTF	Land Based Test Facility
MARLANT SEMS	Maritimes Forces Atlantic Safety and Environment Management System
NAPS	National Air Pollution Surveillance
NO ₂	nitrogen dioxide
NO _x	nitrogen oxides
NSECC	Nova Scotia Environment and Climate Change
NSESA	Nova Scotia Endangered Species Act
O ₃	ozone
PAHs	polycyclic aromatic hydrocarbons
PFAS	perfluoroalkyl substances
PHC	petroleum hydrocarbons
PIEVC	Public Infrastructure Engineering Vulnerability Committee
PM _{2.5}	particulate matter
ppb	parts per billion
RCN	Royal Canadian Navy
RF	radio frequency
ROC	receptors of concern
RPC	Representative Concentration Pathway
SAR	species at risk
SARA	Species at Risk Act
SO ₂	sulfur dioxide
SOCC	species of conservation concern
SOPs	standard operating procedures
VC	valued components
VOC	volatile organic carbons

Part 1. Project Information

1.1 Title of Proposed Project

Construction of a Land Based Test Facility, Hartlen Point, Canadian Forces Base (CFB), Halifax Nova Scotia.

Construction d'une installation d'essai terrestre, à Hartlen Point, à la Base des Forces canadiennes (BFC) Halifax, en Nouvelle-Écosse

1.2 Originating Directorate, Base, or Unit

The originating Establishment is CFB Halifax.

1.3 Location of Proposed Project

Latitude: 44.597715 Longitude: -63.449806

The Project is located at Hartlen Point in the Halifax Regional Municipality (HRM), Nova Scotia in the Eastern Passage. Project location, study areas for the Environmental Effects Determination (EED), and key environmental features are shown on Figure 1 through Figure 3.



Figure 1. Hartlen Point, Halifax Regional Municipality along the Eastern Passage (CBCL 2022)



Figure 2. Hartlen Point with forested area (dark green), Tanner's Eastern Passage Trail (thick dashed yellow), and adjoining unofficial walking trails (thin dashed yellow) (Stantec 2022; AllTrails n.d.)



Figure 3. LBTF 130° angle (delineated in green) which the RF will operate at ground level, whereas the 230° angle where there is human population the RF will only emit in an upward direction; location of the building and fenceline has not been determined to-date.

1.4 Project Summary

The Department of National Defence (DND) is proposing the construction of a Land Based Test Facility (LBTF) ("the Project") on Government of Canada owned land at Hartlen Point, Eastern Passage, Nova Scotia in support of the Canadian Surface Combatant (CSC) Project. The building is anticipated to incorporate office/planning/meeting areas, warehousing, technical workshops, test and evaluation areas, operations areas, and laydown areas, among others.

Associated site infrastructure is anticipated to include paved vehicle parking, and security fencing. Road access and municipal service extensions are expected to be required. Brush clearing and site preparation is anticipated to begin as early as March 2023, prior to the bird breeding season (April 15 to August 15). Construction of the facility is anticipated to begin in Fall 2023 with operations commencing in 2026.

Le ministère de la Défense nationale (MDN) propose la construction d'une installation d'essai terrestre (IET) sur un terrain appartenant au MDN à Hartlen Point, à Eastern Passage, en Nouvelle-Écosse, à l'appui du projet des navires de combat canadiens (NCC). Le bâtiment devrait comprendre des bureaux, des salles de planification et de réunion, des entrepôts, des ateliers techniques, des aires d'entraînement, des aires d'opérations et des aires de repos, entre autres. Le besoin de la protection côtière sera déterminé par l'emplacement du bâtiment et la ligne de clôture

L'infrastructure du site devrait comprendre un stationnement pavé pour les véhicules et une clôture de sécurité. Il sera probablement nécessaire d'élargir l'accès routier et les services municipaux. La construction de l'installation devrait commencer à l'automne 2023 et les opérations débuteront en 2026.

1.5 Applicability of Impact Assessment Act, 2019

This activity meets the definition of a project under s.82 of the *Impact Assessment Act* (IAA) as it is a physical activity to be carried out on federal lands and is in relation to a physical work. Therefore, an EED is required under s.82 before it can proceed with construction. DND is the Federal Authority responsible for this EED.

1.6 EED Start Date

Start date of the effects determination process: 2021-01-05

1.7 DGIEGPS EED number

EIA Number: 2021-26-102773

1.8 Provincial and Municipal Government Involvement

Nova Scotia Department of Natural Resources and Renewables (DNR) were contacted on March 25, 2022. DND provided notification of the undertaking and requested information regarding species at risk under provincial jurisdiction; no response was received.

Municipal roadway and water service extensions to the site area are required, DND is working with the HRM and Halifax Water, respectively, on these matters.

1.9 Other Federal Departments

Environment and Climate Change Canada - Canadian Wildlife Service (ECCC-CWS) has been consulted for wetland compensation options and advice on proceeding with the undertaking. See Section 2.8 for further information. Fisheries and Oceans Canada (DFO) has provided a Letter of Advice and measures to implement to avoid and mitigate the potential for prohibited effects to fish and fish habitat (See Appendix A).

1.10 Contacts

1.10.1 EED Point of Contact

- a) Name, Rank, and Title: Pamela Wells, Staff Officer Environment, MARLANT Safety and Environment
- b) E-mail Address: pamela.wells@forces.gc.ca

1.10.2 Project OPI

- 1) Name, Rank, and Title: Andrew Bradley, P.Eng, DCPC CSC, Project Manager
- 2) E-mail Address: Andrew.Bradley2@forces.gc.ca

Part 2 Environmental Effects Discussion

2.1 Description of Project Components, Project Schedule and Project Area

2.1.1 **Project Description Overview**

DND is proposing to construct a LBTF at the Hartlen Point Canadian Forces Base property (Study Area) in Eastern Passage, Nova Scotia. Defence Construction Canada (DCC), on behalf of DND, contracted PCL Construction to carry out an EED in accordance with Section 82/83 of the IAA. Stantec Consulting Ltd. has been contracted under PCL Construction to conduct the EED to support DND in determining if the proposed construction and operation of the LBTF is likely to result in significant residual adverse effects to the physical, biological, social and cultural environment. The requested work included a desktop review of previously conducted studies, a gap analysis, and development of recommendations and mitigation for the proposed work.

The Project Area consists of the space that will be fenced off around the LBTF for operational and security purposes. The Project Area is approximately 62, 468m² (Figure 1). The LBTF building itself will be approximately 11, 500m² within this fenced area. The construction of the LBTF will occur within the Project Area to avoid environmentally sensitive areas (e.g., wetlands), as much as possible.

The Hartlen Point property is in the Eastern Passage community, neighbouring Cow's Bay, within the HRM in Nova Scotia. The Hartlen Point property (EED Study Area) covers approximately 154 ha, and is located on the eastern point of the Halifax Harbour. The Study Area is comprised of the DND administered land at Hartlen Point, shown in Figure 1. The Study Area also contains a frequently used walking and hiking trail along the shoreline, Tanner's Eastern Passage Trail (Figure 2), a helipad (Figure 3), and a previously used Crash Guard Tactical Air Navigation Building with an existing Aboveground Storage Tank and potential Underground Storage Tank. Since the 1940s, Hartlen Point has been used as a coastal defence site. In the 1960s, a portion of the land was redeveloped as a golf course.

The purpose of the undertaking is to construct a facility that simulates at-sea testing on land. This land based test facility reduces costs and ship's emissions generated with at-sea testing and improves operational efficiency. Components of this Project include the construction of the building, access road alignment and improvements, construction of a parking area, and the

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potential for septic field development for wastewater management of the facility. Within the Project Area, the construction of the facility will include clearing, grubbing, and excavation in order for the LBTF to function while minimizing the impacts on the environment to the extent possible . The building will be a maximum of two stories high, subject to final design decisions. A topside platform will be located above the second floor roof and contain various equipment and radar emitters to simulate the ship topside, approximately 30 m above finished grade in order to simulate the height of the sea vessel. When operating, the facility will emit radio frequencies into the maritime approach to the Halifax Harbour to simulate an operation. The radio frequency (RF) emitter will be capable of a 360-degree path. There will be an unimpeded 130-degree angle view of navigable waters into which the LBTF will emit RF emissions (Figure 3). The RF emissions schedule is yet to be determined. There will be safety measures in place for approximately 230-degrees that has human population wherein the facility can only emit at an upward angle. DND continues to work to-date to establish the anticipated frequency and duration of the RF, which will be used to ensure the project meets RF Safety and Compliance Requirements.

The building will be designed to achieve two Green Globes based on the Green Globes Building Certification which requires the building to commit to sound energy and environmental design practices. Green Globes requires the building to be assessed by an independent third party to determine if the facility achieves resource efficiency, reduces environmental impacts, and improves the occupants' wellness. The facility is also to be designed to comply with the Green Building Directive v.3.0-2021 which requires new government buildings over 100m² meet a net-zero criteria and promote the use of lower carbon construction materials and climate resilient buildings. The building design will also include lighting that is night-friendly for birds based on Green Globes Bird Strikes Design Protocol requirements and CSA A460-19 Bird Friendly Building Standard.

Standard mitigation measures will be used to address potential biological, physical, cultural and social impacts as a result of the undertaking. This includes wetland offsetting, design to minimize ambient light, management of acid generating rock and contaminated soil. Vegetation removal and grubbing will occur outside of the breeding bird window (April 15 to August 15). Although there is no habitat deemed suitable for bat maternity roosts within the Project Area, the forested habitat may still be used by nonreproductive bat individuals for day roosting during the entire active period for bats in Nova Scotia (mid-April to late-October). If works are unavoidable during this time, DND will conduct nest and bat roosting sweeps prior to vegetation removal.

2.1.2 Project Schedule

Construction of the facility is anticipated to begin in Fall 2023 and will take approximately two years to be completed. Once the facility is operational it is estimated to have a lifespan that corresponds with that of the CSC vessels, which is 50 years. Although the facility will have the capability be operational 24-hours a day, 7-days a week, 365-days a year but this is not the intention for the operational use of the LBTF. Brush clearing and site preparation is anticipated to begin as early as March 2023 prior to the bird breeding season (April 15 to August 15).

2.1.3 Construction Activities Summary

The Project requires access road modifications and alignment, clearing, grubbing and excavation of the site, construction of a parking area and the LBTF. A stormwater management

system will be designed to mitigate the addition of impermeable surfaces in the Project Area to balance storm flows over the site and protect nearby streams and wetlands and limit erosion and siltation. The contractor will be required to prepare an environmental protection plan which will outline the sediment and erosion sediment control measures during construction. Construction fencing will be erected surrounding the wetland located close to the facility, HP-2, to limit access and prevent/reduce damage to wetland habitat.

2.1.4 Operations Activities Summary

The facility will have the capability to be staffed with approximately 120 personnel, which peaks at 150 personnel during certain testing, and could operate 24-hours per day, 7-days per week, 365-days a year. During LBTF operation, the public will still have partial access to Hartlen Point for the majority of the time. Staff will be required to access the facility using their personal transportation. Activities in the Project Area will take place within the facility and will be desktop activities, except for the radio frequency emitted from the building. The facility will require standard site maintenance such as snow removal and vegetation control. DND continues to work to-date to establish the anticipated frequency and duration of the RF, which will be used to ensure the project meets RF Safety and Compliance Requirements. Radio frequency licensing will be sought from Innovation, Science and Economic Development Canada (ISED) and stringent health and safety protocols under Health Canada Code 6 will be in place for both facility employees and neighbouring communities (see Section 2.4.2.1; Appendix B). Further RF Safety and Compliance at a Community Engagement Session on January 31, 2023 and is included in Appendix C.

Wastes and emissions from the facility will include construction dust, surface water runoff, noise, light, sewage and solid waste. While in operation, the facility will function as a typical office building with relatively low levels of wastes and emissions. Potable water will be supplied to the facility by extending municipal (Halifax Water) water services, with sewage treatment provided by onsite septic fields. An above-ground storage tank for diesel fuel and backup generators will also be on site. There will be small volumes of hazardous waste typical of an office building, such as cleaning supplies, batteries, and paint. Disposal of solid and hazardous waste will comply with applicable legislative and policy requirements as outlined in Maritime Forces Atlantic Safety and Environment Management Systems (MARLANT SEMS), Directive #SE1 Hazardous Materials and #E5 Solid Waste Management. DND is also aware of the potential for contaminated soil to be present within or close to the Project Area as well as the presence of potentially acid generating bedrock that will require specific operating procedures and management measures. RF will be emitted from the facility at an unimpeded 130-degree angle view of navigable waters (Figure 3). The RF emissions schedule is yet to be determined. There will be safety measures in place for approximately 230-degrees that has human population wherein the facility can only emit at an upward angle. Limited amounts of greenhouse gas (GHG) will be emitted from the building (e.g., operation of heating systems).

At operational full capacity of the LBTF, there will be an increase of 65 trips (55 inbound and 10 outbound) during the AM peak hours and 61 trips (7 inbound and 54 outbound) in the PM peak hours (Stantec 2022a). The future total traffic volumes were predicted by the increase of the proposed developed traffic, with an additional increase of 1% annual growth in the 5-years horizon. Both AM and PM peak times are comparable to the current existing traffic conditions observed at the site. Based on the Traffic Impact Statement (Stantec 2022), the existing road

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network has the capacity to absorb this growth (refer to Section 2.4.4.3 for further information on Transportation Infrastructure).

2.1.5 Accidents and Malfunctions

Accidental spills (e.g., petroleum, oil, and/or lubricants) may occur during construction and operation of the facility, interacting with the physical and biological environment of the Study Area. In the event hazardous material is released into the environment, appropriate procedures will be undertaken to minimize the exposure and clean-up of the area.

2.2 Regulatory Framework

Key federal legislation and policy governing the regulatory framework for this Project includes:

- Impact Assessment Act
- Fisheries Act
- Migratory Birds Convention Act
- Species at Risk Act
- Canadian Environmental Protection Act
- Occupational Safety and Health Act
- Federal Policy on Wetland Conservation
- Health Canada Safety Code 6: Health Canada's radiofrequency exposure guidelines

Provincial legislation governing the regulatory framework:

- Nova Scotia Endangered Species Act
- Nova Scotia Environment Act
- Sulfide Bearing Material Disposal Regulations, NS Reg 57-95

Standard Operating Procedures (SOPs) that will be integrated into the construction and operation of the facility include:

- Environmental Directives, MARLANT Safety and Environmental Management System Manual
- Contract requirements for Environmental Management
- DND Contaminated Sites Instruction CSI.004.001 Soil Management (Version 3.0, 20 January 2022)
- DAOD 8000-1 Conduct of Explosive Ordnance Disposal and Guidance Document: Surface Soils
- Sampling for Munition Residues in Military Live-Fire Training Ranges (December 2012)
- Federal Contaminated Sites Action Plan (2022)
- CSA A460-19 Bird Friendly Building Standard
- DOAD 4003-0 Environmental Protection and Stewardship and Defence Energy and Environment Strategy (2020-2023)
- Green Building Directive v.3.0-2021
- Green Globes Bird Strikes Design Protocol (Green Globes 2021)

2.3 Identification of Valued Components and Potential Project Interactions

The valued components (VCs) have been chosen based on criteria from DND, available existing information, concerns from the public, a review of social media reports and professional

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judgement. Several available technical reports have been analyzed to determine the interaction between the VCs and the Project components. Supplemental research of available academic resources was also undertaken to understand the risk of radio frequency for wildlife (Appendix B); however, DND continues to work to-date to establish the anticipated frequency and duration of the RF, which will be used to ensure the project meets RF Safety and Compliance Requirements. Scoping of VCs was also influenced by comments received during a public open house meeting held by DND on March 3, 2022 and January 31, 2023 (Section 2.6; Appendix C). The reports that have been reviewed include:

- DND Summary of Environmental Considerations on the Proposed Land Based Test Facility (DCC 2020)
- Assessment on Potential Wetland Impacts and Compensation Options (CBCL 2021a)
- DND Facilities and Infrastructure Risk Assessment to Sea Level Risk (CBCL 2021b)
- Bat Habitat Assessment and Bird Surveys (CBCL 2022)
- Environmental Baseline Testing Program for the Hartlen Point LBTF (SNC 2022)
- Natural Resources Management Plan (WSP 2018)
- Directive regarding Environmental Impact Assessment (DND 2016), and DND Interim Direction pertaining to the Directive regarding Environmental Impact Assessment (DND 2019)
- Archeological Resource Impact Assessment (Appendix D)
- Traffic Impact Statement (Stantec 2022a)
- Hartlen Point Land Based Test Facility PIEVC Assessment (Stantec 2022b)

The interaction between each VC and the Project phase is based on VC information, the Project description, construction and operation requirements, and risk associated with spills and accidents. Potential interactions are indicated by an "X" in Table 1 if there is potential for the interaction to affect the health, sustainability, and viability of the VC and require mitigation or management measures. Residual effects are determined based on the predicted impact after the proposed mitigation is applied. Significant residual effects are defined in Section 2.5.

Table 1. Environmental Interactions Matrix

	VALUED COMPONENTS												
			PHYSICAI	L			BIOLC	GICAL		SC	CIAL AND	CULTURAL	
Project Phase	Atmosphere	Surface Water	Groundwater	Soils and Geology	Ambient Noise and Light	Terrestrial Wildlife (including Avifauna) and Habitat	Aquatic Wildlife and Habitat	Vegetation and Wetland	Species at Risk and of Conservation Concern	Land and Marine Use	Cultural Resources	Transportation Infrastructure	Human Health
Construction	Х	Х	Х	Х	Х	х	х	х	х	х	Х	х	х
Operation	Х	Х	х	х	х	х	Х	х	х	Х	-	Х	х
Accident and Malfunctions	х	x	x	x	-	х	х	х	х	-	-	-	х

Legend: [-] = No substantive effect | [X] = Potential Adverse Interactions with VC requiring management or mitigation action.

Physical VCs are predicted to interact with the construction, operation, accidents and malfunctions of the Project. The construction and operation of the facility will result in additional dust, noise and lights, erosion and sedimentation, and excavation affecting the soils and geology of the site.

The biological VCs are predicted to interact with the Project as a result of the terrestrial, aquatic, and species at risk that are present within the Study Area. Hartlen Point is an important site for migrating birds, which may be impacted by the presence of the construction and operation of the facility.

The social and cultural VCs will also interact with the Project and any accidents that may occur. This is linked primarily to the restricted site access for recreational purposes and the potential for heritage resources.

2.4 Description of Valued Components

2.4.1 General Description

A desktop review of available information was conducted to establish the existing conditions of the VCs within the Study Area. Hartlen Point has been DND-administered property since the 1940s as a coastal defence site. The Study Area is surrounded by the Eastern Passage community and includes the Tanner's Eastern Passage Trail which is used for recreational purposes like hiking and bird watching (Figure 2). The Hartlen Point area is used as a birding area, recognized by the Nova Scotia Bird Society as one of the best mainland migrant attraction spots in the province. There is also a DND owned golf course located in the Study Area on DND property, which provides further recreational uses to Hartlen Point. The site is comprised of open areas, mud flats, spruce thickets and rocky beaches. The marine area is located on the outskirts of Halifax Harbour (see Project Location, Figure 1). Hartlen Point is zoned under the Master Real Property Development Plan as community and underdeveloped (DND 2022).

2.4.2 Physical Components

DND has undertaken several physical component studies to support the proposed construction of the LBTF. This included a Baseline Environmental Testing Study conducted by SNC-Lavalin which determined the baseline conditions of the site prior to the construction of the facility, and to identify potential soil contaminants and land constructions present at the site that could impact human health and DND related operations. Other studies examining the risk of DND-administered infrastructure to coastal erosion, influenced by climate change, have also been undertaken and incorporated into the findings of this EED. Public databases have been referenced to provide information on the current air quality at the site, prior to construction.

2.4.2.1 Atmosphere

The Project Area has been previously used for military activity but is within a low-density land use area. Nearest human receptors to the Project Area are within 5 km of the Project Area, including the Hartlen Point Golf Course Club House, nearby residences, elementary and high schools, and a long-term health care facility.

The LBTF is subject to the Federal Green Building Strategy under the *Canadian Net-Zero Emissions Accountability Act*. The building must be designed to be net-zero emissions, subject to balancing climate-resistance design and affordability challenges.

Particulate Matter

Ambient air quality is monitored in Nova Scotia through seven monitoring stations operated by Nova Scotia Environment and Climate Change (NSECC) in accordance with the National Air Pollution Surveillance (NAPS) program. Ambient air stations can monitor fine particulate matter ($PM_{2.5}$), carbon monoxide (CO), sulfur dioxide (SO₂), total reduced sulfur, and nitrogen oxides (NO_x).

The Project Area is located in Nova Scotia's Central Air Zone which has two ambient air quality monitoring stations: Halifax Johnston and Lake Major. The Halifax Johnston Station (NAPS #30113 at 1672 Granville Street in Halifax (44.6471, -63.5737)) is located approximately 11.5 km from the Project Area. The Station measures the average $PM_{2.5}$, ozone (O₃), SO₂, and nitrogen dioxide (NO₂) concentrations.

Halifax Johnston Station data collected in 2020 indicates that the $PM_{2.5}$ was 11 µg/m³ for a 24hour averaging period and 5.4 µg/m³ for an annual averaging period (NSECC 2022). The O₃ concentrations for an 8-hour period was 48 parts per billion (ppb), whereas SO₂ concentrations was 8 ppb for a 1-hour averaging period and 0.3 ppb for an annual averaging period. NO₂ concentrations were measured at 28 ppb for a 1-hour averaging period and 4.6 ppb for an annual averaging period. None of the measurements exceed the Nova Scotia Air Quality Regulations or the Canadian Ambient Air Quality Standards (Table 2). The data at the Halifax Johnston Station may also be influenced by the urban downtown setting which includes industry and high populations.

Reporting	Ozone 8-	PN	12.5	S	02	NO ₂			
Year	hour (ppb)	24-hour (µg/m³)	Annual (µg/m³)	1-hour (ppb)	Annual (ppb)	1-hour (ppb)	Annual (ppb)		
Nova Scotia Air Quality Regulations	82	-	-	340	110	210	50		
Canadian Ambient Air Quality Standards	62	27	8.8	70	5.0	60	17.0		
2020 Halifax Johnston Station	48	11	5.4	8	0.3	28	4.6		
Source: ECCC 2	Source: ECCC 2019; NSECC 2022								

Climate

A review of the historical meteorological data collected from the Halifax International Airport Station (ID 8202250; coordinates: 44.52 N, 63.30 W; elevation: 145.4 m) operated by Environment and Climate Change Canada was completed. The station is located approximately 32 km North of the Project Area. Climate normals from 1981 to 2010 are the most recent records published for climate stations located near the Hartlen Point, and are summarized in Table 3. The climate normal indicate daily average temperatures ranging from -5.9 °C in January to 18.7°C in August. Precipitation was lowest in the winter (January to March), and highest in the spring and fall (September to November).

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	Jan	Feb	Mar	Apr	Мау	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Temperature °C													
Daily average	-5.9	-5.2	-1.3	4.4	10.0	15.1	18.8	18.7	14.6	8.7	3.5	-2.4	6.6
Standard Deviation	2.2	2.0	1.6	1.2	1.3	1.1	1.1	1.0	1.3	1.3	1.3	2.2	0.8
Daily maximum	-1.3	-0.6	3.1	9.1	15.3	20.4	23.8	23.6	19.4	13.1	7.3	1.7	11.3
Daily minimum	-10.4	-9.7	-5.7	-0.3	4.6	9.7	13.7	13.7	9.7	4.2	-0.4	-6.4	1.9
Record high	14.8	17.5	25.6	29.5	32.8	33.4	33.9	35.0	34.2	25.8	19.4	16.3	-
Record low	-28.5	-27.3	-22.4	-12.8	-4.4	0.6	6.1	4.4	-0.8	-6.7	-13.1	-23.3	-
Average Precipitat	ion (mm) /	Snow (cm	n) / Rainfal	l (mm)									
Precipitation	83.5	65.0	86.9	98.2	109.8	96.2	95.5	93.5	102.0	124.6	139.1	101.8	1196.1
Snowfall	58.5	45.4	37.1	15.9	2.0	0.0	0.0	0.0	0.0	0.4	16.6	45.4	221.2
Rainfall	134.3	105.8	120.1	114.5	111.9	96.2	95.5	93.5	102.0	124.9	154.2	143.3	1396.2
Source: ECCC 2023													

Table 3. Summarized Climate Normals for Halifax International Airport (1981-2010)

CBCL (2021a) conducted a sea level risk assessment for DND-administered facilities in the Halifax Area, including Hartlen Point. The Hartlen Point infrastructure should be located further than 160 m from the shoreline to avoid coastal erosion reaching the LBTF (CBCL 2021b); however the details for the location of the building and fenceline has not been determined to-date. The CBCL (2021a) analysis predicted that the current DND-administered Hartlen Point infrastructure has more than 100 years of use before being lost to coastal erosion. The effects of coastal erosion on the facility over time and any requirements for erosion protection will be determined based on the final location of the building and fenceline.

Stantec (2022b) conducted Climate Vulnerability and Risk Assessment (CVRA) for the Hartlen Point LBTF. The CVRA was completed using standards by the Public Infrastructure Engineering Vulnerability Committee (PIEVC) Protocol High Level Screen Guide, developed by Engineers Canada. These standards are used to assess the vulnerabilities of public facilities to the potential impacts of climate change. Stantec (2022b) assessed the climate change-related risks to the LBTF using a downscaled 24-model ensemble developed by the Pacific Climate Impacts Consortium and the Intergovernmental Panel on Climate Change (IPCC) Representative Concentration Pathway 8.5 (RCP 8.5)¹ emission scenario for current and future conditions (baseline, 2050s [2041-2070], and 2080s [2071-2100]). The collected downscaled data was for the West Chezzetcook region which overlays Hartlen Point.

The key conclusions from the Stantec (2022b) study found that freezing rain and snow conditions have the broadest impact on the LBTF infrastructure components, and sea level rise and storm surges present extreme risks to the LBTF by the 2080s-time horizon for the physical security, coastline hardening, and fenceline.

2.4.2.2 Surface Water

There are five watercourses within the DND property outside the Project Area at various distances. Surface water samples were collected at each of the five watercourses (Figure 4). WC-3 is the closest distance to the Project Area at approximately 270m. WC-2 is located 400 m from the Project Area, with WC-4 and WC-5 at distances of 750 m and 850 m, respectively. WC-1 is located furthest from the Project Area in the Northeast of the DND-property by approximately 980 m.

Watercourses within the Study Area were investigated by WSP field staff in 2018 (Figure 4). Measurements included temperature, pH, dissolved oxygen, total dissolved solids, specific conductivity, and salinity. The pH range for all the surface water samples were within aquatic habitat water quality guidelines, except for WC-2, which was outside the optimal range for salmonid species. Surface water stations were reported to have moderate levels of specific conductance (between 103 and 165 microSiemens per centimetre (μ S/cm)). Conductivity readings over 200 μ S/cm are not uncommon in Nova Scotia tributaries. Water temperatures at all five watercourses within the Hartlen Point Study Area were outside the optimal range for salmonid species (11°C to 15°C) but not outside the acceptable range. Low levels of dissolved

¹ Representative Concentration Pathway 8.5 (RCP 8.5) is considered 'business-as-usual' and most closely aligns with current estimates for GHG emissions and, therefore, future climate conditions.

oxygen were reported (between 1.76 and 2.7 mg/L; optimal range is recognized as 6.5 to 9.5 mg/L).

Hartlen Point is bordered by the Atlantic Ocean to the east and west, and is located at the east entrance to the Halifax Harbour. Surface and groundwater are assumed to flow toward Halifax Harbour to the west, or Cow Bay to the east.



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Figure 4. Surface water sample locations by WSP field staff (WSP 2018).

2.4.2.3 Groundwater

Groundwater samples for dissolved metals, petroleum hydrocarbons (PHC), volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs) and perfluoroalkyl substances (PFAS) were collected by SNC in 2021 to screen for potential risk to human and ecological health. The PHC, VOC, PAH and PFAS concentrations were reported to be below method detection limits for all the parameters tested with the exception of select metal parameters. Metals tested were also below the method detection limit or the Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines – Water Quality Guidelines for the Protection of Freshwater Aquatic Life (CCME 1999, as updated), the Federal Interim Groundwater Quality Guidelines (FCSAP 2016), and the Nova Scotia Tier I Environmental Quality Standards (April, 2014), where detected, with the exception of arsenic and iron. The presence of elevated levels of arsenic and iron in the groundwater are consistent with the presence of sulfide minerals associated with the bedrock and overburden from the Halifax Formation strata. SNC (2021) observations concluded that the site is a groundwater discharge zone and is currently interacting with surficial geology.

Elevated metals in groundwater within the Study Area included arsenic and iron, but groundwater is not used for potable or domestic use at the site (SNC 2021). There are no domestic wells located down- or cross-gradient from the site, and groundwater drains towards Cow Bay.

Figure 5 shows the topography of the Hartlen Point Study Area to suggest potential groundwater flow direction.



Figure 5. Hartlen Point topography to suggest groundwater flow

2.4.2.4 Soils and Geology

Soil conditions in the Project Area were observed to consist primarily of 0.03 m to 0.15 m of root mat and humus topsoil, composed of organic rich silty sand and silt, with some sand over poorly sorted glacial till with some pebbles, cobbles, and boulders with varying portions of clay (SNC 2021). During borehole drilling, auger refusal was encountered, however, given the possible thickness of glacial till and cobbles within the area, it is unclear if bedrock was encountered (SNC 2021).

SNC (2021) identified two areas of potential concern for contaminants based on historical information: MARLANT Safety and Environment (MARL SE) Contaminated Sites (Csites) 5550 and 5551 (Figure 6). It is noted that these two Csites were identified as potential contaminated sites in the 1990s. The Csites were assessed in the late 1990s/early 2000s. Based on the assessment, it was determined that no further actions were required and the Csites were subsequently closed.

Site 5550 is a former Marine Beacon, Emergency Explosives Demolition Area, and Artillery Firing Range. Site 5550 was previously assessed in 2001 and was closed.

Site 5551 is part of building HP151, which has an existing aboveground storage tank and potential underground storage tank which are the possible sources of contamination (SNC 2021). The soil at Site 5551 was assessed in 1997 and was closed.

Contaminants of potential concern identified for further assessment as part of the Baseline Environmental Testing Program for the LBTF included metals, PHCs, PAHs, VOCs, PFAS, and explosive compounds (SNC 2021). Soil and groundwater were assessed through test pitting, hand auguring, and monitoring well installation.



Figure 6. Sites 5550 and 5551 within the Hartlen Point Project Area (SNC 2021)

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The concentrations measured in soil were below the method detection limits, except for the PAH parameter (perylene), arsenic and iron; however, perylene was detected slightly above the laboratory detection limit in one sample. For perylene there were no available screening guidelines and the concentrations did not exceed the risk based MARLANT Site Specific Criteria (MARLANT SSC). Arsenic was also measured in soil samples from the Project Area, which slightly exceeded the applicable CCME guidelines but did not exceed the MARLANT SSC. Iron concentrations were identified to also exceed the applicable CCME guidelines for all samples collected except for one borehole sample at Site 5551. The iron concentrations are consistent with previous analytical results, the groundwater measurements, and the presence of the sulfide minerals from the Cambrian to Ordovician age bedrock identified as the Halifax Formation (SNC 2021).

Table 4 provides a summary of the contaminants of potential concern (COPCs) retained for assessment in each of the media types at the Site in the Baseline Environmental Assessment (SNC 2021).

Media Type	Human Health COPCs	Ecological Receptors to COPCs		
	Site			
Soil (≤ 1.5 m bgs)	Arsenic*	Iron		
Subsurface Soil (> 1.5 m bgs)	-	-		
Groundwater	No COPCs	No COPCs		
Notes:				
COPC Contaminant of poter	ntial concern			

Table 4 Summary o	f Final COPCs	by Media Type	e at the Site	(SNC 2021)
-------------------	---------------	---------------	---------------	------------

 Notes:
 COPC
 Contaminant of potential concern

 No COPCs identified in this media type

 *
 Screening criteria is protective of 1 x 10⁻⁶ level of incremental lifetime cancer risk (ILCR); no associated exceedances of ILCR of 1 x 10⁻⁵ for arsenic (ECCC, 1999)

Based on the low likelihood of human receptors of concern (ROC) present at the Site for both commercial works, visitors and recreational receptors and the localized nature of the arsenic soil exceedances exposure to human ROCs via soil, direct contact is anticipated to be negligible. The concentration distribution in soil throughout the Site, as demonstrated using descriptive statistics, further supports that if a human ROC were present at the Site, it is unlikely that they would come into contact with arsenic soil concentrations that exceed the CCME SQG.

Iron was identified as a soil COPC for the protection of terrestrial ecological ROC at the Site, with a maximum concentration of 27,800 mg/kg exceeding the (non-specific) NSE Tier 1 Environmental Quality Standard of 11,000 mg/kg. The maximum concentration of iron marginally exceeded the Dillon (2011) recommended background concentration of 25,739 mg/kg which was calculated from a 95% Student's-t UCL. The 90th percentile and 95% UCLM calculated for soil iron concentrations at the Site were 25,420 and 23,103 mg/kg) (95% Student's-t UCL), respectively, which indicates that soil concentrations are likely representative of background. As the NSE Standard is not a pathway or receptor specific value and based on the descriptive statistics of the soil data at the Site, no a^{dv}erse effects to terrestrial ecological receptors from direct soil contact are anticipated and no additional assessment was recommended (SNC 2021).

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Arsenic and Iron concentrations in soils exceed one or both reference guidelines, CCME CSQG's and the Province of Nova Scotia Tier 1 remediation guidelines. In both cases the guidelines incorporate both human health and ecological considerations. As such, and in accordance with the Contaminated Sites Instruction (CSI.004.001) for Soil Management, the disturbance, removal and /or re-use of these soils must be undertaken in accordance with a prescribed Management Plan. This plan will apply site-specific standards and requirements based on the proposed re-use and potential risks. Based on the concentrations, on- site re-use of these soils will be considered with the application of prescribed procedures and controls based on the application; examples of required procedures would include dust controls, appropriate personal protective equipment, and engineering mitigations such as use of soils beneath asphalt, gravel, or suitable landscaping geotextiles. Given the finer grain sizes in soil, minimizing dust generation will be an important consideration in any Soil Management Plan. The exact location of the former explosive ordnance disposal (EOD) area and small arms ranges remain unclear. As a result, the presence of potential related contaminants in soil and groundwater or other EOD related safety concerns will need to be highlighted in construction related planning information and specifications (SNC 2021).

Hartlen Point bedrock is part of the Halifax Formation, which is made up of a collection of rocks referred to as the Meguma Group (NDSNR n.d.). The Halifax Formation is made up of slate, siltstone, minor sandstone, and FE-Mn nodules. The slate of the Halifax formation is rich in phyrotite, and when exposed to air and moisture, the oxidation process can result in generating sulfuric acid, causing acid rock drainage and potential damage to aquatic environments.

Hartlen Point's shoreline has high exposure to wave action, resulting in coastal erosion ranging from approximately 0.1 to 0.7 m per year (CBCL 2021b). The southeastern shore of the site experiences the most erosion of approximately 0.7 m per year, and the southwestern shore experiences approximately 0.4 m per year of erosion. The eastern and western sides are more stable due to wave dissipation on the cobble shores, but overall, there is high erosion observed on the bluffs surrounding the Study Area (CBCL 2021b).

2.4.2.5 Ambient Noise and Light

The lands around Hartlen Point are well developed with a residential area, golf course, roadway and highly used recreation trail, and can be considered as having ambient light and noise levels consistent with a suburban environment (HRM 2022).

Potential noise and light receptors include the Hartlen Point Golf Course Club House, nearby residences and schools. The Hartlen Point Golf Course Club House is approximately 430 m from the Project Area. The closest residences are along Sandpiper Drive which is approximately 1.10 km away from the Project Area. The nearby school includes Seaside Elementary School and Island View High School, which are approximately 2.5 km away from the Project Area. A long-term health care facility is also approximately 2.3 km from the Project Area.

2.4.3 Biological Components

DND has undertaken several terrestrial, wetland, species at risk (including bat), vegetation and freshwater aquatic studies to identify the baseline biological conditions and productivity of the Project Area and adjacent land. This has included year-long migrating bird surveys, nightjar surveys, functional wetland assessments, and aquatic surveys.

2.4.3.1 Terrestrial Wildlife (including Avifauna) and Habitat

Terrestrial Wildlife and Habitat

Habitat mapping completed by CBCL (2022) delineated the following eight habitat types on the Hartlen Point property: mixed wood, soft wood, wetland, forested natural stands, forested alders, beach, cliff, and urban (Figure 7). The Project Area is primarily forested, (natural stand and alders) (Figure 7). Evidence of the following wildlife was found during WSP (2018) field investigations in the Study Area: snowshoe hare (*Lepus americanus*), red squirrel (*Sciurus vulgaris*), Eastern coyote (*Canis latrans x Canis lycaon*), Northern short-tailed shrew (*Blarina brevicauda*), and white-tailed deer (*Odocoileus virginianus borealis*).



Figure 7. Field delineated habitat (CBCL 2022)

Avifauna and Habitat

Field surveys were conducted in 2021 and 2022 by CBCL to investigate the potential of various bird species in the Study Area. Surveys included fall and spring migration, breeding bird, nightjar, winter bird residency, barn swallow (*Hirundo rustica*) roosting, nocturnal owl, and pileated woodpecker cavity surveys (Table 5). Avifauna was recorded at five habitat types including edge habitat, hardwood dominant forest stand, softwood dominant forest stand, barrens shrublands, cliffs and coastline environment.

Survey Type	Survey Dates	Survey Method
Wetland Reconnaissance	March 8, 2021	Incidental bird observations
	March 17, 2021	Incidental bird observations
Migration	September 1, 2021	Area search
	September 14, 2021	Area search
	October 5, 2021	Area search
	October 29, 2021	Area search
	April 7, 2022	Area search
	April 12, 2022	Point counts, area search, migratory lookoff/stopover count
	April 21, 2022	Point counts, area search, migratory lookoff/stopover count
	April 26, 2022	Point counts, area search, migratory lookoff/stopover count
	May 6, 2022	Point counts, area search, migratory lookoff/stopover count
	May 12, 2022	Point counts, area search, migratory lookoff/stopover count
	May 20, 2022	Point counts, area search, migratory lookoff/stopover count
	May 25, 2022	Point counts, area search, migratory lookoff/stopover count
Breeding Bird	July 14, 2021	Point Counts
	July 15, 2021	Point Counts
	June 2, 2022	Point counts, area search, migratory lookoff/stopover count
	June 8, 2022	Point counts, area search, migratory lookoff/stopover count
	June 16, 2022	Point counts, area search, migratory lookoff/stopover count
	June 23, 2022	Point counts, area search, migratory lookoff/stopover count
	June 27, 2022	Point counts, area search, migratory lookoff/stopover count
Nightjar	July 14, 2021	Point counts
Barn Swallow Roosting	August 23, 2022	Habitat Inventory
	August 19, 2022	Roost Survey
	August 20, 2022	Roost Survey
	August 21, 2022	Roost Survey
	August 22, 2022	Roost Survey
	August 25, 2022	Roost Survey

Table 5. Summary of bird surveys conducted by CBCL in 2021 and 2022 in the Study Area¹ (modified from CBCL 2022)

Survey Type	Survey Dates	Survey Method	
	August 29, 2022	Roost Survey	
Nocturnal Owl	March 29, 2022	Silent Listening and Playback	
	April 21, 2022	Silent Listening and Playback	
Pileated Woodpecker Cavity	September 7, 2022	Transect Surveys ²	
Winter Bird Residency	December 13, 2021	Area search	
	January 13, 2022	Area search	
	January 26, 2022	Area search	
Notes:	·		
¹ See Section 2.4.3.4 for more information on Species at Risk			
² Resources Inventory Committee 1999: ECCC 2022			

A desktop review conducted by CBCL (2022) identified 296 species in the Study Area, 24 of which are species at risk (SAR) and 89 species of conservation concern (SOCC). In the field surveys by CBCL (2022), a total of 122 avian species and seven unidentified taxa were observed in the Study Area. Of these, 111 species are protected under the *Migratory Birds Convention Act* (1994), six are SAR, and 33 are SOCC. In combination with WSP (2018) observations, there is eight SAR and 38 SOCC recorded in the Study Area (refer to Section 2.4.3.4).

SAR include federally protected species that are listed as "endangered", "threatened", or of "special concern" by Schedule 1 of the *Species at Risk Act* (SARA) and species listed under the Nova Scotia *Endangered Species Act* (NS ESA) as "endangered", "threatened", or "vulnerable". SOCC include species that are listed "endangered", "threatened", or of "special concern" on the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) but are not yet listed in Schedule 1 of SARA. SAR and SOCC that have been identified at Hartlen Point are further discussed in Section 2.4.3.4.

Breeding Bird Surveys

Breeding bird surveys conducted by CBCL in 2021 recorded 39 species and three unidentified taxa in the Study Area. Of the 39 species, two were SAR (barn swallow and Eastern wood-pewee (*Contopus virens*)), and eight were SOCC. There was also possible breeding evidence of the barn swallows, but there were no direct observations of bird residence. The most abundant species observed during the 2021 surveys were the common eider (*Somateria mollissima*) and herring gull (*Larus argentatus*).

The breeding surveys in 2022 identified 71 species in total, and nine unidentified taxa. Among these species were one SAR bird species (barn swallows) and fourteen SOCC. Also observed during the 2022 surveys was an American black duck (*Anas rubripes*) nest and egg fragments. An active osprey (*Pandion haliaetus*) nest was also observed, with active nest building beginning in April, and was considered active between May through August 2022. The most abundant species recorded in the Study Area during the 2022 surveys were the common eider and herring gull.

Migratory Bird Surveys

CBCL (2022) also conducted spring and fall migratory bird surveys. A total of 7,059 individuals and 75 species were observed during 2022 spring migration surveys. This included two SAR bird species (barn swallow and Ipswich sparrow (*Passerculus sandwichensis princeps*)) and 11 SOCC. Species richness during these surveys varied between 30 to 44 species, with the highest species richness recorded on May 20th. The most abundant species recorded in the Study Area included common eider and herring gull.

During CBCL (2022) fall migration surveys, there was a total of 1,339 individuals and 65 species observed. Two of these were SAR species (eastern wood-pewee and buff-breasted sandpiper (*Tryngites subruficollis*)) and 20 were SOCC. Species richness was recorded to be highest on October 5. The species with the highest abundance in the Study Area was the European starling (*Sturnus vulgaris*; 13.5%, 184 individuals).

Winter Bird Residency Surveys

CBCL conducted winter bird residency surveys in December 2021 and January 2022, and observed 43 species. Of the 43 species, two were SAR (Ipswich sparrow and Barrow's goldeneye (*Bucephala islandica*)), and eight were SOCC. Species in highest abundance in the Study Area during these surveys included the Canada goose (*Branta canadensis*) and herring gull.

Nightjar, Owl, and Pileated Woodpecker Surveys

Nightjar surveys were conducted by CBCL (2022) to determine if common nighthawk (*Chordeiles minor*) and Eastern whip-poor-will (*Antrostomus vociferus*) species are present in the Study Area. The target species were not detected during these surveys, but 13 other species were, including one SAR (barn swallow).

CBCL conducted nocturnal owl surveys in 2022 to determine the presence and habitat use at the Study Area. A barred owl (*Strix varia*) was observed, but no other individuals during the two surveys conducted.

The Project Area was also surveyed for pileated woodpecker cavities (CBCL 2022). No active or inactive nest cavities were observed, but there were potential forested areas that were within the specifications required for pileated woodpeckers (*Dryocopus pileatus*) (7.3 to 50.6 m in height and >40 cm in diameter at breast height). These forested sections identified in the Project Area were also suitable for foraging and roosting.

Hartlen Point is recognized by the Nova Scotia Bird Society as one of the best migratory stopovers for birding in the province, as a result of surrounding habitat of open areas from the golf course fairways, kelp-covered beach shoreline, spruce thickets, mud flats, alders for breeding, ponds, and caittail marshes (NS Bird Society n.d.). Its location as the last point of land along the north-south route provides a stop-over along coastal migrations and contributes widely to a variety of species using the area. The wetland habitat, specifically HP-6, is also identified by CBCL (2021a) to have moderate potential to support waterbird feeding and nesting habitat. It also has high potential to support songbird, raptor, and mammal habitat. Wetland HP-

2 and HP-5 are identified to have moderate potential to support songbird, raptor, and mammal habitat.

2.4.3.2 Aquatic Wildlife and Habitat

Freshwater Wildlife and Habitat

The aquatic environment on the site is within the Sackville River Primary Watershed and the Shore Direct Secondary Watershed. There are five identified watercourses on DND-administered property outside the Project Area (Figure 8). These watercourses were surveyed by WSP in 2018 and results are summarized below.

WC-1 has sediment of small and large gravel, with cobble and had an average width of 2.5 m at the time of the field assessment. This watercourse drains into the wetland in the northeast portion of the Study Area and drains into the salt marshes to the east of the site. The flatter, lower sections of WC-1 consisted of gravels and would provide salmonid spawning habitat when water levels and velocity are higher in the spring and fall. Run, riffle, pool, and flat habitat were encountered in this section of the watercourse, and the substrate was oversized in the upper reaches. Banks were well defined with evidence of old-farm rock walls in some sections of the bank. This section of the watercourse was assessed to have moderate potential for salmonid spawning, and moderate food potential for salmonid rearing but no individuals were detected during field investigations (WSP 2018).

WC-2 is connected to Wetland HP-2 and located in the northeastern quadrant of the Project Area. WC-2 was classified as an intermittent watercourse, with an average bank-full width of 1.18 m. Substrate is dominated by fine materials, and the water velocity was near absent due to dry sections along the reach. At the time of assessment, water depth was shallow, with an average of 0.083 m. The watercourse drains into a coastal wetland and loses its definition. WC-2 is unlikely to have fish habitat (WSP 2018).

WC-3 is an anthropogenic drainage channel that runs parallel to the golf course parking lot. The channel itself is small, 15-20 cm diameter, and has no useful habitat features for fish. WC-4 is found between two holes on the golf course and was previously included in the WSP 2018 site area but is not within the boundaries for the current EED. This watercourse also has poor aquatic habitat quality, and no fish can access the watercourse. Similarly, WC-5 also has been developed from surface water at the golf course (WSP 2018) and is unlikely that fish can access this channel.

In summary, the aquatic habitat in WC-1 can support seasonal brook trout forage habitat and seasonal foraging habitat and spawning ground for brook trout. WC-2 has low potential for fish habitat except at times of peak flow. WC-3, WC-4, and WC-5 all are unlikely to have fish at any time during the year and have low water quality. None of the watercourses are located within the Project Area, although WC-2 drains into HP-2 which is located within the Project Area (Figure 8). No salmonoid individuals were observed during field investigations conducted by WSP (2018).


Figure 8. Field delineated wetlands and watercourses (CBCL 2021a)

Marine Wildlife and Habitat

The Study Area is located at the eastern entry point of the Halifax Harbour and Atlantic. There are a number of marine fish and mammals that use the Halifax Harbour.

A study conducted in 1999 by Jacques Whitford for the Halifax Harbour noted that there are a number of commercial fish in the habour, including herring (*Clupea harengus*), mackerel (*Scomber scombrus*), gaspereau (*Alosa pseudoharengus*), cod (*Gadus morhua*), haddock (*Melanogrammus aeglefinus*), pollock (*Pollachius sp.*), flatfish (*Pleuronectiformes sp.*), grey sole (*Glyptocephalus cynoglossus*) and halibut (*Hippoglossus stenolepis*). Marine mammals observed in the outer harbour include fin whales (*Balaenoptera physalus*), humpback whales (*Megaptera novaeangliae*), minke whales (*Balaenoptera acutorostrata*), dolphin species, porpoises (*Phocoena phocoena*) and harbour seals (*Phoca vitulina*). The Project activities are not expected to impact the marine waterways. There are no records of Northern wolffish (*Anarhichas denticulatus*), spotted wolffish (*Anarhichas minor*), or striped wolffish (*Anarhichas lupus*) which are protected species under SAR.

There are no aquaculture licenses held within the Hartlen Point Project Area or adjacent communities (Nova Scotia Fisheries and Aquaculture n.d.). It is assumed that commercial fisheries have access to the marine waters off of Hartlen Point (e.g., LFA33).

There are no Marine Protected Areas within proximity to the Hartlen Point Study Area.

2.4.3.4 Vegetation and Wetlands

Vegetation

Hartlen Point has a range of vegetation types including forested area and grasses. An inventory of the forested area was conducted in 2009 which included field studies, aerial photo interpretation and stand delineations (WSP 2018) (Table 6). Forested area covers 19.2 ha or 12.2% of the DND-administered property at Hartlen Point and comprises hardwood, mixedwood and softwood stands. The most prominent species are spruces (*Picea spp.*), and balsam fir (*Abies balsamea*).

	Gross Area (ha)	% Gross Area						
	Productive Land							
Hardwood	4.1	2.6%						
Mixedwood	9.0	5.7%						
Softwood	6.1	3.8%						
Bog	11.4	7.3%						
Barren	7.4	4.7%						
Unforested	119	75.8%						
Total Land	157	100%						
¹ Total rounds to 99.9%								

Table 6. Vegetative habitat types within the Study Area (WSP 2018)¹

Rare plant surveys were conducted by WSP field staff in the Study Area July 25 to July 28, 2017. The WSP surveys (WSP 2018) focused on unique habitats that have elevated potential for the occurrence of rare plant species, such as wetlands and watercourses. Incidental observations of rare plants while completing the additional SAR surveys were also recorded.

CBCL (2021a) completed an additional survey on May 17, 2021 to confirm the presence of rare plant species sanity willow (*Salix pellita*) and seaside groundsel (*Senecio pseudoarnica*).

Wetlands

CBCL (2021a) conducted a desktop review of previously identified wetlands within the Hartlen Point Study Area. There are 17 wetlands identified in the Study Area from previous studies (Table 7).

Wetland ID	Туре	Size	Coordinates at We	etland Centre (UTM)
			Easting	Northing
HP-1	Basin bog	11.08	464225.6909	4938528.792
HP-2	Tidal bay marsh complex	6.52	464712.9237	4938631.051
HP-3	Tall shrub swamp	1.04 (onsite) ¹	463807.6331	4938423.526
HP-4	Treed forested swamp	1.78 (onsite) ¹	464210.6528	4938973.918
HP-5	Basin bog	3.84	464523.4443	4938080.658
HP-6	Slope marsh	2.17 (+0.53 ha) ²	464706.9085	4937939.3
HP-7A	Bog wetland pocket	0.05	464362.6238	4937741.314
HP-7B	Bog wetland pocket	0.06	464424.5364	4937676.226
HP-7C	Bog wetland pocket	0.24	464370.5613	4937503.189
HP-7D	Bog wetland pocket	0.211	464191.9672	4937469.057
HP-8	Basin marsh	0.60	464699.9682	4939151.811
HP-9A	Slope marsh	2.65	463973.9501	4937873.341
HP-9B	Slope marsh	0.60	463597.1827	4938159.092
HP-10	Bog wetland pocket	0.02	464650.5494	4937729.933
HP11	Bog wetland pocket	0.05	464616.5768	4937714.376
HP12	Bog wetland pocket	0.04	464414.7468	4937759.041
HP13	Bog wetland pocket	0.03	464483.0095	4937598.703

Table 7. Wetlands previously identified on Hartlen Point property (CBCL 2021	Table 7. Wetlar	ids previousl	v identified or	Hartlen Point	property	(CBCL	2021
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Notes:

¹ Area does not include the portion of the wetland that extends beyond the property boundary

² WSP (2018) reported an area of 2.17 ha for HP-6. HP-6 also contains an additional 0.53 ha within a fenced area that was not previously reported.

WSP (2018) completed a functional assessment of the wetlands on Hartlen Point using the Adamus (2016) Wetland Ecosystem Services Protocol for Atlantic Canada (WESP-AC) Version 1.1. The non-tidal wetlands were assessed and summarized in Table 8.

CBCL conducted surveys on May 8 and 17, 2021 to evaluate the wetland and habitat conditions, confirm of the WSP (2018) wetland delineations, and collect information on topography and hydrologic conditions. Wetland delineations by CBCL (2021a) generally aligned with previous wetland habitat by WSP (2018). Identification included wetland habitat and several small pockets of wetlands that are present throughout the Study Area, identified as small vernal pools and cattail ponds. Three wetlands, HP-2, HP-5, and HP-6, are within the Project Area or within close proximity.

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Table 8. WESP-AC Ratings for Non-tidal Wetlands (WSP 2017; CBCL 2021a)

Function	Definition	Potential Benefit	Wetlan	Wetland Function Ratings			
			HP-2 (Shrub swamp portion)	HP-5 (Basin bog)	HP-6 (Slope marsh)		
Hydrologic Functions							
Water Storage and Delay	The effectiveness for storing runoff or delaying the downslope movement of surface water for long or short periods.	Flood control and maintaining ecological systems.	Moderate	Higher	Moderate		
Stream Flow Support	The effectiveness for contributing water to streams, especially during the driest part of a growing season.	eness for contributing water to streams, especially Iriest part of a growing season.		Lower	Lower		
Water Quality Maintenan	ce Functions						
Water cooling	The effectiveness for maintaining or reducing temperature of downslope waters.	Supporting cold water fish and other aquatic life.	Lower	Lower	Lower		
Sediment Retention and Stabilization	The effectiveness for intercepting and filtering suspended inorganic sediments thus allowing their deposition; reducing current velocity; resisting erosion; and stabilizing underlying sediments or soil.	Maintaining quality of receiving waters and protecting shoreline structures from erosion	Higher	Higher	Higher		
Phosphorus Retention	The effectiveness for retaining phosphorus for long periods (>1 growing season).	Maintaining quality of receiving waters.	Moderate	Moderate	Higher		
Nitrate Removal and Retention	The effectiveness for retaining particulate nitrate and converting soluble nitrate and ammonium to nitrogen gas while generating little or no nitrous oxide (a potent greenhouse gas).	Maintaining quality of receiving waters	Moderate	Higher	Higher		
Carbon Sequestration	The effectiveness of a wetland both for retaining incoming particulate and dissolved carbon, and converting carbon dioxide gas to organic matter (particulate or dissolved) through photosynthesis. The effectiveness to then retain that organic matter on a net annual basis for long periods while emitting little or no methane (a potent "greenhouse gas").	Maintaining quality of receiving waters.	Higher	Higher	Lower		

Function	Definition	Definition Potential Benefit		Wetland Function Ratings		
			HP-2 (Shrub swamp portion)	HP-5 (Basin bog)	HP-6 (Slope marsh)	
Organic Nutrient Export	The effectiveness for producing and subsequently exporting organic nutrients (mainly carbon), either particulate or dissolved. It does not include exports of carbon in gaseous form or as animal matter.	Supporting food chains in receiving waters.	Higher	Lower	Lower	
Ecological Functions			-			
Anadromous Fish Habitat	The capacity to support an abundance and diversity of native anadromous fish for functions other than spawning.	Supporting recreational and ecological values.	Lower	Lower	Lower	
Resident Fish Habitat	The capacity to support an abundance and diversity of native non- anadromous fish.	Supporting recreational and ecological values.	Lower	Lower	Lower	
Aquatic Invertebrate Habitat	The capacity to support an abundance and diversity of invertebrate animals which spend all or part of their life cycle underwater, on the water service, or in moist soil	Supporting salmon and other aquatic life; and maintaining regional biodiversity.	Higher	Higher	Moderate	
Amphibian & Turtle Habitat	The capacity to support or contribute to an abundance and diversity of native amphibians (e.g., frogs, toads, salamanders) and turtles.	Maintaining regional biodiversity.	Moderate	Lower	Moderate	
Waterbird Feeding Habitat	The capacity to support an abundance and diversity of waterbirds that migrate or winter but do not breed in the region.	Supporting hunting and ecological values; and maintaining regional biodiversity.	Lower	Lower	Moderate	
Waterbird Nesting Habitat	The capacity to support an abundance and diversity of waterbirds that nest in the region.	Maintaining regional biodiversity.	Lower	Lower	Moderate	
Songbird, Raptor, and Mammal Habitat	The capacity to support an abundance and diversity of native songbird, raptor, and mammal species and functional groups, especially those that are most dependent on wetlands or water.	Maintaining regional biodiversity.	Moderate	Moderate	Higher	

Function	Definition	Potential Benefit	Wetland Function Ratings			
			HP-2 (Shrub swamp portion)	HP-5 (Basin bog)	HP-6 (Slope marsh)	
Pollinator Habitat	The capacity to support a diversity of native vascular and non- vascular species and functional groups, especially those that are most dependent on wetlands and water.	Maintaining regional biodiversity and food chains.	Moderate	Moderate	Higher	
Native Plant Habitat	The capacity to support pollinating insects and birds.	Maintaining regional biodiversity and food chains.	Higher	Higher	Moderate	

Wetland HP-2

There is one identified wetland within the Project Area, HP-2, on the northeastern quadrant (Figure 8). HP-2 is approximately 4 ha and includes both tidal and non-tidal components. The area of HP-2 that overlaps with the Project Area (0.33 ha; 8% of total HP-2 area) is classified as tall shrub swamp. Species found within this portion of HP-2 include meadowsweet (*Spiraea alba*), speckled alder (*Alnus incana*), grey birch (*Betula populifolia*), and red maple (*Acer rubrum*).

Approximately 2.5 ha of HP-2 is coastal marsh habitat, and grades into non-tidal tall shrub swamp with an increase in elevation. Along the Hartlen Cove, the salt marsh forms a fringe along the northern coast. None of the tidal portion of HP-2 is within the proposed Project Area, and there is no predicted Project interaction with salt marsh habitat.

The vascular plant community found within HP-2 is representative of small salt marshes found in Nova Scotia, and is dominated by smooth cordgrass (*Sporobolus alterniflorus*) and saltmeadow cordgrass (*Sporobolus pumilus*). Other species common to salt marshes observed by CBCL (2021a) and WSP (2018) include seaside goldenrod (*Solidago sempervirens*), black grass rush (*Juncus geradii*) and Baltic rush (*Juncus balticus*).WSP (2018) had previously reported two SOCC species, satiny willow and seaside groundsel, in HP-2. CBCL (2021a) surveys were unable to confirm the presence of satiny willow in HP-2. Seaside groundsel was observed along the shoreline but not within HP-2. CBCL (2022) identified HP-2 as a high potential for barn swallow roosting, but during field surveys there was no nesting or roosting behaviour observed.

Wetland HP-5

Wetland HP-5 is identified as a basin bog that covers a total area of 3.84 ha, HP-5 receives runoff from upstream drains and during times of high rainfall.

HP-5 vegetation is dominated by low shrub ericaceous vegetation and has few trees. These species include leatherleaf (*Chamaehaphne calyculata*), dwarf huckleberry (*Gaylussacic begeloviana*), and sweet gale (*Myrica gale*). Also present is herbaceous vegetation, including tussock cottongrass (*Eriophorum vaginatum*) and Northern pitcher plant (*Sarracenia purpurea*). A narrow section of HP-5 will be altered by the Project when the existing access road is widened during construction.

Wetland HP-6

Wetland HP-6 is a slope marsh which has a total area of 2.17 ha which drains into the Atlantic Ocean. There is a narrow section of the wetland that is anticipated to be impacted as a result of upgrades to the access road during construction. A portion of HP-6 is currently fenced and inaccessible.

HP-6 is dominated by grass species. During 2021 surveys by CBCL, an invasive species, Japanese knotweed (*Reynoutria japonica*), was identified on the edge of HP-6 and on the access road.

2.4.3.5 Species at Risk and of Conservation Concern

Field surveys conducted by WSP field staff in 2017 discovered no plants under COSEWIC/SARA or the NS ESA as Special Concern, Threatened, or Endangered. Although there were four plant species listed under DNR's General Status of Wildlife as Sensitive or At Risk:

- Cursed buttercup (*Ranunculus sceleratus*)
- Satiny willow (Salix pellita)
- Seabeach ragwort Senecio pseudoarnica)
- Seaside groundsel (Senecio pseudoarnica).

Cursed buttercup's main habitat is wet ditches and was noted in 2017 in the Study Area in the drainage ditch leading into HP-3. Satiny willow's habitat is alluvial shores and this species was observed in HP-2. Seabeach ragwort was observed along the shorelines in the Study Area. These observations were made outside the Project Area.

Bird surveys conducted by CBCL in 2021 and 2022 recorded observations of six species at risk listed under Schedule 1 of SARA. Thirty-three SOCC were also identified during the CBCL (2022) field surveys. Field surveys conducted by WSP in 2017/2018 reported observations of two SAR and nine SOCC in the Study Area. CBCL (2022) and WSP (2018) bird SAR and SOCC observations are summarized in Table 9. Of these surveys, there were no direct observations of any bird residences defined under SARA.

Figure 9 through 13 denote SAR and SOCC sightings and habitat by CBCL field staff. Indications of breeding or nesting status are included in the AC CDC ranking column of Table 9.

Common Name	Scientific Name	SARA Ranking	NS ESA Ranking	AC CDC Ranking	Total No. of Individuals Recorded	Observation
		Species at F	Risk			
Barn Swallow	Hirundo rustica	Threatened	Endangered	S2S3B	55	CBCL (2022)
Barrow's Goldeneye	Bucephala islandica	Special Concern	Not at Risk	S1N	18	CBCL (2022)
Buff-breasted Sandpiper	Tryngites subruficollis	Special Concern	Not at Risk	SNA	1	CBCL (2022)
Canada Warbler	Cardellina canadensis	Threatened	Endangered	S3B	2	CBCL (2022)
Eastern Wood- pewee	Contopus virens	Special Concern	Vulnerable	S3S4B	3	CBCL (2022)
Harlequin Duck	Histrionicus histrionicus	Special Concern	Endangered	S2N	2	WSP (2018)
lpswich Savannah Sparrow	Passerculus sandwichensis princeps	Special Concern	Not Listed	S1B	15	CBCL (2022)
Peregrine Falcon	Falco peregrinus	Special Concern	Vulnerable	S1B, SNAM	1	WSP (2018)

Table 9. Bird SAR and SOCC	observed in the Study	Area (CBCL	. 2021a; WSP 2	018)
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Common Name	Scientific Name	SARA Ranking	NS ESA Ranking	AC CDC Ranking	Total No. of Individuals Recorded	Observation			
Species of Conservation Concern									
American Golden Plover	Pluvialis dominica	Not at Risk	Not at Risk	S1S2M	3	WSP (2018)			
American Robin	Turdus migratorius	Not at Risk	Not at Risk	S5B, S3N	355	CBCL (2022)			
Bay-breasted Warbler	Dendroica castanea	Not at Risk	Not at Risk	S3S4B	3, 1	CBCL (2022); WSP (2018)			
Black-bellied Plover	Pluvialis squatarola	Not at Risk	Not at Risk	S3M	18	CBCL (2022)			
Blackpoll Warbler	Dendroica striata	Not at Risk	Not at Risk	S3S4B	15	CBCL (2022)			
Bufflehead	Bucephala albeola	Not at Risk	Not at Risk	S3S4N	27	CBCL (2022)			
Common Eider	Somateria mollissima	Not at Risk	Not at Risk	S3S4	2706	CBCL (2022)			
Common Murre	Uria aalge	Not at Risk	Not at Risk	S1?B	1	CBCL (2022)			
Common Loon	Gavia immer	Not at Risk	Not at Risk	S4B, S4N	3	WSP (2018)			
Common Tern	Sterna hirundo	Not at Risk	Not at Risk	S3B	1	CBCL (2022)			
Cooper's Hawk	Accipiter cooperii	Not at Risk	Not at Risk	S1?B	1	CBCL (2022)			
Golden-crowned Kinglet	Regulus satrapa	Not at Risk	Not at Risk	S5	6	WSP (2018)			
Gray Catbird	Dumetella carolinensis	Not at Risk	Not at Risk	S3B	1	CBCL (2022)			
Great Cormorant	Phalacrocoras carbo	Not at Risk	Not at Risk	S2S3	1	WSP (2018)			
Greater Yellowlegs	Tringa melanoleuca	Not at Risk	Not at Risk	S3B, S3S4M	13, 6	CBCL (2022); WSP (2018)			
Hudsonian Whimbrel	Numenius phaeopus	Not at Risk	Not at Risk	S2S3M	-	WSP (2018)			
Killdeer	Charadrius vociferus	Not at Risk	Not at Risk	S3B	4	CBCL (2022)			
Least Sandpiper	Calidris minutilla	Not at Risk	Not at Risk	S3B	4	CBCL (2022)			
Lesser Yellowlegs	Tringa flavipes	Not at Risk	Not at Risk	S2B	9	CBCL (2022)			
Northern Harrier	Circus cyaneus	Not at Risk	Not at Risk	S3S4B	37	CBCL (2022)			
Northern Shoveler	Spatula clypeata	Not at Risk	Not at Risk	S2B	9	CBCL (2022)			
Pectoral Sandpiper	Calidris melanotos	Not at Risk	Not at Risk	S2M	1	CBCL (2022)			
Pine Grosbeak	Pinicola enucleator	Not at Risk	Not at Risk	S3B, S5N, S5M	6	CBCL (2022)			
Pine Warbler	Setophaga pinus	Not at Risk	Not at Risk	S1B	2	CBCL (2022)			

Common Name	Scientific Name	SARA Ranking	NS ESA Ranking	AC CDC Ranking	Total No. of Individuals Recorded	Observation
Purple Finch	Haemorhous purpureus	Not at Risk	Not at Risk	S4S5B, S3S4N	29	CBCL (2022)
Purple Sandpiper	Calidris maritima	Not at Risk	Not at Risk	S3?N	16	CBCL (2022)
Red Crossbill	Loxia curvirostra	Not at Risk	Not at Risk	S3S4	2	CBCL (2022)
Red-breasted Merganser	Mergus serrator	Not at Risk	Not at Risk	S3S4B,S5N	35	CBCL (2022)
Rose-breasted Grosbeak	Pheucticus Iudovicianus	Not at Risk	Not at Risk	S2S3B	1	CBCL (2022)
Ruby-crowned Kinglet	Regulus calendula	Not at Risk	Not at Risk	S3S3B	5	CBCL (2022)
Ruddy Turnstone	Arenaria interpress	Not at Risk	Not at Risk	S3M	8	CBCL (2022)
Semipalmated Plover	Charadrius semipalmatus	Not at Risk	Not at Risk	S1B, S3S4M	15	CBCL (2022)
Sanderling	Calidris alba	Not at Risk	Not at Risk	S2N, S3M	2	CBCL (2022)
Semipalmated Sandpiper	Calidris pusilla	Not at Risk	Not at Risk	S3M	150; 229	CBCL (2022); WSP (2018)
Spotted Sandpiper	Actitis macularius	Not at Risk	Not at Risk	S3S4B	17; 5	CBCL (2022); WSP (2018)
Whimbrel	Numenius phaeopus	Not at Risk	Not at Risk	S3S4B	38	CBCL (2022)
Willet	Tringa semipalmata	Not at Risk	Not at Risk	S2S3M	114	CBCL (2022)
Wilson's Snipe	Gallinago delicata	Not at Risk	Not at Risk	S3B, S5M	1	CBCL (2022)

Notes:

S1 - Extremely rare. May be especially vulnerable to extirpation

S2 - Rare. May be vulnerable to extirpation due to rarity or other factors

S3 – Uncommon, or found only in a restricted range due, even if abundant at some locations.

S4 - Usually widespread, fairly common, and apparently secure with many occurrences, but of longer-term concern

S5 - Widespread, abundant, and secure, under present conditions

S#s - Numeric range: a range between conservation ranks, for a species/community.

"B" indicating conservation status refers to the breeding population of the species

"N" indicating conservation status refers to the non-breeding population of the species

"M" Migrant species occurring regularly on migration at particular staging areas or concentration spots where the species might warrant conservation attention.

SAR include federally protected species that are listed as "endangered", "threatened", or of "special concern" by Schedule 1 under the SARA and species listed under the NS ESA as "endangered", "threatened", or "vulnerable". SOCC include species that are listed "endangered", "threatened", or of "special concern" on COSEWIC but are not yet listed in Schedule 1 of SARA. SAR and SOCC that have been identified at Hartlen Point.

During 2022 field surveys, an active osprey nest was observed between May to August (Figure 10).

Barn swallow habitat roosting surveys were conducted by CBCL (2022) to determine the presence of the SAR in the Project Area. There were 14 areas assessed for roosting potential. HP-2 was identified as high potential for roosting habitat for barn swallows which is located within the Study Area. HP-1 and HP-9A were identified as moderate potential for barn swallows. Three buildings were also identified that could be used barn swallow nesting, one of which is located within the Project Area. During barn swallow roosting and habitat surveys, five barn swallows were observed but no nesting or roosting behaviour was identified. Barn swallows use the buildings and/or structures onsite for nesting; due to the close proximity of other buildings, there is also a potential for barn swallows to nest offsite. Autonomous Recording Units (ARUs) detected no barn swallows in the suitable habitat on site.

Surveys conducted by CBCL at Hartlen Point in 2021 detected no bats through acoustic monitoring, no roosting habitat and no bat hibernaculum. Opportunistic acoustic monitoring detected no bats. Bat roosting surveys encountered no trees that are suitable for maternity roosts for bat species. Maternity roosting habitat trees are tall, deciduous trees with cracks in the bark, that have a diameter at breast height (DBH) larger than 10 cm. Trees with these characteristics were not observed at Hartlen Point, except for some birch trees which had peeling bark but did not have a large enough diameter, and trees with larger than 10 cm DBH were coniferous and therefore unsuitable (CBCL 2022). No bat hibernaculum was found on site. Eleven potential hibernacula sites (abandoned mine openings) were identified just north of Route 322 in Cow Bay, but have likely been infilled based on their ranking of "low hazard" by the Nova Scotia Abandoned Mines database (CBCL 2022).



Figure 9. Tree measurements at DBH during bat maternity roosting surveys (CBCL 2022)



Figure 10. Bird species at risk and species of conservation concern observed during breeding bird surveys (CBCL 2022)



Figure 11. SAR and SOCC observations from winter residency surveys (CBCL 2022)



Figure 12. SAR and SOCC observations from fall migration bird surveys (CBCL 2022)



Figure 13. Nightjar survey results (CBCL 2022)

2.4.4 Social and Cultural Components

2.4.4.1 Land and Marine Use

General Land Use and Zoning

Northwest of the Hartlen Point site is the Eastern Passage community within the HRM. The area is designated by the Regional Community Planning Strategy for economic development which promotes vibrant, livable communities (HRM 2022). The Halifax Harbour Designation extends from Hartlen Point to Chebucto Head. This designation supports marine-dependent industries and commercial uses, transportation, and facilities for ferries, recreation, and residential uses. Hartlen Point is zoned in the Municipal Planning Strategy as a rural area zone, with the wetlands as environmental conservation zones (HRM 2022). In the 2016 Municipal Planning Strategy for Eastern Passage/Cow Bay, it is indicated that there will be future amendments to the municipal plan to zone Hartlen Point for Generalized Future Land Use. Hartlen Point is also zoned by the Master Real Property Development Plan as community and undeveloped land (DND 2022).

The Eastern Passage community is predominantly single- and two-unit dwellings with some mobile home development. Shore Road, which is used to access the Project Area, is the primary transportation route used in the Eastern Passage community.

Potable water at Hartlen Point Golf Course, located north of the proposed project site, is provided by bottled drinking water (HRM 2022). There are three wells on the golf course itself, used for maintenance/operational use (e.g. irrigation). Local residents in Eastern Passage are supplied water through the municipal water supply.

The Hartlen Point area is frequently used for various recreation purposes. The public can access the shoreline from the Tanner's Eastern Passage Trail. This trail is approximately 2 km long and is used for hiking, walking, birding and accessing the beach for surfing. Hartlen Point is recognized by the Nova Scotia Birding Society as one of the best migration attraction areas for birds to rest and forage (NS Bird Society n.d.). The seaside area is prime for shorebirds, sea ducks, sparrows, gulls, owls and raptors, which draws many birders into the area. Hartlen Point is also among recognized surfing locations for experienced surfers by locals in the area (Bauman 2022; CBC 2022),

Within the Study Area is also a DND-administered Hartlen Point Force Golf Club which has been operating for decades. Previous use of the DND-administered property included the former Marine Beacon, EODs Area, and Artillery Firing Range which resulted in the contaminated sites 5550 and 5551 (Section 2.4.2.4). In the 1940s Hartlen Point was operated by DND as a Coastal Defence Site and underwent military installations in the 1950s. The golf course was constructed in 1962 and has been in operation since. In 1964 the Air Navigation Antenna was constructed, followed by the High Frequency Surface Wave Radar antennas along southern shore of Hartlen Point within the Study Area which is for the detection and tracking of ships, icebergs, and other objects from a shore-based location.

Marine Use

The Canadian Armed Forces (CAF) have Maritime Local Operating Areas in close proximity to the Halifax Harbour. These areas are used for operational and training purpose by the Royal Canadian Navy (RCN) and Royal Canadian Air Force. There are already standard practices in place to advise marine and air traffic navigation when these areas are used by CAF near Hartlen Point marine area and approaches to the Halifax Harbour.

The surrounding marine area has been known to be subjected to recreational use, such as kayaking and surfing (CBC 2022). No further information on the frequency of recreational marine use in the Study Area is currently available; but it is assumed that that small vessels use the coastal and nearshore waters in the area of Hartlen Point. Other uses may also exist, such as angling. As previously mentioned in Section 2.4.3.2, there are no aquaculture licenses held within the Project Area or adjacent communities, but it is assumed that commercial fisheries have access to the marine waters off of Hartlen Point (e.g. LFA33).

2.4.4.2 Cultural Resources

Stantec has undertaken an Archeological Resource Impact Assessment (ARIA) for Hartlen Point. An archival study and a site walkover has taken place on October 12, 2022 under Heritage Research Permit No. A2022NS178 to investigate the Project Area as well as the previously registered archeological site (BdCu-2) located on the western side of Hartlen Point. Results of the study are summarized in Appendix D. The study identified an access road and two structures which were previously the J. Hartling (Hartlen) Farm which existed in the Project Area. The farm was removed during site clearance by DND after it was purchased in 1940. The Project Area was used as a gunnery range from 1940-1945, and there is evidence of previous landscaping.

The Project Area is exposed to the ocean and shoreline conditions resulting in wet spots and low soil development. Alder swales and rose bushes are also present in the footprint, suggesting previous soil disturbance. Stantec conducted a review of SNC (2021) to identify the soil contamination resulting from the gunnery range, discussed in Section 2.4.2.4. The beach and shoreline to the south of the Project Area was previously used for ordnance clearance until 1980s. An additional tower foundation feature was located along the bank of the shoreline outside of the Project Area; this feature was removed in 1963.

An area for elevated heritage resources potential was noted on the western shoreline of Hartlen Point where a previous artifacts were uncovered, outside of the Project Area. A research request with the Nova Scotia Department of Communities, Culture, Tourism, and Heritage (NSCCTH) was made for previous archaeological reports which indicated an isolated find at the Hartlen Point western shoreline of one corner-notched point and a scraper.

The Study Area is within an area once part of the greater Mi'kmaw territory, known as the *Eskikewa'kik*, meaning "Skin dressers" (CMM 2007). Coastlines, islands, bays, and water systems would have been important transportation systems for the local Mi'kmaq and their ancestors (Stantec 2023). Stantec submitted an inquiry with the Kwilmu'kw Maw-klusuaqn Negotiation Office – Archeology Research Division (KMKNO-ARD), which revealed there is seven traditional use sites within 1 km of the Study Area for fishing and aquatic harvesting and

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procurement of stones and clays (KMKNO-ARD 2022). The Study Area is recognized by KMKNO-ARD as being extensively used by the Mi'kmaw within all aspects of their lives.

The final results from the ARIA do not indicate that archaeological shovel testing is necessary. However, the NSCCTH will review the submitted ARIA and may recommend additional mitigation measures (e.g., archeological monitoring during groundbreaking activities). The ARIA will be submitted to the NSCCTH in Q1 2023.

2.4.4.3 Transportation Infrastructure

The Hartlen Point LBTF requires access through the adjacent neighbourhood via Shore Road to reach the site. Shore Road is a collector road and has a speed limit of 50 km/h. It has a two-lane cross-section and has unpaved shoulders. Shore Road intersects with Caldwell Road, which is also a collector road with a two-lane cross section and a speed limit of 50 km/h. There are sidewalks along Caldwell Road, and it is controlled by a stop sign (Figure 14).



Figure 14. Traffic Impact Study Area

The existing peak hour traffic conditions of Shore Road and Caldwell Road are in Table 10.

Table 10. Existing conditions traffic of	operation analysis (Stantec 2022a)
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Peak Hour	ak Hour AM					Р	М	
Movement	Volume Capacity	Level of Service*	Delay	Queue 95 th (m)	Volume Capacity	Level of Service*	Delay	Queue 95 th (m)
EBLT	0.01	А	2.3	0.3	0.04	А	3.5	0.9
WBTR	0.03	А	0	0	0.05	А	0	0
SBLR	0.07	А	9	1.6	0.1	А	9.8	2.6
Note: * Level of serv	ice ranges fron	n A for 10 seco	nds or less ave	rage delay to F	for average de	elay greater th	an 50 second	6

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Halifax Transit operates along the Eastern Passage nearby to the Hartlen Point LBTF site. Route 6B, Eastern Passage, travels along both Shore Road and Caldwell Road. There is also transit available by ferry system at the Woodside Ferry Terminal and Alderney Terry Terminal. The closest transit stop (#6346) is located on Caldwell Road, approximately 2 km away.

Stantec (2022a) has studied potential impacts of the Hartlen Point LBTF to the local traffic. Assuming the LBTF is operating at full capacity, there will be an increase of 65 trips (55 inbound and 10 outbound) during the AM peak hours and 61 trips (7 inbound and 54 outbound) in the PM peak hours. The future total traffic volumes were predicted by the increase of the proposed developed traffic, with an additional increase of 1% annual growth in the 5-years horizon. Both AM and PM peak times are comparable to the current existing traffic conditions observed at the site (Table 11).

Peak Hour	AM				РМ			
Movement	Volume Capacity	Level of Service*	Delay	Queue 95 th (m)	Volume Capacity	Level of Service*	Delay	Queue 95 th (m)
EBLT	0.01	А	1.3	0.5	0.04	А	3.4	1.0
WBTR	0.03	А	0	0	0.09	А	0	0
SBLR	0.10	А	9.5	9.5	0.12	В	10.4	3.1
** ** *		A.C. 40			· ·		F0 1	

 * Level of service ranges from A for 10 seconds or less average delay to F for average delay greater than 50 seconds

Results from the traffic impact assessment indicate that the road infrastructure allows for the capacity increase associated with the LBTF.

2.4.4.4 Human Health

The Project Area has been previously used for military activity but is within a low-density land use area. Nearest human receptors to the Project Area are within 5 km of the Project Area, including the Hartlen Point Golf Course Club House, nearby residences, elementary and high schools, and a long-term health care facility. Because of its previous use, areas of soil contamination exceeding standards have been recorded and are discussed in Soils and Geology, Section 2.4.2.4. Other issues potentially affecting human health are dust, light, noise, and air quality; these are discussed in Section 2.4.2.1 and Section 2.4.2.5. It is important to note that a portion of the Project Area will be restricted from public access during Project construction and operation. The bounds of the restricted areas during construction and operations have yet to be determined.

RF will be emitted from the LBTF which is regulated under Health Canada Safety Code 6. Health Canada requires limitations and operating procedures to ensure safety of the public and worker safety (Health Canada 2015). The RF frequency limits permitted by Safety Code 6 are proven to have no adverse health effects. These limits permitted by Safety Code 6 also take into account the combination of RF exposure that may occur from various sources at the same time (e.g., cell tower, Wi-Fi) (Health Canada 2015, 2019, 2022).

The International Agency for Research on Cancer conducted research on the possibility of RF as being carcinogenic but found no link between exposure and cancer rates (Health Canada

2022). Innovation, Science and Economic Development Canada (ISED) regulates devices that emit RF to ensure they are within a suitable frequency as outlined in Safety Code 6. The LBTF will be subject to the ISED and Safety Code 6 limits. However, DND continues to work to-date to establish the anticipated frequency and duration of the RF, which will be used to ensure the project meets RF Safety and Compliance Requirements. RF Safety and Compliance information was communicated at a Community Engagement Session on January 31, 2023 and is included in Appendix C.

2.5 Project Effects and Associated Mitigation Measures

Residual Project effects (i.e., after mitigation) are characterized in terms of magnitude, spatial extent, duration, and reversibility. Depending on the scope of the effect, mitigation measures will be employed to prevent, reduce, and respond to the potential impacts. Residual effects characterizations are described in Table 12.

Characterization	Description	Quantitative and Qualitative Measure Descriptions
Magnitude	The amount of change in	Low—effect occurs that is detectable, but is within
	measurable parameters relative to	normal variability of baseline conditions
	the existing conditions	Moderate—effect occurs that would cause an
		increase (or decrease) with regard to baseline, but is
		within regulatory limits and objectives
		High—effect occurs that would cause exceedances
		of objectives or standards
Spatial Extent	The geographic area in which an	Immediate—residual effects are restricted to the
	environmental effect occurs	immediate Project Area
		Local—residual effects extend into the local
		surrounding area
		Regional —residual effects extend into the
		surrounding regional area
Duration	The period of time required until the	Short-term —residual effect occurs over a portion of
	measurable parameter returns to its	the Project phases (e.g., temporary during
	existing condition, or the effect can	construction)
	no longer be measured or otherwise perceived	Medium-term – residual effect occurs over the life of the Project
		Long-term—residual effect extends beyond project
		closure
Reversibility	Pertains to whether a measurable	Reversible—the effect is likely to be reversed
	parameter can return to its existing	Irreversible—the effect is likely to be reversed after
	condition after the project activity	activity completion or rehabilitation
	ceases.	

Table 12. Characterization of Residual Effects

DND is required to determine the significance of effects related to the LBTF Project before allowing construction to proceed. The thresholds for significant adverse residual effects are defined for each VC. Based on DND Guidance (DND 2016), a significant residual effect is defined as:

- An effect that could threaten the potential sustainability of the VC and may require regional management like research, monitoring, and recovery initiatives.

A residual effect is not considered to be significant when there is only a slight decline of the resource during the lifecycle of the Project, or when there is a slight decline but the resource returns back to baseline levels. In this case, research, monitoring, and/or recovery is not

considered. Potential residual effects of the Project on each VC with proposed mitigation measures are summarized in Table 13. Only those interactions indicated in Table 1 are included.

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Table 13. Potential effects of the Project on each Valued Component

VC(s) Affected	Project Component(s)	Description of Effects (magnitude/spatial extent/duration of impacts/reversibility)	Mitigation Measures (numbers appearing after a measure indicate the project component(s) with which it is associated)	Are residual significant adverse effects likely?
Atmosphere	 Construction Operation Accidents and Malfunctions 	Potential increases to dust, and emissions generated from operation of construction equipment and vehicles during operation. Accidental incidents have potential to result in unanticipated releases of dust or emissions from spills. GHG will be emitted from the building (e.g., operation of heating systems). (Low, Immediate/Local, Short-term/Long- term, Reversible)	All equipment and project related vehicles are to be kept in good state of repair. (1, 2, 3) Idling of equipment and project related vehicles will be limited to the extent necessary. (1, 2, 3) Dust control is required (e.g., watering). (1, 2, 3) Building design will be energy efficient to a minimum of two Green Globes certificates. (2) All spills and releases regardless of perceived environmental implications will be reported to MARLANT Safety and Environment Office. (3) Alternative sprinkler system for fire suppression will be incorporated into the detail design of the facility. A dedicated fire suppression system for the combat systems equipment is likely to be a gaseous system to protect the electronics. (3)	No
Surface Water	 Construction Operation Accidents and Malfunctions 	 WC-1 is the closest watercourse potentially supporting fish and fish habitat but is not anticipated to be directly impacted or impacted by drainage. WC-2, WC-3, WC-4, WC-5 do not support fish or fish habitat and are not anticipated to be directly or indirectly impacted by the Project. No Halifax Harbour impacts anticipated. (Low, Immediate/Local, Short-term/Longterm, Reversible) 	Erosion and sediment controls will be employed. (1, 2, 3) Culvert design for access road construction will maintain hydrologic flow between wetlands HP-5 and HP-6. (1) Onsite stormwater management will be developed. (1, 2, 3) In the event of a spill, the material will be identified if possible, and the source of the spill stopped and contained. (MARLANT SEMS, Directive #E1) (3)	No

VC(s) Affected	Project Component(s)	Description of Effects (magnitude/spatial extent/duration of impacts/reversibility)	Mitigation Measures (numbers appearing after a measure indicate the project component(s) with which it is associated)	Are residual significant adverse effects likely?
			Spill material, associated spill clean-up supplies, and contaminated soils and vegetation will be transported to the approved licensed facilities. (MARLANT SEMS, Directive #E1). (3)	
Groundwater	 Construction Operation Accidents and Malfunctions 	Potential impacts to groundwater could result from earthworks associated with site preparation or construction activities. Potential dewatering (Low, Immediate/Local, Short-term, Reversible)	Potable water will be supplied to the site via extension of municipal services. (1, 2, 3) In the event onsite septic treatment is the chosen design, it will be developed in consideration of best practices to prevent adverse effects on water supplies. (2) In the event of a spill, the material will be identified if possible, and the source of the spill stopped and contained (MARLANT SEMS, Directive #E1). (3) All spills and releases, releases regardless of perceived environmental implications will be reported to MARLANT Safety and Environment Office. (3) Site planning, activities and accident responses will comply with the <i>Fisheries Act.</i> (1, 2) Dewatering of any excavation will be pumped to a vegetated area, away from watercourses and wetlands through a filter bag.	No
Soils and Geology	 Construction Operation Accidents and Malfunctions 	Interaction with known areas of site contamination (Site 5551, Site 5550) Excavation and management of acid rock. Former EODs and small arms ranges remain unclear in the area and may result in accidents and malfunctions.	Site design will avoid disturbance of known areas of contaminated soils (site 5551, site 5550) and where avoidance is not possible, soils will be managed according to contaminated soil best management practices (i.e., DAOD 8000-1 Conduct of Explosive Ordnance Disposal of Guidance Document: Surface Soils Sampling for Munition Residues in Military Live-Fire Training Ranges (2021) and Contaminated Site	No

VC(s) Affected	Project Component(s)	Description of Effects (magnitude/spatial extent/duration of impacts/reversibility)	Mitigation Measures (numbers appearing after a measure indicate the project component(s) with which it is associated)	Are residual significant adverse effects likely?
		Potential impacts to soils and geology during project activities as a result of an accidental event and excavation activity. (Low, Immediate, Short-term, Reversible)	Instruction (CSI.004.001) Soil Management, January 2021, as applicable). Such management measures could include containment of impacted soils beneath asphalt onsite, or offsite treatment, with prior approval from MARLANT Safety and Environment. (1) The contractor will prepare an environmental protection plan which will outline the sediment and erosion control, dust control, hazmat management, spill control/response, soil management, and waste management measures during construction. (1) Erosion and sediment control as per DFO "Implementation of Measures", see Appendix A. (1, 3) Ensure prevention of deleterious substances in water, as per DFO "Implementation of Measures", see Appendix A. (1, 3) The UXO/EOD risk assessment was determined as low. A UXO/EOD specialist or local Military EOD specialist will remain on call if item is discovered during works. (1, 3) Geotechnical program will identify the risk of excavation into acid forming bedrock. Excavated material exceeding regulatory standards (e.g. provincial sulfide bearing material regulations) will be managed according to best management practices and regulatory requirements, with prior approval from MARLANT Safety and Environment. (1, 2) In the event of a spill, the material will be identified if possible, and the source of the spill stopped and contained (MARLANT SEMS, Directive #E1). (3)	

VC(s) Affected	Project Component(s)	Description of Effects (magnitude/spatial extent/duration of impacts/reversibility)	Mitigation Measures (numbers appearing after a measure indicate the project component(s) with which it is associated)	Are residual significant adverse effects likely?
			Spill material, associated spill clean-up supplies, and contaminated soils and vegetation will be transported to the approved licensed facilities (MARLANT SEMS, Directive #E1). (3)	
			All soil related activity must comply with the DND Contaminated Sites Instruction CSI.004.001 – Soil Management, including management of stockpiles (Version 3.0, 20 January 2022). (1,3)	
			Temporary stockpiling of excavated material during construction which will be subject to standard erosion and sedimentation controls and compliance with Nova Scotia sulfide bearing material regulations. (1)	
			The need for shoreline protection erosion management is being evaluated pending final location of building and fenceline, and results will be implemented. (1)	
Ambient Noise and Light	 Construction Operation 	Increase in noise emissions generated by Project activities, including construction equipment and potential for blasting during construction.	Best practices will be employed to minimize noise including equipment muffling. (1, 2) Construction activities will be limited to daytime hours where feasible. (1)	
		Light will be generated on site during construction activities and during facility operation.	Site lighting during operation will be limited to that required by safety and security standards (International Dark-Sky Association 2011). (2)	No
		(Small, Immediate, Short term/Long-term, Reversible)	Lighting design will be developed in consideration of minimizing interactions with night flying birds and bats (International Dark-Sky Association 2011). (1, 2)	

VC(s) Affected	Project Component(s)	Description of Effects (magnitude/spatial extent/duration of impacts/reversibility)	Mitigation Measures (numbers appearing after a measure indicate the project component(s) with which it is associated)	Are residual significant adverse effects likely?
Terrestrial Wildlife (including Avifauna) and Habitat	 Construction Operation Accidents and Malfunctions 	Potential disturbance to terrestrial animals and their habitat from construction, operation or accidental events. Site clearing and grubbing will result in a loss of terrestrial habitat including bird breeding habitat and other habitat used by migratory birds. General construction activities may result in sensory disturbance (noise and/or light) to nearby wildlife species. The presence and operation of the facility will result in sensory disturbance (light and noise) to nearby wildlife species. Facility lighting may attract night flying birds and bats, resulting in collisions with structures leading to injury or mortality. RF emissions are not anticipated to impact wildlife (Appendix B; Appendix C). Vehicle movement may be a risk to injury or mortality to wildlife. Vegetation maintenance and tree removal will be required throughout construction and operation for security requirements. (Low, Immediate/Local, Long-term, Reversible/Irreversible – loss of habitat)	Tree removal will be limited to the LBTF footprint and possibly exterior of the footprint toward the fenceline as required along the access road to minimize the destruction, degradation and fragmentation of terrestrial habitat (1) Minimize wetland habitat disturbance (1, 2) Construction equipment will be properly maintained and muffled to reduce disturbance due to noise (1, 2, 3) Site lighting during operation will be limited to that required by safety and security standards. (1) Lighting design will be developed in consideration of minimizing interactions with night flying birds and bats (1, 2) Construction activities will be limited to daytime hours where feasible (1) The facility will be designed according to CSA A460-19 Bird Friendly Building Standard. (1) Develop and implement (as applicable) a Spill Response Plan and associated measures. (1, 2, 3) All work to be conducted in accordance with the <i>Migratory Birds Convention Act, 1994.</i> (1, 2, 3) No vegetation will be cleared during the breeding bird season (i.e., clearing should be conducted outside of April 15 to August 15) (1) No vegetation will be cleared during the roosting bat season (i.e., clearing should be conducted between late October and early April). (1)	No

VC(s) Affected	Project Component(s)	Description of Effects (magnitude/spatial extent/duration of impacts/reversibility)	Mitigation Measures (numbers appearing after a measure indicate the project component(s) with which it is associated)	Are residual significant adverse effects likely?
			Pre-stressing activities (e.g., making noise, fencing, surveying, using human scents) will be conducted to encourage resident or migrant birds to move away from the site prior to clearing. (1)	
			If vegetation must be cleared during the breeding bird season or bat roosting season, pre-clearing surveys using non-intrusive methods will be conducted by a qualified biologist. If an observation of an active nest is made inside or in close proximity to the Project Area, active nests will be protected with buffer zones and setback distances appropriate to the species, level of disturbance, and landscape context. (1)	
			Stockpiling of soils will be avoided during breeding bird season (April 15 to August 15). If stockpiles must be in place during this time, they should be covered in landscape fabric or tarp secured in place to prevent nest excavation, and prior to removal will be checked for soil- nesting birds (e.g., bank swallows). (1)	
			Speed limits will be enforced on the property both day and night hours to reduce the potential for wildlife collisions. (1, 2, 3)	
			All work personnel will be prohibited from to harassing, harming, or feeding wildlife and a No Harassment of Wildlife Policy for the site will be implemented. (1, 2, 3)	
			Direct and/or incidental observations of roosting bats or nesting SAR birds will be reported to the Environmental Officer on site and MARL SE notified. (1, 2)	

VC(s) Affected	Project Component(s)	Description of Effects (magnitude/spatial extent/duration of impacts/reversibility)	Mitigation Measures (numbers appearing after a measure indicate the project component(s) with which it is associated)	Are residual significant adverse effects likely?
			In the event of a spill, the material will be identified if possible, and the source of the spill stopped and contained. (3) Spill material, associated spill clean-up supplies, and contaminated soils and vegetation will be transported to the approved licensed facilities (MARLANT SEMS, Directive #E1). (3) All self-generated or observed releases regardless of perceived environmental implications will be reported to MARLANT Safety and Environment Office. (3)	
Aquatic Wildlife and Habitat	 Construction Operation Accidents and Malfunctions 	Site clearing, grubbing and excavation may result in changes to nearby wetland hydrology and discharge into marine habitat. Road construction and modifications may alter stormwater and surface water discharge. Spills and accidents may result in runoff into marine environment. (Low, Immediate/Local, Long-term, Reversible)	Onsite stormwater management will be employed (1, 2, 3) Construction and operation procedures are planned to avoid disruption to the marine environment. (1, 2) through erosion and sediment controls In the event of a spill, the material will be identified if possible, and the source of the spill stopped and contained. (3) Develop and implement a Spill Response Plan and associated measures. (3) Spill material, associated spill clean-up supplies, and contaminated soils and vegetation will be transported to the approved licensed facilities (MARLANT SEMS, Directive #E1). (3) All self-generated or observed releases regardless of perceived environmental implications will be reported to MARLANT Safety and Environment Office. (3)	No

VC(s) Affected	Project Component(s)	Description of Effects (magnitude/spatial extent/duration of impacts/reversibility)	Mitigation Measures (numbers appearing after a measure indicate the project component(s) with which it is associated)	Are residual significant adverse effects likely?
			The Project will comply with the <i>Fisheries Act.</i> (1, 2, 3) Erosion and sediment control as per DFO "Implementation of Measures", see Appendix A. (1, 3) Ensure prevention of deleterious substances in water, as per DFO "Implementation of Measures", see Appendix A. (1, 3) DFO will be notified if the Project has caused, or about to cause, the death of fish by means of other than fishing and/or the HADD of fish habitat. Notifications will be directed to Fish and Fish Habitat Protection Program at 902-425-3909 or <u>ReferralsMaritimes@dfo-mpo.gc.ca</u> . (1, 2, 3) DFO will be notified at least 10 days before starting the Project and a copy of the DFO "Implementation of Measures" (Appendix A) will be kept on site while the work is in progress. (1)	
Vegetation and Wetlands	 Construction Operation Accidents and Malfunctions 	Potential disturbance to vegetation and wetlands as a result of construction, operation or accidental events. Site clearing and grubbing may result in a loss of wetland habitat and/or plant species of conservation concern. Site clearing, grubbing and excavation may result in changes to nearby wetland hydrology.	Site planning will avoid or reduce disturbance to existing wetlands where possible. (i.e., HP-2). (1) Where avoidance of wetland disturbance is not possible (i.e., HP-2, HP-5, HP-6), offsetting will be in accordance with federal wetland policy of no net loss of wetland function and recommendations from ECCC-CWS to improve wetland connectivity and function between HP-5 and HP-6 across access road. (1) Disturbed wetland areas and upland areas surrounding potentially affected wetland will be revegetated. (1) Onsite stormwater management will be employed. (1, 2, 3)	No

VC(s) Affected	Project Component(s)	Description of Effects (magnitude/spatial extent/duration of impacts/reversibility)	Mitigation Measures (numbers appearing after a measure indicate the project component(s) with which it is associated)	Are residual significant adverse effects likely?
		Site drainage during construction and operations could effect nearby wetlands and vegetation habitat by altering hydrology and/or introducing contaminants into those habitats. Road construction and modifications may alter wetland hydrology. Spills and accidents may result in runoff into wetlands. (Low, Immediate/Local, Long-term, Reversible -offsetting)	Construction activities like tree removal/vegetation clearing will be restricted to the Project footprint. (1, 2) Parking and laydown areas will be restricted to areas outside the wetland to avoid unnecessary clearing or disturbance of wetland vegetation. (1, 2) Trees and native vegetation will be planted onsite. (1) Existing trees and vegetation will be maintained to the extent possible. (1, 2, 3) Equipment and vehicles will be checked for plant or soil materials prior to entering wetlands to avoid the spread of invasive or non-native species. If invasive plant species (e.g. knotweed) are identified, they will be removed and disposed of at an approved facility and will not be mixed with other material to potentially spread. (1, 2) Equipment will be cleaned after working in an area containing invasive species (e.g., along the road between HP-5 and HP-6) before entering a new area (1, 2) Offsetting will be employed per federal wetland policy for no net loss of wetland function on federal lands. (1, 2) In the event of a spill, the material will be identified if possible, and the source of the spill stopped and contained. (3) Spill material, associated spill clean-up supplies, and contaminated soils and vegetation will be transported to the approved licensed facilities. (3) All self-generated or observed releases regardless of perceived environmental implications will be reported to MARLANT Safety and Environment Office. (3)	

VC(s) Affected	Project Component(s)	Description of Effects (magnitude/spatial extent/duration of impacts/reversibility)	Mitigation Measures (numbers appearing after a measure indicate the project component(s) with which it is associated)	Are residual significant adverse effects likely?
Species at Risk and of Conservation Concern	 Construction Operation Accidents and Malfunctions 	Potential disturbance to migratory birds during site preparation, construction, operation, or as a result of an accidental event. Potential loss and/or alteration of SAR habitat. Potential mortality as a result of collisions with vehicles and the facility. Vegetation maintenance and tree removal will be required throughout construction and operation for security requirements. Osprey pair may be impacted from high frequency of construction traffic. The existing building on-site is high potential for barn swallow nesting. It is currently anticipated that the building will be left undisturbed onsite. (Low, Immediate, Long-term, Reversible/Irreversible – loss of habitat)	All work will be conducted in accordance with the <i>Migratory Birds Convention Act, 1994</i> , which outlines that no migratory bird nests or eggs will be moved or obstructed during the construction or operational phase of the Project. (1, 2, 3) DND will evaluate the requirement for a S. 73 permit application under SARA and apply as needed. (1, 2) All work will comply with the <i>Species at Risk Act</i> (1, 2) No vegetation will be cleared during the breeding bird season (i.e., clearing should be conducted outside of April 15 to August 15) (1) No vegetation will be cleared during the roosting bat season (i.e., clearing should be conducted between late October and early April). (1) Pre-stressing activities (e.g., making noise, fencing, surveying, using human scents) will be conducted to encourage resident or migrant birds to move away from the site prior to clearing. (1) If vegetation must be cleared during the breeding bird season or bat roosting season, pre-clearing surveys will be conducted using non-intrusive methods by a qualified biologist. If an observation of an active nest is made inside or in close proximity to the Project Area, active nests will be protected with buffer zones and setback distances appropriate to the species, level of disturbance, and landscape context. (1)	No

VC(s) Affected	Project Component(s)	Description of Effects (magnitude/spatial extent/duration of impacts/reversibility)	Mitigation Measures (numbers appearing after a measure indicate the project component(s) with which it is associated)	Are residual significant adverse effects likely?
			Avoid stockpiling of soils during breeding bird season (April 15 to August 15). If stockpiles must be in place during this time, they should be covered in landscape fabric or tarp secured in place to prevent nest excavation by soil-nesting birds (e.g., bank swallows). (1)	
			Tree removal will be limited to the Project footprint and as required along the access road to minimize the destruction, degradation and fragmentation of suitable bird or bat foraging, nesting, and/or roosting habitat (1)	
			Wetland habitat disturbance will be minimized (1, 2) Construction equipment will be properly maintained and muffled to reduce disturbance due to noise (1, 2, 3)	
			Site lighting during operation will be limited to that required by safety and security standards (International Dark-Sky Association, 2011). (1)	
			Lighting design will be developed in consideration of minimizing interactions with night flying birds and bats (1, 2)	
			Construction activities will be limited to daytime hours where feasible (1)	
			A Spill Response Plan will be developed and implemented, as required (3)	
			Speed limits will be enforced on the property both day and night hours to reduce the potential for wildlife collisions or slipstream injuries to birds and bats. Enforcement during construction will be overseen by PCL, and post- construction of the facility enforcement will be overseen by RCN. (1, 2)	

VC(s) Affected	Project Component(s)	Description of Effects (magnitude/spatial extent/duration of impacts/reversibility)	Mitigation Measures (numbers appearing after a measure indicate the project component(s) with which it is associated)	Are residual significant adverse effects likely?
			Work personnel will be prohibited from harassing, harming, or feeding wildlife and a No Harassment of Wildlife policy for the site will be implemented. Enforcement during construction will be overseen by PCL, and post-construction of the facility enforcement will be overseen by RCN. (1, 2, 3)	
			Direct and/or incidental observations of roosting bats or nesting SAR birds will be reported to the Environmental Officer on site and MARL SE notified. (1, 2)	
			Potential mitigation for use of radio frequency pending confirmation of operational information will be enforced (2)	
			The facility will be designed according to CSA A460-19 Bird Friendly Building Standard (1)	
			In the event of a spill, the material will be identified if possible, and the source of the spill stopped and contained. (3)	
			Spill material, associated spill clean-up supplies, and contaminated soils and vegetation will be transported to the approved licensed facilities. (3)	
			All self-generated or observed releases regardless of perceived environmental implications are reported to MARLANT Safety and Environment Office. (3)	
			The osprey nest will be moved to a suitable location within 100 m of the current nest using industry best practices. (1)	
			The osprey nest will be relocated prior to the bird breeding season (April 15 to August 15) so it is suitable for nesting. (1)	

VC(s) Affected	Project Component(s)	Description of Effects (magnitude/spatial extent/duration of impacts/reversibility)	Mitigation Measures (numbers appearing after a measure indicate the project component(s) with which it is associated)	Are residual significant adverse effects likely?
			A Professional Biologist will conduct monitoring of the relocated osprey nest during bird breeding season to investigate it's usage by the breeding pair. (1) If the existing building on site is to be demolished in the future, it will be monitored for active barn swallow nesting to be followed by appropriate mitigative measures (e.g., seasonal, avoidance). (1)	
Land and Marine Use	 Construction Operation 	Potential change in recreational use (e.g., bird watching and hiking) and marine access (e.g., coastal fishing and recreational boating) due to access restrictions (e.g., security fencing, warning buoys) on the site and potentially along the shore and near shore waters. The site is owned by DND and military land use will be enhanced. Access to adjacent recreational use of the golf course will be largely unaffected. (Moderate, Immediate/Local, Long-term, Irreversible – access restriction)	Engagement will be undertaken with local landowners and recreational user groups to provide project information and answer questions. (1) There will be consideration of recreational amenities. (1) If any areas need to be restricted, those areas will be marked for marine traffic with buoys and signage and marked on navigation charts. (1, 2) Contact name and information will be provided for public use during the construction and operation of the facility. (1, 2)	No
VC(s) Affected	Project Component(s)	Description of Effects (magnitude/spatial extent/duration of impacts/reversibility)	Mitigation Measures (numbers appearing after a measure indicate the project component(s) with which it is associated)	Are residual significant adverse effects likely?
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Cultural Resources	1) Construction	Potential disruptions to physical and cultural heritage resources due to ground disturbance and facility presence. Increased risk of encountering archeological resources due to nearby documented find (BdCu-2) (Low, Immediate, Long-term, Irreversible)	An ARIA has been conducted within the Project Area and mitigation measures arising from the survey and heritage research permit (e.g., archeological monitoring during groundbreaking activity) will be implemented. (1) All construction personnel will be responsible for reporting any unusual materials unearthed during construction activities to the Construction Supervisor. (1) In those situations where the find is believed to be an archaeological resource, the Construction Supervisor will immediately stop work in the vicinity of the find and notify his/her immediate supervisor, the DND Project Manager and MARL SE. (1) If any artifacts are discovered during groundbreaking activities, KMKNO-ARD will be contacted. (1)	No
Transportation Infrastructure	 Construction Operation 	Increased traffic noise and disturbances through community areas to access the site for construction and shift work during operations. (Low, Immediate, Short-term, Reversible)	A traffic study has been conducted and no additional mitigation measures are recommended (Stantec 2022a). (1, 2) Construction equipment entering the site will take place in daytime hours. (1)	No
Human Health	 Construction Operations Accidents and Malfunctions 	Potential effects to worker health and safety during project activities, particularly during construction (e.g., airborne dust) RF emissions (Low, Immediate, Short-term, Reversible)	During commissioning and operation of the facility there will be ongoing RF measurements to determine the full degree of the emitters and inform the operating procedures of the facility. (1, 2) RF design will comply with Canada Safety Code 6: Health Canada's Radiofrequency exposure guidelines. (1, 2)	No

VC(s) Affected	Project Component(s)	Description of Effects (magnitude/spatial extent/duration of impacts/reversibility)	Mitigation Measures (numbers appearing after a measure indicate the project component(s) with which it is associated)	Are residual significant adverse effects likely?
			Mitigation (e.g., warning signs, controlling power output, fencing) will be used to protect personnel from unintended RF exposure, as described by Safety Code 6. (1, 2)	
			RF will only be capable of emitting in 130-degrees into navigable waters. There will be safety measures in place for approximately 230-degrees that has human population wherein the facility can only emit at an upward angle. (2).	
			Site access must be restricted to authorized workers only. (1, 3)	
			Workers in contact with hazardous materials must be provided with and use appropriate personal protective equipment. (1, 2, 3)	
			Proper safety procedures must be followed for the duration of the project as per applicable municipal, provincial, and federal regulations. (1, 2, 3)	
			Employees will be trained in health and safety protocols (e.g., safe work practices, emergency response). (1, 2, 3)	
			The UXO/EOD risk assessment was determined as low. A UXO/EOD specialist or local Military EOD specialist will remain on call if item is discovered during works. (1, 3)	
			All equipment and project related vehicles are to be kept in good state of repair. (1, 2, 3)	
			Idling of equipment and project related vehicles will be limited to the extent necessary. (1, 2, 3)	
			Dust control is required (e.g., watering). (1, 2)	

VC(s) Affected	Project Component(s)	Description of Effects (magnitude/spatial extent/duration of impacts/reversibility)	Mitigation Measures (numbers appearing after a measure indicate the project component(s) with which it is associated)	Are residual significant adverse effects likely?
			In the event of a spill, the material will be identified if possible, and the source of the spill stopped and contained. (MARLANT SEMS, Directive #E1) (3)	
			Spill material, associated spill clean-up supplies, and contaminated soils and vegetation will be transported to the approved licensed facilities (MARLANT SEMS, Directive #E1). (3)	
			Site lighting during construction and operation will be limited to that required by safety and security standards (International Dark-Sky Association, 2011). (1, 2, 3)	
			Speed limits will be enforced on the property both day and night hours to reduce the potential for collisions. Enforcement during construction will be overseen by PCL, and post-construction of the facility enforcement will be overseen by RCN. (1, 2)	

2.6 Public Participation

Under the IAA there is a requirement to post proposed projects on the Canadian Impact Assessment Registry (CIAR) for a minimum of 30 days prior to making a determination under Section 82 of the IAA. The project summary was posted on the Canadian Impact Assessment Registry on January 5, 2021 for public comment on the project and potential effects (CIAR #81264). A Notice of Determination will also be posted on the CIAR to communicate that a determination has been made for the Project, and that the EED has been completed and signed.

A public engagement session was held by DND representatives on March 3, 2022 at the Hartlen Point Golf Course Clubhouse to discuss the LBTF. Members of the public, along with the MLA and HRM Councilor for District 3 were in attendance. DND provided a presentation and handout of general information for the LBTF and progress to-date and led a discussion. DND responded to comments and concerns of the public where they were able to. Key items raised by the attendees were the impacts to bird habitat and migration patterns, human health, recreational use and access, commercial use, and increase to traffic levels and road erosion.

A second public engagement session was held by DND representatives on January 31, 2023 at the Hartlen Point Golf Course Clubhouse. Other individual consultations with concerned members of the public have been ongoing.

A review of various media pertaining to the proposed Project has demonstrated opposition from several sources including an environmental group, "Protect Hartlen Point". This group has been vocal about not supporting the Project and wanting to maintain the ecological integrity of Hartlen Point, primarily for the purpose of birding and recreational activity. Protect Hartlen Point has also initiated a petition against the Project and has held formal rallies in front of Halifax Legislation Building. Protect Hartlen Point is also supported by other environmental groups throughout Nova Scotia, including Protect Our Southdale Wetland Society, Protect Eisner Cove Wetland, PLAN Fall River Society, Development Options Halifax, and Friends' of Halifax Commons.

2.7 Indigenous Community Engagement

CFB Halifax is located in Mi'kma'ki, the ancestral lands and unceded territory of the Mi'kmaq. There are 13 Mi'kmaq First Nations that have asserted their treaty rights and claim Aboriginal rights and title to Nova Scotia. There are five Indigenous communities that are located within a 100 km radius of the Project, Acadian First Nations, Annapolis Valley First Nation, Millbrook First Nations, Glooscap First Nations, and Sipekne'katik First Nations. The Peace and Friendship Treaties contain treaty rights that is recognized by the Supreme Court of Canada. Mi'kmaq are engaged currently in tripartite treaty negotiations with Nova Scotia and the Government of Canada. A Terms of Reference for the Mi'kmaq-Nova Scotia-Canada Consultation Process was signed in 2010. Treaty negotiations aim to establish the Aboriginal rights to hunt, fish, and gather towards earning a moderate livelihood.

DND recognises the comprehensive land claims and statement of intent regarding Indigenous rights on territories, including CFB Halifax. DND has been advised by relevant authorities that notification of the LBTF project to the Indigenous groups was recommended, and this has been fulfilled by the project. The Project has also engaged with various Indigenous groups, as described in Table 14, in order to consider their perspectives in the development of the LBTF.

DND remains committed to maintaining open and continuous communication with Indigenous groups throughout the duration of the LBTF project.

Name of Activity	Geographic Area	DND / CAF OPI / BPI MDN / CAF	Indigenous Community(s)	Estimated Date(s) of Consultation
Initial discussion	Nova Scotia	Commander – CFB Halifax	Mi'kmaq Native Friendship	June 2021
Meeting Invite	Nova Scotia, Newfoundland	Commander – CFB Halifax	Mi'kmaq Native Friendship Mi'kmaw Rights Initiative AFN Regional Chief for NS and NFLD Confederacy of Mainland Mi'kmaw Acadia First Nation/Atlantic Policy Congress (APC) of First Nations Chiefs Secretariat	January 2022
Meeting	Nova Scotia, Newfoundland	Commander – CFB Halifax	Mi'kmaq Native Friendship Mi'kmaw Rights Initiative Confederacy of Mainland Mi'kmaw	February 2022
Follow-up Email	Nova Scotia, Newfoundland	Commander – CFB Halifax	Mi'kmaq Native Friendship Mi'kmaw Rights Initiative AFN Regional Chief for NS and NFLD Confederacy of Mainland Mi'kmaw Acadia First Nation/Atlantic Policy Congress (APC) of First Nations Chiefs Secretariat	July 2022
Interactive Round Table Session	Nova Scotia	Commander - CFB Halifax ADM(IE) - Sr Dir of DCDP	Mi'kmaq Rights Initiative	December 2022
Meeting Invite	Nova Scotia, Newfoundland	Commander – CFB Halifax	Mi'kmaq Native Friendship Mi'kmaw Rights Initiative AFN Regional Chief for NS and NFLD Confederacy of Mainland Mi'kmaw Acadia First Nation/Atlantic Policy Congress (APC) of First Nations Chiefs Secretariat	Meeting scheduled for December 2022 but no responses received; therefore not held
Follow-up Letter	Nova Scotia, Newfoundland	Commander – CFB Halifax	Confederacy of Mainland Mi'kmaq and Keptin First Nations Regional Chief for NS and NL Mi'kmaq Native Friendship Centre Acadia First Nation/Atlantic Policy Congress (APC) of First Nations Native Mi'kmaq Friendship Centre Mi'kmaq Rights Initiative	January 2023

Table 14. DND initiated contact with Indigenous groups for the LBT
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2.8 Federal and Provincial Government Consultation

DND communication with ECCC-CWS is ongoing, and topics to-date have included wetland offsetting options, project designs, SAR and monitoring (CBCL 2021a; CBCL 2022). The preferred wetland offsetting option for ECCC-CWS was to improve connectivity between HP-5 and HP-6 along the access road into the Project Area and to restore historical hydrology and minimize future impacts from the access road. CBCL (2021a) conducted a hydrologic conductivity assessment and topographic delineation to determine the flow pathway of the site. The watershed was determined to flow from upland through HP-5 to HP-6 and into the ocean. The improvements will require installation of culverts during the access road upgrades and a wetland monitoring plan to observe and record water levels to characterize the seasonal patterns during pre- and post- construction periods.

DFO has provided letter of "Implementation of Measurements to Avoid and Mitigate the Potential for Prohibited Effects to Fish and Fish Habitat" (Appendix A). DFO reviewed information to determine if the Project is likely to result in death by fish other than fishing and the harmful alteration, disruption, or destruction (HADD) of fish habitat which is prohibited under 34.4(1) and 35(1) of the *Fisheries Act*, effects to listed aquatic SAR prohibited under sections 32, 33, and 58(1) of the SARA, and introduction of aquatic species into the waterbodies of Hartlen Point. Actions to mitigate the potential for effects have been incorporated into Table 13 of the EED.

Nova Scotia Natural Resources and Renewables was contacted for input on site planning and mitigation, including the potential risk to the osprey nest. DND will obtain the required permits and approvals from DNR for relocating the osprey nest prior to the bird breeding season.

2.9 References

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Part 3. Environmental Effects Determination

On the basis of this DND EED Report, it has been determined that the impact of this project on the environment is as follows

- Project is not likely to cause significant adverse environmental effects. The project **can** proceed with application of the mitigation measures specified in the interaction tables in this report.
- The project is likely to cause significant adverse environmental effects that cannot be mitigated. The project **cannot** proceed without Governor in Council approval.
- Refer the project, through the chain of command and **only on the recommendation of Environmental Command and DGIEGPS**, to Governor in Council for a decision on whether the project is justified to proceed.

DND EED Report Prepared by:

Name: Jocelyn Fries, MPL (Stantec Consulting Ltd.)

Title: Environmental Scientist

Signature

DND EED Report Reviewed by: Name: Robert Federico, MPA (Stantec Consulting Ltd)

Title: Principal

Signature

DND EED Report Reviewed by MARL SE:

Name:

Title:

Signature

EIA#: 2021-26-102773

DND EED Report Accepted and Approved by:

The undersigned accepts the determination and recommendations of this environmental effects determination report. The undersigned also accepts the responsibility to incorporate the recommendations of the report into the project design and implementation.

Name:

Title:

Signature

Appendix A. DFO Implementation of Measures to Avoid and Mitigate the Potential for Prohibited Effects to Fish and Fish Habitat



Fisheries and Oceans Pêches et Océans Canada Canada

P.O. Box 1006, P500 Dartmouth, Nova Scotia B2Y 4A2

January 18, 2023

Your file Votre référence MARL SE File #: 1267-0100-2104 EIA#: 2021-26-102773

Our file Notre référence

22-HMAR-00561

Pamela Wells Staff Officer Environment MARLANT Safety and Environment

Subject: Department of National Defence Hartlen Point Land Based Test Facility – Implementation of Measures to Avoid and Mitigate the Potential for Prohibited Effects to Fish and Fish Habitat

Dear Pamela Wells:

The Fish and Fish Habitat Protection Program (the Program) of Fisheries and Oceans Canada (DFO) received your proposal on November 10, 2022. We understand that you propose to:

- Construct and operate a Land Based Test Facility (LBTF) on federallyowned land at Hartlen Point in Eastern Passage, Halifax County, Nova Scotia in support of the Department of National Defence's Canadian Surface Combatant (CSC) Project. Construction of the facility is anticipated to begin in Fall 2023 and operation in 2025.
- The Project Area is approximately 92, 810 m² and the LBTF is approximately 11,500 m².
- The construction of the LBTF will include clearing, grubbing, and excavation within the Project Area.
- Project components include the construction of a building, access road alignment and improvements, a parking area, and the potential for a septic field for wastewater management of the facility.
- The building will have office areas, warehousing, technical workshops, test and evaluation areas, operations areas, and laydown areas. The building will be a maximum of two stories high, subject to final design decisions. A topside platform will be located above the second floor roof and contain various equipment and radar emitters to simulate the ship topside, approximately 30 m above finished grade in order to simulate the height of the sea vessel.

Canadä

- Associated site infrastructure includes paved vehicle parking, and security fencing. Road access and municipal service extensions are expected to be required.
- No shipboard weapon systems, or associated munitions, will be used or stored at the LBTF.
- During operation, the LBTF will function as a typical office building and will support the testing and evaluation of combat, command and control systems and equipment, including the emission of radio frequency waves at times.
- No substance or energy will be released or emitted from the LBTF that is known to be harmful to fish or fish habitat.

Our review considered the following information:

- Department of National Defence Environmental Effects Determination Report. Project: Construction of a Land Based Test Facility, Hartlen Point, Canadian Forces Base Halifax, Nova Scotia. Version 2. Dated: October 28, 2022. Prepared by: Stantec Consulting Ltd.
- MS Excel Spreadsheet "HartlenPoint_Rev1Comments.xlsx". Dated November 4, 2022.

Your proposal has been reviewed to determine whether it is likely to result in:

- the death of fish by means other than fishing and the harmful alteration, disruption or destruction of fish habitat which are prohibited under subsections 34.4(1) and 35(1) of the *Fisheries Act*;
- effects to listed aquatic species at risk, any part of their critical habitat or the residences of their individuals in a manner which is prohibited under sections 32, 33 and subsection 58(1) of the *Species at Risk Act*; and
- the introduction of aquatic species into regions or bodies of water frequented by fish where they are not indigenous, which is prohibited under section 10 of the *Aquatic Invasive Species Regulations*.

The aforementioned outcomes are prohibited unless authorized under their respective legislation and regulations.

To avoid and mitigate the potential for prohibited effects to fish and fish habitat (as listed above), we recommend implementing the measures listed below:

• Implement DFO's Measures to protect fish and fish habitat: https://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures-eng.html

Provided that you incorporate these measures into your plans, the Program is of the view that your proposal is not likely to result in the contravention of the above mentioned prohibitions and requirements.

Should your plans change or if you have omitted some information in your proposal, further review by the Program may be required. Consult our website (<u>http://www.dfo-</u>

<u>mpo.gc.ca/pnw-ppe/index-eng.html</u>) or consult with a qualified environmental consultant to determine if further review may be necessary. It remains your responsibility to remain in compliance with the *Fisheries Act*, the *Species at Risk Act* and the *Aquatic Invasive Species Regulations*.

It is also your *Duty to Notify* DFO if you have caused, or are about to cause, the death of fish by means other than fishing and/or the harmful alteration, disruption or destruction of fish habitat. Such notifications should be directed to the Fish and Fish Habitat Protection Program at 902-426-3909 or by email at <u>ReferralsMaritimes@dfo-mpo.gc.ca</u>.

We recommend that you notify this office at least 10 days before starting your project and that a copy of this letter be kept on site while the work is in progress. It remains your responsibility to meet all other federal, territorial, provincial and municipal requirements that apply to your proposal.

Please note that the advice provided in this letter will remain valid for a period of 1 year from the date of issuance. If you plan to execute your proposal after the expiry of this letter, we recommend that you contact the Program to ensure that the advice remains up-to-date and accurate. Furthermore, the validity of the advice is also subject to there being no change in the relevant aquatic environment, including any legal protection orders or designations, during the 1 year period.

If you have any questions with the content of this letter, please contact me at our Dartmouth office at 902-233-9731 or by email at <u>christopher.burbidge@dfo-mpo.gc.ca</u>. Please refer to the file number referenced above when corresponding with the Program.

Yours sincerely,

Chris Burbidge Senior Biologist Ecosystems Management-Regulatory Reviews DFO Maritimes

Cc: DFO Conservation and Protection Branch Lorne Oram, Directorate Constructions Project Delivery

Appendix B. Radio Frequency Wildlife Evaluation

Stantec completed a preliminary literature review to evaluate whether radio waves associated with the Project would be likely to have potential adverse effects on wildlife. In parallel, DND continues to work to establish the anticipated frequency and duration of the radio frequency (RF) emissions. This information will be used to ensure the project meets RF Safety and Compliance Requirements.

The focus of this preliminary review was primarily on birds and bats because they are known respectively to use electromagnetic radiation for orientation during migration and echolocation for navigation and foraging. Thus, the concern is whether radio waves emitted by the LBTF could adversely affect navigation or foraging behaviour (via interference), but also whether there could be potential adverse health effects.

Radio waves are waves from the portion of the electromagnetic spectrum that occur at lower frequencies than microwaves (and other wave types) and have wavelengths ranging from 100 kilometres to as little as 1 millimetre. Corresponding frequencies range from 3 hertz (extremely low frequency) to 300 gigahertz (extremely high frequency) (Lucas, 2019). Radio frequency radiation is non-ionizing, meaning that the radiation does not carry enough energy to ionize atoms or molecules (i.e., remove an electron from an atom or molecule). However, radiation from radio waves, particularly short waves, can cause an increase in temperature (through the excitement of electrons) that might affect behaviour or physiology, and potentially tissue or organ damage and even death (Nicholls and Racey, 2007). Typical daily exposure to low levels of non-ionizing radiation are not considered harmful to humans (CDC 2015), and radio waves from cellular phone towers have not been conclusively linked to adverse human health effects (US EPA 2021).

Radio waves are widespread in their use, especially in the field of communications. As they are considered largely non-harmful, there have been relatively few studies on potential adverse effects of radio waves on wildlife, including for birds and bats.² In Israel, one study modelled the predicted change in body temperature that could result from exposure to short radio waves from a radio station (Kleinhaus et al. 1995). The study modelled potential effects across a range of body sizes and found no measurable change in body heat that could cause physiological harm. Large birds, such as raptors, were susceptible to an increase in body temperature, but not in a way that would cause thermal stress outside of their ability to thermoregulate. Further, it was assumed that birds would depart an area, such as from a radio tower perch, and seek a cooler environment if their body temperature became increasingly intolerant (Kleinhaus et al. 1995).

Information on the effects of radio waves on bats is limited. One study that looked at the effects of microwaves from radar observed that bats were less abundant, or occurred less frequently, in areas where radar was used compared to areas without radar (Nicholls and Racey 2007, 2009). It was assumed that bats avoided radar areas not because of harm to tissues or effects of electromagnetic radiation on behaviour or the ability to echolocate, but because of an increase

² During the literature review, a few papers on the adverse effects of radio waves on humans and wildlife were discovered, predominantly from India. These papers, upon review, do not appear to have been subject to the standards of scientific method and peer-review. Further, these papers appear in relatively young journals, have unsupported statements, results, and conclusions, do not use rigorous hypothesis testing, and are not validated or repeated by other independent studies outside of India. These papers have been excluded from review.

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in body temperature and risk of hyperthermia (i.e., overheating). Overheating can be a concern for bats (Reeder and Cowles 1951, Neuweiler 2000), but short-term exposure to radio waves and their ability to change their activity or location to manage heat absorption has not led to the identification of a serious concern for radio wave activity on bats.

Mammals cannot hear radio waves, but the perception of certain wave frequencies can be transmitted to the brain through a thermoelastic wave (Sommer and vov Gierke 1964, Foster and Finch 1974). Thermoelastic waves are propagated through the soft tissues of the head until they reach the fluid inner-ear where it is transduced into a sound pressure wave leading to excitation of auditory neurons (Lin 1990, 2002, Elder and Chou 2003). There is no evidence that the auditory perception of microwaves would act to deter foraging bats any more than the production of ultrasound at the same frequency (Nicholls and Racey 2007). However, if bats can perceive areas of high electromagnetic frequency exposure and experience an associated rise in internal temperature, it does provide a mechanism through which bats could elicit an avoidance response (Nicholls and Racey 2007). It is noteworthy that insect presence, abundance, and activity appeared to be unaffected in areas with operating radar installations, and therefore did not explain the avoidance response observed in bats (Nicholls and Racey 2007).

In the literature search and analysis of potential adverse effects of electromagnetic radiation on wildlife, three themes emerged:

- Wavelength or wave frequency is an important factor in the determination of potential harmful effects. Radio waves have a wave frequency that is largely outside of the range of values that can affect wildlife. Radio wavelengths approaching 1 mm (near the microwave wavelength) cause body temperature to increase. Animals can typically either thermoregulate the effect, or change location to avoid the effect, although prolonged exposure may occur under certain circumstances (e.g. at a nest or roost site).
- 2. Radio waves are non-ionizing and therefore non-cancer causing. Damage to atoms or molecules in wildlife from radio waves emitted by the Project are not expected.
- 3. Duration of exposure is defined by the length of time that radio waves are emitted and for how long a receptor is within the range of potentially harmful emissions (e.g., where hyperthermia may occur). Wildlife may alter their duration of exposure either through avoidance behaviour or through the selection of cooler sites (e.g., shaded versus non-shaded areas). The Project can also affect duration by limiting the use of radio waves.

With information available to date, radio frequency emissions are not anticipated to impact wildlife.

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Appendix C. DND Community Engagement Session Radio Frequency Considerations



Radio Frequency (RF) Safety

Radio Frequency (RF) Emissions in the Modern World

- Modern devices often have RF Emissions, including cell phones, cordless phones, local wireless networks, radio transmission towers, medical scanners and microwave ovens.
- LBTF will have equipment, such as radar, that emits RF.

Is it safe?

- Safety of the local community and the environment is paramount.
- Innovation, Science and Economic Development (ISED) Canada is the government department that issues RF Licences and there are stringent conditions to obtain it.
- The project will be managed to high safety standards through:
 - $_{\odot}$ Compliance with GoC and DND policies and directives
 - Rigorous RF safety processes based on established science and operational experience
 - Follow the established RF Safety Programme.



RF Compliance Requirements Are Rigorous

- Like any other project involving RF emitters (such as cell phone and radio towers or airport control towers), the LBTF will have to comply with *Health Canada Safety Code 6*.
- Safety Code 6 is a document that sets out recommended safety limits for human exposure to radio frequency electromagnetic fields (EMF) in the frequency range from 3 kHz to 300 GHz.

Safety Code 6: https://www.canada.ca/en/health-canada/services/health-riskssafety/radiation/occupational-exposure-regulations/safety-code-6-radiofrequencyexposure-guidelines.html

> ISED also mandates public consultation as part of the RF licencing process.

CPC-2-0-03: https://ised-isde.canada.ca/site/spectrum-managementtelecommunications/en/learn-more/key-documents/procedures/client-procedurescirculars-cpc/cpc-2-0-03-radiocommunication-and-broadcasting-antenna-systems



RF Wildlife Considerations

- There is currently no national standard with respect to RF emission exposure in animals. Due diligence and all environmental guidelines still apply.
- Even though Safety Code 6 is not applicable, the same principles apply: direction, frequency and power density of emissions, duration of exposure.
- Harmful exposure to birds or sea life is not anticipated:
 - Majority of emissions will be directed over a 130-degree arc.
 - Geometry of land and building, elevation of RF emitters and wildlife behavior patterns are expected to mitigate impacts.
 - Legal obligation to avoid harming migratory birds or their nests when they are protected.

Appendix D. Archeological Resource Impact Assessment Interim Memo

Reference: Heritage Research Permit #A2022NS178: Archaeological Resource Impact Assessment for Hartlen Point, Halifax Regional Municipality, Nova Scotia (2022)

On behalf of PCL, Stantec Consulting Ltd. (Stantec) has provided archaeological services related to the Hartlen Point, consisting of a desk-based study and site visitation of the Study Area including the footprint for future Project development and access road.

On October 13, 2022, NSCCTH issued Heritage Research Permit (HRP) No. A2022NS178 to archaeologist Jonathan Kyte M.A., of Stantec to implement an archaeological resource impact assessment (ARIA) to carry-out a site walkover survey of the Study Area focusing on the area of a previously registered archaeological site (BdCu-2) located on the western side of Hartlen Point, the shoreline to the footprint of the planned Land-based Test Facility (LBTF), as well as the access route to the footprint. A site visitation and initial walkover was carried out on October 20, 2022, and was based on the background study, including environmental setting, property history, and past archaeological assessments. A research request has been made with KMKNO's ARD for past Mi'kmaq traditional land use and knowledge relating to the archaeology and history of Study Area.

The site walkover was carried out by Stantec archaeologists Jonathan Kyte M.A. and Dr. Fred Schwartz. The location of the registered archaeological site on the western side of Hartlen Point, was identified and surveyed; although, nothing was located. Stantec archaeologist then walked the shoreline to the footprint of the planned development. During the desk based historical review the old site access road was located with two structures at the end being the J. Hartling (Hartlen) Farm in the area of the footprint (Church 1865: Faribault 1906). This farm was removed during site clearance by DND after the property was purchased in 1940. The footprint was used as a gunnery range (1940-1945) and there is evidence of past landscaping (i.e., berms and some ditching, etc.) present. The exposure to the ocean and the conditions on the shoreline at the location of the footprint was found to be wet is spots, low soil development, and having alder swale and rose bushes suggest a disturbance to the soils in the area. A review of a geotechnical report carried out on this footprint by SNC (2021), SNC identified this area as the range and did testing for contamination etc.; test wells were noted onsite. The beach and shoreline to the south of the footprint was used for ordnance clearance up until recently (1980s); this area has been impacted but outside the footprint; this was torn down in 1963.

The only area for potential so far is the western side of Hartlen Point where a site is registered but outside the development footprint. I made a research request with the NSCCTH for past archaeological reports etc. The brief report indicated that they were isolated finds in this location, one corner notched point that was reported to Nova Scotia Museum Staff and a scraper located onsite while B. Preston (Past NS curator of archaeology) carried out a site visit. So, at this point I would not suggest any areas for raised archaeological potential that would warrant further archaeological shovel testing, as long the contractor sticks to the access road upgrade footprint and the footprint for the new facility

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