Environmental Impact Assessment for the Development of a Renewable Energy Electrical Generation Facility at 5th Canadian Division Support Base Gagetown

Public Services and Procurement Canada
Moncton, NB
Project #TE181447

Prepared for:

Public Services and Procurement Canada
Moncton NB

3-Nov-21

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3-Nov-21

Christian Brazeau
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Public Services and Procurement Canada
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Moncton, NB
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Dear Mr. Brazeau,

Re: Environmental Impact Assessment for the Development of a Renewable Energy Electrical Generation Facility at 5th Canadian Division Support Base Gagetown

Wood Environment & Infrastructure Solutions, a Division of Wood Canada Limited (Wood), is pleased to provide Public Services and Procurement Canada the final Preliminary Environmental Impact Assessment for the development of a renewable energy electrical generation facility at 5th Canadian Division Support Base Gagetown, Oromocto, New Brunswick.

Wood appreciates the opportunity to provide services to your organization. Please do not hesitate to call if you have any questions regarding this, or any other matter.

Sincerely,

Wood Environment & Infrastructure Solutions,
a Division of Wood Canada Limited

Project Manager, Environmental Sciences - Maritimes
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List of Acronyms

Acronym	Definition
µm	Micrometre
µg/m^3	Micrograms per cubic metre
5 CDSB	5th Canadian Division Support Base Gagetown
ACCDC	Atlantic Canada Conservation Data Centre
the Agency	Canadian Environmental Assessment Agency
AIA	Archaeological Impact Assessment
ATV	All-terrain vehicle
AZMF	Air Zone Management Framework
CAAQ	Canadian Ambient Air Quality Standards
CCME	Canadian Council of Ministers of the Environment
CEPA	*Canadian Environmental Protection Act*
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CWS	Canada-Wide Standards
DND	Department of National Defence
ECC	Environmental Components of Concern
EIA	Environmental Impact Assessment
EMM	Environmental Management Manual
ESC	Erosion and Sediment Control
FAL	Freshwater Aquatic Life
GIS	Geographic information system
ha	Hectare
IBA	Important Bird Areas
km	Kilometre
m	Metre
MBBA	Maritimes Breeding Bird Atlas
MBCA	*Migratory Birds Convention Act*
mg/L	Milligrams per litre
MW	Megawatt
NB	New Brunswick
NBAQOs	New Brunswick Air Quality Objectives
NBDTI	New Brunswick Department of Transportation and Infrastructure
NBSRA	New Brunswick *Species at Risk Act*
NO	Nitrogen oxide
NO_2	Nitrogen dioxide
ppb	Parts per billion
PM	Particulate Matter
$PM_{2.5}$	Particulate Matter <2.5 µm
PM_{10}	Particulate Matter <10 µm
PoE	Pathways of Effects
POL	Petroleum, oil, or lubricants
PPA	Power purchase agreement
the Project	Construction of a 5 MW solar farm
RTA	Range and training area
SAR	Species at risk
the Site	Solar farm project boundaries
SO_2	Sulphur dioxide

Acronym	Definition
SOCI	Species of conservation interest
t	Ton
TCH	Trans-Canada Highway
TRS	Total reduced Sulphur
TSP	Total suspended particulate
TSS	Total suspended solids
VEC	Valued environmental components
WAWA	Watercourse and wetland alteration
WNNB	Wolastoqey Nation of New Brunswick

1.0 Introduction

The Government of Canada has committed to purchasing 100% clean electricity for all federal facilities through the purchase of new renewables by 2022, where available. New Brunswick (NB) has been identified as one of the five target provinces for a Green Power Purchase Agreement (PPA) based on the provincial electricity grid's carbon intensity. As an on-site pilot, the Gagetown Green PPA is expected to produce approximately 6,900 megawatt (MW) hours of electricity per year (equivalent to 38% of Department of National Defence's (DND) reduction target for NB). The project will not require battery storage thereby improving the economics of the initiative.

A preliminary Environmental Impact Assessment (EIA) was submitted in March 2021 which did not contain results from neither the avian and wetlands studies undertaken in early summer 2021 nor the stormwater management plan. Comments on the preliminary EIA were received from DND and Public Services and Procurement Canada (PSPC). Those comments have been incorporated into this document. A disposition table of comments and the relevant affected section has been included in Appendix A.

1.1 Title of Proposed Project

5th Canadian Division Support Base Gagetown Green Power Purchase Agreement – Construction of a 5 MW Solar Farm.

1.2 Originating Directorate, Base or Unit

This project originated from the Directorate of Portfolio Innovation (DPI), Department of National Defence, Ottawa, Canada. The project will be constructed at 5 CDSB Gagetown.

2.0 Project Description

DND is proposing to construct a five megawatt (MW) solar farm at the 5th Canadian Division Support Base (5 CDSB) Gagetown (the Project). A five MW solar farm requires approximately two hectares (ha) for every one (1) MW of capacity. DND completed along with environmental consultant, Wood, a site selection process to find a site with the appropriate land available and sloped in a southern direction. The chosen area (Figure 2.1) consists of two land parcels of 14.34 ha and 8.5 ha (PID#60058690), within the 5 CDSB Range and Training Area (RTA) between Shirley Road and the Trans-Canada Highway (TCH) near Oromocto, NB.

The solar farm will be connected directly to the 5 CDSB electrical system and all power produced by the installation will be consumed by the base (there will be no excess production feeding back into NB Power electrical grid). Battery storage by banks of Lithium-ion batteries and associated infrastructure (any energy storage facility will likely be on a concrete slab and equipped with secondary containment) may be considered for inclusion as part of project scope by the independent power producer to regulate voltage or to manage off-peak production. The solar farm will comprise a fixed tilt, ground mounted field of Photovoltaic arrays comprised of multiple monocrystalline solar panels. The system will require inverters to transform DC power to AC power, the balance of the system will include wiring, monitoring equipment and structural components. The solar farm is expected to have a design life of about 25 years. The solar field will be laid out to minimize cable runs and associated electrical losses. It will provide adequate distance between arrays, clusters, and other structures to prevent shading and will also incorporate access routes throughout for maintenance staff and vehicles.

2.1 Design Components

The proposed solar field is still subject to detailed design, therefore the number of arrays and their distribution, as well as mounting details, have not been determined yet. The arrays will be installed facing south, fixed at a specific tilt, and will be adequately spaced apart in order to eliminate overshadowing any time of the year. The modules will possibly be mounted on aluminum or galvanized steel racks on vertical steel posts driven into the ground at a depth of 1 m or more (depth subject to the orientation, weight, wind load, snow load, etc.) or fixed in concrete footings/foundations. Multiple inverter units, along with control/monitoring panels, will be installed outside if they are weatherproof or indoor inside small insulated wood/steel huts (with proper ventilation since inverters reject a lot of heat). All wiring will be installed underground, within PVC conduits and in trenches meeting the Canadian Electrical Code and DND design Guideline requirements. Several power poles (class 3 utility poles) will be installed to interconnect the solar farm to 5 CDSB's existing electrical infrastructure.

The site can currently be accessed via Shirley Road within the RTA. A perimeter road and maintenance pathways, approximately 3m wide, will be constructed around and between clusters of PV arrays. Topsoil will be removed along those pathways and crushed rocks/pit run gravel with possibly vegetation control (e.g. geotextile) will be placed on the subsoil. The roadway network will allow vehicle access directly to electrical equipment (i.e. inverters, arrays) and for general maintenance of the solar farm. While no parking lot and/or storage building should be required for the long-term operation and maintenance of the site, a storage shed could be installed. During construction, and within the project boundaries, a temporary storage/laydown area and temporary parking area will be designated for materials, equipment and construction trailers.

A permanent chain link security fence, with possibly a gate at the access road from Shirley Rd, will be erected along the perimeter of the site. The fence will be 8 feet high with three strands of barbed wire as secondary protection. Video cameras and motion-sensor lighting could be installed, as necessary, across the site.

2503500.000000 2504000.000000 2504500.000000 2505000.000000

7425500.000000 7425000.000000 7424500.000000

PID 60058690

PID 60058690

PID 60058690

Lindsay Brook

Irvine Brook

Kinney Creek

AIR PHOTOS PROVIDED BY RPOD (GAGETOWN) GEOMATICS CELL

LEGEND:

- Major Road
- Minor Road
- Resource Road
- Streams/Creeks
- Proposed Project Area
- Municipal Area
- 5CDSB
- Wetlands
- PID 60058690

CLIENT:
PUBLIC SERVICES AND PROCUREMENT CANADA

wood.

TITLE:
SITE FOOTPRINT

PROJECT:
GAGETOWN GREEN PPA ENVIRONMENTAL IMPACT ASSESSMENT

PROJECT NO:	DATE:
TE181447	OCTOBER 2021
REV NO: 1	DWN BY: CM
DATUM: NAD83 CSRS 2010	PROJECTION: NB DBL STEREO

FIGURE:
FIGURE 2.1

SCALE: 1:5,500

0 25 50 100 150 200
Metres

Path: D:\PROJECTS\TE181400_PWGSC_RISO_Environmental_Srvs_NB_PEI_2018-2020\TE181447_Gagetown_Green_EIA\GIS\MXD\ENVIRONMENTAL_IMPACT_ASSESSMENT\TE181447_FIGURE_2_1_SITE_FOOTPRINT.mxd User: candace.macdonald Date: 10/28/2021

A monitoring system connected to inverters and control panels throughout the site will continuously collect data for analysis and system monitoring remotely. No personnel will be on site during normal operational days.

The site is currently sloping south to an existing drainage ditch system. It is expected that water infiltration will occur across the majority of the site during and following construction (impervious surfaces will be limited). The site grading activities will consist of some cut and fill areas and no additional ditches, culverts or stormwater retention ponds are expected to be required (to be confirmed by the contractor's engineering/design team). No material beside rocks are expected to be imported to the site.

2.2 Construction Phase

Surveying, clearing, grubbing and levelling

Prior to construction activities, a surveyor will be contracted to layout the perimeter of the solar farm. This will be done to ensure that the boundaries are clearly marked before construction. Adequate buffers will be retained near wetland and sensitive areas (>30m), as well as roads and adjacent facilities (>100m). All merchantable timber will be salvaged and non-merchantable timber will be disposed of off site. All vegetation clearing activities will be conducted outside the migratory bird breeding season (i.e. annually from April 1st to August 31st). Once clearing activities are completed, roots and stumps will be removed and shredded/mulched on site, and topsoil/organic matter will be left in place where appropriate. While the proposed project site is currently sloping south, some levelling will be required. High areas will be cut down and low areas will be filled in. Prior to the clearing, grubbing and grading activities, standard erosion and sediment control measures will be installed, where appropriate, and adapted to changing site conditions throughout the construction phase. All equipment used during each of the construction phases/activities are provided in Table 1 below.

Security fencing, roadway network, temporary laydown area, temporary facilities

Before bringing any solar farm equipment on site, the security fencing will be erected at the site perimeter. Construction of the roadways will involve the removal of topsoil, some minor grading and placement of granular materials. A laydown area, located within the site, will also serve as a parking area during construction. The security fence, roadways and laydown area will likely be constructed concurrent with site levelling activities.

Contractor trailers could be brought on site for the construction activities. Those trailers will serve as offices/lunch rooms/equipment storage throughout construction. Temporary washroom facilities, serviced by a licensed third-party contractor, might be required on site. Once the solar farm has been commissioned, the temporary facilities will be removed from the site.

Construction and assembly of the solar system

It is expected that vertical steel/treated wood posts will be used to support the galvanized steel/aluminum racking tables supporting the solar panels. The type of anchors or foundations have not been identified yet, but several methods could be used, including: steel/treated wood posts driven into the ground, steel posts attached to screw piles/helical anchors installed in the ground, steel/treated wood posts attached to concrete foundations/forms (methods and depths depending on site/ground conditions, orientation, weight, wind load, snow load, etc.). Once the racking system is installed, the solar panels will be installed on top. The units will be wired in series and run to the end of each clusters of arrays to enter the small huts protecting the inverters, switches, etc. Electrical cables running between the panels and inverters will be buried in approximately 3 to 4 foot deep trenches, in PVC conduits. A right-of-way for the feeder line, extending from the solar farm to the RTA transmission line, will be cleared. Once clearing is done, pole

drilling will start in order to install several utility pole (pressure treated jack pine, 40 feet high, 10 feet in the ground).

Table 2.1 Equipment Anticipated For Construction Activities

Equipment	Tasks
Semi-trailer truck and float	Floating equipment to and from the site
Rubber-tired mechanical harvester	Felling of trees and delimbing
Rubber-tired skidder	Yarding of felled merchantable timber
Shredder	Shredding and mulching of non-merchantable timber
Tractor and trailer with grappler	Transport of trees off-site
Bulldozer with root rake	Removal of stumps and roots and material movement
Tracked excavator	Loading and movement of material, excavation for footings, foundations, trenches
Back-hoe	Removal of stumps and roots
Dump truck	Material movement (e.g. granular material)
Support/service trucks (pick-up or all-terrain vehicle (ATV))	Transport of equipment and personnel, electrical service
Bobcat fitted with post hole driller	Drilling holes for fence posts
Compactor/roller	Fill compaction (e.g. roadways)
Forklift/Loader	Material movement (e.g. anchors, rebars, gravel, etc.)
Pumper truck	Cleaning of portable washroom
Welding truck	Base-station for welding equipment
Concrete truck	Hauling concrete to site
Concrete pumper truck	Movement of concrete on site
Scissor lift	For safely positioning personnel in above-ground areas
Truck crane (40 t to 90 ton (t))	Movement and placement of equipment on site
Drilling rig	For potential geotechnical study
All-terrain cherry picker pole drilling	Installing utility poles and stringing wires

Post-construction clean-up and site restoration

Once construction activities are completed and prior to site demobilization, all debris and waste will be removed from site and disposed of appropriately. Temporary erosion and sediment control measures, such as silt fencing and seeding/hydroseeding, will be applied on site, as necessary, to stabilize site conditions until full vegetation recovery.

Workforce and timelines

It is expected that approximately 20 to 40 construction personnel will be required on-site during the peak construction period. The location of the project site within the RTA means that there will likely be minimal to no impacts to the public during all construction hours. Project construction is anticipated to occur over a 10 to 12 month period, starting in the Spring/Summer 2022 (with site clearing likely in the Fall 2021/Winter 2022), but could also be completed in 24 months, pending funding and approvals but also due to changing material prices, supply chain delays and/or shortage in material supply.

2.3 Project Operation and Maintenance Phase

The solar farm will operate daily during daylight hours for the duration of the project lifespan (i.e. about 25 years). There will be no permanent on-site employees since the facility will require little maintenance throughout the year. The project will be continuously monitored and operated remotely. Most issues will be remotely diagnosed and, when required, maintenance personnel will be dispatched to correct any problems. It is expected that routine operation and maintenance activities will be contracted out locally. Corrective maintenance may include activities such as replacing broken modules or repairing inverters. It is expected that planned shutdowns for maintenance activities will occur during early morning or evening when light levels are low and energy production is minimal. Typical operational and maintenance activities at the site could include:

- Security checks: inspection of security fencing by foot, automobile, 4-wheeler or snowmobile;
- Electrical testing and inspections: to verify connections and ensure proper voltages and currents (at modules, inverter units, etc.);
- Module cleaning: panel cleaning will normally occur via natural rainfall, however there may be a need to clean panels due to dust/pollen build-up, excessive bird droppings, etc. Cleaning will be done using clean water from a water truck. Manual snow removal may also be required in the winter. No cleaning and/or de-icer solutions will be used on the panels; and
- Landscaping: vegetation will grow under and between the solar arrays and along the power line right-of-way. This will require vegetation management to avoid the site becoming overgrown with weeds and trees. Mowing, trimming and mulching will likely be required in the Spring/Summer. There may be an opportunity to allow cows, sheep or other livestock to graze on the project site. No herbicides will be used for the control and maintenance of vegetation.

2.4 Project Decommissioning Phase

The solar farm will have a useful life of approximately 25 years. Over time, the performance of solar panels decreases as a result of degradation due to environmental conditions (i.e. humidity, temperature, solar irradiation) and module technology (e.g. quality of materials used, lamination effects, cell contact breakdown, etc.). Decommissioning the site would include disconnecting the solar farm from the electrical system, disconnecting the inverters, solar arrays, etc., breaking down the solar arrays, steel support and foundations, removing underground cabling, tearing down security fence, recycling all materials at appropriate facilities (where practical and feasible), and site reclamation. An assessment of activities will be developed in the months prior to decommissioning the site. The plan will identify how the various materials will be handled once removed from the site and how the site will be re-developed.

Note that in 25 years, technology and business practices may change to the point that rather than decommission the solar facility, DND will update, retrofit or replace the solar equipment.

3.0 Approach and Methodology

This Project is listed as an undertaking under Schedule A of the NB EIA Regulation and therefore requires a Provincial assessment. Guidelines and requirements for the NB EIA process, as well as information resources, are described in "A Guide to Environmental Impact Assessment in NB" (NBDELG, 2018).

This activity meets the definition of a project under s.82 or 83 of the *Impact Assessment Act* (IAA) as it is a physical activity to be carried out on federal lands or outside Canada and is in relation to a physical work. Therefore, an Environmental Effects Determination is required under s.82 or 83 before it can proceed.

This project is not found in either the Ministerial Order: Designated Classes of Projects Order or the DND Abbreviated Report Criteria; therefore, a full report has been prepared. The project is registered on the Canadian Impact Assessment Registry (CIAR) as project 81073.

To facilitate the review of identified issues, an understanding and description of the environment within which the activities will occur, or potentially have an influence on, was developed from a review of existing information. Potential positive and negative interactions between Project activities and the environment were identified. Where negative interactions were anticipated, and potential effects were a concern, methods for mitigating the potential effects were proposed. For the purposes of impact assessment, the interactions (effects) between project outputs, or activities, and Valued Environmental Components (VECs) are described as either positive or negative, their significance of potential interactions is determined, and the likelihood of the interactions are also considered.

Generally, the literature presents the EIA as a complete process, which should begin at the earliest stages of planning and remain in force throughout the life of a project, moving through a series of stages:

- Describing the project and establishing environmental baseline conditions;
- Scoping the issues and establishing the boundaries of the assessment;
- Assessing the potential environmental effects of the project, including residual and cumulative effects;
- Identifying potential mitigative measures to eliminate or minimize potential adverse effects; and
- Monitoring and follow-up programs.

The impact assessment focused on the evaluation of potential interactions between Project components and activities, and VECs that were identified through an issues scoping process. Issues scoping was used to identify important issues of the development and focuses the EIA on high-priority issues (Kennedy and Ross, 1992). As suggested by Beanlands and Duinker (1983), VECs were determined on the basis of perceived public concerns related to environmental, social, cultural, economic, or aesthetic values. They were also chosen to reflect the scientific concerns of the professional community.

The EIA approach includes a number of steps as detailed below.

3.1 Assembling Project Baseline Information

A project description was developed and includes construction and operation activities. A description of existing environmental conditions was prepared to allow assessment of the potential effects of the various project activities on the environment as well as the potential effects of the environment on the project.

Geographic information system (GIS) data layers of DND information were supplied to Wood for desktop review prior to initiation of field reconnaissance. Due to a delay in acquiring the complete data set of GIS layers, the September 2020 field reconnaissance for wood turtles, fish and fish habitat, and wetlands had to be undertaken before the information could be reviewed. Data acquired in the field were reconciled with data layers provided by 5 CDSB following the field visit. Since the Archaeological field reconnaissance was

conducted after the other field visits previously mentioned, we were able to review 5 CDSB provided data ahead of the archaeological field reconnaissance.

Wood personnel with experience in wetlands, archaeology, and aquatic habitats walked the candidate site and adjacent areas (the Study Area) to document any constraints to its use for the proposed project. The objective of the field visual surface survey was to obtain first-hand exposure to the project site. The archaeological survey paid particular attention to subsurface exposures, watercourse shorelines and erosional faces, and other areas indicated as having elevated potential from the archaeological desktop research.

All data with relevance was recorded digitally and appropriate photographs were taken. Any other potential constraints noted during the field reconnaissance were also recorded.

Data on species-at-risk potentially within the site boundaries was reviewed via a report from the Atlantic Canada Conservation Data Centre (ACCDC). Buffers of one and five kilometres (km) around a point in the center of the site were applied to the ACCDC database.

A review of applicable legislation was completed by contacting appropriate federal and provincial regulators. A comparison between additional studies required by regulators and available information informed the scope and costs of the second phase of the project.

3.2 Issues Scoping

Issues were identified during the development of the EIA document and comments were received from regulatory bodies and some members of the public. As a result of this "social scoping" effort (Beanlands and Duinker, 1983), environmental issues or Environmental Components of Concern (ECC) that may be affected by the project were identified, by professionals in the field and by the public, and pathways between the ECCs and project activities are identified. Where pathways cannot be identified, the ECC or issue was deemed not to be affected by the Project and, therefore, was no longer part of the analysis.

3.3 Approach to the Selections of VECs

A critical element of any EIA is the delineation of the project through identification of spatial and temporal bounds. The approach to identification of VECs and the approach to bounding are described below.

3.3.1 Identification of VECs

Consideration is given to the possibility of project activities to interact with each VEC. The determination that significant effects may be possible is based upon regulatory requirements, previous experience and our professional judgment.

Two approaches are taken for identifying VECs, upon which the assessment focuses. First, those parameters for which provincial and federal regulations are in place are identified. Second, a scoping exercise is conducted, based upon previous EIA experience with similar project components, consultation, and available information related to the environment near the project site.

3.3.2 Approach to Bounding

Temporal bounds delineate the time period(s) over which project-related impacts / effects can be expected. Spatial bounds delineate the physical area(s) in which VECs may be affected by project activities.

The temporal bounds of this Assessment include the construction (including clearing and grubbing) and operations phases of the project and any proposed monitoring programs.

Spatial bounds for the project effects on most VECs typically include the immediate environs of the Project Footprint, access roads and areas potentially affected by down-gradient movement of groundwater, surface water, and air. For socio-economic components of the environment, bounding extends to communities that have a stake in the potential effects resulting from the proposed project.

The spatial bounds of this Project include the immediate site area and communities bordering 5 CDSB.

3.4 Approach to Determination of Significance

The assessment or determination of the significance of potential effects is based on the framework/criteria provided in Canadian Environmental Assessment Agency (the Agency) guidance document Responsible Authority's Guide (1994) which summarizes the requirements that have been applied to similar projects in the past, and which have been widely accepted by government and regulatory agencies in Canada.

The Reference Guide entitled "Determining Whether A Project Is Likely To Cause Significant Adverse Environmental Effects" included in the Responsible Authority's Guide (the Agency, 1994) was used as the basis for determining the significance of identified potential effects. This determination consists of the following steps:

- determine whether the environmental effect is adverse;
- determine whether the adverse environmental effect is significant; and
- determine whether the significant environmental effect is likely.

For the purposes of the EIA, an effect is defined as the change effected on a VEC(s) as a result of project activities. A project-induced change may affect specific groups, populations, or species, resulting in modification of the VEC(s) in terms of an increase or decrease in its nature (characteristics), abundance, or distribution. Effects will be categorized as either negative (adverse) or positive. Any adverse effects will be determined to be significant or non-significant in consideration of assessment criteria discussed above. The Assessment will focus on those interactions between the VECs and project activities which are significant or likely.

4.0 Environmental and Socio-Economic Setting

This section provides a description of the environmental and the socio-economic setting for the Project and includes those components of the environment potentially affected by the proposed Project. The Project location (the Site) and the surrounding area (proposed Project Area or Study Area) are depicted in Figure 4.1.

The description of the environmental setting encompasses the two parcels that comprise the Site and the habitat adjacent to it. The environmental setting description has been prepared to provide information on environmental and socio-economic components which may potentially be affected by the Project, or which may influence or place constraints on the execution of project-related activities.

4.1 Atmospheric Environment

Air quality is influenced by the concentrations of air contaminants in the atmosphere. Air contaminants are emitted by both natural and anthropogenic sources and are transported, dispersed or concentrated by meteorological and topographical conditions. Air contaminants eventually settle or are washed out of the atmosphere by rain and are deposited back to the earth. In some cases, contaminants may be redistributed into the atmosphere by wind. The information in this section is based on the most up-to-date results available from the monitoring station operated by the Air Quality Branch of the NBDELG nearest the Project. The Needham Street station is located in Fredericton, approximately 20 km northeast of the site.

4.1.1 Air Quality Regulations

Air quality in NB is routinely monitored by the provincial and federal governments at various stations, usually located in or near population centres. Both the air quality standards under Schedule B of the NB *Clean Air Act* and the NB Air Quality Objectives (NBAQOs) established by the Province under the same Act provide Guidelines and Objectives that apply to various components, including Total Suspended Particulate (TSP): 120 micrograms per cubic metre (µg/m^3) per 24 hour averaging period and 70 µg/m^3 per 1 year averaging period. Table 4.1 lists the NBAQOs established under the provincial *Clean Air Act*.

Table 4.1 Air Quality Guidelines in NB

Pollutant	Averaging Period			
	1-hour	**8-hour**	**24-hour**	**1 year**
Carbon monoxide (CO)	30 ppb*	13 ppb		
Hydrogen sulphide (H_2S)	11 ppb		3.5 ppb	
Nitrogen dioxide (NO_2)	210 ppb		105 ppb	52 ppb
Sulphur dioxide (SO_2)***	339 ppb		113 ppb	23 ppb
Total Suspended Particulate			120 µg/m^3	70 µg/m^3

Source: NBDELG, 2020
*ppb – parts per billion
** The standards for SO_2 are 50% lower in Saint John, Charlotte, and Kings Counties.

The following describe each component for which NBAQOs and / or Canadian Standards are set.

- **Carbon Monoxide (CO)**

CO is formed from the incomplete combustion of carbon compounds. The NBDELG has set an air quality guideline for CO of 30 parts per billion (ppb) for a 1-hour averaging period. Carbon monoxide is not monitored by the Fredericton station.

- **Hydrogen Sulphide (H_2S)**

This component is used by the Provincial mobile air quality trailer to measure Total Reduced Sulphur (TRS) in industrial areas such as Saint John and the AV Nackawic Mill, where TRS odour is a concern. TRS is not monitored by the Fredericton station nor is it a concern for this project.

- **Nitrogen Oxides (NO and NO_2)**

Nitric oxide (NO) is released in the exhaust of internal combustion engines and furnaces. NO is an unstable compound and is readily converted to NO_2, which contributes to the formation of acid rain and is a primary precursor pollutant in the formation of smog. NBDELG has set an air quality guideline of 210 ppb, 105 ppb and 52 ppb per 1 hour, 24 hour and 1 year averaging periods, respectively. There were no exceedances of the NBAQOs for NO_2 at the Fredericton monitoring station 2018.

- **Sulphur Dioxide (SO_2)**

Sulphur dioxide is produced by burning oil and coal for energy production and space heating; each containing sulphur as an impurity in various concentrations. Other potential sources of SO_2 to the environment include oil refineries, pulp and paper mills, and vehicles. Industries in NB are responding by using lower or near-zero sulphur fuels as well as reducing production and electricity-generation rates. SO_2 is not monitored by the Fredericton station (NBDELG, 2020).

- **Particulate Matter (PM)**

Particulate matter (PM) refers to those particulates in the air, such as smoke, soot, and dust that do not settle readily and thereby remain suspended. PM is a broad class of chemically and physically diverse substances that can either be in a solid or liquid state, or in a combination of these two states. PM greater than 10 micrometres (µm) in size creates problems such as visibility reduction, soiling, material damage, and vegetation damage.

Particulate matter becomes a potential human health hazard when the particle size is equal to, or less than, 10 µm in diameter (PM_{10}) (NBDELG, 2020). These particles are typical of dust granules that are invisible to the naked eye as individual specks. Such particles are commonly generated from building materials, combustion, human activities and outdoor sources, including atmospheric dust and combustion emissions from mobile and stationary sources. PM_{10} data for Moncton is not monitored.

Particles of 2.5 µm or less ($PM_{2.5}$) are small enough to inhale into the lungs and are believed to cause respiratory and cardiovascular problems. These particles are visible as clouds of smoke and are typically high in sulphates, nitrates, carbon and heavy metals, being produced by fossil fuel combustion, vehicle exhaust and industrial emissions (NBDELG, 2020).

In 2012 all Canadian provinces, with the exception of Quebec, agreed to participate in a new federal air quality management system adopted by the Canadian Council of Ministers of the Environment (CCME) as part of the revised *Canadian Environmental Protection Act* (CEPA). The Air Quality Management System is a comprehensive approach for improving air quality in Canada and is the product of collaboration by the federal, provincial and territorial governments and stakeholders and replaces the Canada-Wide Standards (CWS) that had been in place since 2000. It includes:

- New Canadian Ambient Air Quality Standards (CAAQs) to set the bar for outdoor air quality management across the country;
- Industrial emissions requirements that set a base of performance for major industries in Canada;
- A framework for air zone management within the provinces and territories that enables action tailored to specific sources of air emissions in a given area;

- Regional airsheds that facilitate coordinated action where air pollution crosses a border; and
- Improved intergovernmental collaboration to reduce emissions from the transportation sector.

Standards for fine PM and ground-level ozone have been developed, which are illustrated in Table 4.2. CAAQs are currently in development for NO_2 and SO_2.

Table 4.2 CAAQ Standards for Fine Particulate Matter ($PM_{2.5}$) and Ozone

Pollutant	Averaging Time	Standards (numerical values)		Metric
		2015	2020	
$PM_{2.5}$	24-hour (calendar day)	28 µg/m^3	27 µg/m^3	The 3-year average of the annual 98th percentile of the daily 24 hour average concentrations.
$PM_{2.5}$	Annual (calendar year)	10 µg/m^3	8.8 µg/m^3	The 3-year average of the annual average concentrations.
Ozone	8-hour	63 parts per billion (ppb)	62 ppb	The 3-year average of the annual 4th highest daily maximum 8 hour average concentrations.

The new federal Air Quality Management System is designed to address the challenges of air quality management, including cross-jurisdictional issues, and deliver a Canada-wide approach that provides flexibility to deal with regional differences in air quality issues while, at the same time, ensuring a level of consistency so that Canadians can be assured of good air quality outcomes. As part of this approach, CCME has also created an Air Zone Management Framework (AZMF) which categorizes provincial regions by existing air quality and management goals. The Project Study Area lies within the Central Air Zone of NB, which is considered "orange" and whose mandate is to retain low $PM_{2.5}$ levels (CCME, 2012). In this Zone, threshold values of 0 to 10 µg/m^3 for daily average and 0 to 4 µg/m^3 for annual average $PM_{2.5}$ have been established, which are much lower than the CAAQs (NBDELG, 2020). The Fredericton station had a daily average of 13 µg/m^3 and annual average of 5.7 µg/m^3 (NBDELG, 2020).

4.2 Acoustic Environment

Sound is mechanical energy transmitted by pressure waves through a medium such as air. Physically, there is no distinction between sound and noise. It is common practice to define noise simply as unwanted sound, thus, the terms sound and noise are often used interchangeably.

The proposed solar farm is to be located on immature mixed forested land within the RTA. The Site is immediately south of Shirley Road, the primary road to the RTA. Shirley Road sees considerable traffic from military and contractor trucks and military specific vehicles. On Shirley Road, north of the site are two fueling stations and a vehicle wash station. The TCH, the primary thoroughfare between Fredericton and both Saint John and Moncton is situated south of the Site.

The nearest non-military receptors are residential homes on Robert Street, approximately 900 m west of the Site. A highway interchange and the Broad Road are located between the Site and Robert Street.

4.3 Climatology

The climate of the Study Area is described below. The information is based upon climate normals using the latest data gathered from 1981 to 2010 at the Environment Canada weather station nearest the Study Area.

The Fredericton Airport station is located approximately 6.5 km northeast of the Study Area (Environment and Climate Change Canada, 2020).

The climate of NB is typically continental. This is due to the westerly air flows, dominant in the region, having passed over the interior of the continent and not over a temperature-moderating ocean. The annual average for temperature was 5.6°C and ranges between an average low of -9.4°C in January and an average high of 19.3°C in July. The extreme maximum and minimum temperatures recorded were 37.2°C (August 1975) and -37.2°C (February 1994), respectively (Environment and Climate Canada, 2020).

The average annual precipitation in the Study Area is 1077.7 mm, of which 859.1 mm is in the form of rain. The extreme precipitation was 148.6 mm of rain in August 1989 (Environment and Climate Canada, 2020).

Winds are predominantly from the south or southwest from May to October and predominantly from the west or northwest from November to April (Environment and Climate Canada, 2020).

4.4 Surficial and Bedrock Geology

5 CDSB Gagetown is found within the Grand Lake Ecoregion which encompasses the Grand Lake basin, the Oromocto River Watershed and the floodplains surrounding the mid-section of the lower Saint John River between Prince William and Evandale. This ecoregion is composed almost entirely of Carboniferous, non-calcareous sedimentary rocks, ranging from fine siltstones through sandstones to coarse conglomerates (DNR 2007).

The landscape in this ecoregion is mainly covered with compact loams to clay loams derived from the easily weathered red mudstone and grey sandstone. These acidic, poorly drained soils are part of the Stony Brook and Harcourt units. Floodplains in this area are known to possess thick beds of alluvial sand and gravel overlain by silt or fine sand of the Interval Unit (DNR 2007).

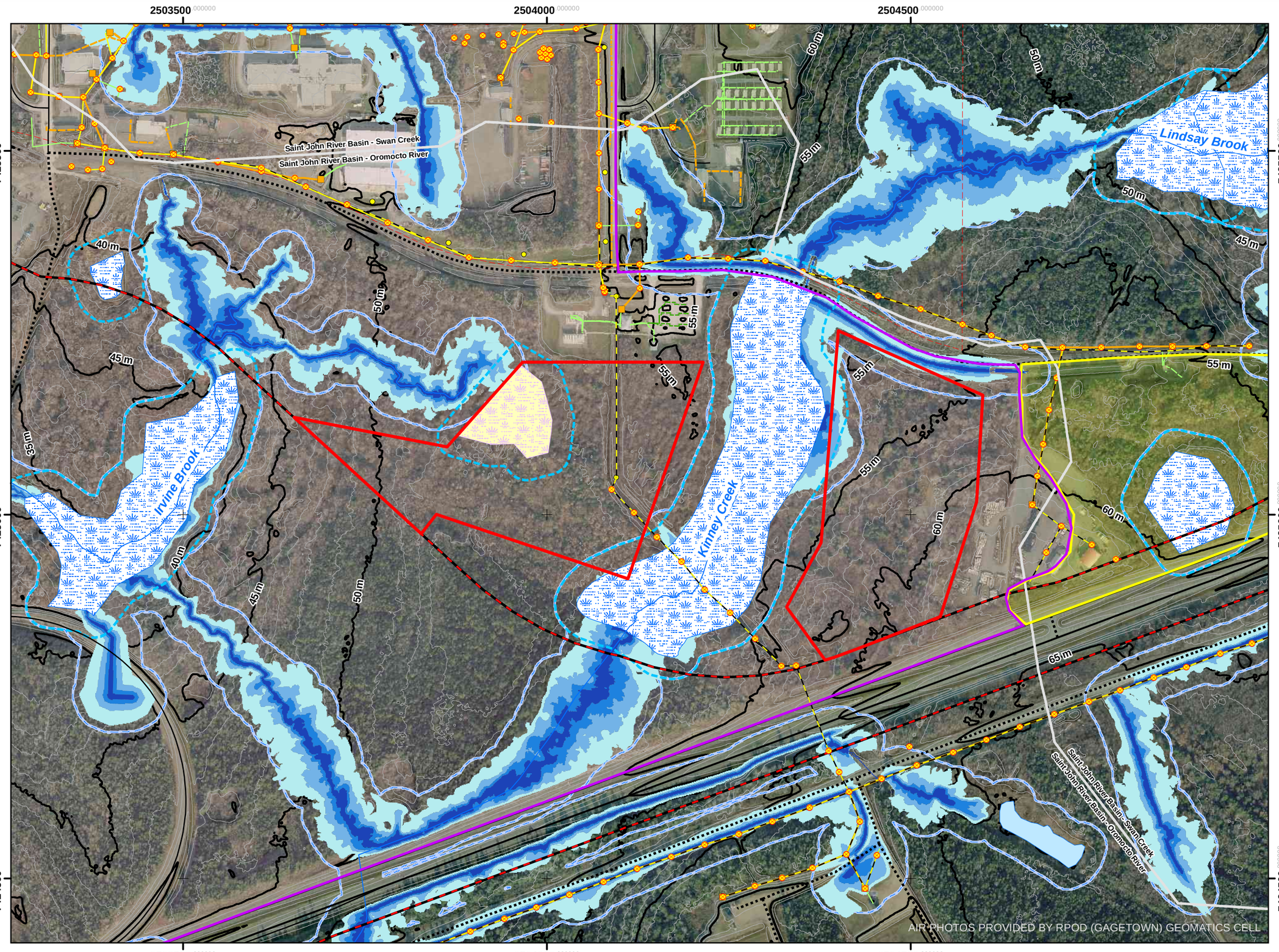
4.5 Groundwater and Surface Water

The following section describes the hydrological and hydrogeological conditions of the Study Area, including water quality for both surface and groundwater resources.

The search of the NB Online Well Log System (OWLS) well data base for a radius of 1 km from the proposed Project provided information for nine wells. Using the reported well log information, the wells were all sedimentary (stratified bedrock such as sandstone) with some shale and clay interspersed. Wells drilled in sedimentary rocks yielded a minimum of 1.5 igpm (Imperial gallons per minute), a maximum of 15 igpm. The average well depth was 250 feet, with a range from 82 to 500 feet. Surface runoff from the site drains into the Oromocto River, which eventually drains into the Saint John River and then into the Bay of Fundy. There are no protected watersheds located within the Study Area (NBDELG, 2021).

4.5.1 Watercourses

The western parcel is bounded by Irvine Brook to the west and Kinney Creek to the east. Both watercourses flow southwest from the site (see Figure 4.1). Approximately 1 km downstream of the TCH, Irvine Creek flows into Kinney Creek which then flows into the Oromocto River. Neither watercourse is within 35 m of the Project boundaries.



LEGEND:

- Transformer
- Communications Conduit to UG Line
- Communications Manhole

Electrical Lines

- Primary Overhead - Unknown Voltage
- Primary Underground - Unknown Voltage
- Secondary Overhead - Unknown Voltage
- Secondary Underground - Unknown Voltage
- Secondary Underground - 120/240V
- Secondary Underground - 600/347V
- Major Road
- Minor Road
- Resource Road
- Streams/Creeks
- Contour - 1 m
- Contour - 5 m
- Communications Line Overhead
- Buried Primary Communications Line
- Proposed Project Area
- Municipal Area
- 5CDSB

Watersheds

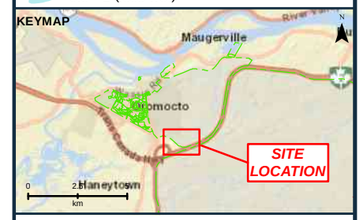
- East
- West
- GeoNB

Depth to Water Table

- 0 - 0.1 (more wet)
- 0.1 - 0.25
- 0.25 - 0.5
- 0.5 - 1 (less wet)

- Wetlands
- Field Identified Wetland
- Wetlands - 30 m Buffer (incl.) Field Identified)

KEYMAP



CLIENT:
PUBLIC SERVICES AND PROCUREMENT CANADA

wood.

TITLE:
WATER FEATURES

PROJECT:
GAGETOWN GREEN PPA ENVIRONMENTAL IMPACT ASSESSMENT

PROJECT NO:	DATE:
TE181447	OCTOBER 2021
REV NO:	DWN BY:
1	CM
DATUM:	PROJECTION:
NAD83 CSRS 2010	NB DBL STEREO

FIGURE:
FIGURE 4.1

SCALE: 1:5,000

0 25 50 100 150 200
Metres

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4.6 Terrestrial Habitat

Terrestrial habitat is depicted in Figure 4.2. Habitats present include mature coniferous forest, mature mixed forest (mainly intolerant hardwood), mainly shrubby habitat on historically cleared/disturbed ground, and immature mixed forest on severely disturbed ground.

The Site is mostly composed of immature mixed forest growing in a landscape that is apparently disturbed by historic training activities. Predominant tree species are white birch (*Betula papyrifera*), red maple (*Acer rubrum*), trembling aspen (*Populus tremuloides*), balsam fir (*Abies balsamea*), and red spruce (*Picea rubens*). The age class ranges from saplings to mature, but most trees are not yet of merchantable size. The canopy is open with a lush undergrowth, often including regenerating tree species that are predominantly coniferous. The ground surface is very rough due to historic severe disturbance by large, tracked vehicles and minor earth moving/excavations. This has resulted in a slightly deranged surface hydrology and local small wet areas have developed in the depressions. There is a small area of mature coniferous forest (red spruce, balsam fir, white pine (*Pinus strobus*)) in the southwest part of the site which shows signs of past timber harvesting but no obvious indication of military training.

A rare plant survey was conducted in early summer 2021 and results are discussed in the section below

4.7 Wetlands

Wetlands in NB have been given specific protection under both the *Clean Environment Act* and the *Clean Water Act*. The NB EIA Regulation requires registration of "all enterprises, activities, projects, structures, works, or programs affecting two ha or more of bog, marsh, swamp, or other wetland". NBDELG requires a permit under the Watercourse and Wetland Alteration (WAWA) Regulation for any alteration within 30 m of the bank of a watercourse or wetland. As the project will be designed to avoid the 30 m buffer, no permit requirement is anticipated.

Federally, wetlands are protected under the Federal Policy on Wetland Conservation and have, as a cornerstone of the policy, the requirement of 'no net loss' of wetland habitat. As the landowner the federal government is responsible for maintaining the quality of and managing impact to wetlands. As outlined in the Federal Policy on Wetland Conservation (FPWC) (Government of Canada 1991), the government's objective with respect to wetland conservation is to: *Promote the conservation of Canada's wetlands to sustain their ecological and socio-economic functions, now and in the future*.

Existing mapping shows a large wetland that divides the two parcels that comprise the Site and depth to water table mapping (Figure 4.1) shows some areas where wetlands may occur nearby, but outside the boundaries of both areas.

During preliminary field reconnaissance surveys in 2020, one previously unmapped shrub swamp wetland area was field verified near the northwest boundary of the western parcel (Figure 4.1). This wetland appears to be associated with a local watercourse but may also have been affected by historic land disturbance (possibly training related excavations). No other wetlands were observed within the surveyed areas.

Detailed physical delineations were carried out for the identified wetlands in 2021, including a spring vegetation survey to identify early season rare plants ("spring ephemerals") and a formal wetland delineation was conducted in July 2021 to precisely define the wetland boundaries that are near the proposed project footprint so that they can be avoided by at least 30 m. The methodology and survey results are described in the Section below. Wetland field data records and site photos are attached in Appendix B. Mitigation measures are described further below in Section 5.0.

2503500.000000 2504000.000000 2504500.000000 2505000.000000

7425500.000000 7425000.000000 7424500.000000

Lindsay Brook

WI2-up

WI2-wet

Irvine Brook

Kinney Creek

WI1-up

WI1-wet

No project activities will occur within delineated wetlands or their buffers

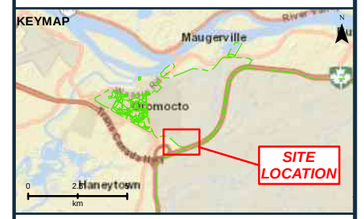
AIR PHOTOS PROVIDED BY RPOD (GAGETOWN) GEOMATICS CELL

LEGEND:

- Field Wetland Delineation Survey Points
- Stationary Bird Survey Location
- Field Verified Wetland Boundary
- Major Road
- Minor Road
- Resource Road
- Streams/Creeks
- Previously Mapped Wetlands
- Wetlands - 30 m Buffer (incl. Field Verified)
- Proposed Project Area
- Municipal Area
- 5CDSB

Terrestrial Habitat

- Mature Coniferous Forest
- Mature Mixed Forest (Intolerant Hardwood)
- Immature Mixed Forest (Disturbed Area)
- Shrubby Disturbed Area (Few Trees)
- Shrubswamp Wetland



CLIENT:
PUBLIC SERVICES AND PROCUREMENT CANADA

wood.

TITLE:
TERRESTRIAL HABITAT

PROJECT:
GAGETOWN GREEN PPA ENVIRONMENTAL IMPACT ASSESSMENT

PROJECT NO:	DATE:
TE181447	OCTOBER 2021
REV NO: 1	DWN BY: CM
DATUM: NAD83 CSRS 2010	PROJECTION: NB DBL STEREO

FIGURE:
FIGURE 4.2

SCALE: 1:5,500

0 25 50 100 150 200
Metres

Path: D:\PROJECTS\TE181400_PWGSC_RISO_Environmental_Srvs_NB_PEI_2018-2020\TE181447_Gagetown_Green_EIA\GIS\MXD\ENVIRONMENTAL_IMPACT_ASSESSMENT\TE181447_FIGURE_4_2_TERRESTRIAL_HABITAT.mxd User: candace.macdonald Date: 10/28/2021

4.7.1 Detailed Wetland Delineation

The wetland delineation was conducted using the methodology developed by the United States (US) Army Corps of Engineers, which has been generally adopted by Canadian regulators and practitioners. This method uses paired data points (one inside and one outside the wetland) to establish the vegetative boundary; which is then used to mark the edge of the wetland. The wetland determination is based on a three-part test that requires the presence of wetland vegetation; hydric soil, and signs of wetland hydrology. The wetland boundary was recorded in the field using a Global Positioning System (GPS) accurate within approximately 5 m. The completed wetland data forms and wetland photos are presented in Appendix B.

The spring vegetation survey was conducted on May 28, 2021 and did not reveal any early season rare plants. Buckbean (*Menyanthese trifoliata*) was in full flower indicting that the timing was appropriate for other early blooming species. Several wildlife observations were recorded including a pair of Canada Goose (*Branta canadensis*) possibly exhibiting courting behavior, one American Bittern (*Botaurus lentiginosus*), and numerous Red-winged Blackbirds (*Agelaius phoeniceus*).

The wetland delineation surveys were conducted during July 19th and 23rd, 2021 by Garrett Bell, an experienced Field Biologist and trained wetland delineator, with assistance from Mike Lewey (a Wood Junior Biologist) and accompanied during part of the survey by another wetland delineator representing the Wolastoqey Nation of New Brunswick (WNNB). Two (2) wetlands were delineated (See WL1 and WL2 on Figure 4.2).

Wetland 1

Wetland 1 (WL1) is a riparian stream marsh dominated by blue-joint grass (*Calamagrostis canadensis*). The surveyed wetland area is approximately 7.5 ha, divided approximately into two equal parts north and south by a man-made causeway. The northern part is generally flooded with shallow to deep standing water and the southern part is mainly saturated only (with a small stream channel). There is no inlet and almost no upgradient watershed at this point. The wetland is bordered to the east by mature mixed forest (mainly intolerant hardwood) and areas of tall shrub thickets on historically disturbed land. To the west, adjacent land is covered by immature mixed forest on highly disturbed land and in the extreme southwest by mature coniferous forest on undisturbed land. One paired sampling site was recorded. The wetland was determined to have normal site conditions/hydrology within it. The wetland drains south to Kinney Creek.

Within the wetland, the dominant vegetation is narrow-leaved emergents with a major secondary component of tall and low shrubs. Grassy vegetation includes blue-joint grass, rattlesnake grass (*Glyceria striata*), common wool grass (*Scirpus cyperinus*), and other sedges (eg. *Carex crinita*). Tall shrubs include speckled alder (*Alnus incana*), and Canada holly (*Ilex verticillate*). Low shrubs include meadow-sweet (*Spirea alba*) and steeple-bush (*Spirea tomentosa*). A few black spruce (*Picea marina*), tamarack (*Larix laricina*), and gray birch (*Betula populifolia*) are growing into the margin of the wetland but a fringe of dead trees indicates that variable flooding has occurred in the past; probably due to the presence of beaver. The transition zone around the perimeter of the wetland is marked generally by a transition from alder and blue-joint grass dominance to brackenfern (*Pteridium aquilinum*), beaked hazel-nut (*Corylus cornuta*), red maple (*Acer rubrum*), and gray birch. The occurrence of bracken fern was particularly useful for determining the location of the upland boundary in both forested and shrubby vegetation communities. Wetland 1 lies within a shallow valley that runs along Kinney Creek and the wetland boundary is usually coincident with a variable rise in elevation from subtle to extreme. The Prevalence Index (PI) was observed to be 1.13. A thin organic soil was present above mainly mineral depleted matrix and was saturated to the surface.

The majority of the adjacent upland has been subject to historic military training activities and old vehicle tracks are visible everywhere throughout the forest. Occasionally more severe excavations interrupt the landscape. The forest is typical of regenerating disturbed areas, aged from immature to mature (about 50-

60 years) and shows some signs of past selective timber harvesting (old cut stumps). The dominant vegetation is trembling aspen (*Populus tremuloides*), red maple, and red spruce. The southwest portion of the site is more mature forest that is not obviously impacted by historic military training and dominated mainly by red spruce and balsam fir (*Abies balsamea*). The understorey and herb layer are moderately vegetated and includes beaked hazel-nut, meadow-sweet (but much less abundant than in the wetland), brackenfern, Canadian bunchberry (*Cornus canadensis*), blackberry (*Rubus alleghaniensis*) and asters (*Aster sp.*). The PI was observed to be 3.34, which is strongly upland oriented.

The wetland boundary was established utilizing changes in vegetation within a relatively narrow transition zone (associated with a rise in elevation), except along the middle part of the eastern shore where shrubby old fields presented a deeper transition zone (up to 30 m) and more gradual slope.

WL1 receives no surface inflow from upgradient. The flow-through is simple and linear toward the south. The flow across the man-made causeway in the middle of the wetland may be interrupted by beaver damming. The wetland extends along the stream downgradient to the Trans-Canada Highway where it crosses through a small culvert (~0.75 m diameter). There may also be some groundwater inflow and outflow. The soil was saturated to the ground surface. No SAR were observed in the wetland or adjacent forest.

Wetland 2

Wetland 2 (WL2) is a discharge basin marsh dominated by blue-joint grass (*Calamagrostis canadensis*). The surveyed wetland area is approximately 6.5 ha. The wetland surface is a complex of low micro-ridges and depressions with a deranged stream channel network, possibly the result of historic military training. There is no inlet and very little upgradient watershed at this point. The wetland is bordered entirely by immature mixed forest on highly disturbed land. One paired sampling site was recorded. The wetland was determined to have normal site conditions/hydrology within it (i.e., typical for the disturbed nature of the site). The wetland drains west into Irvine Brook.

Within the wetland, the dominant vegetation is narrow-leaved emergents with a major secondary component of tall and low shrubs. Areas of lower elevation contain pockets of shallow sphagnum moss. Grassy vegetation includes blue-joint grass, rattlesnake grass, common wool grass, and other sedges (eg. *Carex crinita*). Tall shrubs include speckled alder, and Canada holly. On large hummocks, low shrubs include meadow-sweet (*Spirea alba*) and red-osier dogwood (*Cornus sericea*). A few tamarack, and gray birch are growing in the wetland on hummocks but do not appear to grow above the "tall shrub" stratum. There is no sign of beaver in Wetland 2. The transition zone around the perimeter of WL2 is generally broad from 10-30 m. The wetland lies within a very shallow basin with relatively low slopes at the wetland boundary. The vegetation transition is marked by a change from meadow-sweet and blue-joint grass dominance to rough goldenrod (*Solidago rugosa*), common red raspberry (*Rubus idaeus*), and trembling aspen (*Populus tremuloides*). The Prevalence Index (PI) was observed to be 1.16. The soil was mainly mineral depleted matrix and was saturated to the surface with pockets of shallow standing water (up to 5 cm).

The majority of the adjacent upland has been subject to historic military training activities and old vehicle tracks are visible everywhere throughout the forest. Frequently more severe excavations (defensive trenches) interrupt the landscape. The forest is typical of regenerating disturbed areas, mainly immature (under about 40 years in age class) and shows some signs of past selective timber harvesting (old cut stumps). The dominant forest species is trembling aspen and gray birch but with a mixture of balsam fir and red spruce evenly distributed. The understorey and herb layer are densely vegetated and includes trembling aspen saplings, meadow-sweet (but much less abundant than in the wetland), rough goldenrod, common red raspberry, blackberry (*Rubus alleghaniensis*), sensitive fern, and hawkweeds (*Hieracium canadense*). The PI was observed to be 3.24, which is strongly upland oriented.

The wetland boundary was established mainly by changing dominance in vegetation within a generally broad transition zone (10-30 m wide), somewhat complicated by microtopographic disturbed ground throughout the site which has the effect of presenting very small, isolated wetland pockets (< 10 m^2) outside the delineated boundary and similar pockets of upland within the boundary. The concept of "mosaic wetland" was applied to this site which basically includes areas that are >50% wetland are included inside the boundary and areas <50% wetland are excluded. This was done by visual estimate based on dominant vegetation community and signs of wetland hydrology.

WL1 receives no surface inflow from upgradient. The internal drainage is contorted at the microtopographic level but generally drains west and the wetland overall is gently sloped toward the west. The wetland extends along the stream downgradient to Irvine Brook. There may also be some groundwater inflow and outflow. The soil was saturated to the ground surface with small areas of standing water (up to 5 cm). No SAR were observed in the wetland or adjacent forest.

4.8 Avifauna

Over 420 species of birds have been recorded in NB (Christie et al., 2004; Nature NB, 2016). Most migratory birds are protected under the federal *Migratory Birds Convention Act* (MBCA); others are protected provincially under the *New Brunswick Fish and Wildlife Act*. Avian Species at Risk (SAR) are further protected by the federal *Species at Risk Act* (SARA) and the NB *Species at Risk Act* (NBSRA).

According to Environment and Climate Change Canada's (ECCC) general avoidance information for migratory birds, the Site is in breeding zone C3. In this zone, the regional nesting period during which most MBCA-protected migratory birds breed extends from mid-April to the end of August (ECCC, 2018). However, some species nest outside of this period, including waterfowl, corvids, raptors, crossbills, and waxwings. No SAR that breed outside the regional nesting period are expected to occur on the Site (see below).

The assessment of avifauna presence at the Site consisted of a desktop review and field surveys. Data from the Maritimes Breeding Bird Atlas (MBBA) were obtained for the 10 x 10 km square in which the Site is located (Square ID 19FL97). Data from the ACCDC was consulted to obtain records of rare bird species within a 5 km radius of the Site. Important habitat areas for birds that have been federally or provincially designated were identified using available mapping resources, including the Important Bird Areas (IBA) of Canada database for information on areas of particular importance for birds.

Breeding bird surveys were conducted on 10 June and 28 June 2021. To maximize detection probability, surveys were conducted in early morning and in favourable weather conditions (i.e., wind speeds of less than 20 km/h; no sustained precipitation). Each survey consisted of an area search of both land parcels comprising the Site and stationary watch counts in the wetland complex dividing the parcels (Figure 4.2). For the area search, the surveyor walked through the Site and recorded all species observed within a fixed time interval (four hours). For the watch counts, the survey targeted waterfowl and consisted of 30-minute observation periods at three stationary bird survey locations around the wetland boundary (Figure 4.2). The three locations were selected to maximize the observable area, as the entire wetland complex is not visible from a single location. Details of flight behaviour (e.g., height, direction), breeding evidence, and number of individuals were also recorded.

A review of the IBA database found that the Site is located within the Lower St. John River (Sheffield/Jemseg) IBA (2021). Repeated, extensive historical spring flooding within much of the IBA has resulted in the creation of a unique hardwood and flora combination creating the single largest wetland complex in Atlantic Canada. Habitats include marshy islands, backwaters, creeks, and marshes that extend 2 to 5 km beyond the main riverbanks. The IBA provides breeding habitat for the nationally vulnerable Yellow Rail (*Coturnicops noveboracensis*); has the largest breeding concentration of Black Terns (*Chlidonias niger*) in the northeast

and supports Atlantic Canada's only breeding population of Greater Scaup (*Aythya marila*). Additionally, thousands of waterfowl use this IBA during migration.

A complete list of species observed during field surveys and desktop review is provided in Appendix C. A total of 46 species were observed during field surveys, including 36 species in the Project area and 16 in the wetland. All observed species were common and typical of forested and wetland habitats; no Species at Risk (SAR) or Species of Conservation Interest (SOCI) were observed. According to the MBBA, 90 species (including 15 priority species) are or may be breeding in the area including 20 confirmed species, 32 probable species, 37 possible species (MBBA, 2021). Data from the ACCDC listed an additional 15 priority species not reported by the MBBA and not detected during field surveys. Section 4.10 further addresses SAR noted by ACCDC.

Following MBBA criteria (MBBA, 2006), breeding was confirmed for several species on the Site including Song Sparrow (*Melospiza melodia*), American Redstart (*Setophaga ruticilla*), Yellow Warbler (*Setophaga petechia*), and Black-capped Chickadee (*Poecile atricapillus*). Breeding was also confirmed for several species in the wetland complex including Red-winged Blackbird (*Agelaius phoeniceus*), American Black Duck (*Anas rubripes*), and Swamp Sparrow (*Melospiza georgiana*). Breeding evidence included adults carrying food for young, adults leaving/entering nest site in circumstances indicated an occupied nest, and observations of downy young. There were approximately 20 Red-winged Blackbird pairs in present in the wetland, and six Swamp Sparrow pairs. A female American Black Duck was observed with seven young ducklings on 28 June 21. A total of three waterfowl species were observed utilizing the wetland, with low numbers observed overall. Though observations were infrequent, flights in and out of the wetland were predominantly to the north (i.e., toward the Saint John River).

4.9 Fish and Fish Habitat

Fish population surveys have recorded 28 species of fish within the waters of 5 CDSB (Table 4.3). Another three species; American shad (*Alosa sapidissima*), blueback herring (*Alosa aestivalis*) and alewife (*Alosa pseudoharengus*) have been observed in base waters and there are unconfirmed reports of shortnose sturgeon (*Acipenser brevirostrum*). Recreational fishing is permitted within the Range and Training Area (RTA), outside of the impact areas when compatible with military training activities. The number of range passes issued annually for recreational fishing is highly variable but averages 278 per year. The main species targeted by recreational anglers is brook trout. The only commercial fishery in base waters is for gaspereau (blueback herring and alewife) on Swan Creek Lake. There is no organized Indigenous fishery, but there are likely Indigenous anglers fishing recreationally within base waters.

Table 4.3 Fish Species Identified in 5 CDSB Waters

Common Name	Scientific Name
Alewife	*Alosa pseudoharengus*
American Eel	*Anguilla rostrata*
Atlantic Salmon	*Salmo salar*
American Shad	*Alosa sapidissima*
Blueback Herring	*Alosa aestivalis*
Brown Bullhead	*Ameiurus nebulosus*
Burbot	*Lota lota*
Banded Killifish	*Fundulus diaphanous*
Blacknose Dace	*Rhinchthys atratulus*

Common Name	Scientific Name
Blacknose Shiner	*Notropis heterolepis*
Brook Trout	*Salvelinus fontinalis*
Creek chub	*Semotilus atromaculatus*
Chain Pickerel	*Esox niger*
Common Shiner	*Notropis cornutus*
Fallfish	*Semotilus corporalis*
Finescale Dace	*Chrosomus neogaeus*
Fourspine Stickleback	*Apeltes quadracus*
Golden Shiner	*Notemigonus crysoleucas*
Lake Chub	*Couesius plumbeus*
Northern Redbelly Dace	*Chrosomus eos*
Ninespine Stickleback	*Pungitius pungitius*
Pumpkinseed Sunfish	*Lepomis gibbosus*
Redbreast Sunfish	*Lepomis auritus*
Sea Lamprey	*Petromyzon marinus*
Smallmouth Bass	*Micropterus dolomieui*
Slimy Sculpin	*Cottus cognatus*
Striped Bass	*Morone saxatilis*
Threespine Stickleback	*Gasterosteus aculeatus*
White Perch	*Morone americana*
White Sucker	*Catostomus commersoni*
Yellow Perch	*Perca flavescens*

In association with various projects and fish rescues conducted at two locations on Kinney Creek in 2005 and 2006 downstream of the Site blacknose dace, brook trout, creek chub, sea lamprey and threespine stickleback were collected.

Seven species of freshwater mussel have been identified in 5 CDSB waters. These include the alewife floater (*Anodonta implicata*), Eastern elliptio (*Elliptio complanata*), Eastern floater (*Pyganodon cataracta*), Eastern lampmussel (*Lampsilis radiata*), pearl mussel (*Margaritifera margaritifera*), tidewater mucket (*Leptodea ochracea*), and triangle floater (*Alasmidonta undulata*).

Watercourses and their 30 m buffers identified in the area (Section 4.5.1) are outside of any project boundaries, therefore no fish sampling was undertaken.

4.10 Species-at-Risk

The following section focuses on Species-at-Risk (SAR) and Species of Conservation Interest (SOCI). These species include those that have been listed as endangered, threatened, of special concern or identified as rare species by ACCDC. Available information on the known occurrence of floral and faunal SAR and SOCI

in the Study Area was compiled and reviewed to determine their presence relative to the Project footprint. Sources included published and unpublished listings of occurrences of such species and these are described below.

The federal *Species at Risk Act* (SARA) establishes Schedule 1, as the official list of wildlife SAR. It classifies those species as being either extirpated, endangered, threatened, or a special concern. Once listed, the measures to protect and recover a listed wildlife species are implemented. Under the SARA, the listing process begins with a species assessment that is conducted by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). SARA uses the COSEWIC scientific assessment when making the listing decision. Once a species is added to Schedule 1 it benefits from all the legal protection afforded, and the mandatory recovery planning required under SARA. The Act provides federal legislation to prevent wildlife species from becoming extinct and to provide for their recovery. The status of species protected under SARA can be found at the Species at Risk Public Registry (Government of Canada, 2021).

The Province of NB provides additional species protection through its own NB *Species at Risk Act* (NBSRA), which was adapted from the repealed *Endangered Species Act* in 2012. Under this Act, an endangered species (or sub-species) is defined as any indigenous species of fauna or flora threatened with imminent extinction or imminent extirpation throughout all, or a significant portion, of its range and designated by regulation as endangered. This Act prohibits the killing of, or interference with, any member of an endangered species, or the habitat of an endangered or regionally endangered species.

The ACCDC is part of the NatureServe network, a non-government agency which maintains conservation data for the Atlantic Provinces. ACCDC information on rare and endangered flora and fauna within and near the Site was supplied to Wood on September 10, 2020. S1, S2, and S3 ranked species are considered to be extremely rare to uncommon within its range in the Province. S4 and S5 ranked species are considered to be widespread and their occurrences are fairly common to abundant.

The ACCDC report identified 60 records of 21 animal species and 1 record of 1 plant species within a 5 km radius of the Site. The list of species and their rankings are presented in Table 4.4. No species listed were noted within 1 km of the Site, however potentially suitable habitat for several of these species within the surveyed area, particularly including Wood Turtle (*Glyptemys insculpta*), Common Nighthawk (*Chordeiles minor*), and Monarch Butterfly (*Danaus plexippus*). Other SARA species could make incidental use of the Site although the habitat is not ideal. No avian SAR that breed outside the sensitive nesting window (April 15 to August 31) were observed during field surveys or identified by the ACCDC.

Table 4.4 SAR and SOCI within 5 km of the Site

Common Name	Scientific Name	SARA	COSEWIC	NBESA	ACCDC*
Birds					
Bank Swallow	*Riparia riparia*	Threatened	Threatened	No status	S2S3B, S2S3M
Barn Swallow	*Hirundo rustica*	Threatened	Threatened	Threatened	S2B, S2M
Black Tern	*Chlidonias niger*			No status	S2B, S2M
Bobolink	*Dolichonyx oryzivorus*	Threatened	Threatened	Threatened	S3B, S3M
Chimney Swift	*Chaetura pelagica*	Threatened	Threatened	No status	S2S3B, S2M
Common Nighthawk	*Chordeiles minor*	Threatened	Special Concern	Threatened	S3B, S4M
Common Tern	*Sterna hirundo*			No status	S3B, SUM
Eastern Wood-Pewee	*Contopus virens*	Special Concern	Special Concern	Special Concern	S4B, S4M
Evening Grosbeak	*Coccothraustes vespertinus*	Special Concern	Special Concern	No status	S3B, S3S4N, SUM
Horned Grebe	*Podiceps auritus*	Special Concern	Special Concern	No status	S4N, S4M

Rusty Blackbird	*Euphagus carolinus*	Special Concern	Special Concern	Special Concern	S3B, S3M
	Reptiles				
Snapping turtle	*Chelydra serpentina*	Special Concern	Special Concern	Special Concern	S3
Wood turtle	*Glyptemys insculpta*	Threatened	Threatened	Threatened	S2S3
	Invertebrates				
Monarch	*Danaus plexippus*	Special Concern	Endangered	No status	S3B, S3M
	Plants				
Butternut	*Juglans cinerea*	Endangered	Endangered	Endangered	S1

*B=breeding; M=mating; U=unknown

No aquatic SAR were identified in the ACCDC report. Six species with a designation under COSEWIC or SARA can be found in 5 CDSB waters (Table 4.5). As noted in Section 4.9 watercourses and their buffers were outside project boundaries and no fish sampling was completed.

Table 4.5 Aquatic SAR in 5 CDSB Waters

Common Name	Scientific Name	COSEWIC	SARA	NB ESA	Presence
American Eel	*Anguilla rostrata*	Threatened	No status	Threatened	Confirmed
Atlantic Salmon	*Salmo salar*	Endangered	No status	Endangered	Confirmed
Atlantic Sturgeon	*Acipenser oxyrinchus*	Threatened	No status	Threatened	Unconfirmed (potential in Swan Creek Lake)
Redbreast Sunfish	*Lepomis auritus*	Data Deficient	Special Concern (Schedule 3)	No status	Confirmed
Shortnose Sturgeon	*Acipenser brevirostrum*	Special Concern	Special Concern	No status	Unconfirmed (potential in Swan Creek Lake)
Striped Bass	*Morone saxatilis*	Endangered	No status	Endangered	Confirmed

4.11 Existing Land Use

The Site is located within the RTA which is used exclusively for the training of military personnel. Access to the area is controlled by Range Control which can issue passes to the RTA. Satellite checkpoints are maintained at several gates. In certain areas of the RTA where live ammunition is used (known as impact areas) visitors must be accompanied by Military personnel.

According to DND the site, consisting of two land parcels areas of 14.34 ha and 8.5 ha, has no current operational use or forecasted plan.

4.12 Land Use for Traditional Purposes

Procurement efforts have been initiated to conduct an Indigenous Knowledge Study for the whole Base by others. It is, however, unlikely that the results will be ready for this EIA. Should any information relevant to this EIA be revealed through Indigenous Consultation, it will be included in an addendum report. A site-specific Cultural Study will be completed by WNNB in the fall of 2021.

4.13 Heritage and Archaeological Resources

An Archaeological Impact Assessment (AIA) is one component of an EA[1]. The objectives of an AIA are to identify, inventory and evaluate all sites of archaeological, historical, and architectural significance within the Project Study Area (focusing on the Project footprint) and to assess the potential effects of the Project on these archaeological and heritage resources.

4.13.1 Background Desktop Review

The archaeological desktop research included the following elements:

- Reviewing the 5 CDSB GIS Heritage Data for the Base, which includes the following data elements: identified historic "ruins", identified historic cemeteries, 1953 communities (pre-5 CDSB), historic pre-1953 road locations, provincially registered archaeological sites, and previously defined elevated potential areas for Indigenous and Historic archaeological resources (Washburn & Gillis 1994).
- Reviewing present day and historic aerial photographs and topographic maps.
- Reviewing previous archaeological surveys conducted in the area.
- Reviewing documentation on existing identified heritage sites in the vicinity.
- Conducting a review of archaeological literature sources.
- Conducting a review of historical literature sources.
- Reviewing geological surficial and bedrock mapping of the area.
- Procuring and reviewing the requisite GIS archaeological mapping from the province, for the Project area.

The Site is located within the watersheds of the Nerepis and St. John Rivers, and is flanked on the west by the Oromocto River. These latter two watercourses are, respectively, the primary and secondary watercourses that bound 5 CDSB. All three rivers were used as transportation routes in both prehistoric times (Washburn & Gillis 1994, Ganong 1899) and historic times (Raymond 1943, Reicker 1984). These rivers are also situated within Maliseet territory, and bear names in or derived from the Maliseet language. These principal watercourses and their tributaries have elevated potential for precontact (pre-1604) archaeological resources. While there are dozens of registered Indigenous archaeological sites identified by the shores of the St. John and Oromocto Rivers, there is only one (Site BlDo-4) located within 4 km of the two project areas (Figure 4.3). Areas near watercourses are considered to have potential for Indigenous archaeological resources. These areas are depicted as Precontact Archaeological Potential and Watercourse 80 m Archaeological Buffer on Figure 4.3. Thus, the shores of any watercourses, in the vicinity of the Site have potential for Indigenous archaeological resources.

This general area of the St. John River valley was settled by the Acadians in the late 1600s (Washburn & Gillis 1994). There was permanent British settlement in this area along the St. John River by 1763, following the 1755 expulsion of the French (Ibid.). The Loyalists, from New England, began arriving in the area in 1783 (Reicker 1984, Raymond 1943) and, like their predecessors, settled on waterways and "soon spread out over most of the good farmland… particularly in the interval lands along the St. John River and its tributaries" (Reicker 1984:3). In the early 1800s, many Irish and Scottish immigrants came to the area, with most arriving before 1819, and the peak of Irish immigration occurring between 1834 and 1842 (Reicker 1984:7). In the

[1] Prior to 2012, AIAs were referred to as Heritage Resource Impact Assessments (HRIA). This change in terminology is due to a provincial regulatory change resulting from the presentation of revised regulatory guidelines (ASNB, 2012).

1830s, a large wave of Irish immigrants feeling the famine in Ireland came to the area, and formed settlements within the boundaries of present-day 5 CDSB (Reicker 1984:3). In the early 1950s the Canadian Government created 5 CDSB, which resulted in the expropriation of hundreds of properties in 1954-5 by DND (Reicker 1984). Many settlements in Queens County, and a few in Sunbury County, were expropriated for this purpose. These historic communities were connected via historic "1953 Roads". The Site is located in the immediate vicinity of one of these historic communities, Shirley Settlement (Figure 4.3).

2504000.000000

7426000.000000

Precontact Archaeological Potential

Pre-1850s Historic Resources Potential

Lindsay Brook

Irvine Brook

Kinney Creek

BkDo-1

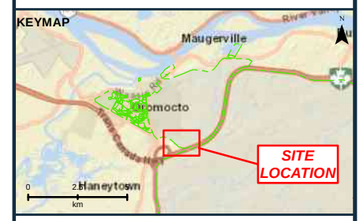
Shirley Settlement

AIR PHOTOS PROVIDED BY RPOD (GAGETOWN) GEOMATICS CELL

2504000.000000

LEGEND:

- Observed Military "Fox Hole"
- Ruin
- Registered Archaeological Site
- 1953 Communities
- 1953 Roads
- Major Road
- Minor Road
- Resource Road
- Streams/Creeks
- Proposed Project Area
- Municipal Area
- 5CDSB
- Wetlands
- Watercourse 80 m Archaeological Buffer
- Precontact Archaeological Potential
- Pre-1850s Historic Resources Potential



CLIENT:

PUBLIC SERVICES AND PROCUREMENT CANADA

wood.

TITLE:

ARCHAEOLOGICAL FEATURES

PROJECT:

GAGETOWN GREEN PPA ENVIRONMENTAL IMPACT ASSESSMENT

PROJECT NO:	DATE:
TE181447	OCTOBER 2021
REV NO: 1	DWN BY: CM
DATUM: NAD83 CSRS 2010	PROJECTION: NB DBL STEREO

FIGURE:

FIGURE 4.3

SCALE: 1:10,000

0 50 100 200 300 400

Metres

Path: D:\PROJECTS\TE181400_PWGSC_RISO_Environmental_Srvs_NB_PEI_2018-2020\TE181447_Gagetown_Green_EIA\GIS\MXD\ENVIRONMENTAL_IMPACT_ASSESSMENT\TE181447_FIGURE_4_3_ARCHAEOLOGY.mxd User: candace.macdonald Date: 10/28/2021

Shirley Settlement, a small farming community, was settled circa 1815 by James Shirley (PANB 2020, BGCHA 2020). The community had approximately 14 residents in 1866, but in 1904 had 60 residents, along with a church (and cemetery), a post office, and a schoolhouse (Ibid.). While the building structures once located in these areas have long since been removed, there are remnants ("Ruins") of some of these structures that have been identified throughout the Base. While the buildings associated with this historic settlement were demolished in the 1950s, remnants of these historic structures are still located along the sides of the 1953 historic roadsides, particularly those located within named settlements. As indicated on Figure 4.3, there is one such "Ruin" located on Shirley Road, approximately 2 km to the east of the Site. Also, the Shirley Settlement cemetery is located 3-4 km east of the Sites, on the south side of Shirley Road. Historical aerial photographs of the Site indicate that neither area was "settled", or had building structures on them at that time. The nearest registered historic archaeological site to the Site is BkDo-1, located on the side of Shirley Road, approximately 350 m east of the Site. The next closest registered archaeological sites are located between 2.5 and up to 4.0 km to the northwest (BlDo-4, BlDo-5, BlDo-16, BlDo-17, and BlDo-18) (Figure 4.3).

As indicated on Figure 4.3, the 1953 roads were located immediately north of the Site. While research does not indicate any historic structural remnants located on the Site, there is potential for such remains; indicated by the "Pre-1850 Historic Resources Potential" shown on Figure 4.3.

As a result of the archaeological desktop review, no registered archaeological sites or known archaeological or heritage resources were identified within the Site. The only areas identified as having potential for archaeological resources are those areas within 80 m of a watercourse ("Watercourse 80 m Archaeological Buffer" and "Precontact Archaeological Potential") and in the immediate vicinity of Shirley Road (Post-contact Historic).

4.13.2 Field Reconnaissance

The Site was surveyed by a Wood provincially permitted archaeologist and an archaeological field technician on October 6, 2020. The two individuals walked 25-50 m apart at regular transects to cover both land parcels comprising the Site. GPS devices were used by both survey crew to track the routes taken, and to document any points of interest identified in the field.

The western, larger, portion of the Site was surveyed first, by walking around the perimeter of the area, and then through the centre to ensure complete coverage. While a multitude of general ground disturbances and dozed earthen berms were observed, resulting from past use for military exercises, no archaeological features or artifacts were identified in this land parcel. Only one point of cultural interest was identified, and that was an observed row (west-east) of five military "Fox Holes", approximately 3 metres (m) in diameter, 1 m deep, with associated pieces of corrugated metal sheeting (Figure 4.3). No areas observed within this portion of the Site were assessed to have elevated potential for archaeological resources.

The eastern, smaller, portion of the Site was surveyed following the completion of the western portion survey. Again, the survey area was covered by initially walking around the perimeter of the area and then walking through the centre, to ensure complete coverage. While indicators of historic use of the property were evident, such as small clearings, ground disturbances, raspberry and blackberry patches, no archaeological features or artifacts were observed during the survey for this area. In addition, no areas observed were considered to have elevated potential for archaeological resources.

4.14 Visual Landscape

The Site for the proposed solar farm is located in a predominantly forested area. Land to the north and west are 5 CDSB property, land to the south is the TCH, and to the west is an interchange for the TCH. The western parcel is located approximately 200 m from the TCH and the interchange. The eastern parcel is

located approximately 30 m from the TCH. The project will require the clearing of forested land that will result in permanent changes in the visual landscape.

The edge of the 5 CDSB property adjacent to the TCH features a small berm (Photo 4.1) than can be expected to, at least partially, hide the view of the solar farm from drivers.

Photo 4.1 Berm between 5 CDSB Property and TCH

5.0 Environmental Effects Assessment and Mitigation

Temporal bounds delineate the time period(s) over which project-related impacts / effects can be expected. Spatial bounds delineate the physical area(s) in which VECs may be affected by project activities.

The temporal bounds of this Assessment include the construction and operations phases of the project and any proposed monitoring programs. Decommissioning has not been considered in this document however, impacts are considered to be similar to those presented for the construction phase.

The spatial bounds of this Project include the area in and adjacent to the Site.

The analysis of the identified ECCs and the list of VECs within the projects spatial and temporal bounds are presented in Table 5.1. As per the EIA methodology described in Section 3.0, VECs were determined on the basis of potential public concerns related to environmental, social, cultural, economic or aesthetic values as well as the scientific concerns of the professional community.

These VECs and pathways were further analysed against potential interactions with Project components resulting in a summary of potential environmental impacts. Table 5.2 is a summary of these potential impacts, coupled with associated mitigation activity.

Gender-based Analysis Plus (GBA+) provides a framework to describe the full scope of potential positive and negative effects under the Impact Assessment Act. The application of GBA+ to impact assessment seeks to understand, describe and, where possible, mitigate adverse impacts on diverse populations. GBA+ is an analytical tool that will be utilized during the undertaking of this assessment as per the guidance provided by the IAA on Gender-based Analysis Plus in Impact Assessment. As such, the intention is to ensure that, as applicable, multiple community relevant, diverse subgroups have been considered and proposed mitigation, where relevant, clearly addresses any issues identified.

Assessment for each VEC involves considerations for defining significance, examination of potential effects that may occur at each phase of the Project's completion (construction, operations and maintenance), mitigation measures and potential residual effects.

5.1 Atmospheric Environment

5.1.1 Significance Definition

A significant adverse effect on air quality is defined as a condition where regulatory objectives are routinely exceeded. Contaminants of concern include TSP, $PM_{2.5}$, NO_2, and SO_2 as regulated under the NB Air Quality Regulations.

Current provincial and federal guidance documents on assessing project-related impacts on climate change do not provide guidelines for determining significance. The construction's effects on GHG and climate change is considered negligible in context to the surrounding environment. The operation of the solar farm would be considered a positive effect on the atmospheric environment as it would offset other types of fuel used to generate power and will not emit GHGs.

Table 5.1 Issues Scoping / Pathway Analysis Summary Matrix – VECs: Construction and Operation of a Solar Farm

Environmental Resources	*Environmental Components of Concern (Biophysical and Socio-Economic)*	*Pathway of Concern*		*Possible Pathway*	*VEC*		*Project Phase*		*Rationale for Inclusion/Exclusion as Valued Environmental Component (VEC)*
		Yes	*No*		*Yes*	*No*	*Construction*	*Operation*	
Physical Environment	Air Quality	X		• Overburden disturbance. • Equipment operation. • Accidental release of hazardous materials. • Operation emissions.	X		X		Included as a VEC – Potential effect on air quality. Protected by statute/regulation.
	Acoustic Environment		X	• Equipment operation.		X			Excluded as a VEC – No pathway of concern identified.
	Surficial and Bedrock Geology		X	• No possible pathway identified.		X			Excluded as a VEC – No pathway of concern identified.
	Surface Water	X		• Excavation near existing watercourses. • Site run-off. • Accidental release of hazardous materials.	X		X	X	Included as a VEC – Potential effect on water quality.
	Groundwater		X	• Equipment operation • Accidental release of hazardous materials		X	X		Excluded as a VEC – No pathway of concern identified.
Biological Environment	Terrestrial Habitat	X		• Clearing, grubbing, and excavation activities. • Accidental release of hazardous materials.	X		X		Included as a VEC – Potential alteration and displacement of habitat
	Wetland Resources	X		• Excavation in or near existing wetland resources. • Accidental release of hazardous materials.	X		X	X	Included as a VEC – Potential alteration and displacement of habitat, soil erosion, effects on water quality, physical disturbance of wildlife, and introduction of invasive species.
	Avifauna	X		• Clearing, grubbing, and excavation activities. • Presence of open water between the two site parcels. • Accidental release of hazardous materials.	X		X	X	Included as a VEC – Protected by statute/regulation.
	Fish and Fish Habitat	X		• Construction activities in or adjacent to watercourses. • Accidental release of hazardous materials/contaminant migration.	X		X	X	Included as a VEC – Protected by statute/regulation.
	Species at Risk	X		• Clearing, grubbing, and excavation activities. • Presence of open water between the two site parcels. • Accidental release of hazardous materials.	X		X	X	Included as a VEC – Protected by statute/regulation.
Socio-Economic Setting	Existing Land Use		X	• No possible pathway identified.		X			Excluded as a VEC – No pathway of concern identified.
	Physical and Cultural Heritage and Structures, sites, or things of Historical, Archaeological, paleontological or architectural concern		X	• Excavation activities.		X			Excluded as a VEC – No pathway of concern identified at this time as engagement is ongoing.
	Visual Landscape		X	• Alteration of the existing visual landscape.		X			Excluded as a VEC – No pathway of concern identified.
	Sustainability		X	• Reduction in greenhouse gases for energy use		X		X	Excluded as a VEC – No pathway of concern identified. Overall benefit of the project

Table 5.2 Summary of Potential Environmental Effects

Environmental Components of Concern (ECC)	Possible Pathway	Potential Impact	Mitigation
Air Quality	Construction Activities Equipment Operation Accidental release of hazardous materials	Fugitive dust Equipment/vehicle emissions	• Control dust with the use of water. • Cover piles of soil to prevent particulate release. • Maintain equipment to limit particulate exhaust releases. • Control speed of vehicles.
Surface Water	Sedimentation from construction activities and equipment operation Accidental release of hazardous materials	Effects on surface water quality	• Suspend construction activities during high water flow periods and extreme weather events. • Preserve existing vegetation to the extent possible. • Consider runoff, Erosion and Sediment Control (ESC) measures to be maintained for the life of the Project. • Proper use and storage of chemicals and POLs. • Have spill kits available and training in their use.
Terrestrial Habitat	Loss of terrestrial habitat within the Project boundaries Sedimentation; dust; stormwater Accidental release of hazardous materials	Indirect loss of plants due to fugitive dust, erosion and sedimentation	• Minimize impacts to site boundaries. • Consider runoff, erosion and sediment controls to be maintained for the life of the Project. • Control dust with the use of water. • Construction vehicles and equipment should be cleaned of vegetation and soil residues before entering the Project site. • Maintenance of ESC measures. • Proper use and storage of chemicals and POLs. • Have spill kits available and training in their use.
Wetlands	Sedimentation from construction activities and equipment operation Accidental release of hazardous materials	Effects on wetland water quality	• Suspend construction activities during high water flow periods and extreme weather events. • Preserve existing vegetation to the extent possible. • Consider runoff, Erosion and Sediment Control (ESC) measures to be maintained for the life of the Project. • Proper use and storage of chemicals and POLs. • Have spill kits available and training in their use.

Environmental Components of Concern (ECC)	Possible Pathway	Potential Impact	Mitigation
Avifauna	Construction activities Equipment presence Presence of people	Alteration / displacement of habitat Noise / physical disturbance of wildlife Behavioural changes Mortality	• Imported equipment will be thoroughly cleaned before it arrives on-site in order to prevent the introduction of exotic species. • All personnel will report the presence of wildlife on construction site to the Construction Manager and any incidents will be logged. • All clearing, grubbing and trimming activities will be scheduled to avoid sensitive breeding, nesting and brooding periods (typically May 1st to August 31st) of avian species (birds and bats) as much as possible. All other construction activities will be scheduled between May 1 and the end of the construction period for that calendar year. • Limit removal of tall trees and snags to areas absolutely necessary for construction, including trees of 15 cm diameter or greater. • For clearing activities, the following measures will be implemented: -Clearing activities will be scheduled in consideration of critical habitat features (e.g., wetland areas) identified during the pre-construction field survey. -The proponent will instruct the management team and contractors on the MBCA, the importance of habitat, the significance of the nesting period, and measures to be implemented to minimize any disturbance to birds/nests. -A bird nest survey of the area will be conducted by a professional biologist/ornithologist/birder prior to clearing activities. The bird species recorded during the survey will be used as an indicator regarding the potential nesting habitat in the area. -the typical nesting habitat for these species would be investigated for potential nests. -Nest trees will be felled prior to or after the nesting season. -The occurrence of all identified nests will be documented. • Native plant regeneration will be promoted in any areas that are cleared but not built upon (i.e. roadside ditches, temporary laydown areas, etc.).

Environmental Components of Concern (ECC)	Possible Pathway	Potential Impact	Mitigation
			• Food waste will be stored in a manner that ensures wildlife will not be attracted and will be removed from the Site daily. If dead birds are encountered, they will be removed and disposed of, as soon as possible. All handling of bird carcasses will be in accordance with a MBCA salvage permit. If SARA species carcasses are found they will be sent to the Sackville CWS office with suitable permitting as advised by the CWS. Have spill kits available and training in their use.
Fish and Fish Habitat	Sedimentation from construction activities and equipment operation Accidental release of hazardous materials	Effects on surface water quality	• Adherence to mitigation presented for surface water
Species at Risk	Construction activities Equipment presence Presence of people	Alteration / displacement of habitat Noise / physical disturbance of wildlife Behavioural changes Mortality	• Report the discovery of any nests of any SAR encountered during clearing/grubbing activities. • Schedule tree clearing to occur outside the sensitive nesting window of April 15 to August 31. • Abide by all relevant timing constraints for wildlife as identified by regulatory agencies. • No on-site employees will harass wildlife. • Adhere to *Migratory Birds Convention Act* (MBCA) stipulations. • Have spill kits available and training in their use.
Accidental Spills and Malfunctions	Accidental release of hazardous materials and contaminant migration	Contamination of local and downstream environment	• Adherence to maintenance schedules and daily pre-work inspection for vehicles and equipment on-site. • Adequate training must be provided for personnel responsible for transportation, storage, handling, or use of hazardous material. • Have spill kits available and training in their use.

5.1.2 Potential Interactions and Effects

5.1.2.1 Construction Phase

The use of equipment during Project construction will result in temporary, short-term emissions of air pollutants during the construction phase, with associated emissions terminating once construction has been completed.

Emissions will be generated during the following construction activities:

- use of heavy construction equipment such as excavators, earth movers, dump trucks and graders to prepare the Site;
- use of heavy construction equipment to handle fill material including dumping, grading and compaction;
- movement of construction vehicles over unpaved roads that will generate dust; and
- operation of construction equipment that will generate exhaust emissions containing TSP, CO, CO_2, NO_2, and SO_2.

These emissions are not anticipated to result in significant adverse effects on the air quality within the vicinity of the Project. Fugitive dust control measures are to be implemented, if required.

5.1.3 Mitigation Measures

The following mitigation measures will be implemented to minimize potential adverse effects on the airshed during Project construction:

- enforce speed limits for on-site vehicles during construction;
- stabilize exposed erodible material;
- ensure proper truck loading and tarping when appropriate;
- minimize drop height for material transfer points;
- only water may be applied for dust suppression;
- ensure vehicles and equipment are maintained as per manufacturer specifications; and
- minimize vehicle idling.

5.1.4 Residual Effects and Determination of Significance

The effects on the atmospheric environment in and near the Site caused by the construction and operation of the Project are not expected to be significant. Impacts on air quality from the construction of the project will occur on a localized basis during construction. Table 5.3 summarizes the residual environmental effects assessment for the atmospheric environment.

5.2 Surface Water

Surface water was identified as a VEC based on the effects that construction and operation may have on watercourses, and wetlands within and adjacent to the Site.

The principal interactions between the Project activities and surface waters are associated with effects to:

- surface water quality (total suspended solids (TSS)) due to land disturbance during construction and effects during operation and maintenance activities (site run-off).

5.2.1 Significance Definition

The CCME Freshwater Aquatic Life (FAL) Guidelines (CCME, 2007) recommend the following:

- TSS concentration in surface waters should not increase by more than 25 milligrams per litre (mg/L) for any short-term exposure (i.e., 24-hour period) with a maximum average increase of 25 mg/L from background levels for longer term exposures (i.e., inputs lasting between 24 hours and 30 days); and
- TSS concentration in surface waters should not increase by more than 25 mg/L from background levels at any time when background levels are between 25 and 250 mg/L. When background levels are greater than or equal to 250 mg/L, TSS concentration should not increase more than 10% of background levels.

Section 36(3) of the *Fisheries Act* states that "no person shall deposit or permit the deposit of a deleterious substance of any type in water frequented by fish or in any place under any conditions where the deleterious substance or any other deleterious substance that results from the deposit of the deleterious substance may enter any such water".

The NB *Clean Water Act* promotes the protection and prudent use of the environment and includes the goal of maintaining the principles of sustainable development. The Watercourse and Wetland Alteration Program pursuant to the *Clean Water Act* has an objective to protect aquatic habitat from unmitigated works in or near watercourses and wetlands.

Based on the above, a significant adverse residual environmental effect on the aquatic environment is defined as a Project-related environmental effect that:

- results in the deposition of a deleterious substance (under Section 36(3) of the *Fisheries Act*) into the aquatic environment; and
- results in the exceedance of water quality guidelines outlined in the conditions of approval.

A positive effect is one that enhances the quality or area of habitat or increases species diversity.

5.2.2 Potential Interactions and Effects

The construction and operation of the Project may result in adverse effects on surface water quality. Fisheries and Oceans Canada (DFO) has developed Pathways of Effects (PoE) diagrams (DFO, 2014) to identify stressors which ultimately lead to effects in the aquatic environment. PoEs that may be relevant to the proposed project include:

- addition or removal of aquatic or riparian vegetation; and
- use of industrial equipment.

The relevant effects identified by these PoEs are discussed below in context of the construction, operation and maintenance phases of the Project.

Table 5.3 Residual Effects – Atmospheric Environment

Project-Environment Interaction	Potential Positive (P) or Adverse (A) Effect	Mitigation	Significance Criteria for Residual Environmental Effects					Significance**
			Magnitude*	Geographic Extent	Duration / Frequency	Reversibility (R=reversible NR=Non-reversible)	Ecological / Social-cultural and Economic Context	
Construction								
Particulate emissions	A	• Minimize particulates (e.g., onsite speed limits, minimizing loading drop height, use of dust suppressants). • If possible, schedule activities when weather conditions (winds) are favourable. • Adhere to idling restrictions. • Maintain all equipment as per manufacturer specifications.	Low	Study Area	Construction phase	R	• Impacts negligible in context to daily activities at 5 CDSB	Minimal, not significant
Contribution to GHG emissions and climate change	A	• Adhere to idling restrictions. • Maintain all equipment as per manufacturer specifications.	Low	Study Area	Construction phase	NR	• Impacts negligible in context to daily activities at 5 CDSB • Project is implementing a renewable resource and will offset GHG	Minimal, not significant

Notes:

* For definition of levels of magnitude (high, moderate, low, nil, unknown) refer to Section 3.0.

** For definition of levels of significance (major, medium minor, minimal) refer to Section 3.0.

5.2.2.1 Construction Phase

The principal interactions between construction activities and surface waters are associated with:

- the clearing of vegetation and earthworks including grubbing and stripping topsoil and overburden;
- the placement of excess material in temporary stockpiles which may be susceptible to erosion and result in sedimentation of watercourses adjacent to the Site; and
- use of heavy equipment adjacent to watercourses.

The primary effects of these interactions on surface water quality are the introduction of excess sediment and contaminants such as POLs to the watercourse.

Sedimentation resulting from erosion of the stream bank as well as riparian zone soils and rocks can affect physical processes, structural attributes, and ecological conditions such as water clarity (by reducing visibility and sunlight as well as damaging fish gills) and reducing the availability and quality of spawning / rearing habitat (through infilling) (DFO, 2014). Sources of sedimentation include the use of mechanized equipment in or near the watercourse, the removal of vegetation in the riparian zone and the disturbance of substrate during culvert installation.

An increase in concentrations of contaminants in sediments and waters can result in exceedance of the ranges of chemical parameters that support healthy aquatic communities. Effects on fish and fish habitat can include direct fatality to organisms; alteration of the ecosystem structure through changes in the abundance, composition, and diversity of communities and habitats; and persistence and progressive accumulation in sediments or biological tissues. Deformities, alterations in growth, reproductive success, and competitive abilities can result (DFO, 2014). Contaminant sources include accidental releases from equipment used during construction and POLs stored onsite to fuel and service that equipment.

5.2.2.2 Operation Phase

The principal interactions between operation and maintenance activities and surface waters are associated with site run-off.

The primary effects of these interactions on surface water quality are the introduction of contaminants to the watercourse. Sources of potential contamination include the release of POLs from equipment used for maintenance at the Site.

5.2.3 Mitigation Measures

The following mitigation measures will be implemented to minimize potential adverse effects on surface water during Project construction.

Sedimentation

During construction, erosion and sedimentation control measures will be used, including but not limited to the following actions:

- Install sediment and erosion control measures as required by Site Supervisor;
- Educate all construction personnel about the Project and importance of erosion and sediment control (ESC) measures and plans;
- Runoff shall be controlled, and sediment will be prevented from leaving the Site at all times;

- To maintain ESC measures during construction, all installed ESC measures will be periodically inspected (especially before and after a rainfall event) and any exposed soil will be protected with either temporary or permanent covers after grading;
- Divert clean water from undisturbed areas around the Site using berms or lined channels, or carry the water across the Site in lined channels or pipes;
- Maintain sufficient staff and equipment to manage erosion and sediment control during storm events and other emergencies;
- Erodible soils will be stabilized using slope roughening, riprap and filter fabric, or by re-establishing vegetation through seeding and rehabilitation by means of mulching, erosion control blankets, or sod, immediately after grading;
- Minimize the use of heavy equipment within 30 m of any wetland or watercourse; and
- Adhere to federal and provincial approval conditions.

Contamination

- Ensure that machinery arrives on-site in a clean condition and is maintained free of fluid leaks;
- Biodegradable fluids should be considered in place of petroleum products whenever possible as a standard for best practices;
- Do not dispose of petroleum products or any other deleterious substances on ground;
- Be diligent and take all necessary precautions to avoid spills and contamination of the soil (both surface and subsurface) when handling petroleum products onsite and during fueling and servicing of vehicles and equipment;
- All on-site chemicals and POLs should also be stored at a designated fueling and material storage site with secondary containment at least 100 m from any surface waters;
- No washing, fueling, or maintenance of vehicles or equipment in the vicinity of a watercourse without secondary containment;
- Ensure pumps operating within 100 m of a watercourse or wetland utilize an appropriate secondary containment system; and
- Provide for training, equipment, and implementation of response procedures-based spill contingency response.

5.2.4 Residual Effects and Determination of Significance

The effects on surface water quality in and near the Site caused by the construction and operation of the Project are not expected to be significant. Table 5.4 summarizes the residual environmental effects for surface water.

Table 5.4 Residual Effects – Surface Water Resources

Project-Environment Interaction	Potential Positive (P) or Adverse (A) Effect	Mitigation	Significance Criteria for Residual Environmental Effects					Significance**
			Magnitude*	Geographic Extent	Duration / Frequency	Reversibility (R=reversible NR=Non-reversible)	Ecological / Social-cultural and Economic Context	
Construction								
Introduction of excess sediment into watercourses	A	• Implementation and inspection of sediment and erosion control measures • Adherence to federal and provincial regulations	Low	Downstream of sediment introduction; full extent depends on water volume and flow	Construction phase	R	No watercourses within the Site boundaries	Minimal, not significant
Introduction of contaminants into watercourses	A	• Proper use and storage of chemicals and Petroleum, oils, ore lubricants (POLs) • Spill kits must be available onsite • Workers should be trained in spill clean-up • Adherence to federal and provincial regulations	Low	Downstream of contaminant introduction; full extent depends on water volume and flow	Construction phase	R	No watercourses within the Site boundaries	Minimal, not significant
Operation								
Introduction of contaminants into watercourses	A	• Adherence to federal and provincial regulations	Low	Downstream of contaminant introduction; full extent depends on water volume and flow	Operation phase	R	No watercourses within the Site boundaries	Minimal, not significant

Notes:

* For definition of levels of magnitude (high, moderate, low, nil, unknown) refer to Section 3.0.

**For definition of levels of significance (major, medium, minor, minimal) refer to Section 3.0.

5.3 Terrestrial Habitat

5.3.1 Significance Definition

A significant adverse effect on terrestrial habitat and vegetation would be one which results in contravention of SARA or NBSRA provisions; or for non-SARA or non-NBSRA listed priority species, a decline in abundance and/or change in distribution beyond which natural recruitment (reproduction and immigration from unaffected areas) would not return the population to its pre-project level within several (three to five) generations. A significant adverse effect on sensitive / critical habitat would be a permanent net loss of habitat function. A positive effect is one that may enhance the quality of habitat, increase species diversity, or increase the area of valued habitat.

5.3.2 Potential Interactions and Effects

5.3.2.1 Construction Phase

Construction activities associated with the Project may result in temporary or permanent adverse effects on terrestrial flora that can result from site preparation (e.g., clearing, grubbing, grading), as well as associated dust, erosion and sedimentation, and possible introduction of invasive species. Potential effects on terrestrial flora, habitat, communities and individuals during construction may also occur as a result of accidental events. Effects can be limited to the footprint of the Project or may extend to adjacent lands as indicated below.

During construction, potential adverse effects on vegetation and habitat include:

- direct and indirect mortality of plants;
- temporary or permanent loss or alteration of habitat and habitat availability;
- impairment from changes to wind exposure and microclimatic conditions;
- impairment or displacement from introduction of invasive species; and
- mortality or impaired growth due to accidental events (discussed in Section 5.8).

Habitat Loss / Alteration

Site clearing, grubbing and grading will result in loss of vegetation habitat, as well as direct mortality of the vascular and non-vascular plants in the area affected. For the purposes of this assessment, it is assumed that all the vegetation in the Site will be lost for the lifetime of the Project as a result of site clearing, grubbing and grading.

Clearing may also change wind exposure and microclimatic conditions in adjacent forests, resulting in some die-off and reduced growth of forest species until edge vegetation matures.

Given the common nature of the habitat and vegetation affected and the previous disturbance through human activities, the effects are not expected to adversely impact floral populations, habitat diversity, quality and availability.

Erosion / Sedimentation

Clearing and grubbing required for all Project components, results in disturbed soil surfaces without vegetative cover. Site clearing will be completed early in the construction phase. Grubbing is performed later to minimize the exposure time of the underlying soil. Exposed soil is vulnerable to erosion, and the resulting sedimentation may smother vegetation or impair plant growth in adjacent terrestrial and aquatic

habitats. These potential effects can be effectively mitigated and avoided through standard sediment and erosion control measures.

Fugitive Dust

Earthwork, movement of construction and transportation machinery, and storage of soil and construction materials may result in emissions of fugitive dust. The deposition of dust on the leaf surfaces of nearby vegetation may cause temporary inhibition of photosynthesis and transpiration in the affected plants, potentially resulting in slower growth rates (Farmer, 1993). However, dust deposition that could have such effects on plant growth are not expected to occur beyond a few metres from the source. Standard dust abatement measures and measures for the protection of air quality as outlined in Section 5.1 will mitigate the potential effects of dust on vegetation in all habitats.

Introduction of Alien and Invasive Species

Clearing, grading and construction activities will result in disturbed areas without cover of natural vegetation. Open soil surfaces encourage the establishment of non-native and potentially invasive species of plants. As the plant inventory indicates, several alien plant species have already been detected in the footprint of the Project, which may be the result of previous disturbance from forest harvesting or other human use.

Seeds, roots or "rootable" fragments of invasive species may stick to construction equipment, transportation vehicles or shoes of workers. Introduction of non-native or invasive species may lead to alteration of nearby habitat and may have an adverse effect on the abundance and diversity of native flora.

5.3.3 Mitigation Measures

The following mitigation measures will be implemented to minimize potential adverse effects on surface water during Project construction.

Site Preparation

During construction:

- Mark Project boundaries to prevent accidental impacts outside the work area;
- Dust prevention and abatement measures will also protect local flora and habitats;
- Stabilize and rehabilitate areas of temporary disturbance as soon as practical;
- Maintain surface water paths through culvert placement and appropriate structure sizing;
- Construction and transportation equipment should be cleaned of vegetation and soil residues and inspected before entering the Project site. Areas of exposed soil should be revegetated as soon as practical, following completion of work activities; and
- Use only non-invasive plant species for restoration.

Sedimentation

During construction:

- Install sediment and erosion control measures as outlined in guidance documents and/or permit approvals;
- Undertake regular inspection of sediment and erosion control measures to ensure they have remained in place and are working properly;
- The Site should be inspected prior to, during, and after a rainfall event;

- Promote growth of vegetation in areas adjacent to wetlands following disturbance. Use temporary measures (e.g. jute mats or mulch) until permanent cover has been established;
- Limit removal of riparian zone vegetation; and
- Adhere to federal and provincial approval conditions.

Contamination

During construction phase:

- Ensure that machinery arrives onsite in a clean condition and is maintained free of fluid leaks;
- Biodegradable fluids should be considered for use in place of petroleum products whenever possible, as a standard for best practices;
- Do not dump petroleum products or any other deleterious substances on ground;
- Be diligent and take all necessary precautions to avoid spills and contamination of the soil (both surface and subsurface) when handling POLs onsite and during fueling and servicing of vehicles and equipment;
- All on-site chemicals and POLs should also be stored at a designated fueling and material storage site with secondary containment at least 30 m from any surface waters;
- Workers should be trained in spill clean-up; and
- Spill clean-up kits must be available.

5.3.4 Residual Effects and Determination of Significance

With the implementation of the recommended mitigation measures, Project activities are not likely to result in significant adverse residual effects on flora (including priority species) and terrestrial habitats.

Table 5.5 provides a summary of mitigation measures and residual environmental effects after successful implementation of the mitigation measures described above.

5.4 Wetlands

5.4.1 Significance Definition

A significant adverse effect from the Project on wetlands is defined as an effect that is likely to cause a permanent net loss of flora and wetland function as established during the wetland evaluation. A positive effect is one that may enhance the quality of wetland habitat/function, increase species diversity, or increase the area of valued habitat.

5.4.2 Potential Interactions and Effects

Construction, operation and maintenance of the Project could result in adverse effects on wetland function and species diversity due to disturbance, erosion and sedimentation, changes to hydrology, introduction of invasive species, or release of hazardous materials.

Wetlands were largely avoided during development of the original Project boundary. During the site selection process two wetlands were noted within the Project site. Those wetlands were delineated in July 2021. Based on the location of the wetlands there should be no need for the Project to encroach within wetland boundaries.

5.4.3 Mitigation

The following mitigation measures will be implemented to minimize potential adverse effects on wetlands Project construction and operation.

- Wetlands boundaries and 30 m buffers staked or flagged prior to work initiating clearing;
- Any construction activities occurring within the 30 m buffer will only commence with a Watercourse and Wetland Alteration permit.;
- Implement erosion/sedimentation mitigation measures of around wetlands when and where necessary;
- No waste, debris or felled trees into wetlands or buffer zone;
- No heavy equipment or motorized vehicles will enter wetlands;
- The on-site POL storage containment shall be located on level terrain, at least 100 m from wetlands;
- No POL storage will occur in sensitive areas (e.g., near wetlands, watercourses or wells) or associated buffer zone;
- Fuelling must be done at least 30 m from a wetland or waterbody; and
- Servicing of equipment will not be allowed within 100 m of a wetland, watercourse or drainage ditch.

5.4.4 Residual Effects and Determination of Significance

With the implementation of the recommended mitigation measures, Project activities are not likely to result in significant adverse residual effects on avian species.

Table 5.6 provides a summary of mitigation measures and residual environmental effects after successful implementation of the mitigation measures described above.

5.5 Avifauna

5.5.1 Significance Definition

A significant adverse effect on avifauna (birds) would be one which results in contravention of MBCA, SARA or NBSRA provisions; for non-SARA or non-NBSRA listed priority species, a decline in abundance and/or a change in distribution beyond which natural recruitment (reproduction and immigration from unaffected areas) would not return the population to its pre-Project level within several (three to five) generations.

5.5.2 Potential Interactions and Effects

The main impacts to bird species during construction activities are the permanent loss of habitat due to site clearing, disturbance from human and vehicular activity, habitat degradation from fugitive dust, negative changes to water quality due to erosion and run-off, and introduction and spread of invasive vegetation.

The main impacts to bird species during operation are disturbance from maintenance activities.

5.5.3 Mitigation

The following mitigation measures will be implemented to minimize potential adverse effects on avifauna during Project construction.

- Imported equipment will be thoroughly cleaned before it arrives on-site in order to prevent the introduction of exotic species;

- All personnel will report the presence of wildlife on construction site to the Construction Manager and any incidents will be logged;
- The proponent will instruct the management team and contractors on the MBCA, the importance of habitat, the significance of the nesting period, and measures to be implemented to minimize any disturbance to birds/nests.
- Limit removal of tall trees and snags to areas absolutely necessary for construction, including trees of 15 cm diameter or greater;
- For clearing activities, the following measures will be implemented:
  - All clearing, grubbing and trimming activities will be scheduled to avoid sensitive breeding, nesting and brooding periods (April 15 to August 31) of avian species (birds and bats) as much as possible. All other construction activities will be scheduled between April 15 and the end of the construction period for that calendar year;
  - Clearing activities will be scheduled in consideration of critical habitat features (e.g., wetland areas) identified during the pre-construction field survey;
  - Should clearing be required during the sensitive nesting window (April 15 to August 31), a bird nest survey of the area will be conducted by a professional biologist/ornithologist/birder prior to clearing activities;
  - If an active nest is discovered, the appropriate regulators will be contacted for consultation on species-specific buffer requirements (ECCC-CWS for species protected under the MBCA, and NB Natural Resources and Energy Development [NB NRED] for other avifauna species) in accordance with ECCC-CWS's Avoidance Guidelines (ECCC 2018). Activities will be immediately halted or minimized within the buffer zone until nesting is complete and fledglings have naturally left the area;
  - Nest trees will be felled prior to or after the nesting season;
  - The occurrence of all identified nests (within or outside the sensitive nesting window) will be documented;
- Following clearing activities, the following measures will be implemented:
  - Contractors and other site workers will be made aware of the potential for Common Nighthawk and other ground-nesting birds to nest in construction areas and informed of steps that are to be taken if a pair and/or nest is encountered.
  - If encountered, any active nests will be protected with a buffer area of appropriate size (determined in consultation with ECCC-CWS and NB NRED) until young have vacated the area.
- Native plant regeneration will be promoted in any areas that are cleared but not built upon (i.e. roadside ditches, temporary laydown areas, etc.);
- Food waste will be stored in a manner that ensures wildlife will not be attracted and will be removed from the Site on a daily basis;
- If dead birds are encountered during construction or operation, they will be removed and disposed of, as soon as possible. All handling of bird carcasses will be in accordance with a MBCA salvage permit. If SARA species carcasses are found they will be sent to the Sackville CWS office with suitable permitting as advised by the CWS;

- If an injured or dead bird is encountered during construction or operation, the following information will be recorded: date and time it was found, injury sustained (if identifiable), cause of injury (if known), and species. Injured or dead SAR will be reported to CWS and/or NB NRED within 24h, and additional mitigation measures shall be developed and implemented, as required.; and
- Development and implementation of an Environmental Protection Plan (EPP), which will include mitigation measures for avifauna.

Mitigation measures presented for construction activities are the same as those required to address impacts from operation and maintenance activities. Should impacts on migratory birds or their nests be detected during construction or operation, further mitigation may be developed in consultation with NB NRED and CWS.

5.5.4 Residual Effects and Determination of Significance

With the implementation of the recommended mitigation measures, Project activities are not likely to result in significant adverse residual effects on avian species.

Table 5.7 provides a summary of mitigation measures and residual environmental effects after successful implementation of the mitigation measures described above.

Table 5.5 Residual Effects – Terrestrial Habitat

Project-Environment Interaction	Potential Positive (P) or Adverse (A) Effect	Mitigation	Significance Criteria for Residual Environmental Effects					Residual Effects, Significance**
			Magnitude*	Geographic Extent	Duration/Frequency	Reversibility (R=reversible NR=Non-reversible)	Ecological/Social-cultural and Economic Context	
Construction								
Direct plant mortality, habitat removal or alteration due to site preparation, clearing and grubbing.	A	• Minimize Project footprint. • Minimize lay-down areas. • Comply with regulatory approvals	Low	Limited to Site boundaries	• Permanent loss; occurring once.	NR	Similar habitat and priority plants in the region. Site within an active military base.	Minor, not significant
Indirect plant mortality as a result of habitat changes through potential erosion, sediment loading, stormwater discharges, and spills.	A	• Temporarily disturbed surfaces to be rehabilitated as soon as possible. • Implement erosion and sediment control plans.	Low	Study Area	• Construction phase.	R	See above	Minimal, not significant
Plant displacement or loss of suitable habitat due to the introduction of invasive species.	A	• Revegetate or stabilize disturbed surfaces as soon as possible. • Equipment to be cleaned from vegetation and soil residues before entering the Project site. • Discourage workers from entering off-site areas.	Low	Local; depends on size of affected area.	• Project lifetime; Infrequent.	R	See above	Minimal, not significant
Impairment of plant growth as result of fugitive dust emissions.	A	• Implement dust abatement measures and sediment control measures.	Low	Local	• Construction and decommissioning phase; frequent.	R	See above	Minimal, not significant

Notes: * For definition of levels of magnitude (high, moderate, low, nil, unknown) refer to Section 3.0.

** For definition of levels of significance (major, medium, minor, minimal) refer to Section 3.0.

Table 5.6 Residual Effects - Wetlands

Project-Environment Interaction	Potential Positive (P) or Adverse (A) Effect	Mitigation	Significance Criteria for Residual Environmental Effects					Residual Effects, Significance**
			Magnitude*	Geographic Extent	Duration / Frequency	Reversibility (R=Reversible NR=Non-reversible)	Ecological / Social-cultural and Economic Context	
Construction								
Introduction of excess sediment into wetlands	A	• Implementation and inspection of sediment and erosion control measures • Adherence to federal and provincial regulations	Low	Downstream of sediment introduction; full extent depends on water volume and flow	• Construction phase	R	No wetlands within the Site boundaries	Minimal, not significant
Introduction of contaminants into wetlands	A	• Proper use and storage of chemicals and Petroleum, oils, ore lubricants (POLs) • Spill kits must be available onsite • Workers should be trained in spill clean-up • Adherence to federal and provincial regulations	Low	Downstream of contaminant introduction; full extent depends on water volume and flow	• Construction phase	R	No wetlands within the Site boundaries	Minimal, not significant
Operation								
Introduction of contaminants into wetlands	A	• Adherence to federal and provincial regulations	Low	Downstream of contaminant introduction; full extent depends on water volume and flow	• Operation phase	R	No wetlands within the Site boundaries	Minimal, not significant

Notes:

* For definition of levels of magnitude (high, moderate, low, nil, unknown) refer to Section 3.0.

** For definition of levels of significance (major, medium, minor, minimal) refer to Section 3.0.

Table 5.7 Residual Effects - Avifauna

Project-Environment Interaction	Potential Positive (P) or Adverse (A) Effect	Mitigation	Significance Criteria for Residual Environmental Effects					Residual Effects, Significance**
			Magnitude*	Geographic Extent	Duration / Frequency	Reversibility (R=Reversible NR=Non-reversible)	Ecological / Social-cultural and Economic Context	
Construction								
Loss of habitat for avian species	A	• Minimize Project footprint. • Use existing access routes to the ROW when possible.	Low	Project footprint	• Permanent loss; occurring once.	NR.	Similar habitat for priority species in the region. Area is affected by past/adjacent human activity.	Minor, not significant
Fragmentation of terrestrial habitat in and around the Project area.	A	• Minimize Project footprint.	Low	Project footprint	• Permanent; occurring once.	NR	Habitats in the Project footprint are not unique; birds able to fly over road corridor.	Minor, not significant
Disturbance of avifauna due to construction activities (noise, dust generation).	A	• Implementation of EPP. • Adherence to applicable guidelines for noise. • Environmental awareness training.	Low	Project footprint	• Construction phase; frequent.	R	Nearby areas are already subject to disturbance by human activities.	Minimal, not significant
Destruction of active migratory bird nests during vegetation clearing.	A	• Avoidance of the breeding bird season and adherence to EPP. • Environmental awareness training.	Low	Project footprint	• Construction phase; occasional.	NR	Through avoidance of the breeding bird season, few active bird nests will be encountered.	Minor, not significant
Operation								

Project-Environment Interaction	Potential Positive (P) or Adverse (A) Effect	Mitigation	Significance Criteria for Residual Environmental Effects					Residual Effects, Significance**
			Magnitude*	Geographic Extent	Duration / Frequency	Reversibility (R=Reversible NR=Non-reversible)	Ecological / Social-cultural and Economic Context	
Disturbance of avifauna due to increased human presence.	A	• Implementation of EPP.	Low	Limited to Project footprint.	• Operations phase; frequent.	R	Nearby areas are already subject to disturbance by human activities.	Minimal, not significant

Notes:

* For definition of levels of magnitude (high, moderate, low, nil, unknown) refer to Section 3.0.

** For definition of levels of significance (major, medium, minor, minimal) refer to Section 3.0.

5.6 Fish and Fish Habitat

Fish and fish habitat were identified as a VEC based on the effects that construction and operation may have on watercourses, and wetlands within and adjacent to the Site.

5.6.1 Significance Definition

A significant adverse effect from the Project on fish and fish habitat is defined as an effect that is likely to cause a permanent net loss of species and/or available habitat.

5.6.2 Potential Interactions and Effects

As no in-water works are anticipated with the Project, potential interaction and effects noted in Section 5.2.2 are sufficient to mitigate potential effects to fish and fish habitat.

5.6.3 Mitigation

Mitigation noted in Section 5.2.3 are sufficient to address fish and fish habitat.

5.6.4 Residual Effects and Determination of Significance

Residual effects and significance are not expected to differ from those presented in Table 5.2.

5.7 Species-at-Risk

The desktop review and 2020 field reconnaissance during the site selection did not identify any SAR within the Site footprint. Neither were any SAR noted during the follow-up 2021 vegetation, wetland, and avian surveys.

5.7.1 Significance Definition

A significant adverse effect on SAR and SOCI would be one which results in contravention of SARA or NBSRA provisions. Significance definitions outlined in Sections 5.3.1 (Terrestrial Habitat), 5.4.1 (Wetlands), and 5.5.1 (Avifauna), would also apply to SAR / SOCI.

5.7.2 Potential Interactions and Effects

Construction activities associated with the Project may result in temporary or permanent adverse effects on SAR and SOCI. Potential adverse effects to terrestrial flora can result from site preparation (e.g., clearing, grubbing, grading, blasting), as well as associated dust, erosion and sedimentation, and possible introduction of invasive species. Potential effects on terrestrial and aquatic flora, habitat, communities and individuals during construction may also occur as a result of accidental events. Effects can include:

- Alteration / displacement of habitat;
- loss of sensitive / critical habitat;
- noise/disturbance to wildlife;
- behavioural changes; and
- mortality.

Effects can be limited to the Project footprint or may extend to adjacent lands.

5.7.3 Mitigation Measures

Mitigation for potential effects on identified SAR and SOCI mirror that provided in Sections 5.3.3 (Terrestrial Habitat), 5.4.3 (Wetlands), and 5.5.3 (Avifauna).

5.7.4 Residual Effects and Determination of Significance

Residual effects for SAR and SOCI will mirror those provided in Tables 5.3, 5.4, and 5.5.

5.8 Accidents and Unplanned Events

The assessment presented in Section 6.0 addresses potential effects of routine, planned Project activities associated with the construction and operation / maintenance phases. Potential for adverse effects on VECs that could be caused by unplanned, accidental events is discussed below.

Plausible accidents and unplanned events that may occur during construction and operation of the Project that have the potential to adversely impact VECs include:

- Spills;
- Erosion and Sediment Control Failures; and
- Fire.

Table 5.8 provides an overview of the VECs that are of primary concern for each of the listed scenarios. Each scenario is briefly discussed in the following subsections.

Table 5.8 Accidents and Unplanned Events

Works and Activities	Surface Water Resources	Atmospheric Environment	Avifauna	Terrestrial Habitat	Wetlands	Aquatic Environment	Species at Risk
Spills	●	●	●	●	●	●	●
Erosion / Sediment Control Failures	●		●	●	●	●	●
Fire	●	●	●	●	●	●	●

5.8.1 Spills of Chemicals and POLs

Accidental spills of POLs and other chemical substances during the construction and operation phases of the Project have the potential to contaminate soil, sediment, surface water and groundwater. The potential contaminants resulting from a spill may also adversely affect vegetation, wildlife and wetlands and could result in contaminants in nearby water wells.

During construction, the contractor will be responsible for reducing the likelihood of spills by implementing effective prevention measures including the careful handling and proper storage of the products in use. The contractor is accountable to prevent, eliminate and/or remediate an adverse effect resulting from a spill and to report the spill to the Project Engineer and other applicable organizations as requested in provincial and federal approvals, authorizations, terms and conditions and letters of advice.

5.8.2 Failure of Erosion and Sediment Control (ESC) Measures

The risk of failure of ESC measures is heightened during spring runoff and extreme or prolonged rainfall events. Failure of ESC measures may cause discharge of runoff with elevated levels of TSS to surface water bodies, potentially causing adverse effects on fish and fish habitat, particularly should runoff with elevated TSS enter fish spawning habitat.

5.8.3 Fires

Accidental fires during Project construction and operation / maintenance activities have the potential to occur. Activities that may accidentally cause a fire include equipment or hot exhaust, refuelling, brush burning, careless smoking near construction / work areas and vehicle accidents.

Accidental fires may have serious adverse effects on sensitive receptors through habitat loss, mortality to wildlife and vegetation, atmospheric emissions and damage or loss of property or heritage / archaeological resources. There is potential for chemicals in runoff during firefighting to adversely affect surface water and fish and fish habitat.

In the unlikely event of a fire, local and provincial emergency response services and procedures would be initiated.

5.8.4 Conclusion

With the implementation of mitigation measures and significant adverse effects are unlikely to occur as a result of accidents and unplanned events.

5.9 Effects of the Environment on the Project

Potential effects of the environment on the condition and function of the Project could result from severe weather.

5.9.1 Severe Weather

The main concern during construction relates to severe precipitation events and the potential for soil erosion and the release of a large quantity of runoff with elevated TSS to receiving watercourses, and subsequent adverse effects on fish and fish habitat. Proper installation, monitoring and maintenance of ESC measures to avoid adverse effects is therefore essential.

Extreme cold temperatures, as well as freezing rain, hail, ice and snow, are also a concern since they could delay construction activities and require additional mitigation measures. Prolonged dry and warm weather is unlikely to impact the construction schedule but could cause increased dust emissions and could require intensified dust management.

Severe weather may impact the Project during the operation phase. Ice and snow cover may affect efficiency of the infrastructure and hail, or high winds may cause damage to the panels. A stormwater management plan has been included in Appendix D.

5.9.2 Significance of Effects

Project design will consider the potential effects of the environment on the Project, including severe weather during construction and operation. Environmental management and mitigation measures outlined in the EA will be implemented during construction together with monitoring of the effectiveness of ESC measures. Adverse significant effects of the environment on the Project are therefore not likely to occur.

6.0 Project Communications Program

As with any EIA, Public and First Nations Engagement is required. For the Project DND has created a Project Communications Program consisting of the elements listed below. Examples of these can be found in Appendix E:

- Newspaper notice – DND put a notice in the 5 CDSB Post Gazette advising of the project EIA registration. The notice had information about the project, indicated the EIA website address and provided contact information for the DND local project contact as well as the link to the EIA documents on the GNB website;
- Letters to First Nations – DND has sent letters to all First Nations in New Brunswick;
- Notice on the Canadian Impact Assessment Registry (CIAR) – DND as a federal entity is also required to conduct an Environmental Effects Determination and as such, has posted project information on the CIAR; and
- Communications with local municipal and provincial representatives – DND has sent project related information by email to the local MLA, and mayor of Oromocto to inform them of the project plans.

DND has a hardcopy of project documents available for viewing at their offices at 5 CDSB as described in the newspaper notice in Appendix E.

6.1 First Nations Engagement

DND has contacted all First Nations in NB by email; six notification and offer to consult letters were sent to WNNB and ten notification letters sent to Mi'kmaq (MTI, Kopit Lodge) and Peskotomuhkati. Letters sent to the Mi'kmaq communities contained project information and were intended for notification purposes only. Each email, complete with an attached letter, was sent to the Chief, a representative of the community and/or the central consultation aggregate that represents them, three representatives from GNB, a representative from DPI, a representative from PSPC and a representative from RPOU(A) Gagetown. The same information was also sent to all Wolastoqey communities, and in addition, an offer to consult has been extended. These letters were sent January 19th by email. Sample letters sent to both Mi'kmaq and Wolastoqey First Nations are in Appendix E. The offer to consult with Wolastoqey is an ongoing process and will continue throughout the project.

An Indigenous Knowledge Study (IKS) for the entire 5 CDSB area is in the planning stages and will be undertaken by WNNB. Details are not yet finalized, but it is anticipated that the IKS will not be available in a timeframe compatible with EIA review. A site-specific Cultural Study will be completed by WNNB in the fall of 2021.

All comments received whether from the general public or First Nations will be taken into account as required during final project design by the successful contractor.

7.0 Cumulative Effects

The recently enacted federal *Impact Assessment Act* (August 2019) defines cumulative effects as "changes to the environment that are caused by an action in combination with other past, present and future human actions" and that a cumulative effects assessment should:

- assess effects over a larger (i.e., "regional") area that may cross jurisdictional boundaries, including effects due to natural perturbations affecting environmental components and human actions;
- assess effects during a longer period of time into the past and future;
- consider effects on VECs that may result in interactions with other actions, and not just the effects of the single action under review;
- include other past, existing and future (reasonably foreseeable) actions; and
- evaluate significance in consideration of other than just local, direct effects.

To-date, the IAAC has adopted the existing reference guide entitled "Cumulative Effects Assessment Practitioners Guide" from the Agency (CEAA, 1999).

7.1 Boundaries

For the purpose of identifying and assessing cumulative effects, the spatial dimensions can be variable, depending on the VEC that is being assessed. For example, the cumulative effects on air quality can cover an area well beyond the footprint of the Study Area. For this assessment, interaction with other major developments within about 15 km have been considered. The temporal boundaries are extended to include past, current, and known planned or reasonably foreseeable projects.

7.2 Other Projects in the Area

A search of the Canadian Impact Assessment Registry identified 3 ongoing projects within 5 km of the Site. Two projects involve upgrades to Tilley Avenue and the other involves upgrades piping at a wastewater treatment plant. These projects are being conducted within the garrison of 5 CDSB, north of the Site. The NBDELG EIA Registry did not identify any ongoing projects in the area. There are no future projects planned in the vicinity of the Project site (J. Parker, pers. comm., 2021).

These projects are anticipated to have impacts to, at a minimum, air quality, acoustic environment and surface water. It is not anticipated that residual adverse effects from the proposed Project will substantially contribute to existing adverse effects from other undertakings. Other future undertakings are anticipated to implement similar mitigation measures for environmental protection as those outlined in this document. This will further reduce potential for future other undertakings in the area to contribute additional adverse effects. All projects are short term and limited in their scope.

8.0 Conclusion

This EIA has been conducted for the proposed construction and operation of a solar farm at 5 CDSB in Oromocto, NB. The assessment presented in this report has considered potential effects on the environment resulting from the activities as described in Section 2.0. A description of the existing environment at the Site has been presented (Section 4.0) based on available information. The VECs identified by issues scoping and pathway analysis (Section 5.0) for which potential effects may be a concern include:

- Atmospheric environment;
- Surface water;
- Terrestrial habitat;
- Wetlands;
- Avifauna;
- Fish and fish habitat; and
- Species-at-Risk

The potential for environmental effects has been discussed in Section 5.0. Significant adverse residual effects are not anticipated based on:

- available information and results of previous field reconnaissance in the Study Area presented in Section 4.0; and
- the mitigation measures outlined in this EIA.

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Personal Communication: Jon Parker, Senior Project Manager, Real Property Operations Detachment

Appendix A

Disposition Table

Gagetown Green PPA – Solar Farm
Concordance Table of Technical Review Committee Comments

Comment #	TRC Comment	Response	Document Section Where Text Inserted to Address Comment
	Department of Environment and Local Government (DELG)		
	Climate Change Adaptation		
1	Ensure all infrastructure and installations are located completely above the historical and projected flood elevations i.e. worst-case scenario extreme projected conditions expected in the future, and any historical extreme weather events that have impacted this location.	Acknowledged. This is well above and outside these features based on records.	
2	Ensure any potable water wells remain unaffected by the project.	No potable water wells will be affected by the project.	
3	**General Information and Guidance the proponent may want to consider consulting:** Please add consultation of the IDF CC (UWO) and IDF ECC information - for any water infrastructure. Projected climate change impacts for the project area - AR5 New Brunswick Climate Change projections, data, and maps, of 29 climate variables, see - *New Brunswick's Future Climate Projections: AR5 Data and Maps* and Technical Report see - *http://142.139.25.105/cgi-bin/koha/opac-detail.pl?biblionumber=39909* • Downscaled projected climate data of 31 climate variables for New Brunswick Municipalities and Ecoregions, see - *https://csrno.ca/climat/* • *Climate Data.Ca* is an online climate data portal which provides high resolution climate data to help decision makers to build resilient infrastructure. • Intensity Duration Frequency (IDF) curves relate to short-duration rainfall intensity with its frequency of occurrence and are often used for flood forecasting and urban drainage design. Analyze Climate Data — Climate Data Canada • The most recent Sea-Level Rise and Flooding Estimates for New Brunswick Coastal Sections 2020 can be found on this site.	Thank you for this information. There will be no water infrastructure as part of this project.	
	Climate Change Mitigation		

Comment #	TRC Comment	Response	Document Section Where Text Inserted to Address Comment
4	The Climate Change Secretariat appreciates that by implementing a renewable resource for energy use, the project will reduce greenhouse gas (GHG) emissions over its lifetime. To better understand the impacts on GHG emission sources and sinks, please provide estimations of the GHG emissions (tonnes of CO2e) from the anticipated land-use change and the project's construction phase. Also provide an estimate of the total GHG emissions that will be avoided as a result of the project.	This project will be a design build and will be awarded after this Environmental Assessment is completed therefore, a design for this facility is not yet available. If we assume that this facility will be a 'typical' installation and will take 'typical' amounts of equipment and time to build, then we can make assumptions based on other solar installations of similar size in NB. In reviewing existing EIA information for NB solar farms (eg. Violet Solar Farm which is a 10 MW facility) and scaling appropriately to reflect this proposed 5 MW installation, DND expects that the solar farm will reduce GHG emissions by approximately 5,000 tonnes per year. The solar farm will produce approximately 6,900 MW hours of electricity annually, which accounts for about 38% of DND's green energy goal for the province of New Brunswick.	
5	Since the Federal Government will be the primary purchaser of the clean electricity generated by this project through the Green Power Purchase Agreement (PPA), the Climate Change Secretariat strongly recommends that the proponent consider adding battery storage technology to the current proposed project. Adding energy storage technology to the project will show the Federal Government leading by example in this area. It will also demonstrate this technology to the NB electricity sector along with providing grid benefits. Because of the Green PPA, NB ratepayers will not be directly impacted by the project's capital costs with or without energy storage technology. Finally, adding energy storage technology to the proposed project will increase its environmental benefits and reduce its associated load balancing costs, resulting in a positive economic benefit to all NB ratepayers.	DND has not precluded the use of battery storage technology as part of the scope of this Green PPA. In fact, prospective bidders may propose battery storage as one means of supporting power quality.	
	Air and Water Sciences Branch		
6	Potential air quality impacts are well identified, and suitable mitigations have been proposed. Therefore, no questions or comments.	Acknowledged.	
	Provincial and Community Planning Branch		
7	The PCP Branch has no comments or concerns.	Acknowledged.	
	Source and Surface Water Management Branch		
8	From a drinking water protection perspective, there is no concern and the reviewer is in agreement with the findings (section 4.5) and the conclusion of the consultant (Table 5.1) to "exclude groundwater as a VEC as there are no pathway of concern identified".	Acknowledged.	
	Water Sciences Section		
9	Page 3, Figure 2.1 – Based on the site footprint, it appears that the proposed project is located on PID 60058690. However, the PID is not included in Figure 2.1 or the project description. Please confirm the PID(s) where the proposed project is to occur.	Please see attached revised figure showing PID. DND confirms this is PID 60058690	Figure 2.1
10	Page 10, Section 4.5.1 Watercourses – Irvine Brook and Kinney Creek should be identified in Figure 4.1 'Water Features' as well as Figure 4.3 'Archaeological Features.'	Comments noted. Please see attached revised figures.	Figure 4.1 and 4.3

Comment #	TRC Comment	Response	Document Section Where Text Inserted to Address Comment
11	Page 25, Table 5.2, Surface Water - As part of the mitigation measures that are associated with the Erosion and Sediment Control (ESC) structures, it should also be noted: ESC structures should be regularly monitored to ensure that they are functioning properly; this includes monitoring be done both before and after heavy rain events. For the mitigation measure: “Proper use and storage of chemicals and POLS”, it should also be noted that: All spills or leaks such as those from machinery or storage tanks must be promptly contained, cleaned up and reported to the DELG’s Fredericton Regional Office at 506-444-5149 or if the spill occurs after regular business hours, then the Canadian Coast Guard ' s 24-hour environmental emergencies reporting system must be contacted at 1-800-565-1633.	Comments noted. These mitigation measures will be included in the EMP which will be provided by the contractor after EIA Approval.	
12	If the project is approved, then an Environmental Management Plan (EMP) must be prepared for project activities. The EMP must be reviewed and approved by DELG prior to the commencement of any project-related activities.	Comment acknowledged. An EMP will be prepared for this project.	
	<u>Source and Surface Water Management Branch (Surface Water)</u>		
13	It is understood that a wetland assessment conducted in September 2020 identified unmapped wetland area. It is also understood that a standard wetland delineation is scheduled for spring 2021 where which a summary of potential impacts and proposed mitigation measures will be developed and provided. At this time there are no questions. Further questions may arise after the review of wetland delineation, wetland functional assessment, and summary of potential impacts and proposed mitigation measures once provided.	Acknowledged.	
	Department of Natural Resources and Energy Development (NRED)		
	<u>Forest Planning and Stewardship (FPS) Branch</u>		
14	In the event that an active bird nest is encountered, all disturbance work should temporarily stopped and a buffer should be placed around the nest. The nest should not be disturbed until the chicks have fledged. It should be noted that bird nests should never be marked using flagging tape or other similar material as this increases the risk of nest predation. Please consult with Environment and Climate Change Canada’s Canadian Wildlife Service or DNRED’s Species At Risk Section at 506-453-5873, to determine the size of the buffer. • The proponent should note that certain bird species may be attracted to cleared areas (threatened Common Nighthawk), or stockpiles (Bank Swallows). Piles of soil (fill or grubbed material) should have slopes less than 70 degrees, to deter Bank Swallows from nesting. Common Nighthawk will perform a “broken wing display” to lure predators away from their nests. If a bird is seen mimicking a wing injury during the breeding season (April 8th to August 28th), it is a very good indicator that an active nest is nearby. Do not approach, harm or harass wildlife. Ensure that garbage and food scraps are disposed of properly to avoid attracting wildlife.	Comments noted. These measures will be put in place should an active nest be discovered.	

<table>
<tr><th>Comment #</th><th>TRC Comment</th><th>Response</th><th>Document Section Where Text Inserted to Address Comment</th></tr>
<tr><td>15</td><td>In addition to the FPS Branch comments/concerns, the following comments / concerns have been expressed by the Fish and Wildlife Branch:

• The registration is lacking details in the project description including, but not limited to, ground preparation requirements, access to the site, site maintenance requirements, etc. Please provide these details.</td><td>Please see the attached revised project description. This information will be added to the document.

A complete project description has been included in the document.</td><td>Section 2.0 – Project Description
Section 2.1 – Design Components
Section 2.2 – Construction Phase
Section 2.3 – Project Operation and Maintenance Phase
Section 2.4 – Project Decommissioning Phase</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>Department of Agriculture, Aquaculture, and Fisheries</td><td></td><td></td></tr>
<tr><td>16</td><td>There are no concerns regarding this project.</td><td>Acknowledged.</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>Department of Transportation and Infrastructure (DTI)</td><td></td><td></td></tr>
<tr><td>17</td><td>The proponent must ensure that light reflection from the solar panels will not impact motorists travelling on public roads.</td><td>Acknowledged. DND will ensure glare/glint impact is controlled for.</td><td></td></tr>
<tr><td>18</td><td>Table 1 below lists typical permits and legislation under the mandate of DTI. Note that Table 1 is not all inclusive and additional permits and requirements relevant to the project may be required. The proponent is requested to review the table and speak with the appropriate contact regarding the permits/legislation which may be relevant to the project. The proponent is advised to contact DTI as early as possible regarding any permits or approvals required. The process required for approvals can take up to several months to complete.

Table 1: Permit / Legislation Requirements by the DTI
<table>
<tr><th>Permit / Legislation Requirements</th><th>DTI Office / Unit</th><th>DTI Contact</th><th>Contact Number</th></tr>
<tr><td>Access Road Permit / Certificate of Setback</td><td>District 5 - Fredericton</td><td>Kevin Richard</td><td>506-453-2611</td></tr>
<tr><td>Highway Usage Permit</td><td>Highway Corridor Management</td><td>Peter McDonald</td><td>506-453-6724</td></tr>
<tr><td>Special Permit</td><td>Special Permits Office</td><td>Tanya Mitchell</td><td>506-453-2982</td></tr>
<tr><td>Traffic Management Plan</td><td>Road Transportation Technical Planning</td><td>Matt Illsley</td><td>506-474-3147</td></tr>
<tr><td>Stormwater Management Plan</td><td>Design Branch Hydraulics</td><td>Frank MacDonald</td><td>506-453-3939</td></tr>
</table></td><td>Comments noted. DTI Will be contacted ahead of commencement of project construction.</td><td></td></tr>
</table>

Comment #	TRC Comment	Response	Document Section Where Text Inserted to Address Comment
19	An **Access Road Permit** or **Certificate of Setback** may be required if the proponent plans to construct a new access road, use an existing access road, or build a structure near DTI roads. a) Maps showing roads administered by DTI are available at: https://www.gnb.ca/0113/maps/Mapbooks/2019-Mapbooks-e.asp. b) The DTI District map is available at: https://www2.gnb.ca/content/gnb/en/departments/dti/highways_roads/content/district_map.html	Comments noted.	
20	A **Highway Usage Permit** may be required if the proponent intends to carry out any development, construction, repair, or maintenance within the limits of a DTI road.	Comment noted. No project activities are going to occur within the limits of a DTI road.	
21	Trucks shall not exceed legal mass and dimensions limits prescribed in NB regulation 2001-67 under the NB Motor Vehicle Act, except as authorized by special permit issued pursuant to paragraph 261 of the NB Motor Vehicle Act, including spring weight restrictions when applicable. A map showing gross vehicle weight limits is available at: https://www2.gnb.ca/content/dam/gnb/Departments/trans/pdf/MapsRoutes/2017_NB_GrossVehicleWeights-RoutiererelativeMasses.pdf The proponent is advised to consult DTI's trucking information which is available at: https://www2.gnb.ca/content/gnb/en/departments/dti/trucking.html.	Comments noted. Trucks are not anticipated to exceed legal mass and dimensions limits.	
22	A **Traffic Management Plan (TMP)** may be required if the project involves the movement of exceptionally large and/or heavy loads on provincial highways.	No exceptionally large and/or heavy trucks are anticipated to be required for this project.	
23	DTI requires that there is no net increase in flow to the receiving watercourses which flow through DTI infrastructure downstream of the development. Both Irvine Brook and Kinney Creek flow from the project site to DTI culverts located at Broad Road and the Trans-Canada Highway. Please provide a **Stormwater Management Plan** (SMP) that includes: a. Pre- and post-development stormwater flows anticipated for this project, assuming a 100-year return rain event + 20% to account for climate change. b. If the calculated post-development flow is greater than the pre-development flow, a flow attenuation/retention pond will be required.	Acknowledged. A stormwater management plan will be created and submitted for review and approval.	See Appendix D
24	DTI requests that the proponent contact the local District Engineer, Kevin Richard, well in advance of beginning the project, to ensure that all of the department's concerns are addressed. The proponent should disclose any concerns regarding additional transportation issues that they are aware of to the District Engineer.	Comment noted. DND or their designate will contact Kevin Richard in advance of the beginning of the project.	
25	All loads must be properly secured during transit in accordance with to the Motor Vehicle Act and NSC Standard 10.	Comment noted. All loads will be properly secured during transit.	
26	Any spillage of material that occurs during hauling must be kept to a minimum and promptly removed from the highway following appropriate safety procedures.	Comment noted. Any material spillage will be promptly cleaned up.	

Comment #	TRC Comment	Response	Document Section Where Text Inserted to Address Comment
27	The Work Area Traffic Control Manual (WATCM) provides a uniform set of traffic control guidelines for all work carried out on New Brunswick provincial roads. Any work that occurs within the right-of-way of a provincial road must conform to the guidelines prescribed by this manual. A PDF version of the manual is available at: https://www2.gnb.ca/content/dam/gnb/Departments/trans/pdf/en/RoadsHighways/WATCM/WATCM2015_Revised_Manual_EN.pdf	No work is anticipated to occur within the right-of-way of a provincial road as part of this project.	
	Environment and Climate Change Canada / Government of Canada		
28	It is not possible to adequately evaluate the potential effects of the Project on migratory birds, including bird species at risk or of conservation concern, based on the information provided. The proponent has taken the first step of obtaining data regarding migratory birds, species at risk (SAR), and species of conservation concern (SOCC) from the Atlantic Canada Conservation Data Centre (ACCDC), which has confirmed that many SAR and SOCC may occur within or near the Project Area, including Barn and Bank Swallow, Chimney Swift, Eastern Wood-peewee, Wood Turtle, Monarch, and Butternut. ECCC-CWS recommends that this information should be supplemented by field surveys by professional biologists (with expertise in conducting the types of surveys required) at the appropriate time of year. ECCC-CWS is available to consult on the development of these surveys prior to their implementation, if desired. Based on survey data, the proponent should develop mitigation measures to avoid adverse effects to migratory birds, species at risk, and species of conservation concern. ECCC-CWS reiterates that when providing information in an environmental assessment document, the proponent should give particular, but not exclusive, consideration to birds or habitat that meet one of the following criteria: • species listed under the Species at Risk Act (SARA) and/or provincial species at risk legislation; designated, under review or identified as candidate species by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC); and/or with rarity ranks assigned by the province and/or the Atlantic Canada Conservation Data Centre (ACCDC); • areas of concentration of migratory birds, such as breeding areas, colonies, spring and fall staging areas, and wintering areas; • breeding and nesting areas of species low in number and high in the food chain; • species that are identified by priority ranking systems (e.g. Bird Conservation Region priority species). ECCC-CWS will be in a better position to comment on this Project once adequate biophysical information has been provided and mitigation measures proposed.	Comments noted. As described in the registration document, surveys will occur in the appropriate time of year and results will be reported once surveys are complete, including any required mitigation. Surveys were completed in late spring 2021.	Section 4.8 – Avifauna Section 4.10 – Species at Risk Section 5.5 – Environmental Effects and Mitigation: Avifauna Section 5.7 – Environmental Effects and Mitigation: Species at Risk
	Wetlands		

Comment #	TRC Comment	Response	Document Section Where Text Inserted to Address Comment
29	It is not possible to adequately evaluate the potential effects of the Project on wetlands and wetland function, based on the information provided. ECCC-CWS recommends that the proponent complete a wetland delineation to clearly identify the proportion of wetlands and wetland functions have the potential to be lost. ECCC-CWS will be in a better position to comment on this Project once adequate biophysical information has been provided and mitigation measures proposed. The FPWC is applicable to any Federal Departments exercising a power, duty, or function that would permit the carrying out of the project or associated activities. The policy recognizes the importance of wetlands to the environment, the economy and human health, and promotes a goal of no-net-loss of wetland functions. In support of this goal, the FPWC and related implementation guidance identify the importance of planning, siting and designing a project in a manner that accommodates a consideration of mitigation options in a hierarchical sequence - avoidance, minimization, and as a last resort, compensation. For those potentially affected wetlands where the FPWC would be applicable, and avoidance is deemed not possible, a detailed description of potential effects, and of the reasons why avoidance and minimization of impacts were determined to not be possible should be provided. The mitigation measures and monitoring plan, as well as a proposed compensation plan, should be consistent with those proposed for other projects in Atlantic Canada. A copy of the FPWC can be found at http://publications.gc.ca/site/eng/9.686114/publication.html The FPWC requires 'no net loss of wetland functions': 1) on federal lands and waters (except territorial lands); 2) in areas where wetland losses have already reached critical levels (e.g. NB, NS, PEI, southern Ontario, Prairies); 3) for regionally important wetlands. If loss of habitat function of wetlands is deemed unavoidable and is justifiable, a draft Wetland Compensation Plan (WCP) which fully describes how the mitigation hierarchy has been considered should be provided for review, including: • Identification of wetland habitat and functions potentially affected by the project; • Detailed description of impacts; • Rationale why avoidance and minimization of impacts is determined not possible; • Amount of wetland area and functions loss; • Proposed compensation offsetting measures to maintain/improve wetland functions with the goal of no net loss of wetland functions, including wetlands required to support bird SAR and species of conservation concern.	Comments noted. The project is currently planned to avoid wetlands by maintaining a buffer of at least 30 m from the wetland for all project related activities therefore, no effects on wetlands are anticipated. As described in the project registration document, a wetland survey and delineation will be conducted in the summer of 2021. A wetland delineation was completed June 2021	Section 4.8 – Wetlands Section 5.4 – Environmental Effects and Mitigation: Species at Risk
	Impact Assessment Agency of Canada (IAA)		

Comment #	TRC Comment	Response	Document Section Where Text Inserted to Address Comment
30	The federal environmental assessment process is set out in the *Impact Assessment Act* (IAA). The *Physical Activities Regulations* (the Regulations) under IAA set out a list of physical activities considered to be "designated projects." For designated projects listed in the Regulations, the proponent must provide the Agency with an Initial Description of a Designated Project that includes information prescribed by applicable regulations (*Information and Management of Time Limits Regulations*). Based on the information submitted to the Province of New Brunswick on the proposed Gagetown Base Renewable Energy Electrical Generation Facility, it does not appear to be described in the Regulations. Under such circumstances the proponent would not be required to submit an Initial Description of a Designated Project to the Agency. However, the proponent is advised to review the Regulations and contact the Agency if, in their view, the Regulations may apply to the proposed project. The proponent is advised that under section 9(1) of the IAA, the Minister may, on request or on his or her own initiative, by order, designate a physical activity that is not prescribed by regulations made under paragraph 109(b) if, in his or her opinion, either the carrying out of that physical activity may cause adverse effects within federal jurisdiction or adverse direct or incidental effects, or public concerns related to those effects warrant the designation. Should the Agency receive a request for a project to be designated, the Agency would contact the proponent with further information. The proposed project may be subject to sections 82-91 of IAA. Section 82 requires that, for any project occurring on federal lands, the federal authority responsible for administering those lands or for exercising any power to enable the project to proceed must make a determination regarding the significance of environmental effects of the project. The Agency is not involved in this process; it is the responsibility of the federal authority to make and document this determination. The proponent is encouraged to contact the Agency at (902) 426-0564 if it has additional information that may be relevant to the Agency or if it has any questions or concerns related to the above matters.	Acknowledged.	
	Transport Canada (TC)		
	Transport Canada Environmental Programs and Indigenous Relations		
31	A review has been completed on the Preliminary Environmental Impact Assessment for the Development of a Renewable Energy Electrical Generation Facility at 5th Canadian Division Support Base Gagetown. Based on our review, it does not appear that TC has a role in this project, therefore, there are no further requirements from TC.	Acknowledged.	

Comment #	TRC Comment	Response	Supporting Information & References
	Department of Fisheries and Oceans (DFO)		
32	Upon reviewing the preliminary EIA for **Renewable Energy Electrical Generation Facility, Base Gagetown**, under the FFHPP mandate, the Program is of the opinion that the project is not likely to result in: 1. The death of fish and the harmful alteration, disruption, or destruction of fish habitat; 2. Prohibited effects to listed aquatic species at risk, nor 3. The introduction of aquatic invasive species. Based on the information provided, the Program has no concerns, however; should plans change or if information was omitted in the Assessment, FFHPP requests the opportunity to review those changes.	Acknowledged.	
	Climate Change Adaptation		
	Climate Change Adaptation		
33	With increasing annual mean temperature and annual hot days, the proponent should consider installing a fire break to guard against the risk of forest fire to the installations associated with this project.	Comment noted. A fire break will be considered.	
	Department of Transportation and Infrastructure (DTI)		
34	DTI is looking forward to reviewing the Stormwater Water Management Plan (SWMP) once it is completed.	Comment noted. The Stormwater Management Plan is under development and will be submitted for review and approval upon its completion.	See Appendix D for the Stormwater Management Plan
	Forest Planning and Stewardship Branch (FPS)		
35	For seeding, use native seed mix if possible. If not possible, ensure the seed mix does not contain invasive species.	Comment noted. Native seed mix will be used if possible. Care will be taken to exclude invasive species.	
	Department of Aboriginal Affairs (DAA)		
36	The Province of New Brunswick will rely on the Federal Duty to Consult process and would ask to be kept informed with regards to these consultations.	Thank you for this information. DND will keep DAA apprised of ongoing consultations.	
37	Aboriginal Affairs has completed the Initial Assessment for the Renewable Energy Electrical Generation Facility project, EIA# 4561-3-1561. Please find attached the Initial Assessment that was sent to Wolastoqey First Nations.	Thank you for this information.	

Appendix B

Wetland Field Data and Photos

Wetland Habitat Form WL1

Name of Investigator: Garrett Bell & Mike Lewey
Date: July 19, 2021
Wetland Form: Marsh
Wetland size: ~ 7.5 ha
Associated Watercourse: Kinney Creek
Weather: Variable clouds, warm, following 24h rain

Topographic Sheet: 21 G/16
General Location: Oromocto, NB
County: Sunbury
PID No.: 60058690
Project No.: TE181447
Client: PSPC

Wetland Type:
1.Aquatic bed/unconsolidated bottom (AB) ___
2.Bog(BO) ___
3.Fen (FE) ___
4.Emergent wetland (EW) _X__
5.Shrub wetland (SB) ___
6.Forested wetland (FW) ___

Wetland Class:
1.Open water ____
2.Deep marsh _X__
3.Shallow marsh ___
4.Seasonally flooded flats ___
5.Meadow ___
6.Shrub swamp ___
7.Wooded swamp ___
8.Bog ___

Wetland Subclass:
1.Vegetated open water _X__
2.Non-vegetated OW ___
3.Floating leaved OW ___
4.Rooted floating leaved OW ___
5.Dead woody OW ___
6.Vegetated deep marsh _X__
7.Non-vegetated DM ___
8.Dead woody DM ___
9.Sub-shrub DM ___
10.Floating leaved DM ___
11.Rooted floating leaved DM ___
12.Robust DM ___
13.Narrow-leaved DM ___
14.Broad-leaved DM ___
15.Dead woody shallow marsh ___
16.Robust SM ___
17.Narrow leaved SM _X__
18.Broad leaved SM ___
19.Floating leaved SM ___
20.Rooted floating leaved SM ___
21.Non-vegetated SM ___
22.Emergent seasonally flooded flats ___
23.Shrubby SFF ___
24.Grazed meadow ___
25.Ungrazed M ___
26.Sedge M ___
27.Sapling shrub swamp ___
28.Bushy SS _X__
29.Compact SS ___
30.Low sparse SS ___
31.Deciduous wooded swamp __
32.Evergreen WS ___
33.Wooded bog ___
34.Shrubby B ___
35.Open B ___

Water Regime Indicator:
1.Permanently flooded _X__
2.Saturated ___
3.Seasonally flooded _X__

Water Depth:
1.0-5 cm ___
2.5-20 cm ___
3.20-50 cm ___
4.50-100 cm ___
5.>100 cm _X__

Impoundment Type

1.Beaver Pond ___
2.Man-made Impoundment _X__
3.Ducks Unlimited Impoundment ___
4. None of the above ___

Percent Vegetation Cover:

1.>95% ___
2.76-95% in peripheral band _X__
3.76-96% in patches ___
4.26-75% in peripheral band ___
5.26-75% in patches ___
6.5-25% in peripheral band ___
7.5-25% in patches ___
8.< 5% ___

Wetland Site:

1.Lacustrine ___
2.Riverine ___
3.Palustrine _X__
4.Isolated ___
5.Deltaic ___

Vegetation Types (%):

1.Deciduous trees	2% grey birch
2.Coniferous trees	2% tamarack,
3.Dead trees	4% dead black spruce and tamarack
4.Tall shrubs	7% speckled alder, Canada holly
5.Low shrubs	7% meadow-sweet, steeple-bush
6.Dead shrubs	
7.Herbs	15% sensitive fern, bog candle, ,
8.Mosses	
9.Narrow-leaved emergents	55% fowl manna grass, blue joint grass, wool-grass, *Carex crinita*
10.Broad-leaved emergents	
11.Robust emergents	
12.Free-floating plants	
13.Floating plants (rooted)	
14.Submerged plants	
15. Other	

Interspersion: 1.Minimal ___ 2.Low ___ 3.Medium _X__ 4.High ___

Water Quality

Conductivity: _N/A__
pH: _N/A__
Alkalinity: _N/A__

Hydrological Classification:

1.Surface water depression ___
2.Ground water depression ___
3.Surface water slope _X__
4.Ground water slope _X__

Inlets/Outlets/water bodies:

No inlet, one outlet (culvert) at Trans-Canada Highway and a mid-wetland impoundment (built causeway) associated with Kinney Creek. A culvert in the causeway was not observed but may be affected by beaver damming.

Wildlife: (Observation/Signs/Reports)

Beaver (signs of recent activity), red fox, American bittern, red-winged blackbird, common yellow-throat, alder fly-catcher, veery, deer tracks and “deer beds” plus signs of ungulate browsing.

Adjacent Wildlife habitat (%):

1.Salt marsh ___
2.Forest _100__ (mixed forest)
3.Dykelands ___
4.Mudflats ___
5.Beach ___
6.River ___
7. Other ___

Description: Immature to mature mixed forest including grey birch, white birch, red maple, trembling aspen, red spruce, and balsam fir.

Surrounding Land Use %:

1 Agriculture ___
2.Forestry ___
3 Recreation ___
4.Industrial ___
5.Urban development ___
6.Transportation _5__
7.Residential ___
8.Waste Disposal ___
9.Scientific Research ___
10.Trapping ___
11.Education ___
12.Seasonal resident ___

Description: Shirley road runs along the north edge for about 100 m. The TransCanada Highway runs across the south edge of the wetland for about 100 m. The majority of the surrounding forest is undeveloped; regenerating since severe historic impacts from military training in the 1960's.

Disturbance: 1.Low _X__ 2.Moderate ___ 3.High ___

Description: Historic impacts appear to have stabilized and current impacts are low to none.

Roads and/or tracks:

1.Private road adjacent ___
2.Public road adjacent _X__
3.Private road within ___
4.Public road within ___
5.Vehicle tracks ___
6.Other _X__

Description: Shirley road runs along the north edge. An old causeway runs through the middle of the wetland along a utility corridor. The embankment is not currently passable except by foot. The TransCanada Highway lies relatively near to the south, within 100 m.

Existing Uses of Wetlands:

1.Economic use (e.g. farming) ___
2.Recreational activities ___
3.Aesthetics ___
4.Education & public awareness ___
5. None evident _X__

Potential Threats: Access is generally restricted as the land is within the army base property, although not within the currently established training area.

Special Features:

1.Rare wetland type ___
2.Rare animal or plant species ___
3.Habitat of rare species ___
4.Nesting site for colonial water birds ___
5.Migration stop-over site ___
6. None evident _X__

Description:

Notes: The highly disturbed nature of the site has likely resulted in the transitional state of regenerating forest and shrub habitats in the adjacent upland. Use of the wetland by beaver and waterfowl was evident but not remarkable.

WL1 Photo 1:
Looking south from Shirley Road into the upper part of WL1. 28 May 2021

Direction:
South

WL1 Photo 2:
The upper part of WL1 is a deep water riparian stream marsh dominated by emergent vegetation and shrubs with patchy structure and wide-spread internal drainage connections. 28 May 2021

Direction:
east

WL1 Photo 3:
The upper part of WL1 is separated from the lower part by a man-made causeway (visible extending from centre right to the left behind the beaver dam). The causeway appears to impound a large open waterbody in the middle of the wetland. The causeway is overgrown with vegetation and is not useable except on foot. 28 May 2021

Direction:
east

WL1 Photo 4:
A pair of Canada Geese were observed in the wetland possibly exhibiting courting behaviour. 28 May 2021

Direction:
Northwest

WL1 Photo 5:
The lower part of WL1 has only a small channel with little open water. The vegetation is still dominated by narrow-leaved emergents and shrubs but with a higher proportion of cattails. A distinct fringe of dead trees around the southern edge of the wetland indicates variable flooding in some years. 28 May 2021.

Direction:
Southwest

WL1 Photo 6:
The surrounding forest is a mixture of hardwood and softwood species ranging from immature to mature. The forest floor is generally sparsely covered with low growing herbs. 28 May 2021.

Direction:
South

WL1 Photo 7:
Along the eastern edge of the upper part of the wetland has a broad shrubby margin that transitions into shrubby upland (on old field). This part of the wetland boundary is the most challenging to delineate due to gentle slope and historic land disturbance. 28 May 2021.

Direction:
Northeast

WL1 Photo 8:
Around the margin of the wetland, wind-thrown trees exhibit flattened root-discs which indicate shallow water table. This was one hydrological indicator used to refine the boundary delineation. 5 July 2021.

Direction:
-

WL1 Photo 9:
The wetland soil pit revealed a depleted mineral matrix with saturation to the surface and water table in the pit. A dark surface was present with accumulated organics. 03 July 2021.

Direction:
West

WL1 Photo 10:
The upland soil pit revealed a yellow-red mineral soil with relatively bright colour and no saturation within 30 cm of the surface. 03 July 2021.

Direction:
East

New Brunswick Department of Environment Wetland Delineation Data Sheet

Project Site: TE181447 Date: July 19, 2021 Sample Point: WL1-wet

Applicant/Owner: PSPC (for DND) Field Investigator(s): Garrett Bell & Mike Lewey

County: Sunbury Coordinates: N45.824203 / E-66.446806

PID: 60058690 Do normal environmental conditions exist on-site? Yes [X] No [ ]

if no explain:

Atypical Situation? Yes [ ] No [X] Explain

Is this a potential Problem Area? Yes [ ] No [X] Explain

Wetland Determination

(Check One Only For Each Criteria)

Dominant Hydrophytic Vegetation (50/20 rule) Yes [X] No [ ]

Wetland Hydrology Yes [X] No [ ]

Hydric Soils Yes [X] No [ ]

Wetland Type: Riparian Stream Marsh

Rational for Determination: All wetland criteria present

Wetland Determination

YES [X] NO [ ]

Vegetation

Tree Stratum: (Plot size: 10m)	%Cover	Dominant Species	Indicator Status
1. Larix laricina	4	X	FACW
2. Betula populifolia	2	X	FAC
3. Picea mariana	2	X	FACW
4.			
5.			
	8 = Total Cover		

Shrub Stratum: (Plot size: 5m)			
1. Alnus incana	5	X	FACW
2. Spirea alba	5	X	FACW
3. Spirea tomentosa	2		FACW
4. Ilex verticillata	2		FACW
5.			
	14 = Total Cover		FACW

Herb Stratum: (Plot size: 2m)			
1. Calamagrostis canadensis	55	X	OBL
2. Onoclea sensibilis	5		FACW
3. Lysimachia terrestris	5		OBL
4. Carex crinita	2		OBL
5. Scirpus cyperinus	2		OBL
	69 = Total Cover		

Dominance Test Worksheet:

Total # of Dominant Species that are OBL,FACW,FAC: 6 (A)

Total # of Dominant Species across all strata: 6 (B)

% of Dominant Species that are OBL,FACW,FAC: 100 (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL Species	55	x1 =	55
FACW Species	20	x2 =	40
FAC Species	2	x3 =	6
FACU Specie		x4 =	
UPL Species		x5 =	
Column Totals:	77	x1 =	101

Prevalence Index = B/A = 1.13

Hydrophytic Vegetation Indicators:

__ Rapid Test for Hydrophytic Vegetation

X Dominance Test is >50%

X Prevalence Index is ≤3.0[1]

__ Morphological Adaptations[1] (explain)

__ Problematic Hydrophytic Vegetation[1] (explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Comments

Hydrophytic Vegetation Present? Yes X No

Hydrology

Primary Hydrological Indicators: (minimum of one is required; check all that apply)

- __ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- __ Water Marks (B1)
- __ Sediment Deposits (B2)
- __ Drift Deposits (B3)
- __ Algal Mat or Crust (B4)
- __ Iron Deposits (B5)
- __ Inundation Visible on Aerial Imagery (B7)
- __ Sparsely Vegetated Concave Surface (B8)
- __ Water Stained Leaves (B9)
- __ Aquatic Fauna (B13)
- __ Marl Deposits (B15)
- __ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- __ Presence of Reduced Iron (C4)
- __ Recent Iron reduction in tilled Soils (C6)
- __ Thin Muck Surface (C7)
- __ Other (Explain in Remarks)

Secondary Indicators: (minimum of two required)

- __ Surface Soil Cracks (B6)
- __ Drainage Patterns (B10)
- __ Moss Trim Lines (B16)
- __ Dry-Season Water Table (C2)
- __ Crayfish Burrows (C8)
- __ Saturation Visible on Aerial Imagery (C9)
- __ Stunted or Stressed Plants (D1)
- __ Geomorphic Position (D2)
- __ Shallow Aquitard (D3)
- __ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes___ No X Depth___

Water Table Present? Yes X No___ Depth 25 cm

Saturation Present? Yes X No___ Depth 0 cm

Wetland Hydrology Present? Yes X No___

Comments:

Soil Profile

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators)

Depth(cm)	Matrix		Redox Features					
	Color(moist)	%	Color(moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-19	7.5YR 3/0	100					C/Sil	
19-30	7.5YR 3/2	100					Sa/Sil	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains.[2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- __ Histosol (A1)
- __ Histic Epipedon (A2)
- __ Black Histic (A3)
- __ Hydrogen Sulfide (A4)
- __ Stratified Layers (A5)
- X Depleted Below Dark Surface (A11)
- __ Thick Dark Surface (A12)
- __ Sandy Mucky Mineral (S1)
- __ 5cm Mucky Peat or Peat (S3)
- __ Sandy Gleyed Matrix (S4)
- __ Sandy Redox (S5)
- __ Stripped Matrix (S6)
- __ Dark Surfaces (S7)
- __ Polyvalue Below Surface (S8)
- __ Thin Dark Surface (S9)
- __ Loamy Gleyed Matrix (F2)
- __ Depleted Matrix (F3)
- __ Redox Dark Surface (F6)
- __ Depleted Dark Surface (F7)
- __ Redox Depressions (F8)

Restrictive Layer (if observed): Type_____ Depth:_____

Hydric Soil Present? Yes X No___

Comments:

New Brunswick Department of Environment Wetland Delineation Data Sheet

Project Site: TE181447 Date: July 19, 2021 Sample Point: WL1-up

Applicant/Owner: PSPC (for DND) Field Investigator(s): Garrett Bell & Mike Lewey

County: Sunbury Coordinates: N45.824416 / E-66.447073

PID: 60058690 Do normal environmental conditions exist on-site? Yes [X] No [ ]

If no explain:

Atypical Situation? Yes [ ] No [X] Explain

Is this a potential Problem Area? Yes [ ] No [X] Explain

Wetland Determination

(Check One Only For Each Criteria)

Dominant Hydrophytic Vegetation (50/20 rule) Yes [ ] No [X]

Wetland Hydrology Yes [ ] No [X]

Hydric Soils Yes [ ] No [X]

Wetland Type:

Rational for Determination:

Wetland Determination

YES [ ] NO [X]

Vegetation

Tree Stratum: (Plot size: 10m)	%Cover	Dominant Species	Indicator Status
1. Picea rubens	5		FACU
2. Larix laricina	10		FACW
3. Acer rubrum	25	X	FAC
4. Betula populifolia	25	X	FAC
5. Pinus strobus	5		FACU
	70	= Total Cover	

Shrub Stratum: (Plot size: 5m)			
1. Betula populifolia	5	X	FAC
2. Corylus cornuta	2	X	FACU
3. Spirea alba	5	X	FACW
4. Acer rubrum	5	X	FAC
5. Sorbus Americana	2	X	FAC
	19	= Total Cover	

Herb Stratum: (Plot size: 2m)			
1. Cornus Canadensis	5		FAC
2. Pteridium aquilinum	50	X	FACU
3. Rubus allegheniensis	5		FACU
4. Syphotricum sp.	5		FAC
5.			
	65	= Total Cover	

Dominance Test Worksheet:

Total # of Dominant Species that are OBL,FACW,FAC: 6 (A)

Total # of Dominant Species across all strata: 8 (B)

% of Dominant Species that are OBL,FACW,FAC: 75 (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL Species	0	x1 =	
FACW Species	15	x2 =	30
FAC Species	72	x3 =	216
FACU Specie	67	x4 =	268
UPL Species		x5 =	
Column Totals:	154	x1 =	514

Prevalence Index = B/A = 3.34

Hydrophytic Vegetation Indicators:

- [ ] Rapid Test for Hydrophytic Vegetation
- [X] Dominance Test is >50% (See comment)
- [ ] Prevalence Index is ≤3.0[1]
- [ ] Morphological Adaptations[1] (explain)
- [ ] Problematic Hydrophytic Vegetation[1] (explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Comments: Dominance test shows general weakness of this method. A PI score of 3.3 is "strongly" upland oriented. Terrestrial mosses dominant but with sphagnum in depressions. The site has a cool moist climate

Hydrophytic Vegetation Present? Yes ____ No X

New Brunswick Department of Environment Wetland Delineation Data Sheet

Hydrology

Primary Hydrological Indicators: (minimum of one is required; check all that apply)

__ Surface Water (A1)
__ High Water Table (A2)
__ Saturation (A3)
__ Water Marks (B1)
__ Sediment Deposits (B2)
__ Drift Deposits (B3)
__ Algal Mat or Crust (B4)
__ Iron Deposits (B5)
__ Inundation Visible on Aerial Imagery (B7)
__ Sparsely Vegetated Concave Surface (B8)
__ Water Stained Leaves (B9)
__ Aquatic Fauna (B13)
__ Marl Deposits (B15)
__ Hydrogen Sulfide Odor (C1)
__ Oxidized Rhizospheres on Living Roots (C3)
__ Presence of Reduced Iron (C4)
__ Recent Iron reduction in tilled Soils (C6)
__ Thin Muck Surface (C7)
__ Other (Explain in Remarks)

Secondary Indicators: (minimum of two required)

__ Surface Soil Cracks (B6)
__ Drainage Patterns (B10)
__ Moss Trim Lines (B16)
__ Dry-Season Water Table (C2)
__ Crayfish Burrows (C8)
__ Saturation Visible on Aerial Imagery (C9)
__ Stunted or Stressed Plants (D1)
__ Geomorphic Position (D2)
__ Shallow Aquitard (D3)
__ Microtopographic Relief (D4)
__ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes___ No X Depth___

Water Table Present? Yes___ No X Depth___

Saturation Present? Yes___ No X Depth___

Wetland Hydrology Present? Yes___ No X

Comments:

Soil Profile

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators)

Depth(cm)	Matrix		Redox Features					
	Color(moist)	%	Color(moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	7.5YR 2.5/3	100					Clay-Sil	
4-16	7.5YR 5/3	100					Sil-Sand	Loamy texture
16-30	5YR 5/3	100					Grav.-Sand	Stony and compact

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains.[2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
__ Stratified Layers (A5)
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Sandy Mucky Mineral (S1)
__ 5cm Mucky Peat or Peat (S3)
__ Sandy Gleyed Matrix (S4)
__ Sandy Redox (S5)
__ Stripped Matrix (S6)
__ Dark Surfaces (S7)
__ Polyvalue Below Surface (S8)
__ Thin Dark Surface (S9)
__ Loamy Gleyed Matrix (F2)
__ Depleted Matrix (F3)
__ Redox Dark Surface (F6)
__ Depleted Dark Surface (F7)
__ Redox Depressions (F8)

Restrictive Layer (if observed): Type_____ Depth:_____

Hydric Soil Present? Yes___ No X

Comments:

Wetland Habitat Form WL2

Name of Investigator: Garrett Bell & Mike Lewey
Date: July 23, 2021
Wetland Form: Marsh
Wetland size: ~ 6.5 ha
Associated Watercourse: Irvine Brook
Weather: Sunny, warm, no recent rain

Topographic Sheet: 21 G/16
General Location: Oromocto, NB
County: Sunbury
PID No.: 60058690
Project No.: TE181447
Client: PSPC

Wetland Type:
1.Aquatic bed/unconsolidated bottom (AB) ___
2.Bog(BO) ___
3.Fen (FE) ___
4.Emergent wetland (EW) ___
5.Shrub wetland (SB) _X__
6.Forested wetland (FW) ___

Wetland Class:
1.Open water ___
2.Deep marsh ___
3.Shallow marsh ___
4.Seasonally flooded flats ___
5.Meadow ___
6.Shrub swamp _X__
7.Wooded swamp ___
8.Bog _X__

Wetland Subclass:
1.Vegetated open water ___
2.Non-vegetated OW ___
3.Floating leaved OW ___
4.Rooted floating leaved OW ___
5.Dead woody OW ___
6.Vegetated deep marsh ___
7.Non-vegetated DM ___
8.Dead woody DM ___
9.Sub-shrub DM ___
10.Floating leaved DM ___
11.Rooted floating leaved DM ___
12.Robust DM ___
13.Narrow-leaved DM ___
14.Broad-leaved DM ___
15.Dead woody shallow marsh ___
16.Robust SM ___
17.Narrow leaved SM _X__
18.Broad leaved SM ___
19.Floating leaved SM ___
20.Rooted floating leaved SM ___
21.Non-vegetated SM ___
22.Emergent seasonally flooded flats ___
23.Shrubby SFF ___
24.Grazed meadow ___
25.Ungrazed M ___
26.Sedge M ___
27.Sapling shrub swamp ___
28.Bushy SS ___
29.Compact SS _X__
30.Low sparse SS ___
31.Deciduous wooded swamp __
32.Evergreen WS ___
33.Wooded bog ___
34.Shrubby B ___
35.Open B _X__

Water Regime Indicator:
1.Permanently flooded ___
2.Saturated _X__
3.Seasonally flooded _X__

Water Depth:
1.0-5 cm _X__
2.5-20 cm ___
3.20-50 cm ___
4.50-100 cm ___
5.>100 cm ___

Impoundment Type

1.Beaver Pond ___
2.Man-made Impoundment ___
3.Ducks Unlimited Impoundment ___
4. None of the above _X__

Percent Vegetation Cover:

1.>95% _X__
2.76-95% in peripheral band ___
3.76-95% in patches ___
4.26-75% in peripheral band ___
5.26-75% in patches ___
6.5-25% in peripheral band ___
7.5-25% in patches ___
8.< 5% ___

Wetland Site:

1.Lacustrine ___
2.Riverine ___
3.Palustrine _X__
4.Isolated ___
5.Deltaic ___

Vegetation Types (%):

1.Deciduous trees	5% grey birch
2.Coniferous trees	
3.Dead trees	2%
4.Tall shrubs	10% speckled alder, Canada holly
5.Low shrubs	15% meadow-sweet, red-osier dogwood
6.Dead shrubs	
7.Herbs	15% sensitive fern, bog candle, purple-stemmed aster,
8.Mosses	50% sphagnum
9.Narrow-leaved emergents	60% soft rush, blue joint grass, rattle-snake grass, *Carex crinita, C. flava*
10.Broad-leaved emergents	5% wool-grass
11.Robust emergents	5% cattails
12.Free-floating plants	
13.Floating plants (rooted)	
14.Submerged plants	
15. Other	

Interspersion: 1.Minimal ___ 2.Low ___ 3.Medium _X__ 4.High ___

Water Quality

Conductivity: _N/A__
pH: _N/A__
Alkalinity: _N/A__

Hydrological Classification:

1.Surface water depression ___
2.Ground water depression ___
3.Surface water slope _X__
4.Ground water slope _X__

Inlets/Outlets/water bodies:

No inlet, one outlet associated with Irvine Brook. Internal drainage is contorted, likely reflecting severe historic ground disturbance caused by military training.

Wildlife: (Observation/Signs/Reports)

Eagle (with large snake in talons), northern leopard frog, deer tracks.

Adjacent Wildlife habitat (%):

1.Salt marsh ___
2.Forest _100__ (mixed forest)
3.Dykelands ___
4.Mudflats ___
5.Beach ___
6.River ___
7. Other ___

Description: Immature mixed forest including grey birch, white birch, red maple, trembling aspen, red spruce, eastern cedar and balsam fir.

Surrounding Land Use %:

1 Agriculture ___
2.Forestry ___
3 Recreation ___
4.Industrial ___
5.Urban development ___
6.Transportation ___
7.Residential ___
8.Waste Disposal ___
9.Scientific Research ___
10.Trapping ___
11.Education ___
12.Seasonal resident ___

Description: The majority of the surrounding forest is undeveloped; regenerating since severe historic impacts from military training in the 1960's.

Disturbance: 1.Low ___ 2.Moderate _X__ 3.High ___

Description: The wetland surface has been severely disturbed by historic military training activity but is now fully vegetated. Drainage is deranged by numerous local depressions and narrow ridges, but a channel system has formed draining to the west. Many man-made trenches are present.

Roads and/or tracks:

1.Private road adjacent ___
2.DOT road adjacent ___
3.Private road within ___
4.DOT road within ___
5.Vehicle tracks ___
6.Other _X__

Description: There are numerous old tracks within the wetland and adjacent upland created by historic military training. None are recent or currently used. Most are fully vegetated or filled with water.

Existing Uses of Wetlands:

1.Economic use (e.g. farming) ___
2.Recreational activities ___
3.Aesthetics ___
4.Education & public awareness ___
5. None evident _X__

Potential Threats: Access is generally restricted as the land is within the army base property, although not within the currently established training area.

Special Features:

1.Rare wetland type ___
2.Rare animal or plant species ___
3.Habitat of rare species ___
4.Nesting site for colonial water birds ___
5.Migration stop-over site ___
6. None evident _X__

Description:

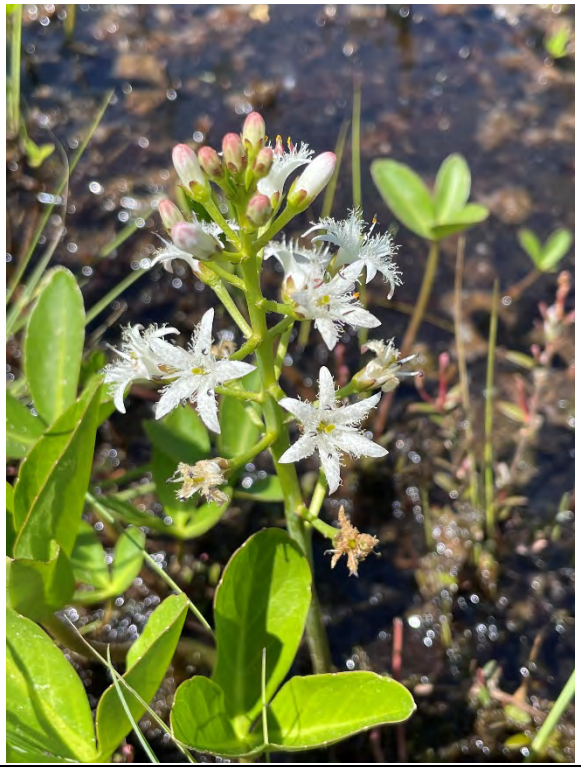
Notes: The highly disturbed nature of the site has likely resulted in the transitional state of regenerating forest and shrub habitats in the adjacent upland. The lack of significant standing water limits the use by waterfowl. There was no sign of beaver activity in the field surveyed area but aerial images indicate some likely beaver dams downgradient.

WL2 Photo 1:
Wetland 2 is a discharge basin marsh located in a deranged landscape of disturbed ground impacted by historic military training activity. The vegetation in the wetland is composed mainly of shrubby and grassy meadow with isolated pockets of shallow standing water and linear (north-south) micro-ridges. 28 May 2021

Direction:
North

WL2 Photo 2:
In some depressions, shallow sphagnum moss has grown with cranberry and other bog associated plants.. 28 May 2021

Direction:
West



WL2 Photo 3:
Buckbean, a typical spring wetland herb was flowering. 28 May 2021

Direction:
North

WL2 Photo 4:
The northwest part of the wetland becomes progressively more grassy. The survey extended far outside the project footprint and was ended about 100 m northwest of the site. 03 July 2021

Direction:
North

WL2 Photo 5:
The wetland soil pit revealed a fully saturated mineral depleted matrix with water table almost at the surface. 03 July 2021.

Direction:
Southwest

WL2 Photo 6:
The upland soil pit revealed a well drained brightly coloured sandy soil with coarse gravel and some stones. 03 July 2021.

Direction:
Southwest

WL2 Photo 7:
The surrounding upland is almost entirely immature mixed forest on highly disturbed ground. 03 July 2021.

Direction:
East

WL2 Photo 8:
Frequently, the surrounding forest fingers into the wetland margin and there is a high degree of interspersion. 03 July 2021.

Direction:
North

New Brunswick Department of Environment Wetland Delineation Data Sheet

Project Site: TE181447 Date: July 23, 2021 Sample Point: WL2-wet

Applicant/Owner: PSPC (for DND) Field Investigator(s): Garrett Bell & Mike Lewey

County: Sunbury Coordinates: N45.827447 / E-66.453449

PID: 60058690 Do normal environmental conditions exist on-site? Yes [X] No [ ]

if no explain:

Atypical Situation? Yes [ ] No [X] Explain

Is this a potential Problem Area? Yes [ ] No [X] Explain

Wetland Determination

(Check One Only For Each Criteria)

Dominant Hydrophytic Vegetation (50/20 rule) Yes [X] No [ ]

Wetland Hydrology Yes [X] No [ ]

Hydric Soils Yes [X] No [ ]

Wetland Type: Discharge Basin Marsh

Rational for Determination: All wetland criteria present

Wetland Determination

YES [X] NO [ ]

Vegetation

Tree Stratum: (Plot size: 10m)	%Cover	Dominant Species	Indicator Status
1. Larix laricina	2	X	FACW
2. Betula populifolia	2	X	FAC
3.			
4.			
5.			
	4 = Total Cover		

Shrub Stratum: (Plot size: 5m)			
1. Cornus sericea	5	X	FACW
2. Spirea alba	10	X	FACW
3. Ilex verticillata	5	X	FACW
4.			
5.			
	20 = Total Cover		FACW

Herb Stratum: (Plot size: 2m)			
1. Calamagrostis canadensis	55	X	OBL
2. Onoclea sensibilis	5		FACW
3. Lysimachia terrestris	5		OBL
4. Carex crinita	5		OBL
5. Scirpus cyperinus	10		OBL
	90 = Total Cover		

Dominance Test Worksheet:

Total # of Dominant Species that are OBL,FACW,FAC: 6 (A)

Total # of Dominant Species across all strata: 6 (B)

% of Dominant Species that are OBL,FACW,FAC: 100 (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL Species	75	x1 =	75
FACW Species	27	x2 =	54
FAC Species	2	x3 =	4
FACU Specie		x4 =	
UPL Species		x5 =	
Column Totals:	114	x1 =	133

Prevalence Index = B/A = 1.16

Hydrophytic Vegetation Indicators:

__ Rapid Test for Hydrophytic Vegetation

X Dominance Test is >50%

X Prevalence Index is ≤3.0[1]

__ Morphological Adaptations[1] (explain)

__ Problematic Hydrophytic Vegetation[1] (explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Comments

Hydrophytic Vegetation Present? Yes X No

Hydrology

Primary Hydrological Indicators: (minimum of one is required; check all that apply)

- [x] Surface Water (A1)
- [x] High Water Table (A2)
- [ ] Saturation (A3)
- [ ] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [ ] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [ ] Sparsely Vegetated Concave Surface (B8)
- [ ] Water Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] Marl Deposits (B15)
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres on Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron reduction in tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators: (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [ ] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Stunted or Stressed Plants (D1)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] Microtopographic Relief (D4)
- [x] FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes [x] No [ ] Depth 5 cm

Water Table Present? Yes [x] No [ ] Depth 25 cm

Saturation Present? Yes [x] No [ ] Depth 0 cm

Wetland Hydrology Present? Yes [X] No [ ]

Comments: Surface water present in shallow depressions, possibly formed by historic disturbance from military training activities. A small contorted stream drains the wetland internally with 1 outlet and no inlets.

Soil Profile

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators)

Depth(cm)	Matrix		Redox Features					
	Color(moist)	%	Color(moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-30	7.5YR 4/2	100					C/Sil	High-organic (poorly humified grass)

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- [ ] Histosol (A1)
- [ ] Histic Epipedon (A2)
- [ ] Black Histic (A3)
- [ ] Hydrogen Sulfide (A4)
- [ ] Stratified Layers (A5)
- [ ] Depleted Below Dark Surface (A11)
- [ ] Thick Dark Surface (A12)
- [ ] Sandy Mucky Mineral (S1)
- [ ] 5cm Mucky Peat or Peat (S3)
- [ ] Sandy Gleyed Matrix (S4)
- [ ] Sandy Redox (S5)
- [ ] Stripped Matrix (S6)
- [ ] Dark Surfaces (S7)
- [ ] Polyvalue Below Surface (S8)
- [ ] Thin Dark Surface (S9)
- [ ] Loamy Gleyed Matrix (F2)
- [x] Depleted Matrix (F3)
- [ ] Redox Dark Surface (F6)
- [ ] Depleted Dark Surface (F7)
- [ ] Redox Depressions (F8)

Restrictive Layer (if observed): Type_____ Depth:_____

Hydric Soil Present? Yes [X] No [ ]

Comments:

New Brunswick Department of Environment Wetland Delineation Data Sheet

Project Site: TE181447 Date: July 23, 2021 Sample Point: WL2-up

Applicant/Owner: PSPC (for DND) Field Investigator(s): Garrett Bell & Mike Lewey

County: Sunbury Coordinates: N45.827511 / E-66.453111

PID: 60058690 Do normal environmental conditions exist on-site? Yes [X] No [ ]

if no explain:

Atypical Situation? Yes [ ] No [X] Explain

Is this a potential Problem Area? Yes [ ] No [X] Explain

Wetland Determination

(Check One Only For Each Criteria)

Dominant Hydrophytic Vegetation (50/20 rule) Yes [ ] No [X]

Wetland Hydrology Yes [ ] No [X]

Hydric Soils Yes [ ] No [X]

Wetland Type:

Rational for Determination:

Wetland Determination

YES [ ] NO [X]

Vegetation

Tree Stratum: (Plot size: 10m)	%Cover	Dominant Species	Indicator Status
1. Betula populifolia	50	X	FAC
2. Populus tremuloides	25	X	FACU
3.			
4.			
5.			
	75 = Total Cover		

Shrub Stratum: (Plot size: 5m)			
1. Spirea alba	10	X	FACW
2. Populus tremuloides	5	X	FACU
3.			
4.			
5.			
	15 = Total Cover		

Herb Stratum: (Plot size: 2m)			
1. Solidago rugosa	50	X	FAC
2. Rubus idaeus	10	X	FACU
3. Veronica officinalis	5		FACU
4. Hieracium canadense	5		UPL
5. Onoclea sensibilis	5		FACW
	65 = Total Cover		

Dominance Test Worksheet:

Total # of Dominant Species that are OBL,FACW,FAC: 3 (A)

Total # of Dominant Species across all strata: 6 (B)

% of Dominant Species that are OBL,FACW,FAC: 50 (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL Species	0	x1 =	
FACW Species	15	x2 =	30
FAC Species	100	x3 =	300
FACU Specie	45	x4 =	180
UPL Species	5	x5 =	25
Column Totals:	165	x1 =	535

Prevalence Index = B/A = 3.24

Hydrophytic Vegetation Indicators:

__ Rapid Test for Hydrophytic Vegetation
__ Dominance Test is >50% (See comment)
__ Prevalence Index is ≤3.0[1]
__ Morphological Adaptations[1] (explain)
__ Problematic Hydrophytic Vegetation[1] (explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Comments: A PI score of 3.24 is distinctly upland oriented.

Hydrophytic Vegetation Present? Yes ____ No X

New Brunswick Department of Environment Wetland Delineation Data Sheet

Hydrology

Primary Hydrological Indicators: (minimum of one is required; check all that apply)

__ Surface Water (A1)
__ High Water Table (A2)
__ Saturation (A3)
__ Water Marks (B1)
__ Sediment Deposits (B2)
__ Drift Deposits (B3)
__ Algal Mat or Crust (B4)
__ Iron Deposits (B5)
__ Inundation Visible on Aerial Imagery (B7)
__ Sparsely Vegetated Concave Surface (B8)
__ Water Stained Leaves (B9)
__ Aquatic Fauna (B13)
__ Marl Deposits (B15)
__ Hydrogen Sulfide Odor (C1)
__ Oxidized Rhizospheres on Living Roots (C3)
__ Presence of Reduced Iron (C4)
__ Recent Iron reduction in tilled Soils (C6)
__ Thin Muck Surface (C7)
__ Other (Explain in Remarks)

Secondary Indicators: (minimum of two required)

__ Surface Soil Cracks (B6)
__ Drainage Patterns (B10)
__ Moss Trim Lines (B16)
__ Dry-Season Water Table (C2)
__ Crayfish Burrows (C8)
__ Saturation Visible on Aerial Imagery (C9)
__ Stunted or Stressed Plants (D1)
__ Geomorphic Position (D2)
__ Shallow Aquitard (D3)
__ Microtopographic Relief (D4)
__ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes___ No X Depth___

Water Table Present? Yes___ No X Depth___

Saturation Present? Yes___ No X Depth___

Wetland Hydrology Present? Yes___ No X

Comments:

Soil Profile

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators)

Depth(cm)	Matrix		Redox Features					
	Color(moist)	%	Color(moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	7.5YR 2.5/2	100					Sil-Sand	
2-10	5YR 5/3	100					Sil-Sand	Loamy texture
10-30	5YR 4/3	100					Grav.-Sand	Stony and compact

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains.[2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
__ Stratified Layers (A5)
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Sandy Mucky Mineral (S1)
__ 5cm Mucky Peat or Peat (S3)
__ Sandy Gleyed Matrix (S4)
__ Sandy Redox (S5)
__ Stripped Matrix (S6)
__ Dark Surfaces (S7)
__ Polyvalue Below Surface (S8)
__ Thin Dark Surface (S9)
__ Loamy Gleyed Matrix (F2)
__ Depleted Matrix (F3)
__ Redox Dark Surface (F6)
__ Depleted Dark Surface (F7)
__ Redox Depressions (F8)

Restrictive Layer (if observed): Type_____ Depth:_____

Hydric Soil Present? Yes___ No X

Comments:

Appendix C

Bird Species List

Table C-1: Bird Species Observed During Field Surveys

Common Name	*Scientific Name*	Priority Status	Observation Location	
			Project Area	Wetland
Red-winged Blackbird	*Agelaius phoeniceus*	-		X
American Black Duck	*Anas rubripes*	-		X
Great Blue Heron	*Ardea herodias*	-		X
Ring-necked Duck	*Aythya collaris*	-		X
Cedar Waxwing	*Bombycilla cedrorum*	-	X	
Ruffed Grouse	*Bonasa umbellus*	-	X	
Canada Goose	*Branta canadensis*	-		X
Wilson's Warbler	*Cardellina pusilla*	-		X
Northern Cardinal	*Cardinalis cardinalis*	-	X	
Veery	*Catharus fuscescens*	-	X	
Northern Flicker	*Colaptes auratus*	-	X	
Rock Pigeon	*Columba livia*	-	X	
American Crow	*Corvus brachyrhynchos*	-		X
Blue Jay	*Cyanocitta cristata*	-	X	X
Downy Woodpecker	*Dryobates pubescens*	-	X	
Hairy Woodpecker	*Dryobates villosus*	-	X	
Pileated Woodpecker	*Dryocopus pileatus*	-	X	
Gray Catbird	*Dumetella carolinensis*	-	X	
Alder Flycatcher	*Empidonax alnorum*	-	X	
Yellow-bellied Flycatcher	*Empidonax flaviventris*	-	X	
Least Flycatcher	*Empidonax minimus*	-	X	
Common Yellowthroat	*Geothlypis trichas*	-	X	X
Swamp Sparrow	*Melospiza georgiana*	-		X
Song Sparrow	*Melospiza melodia*	-	X	
Black-and-White Warbler	*Mniotilta varia*	-	X	
Osprey	*Pandion haliaetus*	-		X
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	-	X	
Black-capped Chickadee	*Poecile atricapillus*	-	X	
Common Grackle	*Quiscalus quiscula*	-	X	X
Ovenbird	*Seiurus aurocapilla*	-	X	
Northern Parula	*Setophaga americana*	-	X	
Yellow-rumped Warbler	*Setophaga coronata*	-	X	
Magnolia Warbler	*Setophaga magnolia*	-	X	
Chestnut-sided Warbler	*Setophaga pensylvanica*	-	X	
Yellow Warbler	*Setophaga petechia*	-	X	X
American Redstart	*Setophaga ruticilla*	-	X	X
Black-throated Green Warbler	*Setophaga virens*	-	X	
Red-breasted Nuthatch	*Sitta canadensis*	-	X	
American Goldfinch	*Spinus tristis*	-	X	X
European Starling	*Sturnus vulgaris*	-	X	
Tree Swallow	*Tachycineta bicolor*	-		X
American Robin	*Turdus migratorius*	-	X	
Red-eyed Vireo	*Vireo olivaceus*	-	X	
Philadelphia Vireo	*Vireo philadelphicus*	-	X	
Mourning Dove	*Zenaida macroura*	-	X	
White-throated Sparrow	*Zonotrichia albicollis*	-	X	

Table C-2: Maritime Breeding Bird Atlas Species List for Square 19FL97

Common Name	Scientific Name	MBCA*	Priority Status	Breeding Evidence Code**	Breeding Status in Square 19FL
Spotted Sandpiper	*Actitis macularius*	Y	ACCDC: S3S4B,S5M	P	Probable
Red-winged Blackbird	*Agelaius phoeniceus*	N	-	NB	Confirmed
Wood Duck	*Aix sponsa*	Y	-	H	Possible
Mallard	*Anas platyrhynchos*	Y	-	NB	Confirmed
American Black Duck	*Anas rubripes*	Y	-	H	Possible
Ruby-throated Hummingbird	*Archilochus colubris*	Y	-	P	Probable
Great Blue Heron	*Ardea herodias*	Y	-	P	Probable
Ring-necked Duck	*Aythya collaris*	Y	-	FY	Confirmed
Cedar Waxwing	*Bombycilla cedrorum*	Y	-	NB	Confirmed
Ruffed Grouse	*Bonasa umbellus*	Y	-	FY	Confirmed
American Bittern	*Botaurus lentiginosus*	Y	-	S	Possible
Canada Goose	*Branta canadensis*	Y	-	NB	Confirmed
Common Goldeneye	*Bucephala clangula*	Y	-	H	Possible
Wilson's Warbler	*Cardellina pusilla*	Y	-	T	Probable
Veery	*Catharus fuscescens*	Y	-	S	Possible
Hermit Thrush	*Catharus guttatus*	Y	-	T	Probable
Swainson's Thrush	*Catharus ustulatus*	Y	-	T	Probable
Brown Creeper	*Certhia americana*	Y	-	S	Possible
Killdeer	*Charadrius vociferus*	Y	ACCDC: S3B,S3M	T	Probable
Common Nighthawk	*Chordeiles minor*	N	ACCDC: S3B,S4M COSEWIC: T SARA: SC	H	Possible
Northern Harrier	*Circus hudsonius*	N	-	H	Possible
Black-billed Cuckoo	*Coccyzus erythropthalmus*	Y	ACCDC: S3B,S3M	S	Possible
Northern Flicker	*Colaptes auratus*	Y	-	S	Possible
American Crow	*Corvus brachyrhynchos*	N	-	T	Probable
Common Raven	*Corvus corax*	N	-	S	Possible
Blue Jay	*Cyanocitta cristata*	N	-	S	Possible
Bobolink	*Dolichonyx oryzivorus*	Y	ACCDC: S3B,S3M COSEWIC/ SARA: T	P	Probable
Downy Woodpecker	*Dryobates pubescens*	Y	-	P	Probable
Hairy Woodpecker	*Dryobates villosus*	Y	-	P	Probable
Pileated Woodpecker	*Dryocopus pileatus*	Y	-	AE	Confirmed
Gray Catbird	*Dumetella carolinensis*	Y	-	S	Possible
Alder Flycatcher	*Empidonax alnorum*	Y	-	T	Probable
Wilson's Snipe	*Gallinago delicata*	Y	ACCDC: S3S4B,S5M	S	Possible
Common Loon	*Gavia immer*	Y	-	S	Possible
Common Yellowthroat	*Geothlypis trichas*	Y	-	T	Probable
House Finch	*Haemorhous mexicanus*	Y	-	NB	Confirmed
Purple Finch	*Haemorhous purpureus*	Y	-	P	Probable
Bald Eagle	*Haliaeetus leucocephalus*	N	-	P	Probable
Barn Swallow	*Hirundico rustica*	Y	ACCDC: S2B,S2M COSEWIC/ SARA: T	AE	Confirmed
Baltimore Oriole	*Icterus galbula*	Y	ACCDC: S3B,S3M	P	Probable
Dark-eyed Junco	*Junco hyemalis*	Y	-	T	Probable
Hooded Merganser	*Lophodytes cucullatus*	Y	-	H	Possible
American Wigeon	*Mareca americana*	Y	-	P	Probable
Belted Kingfisher	*Megaceryle alcyon*	N	-	P	Probable
Swamp Sparrow	*Melospiza georgiana*	Y	-	S	Possible
Song Sparrow	*Melospiza melodia*	Y	-	NB	Confirmed
Black-and-white Warbler	*Mniotilta varia*	Y	-	NB	Confirmed
Brown-headed Cowbird	*Molothrus ater*	N	ACCDC: S3B,S3M	H	Possible
Great Crested Flycatcher	*Myiarchus crinitus*	Y	ACCDC: S2S3B,S2S3M	S	Possible

Nashville Warbler	*Oreothlypis ruficapilla*	Y	-	T	Probable
Osprey	*Pandion haliaetus*	N	-	P	Probable
House Sparrow	*Passer domesticus*	Y	-	H	Possible
Savannah Sparrow	*Passerculus sandwichensis*	Y	-	CF	Confirmed
Cliff Swallow	*Petrochelidon pyrrhonota*	Y	ACCDC: S2S3B,S2S3M	NY	Confirmed
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	Y		S	Possible
Pied-billed Grebe	*Podilymbus podiceps*	Y		S	Possible
Black-capped Chickadee	*Poecile atricapillus*	Y		T	Probable
Purple Martin	*Progne subis*	Y	ACCDC: S1B,S1M	AE	Confirmed
Common Grackle	*Quiscalus quiscula*	N		CF	Confirmed
Ruby-crowned Kinglet	*Regulus calendula*	Y		T	Probable
Golden-crowned Kinglet	*Regulus satrapa*	Y		S	Possible
Eastern Phoebe	*Sayornis phoebe*	Y		S	Possible
American Woodcock	*Scolopax minor*	Y		S	Possible
Ovenbird	*Seiurus aurocapilla*	Y		T	Probable
Northern Parula	*Setophaga americana*	Y		T	Probable
Black-throated Blue Warbler	*Setophaga caerulescens*	Y		T	Probable
Yellow-rumped Warbler	*Setophaga coronata*	Y		T	Probable
Blackburnian Warbler	*Setophaga fusca*	Y		S	Possible
Magnolia Warbler	*Setophaga magnolia*	Y		T	Probable
Chestnut-sided Warbler	*Setophaga pensylvanica*	Y		S	Possible
Yellow Warbler	*Setophaga petechia*	Y		S	Possible
Pine Warbler	*Setophaga pinus*	Y		CF	Confirmed
American Redstart	*Setophaga ruticilla*	Y		S	Possible
Black-throated Green Warbler	*Setophaga virens*	Y		S	Possible
Red-breasted Nuthatch	*Sitta canadensis*	Y		T	Probable
White-breasted Nuthatch	*Sitta carolinensis*	Y		S	Possible
Blue-winged Teal	*Spatula discors*	Y		H	Possible
Yellow-bellied Sapsucker	*Sphyrapicus varius*	Y		S	Possible
American Goldfinch	*Spinus tristis*	Y		NB	Confirmed
Chipping Sparrow	*Spizella passerina*	Y		NB	Confirmed
Common Tern	*Sterna hirundo*	Y	ACCDC: S3B,SUM	P	Probable
European Starling	*Sturnus vulgaris*	N		H	Possible
Tree Swallow	*Tachycineta bicolor*	Y		H	Possible
American Robin	*Turdus migratorius*	Y		NY	Confirmed
Eastern Kingbird	*Tyrannus tyrannus*	Y	ACCDC: S3S4B,S3S4M	AE	Confirmed
Warbling Vireo	*Vireo gilvus*	Y	ACCDC: S3B,S3M	S	Possible
Red-eyed Vireo	*Vireo olivaceus*	Y		T	Probable
Blue-headed Vireo	*Vireo solitarius*	Y		T	Probable
Mourning Dove	*Zenaida macroura*	Y		S	Possible
White-throated Sparrow	*Zonotrichia albicollis*	Y		FY	Confirmed

* Y = Yes; N = No; indicates species protection under the federal Migratory Bird Convention Act (MBCA)

** MBBA Breeding Evidence Codes are as follows:

OBSERVED

X: Species observed during its breeding season but in non-breeding habitat (no evidence of breeding)

POSSIBLE BREEDING

H: Species observed during its breeding season in suitable nesting habitat

S: Singing male present, or breeding calls heard, during its breeding season in suitable nesting habitat

PROBABLE BREEDING

P: Pair observed during their breeding season in suitable nesting habitat

T: Permanent territory presumed through registration of territorial song, or the occurrence of an adult bird, at the same place, in breeding habitat, on at least two days, one week or more apart, during its breeding season
D: Courtship or display between a male and a female or 2 males, including courtship feeding or copulation
V: Adult visiting probable nest site
A: Agitated behaviour or anxiety calls of an adult.
B: Brood patch on adult female or cloacal protuberance on adult male.
N: Nest-building or excavation of nest hole (woodpeckers and wrens).

CONFIRMED BREEDING
NB: Nest building (by all except wrens and woodpeckers) or adult carrying nesting material
DD: Distraction display or injury feigning.
NU: Used nest or egg shell found (occupied or laid within the period of the study).
FY: Recently fledged young (nidicolous species) or downy young (nidifugous species), including young incapable of sustained flight.
AE: Adults leaving or entering nest site in circumstances indicating occupied nest.
FS:Adult carrying faecal sac.
CF: Adult carrying food for young.
NE: Nest containing eggs.
NY: Nest with young seen or heard.

Table C-3: Priority Bird Species Reported Within 5 km of the Study Area by the ACCDC

Common Name	Scientific Name	SARA*	COSEWIC*	ACCDC**	Gen Stat***	# of Records
Spotted Sandpiper	*Actitis macularius*			S3S4B,S5M	4 Secure	3
Northern Pintail	*Anas acuta*			S3B,S5M	3 Sensitive	1
Lesser Scaup	*Aythya affinis*			S1B,S4M	4 Secure	7
Brant	*Branta bernicla*			S1N,S2S3M	4 Secure	1
Chimney Swift	*Chaetura pelagica*	T	T	S2S3B,S2M	1 At Risk	2
Killdeer	*Charadrius vociferus*			S3B,S3M	3 Sensitive	7
Common Nighthawk	*Chordeiles minor*	T	SC	S3B,S4M	1 At Risk	1
Evening Grosbeak	*Coccothraustes vespertinus*	SC	SC	S3B,S3S4N,SUM	3 Sensitive	1
Black-billed Cuckoo	*Coccyzus erythropthalmus*			S3B,S3M	4 Secure	1
Eastern Wood-Pewee	*Contopus virens*	SC	SC	S4B,S4M	4 Secure	4
Bobolink	*Dolichonyx oryzivorus*	T	T	S3B,S3M	3 Sensitive	2
Rusty Blackbird	*Euphagus carolinus*	SC	SC	S3B,S3M	2 May Be At Risk	1
Wilson's Snipe	*Gallinago delicata*			S3S4B,S5M	4 Secure	6
Barn Swallow	*Hirundo rustica*	T	T	S2B,S2M	3 Sensitive	4
Baltimore Oriole	*Icterus galbula*			S3B,S3M	4 Secure	2
Ring-billed Gull	*Larus delawarensis*			S3S4B,S5M	4 Secure	2
Glaucous Gull	*Larus hyperboreus*			S2N,S2M	4 Secure	2
Black Scoter	*Melanitta americana*			S3M,S1S2N	3 Sensitive	3
Brown-headed Cowbird	*Molothrus ater*			S3B,S3M	2 May Be At Risk	5
Great Crested Flycatcher	*Myiarchus crinitus*			S2S3B,S2S3M	3 Sensitive	6
Cliff Swallow	*Petrochelidon pyrrhonota*			S2S3B,S2S3M	3 Sensitive	5
American Three-toed Woodpecker	*Picoides dorsalis*			S2S3	3 Sensitive	1
Horned Grebe	*Podiceps auritus*	SC	SC	S4N,S4M	4 Secure	1
Purple Martin	*Progne subis*			S1B,S1M	2 May Be At Risk	4
Bank Swallow	*Riparia riparia*	T	T	S2S3B,S2S3M	3 Sensitive	1
Northern Shoveler	*Spatula clypeata*			S2S3B,S2S3M	4 Secure	2
Greater Yellowlegs	*Tringa melanoleuca*			S1?B,S5M	4 Secure	2
Eastern Kingbird	*Tyrannus tyrannus*			S3S4B,S3S4M	3 Sensitive	1
Warbling Vireo	*Vireo gilvus*			S3B,S3M	4 Secure	3

Note: Data obtained from the ACCDC in September 2020.

* E = Endangered; T = Threatened; SC = Special Concern

** B = breeding; M = mating; U = unknown

*** As reported in Wild Species 2015: The General Status of Species in Canada (Available from: https://www.wildspecies.ca/r

Appendix D

Stormwater Management Plan

Memo

To	**Janet Blackadar**	File no	**TE181447.3000**
From	**Huixi Xie**		
Date	**August 23, 2021**		

Subject: Impact of proposed solar farm development on the peak flows at the NBDTI stream crossing structures, 5CDSB Gagetown

1.0 INTRODUCTION

Department of National Defence (DND) is proposing to construct a five MW solar panel farm at the 5th Canadian Division Support Base (5CDSB) Gagetown. The project requires approximately 10 ha. area. DND completed a site selection process and identified two land parcels within the Range and Training Areas (RTA) of 5CDSB between Shirley Road and Trans-Canada Highway (TCH) (see Figure 1). The parcel of land to the west consists of an area of 14.3 ha. (referred to as the West Parcel in this memo), and the parcel of land to the east consists of an area of 8.5 ha. (referred to as the East Parcel in this memo).

An environmental impact assessment (EIA) is being conducted for the proposed solar panel development. The EIA registration was reviewed by the NB Department of Transportation and Infrastructure (NBDTI) as part of the Technical Review of the registration document. NBDTI requested the following additional information:

- "NBDTI requires that there is no net increase in flow to the receiving watercourse(s) which flow through NBDTI infrastructure downstream of the development.
- Please provide a map showing elevation contours and provide pre- and post-development stormwater flows anticipated for this project, assuming a 100-year return rain event + 20% to account for climate change.
- If the calculated post-development flow is greater than the pre-development flow, a flow attenuation/retention pond will be required."

This memo addresses the NBDTI requests indicated above.

2.0 DESCRIPTION OF SITE AND PROPOSED DEVELOPMENT

Figure 1 shows the topography, the drainage network, and the presence of wetlands in the area of the proposed solar panel site. It is seen that the site is located in the head water area of two small water courses, Irvine Brook and Kinney Creek. Irvine Brook flows under Broad Road and then under TCH where stream crossing structures (likely culverts) are expected. Kinney Creek flows under TCH where a stream crossing structure is also expected. A total of three stream crossing structures identified as C1, C2 and C3 are located downstream of the proposed solar farm development as shown in Figure 1. These locations were confirmed by NBDTI.

The West Parcel is located on the watershed divide between Irvine Brook and Kinney Creek, with approximately 10 ha draining into Irvine Brook and the remainder draining into Kinney Creek. The entire East Parcel is drained by Kinney Creek. The runoff from the portion of the Western Parcel in Irvine Brook watershed reports to a wetland (identified as WL#1) with a surface area of approximately 3.5 ha. Another wetland with a surface area of 5.2 ha is located along Irvine Brook just upstream of TCH (identified as WL#2).

The runoff from the East Parcel and the portion of the West Parcel located in Kinney Creek watershed reports to a wetland immediately downgradient with a surface area of approximately 6.6 ha (identified as WL#3). These wetlands are expected to provide attenuation to peak runoff inflow from the watersheds and the solar panel site.

The Kinney Creek watershed above TCH generally consists of undeveloped forested land. A portion of the Irvine Brook watershed is occupied with urban development. There is also miscellaneous residential development in the watershed. However, most of the Irvine Brook watershed above TCH consists of undeveloped forested land. It is expected that the existing residential and urban development in Irvine Brook watershed contributes to elevated runoff potential above natural forested conditions.

The proposed solar farm development will consist of clearing and grubbing of natural vegetation. Solar panels will be installed on supporting structures, but the ground will remain covered by native soil materials. It is expected that following construction, grassy vegetation will be established in the areas of the solar farm that will promote infiltration and reduce runoff generation. Therefore, while the proposed solar farm may cause an increase in the potential for runoff generation, this increase is assessed to be relatively small.

3.0 PRE AND POST DEVELOPMENT FLOWS

The pre and post development flows were determined using a hydrological modelling approach. For calculating the pre- and post-development flows resulting from a 100-year storm event, a hydrological model was established using the United States Army Corps of Engineers (USACE) software HEC-HMS (Version 4.3) as the modelling platform. Hydrological modeling using HEC-HMS consists of the development of a basin model and a meteorological model. The basin model provides a representation of the hydrological characteristics of the watershed. The meteorological model depicts the rainfall input from the storm event being simulated.

3.1 Basin model

The delineation of sub-watersheds for establishing the basin model is shown in Figure 1. Three sub-watersheds were delineated for Irvine Brook watershed and two sub-watersheds were delineated for Kinney Brook watershed. A summary of the sub-watershed areas is provided in Table 1.

Simulation of runoff generation from a watershed using HEC-HMS includes simulation of rainfall loss to processes including primarily infiltration and evaporation/transpiration. For the purpose of this study, the Soil Conservation Service (SCS) Curve Number (CN) method was used for this simulation. The determination of this parameter takes into consideration primarily the dominant soil characteristics in the sub-watersheds as well as the ground surface and vegetation cover conditions. For the solar farm, the rainfall loss to infiltration will decrease from the existing forested condition, and the CN for the associated sub-watershed will increase. A summary of the selected CN for each of the delineated sub-watersheds for existing and post development conditions is provided in Table 1.

The excess rainfall (rainfall minus loss) will migrate down the slopes and the drainage network in the form of surface runoff before discharging out of a sub-watershed. In this process, the runoff peak will be delayed and attenuated compared with the rainfall process. There are several methods for simulating this process. For the purpose of this study, the SCS unit hydrograph method was selected for simulating the transformation of excess rainfall through a sub-watershed. The input parameter for this method includes lag time defined as the time lag between the peak of rainfall and peak of the runoff discharging out of a sub-watershed. The lag times for the sub-watersheds were determined by multiplying the time of concentration by a factor of 0.6. A summary of the time of concentration and lag time for each of the delineated sub-watersheds is provided in Table 1.

The attenuation effect from the wetlands was simulated in the HEC-HMS model. An elevation/storage curve was required for each of the wetlands for this simulation. For the purpose of this project, these elevation/storage curves were developed based on the surface area of the wetland.

Table 1 - Summary of Sub-watershed Input Parameters for the Basin Model

Sub-watershed/Wetland	Drainage Area (ha.)	Weighted SCS Curve Number		Time of Concentration (min)	Lag Time (min)
		Existing	Post Development		
IV1 (Excluding WL1)	48.4	70	71.5	48	29
WL1	3.5	n/a	n/a	n/a	n/a
IV2	156.5	77	77	63	38
IV3 (excluding WL2)	146.8	71	71	67	40
WL2	5.2	n/a	n/a	n/a	n/a
KN1 (Excluding WL3)	25	70	85	35	21
WL3	6.6	n/a	n/a	n/a	n/a
KN2	9.2	70	70	25	15

3.2 Meteorological model

A meteorological model was required representing the 100-year storm event. As a data input alternative, the Intensity, Duration and Frequency (IDF) data for a 24-hour event can be entered into the model, and HEC-HMS uses this data to generate the rainfall distribution data. The Environment Canada 1:100-year IDF data for Fredericton (#8101605) as summarized in Table 2 was used for this purpose.

Table 2 - IDF Data Used for Modelling 100-year Rainfall Event

Duration (min)	1:100 Year Rainfall Amount (mm)
5	14.6
10	21.9
15	25.4
30	30.4
60	48.8
120	58.4
360	86.5
720	108.4
1440	127.5

4.0 PRE AND POST DEVELOPMENT FLOWS

A summary of the 1:100 year peak flows reporting to the NBDTI stream crossing structures downstream of the proposed solar panel site modeled using HEC-HMS is provided in Table 3. The modelling was conducted for existing and for future rainfall conditions. For the future condition, the 1:100 rainfall presented in Table 2 was increased by 20 percent. The peak flows reporting to the identified stream crossing structures under existing conditions and post solar farm development conditions are compared. It is seen

that the proposed solar farm development will result in negligible increase in 1:100 year flows at the three stream crossing structures downstream.

Table 3 Summary of modelled flows at the stream crossing structures

Stream Crossing ID	Upstream Drainage Area (ha.)	100 year peak flow for existing climate (m^3/s)		100 year peak flow for projected climate (m^3/s)	
		Existing Condition	Post solar panel farm development	Existing Condition	Post solar panel farm development
C1	208	11.7	11.7	15.9	16.0
C2	360	8.0	8.0	11.9	12.0
C3	41	0.9	1.0	1.2	1.3

5.0 SUMMARY OF FINDINGS

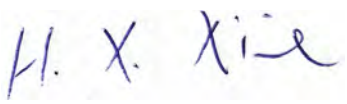
The proposed solar farm will only marginally elevate the runoff potential within its footprint areas from the existing forested conditions. The elevated runoff potential will be attenuated by the wetlands downstream prior to reporting to the DTI stream crossing structures. The modelling results show that there is negligible increase in 100 year peak flow at the three NBDTI stream crossing structures resulting from the proposed solar farm development. Therefore, it is our opinion that no additional attenuation/runoff pond will be necessary for the proposed solar farm development.

6.0 CLOSURE

This memorandum was prepared by Huixi Xie, M.Sc., P.Eng. It is reviewed by Ian Hill, P.Eng. We trust that the information presented in this memorandum meets your current requirements. Should you have any questions, or concerns, please contact the undersigned.

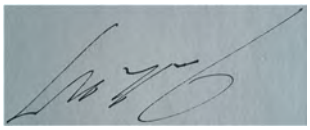
Wood Environment & Infrastructure Solutions,
a Division of Wood Canada Limited.

Prepared by:



Huixi Xie, MSc.Eng., P.Eng
Senior Hydrotechnical Engineer

Reviewed by:



Ian Hill, Ph.D, P.Eng.,
Senior Hydrotechnical Engineer

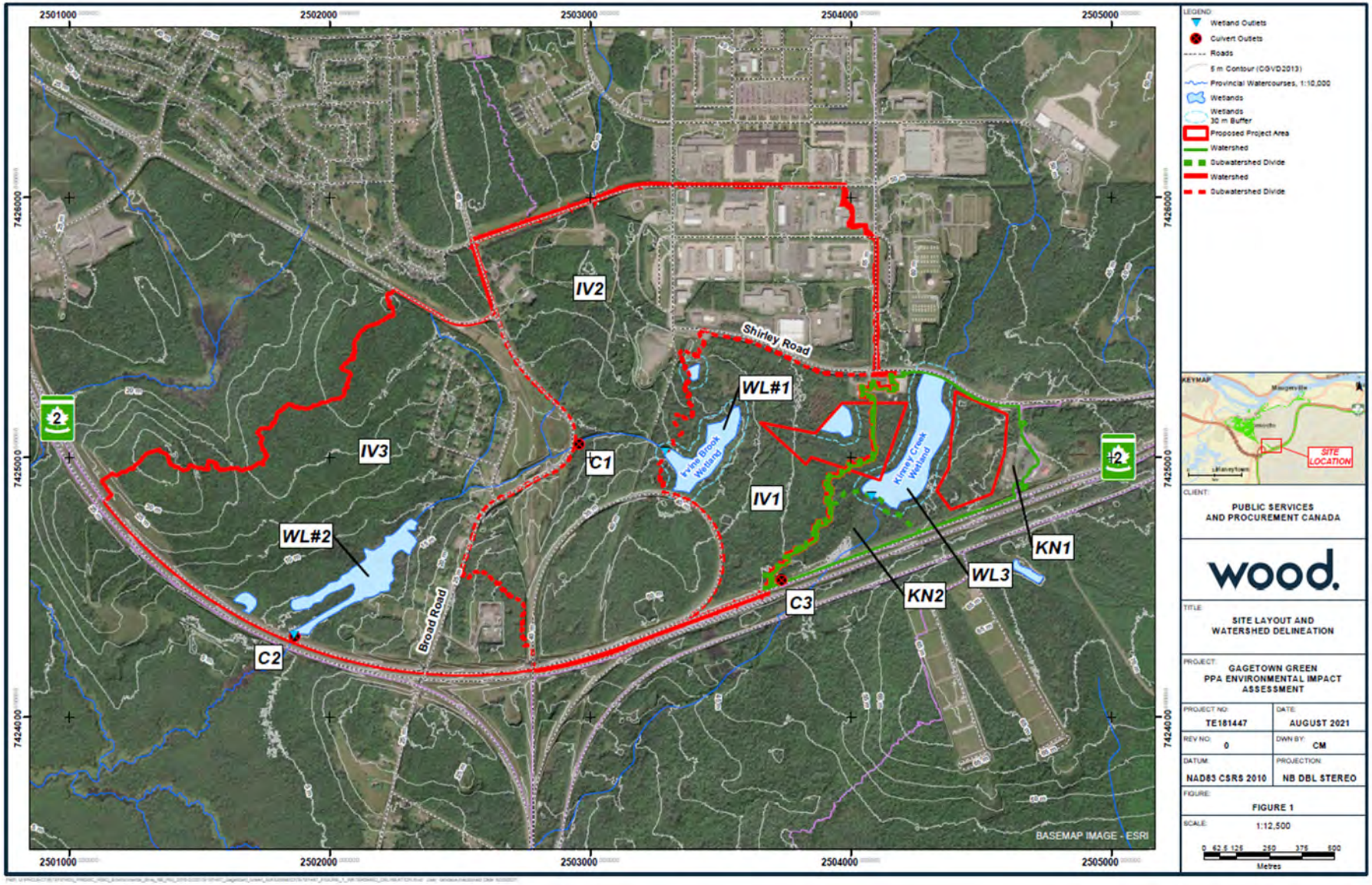


Figure 1 Site layout and watershed delineation

Appendix E

Public Information Program Documentation

28 April 2020

Chief [redacted]
[redacted] First Nation
[redacted]
[redacted]
[redacted]

Dear Chief [redacted],

Notification of Consideration of a Green Power Purchase Agreement (Green PPA) at 5 CDSB Gagetown.

The Department of National Defence (DND) is in the preliminary phase of evaluating a Green PPA at 5 CDSB Gagetown. A Green PPA is a service agreement between a consumer (DND) and a power producer for the purchase of electricity from renewable sources.

The purpose of this Green PPA will be to provide a clean source of power diversified from the grid to 5 CDSB Gagetown. DND is proposing the following schedule for the PPA, which would include the following activities:

- Release the Request for Information (RFI) to potential suppliers in May 2020.
- Start the procurement process: Request for Qualifications (RFQ) in mid-2020, Request for Proposals (RFP) in late-2020.
- Construct a 5 MW renewable energy facility, sized to meet the minimum load of the substation, in order for DND to consume 100% of the energy produced without feeding any excess to the grid.
- 3 different sites are being considered for this Green PPA to ensure that there are no risks or construction constraints (refer to attached maps):
    - Site 1: Southwest Shirley Road
    - Site 2: Lindsey Valley
    - Site 3: Goans Orchard

I would like to hear from you any comments, questions or concerns that you may have regarding this Green PPA, in 5 CDSB Gagetown.

The department is committed to undertake its operations in a way that is respectful of Indigenous rights, culture, and traditional knowledge and in support of Indigenous economic development opportunities.

Thank you for your time in considering this request. Please provide your feedback by **28 May 2020** to ensure your comments will be considered in the continued planning of this Green PPA. If you are unable to reply by this date but want to contribute information, please advise.

If you have any questions or concerns, or require additional information, please do not hesitate to contact me via e-mail at danny.wisniowski-wong@forces.gc.ca

Yours sincerely,

Danny Wisniowski-Wong
A/Manager Public-Private Partnership / Power Purchase Agreement Team
Directorate of Portfolio Innovation

cc: Cameron McEwen, A/Executive Director of Portfolio Innovation

Attachments: Maps of the Areas of Interest

Site 1: Southwest Shirley Road 14.34 ha / 8.5 ha
Situated between Shirley Road and Trans-Canada Hwy 2. Sloped slightly south two parcels separated by wetlands. Overall the site has low vegetation growth, no mature growth. Site would likely be visible to public from the highway. Has no current operational use or forecasted plan. Access via maintained road from within Garrison. Existing power distribution lines located adjacent to the site.

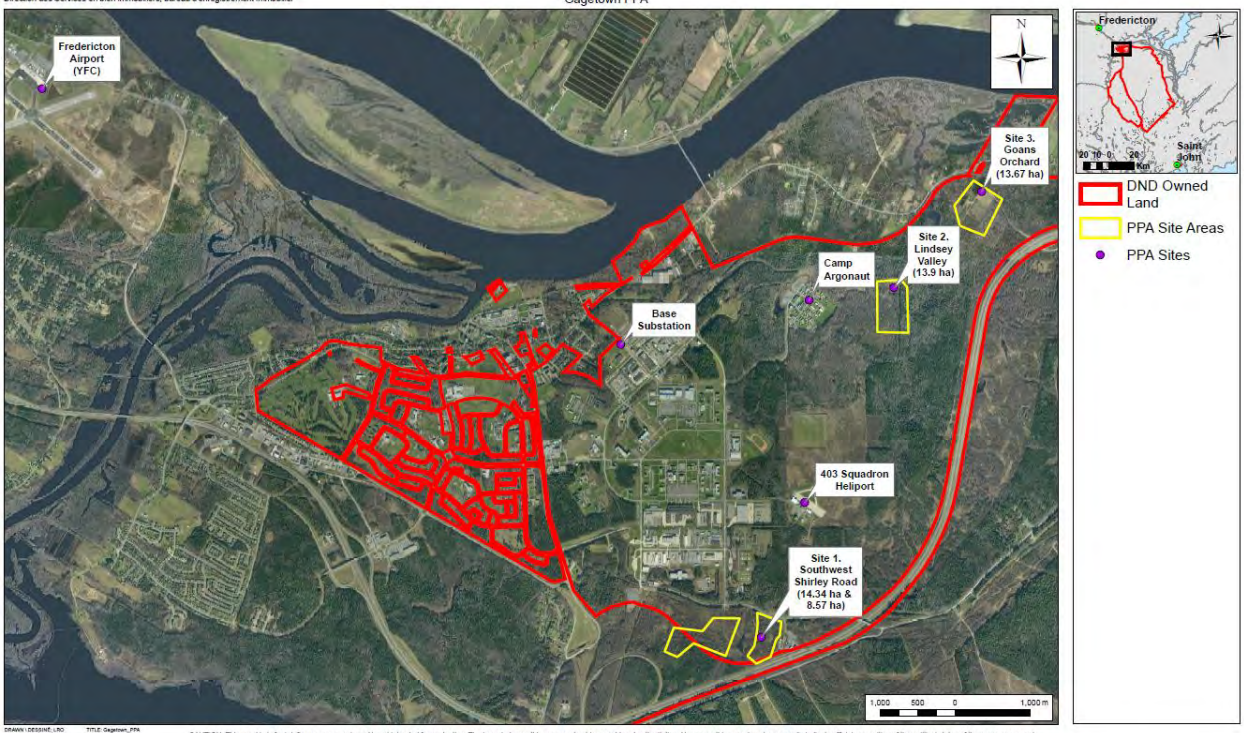
Site 2: Lindsey Valley 13.19 ha
Located off Nashwaak Street in the Lindsey Valley Area approx. 2 km west of Base Gagetown. Area is relatively flat with various wetlands and streams in the general area. The site has medium density vegetation largely covered with trees. Operationally the site has little use however local First Nations have a site located in the area which may have to be avoided. There is access via a maintained road and power distribution is adjacent to the site.

Site 3: Goans Orchard. 16.67 ha
Located off Rte. 102 and Shanks Road in Burton NB approx. 3km north-west of Base Gagetown. The site varies between field, low vegetation and mature trees. Area is flat with a slight south east slope. Operationally the site is used as a bivouac for the military. There is exterior access from Burton via existing road allowing for private access to the site. A 600m power distribution extension line would be required above what would be required for site 1&2.

National Defence / Défense nationale
Directorate of Real Property Services, Land Registry Office
Direction des Services en bien immobiliers, bureau d'enregistrement immobilier

CFB Gagetown
Gagetown, NB
Gagetown PPA

Canada



DND Owned Land
PPA Site Areas
PPA Sites

DRAWN : DESSINÉ : LBO
CHECKED : VÉRIFIÉ : LBO
REVIEWED : EXAMINÉ : LBO
DATE : 25-MAR-2020

TITLE: Gagetown_PPA
IMAGE TYPE: AERIAL
IMAGE DATE: 2010

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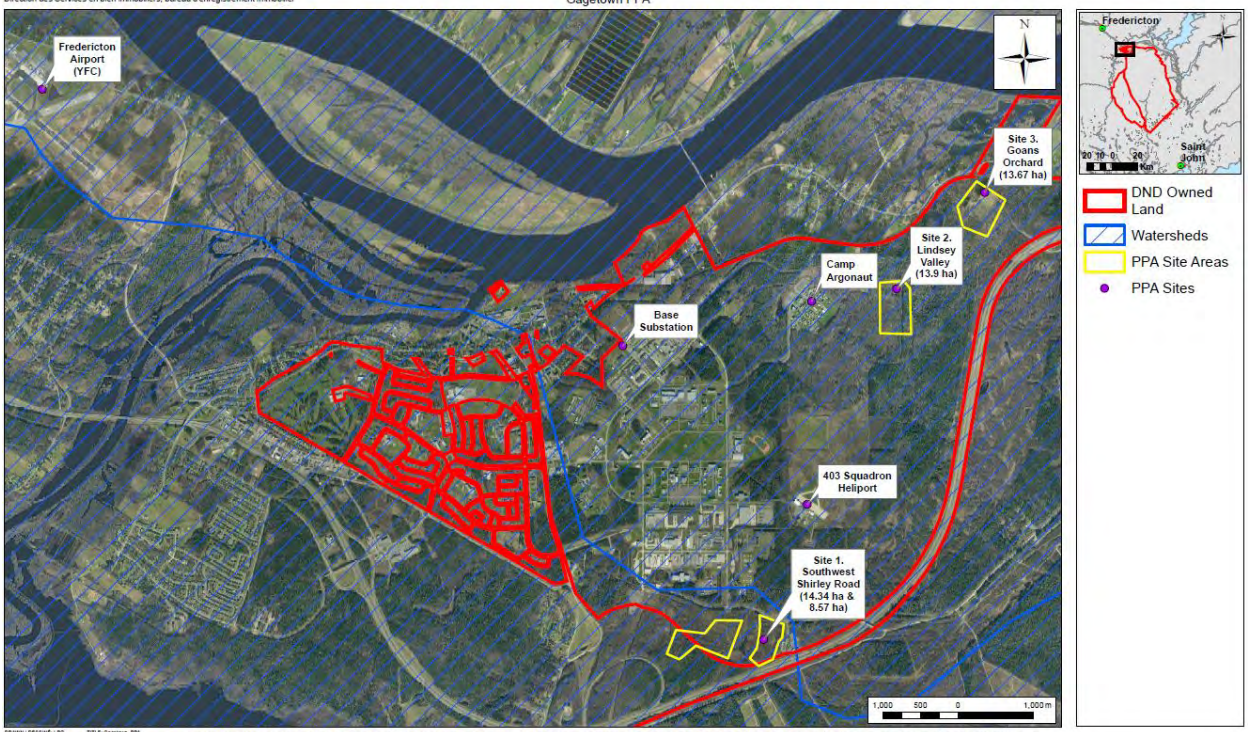
National Defence / Défense nationale
Directorate of Real Property Services, Land Registry Office
Direction des Services en bien immobiliers, bureau d'enregistrement immobilier

CFB Gagetown
Gagetown, NB
Gagetown PPA

Canada



DND Owned Land
Watersheds
PPA Site Areas
PPA Sites

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REVIEWED : EXAMINÉ : LBO
DATE : 25-MAR-2020

TITLE: Gagetown_PPA
IMAGE TYPE: AERIAL
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VIA Email

January 18, 2021

Re: Notification and Offer to Consult on a Green Power Purchase Agreement at 5th Canadian Division Support Base Gagetown, New Brunswick

Dear Chief Sabattis:

The purpose of this letter is to provide notification of, and to offer to consult on the above referenced project, which is located at the 5th Canadian Division Support Base (5 CDSB) at Gagetown, New Brunswick (NB). The Department of National Defence (DND) and the Province of New Brunswick would like to share project details and to hear your views, suggestions, and gain an understanding of any potential impacts that project activities may have on established or asserted Aboriginal or treaty rights.

Project Scope:

DND is in the planning stages of establishing a Green Power Purchase Agreement (PPA) for the 5 CDSB Gagetown, NB. A Green PPA is a service agreement between a consumer (DND) and a power producer for the purchase of electricity from renewable sources. Bids will be solicited from suppliers to construct a 5 MW renewable energy solar facility, sized to meet the minimum load of the substation, in order for DND to consume 100% of the energy produced without feeding any excess to the grid. This initiative is in support of the Government of Canada's commitment under the Pan Canadian Framework on Clean Growth and Climate Change as it intends to produce and purchase new renewable electricity that would displace high carbon production on traditional energy grids.

Once the successful Green PPA bid has been selected, work plans will be developed and are anticipated to include activities such as land clearing, excavation, construction, installation, energy generation and maintenance of the facilities. Permanent fencing would be erected around the site for safety. The project may involve multiple phases. Protective buffer strips would be established around wetlands and/or any sensitive areas.

The project site is situated within the 5 CDSB Range and Training Area between Shirley Road and the Trans-Canada Highway 2 near Oromocto, NB. The site, which slopes slightly to the south, consists of two land parcels of 14.34 ha (Shirley Road West) and 8.5 ha (Shirley Road East), separated by wetlands. One wetland area is located near the northwest boundary of the Shirley Road West site and a large wetland complex divides the two parcels of site 1. The Shirley Road West site is mostly composed of immature mixed forest, with trees that are not yet of merchantable size, growing in a landscape disturbed by historic training activities. There is a small area of mature coniferous trees in the southwest part of the site covering approximately 1 ha. The Shirley Road East site is mainly composed of mature mixed forest and shrubby habitat growing on historically cleared land. Further field investigations and environmental surveys would need to be conducted in 2021 to investigate the potential presence of species at risk, rare plants and migratory birds on site. The middle portion of the East site is currently used for temporary outdoor storage of construction material. A primary communication line follows an overgrown road on the eastern side of this larger land parcel. Please refer to the attached figures.

Next Steps:

A coordinated approach is being taken to carryout both a New Brunswick provincial environmental impact assessment and a Federal Impact Assessment, with support from Public Services and Procurement Canada. The project is expected to be registered with the province by early summer 2021. The successful bidder on the Green PPA is proposed to be selected in 2021. It is anticipated that project activities would take place in 2022/2023 with an intent for the power generation facility to go online in 2023.

Please advise whether you require any additional information or would like to meet on this proposed project. Kindly clarify how you would like to proceed and who we should contact for follow-up. We would appreciate a response by March 15, 2021, as to whether you are (or are not) interested in meeting on this proposed project. In light of the global coronavirus (COVID-19) pandemic, we recognize that many Indigenous groups' capacity to engage may be affected. If you view the current timelines as insufficient, we encourage you to notify us as soon as possible and we will consider extending timelines. We are also open to approaching consultation in a flexible manner that recognizes Indigenous communities' respective capacity to engage in consultation.

If you have any questions and/or would like to discuss further, please contact Marc-André Michaud, Marc-Andre.Michaud2@forces.gc.ca, phone: 506-422-2000 ext. 3366, cell: 506-429-8720.

Sincerely,

Marc-André Michaud, M.A.Sc., P.Eng, PMP

Engineering Officer
Real Property Operations Detachment (Gagetown)
Dept. of National Defence / Government of Canada

Cc:
Shyla O'Donnell, Consultation Coordinator, Wolastoqey Nation in New Brunswick
Fred Sabattis, Community Rep, Consultation Coordinator
Shawn T. Hamilton, P. Eng., Project Manager, Environmental Assessment Branch Environmental Science & Protection Division, NB Dept. of Environment and Local Government
Stephen Gray, Consultation Advisor, Engagement and Consultation, NB Dept. of Aboriginal Affairs
Michelle Daigle, Director, Engagement and Consultation, NB Dept. of Aboriginal Affairs
Jennifer Davies, Analyst, Power Purchase Agreements/Private Public Partnerships, Dept. of National Defence
Tamara McFarland, Senior Environmental Specialist, Public Services and Procurement Canada

VIA Email

January 19, 2021

Re: Notification of a Green Power Purchase Agreement at 5th Canadian Division Support Base Gagetown, New Brunswick

Dear Chief Knockwood:

The purpose of this letter is to provide notification of the above referenced project, which is located at the 5th Canadian Division Support Base (5 CDSB) at Gagetown, New Brunswick (NB). The Department of National Defence's (DND) understanding is that the project location is within the traditional territory of the Wolastoqey. However, DND and the Province of New Brunswick would like to share project details and to hear your views, suggestions, and gain an understanding of any potential impacts that project activities may have on your community.

Project Scope:

DND is in the planning stages of establishing a Green Power Purchase Agreement (PPA) for the 5 CDSB Gagetown, New Brunswick. A Green PPA is a service agreement between a consumer (DND) and a power producer for the purchase of electricity from renewable sources. Bids will be solicited from suppliers to construct a 5 MW renewable energy solar facility, sized to meet the minimum load of the substation, in order for DND to consume 100% of the energy produced without feeding any excess to the grid. This initiative is in support of the Government of Canada's commitment under the Pan Canadian Framework on Clean Growth and Climate Change as it intends to produce and purchase new renewable electricity that would displace high carbon production on traditional energy grids.

Once the successful Green PPA bid has been selected, work plans will be developed and are anticipated to include activities such as land clearing, excavation, construction, installation, energy generation and maintenance of the facilities. Permanent fencing would be erected around the site for safety. The project may involve multiple phases. Protective buffer strips would be established around wetlands and/or any sensitive areas.

The project site is situated within the 5 CDSB Range and Training Area between Shirley Road and the Trans-Canada Highway 2 near Oromocto, NB. The site, which slopes slightly to the south, consists of two land parcels of 14.34 ha (Shirley Road West) and 8.5 ha (Shirley Road East), separated by wetlands. One wetland area is located near the northwest boundary of the Shirley Road West site and a large wetland complex divides the two parcels of site 1. The Shirley Road West site is mostly composed of immature mixed forest, with trees that are not yet of merchantable size, growing in a landscape disturbed by historic training activities. There is a small area of mature coniferous trees in the southwest part of the site covering approximately 1 ha. The Shirley Road East site is mainly composed of mature mixed forest and shrubby habitat growing on historically cleared land. Further field investigations and environmental surveys would need to be conducted in 2021 to investigate the potential presence of species at risk, rare plants and migratory birds on site. The middle portion of the East site is currently used for temporary outdoor storage of construction material. A primary communication line follows an overgrown road on the eastern side of this larger land parcel. Please refer to the attached figures.

Next Steps:

A coordinated approach is being taken to carryout both a New Brunswick provincial environmental impact assessment and a Federal Impact Assessment, with support from Public Services and Procurement Canada. The project is expected to be registered with the province by early summer 2021. The successful bidder on the Green

PPA is proposed to be selected in 2021. It is anticipated that project activities would take place in 2022/2023 with an intent for the power generation facility to go online in 2023.

Please advise whether you would like to meet on this proposed project and/or would like to receive additional information as the project continues to develop. Kindly clarify how you would like to proceed and who we should contact for follow-up. We would appreciate a response by March 15, 2021, as to whether you are (or are not) interested in meeting on this proposed project. In light of the global coronavirus (COVID-19) pandemic, we recognize that many Indigenous groups' capacity to engage may be affected. If you view the current timelines as insufficient, we encourage you to notify us as soon as possible and we will consider extending timelines.

If you have any questions and/or would like to discuss further, please contact Marc-André Michaud, Marc-Andre.Michaud2@forces.gc.ca, phone: 506-422-2000 ext. 3366, cell: 506-429-8720.

Sincerely,

Marc-André Michaud, M.A.Sc., P.Eng, PMP

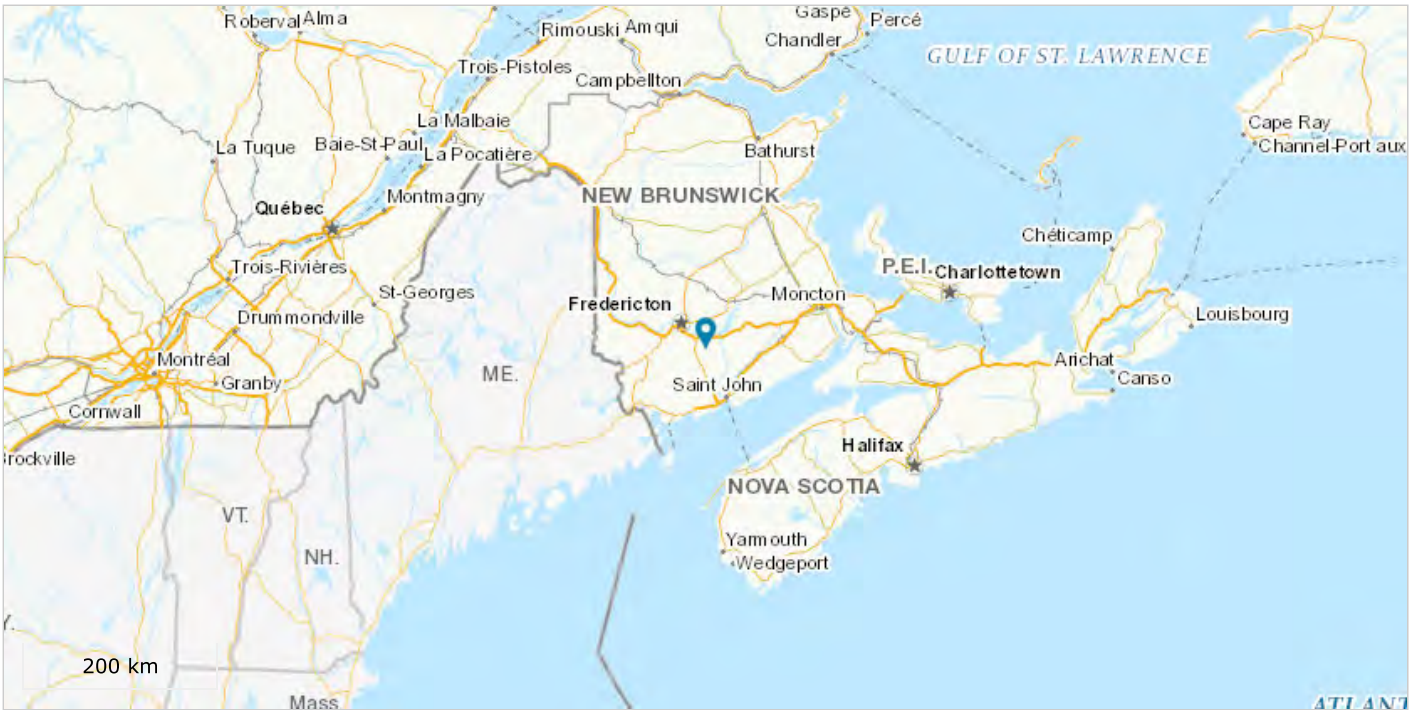
Engineering Officer
Real Property Operations Detachment (Gagetown)
Dept. of National Defence / Government of Canada

Cc:
Jennifer Coleman, Intergovernmental Affairs, Mi'gmawe'l Tplu'taqnn Inc.
Tanya McGraw, Administration, Mi'gmawe'l Tplu'taqnn Inc.
Shawn T. Hamilton, P. Eng., Project Manager, Environmental Assessment Branch Environmental Science & Protection Division, NB Dept. of Environment and Local Government
Stephen Gray, Consultation Advisor, Engagement and Consultation, NB Dept. of Aboriginal Affairs
Michelle Daigle, Director, Engagement and Consultation, NB Dept. of Aboriginal Affairs
Jennifer Davies, Analyst, Power Purchase Agreements/Private Public Partnerships, Dept. of National Defence
Tamara McFarland, Senior Environmental Specialist, Public Services and Procurement Canada

5th Canadian Division Support Base (CDSB) Gagetown Green Power Purchase Agreement (PPA)

The Government of Canada is committed to using 100% clean electricity by 2022 where available, and through the Pan Canadian Framework on Clean Growth and Climate Change, will produce and purchase new renewable electricity that will displace production of the high carbon portion of the electricity grid. The Government of Canada is also targeting industry to reduce greenhouse gases (GHGs (greenhouse gases)) and look to the electricity sector as a priority for this reduction. To respond to this goal, the Department of National Defence proposes to issue a request for proposal for the development of a solar farm to be located at the 5th Canadian Division Support Base (5 CDSB (Canadian Division Support Base)) Gagetown, also known as Base Gagetown. The solar farm is expected to be 5 MW (megawatts) in size and will partially supply the electricity requirements of the Base which has a peak demand of approximately 7.5 MW (megawatts).

▶ Disclaimer



View detailed map

Latest update

April 29, 2021 - The comment period for this project has been extended until October 31, 2021 to align with the "Opportunity for Public Comment" as part of the New Brunswick provincial Environmental Impact Assessment ("EIA (Environmental Impact Assessment)") registration process. A link to the EIA (Environmental Impact Assessment) is as follows: https://www2.gnb.ca/content/dam/gnb/Departments/env/pdf/EIA-EIE/Registrations-Engegistrements/documents/eia-registration-1561.pdf.

List all records

Contacts

Department of National Defence
Jon Parker, Senior Project Manager, Real Property Operations Detachment (Gagetown)
Post Office Box 17000 Station Forces
Oromocto, New Brunswick E2V 4J5
Email: Jon.Parker@forces.gc.ca

Location
5th Canadian Division Support Base (CDSB) Gagetown (New Brunswick)

Nature of Activity
Alternative Energy

Assessment Status
In progress

Start Date
2020-10-13

Proponent
Department of National Defence

Authorities
Department of National Defence

Assessment Type
Project on federal lands

Reference Number
81073

Nearby assessments

.within 200 kilometres

nstallation of a Portable Fuel Tank at Lauvina Wood Compound near Building LW7
5th Canadian Division Support Base, Gagetown

Parking Lot Replacement (2) - 5th Canadian Division Support Base, Gagetown
5th Canadian Division Support Base, Gagetown

Parking Lot Replacement - 5th Canadian Division Support Base, Gagetown
5th Canadian Division Support Base, Gagetown

Design and Replace Watercourse Crossing at Brown Brook at Browntown Road 5CDSB Gagetown
Canadian Forces Base Gagetown

Watercourse Crossing : Lawfield at Queens, Canadian Forces Base Gagetown

Date modified: 2021-04-29

NOTICE

Registration of Undertaking
Environmental Impact Assessment Regulation
Clean Environment Act
Opportunity for Public Comment

On April 14, 2020, Department of National Defence registered the following project with the Department of Environment and Local Government in accordance with Section 5(1) and Schedule "A" of the Environmental Impact Assessment Regulation: **Gagetown Green Power Purchase Agreement**.

The Government of Canada is committed to using 100% clean electricity by 2022 where available, and through the Pan Canadian Framework on Clean Growth and Climate Change, will produce and purchase new renewable electricity that will displace production of the high carbon portion of the electricity grid. The Government of Canada is also targeting industry to reduce greenhouse gases (GHGs) and look to the electricity sector as a priority for this reduction. To respond to this goal, the Department of National Defence proposes to issue a request for proposal for the development of a solar farm to be located at the 5th Canadian Division Support Base (5 CDSB) Gagetown, also known as Base Gagetown. The solar farm is expected to be 5 MW in size and will partially supply the electricity requirements of the Base which has a peak demand of approximately 7.5 MW.

The proponent's registration document can be examined at: 5 CDSB Gagetown, 238 Champlain Ave Oromocto,NB and at the Dept. of Environment and Local Government,Environmental Impact Assessment Branch, 2nd floor, 20 McGloin Street, Fredericton,NB.

To help inform this decision, the Department of National Defence is inviting comments from the public on the project and its potential effects on the environment. You can comment by email, or by post on or before October 31, 2021, and direct your correspondence to:
Jon Parker, P.Eng
Senior Project Manager, Real Property Operations Detachment (Gagetown)
Post Office Box 17000 Station Forces, Oromocto New Brunswick, E2V 4J5
E-mail Address: Jon.Parker@forces.gc.ca

Additional information about the proposal and the public information process is available at: www2.gnb.ca/content/dam/gnb/Departments/env/pdf/EIA-EIE/Registrations-Engegistrements/documents/eia-registration-1561.pdf
Notice Placed by: Department of National Defence

AVIS

Enregistrement d'un ouvrage en vertu du Règlement sur les études d'impact sur l'environnement Loi sur l'assainissement de l'environnement Occasion de faire des commentaires

Le April 14, 2020, le Ministère de la Défense nationale a enregistré l'ouvrage suivant auprès du ministère de l'Environnement et des Gouvernements locaux conformément au paragraphe 5(1) et à l'annexe A du Règlement sur les études d'impact sur l'environnement : Accord d'achat d'énergie verte à la 5e Division du Canada Gagetown.

Le gouvernement du Canada s'est engagé à utiliser si possible 100% d'électricité propre d'ici 2022 et, par l'entremise du Cadre pancanadien sur la croissance propre et les changements climatiques, va produire et acheter une nouvelle électricité renouvelable qui remplacera celle qui est produite par la portion riche en carbone du réseau électrique. Le gouvernement du Canada cible également l'industrie pour réduire les gaz à effet de serre (GES) et considère le secteur de l'électricité comme une priorité pour cette réduction. Pour répondre à cet objectif, le ministère de la Défense nationale propose de lancer une demande de proposition pour le développement d'un parc solaire qui sera situé à la base de soutien de la 5e Division du Canada Gagetown, également connue sous le nom de Base Gagetown. Le parc solaire devrait avoir une taille de 5 MW et couvrira partiellement les besoins en électricité de la base qui a une demande de pointe d'environ 7,5 MW.

Le document d'enregistrement du promoteur peut être examiner aux lieux suivants: 5CDSB Gagetown, et au ministère de l'Environnement et des Gouvernements locaux, Direction des études d'impact sur l'environnement, 20, rue McGloin, Fredericton (N.-B.). Il est aussi accessible sur le site Web du ministère de l'Environnement et des Gouvernements locaux à l'adresse : http://www2.gnb.ca/content/gnb/fr/ministeres/egl/environnement/content/etude_d_impact environnemental/enregistrements.html.

Le Ministère de la Défense nationale a l'intention de déterminer si la réalisation du projet est susceptible d'entraîner des effets négatifs importants sur l'environnement. Afin de contribuer à une prise de détermination éclairée, le Ministère de la Défense nationale invite le public à formuler des commentaires jusqu'au 31 Octobre 2021 sur cette détermination. Les commentaires écrits peuvent être présentés à:

Ministère de la Défense nationale
Jon Parker, Gestionnaire principal de projet, Real Property Operations Detachment (Gagetown)
Case postale Succursale Bureau-chef 17000
Oromocto (Nouveau-Brunswick) E2V 4J5
Courriel : Jon.Parker@forces.gc.ca

Des renseignements supplémentaires au sujet de la proposition et du Règlement sur les études d'impact sur l'environnement sont accessibles en visitant le www.gnb.ca, sous la rubrique « Ministères » > « Environnement et Gouvernements locaux » > « Étude d'impact environnemental » > « Projets à l'étude ».

Avis publié par: Ministère de la Défense nationale

28 April 2020

Chief [redacted]
[redacted] First Nation
[redacted]
[redacted]
[redacted]

Dear Chief [redacted],

Notification of Consideration of a Green Power Purchase Agreement (Green PPA) at 5 CDSB Gagetown.

The Department of National Defence (DND) is in the preliminary phase of evaluating a Green PPA at 5 CDSB Gagetown. A Green PPA is a service agreement between a consumer (DND) and a power producer for the purchase of electricity from renewable sources.

The purpose of this Green PPA will be to provide a clean source of power diversified from the grid to 5 CDSB Gagetown. DND is proposing the following schedule for the PPA, which would include the following activities:

- Release the Request for Information (RFI) to potential suppliers in May 2020.
- Start the procurement process: Request for Qualifications (RFQ) in mid-2020, Request for Proposals (RFP) in late-2020.
- Construct a 5 MW renewable energy facility, sized to meet the minimum load of the substation, in order for DND to consume 100% of the energy produced without feeding any excess to the grid.
- 3 different sites are being considered for this Green PPA to ensure that there are no risks or construction constraints (refer to attached maps):
    - Site 1: Southwest Shirley Road
    - Site 2: Lindsey Valley
    - Site 3: Goans Orchard

I would like to hear from you any comments, questions or concerns that you may have regarding this Green PPA, in 5 CDSB Gagetown.

The department is committed to undertake its operations in a way that is respectful of Indigenous rights, culture, and traditional knowledge and in support of Indigenous economic development opportunities.

Thank you for your time in considering this request. Please provide your feedback by **28 May 2020** to ensure your comments will be considered in the continued planning of this Green PPA. If you are unable to reply by this date but want to contribute information, please advise.

If you have any questions or concerns, or require additional information, please do not hesitate to contact me via e-mail at danny.wisniowski-wong@forces.gc.ca

Yours sincerely,

Danny Wisniowski-Wong
A/Manager Public-Private Partnership / Power Purchase Agreement Team
Directorate of Portfolio Innovation

cc: Cameron McEwen, A/Executive Director of Portfolio Innovation

Attachments: Maps of the Areas of Interest

Site 1: Southwest Shirley Road 14.34 ha / 8.5 ha
Situated between Shirley Road and Trans-Canada Hwy 2. Sloped slightly south two parcels separated by wetlands. Overall the site has low vegetation growth, no mature growth. Site would likely be visible to public from the highway. Has no current operational use or forecasted plan. Access via maintained road from within Garrison. Existing power distribution lines located adjacent to the site.

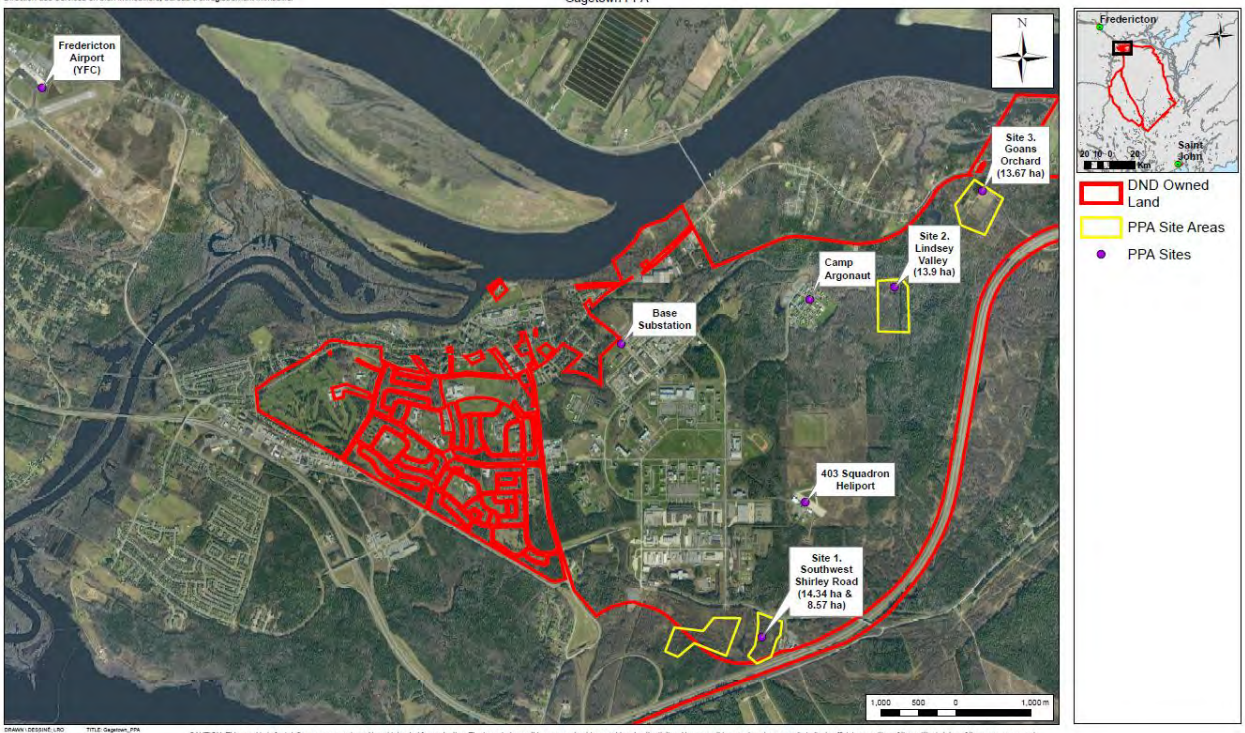
Site 2: Lindsey Valley 13.19 ha
Located off Nashwaak Street in the Lindsey Valley Area approx. 2 km west of Base Gagetown. Area is relatively flat with various wetlands and streams in the general area. The site has medium density vegetation largely covered with trees. Operationally the site has little use however local First Nations have a site located in the area which may have to be avoided. There is access via a maintained road and power distribution is adjacent to the site.

Site 3: Goans Orchard. 16.67 ha
Located off Rte. 102 and Shanks Road in Burton NB approx. 3km north-west of Base Gagetown. The site varies between field, low vegetation and mature trees. Area is flat with a slight south east slope. Operationally the site is used as a bivouac for the military. There is exterior access from Burton via existing road allowing for private access to the site. A 600m power distribution extension line would be required above what would be required for site 1&2.

National Defence / Défense nationale
Directorate of Real Property Services, Land Registry Office
Direction des Services en bien immobiliers, bureau d'enregistrement immobilier

CFB Gagetown
Gagetown, NB
Gagetown PPA

Canada



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DATE : 25-MAR-2020

TITLE: Gagetown_PPA
IMAGE TYPE: AERIAL
IMAGE DATE: 2010

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National Defence / Défense nationale
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CFB Gagetown
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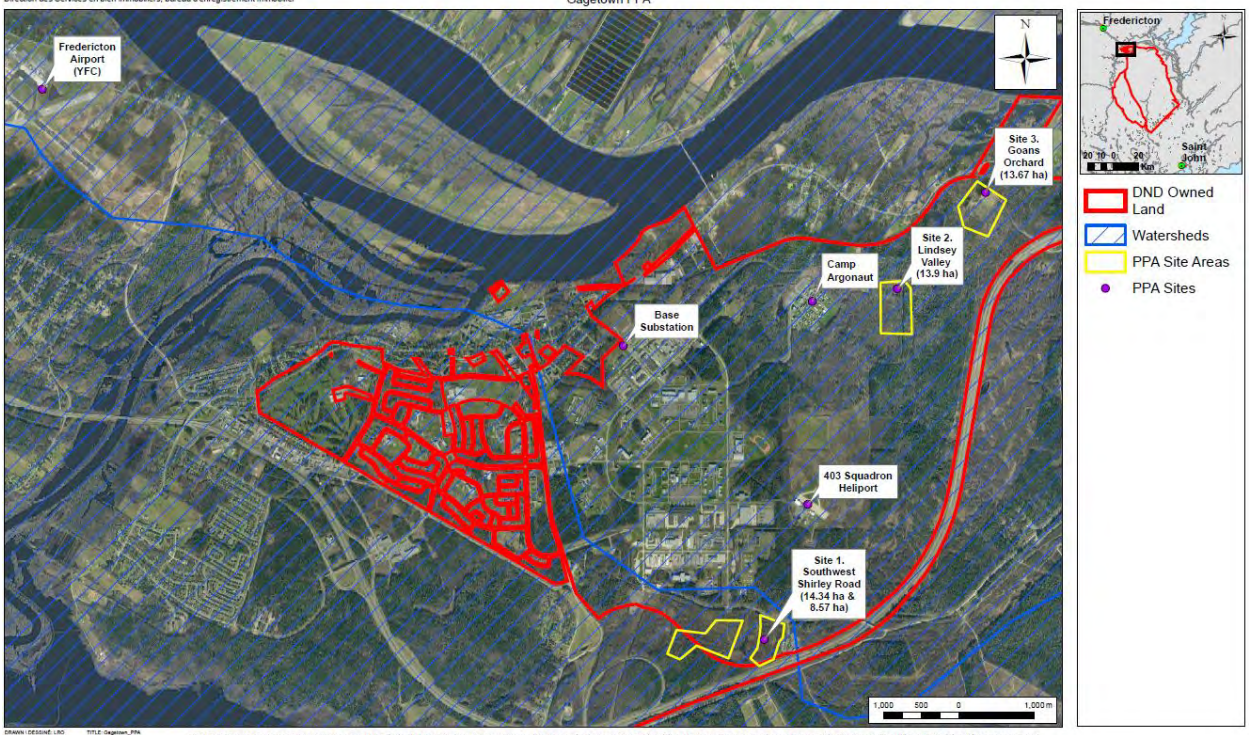

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VIA Email

January 18, 2021

Re: Notification and Offer to Consult on a Green Power Purchase Agreement at 5th Canadian Division Support Base Gagetown, New Brunswick

Dear Chief Sabattis:

The purpose of this letter is to provide notification of, and to offer to consult on the above referenced project, which is located at the 5th Canadian Division Support Base (5 CDSB) at Gagetown, New Brunswick (NB). The Department of National Defence (DND) and the Province of New Brunswick would like to share project details and to hear your views, suggestions, and gain an understanding of any potential impacts that project activities may have on established or asserted Aboriginal or treaty rights.

Project Scope:

DND is in the planning stages of establishing a Green Power Purchase Agreement (PPA) for the 5 CDSB Gagetown, NB. A Green PPA is a service agreement between a consumer (DND) and a power producer for the purchase of electricity from renewable sources. Bids will be solicited from suppliers to construct a 5 MW renewable energy solar facility, sized to meet the minimum load of the substation, in order for DND to consume 100% of the energy produced without feeding any excess to the grid. This initiative is in support of the Government of Canada's commitment under the Pan Canadian Framework on Clean Growth and Climate Change as it intends to produce and purchase new renewable electricity that would displace high carbon production on traditional energy grids.

Once the successful Green PPA bid has been selected, work plans will be developed and are anticipated to include activities such as land clearing, excavation, construction, installation, energy generation and maintenance of the facilities. Permanent fencing would be erected around the site for safety. The project may involve multiple phases. Protective buffer strips would be established around wetlands and/or any sensitive areas.

The project site is situated within the 5 CDSB Range and Training Area between Shirley Road and the Trans-Canada Highway 2 near Oromocto, NB. The site, which slopes slightly to the south, consists of two land parcels of 14.34 ha (Shirley Road West) and 8.5 ha (Shirley Road East), separated by wetlands. One wetland area is located near the northwest boundary of the Shirley Road West site and a large wetland complex divides the two parcels of site 1. The Shirley Road West site is mostly composed of immature mixed forest, with trees that are not yet of merchantable size, growing in a landscape disturbed by historic training activities. There is a small area of mature coniferous trees in the southwest part of the site covering approximately 1 ha. The Shirley Road East site is mainly composed of mature mixed forest and shrubby habitat growing on historically cleared land. Further field investigations and environmental surveys would need to be conducted in 2021 to investigate the potential presence of species at risk, rare plants and migratory birds on site. The middle portion of the East site is currently used for temporary outdoor storage of construction material. A primary communication line follows an overgrown road on the eastern side of this larger land parcel. Please refer to the attached figures.

Next Steps:

A coordinated approach is being taken to carryout both a New Brunswick provincial environmental impact assessment and a Federal Impact Assessment, with support from Public Services and Procurement Canada. The project is expected to be registered with the province by early summer 2021. The successful bidder on the Green PPA is proposed to be selected in 2021. It is anticipated that project activities would take place in 2022/2023 with an intent for the power generation facility to go online in 2023.

Please advise whether you require any additional information or would like to meet on this proposed project. Kindly clarify how you would like to proceed and who we should contact for follow-up. We would appreciate a response by March 15, 2021, as to whether you are (or are not) interested in meeting on this proposed project. In light of the global coronavirus (COVID-19) pandemic, we recognize that many Indigenous groups' capacity to engage may be affected. If you view the current timelines as insufficient, we encourage you to notify us as soon as possible and we will consider extending timelines. We are also open to approaching consultation in a flexible manner that recognizes Indigenous communities' respective capacity to engage in consultation.

If you have any questions and/or would like to discuss further, please contact Marc-André Michaud, Marc-Andre.Michaud2@forces.gc.ca, phone: 506-422-2000 ext. 3366, cell: 506-429-8720.

Sincerely,

Marc-André Michaud, M.A.Sc., P.Eng, PMP

Engineering Officer
Real Property Operations Detachment (Gagetown)
Dept. of National Defence / Government of Canada

Cc:
Shyla O'Donnell, Consultation Coordinator, Wolastoqey Nation in New Brunswick
Fred Sabattis, Community Rep, Consultation Coordinator
Shawn T. Hamilton, P. Eng., Project Manager, Environmental Assessment Branch Environmental Science & Protection Division, NB Dept. of Environment and Local Government
Stephen Gray, Consultation Advisor, Engagement and Consultation, NB Dept. of Aboriginal Affairs
Michelle Daigle, Director, Engagement and Consultation, NB Dept. of Aboriginal Affairs
Jennifer Davies, Analyst, Power Purchase Agreements/Private Public Partnerships, Dept. of National Defence
Tamara McFarland, Senior Environmental Specialist, Public Services and Procurement Canada

VIA Email

January 19, 2021

Re: Notification of a Green Power Purchase Agreement at 5th Canadian Division Support Base Gagetown, New Brunswick

Dear Chief Knockwood:

The purpose of this letter is to provide notification of the above referenced project, which is located at the 5th Canadian Division Support Base (5 CDSB) at Gagetown, New Brunswick (NB). The Department of National Defence's (DND) understanding is that the project location is within the traditional territory of the Wolastoqey. However, DND and the Province of New Brunswick would like to share project details and to hear your views, suggestions, and gain an understanding of any potential impacts that project activities may have on your community.

Project Scope:

DND is in the planning stages of establishing a Green Power Purchase Agreement (PPA) for the 5 CDSB Gagetown, New Brunswick. A Green PPA is a service agreement between a consumer (DND) and a power producer for the purchase of electricity from renewable sources. Bids will be solicited from suppliers to construct a 5 MW renewable energy solar facility, sized to meet the minimum load of the substation, in order for DND to consume 100% of the energy produced without feeding any excess to the grid. This initiative is in support of the Government of Canada's commitment under the Pan Canadian Framework on Clean Growth and Climate Change as it intends to produce and purchase new renewable electricity that would displace high carbon production on traditional energy grids.

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The project site is situated within the 5 CDSB Range and Training Area between Shirley Road and the Trans-Canada Highway 2 near Oromocto, NB. The site, which slopes slightly to the south, consists of two land parcels of 14.34 ha (Shirley Road West) and 8.5 ha (Shirley Road East), separated by wetlands. One wetland area is located near the northwest boundary of the Shirley Road West site and a large wetland complex divides the two parcels of site 1. The Shirley Road West site is mostly composed of immature mixed forest, with trees that are not yet of merchantable size, growing in a landscape disturbed by historic training activities. There is a small area of mature coniferous trees in the southwest part of the site covering approximately 1 ha. The Shirley Road East site is mainly composed of mature mixed forest and shrubby habitat growing on historically cleared land. Further field investigations and environmental surveys would need to be conducted in 2021 to investigate the potential presence of species at risk, rare plants and migratory birds on site. The middle portion of the East site is currently used for temporary outdoor storage of construction material. A primary communication line follows an overgrown road on the eastern side of this larger land parcel. Please refer to the attached figures.

Next Steps:

A coordinated approach is being taken to carryout both a New Brunswick provincial environmental impact assessment and a Federal Impact Assessment, with support from Public Services and Procurement Canada. The project is expected to be registered with the province by early summer 2021. The successful bidder on the Green

PPA is proposed to be selected in 2021. It is anticipated that project activities would take place in 2022/2023 with an intent for the power generation facility to go online in 2023.

Please advise whether you would like to meet on this proposed project and/or would like to receive additional information as the project continues to develop. Kindly clarify how you would like to proceed and who we should contact for follow-up. We would appreciate a response by March 15, 2021, as to whether you are (or are not) interested in meeting on this proposed project. In light of the global coronavirus (COVID-19) pandemic, we recognize that many Indigenous groups' capacity to engage may be affected. If you view the current timelines as insufficient, we encourage you to notify us as soon as possible and we will consider extending timelines.

If you have any questions and/or would like to discuss further, please contact Marc-André Michaud, Marc-Andre.Michaud2@forces.gc.ca, phone: 506-422-2000 ext. 3366, cell: 506-429-8720.

Sincerely,

Marc-André Michaud, M.A.Sc., P.Eng, PMP

Engineering Officer
Real Property Operations Detachment (Gagetown)
Dept. of National Defence / Government of Canada

Cc:
Jennifer Coleman, Intergovernmental Affairs, Mi'gmawe'l Tplu'taqnn Inc.
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