ROY CONSULTANTS

ENGINEERING SERVICES D'INGÉNIERIE

Environmental Impact Assessment

Municipal Wastewater Treatment Lagoon
Lamèque, NB

Our File No.: 042-22-C
February 27, 2023

Prepared for:

Dave Brown
Directeur général
Île-de-Lamèque
44, rue du Pêcheur Nord
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February 27, 2023

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Our File No.: 042-22-C[1]

Dear D. Brown:

Subject: Environmental Impact Assessment
Lamèque Wastewater Lagoon Upgrades, Ile-de-Lamèque, New Brunswick

We are pleased to present you with this report for the aforementioned subject studied.

We appreciate the opportunity to assist you in this project and we trust this report is to your entire satisfaction. However, should you have any questions or comments, or should you require further assistance, please do not hesitate to contact the undersigned.

Yours truly,

Jon Burtt, EP
Environmental Specialist

Jean-Pierre Fournier, P.Eng.
CIVIL Engineer

JB/jpf/ga

Cc- Guillaume Arseneau

Enc.

[1] Ref.: Y:\2022\042-22\C\01-Environment\042-22 Report (27February 2023)

TABLE OF CONTENTS

1 PROPONENT 2

1.1 Name of Proponent 2

1.2 Address of Proponent 2

1.3 Principal Contact: Proponent 2

1.4 Principal Contact: EIA 2

1.5 Property Ownership 2

2 PROJECT DESCRIPTION 3

2.1 Project Name 3

2.2 Project Overview 3

2.3 Purpose, Rationale and/or Need for the Undertaking 4

2.4 Project Location 4

2.5 Siting Considerations 5

2.6 Physical Components and Dimensions of the Project 5

2.7 Construction Details 6

2.7.1 Step 1 6

2.7.2 Step 2 6

2.7.3 Step 3 7

2.7.4 Step 4 8

2.8 Operation and Maintenance Details 9

2.9 Future Modifications, Extensions or Abandonment 9

3 EXISTING ENVIRONMENT 10

3.1 Physical and Natural Features 10

3.1.1 Aquatic Wildlife and Habitat 10
3.1.2 Atmospheric 10
3.1.3 Climate Change and Flooding 11
3.1.4 Environmentally Significant Areas 11
3.1.5 Geology 13
3.1.6 Groundwater 13
3.1.7 Migratory Birds 14
3.1.8 Species at Risk 15
3.1.9 Surface Water 18
3.1.10 Terrestrial Wildlife and Habitat 18
3.1.11 Topography and Drainage 19
3.1.12 Vegetation 20
3.1.13 Wetlands 20

3.2 Cultural Features 20

3.2.1 Archaeological Resources 20
3.2.1 Heritage Resources 22
3.2.1 Land Use 22

4 IDENTIFICATION OF ENVIRONMENTAL IMPACTS 24

4.1 Aquatic Life and Habitat 24

4.2 Atmospheric 25

4.3 Migratory Birds and Bird Species at Risk 26

4.4 Surface Water Quality 26

4.5 Terrestrial Wildlife 28

4.6 Wetlands 28

5 ACCIDENTS AND UNPLANNED EVENTS 30

6 PUBLIC AND FIRST NATIONS INVOLVEMENT 32

6.1 Public Involvement Program 32

6.2 Indigenous Peoples Engagement 33

7 APPROVAL OF THE PROJECT 35

8 FUNDING 36

9 FUTURE PHASE 37

10 CLOSURE 38

11 REFERENCES 39

APPENDIX 42

EXECUTIVE SUMMARY

The Municipality of Île-de-Lamèque is proposing to upgrade their existing wastewater treatment lagoon, located near the Jean-Marie Stream estuary. The proposed project will consist of two phases: Phase 1 will include splitting the lagoon cell into two separate cells, raising the lagoon berms, adding a new aeration system, and construction of a new UV treatment/blower building. Phase 2, to be completed at a later date, will consist of the relocation of the effluent discharge pipe to a more suitable location.

Photo No. 1: Subject Site

Roy Consultants initiated an Environmental Impact Assessment for the proposed project, as per item (n) of Schedule A of the New Brunswick Environmental Impact Assessment Regulation for "all sewage disposal or sewage treatment facilities, other than domestic, on-site facilities". Significance of impacts was determined based on the criteria of likelihood, scale, duration and proposed mitigation. Based on this assessment, no significant adverse environmental impacts are anticipated.

1 PROPONENT

1.1 Name of Proponent

The project proponent is *Île-de-Lamèque*.

1.2 Address of Proponent

Île-de-Lamèque
44, rue du Pêcheur Nord
Lamèque, NB
E8T 3N4

1.3 Principal Contact: Proponent

Dave Brown
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1.4 Principal Contact: EIA

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1.5 Property Ownership

The subject site consists of property parcels owned by the Town of Lamèque.

2 PROJECT DESCRIPTION

2.1 Project Name

The proposed project name is “Lamèque Wastewater Treatment Lagoon Upgrade”.

2.2 Project Overview

The proposed project is to upgrade the existing Lamèque municipal wastewater treatment plant lagoon, and to install a new outfall in a future phase. The upgrades will consist of re-configuring the existing lagoon cell, installing a new High-density Polyethylene (HDPE) liner, raising the existing berms, adding a new aeration system, and relocating and upgrading the ultraviolet (UV) system building.

The proposed project will improve treatment efficiency, reduce odours to nearby receptors, and will not require expanding the existing footprint.

The existing lagoon was first built in 1974 (refer to Photo No. 2).

Photo No. 2: 1974 Aerial Photo of Lamèque (Lagoon in Red), (NB DNRED)

2.3 Purpose, Rationale and/or Need for the Undertaking

The existing wastewater treatment lagoon is inadequate as it does not have sufficient aeration to adequately treat the current or anticipated volumes of waste. More importantly, the existing aeration system composed of four (4) floating aerators is removed from the lagoon during winter months therefore there is essentially no treatment done during that period.

Relocating the lagoon to a new site was deemed not financially feasible. Other treatment options were assessed; however given the level of treatment required, funding availability, and anticipated future treatment needs of the community, and given the option of containing the proposed improvements within the existing lagoon footprint, the proposed treatment design was deemed the most appropriate.

The “do-nothing” alternative was assessed; however, from an environmental perspective, this is not desirable as it would continue to contribute to the eutrophication of the receiving water, and continued nuisance to nearby receptors.

2.4 Project Location

The subject site is located within the municipal entity No. 15 “Ile-de-Lamèque” in Gloucester County, New Brunswick. The civic address is listed as No. 69 rue de l’Aréna. The centre of the proposed project is geo-referenced at Latitude 47.799383, Longitude -64.651863. Per Service New Brunswick (SNB)’s online Planet database, the subject site contains the following parcels (Table 1):

Table 1: Subject Site Parcel Information

PARCEL ID	OWNER	DESCRIPTION	AREA (ha)
20450029	Île-de-Lamèque	Lagoon and building	1.07
20450045	Île-de-Lamèque	Lagoon	1.61
20221438	Île-de-Lamèque	Lagoon	3.31

Figure A: Subject Site Location

2.5 Siting Considerations

The subject site was chosen as it is the site of the existing wastewater treatment lagoon, is already owned by the Town of Lamèque, and is located near a suitable receiving water. Re-use of the existing lagoon site avoids potential environmental impacts inherent with new construction.

2.6 Physical Components and Dimensions of the Project

Table 2 below shows the proposed modifications compared to the existing lagoon:

Table 2: Proposed Modification Details

Item	Existing Conditions	Proposed Modifications
Lagoon Footprint (sq. m)	47,700	33,000
Lagoon Approximate Depth (m)	1.6	3.7
Lagoon Approximate Volume	53,500	45,000
Aeration System	4 floating aerators	Air diffusers and blower building
Aeration System (HP)	40 HP	80 HP (40 HP used, 40 HP standby)
UV System	Yes	Yes (unchanged)
Lagoon Type	One Cell	3 Cells (in series)
Liner Type	Clay Liner	HDPE Liner (80 mil)
Average Daily Design Flow (cubic metres/day)	750	980
Minimum Daily Flow (cu. m/day)	410	530
Maximum Daily Flow (cu. m/day)	1,740	2,262
Theoretical Organic Load (kg/day)	149	194

2.7 Construction Details

The proposed lagoon upgrades must be completed in a manner that allows the uninterrupted treatment of waste during the construction period, which will be completed via the following sequence.

2.7.1 Step 1

- Lower the water level (done by the municipality) to allow berm construction;
- Construction of berm to divide the lagoon in two sections.

2.7.2 Step 2

- Installation of surface aerators in the north side of the lagoon to use this area for temporary treatment;
- Note: temporary treatment will be less effective than the current treatment and will not meet the approval to operate at times; however, this will be temporary for the duration of construction only.

Figure B: Subject Site Aerial View (GeoNB)

- Relocation of the sludge on the south side of the lagoon to proceed with the construction of the first lagoon.
  - The sludge will begin drying in this area.
- Construction of the first lagoon.
  - The southern lagoon, which will ultimately be the secondary lagoon, will be built first since the aeration system is simpler and will be installed later in the project due to the current availability of materials and equipment.
- Begin the construction of the blower/UV building.
  - This will not be completed before the first lagoon has been completed, mainly due to delivery of materials.

2.7.3 Step 3

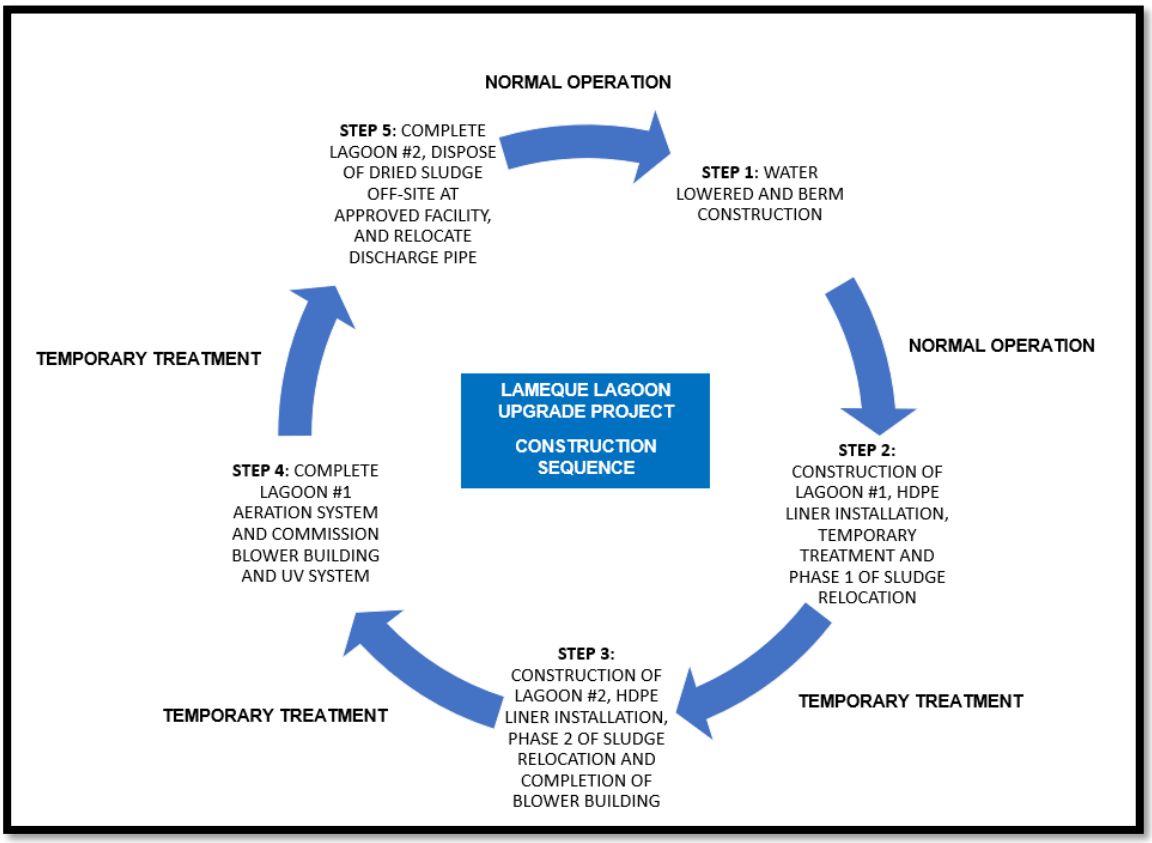
- Relocate temporary treatment into newly built lagoon.
  - Temporary treatment will be less effective than the current treatment and will not meet the approval to operate at times, but this will be temporary during construction.

- Relocate sludge from the south side of the main berm into the north side (where the temporary treatment was initially done) and allow it to dry. Addition of hydraulic seeding or other means could be necessary to reduce smell.
- Construction of the second lagoon, including the aeration system.
- Complete the construction of the blower/UV building.
- Start using the second lagoon for treatment with a new aeration system.
  - Temporary treatment may be less effective than the current treatment and will not meet the approval to operate at times; this will be temporary during construction.

2.7.4 Step 4

- Remove the temporary aeration system (floating aerators) and drain the first lagoon to install new, permanent aeration system.
  - After this is installed, both lagoons will be operational.
- Remove sludge and haul off-site to the approved composting or landfill facility after it has sufficiently dried.
  - Both facilities only accept dried sludge.

Figure C: Construction Cycle Diagram



2.8 Operation and Maintenance Details

The lagoon will be operated per the requirements of an *amended* Certificate of Approval to Operate issued by the Department of Environment and Local Government. An application to amend the Approval will be submitted concurrent with this EIA review. Refer to Appendix B for the current Approval to Construct to operate.

Effluent characteristics are anticipated to improve at the end-of-pipe, with the completion of the proposed upgrades. Table 3 shows the anticipated changes to effluent quality.

Table 3: Effluent Quality Pre- and Post-Upgrades

ITEM	EXISTING CONDITIONS	PROPOSED MODIFICATIONS
CBOD5 Summer (mg/l)	5-25 *	≤ 25
CBOD5 Winter (mg/l)	20-130 *	≤ 25
TSS Summer (mg/l)	5-40 *	≤ 25
TSS Winter (mg/l)	10-15 *	≤ 25
Dissolved Oxygen (DO) summer (mg/l)	varies	≥ 2
Dissolved Oxygen (DO) winter (mg/l)	0-2 **	≥ 2

* Values received from the municipality for year 2021.

** 0-2 mg/L is presumed since the municipality has stated conditions are anoxic during winter

2.9 Future Modifications, Extensions or Abandonment

The above construction sequence relates to Phase 1 of the proposed project. Phase 2 will include the relocation/installation of the discharge pipe, to a location within the estuary that will allow more sufficient mixing at the end-of-pipe. Refer to Section 9 for additional details on Phase 2.

No abandonment of the proposed project is anticipated at this time. The typical lifespan of the proposed HDPE liner is estimated to be over 100 years, at which time additional assessment and possibly replacement will be required. It should be noted that the proposed project design anticipates this, and will maintain the unused, remaining cell for use in the event that the lagoon requires maintenance or further expansion. This will ensure that future modifications or extensions can be completed with minimal environmental impact.

Also, having two lagoons instead of one will facilitate maintenance and repairs as one lagoon can be emptied temporarily while maintaining a certain level of treatment.

The space of the existing lagoon left unused by the new design is intended to be used as a tertiary treatment in the future, in case the discharge limits become more stringent.

3 EXISTING ENVIRONMENT

3.1 Physical and Natural Features

3.1.1 Aquatic Wildlife and Habitat

The existing effluent pipe discharges to a small unnamed watercourse within the Jean-Marie stream estuary, which is a tributary of Lamèque Bay via the culverts under Route 313. The estuary is a shallow waterbody bounded by Provincially Significant coastal marsh wetlands and is significantly influenced by the tides in the Bay. The substrate consists of fine silts with some sandy/gravel areas, shallow areas of eel grass and other aquatic vegetation, and fringed by coastal marshes that are classified as Provincially Significant Wetlands (PSWs).

The proponent attempted to complete an underwater benthic habitat survey of the estuary, for the Phase 2 relocation of the discharge pipe. Due to late-season conditions, the survey was not possible. This will be completed and submitted for review prior to initiation of Phase 2 of the project.

3.1.2 Atmospheric

Atmospheric conditions, or air quality, refers to the existing ambient air conditions in proximity to the proposed project. This includes common air pollution, greenhouse gas (GHGs) emissions, odours, and noise. The subject site is located within the Northern Air Zone, a largely rural zone of which Bathurst is the largest municipal centre. While this zone does not experience many of the air quality issues associated with larger centres, it nevertheless contains major industrial emitters, including the AV Group pulp mill in Athol Ville and the NB Power Belledune Generating Station. No large emitters are in proximity to the subject site.

Typical sources of common air pollution in the Lamèque region consist of particulate matter (diesel combustion, home heating from oil and wood, and dust from peat operations) and Volatile Organic Carbon (VOCs) and GHG's from internal combustion engines. Odours are generated from the marine shoreline and the existing wastewater treatment plant, and small industry such as fish processing plants, and noise generated by a large wind farm and vehicle use.

According to the NB DELG Air Quality Data Portal, no government- or industry-operated air quality monitoring stations are located in proximity of the proposed project. The nearest government monitoring station is located at Bathurst, approximately 75 km to the west. The nearest industry-operated station is at the NB Power Corporation's generating station in Belledune, approximately 90 km west of the lagoon.

According to the latest available air quality report, no air quality exceedances were reported in the Bathurst or Belledune monitoring stations (DELG, 2021). Odour complaints have been recorded in properties surrounding the existing wastewater treatment lagoon. One of the goals of the proposed project will be to reduce or eliminate annoying odours from the lagoon.

Odours may impact nearby receptors during construction. Refer to Section 4 for additional information.

3.1.3 Climate Change and Flooding

No coastal erosion data is available for the subject site per GeoNB.

According to GeoNB's flood hazard map application, the lagoon is above present day 1-in-20-year flood level (5% annual exceedance probability), the 1-in-100-year flood level (1% annual exceedance probability) and the 2100 flood with climate change, 1-in-20-year flood level (5% annual exceedance prob.), which predicts flooding up to the existing lagoon berm elevation. The 2100 flood with climate change, 1-in-100-year (1% annual exceedance probability) flood level map shows that in this scenario, the lagoon access road and building would be inundated by flood waters.

The proposed project will raise the existing berms and elevation of the treatment plant building above the 2100, 1 in 100-year scenario (the top of the new berm elevations to be 6.3 m and building's floor elevation will be 6.1 m above sea-level).

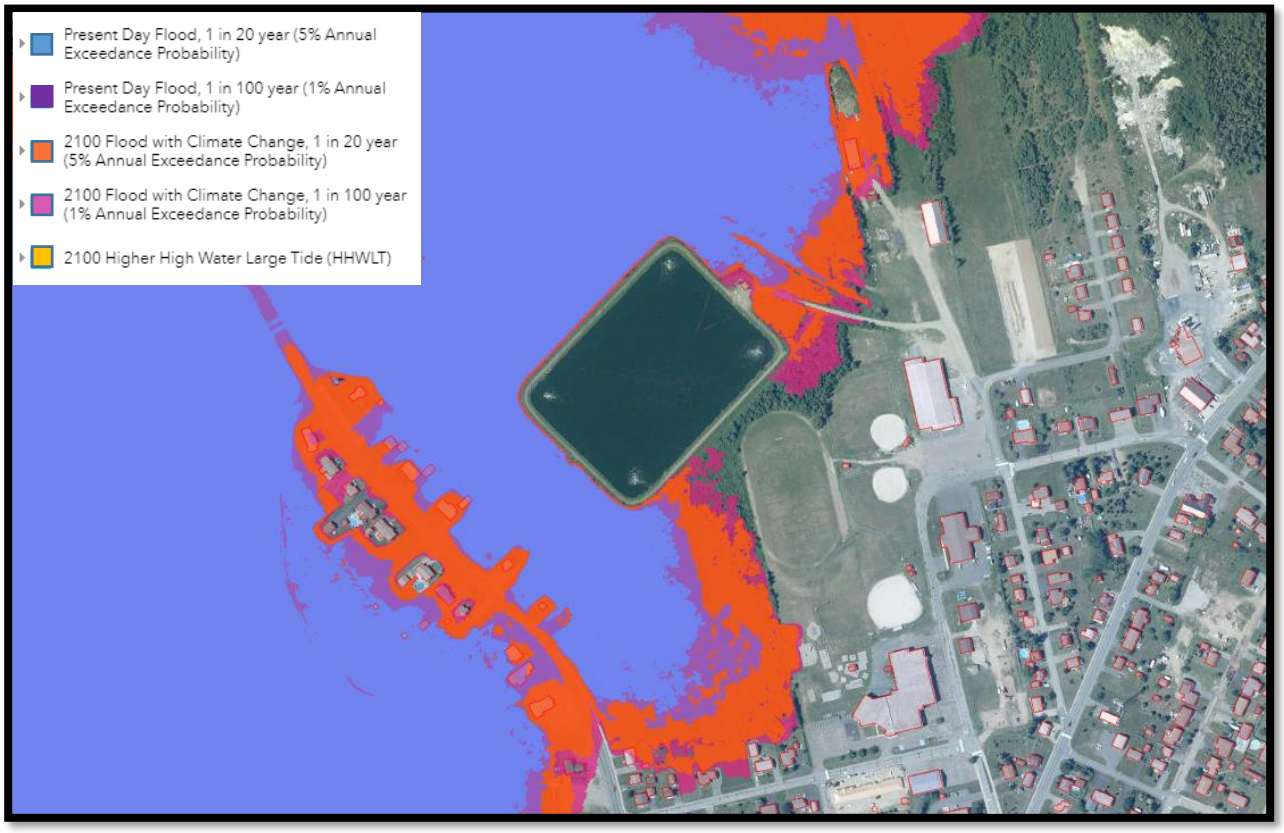
Based on the available information and the project design, the environmental effects of climate change are not anticipated to adversely impact the proposed project.

3.1.4 Environmentally Significant Areas

According to the Nature NB Environmentally Significant Areas (ESA) database, the following ESAs are found within a 5 km radius of the subject site.

- ESA No. 087 – Lamèque Bridge/Rue du Pêcheur: Located on the "West shore of Upper Lamèque Bay, immediately east of Lamèque, on both sides of the bridge. This site has the best intertidal feeding area for shorebirds on Lamèque Island. At least 45 species of birds have been recorded here, many of them shorebirds. A maximum of 2,000 shorebirds have been seen at one time but as many as 15,000 use this area during the summer. A strong representation of salt marsh plants grows here. Baie de Lamèque is important for the mussel and oyster harvesting, but is sensitive to any decline in water quality, which would seriously impact on the quality of the bay as habitat."

Figure D: GeoNB Flood Mapping for Subject Site



- ESA No. 088 – Lamèque Heron Colony: Located on the south shore of Lamèque Bay, west of Route 113, opposite large peat-cutting operation on the other side of the highway. This colony in a regenerating softwood forest contains Great Blue Heron and Black-Crowned Night-Heron and has been used off and on since at least 1968. There were 42 Black-crowned Night-Heron nests and 43 Great Blue Heron nests in 1993; about 20 dead young Herons were found. Pine Sap *Monotropa hypopithys* was discovered on a trail adjacent to the colony - first time seen on Lamèque Island.
- ESA No. 100 – Ruisseau Charlemagne: Located on the east shore of Lamèque Bay, at route 113 bridge north of peat-cutting operation. "A moist white cedar forest with a stream running through it. It has a high diversity of plant life, including a number of orchids and ferns.
- ESA No. 102 – Ste-Marie-sur-Mer: Roadside ditch at edge of dry peat bog, 1 mile west of Ste-Marie-sur-Mer, Ile Lamèque. "This is one of only two known sites in New Brunswick for the peat bog-dwelling *Eriophorum gracile Koch*. There are two bogs situated just west of Ste. Marie-sur-Mer. BOG No. 592 is a large coastal ombrotrophic bog (599 ha) with a surface cover of shrubs, Sphagnum mosses, smaller areas of sedges and about 40% tree cover; it is leased to Fisons-Western Corp. under Peat Moss Lease No. 10. BOG No. 576 is a raised bog of about 220 ha sitting just north of the road. There is a tree cover on about 95 ha while the remainder has a surface vegetation of shrubs, Sphagnum mosses and

sedges. St. Raphael Peat Moss Ltd. has leased 115 ha under Peat Moss Lease No. 17 for the production of horticultural peat."

Due to the scale and location of the proposed project in relation to the above-noted ESAs, no adverse interaction with this VECs is anticipated as a result of the project.

3.1.5 Geology

The subject site region bedrock geology consists of Late Carboniferous-aged stratified bedrock from the Pictou Group – Clifton, Hurley Creek, Minto, Mountain View, Richibucto, Salisbury, Sunbury Creek and Tormentine Formations. Surficial geology of the region consists of Late Wisconsinan and/or early Holocene Marine Sediments. These marine sediments are sand, silt, gravel and clay deposited in shallow marine water, locally deep, which submerged coastal areas and sections of many valleys during and following Late Wisconsinan deglaciation. At the subject site, this consists of Blankets and plains; sand, silt, some gravel and clay, generally 0.5 m to 3 m thick.

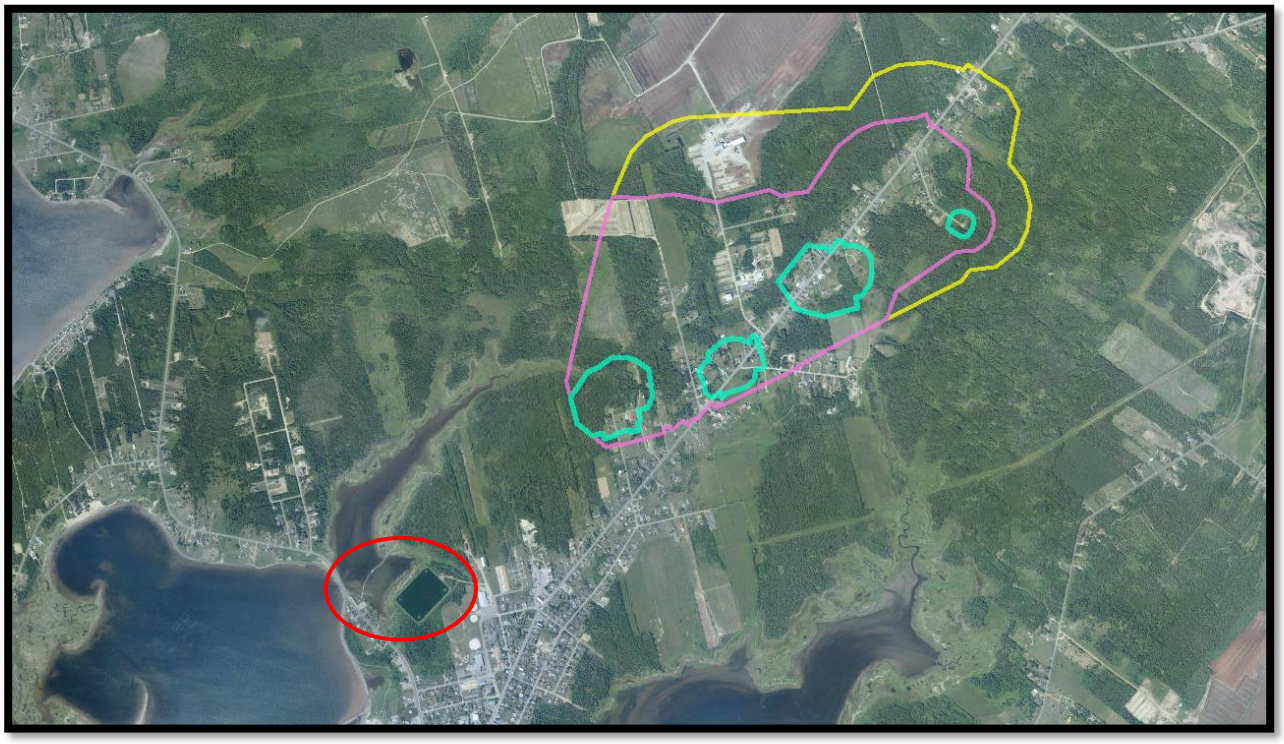
Figure E: Environmentally Significant Areas (Subject Site in Red)

3.1.6 Groundwater

The subject site is located approximately 1km downgradient of the Lamèque designated municipal Wellfield. A search of the DELG Online Well Log System database identified twelve (12) drilled wells within a 750m radius of the lagoon, consisting of seven (7) domestic potable supplies, three (3) industrial, non-potable wells, and two (2) heat pump wells. Discounting the heat pump wells, the average depth of the wells is 44.5 m, average depth to bedrock is 2.01 m, and the average sustainable yield was 338.98 litres per minute (LPM) – (one industrial well has a reported sustainable yield of 1,296.75 LPM). Driller reports show various sand and gravel overburden material underlain by red and brown shale, fine to coarse-grained grey sandstone, slate and limestone.

Given the location of the proposed project and its distance from the nearest designated Wellfield and domestic wells, as well as the fact that the project includes upgrading the existing lagoon clay liner with an HDPE liner, no adverse interactions are anticipated between the project and groundwater.

Figure F: Lamèque Designated Wellfield (Subject Site in Red)



3.1.7 Migratory Birds

Migratory birds are an important consideration in any project. Environment Canada regulates the protection of migratory birds through the *Migratory Birds Convention Act* (MBCA), which protects migratory birds, their eggs, nests and young through the *Migratory Birds Regulations* (MBR).

“Under Section 6 of the Migratory Birds Regulations (MBR), no person shall disturb, destroy or take a nest or egg of a migratory bird; or to be in possession of a live migratory bird, or its carcass, skin, nest or egg, except under authority of a permit. It is important to note that under the current

MBR, no permits can be issued for the incidental take of migratory birds caused by development projects or other economic activities. Furthermore, Section 5.1 of the MBCA describes prohibitions related to deposit of substances harmful to migratory birds.

Migratory birds protected by the MBCA include all seabirds except cormorants and pelicans, all waterfowl, all shorebirds and most landbirds (birds with principally terrestrial life cycles). Most of these birds are specifically named in the Environment Canada publication titled Birds Protected in

Canada under the Migratory Birds Convention Act, Canadian Wildlife Service Occasional Paper No. 1.

> *"5.1 (1) No person or vessel shall deposit a substance that is harmful to migratory birds, or permit such a substance to be deposited, in waters or an area frequented by migratory birds or in a place from which the substance may enter such waters or such an area.*
>
> *(2) No person or vessel shall deposit a substance or permit a substance to be deposited in any place if the substance, in combination with one or more substances, results in a substance — in waters or an area frequented by migratory birds or in a place from which it may enter such waters or such an area — that is harmful to migratory birds."*

The subject site contains suitable foraging, nesting and migration staging habitat for waterfowl species, songbirds, and other migratory birds protected under the MBR. Species observed on site included Osprey (*Pandion haliaetus*), American Crow (*Corvus brachyrhynchos*), and Mallard (*Ana platyrhynchos*).

According to the Birds Canada nesting calendar query tool, the majority of bird species in the region of the proposed project nest between April 15th and September 1st.

Refer to Section 4 for additional information.

3.1.8 Species at Risk

The proponent is aware that the Species at Risk Act's (SARA) "General prohibitions" apply to this project. In applying the general prohibitions, the proponent, staff, and contractors, should be aware that no person shall:

- kill, harm, harass, capture, or take an individual;
- possess, collect, buy, sell, or trade an individual, or any part or derivative;
- damage or destroy the residence of one or more individuals.

In the case of the proposed project, the general prohibitions apply automatically to migratory birds protected under the MBCA anywhere they occur. The proponent is also aware that Section 33 of SARA prohibits damaging or destroying the residence of a listed threatened, endangered, or extirpated species. For migratory bird species at risk (SAR), this prohibition immediately applies on all lands or waters (federal, provincial, territorial, and private) in which the species occurs.

A review of available Species at Risk (SAR) data was conducted for the subject site, including data obtained from the Atlantic Canada Conservation Data Centre (ACCDC), and these species' habitat requirements were compared with the subject site and adjoining properties' characteristics.

ACCDC identified fourteen (14) bird SAR and 1 mammal SAR reported in the vicinity of the proposed project:

Short-eared Owl (*Asio flammeus*) has a COSEWIC status of Threatened, and a SARA and Provincial rank of Special Concern. It is a bird of open landscapes, including grasslands, tundra, and wetlands and nesting takes place in large open areas. According to COSEWIC, in the Maritime provinces most nests are found in well-drained grasslands, or dyked areas in coastal wetlands, but it is a rare breeder, with only the areas around the Tantramar Marshes, CFB Gagetown, and northern valley lowlands of New Brunswick having concentrations of records during the second breeding bird atlas. Based on this species' habitat requirements and the spatial and temporal extent of the proposed project, no adverse interaction between the project and this species is not anticipated.

Wood Thrush (*Hylocichla mustelina*) has a COSEWIC, SARA and Provincial Legal Protection Status of Threatened. In Canada, the Wood Thrush nests mainly in second-growth and mature deciduous and mixed forests, with saplings and well-developed understory layers. This species prefers large forest mosaics, but may also nest in small forest fragments. Wintering habitat is characterized primarily by undisturbed to moderately disturbed wet primary lowland forests. Based on this species' habitat requirements and the spatial and temporal extent of the proposed project, no adverse interaction between the project and this species is not anticipated.

Bank Swallow (*Riparia riparia*) has a COSEWIC and SARA status of Threatened. The Bank Swallow is a small insectivorous songbird that nests by excavating burrows in eroding vertical banks, in a wide variety of natural and artificial sites including riverbanks, lake and ocean bluffs, gravel pits, road cuts, and stockpiles. Breeding sites are often situated near open terrestrial habitat used for aerial foraging, and large wetlands are used as communal nocturnal roost sites post-breeding, during migration and wintering. Based on this species' habitat requirements and the spatial and temporal extent of the proposed project, no adverse interaction between the project and this species is not anticipated.

Lesser Yellowlegs (*Tringa flavipes*) has a COSEWIC status of Threatened. It breeds in the boreal forest of Canada in all provinces and territories *except* New Brunswick, Nova Scotia and Prince Edward Island. It is a visitor to New Brunswick coastal wetland and intertidal habitat during its annual migration, and winters in coastal areas from the southern United States through South America. Based on this species' habitat requirements and the spatial and temporal extent of the proposed project, no adverse interaction between the project and this species is not anticipated.

Hudsonian Godwit (*Limosa haemastica*) has a COSEWIC status of Threatened. It breeds primarily in wetlands in sub-arctic and boreal regions. During migration, it uses a wide variety of habitats on migration, including freshwater marshes, shallow ponds, coastal wetlands and mudflats, but is a rare visitor to the Atlantic provinces. Based on this species' habitat requirements and the spatial and temporal extent of the proposed project, no adverse interaction between the project and this species is not anticipated.

Barn Swallow (*Hirundo rustica*) has a COSEWIC status of Special Concern, and a SARA and Provincial Legal Status of Threatened. It is a medium-sized aerial insectivore with a deeply forked

tail with long outer feathers, and breeds in every province and territory. The Barn Swallow's preferred nesting habitat is in man-made structures including barns, houses, sheds, and bridges. They prefer to hunt over open spaces such as wetlands, grasslands, agricultural fields, shorelines, woodland clearings and roads. Based on this species' habitat requirements and the spatial and temporal extent of the proposed project, no adverse interaction between the project and this species is not anticipated.

Eastern Wood-pewee (*Contopus virens*) has a COSEWIC, SARA and Provincial Legal status of Special Concern. It is a small forest bird which can be distinguished from similar-appearing species by its distinctive three-phased whistled song. The Wood-Pewee breeds from southeastern Saskatchewan to the Maritime Provinces, mostly associated with mid-canopy layer of forest clearings and edges of deciduous and mixed forests. Based on this species' habitat requirements and the spatial and temporal extent of the proposed project, no adverse interaction between the project and this species is not anticipated.

Olive-sided Flycatcher (*Contopus cooperi*) has a COSEWIC status of Special Concern and a SARA and Provincial Legal Status of Threatened. They prefer "natural forest openings and other forest edges (especially along wetlands) or open to semi-open forest stands containing snags. Olive-sided Flycatcher requires habitat heterogeneity along high-contrast edges of two distinct habitats, most often occurring where mature forest meets burns, shrub fields, bogs, meadows, and other openings (Altman and Sallabanks 2012) or the edges of harvested forest, as long as there are tall snags and residual live trees for nesting, sallying, and foraging" (COSEWIC, 2018). Based on this species' habitat requirements and the spatial and temporal extent of the proposed project, no adverse interaction between the project and this species is not anticipated.

Bobolink (*Dolichonyx oryzivorus*) has a COSEWIC status of Special Concern and a SARA and Provincial Status of Threatened. It is a medium-sized passerine, which breeds in the southern part of all Canadian provinces. Originally, it nested in the tall-grass prairie, but since the conversion of prairie to cropland, it has nested in forage crops, as well as various grassland habitats including wet prairie, graminoid peatlands and abandoned fields dominated by tall grass.

Canada Warbler (*Cardellina canadensis*) has a COSEWIC status of Special Concern and a SARA and Provincial Status of Threatened. Canada Warblers favour forested habitats such as conifer and deciduous forests. They nest on or near ground within areas of dense shrubs, ferns or rhododendrons. Based on this species' habitat requirements and the spatial and temporal extent of the proposed project, no adverse interaction between the project and this species is not anticipated.

Buff-breasted Sandpiper (*Calidris subruficollis*) has a COSEWIC and SARA status of Special Concern. It breeds in Canada's tundra regions, primarily in wet/lowland habitat, often near a pond, lake or wetland, in sedge-dominated vegetation. In New Brunswick, they are generally an accidental and rare visitor during migration. Based on this species' habitat requirements and the spatial and temporal extent of the proposed project, no adverse interaction between the project and this species is not anticipated.

Red Knot rufa Subspecies (*Calidris canutus rufa*) has a COSEWIC status of E, SC and a SARA and Provincial Legal Status of Endangered. Red Knot uses different habitats for breeding, migration, and wintering. In the Arctic, knots nest in exposed barren habitats, such as windswept ridges, slopes, or plateaus. On migration and in winter, Red Knot favours coastal areas with extensive intertidal flats, usually sand although sometimes mud, where the birds feed on bivalves

and other benthic invertebrates.). Red Knot also use eroding peat banks along the shoreline of the eastern United States on northward and southward migration, where they feed on mussel spat (Niles et al. 2010a; Baker et al. 2013). They sometimes forage within the tide wrack on beaches, salt marshes, brackish lagoons, mangrove areas, and mudflats on migration and in winter" (COSEWIC, 2020).

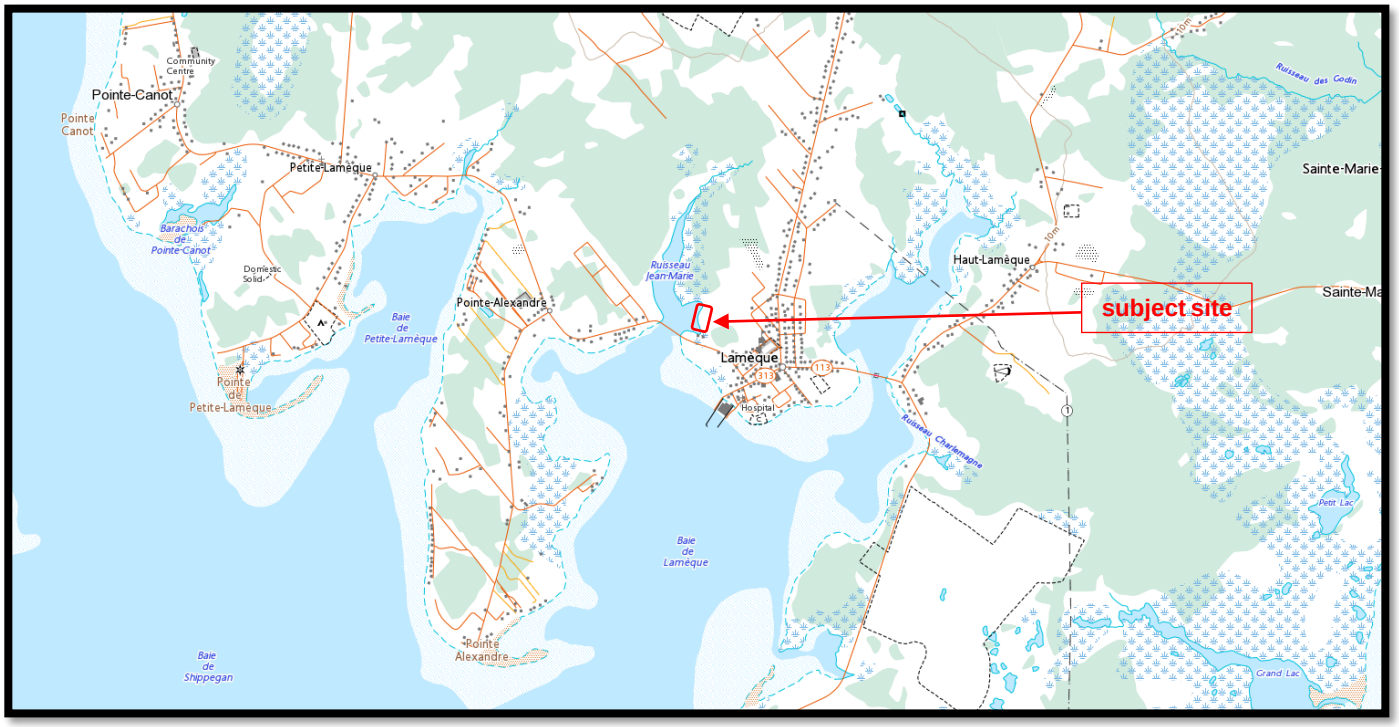
Refer to Section 4 for additional information.

3.1.9 Surface Water

The existing lagoon is located within 50 m of the normal high-water mark of the Jean-Marie Stream estuary, a tidally-influenced body of water that drains into the Lamèque Bay via 2 large culverts under Route 313. Jean-Marie Stream originates in wetlands approximately 3.6 km inland (northeast) from the subject site.

Lamèque Bay is an inlet of Shippagan Bay, the body of water that separates Lamèque Island from mainland New Brunswick, and which is connected to Chaleur Bay to the north and the Gulf of St. Lawrence to the southeast. Refer to Figure G for surface water features in the vicinity of the project.

Figure G: Surface Water Features (Toporama Atlas of Canada)



3.1.10 Terrestrial Wildlife and Habitat

The subject site is an active wastewater treatment lagoon, surrounded by a 1.5m security fence. The foreslope beyond the berm fence consists of low, native vegetation herb and shrub species.

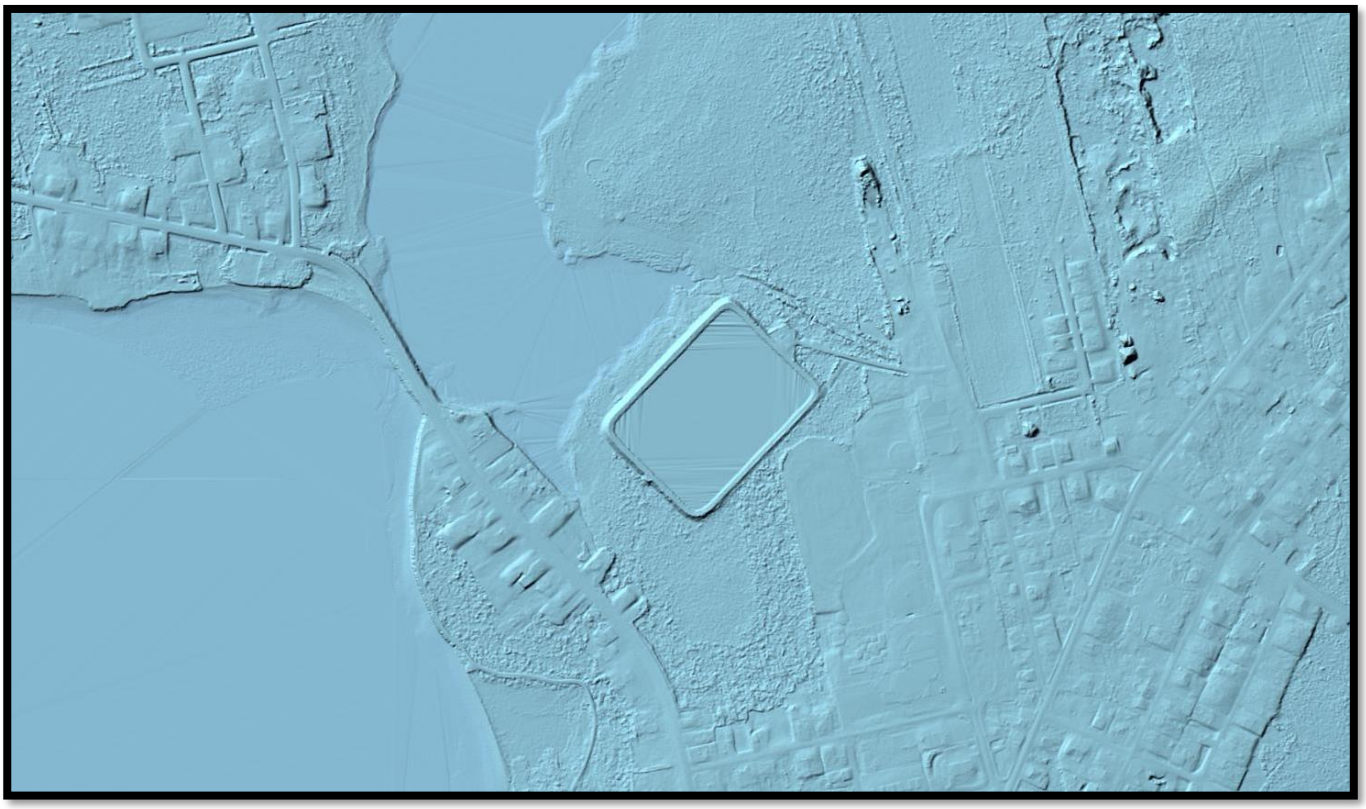
Areas beyond the berm to the south, east and north contain shrub and forested wetland and upland areas with shrub and tree species including Speckled Alder, White Birch, Trembling Aspen, Red Maple, Black Spruce and Tamarack. These areas are, however, narrow strips of habitat between the lagoon and developed areas. To the west, the lagoon borders on coastal wetland. As such, the subject site contains limited terrestrial habitat. Use of the area by terrestrial wildlife is anticipated to be limited to small- and medium-sized terrestrial wildlife such as muskrat, raccoon, coyote, fox, and small rodents.

Based on the spatial and temporal extent of the proposed project and the limited terrestrial habitat, no adverse interaction with terrestrial wildlife is anticipated.

3.1.11 Topography and Drainage

The subject site is in a relatively flat area surrounded by wetlands to the north, west and south. A narrow strip of upland is found east of the subject site, beyond which is developed land (outdoor sports fields, school and a residential area). Surface water from the site drains to the north, west or south into these wetland areas, which drain into the Jean-Marie stream estuary to the west of the site.

Figure H: LIDAR Topographic Image of Subject Site



3.1.12 Vegetation

The subject site berms contain low, native vegetation herb and shrub species, including common grass species, goldenrod (*Solidago* spp.), aster spp., raspberry (*Rubus idaeus*), Red-osier Dogwood (*Cornus sericea*) and various tree seedlings. Areas beyond the berm to the south, east and north contain shrub and forested wetland and upland areas with shrub and tree species including Speckled Alder (*Alnus incana*), White Birch (*Betula papyrifera*), Trembling Aspen (*Populus tremuloides*), Red Maple (*Acer rubrum*), Black Spruce (*Picea mariana*), Balsam Fir (*Abies balsamea*) and Tamarack (*Larix laricina*).

3.1.13 Wetlands

The subject site is a wastewater treatment lagoon situated among wetland areas. A mapped provincially significant wetland is immediately adjacent to the lagoon, to the north, west and southeast. Additionally, an unmapped shrub wetland is located to the east of the lagoon. Refer to Figure I for approximate wetland boundaries, and photos 3 and 4.

The proposed project development area boundary will coincide with the current berm toe-of-slope, and as such will not impinge into the PSWs adjacent to the lagoon. Refer to Section 4 for additional information.

3.2 Cultural Features

3.2.1 Archaeological Resources

A request for archaeological probability mapping was submitted to the NB Department of Tourism, Heritage and Culture's (THC) Heritage and Archaeological Services Branch (HASB). The mapping (Figure J). No mapped archaeological sites are located in proximity of the proposed project.

The subject site is within 80 m of a surface water body, and is therefore considered to be within a zone of high potential for archaeological resources. However, the project footprint will be entirely confined to the existing lagoon footprint, which was already developed prior to this project. Based on boreholes excavated through the lagoon liner, the current liner is underlain by either bedrock or a clay/silt soil, representing archaeological bottom. As such, there will be no excavation into original, undisturbed soil as a result of the proposed project. Based on this, no adverse impacts to unknown archaeological resources are anticipated as a result of the proposed project.

Nevertheless, in the event of a discovery of a potential archaeological resource during excavation, work in the area will be stopped immediately and an archaeological curator at the New Brunswick Department of Tourism, Heritage and Culture - Heritage and Archaeological Services (Branch) will be contacted at 506-453-3115.

Photo No. 3: PSW North of Lagoon

Photo No. 4: PSW and Jean-Marie Estuary (Looking West)

Figure I: Mapped Wetlands Near Subject Site

3.2.1 Heritage Resources

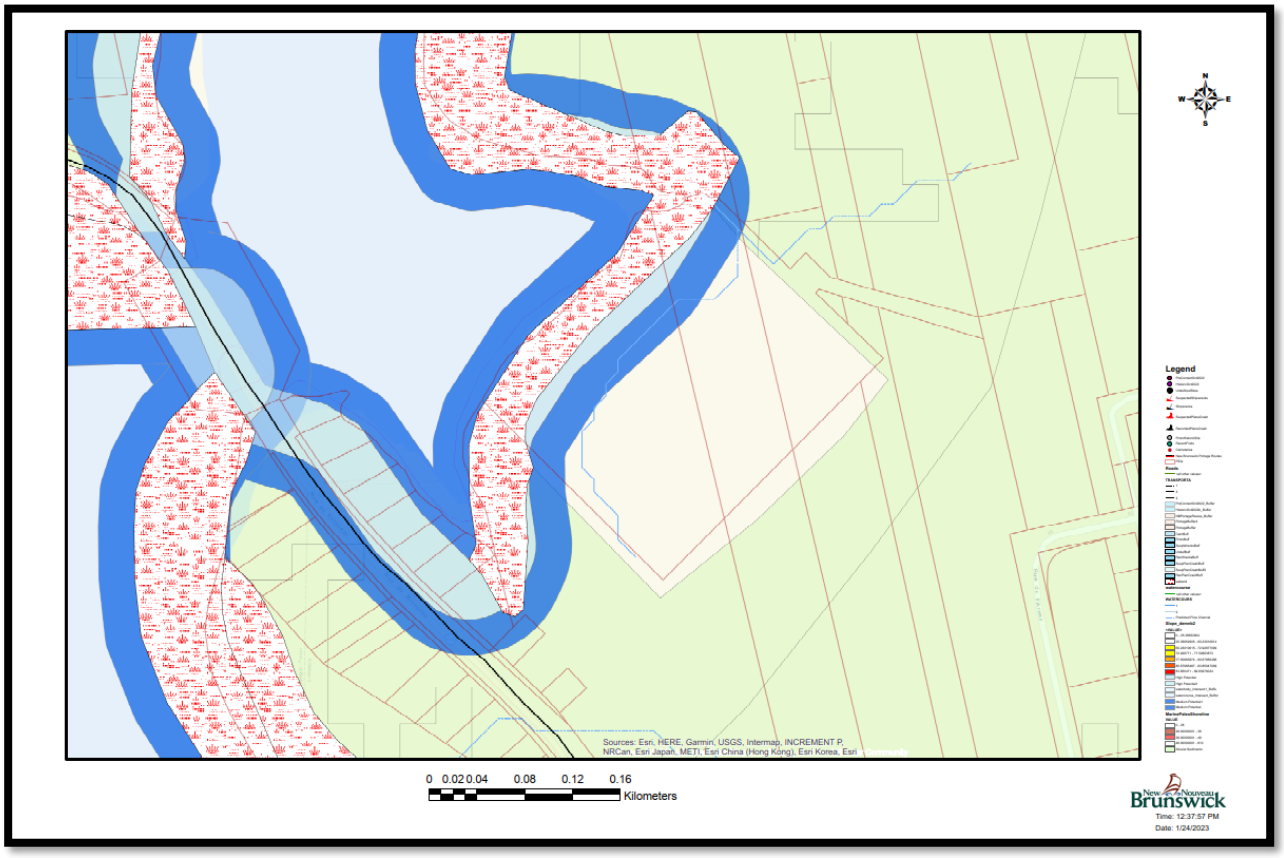
According to a search of the Canadian and New Brunswick Registers of Historic Places, there are no historically or culturally significant resources in the vicinity of the subject site.

3.2.1 Land Use

The subject site is within the municipality of Île-de-Lamèque and is currently zoned Institutional (INS) and Natural (N). Surrounding neighbouring land use consists of residential to the south (along route 313), forested and wetland to the north and west, and institutional and residential to the east. This area contains, among others, the municipal arena, baseball and soccer fields, the Lamèque municipal building and Ecole Sr. St.-Alexandre, as well as a residential area.

Based on the spatial and temporal scale of the proposed project, the established zoning of the area, the existing land uses, and the fact that the proposed project will improve odours and wastewater treatment, no land use conflicts are anticipated as a result of the proposed project.

Figure J: HASB Archaeological Mapping



4 IDENTIFICATION OF ENVIRONMENTAL IMPACTS

The environmental impact assessment methodology used herein focuses on those Valued Environmental Components (VECs) present on site that are most likely to be impacted by the project, before mitigation is implemented. VECs are selected based on a review of site information and potential project-VEC interactions. Determination of Significance of these potential impacts on VECs is based on an evaluation of magnitude, reversibility, geographic extent, duration and frequency.

Based on the review of the project description and the biophysical characteristics of the environment, the following potential VECs were identified and assessed for the proposed project:

a) Aquatic Wildlife and Habitat
b) Atmospheric Quality
c) Migratory Birds and Bird Species at Risk
d) Surface Water Quality
e) Terrestrial Wildlife
f) Wetlands

Where there is potential for a project-VEC interaction, further discussion is provided in the following sections. For issues where there is limited or no anticipated interaction, a rationale was provided in Section 3, and the issue is not discussed further in the present report. Potential project-environment interactions are presented in Table 4.

Table 4: Potential Project-Environment Interaction Matrix

Activities ➡ / VEC ⬇	Construction/ Installation of Physical Work	Operation/ Maintenance of Physical Work	Decommissioning/ Abandonment of the Physical Work	Accidents and Unplanned Events
Aquatic Wildlife and Habitat	X	X		X
Atmospheric	X	X		X
Migratory/SAR Birds	X			X
Surface Water Quality	X	X		X
Terrestrial Wildlife	X			X
Wetlands	X			X

4.1 Aquatic Life and Habitat

Existing Conditions: The subject site is adjacent to the Jean-Marie Stream estuary, a shallow brackish estuary separated from Lamèque Bay by the Route 313 causeway.

Potential Environmental Impact 1: Treated wastewater from the lagoon will continue to be discharged to a small unnamed tributary of the Jean-Marie estuary as per the present situation, which may create localized impacts to aquatic life and habitat.

Recommended Mitigation:

Mitigation 1: The updates to the lagoon will enhance treatment efficacy, resulting in improved water quality in the mixing zone and reduction in algae and odours compared to the present location.

Mitigation 2: Effluent quality will meet the requirements of the lagoon Approval to Operate.

Mitigation 3: The municipality will continue to operate the lagoon per the DELG Approval to Operate, which includes requirements for regular monitoring and reporting.

Significance of Impact: Small magnitude, reversible, immediate, short-term and once. Based on this assessment, potential impacts to aquatic wildlife and habitat are not significant.

4.2 Atmospheric

Existing Conditions: The nearest residential receptor is a single dwelling located approximately 100m west of the lagoon.

Potential Environmental Impact 1: The construction of the project includes dredging and temporarily storing the lagoon sludge in situ (within the unused lagoon cell) for decanting. This will temporarily create odours which may impact nearby receptors.

Potential Environmental Impact 2: Operation of motorized equipment will create localized emissions (odours, particulate and greenhouse gas emissions from internal combustion engines).

Potential Environmental Impact 3: Operation of motorized equipment will create noise which may impact nearby receptors.

Recommended Mitigation:

Mitigation 1: Sludge drying on site will be seeded or covered to mitigate odours. This will be a temporary impact for the duration of construction.

Mitigation 2: Sludge will be removed as soon as possible, to be disposed off-site at an approved disposal facility.

Mitigation 3: Work hours will adhere to local noise bylaws.

Mitigation 4: All equipment to be used is to be in proper working order and properly muffled.

Mitigation 5: Equipment shall be used for its intended use only.

Mitigation 6: Equipment shall not idle excessively.

Significance of Impact: Small magnitude, reversible, immediate, short-term and once. Based on this assessment, potential impacts to atmospheric quality are not significant.

4.3 Migratory Birds and Bird Species at Risk

Existing Conditions: The subject site contains suitable breeding, foraging and staging habitat for migratory birds. The majority of bird species breed in this zone between April 15th and September 1st.

Potential Environmental Impact: The construction of the project could temporarily displace or disturb migratory birds.

Recommended Mitigation:

Mitigation 1: No large vegetation, suitable for songbird nesting, will be cleared for the purposes of the project.

Mitigation 2: Construction activities are scheduled to take place during of the breeding bird season. As very little/no vegetation will be removed with the exception of the herb layer and some small seedlings, ground-nesting bird species may be impacted. Prior to initiating construction, a qualified bird biologist will conduct a survey of the project development area to identify any active nests. In the event an active nest is encountered, a suitable buffer will be established around the nest, and no construction activities shall take place within the buffer until the chicks have fledged and left the nest.

Mitigation 3: Low vegetation will be re-established upon completion of the project, using only native vegetation typical of the region.

Mitigation 4: No material shall be stockpiled on site, to prevent swallows from nesting in temporary stockpiles.

Mitigation 5: Construction activities during migration: It is anticipated that migrating waterfowl will avoid an active construction site. The presence of machinery operating will displace birds from the lagoon into the nearby estuary, which is suitable staging habitat.

Mitigation 6: Contractors will be advised not to approach or disturb migratory birds or their nests.

Significance of Impact: Small magnitude, reversible, immediate, short-term and once. Based on this assessment, potential impacts to migratory birds are not significant.

4.4 Surface Water Quality

Existing Conditions: The subject site is adjacent to the Jean-Marie Stream estuary, a shallow brackish estuary separated from Lamèque Bay by the Route 313 causeway.

Potential Environmental Impact 1: Treated wastewater from the lagoon will continue to be discharged to a small unnamed tributary of the Jean-Marie estuary as per the present situation, which may adversely impact to surface water quality.

Potential Environmental Impact 2: Excavation of existing berms and operation of motorized equipment will occur within 30 m of the adjacent PSWs. Sediment migration could occur into these sensitive areas.

Recommended Mitigation:

Mitigation 1: The updates to the lagoon will enhance treatment efficacy, resulting in improved water quality in the receiving water, and a reduction in algae and odours compared to the present situation.

Mitigation 2: Effluent quality will meet the requirements of the DELG Approval to Operate.

Mitigation 3: The municipality will continue to operate the lagoon per the DELG Approval to Operate, which includes requirements for regular monitoring at the end-of-pipe, and reporting of results.

Mitigation 4: The contractor will be required to have suitable operational and engineering controls to prevent and contain erosion and sedimentation within the work area. All sedimentation and erosion mitigation measures must be designed, constructed, and in sufficient quantity to prevent surface runoff from the project from having a negative impact on surface water quality. Such mitigation measures must be installed prior to exposure of erosion-susceptible soils, and must be maintained regularly to ensure they are functioning properly. Additional mitigation measures must be added, as applicable. All such mitigation measures must be maintained until such time as vegetation is re-established.

Mitigation 5: The new berms shall be stabilized, as soon as practical, by re-seeding them with native vegetation species common in the region. All exposed soil susceptible to erosion created by the project must be permanently revegetated with plant species that are native to the region, non-invasive and must be covered with straw. If the work is completed outside of the growing season, all slopes must be temporarily stabilized in such a manner to withstand winter conditions, until such time as permanent revegetation can be completed.

Mitigation 6: All machinery will operate from land or infrastructure above the high-water mark in a manner that minimizes disturbance.

Mitigation 7: In the event that erosion of soil or sedimentation of wetlands or watercourses occurs, all work must cease until the cause is identified and corrected.

Mitigation 8: Weather conditions are to be assessed on a daily basis to determine the risk of extreme weather in the project areas. Avoid work during periods with rainfall or heavy wind warnings for the work area.

Mitigation 9: Turbidity will be monitored in accordance with applicable Acts, regulations and permit requirements.

Mitigation 10: Any construction-related material used must be clean and non-toxic (i.e., free of fuel, oil, grease, and/or any contaminants).

Mitigation 11: No refuelling or fuel storage shall be permitted within 30 m of a wetland.

Significance of Impact: Small magnitude, reversible, immediate, long-term and ongoing. Based on this assessment, potential impacts to water quality are considered not significant.

4.5 Terrestrial Wildlife

Existing Conditions: The lagoon berms contain marginal terrestrial wildlife habitat.

Potential Environmental Impact: Construction of the project, primarily removing low vegetation and re-instating the berms, could disrupt or kill small terrestrial wildlife species and temporarily disturb approximately 6,000 m^2 of marginal terrestrial habitat.

Recommended Mitigation:

Mitigation 1: Construction contractors shall be required to have a wildlife response plan, in the event that terrestrial wildlife and nesting birds are discovered during construction. The response plan will follow the Environment and Climate Change *Canada 2021 Guidelines for Wildlife Response Plans*.

Significance of Impact:

Small magnitude, reversible, immediate, short-term and once. Based on this assessment, potential impacts to wildlife and wildlife habitat are not significant.

4.6 Wetlands

Existing Conditions: The subject site is immediately adjacent to PSW coastal marshes to the north west and south. The construction footprint will extend to the berm toe-of-slope, which is the PSW edge.

Potential Environmental Impact: Excavation or infilling of the berms will be adjacent to the PSW edge, and sediment or other material may migrate into the PSW, damaging habitat or wetland vegetation.

Recommended Mitigation:

Mitigation 1: The contractor will be required to have suitable operational and engineering controls to prevent and contain erosion and sedimentation within the work area. All sedimentation and erosion mitigation measures must be designed, constructed, and in sufficient quantity to prevent surface runoff from the project from having a negative impact on surface water quality. Such mitigation measures must be installed prior to exposure of erosion-susceptible soils, and must be maintained regularly to ensure they are functioning properly. Additional mitigation measures must be added, as applicable. All such mitigation measures must be maintained until such time as vegetation is re-established.

Mitigation 2: The new berms shall be stabilized, as soon as practical, by re-seeding them with native vegetation species common in the region. All exposed soil susceptible to erosion created by the project must be permanently revegetated with plant species that are native to the region, non-invasive and must be covered with straw. If the work is completed outside of the growing season, all slopes must be temporarily stabilized in such a manner to withstand winter conditions, until such time as permanent revegetation can be completed.

Mitigation 3: All machinery will operate from land or infrastructure above the high-water mark in a manner that minimizes disturbance.

Mitigation 4: In the event that erosion of soil or sedimentation of wetlands or watercourses occurs, all work must cease until the cause is identified and corrected.

Mitigation 5: Weather conditions are to be assessed on a daily basis to determine the risk of extreme weather in the project areas. Avoid work during periods with rainfall or heavy wind warnings for the work area.

Mitigation 6: Turbidity will be monitored in accordance with applicable Acts, regulations and permit requirements.

Mitigation 7: Any construction-related material used must be clean and non-toxic (i.e., free of fuel, oil, grease, and/or any contaminants).

Mitigation 8: Prior to initiating construction, the wetland edges will be clearly flagged and geo-referenced for contractors working on site, and contractors and their employees will be advised to avoid entering the PSW.

Mitigation 9: No refuelling or storage of fuel will be permitted within 30 m of a wetland.

Significance of Impact: Small magnitude, reversible, immediate, short-term and once. Based on this assessment, potential impacts to PSW are not significant.

5 ACCIDENTS AND UNPLANNED EVENTS

Accidents and unplanned events can result in the release of hazardous materials into the environment. These are primarily the result of leaks or spills from motorized equipment, or unplanned events such as collisions.

Existing Conditions: The construction of the proposed project will require the use of motorized light and heavy equipment, including excavators, mini-excavators, bulldozers and dump trucks.

Potential Environmental Impact: Leaks, spills or other unplanned events can result in adverse impacts on the terrestrial and aquatic environment.

Recommended Mitigation:

The proposed project will be awarded through a tender bid process. Contractors will be required to adhere to a technical specifications package, which will include the following measures:

Mitigation 1: If a suspected archaeological resource is uncovered during excavation, work in the area will be stopped immediately and an archaeological curator at the New Brunswick Department of Tourism, Heritage and Culture - Heritage and Archaeological Services (Branch) will be contacted at (506) 453-3115.

Mitigation 2: Procedures and training aimed at safe construction practices will be implemented during the construction to prevent or avoid potential situations that might lead to accidents, malfunctions or unplanned events.

Mitigation 3: The Contractor will be required to have an emergency response plan to control any accidental spills or unplanned events, which will include having appropriate on-site spill response equipment readily available for immediate deployment.

Mitigation 4: All equipment to be used is to be free from leaks or coating of hydrocarbon-based fluids and/or lubricants harmful to the environment. Hoses and tanks are to be inspected on a regular basis to prevent fractures and breaks.

Mitigation 5: On site, crews must have emergency spill clean-up equipment adequate for the activity involved, and it must be on site. Spill equipment will include, as a minimum, at least one 250 L (i.e., 55 gal) overpack spill kit containing items to prevent a spill from spreading; absorbent booms, pillows, and mats; rubber gloves; and plastic disposal bags.

Mitigation 6: All spills or leaks must be promptly contained, cleaned up, and reported to the Bathurst Environment and Local Government Regional Office at 547-7443, or to the 24-Hour Environmental Emergencies Report System (1-800-565-1633).

Mitigation 7: All equipment and materials must be operated and stored in such a manner to prevent deleterious substances from entering the wetlands or watercourse.

Mitigation 8: All material stored within 30 m of a wetland or watercourse must be free of contaminants.

Mitigation 9: Contractors shall implement measures to ensure no invasive plant species are imported to the project site.

Mitigation 10: Contractors will be required to have a Wildlife Response Plan for the project, using the 2021 ECCC Guidelines for Wildlife Response Plans as a guide.

Mitigation 11: Storage of fuel or refuelling of equipment shall not be permitted within 30 m of a wetland or watercourse.

Significance of Impact: Small magnitude, reversible, immediate, short-term and once. Based on this assessment, potential impacts from accidents and unplanned events are not significant.

6 PUBLIC AND FIRST NATIONS INVOLVEMENT

6.1 Public Involvement Program

The proposed project is located approximately 100 m from the nearest residence. Given its location, type of project and temporary odour impacts on nearby receptors, the following minimum required public involvement program is recommended per the requirements of Schedule C of the Guide to Environmental Impact Assessment in New Brunswick (2018) and will involve the following, based on a program to be submitted and approved by the DELG.

1) "The proponent shall communicate directly with elected officials (i.e.: MLA and mayor), local service districts, community groups, environmental groups and other key stakeholder groups (companies, agencies, interest groups, etc.) and First Nations as appropriate, enabling them to become familiar with the proposed project and ask questions and/or raise concerns."

a) Acknowledged. First Nations will be contacted as per Section 6.2 below.

2) The proponent shall provide direct, written notification (letter, information flyer, etc.) about the project and its location to potentially affected area residents, landowners and individuals (to be determined in consultation with Sustainable Development, Planning and Impact Evaluation Branch). The notification must include the following:

a) A brief description of the proposed project;

b) Information on how to view the registration document;

c) A description of the proposed location (map is desirable);

The status of the provincial approval process (i.e.: "The project is currently registered for review with the Department of Environment and Local Government under the Environmental Impact Assessment Regulation, Clean Environment Act");

d) A statement indicating people can ask questions or raise concerns with the proponent regarding the environmental impacts;

e) Proponent contact information (name, address, phone number, email); and

f) The date by which comments must be received (See Section 6.0 of the Registration Guide).

A hard copy of the project description with the above information will be hand-delivered or mailed to the residents and landowners within an approximate 500m radius as shown in Figure K.

3) When the EIA report is completed, it will be submitted to the DELG and placed on the DELG Website and the registration document (and any subsequent submissions in response to issues raised by the Technical Review Committee) shall be made available for public review at 20 McGloin Street, 2nd Floor, Fredericton, New Brunswick.

Acknowledged.

4) The proponent shall make copies of the project's registration document (and any subsequent submissions in response to issues raised by the Technical Review Committee) available to any interested member of the public, stakeholder or First Nation.

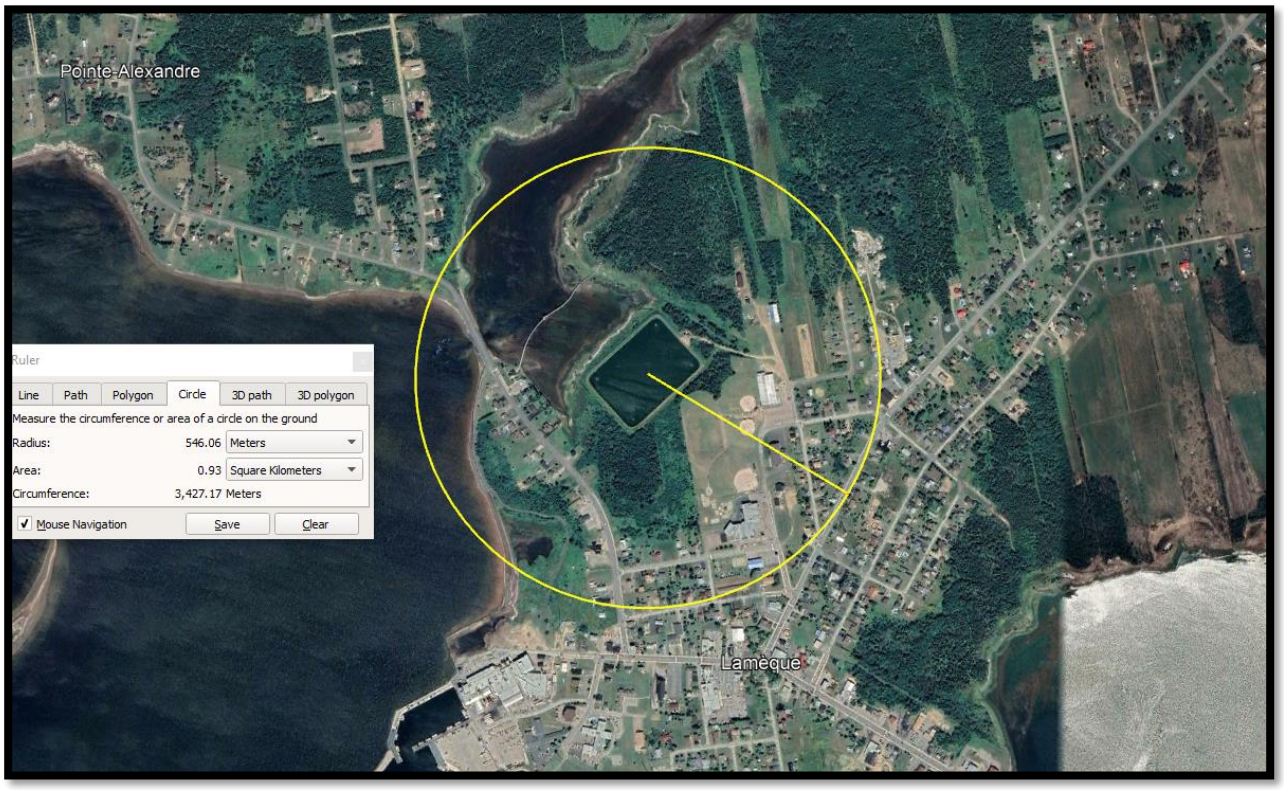
A hard copy of the EIA registration document will be kept at the Lamèque municipal building for public viewing during regular business hours.

5) Within 60 days of project registration, the proponent shall prepare and submit to the Department of Environment and Local Government a report documenting the above public involvement activities and shall make this report available for public review.

Acknowledged.

In addition to the above, the project description per item No. 2 above will be posted on the municipality's website and/or Facebook page, to allow members of the community to view and provide comments.

Figure K: Neighbouring Landowners to Receive Project Description



6.2 Indigenous Peoples Engagement

The Municipality of Île-de-Lamèque respectfully acknowledges the project is located on the traditional unceded territory of the Mi'gmaq Indigenous Peoples. It is also recognized that early engagement with Indigenous Peoples is beneficial to all parties as the project moves through the early conceptual stage, to design, and finally implementation stages. The proposed project was presented to staff of Mi'gmawe'l Tplu'taqnn Inc. (MTI) in December 2022.

MTI has implemented a Mi'gmaq Rights Impact Assessment (MRIA) framework to assess potential impacts that the project may have on the rights of Indigenous Peoples. The Municipality of Ile de Lamèque acknowledges this process and looks forward to additional dialogue as the project review advances.

In addition to the aforementioned presentation, project descriptions and copies of the EIA registration document will be provided to MTI directly by email, as well as to Chiefs of all Mi'gmaq First Nations in New Brunswick, and the Wolastoqey Nation in New Brunswick (WNNB) organization.

7 APPROVAL OF THE PROJECT

The following authorizations are anticipated for the proposed project.

- Environmental Impact Assessment Certificate of Determination (DELG)
- Certificate of Approval to Operate (Amended) (DELG)

Any additional permits will be obtained by the Municipality prior to initiating construction on an as-needed basis.

8 FUNDING

The proposed project will be publicly funded by the Province of New Brunswick, the Municipality of Île-de-Lamèque, and Infrastructure Canada.

9 FUTURE PHASE

The current outfall location is in a small, unnamed tributary of the Jean-Marie Stream that is inadequate for a proper mixing zone, which can create algal blooms and odours in low water.

A future, second phase of the proposed project will relocate the existing discharge pipe to a more advantageous location for mixing, with more flow and deeper water to allow for the discharge of the effluent that will mitigate impacts to water quality and aquatic life in the estuary.

Phase 2 will be initiated upon completion of Phase 1, subject to available funding and on condition that a suitable discharge location can be identified. Before this future phase is implemented, an Underwater Benthic Habitat Survey (UBHS), rare plant survey, and Ecological Risk Assessment (ERA) will be completed and submitted to the DELG for review and approval.

10 CLOSURE

This report identifies Valued Environmental Components which may potentially be impacted by the proposed lagoon upgrades. Where possible, impacts have been avoided in the project design. Where avoidance is not feasible, generally-accepted and effective mitigation measures are proposed. Significance of impacts was then determined based on the criteria of likelihood, scale, duration and proposed mitigation.

Potential VECs were identified and assessed as either not potentially impacted by the project, or potential impacts were considered *not significant* based on the above criteria.

This report was prepared by Roy Consultants for the exclusive use of the proponent. The information contained herein may not be republished or relied upon for any other purpose or by any other third party without the express written notice of the author.

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APPENDICES

APPENDIX A

Appendix A – Project Design Drawings

CELLULE : VOLUME 53,500m³
PROFONDEUR D'EAU ±1.6m
MEMBRANE: ARGILE

ACTUEL : DÉBIT MIN. 410m³/jr
DÉBIT MOYEN 740m³/jr
DÉBIT MAX. 1750m³/jr
CHARGE ORGANIQUE 135kg/jr

NORMES DE PREFORMANCES VISÉES PAR LA MUNICIPALITÉ AU POINT DE REJET : DBO_5C 25mg/l (MOYENNE) DEMANDE BIOLOGIQUE EN OXYGÈNE
TSS^2 25mg/l (MOYENNE) TOTAL DES SOLIDES EN SUSPENSION
NH_3–N 1.25mg/l AMMONIAC NON IONISÉ, EXPRIMÉ SOUS FORME D'AZOTE (N) À 15% ±1°C

CONDUITE DE SORTIE EXISTANTE

BATIMENT UV EXISTANT

RAYON DE 150m DE LA MAISON LE PLUS PRÈS

165.52

PID#20221438

225.43

PID#20453627

CONDUITE DE REFOULEMENT EXISTANTE

PID#20451993

PID#20579900

238.40

175.19

RAYON DE 150m DU BATIMENT LE PLUS PRÈS

CONDUITE DE REFOULEMENT EXISTANTE

PID#20452033

PID#20220265

PID#20219952

A DETAIL No
No DU DETAIL
B LOCATION DRAWING No
SUR DESSIN No
C DRAWING No
DESSIN No

ROY CONSULTANTS
ENGINEERING SERVICES D'INGÉNIERIE
548, av. King Ave
Bathurst (NB) E2A 1P7
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No.	date	revisions	by/par
A	23/02/13	Préliminaire	A.K.

project/projet AMÉLIORATION DU SYSTÈME DE TRAITEMENT DES EAUX USÉES

design by/design par	check by/verifie par
J.P. FOURNIER	J.P. FOURNIER

scale/echelle	date	drawn by/dessine par
1:1500	FÉVRIER 2023	A. KNOWLES

title/titre: PLAN LAGUNE EXISTANTE

No.: 42–22–EIA–1

rev.: A

CELLULE #1 :VOLUME ±22,500m³
PROFONDEUR D'EAU 3.7m

CELLULE #2 :VOLUME ±11,2500m³
PROFONDEUR D'EAU 3.7m

CELLULE #3 :VOLUME ±11,2500m³
PROFONDEUR D'EAU 3.7m

ACTUEL : DÉBIT MIN. 410m³/jr
DÉBIT MOYEN 740m³/jr
DÉBIT MAX. 1750m³/jr
CHARGE ORGANIQUE 135kg/jr

FUTUR : DÉBIT MIN. 530m³/jr
DÉBIT MOYEN 960m³/jr
DÉBIT MAX. 2090m³/jr
CHARGE ORGANIQUE 175kg/jr

NORMES DE PREFORMANCES VISÉES PAR LA MUNICIPALITÉ AU POINT DE REJET : DBO_5C 25mg/l (MOYENNE) DEMANDE BIOLOGIQUE EN OXYGÈNE
TSS^2 25mg/l (MOYENNE) TOTAL DES SOLIDES EN SUSPENSION
NH_3–N 1.25mg/l AMMONIAC NON IONISÉ, EXPRIMÉ SOUS FORME D'AZOTE (N) À 15% ±1°C

CONDUITE DE SORTIE PROPOSÉE (PHASE 1)
CONDUITE DE SORTIE EXISTANTE
BATIMENT DES SURPRESSIONS EXISTANTS
CONDUITE D'ÉGOUT SANITAIRE
ESPACE DE TRAITEMENT TEMPORAIRE
BATIMENT DES SOUFFLANTES/UV PROPOSÉ
CONDUITE DE SORTIE FUTURE (PHASE 2)
CELLULE #1
PID#20221438
CELLULE #3
CELLULE #2
PID#20453627
PID#20451993
CONDUITE DE REFOULEMENT EXISTANTE
PID#20579900
CONDUITE DE REFOULEMENT EXISTANTE
RIDEAU PROPOSÉ
PID#20220265
CONDUITE DE REFOULEMENT PROPOSÉE
PID#20452033
PID#20219952
28.19
45.36
95.14
5.00
6.00
95.13
14.10 TYP.
163.05
139.89

A DETAIL No
No DU DETAIL
B LOCATION DRAWING No
SUR DESSIN No
C DRAWING No
DESSIN No

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No.	date	revisions	by/par
A	23/02/13	Préliminaire	A.K.

project/projet AMÉLIORATION DU SYSTÈME DE TRAITEMENT DES EAUX USÉES

design by/design par	check by/verifie par
J.P. FOURNIER	J.P. FOURNIER

scale/echelle	date	drawn by/dessine par
1:1500	FÉVRIER 2023	A. KNOWLES

title/titre: PLAN LAGUNE PROPOSÉE

No.: 42–22–EIA–2

rev.: A

APPENDIX B

Appendix B – DELG Approval to Operate

AGRÉMENT D'EXPLOITATION

S-3106

Conformément au paragraphe 8(1) *du Règlement sur la qualité de l'eau établi en vertu de la Loi sur l'assainissement de l'environnement*, cet agrément d'exploitation est par les présentes émis à:

Lamèque

pour l'exploitation des

Ouvrages d'évacuation des eaux usées

Description de la source:	Cet agrément couvre le rejet d'effluent à partir des emplacements contenus dans le Système d'information et de rapports réglementaires sur les effluents pour l'ouvrage suivant. **Lagune aérée** **CEU: Classe II / EEU: Classe I**
Adresse postale:	**44, rue du Pêcheur Nord** **Lamèque, N.-B. E8T 3N4**
Conditions de l'agrément:	**Se référer à l'annexe « A » et l'annexe « B » du présent agrément**
Remplace l'agrément:	**S-2568**
Valide à partir du:	**12 avril 2019**
Date d'expiration:	**11 avril 2024**

Recommandé par: Maryline Mallet
Division de l'environnement

Émis par: _____ le 1 avril 2019
pour Ministre de l'Environnement et Gouvernements locaux Date

ANNEXE « A »

A. DÉFINITIONS

1. « **Accrédité** » désigne l'accréditation ISO/IEC 17025 par le Conseil canadien des normes (CCN), par la « *Canadian Association for Laboratory Accreditation Inc.* » (CALA), ou encore l'accréditation ISO/IEC 17025 par un autre organisme étant reconnu pour accorder une telle accréditation selon les critères ISO/IEC 17011.

2. « **Agent d'autorisation** » désigne le Gérant de la Section de la Délivrance de permis - Nord du Ministère de l'Environnement et des gouvernements locaux, ainsi que toute personne désignée pour agir au nom du Gérant.

3. « **Certifié** » désigne le détenteur d'un certificat valide de qualification, sur lequel est stipulée la classe de l'*opérateur,* émis par le ministère de l'Éducation postsecondaire, Formation et Travail du Nouveau-Brunswick.

4. « **Chlore résiduel total** » désigne la quantité totale de chlore libre et de chlore combiné, y compris les chloramines inorganiques.

5. « **DBOC** » ou « **Matières exerçant une demande biochimique en oxygène de la partie carbonée** » désigne les matières carbonées qui consomment de l'oxygène dissous dans l'eau par oxydation biochimique.

6. « **Lagune** » désigne une installation d'épuration des eaux usées où la période de rétention moyenne des eaux usées à l'intérieur de l'installation, pour l'épuration, est de cinq jours ou plus.

7. « **Létalité aiguë** », s'agissant d'un effluent, désigne la capacité de provoquer, à l'état non dilué, la mort de plus de 50 % des truites arc-en-ciel qui y sont exposées pendant une période de quatre-vingt-seize heures.

8. « **Matières en suspension** » désigne toutes matières solides dans l'effluent retenues sur un papier-filtre ayant des pores d'au plus 2.0 micromètres (µm).

9. « **Opérateur** » désigne une personne qui dirige, ajuste, inspecte, analyse ou évalue une exploitation ou un procédé qui contrôle l'efficacité ou l'efficience de l'ouvrage d'évacuation des eaux usées.

10. « **Point de débordement** » désigne tout point de rejet d'un ouvrage d'évacuation des eaux usées à partir duquel un trop plein d'eaux usées peut être rejeté et au-delà duquel la qualité des eaux usées, avant leur rejet comme effluent dans des eaux ou autres lieux, n'est plus assujettie au contrôle du propriétaire ou de l'exploitant.

11. « **Point d'entrée** » désigne tout point ou l'effluent est rejeté dans les eaux fréquentées par les poissons à partir du *point de rejet final* ou un *point de débordement.*

12. « **Point de rejet final** » désigne le point de l'ouvrage d'évacuation des eaux usées, autre qu'un *point de débordement*, au-delà duquel la qualité des eaux usées avant leur rejet comme effluent dans l'environnement n'est plus assujettie au contrôle du propriétaire ou de l'exploitant.

13. « **Titulaire de l'agrément**" désigne le nom identifié sur la page couverture du présent Certificat d'agrément.

14. « **Trimestre** » désigne une période de trois mois commençant le premier jour de janvier, d'avril, de juillet ou d'octobre de l'année en cause.

15. « **Urgence environnementale** » désigne une situation où il y a eu ou qu'il risque d'y avoir un rejet d'eaux usées non autorisé à un endroit autre que le *point de rejet final* et/ou une dérivation non planifiée a au moins un des processus de traitement normalement appliqué aux eaux usées du système. Les rejets non autorisés incluent les débordements d'eaux usées attribuables à des averses de pluie ou des fontes de neige excessive.

16. « **SIRRE** » ou « **Système d'information pour les rapports réglementaires sur les effluents** » désigne l'application Web élaborée par Environnement et Changement climatique Canada pour faciliter la production de rapports sur les renseignements requis par les règlementations.

17. « **Substances nocives** » sont désignées comme les substances ou les catégories de substances suivantes : les matières exerçant une demande biochimique en oxygène de la partie carbonée; les matières en suspension; le chlore résiduel total; et, l'ammoniac non ionisé.

18. « **Volume journalier moyen** » désigne le calcul de la somme des volumes journaliers d'influent ou d'effluent et la division de cette somme par le nombre de jours compris dans l'année civile.

B. CONDITIONS DE L'AGRÉMENT

RAPPORT DES URGENCES

19. Lorsqu'une *urgence environnementale* est constatée, un représentant désigné du *titulaire de l'agrément* doit **immédiatement** aviser le Centre national des urgences environnementales (CNUE) d'Environnement et Changement climatique Canada **jusqu'à ce qu'on arrive à joindre un agent** (p. ex. aucun message dans la boîte vocale ne sera accepté) et fournir le plus de renseignements disponibles possible concernant l'*urgence environnementale,* tel que: l'endroit en latitude et longitude, débit, heure, et une brève description.

Le numéro de téléphone pour le **CNUE d'Environnement et Changement climatique Canada** est le **1-800-565-1633.**

20. **Dans les cinq (5) jours** suivants le premier avis, une copie du **Rapport détaillé de l'urgence** doit être envoyée, par courriel ou par télécopieur, à l'ingénieur ou au coordonnateur des agréments d'eaux usées responsable de réglementer l'ouvrage d'évacuation des eaux usées du *titulaire de l'agrément.* Le Rapport détaillé de l'urgence doit comprendre au moins les éléments suivants : (i) une description du problème survenu; (ii) une description de l'impact résultant du problème; (iii) une description des mesures qui ont été prises pour atténuer l'impact; et (iv) une description des mesures qui ont été prises pour prévenir la récurrence de ce problème.

AUTORISATION TEMPORAIRE DE DÉRIVATION

21. Le *titulaire de l'agrément* doit faire une demande d'autorisation temporaire de dérivation à l'*agent d'autorisation* pour soustraire les eaux usées du système à au moins un des processus de traitement habituel. La demande doit être présentée, en la forme précisée dans le *SIRRE*, **au moins quarante-cinq (45) jours avant la date** à laquelle la dérivation est requise.

NORMES DE PERFORMANCE DE L'EFFLUENT

22. Le *titulaire de l'agrément* doit s'assurer que la concentration moyenne de polluant dans l'effluent rejeté à partir du *point de rejet final* de l'ouvrage d'évacuation des eaux usées ne dépasse pas les critères limites suivants. La moyenne doit être calculée en utilisant la période de calcul applicable identifiée à la condition 28.

    i. *DBO_5C*: 25 mg/L (moyenne); et,
    ii. *Matières en suspension*: 25 mg/L (moyenne).

23. Pour une *lagune*, le *titulaire de l'agrément*, lors de la détermination de la moyenne visée à la condition 22, ne doit pas tenir compte du résultat de la détermination de la concentration de *matières en suspension* visée à la condition 29 provenant d'un échantillon prélevé durant le mois de juillet, d'août, de septembre ou d'octobre, si elle dépasse 25 mg/L.

24. Le *titulaire de l'agrément* doit **immédiatement** faire une demande à l'*agent d'autorisation*, en la forme précisée dans le *SIRRE*, si un échantillon de l'effluent rejeté à partir du *point de rejet final* contient une concentration d'ammoniac non ionisé égal ou supérieur à 1,25 mg/L, exprimée sous forme d'azote (N) à 15°C ± 1°C.

25. Pour les systèmes dont le *volume journalier moyen* de l'effluent calculé à la condition 26 est supérieur ou égal à 5 000 m^3, le *titulaire de l'agrément* doit assurer que la concentration de *chlore résiduel total* dans l'effluent rejeté à partir du *point de rejet final* ne dépasse pas 0,02 mg/L si le chlore, ou l'une de ses composantes, est utilisé pour

le traitement des eaux usées. Pour tous autres systèmes, soit ceux dont le *volume journalier moyen* de l'effluent calculé à la condition 26 est inférieur à 5 000 m^3, le *titulaire de l'agrément* doit assurer que la concentration de *chlore résiduel total* dans l'effluent rejeté à partir du *point de rejet final* ne dépasse pas 0,02 mg/L si le chlore, ou l'une de ses composantes, est utilisé pour le traitement des eaux usées **d'ici le 1er janvier 2021.**

SURVEILLANCE ET ÉCHANTILLONNAGE

Conformément au paragraphe 17 du *Règlement sur la qualité de l'eau*, cet agrément est assujetti aux conditions suivantes:

26. Le *titulaire de l'agrément* doit, pour chaque année civile, calculer et noter le *volume journalier moyen* d'effluent rejeté à partir du *point de rejet final*. Le volume d'effluent durant chaque jour doit être déterminé en utilisant un équipement de surveillance qui fournit :
    i. une mesure en continu du volume de l'affluent ou de l'effluent, ou une mesure du débit de l'affluent ou de l'effluent à partir de laquelle une estimation du volume journalier peut être effectuée; ou,
    ii. une mesure en continu du volume de l'affluent ou de l'effluent si le *volume journalier moyen* au cours de l'année civile précédente dépassait 2 500 m^3.

27. Le *titulaire de l'agrément* doit recueillir des échantillons pour les paramètres suivants conformément aux exigences de la condition 28:
    i. La concentration de *DBOC;* et,
    ii. La concentration de *matières en suspension.*

28. Le *titulaire de l'agrément* doit recueillir des échantillons, à partir du *point de rejet final,* du type et à la fréquence indiquée ci-dessous selon le *volume journalier moyen* de l'effluent calculé à la condition 26:

Volume journalier moyen (m^3)	Type de traitement	Type d'échantillon à prélever	Fréquence d'échantillonnage	Période de calcul[1]	Fréquence des rapports
≤ 2 500	*Lagune*	Instantané ou composite	Trimestrielle, à au moins 60 jours d'intervalle	Annuelle	Annuelle
	Mécanique	Instantané ou composite	Tous les mois, à au moins 10 jours d'intervalle	Trimestrielle	Trimestrielle
> 2 500 et ≤ 17 500	*Lagune*	Instantané ou composite	Toutes les 2 semaines, à au moins 7 jours d'intervalle	Trimestrielle	Trimestrielle
	Mécanique	Composite			
> 17 500 et ≤ 50 000	*Lagune*	Instantané ou composite	Toutes les semaines, à au moins 5 jours d'intervalle	Mensuelle	Trimestrielle
	Mécanique	Composite			
> 50 000	*Lagune*	Instantané ou composite	Trois jours par semaine, à au moins un jour d'intervalle	Mensuelle	Trimestrielle
	Mécanique	Composite			

[1]La moyenne doit être déterminée pour la *DBOC* et les *matières en suspension.*

29. Le *titulaire de l'agrément* doit recueillir un échantillon instantané au *point de rejet final* pour la toxicité de *létalité aiguë* selon la fréquence indiquée ci-dessous selon le *volume journalier moyen* de l'effluent calculé à la condition 26:

Volume journalier moyen (m^3)	Fréquence d'échantillonnage minimum
≤ 2 500	s.o.
> 2 500 et ≤ 50 000	Trimestrielle[1]
> 50 000	Mensuelle[2]

[1] à au moins soixante (60) jours d'intervalle
[2] à au moins vingt-et-un (21) jours d'intervalle

30. Si un échantillon est déterminé d'être de *létalité aiguë* au *point de rejet final,* le *titulaire de l'agrément* doit **immédiatement** avisé l'*agent d'autorisation.*

31. Si les résultats du *point de rejet final* sont déterminés de ne pas être de *létalité aiguë* selon la condition 32, le *titulaire de l'agrément* peut réduire la fréquence d'échantillonnage indiquée ci-dessous selon le *volume journalier moyen* de l'effluent calculé à la condition 26:

Volume journalier moyen (m^3)	Nombre de tests sans létalité aiguë	Fréquence réduite[1]
≤ 2 500	s.o.	s.o.
> 2 500 et ≤ 50 000	4 trimestres consécutifs	Annuelle[2]
> 50 000	12 mois consécutifs	Trimestrielle[3]

[1] fréquence réduite si le nombre de tests consécutifs de la colonne 2 de ce tableau sont passés
[2] à au moins six (6) mois d'intervalle
[3] à au moins soixante (60) jours d'intervalle

32. Le *titulaire de l'agrément* doit s'assurer que la *létalité aiguë* de l'effluent soit déterminée conformément à la méthode de référence SPE 1/RM/13 ou SPE 1/RM/50.

33. Le *titulaire de l'agrément* doit s'assurer que le Plan de surveillance de l'effluent, basé sur l'Évaluation du risque environnemental de l'ouvrage d'évacuation des eaux usées, est approuvé par l'*agent d'autorisation.* Le *titulaire de l'agrément* doit suivre la fréquence de surveillance identifiée dans le Plan de surveillance de l'effluent pour les paramètres identifiés dans le plan approuvé.

34. Le *titulaire de l'agrément* doit calibrer l'équipement de surveillance du débit ou du volume au moins une fois durant l'année civile et à au moins cinq mois d'intervalle.

35. Le *titulaire de l'agrément* doit s'assurer que l'équipement de surveillance permet de déterminer le volume ou le débit selon une marge d'erreur de ±15%.

36. Le *titulaire de l'agrément* doit s'assurer que les échantillons sont prélevés selon les méthodes décrites dans la plus récente version de la norme ISO 5667-10 « Water quality - sampling – Part 10 : Guidance on sampling of wastewater ».

37. Le *titulaire de l'agrément* doit s'assurer que tous les paramètres qui doivent être analysés selon le présent agrément soient analysés par des laboratoires *accrédités,* dont l'accréditation couvre la méthode d'analyse utilisée pour effectuer les déterminations en cause.

38. Le *titulaire de l'agrément* doit s'assurer que l'équipement utilisé pour la surveillance des paramètres requis par le présent agrément est calibré conformément aux recommandations du fabricant.

GESTION DES DÉBORDEMENTS

39. Le *titulaire de l'agrément* doit maintenir un plan à long terme visant à réduire les débordements d'égouts combinés ainsi qu'à réduire les débordements liés à l'infiltration. Le plan doit suivre, au minimum, les lignes directrices de l'*agent d'autorisation* du « Plan de gestion à long terme des débordements d'égouts combinés et sanitaires » du *ministère.*

40. Le *titulaire de l'agrément* doit s'assurer que toutes les stations de pompage sont conçues pour prévenir le rejet de matériaux flottants.

CERTIFICATION DES OPÉRATEURS

41. Conformément au paragraphe 19 du *Règlement sur la qualité de l'eau*, le ministre avise que le *titulaire de l'agrément* doit employer et avoir à sa disposition le(s) *opérateur(s) certifié(s)* suivant(s) selon la classe de l'installation identifiée sur la page couverture du présent Certificat d'agrément.

Classe "Épuration"	***Opérateur(s) certifié(s)* Épuration des eaux usées (EEU)**	**Classe "Collecte"**	***Opérateur(s) certifié(s)* Collecte des eaux usées (CEU)**
I	Minimum d'un *opérateur* Classe I	I	Aucun
II	Minimum d'un *opérateur* Classe II et d'un opérateur Classe I	II	Un *opérateur* Classe I
III	Minimum d'un *opérateur* Classe III et d'un *opérateur* Classe II	III	Un *opérateur* Classe I
IV	Minimum d'un *opérateur* Classe IV et d'un *opérateur* Classe III	IV	Un *opérateur* Classe I

TENUE DE REGISTRE

Conformément au paragraphe 17 du *Règlement sur la qualité de l'eau*, cet agrément est assujetti aux conditions suivantes:

42. Le *titulaire de l'agrément* doit maintenir et conserver des dossiers pendant une période de 5 ans concernant l'information suivante, et ceux-ci doivent être mis à la disposition de l'*agent d'autorisation* sur demande:
    a. Les dates auxquelles aucun effluent n'a été rejeté à partir du *point de rejet final* (si applicable);
    b. Pour chacune des dates auxquelles un effluent a été rejeté à partir du *point de rejet final*:
        i. le volume journalier rejeté, en m^3, s'il a été obtenu par une mesure en continu, ou
        ii. l'estimation du volume journalier, en m^3, dans les autres cas, et les résultats des calculs et mesures utilisés pour les estimations, tel que décrit à la condition 26(i);
    c. Pour tous les débordements d'eaux usées pour chaque *point de débordement*, y compris ceux causés par la pluie excessive ou la fonte des neiges:
        i. les dates au cours desquelles un effluent a été rejeté à partir du *point de débordement*,
        ii. pour chacune de ces dates, la durée ou une estimation de la durée du débordement au cours de laquelle un effluent a été rejeté à partir de ce point, exprimée en heures, ainsi qu'une mention indiquant s'il s'agit de la durée réelle ou d'une estimation,
        iii. le volume journalier rejeté en m^3, s'il a été obtenu par une mesure en continu ou l'estimation du volume journalier en m^3, dans les autres cas;
    d. Pour tout équipement de surveillance utilisé pour déterminer le volume ou le débit:

i. sa description, y compris son type,
ii. les spécifications du fabricant, l'année de fabrication et le numéro du modèle,
iii. la date à laquelle l'équipement fut calibré et le degré d'exactitude de l'équipement après la calibration,
iv. la date de son installation et, le cas échéant, celle à laquelle il cesse d'être utilisé et celle à laquelle il est remplacé;

e. Pour chaque échantillon exigé par la condition 28, ainsi que pour chaque échantillon additionnel analysé par un laboratoire *accrédité*:
   i. les résultats des analyses pour chacun des paramètres identifiés à la condition 27 et condition 29 (si applicable),
   ii. le type d'échantillon prélevé, soit instantané ou composite, et la date du prélèvement;
f. Tous les résultats d'analyses pour chacun des paramètres du Plan de surveillance de l'effluent;
g. Tous les résultats d'analyses exigées à l'annexe « B », si applicable; et,
h. Une liste identifiant le(s) opérateur(s) et indiquant le degré de certification de chaque opérateur(s).

RAPPORT

Conformément au paragraphe 17 du *Règlement sur la qualité de l'eau*, cet agrément est assujetti aux conditions suivantes:

43. S'il y a un changement à l'information dans le rapport d'identification dans le *SIRRE*, le *titulaire de l'agrément*, au plus tard **quarante-cinq (45) jours après le changement**, doit aviser l'*agent d'autorisation* du rapport d'identification modifié.

44. Le *titulaire de l'agrément* doit soumettre électroniquement à l'*agent d'autorisation*, en la forme précisée dans le *SIRRE*, un rapport pour la période de rapport précédente:
   i. **quarante-cinq (45) jours suivant la fin de chaque année**, celle-ci débutant le premier jour de janvier de chaque année, pour une lagune ayant un *volume journalier moyen* d'effluent inférieur à 2 500 m^3/jour;
   ii. **quarante-cinq (45) jours suivant la fin de chaque *trimestre***, le premier *trimestre* débutant le premier jour de janvier de chaque année, pour tous les autres ouvrages.

   Le rapport doit inclure l'information suivante:
   a. Le nombre de jours au cours desquels l'effluent a été rejeté;
   b. Le volume d'effluent rejeté, exprimé en m^3;
   c. La concentration moyenne de *DBOC* dans l'effluent;
   d. La concentration moyenne de *matières en suspension* dans l'effluent;
   e. Les résultats d'analyses pour la toxicité de *létalité aiguë;* et,
   f. Si une autorisation temporaire de dérivation a été émise.

45. Le *titulaire de l'agrément* doit soumettre à l'*agent d'autorisation* **quarante-cinq (45) jours suivants la fin de chaque année** :
    a. Tous les résultats d'analyses complétées conformément au Plan de surveillance de l'effluent approuvé exigé à la condition 33;
    b. Un résumé de toutes les *urgences environnementales* survenues qui ont été signalées à l'aide des modalités énoncées à la section « Rapport des urgences » du présent agrément; et,
    c. Tous les résultats d'analyses exigées à l'annexe « B », si applicable.

ANNEXE « B »

A. CONDITIONS DE L'AGRÉMENT

EXIGENCES POUR LA DÉSINFECTION

Conformément au paragraphe 8(2) du *Règlement sur la qualité de l'eau,* cet agrément est assujetti aux conditions suivantes:

1. Le *titulaire de l'agrément* doit recueillir des échantillons à partir du *point de rejet final* et les faire analyser pour la bactérie *E.coli* mensuellement, et ce à chaque mois que les installations de désinfection sont en opération.

2. Le *titulaire de l'agrément* doit s'assurer que les installations de désinfection sont opérationnelles en tout temps.

3. Le *titulaire de l'agrément* doit s'assurer que la concentration de polluant dans l'effluent rejeté à partir du *point de rejet final* de l'ouvrage d'évacuation des eaux usées ne dépasse pas 200 MPN/100ml d'*E.coli*.

Préparé par: _____

Maryline Mallet, ing.,
Direction des Autorisations

APPENDIX C

Appendix C – Site Photos

Environmental Impact Assessment – Site Photos
Lamèque Wastewater Lagoon Upgrade

Photo No. 1: Subject Site Entrance Looking North

Photo No. 2: Subject Site Access Road Looking Southeast

Photo No. 3: Subject Site Looking West

Photo No. 4: Subject Site Berm Looking North

Photo No. 5: Vegetation North of Subject Site

Photo No. 6: PSW North of Lagoon

Photo No. 7: Estuary and Berm (Looking West)

Photo No. 8: PSW and Estuary (Looking West)

Photo No. 9: Southeast Corner of Lagoon

Photo No. 10: Vegetation Southeast of Lagoon

Photo No. 11: Unmapped Wetland East of Lagoon

Photo No. 12: Vegetation Northeast of Subject Site

Photo No. 13: Jean-Marie Estuary and Subject Site (Background)

Photo No. 14: Jean-Marie Estuary Looking North from Route 313

APPENDIX D

Appendix D – ACCDC Report 7549

DATA REPORT 7549: Lameque, NB

Prepared 24 January 2023
by J. Churchill, Conservation Data Analyst

CONTENTS OF REPORT

- **1.0 Preface**
  - 1.1 Data List
  - 1.2 Restrictions
  - 1.3 Additional Information
  - Map 1: Buffered Study Area
- **2.0 Rare and Endangered Species**
  - 2.1 Flora
  - 2.2 Fauna
  - Map 2: Flora and Fauna
- **3.0 Special Areas**
  - 3.1 Managed Areas
  - 3.2 Significant Areas
  - Map 3: Special Areas
- **4.0 Rare Species Lists**
  - 4.1 Fauna
  - 4.2 Flora
  - 4.3 Location Sensitive Species
  - 4.4 Source Bibliography
- **5.0 Rare Species within 100 km**
  - 5.1 Source Bibliography

Map 1. A 100 km buffer around the study area

1.0 PREFACE

The Atlantic Canada Conservation Data Centre (AC CDC; www.accdc.com) is part of a network of NatureServe data centres and heritage programs serving 50 states in the U.S.A, 10 provinces and 1 territory in Canada, plus several Central and South American countries. The NatureServe network is more than 30 years old and shares a common conservation data methodology. The AC CDC was founded in 1997, and maintains data for the jurisdictions of New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador. Although a non-governmental agency, the AC CDC is supported by 6 federal agencies and 4 provincial governments, as well as through outside grants and data processing fees.

Upon request and for a fee, the AC CDC queries its database and produces customized reports of the rare and endangered flora and fauna known to occur in or near a specified study area. As a supplement to that data, the AC CDC includes locations of managed areas with some level of protection, and known sites of ecological interest or sensitivity.

1.1 DATA LIST

Included datasets:

Filename	Contents
LamequeNB_7549ob.xls	Rare or legally-protected Flora and Fauna in your study area
LamequeNB_7549ob100km.xls	A list of Rare and legally protected Flora and Fauna within 100 km of your study area
LamequeNB_7549msa.xls	Managed and Biologically Significant Areas in your study area

1.2 RESTRICTIONS

The AC CDC makes a strong effort to verify the accuracy of all the data that it manages, but it shall not be held responsible for any inaccuracies in data that it provides. By accepting AC CDC data, recipients assent to the following limits of use:

a) Data is restricted to use by trained personnel who are sensitive to landowner interests and to potential threats to rare and/or endangered flora and fauna posed by the information provided.
b) Data is restricted to use by the specified Data User; any third party requiring data must make its own data request.
c) The AC CDC requires Data Users to cease using and delete data 12 months after receipt, and to make a new request for updated data if necessary at that time.
d) AC CDC data responses are restricted to the data in our Data System at the time of the data request.
e) Each record has an estimate of locational uncertainty, which must be referenced in order to understand the record's relevance to a particular location. Please see attached Data Dictionary for details.
f) AC CDC data responses are not to be construed as exhaustive inventories of taxa in an area.
g) The absence of a taxon cannot be inferred by its absence in an AC CDC data response.

1.3 ADDITIONAL INFORMATION

The accompanying Data Dictionary provides metadata for the data provided.

Please direct any additional questions about AC CDC data to the following individuals:

Plants, Lichens, Ranking Methods, All other Inquiries	Sean Blaney	Senior Scientist / Executive Director	(506) 364-2658	sean.blaney@accdc.ca
Animals (Fauna)	John Klymko	Zoologist	(506) 364-2660	john.klymko@accdc.ca
Data Management, GIS	James Churchill	Conservation Data Analyst / Field Biologist		james.churchill@accdc.ca
Billing	Jean Breau	Financial Manager / Executive Assistant	(506) 364-2657	jean.breau@accdc.ca

Questions on the biology of Federal Species at Risk can be directed to AC CDC: (506) 364-2658, with questions on Species at Risk regulations to: Samara Eaton, Canadian Wildlife Service (NB and PE): (506) 364-5060 or Julie McKnight, Canadian Wildlife Service (NS): (902) 426-4196.

New Brunswick. For information about rare taxa, protected areas, game animals, deer yards, old growth forests, archeological sites, fish habitat etc., or to determine if location-sensitive species (section 4.3) occur near your study site, please contact Hubert Askanas, Energy and Resource Development: (506) 453-5873.

Nova Scotia. For information about Species at Risk or general questions about Nova Scotia location-sensitive species please contact the Biodiversity Program at biodiversity@novascotia.ca. For questions about protected areas, game animals, deer yards, old growth forests, archeological sites, fish habitat etc., or to determine if location-sensitive species (section 4.3) occur near your study site please contact a Regional Biologist:

DIGB, ANNA, KING	Emma Vost	(902) 670-8187	Emma.Vost@novascotia.ca
SHEL, YARM	Sian Wilson	(902) 930-2978	Sian.Wilson@novascotia.ca
QUEE, LUNE	Peter Kydd	(902) 523-0969	Peter.Kydd@novascotia.ca
HALI, HANT	Shavonne Meyer	(902) 893-0816	Shavonne.Meyer@novascotia.ca
Central Region	Jolene Laverty	(902) 324-8953	Jolene.Laverty@novascotia.ca
COLC, CUMB	Kimberly George	(902) 890-1046	Kimberly.George@novascotia.ca
ANTI, GUYS	Harrison Moore	(902) 497-4119	Harrison.Moore@novascotia.ca
INVE, VICT	Maureen Cameron-MacMillan	(902) 295-2554	Maureen.Cameron-MacMillan@novascotia.ca
CAPE, RICH, PICT	Elizabeth Walsh	(902) 563-3370	Elizabeth.Walsh@novascotia.ca

Prince Edward Island. For information about rare taxa, protected areas, game animals, fish habitat etc., please contact Garry Gregory, PEI Department of Environment, Energy and Climate Action: (902) 569-7595.

2.0 RARE AND ENDANGERED SPECIES

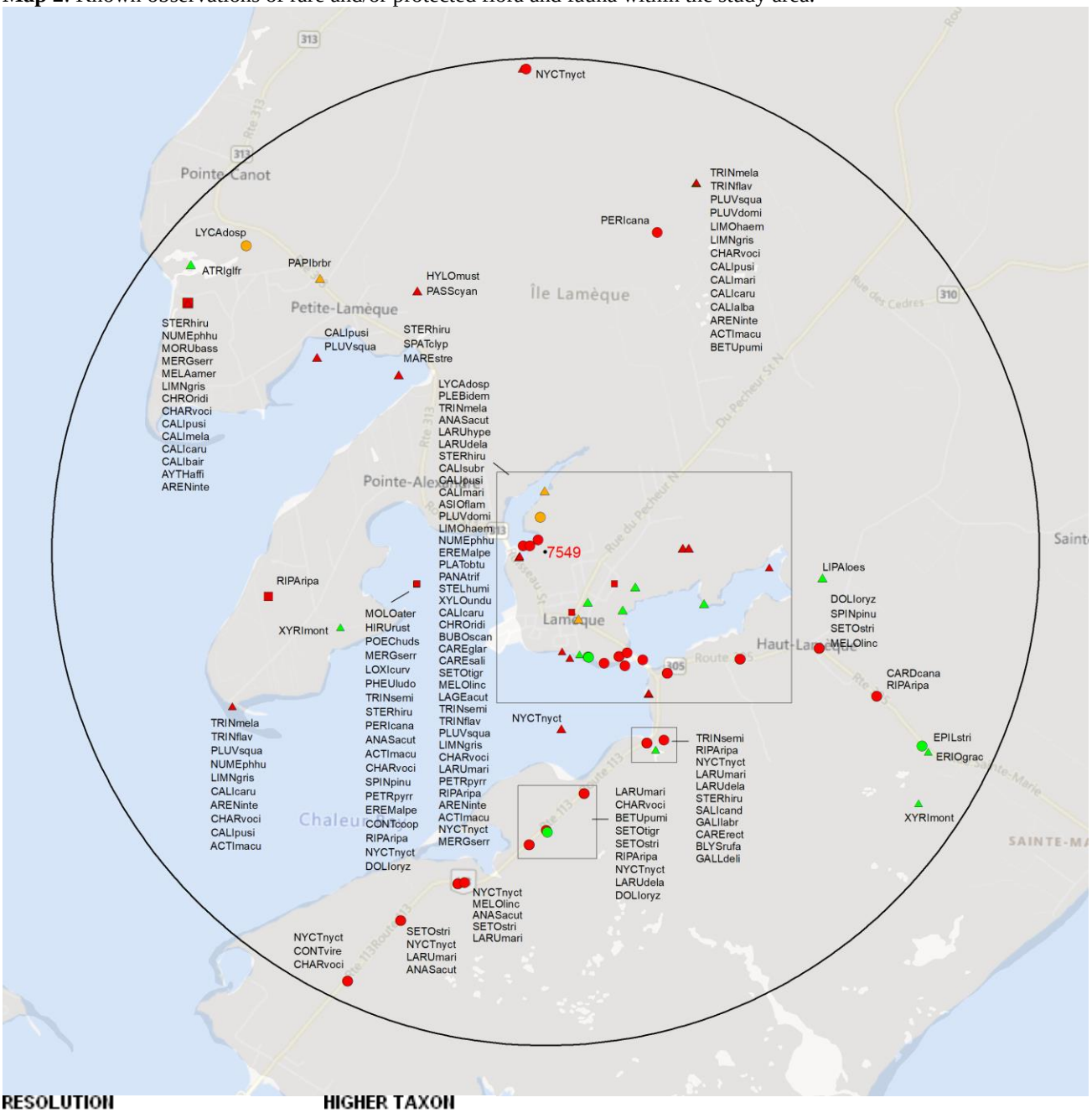
2.1 FLORA

The study area contains 23 records of 15 vascular and no records of nonvascular flora (Map 2 and attached: *ob.xls), excluding 'location-sensitive' species.

2.2 FAUNA

The study area contains 313 records of 54 vertebrate and 5 records of 4 invertebrate fauna (Map 2 and attached data files - see 1.1 Data List), excluding 'location-sensitive' species. Please see section 4.3 to determine if 'location-sensitive' species occur near your study site.

Map 2: Known observations of rare and/or protected flora and fauna within the study area.



3.0 SPECIAL AREAS

3.1 MANAGED AREAS

The GIS scan identified no managed areas in the vicinity of the study area (Map 3).

3.2 SIGNIFICANT AREAS

The GIS scan identified 5 biologically significant sites in the vicinity of the study area (Map 3 and attached file: *msa.xls).

Map 3: Boundaries and/or locations of known Managed and Significant Areas within the study area.

4.0 RARE SPECIES LISTS

Rare and/or endangered taxa (excluding “location-sensitive” species, section 4.3) within the study area listed in order of concern, beginning with legally listed taxa, with the number of observations per taxon and the distance in kilometers from study area centroid to the closest observation (± the precision, in km, of the record). [P] = vascular plant, [N] = nonvascular plant, [A] = vertebrate animal, [I] = invertebrate animal, [C] = community. Note: records are from attached files *ob.xls/*ob.shp only.

4.1 FLORA

	Scientific *Name*	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)
P	*Carex glareosa*	Gravel Sedge				S1	1	1.2 ± 0.0
P	*Carex salina*	Saltmarsh Sedge				S1	3	1.0 ± 1.0
P	*Atriplex glabriuscula var. franktonii*	Frankton's Saltbush				S2	1	4.6 ± 0.0
P	*Panax trifolius*	Dwarf Ginseng				S3	1	0.7 ± 3.0
P	*Stellaria humifusa*	Saltmarsh Starwort				S3	2	1.1 ± 0.0
P	*Salix candida*	Sage Willow				S3	2	2.3 ± 0.0
P	*Eriophorum gracile*	Slender Cottongrass				S3	3	4.4 ± 0.0
P	*Blysmopsis rufa*	Red Bulrush				S3	1	2.3 ± 0.0
P	*Betula pumila*	Bog Birch				S3S4	2	2.8 ± 0.0
P	*Epilobium strictum*	Downy Willowherb				S3S4	1	4.3 ± 0.0
P	*Galium labradoricum*	Labrador Bedstraw				S3S4	1	2.3 ± 0.0
P	*Carex recta*	Estuary Sedge				S3S4	1	2.3 ± 0.0
P	*Liparis loeselii*	Loesel's Twayblade				S3S4	1	2.8 ± 1.0
P	*Platanthera obtusata*	Blunt-leaved Orchid				S3S4	1	1.0 ± 3.0
P	*Xyris montana*	Northern Yellow-Eyed-Grass				S3S4	2	2.2 ± 0.0

4.2 FAUNA

	Scientific *Name*	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)
A	*Asio flammeus*	Short-eared Owl	Threatened	Special Concern	Special Concern	S1S2B	1	1.4 ± 1.0
A	*Hylocichla mustelina*	Wood Thrush	Threatened	Threatened	Threatened	S1S2B	1	2.9 ± 1.0
A	*Riparia riparia*	Bank Swallow	Threatened	Threatened		S2B	12	1.3 ± 7.0
A	*Tringa flavipes*	Lesser Yellowlegs	Threatened			S3M	14	1.1 ± 0.0
A	*Limosa haemastica*	Hudsonian Godwit	Threatened			S3M	6	1.4 ± 1.0
A	*Hirundo rustica*	Barn Swallow	Special Concern	Threatened	Threatened	S2B	1	1.3 ± 7.0
A	*Contopus virens*	Eastern Wood-Pewee	Special Concern	Special Concern	Special Concern	S3B	1	4.8 ± 0.0
A	*Contopus cooperi*	Olive-sided Flycatcher	Special Concern	Threatened	Threatened	S3B	1	1.3 ± 7.0
A	*Dolichonyx oryzivorus*	Bobolink	Special Concern	Threatened	Threatened	S3B	3	1.3 ± 7.0
A	*Cardellina canadensis*	Canada Warbler	Special Concern	Threatened	Threatened	S3S4B	1	3.7 ± 0.0
A	*Calidris subruficollis*	Buff-breasted Sandpiper	Special Concern	Special Concern		SNA	1	1.4 ± 1.0
A	*Bubo scandiacus*	Snowy Owl	Not At Risk			S1N,S2S3M	2	1.3 ± 0.0
A	*Sterna hirundo*	Common Tern	Not At Risk			S3B,SUM	11	0.3 ± 0.0
A	*Lagenorhynchus acutus*	Atlantic White-sided Dolphin	Not At Risk			S3S4	1	1.5 ± 0.0
A	*Calidris canutus rufa*	Red Knot rufa subspecies	E,SC	Endangered	Endangered	S2M	13	1.0 ± 0.0
A	*Tringa melanoleuca*	Greater Yellowlegs				S1?B,S4S5M	18	0.1 ± 0.0
A	*Aythya affinis*	Lesser Scaup				S1B,S4M	1	4.4 ± 65.0
A	*Eremophila alpestris*	Horned Lark				S1B,S4N,S5M	4	0.8 ± 7.0
A	*Chroicocephalus ridibundus*	Black-headed Gull				S1N,S2M	3	1.3 ± 0.0
A	*Calidris alba*	Sanderling				S1N,S3S4M	1	4.0 ± 0.0
A	*Nycticorax nycticorax*	Black-crowned Night-heron				S1S2B	45	1.3 ± 7.0
A	*Calidris bairdii*	Baird's Sandpiper				S1S2M	1	4.4 ± 65.0
A	*Melanitta americana*	American Scoter				S1S2N,S3M	1	4.4 ± 50.0
A	*Petrochelidon pyrrhonota*	Cliff Swallow				S2B	2	1.3 ± 7.0
A	*Mareca strepera*	Gadwall				S2B,S3M	1	2.3 ± 0.0
A	*Larus hyperboreus*	Glaucous Gull				S2N	2	0.3 ± 0.0

	Scientific *Name*	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)
A	*Larus delawarensis*	Ring-billed Gull				S2S3B,S4N,S5M	6	0.2 ± 0.0
A	*Pluvialis dominica*	American Golden-Plover				S2S3M	2	1.4 ± 1.0
A	*Larus marinus*	Great Black-backed Gull				S3	6	1.7 ± 0.0
A	*Loxia curvirostra*	Red Crossbill				S3	1	1.3 ± 7.0
A	*Spinus pinus*	Pine Siskin				S3	2	1.3 ± 7.0
A	*Spatula clypeata*	Northern Shoveler				S3B	1	2.3 ± 0.0
A	*Charadrius vociferus*	Killdeer				S3B	20	1.1 ± 0.0
A	*Tringa semipalmata*	Willet				S3B	5	1.3 ± 7.0
A	*Pheucticus ludovicianus*	Rose-breasted Grosbeak				S3B	1	1.3 ± 7.0
A	*Passerina cyanea*	Indigo Bunting				S3B	1	2.9 ± 1.0
A	*Molothrus ater*	Brown-headed Cowbird				S3B	1	1.3 ± 7.0
A	*Setophaga tigrina*	Cape May Warbler				S3B,S4S5M	3	2.3 ± 0.0
A	*Mergus serrator*	Red-breasted Merganser				S3B,S4S5N,S5M	3	1.3 ± 7.0
A	*Anas acuta*	Northern Pintail				S3B,S5M	9	0.3 ± 0.0
A	*Numenius phaeopus hudsonicus*	Whimbrel				S3M	3	2.3 ± 0.0
A	*Arenaria interpres*	Ruddy Turnstone				S3M	15	1.4 ± 1.0
A	*Calidris pusilla*	Semipalmated Sandpiper				S3M	23	1.4 ± 1.0
A	*Calidris melanotos*	Pectoral Sandpiper				S3M	1	4.4 ± 65.0
A	*Limnodromus griseus*	Short-billed Dowitcher				S3M	19	1.1 ± 0.0
A	*Calidris maritima*	Purple Sandpiper				S3N	2	1.4 ± 1.0
A	*Perisoreus canadensis*	Canada Jay				S3S4	2	1.3 ± 7.0
A	*Poecile hudsonicus*	Boreal Chickadee				S3S4	2	1.3 ± 7.0
A	*Actitis macularius*	Spotted Sandpiper				S3S4B,S4M	9	1.3 ± 7.0
A	*Melospiza lincolnii*	Lincoln's Sparrow				S3S4B,S4M	3	2.3 ± 0.0
A	*Gallinago delicata*	Wilson's Snipe				S3S4B,S5M	1	2.2 ± 0.0
A	*Setophaga striata*	Blackpoll Warbler				S3S4B,S5M	8	2.9 ± 0.0
A	*Pluvialis squatarola*	Black-bellied Plover				S3S4M	13	1.1 ± 0.0
A	*Morus bassanus*	Northern Gannet				SHB	3	4.4 ± 0.0
I	*Xylotrechus undulatus*	Spruce Zebra Beetle				S3	1	0.8 ± 1.0
I	*Papilio brevicauda bretonensis*	Short-tailed Swallowtail				S3	1	3.6 ± 2.0
I	*Tharsalea dospassosi*	Maritime Copper				S3	2	0.6 ± 1.0
I	*Plebejus idas empetri*	Crowberry Blue				S3	1	0.4 ± 0.0

4.3 LOCATION SENSITIVE SPECIES

The Department of Natural Resources in each Maritimes province considers a number of species “location sensitive”. Concern about exploitation of location-sensitive species precludes inclusion of precise coordinates in this report. Those intersecting your study area are indicated below with “YES”.

New Brunswick

Scientific *Name*	Common Name	SARA	Prov Legal Prot	Known within the Study Site?
Chrysemys picta picta	Eastern Painted Turtle	Special Concern		No
Chelydra serpentina	Snapping Turtle	Special Concern	Special Concern	No
Glyptemys insculpta	Wood Turtle	Threatened	Threatened	No
Haliaeetus leucocephalus	Bald Eagle		Endangered	No
Falco peregrinus pop. 1	**Peregrine Falcon - anatum/tundrius pop.**	**Special Concern**	**Endangered**	**YES**
Cicindela marginipennis	Cobblestone Tiger Beetle	Endangered	Endangered	No
Coenonympha nipisiquit	Maritime Ringlet	Endangered	Endangered	No
Bat hibernaculum or bat species occurrence		[Endangered][1]	[Endangered][1]	No

1 *Myotis lucifugus* (Little Brown Myotis), *Myotis septentrionalis* (Long-eared Myotis), and *Perimyotis subflavus* (Tri-colored Bat or Eastern Pipistrelle) are all Endangered under the Federal Species at Risk Act and the NB Species at Risk Act.

4.4 SOURCE BIBLIOGRAPHY

The recipient of these data shall acknowledge the AC CDC and the data sources listed below in any documents, reports, publications or presentations, in which this dataset makes a significant contribution.

# recs	CITATION
108	Morrison, Guy. 2011. Maritime Shorebird Survey (MSS) database. Canadian Wildlife Service, Ottawa, 15939 surveys. 86171 recs.
72	Pardieck, K.L., Ziolkowski Jr., D.J., Lutmerding, M., Aponte, V.I., and Hudson, M-A.R. 2020. North American Breeding Bird Survey Dataset 1966 - 2019: U.S. Geological Survey data release, https://doi.org/10.5066/P9J6QUF6
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1	Pike, E., Tingley, S. & Christie, D.S. 2000. Nature NB Listserve. University of New Brunswick, listserv.unb.ca/archives/naturenb. 68 recs.
1	Shortt, R. UNB specimen data for various tracked species formerly considered secure. Connell Memorial Herbarium, UNB, Fredericton NB. 2019.
1	Webster, R.P. & Edsall, J. 2007. 2005 New Brunswick Rare Butterfly Survey. Environmental Trust Fund, unpublished report, 232 recs.
1	Wilhelm, S.I. et al. 2011. Colonial Waterbird Database. Canadian Wildlife Service, Sackville, 2698 sites, 9718 recs (8192 obs).

5.0 RARE SPECIES WITHIN 100 KM

A 100 km buffer around the study area contains 17118 records of 133 vertebrate and 530 records of 27 invertebrate fauna; 2773 records of 170 vascular and 71 records of 25 nonvascular flora (attached: *ob100km.xls).

Taxa within 100 km of the study site that are rare and/or endangered in the province in which the study site occurs (including “location-sensitive” species). All ranks correspond to the province in which the study site falls, even for out-of-province records. Taxa are listed in order of concern, beginning with legally listed taxa, with the number of observations per taxon and the distance in kilometers from study area centroid to the closest observation (± the precision, in km, of the record).

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
A	*Myotis lucifugus*	Little Brown Myotis	Endangered	Endangered	Endangered	S1	2	99.5 ± 0.0	PE
A	*Myotis septentrionalis*	Northern Myotis	Endangered	Endangered	Endangered	S1	1	99.5 ± 0.0	PE
A	*Eubalaena glacialis*	North Atlantic Right Whale	Endangered	Endangered	Endangered	S1	2	25.6 ± 0.0	NB
A	*Charadrius melodus melodus*	Piping Plover melodus subspecies	Endangered	Endangered	Endangered	S1B	2553	6.5 ± 0.0	NB
A	*Dermochelys coriacea pop. 2*	Leatherback Sea Turtle - Atlantic population	Endangered	Endangered	Endangered	S1S2N	2	69.6 ± 1.0	NB
A	*Rangifer tarandus pop. 2*	Caribou - Atlantic-Gasp ├⌐sie population	Endangered	Endangered	Extirpated	SX	1	57.4 ± 1.0	NB
A	*Leucoraja ocellata pop. 5*	Winter Skate - Gulf of St.	Endangered		Endangered		4	7.4 ± 0.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
		Lawrence population							
A	*Sturnella magna*	Eastern Meadowlark	Threatened	Threatened	Threatened	S1B	2	40.6 ± 0.0	NB
A	*Asio flammeus*	Short-eared Owl	Threatened	Special Concern	Special Concern	S1S2B	19	1.4 ± 1.0	NB
A	*Hylocichla mustelina*	Wood Thrush	Threatened	Threatened	Threatened	S1S2B	22	2.9 ± 1.0	NB
A	*Hydrobates leucorhous*	Leach's Storm-Petrel	Threatened			S1S2B	1	15.5 ± 0.0	NB
A	*Catharus bicknelli*	Bicknell's Thrush	Threatened	Threatened	Threatened	S2B	2	81.1 ± 7.0	NB
A	*Riparia riparia*	Bank Swallow	Threatened	Threatened		S2B	537	1.3 ± 7.0	NB
A	*Glyptemys insculpta*	Wood Turtle	Threatened	Threatened	Threatened	S2S3	31	70.7 ± 10.0	NB
A	*Chaetura pelagica*	Chimney Swift	Threatened	Threatened	Threatened	S2S3B,S2M	186	19.6 ± 0.0	NB
A	*Tringa flavipes*	Lesser Yellowlegs	Threatened			S3M	521	1.1 ± 0.0	NB
A	*Limosa haemastica*	Hudsonian Godwit	Threatened			S3M	323	1.4 ± 1.0	NB
A	*Anguilla rostrata*	American Eel	Threatened		Threatened	S4N	8	36.3 ± 0.0	NB
A	*Histrionicus histrionicus pop. 1*	Harlequin Duck - Eastern population	Special Concern	Special Concern	Endangered	S1B,S1S2N,S2M	8	6.9 ± 0.0	NB
A	*Antrostomus vociferus*	Eastern Whip-Poor-Will	Special Concern	Threatened	Threatened	S2B	5	22.7 ± 0.0	NB
A	*Hirundo rustica*	Barn Swallow	Special Concern	Threatened	Threatened	S2B	239	1.3 ± 7.0	NB
A	*Salmo salar pop. 12*	Atlantic Salmon - Gaspe - Southern Gulf of St. Lawrence population	Special Concern		Special Concern	S2S3	118	18.5 ± 1.0	NB
A	*Euphagus carolinus*	Rusty Blackbird	Special Concern	Special Concern	Special Concern	S2S3B,S3M	32	18.7 ± 0.0	NB
A	*Bucephala islandica*	Barrow's Goldeneye	Special Concern	Special Concern	Special Concern	S2S3N,S3M	39	9.0 ± 0.0	NB
A	*Contopus virens*	Eastern Wood-Pewee	Special Concern	Special Concern	Special Concern	S3B	138	4.8 ± 0.0	NB
A	*Contopus cooperi*	Olive-sided Flycatcher	Special Concern	Threatened	Threatened	S3B	94	1.3 ± 7.0	NB
A	*Dolichonyx oryzivorus*	Bobolink	Special Concern	Threatened	Threatened	S3B	384	1.3 ± 7.0	NB
A	*Coccothraustes vespertinus*	Evening Grosbeak	Special Concern	Special Concern		S3B,S3S4N,SUM	104	7.0 ± 0.0	NB
A	*Chordeiles minor*	Common Nighthawk	Special Concern	Threatened	Threatened	S3B,S4M	88	23.2 ± 24.0	NB
A	*Phalaropus lobatus*	Red-necked Phalarope	Special Concern	Special Concern		S3M	6	19.9 ± 1.0	NB
A	*Podiceps auritus*	Horned Grebe	Special Concern	Special Concern	Special Concern	S3N	2	19.9 ± 1.0	NB
A	*Cardellina canadensis*	Canada Warbler	Special Concern	Threatened	Threatened	S3S4B	144	3.7 ± 0.0	NB
A	*Phocoena phocoena*	Harbour Porpoise	Special Concern		Spec.Concern	S4	5	11.2 ± 5.0	NB
A	*Fulica americana*	American Coot	Not At Risk			S1B	4	10.4 ± 7.0	NB
A	*Falco peregrinus pop. 1*	Peregrine Falcon - anatum/tundrius	Not At Risk	Special Concern	Endangered	S1B,S3M	7	4.4 ± 65.0	NB
A	*Falco peregrinus*	Peregrine Falcon	Not At Risk	Special Concern		S1B,S3M	1	22.1 ± 0.0	NB
A	*Bubo scandiacus*	Snowy Owl	Not At Risk			S1N,S2S3M	18	1.3 ± 0.0	NB
A	*Buteo lineatus*	Red-shouldered Hawk	Not At Risk			S1S2B	4	20.2 ± 0.0	NB
A	*Aegolius funereus*	Boreal Owl	Not At Risk			S1S2B,SUM	7	13.0 ± 7.0	NB
A	*Podiceps grisegena*	Red-necked Grebe	Not At Risk			S2N,S3M	4	37.0 ± 1.0	NB
A	*Globicephala melas*	Long-finned Pilot Whale	Not At Risk			S2S3	2	8.8 ± 0.0	NB
A	*Sterna hirundo*	Common Tern	Not At Risk			S3B,SUM	475	0.3 ± 0.0	NB
A	*Lagenorhynchus acutus*	Atlantic White-sided Dolphin	Not At Risk			S3S4	1	1.5 ± 0.0	NB
A	*Haliaeetus leucocephalus*	Bald Eagle	Not At Risk		Endangered	S4	227	6.5 ± 2.0	NB
A	*Lynx canadensis*	Canada Lynx	Not At Risk		Endangered	S4	9	57.0 ± 1.0	NB
A	*Puma concolor pop. 1*	Cougar - Eastern population	Data Deficient		Endangered	SU	13	63.1 ± 1.0	NB
A	*Calidris canutus rufa*	Red Knot rufa subspecies	E,SC	Endangered	Endangered	S2M	406	1.0 ± 0.0	NB
A	*Morone saxatilis*	Striped Bass	E,SC			S3S4B,S3S4N	13	13.4 ± 0.0	NB
A	*Odobenus rosmarus pop. 5*	Atlantic Walrus - Nova Scotia - Newfoundland - Gulf of St Lawrence population	X			SX	6	12.0 ± 1.0	NB
A	*Synaptomys borealis sphagnicola*	Northern Bog Lemming				S1	1	74.0 ± 5.0	NB
A	*Tringa melanoleuca*	Greater Yellowlegs				S1?B,S4S5M	661	0.1 ± 0.0	NB
A	*Aythya americana*	Redhead				S1B	1	36.5 ± 1.0	NB
A	*Grus canadensis*	Sandhill Crane				S1B	2	87.7 ± 0.0	NB
A	*Bartramia longicauda*	Upland Sandpiper				S1B	8	36.5 ± 1.0	NB
A	*Phalaropus tricolor*	Wilson's Phalarope				S1B	19	8.2 ± 1.0	NB
A	*Leucophaeus atricilla*	Laughing Gull				S1B	2	9.0 ± 0.0	NB
A	*Rissa tridactyla*	Black-legged Kittiwake				S1B	35	24.9 ± 1.0	NB

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A	*Uria aalge*	Common Murre				S1B	7	17.4 ± 0.0	NB
A	*Alca torda*	Razorbill				S1B	19	41.3 ± 7.0	NB
A	*Fratercula arctica*	Atlantic Puffin				S1B	1	72.1 ± 0.0	NB
A	*Aythya marila*	Greater Scaup				S1B,S2N,S4M	26	8.2 ± 1.0	NB
A	*Oxyura jamaicensis*	Ruddy Duck				S1B,S2S3M	11	8.2 ± 1.0	NB
A	*Aythya affinis*	Lesser Scaup				S1B,S4M	39	4.4 ± 65.0	NB
A	*Eremophila alpestris*	Horned Lark				S1B,S4N,S5M	113	0.8 ± 7.0	NB
A	*Sterna paradisaea*	Arctic Tern				S1B,SUM	23	21.3 ± 7.0	NB
A	*Chroicocephalus ridibundus*	Black-headed Gull				S1N,S2M	6	1.3 ± 0.0	NB
A	*Branta bernicla*	Brant				S1N,S2S3M	76	7.9 ± 0.0	NB
A	*Calidris alba*	Sanderling				S1N,S3S4M	454	4.0 ± 0.0	NB
A	*Butorides virescens*	Green Heron				S1S2B	2	35.8 ± 0.0	NB
A	*Nycticorax nycticorax*	Black-crowned Night-heron				S1S2B	264	1.3 ± 7.0	NB
A	*Empidonax traillii*	Willow Flycatcher				S1S2B	11	7.3 ± 0.0	NB
A	*Stelgidopteryx serripennis*	Northern Rough-winged Swallow				S1S2B	2	40.6 ± 0.0	NB
A	*Troglodytes aedon*	House Wren				S1S2B	2	40.7 ± 0.0	NB
A	*Calidris bairdii*	Baird's Sandpiper				S1S2M	28	4.4 ± 65.0	NB
A	*Melanitta americana*	American Scoter				S1S2N,S3M	148	4.4 ± 50.0	NB
A	*Petrochelidon pyrrhonota*	Cliff Swallow				S2B	156	1.3 ± 7.0	NB
A	*Mimus polyglottos*	Northern Mockingbird				S2B	45	10.4 ± 7.0	NB
A	*Pooecetes gramineus*	Vesper Sparrow				S2B	37	5.9 ± 0.0	NB
A	*Mareca strepera*	Gadwall				S2B,S3M	55	2.3 ± 0.0	NB
A	*Tringa solitaria*	Solitary Sandpiper				S2B,S4S5M	31	5.9 ± 0.0	NB
A	*Pinicola enucleator*	Pine Grosbeak				S2B,S4S5N,S4S5M	13	37.3 ± 7.0	NB
A	*Phalacrocorax carbo*	Great Cormorant				S2N	51	9.7 ± 0.0	NB
A	*Somateria spectabilis*	King Eider				S2N	2	37.0 ± 1.0	NB
A	*Larus hyperboreus*	Glaucous Gull				S2N	13	0.3 ± 0.0	NB
A	*Melanitta perspicillata*	Surf Scoter				S2N,S4M	35	6.5 ± 0.0	NB
A	*Melanitta deglandi*	White-winged Scoter				S2N,S4M	15	7.3 ± 10.0	NB
A	*Asio otus*	Long-eared Owl				S2S3	10	13.0 ± 7.0	NB
A	*Picoides dorsalis*	American Three-toed Woodpecker				S2S3	10	19.6 ± 1.0	NB
A	*Toxostoma rufum*	Brown Thrasher				S2S3B	16	11.6 ± 7.0	NB
A	*Icterus galbula*	Baltimore Oriole				S2S3B	11	19.9 ± 1.0	NB
A	*Somateria mollissima*	Common Eider				S2S3B,S2S3N,S4M	173	6.5 ± 0.0	NB
A	*Larus delawarensis*	Ring-billed Gull				S2S3B,S4N,S5M	391	0.2 ± 0.0	NB
A	*Pluvialis dominica*	American Golden-Plover				S2S3M	90	1.4 ± 1.0	NB
A	*Calcarius lapponicus*	Lapland Longspur				S2S3N,SUM	4	14.9 ± 1.0	NB
A	*Larus marinus*	Great Black-backed Gull				S3	460	1.7 ± 0.0	NB
A	*Picoides arcticus*	Black-backed Woodpecker				S3	21	37.1 ± 7.0	NB
A	*Loxia curvirostra*	Red Crossbill				S3	27	1.3 ± 7.0	NB
A	*Spinus pinus*	Pine Siskin				S3	104	1.3 ± 7.0	NB
A	*Sorex maritimensis*	Maritime Shrew				S3	18	82.6 ± 0.0	NB
A	*Spatula clypeata*	Northern Shoveler				S3B	64	2.3 ± 0.0	NB
A	*Charadrius vociferus*	Killdeer				S3B	544	1.1 ± 0.0	NB
A	*Tringa semipalmata*	Willet				S3B	388	1.3 ± 7.0	NB
A	*Cepphus grylle*	Black Guillemot				S3B	54	23.0 ± 0.0	NB
A	*Coccyzus erythropthalmus*	Black-billed Cuckoo				S3B	83	20.0 ± 0.0	NB
A	*Myiarchus crinitus*	Great Crested Flycatcher				S3B	4	70.1 ± 1.0	NB
A	*Piranga olivacea*	Scarlet Tanager				S3B	13	20.0 ± 0.0	NB
A	*Pheucticus ludovicianus*	Rose-breasted Grosbeak				S3B	155	1.3 ± 7.0	NB
A	*Passerina cyanea*	Indigo Bunting				S3B	9	2.9 ± 1.0	NB
A	*Molothrus ater*	Brown-headed Cowbird				S3B	94	1.3 ± 7.0	NB
A	*Setophaga tigrina*	Cape May Warbler				S3B,S4S5M	107	2.3 ± 0.0	NB
A	*Mergus serrator*	Red-breasted Merganser				S3B,S4S5N,S5M	200	1.3 ± 7.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
A	*Anas acuta*	Northern Pintail				S3B,S5M	205	0.3 ± 0.0	NB
A	*Anser caerulescens*	Snow Goose				S3M	5	37.0 ± 1.0	NB
A	*Numenius phaeopus*	Whimbrel				S3M	1	81.6 ± 5.0	NB
A	*Numenius phaeopus hudsonicus*	Whimbrel				S3M	292	2.3 ± 0.0	NB
A	*Arenaria interpres*	Ruddy Turnstone				S3M	616	1.4 ± 1.0	NB
A	*Calidris pusilla*	Semipalmated Sandpiper				S3M	745	1.4 ± 1.0	NB
A	*Calidris melanotos*	Pectoral Sandpiper				S3M	131	4.4 ± 65.0	NB
A	*Limnodromus griseus*	Short-billed Dowitcher				S3M	435	1.1 ± 0.0	NB
A	*Phalaropus fulicarius*	Red Phalarope				S3M	3	55.5 ± 0.0	NB
A	*Bucephala albeola*	Bufflehead				S3N	20	19.9 ± 1.0	NB
A	*Calidris maritima*	Purple Sandpiper				S3N	20	1.4 ± 1.0	NB
A	*Perisoreus canadensis*	Canada Jay				S3S4	127	1.3 ± 7.0	NB
A	*Poecile hudsonicus*	Boreal Chickadee				S3S4	123	1.3 ± 7.0	NB
A	*Synaptomys cooperi*	Southern Bog Lemming				S3S4	1	94.1 ± 0.0	NB
A	*Tyrannus tyrannus*	Eastern Kingbird				S3S4B	111	9.8 ± 7.0	NB
A	*Vireo gilvus*	Warbling Vireo				S3S4B	30	19.9 ± 1.0	NB
A	*Actitis macularius*	Spotted Sandpiper				S3S4B,S4M	754	1.3 ± 7.0	NB
A	*Melospiza lincolnii*	Lincoln's Sparrow				S3S4B,S4M	174	2.3 ± 0.0	NB
A	*Gallinago delicata*	Wilson's Snipe				S3S4B,S5M	175	2.2 ± 0.0	NB
A	*Setophaga striata*	Blackpoll Warbler				S3S4B,S5M	41	2.9 ± 0.0	NB
A	*Pluvialis squatarola*	Black-bellied Plover				S3S4M	576	1.1 ± 0.0	NB
A	*Morus bassanus*	Northern Gannet				SHB	249	4.4 ± 29.0	NB
I	*Coenonympha nipisiquit*	Maritime Ringlet	Endangered	Endangered	Endangered	S1	105	13.4 ± 0.0	NB
I	*Danaus plexippus*	Monarch	Endangered	Special Concern	Special Concern	S2S3?B	8	7.4 ± 2.0	NB
I	*Bombus terricola*	Yellow-banded Bumble Bee	Special Concern	Special Concern		S4	24	8.7 ± 0.0	NB
I	*Coccinella transversoguttata richardsoni*	Transverse Lady Beetle	Special Concern			SH	6	7.5 ± 1.0	NB
I	*Leucorrhinia patricia*	Canada Whiteface				S1	1	49.1 ± 1.0	NB
I	*Icaricia saepiolus*	Greenish Blue				S1S2	20	21.3 ± 7.0	NB
I	*Strymon melinus*	Gray Hairstreak				S2	11	17.4 ± 0.0	NB
I	*Desmocerus palliatus*	Elderberry Borer				S3	2	75.9 ± 5.0	NB
I	*Carabus maeander*	Meander Ground Beetle				S3	1	7.5 ± 1.0	NB
I	*Xylotrechus quadrimaculatus*	Birch Long-horned Beetle				S3	1	37.0 ± 1.0	NB
I	*Xylotrechus undulatus*	Spruce Zebra Beetle				S3	2	0.8 ± 1.0	NB
I	*Calathus gregarius*	Gregarious Harp Ground Beetle				S3	1	79.7 ± 1.0	NB
I	*Hyperaspis disconotata*	Disc-marked Lady Beetle				S3	1	84.0 ± 5.0	NB
I	*Hesperia sassacus*	Indian Skipper				S3	2	80.1 ± 0.0	NB
I	*Euphyes bimacula*	Two-spotted Skipper				S3	2	74.6 ± 10.0	NB
I	*Papilio brevicauda bretonensis*	Short-tailed Swallowtail				S3	104	3.6 ± 2.0	NB
I	*Tharsalea dospassosi*	Maritime Copper				S3	152	0.6 ± 1.0	NB
I	*Satyrium acadica*	Acadian Hairstreak				S3	8	11.3 ± 2.0	NB
I	*Callophrys eryphon*	Western Pine Elfin				S3	7	77.1 ± 2.0	NB
I	*Plebejus idas*	Northern Blue				S3	4	81.9 ± 0.0	NB
I	*Plebejus idas empetri*	Crowberry Blue				S3	42	0.4 ± 0.0	NB
I	*Argynnis aphrodite*	Aphrodite Fritillary				S3	1	72.6 ± 1.0	NB
I	*Boloria eunomia*	Bog Fritillary				S3	5	76.9 ± 0.0	NB
I	*Boloria chariclea*	Arctic Fritillary				S3	13	68.4 ± 7.0	NB
I	*Boloria chariclea grandis*	Purple Lesser Fritillary				S3	2	75.6 ± 10.0	NB
I	*Papilio brevicauda*	Short-tailed Swallowtail				S3S4	2	24.2 ± 0.0	NB
I	*Somatochlora forcipata*	Forcipate Emerald				S3S4	3	59.1 ± 1.0	NB
N	*Pannaria lurida*	Wrinkled Shingle Lichen	Threatened	Threatened		S1?	4	84.3 ± 0.0	NB
N	*Fuscopannaria leucosticta*	White-rimmed Shingle Lichen	Threatened			S2	27	93.3 ± 0.0	NB
N	*Cinclidium stygium*	Sooty Cupola Moss				S1?	1	82.2 ± 0.0	NB
N	*Dicranum bonjeanii*	Bonjean's Broom Moss				S1?	1	81.8 ± 1.0	NB

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N	*Paludella squarrosa*	Tufted Fen Moss				S1?	1	82.2 ± 0.0	NB
N	*Odontoschisma sphagni*	Bog-Moss Flapwort				S1S2	1	98.4 ± 0.0	NB
N	*Calypogeia neesiana*	Nees' Pouchwort				S1S3	1	45.3 ± 1.0	NB
N	*Fuscocephaloziopsis connivens*	Forcipated Pincerwort				S1S3	1	20.1 ± 10.0	NB
N	*Meesia triquetra*	Three-ranked Cold Moss				S2	1	55.3 ± 10.0	NB
N	*Sphagnum lindbergii*	Lindberg's Peat Moss				S2	1	77.1 ± 0.0	NB
N	*Ptychostomum cernuum*	Swamp Bryum				S2S3	1	95.7 ± 9.0	NB
N	*Scorpidium scorpioides*	Hooked Scorpion Moss				S2S3	1	82.2 ± 0.0	NB
N	*Cetrariella delisei*	Snowbed Icelandmoss Lichen				S2S3	17	24.9 ± 0.0	NB
N	*Parmeliopsis ambigua*	Green Starburst Lichen				S2S3	1	97.0 ± 0.0	PE
N	*Nephroma bellum*	Naked Kidney Lichen				S3	1	99.2 ± 0.0	PE
N	*Dicranella rufescens*	Red Forklet Moss				S3?	1	45.2 ± 7.0	NB
N	*Scytinium subtile*	Appressed Jellyskin Lichen				S3?	1	99.2 ± 0.0	PE
N	*Dicranella varia*	a Moss				S3S4	1	95.7 ± 9.0	NB
N	*Dicranum leioneuron*	a Dicranum Moss				S3S4	1	83.4 ± 10.0	NB
N	*Fissidens bryoides*	Lesser Pocket Moss				S3S4	1	95.7 ± 9.0	NB
N	*Orthotrichum speciosum*	Showy Bristle Moss				S3S4	1	95.7 ± 9.0	NB
N	*Abietinella abietina*	Wiry Fern Moss				S3S4	1	95.7 ± 9.0	NB
N	*Pannaria rubiginosa*	Brown-eyed Shingle Lichen				S3S4	2	93.8 ± 0.0	NB
N	*Stereocaulon paschale*	Easter Foam Lichen				S3S4	1	90.9 ± 1.0	NB
N	*Pannaria conoplea*	Mealy-rimmed Shingle Lichen				S3S4	1	42.5 ± 0.0	NB
P	*Symphyotrichum laurentianum*	Gulf of St Lawrence Aster	Threatened	Threatened	Endangered	S1	213	20.2 ± 8.0	NB
P	*Fraxinus nigra*	Black Ash	Threatened			S3S4	65	44.8 ± 0.0	NB
P	*Lechea maritima var. subcylindrica*	Beach Pinweed	Special Concern	Special Concern	Special Concern	S2	20	74.5 ± 0.0	NB
P	*Symphyotrichum subulatum (Bathurst pop)*	Bathurst Aster - Bathurst pop.	Not At Risk		Endangered	S2	169	61.1 ± 0.0	NB
P	*Pseudognaphalium obtusifolium*	Eastern Cudweed				S1	1	77.5 ± 0.0	NB
P	*Betula michauxii*	Michaux's Dwarf Birch				S1	3	92.6 ± 0.0	NB
P	*Draba glabella*	Rock Whitlow-Grass				S1	7	89.1 ± 0.0	NB
P	*Draba incana*	Twisted Whitlow-grass				S1	9	23.8 ± 1.0	NB
P	*Stellaria crassifolia*	Fleshy Stitchwort				S1	1	93.9 ± 10.0	NB
P	*Stellaria longipes*	Long-stalked Starwort				S1	18	20.0 ± 1.0	NB
P	*Suaeda rolandii*	Roland's Sea-Blite				S1	2	88.3 ± 0.0	NB
P	*Vaccinium boreale*	Northern Blueberry				S1	1	5.3 ± 1.0	NB
P	*Vaccinium uliginosum*	Alpine Bilberry				S1	4	23.5 ± 2.0	NB
P	*Euphorbia polygonifolia*	Seaside Spurge				S1	4	24.9 ± 1.0	NB
P	*Bartonia virginica*	Yellow Bartonia				S1	3	81.6 ± 0.0	NB
P	*Coptidium lapponicum*	Lapland Buttercup				S1	1	85.9 ± 0.0	NB
P	*Salix serissima*	Autumn Willow				S1	4	80.6 ± 0.0	NB
P	*Carex glareosa*	Gravel Sedge				S1	4	1.2 ± 0.0	NB
P	*Carex rariflora*	Loose-flowered Alpine Sedge				S1	16	5.4 ± 0.0	NB
P	*Carex salina*	Saltmarsh Sedge				S1	15	1.0 ± 1.0	NB
P	*Carex viridula var. elatior*	Greenish Sedge				S1	11	80.6 ± 0.0	NB
P	*Juncus greenei*	Greene's Rush				S1	1	96.5 ± 0.0	PE
P	*Anticlea elegans*	Mountain Death Camas				S1	7	89.1 ± 0.0	NB
P	*Malaxis monophyllos var. brachypoda*	North American White Adder's-mouth				S1	4	80.6 ± 0.0	NB
P	*Catabrosa aquatica*	Water Whorl Grass				S1	2	26.1 ± 0.0	NB
P	*Dichanthelium xanthophysum*	Slender Panic Grass				S1	3	83.3 ± 0.0	NB
P	*Zizania aquatica var. brevis*	St. Lawrence Wild Rice				S1	3	93.4 ± 0.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
P	*Potamogeton friesii*	Fries' Pondweed				S1	1	99.5 ± 3.0	PE
P	*Cystopteris laurentiana*	Laurentian Bladder Fern				S1	1	90.3 ± 0.0	NB
P	*Polygonum aviculare ssp. neglectum*	Narrow-leaved Knotweed				S1?	4	37.2 ± 1.0	NB
P	*Eriophorum russeolum ssp. albidum*	Smooth-fruited Russet Cottongrass				S1S3	1	54.0 ± 0.0	NB
P	*Osmorhiza depauperata*	Blunt Sweet Cicely				S2	1	81.5 ± 1.0	NB
P	*Atriplex glabriuscula var. franktonii*	Frankton's Saltbush				S2	14	4.6 ± 0.0	NB
P	*Nuphar x rubrodisca*	Red-disk Yellow Pond-lily				S2	1	92.6 ± 0.0	NB
P	*Carex albicans var. emmonsii*	White-tinged Sedge				S2	7	74.6 ± 0.0	NB
P	*Galearis rotundifolia*	Small Round-leaved Orchid				S2	12	22.5 ± 3.0	NB
P	*Calypso bulbosa var. americana*	Calypso				S2	1	18.8 ± 0.0	NB
P	*Coeloglossum viride*	Long-bracted Frog Orchid				S2	1	94.7 ± 1.0	NB
P	*Cypripedium parviflorum var. makasin*	Small Yellow Lady's-Slipper				S2	1	89.2 ± 2.0	NB
P	*Platanthera huronensis*	Fragrant Green Orchid				S2	4	85.2 ± 0.0	NB
P	*Puccinellia nutkaensis*	Alaska Alkaligrass				S2	37	6.1 ± 1.0	NB
P	*Symphyotrichum novi-belgii var. crenifolium*	New York Aster				S2?	1	26.5 ± 0.0	NB
P	*Crataegus macrosperma*	Big-Fruit Hawthorn				S2?	1	83.5 ± 0.0	NB
P	*Bidens heterodoxa*	Connecticut Beggar-Ticks				S2S3	41	5.3 ± 1.0	NB
P	*Cuscuta cephalanthi*	Buttonbush Dodder				S2S3	20	71.0 ± 1.0	NB
P	*Ranunculus sceleratus*	Cursed Buttercup				S2S3	13	21.2 ± 0.0	NB
P	*Rosa acicularis ssp. sayi*	Prickly Rose				S2S3	63	80.0 ± 0.0	NB
P	*Galium obtusum*	Blunt-leaved Bedstraw				S2S3	3	20.4 ± 0.0	NB
P	*Carex crawei*	Crawe's Sedge				S2S3	1	49.2 ± 0.0	NB
P	*Cyperus bipartitus*	Shining Flatsedge				S2S3	3	93.4 ± 0.0	NB
P	*Juncus ranarius*	Seaside Rush				S2S3	7	16.8 ± 0.0	NB
P	*Corallorhiza maculata var. maculata*	Spotted Coralroot				S2S3	2	91.6 ± 10.0	NB
P	*Piptatheropsis canadensis*	Canada Ricegrass				S2S3	1	83.7 ± 0.0	NB
P	*Puccinellia phryganodes ssp. neoarctica*	Creeping Alkali Grass				S2S3	2	14.7 ± 0.0	NB
P	*Poa glauca*	Glaucous Blue Grass				S2S3	3	90.3 ± 0.0	NB
P	*Piptatheropsis pungens*	Slender Ricegrass				S2S3	6	74.6 ± 0.0	NB
P	*Panax trifolius*	Dwarf Ginseng				S3	1	0.7 ± 3.0	NB
P	*Artemisia campestris ssp. caudata*	Tall Wormwood				S3	5	58.1 ± 5.0	NB
P	*Ionactis linariifolia*	Flax-leaved Aster				S3	38	80.0 ± 0.0	NB
P	*Symphyotrichum subulatum*	Annual Saltmarsh Aster				S3	137	61.1 ± 0.0	NB
P	*Turritis glabra*	Tower Mustard				S3	8	88.7 ± 0.0	NB
P	*Boechera stricta*	Drummond's Rockcress				S3	3	83.5 ± 1.0	NB
P	*Sagina nodosa*	Knotted Pearlwort				S3	8	21.1 ± 5.0	NB
P	*Sagina nodosa ssp. borealis*	Knotted Pearlwort				S3	1	38.1 ± 0.0	NB
P	*Stellaria humifusa*	Saltmarsh Starwort				S3	11	1.1 ± 0.0	NB
P	*Stellaria longifolia*	Long-leaved Starwort				S3	1	99.2 ± 0.0	NB
P	*Oxybasis rubra*	Red Goosefoot				S3	55	6.3 ± 0.0	NB
P	*Hudsonia tomentosa*	Woolly Beach-heath				S3	109	8.4 ± 0.0	NB
P	*Lonicera oblongifolia*	Swamp Fly Honeysuckle				S3	1	23.5 ± 2.0	NB
P	*Oxytropis campestris var. johannensis*	Field Locoweed				S3	1	87.3 ± 10.0	NB
P	*Bartonia paniculata ssp. iodandra*	Branched Bartonia				S3	2	97.1 ± 0.0	NB
P	*Gentianella amarella ssp. acuta*	Northern Gentian				S3	6	24.2 ± 1.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
P	*Geranium bicknellii*	Bicknell's Crane's-bill				S3	4	50.3 ± 5.0	NB
P	*Rumex pallidus*	Seabeach Dock				S3	7	20.8 ± 0.0	NB
P	*Pyrola minor*	Lesser Pyrola				S3	4	52.1 ± 0.0	NB
P	*Amelanchier canadensis*	Canada Serviceberry				S3	2	96.0 ± 0.0	NB
P	*Crataegus scabrida*	Rough Hawthorn				S3	2	83.5 ± 1.0	NB
P	*Salix candida*	Sage Willow				S3	60	2.3 ± 0.0	NB
P	*Salix myricoides*	Bayberry Willow				S3	3	37.3 ± 5.0	NB
P	*Comandra umbellata*	Bastard's Toadflax				S3	76	9.8 ± 0.0	NB
P	*Agalinis purpurea var. parviflora*	Small-flowered Purple False Foxglove				S3	1	46.9 ± 1.0	NB
P	*Valeriana uliginosa*	Swamp Valerian				S3	8	80.6 ± 0.0	NB
P	*Viola adunca*	Hooked Violet				S3	4	23.5 ± 2.0	NB
P	*Sagittaria montevidensis ssp. spongiosa*	Spongy Arrowhead				S3	29	93.4 ± 0.0	NB
P	*Carex adusta*	Lesser Brown Sedge				S3	5	53.8 ± 0.0	NB
P	*Carex conoidea*	Field Sedge				S3	1	70.8 ± 10.0	NB
P	*Carex garberi*	Garber's Sedge				S3	8	83.5 ± 0.0	NB
P	*Carex gynocrates*	Northern Bog Sedge				S3	12	80.6 ± 0.0	NB
P	*Carex livida*	Livid Sedge				S3	5	21.9 ± 0.0	NB
P	*Carex ormostachya*	Necklace Spike Sedge				S3	2	46.6 ± 0.0	NB
P	*Carex sprengelii*	Longbeak Sedge				S3	1	88.2 ± 0.0	NB
P	*Carex tenuiflora*	Sparse-Flowered Sedge				S3	2	28.0 ± 10.0	NB
P	*Carex vaginata*	Sheathed Sedge				S3	8	80.6 ± 0.0	NB
P	*Eriophorum gracile*	Slender Cottongrass				S3	9	4.4 ± 0.0	NB
P	*Blysmopsis rufa*	Red Bulrush				S3	41	2.3 ± 0.0	NB
P	*Juncus brachycephalus*	Small-Head Rush				S3	2	80.6 ± 0.0	NB
P	*Juncus vaseyi*	Vasey Rush				S3	31	23.2 ± 0.0	NB
P	*Cypripedium reginae*	Showy Lady's-Slipper				S3	13	23.3 ± 2.0	NB
P	*Goodyera oblongifolia*	Menzies' Rattlesnake-plantain				S3	13	37.1 ± 5.0	NB
P	*Neottia auriculata*	Auricled Twayblade				S3	11	49.7 ± 0.0	NB
P	*Platanthera grandiflora*	Large Purple Fringed Orchid				S3	3	22.6 ± 5.0	NB
P	*Platanthera orbiculata*	Small Round-leaved Orchid				S3	16	37.5 ± 2.0	NB
P	*Spiranthes lucida*	Shining Ladies'-Tresses				S3	1	97.6 ± 0.0	NB
P	*Agrostis mertensii*	Northern Bent Grass				S3	15	82.3 ± 1.0	NB
P	*Dichanthelium linearifolium*	Narrow-leaved Panic Grass				S3	1	95.2 ± 0.0	NB
P	*Anchistea virginica*	Virginia chain fern				S3	9	81.9 ± 0.0	NB
P	*Diphasiastrum x sabinifolium*	Savin-leaved Ground-cedar				S3	5	20.5 ± 1.0	NB
P	*Huperzia appressa*	Mountain Firmoss				S3	1	82.6 ± 1.0	NB
P	*Botrychium lanceolatum ssp. angustisegmentum*	Narrow Triangle Moonwort				S3	2	93.6 ± 0.0	NB
P	*Botrychium simplex*	Least Moonwort				S3	4	19.7 ± 1.0	NB
P	*Ophioglossum pusillum*	Northern Adder's-tongue				S3	4	23.5 ± 1.0	NB
P	*Selaginella selaginoides*	Low Spikemoss				S3	14	80.6 ± 0.0	NB
P	*Crataegus submollis*	Quebec Hawthorn				S3?	1	52.8 ± 1.0	NB
P	*Platanthera hookeri*	Hooker's Orchid				S3?	34	18.2 ± 0.0	NB
P	*Arnica lanceolata*	Lance-leaved Arnica				S3S4	3	83.4 ± 50.0	NB
P	*Bidens hyperborea*	Estuary Beggarticks				S3S4	37	33.9 ± 0.0	NB
P	*Symphyotrichum boreale*	Boreal Aster				S3S4	9	52.1 ± 1.0	NB
P	*Betula pumila*	Bog Birch				S3S4	162	2.8 ± 0.0	NB
P	*Mertensia maritima*	Sea Lungwort				S3S4	10	9.4 ± 0.0	NB
P	*Callitriche hermaphroditica*	Northern Water-starwort				S3S4	4	26.4 ± 2.0	NB
P	*Viburnum edule*	Squashberry				S3S4	2	85.3 ± 100.0	NB
P	*Crassula aquatica*	Water Pygmyweed				S3S4	8	64.1 ± 0.0	NB
P	*Elatine americana*	American Waterwort				S3S4	6	63.9 ± 0.0	NB
P	*Hedysarum americanum*	Alpine Hedysarum				S3S4	5	87.2 ± 0.0	NB
P	*Fagus grandifolia*	American Beech				S3S4	18	19.9 ± 1.0	NB
P	*Stachys pilosa*	Hairy Hedge-Nettle				S3S4	1	94.6 ± 0.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
P	*Teucrium canadense*	Canada Germander				S3S4	18	67.0 ± 0.0	NB
P	*Utricularia gibba*	Humped Bladderwort				S3S4	1	88.0 ± 1.0	NB
P	*Fraxinus americana*	White Ash				S3S4	5	79.2 ± 0.0	NB
P	*Epilobium strictum*	Downy Willowherb				S3S4	6	4.3 ± 0.0	NB
P	*Fallopia scandens*	Climbing False Buckwheat				S3S4	4	80.2 ± 0.0	NB
P	*Rumex persicarioides*	Peach-leaved Dock				S3S4	77	6.2 ± 0.0	NB
P	*Samolus parviflorus*	Seaside Brookweed				S3S4	78	60.6 ± 9.0	NB
P	*Drymocallis arguta*	Tall Wood Beauty				S3S4	1	95.0 ± 0.0	NB
P	*Rosa palustris*	Swamp Rose				S3S4	1	81.5 ± 1.0	NB
P	*Rubus pensilvanicus*	Pennsylvania Blackberry				S3S4	2	37.2 ± 2.0	NB
P	*Sanguisorba canadensis*	Canada Burnet				S3S4	84	6.6 ± 0.0	NB
P	*Galium boreale*	Northern Bedstraw				S3S4	2	44.3 ± 1.0	NB
P	*Galium labradoricum*	Labrador Bedstraw				S3S4	36	2.3 ± 0.0	NB
P	*Salix pedicellaris*	Bog Willow				S3S4	18	23.6 ± 1.0	NB
P	*Geocaulon lividum*	Northern Comandra				S3S4	58	5.3 ± 1.0	NB
P	*Parnassia glauca*	Fen Grass-of-Parnassus				S3S4	11	80.6 ± 0.0	NB
P	*Limosella australis*	Southern Mudwort				S3S4	40	42.3 ± 1.0	NB
P	*Ulmus americana*	White Elm				S3S4	7	52.8 ± 1.0	NB
P	*Juniperus horizontalis*	Creeping Juniper				S3S4	18	12.0 ± 0.0	NB
P	*Carex capillaris*	Hairlike Sedge				S3S4	1	82.6 ± 0.0	NB
P	*Carex haydenii*	Hayden's Sedge				S3S4	1	64.1 ± 0.0	NB
P	*Carex tenera*	Tender Sedge				S3S4	1	77.7 ± 0.0	NB
P	*Carex wiegandii*	Wiegand's Sedge				S3S4	31	53.9 ± 0.0	NB
P	*Carex recta*	Estuary Sedge				S3S4	11	2.3 ± 0.0	NB
P	*Eleocharis quinqueflora*	Few-flowered Spikerush				S3S4	1	99.9 ± 0.0	PE
P	*Rhynchospora capitellata*	Small-headed Beakrush				S3S4	18	80.6 ± 0.0	NB
P	*Trichophorum clintonii*	Clinton's Clubrush				S3S4	10	80.0 ± 0.0	NB
P	*Triglochin gaspensis*	Gasp ├⌐ Arrowgrass				S3S4	53	14.3 ± 0.0	NB
P	*Lilium canadense*	Canada Lily				S3S4	5	52.8 ± 1.0	NB
P	*Corallorhiza maculata*	Spotted Coralroot				S3S4	5	23.3 ± 2.0	NB
P	*Liparis loeselii*	Loesel's Twayblade				S3S4	33	2.8 ± 1.0	NB
P	*Neottia cordata*	Heart-leaved Twayblade				S3S4	12	18.8 ± 1.0	NB
P	*Platanthera obtusata*	Blunt-leaved Orchid				S3S4	15	1.0 ± 3.0	NB
P	*Calamagrostis stricta*	Slim-stemmed Reed Grass				S3S4	34	8.1 ± 0.0	NB
P	*Calamagrostis stricta ssp. stricta*	Slim-stemmed Reed Grass				S3S4	1	14.1 ± 0.0	NB
P	*Stuckenia filiformis*	Thread-leaved Pondweed				S3S4	4	23.5 ± 1.0	NB
P	*Potamogeton praelongus*	White-stemmed Pondweed				S3S4	1	33.3 ± 0.0	NB
P	*Potamogeton richardsonii*	Richardson's Pondweed				S3S4	2	24.1 ± 1.0	NB
P	*Xyris montana*	Northern Yellow-Eyed-Grass				S3S4	84	2.2 ± 0.0	NB
P	*Cryptogramma stelleri*	Steller's Rockbrake				S3S4	1	90.4 ± 0.0	NB
P	*Asplenium viride*	Green Spleenwort				S3S4	1	90.4 ± 0.0	NB
P	*Polygonum oxyspermum ssp. raii*	Ray's Knotweed				SH	9	12.2 ± 1.0	NB
P	*Montia fontana*	Water Blinks				SH	1	99.2 ± 1.0	NB
P	*Botrychium campestre*	Prairie Moonwort				SH	1	89.1 ± 0.0	NB

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The recipient of these data shall acknowledge the AC CDC and the data sources listed below in any documents, reports, publications or presentations, in which this dataset makes a significant contribution.

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APPENDIX E

Appendix E – ECCC Guide to Wildlife Response Plans

Environment and Climate Change Canada
Environnement et Changement climatique Canada

2021

GUIDELINES FOR WILDLIFE RESPONSE PLANS

Canada

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Aussi disponible en français

EXECUTIVE SUMMARY

Environment and Climate Change Canada's Canadian Wildlife Service (ECCC-CWS) is responsible for the management and conservation of Wildlife under its jurisdiction. The *Guidelines for Wildlife Response Plans* outline the rationale, objectives, and process for developing, implementing and evaluating the efficacy of Wildlife response planning for Pollution and Non-Pollution Incidents. This document supports the standardization of the planning process according to ECCC-CWS's recommendations. The purpose of this document is to guide governments, Indigenous organizations, industry, Response Organizations, and other stakeholders in developing Wildlife Response Plans that consider all aspects of planning throughout the full life cycle of an incident with regards to Wildlife specific to ECCC-CWS's mandate.

TABLE OF CONTENTS

EXECUTIVE SUMMARY iii

TABLE OF CONTENTS iv

LIST OF ACRONYMS 1

DEFINITIONS 2

1.0 INTRODUCTION 5

1.1. Scope 5

2.0 REGULATORY REQUIREMENTS 7

2.1 Applicable Legislation 7

2.2 Permits and Authorizations 8

3.0 ELEMENTS OF WILDLIFE RESPONSE PLANNING 11

3.1 Wildlife Response within the Incident Command System 11

3.2 Types of Wildlife Response Plans 12

3.2.1 Strategic Response Plans 12

3.2.2 Incident-specific Response Plans 13

3.2.3 Plan Development 14

3.3 Habitat Considerations for Response Planning 14

3.3.1 Marine and Open Fresh Water 14

3.3.2 Aquatic Habitats 15

3.3.3 Terrestrial Habitats 15

3.4 Detecting Signs of impacted Avian Species 16

4.0 COMPONENTS OF A WILDLIFE RESPONSE PLAN 17

4.1 Introduction 17

4.2 Notification Procedures 18

4.3 Regulatory Requirements 18

4.3.1 Permits and Authorizations 18

4.4 Resources-at-Risk 18

4.5 Wildlife Management and Response 19

4.5.1 Operational Objectives 19

4.5.2 Initial Wildlife Impact Assessment (0 to 24 Hours) 19

4.5.3 Reconnaissance Surveys (24 to 48 Hours) 20

4.5.4 Surveillance (Monitoring) Surveys (48 to 72 Hours and Onwards) 21

4.5.5 Deterrence and Dispersal 21

4.5.6 Exclusion, Pre-emptive Capture, and Relocation 22

4.5.7 Wildlife Capture, Transport, Rehabilitation, Release, and/or Euthanasia 23

4.5.8 Wildlife Carcass Collection Procedures 24

4.5.9 Waste Management 24

4.5.10 Demobilization 25

4.6 Information Management and Reporting 25
4.6.1 Wildlife Reporting From the Public (Wildlife Hotline) ... *25*
4.6.2 Media Relations ... *25*
4.6.3 Permits Reporting ... *26*
4.7 Health and Safety 26
4.7.1 Personal Protective Equipment ... *26*
4.7.2 Zoonoses ... *27*
4.7.3 Biosecurity ... *27*
4.8 Personnel Requirements 27
4.9 Facility and Equipment Requirements 27
5 EVALUATING WILDLIFE RESPONSE ... 28
5.1 Evaluation and Review 28
5.2 Emergency Exercises 28
6 CUSTODIAN ... 28
7 ACKNOWLEDGEMENTS ... 29
8 LITERATURE CITED ... 29
APPENDIX A: EXAMPLE TEMPLATE OF A WILDLIFE RESPONSE PLAN ... 31
APPENDIX B: EXAMPLE CHECKLIST OF WILDLIFE EMERGENCY ACTIVITIES ... 32

LIST OF ACRONYMS

CWA	*Canada Wildlife Act, 1985*
CWS	Canadian Wildlife Service
ECCC	Environment and Climate Change Canada
ECCC-CWS	Environment and Climate Change Canada's Canadian Wildlife Service
ICP	Incident Command Post
ICS	Incident Command System
IPIECA	International Petroleum Industry Environmental Conservation Association
MBCA	*Migratory Birds Convention Act, 1994*
MBR	*Migratory Birds Regulations*
MBSR	*Migratory Bird Sanctuary Regulations*
NWA	National Wildlife Area
RP	Responsible Party
SARA	*Species at Risk Act, 2002*
WRP	Wildlife Response Plan
WRO	Wildlife Response Organization

DEFINITIONS

Chain of Custody: A written record for a legal sample documenting the continuity by tracing the possession of the sample from the point of collection through introduction into evidence.

CWS Co-ordinator: A person who leads and implements regional Wildlife Emergency preparedness and response on behalf of ECCC-CWS and represents ECCC-CWS's policies and interests when liaising and integrating with other federal and provincial/territorial government departments, Indigenous governments and organizations, and stakeholders involved in the response during Wildlife Emergencies. CWS Co-ordinators may also fulfill some of the on-site roles of responder.

CWS Responder: Emergency response personnel that provide on-site support on behalf of ECCC-CWS, as directed by the CWS Co-ordinator, during Wildlife Emergencies.

Environmental Emergency: Any uncontrolled or unexpected incident involving the release (or the likelihood thereof) of a polluting substance into the environment that results or may result in an immediate or long-term harmful effect on the environment, or constitutes or may constitute a danger to human life or health. It may be caused by an industrial activity, natural emergency or by a wilful act.

Field Stabilization Site: Facility that provides initial triage, care and/or euthanasia as well as short-term holding (sometimes overnight) for Wildlife prior to transport to an Oiled Wildlife Rehabilitation Centre. It is not meant for washing oiled Wildlife and not designed for long-term care.

Incident Command: Responsible for overall management of the incident and consists of the Incident Commander, either single or unified command, and any assigned supporting staff.

Incident Commander: The individual responsible for all incident activities, including the development of strategies and tactics and the ordering and release of resources. The Incident Commander has overall authority and responsibility for conducting incident operations and is responsible for the management of all incident operations at the incident site.

Lead Agency: The governmental authority that regulates or has legislative authority over the responsible parties' response and is responsible for overseeing the appropriateness of the response.

Migratory Bird: As defined in the *Migratory Birds Convention Act, 1994*, a Migratory Bird referred to in the Convention, and includes the sperm, eggs, embryos, tissue cultures and parts of the bird of species listed under Article 1 of the Convention (Government of Canada 2017).

National Environmental Emergencies Centre (NEEC): Environment and Climate Change Canada's 24/7 focal point for pollution-related emergencies, providing technical/scientific advice, assistance and coordination to the Lead Agency, as well as management of an incident when required.

National Wildlife Area: A protected area created under the *Canada Wildlife Act* that contains nationally significant habitats for plants and animals and that is managed for the purposes of wildlife conservation, research and interpretation.

Non-Pollution Incident: An uncontrolled or unexpected Wildlife injury or mortality event other than a Pollution Incident.

Oiled Wildlife Rehabilitation Centre: Facility used for the triage, stabilization, cleaning, pre-release conditioning and/or euthanasia of oiled Wildlife. The centre may be a permanent purpose-built facility, an existing Wildlife rehabilitation centre, a mobile facility, or a temporary facility established during an incident.

Pollution Incident: The release or deposit of a substance that is harmful to Wildlife into an area or waters that are frequented by Wildlife or into a place from which the harmful substance may enter an area or waters frequented by Wildlife.

Resource Agency: Any department or agency, other than the Lead Agency, that has jurisdiction or interest in the response, which provides support to the Lead Agency.

Response Organization: Any qualified person or organization that has been certified and designated by the Minister of Transport to carry out emergency response activities (as per the revised *Canada Shipping Act* (2001)). In Canada, there are four Response Organizations as follows: Atlantic Emergency Response Team, Eastern Canada Response Corporation Ltd., Western Canada Marine Response Corporation, and Point Tupper Marine Services Ltd.

Responsible Party: Any person or organization who might be responsible for the source or cause of an environmental emergency and/or a Wildlife Emergency.

SARA-listed Species: A species listed on the List of Wildlife Species at Risk set out in Schedule 1 of the *Species at Risk Act* (SARA).

Species at Risk: As defined in the *Species at Risk Act* (S.C. 2002, c.29), means an Extirpated, Endangered or Threatened species, or a species of Special Concern.

Unified Command: An application of the Incident Command System, used when there is more than one agency with incident jurisdiction or when incidents cross political jurisdictions. Agencies work together through the designated members of the Unified Command to establish a common set of objectives and strategies and a single Incident Action Plan.

Wildlife: In this document, "Wildlife" is used to refer to the terms Migratory Birds as defined under the *Migratory Birds Convention Act,* and listed Species at Risk as those terms are defined under the *Species at Risk Act* for species falling within the jurisdiction of the Minister of Environment and Climate Change (with the exception of individuals of SARA-listed Species that are located on lands administered by Parks Canada). This term also refers

to all wild species occurring in the National Wildlife Areas set out on Schedule I of the *Wildlife Area Regulations* (C.R.C., c. 1609).

Wildlife Emergency: A Pollution or Non-Pollution Incident that results or may result in an immediate and/or long-term harmful effect on the life or health of Wildlife and/or their habitat.

Wildlife Response Organization: Organizations that provide expertise, capabilities and trained personnel to undertake one or several aspects of response, including planning, implementation and reporting of activities related to Wildlife Emergencies. Wildlife Response Organizations (or representatives thereof) are authorized under applicable federal, provincial, and/or territorial legislation to capture, transport, clean, rehabilitate, euthanize, and release Wildlife.

Wildlife Response Plan: A document that outlines the initial and ongoing Wildlife-related strategies that are needed to support any Wildlife response objectives that may occur at the onset of a Pollution or Non-Pollution Incident.

1.0 INTRODUCTION

Environmental protection legislation in Canada at the federal, provincial or territorial level contains provisions to have approved contingency plans in the event of an environmental emergency for construction, operation or decommissioning activities that may impact the environment. Projects undergoing an environmental assessment may include additional conditions upon approval to develop and implement an environmental protection plan. All contingency plans/environmental protection plans for which a threat to Wildlife is identified may have specific sections dedicated to Wildlife response in order to be in compliance with applicable federal, provincial, or territorial legislation.

Environment and Climate Change Canada's Canadian Wildlife Service (ECCC-CWS) oversees and/or leads Wildlife Emergency response activities in association with Environment and Climate Change Canada (ECCC)'s responsibilities under the *Migratory Birds Convention Act, 1994* (MBCA) and its regulations (*Migratory Birds Regulations* (MBR) and *Migratory Bird Sanctuary Regulations* (MBSR)), the *Species at Risk Act, 2002* (SARA), the *Canada Wildlife Act, 1985* (CWA), and *Wildlife Area Regulations*. Through these pieces of legislation, ECCC-CWS is responsible for the management and conservation of all Migratory Birds and Species at Risk under its jurisdiction (hereafter "Wildlife") and how they are managed during a Pollution or Non-Pollution Incident. In the case of Migratory Birds, including SARA-listed Migratory Bird species, this document applies to wherever they are found in Canada. For other SARA-listed Species, this document applies to individuals that are located on federal lands in the provinces, on lands under the authority of the Minister of Environment and Climate Change in the territories, or in the exclusive economic zone or on the continental shelf of Canada (with the exception of individuals of SARA-listed Species under the jurisdiction of Parks Canada or Fisheries and Oceans Canada) (see also Section 2.2 for additional details). For greater clarity, this document does not apply to any wildlife species, including aquatic species (which include fish, marine mammals, marine turtles, and marine plants, as defined in Sections 2 and 47 of the *Fisheries Act*), located on any lands or in any waters administered by Parks Canada or under the jurisdiction of Fisheries and Oceans Canada. The CWA and *Wildlife Area Regulations* broaden the responsibility of ECCC-CWS to include habitats and all wild species within designated National Wildlife Areas (NWAs).

1.1. SCOPE

Wildlife Emergencies, in the context of this document, include Pollution or Non-Pollution Incidents that result or may result in an immediate and/or long-term harmful effect on the life or health of Wildlife and/or their habitat. Pollution Incidents with potential harm to Wildlife are prohibited under the MBCA and SARA. Non-Pollution Incidents are uncontrolled or unexpected Wildlife injury or mortality events other than a Pollution Incident, which may include things such as disease outbreaks, mass strandings, or other unexplained Wildlife deaths. The degree to which any Pollution or Non-Pollution Incident may be deemed a Wildlife Emergency is dependent on a number of factors such as the scope and severity of the incident (e.g. numbers of animals or area of habitat impacted), the likelihood of an incident expanding, potential for impacts to Species at Risk, and potential link

to human health, among other factors. The appropriate level of response expected to incidents should be reasonable and commensurate with the risks. ECCC-CWS is responsible for informing various aspects of response to Wildlife Emergencies, including the development and implementation of Wildlife response strategies and activities, as outlined in the *National Policy on Wildlife Emergency Response* (ECCC-CWS 2021).

During an incident, Responsible Parties (RPs) must demonstrate their ability to safely, efficiently, and effectively respond in a manner that incorporates measures designed to avoid or minimize harm to Wildlife, while managing the public's understanding of response decisions and activities. In the absence of an RP during an incident (e.g. mystery spill), or for planned operations with a potential to impact Wildlife (e.g., oil removal from wreckages), the Lead Agency is deemed responsible for implementing Wildlife response appropriate to that incident.

Wildlife Response Plans (WRPs) are documents that formalize the guidance and strategy for responding to incidents with potential to impact Wildlife. A WRP should include the following elements:

- The objectives of implementing a WRP with respect to managing or preventing harm to Wildlife and its habitat during a Pollution or Non-Pollution Incident
- A description of the incident management structure for Wildlife response and how it is integrated into an incident-specific response command system (e.g., an Incident Command Post (ICP))
- Background information on responsibilities of the RP as well as regulatory requirements, permits, and authorizations to engage in Wildlife response activities
- Information on Wildlife and its habitat known or potentially impacted by an incident
- A description of Wildlife response procedures to be implemented immediately following an incident (e.g., deterrence and dispersal, surveillance)
- A description of the operational structure and implementation of ongoing Wildlife response efforts throughout all phases of an incident
- Procedures for information management and communication, including to key stakeholders (e.g., local communities, hunters)
- Health and safety, security, and training requirements for personnel, equipment, and facilities required to support Wildlife response activities

The purpose of this document is to guide federal, provincial/territorial and Indigenous governments, Indigenous organizations, industry, Response Organizations, and other stakeholders in developing a WRP that considers all aspects of planning throughout the full lifecycle of an incident. This document outlines the attributes that are necessary for effective implementation of Wildlife Emergency response. Proponents should keep in mind that the guidance provided within this document is developed by ECCC-CWS for species' protection within their mandate. As such, proponents developing comprehensive WRPs should also consult with other federal and provincial/territorial agencies which are responsible for other wildlife (e.g., mammals, reptiles, amphibians, fish and some bird species not under the jurisdiction of the MBCA).

2.0 REGULATORY REQUIREMENTS

2.1 APPLICABLE LEGISLATION

ECCC-CWS is responsible for ensuring that all Wildlife response activities are coordinated, enacted, and carried out in compliance with applicable federal law. Federal legislation applicable to Wildlife response includes:

- ***Migratory Birds Convention Act* (MBCA):** Section 5 of the MBCA prohibits the deposit of harmful substances into waters or areas frequented by Migratory Birds, unless authorized under the *Canada Shipping Act, or* the substance is of a type and quantity, and the deposit is made under conditions, authorized under an Act of Parliament other than the *Canada Shipping Act, 2001* or authorized for scientific purposes by the Minister of Environment and Climate Change. Section 6 of the *Migratory Birds Regulations* (MBR) made under the MBCA prohibits the disturbance, destruction, taking of a nest, egg, nest shelter, eider duck shelter or duck box of a Migratory Bird, or anyone from having in his possession a live Migratory Bird, or a carcass, skin, nest or egg of a Migratory Bird. The MBR regulate the hunting of Migratory Birds and other circumstances under which the killing, capturing of and harming of Migratory Birds may be authorized. The *Migratory Bird Sanctuary Regulations* (MBSR) further regulate activities related to Migratory Birds and their habitats within designated Migratory Bird Sanctuaries. Permits may be issued to authorize the permit holder to undertake activities that are otherwise prohibited (Government of Canada 2017).

- ***Species at Risk Act* (SARA):** SARA permits are required for activities affecting a SARA-listed Species, any part of its critical habitat or the residences of its individuals. For the purpose of SARA, an "*activity affecting*" means any activity prohibited under the Act or its regulations. Section 73 of SARA authorizes the issuance of permits for activities affecting a SARA-listed Species, any part of its critical habitat or the residences of its individuals, and sets out conditions that must be met before a competent minister can issue a permit. SARA prohibitions apply to any species listed on Schedule 1 as Threatened, Endangered or Extirpated, but do not apply to species listed as Special Concern.

- ***Canada Wildlife Act* (CWA):** The CWA allows for the establishment of National Wildlife Areas (NWAs), which protect wildlife habitat in Canada. The *Wildlife Area Regulations* identify all NWAs and prohibit certain activities from occurring within NWAs, but Section 3.4 of the *Wildlife Area Regulations* provides exemptions for the prohibited activities within the NWAs in the event of an emergency response effort (e.g., ensuring public safety and national security). The Scott Islands marine NWA has its own regulations, *Scott Islands Protected Marine Area Regulations*, which also provide exemptions for the prohibited activities in the event of an emergency response effort.

Further to these Wildlife specific pieces of legislation, other environmental protection legislation in Canada at the federal, provincial or territorial level contain additional provisions which require approved contingency plans in the event of an environmental emergency for construction, operation or decommissioning activities that may impact the environment. Projects undergoing an environmental assessment may require the development and implementation of an environmental protection plan, conditional upon approval.

Where contingency plans/environmental protection plans identify a threat to Wildlife, ECCC-CWS considers a WRP to fulfill some of these requirements if contingency and emergency response planning efforts adequately address the identified Wildlife issues.

ECCC-CWS recommends that strategic WRPs be developed prior to incidents for activities or areas where the potential for, or associated risk of a Wildlife Emergency is high (see Section 3.2 for more details). These strategic plans may be standalone plans or components (or annex) to overarching response plans (e.g., operators'

facilities response plans). Incident-specific WRPs are routinely developed as part of the ICP to standardize and document Wildlife response activities during an incident (Section 3.2). Both approaches are in keeping with international standards for Wildlife response planning (International Petroleum Industry Environmental Conservation Association (IPIECA) 2014).

2.2 PERMITS AND AUTHORIZATIONS

As part of Wildlife Emergency response, Wildlife Response Organizations (WROs) are often responsible for undertaking response activities involving direct interaction with Wildlife including the capture, collection, transport, and care/rehabilitation, release, and/or euthanasia of impacted Wildlife. Some WROs operating in Canada may retain annual permits that allow certain levels of immediate response, assuming permits are renewed and standards are maintained. Qualifications of these organizations to perform certain activities are assessed during the permit application process. Otherwise, a WRO will work with ECCC-CWS to obtain incident-specific permits for aspects of Wildlife Emergency response requiring authorizations. Other qualified individuals, working for or contracted by WROs, Response Organizations, the RP, or government agencies, may also apply for permits, as required. Permit and authorization requirements are summarized in Table 1.

ECCC-CWS recognizes deterrence and dispersal as a beneficial practice during Wildlife Emergencies. If proponents plan to use deterrence and dispersal tactics during a Wildlife Emergency, this should be described in a WRP (Section 4.5.5), and ECCC-CWS should be consulted to provide guidance on effective tactics for species, seasons, and habitats.

For most of the activities listed in Table 1, activities affecting SARA-listed Migratory Birds may be permitted through the issuance of SARA compliant MBCA-permit (Scientific Permit or Banding Permit). It is important to note that a SARA permit cannot be issued for an activity that would have a prohibited effect on a listed Migratory Bird for which a permit is not available under the MBCA and its regulations. For activities affecting SARA-listed Species, other than a Migratory Bird, permits may be issued under Section 73 of SARA. Specifically, ECCC-CWS SARA permits are required for SARA-listed Species that, a) are located on federal lands in the provinces, b) are located on lands administered by the Minister of Environment and Climate Change in the territories; c) are located in the exclusive economic zone or on the continental shelf of Canada; or d) are the subject of an order of the Governor in Council under SARA, including an order pertaining to the species' critical habitat or habitat that is necessary for the survival or recovery of the species (except for species under the jurisdiction of Parks Canada or Fisheries and Oceans Canada). Table 1 outlines examples of activities that require permits for SARA-listed Species. For additional clarification on the permitting provisions and how to apply for a SARA permit, please consult the *Species at Risk Public Registry Policies and Guidelines* (Government of Canada 2020).

For emergency response activities occurring on Migratory Bird Sanctuaries, permits are required on a site-specific basis (Table 1). Some types of activities that require authorization on Migratory Bird Sanctuaries include carrying firearms and other weapons, and possession/handling of any animal, carcass, skin, nest, egg or part of

those things. These activities may be authorized by permits issued under the MBSR.

With respect to NWAs, a permit is not required to carry out emergency relief activities, as per Section 3.4 of the *Wildlife Area Regulations*. With respect to the Scott Islands marine NWA, a permit is not required to carry out emergency relief activities, as per Section 3 of the *Scott Islands Protected Marine Area Regulations*.

Table 1. Wildlife-related Permits and Authorization Requirements that may be issued by ECCC-CWS[1] during a Wildlife Emergency.

Wildlife	Permit Type	Examples of Activities that Require Permits or Authorization	Permit Holders
Migratory Birds (including SARA-listed Species)	Scientific (for collection)	• Possession • Transportation • Collection/capture • Treatment/rehabilitation/care • Euthanasia	Individuals of WROs are generally permitted for most activities. Subcontractors or independent contractors may be permitted for specific activities through one or several permits.
	Scientific (for capture and banding)	• Capturing • Banding • Using auxiliary markers (e.g., color bands and GPS transmitters) • Collection of biological samples	
	SARA Section 73/74 permit	• Destruction of protected critical habitat • Damage or destruction of any critical habitat that could result in harming individuals of a SARA-listed Migratory Bird • Damage or destruction of residences[2] of a SARA-listed Migratory Bird	SARA permits are issued on site and situation-specific basis and must be discussed early in response activities, as appropriate.
Any SARA-listed Species other than Migratory Birds (on any federal land including NWAs, and any land affected by an order or regulation made under SARA)	SARA Section 73 permit	• Collection, taking, possession • Transportation/relocation • capture/marking • Treatment/rehabilitation/care • Euthanasia • Harassing, including deterrence and dispersal • Exclusion barriers / trenches • Damage or destruction of critical habitat • Damage or destruction of residences[2] • Any activity specifically prohibited by a Section 80 emergency order, or by a regulation made under SARA	SARA permits are issued on a site and situation-specific basis and must be discussed early in response activities, as appropriate.
Migratory Bird Sanctuaries	Scientific (Collection)	• Operations occurring on Migratory Bird Sanctuaries[3]	Migratory Bird Sanctuary[3] permits are issued on a site-specific basis and will be developed early in response activities.

Note:

[1] The permitting process and the types of activities requiring permits is subject to change periodically as regulations are updated. Individuals/organizations should seek up to date advice on permitting from ECCC-CWS permit officers.

[2] For the purpose of SARA, "residence" means a dwelling-place, such as a den, nest or other similar area or place, that is occupied or habitually occupied by one or more individuals during all or part of their life cycles, including breeding, rearing, staging, wintering, feeding or hibernating.

[3] Permits issued under the MBSR.

3.0 ELEMENTS OF WILDLIFE RESPONSE PLANNING

3.1 WILDLIFE RESPONSE WITHIN THE INCIDENT COMMAND SYSTEM

Any activities with potential to result in a Wildlife Emergency may warrant immediate implementation of response actions. Guidance on Wildlife response concerns and actions may be provided through the Environmental Emergencies Science Table, which is chaired by ECCC's National Environmental Emergencies Centre (NEEC). Increasingly, within industries or the Government of Canada, emergency incidents are managed and structured using the Incident Command System (ICS) approach, including the establishment of an ICP for major incidents. It is therefore recommended to stakeholders to use ICS for emergency response. Wildlife experts, such as ECCC-CWS, may be situated in the Environmental Unit of the Planning Section within an ICP, a role which may be titled Wildlife Technical Specialist. The Environmental Unit would develop and refine response plans as well as incident-specific tactics. Depending on the scale of the incident and scope of potential or actual impacts to Wildlife, ECCC-CWS may assist in establishing a Wildlife Branch which is typically situated within the Operations Section of the ICP (IPIECA 2014; Figure 1). An Environmental Unit Liaison position may also be staffed in the Wildlife Branch (Figure 1) to facilitate the dissemination of planning and operational information between the Environmental Unit and the Wildlife Branch. WRPs may also be developed and used for Wildlife Emergencies that are not managed with an ICP or a Wildlife Branch.

The WRP should identify, schematically, the structure and function of the Wildlife Branch and its integration into the Operations Section of the ICP, as well as how it liaises with other ICP sections (e.g., Planning). The WRP should anticipate structuring and scaling the Wildlife Branch according to how the incident is expected to proceed.

It is essential to identify and implement Wildlife response activities within the first 24, 48, and 72 hours of an incident. These response activities are formalized within a WRP to structure and guide response activities. The RP is responsible for the development of WRPs, to address all of the procedures and strategies required to mount an effective Wildlife response. During an incident, ECCC-CWS will provide advice to support the Wildlife response consistent with the components outlined in Section 4. However, the RP typically leads the development of a WRP and may contract the WRO to develop it on their behalf to ensure the WRP is operationally feasible. While ECCC-CWS does not have the authority to assign, recognize, or approve specific WRPs, ECCC-CWS may provide advice to the Lead Agency, the RP, and WROs regarding the direction and content of a WRP, based on available science and expertise. A WRP does not necessarily equate with statutes and regulations; rather, developing a WRP identifies actions that support compliance with the MBCA, MBR, MBSR, SARA, and the CWA. A WRP receives formal approvals within an ICP through sign-off by the Incident Command and RP.

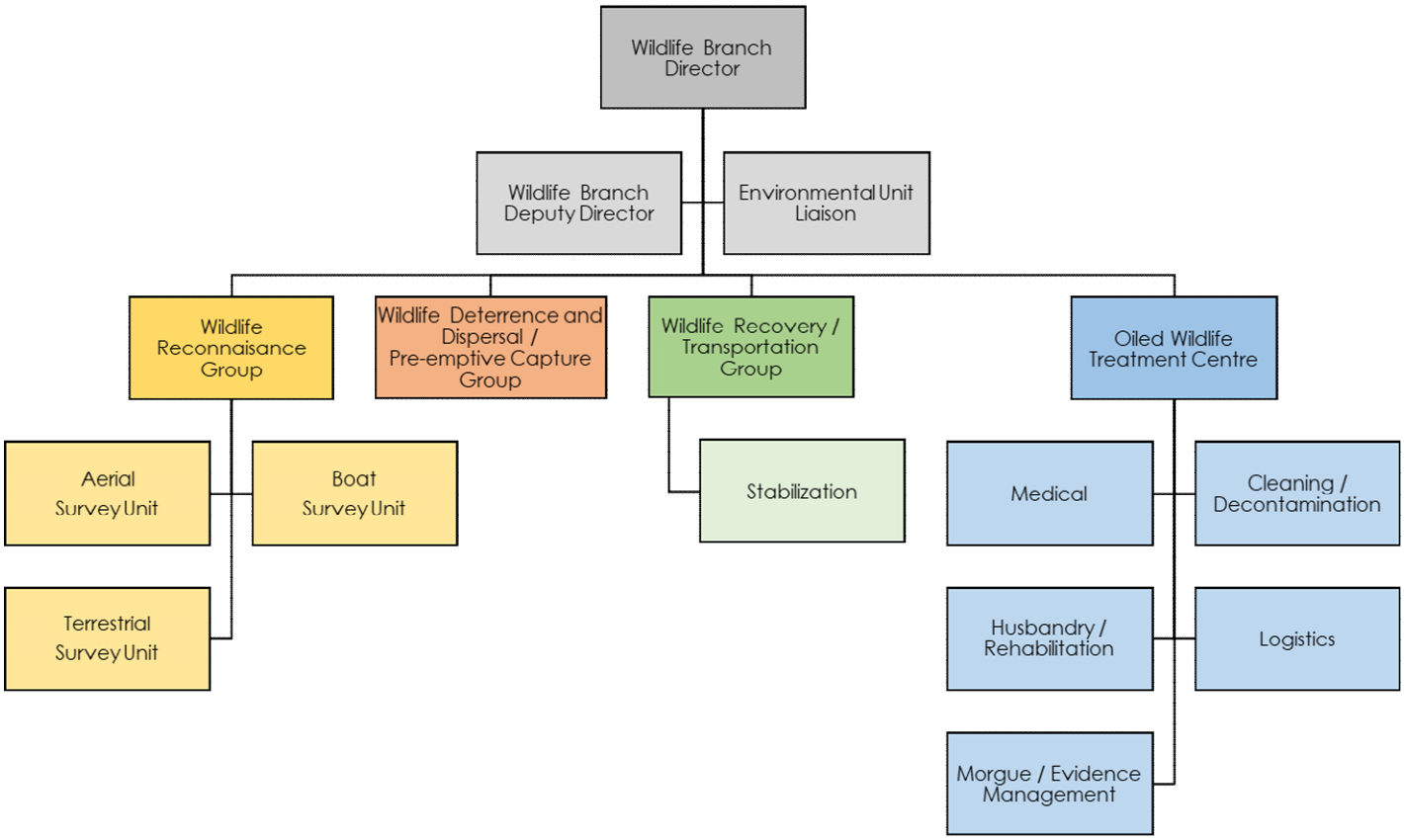

Figure 1. Example of a scalable Wildlife Branch within an ICS setting (adapted from IPIECA 2014).

3.2 TYPES OF WILDLIFE RESPONSE PLANS

There are two main types of WRPs, strategic response plans and incident-specific response plans (described below). ECCC-CWS may support the development of various WRPs, including providing technical expertise, permit support, and incident-specific guidance. However, WRP approvals are the responsibility of the RP and the Incident Command (or Unified Command).

3.2.1 Strategic Response Plans

Strategic response plans are often created for specific activities, where there is a recognized risk of a Wildlife Emergency, or for designated areas or specific locations which may warrant special planning considerations (e.g. protected areas, geographic response areas). Strategic WRPs describe the likely activities to be enacted during a response, but may lack incident-specific actions or tactical plans which may only be developed once the parameters of the incident are known or tested. Thus strategic WRPs are refined and adapted throughout the incident based on incident-specific considerations (Hebert and Schlieps 2018).

Activity-specific Plans: Accidents or malfunctions that may occur at certain types of facilities or infrastructure (e.g., oil-handling facilities, offshore petroleum platforms, liquid natural gas marine terminals), projects (e.g., exploratory drilling), or routine activities (e.g., transport of oil by rail or vessel) have an associated increased risk

for Wildlife Emergencies. However, given the static nature of these sites, the characteristics of a Pollution or Non-Pollution Incident and the procedures for mounting a response can be anticipated to a certain degree. Industries or other stakeholders determine whether it is appropriate to develop strategic WRPs to structure a response that aligns with internal policies and procedures (e.g., industry best practices, contract with WROs), and incorporates site-specific considerations for implementing effective response actions (e.g., pre-determined Wildlife rehabilitation areas, standardized methods for Wildlife surveillance). As with other types of plans, activity-specific WRPs need to be adaptable and scalable, depending on the nature of the incident. Activity-specific WRPs should be reviewed and revised on a regular basis to accommodate changes to infrastructure, activities, and operational procedures, and to reflect current guidance on Wildlife response planning. In cases where activity-specific plans are identified for development, ECCC-CWS can review and provide recommendations on WRP components based on site-specific information.

An example of an activity-specific WRP is one that is developed as part of planned vessel salvage or oil recovery activities, where there is potential for impacts to Wildlife. In the case of a planned salvage, the initial draft of the WRP should be developed and approved in advance of initiating salvage activities. As with other incidents, the WRP will evolve over the course of the salvage to address specific response conditions.

Area-specific Plans: Wildlife Emergencies can also occur in land tenures or aquatic areas of significant biological importance, with specific management objectives, and/or where there is otherwise concerted interest in having a response plan in place (e.g., protected areas, geographic response areas). As with activity-specific plans, the procedures for mounting a response to a Pollution or Non-Pollution Incident may be anticipated and planned for to a certain degree. Managers of these areas may determine it is appropriate to develop strategic WRPs to structure a response that aligns with local or regional management objectives. Stakeholders' input that incorporates site-specific considerations for implementing effective response actions should be considered. Area-specific WRPs need to be adaptable and scalable, depending on the nature of the incident. Managers of these areas need to identify zones of higher sensitivity that are to be protected and those of lower sensitivity to allow an efficient response (access points for machinery, ICP, response personnel, etc.). WRPs should be reviewed and revised on a regular basis. In cases where area-specific plans are identified for development, ECCC-CWS can review and provide recommendations on WRP components based on site-specific information.

3.2.2 Incident-specific Response Plans

The most common type of WRP is typically one that is developed in the early phases of a Wildlife Emergency as part of the ICS and is specific to the incident (IPIECA 2014). Incident-specific WRP, sometimes referred to as Wildlife Management Plans, take into account the actual circumstances of a specific incident, particularly factors related to the scope of the incident (e.g., quantity, location and dispersion of pollution), environmental considerations (e.g., weather), and seasonal considerations (e.g., Wildlife abundance and distribution). A comprehensive strategic WRP may fulfil most of the information needs for an incident-specific plan, but might require further details on implementation given the available resources, weather, and time of year.

For incidents where an RP has been identified, the RP has the first responsibility for initiating effective countermeasures to a Wildlife Emergency and has financial responsibility for damage and cleanup costs incurred during an incident. Upon the establishment of an ICP, the RP and Incident Command will outline planned Wildlife response activities. ECCC-CWS will contribute to the development of an incident-specific WRP by participation in the Wildlife Branch (or Environmental Unit) of the ICP, or by reviewing plans and providing expert advice to individuals working within the ICP. Here, ECCC-CWS may provide guidance on the scope of a WRP and direct the RP, or its contracted response personnel, towards resources that support its development. In particular, ECCC-CWS will inform on any Wildlife response activities that require authorization (i.e., permits), or technical expertise. ECCC-CWS will review and make recommendations on a WRP and subsequent iterations, but the Incident Command ultimately approves the plan. For incidents where an RP has not been identified, ECCC-CWS may contribute to the development and implementation of a WRP.

3.2.3 Plan Development

It is important to recognize that Wildlife Emergency response and WRP development is an iterative process that will evolve as an incident unfolds. A WRP should be structured and implemented in a way that it is adaptable and scalable over the course of an incident, and may accommodate needs for post-incident monitoring.

The Wildlife Branch will determine the appropriate level of response based on specific needs of the incident. The need for greater or fewer resources, equipment, facilities, and response personnel will be based on incident-specific factors including:

- the present and future geographic extent of the incident
- the species, numbers of individuals, and types of habitats present in the geographic extent
- the known or potential risk for injury or mortality
- the timeframe for which incident response actions are implemented

Plans that are developed prior to an incident may also consider tiered response planning to appropriately manage various degrees or types of Wildlife Emergencies. *Wildlife Response Preparedness* (IPIECA 2014) describes tiered response planning in more detail.

3.3 HABITAT CONSIDERATIONS FOR RESPONSE PLANNING

The various habitats occupied by Wildlife require different considerations with regards to response planning. For emergency response involving pollutants such as oil, the key variable in a response plan is the presence of bodies of water that may act as a carrier for contaminants discharged into the environment, causing contaminants to spread over large areas where Wildlife may become affected. In Canada, habitats occupied by Wildlife requiring similar response approaches during an emergency response involving contaminants can be grouped into the following three main landscape categories: a) marine and open fresh water, b) aquatic, and c) terrestrial.

3.3.1 Marine and Open Fresh Water

Pollution Incidents that occur in the marine environment or large freshwater bodies of open water tend to affect Wildlife that spend a high proportion of their time on the water, such as alcids and waterfowl. The effect on Wildlife is influenced by the location of the incident, persistence and toxicity of the contaminants, and duration of the incident. In seasons and areas of high concentrations of vulnerable Wildlife, the number of impacted individuals may reach the thousands, even when a relatively low volume of contaminant is discharged. Affected Wildlife may eventually come ashore either alive or dead, requiring systematic search and collection effort on accessible shorelines. Contaminants discharged offshore may eventually travel inshore and reach the coastline, affecting other Wildlife communities associated with aquatic habitats (see Section 3.3.2). A Wildlife response in the marine and open fresh water landscape focuses on preventing Wildlife from utilizing the affected area, recovering affected individuals if they come to shore, and assessing the impact of the incident on Wildlife (Table 2).

3.3.2 Aquatic Habitats

For the purpose of this document, aquatic habitats consist of any land saturated with water long enough to take on the characteristic of an ecosystem and promote aquatic processes, such as salt marshes, wetlands, fens, lagoons, and bogs, but also include small ponds, creeks, rivers, tidal flats, marshes, and reed beds, or any combination of such categories. Unlike the other landscapes, aquatic habitats are vulnerable to activities that occur both on land and in the marine environment. During a response to a Pollution Incident, aquatic habitats are priority areas for protection as they can trap large quantities of contaminant, are difficult to clean, and can take years or decades to recover due to the retention of contaminants in these environments. Because of the large variety of aquatic habitats and biotypes that they accommodate, removing contaminants from the environment and operationalizing a Wildlife response may be complex. Rivers will carry and spread pollutants over potentially large distances, and shorelines may be inaccessible. Wildlife diversity may be high and include a mix of aquatic (waterfowl, shorebirds, inland waterbirds) and terrestrial (landbirds) Migratory Bird species and Species at Risk from a variety of groups, including mammals, birds, amphibians, reptiles, plants, and fish. Additional survey effort and resources may be required for reconnaissance and surveillance surveys as well as collecting affected individuals. Small lakes and ponds may be attractive for large concentrations of Migratory Birds during migration, molting, and staging periods and may require extended resources to exclude Wildlife from the area. In addition to deterrence activities, a Wildlife response in aquatic habitats may also focus on prioritizing protection and containment strategies to minimize the spread of contaminants to key habitats, denying Wildlife access to impacted habitats, pre-emptive capture to relocate unaffected individuals (e.g., Species at Risk), recovery of affected individuals, and assessing the effect of the incident on Wildlife (Table 2).

3.3.3 Terrestrial Habitats

Pollution discharged into a terrestrial landscape where a body of water is absent will be limited in spread and affect a small area in relation to the released volume. Pollution Incidents in a terrestrial landscape are usually limited to a point source (e.g., truck, rail, pipeline, oil storage facility), however, the species and types of incident interactions among terrestrial Wildlife may be diverse, as there is potential for impacts to birds,

mammals, reptiles, and amphibians. A Wildlife response strategy in a terrestrial landscape may focus on excluding Wildlife from the affected area, pre-emptive capture to relocate unaffected individuals (e.g., Species at Risk), recovering affected individuals, and assessing the impact of the incident on Wildlife.

Table 2. Key activities/strategies for Wildlife response based on major landscape types. This table is meant as a guide to highlight some potential key differences in approaches, but should not be considered as a checklist for all incidents. Refer to text for details.

Response Strategy/Activity	Landscape Categories		
	Marine/ Open fresh water	Aquatic	Terrestrial
Reconnaissance and surveillance surveys	X	X	X
Wildlife deterrence	X	X	X
Wildlife exclusion		X	X
Prioritize habitats for protection	X	X	X
Pre-emptive capture of Wildlife		X	X
Recovery of affected individuals	X	X	X
Assessing impacts to Wildlife	X	X	X

3.4 DETECTING SIGNS OF IMPACTED AVIAN SPECIES

In planning for Wildlife Emergency and preparation of a WRP, it can be important to consider target species and how detectable contaminated (or injured) Wildlife may be. The ability to detect contaminated Wildlife will help in planning several of the actions to be taken during a response, notably Initial Wildlife Impact Assessment (Section 4.5.2), reconnaissance and surveillance surveys (Sections 4.5.3 and 4.5.4), and Wildlife capture (Section 4.5.7). Detecting contaminated Wildlife is best done by experienced observers, such as WRO, but understanding of contaminated Wildlife detection can benefit all aspects of response planning and implementation. Here we provide guidance for detecting signs of oiling in avian species, though the principles outlined are generally applicable to birds affected by other contaminants.

Under normal conditions, typical bird behaviour will vary by the species, the habitats they occupy, as well as time of year and weather conditions. Generally, birds that spend a great deal of time on the surface of the water are typically seen resting on the water (e.g., loons, grebes, scoters, alcids, and cormorants). Piscivorous species (e.g., loons, grebes, alcids), will normally dive and surface repeatedly over time. Some species, like gulls, will move between resting on the water to being flight bound to using land to feed or rest. Species that are common in shore environments, like shorebirds, dabbling ducks, and cormorants are typically quite obvious on rocks or beaches, and would be expected to be quite mobile/active.

Birds that have come into contact with oil may have obvious oiling indications, including coating, discoloured feathers, or feathers having a wet or ragged appearance (i.e., disruption of feather structure). Heavily oiled birds or individuals oiled below the waterline may also appear as though they are sitting low on the water

(when compared with normal species posture), struggling to maintain buoyancy. Oiled birds have increased potential to lose buoyancy and thermoregulatory properties of their feathers. Accordingly, it is common to see oiled birds focused intently on preening themselves in order to maintain buoyancy and reduce heat loss; this may be most apparent while birds are on the water. Diving or dabbling species may appear to be foraging less than expected (although this should be assessed by experienced observers). Birds may also exhibit changes in flushing behaviour, being less inclined to fly when disturbed. Birds might also congregate near or on shore, or strand and rest on structures (e.g., vessels, buildings, platforms); this includes species that would not normally be expected to use these habitats or those that have contacted oil in the intertidal environment. In nearshore or shoreline environments, birds may also use shallow waters to reduce risk of drowning or take advantage of coastal vegetation to camouflage or reduce risk of predation while they try to preen or recover. Observations of behavioral changes in birds are sometimes the key indicators of oil impacts.

Detecting birds contaminated with oil is particularly difficult for aquatic birds with dark plumage that remain on the water and far from shore. Under these circumstances, it may be appropriate to determine a probable rate of contamination using appropriate indicator species. Ideally, indicator species are common throughout the incident area, share similar life history attributes, are sensitive to oiling, and signs of oiling are readily observable. The contamination percentage determined for indicator species only provides an estimation of the contamination percentage for the other species in the incident area. This type of assessment is likely to underestimate the actual contamination rate of the most vulnerable aquatic species, such as sea ducks and alcids, and overestimate the contamination of the more coastal species, such as geese and dabbling ducks (Lehoux and Bordage 1999). Additional details on how to assess rates of oiling for indicator species is provided in the *Guidance and Protocols for Wildlife Surveys for Emergency Response* (ECCC-CWS 2021a).

4.0 COMPONENTS OF A WILDLIFE RESPONSE PLAN

A WRP is a plan that describes the objectives and methods for undertaking Wildlife Emergency response, specific to an area and Pollution or Non-Pollution Incident(s). The aim of a WRP is to avoid or minimize injury or harm to Wildlife during Pollution and Non-Pollution Incidents.

The following section outlines attributes that should be considered within a WRP (IPIECA 2014; Hebert and Schlieps 2018). An annotated WRP template is provided as an example in Appendix A, to be adapted and scaled based on the nature of individual Wildlife Emergencies. A checklist of activities that should be completed within the first 24, 48, and 72 hours of an incident involving Wildlife is provided in Appendix B.

4.1 INTRODUCTION

The Introduction section of the WRP provides the basis and rationale for how a Wildlife response will be handled. The Introduction will provide a general description of the types of issues that will be addressed by the

WRP. Where appropriate, the Introduction will describe how this WRP interfaces with various aspects of an ICP, including other response plans that WRP activities may interact with.

4.2 NOTIFICATION PROCEDURES

The Notification Procedures section outlines the agencies, organizations, and other technical specialists that will be notified during incidents involving Wildlife response. Where appropriate, this section will describe how notifications operate within the incident-specific ICS structure, as well as any intra- and interdepartmental communication requirements.

4.3 REGULATORY REQUIREMENTS

The Regulatory Requirements section provides a brief description of the applicable Wildlife legislation, where it applies, and whether supporting permits or authorizations are required to support a Wildlife response. In most cases, incidents involving Wildlife will need to consider the MBCA, the SARA, and possibly the CWA (see Section 2), as well as other provincial or territorial legislation. Additional permits and authorizations may also be required outside the regulatory authority of ECCC-CWS.

4.3.1 Permits and Authorizations

For any Wildlife Emergency involving the development of a WRP, the plan will identify any WROs or contracted subject-matter experts that will be engaged to support Wildlife response activities. Authorized organizations or individuals must have the training and resources necessary to meet Wildlife response requirements. Where permits or authorizations are identified, this section will highlight:

a) what the authorization is for
b) the issuing agency
c) activities that are authorized
d) who holds authorization to conduct those activities
e) if a technical specialist or qualified professional is required to supervise or participate in the authorized activity (e.g., supervision or guidance of bird deterrence activities by ECCC-CWS or a WRO supervision of bird deterrence activities)
f) reporting requirements, if any, for these authorizations

With respect to strategic WRPs prepared in advance for specific activities or areas, this section will also identify permits which are already in place and relevant information on renewal and reporting cycles.

4.4 RESOURCES-AT-RISK

The WRP will outline potential Wildlife and habitat resources-at-risk from the incident's current and reasonably foreseeable impacts. The resources-at-risk section of the WRP will describe:

- the geographic extent for which resources are being identified

- Migratory Bird sensitivities
- Species at Risk sensitivities
- important habitats for consideration and protection:
    - critical habitat
    - protected areas
    - colonial nesting areas
    - general nesting areas
    - seasonal stopover, molting, or staging areas
    - key areas (e.g., Important Bird Areas, Ecologically and Biologically Significant Areas)
    - other important habitat features such as estuaries

In addition to these general factors, the characterization of resources-at-risk should consider area- and species-specific factors such as seasonal presence, abundance, life stage, and habitat associations. Where available, incident-specific observations should be referenced in the description of resources-at-risk to characterize current conditions. Resources-at-risk should also consider details on mitigations related to habitats including priority sites, protection measures, clean-up restrictions, and information relevant to Net Environmental Benefits Assessment (NEBA) or Spill Impact Mitigation Assessment (SIMA) (e.g., IPIECA 2016, 2018).

4.5 WILDLIFE MANAGEMENT AND RESPONSE

This section will describe the nature of Wildlife management and response activities that are, or will be undertaken as part of the incident. The nature and scale of a WRP will depend on the incident, and the known or potential impacts to Wildlife.

For the early phases of an incident, the WRP should include, at minimum, a description of the initial approaches for Wildlife impact assessment (e.g., reconnaissance and monitoring activities). This section of the WRP will be revised as an incident evolves. Where appropriate, aspects of Wildlife management and response may warrant standalone plans that could be appended, and referenced in this section (e.g., detailed plans for Wildlife rehabilitation).

4.5.1 Operational Objectives

This section briefly describes the primary objectives for the activities that will be implemented during the operational period(s) this plan is expected to apply to until its next iteration. Objectives will consider the ethical considerations in context with situational, technical, and financial feasibility of implementation (IPIECA 2014). Objectives will change based on Wildlife concerns as well as personnel and equipment resource availability. These objectives form the basis for the nature and scope of activities described in this section of the WRP.

4.5.2 Initial Wildlife Impact Assessment (0 to 24 Hours)

In order to effectively plan for and direct Wildlife response efforts, an Initial Wildlife Impact Assessment needs to be conducted as early in the incident response as possible, to determine:

- existing information on Wildlife and habitats
- current/initial estimates of Wildlife impacts
- projection of potential impacts to Wildlife
- initial Wildlife response recommendations
- initial habitat protection recommendations
- initial resource, personnel, equipment, and facility requirements

As with all phases of a response, the Initial Wildlife Impact Assessment must be completed in consideration of the health and safety of response personnel and adhere to all incident-specific health and safety requirements (see Section 4.7).

4.5.3 Reconnaissance Surveys (24 to 48 Hours)

Reconnaissance surveys should be conducted in a timely manner on a large geographic scale to assess the outer limits of the incident. These surveys serve to obtain current information on impacted habitats, areas of special concern (e.g., colonial nesting areas) and the abundance and distribution of Wildlife within the general area of the incident, recognizing that Wildlife movements may extend beyond the geographic limits of the incident area. Initial reconnaissance surveys should take place as early in the response as possible to determine current conditions and inform potential response priorities and strategies. In all cases, reconnaissance should extend, at minimum, to the expected geographic limits of the incident area, recognizing those boundaries may change as the incident progresses. Reconnaissance surveys may be conducted on a recurring basis to inform response activities (e.g., deterrence and dispersal, Wildlife capture), or if the situation of the incident changes (e.g., following a storm). Reconnaissance surveys help identify the most suitable approaches for the surveillance or monitoring phase of the response. Reconnaissance may occur from land, boat, or air. Reconnaissance surveys are not systematic and the goal is not to precisely assess Wildlife densities but rather to conduct informal surveys to rapidly assess the distribution of impacted, or potentially impacted, Wildlife and habitats for a prompt response.

Primary objectives of reconnaissance surveys are to:

- determine the geographic scale of the incident
- identify Wildlife and habitats that have already been impacted
- estimate relative abundance and distribution of Wildlife with potential to be impacted
- evaluate key habitats of importance to Wildlife with potential to be impacted
- inform development of appropriate response strategies
- inform mitigation activities to minimize further damage to Wildlife
- inform suitability of various survey methods (e.g., shore, boat, or aerial surveys) for subsequent surveillance or monitoring for the duration of the incident
- inform Incident Command on the status of known or potential impact on Wildlife

If impacts to Wildlife or their habitats are known or anticipated, an approach for systematically surveying and monitoring Wildlife should be developed and articulated in the WRP (see Section 4.5.4). Standardized protocols

have been developed for conducting systematic Migratory Bird surveys during an emergency response in Canada and are summarized in the *Guidance and Protocols for Wildlife Surveys for Emergency Response* (ECCC-CWS 2021a). The following stages of a Wildlife response (Sections 4.5.5 to 4.5.10) should be developed and implemented by trained and qualified personnel under the supervision of the Wildlife Branch Director in the Wildlife Branch and/or Wildlife Technical Specialist(s) in the Environmental Unit, depending on the structure of the response (see also Section 3.1).

4.5.4 Surveillance (Monitoring) Surveys (48 to 72 Hours and Onwards)

If impacts to Wildlife or their habitats are known or anticipated, Wildlife Branch will develop a systematic surveillance (monitoring) survey program with an appropriate temporal and geographic scope. If surveillance is required, the RP will secure qualified personnel to develop and execute the program and who will report to Wildlife Branch Director and/or Wildlife Technical Specialist(s). The methods and general approach(es) may be described in strategic WRPs and ECCC-CWS can advise on survey design and implementation for incident-specific WRPs, consistent with the *Guidance and Protocols for Wildlife Surveys for Emergency Response* (ECCC-CWS 2021a).

Primary objectives of surveillance surveys are to:

- monitor and refine the identification of Wildlife and habitats in the impacted area
- monitor and identify areas where Wildlife would be potentially at risk from further impacts
- monitor and refine estimates of abundance and distribution of Wildlife in the impacted area
- monitor and estimate Wildlife densities for damage assessment
- monitor and estimate number of dead and moribund Wildlife affected by incident
- identify areas where affected Wildlife can be collected
- inform other response activities such as habitat protection and Wildlife deterrence and dispersal
- inform Incident Command

Implemented throughout the response in accordance with the plan, data collected during surveillance provides critical response information and can also be used to document damage assessment following the incident.

4.5.5 Deterrence and Dispersal

For some incidents, deterrence and dispersal can be an effective early means to deter Wildlife from moving into or near the incident area and coming into contact with contaminants. Use of these techniques can also be helpful in excluding Wildlife from impacted areas throughout the response phase. Deterrent devices used to disperse Wildlife include both visual and auditory techniques and range in their effectiveness depending on the species, number of individuals, time of year, and habitat where the incident occurs.

If deterrence or dispersal is required or recommended, the RP will retain a qualified and, if applicable, authorized WRO to develop and execute a Wildlife deterrence and dispersal program. In the absence of an RP, the Lead Agency may develop and execute a Wildlife deterrence and dispersal program. Guidance to

conduct activities related to deterrence and dispersal are outlined in Lehoux and Bordage (2000), with revisions and updates in development by ECCC-CWS. Other guidance to consider in the development of deterrence and dispersal tactics for WRP include Gorenzel and Salmon (2008) and IPIECA (2017). Deterrence will be conducted only by appropriately trained personnel, and under direct guidance and supervision (as required) from the Wildlife Branch Director and/or Wildlife Technical Specialist(s). A WRP may also outline protocols for Wildlife Technical Specialists in the field to monitor and document the use and effectiveness of deterrence and dispersal techniques so that updates may be made to subsequent WRPs. ECCC-CWS may provide guidance on deterrence and dispersal strategies and may also supervise deterrence and dispersal techniques for habitats or species that are particularly sensitive to these types of response measures (e.g., in proximity to breeding colonies). Strategic WRPs may outline a set of applicable techniques for a particular industry or facility, whereas an incident-specific WRP may then specify actions to be put in place given the species observed and environmental conditions at the time (e.g., weather).

Deterrence activities should be determined on a species-specific and location-specific basis that considers the following factors:

- What is the location and/or the extent of the spill
- Where are alternative species-appropriate habitats that birds can be dispersed to
- What species are present or likely to be at risk
- What is the life history status of the birds present (e.g., roosting, staging, breeding)
- What qualified personnel and equipment is available with experience and knowledge for deterrent use and Wildlife dispersal
- What are the environmental conditions
- Can the deterrence and dispersal plan be enacted in a safe manner for response personnel and Wildlife

4.5.6 Exclusion, Pre-emptive Capture, and Relocation

WRPs often implement measures designed to pre-emptively limit the potential for Wildlife to become impacted during Pollution Incidents. Often, marine, aquatic and terrestrial Wildlife can be excluded from areas that are known or have potential to become impacted through a combination of mechanical and physical techniques designed to dissuade habitat use (e.g., visual or acoustical deterrents, fence or net installation, physical habitat modification). Pre-emptive Wildlife capture and relocation similarly seeks to collect Wildlife before they are impacted during a Wildlife Emergency. Planning for Wildlife collection requires considerations for capture, transport, holding, and release strategies. If pre-emptively captured Wildlife need to be contained for a period of time, a WRO authorized to carry out these activities must be identified to provide appropriate species-specific housing, nutritional support, and medical care (if necessary) for a potentially extended period. Guidance and protocols on pre-emptive capture and care for Wildlife during a Pollution Incident are described in the *Guidelines for the Capture, Transport, Cleaning, and Rehabilitation of Oiled Wildlife* (ECCC-CWS 2021b). Where appropriate, the WRP should describe plans for Wildlife collection and relocation activities.

4.5.7 Wildlife Capture, Transport, Rehabilitation, Release, and/or Euthanasia

This section of the WRP will be broken down into detailed phases, each of which are described briefly in Table 3. Planning for these activities may evolve over the course of the incident to include details on the number of monitoring and field staging facilities, capture procedures, rehabilitation facilities, as well as coordination of rehabilitation personnel.

The RP should retain a qualified and authorized WRO to develop and implement these phases of Wildlife response. These programs will adhere to the *Guidelines for the Capture, Transport, Cleaning, and Rehabilitation of Oiled Wildlife* (ECCC-CWS 2021b), *Guidelines for Establishing and Operating Treatment Facilities for Oiled Wildlife* (ECCC-CWS 2021c), as well as an area-specific or incident-specific Health and Safety Plan. Not all phases will be applicable or readily implemented during a response, but all may be considered as options when developing a strategic WRP, and later refined in an incident-specific WRP.

Table 3. Phases of Wildlife Capture, Transport, Rehabilitation, Release, and/or Euthanasia

Phase	Objectives
Pre-emptive Capture	• The capture of Wildlife that is at risk of being impacted • Transport of Wildlife to a holding facility
Capture	• The capture of impacted Wildlife • Transport of Wildlife to Field Stabilization Site or Oiled Wildlife Rehabilitation Centre
Field Stabilization	• Physical evaluation • Removal of gross contaminants • Thermoregulatory support • Fluid therapy and nutritional support • Address life threatening conditions • Euthanasia evaluations based on established criteria and best practices
Transportation	• Transport of contaminated animals from field or Field Stabilization Site to an Oiled Wildlife Rehabilitation Centre
Processing	• Evidence collection • Birds given individual, temporary band • Feather/fur sample • Photograph • Individual medical record
Intake	• Medical examination, triage, and treatment plan development • Critical care concerns addressed • Euthanasia evaluations based on established criteria and best practices
Triage	• Ongoing euthanasia and treatment plan evaluation based on medical health status
Euthanasia	• Euthanize Wildlife that are assessed by the WRO as not being good candidates for rehabilitation or survival
Stabilization	• Fluid, nutritional and medical stabilization of impacted animals • 48–72 hours period • Prepare animals for cleaning process
Cleaning	• Removal of all contaminants from an impacted animal by washing • Removal of the cleaning agent by rinsing • Drying cleaned and rinsed animal
Conditioning	• Restoring waterproofing and physical condition
Release	• Federal banding of individual animals • Consider additional tracking devices on some birds to monitor post-release • Release of cleaned, waterproof animals into a clean environment
Post-release	• Determining the effectiveness of rehabilitation of Wildlife impacted during a

Phase	Objectives
Monitoring	Pollution Incident • Monitoring the clean Wildlife's condition and activities • Following short-term and long-term survival and breeding status following rehabilitation

4.5.8 Wildlife Carcass Collection Procedures

Dead Wildlife should be removed from the environment to avoid attracting scavengers to the site and secondary contamination of Wildlife. The responsibility for the collection and documentation of dead Wildlife is primarily the responsibility of the Wildlife Branch and is completed under the supervision of authorized organizations (e.g., Wildlife Enforcement Directorate) and personnel with appropriate permits. Protocols for Wildlife collection, storage and documentation will be developed. Wildlife recovery personnel will retrieve dead Wildlife as part of daily activities. Dead Wildlife observed by the public can be reported to a 24-hour hotline (see Section 4.6.1). Members of the public must not pick up dead Wildlife but rather report them to the hotline. The Wildlife Branch will work with the Information Officer to develop appropriate messaging.

Carcass collection information will be used to:

- refine the geographic scale of the incident
- determine the cause of death if the source is unknown
- minimize damage and exposure to unaffected Wildlife by removing affected Wildlife from the environment
- minimize potential for harm or exposure by the public who participate in hunting activities or are supporting aspects of the response
- support appropriate response strategies for the treatment of affected Wildlife
- obtain a minimum number of casualties for damage assessment purposes
- obtain specimens/samples for legal enforcement activities or reporting requirements
- inform Incident Command

These procedures will also outline requirements necessary for proper chain of custody and storage of specimens. Chain of custody, and other record-keeping forms, will be attached as appendices to the WRP.

For additional guidance on collecting dead Wildlife during incidents, see the *Guidance and Protocols for Wildlife Surveys for Emergency Response* (ECCC-CWS 2021a).

4.5.9 Waste Management

Plans for decontamination and disposal of waste materials will be developed. Waste and secondary pollution should be minimized at each step of the Wildlife response. During the various phases of Wildlife cleaning (holding pen, carcass wrapping), waste will be created. Washing Wildlife will cause waste water (e.g., oil with detergent), which will need to be managed (through existing Waste Management Plans or by establishing additional plans as needed). Medical waste (e.g., syringes and gloves) should be considered. The response

plan will identify the legislation and the authorities responsible for waste management.

4.5.10 Demobilization

Regardless of the scale of a Wildlife Emergency, the WRP will describe any processes or considerations for demobilizing Wildlife response activities. As appropriate, demobilization will be scaled in accordance with the size of Wildlife response (e.g., decreased intake of contaminated Wildlife) and must be approved by the Incident Command.

This section of the plan will discuss, as applicable:

- processes for demobilizing equipment, facilities, and personnel
- processes for ongoing involvement in the ICP or post-response impact assessment and monitoring
- processes for chain of custody of data to support enforcement decisions
- processes by which the RP can continue to receive advice and support from ECCC-CWS

4.6 INFORMATION MANAGEMENT AND REPORTING

This section of a WRP should describe how information collected throughout the operational periods of the WRP would be managed, organized, vetted, and reported on. It should include:

- the type of data being collected (e.g., inventory, photos, videos, GIS)
- the personnel that will collect, organize, and vet the data
- the process for maintaining data records during and after the incident
- the process for integrating Wildlife data and activities into an incident information system (often referred to as the Common Operating Picture) within an ICP
- who data will be reported to, including the type and frequency of reports (e.g., daily email tabular summaries to the Environmental Unit Leader)
- how information is disseminated to agencies responsible for overseeing response

4.6.1 Wildlife Reporting From the Public (Wildlife Hotline)

Within the initial phases of an ICP being established where there are potential impacts to Wildlife, ECCC-CWS should ensure that reports of impacted Wildlife are directed to the Environmental Unit by way of a 24-hour hotline (or other reporting mechanism created for an incident). The contact information and instructions to the public for the 24-hour hotline should be outlined in the WRP. This may include the use of already existing environmental emergencies reporting systems, or the development of new hotlines as required for the scale of the incident. The Wildlife hotline may also serve as a platform to relay incident-specific safety information to the public (e.g., avoiding direct contact with contaminated Wildlife).

4.6.2 Media Relations

Media statements help to inform the public and raise awareness regarding Wildlife concerns and treatment, as well as public safety. The WRP should identify how Wildlife response activities will be reported to the public

through media statements, and who within the Environmental Unit or Wildlife Branch are responsible for informing them. Generally, Wildlife Branch Response Director and the incident's Information Officer will jointly develop these statements, with relevant input from Wildlife Technical Specialist(s) and/or Environmental Unit Lead. Where appropriate, public statements involving Wildlife will also be vetted and approved by the ECCC-CWS technical specialists, Media Relations, and the Regional Director.

4.6.3 Permits Reporting

Certain permits which may be issued prior to or during an incident may also have reporting requirements. Most ECCC-CWS issued permits require reporting of activities within 30 days of the permit expiry.

4.7 HEALTH AND SAFETY

Responder safety is of paramount importance when initiating Wildlife response activities. Activities recommended and implemented as part of a WRP will adhere to the incident-specific health and safety plan and be identified in consultation with the Incident Safety Officer. A brief overview of health and safety considerations and requirements will be described in the WRP, with specific mention of Wildlife responder personal protective equipment, zoonoses, and site safety and security (including areas off limits to Wildlife responders). This section will evolve over the course of the incident.

4.7.1 Personal Protective Equipment

For Wildlife management and response activities proposed in a WRP, responders will have appropriate training and equipment for safely operating in shoreline, marine, or aerial environments (depending on incident location and response activities) and for contaminated Wildlife handling within a rehabilitation setting. Responders will have appropriate equipment and clothing to operate for extended periods and that protect against environmental exposure or incident-specific conditions. Basic personal protective equipment recommended for Wildlife management and monitoring activities includes:

- eye protection (e.g., sunglasses, goggles, safety glasses, or face shield)
- oil-resistant rain gear or oil protective clothing (e.g., coated Tyvek, Saranex, etc.)
- water and oil resistant hand protection (e.g., neoprene or nitrile rubber)
- waterproof and oil resistant non-skid boots; steel-toes may be required under the incident-specific health and safety plan
- hearing protection (muff or ear plug type)
- personal flotation device when working on, near, or over water
- air monitoring device when appropriate
- specific gear appropriate for work where personnel are or may be submersed in water (wet suits, dry suits, survival gear)
- species-specific capture and protective gear (welding gloves, steel toed boots etc.)

The above list should not be considered comprehensive or applicable to all incidents. Additional incident-

specific and specialized equipment may be required for other aspects of Wildlife response and will be developed in consultation with WROs and the Safety Officer.

4.7.2 Zoonoses

Zoonoses are infectious diseases that may be transmitted between animals and humans under natural conditions. Personnel handling or coming into contact with Wildlife are at risk of zoonotic disease exposure. Veterinarians, technicians, response personnel, Wildlife handlers, and other animal care personnel who come into direct or indirect contact with Wildlife or any body fluids are at risk of contact with disease agents that may have zoonotic potential. Organisms that may cause or transmit zoonotic diseases include many classifications from viruses, fungi, and bacteria to internal and external parasites. The WRP will describe biosecurity practices that will be employed in all aspects of Wildlife response to reduce risk of disease transmission.

4.7.3 Biosecurity

Biosecurity is a set of preventative measures that reduce the risk of transmission of infectious diseases, pests, and invasive species. Where there is potential for response measures (both overall incident response and Wildlife-specific response) to contribute to issues involving biosecurity, the WRP will outline a suite of measures to control for these risks.

4.8 PERSONNEL REQUIREMENTS

There are many personnel that could be involved in various aspects of WRP implementation. Certain roles, responsibilities, or authorized activities require various types of training or technical expertise.

Where applicable, the WRP will specify which activities individuals with specific training or expertise can complete. This may include outlining training standards and/or experience that may be required for specific industries, areas, or facilities. Industries and Response Organizations should consult with regional ECCC-CWS staff for guidance on relevant standards.

4.9 FACILITY AND EQUIPMENT REQUIREMENTS

As part of planning and implementing Wildlife response measures outlined in a WRP, specific equipment and facility requirements may need to be developed. The level of detail of these requirements will vary by the scale of the incident and may be more appropriately described in documents appended to the WRP. Components of equipment and facility considerations may include:

- the type and amount of equipment required
- means of transportation to support Wildlife response elements
- requirements for utilities, waste management, and security
- the nature of equipment or facility requirements (e.g., temporary, mobile, permanent)
- sources of supplies if known

Additional information to support equipment and facility planning is outlined in the *Guidelines for Establishing*

and Operating Treatment Facilities for Oiled Wildlife (ECCC-CWS 2021c).

5 EVALUATING WILDLIFE RESPONSE

5.1 EVALUATION AND REVIEW

WRPs should be implemented and evaluated for their effectiveness within a context of adaptive management, where the results are used to refine future iterations (IPIECA 2014, Hebert and Schlieps 2018). Following a Wildlife Emergency, WRP developers and implementers should debrief on strengths and weaknesses of the plan, lessons learned, and gaps or areas for improvement (particularly for strategically developed activity- or area-based WRPs). Evaluation of the WRP should consider a) ease of implementation, b) efficiency of implementation, c) areas of practice that were or were not included, and d) whether the WRP supported the desired response outcome(s), business and legal requirements. ECCC-CWS may be consulted in this review and assist with recommendations for refinement.

5.2 EMERGENCY EXERCISES

Emergency exercises are important for testing the effectiveness of WRPs, identifying potential gaps, and ensuring activity-, area- or incident-specific considerations are planned for in advance of an actual incident occurring (IPIECA 2014). Exercises also allow for government and industry partners to work together and familiarize themselves with the personnel and resources available to support Wildlife response activities. Exercises can also be an excellent means to provide training, or to test certain response strategies in a controlled setting.

Emergency exercises can take place in several formats: notifications, tabletop, field drills, and participation in the Environmental Unit or Wildlife Branch of an ICP. Each exercise will be planned with specific Wildlife response focused objectives in mind, and may center on testing particular aspects of the WRP. WRPs should be updated and revised to incorporate identified gaps and lessons learned into the plans.

6 CUSTODIAN

The custodian for the *Guidelines for Wildlife Response Plans* and any amendments thereto is the:
Director General, Regional Operations Directorate
ECCC-CWS
ECCC

The approval of future updates is vested to the Director General, Regional Operations Directorate, ECCC-CWS.

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APPENDIX A: EXAMPLE TEMPLATE OF A WILDLIFE RESPONSE PLAN

APPENDIX B: EXAMPLE CHECKLIST OF WILDLIFE EMERGENCY ACTIVITIES

Table B.1. Example Checklist of Activities to Undertake within the initial 24, 48, and 72 hours of a Wildlife Emergency (adapted from Hebert and Schlieps 2018)

Timeline	Responsibility	Action
0-24 Hours	Incident Command/ Unified Command	• Ensure appropriate notifications to relevant government departments and branches • Activate an authorized WRO
	Environmental Unit	• Compile existing information on Wildlife • Complete a Resources-at-risk form (i.e., ICS 232) • Initiate Initial Wildlife Impact Assessment • Initiate deterrence and dispersal strategy
24-48 Hours	Incident Command/ Unified Command	• Establish a Wildlife Branch under the Operations Section of the ICP • Designate a Wildlife Branch Director
	Environmental Unit and/or Wildlife Branch	• Mobilize the WRO • Continue Initial Wildlife Impact Assessment • Conduct Reconnaissance Survey • Refine deterrence and dispersal strategy • Develop Wildlife Branch organization chart • Establish a Wildlife hotline • Initiate incident-specific WRP • Initiate requests for resources (personnel, supplies, facilities, equipment) • Identify Wildlife response health and safety requirements • Ensure ongoing notifications and updates to relevant government department contacts • Identify subject matter experts that might support the ICP
48-72 Hours	Wildlife Branch and/or WRO	• Coordinate with the WRO to develop or modify an existing WRP, and a process for WRP implementation • Develop plan for ongoing monitoring • Conduct surveillance and monitoring surveys • Determine locations for field stabilization • Establish field staging areas • Refine incident-specific WRP • Develop internal and external communications with the Information Officer and departmental communications personnel • Ensure ongoing notifications and updates to departmental contacts

APPENDIX F

Appendix F – NATECH Environmental Risk Assessment Report (2014)

Environmental Risk Assessment for the Town of Lameque Wastewater Treatment Plant in accordance with the Canada-Wide Strategy for Municipal Wastewater Effluent

Submitted to: **Roy Consultants**
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Tracadie-Sheila, N.B.
E1X 1E2

Prepared by: **NATECH Environmental Services Inc.**
2492 Route 640
Hanwell, N.B.
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Date: **January 12, 2012**

NATECH

TABLE OF CONTENTS

1. INTRODUCTION . . . . . - 1 -

2. SUBSTANCES OF POTENTIAL CONCERN . . . . . - 4 -

2.1 Facility size categorization . . . . . - 4 -

2.2 Determination of the list of substances of potential concern . . . . . - 6 -

2.3 Additional substances associated with industrial discharges . . . . . - 6 -

3. INITIAL EFFLUENT CHARACTERIZATION PROGRAM - METHODOLOGY . . . - 7 -

4. RECEIVING WATER BODY CHARACTERIZATION . . . . . - 8 -

4.1 Receiving water physical characteristics . . . . . - 8 -

4.2 Resource usage downstream . . . . . - 13 -

4.3 Background water quality . . . . . - 13 -

4.4 Field reconnaissance . . . . . - 14 -

5. INITIAL EFFLUENT CHARACTERIZATION PROGRAM - RESULTS . . . . . - 18 -

6. DETERMINATION OF EFFLUENT DISCHARGE OBJECTIVES (EDOs) . . . . . - 22 -

6.1 Determination of Environmental Quality Objectives (EQOs) . . . . . - 22 -

6.2 Determination of the mixing zone and assessment of dilution . . . . . - 25 -

6.2.1 Assessment of average and worst-case scenarios . . . . . - 25 -

6.2.2 Mixing modeling . . . . . - 25 -

6.2.3 Allocated mixing zones . . . . . - 26 -

6.3 Determination of EDOs . . . . . - 26 -

7. SELECTION OF SUBSTANCES FOR COMPLIANCE MONITORING . . . . . - 28 -

7.1 Selection of substances . . . . . - 28 -

7.2 Monitoring frequencies . . . . . - 28 -

8. CONCLUSIONS AND RECOMMENDATIONS . . . . . - 30 -

9. REFERENCES . . . . . - 32 -

10. GLOSSARY . . . . . - 33 -

APPENDIX A - Photographs . . . . . - 37 -

1. INTRODUCTION

The *Canada-wide Strategy for the Management of Municipal Wastewater Effluent* was released by the Canadian Council of Ministers of the Environment (CCME) in 2009 to improve the protection of human health and the environment, and to provide better clarity in the way municipal wastewater effluent is managed across the country. The strategy is based on preparing a site-specific Environmental Risk Assessment (ERA) for each municipal wastewater treatment plant in the country. The Province of New Brunswick is a signatory to the strategy and has requested that the Town of Lameque starts the one-year water quality monitoring program in 2010 for its wastewater treatment plant (WWTP). NATECH Environmental Services Inc. was asked by the Roy Consultants to carry out the ERA.

The objective of this ERA is to provide Effluent Discharge Objectives for the WWTP based on the assimilative capacity of the local receiving environment (estuary of Jean-Marie Brook). Figure 1-1 shows the location of the WWTP. The plant consists of an aerated lagoon. The effluent is disinfected by chlorination from May to October. De-chlorination of the effluent is not provided. The discharge enters an embayment that is being flushed twice per day by the tides. The embayment is part of the Acadian Ecological Park.

ENVIRONMENTAL RISK ASSESSMENT

LAMEQUE WWTP

SITE LOCATION

NATECH Environmental Services Inc.
109 Patterson Cross Rd., Harvey Station, N.B.
Ph: (506) 366-1080 Fax: (506) 366-1090

Date: / Date:	Project No.: / Nº du projet
11/02/11	RC-528-09
Scale: / Echelle:	**Sheet No.: / Nº de la feuille:**
AS SHOWN	FIGURE 1-1

The methodology used to carry out this investigation is in accordance with the ERA framework outlined in the technical supplements of the CCME Strategy:

- ❑ A one year characterisation of the effluent is carried out by the municipality, including flow monitoring, sampling for chemical parameters, and toxicity tests. The number of parameters, and the frequency of sampling depend on the size of the municipality.

- ❑ Environmental Quality Objectives (EQOs) are determined. An EQO is the concentration of a substance in the environment considered safe for aquatic life and for human uses.

- ❑ An allocated mixing zone (MZ) in the receiving water body is determined: the MZ is the extent of the water body around the outfall where the effluent is initially diluted, and where contaminant concentrations greater than the EQOs are authorised by the regulators.

- ❑ The target Effluent Discharge Objectives (EDOs) are determined. The EDOs are maximum acceptable concentrations in the effluent from the WWTP. The EDOs are calculated based on worst-case conditions to ensure that the EQOs are met at all times at the edge of the mixing zones.

- ❑ Compliance monitoring requirements are determined, specifying what parameters should be regularly tested, and at what frequency, after the one-year characterisation has been completed.

The process of determining EDOs involves a combination of documentation review, consultation with stake holders, field investigations and mathematical plume dispersion modeling.

2. SUBSTANCES OF POTENTIAL CONCERN

2.1 Facility size categorization

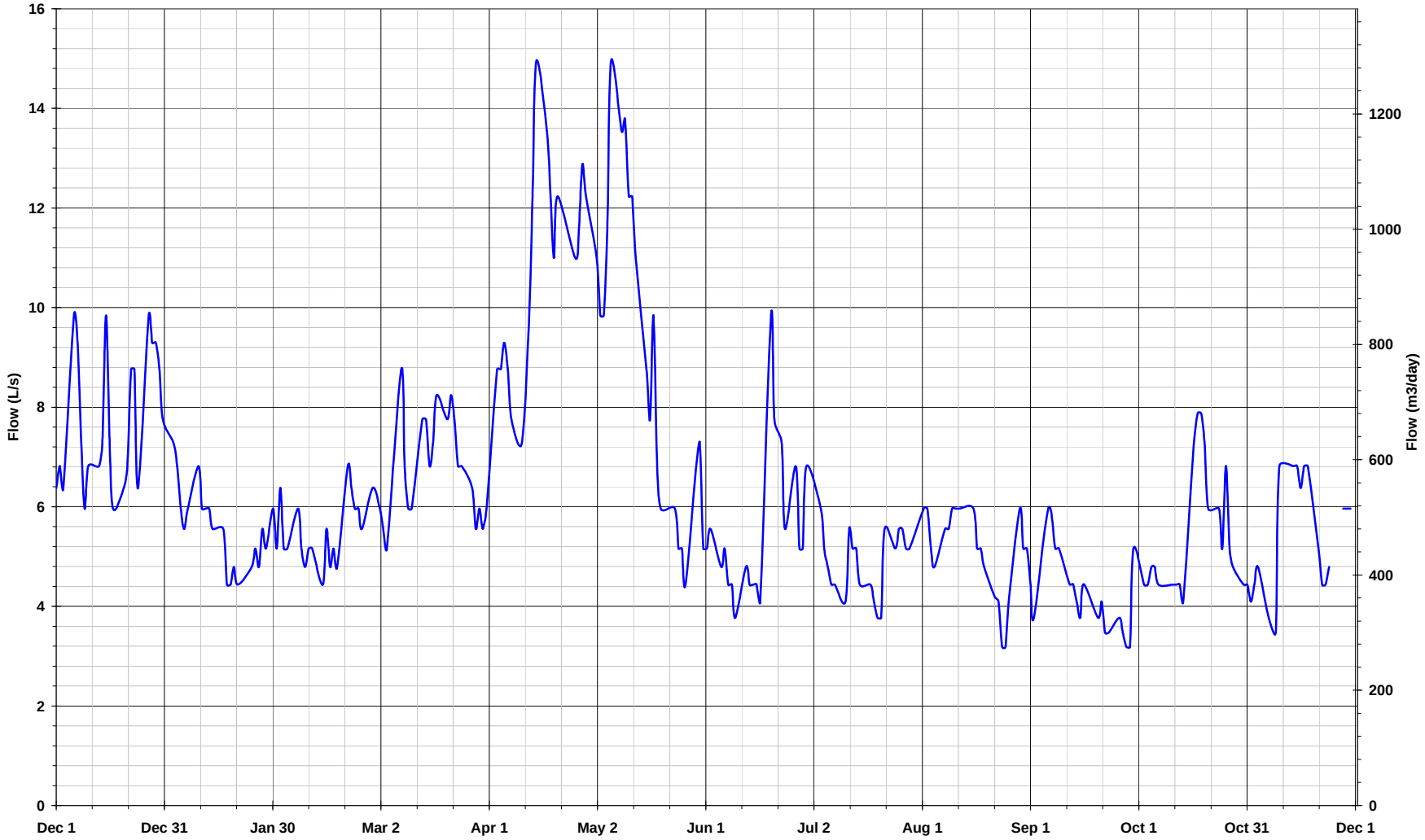
According to the definitions in the CCME Strategy, the Lameque WWTP is characterized as a "small" category facility (wastewater flows of 500 to 2,500 m^3/day).

- Theoretically, for 560 residences connected to the WWTP, the annual average daily wastewater flow would be 785 m^3/day (9.1 L/s) (assuming 1.4 m^3/day/dwelling).

- The measured annual average daily wastewater flow through the plant was 546 m^3/day (6.3 L/s) from December 2010 to November 2011 (see Figure 2-1). The summer low flow during that period was approximately 300 m^3/day (3.5 L/s), and the peak flow was 1,290 m^3/day (15 L/s), in April and May.

According to the local municipal engineer, there are no industries that discharge process water into the municipal sewer system to a level that would exceed 5% of the dry weather sewage flow.

Lameque WWTP - Measured Effluent Flows in 2010-2011



Environmental Risk Assessment
Lameque WWTP
Measured Effluent Flows

NATECH Environmental Services Inc.
109 Patterson Cross Road,
Harvey Station, NB, CANADA,
E6K 1L9

SCALE: Not to scale

DATE: 2011/12/20

FILE: RC-528-09

FIGURE: 2-1

2.2 Determination of the list of substances of potential concern

The substances of potential concern for a small-size facility such as the Lameque WWTP are, based on CCME (2009):

- Carbonaceous biological oxygen demand ($CBOD_5$)
- Total suspended solids (TSS)
- Total residual chlorine (TRC)
- Total ammonia-nitrogen (NH_3-N total)
- Total Kjeldahl nitrogen (TKN)
- Total phosphorus (TP)
- pH, Temperature
- Pathogens (E. Coli., faecal coliforms)

2.3 Additional substances associated with industrial discharges

No additional substances from industrial discharges were identified.

3. INITIAL EFFLUENT CHARACTERIZATION PROGRAM - METHODOLOGY

The CCME Strategy stipulates that the parameters in Table 3-1 have to be measured during a year.

Table 3.1: Monitoring requirements for a period of one year, for the Lameque WWTP

Parameter	Sampling frequency	Procedure	Anticipated schedule
Flow	Daily	Measured by operator	Dec. 2010 to Nov. 2011
TRC (when chlorine is used)			
$CBOD_5$ and BOD_5 (1)	Monthly	Sampled by operator, analysed by lab (ENV)	Dec. 2010 to Nov. 2011
TSS			
NH_3-N Total (NH_3+NH_4^+)			
TKN			
TP			
E. Coli			
Faecal coliforms (2)			
pH		Measured by operator	
Temperature			
Acute toxicity (Rainbow trout)	Quarterly	Sampled by operator, analysed by lab.	Jan. 2011 April 2011 July 2011 Oct. 2011
Acute toxicity (Daphnia magna)			
Chronic Toxicity Ceriodaphnia dubia)			
Chronic Toxicity (Fathead minnow) optional			

(1) BOD_5 only three times to allow to establish a correlation with $CBOD_5$

(2) Added to allow an assessment of the impact on shellfish

4. RECEIVING WATER BODY CHARACTERIZATION

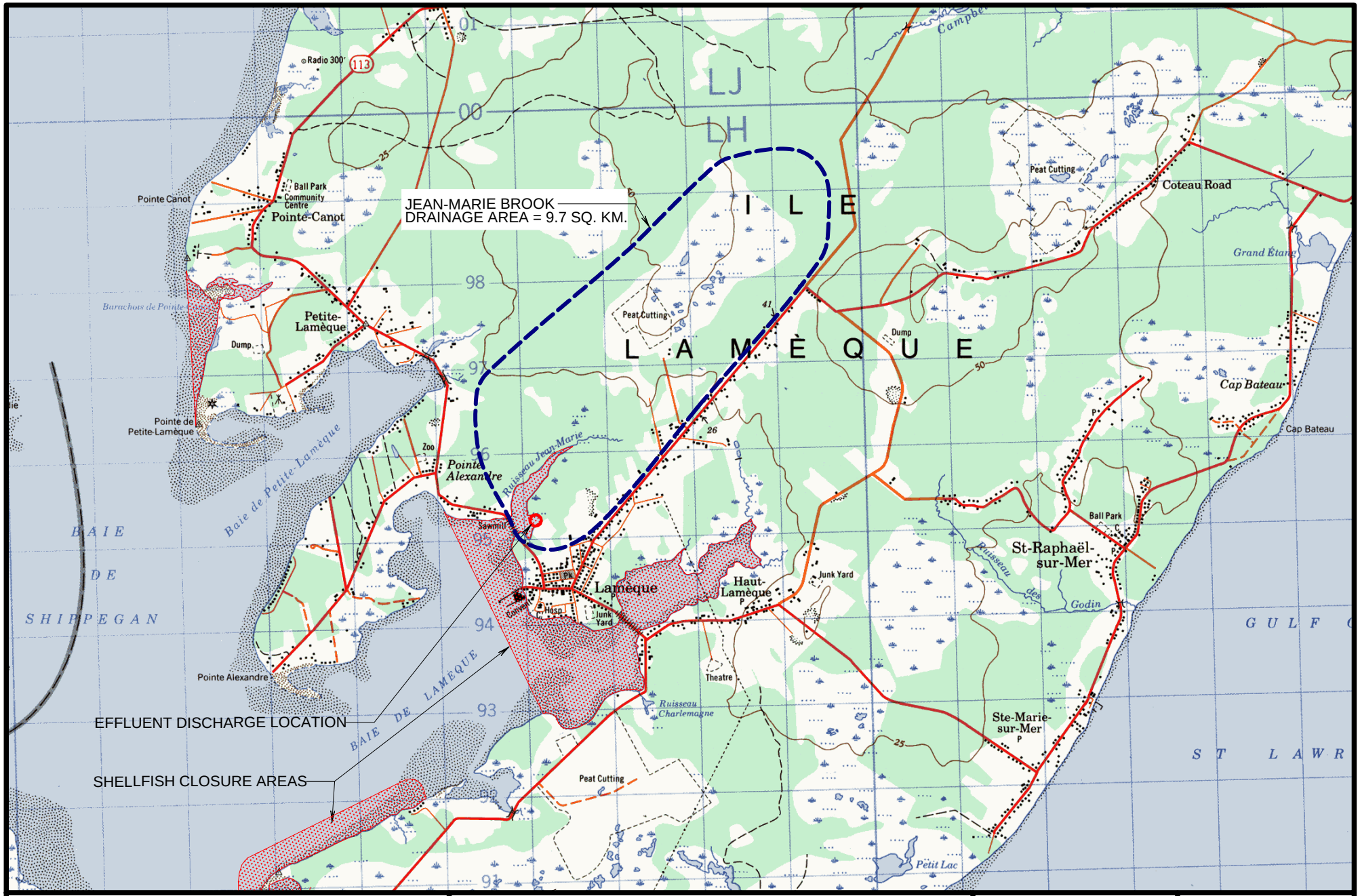
4.1 Receiving water physical characteristics

The outfall is located within a small embayment that is part of the Ecological Park. Jean-Marie Brook discharges at the head of the water body, and the water level within the impoundment is influenced by the tides. The water flows between the impoundment and Lameque Bay via three concrete culverts. Figures 4-1 and 4-2 show a topographic map and a hydrographic chart of the area.

Table 4.1 summarises the hydraulic characteristics of Jean-Marie Brook. The flows were prorated based on the closest available gauging station located on the Caraquet River. The average flow is calculated to be 204 L/s, and the 7 day-10 year (7DQ10) low flow 28 L/s.

Tidal water level variation typical of the area (at Shippagan Gully) are summarised in Table 4.2. Predicted tidal water levels for Shippagan obtained from the Canadian Hydrographic Service (2010) are plotted on Figure 4-3 for July and August 2010. Over that period, the levels varied between 0.1 m and 2.1 m above chart datum*, with an average of 0.9 m. These variations are slightly greater than the tidal characteristics indicated on the chart for Shippagan Gully.

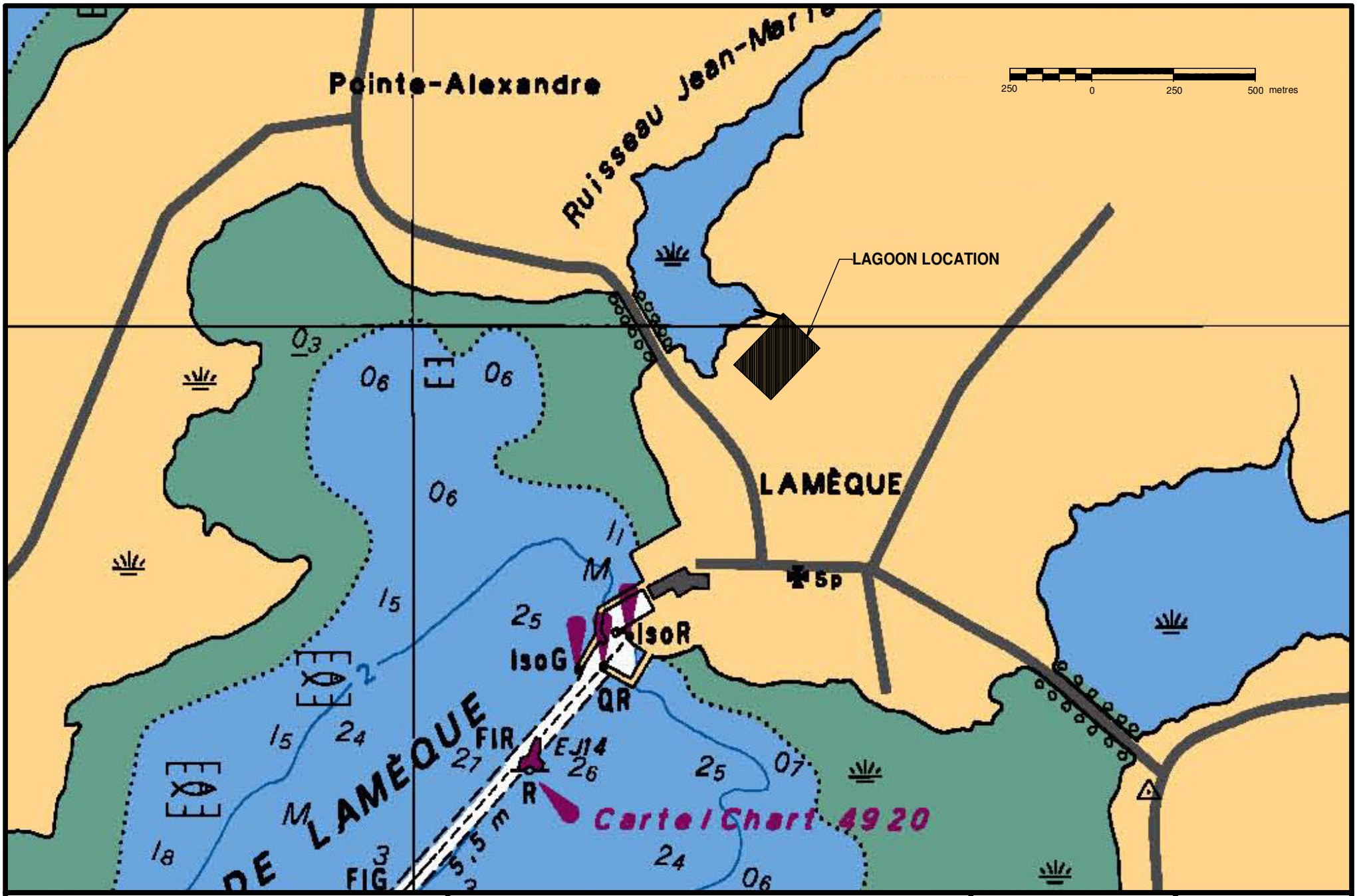
*The chart datum is the lowest low water level



ENVIRONMENTAL RISK ASSESSMENT
LAMEQUE WWTP
SHELLFISH HARVESTING CLOSURE AREAS
AND JEAN-MARIE BROOK DRAINAGE AREA

NATECH
Environmental Services Inc.
109 Patterson Cross Rd., Harvey Station, N.B.
Ph: (506) 366-1080 Fax: (506) 366-1090

Date: / Date:	Project No.: / Nº du projet
11/02/11	RC-528-09
Scale: / Echelle:	**Sheet No.: / Nº de la feuille:**
1 KM GRID	FIGURE 4-1



ENVIRONMENTAL RISK ASSESSMENT
LAMEQUE WWTP
HYDROGRAPHIC CHART

NATECH
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Ph: (506) 366-1080 Fax: (506) 366-1090

Date: 11/02/11

Project No.: RC-528-09

Scale: DEPTHS IN METRES BELOW CHART DATUM

Sheet No.: FIGURE 4-2

Table 4-1. Characteristics of local watercourses

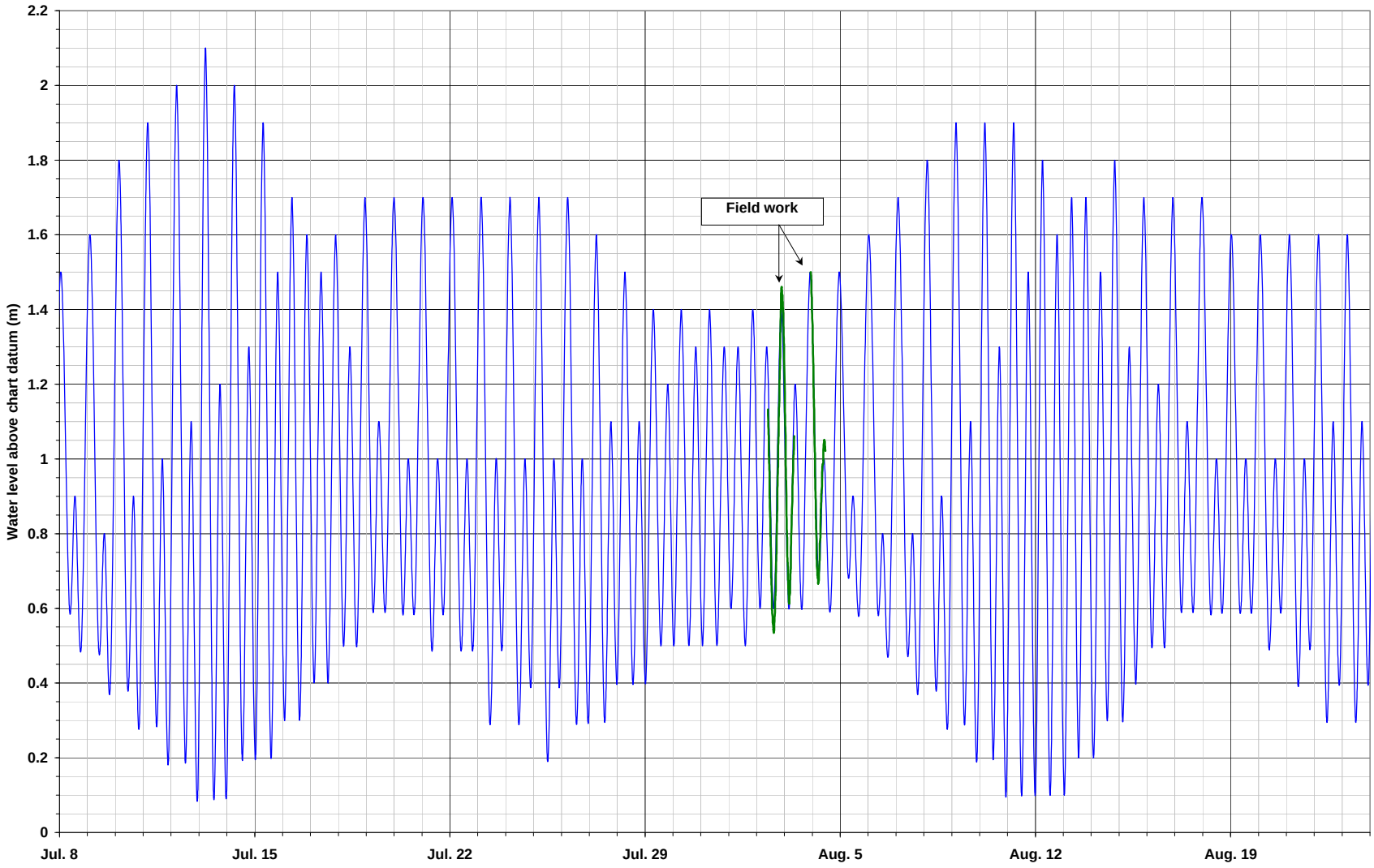
Parameter	Caraquet River at Burnsville (Station 01BL002)	Jean-Marie Brook at mouth
Drainage area (km^2)	173	9.7
Flow regime	unregulated	unregulated
Average annual flow (L/s)	3,640	204
1:10 year - 7 day (7DQ10) low flow (L/s)	494 (1)	28

(1) From Caissie et al. (2011)

Table 4.2. Characteristics of tidal water levels at Shippagan Gully near Lameque (from Nautical Chart # 4486), relative to chart datum (CD).

Parameter	Mean tides	Large tides
Low water level (m)	0.2	0.1
High water level (m)	1.3	1.7
Range (m)	1.1	1.6

Lameque - Predicted tidal water level changes in the summer of 2010



Environmental Risk Assessment **Lameque WWTP** **Tidal water levels**	**NATECH Environmental Services Inc.** 109 Patterson Cross Road, Harvey Station, NB, CANADA, E6K 1L9	**SCALE:** Not to scale	**DATE:** 2011/12/20
		FILE: RC-528-09	**FIGURE:** 4-3

4.2 Resource usage downstream

The water within the impoundment does not appear to be used for boating or swimming, however the receiving water forms part of the Acadian Ecological Park. The potential for bodily contact and recreational fishing cannot be excluded. The surrounding area could be used for shellfish harvesting. However, large sections of Lameque Bay are closed to shellfish harvesting due to high bacteria counts in the water (see Figure 4-1). To assess the potential environmental protection components, the Canadian Water Quality Guidelines for the Protection of Aquatic Life (CCME, 2007), and the Canadian Recreational Water Quality Guidelines and Aesthetics (CCME, 1999) were consulted.

4.3 Background water quality

No background water quality data were available for Jean-Marie Brook upstream of the lagoon discharge.

A board walk crosses the impoundment and water quality degradation is clearly visible from there. A thick mat of algae is deposited near the mouth of the discharge ditch. Also, the presence of a wind-powered aerator in the impoundment indicates that environmental concerns resulted in action being taken by providing additional aeration to the receiving water (see photographs in Appendix A).

4.4 Field reconnaissance

The following conditions were observed during field work carried out on August 2, 2010:

- The recorded tidal water level amplitude was 0.8 m during the mixing zone measurements (see Figure 4-4). The water level variations were similar on both sides of the causeway that crosses the Jean-Marie Brook estuary. The freshwater flow in Jean-Marie Brook was estimated to be 36 L/s during that time based on proration from the gauging station on the Caraquet River.

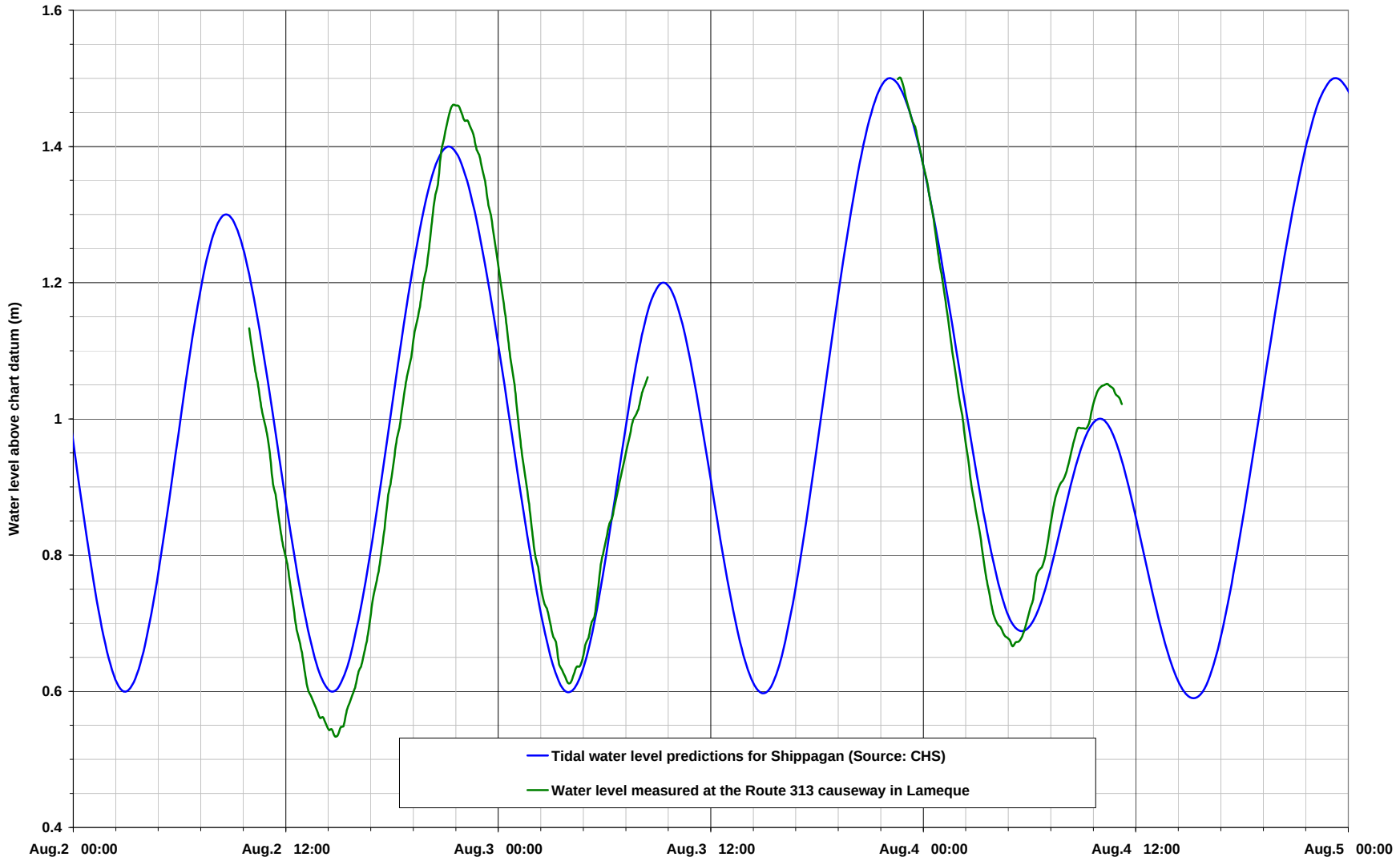
- The effluent flow at 9:20 was approximately 5 L/s (which corresponds to 430 m^3/day). A dye tracer (Rhodamine WT) was released into the effluent flow at 22:30 at high tide. A total of 1 L of dye was released. Fluorometers were suspended under the board walk and next to the road culvert in the Route 313 causeway. The resulting dye measurements in Figure 4-5 indicate that the effluent pools near the outfall during a rising tide, and then is flushed out into Lameque Bay during the falling tide (approximately 2.5 hours after high tide). There was no sign of dye returning during the following rising tide.

- Water quality measurements were taken in the effluent stream, as well as upstream and downstream of the outfall on August 2, 2010. Also, samples were collected at the same locations and sent to an independent laboratory. The results are detailed in Table 4.3.

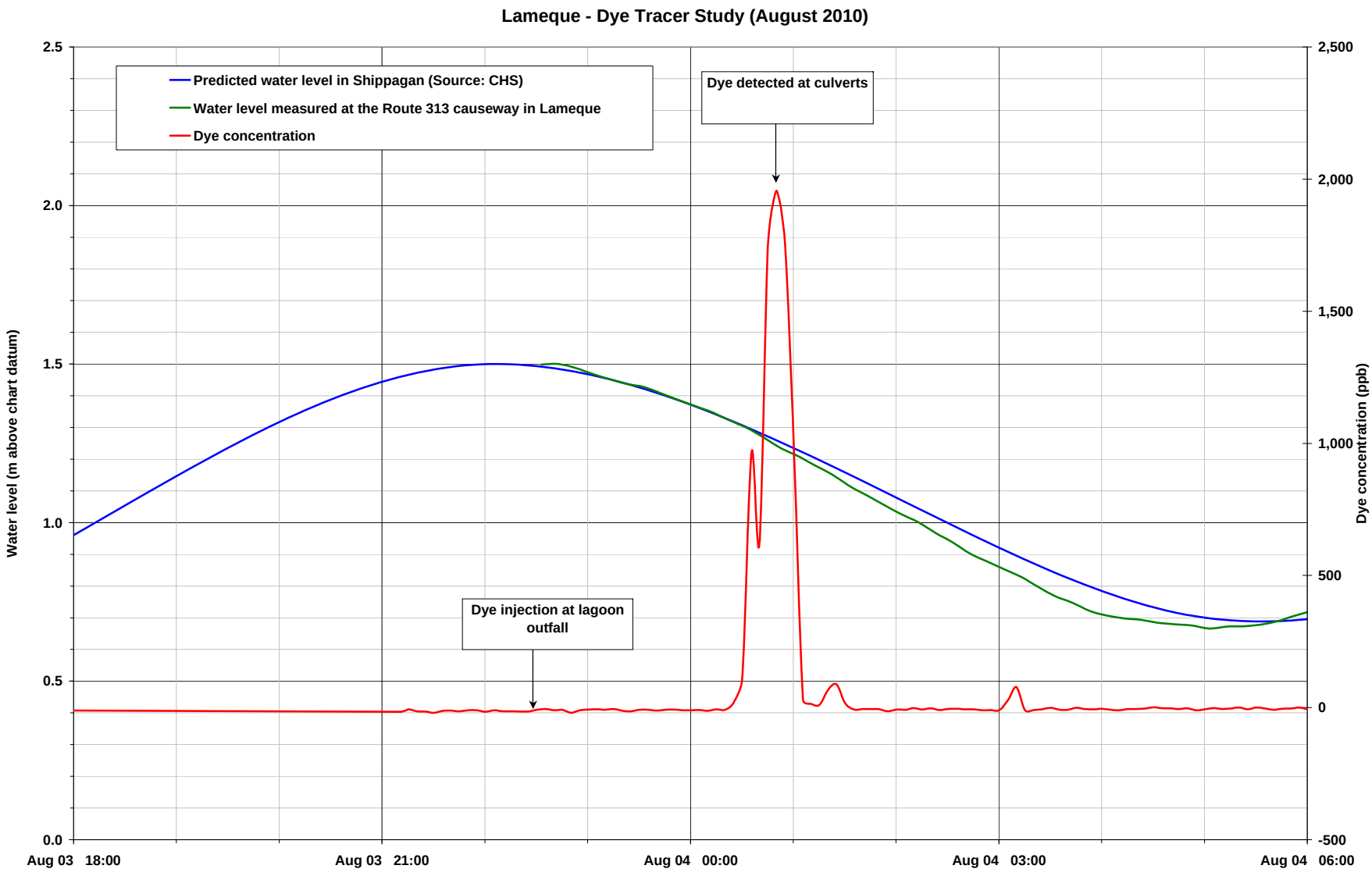
- The growth of sea lettuce near the outlet indicates eutrophic conditions. The area appears to be limited to 500 m^2 and is visible from the board walk. It cannot be precluded that future effluent discharge will result in an expansion of the impacted zone. Anoxic conditions may then lead to odours in the summer.

- Photographs of the discharge are shown in Appendix A.

Lameque - Measured tidal water level changes during the field work in 2010



Environmental Risk Assessment **Lameque WWTP** **Tidal water levels**	**NATECH Environmental Services Inc.** 109 Patterson Cross Road, Harvey Station, NB, CANADA, E6K 1L9	**SCALE:** Not to scale	**DATE:** 2011/12/20
		FILE: RC-528-09	**FIGURE:** 4-4



Environmental Risk Assessment **Lameque WWTP** **Dye Tracer Study**	**NATECH Environmental Services Inc.** 109 Patterson Cross Road, Harvey Station, NB, CANADA, E6K 1L9	**SCALE:** Not to scale	**DATE:** 2011/12/23
		FILE: RC-528-09	**FIGURE:** 4-5

Table 4.3: Water quality of the receiving water body near the outfall, and the effluent, on August 2, 2010.

Parameter	Unit	Upstream	Effluent	Downstream
Field measurements				
DO	mg/L	10.0	6.9	15.4
pH	units	8.6	7.9	9.6
Temperature	℃	22.5	23.0	25.0
TDS	mg/L	30.9	1.1	31.1
Conductivity	mS/cm	47.6	1.7	47.9
Salinity	ppt	31.0	0.8	31.1
Lab. analyses				
$CBOD_5$	mg/L	<5	6	<5
TSS	mg/L	13	19	4
NH_3-N Total (NH_3+NH_4^+)	mg/L	<0.07	21.7	0.18
TKN	mg/L	<5	25	<5
TP	mg/L	0.08	5.11	0.22
pH	units	8.2	7.8	9.2
E. Coli	MPN/100 mL	<2	120	<2

5. INITIAL EFFLUENT CHARACTERIZATION PROGRAM - RESULTS

Effluent quality data obtained from the one-year monitoring program are summarised in Table 5.1. Figure 5-1 details total residual chlorine measurements, and Figure 5-2 illustrates pH, temperature, and dissolved oxygen variations.

The following observations were made:

- The $CBOD_5$ was elevated from December to April, but remained below the National Performance Standard of less than 25 mg/L from May to October. Also, dissolved oxygen in the effluent was above 5 mg/L from May to October.

- TSS were usually below the National Performance Standard of less than 25 mg/L, except for May.

- Total residual chlorine varied between 0 and 0.35 with an average of 0.12 mg/L, which is significantly above the National Performance Standard of less than 0.02 mg/L.

- Ammonia, TKN and TP were typical of lagoon effluent.

- The effluent was found to be acutely and chronically toxic twice, in April and October.

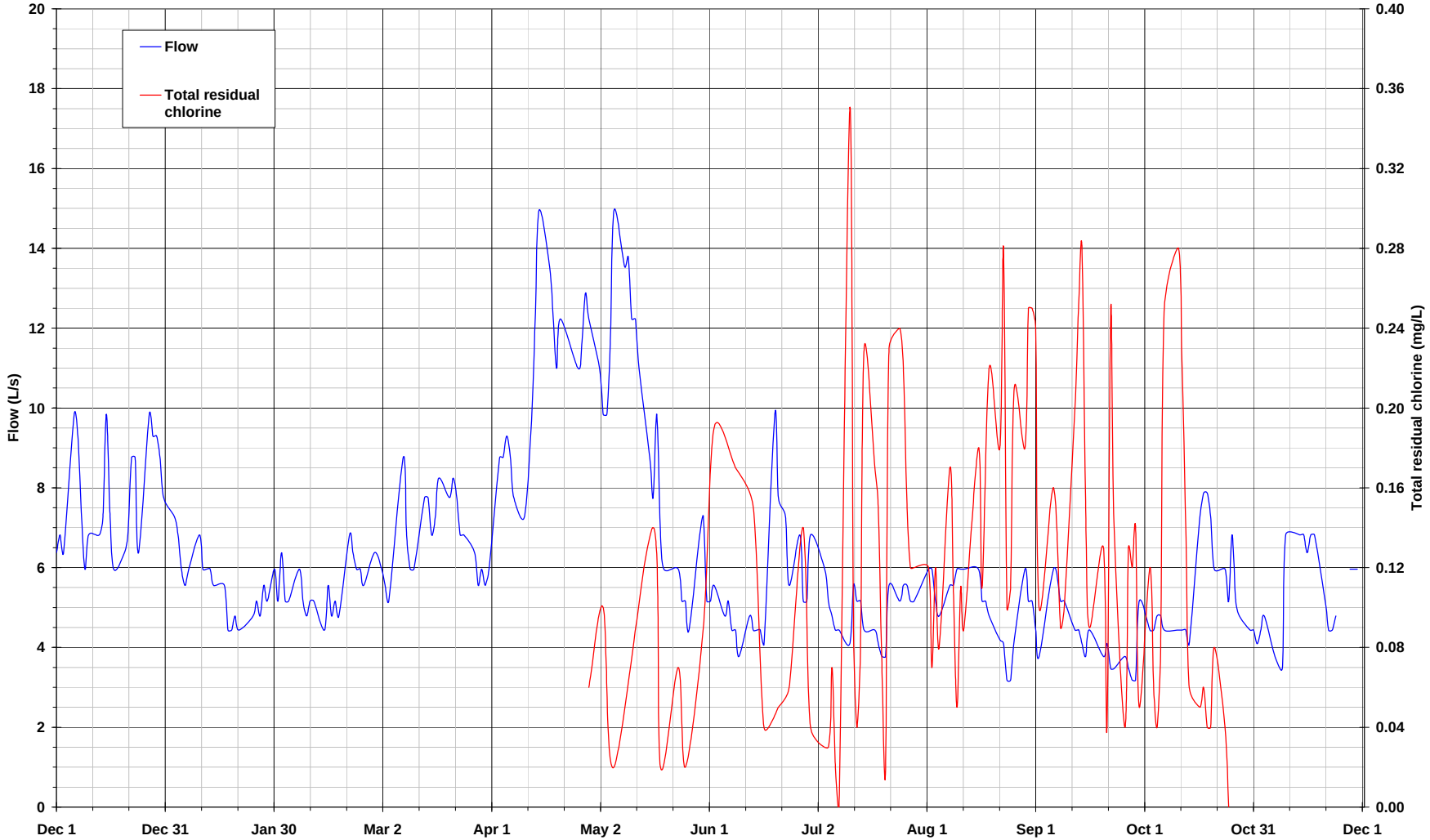
Table 5.1: Effluent characteristics from December 2010 to November 2011

Parameter	Unit	Min	Max	Average	Number of data
Plant data					
pH*	units	6.4	7.6	**7.1**	8
Temperature*	℃	3.6	22.5	**14.2**	8
Laboratory analyses					
$CBOD_5$	mg/L	2	81	**21**	12
TSS	mg/L	4	37	**14**	12
NH_3-N Total (NH_3+NH_4^+)	mg/L	<0.07	28	**19**	12
TKN	mg/L	12	31	**23**	12
TP	mg/L	2.5	4.2	**3.3**	12
E. Coli	MPN/ 100 mL	24	>241,920	**-**	12
E. Coli (June to September only)	MPN/ 100 mL	24	921	**349**	4
		January	**April**	**July**	**October**
Acute toxicity (rainbow trout)	TU	<1	**1**	<1	**1.6**
Acute toxicity (daphnia magna)	TU	<1	<1	<1	<1
Chronic toxicity (ceriodaphnia dubia)	TU	<1	**1.7**	<1	**1.4**

* Data from April to November 2011

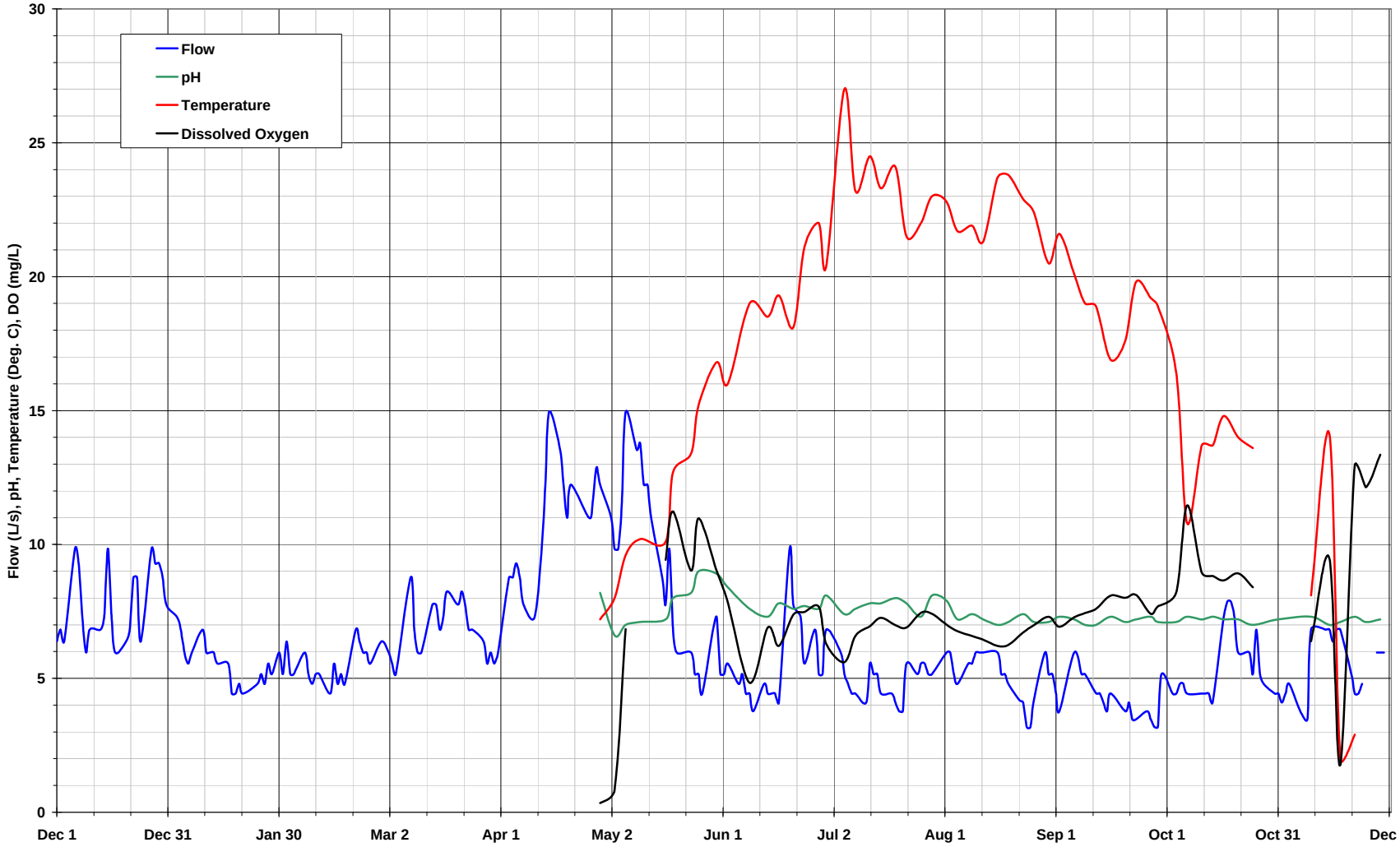
TU = Toxicity units

Lameque WWTP - Effluent characteristics from December 2010 to November 2011



Environmental Risk Assessment **Lameque WWTP** **Measured effluent quality**	**NATECH Environmental Services Inc.** 109 Patterson Cross Road, Harvey Station, NB, CANADA, E6K 1L9	**SCALE:** Not to scale	**DATE:** 2011/12/23
		FILE: RC-528-09	**FIGURE:** 5-1

Lameque WWTP - Effluent characteristics from December 2010 to November 2011



Environmental Risk Assessment **Lameque WWTP** **Measured effluent quality**	**NATECH Environmental Services Inc.** 109 Patterson Cross Road, Harvey Station, NB, CANADA, E6K 1L9	**SCALE:** Not to scale	**DATE:** 2011/12/23
		FILE: RC-528-09	**FIGURE:** 5-2

6. DETERMINATION OF EFFLUENT DISCHARGE OBJECTIVES (EDOs)

6.1 Determination of Environmental Quality Objectives (EQOs)

Guideline values for relevant water quality parameters were obtained from the Canadian Water Quality Guidelines for the Protection of Aquatic Life (CCME, 2007), and the Canadian Recreational Water Quality Guidelines and Aesthetics (CCME, 1999). The values are summarised in Table 6.1.

Table 6.1 Environmental Quality Objectives (EQOs) for the Lameque impoundment

Parameter	Unit	EQOs based on Canadian Water Quality Guidelines
DO (related to $CBOD_5$)	mg/L	Min. dissolved oxygen (DO) concentration in water body: > 8.0 (1)
TSS	mg/L	<5 to <25 above background (2)
TRC	mg/L	<0.0005 chlorine-produced oxidants, which are essentially the reactive chlorine species formed under marine conditions (3)
NH_3-N Total	mg/L	<1.1 (4)
TKN	mg/L	<0.55 (5)
TP	mg/L	<0.055 (6)
pH		7.0 to 8.7 in marine water
E. Coli	MPN/ 100 mL	<200 (7)
Faecal coliforms	CFU/ 100 mL	<14 (8)
Acute toxicity	TU	<1 at the end of the pipe
Chronic toxicity	TU	<1 at the edge of the mixing zone

TU = Toxicity unit

(1) **Dissolved oxygen:**

Marine/estuarine waters guideline: "The recommended minimum concentration of DO in marine and estuarine waters is 8.0 mg/L. Depression of DO below the recommended value should only occur as a result of natural processes. When ambient DO concentrations are greater than 8.0 mg/L, human activities should not cause DO levels to decrease by more than 10% of the natural concentration expected in the receiving environment at that time." (CCME, 2007)

(2) **Suspended sediments:**

"clear flow : Maximum increase of 25 mg·L-1 from background levels for any short-term exposure (e.g., 24-h period). Maximum average increase of 5 mg·L-1 from background levels for longer term exposures (e.g., inputs lasting between 24 h and 30 d).

high flow: Maximum increase of 25 mg·L-1 from background levels at any time when background levels are between 25 and 250 mg·L-1. Should not increase more than 10% of background levels when background is >250 mg·L-1. " From Canadian Water Quality Guidelines for the Protection of Aquatic Life (CCME, 2007)

(3) **Chlorine:**

"It should be noted that the lowest reliable limit of detection reported is 0.01 mg/L, a value that is higher than the Canadian water quality guideline for the protection of aquatic life. Therefore, any detection of reactive chlorine species in aquatic systems is an indication that aquatic life is potentially being negatively affected" (CCME, 2007)

(4) **Ammonia:**

Marine/estuarine waters: There is no recommended guideline for marine aquatic life from CCME.

The following values for total NH_3-N were determined based on values used in BC (Nordin, 2001), assuming a salinity of 30 ppt, a sea temperature of 20 deg. C, and a pH of 8.0:

<1.1 mg/L average 5 to 30-day concentration

<7.3 mg/L maximum concentration

(5) **Total Kjeldahl Nitrogen:**

A maximum concentration of 0.55 mg/L for nitrogen was chosen based on the mean guidelines proposed by Bricker et al (1999) for a medium degree of over-enrichment in estuarine waters (CCME, 2007).

(6) **Total Phosphorus:**

A maximum concentration of 0.055 mg/L for phosphorus was chosen based on the mean guidelines proposed by Bricker et al (1999) for a medium degree of over-enrichment in estuarine waters (CCME, 2007).

(7) **E. coli:** A maximum concentration of 200 MPN/100 mL (from Recreational Water Quality Guidelines and Aesthetics (CCME, 1999))

(8) **Faecal coliforms:**

"Shellfish growing waters are considered polluted when the faecal coliform densities exceed a median of 14/100 mL (based on 15 data points). By comparison the standard for drinking water is 0 FC/100 mL while swimming water standard is 200 FC/100mL. The stringent standard for shellfish growing water is necessary due to the filter feeding mechanism of bivalve shellfish which can concentrate bacteria" (Source: DFO website http://www.pac.dfo-mpo.gc.ca/fm-gp/contamination/index-eng.htm).

6.2 Determination of the mixing zone and assessment of dilution

6.2.1 Assessment of average and worst-case scenarios

The following conditions were used to assess the **average-case scenario**:

- ❑ Average annual flow of 204 L/s in Jean-Marie Brook.
- ❑ Average effluent discharge of 546 m^3/day (6.3 L/s).

The following conditions were used to assess the **worst-case scenario**:

- ❑ 7DQ10 low flow of 28 L/s in Jean-Marie Brook combined with a small tidal amplitude of 0.2 m in the tidal inlet.
- ❑ Dry weather effluent discharge of 300 m^3/day (3.5 L/s).

6.2.2 Mixing modeling

In Lameque, the WWTP outfall discharges into a tidal inlet that is connected to Lameque Bay. The inlet undergoes similar tidal water level changes as the bay. Flushing and mixing are limited at the outfall location. The effluent pools during rising tides and is flushed out of the embayment during the falling tides. There is no indication that returning water from Lameque Bay carries significant quantities of effluent.

Dilution calculations were done based on the flow in Jean-Marie Brook, the effluent flows and tidal flushing volumes. The dilution rate of the effluent flow in Jean-Marie Brook is 1 in 33 In the average scenario, and 1 in 8 in the worst-case scenario. The embayment between the board walk and the lagoon outlet covers an area of approximately 30,000 m^2. This corresponds to a flushing volume of 6,000 m^3 for a 0.2 m tide, and to a net flushing flow of 133 L/s over the 12.5 hour long tidal cycle. The dilution rate of the effluent into the freshwater flow plus the tidal water flow is 1 in 47 on average over a full tidal cycle, in the worst-case scenario.

6.2.3 Allocated mixing zones

The extent of a mixing zone varies with each water quality parameter. For most parameters, dilutions should be calculated for the edge of the near-field mixing zone. The near-field mixing zone is the part of the water body where the energy contained in the effluent (mainly momentum and buoyancy) is dissipating and is the main cause of effluent dilution. In the far-field, effluent dilution is solely dependent on transport and dispersion by the ambient current. Most effluent constituents exhibit their strongest impact in the near-field where their concentrations are the highest. However, the impact of certain parameters, such as BOD and nutrients (nitrogen and phosphorus) can be felt further downstream, sometimes days after the release, once biological processes make use of the material. In that case, a larger part of the receiving water body has to be considered to be part of the mixing zone. We recommend to use the following parameter-specific allocated mixing zones:

- For $CBOD_5$, TKN, and TP: the tidal inlet area between the board walk and the shore (approximate area of 0.03 km^2). The dilution available from tidal flushing and dilution by the brook is calculated to be 1 in 47 in the worst-case scenario.

- For all other parameters: the near-field mixing zone, which extends up to approximately 20 m downstream of the discharge based on the field observations. At the edge of this zone, the predicted dilution is 1 in 8 in the worst-case scenario.

6.3 Determination of EDOs

The Effluent Discharge Objectives (EDOs) in Table 6.2 below are calculated based on the Environmental Quality Objectives (EQOs) in Table 6.1, the dilutions available at the edge of the allocated mixing zones, and background concentrations in the receiving water body.

Table 6.2: Proposed future EDOs for the Lameque WWTP outfall

Parameter	Unit	Assumed background concentration	EQO[1]	Allocated MZ	Dilution at edge of MZ	EDO
$CBOD_5$	mg/L	0	DO>8	estuary	1:47	**<25** [2]
TSS	mg/L	5	<5 or <25 above background	20 m	1:8	**<25** [2]
TRC	mg/L	0	<0.0005 [3]	20 m	1:8	**<0.02** [3]
NH_3-N Total	mg/L	0	<1.1	20 m	1:8	**<9**
TKN	mg/L	0.1	<0.55	estuary	1:47	**<21**
TP	mg/L	0.01	<0.055	estuary	1:47	**<2.1**
E. Coli	MPN/ 100 mL	0	<200	20 m	1:8	**<1,600**
Faecal Coliforms	MPN/ 100 mL	0	<14	20 m	1:8	**<112**
Acute toxicity	TU	0	<1	none	none	**<1**
Chronic toxicity	TU	0	<1	20 m	1:8	**<8**

(1) From Table 6.1

(2) The Minimum National Performance Standards of less than 25 mg/L mentioned in the CCME Strategy appear sufficient to ensure that there will be no negative impact on the receiving environment due to $CBOD_5$ and TSS.

(3) The guideline value used for the EQO is for chlorine-produced oxidants (CPO), not total residual chlorine (TRC). The EDO would be <0.004 mg/Lfor CPO based on the dilution at the edge of the allocated mixing zone. The numerical relationship between CPO and TRC is unclear. Also the detection limit for TRC is typically 0.01 mg/L. It is recommended to use the National Performance Standard of 0.02 mg/L as an EDO until an environmental guideline for TRC is available from CCME.

7. SELECTION OF SUBSTANCES FOR COMPLIANCE MONITORING

The CCME strategy requires that continuous monitoring is conducted after the initial effluent characterization is completed:

7.1 Selection of substances

- $CBOD_5$, TSS, and TRC (when chlorination is used) must be monitored regardless of the initial characterization results.

- All substances with mean effluent values greater than 80% of their EDO. In this case, total ammonia, TKN, TP, E. Coli, and Faecal Coliforms should be monitored. The effluent pH and temperature should be measured along with ammonia to determine actual ammonia toxicity.

- For a “small” facility such as the Lameque WWTP, additional monitoring of acute and chronic toxicity is not required by the CCME Strategy. However it should be noted that the effluent was found to be acutely and chronically toxic twice during the one-year characterization period.

7.2 Monitoring frequencies

Table 7.1 lists the recommended substances for compliance monitoring and their monitoring frequencies.

Table 7.1. Compliance monitoring requirements for the Lameque WWTP

Parameter	**Sampling frequency**	**Procedure**
TRC	Daily*	Measured by operator
$CBOD_5$	Monthly	Sampled by operator, analysed by lab (ENV)
TSS		
NH_3-N Total		
TKN		
TP		
E. Coli		
Faecal Coliforms		
pH		Measured by operator
Temperature		

* Only when chlorine is used

8. CONCLUSIONS AND RECOMMENDATIONS

The effluent from the Lameque lagoon is being discharged continuously into a tidal embayment. The embayment is part of the estuary of Jean-Marie Brook, and is located within of the Acadian Eco Centre. Signs of eutrophication were observed in the area.

The measured annual average daily wastewater flow through the plant was 546 m^3/day (6.3 L/s) from December 2010 to November 2011. The dry weather flow can be estimated at 300 m^3/day (3.5 L/s), and the peak flow was 1,290 m^3/day (15 L/s), in April and May. These measurements are in line with theoretical flow predictions.

The effluent quality was typical of a lagoon effluent. $CBOD_5$ and TSS concentrations were below the National Performance Standard of less than 25 mg/L on average, but exceeded it several times over the one-year characterization period. The effluent was found to be acutely and chronically toxic twice out of four sampling events, in April and October. Bacteria levels were low from June to September, which shows that the disinfection was effective.

Considering the characteristics of the receiving water, the calculated effluent discharge objectives (EDOs) are: less than 25 mg/L for $CBOD_5$ and TSS, <0.02 mg/L for total residual chlorine, <9 mg/L for total NH_3-N, <21 mg/L for TKN, < 2.1 mg/L for TP, <1,600 mg/L for E. Coli, and <112 mg/L for Faecal Coliforms.

Currently, the effluent is being disinfected with chlorine in the summer, but dechlorination is not performed. Consequently, residual chlorine levels are elevated. De-chlorination could be added to the treatment process. Alternatively, a UV system could be installed, which would eliminate the requirement to monitor residual chlorine daily. Disinfection should be implemented year-round, to minimise the impact on shellfish in the area.

Nitrogen and phosphorus levels should be lowered. Additional treatment options should be explored, for example a constructed wetland. The area impacted by eutrophication is near the mouth of the discharge ditch inside the embayment. The localised impacts could be eliminated by routing an outfall pipe into one of the culverts under Route 313, next to Lameque Bay.

The effluent toxicity in April and October may have been caused by the elevated ammonia concentrations in the effluent at the time (28 and 20 mg/L respectively). Lowering ammonia concentrations year-round should help decrease the toxicity of the effluent. This objective can be achieved by providing additional aeration . Another potential cause for acute toxicity in the effluent ca be the elevated concentration of chlorine. The addition of de-chlorination would help to reduce the acute toxicity of the effluent.

9. REFERENCES

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10. GLOSSARY

A

Acutely Lethal *(Létal aigu)*
At 100 percent concentration of effluent, more than 50 percent of the test species subjected to it over the test period are killed when tested in accordance with the acute lethality test set out in the appropriate method. For rainbow trout this is Reference Method EPS 1/RM/13.

Allocated Mixing Zone *(Zone de mélange allouée)***:** see mixing zone

Ammonia *(Ammoniac)*
Total ammonia expressed as nitrogen. Total ammonia means the sum of the unionized ammonia (NH_3) and ionized ammonia (NH_4+) species which exist in equilibrium in water. Analytical methods measure and typically report on ammonia nitrogen as opposed to total ammonia. The unionized ammonia (NH_3) is toxic to fish in low concentrations. The amount of NH_3 is calculated as a fraction of the total nitrogen, based on temperature and pH.

C

Canadian Environmental Quality Guidelines *(Recommandations canadiennes pour la qualité de l'environnement)*
Nationally endorsed, science-based goals for the quality of atmospheric, aquatic, and terrestrial ecosystems. Environmental quality guidelines are defined as numerical concentrations or narrative statements that are recommended as levels that should result in negligible risk to biota, their functions, or any interactions that are integral to sustaining the health of ecosystems and the designated resource uses they support. Developed by CCME.

Carbonaceous Biochemical Oxygen Demand (CBOD5, 5-day) *(Demande biochimique en oxygène des matières carbonées [DBO5C, 5 jours])*
A measure of the quantity of oxygen used in the biochemical oxidation of organic matter in 5 days, at a specific temperature, and under specified conditions. The method of analysis is defined by Method 5210 in Standard Methods. The CBOD is a fraction of the total BOD. This fraction is specific to each effluent.

Chronic Toxicity *(Toxicité chronique)*
The ability of a substance or mixture of substances to cause harmful effects over an extended period, usually upon repeated or continuous exposure sometimes lasting for the entire life of the exposed organism. Chronic toxicity results in reduced reproductive capacity or reduced growth of young, in fish or invertebrate populations.

Combined Sewer *(Égout unitaire)*
A sewer intended to receive both sanitary waste and storm water.

Combined Sewer Overflow (CSO) *(Débordement d'égout unitaire [DEU])*
A discharge to the environment from a combined sewer system that occurs when the hydraulic capacity of the combined sewer system has been exceeded, usually as a result of rainfall and/or snow melt events.

D

Designated Area *(Zone désignée)*
Sensitive areas as identified by the regulator and that may be affected by municipal wastewater discharges, such as fish spawning sites, beaches, drinking water intakes, etc.

E

Effluent Discharge Objective (EDO) *(Objectif environnemental de rejet [OER])*
Concentration, load or toxicity units that should be met at the municipal wastewater effluent discharge to adequately protect all water uses in the receiving environment. Effluent discharge objectives are obtained through an environmental risk assessment methodology using the principles of assimilative capacity and mixing zone, in conjunction with environmental quality.

Environmental Quality Objective (EQO) *(Objectif de qualité de l'environnement [OQE])*
Concentration of a substance considered safe for aquatic life and for the human uses that exist or should exist outside of a determined mixing zone. The *Canadian Environmental Quality Guidelines* (CEQG) are generic EQOs often used in Canada. The numerical concentrations or narrative statements that establish the conditions necessary to support and protect the most sensitive designated use of water at a specified site (CCME, 1987)

Environmental Risk Assessment (ERA) *(Évaluation des risques environnementaux [ERE])*
A procedure that will enable the establishment of effluent discharge objectives for substances of concern. This process will take into account the characteristics of the effluent and of the site-specific receiving environment. The environmental risk assessment includes a one-year period where a facility will characterize its effluent (initial characterization).

Eutrophication: Excessive growth of aquatic vegetation in response to elevated concentrations of nutrients (often associated with wastewater discharges).

M

Mixing Zone *(Zone de mélange)*
Also called the initial dilution zone. The area contiguous with a point source (effluent discharge site) or a delimited non-point source where the discharge mixes with ambient water and where concentrations of some substances may not comply with water quality guidelines or objectives. For the purpose of the Strategy, “mixing zone” means the “allocated mixing zone” at the edge of which environmental quality objectives should be met.

N

Near-Field Mixing Zone The volume of water between the end of the discharge pipe or the diffuser nozzle, and the point where the energy (mainly momentum and buoyancy) of the effluent has dissipated. Beyond this point - in the far-field - river or coastal current transport takes over.

Nutrient *(Élément nutritif)*
Any substance that is assimilated by organisms and promotes growth; generally applied to nitrogen and phosphorus in wastewater, but also to other essential and trace elements.

R

Receiving Environment *(Milieu récepteur)*
The water body into which effluent is discharged.

S

Streeter Phelps algorithm: A method of predicting oxygen depletion in a receiving water body as a function of organic loadings and existing background condition.

APPENDIX A - Photographs

Eutrophication at impoundment

Receiving water

Eutrophication at Mouth of outfall brook

Environmental Risk Assessment

Lameque WWTP

Photographs

Environmental Services Inc.
Patterson Rd., Harvey Stn., N.B., E6K 1L9
ph: (506) 366 1080, fax (506) 366 1090

DATE: 2011/08/31

FILE: RC-528-09

SCALE: -

FIGURE: A1

Impoundment

Aerator in impoundment

Lameque Bay

Receiving water in impoundment

Environmental Risk Assessment

Lameque WWTP

Photographs

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ph: (506) 366 1080, fax (506) 366 1090

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SCALE: -

FIGURE: A2

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