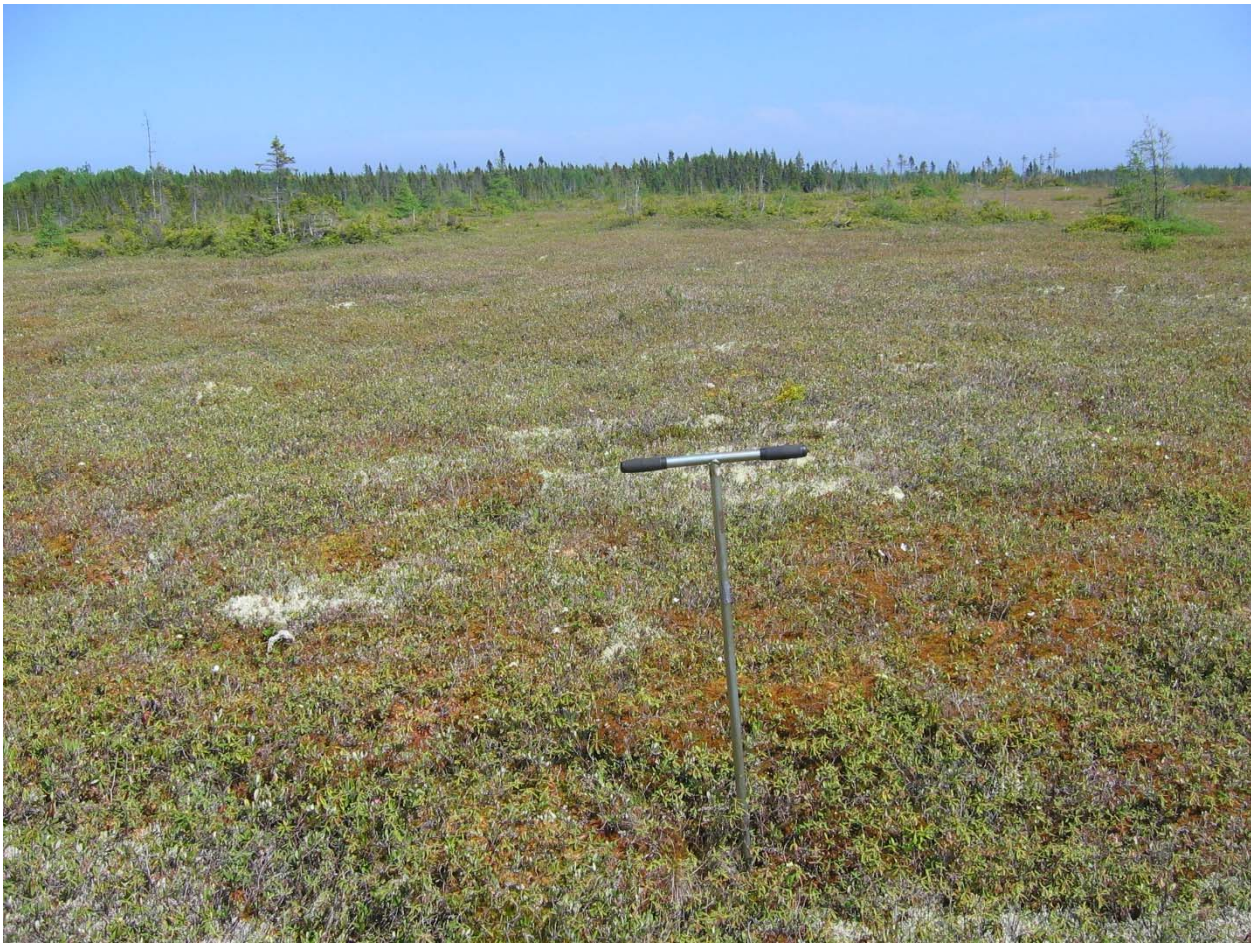
SUN GRO HORTICULTURE CANADA LTD.
PROJECT NO.: 221-05720-00

ENVIRONMENTAL IMPACT ASSESSMENT - UPDATE

PEATLAND NO. 343 DEVELOPMENT PROJECT

DECEMBER 2022



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SUN GRO HORTICULTURE CANADA LTD.

PROJECT NO.: 221-05720-00
DATE: DECEMBER 2022

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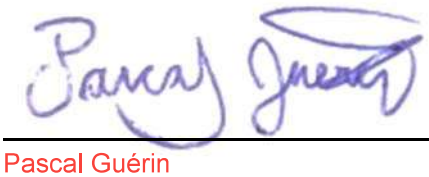

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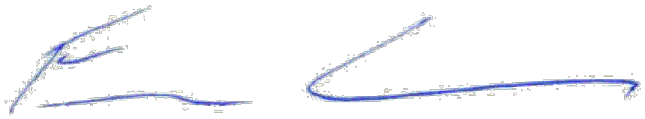

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CLIENT

SUN GRO HORTICULTURE CANADA LTD.

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Reference to be cited :

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EXECUTIVE SUMMARY

In April 2011, the Department of Environment and Local Government issued a Certificate of Determination authorizing FPM Peat Moss Ltd. to develop Peatland No. 343 near Oak Point for peat harvesting for horticultural uses.

According to an initial estimation, Peatland No. 343 contains approximately 1.63 million m^3 of horticultural grade peat within the area with a peat thickness of 1 m or more. It is located in Northumberland County, and it lies both on Crown land and on private lands. According to Regulation 87-83 of the *Clean Environment Act*, the Proponent is required to register information about the proposal with the Department of Environment. FPM mandated SNC-Lavalin Environment, division of SNC-Lavalin Inc. to prepare an Environmental Impact Assessment.

In 2013, Sun Gro Horticulture Canada bought FPM including Oak Point peatland operations. It turned out that FPM did some modifications to the initial development plan. The access road was supposed to be constructed from Winston Road to the north of the peatland, but it was constructed direct from Highway 11 to the south of the peatland. The service area that was also constructed to the south of the peatland at the end of the access road. DELG requires Sun Gro to submit a revised Environmental Impact Assessment (EIA) that describes the change to rectify the situation before allowing access to the peatland and resuming peat harvesting. Sun Gro also wants to benefit from the revision to incorporate other change to the initial project in the revised EIA:

- A mineral layer will be added on top of bog roads were supposed to be made only of woody material removed during field preparation.
- Sun Gro recently acquired private properties located to the south of the peatland that will add 5.1 ha to the harvest area and require construction of a section of main ditch.
- An outlet was added along the southwest margin of the peatland.

The initial project consisted of standard peat development and harvesting operations, similar to existing operations in the area. It involved a development area of 89 ha that includes Crown land and private land. The development plan comprised a construction phase, an operation phase, and a decommissioning phase. The operation phase consists of building an access road, a service area, installing a drainage network and preparing peat fields. The drainage network includes field ditches, perimeter ditches and sedimentation ponds. The purpose of the field ditches is to lower the water table within each harvesting field. A bog road will be built to provide access for peat harvesting equipment to the peat fields and peat stockpiles. Peat harvesting operations include harrowing, vacuum harvesting, stockpiling and shipping the peat to Sun Gro's Inkerman processing facility.

Progressive decommissioning will be performed as harvesting ends on individual peat fields, based on guidelines developed by the New Brunswick Department of Natural Resources. Progressive decommissioning includes three rehabilitation options, which are sphagnum restoration, forested wetland reclamation and water body creation.

Harvesting on a given peat field will stop when a low-quality peat layer is reached; any remaining peat will be retained for site rehabilitation. Final decommissioning will be performed upon total shutdown of peat harvesting activities. As of the end of 2021, 32 ha have been prepared for harvesting.

Existing environmental conditions were described, and potential impacts were assessed using standard impact assessment methodology. Geology, hydrology, hydrogeology, and climatology are the physical components of the environment that were identified for assessment. Biological components included vegetation, mammals, birds, fish, amphibians and reptiles.

Special status plant and fauna species, and important habitats, were given special attention. Social conditions, the economy, and other human environmental components of the region were also assessed.

A conservative approach was used to evaluate the anticipated drainage discharge and surface runoff. Most drainage water transits through sedimentation ponds before being released to the surrounding environment as overland flow. Two watercourses are present within a radius of 1 km, Oyster River to the west and Whites Brook to the east. No drainage water or surface runoff from bog 343 discharges to these watercourses or their tributaries. There is no watercourse crossing along bog access road.

Mitigation and monitoring measures were developed to reduce the significance of the identified impacts. As described previously, progressive decommissioning will be the primary component of the mitigation program. Specific mitigation measures are proposed to address potential impacts of the project on air quality, soil quality, water flow and quality, and employee's health and safety. Preventive measures and standard operating procedures to minimize environmental impacts related to spills, accidents, and similar events are provided in an Environmental Protection Plan.

Following application of the mitigation measures, no significant residual negative impacts on the physical, biological, or human environmental components were identified in relation to proposed peat harvesting operations at Peatland No. 343.

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1 INTRODUCTION

In April 2011, the Department of Environment and Local Government (hereinafter "DELG") issued a Certificate of Determination authorizing FPM Peat Moss Ltd. (herein after "FPM") to develop Peatland No. 343 near Oak Point for horticultural peat harvesting (Appendix A).

According to an initial estimate, Peatland No. 343 contains approximately 1.63 million m^3 of horticultural grade peat within the area with a peat thickness of 1 m or more. It is located in Northumberland County (Map 1), and it lies both on Crown land and on private lands (Map 7). According to Regulation 87-83 of the *Clean Environment Act*, the Proponent is required to register information about the proposal with the DELG. FPM mandated SNC-Lavalin Environment, division of SNC-Lavalin Inc. to prepare an Environmental Impact Assessment (EIA) that represents the Registration Document.

In 2013, Sun Gro Horticulture Canada (herein after "Sun Gro") bought FPM Peatland No. 343 operations. It turned out that FPM did some modifications to the initial development plan, such as the location of the access road to the peatland and the location of the service area. To rectify the situation, Sun Gro proposed to submit a revised Environmental Impact Assessment (EIA) that describes the change before allowing access to the peatland and resuming peat harvesting. Sun Gro also wants to benefit from the situation to incorporate other minor change to the initial project in the revised EIA.

This document represents the revised EIA that is also the Registration Document. It was prepared to comply with a request from DELG to allow Sun Gro access to Peatland No. 343. Given the short notice to review the document, it is possible that some sections of the EIA need to be updated at a later date when appropriate information becomes available. The document was adapted from the EIA submitted in 2011 that was prepared by SNC-Lavalin in compliance with *A Guide to Environmental Impact Assessment in New Brunswick*, of the New Brunswick Department of Environment and Local Government (NBDELG, 2005) and the *Additional Information Requirements for Peat Development Projects* of the New Brunswick Department of Environment (NBDE, 2007). The revised EIA is also based on the following assumptions:

- Sun Gro will follow the development plan and use the same methods as described in the initial EIA except for the modifications that are mentioned.
- Physical, biological, and human environment are similar to that of the 2010 EIA.
- Impacts on the environment are comparable to those described in the 2010 EIA.

The following sections present the Proponent, along with the description of the project construction, operation and decommissioning phases. The description of the environment, a summary of the impacts of the project and a summary of the proposed mitigation measures are also covered in this document.

2 THE PROPONENT

2.1 SUN GRO HORTICULTURE CANADA LTD.

The Sun Gro Group founded in 1929 in Vancouver, British Columbia is a vertically integrated producer and supplier of growing media, controlling the harvesting and processing of the basic ingredients in its products, as well as the mixing, distribution, and marketing of its products at its own facilities across North America. The Sun Gro Group is the largest producer of peat in North America and the largest seller of peat moss and peat-based and bark-based growing media products to the North American professional plant growers market. Sun Gro supplies soilless growing mixes to North America's top 100 greenhouse and nursery growers, shipping over 70,000 truckloads of product annually. Sun Gro's mixes are made from Canadian Sphagnum peat moss which is harvested from peat bogs located throughout Canada and the northern United States. Sun Gro's operations are also reinforced by technical support teams which perform analyses for customers including plant tissue analysis, water analysis, soil analysis, and media analysis to help detect and prevent plant nutritional problems and crop production disasters. The Sun Gro Group has over 800 employees (flexing to over 1,000 for seasonal demands) and 25 distribution, resource, and production facilities across North America.

Sun Gro is also the largest peat producer in New Brunswick with 11 harvesting sites in operation, 3 sites at the pre-development phase and 2 sites that are being restored.

2.2 CONTACT

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3 THE UNDERTAKING

3.1 NAME OF THE UNDERTAKING

The project is called « Peatland No. 343 Revised Development Project » (hereinafter “Project”).

3.2 PURPOSE / RATIONALE / NEED FOR THE UNDERTAKING

There are growing demands for Sun Gro’s quality and custom-made peat and growing mix products across Canada, the Americas and internationally. In light of these expanding markets, it is presently impossible to supply and service the market demand from the current Sun Gro operated peat bogs in Eastern Canada. This positive growth has challenged Sun Gro to identify potential, good quality peat resources in New Brunswick to respond to this very favorable and growing business position. Buying FPM was part of that strategy as it provided an opportunity for Sun Gro to expand its current New Brunswick holdings and to meet its business model and market demands.

Sun Gro already operates on Peatland No. 343 in accordance with the standards and practices of peatland development of the industry and the Government of New Brunswick. The peat is processed at Sun Gro Inkerman facilities with a value-added component, packaged in different bag formats, and it services the market demand through export. In the future it will also be possible that a new mixing facility be added in the south of the province, in that case the peat would be ship at that plant. The Project also assists the New Brunswick Department of Natural Resources in attaining its objective to increase the level of secondary processing of natural resources within the province.

3.3 MAIN CHANGE FROM INITIAL DEVELOPMENT PLAN

Changes from the development plan described in the 2010 EIA result mainly from misplacement of the access road and service area by FPM and by the expansion of the harvestable area to the south following acquisition of private land by Sun Gro. These modifications can be summarized as follow and they are illustrated on Map 2:

- Access Road: The access road was constructed direct from Highway 11 to the south of the peatland. According to the 2010 EIA it was supposed to be constructed from Winston Road to the north of the peatland.
- Service Area: The service area was constructed at the end of the access road south of the peatland partly on a mineral outcrop. According to the 2010 EIA it was supposed to be constructed to the north of the peatland in a wetland area.
- Mineral bog road: According to the 2010 EIA, all bog roads were supposed to be made only of woody material removed during field preparation. A mineral layer will be added on top of it.
- Acquisition of private properties: Sun Gro recently acquired private properties located to the south of the peatland. It has also a verbal agreement with the owner of the private property to the east of the peatland and it is in the process of completing the acquisition of that property (Map 7).
- Additional harvest area: The newly acquired properties will allow an extension of 5.1ha of the harvested area to the south of the bog. The property to the east was already incorporated in the harvested area in the Option 1 of the 2010 EIA.

— Drainage: The drainage network proposed in the 2010 EIA is respected except for:

  · Addition of a main drainage for the extension south of the peatland;

  · An outlet was added along the southwest margin of the peatland.

3.4 PROJECT LOCATION

Peatland No. 343 is located on the southern part of the Acadian Peninsula, 2 km from Miramichi Bay and approximately 20 km northeast of Miramichi, at 47°8'24.29"N, 65°17'16.43"W (Map 1). Adjacent communities are Barryville (3 km to the northeast), Oak Point (1.5 km to the southeast), and The Willows (1.5 km to the south). There is no direct public road to access the proposed site. Peatland No. 343 lies 7 km west from Peatland No. 353 which is under development by Sun Gro. It is located in part on Crown land and on private land within the following PIDs:

— 40281073 (Crown Land);

— 40241374 (purchase by Sun Gro confirmed since 2010, see Appendix B);

— 40543258 (added from 2010 EIA, see Appendix B);

— 40547358 (added from 2010 EIA, see Appendix B).

3.5 PHYSICAL COMPONENTS AND DIMENSIONS OF THE PROJECT

The Peatland No. 343 Development Project consists of standard peat operations. The pneumatic method (vacuum harvesting) is used to harvest the peat. The Project involves the following components:

— An access road which origin from Highway 11.

— A service area located at the extremity of the access road. It includes a building with office and rest/lunch room for employees, a garage for equipment maintenance, a parking area for employee's cars and equipment, a peat storage area and a fuel station.

— A 25,000 watt generator (Sun Gro will consider building a power line in the future).

— A drainage network that will consist of field ditches, perimeter ditches, and sedimentation ponds.

— A bog road built to access the bog from the service area.

There is no plan to build processing facilities at Peatland No. 343. The harvested peat will be shipped to the Sun Gro existing processing plant in Inkerman, N.B.

Peatland No. 343 covers 213 ha of which 104 ha have peat depth over 1 m and development will be restricted to that area. Keys & Henderson (1987a) estimated the *in situ* volume of horticultural grade peat at 2.29 million m^3. According to a recent estimate, the total harvestable volume of peat is 1.63 million m^3 within the area with a peat thickness of 1 m or more. A peat layer of approximately 30 cm will be left in place. The area with peat depth less than 1 m will be left untouched as a buffer zone and a source of plant material for sphagnum restoration.

Peat is currently harvested on the section of the peatland that lies on Crown land (Map 2) and it will extend on private properties located to the east and to the south. However, for practical reasons, the 2010 EIA covered all the area of the peatland with a peat depth over 1 m even if the private properties to the south were not included in the initial project.

The peat road and stockpiles areas within the bog limit will cover approximately 6 ha while that of the access road and the service area will total 4 ha.

Development of the peatland that lies on Crown land is under peat lease 56 from the New Brunswick Government. There are no other constraints in regard to the development of Peatland No. 343.

3.5.1 LEASE LIMIT

The peat lease 56 covers 202 ha (Map 7). The lease extends beyond the peatland limits to include a minimum of 50 m wide buffer zone around the development area and the sedimentation ponds. It also includes the area between the peatland and the initially proposed service area and access road from Winston Road.

3.6 CONSTRUCTION DETAILS

The Project consists of establishing a drainage network, constructing a service area and peat fields for standard peat harvesting operations.

3.6.1 DEVELOPMENT PLAN

The development plan consists of a construction phase, an operation phase, a development schedule and a decommissioning plan. The construction phase describes the methods used to prepare peat fields. The operation phase presents the peat harvesting methods and associated operations. The development schedule outlines the way the peatland will be developed in time and space. The decommissioning phase consists of the rehabilitation plan that will be implemented when peat harvesting terminates on individual peat fields, and upon total shutdown of peat harvesting activities, and the associated rehabilitation cost.

3.6.2 CONSTRUCTION PHASE

The proposed construction phase is as follows:

1. Access road construction
2. Service area construction
3. Establishment of drainage network
4. Field preparation
5. Bog road construction

ACCESS ROAD

The access road takes its origin from Provincial Road 11 (Map 2). It 1,132 m long, entirely built on private land and lead to the southern extremity of Peatland No. 343. Figure 1 presents a schematic cross-section of the access road as drawn by FPM for the 2010 EIA.

SERVICE AREA

The Project requires a service area of approximately 1.2 ha. It was strategically located on a mineral outcrop on the south side of the peatland at the extremity of the access road (Map 2). Trees and vegetation were cleared, and mineral material was added where necessary. The site was graded to ensure proper drainage.

A layout of the service area is presented in Figure 2. The service area consists of a peat storage area, a parking area for harvesting equipment, a parking area for employees, a staging area for fuel storage and refueling, a service garage, and a building that serves as employee facilities and office.

No surface well has been installed to provide water and Sun Gro supplies bottled water to the employees. Portable toilet systems are installed on site and serviced by a specialized contractor.

Diesel fuel is stored in a 13,600 L dual wall aboveground fuel storage steel tank (AFST), which will comply with CAN/ULC S601 standards. It is installed near the equipment storage area on a 20 cm thick concrete platform surrounded by 15 cm posts every 60 cm. Gasoline is stored in 20 L portable containers and placed in the designated area, chosen to create the least possible negative impact on the local environment. Installation, operation and maintenance of AFST follows the Environmental Code of Practice for Aboveground Storage Tank Systems Containing Petroleum Products of the Canadian Council of the Ministers of the Environment (CCME, 1994). Other petroleum products are stored in a designated area.

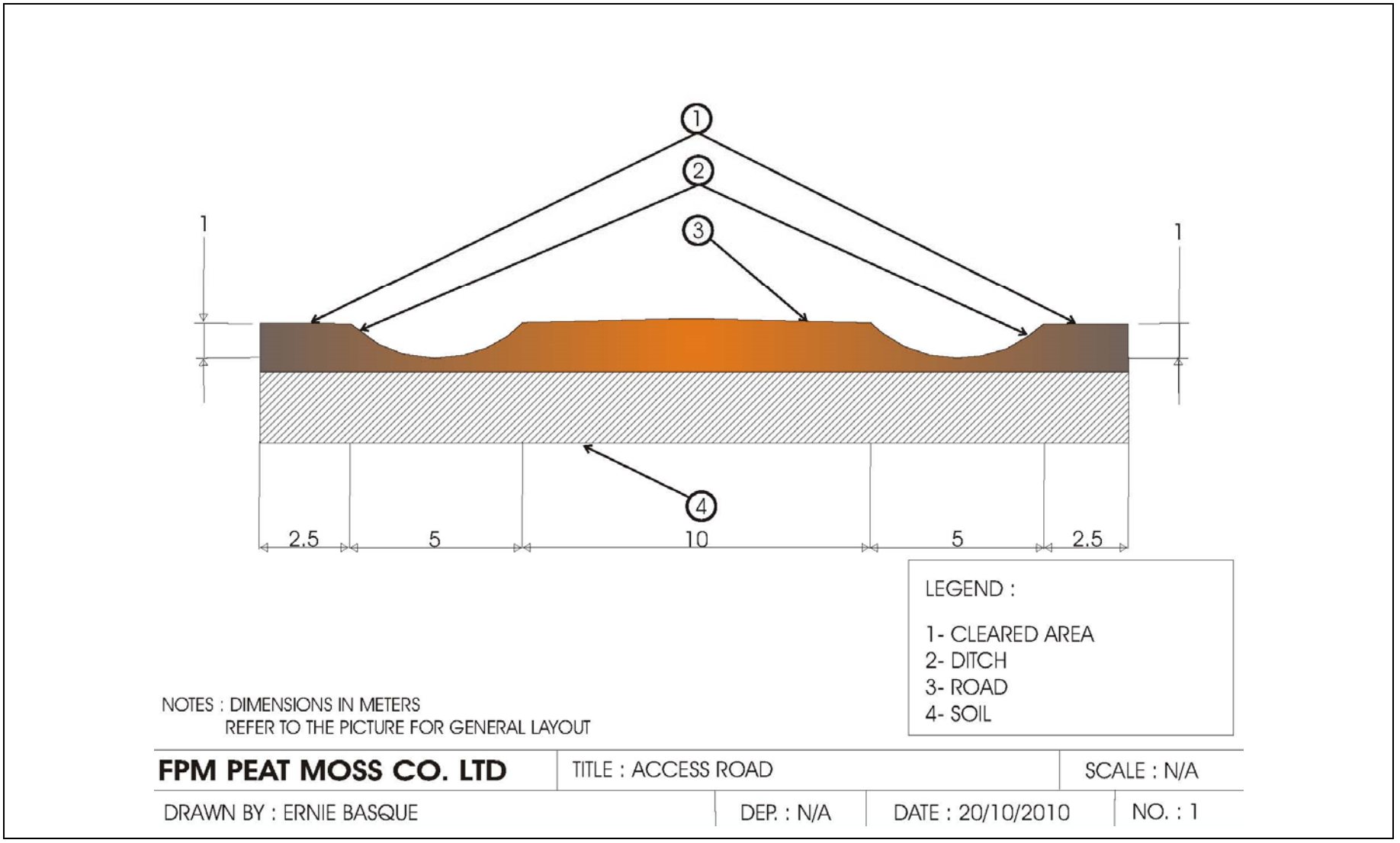

Figure 1 **Typical Road Layout**

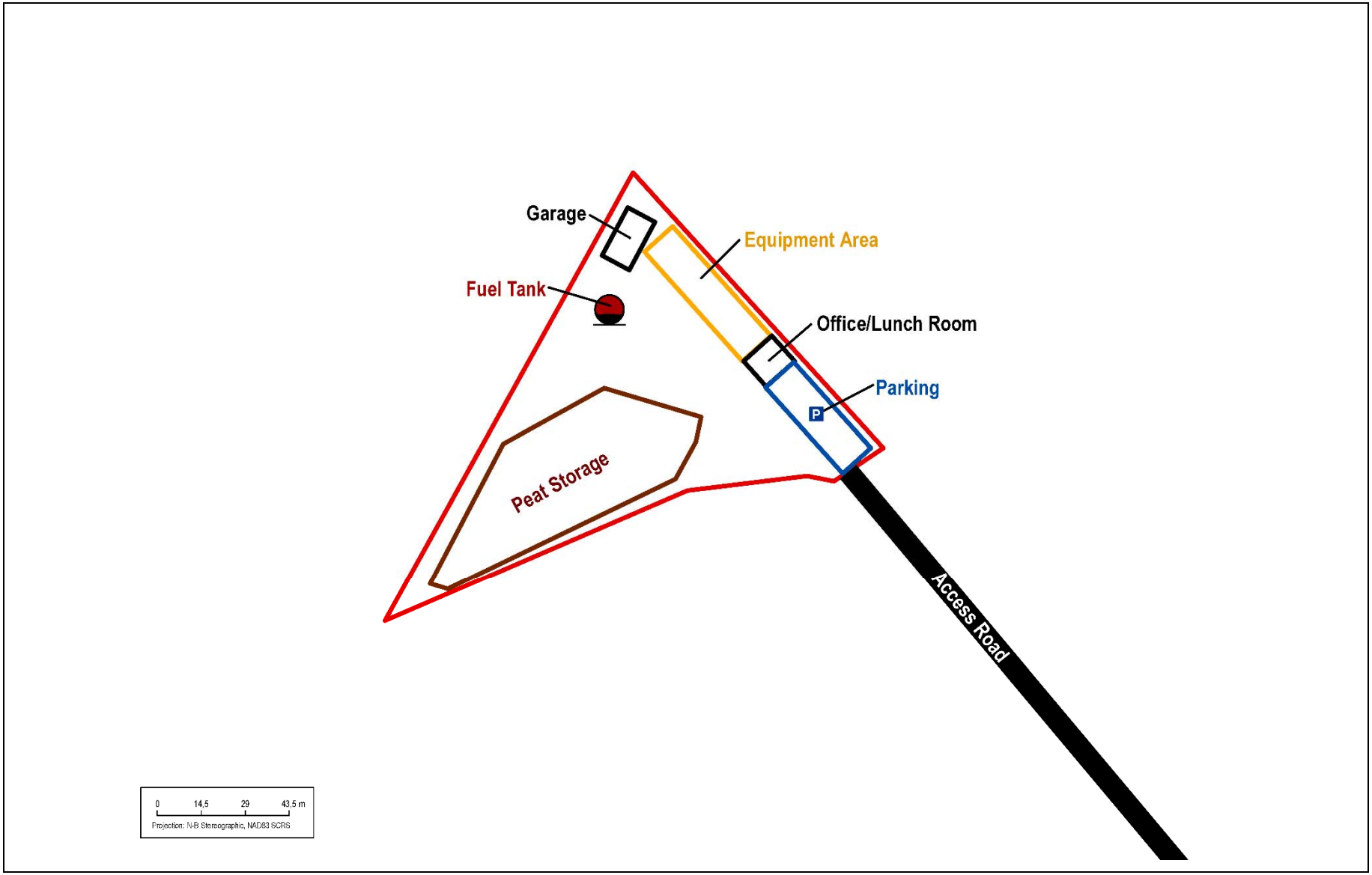

Figure 2 **Service Area Layout**

DRAINAGE NETWORK

Adequate drainage is required to create suitable conditions for peat harvesting. For Peatland No. 343, the drainage network includes field (or secondary) ditches, perimeter (or main) ditches that belt the area of the peatland and sedimentation ponds. The design and construction of the drainage system follows guidance of the *Guidelines for Peat Mining Operations in New Brunswick* (Thibault, 1998). Table 1 presents the dimensions of the drainage network components.

Along with the access road construction, ditch construction was initiated in the first stages of construction in accordance with the drainage plan outlined in Map 2. Draining is the first step in bog opening since it creates conditions that allow other mechanized operations.

Drainage water is not directly discharged to streams or watercourses. It first flow through sedimentation ponds to trap suspended peat and other sediments. At the outlet of the ponds, drainage water is released to the surrounding environment as overland flow. Where applicable, culverts were installed under bog roads at ditch crossing locations. Culverts are designed to ensure sufficient drainage capacity for peak discharge with respect to the catchment area of the given crossing. All transport, retention and release infrastructure for drainage water are located on-site; no off-site drainage channels or other infrastructure are constructed.

The drainage network has been designed in order to respect the natural water divide straddling Peatland No. 343 and separating Oyster River watershed from Whites Brook watershed. As such, the drainage network is subdivided in two sub-networks corresponding to the two natural watersheds. Each sub-network drains and discharges water in the watershed within which it naturally occurs and flows. The addition of a 5.1 ha harvest area to the south, compare with the initial EIA, will lead to the transfer of about 4.7 ha of Whites Brook watershed to Oyster River watershed. The net gain or loss of peatland area for one watershed or the other is deemed negligible at the scale of the watersheds (Section 5.1.1).

Table 1 Drainage network components dimensions[1]

	Length (m)	Width (m)	Depth (m)
Secondary ditches (± 98)	Average: ± 375	1.5	1.5
Main ditches	Total : ± 3,650	2	3
Sedimentation ponds (2 series of 4)			
Oyster River watershed	44.5	6.1	2
Whites Brook watershed	50.6	7.6	2

[1] Numbers have not been updated for the 5.1ha extension to the south of the peatland.

FIELD DITCHES

Field ditches are V-shaped and dug from the peat with a double-wheeled V-ditcher attached to a 3-point hitch and powered by a tractor. The peat cut from the ditches is then spread onto the adjacent peat fields. The ditch profile generally follows the local topographical gradient to allow gravitational flow of water toward the perimeter ditches. Field ditches are spaced in parallel rows every 25 m. The area between two secondary ditches is referred to as a peat field.

PERIMETER DITCHES

Perimeter ditches run around the developed area of the peatland and are dug with an excavator. They collect water from the secondary ditches and direct them to the sedimentation ponds. The main ditches are normally constructed with a slow gradient, thus allowing low velocity flows which are conducive to settlement of suspended solids.

SEDIMENTATION PONDS

Sedimentation ponds will be installed at the two main outlets of the drainage network. They consist of a series of elongated trenches dug through the mineral overburden that channel water discharging from the upstream segments of the main ditch. Sedimentation ponds slow down water flow which in turn favors peat particle sedimentation.

Sedimentation ponds are designed based on New Brunswick guidelines for peat mining operations (Thibault, 1998). The volume prescribed by the guidelines (25 m^3 per ha of peatland area drained) is doubled in order to increase the particles retention efficiency and the level of protection of water quality downstream from the peatland. Doubling the volume of the sedimentation ponds will also allow for the addition of the 5.1 ha area to the south of the peatland that will flow to the west toward Oyster River. A total of four sedimentation ponds will be excavated at each outlet. The ponds array is structured in both a serial and parallel fashion: water discharging from the main ditch is diverted towards two ponds ("upstream ponds"), and each upstream pond discharges water in a specific downstream pond.

Sedimentation ponds volume is a function of drained upstream area. A fixed depth of 2 meters is used for each pond. A first group of four ponds was installed at the outlet of the sub-network located within Oyster River watershed. It receives water from a peatland area of about 48.5 ha. Each series of two ponds temporarily store water drained from an area of about 24.25 ha. Each pond covers an area of approximately 271 m². Suggested pond length and width are respectively 44.5 m (146 ft) and 6.1 m (20 ft) for the first group of ponds.

A second group of four ponds will be installed at the outlet of the sub-network located within Whites Brook watershed. It will receive water from a peatland area of 61.5 ha. The two series of two ponds will each receive water from an area of about 30.75 ha of peatland. Each pond of the second group will cover an area of approximately 384 m². Suggested pond length and width are respectively 50.6 m (166 ft) and 7.6 m (25 ft) for the second group.

Such dimensions are in compliance with length/width ratios recommended by Thibault (1998). Actual ponds dimensions may vary upon construction. Any variation stays within margins that maintain compliance with recommended dimensions criteria.

A floating boom is installed in each pond to retain debris and prevent outlet obstruction. All channels connecting serial ponds as well as their outlets are lined with a geotextile in order to prevent their degradation.

Maintenance

Sedimentation ponds maintenance and cleaning procedures are implemented in accordance with guidelines presented in Thibault (1998). Cleaning consists of removing peat settled in the ponds in order to preserve their efficiency, as peat settling capacity is dependent upon the storage volume available for the retention of water inflow over a given period of time.

During the peat extraction phase, cleaning of sedimentation ponds is carried out at least twice a year, even if the volume of accumulated peat in ponds is less than half of the pond volume. Cleaning operations are scheduled to take place in middle-to-late fall and following spring freshet. Sedimentation ponds are inspected every week during the peat extraction season. Additional inspection(s) are carried out following episodes of intense precipitations, and additional cleaning is carried out on an as per needed basis.

Inspection of sedimentation ponds also aims at assessing the state of the various hydraulic structures forming the outlet of each drainage sub-network. Any degradation or malfunctioning that may be observed is corrected as soon as possible.

Sun Gro proposes to carry out cleaning (emptying) operations in any given pond when the accumulation of peat reaches 25% of the total volume of the pond, the lower threshold of the NB guidelines. Maintenance is performed on one series of ponds at a time. Before sediment removal is undertaken, one series of ponds is closed, and water is directed in the adjacent series.

Sediments are removed using an excavator or a sludge pump and are piled at a minimal distance of 5 m from the ponds. Piles are protected or moved to a safe place when climatic conditions present a risk for these sediments to be transported in the drainage system. Once sediment removal is complete, the ponds are kept isolated from the drainage system in order to allow sedimentation of the remaining sediments. They are brought back in operation 24 hours later. To prevent overflow of the sedimentation ponds, their condition and capacity are verified before new field ditches are dug.

DESCRIPTION OF PEAT DEPOSIT DRAINAGE

Water collected by the ditch network during construction mostly originates from natural storage within peat porosity. Water drains from the various fields in a progressive way, as the local water table is gradually lowered. Occasional surface runoff also reaches the ditches following rainfall, once secondary ditches are cut (while a small component of surface runoff is directly collected by the main ditches). Drainage water and surface runoff collected from secondary ditches flow gravitationally towards the main ditches and end up in the sedimentation ponds. Water then discharges at the outlets of the ponds.

It is important to emphasize that ditch construction on the peatland is carried out progressively. Three cutting phases are performed until the completion of each secondary ditch, and each phase is executed approximately one week after the previous one. Peat field drainage thus takes place in an incremental fashion as ditches bordering any given field are being deepened. This approach has the benefit of spreading over a long period of time the release of water taking place from the peat fields to any given down-gradient ditch. Peak drainage discharge is thus be kept to low figures.

WATER RELEASE POINTS

At the peatland scale, water is released at the point of lowest elevation of each drainage sub-network, along the corresponding reach of the peripheral (main) ditch. It then flows through either series of sedimentation ponds. Final release points correspond to the outlet of each of the four downstream ponds. As such, there are two main release points, or outlets, in each watershed of the area.

No outlet is located less than 70 m away from a watercourse. Water discharge at the release points is essentially in the form of overland flow over undisturbed land. Release points in Oyster River watershed are located inside the peatland. The peat deposit is essentially composed of sphagnum moss. Shrubs and sedge discontinuously cover the ground surface. Release points within Whites Brook watershed are located in a vegetated area, where a layer of organic soil blankets the mineral overburden. A relatively dense cover of trees and shrubs is found in the area. Similar biophysical conditions are found some distance downstream from the release points located within Oyster River watershed. The local topography is uniformly flat at and downstream from the various released points. One release point was added on the west side of the peatland in the Oyster River watershed due to the presence of unexpected higher ground. It is located halfway between the south end of the harvest area and the sedimentation ponds. It consists of a channel that diverts part of the drainage water. Water flow is directed into two channels leading toward vegetated ground within the peatland limit where water is dispersed as overland flow.

The actual functional design of the release points consists of a small box-shape channel dug in the deposits in place and connecting the outlet of each downstream pond with surrounding undisturbed land. The channel depth at the ponds outlet may reach up to 0.5 m. The channel floor is profiled in order for its depth to gradually decrease in the downstream direction, until it becomes level with the undisturbed ground surface.

Water accumulates in downstream ponds. As water level reaches the channel invert elevation, water level gradually fills the channel. Water flows out of the channel upon reaching its upper edges. Semi-radial horizontal flow through and over the undisturbed organic cover, away from the sedimentation ponds, hence, progressively takes place. Local channel overflow gradually releases water along an active discharge length that may span up to several meters along the channel edges, depending on the intensity of the water inflow.

Water is discharged from the outlet channels into lower areas of flat topography in the surrounding vegetated land. The water disperses in a semi-radial fashion, occurring as diffuse sheet flow at the surface of the organic cover and porous medium flow within both the organic cover and underlying mineral deposits. Flow intensity and magnitude decreases sharply with distance from the outlet channels. The discharged water then becomes available for evapotranspiration and further infiltration into the deposits. Hence, no significant surface flow originating from peatland drainage reaches the local surface drainage network under normal operation conditions.

There is a possibility that sustained water discharge at the outlet channels may induce concentrated flow downstream from the channels. Sun Gro intends to perform regular inspections of release points during the development phase, in order to validate the effective lateral dispersion of discharging flow and to monitor any flow channeling that could take place away from the release points. If such event should occur, appropriate measures should be taken to convert any concentrated or channel-like flow into diffuse sheet flow, downstream from the channels.

TIMING, RATE, VOLUME AND QUALITY OF WATER DISCHARGE

Peat fields are drained by ditching and induced water table lowering in a progressive fashion. Excavation of each secondary ditch proceeds in three cutting phases. Each phase excavates between 0.475 and 0.915 m of peat, until a total depth of 2 m is reached. The actual final depth of each secondary ditch is however less than 2 m because of subsidence and peat fields profiling operations, which displace some peat away from the ditch surroundings and towards the center of the fields. Each subsequent excavation phase along a given secondary ditch is carried out about a week after the previous one.

The anticipated drainage discharge during ditch construction has been evaluated assuming that the execution of each cutting phase proceeds at a rate of four 375- meters secondary ditches per day. This is based on secondary ditches cutting speed of 91 m/hr and a double-shift workday of 16 hours. Each cutting phase is assumed to take place over five consecutive days in a given sector, with two days interruptions on weekends. The second phase is carried out the following week and the third, the week after. Once the three phases are completed, ditching operations resumes in another sector of the peatland.

It is hypothesized that there is no interruption in the ditching sequence. This approach has the benefit of maximizing the peak drainage discharge that may be recorded during ditches network construction. Under that scenario, it is estimated that ditching operations would be executed and completed in approximately 17 weeks for the entire peatland, except for the 5.1 ha area added to the south of the peatland. One must however note that actual duration of the operations has deviated from this estimate, as all the initially proposed harvest area has not been opened all at once. As of the end of 2021, only 32 ha were opened, then this estimate is conservative.

Drainage discharge evaluation was carried out separating the vertical profile of each peat field in three layers to represent the three stages of secondary ditch excavation. Drainage of each layer was considered independently from the other, and a 1-week delay was defined between drainage initiation in two contiguous layers.

Drainage discharge in the first stages of each ditch excavation phase was calculated using the exact solution method of Polubarinova-Kochina (1962), which evaluates outflow to a fully penetrating channel during drawdown. Drainage discharge in the later stages was calculated using the Boussinesq (1904) exact solution method. The transition point between the early and late stages of drainage was established using the hydrograph separation approach proposed by Brutsaert & Nieber (1977). The hydraulic properties of the peat were based on the stratigraphic and humification characteristics described by Keys & Henderson (1987c, 1987d) as well as data computed by Carrier (2003) in various peatlands of New Brunswick, Price (1996) and Price *et al*. (2003). The detail for hydraulic properties defined for each layer is given in Table 2.

Geometric and spatial characteristics of the secondary ditches presented in this section were used in the drainage discharge calculations.

Table 2 Hydraulic Properties of Peat Layers

	Layer 1 0-0.915 m	Layer 2 0.915-1.53 m	Layer 3 1.53-2.00 m
Hydraulic conductivity (m/s)	6.3E-06	2.5E-06	1.6E-06
Specific yield (-)	0.25	0.15	0.12

The peak drainage discharge during the construction of the peatland ditch network was estimated to be 1,900 m³/day. This figure is equivalent to a rainfall event with an intensity of 0.075 mm/h over a 105-ha area during a 24 h period with no infiltration, interception or storage loss (complete contribution of rainfall to surface runoff). The drainage peak discharge occurs in the later stages of peatland ditching, during the fifth cycle of three-phases cutting sequence. A sustained decrease in drainage discharge is observed after the last day of ditch construction, which occurs around 125 days after ditching initiation. Discharge rate then declines more significantly about 200 days after initiation. The residual drainage discharge 365 days after ditching completion is approximately 115 m³/d, or about 6% of the peak discharge value. It is estimated that this residual drainage discharge results in a water input of 0.55 L/s to Oyster River watershed, and of 0.78 L/s to Whites Brook watershed.

Figure 3 presents the evolution of drainage discharge during ditch network construction at Peatland No. 343. The three-crests pattern of each of the six major peaks along the ascending limb of the curve represent the incremental contribution to discharge of each cutting phase taking place within a given sector. The troughs between each of the major peak correspond to the completion of the third cutting phase.

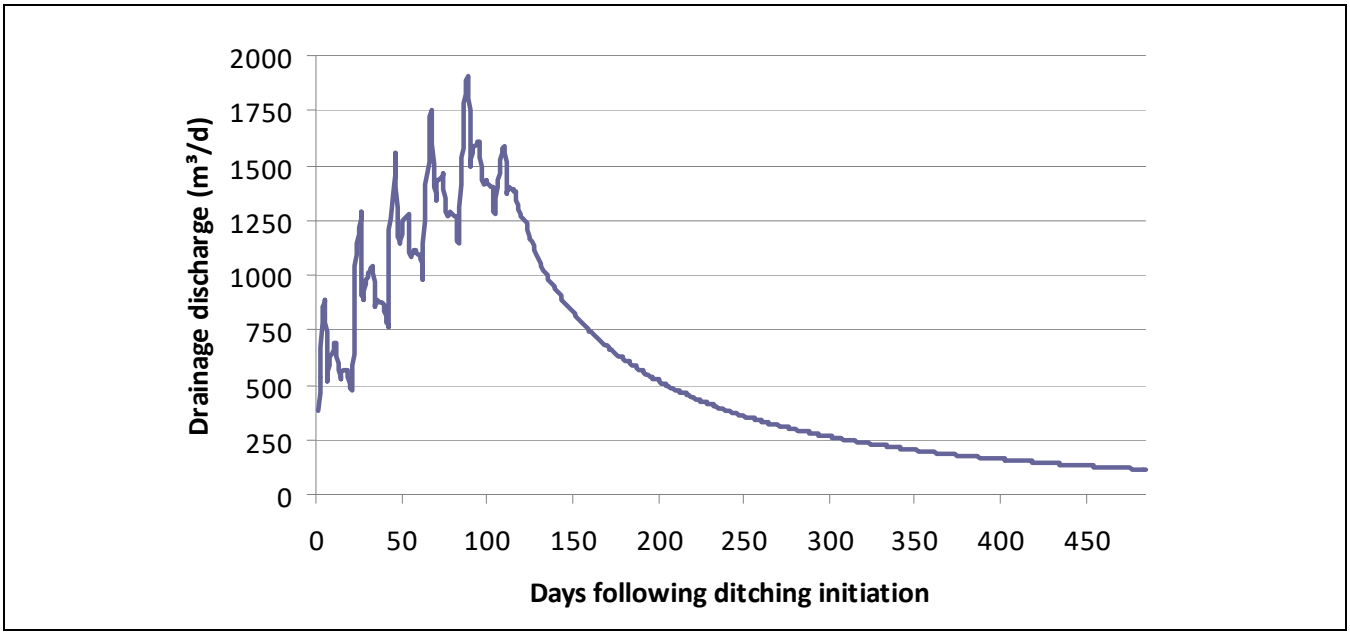

Figure 3 Expected Peatland Drainage Discharge During Development Opening

Sustained extraction in areas where natural peat thickness exceeds 2 m will eventually require drainage of deeper portions of the peat deposit, as the layer of dry extractible peat is reduced. Additional drainage will be carried out through deepening of existing secondary ditches. Ditches deepening will take place yearly after initial development opening or on an as needed basis. The deepening rate and targeted depth for a given deepening phase will be smaller than those related to initial cutting sequence. Drainage discharge will thus be significantly smaller than that expected during development opening.

Rainfall and snowmelt events generate surface runoff when the infiltration capacity of the surface has been exceeded. Surface runoff from each field flows towards the secondary ditches, where it is collected by the drainage network. Surface runoff collection by the drainage network may take place during ditching, in response to episodes of runoff-generating rainfall. In such cases, water discharge at the network outlets originates from both drainage and runoff. During harvesting, water discharge at the outlets essentially comes from runoff generation induced by precipitation. For this reason, the water sample collection program to be conducted during the initial development phase is reduced after the second year.

A secondary component of water discharge at the outlet originates from the resurgence of rainfall/snowmelt from the peat fields and into the ditch network, after infiltration and porous-medium flow through peat. Due to the time required for runoff from distant parts of the watershed to reach a given outlet ("concentration time"), the peak discharge occurs in phase with, or slightly lagging, episodes of rainfall or snowmelt. The timing of the discharge also depends upon the duration and intensity of the precipitation events, as well as the antecedent climatic conditions and moisture condition of the peat field surface at the start of the runoff event. The discharge rate is generally low to moderate, although it may be elevated during episodes of intense surface runoff. Phases of elevated discharge rate generally have a short duration. The volume of water discharge associated with surface runoff is proportional to the precipitation recorded and inversely proportional to the magnitude of infiltration and evaporation (in the case of snowmelt).

The timing of water discharge associated with resurgence of infiltrated rainfall/snowmelt in the ditch network is delayed with respect to the infiltration episode(s). Because of the moderate permeability of drained peat, flow through peat and subsequent discharge to the ditches occur at a relatively low rate. For this reason, discharge rate at the network outlets is generally low. Volumes of water discharge associated with infiltrated rainfall/snowmelt resurgence are proportional to the magnitude of infiltration and inversely proportional to the magnitude of evaporation.

It is expected that discharge water originating from peat drainage exhibits a chemical signature similar to that of water commonly found in peatlands of the area. Drainage water is thus acidic, with pH that may range around 4.0. Given the ombrotrophic characteristics of Peatland No. 343, the electric conductivity, metals content and inorganic compounds concentrations are expected to be generally low, and below concentrations recorded in waters of the peatland's receiving streams.

The chemical composition of discharge associated with surface runoff should be similar to that of rainfall and snowmelt water, given the relatively short transit time through the peatland. Discharge associated with resurgence of infiltrated rainfall/snowmelt water in the ditch network should likely exhibit hybrid chemical characteristics, being influenced by both rainfall/snowmelt water quality and the chemical characteristics of peat. Ion content and conductivity of discharge generated by resurgent water should be low, and acidity should be moderate.

In addition, when runoff occurs on a snow-free surface, suspended solids in the form of peat particles are generally mobilized and transported by the runoff. However, it is expected that suspended solids content in discharge associated with resurgence of infiltrated rainfall/snowmelt water be low, as peat particle mobility is restricted to water flow within the ditches.

Runoff water discharge into the sedimentation ponds thus has variable suspended solids content, depending on the intensity of the runoff, antecedent climatic conditions, the moisture condition of the peat field surface at the start of the runoff event, and the field activities being conducted (e.g., maintenance ditching).

FIELD PREPARATION

Peat field preparation consists of the removal of trees and the dome-shaped contouring of peat fields to facilitate drainage. All non-merchantable timber and shrubs are mulched, and the debris are used for bog road construction and to fill depressions in the peatland.

A profiler is used to profile (dome-shape) peat fields by scraping and moving peat from the edges toward the center of fields. This dome-shaped profile allows adequate drainage and favors peat drying.

BOG ROADS AND IN-FIELD STOCKPILING AREAS

The revised development plan includes two bog road built on the peatland. One on the south-north axis along the watershed divide of the peatland to access peat fields (Map 2). The other is along an east-west axis between the service area and the other bog road. The road width is extended to accommodate temporary stockpiling of the harvested peat before it is transferred to the service area. The total width of the bog roads and stockpiling areas is 35 m. The bog roads are made of woody material removed during field preparation. They will be covered with a geotextile and a 45cm layer of gravel to ensure adequate soil bearing capacity for the machinery.

3.6.3 OPERATION PHASE

The operation phase involves harrowing, harvesting, stockpiling, peat transportation, drainage and maintenance.

HARROWING

Peat fields are first harrowed to a depth of approximately 15 cm using tooth rakes attached to tractors to decompress the undisturbed compacted peat and break it up into small chunks. Before harvesting can start, fields are again harrowed with other types of equipment to loosen up 2 to 4 cm of peat for drying.

HARVESTING

Harvesting may occur between April and November, but it generally concentrates from June to September. Weather conditions represent the major constraint since peat must be harvested when it is dry. Harvesting operations may take place from sunrise to sunset, 7 days a week. The expected annual rate of harvesting is estimated at around 8.5 cm of peat or 850 m^3/ha. Once dry, peat is collected using a method referred to as pneumatic harvesting, which alternates with harrowing. Sun Gro uses standard two-headed vacuum harvesters equipped with dust collection systems installed underneath the harvester. Commonly, harvesters go up and down a field and dump the collected peat into stockpiles along the bog roads.

STOCKPILING

Usually, vacuum harvesters travel up and down a field and dump the harvested peat into stockpiles along the bog road. Peat is loaded from these field stockpiles into large trailers with a front-end loader and hauled to the stockpiling area within the service area. To maintain the quantity and quality of harvested peat, stockpiles are covered with large plastics tarps. This procedure prevents any possible loss of peat by wind action or soaking by heavy rain. Covering the stockpiles also reduces the risk of peat particles being transported in the drainage network and/or outside the developed area.

TRANSPORTATION

There is no on-site peat processing. Peat is transported in bulk to the Sun Gro Inkerman processing plant using a highway tractor and a tarp-covered, enclosed 16 m foot walking floor (self-unloading) trailer (Map 3). Trucks follow Highway 11 for 70 km and turn right on Pallot road for another 2 km to reach Inkerman facilities.

Transportation of the peat generally occurs on a daily basis and the number of shipments varies, depending on the Inkerman processing plant requirements. It is estimated that during normal operations, the number of daily shipments is around 6.

A maximum of 10 to 12 shipments might be necessary during high demand periods. According to the development plan, volumes of harvested peat will diminish as parts of the peatland will be depleted. Consequently, the number of shipments per year will decrease with time (Table 3).

MAINTENANCE

Secondary ditches are renewed yearly before closing the peatland for winter. Accumulated debris are removed as needed to maintain a constant depth. Perimeter ditches are cleaned if necessary.

Peat field maintenance includes reshaping (for dome-shaped fields) using a leveler. Branches, roots, and other wood debris on the field's surfaces are collected with a special rake hauled off and used for bog road maintenance. These operations are conducted yearly, preferably in the fall after harvesting season and prior to winter. However, any of these operations can be carried out when necessary.

SITE ACCESS CONTROL

The access to the site is controlled by a gate at the entrance of the access road. The gate is locked after work hours. Keys were provided to the local forestry district office to permit access to the site in the event of a forest fire, or other situations where access is required.

3.6.4 DEVELOPMENT SCHEDULE

A development schedule for Peatland No. 343 has been designed, which is based on the following assumptions:

- Peatland area with a peat depth of 1 m and over = 104.87 ha (does not include 5.1 ha added to the south of the peatland);
- Harvesting rate = 8.5 cm/yr;
- Loss of 50 cm of surface peat due to shrinkage of peat following drainage;
- A layer of 30 cm of peat left in place (Section 3.5).

In order to estimate areas and volumes of peat that will be harvested, data from Keys and Anderson (1987c, 1987d) were used to create a digital elevation model. Given the above assumptions, it has been determined that approximately 1.63 million m^3 of horticultural peat could be extracted over a 42-year period, taking into account the subsidence of peat following drainage (50 cm).

However, life expectancy of the Project was first estimated at 32 years. This represents a total of 4.79 million bales of peat[1]. These estimates do not take into account losses of harvestable peat due to the bog roads.

Table 3 presents the original development schedule that includes annual and cumulative production areas, peat production volume as well as abandoned areas. Map 4 illustrates the evolution of harvested and abandoned areas at 5 years intervals according to this schedule. As peat depths are thicker in the center of the peatland, results show a constant decrease of the harvested area in a centripetal pattern.

FPM started Peatland No. 343 development and did not develop all the proposed harvest area as expected during the first year. As of the end of 2021, 32 ha had been prepared for harvesting. The acquisition by Sun Gro of private land to the south that was not included in the initial 2010 EIA adds 5.1 ha to the harvest area. Sun Gro also acquired the private land to the east of the lease area, a section that was already considered in the 2010 EIA (Option 1). Table 3 shows the original schedule, and it was not updated to show the change from the original development plan.

1 peat bale = 0.17 m^3, containing 0.34 m^3 of peat compressed 2:1.

Table 3 Peatland No. 343 Development Projection

Year	Production Area (ha)	Abandoned Area (ha)	Abandoned Area (ha) - Cumulative	Peat Production (m^3)	Cumulative Peat Production (m^3)	Peat Production (bale)[1]	Shipments to processing plant[2]
2011	104,87	-	-	89 140	89 140	262 175	660
2012	104,87	-	-	89 140	178 279	262 175	660
2013	104,87	2,46	2,46	89 140	267 419	262 175	660
2014	102,41	3,73	6,19	87 050	354 468	256 028	645
2015	98,68	3,85	10,04	83 878	438 346	246 699	621
2016	94,83	3,38	13,42	80 605	518 950	237 072	597
2017	91,45	3,20	16,61	77 735	596 686	228 633	576
2018	88,26	3,12	19,73	75 017	671 703	220 639	556
2019	85,14	3,09	22,82	72 365	744 068	212 839	536
2020	82,05	3,04	25,86	69 743	813 811	205 125	517
2021	79,01	3,10	28,97	67 156	880 967	197 517	497
2022	75,90	3,24	32,20	64 519	945 485	189 761	478
2023	72,67	3,35	35,55	61 766	1 007 251	181 664	458
2024	69,32	3,79	39,34	58 922	1 066 173	173 301	436
2025	65,53	4,43	43,78	55 698	1 121 871	163 818	413
2026	61,09	4,38	48,16	51 929	1 173 800	152 733	385
2027	56,71	4,52	52,68	48 205	1 222 005	141 780	357
2028	52,19	4,26	56,94	44 361	1 266 366	130 474	329
2029	47,93	3,66	60,60	40 740	1 307 107	119 825	302
2030	44,27	3,53	64,14	37 628	1 344 735	110 670	279
2031	40,73	3,51	67,65	34 624	1 379 358	101 835	256
2032	37,22	3,44	71,09	31 637	1 410 995	93 050	234
2033	33,78	3,45	74,54	28 713	1 439 708	84 449	213
2034	30,33	3,45	78,00	25 779	1 465 488	75 822	191
2035	26,87	3,33	81,32	22 843	1 488 331	67 186	169
2036	23,55	3,46	84,79	20 016	1 508 347	58 871	148
2037	20,08	2,72	87,50	17 072	1 525 419	50 212	126
2038	17,37	2,20	89,70	14 764	1 540 182	43 422	109
2039	15,17	0,02	89,72	12 895	1 553 078	37 927	96
2040	15,15	1,95	91,67	12 878	1 565 956	37 877	95
2041	13,20	1,67	93,33	11 222	1 577 178	33 006	83
2042	11,54	1,46	94,80	9 805	1 586 983	28 839	73
2043	10,07	1,30	96,10	8 563	1 595 546	25 185	63

[1] 1 peat bale = 0.17 m^3, containing 0.34 m^3 of peat compressed 2:1.
[2] Estimates are based on a truckload capacity of 135 m^3 of peat.

3.6.5 DECOMMISSIONING PLAN

The decommissioning plan is based on the decommissioning guidelines developed by the New Brunswick Department of Natural Resources (Thibault, 1998, NBDNR, 2005). It consists of a rehabilitation plan that involves rehabilitation options to be implemented to return abandoned peat fields to acceptable habitat conditions and measures to dismantle infrastructures. It also includes a cost estimate for the rehabilitation plan.

REHABILITATION PLAN

At this point, the rehabilitation plan represents a conceptual plan that relies on anticipated conditions at cessation of peat harvesting activities. It will need to be revised in the future.

The primary goal of peatland rehabilitation is to restore harvested sites to wetland conditions. Three options are considered:

- Sphagnum restoration
- Forested wetland reclamation
- Open water body creation

The best available methods at the time of reclamation work will be applied. At this point, this comprises methods developed by the Peatland Ecology Research Group (PERG) for rewetting (Landry & Rochefort, 2012), re-establishing peatland vegetation (Quinty & Rochefort, 2003) and planting tree species (Hugron *et al.*, 2013). The reclamation plan should favor the option that has the best chance of success according to anticipated conditions at the cessation of peat harvesting.

SPHAGNUM RESTORATION

The objective of sphagnum restoration is to re-establish a moss-dominated wetland ecosystem. A peatland restoration method was developed with the help of the Canadian peat industry (Quinty & Rochefort, 2003). This method is currently applied successfully to abandoned peatlands in eastern Canada. This approach usually allows re-establishment of a peatland vegetation cover within 5 years and restoration of the local hydrologic cycle within 17 years. This option has the best chance of succeeding where bog conditions still prevail, that is where a 40-50 cm layer of peat has been left in place, acidic conditions are still present, and where the water level can be kept close to the surface. Such conditions can be created in abandoned fields where drainage can be blocked without affecting bog roads or nearby fields that are still being harvested. It also depends on peat bottom topography.

This approach consists of shredding the top living vegetation layer in undisturbed peatland areas. This plant material is spread over abandoned peat fields at a 1:10 ratio (borrow area: restored area) and covered by straw mulch. Light phosphorus-rich fertilizer is added to speed up plant establishment and prevent damage from frost heaving. Site specific field preparation, such as dyke construction, may also be required to favor uniform wet soil conditions. Plant material is commonly collected from borrow areas such as new peat fields being developed, or from shallow peat areas within lease limits. It is important to note that donor site vegetation can recover rapidly after plants are collected (Guêné-Nanchen *et al.*, 2019).

Sun Gro proposes to perform sphagnum restoration over an area of approximately 63.27 ha located in the southern portion of Peatland No. 343 (Map 5). It is anticipated that this section will offer best conditions for sphagnum restoration because it has a ± 50 cm layer of decomposed peat that will likely be left in place, it is bordered by wetlands that will serve as a water recharge and peat bottom topography consists of a depression that should help maintain adequate hydrological conditions for peatland vegetation, namely *Sphagnum* mosses.

Plant material will be collected within the 0 to 1 m peat depth area.

FORESTED WETLAND RECLAMATION

Forested wetland reclamation represents a suitable option in drier and/or minerotrophic conditions (Bussières *et al*., 2008; Hugron *et al.*, 2013). The long-term objective is to turn depleted peat fields into forested wetland habitats. These habitats should be comparable to those that already exist around Peatland No. 343 and regionally.

The short-term goal of forested wetland reclamation consists of planting tree seedlings and favoring spontaneous colonization by vegetation to start a process that will lead to forested wetlands. The tree species most planted on abandoned peatlands, Black Spruce (*Picea mariana*), Tamarack (*Larix laricina*) and Jack Pine (*Pinus banksiana*), will be considered. It is strongly suggested to plant more than one species to obtain a higher biodiversity and to prevent die out due to disease or other problems that can affect one species. However, Black Spruce will be favored in drier areas and Tamarack in wetter and more minerotrophic conditions.

According to the current tree planting method in harvested bogs, seedlings are planted at a density of 1,200/ha, which corresponds to a spacing of 3 m between plants. They are fertilized with 10 g of 20-11-9 in the form of pills or tea bags inserted in the soil close to the roots. Seedlings are planted in patterns that mimic natural forest typical of bog-edge habitat rather than a tree plantation. Other plant species, such as Birch and ericaceous shrubs, should establish themselves spontaneously and increase biodiversity (Poulin *et al,* 2005). Planted trees should speed up the re-colonization process by providing sheltered sites. With time, ditches will get clogged, and the water level will rise slowly, leading to forested wetland conditions.

Forested wetland reclamation will be performed on 41.60 ha in the northern sections of Peatland No. 343 (Map 5). Peat data reveals that undecomposed sphagnum peat is found almost to the bottom of the bog in these areas (Keys & Henderson, 1987b; 1987c). As a result, a shallow layer of peat should be left, which would be more conducive to minerotrophic conditions. Moreover, it is expected that the neighboring forested uplands may also induce minerotrophic influence that would be detrimental to sphagnum restoration especially at the margin of the bog.

OPEN WATER BODY CREATION

Creation of open water bodies improves the ecological value of restored wetlands because they provide habitat for specific species of ecologically valuable plants, invertebrates, and insects (Fontaine *et al.*, 2007). Bog pools can also be used by birds and wildlife. Open water body creation is a worthwhile option in depressions and low-lying zones where water accumulates and prevents sphagnum restoration or tree planting. It was shown that created bog pools are rapidly colonized by amphibians and certain insects, but that vegetation requires more time to become established (Mazzerolle *et al*., 2006).

Open water bodies are planned to be created in most depressions with permanent or intermittent standing water across sphagnum restoration and forested wetland reclamation areas. These spontaneously occurring ponds may be enlarged to increase the surface of open water bodies or reshaped to improve habitat conditions such as shelter for waterfowl and wildlife. Leaving some ditches open is another way to create open water bodies. All created water bodies will be shallow with gentle slopes for safety.

INFRASTRUCTURE DECOMMISSIONING

Infrastructure decommissioning involves the dismantling of the service area, main ditches, bog roads, and a temporary access road located to the north of the peatland.

The service area will be cleared of all buildings or other structures. Soil will be tested for contamination, although appropriate measures will have been applied from the outset to avoid spills and leakage. If contaminated soil is found, it will be treated in accordance with New Brunswick regulations and standards. Finally, the area that lies on the mineral outcrop will be planted with tree seedlings.

Main ditches will be blocked or filled in such a way as to ensure proper conditions for sphagnum restoration, tree planting or open water bodies. Some sections of ditches may not be filled and may therefore become open water bodies.

Mineral bog roads will be decommissioned at closure of the peatland using the best methods available (some road decommissioning methods are being tested by Valores). At the time of decommissioning, Sun Gro will evaluate the possibility of leaving the access road intact for post-decommissioning monitoring purposes, or for use by other eventual land users.

An access road was built to the north of the peatland at the first stage of development. It lies on upland, but damage was made to surrounding wetlands. Sun Gro will restore the damaged area using applicable methods.

DECOMMISSIONING SCHEDULE

Sun Gro will implement appropriate rehabilitation options as progressive decommissioning as soon as sufficient area is abandoned provided that does not interfere with its operations. For instance, sphagnum restoration has a better chance of success and is more cost efficient when it is conducted over a substantial area (> 5 ha). It was initially expected that some surfaces be abandoned by 2016 as a small strip around the production area, and sphagnum restoration and forested wetland reclamation begin around 2021, but development of Peatland No. 343 is far behind the original schedule. The decommissioning schedule will be updated concurrently with the development schedule, and it will be submitted to DELG and DNRED.

REHABILITATION COSTS

The estimated cost of rehabilitation is based on 2010 cost for sphagnum restoration and forested wetland reclamation, which are $2,000/ha and $720/ha respectively. The cost for open water body creation is highly variable. When permanent standing water occurs in depressions, there is almost no cost. If ponds have to be dug out, the cost can rise over $2,000/ha. In general, only small ponds (0.05 ha) are dug out and that does not influence the overall cost of restoration.

Based on the conceptual rehabilitation plan, the cost for rehabilitating Peatland No. 343 is estimated at $133,785, including $91,060 for sphagnum restoration of 63.27 ha and $42,725 for forested wetland reclamation of 41.60 ha.

4 DESCRIPTION OF THE EXISTING ENVIRONMENT

4.1 BIOPHYSICAL ENVIRONMENT

4.1.1 GEOLOGICAL AND GEOMORPHOLOGICAL SETTING

Peatland No. 343 is located in the Maritimes Carboniferous basin. This basement is formed by thick and complex sequences of sedimentary rocks. The predominant lithologies found in the area are sandstones, conglomerates, siltstones and mudstones. The bedrock is overlain by deposits of glacial origin, namely loamy lodgment till and minor ablation till. The units are mostly formed of silt, sand, gravel, and rubble. The thickness of till deposits generally ranges between 0.5 and 3 m. A fringe of marine deposits covers the till along the local coastline. This fringe, which encompasses Peatland No. 343, extends inland between 5 and 10 km. Marine deposits are essentially composed of sand and silt, with some clay and/or gravel. Vertical extent of the marine deposits varies between 0.5 and 3 m. Organic deposits, namely peat and muck, overlie the mineral blanket at Peatland No. 343.

Peatland No. 343 is located in the coastal plain bordering the Miramichi Bay (Map 6). The area is slightly undulating, with a mild topographical gradient oriented towards the southeast and Miramichi Bay.

4.1.2 PEAT CHARACTERISTICS

According to the New Brunswick peatland survey (Keys & Henderson, 1983a), Peatland No. 343 covers 213 ha, of which 49% is more than 1 m deep. Based on the analysis of the 50 peat cores that were taken throughout the peatland, these authors estimated the volume of *in situ* poorly decomposed (H1-H4) sphagnum peat at 2.29 million m^3 within the area with over 1 m of peat. According to a recent estimation that takes into account the subsidence of peat following drainage, the total harvestable volume of peat would be 1.63 million m^3.

Poorly and moderately decomposed peat accounts for 88% of the peat volume in the area with over 1 m peat depth. In fact, humic peat forms a thin discontinuous layer at the base of the peat deposit, and it is almost absent in the north section of the bog. Sphagnum peat largely dominates all peat layers. It is often mixed with shrubs or sedge in the shallow area in the eastern section or with both at the base of the deposit.

4.1.3 CLIMATOLOGY

Peatland No. 343 is located in the maritime climatic zone, which is characterized by cool temperatures and frequent precipitation year-round. The closest meteorological station is Miramichi A, operated by Environment Canada. Mean yearly temperature is approximately 4.7 °C at the site (Environment Canada, 2010). Mean, minimum, and maximum temperatures for July are 19.2 °C, 13.1 °C and 25.3 °C, respectively.

Mean, minimum and maximum temperatures for January are -10.7 °C, -16.4 °C and -4.8 °C, respectively. Generally, periods with the most precipitations are at the end of fall and in the beginning of winter.

However, the wettest month is usually July, with total precipitation of 106.1 mm, falling exclusively in the form of rain. The following month, August, generally records the lowest precipitations, along with April. A total average of 89.2 mm water equivalent is normally received during both months. Mean precipitations of 58.1 mm of rain and 29.6 cm of snow (31.1 mm water equivalent) occur during April, while only rainfall-type precipitations occur in the month of August.

The most frequent wind direction during the peat harvesting season is northeast for May, south for June and southwest from July to September.

Details regarding the average monthly temperatures and precipitation are presented in Table 4.

Table 4 Average Monthly Temperature and Precipitation in the Study Area

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Temperature												
Daily mean (°C)	-10.7	-9.1	-3.3	3.1	10	15.9	19.2	18.3	13	6.6	0.5	-6.9
Precipitation												
Rainfall (mm)	29.1	18.6	31.5	58.1	95.8	89.3	106.1	89.2	85.5	94.8	73.2	42.3
Snowfall (cm)	70.3	54.6	64.3	29.6	1.7	0	0	0	0	2.5	26.7	60.3
Total (mm Water Equivalent)	95.5	72.1	94.3	89.2	97.7	89.3	106.1	89.2	85.5	97.4	99.4	99.4

4.1.1 HYDROGEOLOGY

Groundwater is present throughout the entire local stratigraphic sequence. The various geological formations however exhibit different hydrogeological behaviour. In the peat deposits, the acrotelm[2] has permeability several orders of magnitude higher than that of the catotelm. Hence, in saturated to nearly saturated conditions, water flow mainly occurs within the acrotelm. Conversely, the catotelm generally remains saturated, but its low permeability precludes significant water flow.

The major component of flow in the acrotelm is horizontal, while vertical exchanges with the underlying catotelm do occur, however at a lower rate. Water fluxes between the acrotelm and catotelm may be oriented upward or downward, depending on the point-specific hydraulic conditions. Horizontal water flow in the acrotelm and catotelm essentially occurs in a direction parallel to the local topographical gradient. Hence, it is oriented from the center of the bog towards its periphery.

Fine-textured marine sediments and glacial deposits essentially act as aquicludes in the local hydrogeological system. Their low permeability precludes the occurrence of significant water flow, whether along the horizontal or vertical axis. As a result, no significant groundwater fluxes take place between the peat and the underlying mineral deposits (Carrier, 2003). Hence, the peat deposit essentially behaves as a closed groundwater system, independent from the bedrock aquifer.

Sedimentary rocks forming bedrock are generally fractured. Most groundwater movement in the bedrock aquifer occurs along the fractures that pervade the rock mass, although some flow may as well take place within the porous matrix (Stapinsky *et al.*, 2002). Local available data indicate that the piezometric surface of the bedrock aquifer would lie below bedrock surface, which means that unconfined conditions would prevail within the aquifer.

Horizontal groundwater flow in the bedrock aquifer is generally oriented in accordance with the topographical gradient. Recharge of the aquifer essentially occurs through rainwater infiltration in areas where bedrock outcrops and/or where it is overlain by a thin and/or permeable mineral overburden cover. Because of the low permeability of till deposits overlying bedrock, no significant groundwater recharge would occur in the area of Peatland No. 343.

[2] The acrotelm is the upper layer of a peat bog, in which organic matter decomposes the presence of oxygen. The catotelm is the underlying layer which is permanently below the water table.

It would instead take place in areas located north and northeast of the study area, from upland locations where bedrock outcrops and where till veneers of less than 0.5 m discontinuously overlie bedrock. Groundwater thus flows from these areas towards both the Gulf of Saint-Lawrence (eastward) and Miramichi Bay (southward).

The local presence of outcropping coarser marine deposits may lead to the formation of near-surface water tables at a site-specific scale, when such deposits extend some meters along the vertical axis. Such water tables would only have limited horizontal and vertical extend, as well as a significance that would be strictly local. In addition, no sustained water abstraction from such water tables is possible, because of their very low storage capacity. No water table of that sort however exists within Peatland No. 343, given the nature of the deposits outcropping therein.

Research carried out in New Brunswick Well drillers database revealed that the closest groundwater-pumping wells drilled after 1995 are located between 1.7 and 1.8 km from the approximate center of Peatland No. 343. Domestic wells are likely present in dwellings located along Provincial Road 11, although it was not possible to locate them individually.

4.1.2 WATERCOURSE, FISH AND FISH HABITAT

Peatland No. 343 is composed of a coastal bog-pool system that is linked to three neighboring (and unnamed) watercourses. They act as receiving streams, as the convex profile of the peatland inherited from peat accumulation places Peatland No. 343 in an upland position with respect to local surface drainage. The peatland periphery forms the headwater of the streams, which have their source at the approximate contact between peat blanket outer limit and forested lands. One of the streams flows westward towards Oyster River over a distance of 0.7 km. The other two flow eastward towards Whites Brook (Map 2) over distances of 0.7 and 0.6 km.

A fourth stream would be linked to Peatland No. 343, according to hydrographical data provided by Service New Brunswick's Land Information Secretariat (2010). It would connect the northern end of Peatland No. 343 with a small wetland of about 1.5 ha located approximately 600 m to the north (Map 2). Examination of aerial photographs and site visits did not allow the formal identification of this stream. Topographical data indicate that if actually existing, the stream would be flowing from the small wetland towards Peatland No. 343, which would act as the receiving body. Water from the stream would discharge at the peatland margin, where flow would become diffuse.

No lake or large pond are present within Peatland No. 343 proposed development area. Small pools may be found throughout the bog.

Oyster River, located to the west, runs in a southward direction at a minimum distance of 400 m from Peatland No. 343. It is formed by the confluence of its West Branch and East Branch, which sits approximately 350 m upstream of the confluence between Oyster River and Peatland No. 343's western receiving stream. The shortest distance of the East Branch with the peatland is 150 m (northwest sector). Oyster River discharges in Miramichi Bay at 3.5 km south of the latter confluence, west from the community of Oak Point and its watershed covers 3,154 ha (31.5 km^2). Whites Brook flows in a southeastern direction and the shortest distance with Peatland No. 343 is 170 m (southeast sector). Its watershed spreads over 1,004 ha (10 km^2). It also discharges in Miramichi Bay, approximately 2.5 km south of its confluence with Peatland No. 343's eastern receiving stream.

As requested by the Department Fisheries and Oceans Canada (DFO), fish communities were sampled in late June 2010 using electrofishing based on a sampling protocol approved by DFO (Appendix C). Two fish species were caught: Atlantic Salmon (*Salmo salar*) and Brook Trout (*Salvelinus fontinalis*).

The 2 stations sampled on East Branch Oyster River and Oyster River yielded Atlantic Salmon (n=10). All the individuals were parr and fry. Appendix D provides the complete results of fish sampling and watercourse characterisation while Table 5 below presents the main ones.

Table 5 Main Results of the Watercourse Survey

Watercourse (Station)	Mean Depth (m)	Mean Width (m)	Substrate of Riverbed (mean %)				Mean Shade (%)	Mean Flow Velocity (m/s)
			Gravel	Sand	Rubble	Fines		
East Branch Oyster River (343-1)	0.25	4.0	55	10	35	0	28	<0.50
Tributary of Oyster River (343-2)	0.25	1.1	10	60	0	20	47	<0.50
Oyster River (343-3)	0.23	6.0	45	15	20	0	27	0.50
Whites Brook (343-4)	0.20	1.3	25	60	0	15	40	<0.50
Tributary of Whites Brook (343-5)	0.10	0.70	30	40	15	10	50	<0.50

No fish was caught in the receiving stream west of Peatland No. 343.

Electrofishing in Whites Brook resulted in the capture of 12 Brook Trout and one Ninespined Stickleback (*Pungitius pungitius*). Fish were also caught in a tributary of Whites Brook, about two-thirds of the way along its length before it discharges into Whites Brook. Brook Trout was the only species captured (n=3).

Results indicate that the two main watercourses in the vicinity of Peatland No. 343 provide quality habitat for cold water species for any of their biological needs. Catches of parr and fry individuals of Atlantic Salmon in both fished segments of Oyster River and East Branch Oyster River denotes the presence of spawning grounds for this species. The same is true for Brook Trout, who also benefits from adequate habitat conditions to reproduce, including in Whites Brook. It is worthwhile to point out that Atlantic Salmon and Brook Trout are species sensible to water quality, namely water temperature and pH.

None of Peatland No. 343 direct receiving streams are used for angling or recreational purposes. Oyster River and Whites Brook support Brook Trout populations that are fished by recreational anglers. Oyster River also supports an Atlantic Salmon population, which represents a significant interest for fishing. In addition, shellfish growing activities take place within Miramichi Bay.

Neither Oyster River nor Whites Brook is classified under the *Water Classification Regulation*. A water classification strategic plan has however been put forward for the Miramichi River and its bay. Under this plan, Oyster River and Whites Brook are included in the Estuary Drainage. Miramichi River watershed was under assessment, with the objective of issuing a classification for the river and its tributaries. Estuary Drainage assessment was supposed to be carried out between 2012 and 2014, and classification be produced between 2016 and 2018. No information resulting from these assessments was found during the 2022 revision of the EIA.

4.1.3 WATER QUALITY

Surface water was sampled in receiving and/or nearby streams of Peatland No. 343. Sampling at western and eastern receiving streams aimed at documenting and monitoring surface water quality downstream from the peatland.

In addition, sampling took place upstream (East Branch) and downstream from the confluence of the western receiving stream with Oyster River. Whites Brook was sampled upstream from the confluence of with Peatland No. 343's eastern receiving stream.

Surface water sampling had been carried out twice at time of submission of the 2010 EIA, in late June and early November 2010. These phases are deemed representative of summer and fall conditions, respectively. Additional sampling was planned in 2011 to characterize winter and spring conditions. It is assumed that water analysis results from these sampling campaigns were submitted to the Department of Environment.

Surface waters were sampled in accordance with the *Guidelines for peat mining operations in New Brunswick* (Thibault, 1998). Analytical results from the collected water samples are provided in Table 6 and certificates of analysis are enclosed in Appendix E. The results are compared to CCME's recommended quality criteria for *Freshwater aquatic life protection* (CCME, 2007). Metals concentrations provided refer to the total concentrations, i.e., the summation of dissolved and particulate forms.

Samples collected in late June of 2010 highlighted the variability in the acidity of local surface waters. Values of pH obtained from Whites Brook, East Branch and Oyster River indicate that water flowing at the corresponding locations are slightly acidic to slightly basic, ranging between 6.6 and 7.3. All these values fall within the pH values bracket prescribed by CCME for aquatic life protection. In contrast, tributaries of Oyster River and Whites Brook, respectively western and eastern receiving streams of Peatland No. 343, display sharp levels of acidity, with pH values (4.5 and 4.6) falling well below recommended CCME lower limit (6.5).

Significantly lower pH values were measured in samples collected in November 2010 in all five streams. Values measured in samples from East Branch, Oyster River and Whites Brook all decreased by more than one unit with respect to values measured in June 2010. Corresponding pH values ranged between 5.5 and 6.2, which is outside of CCME's recommended range for aquatic life protection. Similar although smaller decreases were observed for pH of waters flowing in western and eastern receiving streams, with values of respectively 3.7 and 4.0 recorded in November 2010.

Water conductivity and hardness display a similar spatial pattern, with maximum values recorded in Oyster River and East Branch, and minimum values generally recorded in the two receiving streams of Peatland No. 343. Low sulfates concentrations were also detected in waters of the two receiving streams during the sampling campaign of November 2010.

Nitrogen was detected in the two samples collected in Whites Brook as well as in East Branch's June sample. Additionally, nitrates were recorded in Whites Brook's June sample and Oyster River's November sample. These detections are likely related to activities taking place upstream from the two sampling points.

Metal concentrations present in local stream waters exhibit different patterns depending upon the sampling station and date of sampling. Aluminum and iron exceed CCME corresponding criteria in all sampled surface waters for both June and November monitoring campaigns. Highest aluminum concentrations were recorded in the two receiving streams as well as in Whites Brook in late June. Significant concentrations decrease was observed in November in all three streams, and results of November for the two receiving streams are lower or very slightly above those obtained for the streams in which they subsequently discharge (Oyster River and Whites Brook). Iron concentrations recorded in June 2010 in the two receiving streams exceed CCME criterion for the compound by a factor of about 9. November concentrations in those streams indicate a decrease by a factor between 2 and 2.5 with respect to concentrations of June.

Concentrations exceeding CCME criteria for cadmium and lead were recorded in all, but one sample collected in the two receiving streams. Significant decrease is however observed for cadmium between June and November. Cadmium concentrations recorded in East Branch display a similar pattern. In contrast, water samples collected in Oyster River and Whites Brook indicate criteria exceeding for cadmium during November, while the compound had gone undetected in June.

Low concentrations of chromium and mercury were measured in waters flowing in Whites Brook during the month of June. Equal concentration of mercury was as well measured in East Branch. Waters sampled during the same period in the eastern receiving stream displayed chromium and mercury concentrations respectively above and below CCME criteria for the corresponding compounds. Chromium and mercury concentrations measured in November again displayed significant decreases, with all but one result indicating an absence of detection.

Zinc concentrations recorded throughout the monitoring grid are all lower than CCME applicable criterion. Results obtained for western and eastern receiving streams indicate concentrations decrease by a factor of approximately 2 between June and November 2010, while results from the other streams indicate a relative stability in the compound's presence.

Cobalt and phosphorus concentrations recorded in the various streams over both sampling phases all comply with CCME applicable criteria. In addition, nickel or vanadium were not detected in any sample collected throughout 2010 monitoring around Peatland No. 343.

These results highlight the different environmental conditions prevailing in the streams surrounding Peatland No. 343, which in turn control their respective water quality. As such, strong influence from peatland drainage waters appears in the western receiving stream, which discharges to Oyster River, as well as in eastern receiving stream, which discharges to Whites Brook. This is supported by low pH, conductivity and hardness as well as generally high metals content.

A strong seasonality appears in the various water quality results obtained for western and eastern receiving streams. In contrast, concentrations observed in late June and early November 2010 in East Branch, Oyster River and Whites Brook are generally similar, with pH of all three streams and, to a lesser extent, cadmium in East branch and nitrogen in Whites Brook being the most significant exceptions.

Seasonality in the receiving streams is essentially expressed by major decreases in pH and metals concentrations. Such discrepancies would be linked to different hydric conditions prevailing during the two sampling phases. Sampling of late June took place in conditions of relatively low flow, while sampling of early November took place following periods of important rainfall and equally elevated flow. Wet conditions led to a greater discharge from Peatland No. 343 of low-pH, low metals content waters in both receiving streams.

In opposition, drier conditions in late June translated into smaller water discharge from the peatland to the receiving streams, which resulted in a greater relative contribution from other forms of water input displaying lesser acidic characteristics and a higher metals content.

Comparison of physical and chemical analysis results from the various streams of Oyster River watershed indicates that water quality of the western receiving stream only has a limited influence on water quality of Oyster River, into which it discharges. This influence is mostly restricted to stream water pH. The eastern receiving stream could also have an influence on water quality of Whites Brook, into which it discharges, although this could not be documented.

Water quality in Oyster River appears to be better than that of East Branch, given the absence of detection or lower concentrations recorded for total suspended solids, nitrogen, aluminum, cobalt and mercury. Certain activities taking place along East Branch upstream from Peatland No. 343 would likely impact its water quality. It is hypothesized that confluence with West Branch of Oyster River contributes to a reduction of concentration for some compounds by way of dilution.

Detection of nitrates, nitrogen, mercury and high aluminum concentrations in Whites Brook upstream from its confluence with the eastern receiving stream also indicate that water quality is impacted to some extent by certain conditions or activities prevailing upstream from Peatland No. 343. Physical and chemical signatures observed in water from the eastern receiving stream suggest that it might naturally have a further impact on water quality of Whites Brook downstream from their confluence.

No water withdrawal was identified for either direct or downstream receiving streams. Local domestic water is exclusively supplied by groundwater through private wells. No municipal well is present within the study area.

Table 6 Summary of Water Quality for Watercourses around Peatland No. 343

(See Map 1, Appendix D for water sampling stations locations)

				East Branch Oyster River 343-1		Tributary of Oyster River 343-2		Oyster River 343-3		Whites Brook 343-4		Tributary of Whites Brook 343-5	
ANALYSIS	***Units***	***DT[1]***	***CCME***	Jun. 10	Nov .10	Jun. 10	Nov .10	Jun. 10	Nov. 10	Jun. 10	Nov. 10	Jun. 10	Nov. 10
Ammonia nitrogen	mg/L	0.05 / 0.07	26.8[2]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
pH	s.o.	s.o.	6.5-9.0	7.31	**6.2**	**4.52**	**3.7**	7.34	**5.9**	6.60	**5.5**	**4.59**	**4.0**
Conductivity	µS/L	1.0 / 1.9	NR	53	50.5	29	35.7	50	46.9	31	32.8	29	40
Hardness ($CaCO_3$)	mg $CaCO_3$/L	1.0 / 0.2	NR	26	18.3	6	4.3	24	18.1	12	9.6	7	5.9
Nitrates	mg/L	0.05	13.00[3]	ND	ND	ND	ND	ND	0.7	0.05	ND	ND	ND
Total Suspended Solids (TSS)	mg/L	2.0	+25 / +5 [4]	2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Sulfates (SO_4)	mg/L	2.0	NR	ND	ND	ND	3	ND	ND	ND	ND	ND	3
TKN (Method adapted from 4500-N org C)	mg/L	5.0	NR	6	ND	ND	ND	ND	ND	5	13	ND	ND
Aluminium (Al)	µg/L	5.0 / 1.0	5-100[5]	**136**	**137**	**255**	**127**	**117**	**123**	**280**	**223**	**281**	**186**
Cadmium (Cd)	µg/L	0.017 / .01	0.017	**0.097**	0.01	**0.858**	**0.03**	ND	**0.03**	ND	**0.02**	**0.113**	**0.03**
Chrome (Cr)	µg/L	1.0	9.9	ND	ND	ND	ND	ND	ND	**2.1**	ND	**19.8**	ND
Cobalt (Co)	µg/L	0.4 / 0.1	NR	0.41	0.1	0.46	0.2	ND	0.1	ND	0.2	ND	0.4
Iron (Fe)	µg/L	50 / 20	300	**397**	**350**	**2750**	**1080**	**441**	**340**	**644**	**450**	**2620**	**1330**
Mercury (Hg)	µg/L	0.013	0.026	0.020	ND	ND	ND	ND	ND	0.020	ND	0.021	0.018
Nickel (Ni)	µg/L	2.0 / 1.0	25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phosphorus (P)	µg/L	100 / 2	10-20[6]	ND	12	ND	19	ND	11	ND	18	ND	15
Vanadium	µg/L	- / 1	NR	-	ND	-	ND	-	ND	-	ND	-	ND
Lead (Pb)	µg/L	0.5 / 0.1	1	ND	0.2	ND	1	ND	0.4	ND	0.3	**1.98**	**3**
Zinc (Zn)	µg/L	5.0 / 1.0	30	5.5	3	16.8	7	5.8	6	5.8	5	13.5	7

NR: No recommendation; DT: Detection threshold; ND: Non-detected; -: does not apply; Values in **bold** indicate an exceeding with respect to the applicable quality criterion.
CCME: Recommended quality criteria for freshwater aquatic life protection – Canadian Council of Ministers of the Environment
1: Detection threshold for June samples / Detection threshold for November samples.
2: Recommendation for ammonia nitrogen varies according to sample's pH and temperature. The value displayed in the table corresponds to a pH of 6.0 at a temperature of 25°C.
3: These recommendations are dependent upon water hardness. Indicated value corresponds to a water hardness of 0 to 60 mg/L.
4: Maximal increase of 25 mg/L with respect to background concentration for short-duration exposure and flood discharge; maximal increase of 5 mg/L for long-duration exposure.
5: Recommendation for aluminum is 5 µg/L for pH lower than 6.5 and 100 µg/L for pH equal to or higher than 6.5.
6: For mesotrophic conditions.

4.1.4 WETLANDS

Peatland No. 343 is a small round bog that covers 213 ha. It is a typical raised bog of this area, which is characterized by the presence of a dome, open vegetation, ombrotrophic conditions and deep layers of poorly decomposed peat. It developed within a depression on a sandy deposit. Peatland No. 343 has one main central dome where peat depth reaches 4.3 m and a shallow peat area located to the southeast. According to the plant survey (Appendix F), it is a non-patterned bog with pools. There is no large pond. Peatland No. 343 is surrounded by forested wetlands and uplands dominated by Black Spruce stands that are used for tree harvesting.

VEGETATION

The description of the vegetation is based on the work of D. Bastien who surveyed the vegetation at the end of May and at mid-August 2010 (Appendix F) and on the report of Hunter (1975).

The vegetation communities and their distribution are typical for this type of bog. The bog center is characterized by open vegetation dominated by an almost continuous Sphagnum mat with a more or less dense ericaceous layer and Black Spruce growing as shrubs. The bog margin supports plant communities influenced by minerotrophic conditions.

Three vegetation communities are distinguished:

1. ***Sphagnum-Ericaceous-Uniform*** (Arbustaie uniforme à éricacées *sensu* Bastien (see Appendix F))
2. ***Open Sphagnum-Black spruce shrub-Ericaceous*** (Arbustaie ouverte (*Picea mariana*) à éricacées)
3. ***Open Sphagnum-Tamarack-Carex*** (Arbustaie ouverte (*Larix laricina*) à sphaignes et cypéracées)

The Sphagnum-Ericaceous-Uniform community is found on the top of the dome and is equivalent to the Sphagnum-Ericaceous-Flark-Core community described by Hunter (1975). The quasi absence of depressions and pools explains the homogeneity and the low biodiversity of the vegetation. It has a uniform Sphagnum carpet dominated by *Sphagnum fuscum* and *S. rubellum*, a dense ericaceous cover with Sheep Laurel (*Kalmia angustifolia*) and Labrador Tea (*Ledum groenlandicum*) as main species and Black Spruce shrubs (*Picea mariana*).

The Open Sphagnum-Black spruce shrubs-Ericaceous community includes the Sphagnum-Regeneration, Sphagnum-Regeneration-Core and the Sphagnum-Undifferentiated-Ericaceous communities described by Hunter (1975). This community covers most of the peatland except for the top of the dome and the margin to the north and the west. It consists of a Sphagnum moss carpet with an ericaceous shrub layer and Black Spruce shrubs. It differs from the previous plant community because of the presence of depressions and pools and higher species diversity associated with these wetter habitats, such as a more developed grass layer. For instance, *Sphagnum magellanicum*, *S. pulchrum* and *S. papillosum* can be found in the moss layer, Leatherleaf (*Chamaedaphne calyculata*) and Bog Rosemary (*Andromeda glaucophylla*) in the ericaceous cover and Tufted Bulrush (*Scirpus cespitosus*) in the herb layer.

The Open Sphagnum-Tamarack-Carex plant community corresponds to the Sphagnum Undifferentiated-Treed vegetation of Hunter (1975). It is present along the north and west margin of Peatland No. 343. It has wet and minerotrophic conditions compare to the rest of the bog and its species composition is different. The Sphagnum carpet is dominated by *Sphagnum fallax* and sedges replace ericaceous shrubs as the second most important plant layer. Herbaceous species such as Buckbean (*Menyanthes trifoliata*) and Threeleaf False Lily of the Valley (*Smilacina trifolia*) are also present, and tamarack (*Larix laricina*) is the dominant tree species.

SPECIAL STATUS PLANT SPECIES

The 2022 Atlantic Canada Conservation Data Center (ACCDC) reports one known occurrence of rare or endangered plant species within a 5 km radius around Peatland No. 343 (Appendix G): the black ash (*Fraxinus nigra*). According to ACCDC, Peatland No. 343 lies within the range of the Southern Twayblade (*Listera australis*), a hard to see orchid that grows in peatlands. However, the two vegetation surveys conducted in summer 2010 reported no rare or endangered species.

4.1.5 FAUNA

The Canadian Wildlife Service (CWS), the New Brunswick Natural Resources (NBNR), the Atlantic Canada Conservation Data Center (ACCDC), and the New Brunswick Museum (NBM) were consulted to obtain information on migratory birds and other wildlife using the area, as well as special status species (Appendix G).

Neither biologically significant area nor managed areas were identified by the ACCDC within 5 km of the study area (Stefen Gerriets, Atlantic Canada Conservation Data Center, personal communication, 2010).

MIGRATORY BIRDS

The study area does not overlap any important bird area (IBA Canada, 2009). Roadside point counts conducted for the Maritime Breeding Bird Atlas in 2006-2010 revealed the presence of at least 62 bird species in a 10 km x 10 km square including the study area (square 20LT22; Maritimes Breeding Bird Atlas, 2010). Most of these species are fairly common throughout New Brunswick, though some are rare or uncommon in the province (Appendix G) or at risk in Canada (COSEWIC, 2022). The absence of ponds limits the potential of the bog as a habitat for waterfowl and other aquatic birds.

OTHER WILDLIFE

MAMMALS

Common species in New Brunswick, such as American Black Bear (*Ursus americanus*), White-tailed Deer (*Odocoileus virgnianus*) and Red Squirrel (*Tamiasciurus hudsonicus*) are probably using the study area throughout the year. Bogs are usually not considered as suitable habitats for Moose (*Alces alces*; Samson *et al*. 2002), but this species is often observed in shrubby vegetation at the perimeter of bogs, especially in spring (Gautreau-Daigle, 1990).

HERPETOFAUNA

Based on the online distribution maps of amphibians in Canada (Canadian Amphibian and Reptile Conservation Network, 2010) and their habitat requirements (Desroches & Rodrigue, 2004), about 15 amphibian species are likely to occur in the area. Most of them can be found in wet or damp habitats such as bogs. The presence or proximity of water is however essential for most of these species for breeding.

Eight species of reptiles are likely to inhabit the area based on the same elements. Snake species could be found throughout the study area as they often live in forests (Desroches and Rodrigue, 2004). Turtles are mainly aquatic species and therefore are probably absent from Peatland No. 343.

SPECIAL STATUS FAUNA SPECIES

The presence of 12 Species at Risk (SAR) has been confirmed in or near the study area by the ACCDC. SAR include those listed on Schedule 1 of SARA (including Special Concern species), or under provincial species at risk legislation.

SAR can be designated under the Committee on the Status of Endangered Wildlife in Canada (COSEWIC, 2022) and the Endangered Species Act of New Brunswick (DNR, 2010), as well as others provincial species at risk legislation. Table 7 presents a list of such species known to inhabit the vicinity of the study area.

Table 7 Wildlife Species of Special Status Known to Inhabit the Vicinity of the Study Area

Common Name	Scientific Name	COSEWIC Status	Species at Risk Act Status	Provincial Legal Protection	Provincial Conservation Status*
Eastern Meadowlark	*Sturnella magna*	Threatened	Threatened	Threatened	S1B
Eastern Whip-Poor-Will	*Antrostomus vociferus*	Threatened	Threatened	Threatened	S2B
Bald Eagle	*Haliaeetus leucocephalus*	-	-	Endangered	S4
Bank Swallow	*Riparia riparia*	Threatened	Threatened	-	S2B
Bobolink	*Dolichonyx oryzivorus*	Threatened	Threatened	Threatened	S3B
Barn Swallow	*Hirundo rustica*	Special Concern	Threatened	Threatened	S2B
Barrow's Goldeneye	*Bucephala islandica*	Special Concern	Special Concern	Special Concern	S2S3N, S3M
Eastern Wood-Pewee	*Contopus virens*	Special Concern	Special Concern	Special Concern	S3B
Olive-sided Flycatcher	*Contopus cooperi*	Special Concern	Threatened	Threatened	S3B
Evening Grosbeak	*Coccothraustes vespertinus*	Special Concern	Special Concern	-	S3B, S3S4N, SUM
Common Nighthawk	*Chordeiles minor*	Special Concern	Threatened	Threatened	S3B, S4M
Canada Warbler	*Wilsonia canadensis*	Special Concern	Threatened	Threatened	S3S4B

* See Appendix G for provincial conservation status definition.

The 12 SAR are the Eastern Whip-Poor-Will, Bald Eagle, Bank Swallow, Bobolink, Barn Swallow, Barrow's Goldeneye, Eastern Wood-Pewee, Olive-sided Flycatcher, Evening Grosbeak, Common Nighthawk and Canada Warbler (Appendix G). Other rare or endangered species could also be present in the area, even though there are no official data to confirm it.

Listed as "Endangered" by provincial legislation, the Bald Eagle has the highest status at the provincial level that can be found on the study site. According to the ACCDC report, there is a known occurrence of this species intersecting with the study site. The Bald Eagle is widely spread in North America and is known to be able to stay year-round in New Brunswick. This bird's habitat comprises mostly forested areas near large bodies of water where it can fish. Since the ponds located on the study site present poor conditions for fishes, the peatland targeted by this project is not expected to be highly used by the Bald Eagle.

Eastern Whip-Poor-Will, Bank Swallow and Bobolink are also threatened in Canada according to COSEWIC. Eastern Whip-Poor-Will can be found in forests with open understories (Spiller & King, 2021). Bank Swallow tends to prefer open lowland areas near bodies of water. They usually avoid forest and other areas not proper for them as nesting habitats. They also prefer to nest in banks with a low vegetation cover and a steep slope. The Bobolink nests in fields comprised of a mixture of grasses and broad-leaved forbs (Martin & Gavin, 1995). The study area, an ombrotrophic peatland, does not comprise these types of habitats; therefore, the presence of these three species during the breeding season is considered unlikely.

Eastern Meadowlark is also listed as threatened by COSEWIC. This species typically inhabits habitats with good grass and litter cover, mainly native grasslands, pastures, and savannas (Lanyon, 1995). Bogs such as Peatland No. 343 are not known to offer suitable habitat to this species.

Common Nighthawks are designated as threatened in Canada and as a "special concern" according to COSEWIC. This species usually nests on bare ground in open habitats with little or no vegetation, such as coastal sand dunes and beaches, logged/slash burned areas, woodland clearings, peat bogs, prairies and plains, sagebrush and grassland habitat, farm fields, open forests, and rock outcrops (COSEWIC, 2018). Open areas of the bog itself and logged areas in the vicinity of Peatland No. 343 could be considered as potential habitats for this species.

Canada Warbler, Evening Grosbeak, Olive-sided Flycatcher, Eastern Wood-Pewee, Barrow's Goldeneye and Barn Swallow are also all listed as "special concern" species by COSEWIC. Canada Warbler inhabit moist, mixed coniferous-deciduous forests with a well-developed understory (Reitsma *et al*., 2010). These habitats seem to be abundant in the surroundings of the bog, suggesting that Canada Warblers are breeding in the area.

Barn Swallow and Evening Grosbeak are species usually not associated with open bog habitats. However, the Evening Grosbeak could inhabit the forest surrounding the bog, as they inhabit mature coniferous forests (Gillihan & Byers, 2001).

4.2 HUMAN ENVIRONMENT

4.2.1 COMMUNITIES

Approximately 55% (117 ha) of Peatland No. 343 is situated on Crown land and the peatland's limits intersects several private lots. Four communities are located within 5 km of the peatland: Barryville to the northeast, Oak Point to the southeast, The Willows to the south and Bartibog Bridge to the southwest. The town of Miramichi is located about 20 km to the southwest.

4.2.2 FIRST NATIONS

Burnt Church 14, located 13 km northeast of Peatland No. 343, is the closest First Nation community and one of the three reserves of the Esgenoôpetitj (Burnt Church) First Nation in New Brunswick (Map 1). It occupies an area of 9.85 km^2 and has a population of 1,120 persons (Statistic Canada, 2006). Other First Nation communities close to the area are Natoaganeg (Eel Ground) and Metepenagiag (Red Bank) west of Miramichi.

4.2.3 POPULATION

The proposed development is located in Northumberland County. Specific demographic data for the communities listed in section 4.2.1 were not available; therefore, population data for the Alnwick subdivision from the 2021 Canada census are presented in Table 8. The closest city, Miramichi, has a population of 19,867.

Table 8 Population and Dwelling Statistics

Population and Dwelling Information	Alnwick
Population in 2016	3,640
Population in 2021	3,615
2006 to 2001 Population Change (%)	-0,7
Total Private Dwellings	1,882
Population Density per km^2	5.4
Land Area (km^2)	669

Source: Statistics Canada, 2010

4.2.4 SERVICES

Peatland No. 343 is accessible from Highway 11 via a 1.1km access road. Most services close to Peatland No. 343 are located in Miramichi about 20km to the southwest. The City as its own Police Force located at 1820 Water Street (tel.: 506-623-2124) and its Fire Department. The nearest station is at 94 General Manson Way (506-623-2300). while the closest fire department is the City of Miramichi Fire Department. The Royal Canadian Mounted Police (RCMP) also provides law enforcement services to the communities located in the area.

Horizon's Miramichi Regional Hospital is the closest place where health services can be provided in case of an emergency (> 22 km). Horizon's Rogersville Health Center, located in the village of Rogersville, can also provide basic health services.

Most services (groceries, restaurants, car repairs services, etc.) can be found in the City of Miramichi, which is the biggest city north-east of the province of New Brunswick.

4.2.5 EXISTING LAND USE

The proposed site is located in the Caraquet Ecodistrict of the Eastern Lowlands Ecoregion, in the Atlantic Maritime Ecozone (NBDNR, 2010). This region contains the highest percentage of wetlands of all New Brunswick ecoregions and has by far the largest area of peatlands. Acidic soil found in the region support vast forests. However, they offer little to low potential for agriculture which occupies around 7.5% of the land.

Seventy percent (70%) of the land in the Caraquet ecodistrict is covered by forests. The remaining lands are occupied by peatlands (15%), agriculture lands (9%) and developed lands, including roads (6%).

The following activities and/or land use are found within the 5-km study area or in the vicinity (Map 7):

- About a dozen proposed harvest woodlands for the 2007-2013 period were located north of Peatland No. 343 (not shown on Map 7);
- Peatland 353, located 7 km northeast, is the only other harvested peatland in the study area, and it is operated by Sun Gro (Map 1);
- A domestic burying landfill site is located some 120 m southwest, on Winston Road. The site is no longer in operation (Map 7);
- The closest residential dwellings are located approximately 900 m south of Peatland No. 343, along Highway 11;
- There are 14 aquaculture sites in operation in the Miramichi Inner Bay in the vicinity of Oak Point. Three of these sites are located approximately 300 m east of the Oyster River estuary, and 5 around Whites Brook estuary;

— One snowmobile trail runs at approximately 4.5 km west from Peatland No. 343 along Bartibog River and an ATV trail passes about 9 km to the north, north of South Branch Burnt Church River. There are no known human activities such as snowmobile or ATV trails, hunting and fishing within the limit of the proposed development.

4.2.6 AREAS OF INTEREST

According to New Brunswick's Department of Natural Resources, there is no area of interest or protected areas within a 5 km radius of the study area.

4.2.7 ECONOMY

The economy of the Parish of Alnwick is largely based on the service sector but approximately 25% of the experienced labor force (430 out of 1,710 persons) are employed in resource-based industry and manufacturing in 2016. Unemployment rate for was 29.9% in 2017, compared to 8.2% in New Brunswick. The median age was 51.2 in 2021. The median family income for 2016 was $51,059 compared to the New Brunswick median of $72,330.

Unlike other parts of the Eastern Lowlands ecoregion, the southern study area has few peatlands under exploitation. There are six in the Tabunistac area (Peatlands 353, 514, 516, 517, 522 and 524). Most of the peart harvesting activities are concentrated around Tracadie-Sheila, Shippagan, and Lamèque Island.

The peat harvesting industry has had a positive impact on many New Brunswick communities as a significant rural employer. It offers permanent employment, and a significant number of seasonal jobs. Additional jobs are related to peat shipping and processing, and trucking and handling of the peat products. Twenty-three (23) companies were involved in peat harvesting in New Brunswick in 2021 (NBDNR, 2021). New Brunswick holds less than 1% of Canadian peatlands but produces about 33% of the country's peat shipments (NBDNR, 2021).

4.2.8 HERITAGE SITES

The New Brunswick's Archaeological Services of the Heritage Branch has no record of historic resources within 5 km of the project site (NBWCS, 2010).

5 SUMMARY OF ENVIRONMENTAL IMPACTS

According to the Guidelines for peat mining operations in New Brunswick (Thibault, 1998), there are four principal areas of concern in regard to peat harvesting:

- Impact of peatland drainage on receiving water bodies;
- Impact of habitat change on flora and fauna;
- Nuisance of wind-blown peat particles on surrounding communities; and
- Issue of post-mining restoration or reclamation of harvested peatlands.

Other, minor impacts include change in microclimate due to surface heating, gas emissions, noise, spills, increased traffic on public roads, and risks for workers health.

5.1 IMPACT ON HYDROLOGY

5.1.1 SURFACE WATER REGIME

Peatland No. 343 sits on the water divide separating Oyster River and Whites Brook watersheds. The portion of the bog with a peat depth 1 m and over located in Oyster River watershed is estimated to be 43.0 ha, while the portion lying in Whites Brook watershed is approximately 61.8 ha. Natural water flow within the bog predominantly occurs in the form of subsurface acrotelm flow, and surface runoff only occurs during episodes of significant precipitation or snowmelt. Ditch construction creates structured surface drainage networks throughout most of the peatland. The ditches network pattern has been planned in a way that minimizes modifications in the respective water contribution of the bog to the two watersheds. As such, upon ditch network completion, it is estimated that 47.75 ha of the peatland surface will drain towards Oyster River watershed, while 57.1 ha will drain towards Whites Brook. Therefore, the variation in aerial extent within one watershed or the other will be between +6.9% for Oyster River and -10.2% for Whites Brook for the portion of their watershed located within the portion of the bog with a peat depth 1 m and over. The difference in water input to the entire watersheds will be negligible with +0.15% and -0.47% for the Oyster River and Whites Brook respectively.

Incremental water input to the receiving bodies mostly takes the form of subsurface flow at the drainage sub-network release points, and no significant additional discharge to the surrounding streams in the form of surface flow is expected. Subsurface flow towards the local drainage network occurs at rates several orders of magnitude lower than those associated with surface flow. Resurgence and resulting incremental water discharge to the receiving streams are spread over long periods of time as a consequence of delayed water transit through the subsurface. They also take place along extended segments of the streams rather than being point-specific. No perceptible impact is expected in terms of peak flow magnitude, timing and flow velocity in the receiving streams as a result of peatland area transfer from Whites Brook watershed to Oyster River watershed. Alternatively, withdrawal of this surface from Whites Brook tributaries drainage basins should not have any perceptible impact on the hydrological regime of the tributaries, let alone that of Whites Brooks, given the small size of the surface with respect to that of aforementioned drainage basins, as well as the global availability of water at the periphery of Peatland No. 343.

Hydrological budget of Peatland No. 343 was carried out in order to quantify potential changes to naturally occurring water fluxes. Monthly runoff was estimated using the method of Thornthwaite (1948), which allows calculation of potential and actual evapotranspiration based on climatic data and latitudinal location. The difference between precipitation and actual evapotranspiration are distributed between surface runoff and peat water table recharge.

Quantification of potential evapotranspiration (PET) in undisturbed conditions yielded a value of 543 mm/y. Validation of this figure was performed using reference evapotranspiration (ET) data computed by Xing *et al*. (2008) for conditions prevailing in Fredericton and adjusted for a time-varying crop coefficient reproducing the seasonal stages in sphagnum growth. The latter method yielded a PET of 582 mm/y over an undisturbed New Brunswick peatland. Close conformity between the two results validated the use of the Thornthwaite method.

Average yearly precipitations range at about 1115 mm. It appears that actual ET in undisturbed conditions would be close or equal to PET, since water availability is generally not a limiting factor for a maritime bog. As such, there is a net natural water output of approximately 572 mm/y to the local watersheds. Water output would take the form of both subsurface acrotelm flow and diffuse sheet flow (overland flow), from the peatland's final release points towards downstream peripheral areas.

Water budget for disturbed conditions considered a maximum readily available soil water supply of 225 mm for the peat deposits, in accordance with the storage capacity of peat present in the area. As the method of Thornthwaite (1948) does not take into account the influence of frozen conditions and storage of water in the form of snow on infiltration capacity and delayed runoff response related to spring snowmelt, minor modifications were applied to the computed runoff in order to represent monthly runoff fluctuations and timing in a more realistic manner. As such, integral (100%), non-delayed surface runoff was considered for rainfall recorded between December and March, in accordance with observations presented in Gemtec Limited (1994). In addition, snow storage depletion and subsequent contribution to runoff was modeled to reproduce the spring freshet timing and evolution of nearby southwest Miramichi River, based on hydrological data recorded at hydrometric station 01BO001 at Blackville.

Field measurements carried out by Gemtec Limited (1991) in Peatland 509 showed that equivalent surface runoff coefficients with respect to incident rainfall were systematically lower than 0.2. Nevertheless, a runoff coefficient of 0.3 was used to evaluate the surface runoff discharge from the peatlands during harvesting phases, in order to yield more conservative estimates of the total surface runoff outflow to the surrounding terrain.

The estimated monthly runoff pattern from Peatland No. 343 upon reaching its full development is presented in Figure 4. Runoff quantities are also presented in the form of specific runoff per unit hectare of mined peatland. Total annual runoff is estimated at 572 mm of water per unit surface area.

Water budget assessment for both natural (undisturbed) and developed (disturbed) conditions shows that total yearly output of water from the bog would remain more or less the same. This is due to the fact that peatland drainage should have little effect on the actual evapotranspiration losses. Indeed, water available for evapotranspiration is the water that remains stored within the peat once infiltrated water has drained away freely.

Vegetation cover removal upon field preparation and harvesting initiation results in increased surface runoff, and thus direct water losses, under important precipitation events and/or precipitation events taking place in previously wet conditions. However, this should have only limited effect on water availability for evapotranspiration, as water storage capacity of peat is significantly enhanced by field drainage. As such, infiltration under low-to-average rainfall replenishes water stocks available for evapotranspiration and offset the effects of water losses via surface runoff. Vegetation cover removal also reduces potential transpiration to about zero. On the other hand, potential evaporation is expected to increase because of the ground's reduced albedo and increased exposure to winds. Antagonistic hydrological consequences of surface modifications in relation with development activities should thus have limited impact on actual global evapotranspiration at the field scale.

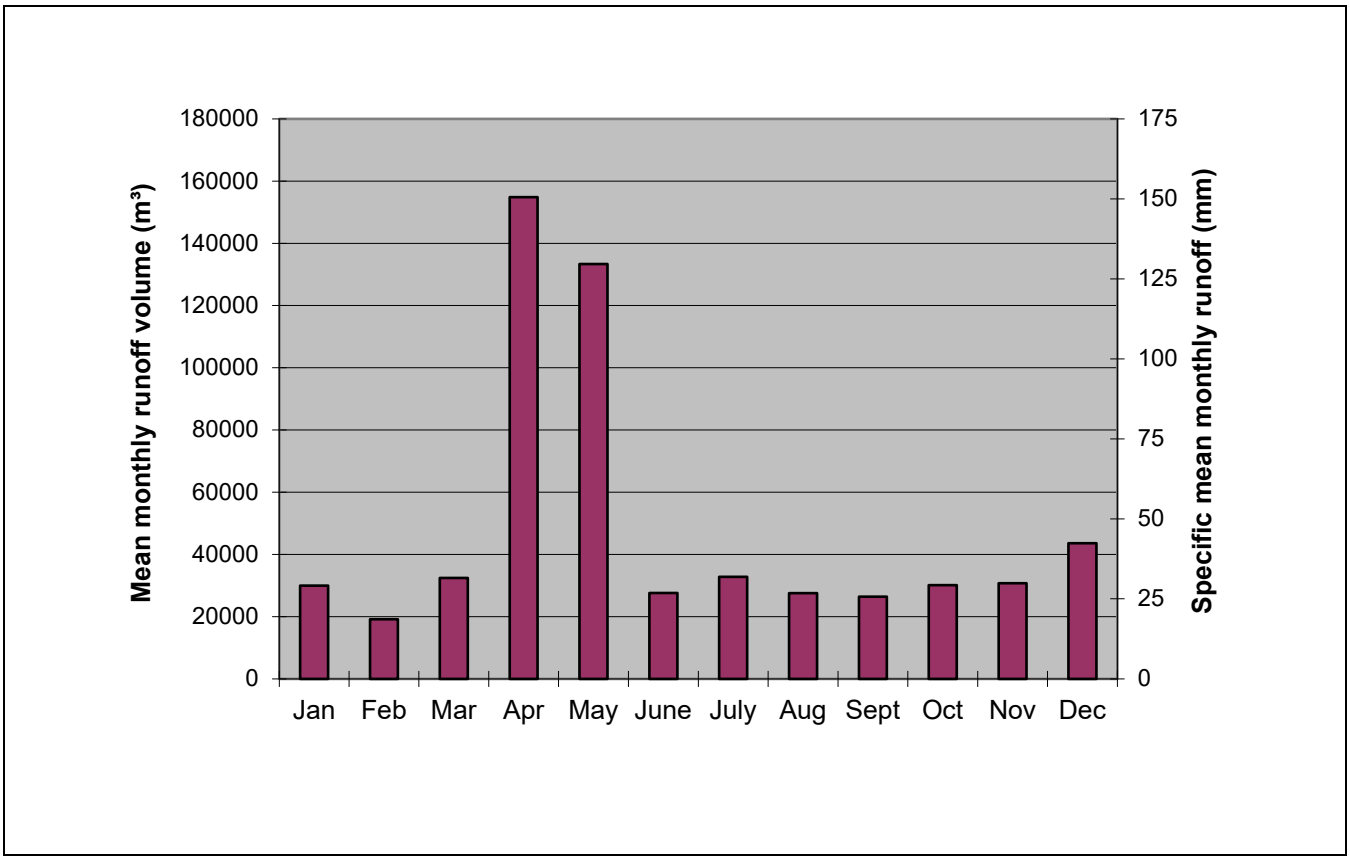

Figure 4 Estimated Monthly Runoff upon Reaching Full Development

Natural water drainage from Peatland No. 343 towards its receiving streams essentially takes the form of hypodermic flow, with secondary contribution from diffuse sheet flow towards the peatland's edges. No channeled flow thus takes place within the peatland. Therefore, ditches network construction does not lead to any stream disruption. Ditching affects the rate and timing at which water drains away from the bog. Water discharge at the sedimentation ponds outlets initiates infiltration, subsurface hypodermic flow and overland flow, the latter decreasing significantly as water moves away from the release points. Hence, most drained water is reintegrated in the natural subsurface flow system, and any residual surface flow that may reach the local surface drainage network essentially mimics diffuse sheet flow that can naturally take place near the peatland's edge. Given the distance separating sedimentation ponds outlets from the nearest stream, the minimum travel length for any surface flow to reach a watercourse would be 70 m.

Diversion of peatland drainage water away from natural release locations modifies natural discharge to the upstream ends of western and eastern receiving streams. Diffuse sheet flow towards the peatland's edge should likely cease, due to the interception of water by the drainage network. Since the greatest flow contribution to the receiving stream originates from subsurface flow, impacts on the hydrology of the receiving streams should be moderate at most. They should also be restricted to the uppermost reaches of the streams. Indeed, locally raised water tables at the release points should enhance subsurface flow and resurgence to the natural surface drainage network nearby. Occasional contribution of overland flow completes the offset of any water deficit in both receiving streams within 200 to 300 m downstream from the peatland.

Hence, global flow contributions to both Oyster River and Whites Brook will remain unaltered. No modification to the spring freshet timing or peak flow timing following rainfall events are expected, and their respective hydrological regime will be preserved.

The peat development project will not have any impact on the erosion and deposition processes taking place in watercourses downstream from the site, with the exception of the uppermost reaches of both western and eastern receiving streams, where decreased discharge may lead to enhanced sedimentation. This impact is site-specific, and no related modification should be witnessed further downstream along their respective course.

If a watercourse crossing needs to be constructed, it is designed to accommodate peak flow. The required waterway opening is determined in compliance with applicable New Brunswick guidelines. Crossing construction follows the *Watercourse Alteration Technical Guidelines* of the DELG. No temporary/permanent flow interruption or water diversion to another stream will take place during or after crossing construction.

5.1.2 GROUNDWATER REGIME

Two types of groundwater are considered:

— Groundwater of the local aquifer, which is contained within the Paleozoic bedrock.

— Surficial groundwater contained in the peat deposits.

No impact is expected on the local aquifer because no hydraulic connection exists between the peat deposits and the underlying bedrock. Hence, no impact to the availability of groundwater for local downgradient users is expected.

Ditching and drainage activities will result in the lowering of the water table in the mined peat deposits. The lowering of the water table will take place during the construction phase and will be kept at a locally low level throughout the harvesting phase. The water table drop will not extend more than about 25 to 50 m beyond the mined area, as the majority of the peat deposit (catotelm) has a low hydraulic conductivity. A local rise in the level of the surficial water table is expected at the sedimentation ponds release points, due to greater infiltration resulting from increased water availability.

The more or less 30 cm layer of peat that will be left after peat harvesting has ended will remain saturated and will maintain a perched water table on the harvested sites. The progressive decommissioning will lead to a recovery of the surficial groundwater as certain ditches are blocked and open water bodies are created. It is expected that the residual impact will be low.

5.1.3 SURFACE WATER AND GROUNDWATER QUALITY

Peat harvesting does not involve use of chemicals or other hazardous material except for petroleum products for motorized equipment. Water quality in the surficial (peat) aquifer could be potentially affected by accidental petroleum spills during the construction and operation phases. The spatial extent of the impact would however be localized. Implementation of the Environmental Protection Plan (Appendix H) would allow efficient containment before appropriate clean-up and restoration procedures further mitigate the associated negative impacts. Hence, no chemicals or other hazardous materials may be released to the surrounding environment.

Drainage water and surface runoff originating from peatland developments can have elevated suspended particles (solids) contents. In addition, they should likely exhibit a relative acidity, especially for drainage water.

Water flowing to the ditches network outlets discharges in a series of sedimentation ponds where the bulk of the transported suspended solids (essentially peat particles) is able to settle except for a small portion that flows direct as overland flow in the southwest section of the peatland. Subsequent discharge from sedimentation ponds takes the form of overland flow to adjacent undisturbed vegetated lands, which allows the settling of residual peat particles. This technique has proven to be efficient at limiting impact on water quality. It has been implemented and tested at many harvested peatlands in New Brunswick. Combination of the two suspended solids management approaches ensures efficient peat particles interception. Considering the relatively flat topography downgradient from the final release points and the distance between such points and the nearest watercourse (≥ 70 m), no significant discharge of suspended solids to the local watercourses is expected.

In order to reduce the risk of channel formation downstream from the sedimentation ponds, a radial series of small ditches are dug at release points where detailed field reconnaissance shows that microtopography could favour development of channelized flow. Such structures will also be dug after development is underway if channelized flow is observed during inspection of a given release point.

Peat drainage water released to the surrounding lands could display a higher acidity than water of the receiving deposits. This mostly occurs during the initial drainage phase, as the drainage process involves a finite volume of water. The pH of water discharging from the peatland subsequently increases as the relative contribution of water initially stored in the peat deposits to the overall discharge decreases, and as a result of enhanced surface runoff and more rapid peat drainage in response to rainfall.

Peat drainage water generally has low metals content, given the ombrotrophic conditions prevailing therein. Upon discharge at the release points, metals ionic content of the soil solution locally increases as a result of enhanced solubilisation of metals naturally present in the soils, in response to increased acidity. Subsequent subsurface and surface flow away from the release points lead to a reduction of both acidity and metals concentrations by way of buffering and chemical re-equilibration. Hence, water reaching the peatland's receiving streams through resurgence or overland flow likely exhibit higher pH and lower metals content than those naturally occurring in the streams water. As such, no significant impact is expected on the water quality of streams located downstream from Peatland No. 343.

As per the above assessment on water quality, fish habitat conditions in surrounding watercourses (Section 4.1.2) should not be affected. The same is true for Oyster River and Whites Brook estuaries and Miramichi Bay. Considering the approach to reduce risks of peat particles being transported to nearby watercourses (doubling of sedimentation ponds and overland diffuse flow at the sedimentation ponds release points), there is no risk of alteration of water quality at the aquaculture sites.

No impact is expected on water quality in the bedrock aquifer. Hence, no alteration to the quality of groundwater that may be utilized as potable water supply in nearby domestic wells is expected.

5.2 IMPACT ON FLORA AND FAUNA

5.2.1 FLORA

Peat harvesting involves clearing of trees and peatland vegetation from operation areas, which results in an important impact at site level. Peatland No. 343 is a typical bog of the coastal region of New Brunswick (Region 1, according to Keys & Henderson 1987a) regarding plant communities. These habitats and plant communities are not threatened by the project locally or regionally since they exist in the buffer zone or in other bogs in the region.

Moreover, the sphagnum restoration of large parts of the peatland will ensure the re-establishment of bog plant communities. Consequently, no loss of exceptional tree stands, or specific habitats is expected.

The construction of the access road and service area will also result in clearing of trees and vegetation on a surface of 2.2 ha in wetlands and uplands. The construction of a temporary access road to provide access to the north of the peatland also affected vegetation in upland and wetland areas. The vegetation around the bog is dominated by dense Black Spruce stands that may include Red Maple (*Acer rubrum*), White Pine (*Pinus strobus*) and Balsam Fir (*Abies balsamea*). This plant community is widespread in the area and clearing will not result in loss of exceptional stands.

Wetlands within 100 m from infrastructures (access road and service area) will be delineated by a field survey to determine the loss of wetland area and used to elaborate a compensation plan for the loss of wetlands. Wetlands that have been damaged during the development phase, to the north of the peatland or elsewhere, will also be assessed as part of a restoration plan that will be submitted to DELG for approval.

SPECIAL STATUS PLANT SPECIES

No rare or endangered plant species were found within the area affected by the project. ACCDC reports no occurrence of such species in a radius of 5 km. The Southern Twayblade is the only plant species of concern that may grow within the bog. The survey performed in May 2010 reported no occurrence of this species.

5.2.2 FAUNA

Preparation of the site for peat harvesting will result in habitat losses and disturbance of birds, mammals and herpetofauna at peatland level. Because Peatland No. 343 is a typical bog of this area, no loss of exceptional habitats is expected. These habitats are not threatened by the project locally or regionally as they exist in the buffer zone and around Peatland No. 343. Moreover, the restoration of large parts of the peatland will ensure the re-establishment of wildlife populations. The construction of an access road to the site will have the same impact on birds, mammals and herpetofauna on surrounding wetlands and uplands. Watercourse crossings, if any, will involve watercourse alteration; however, road construction methods and mitigation measures will ensure a low impact on fish and fish habitat.

SPECIAL STATUS FAUNA SPECIES

Three species at risk (SAR) are known to be present in the vicinity of the area affected by the project, namely Common nighthawks, Bobolinks and Canada warblers. Clearing of vegetation outside the nesting season will prevent nest destruction. Individuals of these species may be disturbed by clearing of peatland vegetation. However, their habitats are not threatened by the project locally or regionally as they exist in the buffer zone and around Peatland No. 343. Impacts on these species would therefore be limited.

Any observation of special status fauna species will be reported to the New Brunswick DELG.

5.3 IMPACT OF WIND-BLOWN PEAT PARTICLES

Peat dust generation is an important concern for air quality. Harrowing, vacuum harvesting, peat handling and transport are all potential sources of peat particles emission. These emissions may affect human activities due to peat deposition and human health because of airborne particles. Peat particles may also alter water quality in watercourses and affect surrounding vegetation. Extensive peat harvesting occurs close to and within populated areas of New Brunswick and the peat industry has developed management practices and equipment to reduce these potential effects.

In the case of Peatland No. 343, a treed buffer zone will be preserved around the peatland to limit airborne peat particles transportation. Given the application of mitigation measures that will greatly reduce peat particle emissions, such as dust control devices on the vacuum harvesters (Section 6.3.1), and considering the direction of winds during the peak harvesting season (from the south in June and from the southwest from July to September), and that no dwellings or residents are located under the wind at a close distance from Peatland No. 343, impacts caused by windblown particles are expected to be minimal.

5.4 RECLAMATION ISSUES

After-use of harvested peatland has attracted a lot of attention in New Brunswick and worldwide in recent years. Canada has been a leader in that matter with the development of peatland restoration and reclamation methods. Monitoring of rehabilitated peatlands from New Brunswick and elsewhere in Canada suggest that sphagnum restoration, forested wetland reclamation and water body creation are effective approaches.

As a member of the Canadian Sphagnum Peat Moss Association (CSPMA), Sun Gro is committed to apply best efforts to return harvested bogs to valuable ecosystems. Sun Gro has been involved in the development of reclamation methods with the Peatland Ecology Research Group for more than 25 years. Sun Gro has approved reclamation plans for all its New Brunswick peatlands. It has reclaimed 320 ha that includes sphagnum restoration (186 ha), tree planting (115 ha), and marsh/open water body creation (20 ha).

Peatland 530 (Shippagan Bog) represents a special case since it had to be totally abandoned following a flooding event and salt contamination from sea water. Moreover, large sections are flooded for extended periods, a situation that maintains soft ground conditions that prevent access to machinery. As a consequence, current reclamation methods could not be applied to most sections and the restoration plan included reclamation to brackish marsh and large open water bodies. As of 2009, 100 ha of the 173 ha were under reclamation. Three islands were created in a large open water body. Sun Gro collaborates with the Peatland Ecology Research Group (PERG) in the development of reclamation methods specific to saltwater impacted peatlands. The PERG also conducted experimental vegetation introduction in created pools (open water bodies) at Peatland 529.

The rehabilitation plan presented in Section 3.6.5 represents the main mitigation measure to reduce overall impact of peat harvesting. Based on current knowledge and the continuing efforts allocated to the development of harvested peatland rehabilitation methods, and on its commitment, Sun Gro is confident that Peatland No. 343 will be returned to a satisfactory state.

5.5 OTHER IMPACTS

Peat harvesting involves other impacts that are considered as minor either because they have a low intensity, are site specific, or because effective mitigation measures reduce the residual impact to a low significance.

From a general standpoint, peatlands influence the global climate by storing carbon and reducing the greenhouse effect (Chapman, 2002). Peat is made of plant debris that contain carbon and based on a peat accumulation rate of 1 mm/yr, the carbon capture rate is 68 g/m^2/yr (Rydin & Jeglum, 2008). However, the contribution of one single peatland is negligible. For instance, the Canadian peat industry uses 17,000 ha of Canada's 113 million ha of peatlands (Daigle & Gautreau-Daigle, 2001). The impact of the proposed project on climate will be mitigated by the rehabilitation plan, mainly tree planting and sphagnum restoration, which will resume carbon storage as wood and peat.

Peatlands influence microclimate conditions in two ways. First, peatland vegetation influences the albedo and is responsible for evapotranspiration; both result in localized cooling effects (Rydin & Jeglum, 2008). Second, the typical hummock-hollow microtopography results in a non-uniform snow distribution. The resulting snow patches that remain longer in the spring also contribute to cooler temperatures locally. In turn, the microclimate influences the functions of the whole ecosystem that rely on the plant-hydrology equilibrium. The disappearance of trees and vegetation creates bare peat surfaces where diurnal temperature fluctuations increase. Wind speed may also become higher. Such changes are site specific and do not have repercussions outside the developed area. Re-establishment of peatland vegetation, tree cover and overall bog conditions following progressive restoration will return Peatland No. 343 to pre-development conditions in terms of micro-climate. Since dominant winds during the intensive use of motorized equipment period (i.e. peat harvesting season) are oriented in the opposite direction (SW-NE), the significance of the impact is expected to be minor.

Although peat harvesting does not involve the use of specific chemical products or contaminants, mechanized operations always entail the risk of petroleum product spills. Dry peat is recognized and used as an efficient product to absorb hydrocarbon spills and will capture hydrocarbon spill on the ground. In any case, the Environmental Protection Plan (Appendix H) requires that a spill kit be available on site to help control eventual spill and clean the affected area. No significant impact on soil quality is expected.

Lower water tables in peat bogs result in drier surface vegetation and a higher fire risk (Corporation of Delta, 2010). Sun Gro will follow the *Basic Firefighting Guidelines* developed by the CSPMA (2010) as a mitigation measure. In addition, the New Brunswick Department of Natural Resources has issued standard firefighting equipment requirements for all peat bog operations to ensure that any fire starts are kept to a minimum (NBDNR, 2006).

The firefighting equipment listed in the Environmental Protection Plan combines the NBDNR requirements and the CSPMA recommendations.

Transporting peat from Peatland No. 343 to Sun Gro Inkerman processing facilities should not significantly increase traffic on public roads. Shipments will be more numerous during the first decade of activities but will decrease as the annual peat production will be declining. Truck movement in the vicinity of Peatland No. 343 and on public roads might pose risks to public safety. Sun Gro will implement mitigation measures (Section 6.3.5) to reduce these risks and as such, impacts on public safety will not be significant.

There are some risks for employees in peat harvesting operations. Injuries may happen while using machinery and equipment. Employees may be exposed to airborne peat particles, although the risk to employees on the peat fields is negligible given the use of tractors with enclosed cabs. Management practices, training and appropriate equipment can be considered as mitigation measures that considerably reduce the risks for employees. Sun Gro is committed to provide safe and healthy environment to their employees while applying safety standards, policies and programs and providing corresponding training.

5.6 CUMULATIVE IMPACTS

Impacts from other human activities may combine and result in higher impact values than would otherwise be expected from an individual project. As such, cumulative impacts may arise from development of Peatland No. 343 with that of Peatland No. 353 located in Miramichi Bay. Impacts caused by forestry activities may also combine with that of Peatland No. 343 development.

The main impacts of peat harvesting on air quality result from dust generation during the preparation and operation phases. Impacts on air quality during the preparation and operation phases for Peatland No. 343 are considered to be minor or not significant once mitigation measures are applied. In essence, forestry (i.e. tree cutting) is not a dust generating activity, although truck movements on local unpaved roads may generate dust. Thus, it is likely that there will be no significant cumulative impact on air quality.

As stated previously, most of the potential negative hydrological impacts will be time-specific, i.e. during initial peatland drainage, and/or site-specific, i.e. limited to the bog itself and its near-periphery. Implementation of mitigation measures such as sedimentation ponds and overland flow will contribute to lowering potential negative impacts to a non-significant value further away (downstream) from the peatland and its receiving streams uppermost reaches.

Hence, development of Peatland No. 343 is unlikely to result in significant negative impact on surface water regime, groundwater regime or water quality at the watershed scale. It does not appear that development of Peatland No. 343 will have an incremental effect on modifications to the hydrological regime or water quality that may have occurred or might be occurring in response to other activities already taking place within the watersheds.

Considering the above, it is therefore likely that there will not be any cumulative effects on fish habitat.

No cumulative impacts on special status species are anticipated because no such species were identified at Peatland No. 343 and at other harvested peatlands in the area.

Impact of traffic on public safety may cumulate with those of other traffic generating activities (i.e. forestry). During peak years of peat harvesting at Peatland No. 343, it is estimated that no more than 10 to 12 shipments per day will leave the peatland to transport peat to Sun Gro Inkerman processing plant. With the implementation of the recommended mitigation measures, the impacts of increase traffic on public safety will be minor or not significant. Therefore, no significant cumulative impact is predicted.

Impacts on employees' health are site specific, and there is no possibility of cumulative impacts. The development of Peatland No. 343 will add to the positive economic impact of other peat harvesting operations in the region by creating new jobs and business opportunities at all phases.

5.7 REVERSIBILITY OF IMPACTS

The impact assessment shows that Peatland No. 343 development project should not result in significant residual impacts on the environment. The peatland rehabilitation options described in Section 3.6.5 are the main mitigation measures to be implemented and are the principal factors that limit the impact of peat harvesting to a low value. The goal of peatland rehabilitation is to restore harvested sites back to functioning wetland ecosystems. Research has shown that a peatland vegetation cover can be re-established over the entire surface of a harvested peatland within 5-10 years of the application of restoration measures (Rochefort *et al*., 2008), and that hydrological conditions also recover within 15 to 17 years (Shantz & Price 2006). Carbon storage, an important function of peatlands, returned after 14 years and earlier at some sites (Waddington *et al*., 2010; Strack & Zuback, 2013; Nugent *et al*., 2018). Consequently, peat harvesting does not result in irreversible impacts provided that appropriate mitigation measures are applied.

6 SUMMARY OF PROPOSED MITIGATION

6.1 MITIGATION MEASURES

Reduction of environmental impact depends on applying mitigation measures in combination with an appropriate monitoring plan that will determine if these measures are effective. Some of the mitigation measures that Sun Gro intends to implement at Peatland No. 343 are described in the following section.

The mitigation measures developed by Sun Gro for peat harvesting operations consist of a site rehabilitation plan, and a series of measures that address specific situations. Sun Gro will prepare an annual report that will describe implementation of the rehabilitation plan. It will also review the plan as required to comply with the New Brunswick Peat Mining Policy.

6.2 REHABILITATION PLAN

The long-term goal of the rehabilitation plan is to restore wetland habitat similar to ecosystems currently present in the area. Meeting this objective eliminates most impacts of peat harvesting on the peatland ecosystem. The rehabilitation plan described in Section 3.5.5 includes three options: sphagnum restoration, forested wetland reclamation and open water body creation.

Re-establishing the vegetation cover stabilizes the surface and prevents further generation of peat dust by wind, or deposition of peat dust in watercourses as suspended sediment. Return of peatland vegetation and a tree cover restore lost wildlife and plant habitats and peatlands functions such as microclimate regulation. The vegetation cover also plays a role in the hydrological regime, since a large percentage of water is lost through evapotranspiration in peatlands.

Re-establishment of vegetation also returns soils to their original state by recreating the acrotelm typical of peat bogs, which depends on equilibrium between vegetation and hydrology: sphagnum mosses form a loose layer that can contain a large amount of water, thus limiting water table fluctuations and providing sphagnum with adequate water supply.

Restoration of the hydrological regime eliminates most impacts on surface water flow in the short term. Creation of open water bodies and dikes to retain water on site and raise the water table regulates surface runoff, restores the water storage capacity of the peat, and improves water quality.

Although there are a number of methods currently available to monitor the success of rehabilitation options, these methods may change in the near future because peatland restoration is a rapidly evolving research field. Sun Gro intends to use methods that are recognized at time of follow-up of the decommissioned peat fields.

According to the Peatland Restoration Guide (Quinty & Rochefort, 2003), monitoring of the vegetation cover should be adequate to assess the success of peatland restoration, since plant growth and colonizing species reflect overall site conditions, including the hydrological regime. For restored fields, Sun Gro proposes to set up permanent plots where plant species are identified, and their cover is estimated. This is a recognized approach to monitor peatland restoration (Rochefort *et al*., 2008).

Tree planting and open water body creation success will be evaluated according to recognized method at the time of the monitoring.

6.3 SPECIFIC MITIGATION MEASURES

6.3.1 AIR QUALITY

Several measures are aimed at reducing impacts on air quality caused mainly by dust emissions. Sun Gro will implement the following measures:

- Use of harvesters with a dust control device;
- Appropriate training for harvester operators;
- Covering stockpiles in the field with plastic tarps;
- Location and orientation of peat stockpiles where they are less exposed to dominant winds and where there is existing natural protection;
- Limiting peat handling in windy conditions;
- Daily coordination of harvesting activities, unloading of harvesters or loading of trailers with wind direction and velocity;
- Re-establishing the vegetation cover as proposed in the reclamation plan (Section 3.6.5).

Other mitigation measures include use of tarpaulin-covered trailers and ensuring proper maintenance of equipment. The site manager will conduct periodic inspections to make sure that these measures are applied.

6.3.2 SOIL QUALITY

The potential for impacts on soil quality arises almost exclusively from leakage or spills of petroleum products. Sun Gro uses a double-walled fuel tanks that meets CAN/ULC S601 standards and complies with the CCME Environmental Code of Practice for Above Ground Storage Tanks Systems Containing Petroleum Products (CCME, 1994). Sun Gro has developed an Environmental Protection Plan that addresses these risks, and that describes a series of measures to be applied in the event of spills. Employee training and availability of spill kits on site are among the measures included in the Environmental Protection Plan.

6.3.3 WATER FLOW AND QUALITY

Mitigation measures regarding water flow and quality consist primarily of discharge of drainage and peatland surface runoff from the ditches to two series of sedimentation ponds, overland flow or the combination of both. The number of ponds and the available storage volume will be doubled with respect to recommendations formulated in New Brunswick peat mining guidelines (Thibault, 1998), as a measure of precaution. Optimal functioning of the sedimentation ponds will be ensured through regular inspection and cleaning. Further mitigation of water discharge and water quality will be performed at the outlet of sedimentation ponds via the release of water by way of overland flow. This method contributes to controlling water flow and improving water quality and is recommended by Thibault (1998) for reducing sediment load in drainage water.

Sun Gro considers that combination of the two methods should prevent negative impacts of peat water discharge on water flow and quality of nearby watercourses as well as downstream locations.

The release points will be inspected on a routine basis to ensure they are functioning as intended, and to monitor any channel formation that may develop downstream from these points. Appropriate mitigation, including excavation and profiling of a series of outlet ditches, will be implemented as needed if it becomes apparent that the release points are not functioning as intended.

A series of mitigation measures aimed at reducing impacts of access road construction will be implemented based on the *Guidelines for Road and Watercourse Crossings* (DNR, 2004), should the access road route cross a watercourse. Such measures target preventing erosion and sediment control. For instance, existing vegetation will be protected, silt fences and straw bales will be used to trap sediment, and geotextile will be used to prevent stream banks erosion. Construction will be conducted in winter and culvert(s) will be installed during a period of low flow to limit impacts on water quality.

MONITORING PROGRAM

Water quality monitoring applies to drainage water flowing out of the sedimentation ponds as well as water of three surrounding watercourses.

Monitoring of drainage water is performed according to *Guidelines for peat mining operations in New Brunswick* (Thibault, 1998). Suspended solids concentration (i.e., peat particles) are measured once a week during the harvesting season and twice during frost free periods if flow is observed in the drainage system. Sampling is also done following a heavy rain episode (10 mm/h for 6 consecutive hours) or a strong wind episode (>80 km/h). Samples are taken 24 hours after such climatic events.

For watercourses, Sun Gro proceeds with two annual water analysis, the first following spring freshet that coincides with the first ditch maintenance operations and the second during peak harvesting activities in summer. Monitoring would be conducted for two years at three of the five stations sampled in June 2010 and November 2010: Tributary of Oyster River (343-2), Oyster River (343-3) and Tributary of Whites Brook (343-5) (Map 1, Appendix D). The water analysis will target the compounds and parameters prescribed in the abovementioned guide[3] to which vanadium, tin and cobalt will be added.

Results of both programs will be submitted to appropriate governmental departments for review. The watercourse monitoring program will be reevaluated after 2 years of peat harvesting with the collaboration of the New Brunswick Government departments.

6.3.4 PLANT AND FAUNA SPECIES

The main specific mitigation measure regarding wildlife consists of avoiding tree clearing and other activities associated with peat field development during the bird nesting season, which extends roughly from mid-April to the end of August. Sun Gro considers that there is sufficient undeveloped peatland in the surrounding area to serve as habitat for wildlife and plants, which will subsequently re-colonize harvested peatlands during the rehabilitation process.

6.3.5 PUBLIC SAFETY

Measures are implemented to limit risks to public safety. New Brunswick traffic and regulations will be rigorously respected, in particular speed limits. Sun Gro also makes sure that the trucks and trailers used for peat shipment are inspected regularly.

[3] Aluminium (Al), Ammonia nitrogen, Cadmium (Cd), Chrome (Cr), Conductivity, Hardness (CaCO3), Iron (Fe), Lead (Pb), Mercury (Hg), Nickel (Ni), Nitrates, pH, Phosphorus (P), Sulfates (SO4), TKN, Total Suspended Solids, Zinc (Zn).

6.3.6 EMPLOYEE HEALTH AND SAFETY

Exposure to peat dust and the risk of work-related accidents are the main source of potential impacts with regard to employee's health and safety. Sun Gro implements several mitigation measures to reduce the likelihood of potential impacts. In addition to dust control measures, use of tractors with air-conditioned cabs reduces employees' exposure to peat dust. Sun Gro provides appropriate personal protection equipment and training for employees. The site manager keeps records of all incidents and accidents and implement appropriate prevention measures. A hygiene and safety policy is applied at all times, and in case of emergency.

7 CONSULTATION AND ENGAGEMENT

7.1 PUBLIC INVOLVEMENT

A public consultation was performed as part of the 2010 EIA process and the results are present in this section. Sun Gro will conduct a similar consultation to inform the local population and stakeholders about the change to the Peatland No. 343 development plan. The public consultation will be done in collaboration with DELG who will approve each step of the process.

For the 2010 EIA, FPM complied with all public participation requirements of the *Environmental Impact Assessment Regulation* (87-83). It ensured that those potentially affected by the project were made aware of the project registration.

As a first phase in the public involvement process, landowners of 177 properties located within a 2,000 m radius of Peatland No. 343 were sent a letter to inform them of the proposed project and to invite them to share any concerns they could have in relation to it (Appendix I). The same letter was also sent to the Kiwanis Oak Point Campground and Park and the Professional Shellfish Growers Association of New Brunswick.

As of December 15, 2010, 7 landowners had responded to the invitation and contacted FPM. While most of the responders shared their support of the project, some expressed concerns relating to air quality, noise and traffic (Table 9). FPM provided responses by phone or in writing where required. The responders were informed of the opportunity to review the EIA report during the second phase of the public involvement process and express further comment if required.

Table 9 Responses to Public Information Letter

Property Identification Number[1]	Owner's comment
[redacted]	Supportive of Project.
	Asks questions on impacts. Supportive of Project.
	Asks questions on impacts. Supportive of Project.
	Supportive of Project, Would like to review portions of EIA relating to traffic, noise and dust.
	Supportive of Project.
	Expresses concerns on the environmental impacts.
	Would like to have information on traffic and noise level increase and impact on property.
Professional Shelfish Growers Association of New Brunswick	Expresses concerns on water quality.

[1] Each Property Identification Number corresponds to a property owner.

The second phase of the public involvement process followed the Project registration pursuant to Regulation 87-83. Copies of the registration document and the EIA report were made available for consultation. Through public notices, the public was invited to submit comments on the EIA report and on the Project.

FPM provided to the DELG a complete report documenting the public involvement process described above, in accordance with the proposed schedule, within 60 days after the Project registration.

8 APPROVAL OF THE UNDERTAKING

All permits, approvals and licenses were obtained following the registration of the 2010 EIA and other documents, including:

- Peat Lease (No. 56)
- Watercourse and Wetland Alteration Permit
- Approval to Construct/Operate under the Air Quality Regulation and under the Clean Air Act and the Water Quality Regulation – Clean Environment Act Public Land Use

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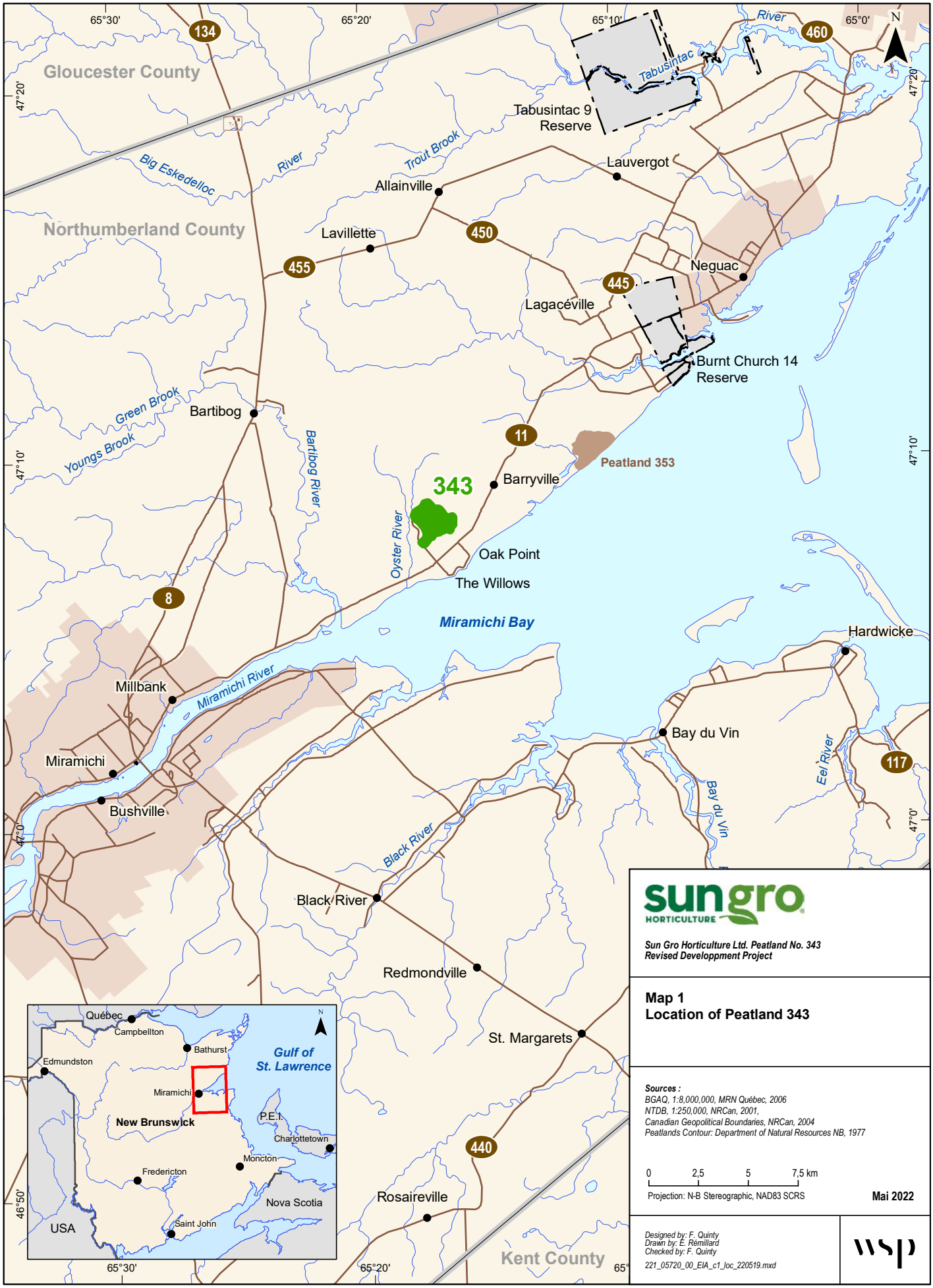
MAPS



sungro HORTICULTURE

Sun Gro Horticulture Ltd. Peatland No. 343
Revised Developpment Project

Map 1
Location of Peatland 343

Sources :
BGAQ, 1:8,000,000, MRN Québec, 2006
NTDB, 1:250,000, NRCan, 2001,
Canadian Geopolitical Boundaries, NRCan, 2004
Peatlands Contour: Department of Natural Resources NB, 1977

0 2,5 5 7,5 km

Projection: N-B Stereographic, NAD83 SCRS

Mai 2022

Designed by: F. Quinty
Drawn by: É. Rémillard
Checked by: F. Quinty

221_05720_00_EIA_c1_loc_220519.mxd

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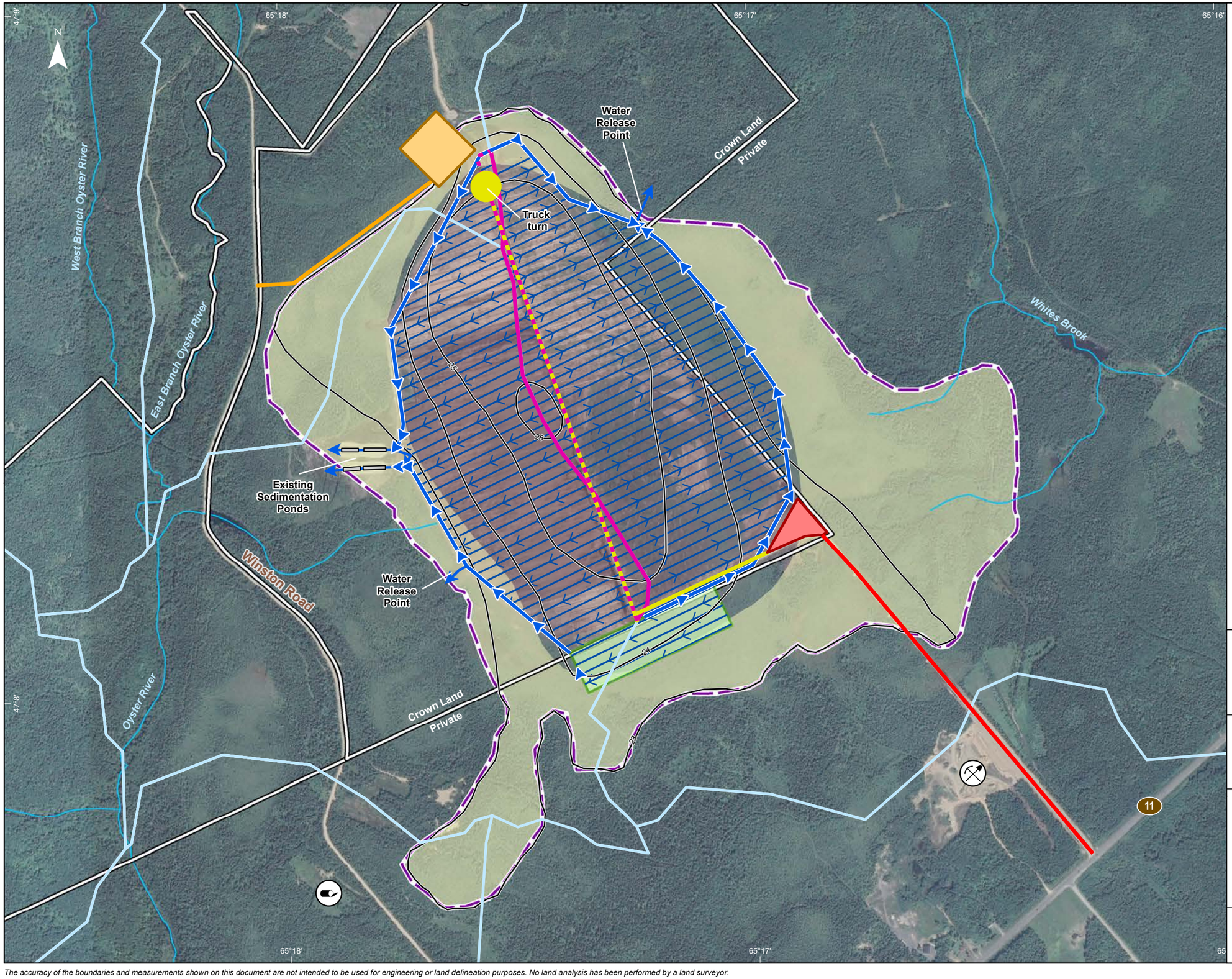


Project Layout

- Perimeter of Local Peatlands (Department of Natural Resources NB, 1977)
- Peat Thickness between 0 and 1 m (Department of Natural Resources NB, 1977)
- Elevation Contour (Department of Natural Resources NB, 1977)
- Harvest Area (Added 2022) 427 x 120 m (5,1 ha)
- Existing Service Area
- Proposed Service Area (EIA,
- Sand Pit
- Landfill (Closed)

Watersheds

- Modified Watershed Divide within Peatland
- Interpretated Watershed Divide
- Watershed Divide

Drainage

- Main Ditch
- Secondary Ditch
- Expected Overland Flow Direction
- Sedimentation Pond

Roads

- Bog Road
- Existing Access Road
- Access Road (EIA, 2010)

Basemap

- Watercourse
- Provincial Crown Land

sungro HORTICULTURE

Sun Gro Horticulture Ltd. Peatland No. 343
Revised Developpment Project

Map 2
Infrastructure and Drainage Network

Sources:
Basemap: SNB GeoNB, Data Extraction on December 7, 2020 ;
Imagery, Google Earth 2021
CanVec, 1:50 000, NRCan, 2008
Peatlands Contour: Department of Natural Resources NB, 1977
Watershed: Atlantic Data Warehouse, 2010

0 100 200 300 m

Projection: N-B Stereographic, NAD83 SCRS

November 2022

Designed by: F. Quinty
Drawn by: É. Rémillard
Checked by: F. Quinty

221_05720_00_EIA_c2_drainage_221104.mxd

wsp

Project no: 221-05720-00

The accuracy of the boundaries and measurements shown on this document are not intended to be used for engineering or land delineation purposes. No land analysis has been performed by a land surveyor.

sungro HORTICULTURE

Sun Gro Horticulture Ltd. Peatland No. 343
Revised Developpment Project

Map 3
Transportation Route to Sungro Inkerman Processing Plant

Sources :
BGAQ, 1:8,000,000, MRN Québec, 2006
NTDB, 1:250,000, NRCan, 2001,
Canadian Geopolitical Boundaries, NRCan, 2004
Peatlands Contour: Department of Natural Resources NB, 1977

0 4,5 9 13,5 km

Projection: N-B Stereographic, NAD83 SCRS

Mai 2022

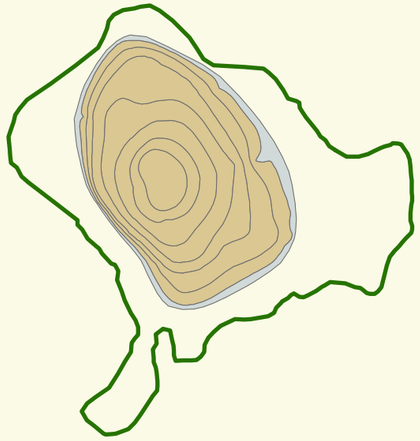
Designed by: F. Quinty
Drawn by: É. Rémillard
Checked by: F. Quinty
221_05720_00_EIA_c3_transport_220520.mxd

wsp

2011

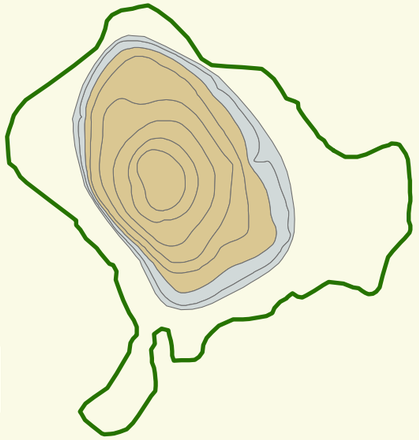
Harvested : 104.87 ha
Abandoned : 0.00 ha

2016



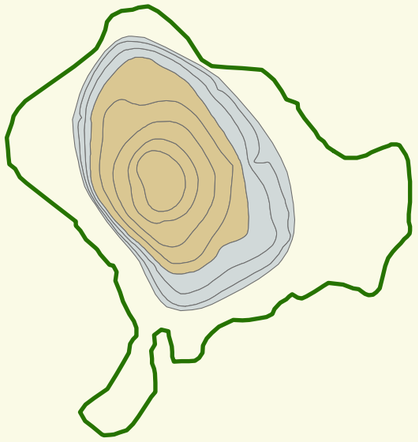
Harvested : 94.83 ha
Abandoned : 10.04 ha

2021



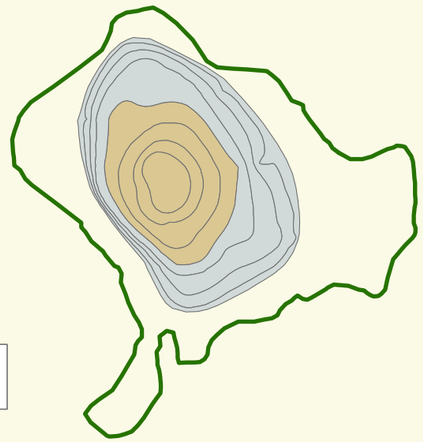
Harvested : 79.01 ha
Abandoned : 25.86 ha

2026



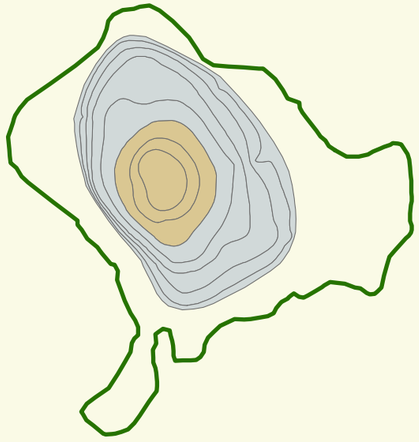
Harvested : 61.09 ha
Abandoned : 43.78 ha

2031



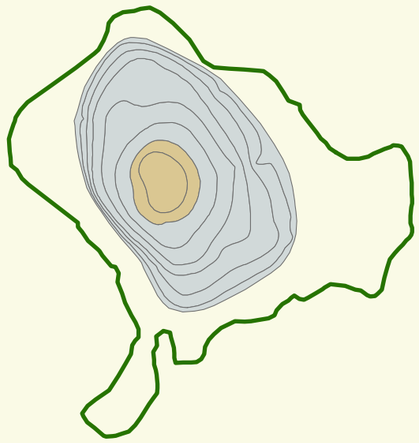
Harvested : 40.73 ha
Abandoned : 64.14 ha

2036



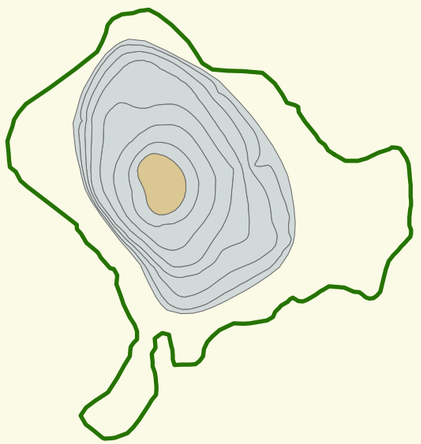
Harvested : 23.55 ha
Abandoned : 81.32 ha

2041



Harvested : 13.20 ha
Abandoned : 91.67 ha

2046



Harvested : 5.49 ha
Abandoned : 99,38 ha

Harvested
Abandoned/
Rehabilitated
Perimeter of Peatland 343

sungro HORTICULTURE

Sun Gro Horticulture Ltd. Peatland No. 343
Revised Developpment Project

Map 4
Peatland Development Projection

Sources:
Peatlands Contour: Department of Natural Resources NB, 1977

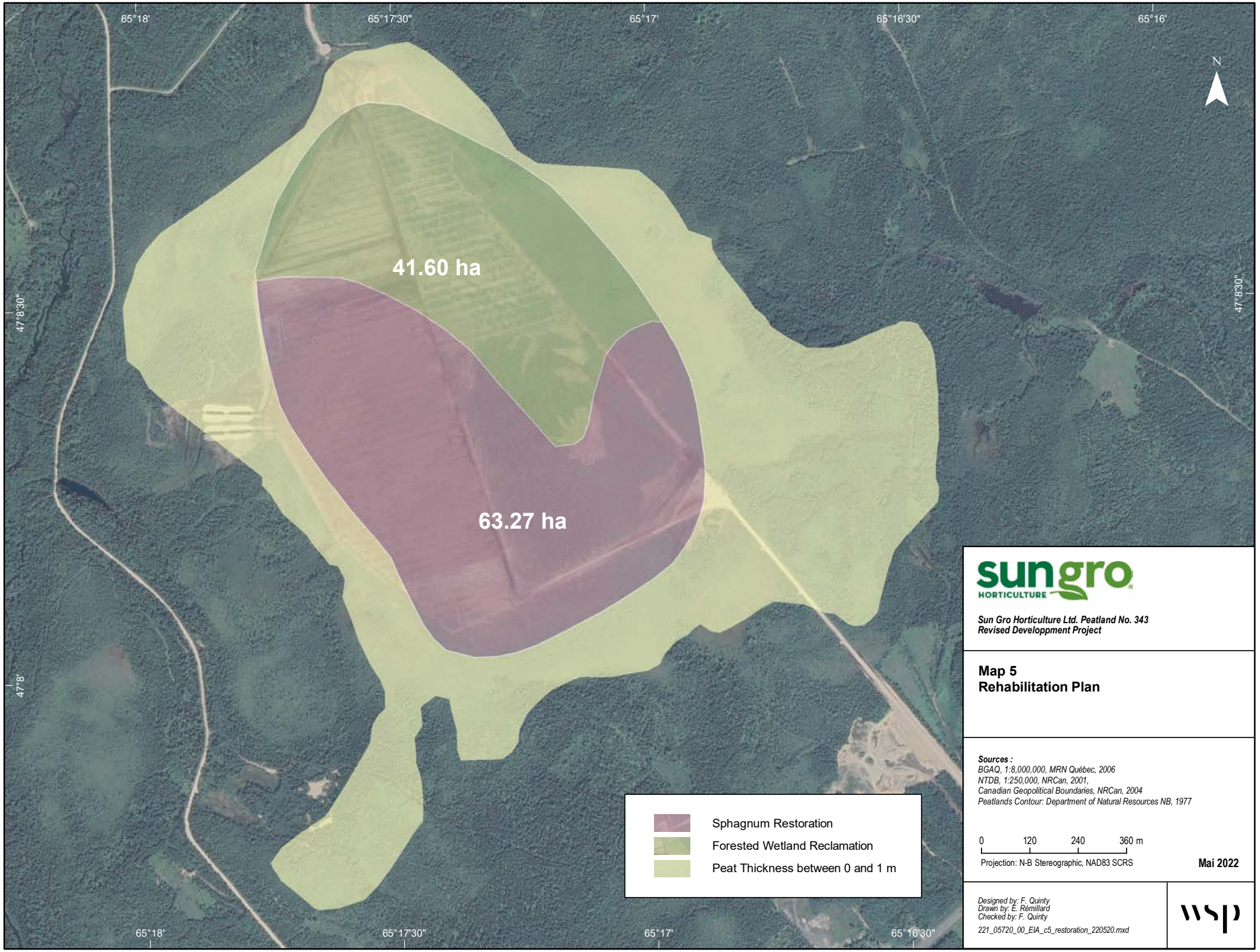
0 300 600 900 m

Projection: N-B Stereographic, NAD83 SCRS

May 2022

Designed by: F. Quinty
Drawn by: É. Rémillard
Checked by: F. Quinty
221_05720_00_EIA_c4_project_220520.mxd

wsp



sungro HORTICULTURE

Sun Gro Horticulture Ltd. Peatland No. 343
Revised Developpment Project

Map 5
Rehabilitation Plan

Sources :
BGAQ, 1:8,000,000, MRN Québec, 2006
NTDB, 1:250,000, NRCan, 2001,
Canadian Geopolitical Boundaries, NRCan, 2004
Peatlands Contour: Department of Natural Resources NB, 1977

0 120 240 360 m

Projection: N-B Stereographic, NAD83 SCRS

Mai 2022

Designed by: F. Quinty
Drawn by: É. Rémillard
Checked by: F. Quinty

221_05720_00_EIA_c5_restoration_220520.mxd

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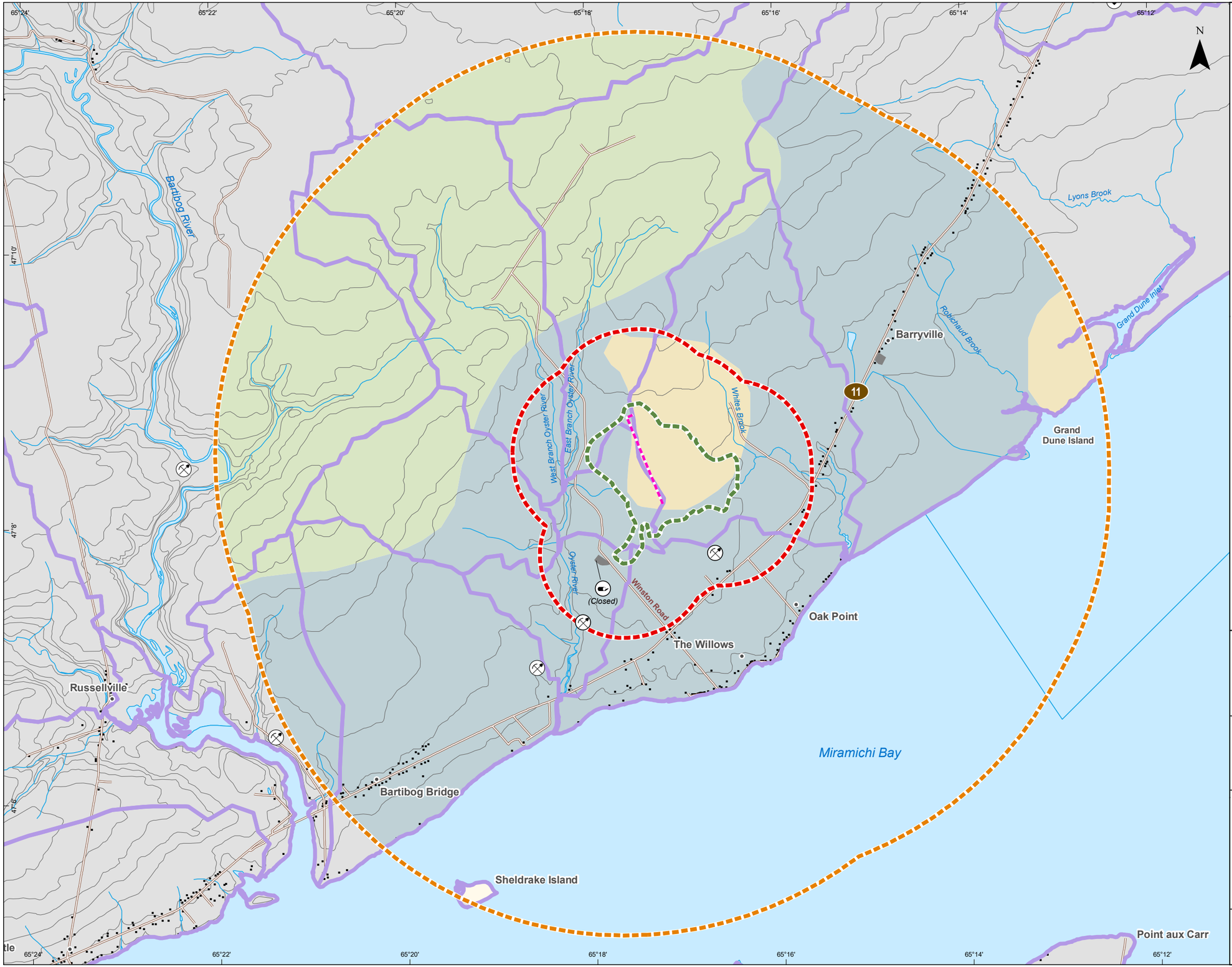


Project Layout

- Peatland
- Study Area 1
- Study Area 5

Surficial Geology

- Blanket and Veneer: loamy lodgment till, minor
- Blankets and Plains: sand, silt, some gravel and clay
- Organic Deposit: marsh, bog and swamp

Limits and infrastructure

- Building
- Road
- Land filled *(closed)*
- Pit
- Watershed
- Modified Watershed Divide within Peatland

sungro HORTICULTURE

Sun Gro Horticulture Ltd. Peatland No. 343
Revised Developpment Project

Map 6
Physical Environment

Sources:
Basemap: SNB GeoNB, Data Extraction on December 7, 2020 ;
Imagery, Google Earth 2021
CanVec, 1:50 000, NRCan, 2008
Peatlands Contour: Department of Natural Resources NB, 1977
Watershed: Atlantic Data Warehouse, 2010

0 0,5 1 1,5 km

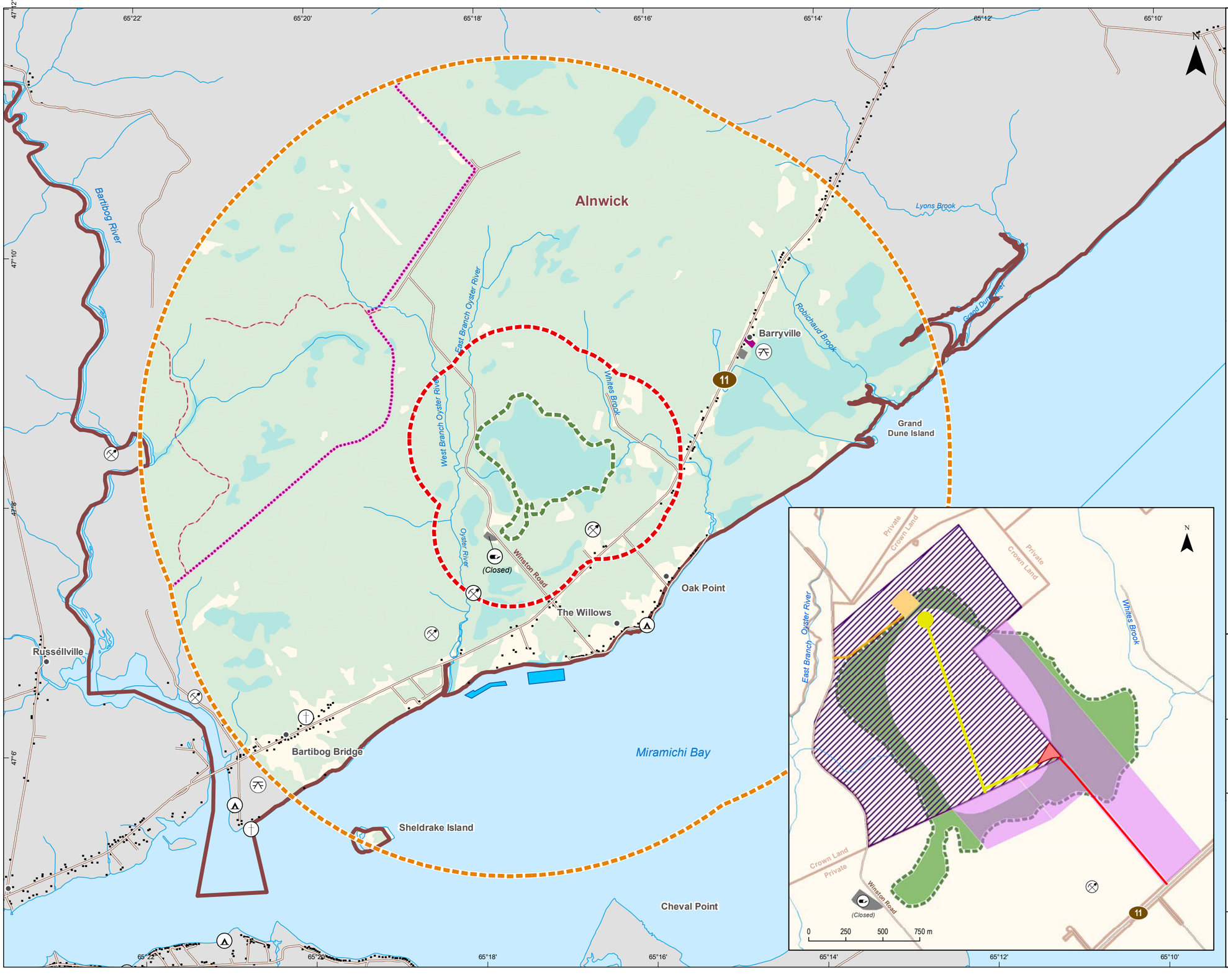
Projection: N-B Stereographic, NAD83 SCRS

October 2022

Designed by: F. Quinty
Drawn by: É. Rémillard
Checked by: F. Quinty

221_05720_00_EIA_c6_PE_221027.mxd

wsp



Project Layout

- Peatland
- Peat Thickness between 0 and 1 m
- Existing Access
- Access Road (EIA, 2010)
- Bog Road
- Service area (EIA, 2010)
- Existing Service
- Study Area 1
- Study Area 5
- Wooded
- Wetland

Human Environment

- Trail
- ATV Trail
- Campground
- Park/Sports Field
- Aquaculture Sites

Limits and Infrastructure

- Building
- Cimetery
- Landfill
- Pit
- Census Subdivision
- Lease Area
- Private Parcel
- Provincial Crown Land

sungro HORTICULTURE

Sun Gro Horticulture Ltd. Peatland No. 343
Revised Developpment Project

Map 7
Natural and Human Environment

Sources:
Basemap: SNB GeoNB, Data Extraction on December 7, 2020 ;
Imagery, Google Earth 2021
CanVec, 1:50 000, NRCan, 2008
Peatlands Contour: Department of Natural Resources NB, 1977
Watershed: Atlantic Data Warehouse, 2010

0 0,5 1 1,5 km
Projection: N-B Stereographic, NAD83 SCRS

October 2022

Designed by: F. Quinty
Drawn by: É. Rémillard
Checked by: F. Quinty
221_05720_00_EIA_c7_MHN_221027.mxd

wsp

APPENDIX

A

CERTIFICATE OF DETERMINATION

DOCUMENT A

DÉCISION DU MINISTRE
CONDITIONS DE L'AGRÉMENT
Conformément au *Règlement 87-83* de la *Loi sur l'assainissement de l'environnement*
Le 18 avril 2011
Numéro de référence : 4561-3-1283

1. Conformément au paragraphe 6(6) du Règlement, il a été déterminé que l'ouvrage peut être entrepris après l'obtention d'un agrément en vertu de tous les autres règlements et lois qui s'appliquent.

2. L'ouvrage visé doit être entrepris dans les trois ans suivant la date de la présente décision. Si les travaux ne peuvent commencer dans les délais prescrits, l'ouvrage doit être enregistré de nouveau en application du *Règlement sur les études d'impact sur l'environnem*ent (87-83) de la *Loi sur l'assainissement de l'environnement*, à moins d'indication contraire par le ministre de l'Environnement.

3. Le promoteur doit respecter tous les engagements ainsi que toutes les obligations et les mesures de surveillance et d'atténuation énoncés dans le document d'enregistrement en vue d'une EIE, de janvier 2011, et les addendas subséquents, de même que toutes les autres exigences précisées dans la correspondance ultérieure pendant l'examen découlant de l'enregistrement. À l'achèvement du projet conformément aux conditions du présent document, le promoteur doit aussi soumettre, au gestionnaire de la Section de l'évaluation environnementale du ministère de l'Environnement (MENV), un tableau sommaire décrivant l'état de chaque condition énoncée dans la présente décision.

4. Avant le début des travaux de construction, le promoteur doit obtenir un agrément de construction et d'exploitation (air et eau) pour ce projet conformément à la *Loi sur l'assainissement de l'environnement***.** Le promoteur doit présenter une demande au moins 90 jours avant le début des travaux. Veuillez communiquer avec le gestionnaire de la Section des processus industriels au 506-453-7495 pour de plus amples renseignements.

5. Même si aucun exemplaire de listère australe (*Listera australis*), une espèce végétale en péril, n'a été découvert dans le périmètre du projet, le promoteur doit veiller à ce que les spécimens qui pourraient être découverts pendant la durée du projet soient dûment protégés.

6. En cas de vente, de location à bail ou de tout autre transfert ou modification du contrôle de l'ensemble ou d'une partie du projet, le promoteur doit donner un avis écrit des conditions au preneur à bail, au contrôleur ou à l'acheteur.

7. Le promoteur doit s'assurer que tous les concepteurs, entrepreneurs et exploitants associés au projet visé (construction et exploitation) se conforment aux exigences énoncées ci-dessus.

APPENDIX

B

PROOF OF OWNERSHIP

AGREEMENT OF PURCHASE AND SALE

THIS AGREEMENT made in duplicate, this 23 day of November, 2022.

BETWEEN:

[redacted], businessman, of Pointe Alexandre, in the County of Gloucester, New Brunswick, hereinafter referred to as "**THE VENDOR**";

OF THE FIRST PART

- and -

Sun Gro Horticulture Canada Ltd., a body corporate, duly incorporated and registered as an extra-provincial corporation by virtue of the laws of the Province of New Brunswick, having its registered office in Calgary, Alberta, hereinafter referred to as "**THE PURCHASER**";

OF THE SECOND PART

1. The Vendor and the Purchaser hereby agree, according to the terms hereof, for the purchase and sale of the following : the approximately 64.3 hectare parcel of land and premises located on Route 11 Oak Point currently identified as PID **40241374** (hereinafter called the "**Lands**" and shown in Schedule "A");

2. **PURCHASE PRICE**

The purchase price of the **Lands** shall be [redacted] 21(1) [redacted] of lawful money of Canada, plus HST, if applicable, payable according to paragraph 3 of this Agreement.

3. **METHOD OF PAYMENT**

The purchase price shall be paid as follows:

a) The adjusted balance of the purchase price at closing of the sale.

4. **CLOSING**

Subject to the terms and conditions of this Agreement, the closing date (the "closing date") shall be the date which is ten (10) days following the waiver of the conditions set out in section 9 hereof, in writing by the Purchaser. The parties agree that if it's not possible to close on the closing date, they will grant each other a 7 day extension or such other extension as they may mutually agree. On the closing date, vacant possession of the Lands shall be given to the Purchaser by the Vendor.

5. **HST**

Regarding any or all HST applicable to this transaction, the parties agree as such:

RC

a) Any HST, if applicable to this transaction, shall be paid by the Purchaser to the Vendor in addition to the purchase price in accordance with the provisions of the *Excise Tax Act*. However, the Vendor and the Purchaser have agreed and do hereby agree that:

i) The Vendor is relieved from collecting the applicable HST from the Purchaser under the provisions of subsection 221(2) of the *Excise Tax Act* and,

ii) The Purchaser will self-assess for HST when required under the provisions of subsection 228(4) of the *Excise Tax Act*.

b) The Purchaser agrees to file the prescribed HST Return and self-assess on the disposition as described in paragraph 2 no later than the prescribed day for filing such prescribed form.

6. ADJUSTMENTS

Adjustments shall be computed as of the closing date for property taxes.

7. TITLE

a) The title shall be good freehold and free from all encumbrances except any registered easements, rights-of-way of record, municipal by-laws or government enactment that do not affect the market value of the Lands provided the Lands and the Vendor are in full compliance with the same.

b) The Purchaser is not to call for the production of any title deed, survey or other evidence of title, except as may be in the possession of the Vendor.

c) The Purchaser is to be allowed until the closing date to examine the title to the Lands. If prior to such last-mentioned date, any valid objection to title is made in writing, which the Vendor is unable or unwilling to remove and which the Purchaser will not waive, this Agreement shall be null and void, notwithstanding any intermediate acts or negotiations in respect of such objection and any deposit paid from the purchaser to the Vendor shall be repaid to the Purchaser without any deduction or interest.

8. DEED ETC.

On the closing date, the Vendor shall deliver to the Purchaser:

a) a duly executed transfer in registerable form sufficient to vest title in fee simple to the **Lands** in the Purchaser, subject to the conditions, reservations and provisos in the original grant from the Crown, an HST Certificate, and any other documents that may be required to put in effect the transfer of the Lands to the Purchaser.

9. CONDITIONS IN FAVOUR OF PURCHASER

a) This Agreement shall be conditional upon the following conditions in favour of the Purchaser being satisfied and fulfilled:

i) all zoning by-laws and ordinances of similar effect applicable to the Lands being satisfactory to the Purchaser in every respect;

RC

ii) access to the Lands being satisfactory to the Purchaser in every respect;

iii) the soil and environmental condition of the Lands being satisfactory to the Purchaser in every respect, and for that purpose, the Purchaser shall at its own expense have the right to enter upon the Lands following the execution of this Agreement for the purpose of making such inspections and investigations; and

iv) the Purchaser having received all necessary permits, approvals and authorizations for purchasing the Lands and for carrying out its intended use thereof (including but not limited to all permits, approvals and authorizations necessary for the Purchaser carrying out peat operations at the Lands.

b) The Vendor shall provide such authorizations to the Purchaser as may be necessary for completing any investigations or searches in relation to the above noted conditions.

c) In connection with the conditions, the Vendor shall deliver to the Purchaser within 5 days of the execution of this Agreement, any environmental site assessment reports, orders, complaints or correspondences relating to the environmental condition of the Lands in the possession of the Vendor.

d) On or before the date that is three (3) business days before the closing date, this Agreement has been approved by the Purchaser's Shareholders or Board of Directors. Unless otherwise notified in writing by the Purchaser on or before the end of such three day period the directors and shareholders of the Purchaser shall be deemed to have so approved this Agreement.

e) In the event any of the conditions set out in this Section 9 are not satisfied prior to or on the date which is 90 days after this agreement is signed by the Vendor and delivered to the Purchaser then this Agreement becomes null and void. The conditions set out in this Section 9 are for the sole benefit of the Purchaser, which the Purchaser may waive in the Purchaser's sole discretion. The Purchaser agrees to make reasonable efforts to satisfy these conditions in a timely fashion.

10. DELAYS

Time shall be of the essence of this Agreement.

11. LEGAL REPRESENTATION

The Purchaser shall be responsible for its own legal fees regarding the present transaction. Further, the Purchaser shall be responsible for the Vendor's legal fees regarding the present transaction, to a maximum of one thousand dollars (1 000 $), plus HST.

12. TERMINATION OF THE AGREEMENT

a) If the Purchaser does not conclude the sale according to the provisions of this Agreement, other than due to any condition in favour of the Purchaser provided for in this Agreement not being satisfied, the Vendor may retain any deposit paid hereunder, by way of liquidated damages or compel the Purchaser to complete the sale.

RC

b) If the Vendor does not conclude the sale according to the provisions of this Agreement, the Purchaser may require the repayment of any sum paid to the Vendor hereunder and accept the termination of this Agreement, or compel the Vendor to complete the sale.

13. WAIVER

Either party may, by notice in writing, waive any breach by the other of any of the terms, conditions, covenants or provisions contained in this Agreement; provided always, that no act or omission by either party shall extend to or be taken in any manner whatsoever to affect any subsequent breach or default of the rights resulting therefrom.

14. NOTICES

Any notice, demand or other communication required or permitted to be given to any party hereunder shall be given in writing and addressed to their respective solicitor.

Any such notice shall be deemed to be sufficiently given if personally delivered or sent by facsimile transmission, and in each case shall be deemed to have been received by the other party on the day following the day on which it was delivered or sent by facsimile transmission, if such day is a business day at the location of receipt, and, if not, on the next following business day.

15. MODIFICATIONS

No extension, change, modification or amendment to or of this instrument of any kind whatsoever shall or will be made or claimed by either party hereto and no notice of any extension, change, modification or amendment, made or claimed by either party hereto shall have any force or effect whatsoever, except where the same has been endorsed in writing on this Agreement and signed by the parties hereto; provided always, that the parties hereto may, by mutual agreement in writing, amend this contract.

16. ENTIRE AGREEMENT

It is understood and agreed that all understandings and agreements heretofore made between the parties hereto are merged in this contract, which alone fully and completely expresses their agreement, and that the same is entered into after full investigation, neither party relying upon statements or representations not embodied in this contract.

17. INTERPRETATION

a) The paragraph headings in this Agreement are for convenience only and shall not be construed to affect the meanings of the paragraphs so headed.

b) In this Agreement, words importing the singular include the plural, and vice versa; and words importing the masculine gender include the feminine and neuter genders.

18. SUCCESSORS

This Agreement shall endure to the benefit of and be binding upon the parties hereto, their respective heirs, executors, administrators and assigns.

RC

19. GOVERNING LAW

This Agreement is governed by the laws of the Province of New Brunswick.

20. ELECTRONIC COPIES

The parties agree to be bound by this agreement. Any document related to it and/or communications that could be distributed electronically as well as the reproduction of a signature will be deemed to be an original copy.

Signatures on the next page

DC

IN WITNESS WHEREOF, THE VENDOR has affixed its seal and signature, in , in the Province of New Brunswick, this 15 November 2022.

SIGNED, SEALED AND DELIVERED)
)
)
)
)
)
)

Witness) Rémi Chiasson

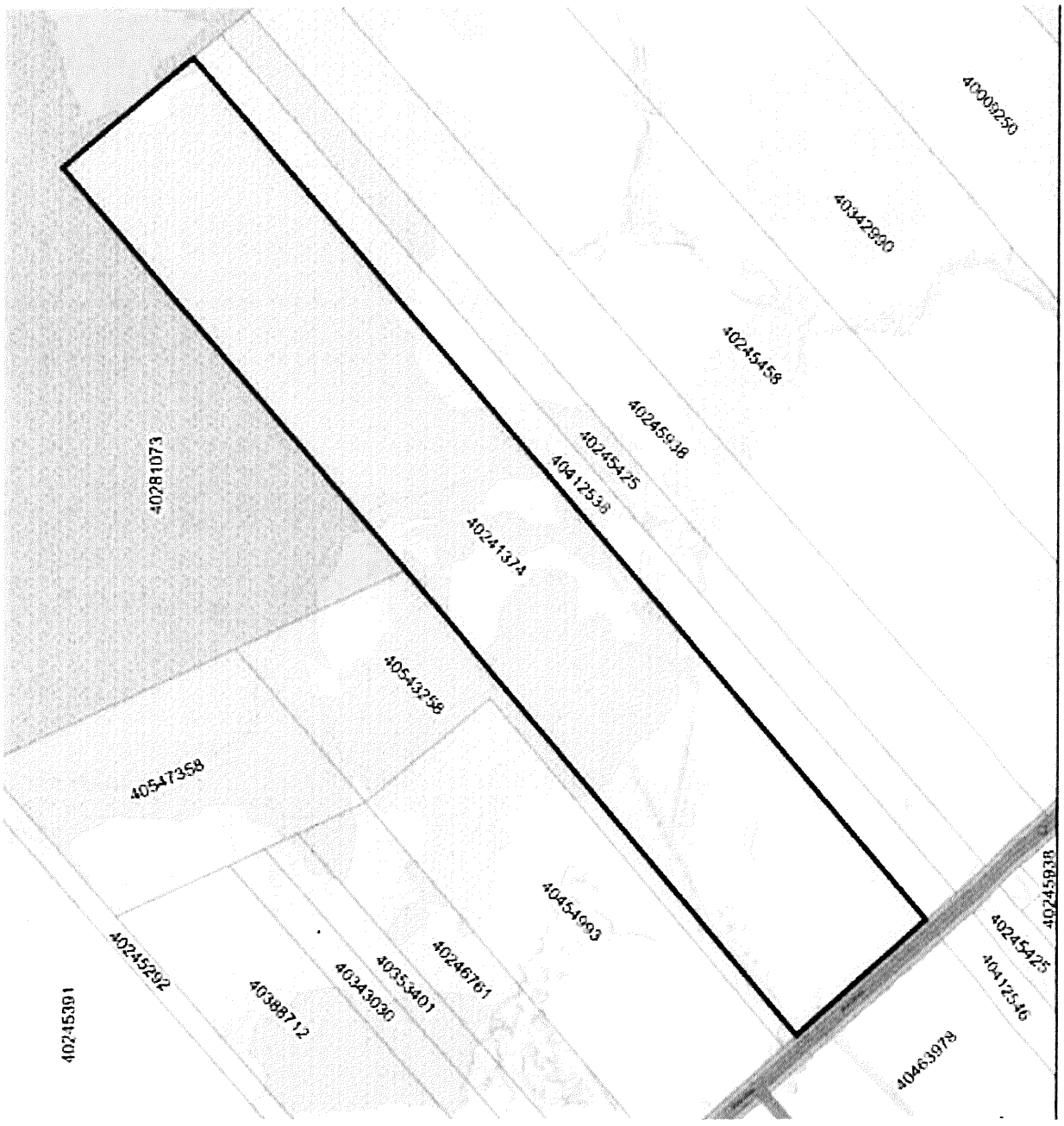
IN WITNESS WHEREOF, THE PURCHASER has affixed its corporate seal and the signature of its officially authorized representative, at Toronto, in the province of Ontario, this 23rd of November 2022.

SIGNED, SEALED AND DELIVERED) **Sun Gro Horticulture Canada Ltd.**
in the presence of:)
)
)
)
)
)

Vanessa Rosalia Fiumara) Per:
Notary) Yedidia Koschitzky –
Chief Operating Officer

Schedule "A"

PID: 40241374



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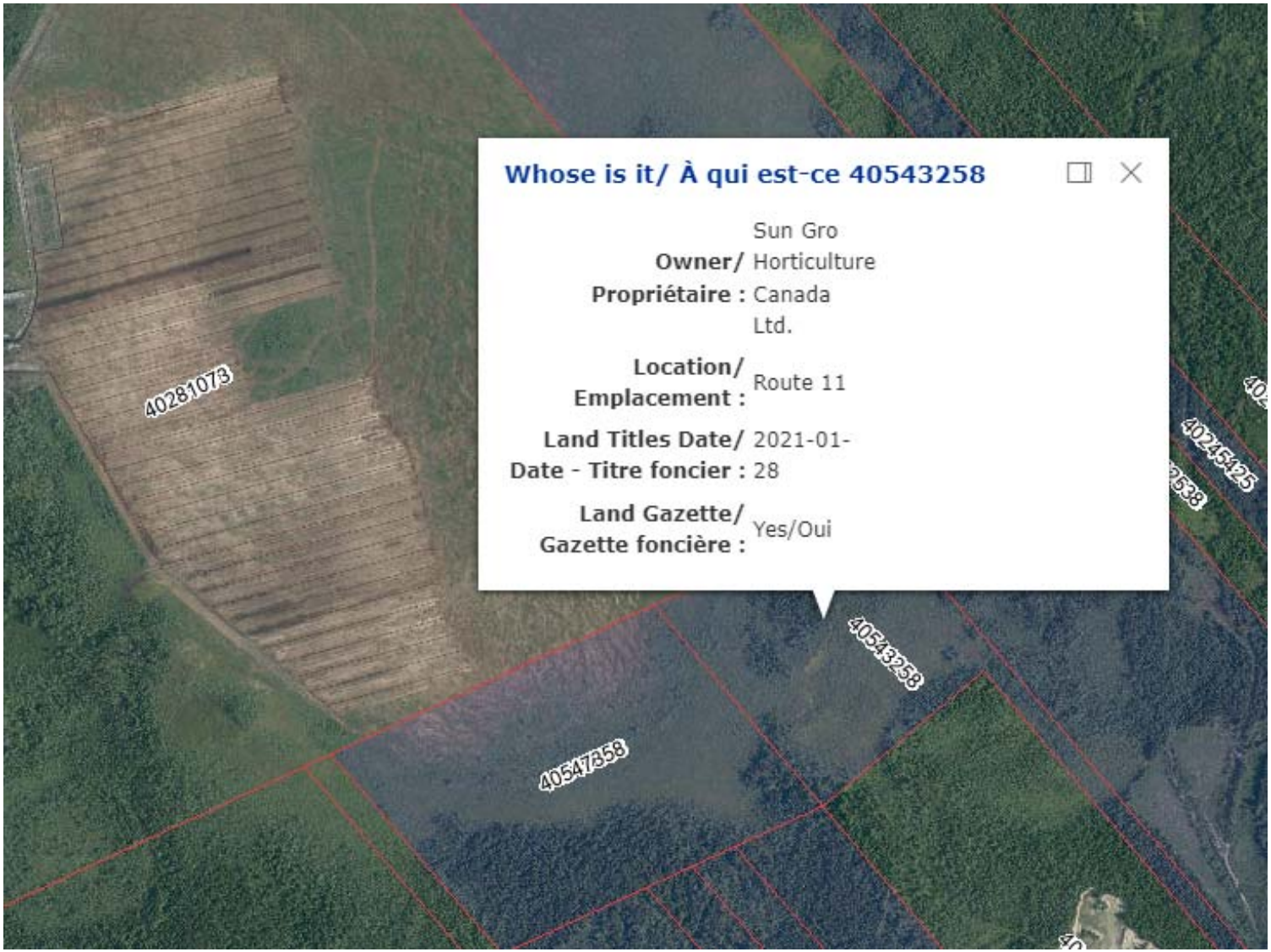
Whose is it/ À qui est-ce 40543258
Owner/ Propriétaire : Sun Gro Horticulture Canada Ltd.
Location/ Emplacement : Route 11
Land Titles Date/ Date - Titre foncier : 2021-01-28
Land Gazette/ Gazette foncière : Yes/Oui
40281073
40543258
40547358
40245425


40281073
Whose is it/ À qui est-ce 40547358
Owner/ Propriétaire : Sun Gro Horticulture Canada Ltd.
Location/ Emplacement : Route 11
Land Titles Date/ Date - Titre foncier : 2022-03-29
Land Gazette/ Gazette foncière : No Records Returned/ Aucune fiche retrouvée
40241374
40454993

APPENDIX

C

FISHING LICENCE FOR SCIENTIFIC PURPOSES

Pêches et Océans Canada | Fisheries and Oceans Canada

Canada

DEPARTMENT OF FISHERIES AND OCEANS
GULF REGION

LICENCE TO FISH FOR
Scientific purposes

LICENCE No SG-NBT10-142

Pursuant to Part VII, Section 52, of the *Fishery (General) Regulations*, this licence is issued to Rod Currie, Biologist of R. A. Currie Ltd., P.O. Box 1484, Fredericton, New Brunswick, E3B 5E3, (506) 458-5643

This licence is issued for the purpose of collecting background fisheries data for possible future peat bog development in the Oyster River drainage, tributary to Miramichi Bay; and in the Caraquet River drainage in New Brunswick .

The following persons are authorized to carry out activities under the authority of this licence:

Name	Organization	Telephone
Rod Currie	R. A. Currie Ltd.	(506)458-5643

THE FOLLOWING CONDITIONS APPLY TO THIS LICENCE:

AUTHORITY TO FISH

Fishing activities carried out under the authority of this licence may only be conducted under the direct supervision of the licence holder or authorized individuals as listed above. Persons working under the authority of this licence must carry a copy of the licence while conducting fishing activities, and while in possession of fish caught or fishing gear used for fishing under the authority of this licence. The operator of a vessel or persons authorized to carry out fishing activities shall produce this licence upon request by a fishery officer or fishery guardian for inspection.

AREA OF ACTIVITIES

This licence authorizes fishing to be carried out in the following areas:

The project involves tributaries of two (2) bogs,
specifically Bog 343 in the Oyster River drainage, tributary to Miramichi Bay; and
Bog 547 in the Caraquet River drainage in New Brunswick .

(See attached maps in Annex "B").

SPECIES

Only the minimum number of species required to complete the survey or supply research samples will be retained as specified below. All other organisms shall forthwith be returned to the place from which they were taken and where they are alive in a manner that causes them the least harm.

Species	Size	Number to be Caught and Sampled		
		Caught	Released	Retained
All	All	All	All	0

SAMPLES

Fish will be captured, identified, measured, and released. None will be retained.
This project involves the standard spot electrofishing surveys to collect basic baseline fish data for peat bog surveys.

DISPOSITION OF RETAINED FISH

Fish retained under the authority of this licence will not be used for human consumption and may not be sold.

GEAR

To prevent the transfer of disease and non-native organisms into water bodies, it is mandatory that all gear and equipment (including waders, nets, electrofishing cathode, anode, buckets) that go in the water be cleaned, disinfected and decontaminated when transferring from one body of water to another.

You are authorized to use the following fishing gear:

Gear Type	Specifics	Mesh Size	Number of Units	Tended?
Smith-Root electrofisher	LR-24		1	Yes

GEAR IDENTIFICATION

All fishing gear must be identified with the name of the licence holder, contact telephone number, and licence number and this must be legible and readily visible at all times.

PERIOD OF ACTIVITY

This licence is valid from **June 29 to September 30, 2010.**

NOTIFICATION REQUIREMENTS

Prior to commencing activities authorized under the authority of this licence, the licence holder or delegate must provide the Field Supervisor at the nearest Conservation and Protection office with the time and the location the activities are to be carried out and the details of the activities. Annex "A" is a list of all Conservation and Protection offices in the Gulf Region.

REPORT REQUIREMENTS

A summary report on the project activities must be submitted to the Chief, Licensing, Fisheries and Oceans Canada, P.O. Box 5030, Moncton, NB, E1C 9B6 within 4 weeks of the expiry date of this licence.

ISSUED AT TRACADIE-SHEILA, N.-B.

June 29, 2010.
Date

DFO Authorized Person

Signature of Licence Holder

Licence not valid unless signed by DFO Authorized Person and Licence Holder.

APPENDIX

D

WATERCOURSE SURVEY

RAPPORT
FINAL

FPM
Peat Moss Co. Ltd.

Projet d'exploitation de la tourbière 343

Caractérisation des cours d'eau et pêche électrique

N^{O} 607193

Décembre 2010
Rév. 00

SNC·LAVALIN
Environnement

RAPPORT FINAL

FPM PEAT MOSS CO. LTD.

Projet d'exploitation de la tourbière 343

Caractérisation des cours d'eau et pêche électrique

N^{O} 607193

Décembre 2010
Rév. 00

SNC•LAVALIN Environnement

Préparé par :

Benoit Caron, B. Sc., biologiste

Vérifié par :

Jacques Ladroix, M. Sc., géographe, chargé de projet

AVIS

Ce document fait état de l'opinion professionnelle de SNC-Lavalin inc., division Environnement (ci-après appelée « SNC-Lavalin Environnement ») quant aux sujets qui y sont abordés. Elle a été formulée en se basant sur ses compétences professionnelles en la matière et avec les précautions qui s'imposent. Le document doit être interprété dans le contexte du contrat daté du 07-08-2010 (le « Contrat ») intervenu entre SNC-Lavalin Environnement et FPM Peat Moss Co. Ltd. (le « Client ») ainsi que de la méthodologie, des procédures et des techniques utilisées, des hypothèses de SNC-Lavalin Environnement ainsi que des circonstances et des contraintes qui ont prévalu lors de l'exécution de ce mandat. Ce document n'a pour raison d'être que l'objectif défini dans le Contrat, et est au seul usage du Client, dont les recours sont limités à ceux prévus dans le Contrat. Il doit être lu comme un tout, à savoir qu'une portion ou un extrait isolé ne peut être pris hors contexte.

Pour la préparation de ce document, SNC-Lavalin Environnement a suivi une méthodologie et des procédures et a pris les précautions appropriées en se basant sur ses compétences professionnelles en la matière et avec les précautions qui s'imposent. Cependant, l'exactitude de ces estimations ne peut être garantie. À moins d'indication contraire expresse, SNC-Lavalin Environnement n'a pas contre-vérifié les hypothèses, données et renseignements en provenance d'autres sources (dont le Client, les autres consultants, laboratoires d'essai, fournisseurs d'équipements, etc.) et sur lesquels est fondée son opinion. SNC-Lavalin Environnement n'en assume nullement l'exactitude et décline toute responsabilité à leur égard.

À l'exception des dispositions du Contrat, SNC-Lavalin Environnement décline en outre toute responsabilité envers le Client et les tiers en ce qui a trait à l'utilisation (publication, renvoi, référence, citation ou diffusion) de tout ou partie du présent document, ainsi que toute décision prise ou action entreprise sur la foi dudit document.

ASSURANCE QUALITÉ

Chez SNC-Lavalin Environnement, nous tenons en haute estime nos clients ainsi que l'environnement et les communautés au sein desquels nous travaillons.

Nous appliquons rigoureusement et améliorons continuellement notre Système de Gestion de la Qualité, qui a été enregistré par le Bureau de normalisation du Québec (BNQ) selon la norme internationale ISO 9001, afin de répondre et de surpasser les exigences de nos clients. Nous reconnaissons que la qualité de notre prestation est souvent jugée par :

- Des travaux de terrain réalisés en toute sécurité;
- Une cueillette d'information (inventaires, relevés, recherches) précise et complète;
- La qualité technique et linguistique des livrables soumis;
- Le respect des échéanciers;
- Le respect des budgets;
- Une facturation rapide, claire et précise;
- La compétence de notre personnel.

Tous les documents présentés à nos clients seront révisés par au moins deux professionnels pour les fins de contrôle de la qualité et ainsi réduire les efforts et délais de révision par nos clients.

Dans la planification et la réalisation des projets qui nous sont confiés, nous sommes fidèles aux principes du développement durable en incorporant les principes de durabilité à chaque stade du cycle de vie d'un projet.

Chez SNC-Lavalin Environnement, nous comprenons que la satisfaction de nos clients est indispensable à la réussite de nos affaires et nous voulons être perçus par eux comme un partenaire privilégié pour réaliser des projets durables.

L'entreprise est membre de diverses associations accréditées dont l'Association québécoise pour l'évaluation d'impacts (AQEI), le Réseau Environnement et l'Association canadienne de réhabilitation des sites dégradés (ACRSD).

Certifié ISO 9001

ÉQUIPE DE TRAVAIL

FPM Peat Moss Co., Ltd.

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	Ernie Basque

SNC-Lavalin Environnement

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Équipe de terrain	Benoit Caron, B.Sc., biologiste
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TABLE DES MATIÈRES

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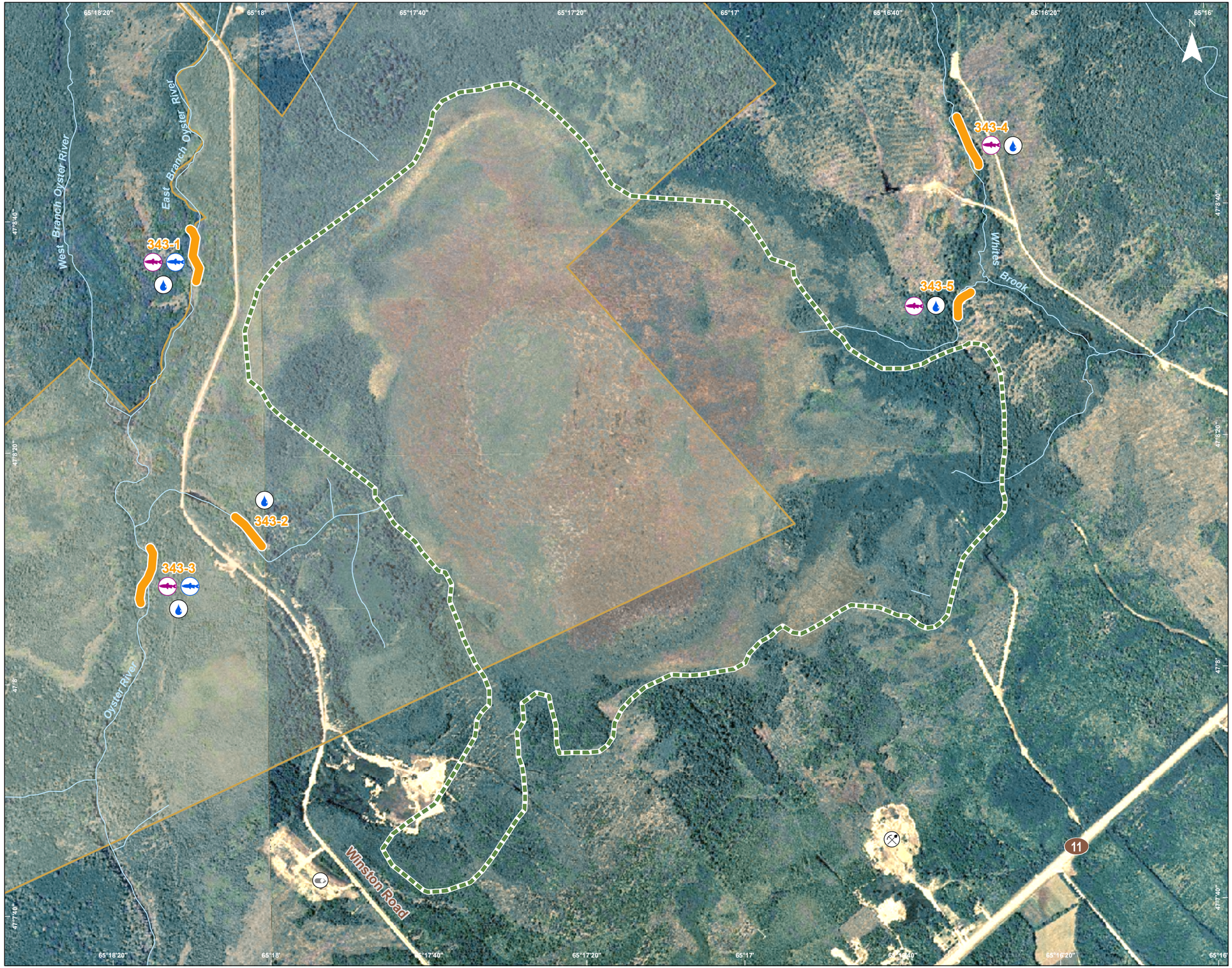
1 INTRODUCTION

Dans le cadre de la réalisation de l'étude d'impact sur l'environnement portant sur le projet de développement de la tourbière 343, une caractérisation des habitats de cours d'eau situés près de la tourbière ainsi qu'une pêche électrique ont été réalisées. La caractérisation des cours d'eau a notamment été réalisée selon les directives du gouvernement du Nouveau-Brunswick spécifiques aux projets d'exploitation de la tourbe[1].

Les relevés de terrain ont été réalisés le 29 juin 2010 et ont visé cinq cours d'eau, tous situés à une distance inférieure à 1 km de la tourbière. Ces relevés ont été réalisés par une équipe de quatre personnes, soit un biologiste de SNC-Lavalin inc., division Environnement, un consultant externe responsable des pêches électriques ainsi que deux employés de la compagnie FPM Peat Moss Co. Ltd.

Ce rapport présente les résultats de la caractérisation des cours d'eau et ceux de la pêche électrique. La carte 1 présente la localisation des tronçons étudiés.

[1] Ministère de l'Environnement du Nouveau-Brunswick. (2007) Autre information requise pour les projets d'exploitation de la tourbe [http://www.gnb.ca/0009/0377/0002/0001/0016-e.pdf] accédé en novembre 2010



FPM Pond Mesa Co. Ltd.

PROJET D'EXPLOITATION DE LA TOURBIÈRE 343

Carte 1

Caractérisation des cours d'eau

PROJET

- Tourbière

HABITAT DU POISSON ET PÊCHE ÉLECTRIQUE

- Tronçon étudié
- Capture - omble de fontaine
- Capture - saumon atlantique

ANALYSE D'EAU

- Station d'échantillonnage

LIMITES ET INFRASTRUCTURES

- Sablière
- Site d'enfouissement (fermé)
- Terres de la Couronne

0 100 200 300 400 m

Projection New Brunswick Stereographic, NAD83

Sources :
Orthophoto: Service Nouveau-Brunswick, résolution 1m ,1998
Service Nouveau-Brunswick, 1998
CanVec, 1:50 000, RNCan, 2008
Tourbière : Ministère des Ressources naturelles N.-B, 1977

Projet : 607193
Fichier : snc607193-343_c1_poisson_101207.mxd

Décembre 2010

SNC·LAVALIN Environnement

2 CARACTÉRISATION DES COURS D'EAU

2.1 MÉTHODOLOGIE

La caractérisation des cours d'eau a été réalisée conformément aux directives du ministère Pêches et Océans Canada[2]. Les relevés de terrain ont été réalisés le 29 juin 2010 et ont visé des tronçons de 100 à 150 m de cinq cours d'eau situés à proximité de la tourbière 343. Lors de ces relevés, une fiche a été complétée et les données qui y sont inscrites expriment une moyenne des observations faites tout au long du tronçon. Un exemple de fiche de données est fourni à l'annexe A. Cinq paramètres physico-chimiques de l'eau ont été mesurés *in situ* à l'aide d'une sonde multiparamètres Hannah, modèle HI9828. Ces paramètres sont le pH, la température, la conductivité, l'oxygène dissous et les solides totaux dissous (TDS). La vitesse d'écoulement a été mesurée à l'aide d'un courantomètre flowprobe, modèle FP101[3].

2.2 RÉSULTATS

2.2.1 Branche est de la rivière Oyster – Station 343-1

Cette rivière est de petite dimension et présente un chenal immergé d'une largeur moyenne d'environ 4 m et une profondeur d'eau moyenne de 0,25 m. En conditions de crue, on estime que cette profondeur peut atteindre environ 0,45 m alors que la largeur demeure inchangée. La profondeur maximale observée atteignait 0,9 m. Le long du tronçon, les faciès d'écoulement sont constitués principalement de plats courants (*run*) et de radiers (*riffle*) et ce, dans une proportion respective de 70 % et 30 %. La vitesse d'écoulement mesurée était inférieure à 0,5 m/sec. Les paramètres physico-chimiques sont regroupés au tableau 1 tandis que le tableau 2 présente les caractéristiques physiques et morphologiques.

Le cours d'eau est obstrué par de nombreux débris ligneux (*large woody debris*) (n = 8) d'un diamètre supérieur à 0,15 m. Ces débris constituent de bons abris pour la faune ichtyenne, en raison de la protection qu'ils offrent contre la prédation mais également des zones d'ombre qu'ils créent. Quelques fosses (n = 4) ont également été observées; celles-ci offrent des abris additionnels et des aires de repos pour l'ichtyofaune. L'ensemble du tronçon caractérisé présente des berges affouillées (*undercut bank*). Ce type de berge offre d'excellents abris aux macroinvertébrés ainsi qu'aux poissons.

[2] Courriel reçu le 22 juin 2010.

[3] Les données peuvent comporter une marge d'erreur en raison d'un problème d'étalonnage.

La végétation riveraine est composée principalement d'herbes (40 %), d'arbustes (40 %) et, dans une moindre proportion, d'arbres (20 %). La végétation arbustive, en particulier les aulnes (*Alnus spp.),* est dense et surplombe le cours d'eau, le protégeant du soleil et prévenant ainsi un réchauffement excessif de l'eau. Les indices d'une coupe d'arbres récente ont été relevés dans les derniers 40 à 50 m du tronçon de la rivière. Par endroit, cette coupe atteint les berges du cours d'eau.

Enfin, le substrat est dominé par le gravier (55 %), suivi d'un mélange de cailloux et de galets (35 %) et de sable (10 %). Le pourcentage d'enfouissement des galets était faible (inférieur à 20 %). Ce faible pourcentage d'enfouissement est indicateur du faible apport sédimentaire à la rivière et suggère que ses berges amont sont stables. À cet égard, les berges du tronçon à l'étude ne présentent pas de signe évident d'érosion active.

Tableau 1 Paramètres physico-chimiques

		Cours d'eau				
		Branche est de la rivière Oyster (343-1)	**Tributaire de la rivière Oyster (343-2)**	**Rivière Oyster (343-3)**	**Ruisseau Whites (343-4)**	**Tributaire du ruisseau Whites (343-5)**
Paramètres	Température (ºC)	12,43	12,78	12,68	12,45	13
	pH	6,86	3,78	6,47	6,28	4,43
	Conductivité (µs/cm)	38	22	36	17	19
	Solides en suspension totaux (TDS)	19	11	18	9	9
	Oxygène dissous (ppm)	9,07	7,24	8,79	8,63	6,47

2.2.2 Tributaire de la rivière Oyster – Station 343-2

Une partie des eaux de ce cours d'eau prend sa source dans la tourbière 343; son bas pH en témoigne. Le chenal d'écoulement est de faible dimension. En conditions mouillées, sa largeur et sa profondeur moyennes sont respectivement de 1,1 m et 0,25 m. La profondeur maximale observée atteignait 0,9 m. En période de débit plein bord, on estime que ces valeurs augmentent à 1,5 m pour la largeur moyenne et à 0,45 m pour la profondeur moyenne. La vitesse d'écoulement mesurée était inférieure à 0,5 m/sec. Le faciès d'écoulement dominant est de type plat courant (60 %), entremêlé de quelques radiers (30 %) et de quelques plats (*flat*) (10 %). Aucune présence de fosse n'a été relevée.

Ce cours d'eau est parsemé de nombreux gros débris ligneux qui étaient émergés lors de la visite de terrain. En conditions de crue, ces débris sont, selon toute vraisemblance, immergés et peuvent constituer des abris pour le poisson ou des obstacles à leur circulation. Les berges des rives sont, en bonne partie, affouillées (80 %).

La végétation basse surplombant le cours d'eau est relativement clairsemée, et ce, sur les deux rives du tronçon caractérisé. En revanche, un ombrage assez important est créé par la végétation en canopée (couverture d'environ 80 %).

Enfin, le substrat est composé de sable (60 %), de particules fines (20 %), de gravier (10 %), de blocs (5 %) et de gros blocs (5 %). Le pourcentage d'enfouissement des galets est moyen (entre 20 % et 35 %).

2.2.3 Rivière Oyster – Station 343-3

Lors de la visite de terrain, la rivière Oyster avait une largeur moyenne de 6 m et une profondeur de 0,23 m. On estime qu'en conditions de débit plein bord, sa profondeur peut atteindre environ 0,45 m alors que la largeur demeure inchangée. En ce qui concerne le type de faciès, les radiers dominent et ce, dans une proportion de 50 %. Suivent, dans l'ordre, les plats courants (25 %), les plats (20 %) et enfin quelques rapides (*rapid*) (5 %). Deux fosses occupent le tronçon parcouru. La vitesse d'écoulement mesurée se situait entre 0,5 m/sec et 1 m/sec.

Quelques gros débris ligneux (n = 6) ont été observés. De plus, une faible partie du cours d'eau (± 5 %) était parfois peuplée d'algues. Des berges affouillées offrant de bons abris sont présents sur la berge droite et ce, sur 90 % de la longueur (vue en direction amont) alors que la berge gauche en offre uniquement sur la moitié du parcours. L'ombrage offert par la végétation surplombant le cours d'eau est moyen avec une proportion d'environ 40 % sur la berge gauche et de 70 % sur la berge droite. Quant à l'ombrage offert par la végétation en canopée, elle est moindre avec une proportion s'établissant à 20 % sur la rive gauche et 30 % sur la rive droite.

Le substrat est composé de gravier (45 %), de cailloux (20 %), de sable (15 %), de galets (15 %) et de blocs (5 %). Enfin, l'apport de sédiments issus d'une érosion active en amont est jugé faible en raison du faible pourcentage d'enfouissement des galets (< 20 %).

2.2.4 Ruisseau Whites – Station 343-4

Le ruisseau Whites présente une largeur moyenne de 1,3 m et une profondeur de 0,2 m. On estime que ces dimensions augmentent sensiblement en conditions de crue, notamment en ce qui a trait à la largeur qui peut atteindre 2,5 m, alors que la profondeur moyenne est estimée à près de 0,5 m. Le plat courant est prépondérant (60 %) par rapport au radier (40 %) et aucune fosse n'a été notée. La vitesse d'écoulement mesurée était inférieure à 0,5 m/sec.

Le chenal du cours d'eau est jonché de gros débris ligneux (n = 8), davantage retrouvés dans les portions de la rivière affichant un faciès de plat courant (n = 7). Les berges forment un angle droit avec le chenal et sont stables en très grande partie. Environ 10 % des berges présentaient de légers indices d'instabilité. L'affouillement de ces dernières est également présent sur environ 40 % de la longueur du tronçon caractérisé. Ajoutons à ces observations la présence de débris ligneux d'un diamètre plus faible, et ce, dans une proportion d'environ 15 % le long du tronçon.

Sur les deux rives du cours d'eau, l'ombrage généré par la végétation en surplomb est faible (20 %) alors que celui offert par la canopée est important (70 %). Cette végétation est composée principalement d'arbres (70 %), d'herbes (20 %) et enfin d'arbustes (10 %), sauf dans les 50 à 60 premiers mètres du tronçon où elle est composée presque exclusivement d'herbacées.

Ce tronçon du cours d'eau s'écoule dans ce qui semble correspondre à un marais. Une végétation herbacée pionnière (suite à une perturbation récente) s'est installée de manière uniforme au pourtour du cours d'eau. Une strate arborescente composée de chicots subsiste. C'est à cet endroit que l'ombrage offert par la végétation est à son plus faible. La partie amont de ce secteur est, quant à elle, occupée par une végétation vivante qui prodigue davantage d'ombre au cours d'eau.

Le substrat est composé de sable (60 %), de gravier (25 %) et de particules fines (15 %). L'absence de galets n'a pas permis d'estimer le pourcentage d'enfouissement.

2.2.5 Tributaire du ruisseau Whites – Station 343-5

Le chenal de ce tributaire du ruisseau Whites a une largeur moyenne de 0,7 m et on estime que cette valeur augmente à 1,5 m lors de crues. La profondeur moyenne observée atteignait 0,1 m avec un maximum de 0,2 m. Cette profondeur pourrait atteindre approximativement 0,25 m lors des débits plein bord. Le faciès d'écoulement est nettement dominé par les plats courants (80 %); on y a également observé quelques radiers (20 %). Aucune fosse ne fut observée et la vitesse d'écoulement mesurée était inférieure à 0,5 m/sec.

Les gros débris ligneux sont abondants (n > 15) et sont susceptibles de nuire au libre passage du poisson. À cela s'ajoute la présence d'une part relativement importante (35 %) de débris végétaux de petit diamètre. L'affouillement des berges est faible, tout comme l'ombrage créé par la végétation surplombant le cours d'eau. L'ombrage produit par la végétation en canopée est complet (100 %). Plus précisément, la végétation riveraine est dominée par les arbustes (40 %) puis, à part égale, par une végétation arborescente et herbacée et ce, sur les deux rives du cours d'eau.

Le substrat du cours d'eau est dominé par le sable (40 %), suivi du gravier (30 %), des galets (15 %), des particules fines (10 %) et des blocs (5 %). L'enfouissement est moyen avec une valeur observée s'étalant entre 20 % et 35 %. En terminant, lors de la visite de terrain, un petit marécage a été découvert non loin du tributaire du ruisseau Whites (± 20 m) (voir annexe B).

Tableau 2 Paramètres physiques et morphologiques

Cours d'eau	Dimensions du site					Type de faciès[1] (%)	Type de substrat[2] (%)	Vitesse d'écoulement (m/sec)	Enfouissement (%)	Érosion (%)[3]						Végétation en rive (%)[3]						Gros débris ligneux (n)	Couvert disponible (%)[4]												Présence de fosses (n)	Petit débris ligneux (%)	Végétation aquatique (%)	Présence d'abris pour les salmonidés (%)
										Rive gauche			Rive droite			Rive gauche			Rive droite				Berge affouillée (undercut bank)				Végétation surplombante				Végétation en canopée							
																							Mouillée		Plein bord		Mouillée		Plein bord		Mouillée		Plein bord					
	Largeur mouillée moyenne (m)	Largeur moyenne à débit plein bord (m)	Profondeur mouillée moyenne (m)	Largeur moyenne à débit plein bord (m)	Profondeur maximale (m)					Stable	Moyenne stable	En érosion	Stable	Moyenne stable	En érosion	Herbacée	Arbustive	Arborescent	Herbacée	Arbustive	Arborescent		Rive Gauche	Rive droite	Rive Gauche	Rive droite	Rive Gauche	Rive droite	Rive Gauche	Rive droite	Rive Gauche	Rive droite	Rive Gauche	Rive droite				
Branche est de la rivière Oyster (343-1)	4	4	0,25	0,45	0,90	R = 30 Pc = 70	G = 35 Gr = 55 S = 10	< 0,5	< 20	50	0	0	45	5	0	20	20	10	20	20	10	4	40	35	40	40	40	30	40	25	10	10	-	-	3	20	2	40-60
Tributaire de la rivière Oyster (343-2)	1,1	1,5	0,25	0,45	0,30	R = 30 Pc = 60 P = 10	B = 5 Ro = 5 Gr = 10 S = 60 F = 20	< 0,5	20-35	50	0	0	50	0	0	20	0	30	20	0	30	> 30	40	40	45-	45-	10	15	10	15	40	40	40	40	0	0	0	40-60
Rivière Oyster (343-3)	6	6	0,23	0,43	0,35	R = 50 Pc = 25 Ra = 5 P = 20	B = 5 Ro = 15 G = 20 Gr = 45 S = 15	0,5	< 20	50	0	0	50	0	0	25	15	10	25	15	20	6	25	45	20-	30	20	35	20	35	10	15	10	15	2	0	5	20-40
Ruisseau Whites (343-4)	1,3	2,5	0,20	0,50	0,40	R = 40 Pc = 60	Gr = 25 S = 60 F = 15	< 0,5	N.A.	45	5	0	45	5	0	10	5	35	10	5	35	8	20	20	35	35	10	10	10	10	35	35	35	35	0	15	0	20-40
Tributaire du ruisseau Whites (343-5)	0,70	1,5	0,1	0,25	0,20	R = 20 Pc = 80	Ro = 5 G = 15 Gr = 30 S = 40 F = 10	< 0,5	20-35	50	0	0	50	0	0	10	20	10	10	20	10	> 30	10	10	10	10	±0	±0	±0	±0	50	50	50	50	0	35	0	> 60

1 : R = Radier; Pc = Plat courant (v> 0,30 m/sec); Ra = Rapide; F = Fosse; P = Plat
2 : R = Roc; B = Bloc; Ro = Roche; G = Galet; Gr = Gravier; S = Sable; F = Particules fines (limon-argile); M.O. = Matière organique; N.A. = Non applicable;
3 : La somme des deux rives (50 %/rive) doit égaler 100 %.
4 : La somme des deux rives (50 %/rive) peut égaler 100 % ou moins.

3 PÊCHE ÉLECTRIQUE

3.1 MÉTHODOLOGIE

Les pêches électriques ont été réalisées conformément aux directives du *NB DNR Provincial Brook Trout Assessment Program: Outline* (version préliminaire en ligne du printemps 2010). Un appareil portatif de pêche électrique de marque Smit-Root LR-24 alimenté par une pile sèche de 24 V a été utilisé. Le voltage a été déterminé automatiquement par l'appareil en fonction de la conductivité de l'eau. L'appareil déterminait également la modulation de largeur d'impulsion (*pulse width*), le rapport cyclique (*duty cycle*) ainsi que la fréquence (*frequency*).

Les pêches électriques ont été réalisées par trois personnes, soit une personne manipulant l'appareil de pêche et deux personnes manipulant les filets. La longueur du parcours des pêches a été établie en veillant à couvrir un minimum de 15 fois la largeur du cours d'eau inventorié. En règle générale, une distance d'au moins 100 m a été parcourue à chaque site. L'effort de pêche a duré entre 686 et 1 576 secondes. Les poissons capturés ont été dénombrés, mesurés (longueur à la fourche) et identifiés à l'espèce. Tous les poissons capturés ont été remis à l'eau suite à leur identification.

3.2 RÉSULTATS

Au total, trois espèces de poisson ont été capturées : l'omble de fontaine (*Salvelinus fontinalis*), le saumon atlantique (*Salmo salar*) et l'épinoche à neuf épines (*Pungitius pungitius).* Le tableau 3 présente le résultat des captures effectuées lors de cette journée de pêche.

Tous les cours d'eau abritent de l'omble de fontaine à l'exception du tributaire de la rivière Oyster. C'est dans le ruisseau Whites que l'on observe le plus grand nombre de poissons de cette espèce avec douze individus. La moyenne des tailles est de 82 mm. Les pêches effectuées dans la branche est de la rivière Oyster et dans la rivière Oyster ont permis de capturer huit et sept individus respectivement. Les moyennes des tailles des captures varient entre 66 et 130 mm. C'est dans le tributaire du ruisseau Whites que le plus grand individu d'omble de fontaine a été capturé avec une taille de 160 mm, alors que les plus petits (45 mm) ont été mesurés dans le ruisseau Whites ainsi que dans la branche est de la rivière Oyster.

Quant au saumon atlantique, 13 individus ont été capturés, dont trois dans la branche est de la rivière Oyster et 10 dans la rivière Oyster. Ces individus appartiennent à deux classes d'âge, l'alevin et le tacon. La taille des individus capturés dans la rivière Oyster varie de 30 mm à 140 mm (moyenne de 77 mm) alors que la taille des saumons capturés dans la branche est de la rivière Oyster varie de 55 mm à 105 mm (moyenne de 85 mm).

Enfin, une seule épinoche à neuf épines a été capturée (ruisseau Whites) et elle mesure 30 mm.

Tableau 3 Résultats des pêches électriques

Espèce	**Station**				
	Branche est de la rivière Oyster 343-1	Tributaire de la rivière Oyster 343-2	Rivière Oyster 343-3	Ruisseau Whites 343-4	Tributaire du ruisseau Whites 343-5
Omble de fontaine (*Salvelinus fontinalis*)	8	0	7	12	3
Saumon atlantique (*Salmo salar*)	3	0	10	0	0
Épinoche à neuf épines (*Pungitius pungitius*)	0	0	0	1	0
Temps de pêche (secondes)	1 576	689	1 043	1 443	1 129

4 CONCLUSION

Dans le cadre de l'étude d'impact portant sur le projet de développement de la tourbière 343, une caractérisation des cours d'eau ainsi que des pêches électriques ont été réalisées dans cinq cours d'eau afin d'établir les conditions de référence sur les plans physico-chimique et géomorphologique, et d'y déterminer la présence de poissons.

Les cours d'eau présentaient tous des largeurs relativement faibles, soit entre 0,7 m et 6 m et une faible profondeur moyenne (0,2 m). Les vitesses d'écoulement étaient également faibles, avec des valeurs égales ou inférieures à 0,5 m/sec. Les radiers et les plats courants dominaient les types de faciès. En général, les substrats étaient assez diversifiés, avec une légère dominance de sable et de gravier. Le recouvrement végétal en rive était important et la végétation arborescente dominait. Tous les cours d'eau étaient caractérisés par la présence d'abris créés par la végétation en surplomb et la présence de berges affouillées. Cette caractéristique était davantage prononcée pour les cours d'eau présentant les plus grandes largeurs de chenal. En revanche, la végétation en canopée était moins importante.

En plus de la caractérisation des cours d'eau, les pêches électriques ont permis de relever la présence d'ombles de fontaine (*Salvelinus fontinalis*) dans tous les cours d'eau, à l'exception du tributaire du ruisseau Whites. La présence de saumons atlantiques fut également relevée, mais uniquement dans la rivière Oyster et dans la branche est de cette rivière. Un seul individu d'épinoche à neuf épines a capturé, et ce, dans le ruisseau Whites.

En conclusion, les données récoltées indiquent que les habitats des tronçons des cours d'eau qui ont fait l'objet de la caractérisation sont favorables à la survie du poisson. Les captures d'alevins permettent également de conclure que les conditions présentes dans ces cours d'eau sont propices à la reproduction. Il y aurait lieu de mettre en place des mesures visant à préserver la qualité de ces habitats aquatiques.

Annexe A

Fiches de caractérisation de cours d'eau et de pêche électrique

ELECTROFISHING SITE FORM

Fish Collection Permit #:
Session ID#:
Date *(yyyy-mm-dd)*:
Water Name:
Tributary to:
Site ID#:
Site Name:
Agency:
Personnel:
Second Agency/Contact
Weather:

SITE COORDINATES:
Start Waypoint ID#: End Waypoint ID#:

Coordinates:	Start Point	End Point
x/long:	± m	± m
y / lat:	± m	± m

Projection: *(e.g., UTM)* Datum: *(e.g., NAD83)*

Site Pictures:

Water ID: **Drainage Code:**

Rating of the site for brook trout prior to electrofishing: ☐ Poor ☐ Fair ☐ Good ☐ Excellent

Angler Pressure: Low ☐ Moderate ☐ High ☐ **Access Rating:** Easy ☐ Moderate ☐ Difficult ☐

ELECTROFISHING DETAILS: (Reminder: electrofishing MUST proceed in upstream direction!)
(check one of the choices under each of the following headings and provide additional details if required.)

Method Used:
☐ Diminishing Returns
☐ Catch Per Unit Effort
☐ Spot Check
☐ Salvage

Site Set-Up: Open ☐ Closed ☐

Gear Used: Model
☐ Backpack
☐ Boat
☐ Shore-based

Settings:
Voltage:
Frequency:
Duty-Cycle:
POW Setting:
Power Output (watts):

Date: (if different then habitat data)

Sweep/Effort	1 (t = s)	2 (t = s)	3 (t = s)	4 (t = s)	5 (t = s)
# of Netters					

WATER CHEMISTRY: *(see "Forms Manual" for details)*

Ambient Water Conductivity (Ca) = **TDS** **pH**
from meter *from calculation*

Specific Water Conductivity (Cs) =

Water Clarity: Poor ☐ Fair ☐ Good ☐

Temperature

	Water	Air	Time
Start			
End			

Water Level: Low ☐ Moderate ☐ High ☐

SITE DIMENSIONS: SUMMARY

Length (m):
Average Wetted Width (m):
Average Bankfull Width (m):
Average Wetted Depth (m):
Average Bankfull Depth (m):
Maximum Site Depth (m):
Bankfull Area (m^2):
Wetted Area (m^2):

STREAM TYPE:

	% of area	Qty
Riffle:		
Run:		
Rapid:		
Pool:		
Flat:		
Other: *(specify)*		

SUBSTRATE TYPE: *(% of wetted surface area)*

Bedrock (ledge):
Boulder (> 460 mm):
Rock (180 - 460 mm):
Rubble (54 - 179 mm):
Gravel (2.6 - 53 mm):
Sand (0.06 - 2.5 mm):
Fines (0.0005 - 0.05 mm):

CHANNEL TYPE: ☐ Main ☐ Side ☐ Split ☐ Bogan

% Embeddness: ☐ 1 (< 20%) ☐ 2 (20 - 35%) ☐ 3 (35 - 50%) ☐ 4 (≥ 50%)

Water Velocity (m/s):
☐ from meter ☐ from calculation

Water Flow (m^3/sec):

Formula (CMS) = $\frac{W\ (m) \times D\ (m) \times A \times L\ (m)}{T\ (sec)}$

Coefficient		FLOAT TIME (sec) of Length of ___m			
Smooth	0,9	¼ WAY	½ WAY	¾ WAY	Average
Rough	0,8				

where W = width, D = depth, A = coefficient for the stream bottom, L = length, and T = average float time

Comments:

*****************************MUST COMPLETE BACK SIDE OR SECOND PAGE OF FORM***************************

ELECTROFISHING SITE FORM

Session ID#: _____ **Site ID#:** _____

Date (yyyy-mm-dd): _____ **Site Name:** _____

STANDARDIZED STREAM TRANSECTS:

Indicate which transect was used for the flow measurement calculation.

Transect #	Stream Type	WIDTH (m):		WETTED DEPTH (m)					BANKFULL DEPTH (m)		
		Wet	Bankfull	1/4	1/2	3/4	DIFF.	MAX	1/4	1/2	3/4

STREAM BANK CHARACTERISTICS & CANOPY: based on the BANKFULL WIDTH

	% Bank Erosion			% Bank Vegetation			
	Stable	Bare Stable	Eroding	Bare	Grasses	Shrubs	Trees
LEFT							
RIGHT							

% OVERHEAD CANOPY

(e.g. mature trees)

0	0
1	≤ 1-20%
2	21 - 40%
3	41 - 70%
4	71- 90%
5	>90%

LARGE WOODY DEBRIS (LWD): Individual lengths (m)

(Record for each piece the length that is Dry (D) & Wet (W) and if Wet record Stream Type).

ID#	Dry	Wet	S. Type	ID#	Dry	Wet	S. Type	ID#	Dry	Wet	S. Type

% COVER BY TYPE:

	% Undercut		*% OHV "Cover"*		*% OHV "Canopy"*	
	Wet	Bankfull	*Wet*	*Bankfull*	*Wet*	*Bankfull*
LEFT						
RIGHT						

POOL WITH STRUCTURE (PWS):

Individual Measurements

PWS#	Length (m)	Width (m)	Area (m2)

% INSTREAM COVER BY TYPE: based on WETTED area

COVER TYPE	%
Turbulence	
Instream vegetation	
Instream SWD	
Other: (specify)	
Other: (specify)	
Other: (specify)	

TOTAL BROOK TROUT COVER RATING: (visual estimate of the % stream wetted area that offers cover)

☐ <20% ☐ 20-40% ☐ 40-60% ☐ >60%

**********MUST COMPLETE FRONT SIDE OR FIRST PAGE OF FORM**********

Annexe B

Annexe photographique

Branche est de la rivière Oyster

(Station d'échantillonnage 343-1)

Photo 1 Vue de la partie aval de la branche est de la rivière Oyster

Photo 2 Autre vue de la partie aval de la branche est de la rivière Oyster

Photo 3 Vue de la partie amont de la branche est de la rivière Oyster

Photo 4 Autre vue de la partie amont de la branche est de la rivière Oyster

Photo 5 Résultat de capture par pêche électrique

Photo 6 Tacon de saumon atlantique capturé

Tributaire ouest de la tourbière 343

(Station d'échantillonnage 343-2)

Photo 7 Vue de la partie aval du tributaire de la rivière Oyster

Photo 8 Autre vue de la partie aval du tributaire de la rivière Oyster

Photo 9 Vue de la partie amont du tributaire de la rivière Oyster

Rivière Oyster

(Station d'échantillonnage 343-3)

Photo 10 Vue de la partie aval de la rivière Oyster

Photo 11 Vue de la partie aval de la rivière Oyster

Photo 12 Autre vue de la partie aval de la rivière Oyster

Photo 13 Vue de la partie amont de la rivière Oyster

Ruisseau Whites

(Station d'échantillonnage 343-4)

Photo 14 Vue de la partie aval du ruisseau Whites

Photo 15 Autre vue de la partie aval du ruisseau Whites

Photo 16 Vue de la partie amont du ruisseau Whites

Photo 17 Autre vue de la partie amont du ruisseau Whites montrant la présence de berges affouillées

Tributaire du ruisseau Whites

(Station d'échantillonnage 343-5)

Photo 18 Vue du tributaire du ruisseau Whites

Photo 19 Vue de la partie aval du tributaire du ruisseau Whites

Photo 20 Autre vue de la partie aval du tributaire du ruisseau Whites

Photo 21 Autre vue de la partie amont du tributaire du ruisseau Whites

Photo 22 Vue du petit étang situé à proximité du tributaire du ruisseau Whites

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Environnement

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Division Environnement
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bureau 300
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Tél. : 418-837-3621
Téléc. : 418-837-2039

APPENDIX

E

WATER ANALYSIS CERTIFICATES

Institut de recherche sur les zones côtières inc.
Coastal Zones **Research Institute** Inc.

232B, avenue de l'Église, Shippagan (N.-B.) CANADA E8S 1J2
Tél. / Tel.: (506) 336-6600 ; Téléc./Fax : (506) 336-6601
www.irzc.umcs.ca info@irzc.umcs.ca

RAPPORT D'ANALYSES

Client : La Compagnie de tourbe FPM ltée	**Adresse:** 6044, route 126 Birch Ridge, NB E4T 2C4	**# de Requête:** 10-0864
Personne ressource : Ernie Basque	**Téléphone :** 955-3098	**Échantillon(s) reçu(s) :** 2010-06-30
Date : 2010-07-12	**Télécopieur :** 955-3241	**Échantillon(s) :** eau de drainage (5)
Copie(s) : Jacques Thibault Télécopieur : 547-7694 André Fortin Télécopieur : 457-7805 Benoît Carron (SNC-Lavalin Inc.) Télécopieur : 1-418-837-2039		**Échantillonné par :** C.G.

ANALYSE[1]		LQ	CODE DU LAB 10-0864-1 ÉCHANTILLON 343-1 2010-06-29 (12h54)	CODE DU LAB 10-0864-2 ÉCHANTILLON 343-2 2010-06-29 (10h57)	CODE DU LAB 10-0864-3 ÉCHANTILLON 343-3 2010-06-29 (09h25)	RCQE
Aluminum (Al)	µg / L	5.0	**136 (L)**	**255 (L)**	**117 (L)**	5-100*
Azote ammoniacal	mg / L	0.05	ND	ND	ND	26.8**
Cadmium (Cd)	µg / L	0.017	**0.097 (L)**	**0.858 (L)**	ND	0.017
Chrome (Cr)	µg / L	1.0	ND	ND	ND	9.9
Conductivité	µS / cm	1	53	29	50	AR
Dureté ($CaCO_3$)	mg $CaCO_3$ / L	1	26	6	24	AR
Fer (Fe)	µg / L	50	**397 (L)**	**2 570 (L)**	**441 (L)**	300
Mercure (Hg)	µg / L	0.013	0.020	ND	ND	0.026
Nickel (Ni)	µg / L	2.0	ND	ND	ND	25***
Nitrate	mg / L	0.05	ND	ND	ND	13
pH		s.o.	7.31	**4.52 (L)**	7.34	6.5 – 9.0
Phosphore (P)	µg / L	100	ND	ND	ND	10 – 20****
Plomb (Pb)	µg / L	0.5	ND	**2.06 (L)**	ND	1***
Sulfate (SO_4)	mg / L	2	ND	ND	ND	AR
Zinc (Zn)	µg / L	5.0	5.5	16.8	5.7	30

[1]Analyses sous-traitées
*La recommandation pour l'aluminium est de 5 µg / L pour un pH inférieur à 6.5 et de 100 µg / L pour un pH supérieur ou égal à 6.5
**La recommandation pour l'azote ammoniacal varie selon le pH et la température de l'échantillon. La valeur indiquée dans le tableau est la recommandation pour un pH de 6.0 à une température de 25°C
***Ces recommandations sont établies selon la dureté de l'échantillon. Les valeurs indiquées sont pour une dureté de l'eau de 0 à 60 mg / L
****Pour des conditions mésotrophes
Légende : RCQE = Recommandations canadiennes pour la qualité des eaux : protection de la vie aquatique (2007)
LQ = limite de quantification s.o. = sans objet ND = non détecté AR = aucune recommandation **L = supérieur ou inférieur à la limite acceptable**

Manon Losier, M.Sc.
Gestionnaire de la qualité

Mathieu Ferronnière
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Directrice des laboratoires et services d'analyses

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Date : 2010-07-12	**Télécopieur :** 955-3241	**Échantillon(s) :** eau de drainage (5)
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ANALYSE	LQ	CODE DU LAB 10-0864-1 ÉCHANTILLON 343-1 2010-06-29 (12h54)	CODE DU LAB 10-0864-2 ÉCHANTILLON 343-2 2010-06-29 (10h57)	CODE DU LAB 10-0864-3 ÉCHANTILLON 343-3 2010-06-29 (09h25)	RCQE
Solides en suspension totaux (SST) mg / L (méthode adaptée de 2540D)[1]	2	2	< 2	< 2	AR
TKN mg / L (méthode adaptée de 4500-N_{org} C)[1]	5	6	< 5	< 5	AR

[1]Déterminations effectuées selon le "Standard Methods for the Examination of Water and Wastewater, 21st ed."

Le Ministère de l'Environnement du Nouveau-Brunswick fixe à 25 mg / L la limite de déversement des solides en suspension en tout temps.

Légende : RCQE = Recommandations canadiennes pour la qualité des eaux : protection de la vie aquatique (2007)
LQ = limite de quantification ND = non détecté AR = aucune recommandation **L = supérieur ou inférieur à la limite acceptable**

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Mathieu Francoeur pour
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Directrice des laboratoires et services d'analyses

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RAPPORT D'ANALYSES

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Personne ressource : Ernie Basque	**Téléphone :** 955-3098	**Échantillon(s) reçu(s) :** 2010-06-30
Date : 2010-07-12	**Télécopieur :** 955-3241	**Échantillon(s) :** eau de drainage (5)
Copie(s) : Jacques Thibault Télécopieur : 547-7694 André Fortin Télécopieur : 457-7805 Benoit Carron (SNC-Lavalin Inc.) Télécopieur : 1-418-837-2039		**Échantillonné par :** C.G.

ANALYSE[1]		LQ	CODE DU LAB 10-0864-4 ÉCHANTILLON 343-4 2010-06-29 (17h24)	CODE DU LAB 10-0864-5 ÉCHANTILLON 343-5 2010-06-29 (15h43)	RCQE
Aluminum (Al)	µg / L	5.0	**280 (L)**	**281 (L)**	5-100*
Azote ammoniacal	mg / L	0.05	ND	ND	26.8**
Cadmium (Cd)	µg / L	0.017	ND	**0.113 (L)**	0.017
Chrome (Cr)	µg / L	1.0	2.1	**19.8 (L)**	9.9
Conductivité	µS / cm	1	31	29	AR
Dureté ($CaCO_3$)	mg $CaCO_3$ / L	1	12	7	AR
Fer (Fe)	µg / L	50	**644 (L)**	**2 620 (L)**	300
Mercure (Hg)	µg / L	0.013	0.020	0.021	0.026
Nickel (Ni)	µg / L	2.0	ND	ND	25***
Nitrate	mg / L	0.05	0.05	ND	13
pH		s.o.	6.60	**4.59 (L)**	6.5 – 9.0
Phosphore (P)	µg / L	100	ND	ND	10 – 20****
Plomb (Pb)	µg / L	0.5	ND	**1.98 (L)**	1***
Sulfate (SO_4)	mg / L	2	ND	ND	AR
Zinc (Zn)	µg / L	5.0	5.8	13.5	30

[1]Analyses sous-traitées

*La recommandation pour l'aluminium est de 5 µg / L pour un pH inférieur à 6.5 et de 100 µg / L pour un pH supérieur ou égal à 6.5

**La recommandation pour l'azote ammoniacal varie selon le pH et la température de l'échantillon. La valeur indiquée dans le tableau est la recommandation pour un pH de 6.0 à une température de 25°C

***Ces recommandations sont établies selon la dureté de l'échantillon. Les valeurs indiquées sont pour une dureté de l'eau de 0 à 60 mg / L

****Pour des conditions mésotrophes

Légende : RCQE = Recommandations canadiennes pour la qualité des eaux : protection de la vie aquatique (2007)

LQ = limite de quantification s.o. = sans objet ND = non détecté AR = aucune recommandation **L = supérieur ou inférieur à la limite acceptable**

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RAPPORT D'ANALYSES

Client : La Compagnie de tourbe FPM ltée	**Adresse:** 6044, route 126 Birch Ridge, NB E4T 2C4	**# de Requête:** 10-0864
Personne ressource : Ernie Basque	**Téléphone** : 955-3098	**Échantillon(s) reçu(s)** : 2010-06-30
Date : 2010-07-12	**Télécopieur** : 955-3241	**Échantillon(s)** : eau de drainage (5)
Copie(s) : Jacques Thibault Télécopieur : 547-7694 André Fortin Télécopieur : 457-7805 Benoit Carron (SNC-Lavalin Inc.) Télécopieur : 1-418-837-2039		**Échantillonné par** : C.G.

ANALYSE	LQ	CODE DU LAB 10-0864-4 ÉCHANTILLON 343-4 2010-06-29 (17h24)	CODE DU LAB 10-0864-5 ÉCHANTILLON 343-5 2010-06-29 (15h43)	RCQE
Solides en suspension totaux (SST) mg / L (méthode adaptée de 2540D)[1]	2	< 2	< 2	AR
TKN (méthode adaptée de 4500-N_{org} C)[1] mg / L	5	5	< 5	AR

[1]Déterminations effectuées selon le "Standard Methods for the Examination of Water and Wastewater, 21st ed."

Le Ministère de l'Environnement du Nouveau-Brunswick fixe à 25 mg / L la limite de déversement des solides en suspension en tout temps.

Légende : RCQE = Recommandations canadiennes pour la qualité des eaux : protection de la vie aquatique (2007)
LQ = limite de quantification ND = non détecté AR = aucune recommandation **L = supérieur ou inférieur à la limite acceptable**

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11/10

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RAPPORT D'ANALYSES

Client : La compagnie de tourbe FPM	**Adresse:** 6044, route 126 Birch Ridge, NB E4T 2C4	**# de Requête:** 10-1713
Personne ressource : Ernie Basque	**Téléphone :** 955-3098	**Échantillon(s) reçu(s) :** 2010-11-03
Date : 2010-11-23	**Télécopieur :** 955-3241	**Échantillon(s) :** eau de drainage (5)
Copie(s) : Jacques Thibault Télécopieur : 547-7694 André Fortin Télécopieur : 457-7805		**Échantillonné par :** E.B.

ANALYSE[1]		LQ	CODE DU LAB 10-1713-1 ÉCHANTILLON Site : 343-1 2010-11-03 (09h15)	CODE DU LAB 10-1713-2 ÉCHANTILLON Site : 343-2 2010-11-03 (09h00)	CODE DU LAB 10-1713-3 ÉCHANTILLON Site : 343-3 2010-11-03 (08h30)	RCQE
Aluminium (Al)	µg/L	1	**137 (L)**	**127 (L)**	**123 (L)**	5-100*
Antimoine (Sb)	µg/L	0.1	ND	ND	ND	AR
Arsenic (As)	µg/L	1	ND	1	ND	5
Barium (Ba)	µg/L	1	56	37	54	AR
Berylium (Be)	µg/L	0.1	ND	ND	ND	AR
Bismuth (Bi)	µg/L	1	ND	ND	ND	AR
Bore (B)	µg/L	1	3	5	4	AR
Cadmium (Cd)	µg/L	0.01	0.01	**0.03 (L)**	**0.03 (L)**	0.017
Calcium (Ca)	µg/L	50	6 060	1 120	5 890	AR
Chrome (Cr)	µg/L	1	ND	ND	ND	9.9
Cobalt (Co)	µg/L	0.1	0.1	0.2	0.1	AR
Cuivre (Cu)	µg/L	1	**3 (L)**	**10(L)**	**11 (L)**	2.0**
Fer (Fe)	µg/L	20	**350 (L)**	**1 080 (L)**	**340 (L)**	300
Plomb (Pb)	µg/L	0.1	0.2	1.0	0.4	1.0**
Lithium (Li)	µg/L	0.1	0.8	0.4	0.7	AR
Magnésium (Mg)	µg/L	10	780	370	830	AR

[1]Analyses sous-traitées

*La recommandation pour l'aluminium est de 5 µg / L pour un pH inférieur à 6.5 et de 100 µg / L pour un pH supérieur ou égal à 6.5
**Ces recommandations sont établies selon la dureté de l'échantillon. Les valeurs indiquées sont pour une dureté de l'eau de 0 à 60 mg / L pour le plomb et de 0 à 120 mg / L pour le cuivre

Légende :
RCQE = Recommandations canadiennes pour la qualité des eaux : protection de la vie aquatique (2007)
LQ = limite de quantification
AR = aucune recommandation
s.o. = sans objet
< = inférieur à la valeur indiquée
ND = non détecté
L = supérieur ou inférieur à la limite acceptable

Manon Losier, M.Sc.
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RAPPORT D'ANALYSES

Client : La compagnie de tourbe FPM	**Adresse:** 6044, route 126 Birch Ridge, NB E4T 2C4	**# de Requête:** 10-1713
Personne ressource : Ernie Basque	**Téléphone :** 955-3098	**Échantillon(s) reçu(s) :** 2010-11-03
Date : 2010-11-23	**Télécopieur :** 955-3241	**Échantillon(s) :** eau de drainage (5)
Copie(s) : Jacques Thibault Télécopieur : 547-7694 André Fortin Télécopieur : 457-7805		**Échantillonné par :** E.B.

ANALYSE[1]		LQ	CODE DU LAB 10-1713-1 ÉCHANTILLON Site : 343-1 2010-11-03 (09h15)	CODE DU LAB 10-1713-2 ÉCHANTILLON Site : 343-2 2010-11-03 (09h00)	CODE DU LAB 10-1713-3 ÉCHANTILLON Site : 343-3 2010-11-03 (08h30)	RCQE
Manganèse (Mn)	µg/L	1	210	67	156	AR
Mercure (Hg)	µg/L	0.013	ND	ND	ND	0.026
Molybdène (Mo)	µg/L	0.1	ND	ND	ND	73
Nickel (Ni)	µg/L	1	ND	ND	ND	25**
Phosphore (P)	µg/L	2	12	9 (L)	11	10-20***
Potassium (K)	µg/L	20	280	170	400	AR
Rubidium (Rb)	µg/L	0.1	0.6	0.6	0.7	AR
Sélénium (Se)	µg/L	1.0	ND	ND	ND	1.0
Argent (Ag)	µg/L	0.1	ND	ND	ND	0.1
Sodium (Na)	µg/L	50	2 270	1 700	2 400	AR
Strontium (Sr)	µg/L	1	23	11	23	AR
Tellure (Te)	µg/L	0.1	ND	ND	ND	AR
Thallium (Tl)	µg/L	0.1	ND	ND	ND	0.8
Étain (Sn)	µg/L	0.1	ND	ND	0.2	AR
Uranium (U)	µg/L	0.1	ND	ND	ND	AR
Vanadium (V)	µg/L	1	ND	ND	ND	AR
Zinc (Zn)	µg/L	1	3	7	6	30

[1]Analyses sous-traitées

**Cette recommandation est établie selon la dureté de l'échantillon. La valeur indiquée est pour une dureté de l'eau de 0 à 60 mg / L
***Pour des conditions mésotrophes

Légende : RCQE = Recommandations canadiennes pour la qualité des eaux : protection de la vie aquatique (2007)
LQ = limite de quantification AR = aucune recommandation
s.o. = sans objet < = inférieur à la valeur indiquée
ND = non détecté L = **supérieur ou inférieur à la limite acceptable**

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RAPPORT D'ANALYSES

Client : La compagnie de tourbe FPM	**Adresse:** 6044, route 126 Birch Ridge, NB E4T 2C4	**# de Requête:** 10-1713
Personne ressource : Emie Basque	**Téléphone :** 955-3098	**Échantillon(s) reçu(s) :** 2010-11-03
Date : 2010-11-23	**Télécopieur :** 955-3241	**Échantillon(s) :** eau de drainage (5)
Copie(s) : Jacques Thibault Télécopieur : 547-7694 André Fortin Télécopieur : 457-7805		**Échantillonné par :** E.B.

ANALYSE	LQ	CODE DU LAB 10-1713-1 ÉCHANTILLON Site : 343-1 2010-11-03 (09h15)	CODE DU LAB 10-1713-2 ÉCHANTILLON Site : 343-2 2010-11-03 (09h00)	CODE DU LAB 10-1713-3 ÉCHANTILLON Site : 343-3 2010-11-03 (08h30)	RCQE
Azote ammoniacal (méthode adaptée de 4500-NH_3 D)[2] mg / L	0.07	ND	ND	ND	2.77****
Conductivité (méthode adaptée de 2510B)[2] µS / cm	1.9	50.5	35.7	46.9	AR
Dureté ($CaCO_3$) (calculée) mg $CaCO_3$ / L	0.2	18.3	4.3	18.1	AR
Nitrate[1] mg / L	0.05	ND	ND	0.07	13
Nitrite[1] mg / L	0.05	ND	ND	ND	0.06
pH (méthode adaptée de 4500-H^+)[2]	s.o.	**6.2 (L)**	**3.7 (L)**	**5.9 (L)**	6.5-9.0
Solide en suspension totaux (méthode adaptée de 2540D)[2] mg / L	2	ND	ND	ND	AR
Sulfate[1] (SO_4) mg / L	1	ND	3	ND	AR
TKN (méthode adaptée de 4500-Norg C)[2] mg / L	5	ND	ND	ND	AR

[1]Analyses sous-traitées
[2]Déterminations effectuées selon le "Standard Methods for the Examination of Water and Wastewater, 21st ed."

****La recommandation pour l'azote ammoniacal varie selon le pH et la température de l'échantillon. La valeur indiquée dans le tableau est la recommandation pour un pH de 7.0 à une température de 25°C

Le Ministère de l'Environnement du Nouveau-Brunswick fixe à 25 mg / L la limite de déversement des solides en suspension en tout temps.

Légende : RCQE = Recommandations canadiennes pour la qualité des eaux : protection de la vie aquatique (2007)
LQ = limite de quantification AR = aucune recommandation
s.o. = sans objet < = inférieur à la valeur indiquée
ND = non détecté L = **supérieur ou inférieur à la limite acceptable**

Note : Le délai pour l'analyse du pH est dépassé à la réception des échantillons.

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RAPPORT D'ANALYSES

Client : La compagnie de tourbe FPM	**Adresse:** 6044, route 126 Birch Ridge, NB E4T 2C4	**# de Requête:** 10-1713
Personne ressource : Ernie Basque	**Téléphone :** 955-3098	**Échantillon(s) reçu(s) :** 2010-11-03
Date : 2010-11-23	**Télécopieur :** 955-3241	**Échantillon(s) :** eau de drainage (5)
Copie(s) : Jacques Thibault Télécopieur : 547-7694 André Fortin Télécopieur : 457-7805		**Échantillonné par :** E.B.

ANALYSE[1]		LQ	CODE DU LAB 10-1713-4 ÉCHANTILLON Site : 343-4 2010-11-03 (10h15)	CODE DU LAB 10-1713-5 ÉCHANTILLON Site : 343-5 2010-11-03 (09h50)	RCQE
Aluminium (Al)	µg/L	1	**223 (L)**	**186 (L)**	5-100*
Antimoine (Sb)	µg/L	0.1	ND	ND	AR
Arsenic (As)	µg/L	1	ND	1	5
Barium (Ba)	µg/L	1	19	30	AR
Beryllium (Be)	µg/L	0.1	ND	ND	AR
Bismuth (Bi)	µg/L	1	ND	ND	AR
Bore (B)	µg/L	1	5	3	AR
Cadmium (Cd)	µg/L	0.01	**0.02 (L)**	**0.03 (L)**	0.017
Calcium (Ca)	µg/L	50	2 610	1 580	AR
Chrome (Cr)	µg/L	1	ND	ND	9.9
Cobalt (Co)	µg/L	0.1	0.2	0.4	AR
Cuivre (Cu)	µg/L	1	**6 (L)**	**8 (L)**	2.0**
Fer (Fe)	µg/L	20	**450 (L)**	**1 330 (L)**	300
Plomb (Pb)	µg/L	0.1	0.3	**1.3 (L)**	1.0**
Lithium (Li)	µg/L	0.1	0.6	0.6	AR
Magnésium (Mg)	µg/L	10	740	470	AR

[1]Analyses sous-traitées

*La recommandation pour l'aluminium est de 5 µg / L pour un pH inférieur à 6.5 et de 100 µg / L pour un pH supérieur ou égal à 6.5
**Ces recommandations sont établies selon la dureté de l'échantillon. Les valeurs indiquées sont pour une dureté de l'eau de 0 à 60 mg / L pour le plomb et de 0 à 120 mg / L pour le cuivre

Légende :
RCQE = Recommandations canadiennes pour la qualité des eaux : protection de la vie aquatique (2007)
LQ = limite de quantification
AR = aucune recommandation
s.o. = sans objet
< = inférieur à la valeur indiquée
ND = non détecté
L = **supérieur ou inférieur à la limite acceptable**

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RAPPORT D'ANALYSES

Client : La compagnie de tourbe FPM	**Adresse:** 6044, route 126 Birch Ridge, NB E4T 2C4	**# de Requête:** 10-1713
Personne ressource : Emie Basque	**Téléphone :** 955-3098	**Échantillon(s) reçu(s) :** 2010-11-03
Date : 2010-11-23	**Télécopieur :** 955-3241	**Échantillon(s) :** eau de drainage (5)
Copie(s) : Jacques Thibault Télécopieur : 547-7694 André Fortin Télécopieur : 457-7805		**Échantillonné par :** E.B.

Analyse[1]		LQ	Code du lab 10-1713-4 Échantillon Site : 343-4 2010-11-03 (10h15)	Code du lab 10-1713-5 Échantillon Site : 343-5 2010-11-03 (09h50)	RCQE
Manganèse (Mn)	µg/L	1	78	171	AR
Mercure (Hg)	µg/L	0.013	ND	0.018	0.026
Molybdène (Mo)	µg/L	0.1	ND	ND	73
Nickel (Ni)	µg/L	1	ND	ND	25**
Phosphore (P)	µg/L	2	8 (L)	15	10-20***
Potassium (K)	µg/L	20	230	30	AR
Rubidium (Rb)	µg/L	0.1	0.5	0.1	AR
Sélénium (Se)	µg/L	1.0	ND	ND	1.0
Argent (Ag)	µg/L	0.1	ND	ND	0.1
Sodium (Na)	µg/L	50	2 290	2 240	AR
Strontium (Sr)	µg/L	1	12	8	AR
Tellure (Te)	µg/L	0.1	ND	ND	AR
Thallium (Tl)	µg/L	0.1	ND	ND	0.8
Étain (Sn)	µg/L	0.1	ND	ND	AR
Uranium (U)	µg/L	0.1	ND	ND	AR
Vanadium (V)	µg/L	1	ND	ND	AR
Zinc (Zn)	µg/L	1	5	7	30

[1]Analyses sous-traitées

**Cette recommandation est établie selon la dureté de l'échantillon. La valeur indiquée est pour une dureté de l'eau de 0 à 60 mg / L
***Pour des conditions mésotrophes

Légende : RCQE = Recommandations canadiennes pour la qualité des eaux : protection de la vie aquatique (2007)
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RAPPORT D'ANALYSES

Client : La compagnie de tourbe FPM	**Adresse:** 6044, route 126 Birch Ridge, NB E4T 2C4	**# de Requête:** 10-1713
Personne ressource : Ernie Basque	**Téléphone :** 955-3098	**Échantillon(s) reçu(s) :** 2010-11-03
Date : 2010-11-23	**Télécopieur :** 955-3241	**Échantillon(s) :** eau de drainage (5)
Copie(s) : Jacques Thibault Télécopieur : 547-7694 André Fortin Télécopieur : 457-7805		**Échantillonné par :** E.B.

ANALYSE	LQ	CODE DU LAB 10-1713-4 ÉCHANTILLON Site : 343-4 2010-11-03 (10h15)	CODE DU LAB 10-1713-5 ÉCHANTILLON Site : 343-5 2010-11-03 (09h50)	RCQE
Azote ammoniacal (méthode adaptée de 4500-NH_3 D)[2] mg/L	0.07	ND	ND	2.77****
Conductivité (méthode adaptée de 2510B)[2] µS/cm	1.9	32.8	40.0	AR
Dureté ($CaCO_3$) (calculée) mg $CaCO_3$/L	0.2	9.6	5.9	AR
Nitrate[1] mg/L	0.05	ND	ND	13
Nitrite[1] mg/L	0.05	ND	ND	0.06
pH (méthode adaptée de 4500-H+)[2]	s.o.	**5.5 (L)**	**4.0 (L)**	6.5-9.0
Solide en suspension totaux (méthode adaptée de 2540D)[2] mg/L	2	ND	ND	AR
Sulfate[1] (SO_4) mg/L	1	ND	3	AR
TKN (méthode adaptée de 4500-Norg C)[2] mg/L	5	13	ND	AR

[1]Analyses sous-traitées
[2]Déterminations effectuées selon le "Standard Methods for the Examination of Water and Wastewater, 21st ed."

****La recommandation pour l'azote ammoniacal varie selon le pH et la température de l'échantillon. La valeur indiquée dans le tableau est la recommandation pour un pH de 7.0 à une température de 25°C

Le Ministère de l'Environnement du Nouveau-Brunswick fixe à 25 mg / L la limite de déversement des solides en suspension en tout temps.

Légende : RCQE = Recommandations canadiennes pour la qualité des eaux : protection de la vie aquatique (2007)
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Note : Le délai pour l'analyse du pH est dépassé à la réception des échantillons.

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APPENDIX

F

VEGETATION SURVEY REPORT

Table des matières

Mandat

Dans le cadre du processus d'étude d'impact environnementale (EIA) associé à la récolte de tourbe au Nouveau Brunswick, Denis-F. Bastien (***BOTALYS***) a été mandaté pour effectuer l'inventaire des espèces végétales à risque dans le secteur de la tourbière #343. Le consultant s'est déplacé à deux reprises sur le terrain pour déterminer si l'une ou l'autre des plantes figurant sur la liste électronique des espèces floristiques rares du Nouveau-Brunswick (2008) se trouve dans le secteur immédiat de la tourbière et en périphérie. Un rapport final sera livré au requérant, « SNC-Lavalin» à la fin de l'été 2010.

Introduction

Plusieurs espèces de plantes menacées ou vulnérables ou susceptibles d'être ainsi désignées sont présentes dans les tourbières du Nouveau Brunswick (Hinds, 2000, 1986, 1983 et liste électronique 2008). Elles se rencontrent dans les tourbières autant minérotrophes qu'ombrotrophes. En accord avec les lignes directrices sur l'exploitation des tourbières au Nouveau Brunswick, un inventaire floristique doit être réalisé pour tous les projets d'extraction de tourbe afin de préserver le patrimoine floristique de la province. Advenant la présence d'une ou de plusieurs espèces rares, des mesures de mitigations doivent être adoptées après discussion entre les divers intervenants (Ressources Naturelles et Énergie, Ministère de l'Environnement, producteur de tourbe, botaniste, etc.), chaque cas étant particulier.

Description générale

La tourbière #343 visée par le projet est estimé de petite dimension. Les groupements ouverts à épinette noire (*Picea mariana*), uniformes à sphaignes, éricacées et à cypéracées forment l'essentiel de la végétation présente à la surface de la tourbière. En bordure, on note localement des signes d'enrichissement (Lagg, etc.). Géologiquement, il ne semble pas y avoir d'affleurement rocheux (carbonaté ou autres) dans ce secteur et le sol minéral avoisinant, relativement plat, est dominé par des dépôts d'origine glaciaire. La tourbière est convexe et donc principalement isolée de l'influence hydrologique environnante. Dans son ensemble, il s'agit d'une tourbière ombrotrophe puisqu'elle n'est alimentée en eau que par les précipitations. Plus spécifiquement, il s'agit d'un Bog à mares non structuré, côtier, comme il y en plusieurs dans cette partie du Nouveau Brunswick.

Méthodologie

Le travail sur le terrain consiste à rechercher des espèces végétales d'intérêt se trouvant à l'intérieur de la tourbière visée par la demande (tourbière #343, annexe 1) en s'inspirant de la liste électronique 2008 du Ministère des Ressources Naturelles et Énergie. Pour ce faire, tous les types d'habitats présents dans le secteur compris à l'intérieur du secteur de récolte prévue, et même au-delà, ont été visités par le botaniste. Ce dernier ouvre aussi l'œil pour toute autre espèce qui n'aurait pas encore été rapporté au Nouveau Brunswick (nouvelle mention).

En raison de la phénologie particulière de certaines espèces, deux inventaires sont requis pour couvrir une fenêtre suffisamment étendue pour permettre l'observation de toutes les espèces susceptibles d'être rencontrés dans l'un ou l'autre des habitats. Ainsi, une visite a été faite au printemps 2010 (fin mai) et une autre à la fin de l'été 2010 (deuxième semaine août). La visite printanière vise principalement à vérifier la présence de la listère australe (*Listera australis*) une petite orchidée fugace, qui disparaît complètement du paysage peut de temps après avoir complété son cycle naturel. Quelques habitats potentiels ont été visités à l'intérieur du territoire à l'étude. Pour observer la listère, il est préférable, non seulement de marcher lentement mais de se pencher et de faire des arrêts fréquents permettant de bien scruter la végétation. Sous certaines conditions d'ensoleillement, les lunettes polarisées se sont avérées efficace pour rehausser le contraste de la végétation.

Lors de l'inventaire, toutes les plantes d'intérêts ou celles dont l'identification sur le terrain ne peut être effectuée avec certitude sont récoltées et placées dans une presse à plantes. Les zones difficiles d'accès (si présentes) sont scrutées à l'aide de jumelles *Swarovski* 10X25 afin de s'assurer qu'aucune espèce d'intérêt ne s'y trouve. Si des plantes sont récoltées, elles sont par la suite séchées avec une boite électrique spécialement conçus. Les espèces pouvant présenter un quelconque intérêt et qui n'ont pu être nommées sur le terrain, sont identifiées en laboratoire (Herbier) à l'aide des livres d'identifications (Flores) ou des judicieux conseils d'autres botanistes (si nécessaire). Si une colonie de plantes menacées ou vulnérables est trouvée, sa localisation précise sera établie à partir des renseignements observables sur le terrain et/ou de coordonnées topographiques obtenues avec un Ordinateur-GPS portatif (*Getac PS535F*) utilisant *ArcPad 8* de *ESRI* comme logiciel de prises de données. Le ruban de marquage (Flag Tape) est aussi nécessaire pour préciser la localisation des colonies d'intérêts.

Au moment de la visite dans les secteurs visés par l'étude, une liste des principales espèces vasculaires et invasculaires observées pendant la visite est dressée et leur abondance relative notées. Les cotes d'abondances suivantes ont été adoptées tel que suggéré par l'annexe C de la section de l'évaluation des projets du Ministère de l'environnement du Nouveau Brunswick.

(a) Rares à cet endroit; une ou deux populations seulement ont été observées.
(b) Trois populations ou plus ont été observées; principalement éparpillées.
(c) Populations non courantes à cet endroit, mais on en trouve à l'occasion un peu partout.
(d) Populations présentes partout, mais pas en grandes quantités.
(e) Populations courantes partout, souvent en grandes quantités.

Les spécimens d'intérêts récoltés sur le terrain ou dont l'identification est incertaine, si présents, seront acheminés à M. Stephen Clayden, conservateur au Musée du Nouveau Brunswick.

Principales zones de végétation

À l'annexe 3, une carte indique les principales zones de végétation rencontrées dans la tourbière et les secteurs visités. Dans les inventaires de ce type, il s'agit de visiter une superficie adéquate qui permet de s'assurer qu'une bonne couverture de toutes les zones de végétation ait été établie et d'insister sur les habitats offrant le plus de potentiel en se basant sur l'écologie des espèces susceptibles d'être observées.

Résultats de l'inventaire

Zones de végétation

Sur le terrain, plusieurs zones de végétation dominante ont été rencontrées (annexe 3). En périphérie de la tourbière, **l'arbustaie-arboraie dense (*Picea mariana*)** est caractérisée par la présence marquée d'un couvert arbustif ou arborescent dense de l'épinette noire, seule ou en association avec d'autres espèces (*Acer rubrum, Pinus strobus, Abies balsamea*, etc.). Sur la tourbière elle-même, l'**arbustaie ouverte (*Picea mariana*) à éricacées** se rencontre un peu partout dans la tourbière. La plupart des dépressions humides rencontrés à la surface de la tourbière #343 sont observés dans cette zone de végétation uniforme et à potentiel faible en terme d'espèces d'intérêts. On trouve aussi une arbustaie uniforme comparable à la zone précédente mais qui en diffère au niveau de sa structure ; sans dépression, régulièrement distribués et plus dense, etc. L'**arbustaie ouverte (*Larix laricina*) à cypéracées et sphaignes** est un habitat faiblement minérotrophe, très humide et localisé, localement, à la marge de la tourbière. Dans cette dernière zone, *Sphagnum fallax* domine au niveau des mousses alors que les cypéracées, des plantes herbacées (*Menyanthes trifoliata, Smilacina trifolia,* etc.) et le mélèze (*Larix laricina*) dominent au niveau de la végétation compagne, d'autres espèces s'ajoutent selon les endroits. Une liste des plantes observées dans l'une ou l'autre de ces zones de végétation est présentée à l'annexe 6.

Occurrence de plantes d'intérêts

Lors des deux inventaires effectués à la tourbière #343, aucune espèce figurant sur la liste électronique (ou nouvelle mention) n'a été observée. Parmi les principales espèces à statut particulier susceptibles d'être rencontrées dans les tourbières de cette région notons : *Bartonia paniculata subsp. iodandra, Bartonia virginica, Betula michauxii, Carex rariflora, Drosera anglica, Drosera linearis, Eriophorum gracile, Glyceria obtusa, Huperzia selago, Listera australis*, *Vaccinium boreale* et *Woodwardia virginica.* Ces dernières espèces peuvent être liées à la présence de dépôt tourbeux de type tourbière qu'elles soient ombrotrophes ou même minérotrophes. La plupart de ces espèces se rencontrent sur les platières à sphaignes, bordure de mares, etc. alors que *Woodwardia virginica* et *Listera australis* sont habituellement plus à la marge des tourbières, souvent par très loin du sol minéral. Pour la liste plus exhaustive des espèces rares pour cette région, consulter « New Brunswick Department of Natural Resources (2008) ».

Conclusion et recommandations

- En relation avec les études d'impact environnementale (EIE), un inventaire floristique a été réalisé dans le secteur de Barryville au Nouveau Brunswick (tourbière #343).

- En l'absence d'une limite de bail bien définie, l'essentiel de l'effort de recherche a été concentré à l'intérieur des limites spécifiées par le requérant ainsi que sur la périphérie (zone d'influence) de ce secteur jusqu'au contact avec le sol minéral.

- En raison de la phénologie de certaines espèces, une visite a été effectuée au printemps 2010 et une autre à la fin de l'été 2010.

- La tourbière #343 est estimée de petite dimension; plusieurs zones de végétation dominantes sont quand même présentes, principalement l'arbustaie ouverte à *Picea mariana*. Les espèces végétales observées sur le site à l'étude sont similaires à ce que l'on rencontre habituellement dans cette partie du Nouveau Brunswick. Le potentiel du secteur à l'étude est estimé faible à fort (selon le type d'habitat) quant à la possibilité de trouver une espèce végétale d'intérêt.

- Les habitats potentiels pour la *Listera australis*, tel que décrit par Boudreau 2004, sont tous situés à la périphérie de la tourbière, généralement en-dehors de la zone directement visée par l'exploitation.

- Au cours des deux visites, aucune espèce végétale à statut particulier figurant sur la liste électronique du Nouveau Brunswick n'a été observée sur le terrain.

- Pour toute la périphérie du secteur visé par la récolte, le botaniste recommande de minimiser les activités pouvant perturber les écosystèmes tourbeux qui y sont présents ; ces endroits constituent des habitats potentiels non seulement pour la *Listera australis* mais aussi pour la *Woodwardia virginica* ou d'autres espèces d'intérêts qui pourraient éventuellement s'y implanter.

Ouvrages cités et d'intérêt

Bastien, D-F. et Garneau, M. 1997. *Guide d'identification macroscopique des principales espèces de sphaignes rencontrées dans l'est du Canada.* Report 61, Geologjcal Survey of Canada, Natural Resources Canada, Canada.

Boudreau, L. 2004. *L'autoécologie du Listera australis Lindl. au Québec, une orchidée rare de nos tourbières.* Mémoire de maîtrise, Faculté des études supérieures, Université Laval, Québec. 147 p.

Buteau, P., Dignard, N. & Grondin, P. 1994. Système de classification des milieux humides du Québec. Gouvernement du Québec, Ministère de l'Énergie et des Ressources, Direction de la recherche géologique. 35 p.

Fernald, M.L. 1970. Gray's Manual of Botany. Huitième édition. D. Van Nostrand company (Éd.). 1632 p.

Hinds, H.R. 2000. Flora of New Brunswick, Second Edition. Biology Department, Univerity of New Brunswick, Fredericton, N.B. E3B 6E1. 700 p.

Hinds, H.R. 1986. Flora of New Brunswick. Biology Department, Univerity of New Brunswick, Fredericton, N.B. E3B 6E1.

Hinds, H.R. 1983. Les plantes vasculaires rares du Nouveau-Brunswick. Syllogeus #50. Musée National des Sciences Naturelles.

New Brunswick Department of Natural Resources. 2008. General Status of Wildlife in New Brunswick: Provisional Report: Vascular Plants. April 15, 2008 (liste électronique).

Victorin, Frère M. 1995. Flore Laurentienne. Troisième édition. Les presses de l'Université de Montréal, Montréal. 1083 p.

Annexes

Annexe 1

(Carte de localisation de la tourbière #343)


Winston
Barryvill
N
343
Oak Point
© 2010 Google

Annexe 2

(Lignes directrices pour les espèces végétales à statut particulier)

Méthodes recommandées pour l'étude des plantes vasculaires vulnérables
(rares, menacées, en voie de disparition sur une base régionale ou en voie de disparition) aux fins d'ÉIE ou d'études semblables

INTRODUCTION

Ce genre d'étude vise à documenter la présence ou l'absence de plantes vasculaires que l'on soupçonne d'un certain degré de rareté dans un secteur donné. Les plantes de cette catégorie passent souvent inaperçues et elles sont difficiles à repérer. Bon nombre d'entre elles sont cryptiques, c'est-à-dire qu'elles peuvent ressembler énormément à une autre espèce plus courante. Elles ne sont pas distribuées au hasard et elles sont rares, principalement en raison de leurs habitats spécialisés qui ne se présentent que sporadiquement parmi le paysage.

L'analyse botanique par la méthode de l'échantillonnage au hasard sur de petits quadrants **n'**est **pas** la méthode à utiliser pour étudier les plantes vulnérables d'un secteur. L'échantillonnage au hasard sur des quadrats fournit une analyse généralisée de la végétation, ce qui n'est pas le but de cet exercice. Cet exercice vise plutôt à chercher précisément les espèces qu'on ne pourrait trouver par échantillonnage au hasard, ou du moins qu'on trouverait rarement, parce qu'elles ne constituent pas un élément courant de la végétation.

MÉTHODES D'ÉTUDE SUR LE TERRAIN

1. Il faut consulter des photographies aériennes ainsi que des cartes géologiques et topographiques afin d'obtenir une idée générale de la géologie, de la topographie, de la végétation, des chemins et des autres caractéristiques importantes de la région. Il faut préalablement noter quels secteurs sont susceptibles de soutenir des populations de plantes rares. Les affleurements rocheux, les embouchures des cours d'eau et les marais calcaires sont des exemples de secteurs dont if faut prendre note. Des itinéraires temporaires de visite doivent être tracés sur la carte et il faut prélever des échantillons dans le maximum de micro-habitats possible, spécialement ceux soupçonnés de produire des plantes rares.

2. Il faut entreprendre un dépouillement de la documentation au sujet des plantes rares de la région d'étudier attentivement les espèces rares de l'habitat en question, de préférence à partir de spécimens d'herbier, si c'est possible. Des notes doivent être prises sur ces espèces et il faut apporter des photostats de chaque taxon sur le terrain.

3. L'itinéraire de visite prévu doit être suivi d'aussi près que les conditions de terrain le permettent sur le terrain. Les conditions locales dicteront cependant où l'étude sera réalisée dans une certaine mesure. La superficie visitée peut être jugée adéquate lorsque le responsable croit que l'on a réalisé un bon échantillonnage de toutes les zones de végétation ou de tous les écosystèmes. Le cas échéant, on ne terminera l'échantillonnage qu'après avoir soigneusement et entièrement examiné un nombre raisonnable d'emplacements. Si l'habitat est relativement homogène, il n'est pas nécessaire de consacrer autant de temps à l'échantillonnage qu'en présence de nombreux micro-habitats différents. On trouvera plus d'espèces, notamment des espèces rares, dans un secteur comportant de nombreux micro-habitats.

4. Le botaniste du groupe de visite doit être capable d'identifier, à l'œil, la grande majorité de la flore vasculaire du secteur. On peut donc supposer que toute la végétation qu'il ne peut identifier est rare et qu'un spécimen doit alors être recueilli aux fins d'identification ultérieure en laboratoire. Il faut prendre des notes sur l'habitat, sur le nombre de plantes que comprend la population et sur toute autre caractéristique pouvant contribuer à l'identification. Il faut recueillir des fleurs, des feuilles supérieures et inférieures ainsi que des fruits, si on le peut. Ces spécimens, soigneusement étiquetés, pressés, séchés et fixés sur un support serviront à documenter leur présence dans le secteur. Les emplacements où vivent des plantes rares doivent être marquées à l'aide de ruban de jalonnement bien visible et être indiqués le plus précisément possible sur les cartes d'arpentage de façon à ce qu'on puisse facilement retrouver les populations importantes, au besoin.

   Cette étude doit être faite en août. Lorsque c'est possible, d'autres visites doivent être effectuées afin d'observer les plantes qui ne sont visibles que le printemps, l'été ou l'automne.

5. Il ne faut pas oublier que bon nombre des plantes rares sont des espèces ayant l'aspect de l'herbe ou des cypéracées, ou encore des plantes aquatiques non visibles, qui n'attirent pas beaucoup l'attention. Il faut chercher avec soin ces taxons le long de l'itinéraire de visite et il faut prélever un échantillon de tous les végétaux inconnus.

6. On doit compiler une liste exhaustive de toutes les plantes vasculaires pendant la visite et noter leur abondance relative avant de quitter l'emplacement (pendant que les renseignements sont encore frais en mémoire). On peut établir des catégories d'abondance comme suit :

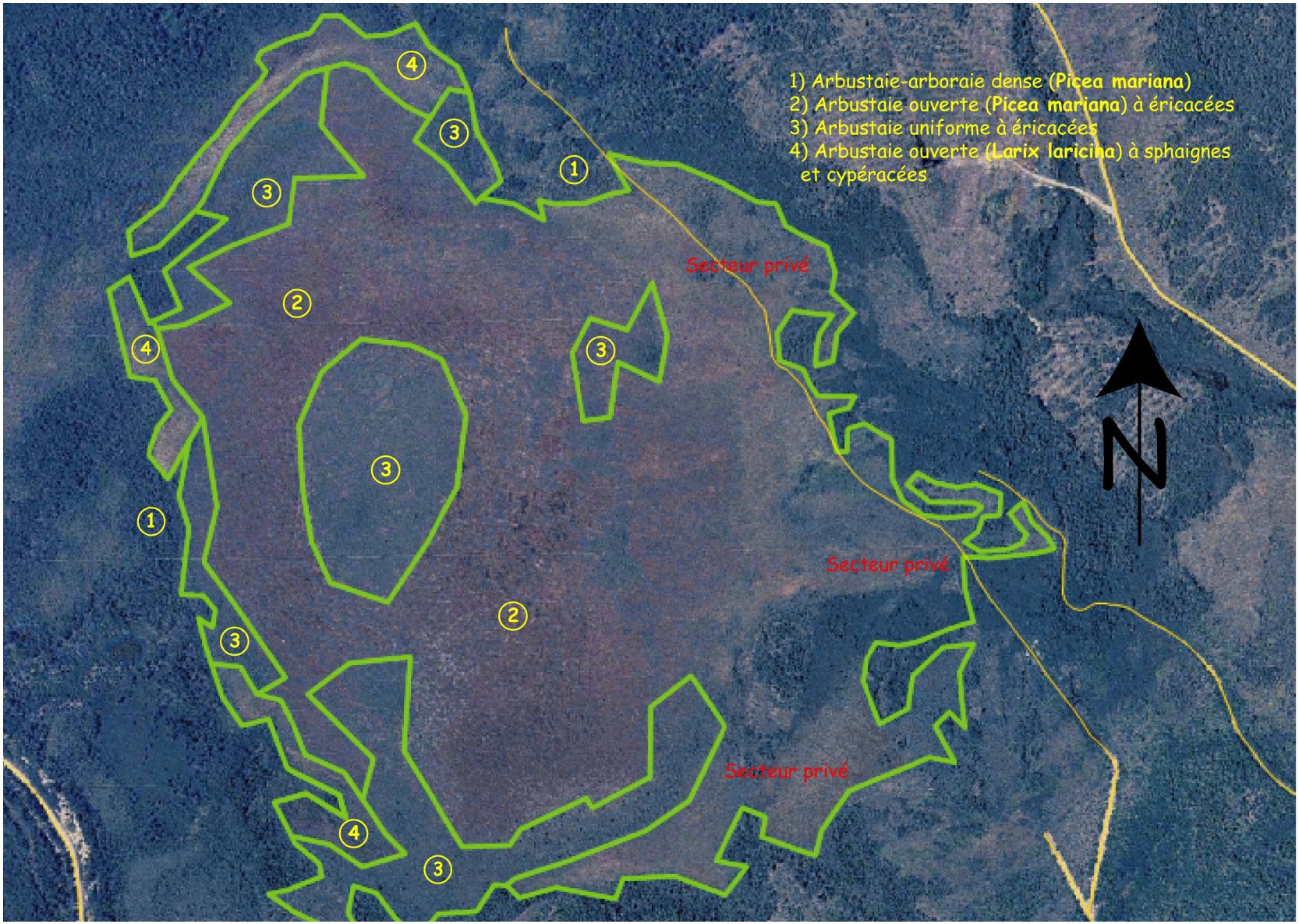
(a) Rares à cet endroit; une ou deux populations seulement ont été observées.
(b) Trois populations ou plus ont été observées; principalement éparpillées.
(c) Populations non courantes à cet endroit, mais on en trouve à l'occasion un peu partout.
(d) Populations présentes partout, mais pas en grandes quantités.
(e) Populations courantes partout, souvent en grandes quantités.

7. Pour mieux déceler la répartition et la quantité de taxons inconnus, il est utile de leur donner un nom d'après certaines caractéristiques faciles à déterminer, p. ex. plante à fruits épineux, plante ressemblant à une orchidée jaune, etc. On pourra substituer le nom scientifique à ces appellations une fois que la plante aura été identifiée.

8. Les renseignements ainsi recueillis sont extrêmement importants pour le Comité des espèces menacées d'extinction de Nouveau-Brunswick et spécialement pour le sous-comité sur les plantes. Veuillez communiquer avec M. Stephen Clayden, du Musée du Nouveau-Brunswick, à Saint-Jean, si vous avez des questions concernant cette méthodologie, afin de remettre des spécimens ou d'obtenir de l'aide relativement à l'identification.

Annexe 3

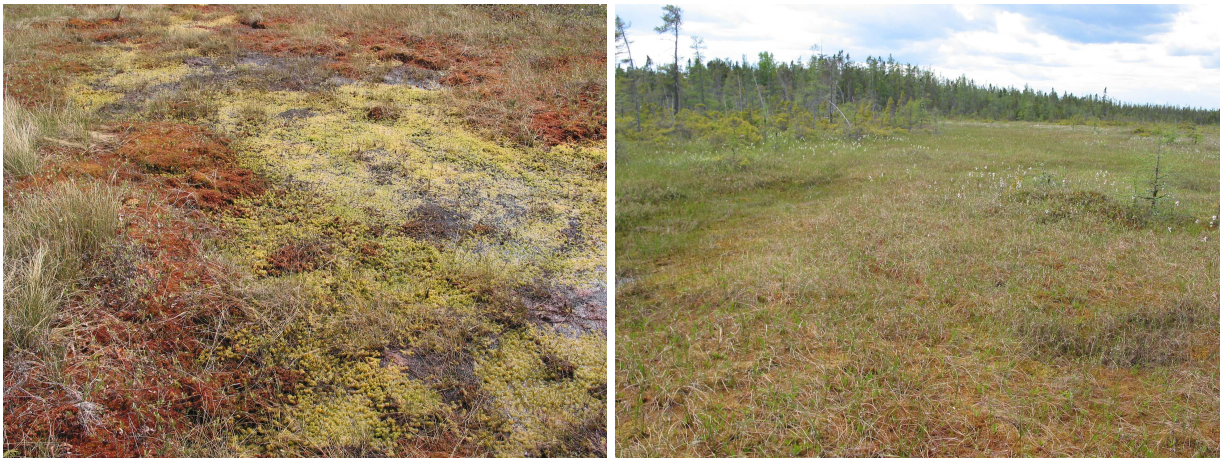
(Carte des zones de végétation)


1) Arbustaie-arboraie dense (**Picea mariana**)
2) Arbustaie ouverte (**Picea mariana**) à éricacées
3) Arbustaie uniforme à éricacées
4) Arbustaie ouverte (**Larix laricina**) à sphaignes et cypéracées
Secteur privé
Secteur privé
Secteur privé
N

Annexe 4

(Photos terrain)

À gauche, arbustaie basse à épinette noire, à droite, secteur à éricacées.



À gauche, dépression humide (*Sphagnum cuspidatum*, etc.), à droite, lagg à la marge sud.

À gauche, tapis muscinal à sphaigne, à droite, bosquet de Némopanthe en périphérie.

Annexe 5

(Habitats potentiels pour la *Listera australis)*


N
En jaune, zones potentielles pour la **Listera australis** dans ou avoisinant le secteur de récolte

Annexe 6

(Principales espèces végétales recensées)

Liste des principales espèces végétales recensées

La liste ci-dessous contient toutes les espèces observées sur le terrain (sol tourbeux ou minéral). La lettre «**a**» indique que la plante est rare à cet endroit (une ou deux populations seulement ont été observées), la lettre «**b**» que trois populations ou plus on été observées ; principalement éparpillées, la lettre «**c**» que la population est non courante à cet endroit mais on en trouve un peu partout à l'occasion, «**d**» population présente partout mais pas en grande quantité et finalement «**e**», populations courantes partout et souvent en grandes quantités. En rouge sont les espèces rares (may be at risk, sensitive, at risk, première mention) selon les listes consultées (liste électronique 2008).

Arbres et arbustes

(c)*Acer rubrum*
(d)*Alnus rugosa*
(d)*Andromeda glaucauphylla*
(c)*Aronia melanocarpa*
(c)*Betula papyrifera*
(b)*Betula populifolia*
(e)*Cassandra calyculata*
(c)*Chiogenes hispidula*
(d)*Empetrum nigrum*
(e)*Kalmia angustifolia*
(d)*Kalmia polyfolia*
(d)*Larix laricina*
(e)*Ledum groenlandicum*
(b)*Myrica gale*
(c)*Nemopanthus mucronatus*
(e)*Picea mariana*
(b)*Pinus divaricata*
(d)*Pinus strobus*
(d)*Rhododendron Canadensis*
(b)*Spirea latifolia*
(a) *Thuja occidentalis*
(c) *Vaccinium angustifolium*
(d) *Vaccinium oxycoccos*
(c) *Viburnum cassinoides*

Plantes herbacées

(d)*Calamagrostis canadensis*
(c)*Carex aquatilis*
(c)*Carex limosa*
(c)*Carex oligosperma*
(c)*Carex paupercula*
(c)*Carex trisperma*
(c)*Cornus canadensis*
(c)*Cypripedium acaule*
(d)*Drosera rotundifolia*
(d)*Drosera intermedia*
(b)*Equisetum fluviatile*
(c)*Equisetum sylvaticum*
(c)*Eriophorum angustifolium*
(b)*Eriophorum russeolum*
(d)*Eriophorum spissum*
(c)*Eriophorum virginicum*
(c)*Iris versicolor*
(c)*Lysimachia terrestris*
(c)*Menyanthes trifoliata*
(c)*Nuphar variegatum*
(b)*Osmunda cinnamomea*
(c)*Pteridium aquilinum*
(d)*Rhynchospora alba*
(d)*Rubus chamaemorus*
(c)*Rubus pubescens*
(c)*Sarracenia purpurea*
(e)*Scirpus caespitosus*
(c)*Smilacina trifoliata*

Invasculaires

(d)*Cetraria islandica* ssp. *Islandica*
(c)*Cetraria islandica* ssp. *crispiformis*
(d)*Cladina rangiferina*
(c)*Cladina mitis*
(e)*Cladina stellaris*
(c)*Cladonia botrytes*
(c)*Cladonia cenotea*
(c)*Cladonia crispata*
(c)*Cladonia squamosa ssp. squamosa*
(c)*Dicranum undulatum*
(d)*Polytrichum strictum*
(d)*Pleurozium schreberi*
(c)*Ptilidium ciliare*
(b)*Sphagnum angustifolium*
(d)*Sphagnum capillifolium*
(d)*Sphagnum cuspidatum*
(c)*Sphagnum fallax*
(e)*Sphagnum fuscum*
(d)*Sphagnum magellanicum*
(d)*Sphagnum majus*
(c)*Sphagnum papillosum*
(b)*Sphagnum tenellum*

APPENDIX

G

ATLANTIC CANADA CONSERVATION DATA CENTER (ACCDC) 2022 REPORT

DATA REPORT 7265: Alnwick Parish, NB

Prepared 22 May 2022
by J. Pender, Data Manager

CONTENTS OF REPORT

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
AlnwickParisNB_7265ob.xls	Rare or legally-protected Flora and Fauna in your study area
AlnwickParisNB_7265ob100km.xls	A list of Rare and legally protected Flora and Fauna within 100 km of your study area
AlnwickParisNB_7265msa.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
(902) 679-6146
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.

For provincial information about rare taxa and protected areas, or information about game animals, deer yards, old growth forests, archeological sites, fish habitat etc., in New Brunswick, please contact Hubert Askanas, Energy and Resource Development: (506) 453-5873.

For provincial information about rare taxa and protected areas, or information about game animals, deer yards, old growth forests, archeological sites, fish habitat etc., in Nova Scotia, please contact Donna Hurlburt, NS DLF: (902) 679-6886. To determine if location-sensitive species (section 4.3) occur near your study site please contact a NS DLF Regional Biologist:

Western: Emma Vost
(902) 670-8187
Emma.Vost@novascotia.ca

Western: Sarah Spencer
(902) 541-0081
Sarah.Spencer@novascotia.ca

Central: Shavonne Meyer
(902) 893-0816
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Harrison.Moore@novascotia.ca

Eastern: Maureen Cameron-MacMillan
(902) 295-2554
Maureen.Cameron-MacMillan@novascotia.ca

Eastern: Elizabeth Walsh
(902) 563-3370
Elizabeth.Walsh@novascotia.ca

For provincial information about rare taxa and protected areas, or information about game animals, fish habitat etc., in Prince Edward Island, please contact Garry Gregory, PEI Dept. of Communities, Land and Environment: (902) 569-7595.

2.0 RARE AND ENDANGERED SPECIES

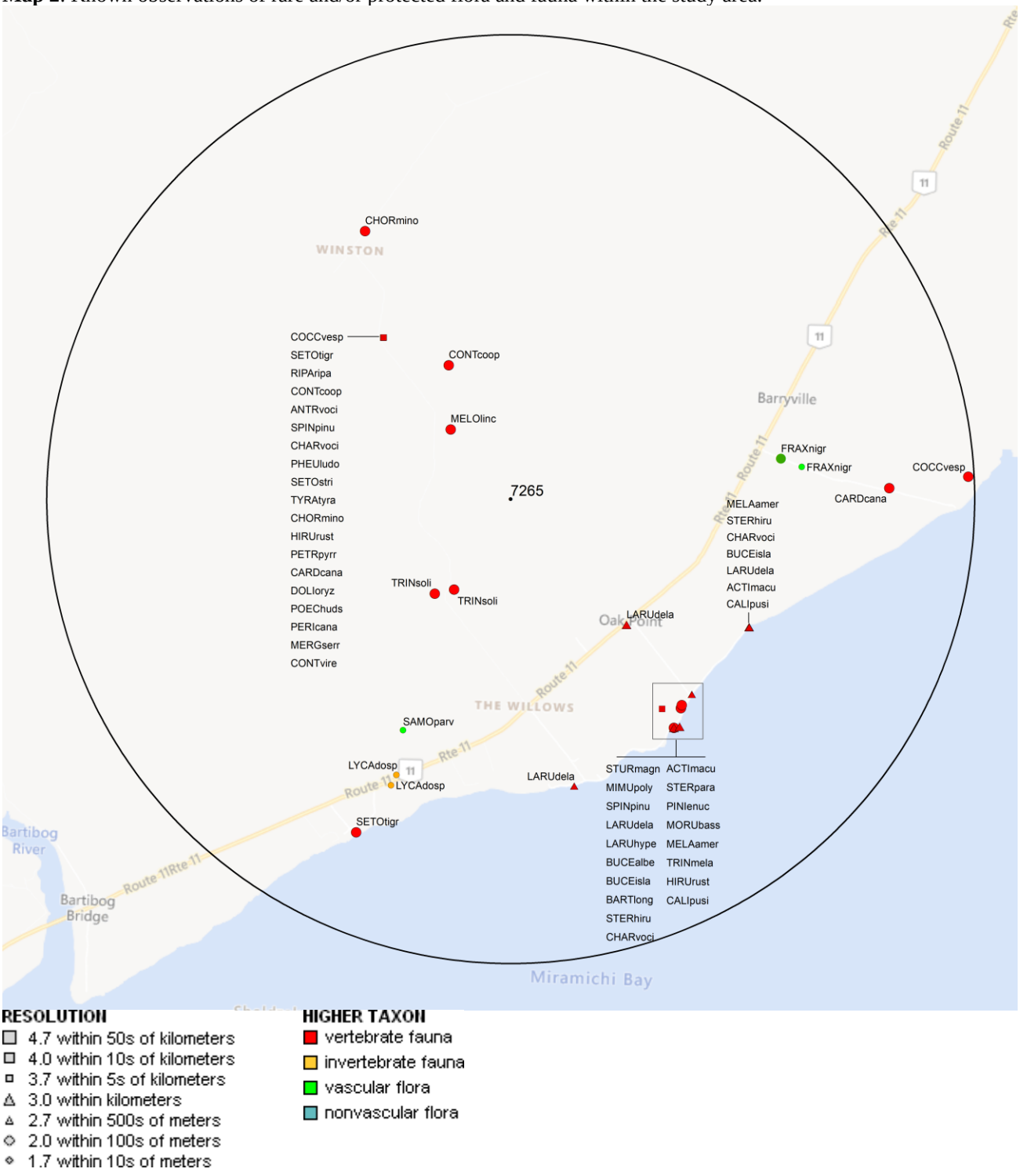
2.1 FLORA

The study area contains 3 records of 2 vascular, no records of nonvascular flora (Map 2 and attached: *ob.xls), excluding 'location-sensitive' species.

2.2 FAUNA

The study area contains 101 records of 36 vertebrate, 2 records of 1 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

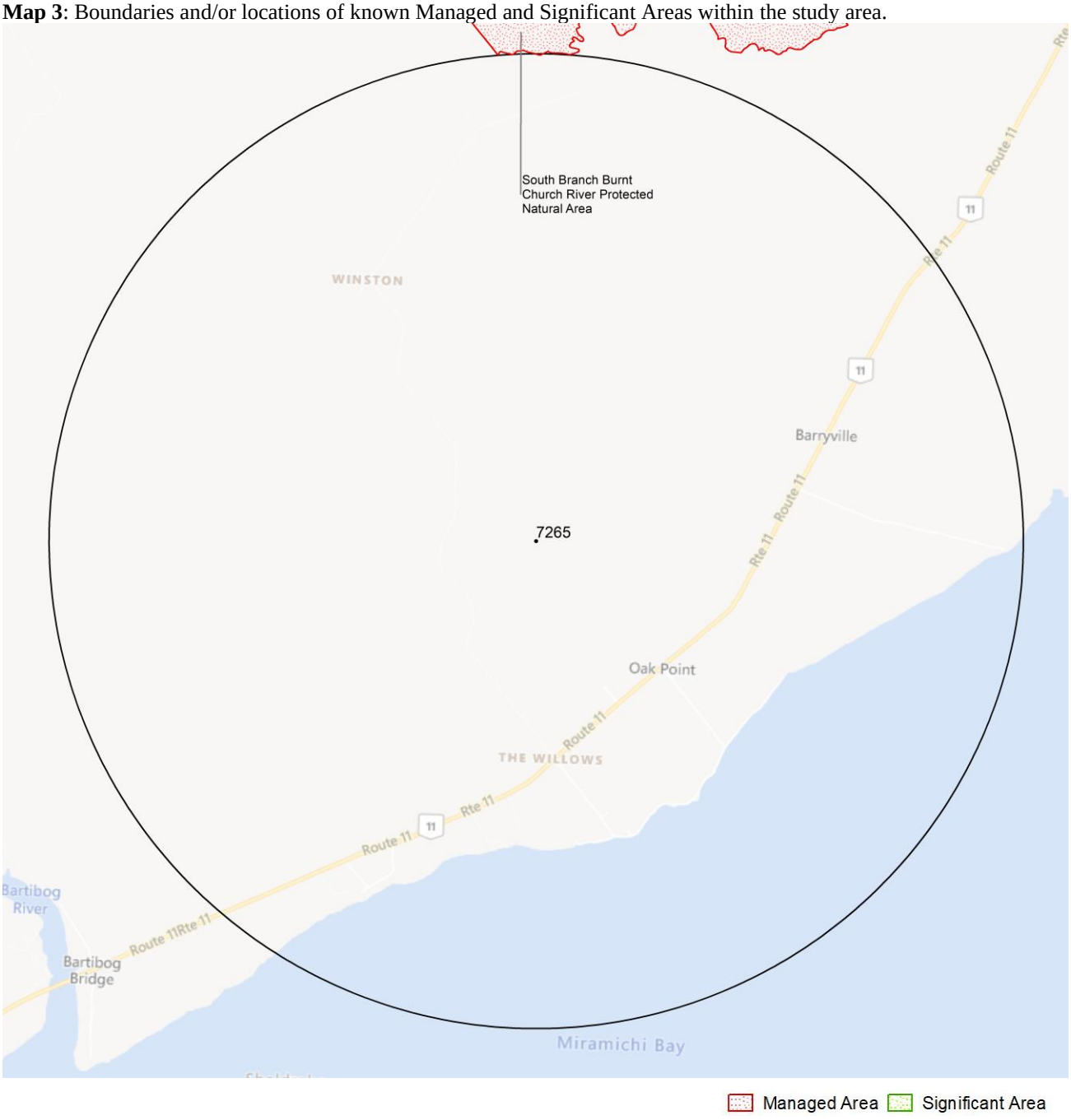
3.1 MANAGED AREAS

The GIS scan identified 1 managed area in the vicinity of the study area (Map 3 and attached file: *msa.xls).

3.2 SIGNIFICANT AREAS

The GIS scan identified no biologically significant sites in the vicinity of the study area (Map 3).

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	*Fraxinus nigra*	Black Ash	Threatened			S3S4	2	2.9 ± 0.0
P	*Samolus parviflorus*	Seaside Brookweed				S3S4	1	2.7 ± 0.0

4.2 FAUNA

	Scientific *Name*	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)
A	*Sturnella magna*	Eastern Meadowlark	Threatened	Threatened	Threatened	S1B	1	2.8 ± 7.0
A	*Antrostomus vociferus*	Eastern Whip-Poor-Will	Threatened	Threatened	Threatened	S2B	1	2.2 ± 7.0
A	*Riparia riparia*	Bank Swallow	Threatened	Threatened		S2B	2	2.2 ± 7.0
A	*Dolichonyx oryzivorus*	Bobolink	Threatened	Threatened	Threatened	S3B	2	2.2 ± 7.0
A	*Hirundo rustica*	Barn Swallow	Special Concern	Threatened	Threatened	S2B	3	2.2 ± 7.0
A	*Bucephala islandica*	Barrow's Goldeneye	Special Concern	Special Concern	Special Concern	S2S3N,S3M	3	2.9 ± 0.0
A	*Contopus virens*	Eastern Wood-Pewee	Special Concern	Special Concern	Special Concern	S3B	1	2.2 ± 7.0
A	*Contopus cooperi*	Olive-sided Flycatcher	Special Concern	Threatened	Threatened	S3B	2	1.6 ± 0.0
A	*Coccothraustes vespertinus*	Evening Grosbeak	Special Concern	Special Concern		S3B,S3S4N,SUM	2	2.2 ± 7.0
A	*Chordeiles minor*	Common Nighthawk	Special Concern	Threatened	Threatened	S3B,S4M	3	2.2 ± 7.0
A	*Cardellina canadensis*	Canada Warbler	Special Concern	Threatened	Threatened	S3S4B	2	2.2 ± 7.0
A	*Sterna hirundo*	Common Tern	Not At Risk			S3B,SUM	2	2.9 ± 0.0
A	*Tringa melanoleuca*	Greater Yellowlegs				S1?B,S4S5M	1	3.0 ± 1.0
A	*Bartramia longicauda*	Upland Sandpiper				S1B	1	2.9 ± 0.0
A	*Sterna paradisaea*	Arctic Tern				S1B,SUM	1	3.0 ± 0.0
A	*Melanitta americana*	American Scoter				S1S2N,S3M	5	2.9 ± 1.0
A	*Petrochelidon pyrrhonota*	Cliff Swallow				S2B	1	2.2 ± 7.0
A	*Mimus polyglottos*	Northern Mockingbird				S2B	1	2.9 ± 0.0
A	*Tringa solitaria*	Solitary Sandpiper				S2B,S4S5M	3	1.1 ± 0.0
A	*Pinicola enucleator*	Pine Grosbeak				S2B,S4S5N,S4S5M	1	3.0 ± 0.0
A	*Larus hyperboreus*	Glaucous Gull				S2N	1	3.0 ± 0.0
A	*Larus delawarensis*	Ring-billed Gull				S2S3B,S4N,S5M	14	1.8 ± 1.0
A	*Spinus pinus*	Pine Siskin				S3	2	2.2 ± 7.0
A	*Charadrius vociferus*	Killdeer				S3B	13	2.2 ± 7.0
A	*Pheucticus ludovicianus*	Rose-breasted Grosbeak				S3B	1	2.2 ± 7.0
A	*Setophaga tigrina*	Cape May Warbler				S3B,S4S5M	2	2.2 ± 7.0
A	*Mergus serrator*	Red-breasted Merganser				S3B,S4S5N,S5M	1	2.2 ± 7.0
A	*Calidris pusilla*	Semipalmated Sandpiper				S3M	2	2.9 ± 0.0
A	*Bucephala albeola*	Bufflehead				S3N	2	2.9 ± 0.0
A	*Perisoreus canadensis*	Canada Jay				S3S4	2	2.2 ± 7.0
A	*Poecile hudsonicus*	Boreal Chickadee				S3S4	1	2.2 ± 7.0
A	*Tyrannus tyrannus*	Eastern Kingbird				S3S4B	2	2.2 ± 7.0
A	*Actitis macularius*	Spotted Sandpiper				S3S4B,S4M	5	2.9 ± 0.0
A	*Melospiza lincolnii*	Lincoln's Sparrow				S3S4B,S4M	1	1.0 ± 0.0
A	*Setophaga striata*	Blackpoll Warbler				S3S4B,S5M	1	2.2 ± 7.0
A	*Morus bassanus*	Northern Gannet				SHB	13	3.0 ± 0.0
I	*Tharsalea dospassosi*	Maritime Copper				S3	2	3.2 ± 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**	**YES**
Falco peregrinus pop. 1	Peregrine Falcon - anatum/tundrius pop.	Special Concern	Endangered	No
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
64	eBird. 2014. eBird Basic Dataset. Version: EBD_relNov-2014. Ithaca, New York. Nov 2014. Cornell Lab of Ornithology, 25036 recs.
17	Erskine, A.J. 1992. Maritime Breeding Bird Atlas Database. NS Museum & Nimbus Publ., Halifax, 82,125 recs.
14	Lepage, D. 2014. Maritime Breeding Bird Atlas Database. Bird Studies Canada, Sackville NB, 407,838 recs.
6	iNaturalist. 2020. iNaturalist Data Export 2020. iNaturalist.org and iNaturalist.ca, Web site: 128728 recs.
2	Blaney, C.S. 2020. Sean Blaney 2020 field data. Atlantic Canada Conservation Data Centre, 4407 records.
2	Klymko, J. 2018. Maritimes Butterfly Atlas database. Atlantic Canada Conservation Data Centre.
1	Blaney, C.S.; Mazerolle, D.M.; Belliveau, A.B. 2013. Atlantic Canada Conservation Data Centre Fieldwork 2013. Atlantic Canada Conservation Data Centre, 9000+ recs.
1	Canadian Wildlife Service. 2019. Canadian Protected and Conserved Areas Database (CPCAD). December 2019. ECCC.https://www.canada.ca/en/environment-climate-change/services/national-wildlife-areas/protected-conserved-areas-database.html.

5.0 RARE SPECIES WITHIN 100 KM

A 100 km buffer around the study area contains 29559 records of 143 vertebrate and 829 records of 46 invertebrate fauna; 8584 records of 255 vascular, 361 records of 93 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	7	45.8 ± 1.0	NB
A	*Myotis septentrionalis*	Northern Myotis	Endangered	Endangered	Endangered	S1	1	96.5 ± 0.0	PE
A	*Charadrius melodus melodus*	Piping Plover melodus subspecies	Endangered	Endangered	Endangered	S1B	3122	6.2 ± 0.0	NB
A	*Dermochelys coriacea pop. 2*	Leatherback Sea Turtle - Atlantic population	Endangered	Endangered	Endangered	S1S2N	4	19.7 ± 1.0	NB
A	*Rangifer tarandus pop. 2*	Caribou - Atlantic-Gasp ├⌐sie population	Endangered	Endangered	Extirpated	SX	4	32.1 ± 1.0	NB
A	*Leucoraja ocellata pop. 5*	Winter Skate - Gulf of St. Lawrence population	Endangered		Endangered		4	51.1 ± 0.0	NB
A	*Sturnella magna*	Eastern Meadowlark	Threatened	Threatened	Threatened	S1B	5	2.8 ± 7.0	NB
A	*Asio flammeus*	Short-eared Owl	Threatened	Special Concern	Special Concern	S1S2B	15	17.5 ± 0.0	NB
A	*Ixobrychus exilis*	Least Bittern	Threatened	Threatened	Threatened	S1S2B	1	97.3 ± 0.0	NB
A	*Hylocichla mustelina*	Wood Thrush	Threatened	Threatened	Threatened	S1S2B	47	12.6 ± 7.0	NB
A	*Hydrobates leucorhous*	Leach's Storm-Petrel	Threatened			S1S2B	1	89.9 ± 0.0	NB
A	*Antrostomus vociferus*	Eastern Whip-Poor-Will	Threatened	Threatened	Threatened	S2B	43	2.2 ± 7.0	NB
A	*Catharus bicknelli*	Bicknell's Thrush	Threatened	Threatened	Threatened	S2B	250	39.5 ± 7.0	NB
A	*Riparia riparia*	Bank Swallow	Threatened	Threatened		S2B	847	2.2 ± 7.0	NB
A	*Glyptemys insculpta*	Wood Turtle	Threatened	Threatened	Threatened	S2S3	765	6.9 ± 0.0	NB
A	*Chaetura pelagica*	Chimney Swift	Threatened	Threatened	Threatened	S2S3B,S2M	238	11.5 ± 7.0	NB
A	*Dolichonyx oryzivorus*	Bobolink	Threatened	Threatened	Threatened	S3B	653	2.2 ± 7.0	NB
A	*Tringa flavipes*	Lesser Yellowlegs	Threatened			S3M	810	5.4 ± 0.0	NB
A	*Limosa haemastica*	Hudsonian Godwit	Threatened			S3M	265	8.0 ± 0.0	NB
A	*Anguilla rostrata*	American Eel	Threatened		Threatened	S4N	10	6.6 ± 1.0	NB
A	*Histrionicus histrionicus pop. 1*	Harlequin Duck - Eastern population	Special Concern	Special Concern	Endangered	S1B,S1S2N,S2M	11	44.9 ± 1.0	NB
A	*Hirundo rustica*	Barn Swallow	Special Concern	Threatened	Threatened	S2B	631	2.2 ± 7.0	NB
A	*Salmo salar pop. 12*	Atlantic Salmon - Gaspe - Southern Gulf of St. Lawrence population	Special Concern		Special Concern	S2S3	1722	6.6 ± 1.0	NB
A	*Euphagus carolinus*	Rusty Blackbird	Special Concern	Special Concern	Special Concern	S2S3B,S3M	158	8.8 ± 7.0	NB
A	*Bucephala islandica*	Barrow's Goldeneye	Special Concern	Special Concern	Special Concern	S2S3N,S3M	59	2.9 ± 0.0	NB
A	*Chelydra serpentina*	Snapping Turtle	Special Concern	Special Concern	Special Concern	S3	2	22.6 ± 0.0	NB
A	*Contopus virens*	Eastern Wood-Pewee	Special Concern	Special Concern	Special Concern	S3B	410	2.2 ± 7.0	NB
A	*Contopus cooperi*	Olive-sided Flycatcher	Special Concern	Threatened	Threatened	S3B	408	1.6 ± 0.0	NB
A	*Coccothraustes vespertinus*	Evening Grosbeak	Special Concern	Special Concern		S3B,S3S4N,SUM	345	2.2 ± 7.0	NB
A	*Chordeiles minor*	Common Nighthawk	Special Concern	Threatened	Threatened	S3B,S4M	289	2.2 ± 7.0	NB
A	*Phalaropus lobatus*	Red-necked Phalarope	Special Concern	Special Concern		S3M	5	51.2 ± 1.0	NB
A	*Podiceps auritus*	Horned Grebe	Special Concern	Special Concern	Special Concern	S3N	2	43.0 ± 3.0	NB
A	*Cardellina canadensis*	Canada Warbler	Special Concern	Threatened	Threatened	S3S4B	390	2.2 ± 7.0	NB
A	*Phocoena phocoena*	Harbour Porpoise	Special Concern		Spec.Concern	S4	5	22.7 ± 0.0	NB
A	*Chrysemys picta picta*	Eastern Painted Turtle	Special Concern	Special Concern		S4	8	50.6 ± 0.0	NB
A	*Fulica americana*	American Coot	Not At Risk			S1B	7	18.1 ± 1.0	NB
A	*Falco peregrinus pop. 1*	Peregrine Falcon - anatum/tundrius	Not At Risk	Special Concern	Endangered	S1B,S3M	14	29.7 ± 20.0	NB
A	*Falco peregrinus*	Peregrine Falcon	Not At Risk	Special Concern		S1B,S3M	1	51.3 ± 0.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
A	*Bubo scandiacus*	Snowy Owl	Not At Risk			S1N,S2S3M	14	35.3 ± 3.0	NB
A	*Accipiter cooperii*	Cooper's Hawk	Not At Risk			S1S2B	1	25.2 ± 3.0	NB
A	*Buteo lineatus*	Red-shouldered Hawk	Not At Risk			S1S2B	10	18.4 ± 0.0	NB
A	*Aegolius funereus*	Boreal Owl	Not At Risk			S1S2B,SUM	14	16.3 ± 7.0	NB
A	*Sorex dispar*	Long-tailed Shrew	Not At Risk			S2	8	91.9 ± 1.0	NB
A	*Chlidonias niger*	Black Tern	Not At Risk			S2B	5	43.9 ± 7.0	NB
A	*Podiceps grisegena*	Red-necked Grebe	Not At Risk			S2N,S3M	7	18.3 ± 0.0	NB
A	*Globicephala melas*	Long-finned Pilot Whale	Not At Risk			S2S3	2	12.5 ± 1.0	NB
A	*Sterna hirundo*	Common Tern	Not At Risk			S3B,SUM	787	2.9 ± 0.0	NB
A	*Lagenorhynchus acutus*	Atlantic White-sided Dolphin	Not At Risk			S3S4	1	87.3 ± 0.0	NB
A	*Haliaeetus leucocephalus*	Bald Eagle	Not At Risk		Endangered	S4	444	3.0 ± 0.0	NB
A	*Lynx canadensis*	Canada Lynx	Not At Risk		Endangered	S4	39	22.5 ± 1.0	NB
A	*Canis lupus*	Grey Wolf	Not At Risk		Extirpated	SX	1	54.1 ± 100.0	NB
A	*Puma concolor pop. 1*	Cougar - Eastern population	Data Deficient		Endangered	SU	44	10.0 ± 1.0	NB
A	*Calidris canutus rufa*	Red Knot rufa subspecies - Tierra del Fuego / Patagonia wintering population	E,SC	Endangered	Endangered	S2M	415	9.4 ± 0.0	NB
A	*Morone saxatilis*	Striped Bass	E,SC			S3S4B,S3S4N	21	8.8 ± 10.0	NB
A	*Salmo salar*	Atlantic Salmon	E,T,SC			S2S3	1	72.0 ± 0.0	NB
A	*Odobenus rosmarus pop. 5*	Atlantic Walrus - Nova Scotia - Newfoundland - Gulf of St Lawrence population	X			SX	5	18.8 ± 1.0	NB
A	*Thryothorus ludovicianus*	Carolina Wren				S1	2	20.8 ± 0.0	NB
A	*Salvelinus alpinus*	Arctic Char				S1	4	97.0 ± 1.0	NB
A	*Synaptomys borealis sphagnicola*	Northern Bog Lemming				S1	2	71.6 ± 1.0	NB
A	*Tringa melanoleuca*	Greater Yellowlegs				S1?B,S4S5M	1063	3.0 ± 1.0	NB
A	*Aythya americana*	Redhead				S1B	2	24.6 ± 0.0	NB
A	*Grus canadensis*	Sandhill Crane				S1B	12	15.0 ± 1.0	NB
A	*Bartramia longicauda*	Upland Sandpiper				S1B	18	2.9 ± 0.0	NB
A	*Phalaropus tricolor*	Wilson's Phalarope				S1B	14	50.6 ± 7.0	NB
A	*Leucophaeus atricilla*	Laughing Gull				S1B	2	44.0 ± 0.0	NB
A	*Rissa tridactyla*	Black-legged Kittiwake				S1B	35	68.6 ± 0.0	NB
A	*Uria aalge*	Common Murre				S1B	3	67.6 ± 0.0	NB
A	*Alca torda*	Razorbill				S1B	19	71.8 ± 14.0	NB
A	*Fratercula arctica*	Atlantic Puffin				S1B	1	17.1 ± 0.0	NB
A	*Progne subis*	Purple Martin				S1B	3	43.9 ± 10.0	NB
A	*Aythya marila*	Greater Scaup				S1B,S2N,S4M	20	18.8 ± 1.0	NB
A	*Oxyura jamaicensis*	Ruddy Duck				S1B,S2S3M	16	18.8 ± 0.0	NB
A	*Aythya affinis*	Lesser Scaup				S1B,S4M	78	15.4 ± 1.0	NB
A	*Eremophila alpestris*	Horned Lark				S1B,S4N,S5M	132	12.6 ± 7.0	NB
A	*Sterna paradisaea*	Arctic Tern				S1B,SUM	39	3.0 ± 0.0	NB
A	*Chroicocephalus ridibundus*	Black-headed Gull				S1N,S2M	9	51.1 ± 0.0	NB
A	*Branta bernicla*	Brant				S1N,S2S3M	78	17.1 ± 0.0	NB
A	*Calidris alba*	Sanderling				S1N,S3S4M	604	8.0 ± 0.0	NB
A	*Butorides virescens*	Green Heron				S1S2B	2	50.6 ± 7.0	NB
A	*Nycticorax nycticorax*	Black-crowned Night-heron				S1S2B	261	17.9 ± 0.0	NB
A	*Empidonax traillii*	Willow Flycatcher				S1S2B	25	14.9 ± 0.0	NB
A	*Stelgidopteryx serripennis*	Northern Rough-winged Swallow				S1S2B	5	45.6 ± 1.0	NB
A	*Troglodytes aedon*	House Wren				S1S2B	4	28.0 ± 0.0	NB
A	*Calidris bairdii*	Baird's Sandpiper				S1S2M	16	18.5 ± 0.0	NB
A	*Melanitta americana*	American Scoter				S1S2N,S3M	155	2.9 ± 1.0	NB
A	*Petrochelidon pyrrhonota*	Cliff Swallow				S2B	284	2.2 ± 7.0	NB
A	*Cistothorus palustris*	Marsh Wren				S2B	1	96.8 ± 0.0	NB
A	*Mimus polyglottos*	Northern Mockingbird				S2B	63	2.9 ± 0.0	NB
A	*Pooecetes gramineus*	Vesper Sparrow				S2B	84	11.8 ± 7.0	NB
A	*Mareca strepera*	Gadwall				S2B,S3M	84	24.3 ± 1.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
A	*Tringa solitaria*	Solitary Sandpiper				S2B,S4S5M	108	1.1 ± 0.0	NB
A	*Pinicola enucleator*	Pine Grosbeak				S2B,S4S5N,S4S5M	56	3.0 ± 0.0	NB
A	*Phalacrocorax carbo*	Great Cormorant				S2N	79	29.3 ± 1.0	NB
A	*Somateria spectabilis*	King Eider				S2N	2	43.0 ± 1.0	NB
A	*Larus hyperboreus*	Glaucous Gull				S2N	22	3.0 ± 0.0	NB
A	*Melanitta perspicillata*	Surf Scoter				S2N,S4M	38	5.3 ± 15.0	NB
A	*Melanitta deglandi*	White-winged Scoter				S2N,S4M	15	5.3 ± 15.0	NB
A	*Asio otus*	Long-eared Owl				S2S3	19	42.1 ± 1.0	NB
A	*Picoides dorsalis*	American Three-toed Woodpecker				S2S3	55	26.8 ± 7.0	NB
A	*Toxostoma rufum*	Brown Thrasher				S2S3B	31	18.7 ± 0.0	NB
A	*Icterus galbula*	Baltimore Oriole				S2S3B	68	14.1 ± 7.0	NB
A	*Somateria mollissima*	Common Eider				S2S3B,S2S3N,S4M	167	17.1 ± 0.0	NB
A	*Larus delawarensis*	Ring-billed Gull				S2S3B,S4N,S5M	515	1.8 ± 1.0	NB
A	*Pluvialis dominica*	American Golden-Plover				S2S3M	88	9.9 ± 2.0	NB
A	*Calcarius lapponicus*	Lapland Longspur				S2S3N,SUM	10	19.8 ± 0.0	NB
A	*Larus marinus*	Great Black-backed Gull				S3	594	5.3 ± 15.0	NB
A	*Picoides arcticus*	Black-backed Woodpecker				S3	123	8.8 ± 7.0	NB
A	*Loxia curvirostra*	Red Crossbill				S3	112	5.7 ± 0.0	NB
A	*Spinus pinus*	Pine Siskin				S3	288	2.2 ± 7.0	NB
A	*Sorex maritimensis*	Maritime Shrew				S3	39	23.1 ± 0.0	NB
A	*Spatula clypeata*	Northern Shoveler				S3B	85	17.1 ± 0.0	NB
A	*Charadrius vociferus*	Killdeer				S3B	808	2.2 ± 7.0	NB
A	*Tringa semipalmata*	Willet				S3B	555	6.6 ± 0.0	NB
A	*Cepphus grylle*	Black Guillemot				S3B	57	41.4 ± 3.0	NB
A	*Coccyzus erythropthalmus*	Black-billed Cuckoo				S3B	105	14.1 ± 7.0	NB
A	*Myiarchus crinitus*	Great Crested Flycatcher				S3B	26	14.1 ± 7.0	NB
A	*Piranga olivacea*	Scarlet Tanager				S3B	61	21.5 ± 7.0	NB
A	*Pheucticus ludovicianus*	Rose-breasted Grosbeak				S3B	379	2.2 ± 7.0	NB
A	*Passerina cyanea*	Indigo Bunting				S3B	28	10.1 ± 7.0	NB
A	*Molothrus ater*	Brown-headed Cowbird				S3B	166	8.4 ± 7.0	NB
A	*Setophaga tigrina*	Cape May Warbler				S3B,S4S5M	244	2.2 ± 7.0	NB
A	*Mergus serrator*	Red-breasted Merganser				S3B,S4S5N,S5M	309	2.2 ± 7.0	NB
A	*Anas acuta*	Northern Pintail				S3B,S5M	198	7.0 ± 1.0	NB
A	*Anser caerulescens*	Snow Goose				S3M	22	28.0 ± 0.0	NB
A	*Numenius phaeopus hudsonicus*	Whimbrel				S3M	188	18.6 ± 0.0	NB
A	*Arenaria interpres*	Ruddy Turnstone				S3M	844	9.2 ± 2.0	NB
A	*Calidris pusilla*	Semipalmated Sandpiper				S3M	1120	2.9 ± 0.0	NB
A	*Calidris melanotos*	Pectoral Sandpiper				S3M	142	6.1 ± 0.0	NB
A	*Limnodromus griseus*	Short-billed Dowitcher				S3M	540	6.1 ± 0.0	NB
A	*Phalaropus fulicarius*	Red Phalarope				S3M	6	9.4 ± 0.0	NB
A	*Bucephala albeola*	Bufflehead				S3N	43	2.9 ± 0.0	NB
A	*Calidris maritima*	Purple Sandpiper				S3N	17	45.2 ± 0.0	NB
A	*Perisoreus canadensis*	Canada Jay				S3S4	507	2.2 ± 7.0	NB
A	*Poecile hudsonicus*	Boreal Chickadee				S3S4	461	2.2 ± 7.0	NB
A	*Synaptomys cooperi*	Southern Bog Lemming				S3S4	12	23.1 ± 0.0	NB
A	*Tyrannus tyrannus*	Eastern Kingbird				S3S4B	253	2.2 ± 7.0	NB
A	*Vireo gilvus*	Warbling Vireo				S3S4B	54	14.1 ± 7.0	NB
A	*Actitis macularius*	Spotted Sandpiper				S3S4B,S4M	1203	2.9 ± 0.0	NB
A	*Melospiza lincolnii*	Lincoln's Sparrow				S3S4B,S4M	360	1.0 ± 0.0	NB
A	*Gallinago delicata*	Wilson's Snipe				S3S4B,S5M	393	6.7 ± 0.0	NB
A	*Setophaga striata*	Blackpoll Warbler				S3S4B,S5M	354	2.2 ± 7.0	NB
A	*Pluvialis squatarola*	Black-bellied Plover				S3S4M	801	6.6 ± 0.0	NB
A	*Morus bassanus*	Northern Gannet				SHB	271	3.0 ± 0.0	NB
I	*Coenonympha nipisiquit*	Maritime Ringlet	Endangered	Endangered	Endangered	S1	103	56.0 ± 7.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
I	*Danaus plexippus*	Monarch	Endangered	Special Concern	Special Concern	S2S3?B	27	9.9 ± 0.0	NB
I	*Cicindela marginipennis*	Cobblestone Tiger Beetle	Special Concern	Endangered	Endangered	S2S3	13	79.3 ± 0.0	NB
I	*Ophiogomphus howei*	Pygmy Snaketail	Special Concern	Special Concern	Special Concern	S2S3	28	54.4 ± 1.0	NB
I	*Alasmidonta varicosa*	Brook Floater	Special Concern	Special Concern	Special Concern	S3	25	33.3 ± 0.0	NB
I	*Bombus terricola*	Yellow-banded Bumble Bee	Special Concern	Special Concern		S4	60	18.6 ± 0.0	NB
I	*Coccinella transversoguttata richardsoni*	Transverse Lady Beetle	Special Concern			SH	14	25.9 ± 2.0	NB
I	*Catocala neogama*	The Bride Underwing				S1	1	50.5 ± 1.0	NB
I	*Leucorrhinia patricia*	Canada Whiteface				S1	11	44.9 ± 0.0	NB
I	*Icaricia saepiolus*	Greenish Blue				S1S2	20	11.5 ± 7.0	NB
I	*Cicindela ancocisconensis*	Appalachian Tiger Beetle				S2	1	78.3 ± 0.0	NB
I	*Satyrium calanus*	Banded Hairstreak				S2	1	77.6 ± 7.0	NB
I	*Strymon melinus*	Gray Hairstreak				S2	11	14.8 ± 1.0	NB
I	*Chrysops delicatulus*	Delicate Deer Fly				S2S3	1	29.4 ± 1.0	NB
I	*Psyrassa unicolor*	Unicoloured Long-horned Beetle				S3	1	97.9 ± 0.0	NB
I	*Desmocerus palliatus*	Elderberry Borer				S3	2	18.7 ± 0.0	NB
I	*Carabus maeander*	Meander Ground Beetle				S3	1	80.2 ± 1.0	NB
I	*Hippodamia parenthesis*	Parenthesis Lady Beetle				S3	4	44.3 ± 1.0	NB
I	*Xylotrechus quadrimaculatus*	Birch Long-horned Beetle				S3	1	50.7 ± 1.0	NB
I	*Xylotrechus undulatus*	Spruce Zebra Beetle				S3	2	59.5 ± 1.0	NB
I	*Calathus gregarius*	Gregarious Harp Ground Beetle				S3	1	70.8 ± 1.0	NB
I	*Hyperaspis disconotata*	Disc-marked Lady Beetle				S3	1	87.3 ± 5.0	NB
I	*Enoclerus muttkowskii*	Muttkowski's Checkered Beetle				S3	1	93.1 ± 0.0	NB
I	*Hesperia sassacus*	Indian Skipper				S3	11	7.0 ± 0.0	NB
I	*Euphyes bimacula*	Two-spotted Skipper				S3	13	23.8 ± 0.0	NB
I	*Papilio brevicauda gaspeensis*	Short-tailed Swallowtail				S3	2	82.0 ± 0.0	NB
I	*Papilio brevicauda bretonensis*	Short-tailed Swallowtail				S3	113	17.7 ± 0.0	NB
I	*Tharsalea dospassosi*	Maritime Copper				S3	172	3.2 ± 0.0	NB
I	*Satyrium acadica*	Acadian Hairstreak				S3	11	56.0 ± 7.0	NB
I	*Callophrys eryphon*	Western Pine Elfin				S3	23	20.7 ± 10.0	NB
I	*Plebejus idas*	Northern Blue				S3	4	35.5 ± 0.0	NB
I	*Plebejus idas empetri*	Crowberry Blue				S3	45	28.6 ± 7.0	NB
I	*Argynnis aphrodite*	Aphrodite Fritillary				S3	4	39.2 ± 1.0	NB
I	*Boloria eunomia*	Bog Fritillary				S3	14	35.8 ± 2.0	NB
I	*Boloria bellona*	Meadow Fritillary				S3	12	41.2 ± 2.0	NB
I	*Boloria chariclea*	Arctic Fritillary				S3	39	9.6 ± 2.0	NB
I	*Boloria chariclea grandis*	Purple Lesser Fritillary				S3	2	20.7 ± 10.0	NB
I	*Nymphalis l-album*	Compton Tortoiseshell				S3	5	44.8 ± 10.0	NB
I	*Ladona exusta*	White Corporal				S3	1	59.3 ± 0.0	NB
I	*Alasmidonta undulata*	Triangle Floater				S3	1	44.8 ± 1.0	NB
I	*Pantala hymenaea*	Spot-Winged Glider				S3B	2	44.9 ± 0.0	NB
I	*Hemicrepidius memnonius*	Memnon's Click Beetle				S3S4	3	97.9 ± 0.0	NB
I	*Bolitophagus corticola*	Corticolous Darkling Beetle				S3S4	1	97.9 ± 0.0	NB
I	*Papilio brevicauda*	Short-tailed Swallowtail				S3S4	1	35.2 ± 0.0	NB
I	*Somatochlora forcipata*	Forcipate Emerald				S3S4	13	5.4 ± 1.0	NB
I	*Somatochlora tenebrosa*	Clamp-Tipped Emerald				S3S4	7	42.0 ± 0.0	NB
N	*Pannaria lurida*	Wrinkled Shingle Lichen	Threatened	Threatened		S1?	6	8.5 ± 0.0	NB
N	*Fuscopannaria leucosticta*	White-rimmed Shingle Lichen	Threatened			S2	138	8.6 ± 0.0	NB
N	*Arrhenopterum heterostichum*	One-sided Groove Moss				S1	1	41.3 ± 0.0	NB
N	*Campylostelium saxicola*	a Moss				S1	1	39.2 ± 0.0	NB
N	*Zygodon viridissimus var.*	a Moss				S1	1	39.7 ± 0.0	NB

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	viridissimus								
N	*Syntrichia ruralis*	a Moss				S1	1	93.7 ± 0.0	NB
N	*Sticta fuliginosa*	Peppered Moon Lichen				S1	1	27.3 ± 0.0	NB
N	*Leptogium hirsutum*	Jellyskin Lichen				S1	1	94.0 ± 0.0	NB
N	*Cinclidium stygium*	Sooty Cupola Moss				S1?	1	79.5 ± 0.0	NB
N	*Dicranum bonjeanii*	Bonjean's Broom Moss				S1?	1	37.3 ± 1.0	NB
N	*Homomallium adnatum*	Adnate Hairy-gray Moss				S1?	1	39.9 ± 0.0	NB
N	*Paludella squarrosa*	Tufted Fen Moss				S1?	1	79.5 ± 0.0	NB
N	*Plagiothecium latebricola*	Alder Silk Moss				S1?	1	47.2 ± 0.0	NB
N	*Rhizomnium pseudopunctatum*	Felted Leafy Moss				S1?	1	44.0 ± 0.0	NB
N	*Lathagrium auriforme*	a tarpaper lichen				S1?	1	93.6 ± 0.0	NB
N	*Phaeophyscia hispidula*	Whiskered Shadow Lichen				S1?	1	93.9 ± 0.0	NB
N	*Cephaloziella spinigera*	Spiny Threadwort				S1S2	1	99.9 ± 0.0	NB
N	*Odontoschisma sphagni*	Bog-Moss Flapwort				S1S2	1	36.6 ± 0.0	NB
N	*Pallavicinia lyellii*	Lyell's Ribbonwort				S1S2	1	72.5 ± 1.0	NB
N	*Reboulia hemisphaerica*	Purple-margined Liverwort				S1S2	2	93.3 ± 0.0	NB
N	*Drummondia prorepens*	a Moss				S1S2	1	39.4 ± 0.0	NB
N	*Calypogeia neesiana*	Nees' Pouchwort				S1S3	1	42.5 ± 1.0	NB
N	*Dicranella palustris*	Drooping-Leaved Fork Moss				S2	1	41.6 ± 0.0	NB
N	*Meesia triquetra*	Three-ranked Cold Moss				S2	1	66.3 ± 10.0	NB
N	*Pohlia elongata*	Long-necked Nodding Moss				S2	4	39.0 ± 0.0	NB
N	*Seligeria brevifolia*	a Moss				S2	4	40.0 ± 0.0	NB
N	*Sphagnum lindbergii*	Lindberg's Peat Moss				S2	1	36.8 ± 0.0	NB
N	*Sphagnum flexuosum*	Flexuous Peatmoss				S2	2	66.9 ± 10.0	NB
N	*Tetrodontium brownianum*	Little Georgia				S2	5	39.0 ± 0.0	NB
N	*Nephroma laevigatum*	Mustard Kidney Lichen				S2	10	48.1 ± 0.0	NB
N	*Peltigera lepidophora*	Scaly Pelt Lichen				S2	4	94.9 ± 0.0	NB
N	*Barbilophozia lycopodioides*	Greater Pawwort				S2?	1	98.1 ± 1.0	NB
N	*Anacamptodon splachnoides*	a Moss				S2?	2	26.9 ± 0.0	NB
N	*Ptychostomum pallescens*	Tall Clustered Bryum				S2?	1	54.4 ± 100.0	NB
N	*Sphagnum angermanicum*	a Peatmoss				S2?	1	38.1 ± 0.0	NB
N	*Collema leptaleum*	Crumpled Bat's Wing Lichen				S2?	1	41.2 ± 0.0	NB
N	*Ptychostomum cernuum*	Swamp Bryum				S2S3	1	98.6 ± 9.0	NB
N	*Buxbaumia aphylla*	Brown Shield Moss				S2S3	1	46.0 ± 0.0	NB
N	*Pohlia proligera*	Cottony Nodding Moss				S2S3	8	39.0 ± 0.0	NB
N	*Saelania glaucescens*	Blue Dew Moss				S2S3	5	93.2 ± 0.0	NB
N	*Scorpidium scorpioides*	Hooked Scorpion Moss				S2S3	2	77.3 ± 1.0	NB
N	*Sphagnum subfulvum*	a Peatmoss				S2S3	2	45.1 ± 0.0	NB
N	*Zygodon viridissimus*	a Moss				S2S3	1	39.9 ± 0.0	NB
N	*Cladonia sulphurina*	Greater Sulphur-cup Lichen				S2S3	1	99.1 ± 0.0	NB
N	*Dendriscocaulon umhausense*	a lichen				S2S3	1	38.9 ± 0.0	NB
N	*Schistidium maritimum*	a Moss				S3	1	44.0 ± 0.0	NB
N	*Collema nigrescens*	Blistered Tarpaper Lichen				S3	2	38.9 ± 0.0	NB
N	*Solorina saccata*	Woodland Owl Lichen				S3	13	93.7 ± 0.0	NB
N	*Ahtiana aurescens*	Eastern Candlewax Lichen				S3	2	43.2 ± 0.0	NB
N	*Cladonia farinacea*	Farinose Pixie Lichen				S3	1	87.0 ± 0.0	PE
N	*Scytinium lichenoides*	Tattered Jellyskin Lichen				S3	1	93.3 ± 0.0	NB
N	*Nephroma bellum*	Naked Kidney Lichen				S3	1	96.0 ± 0.0	PE
N	*Leptogium laceroides*	Short-bearded Jellyskin Lichen				S3	1	96.8 ± 0.0	PE
N	*Peltigera membranacea*	Membranous Pelt Lichen				S3	1	99.1 ± 0.0	NB
N	*Cladonia deformis*	Lesser Sulphur-cup Lichen				S3	1	98.9 ± 0.0	NB
N	*Aulacomnium androgynum*	Little Groove Moss				S3?	4	41.3 ± 0.0	NB
N	*Ptychostomum inclinatum*	Blunt-tooth Thread Moss				S3?	1	41.5 ± 0.0	NB
N	*Dicranella rufescens*	Red Forklet Moss				S3?	1	42.5 ± 7.0	NB
N	*Cystocoleus ebeneus*	Rockgossamer Lichen				S3?	1	54.4 ± 0.0	NB

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N	*Scytinium subtile*	Appressed Jellyskin Lichen				S3?	4	42.8 ± 0.0	NB
N	*Barbula convoluta*	Lesser Bird's-claw Beard Moss				S3S4	1	89.1 ± 15.0	NB
N	*Dicranella varia*	a Moss				S3S4	1	98.6 ± 9.0	NB
N	*Dicranum majus*	Greater Broom Moss				S3S4	4	41.5 ± 0.0	NB
N	*Dicranum leioneuron*	a Dicranum Moss				S3S4	1	33.6 ± 10.0	NB
N	*Encalypta ciliata*	Fringed Extinguisher Moss				S3S4	2	95.3 ± 0.0	NB
N	*Fissidens bryoides*	Lesser Pocket Moss				S3S4	4	63.9 ± 5.0	NB
N	*Heterocladium dimorphum*	Dimorphous Tangle Moss				S3S4	2	40.0 ± 0.0	NB
N	*Isopterygiopsis muelleriana*	a Moss				S3S4	2	93.2 ± 0.0	NB
N	*Myurella julacea*	Small Mouse-tail Moss				S3S4	2	95.3 ± 0.0	NB
N	*Orthotrichum speciosum*	Showy Bristle Moss				S3S4	6	39.9 ± 0.0	NB
N	*Pogonatum dentatum*	Mountain Hair Moss				S3S4	1	39.5 ± 0.0	NB
N	*Sphagnum compactum*	Compact Peat Moss				S3S4	1	39.3 ± 1.0	NB
N	*Sphagnum torreyanum*	a Peatmoss				S3S4	1	65.4 ± 0.0	NB
N	*Sphagnum contortum*	Twisted Peat Moss				S3S4	1	65.4 ± 0.0	NB
N	*Tetraphis geniculata*	Geniculate Four-tooth Moss				S3S4	4	47.2 ± 0.0	NB
N	*Tetraplodon angustatus*	Toothed-leaved Nitrogen Moss				S3S4	1	41.3 ± 0.0	NB
N	*Abietinella abietina*	Wiry Fern Moss				S3S4	3	93.9 ± 0.0	NB
N	*Rauiella scita*	Smaller Fern Moss				S3S4	1	44.9 ± 0.0	NB
N	*Pannaria rubiginosa*	Brown-eyed Shingle Lichen				S3S4	5	8.8 ± 0.0	NB
N	*Pseudocyphellaria holarctica*	Yellow Specklebelly Lichen				S3S4	4	41.2 ± 0.0	NB
N	*Scytinium teretiusculum*	Curly Jellyskin Lichen				S3S4	4	86.9 ± 0.0	PE
N	*Montanelia panniformis*	Shingled Camouflage Lichen				S3S4	1	98.8 ± 0.0	NB
N	*Cladonia floerkeana*	Gritty British Soldiers Lichen				S3S4	1	97.5 ± 0.0	NB
N	*Nephroma parile*	Powdery Kidney Lichen				S3S4	4	26.9 ± 0.0	NB
N	*Nephroma resupinatum*	a lichen				S3S4	4	96.7 ± 0.0	NB
N	*Protopannaria pezizoides*	Brown-gray Moss-shingle Lichen				S3S4	9	87.0 ± 0.0	PE
N	*Usnea strigosa*	Bushy Beard Lichen				S3S4	1	95.8 ± 0.0	PE
N	*Fuscopannaria sorediata*	a Lichen				S3S4	1	90.5 ± 0.0	NB
N	*Stereocaulon paschale*	Easter Foam Lichen				S3S4	1	67.0 ± 1.0	NB
N	*Pannaria conoplea*	Mealy-rimmed Shingle Lichen				S3S4	16	26.8 ± 0.0	NB
N	*Physcia tenella*	Fringed Rosette Lichen				S3S4	2	90.2 ± 0.0	PE
N	*Leucodon brachypus*	a Moss				SH	9	38.8 ± 0.0	NB
N	*Splachnum luteum*	Yellow Collar Moss				SH	1	54.4 ± 100.0	NB
P	*Juglans cinerea*	Butternut	Endangered	Endangered	Endangered	S1	55	43.5 ± 0.0	NB
P	*Symphyotrichum laurentianum*	Gulf of St Lawrence Aster	Threatened	Threatened	Endangered	S1	63	38.8 ± 0.0	NB
P	*Fraxinus nigra*	Black Ash	Threatened			S3S4	353	2.9 ± 0.0	NB
P	*Lechea maritima var. subcylindrica*	Beach Pinweed	Special Concern	Special Concern	Special Concern	S2	2509	18.9 ± 0.0	NB
P	*Symphyotrichum subulatum (Bathurst pop)*	Bathurst Aster - Bathurst pop.	Not At Risk		Endangered	S2	201	6.3 ± 0.0	NB
P	*Eriocaulon parkeri*	Parker's Pipewort	Not At Risk		Endangered	S3	156	32.5 ± 1.0	NB
P	*Pterospora andromedea*	Woodland Pinedrops			Endangered	S1	1	94.8 ± 0.0	NB
P	*Cryptotaenia canadensis*	Canada Honewort				S1	1	79.7 ± 1.0	NB
P	*Bidens discoidea*	Swamp Beggarticks				S1	1	36.6 ± 0.0	NB
P	*Bidens eatonii*	Eaton's Beggarticks				S1	9	35.8 ± 0.0	NB
P	*Pseudognaphalium obtusifolium*	Eastern Cudweed				S1	5	19.0 ± 0.0	NB
P	*Betula glandulosa*	Glandular Birch				S1	23	83.1 ± 0.0	NB
P	*Betula michauxii*	Michaux's Dwarf Birch				S1	3	32.3 ± 0.0	NB
P	*Andersonglossum boreale*	Northern Wild Comfrey				S1	3	64.8 ± 0.0	NB
P	*Cardamine parviflora*	Small-flowered Bittercress				S1	1	48.8 ± 0.0	NB
P	*Draba glabella*	Rock Whitlow-Grass				S1	7	94.4 ± 0.0	NB

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P	*Draba incana*	Twisted Whitlow-grass				S1	6	76.8 ± 0.0	NB
P	*Moehringia macrophylla*	Large-Leaved Sandwort				S1	1	93.9 ± 0.0	NB
P	*Stellaria crassifolia*	Fleshy Stitchwort				S1	1	13.5 ± 10.0	NB
P	*Stellaria longipes*	Long-stalked Starwort				S1	6	67.7 ± 1.0	NB
P	*Suaeda rolandii*	Roland's Sea-Blite				S1	11	38.3 ± 0.0	NB
P	*Vaccinium boreale*	Northern Blueberry				S1	17	83.0 ± 0.0	NB
P	*Vaccinium uliginosum*	Alpine Bilberry				S1	6	83.1 ± 0.0	NB
P	*Euphorbia polygonifolia*	Seaside Spurge				S1	7	46.3 ± 5.0	NB
P	*Bartonia virginica*	Yellow Bartonia				S1	3	38.2 ± 1.0	NB
P	*Coptidium lapponicum*	Lapland Buttercup				S1	1	84.6 ± 0.0	NB
P	*Crataegus jonesiae*	Jones' Hawthorn				S1	1	98.5 ± 1.0	NB
P	*Rubus flagellaris*	Northern Dewberry				S1	2	42.0 ± 1.0	NB
P	*Salix serissima*	Autumn Willow				S1	4	78.2 ± 0.0	NB
P	*Saxifraga paniculata ssp. laestadii*	Laestadius' Saxifrage				S1	3	94.6 ± 0.0	NB
P	*Carex glareosa*	Gravel Sedge				S1	4	66.0 ± 1.0	NB
P	*Carex rariflora*	Loose-flowered Alpine Sedge				S1	5	85.6 ± 0.0	NB
P	*Carex salina*	Saltmarsh Sedge				S1	12	32.4 ± 0.0	NB
P	*Carex viridula var. elatior*	Greenish Sedge				S1	11	78.2 ± 0.0	NB
P	*Carex bigelowii*	Bigelow's Sedge				S1	1	86.2 ± 0.0	NB
P	*Cyperus diandrus*	Low Flatsedge				S1	5	35.7 ± 0.0	NB
P	*Eleocharis flavescens var. olivacea*	Bright-green Spikerush				S1	8	35.3 ± 0.0	NB
P	*Scirpus pendulus*	Hanging Bulrush				S1	1	88.6 ± 0.0	PE
P	*Sisyrinchium angustifolium*	Narrow-leaved Blue-eyed-grass				S1	1	37.2 ± 0.0	NB
P	*Juncus greenei*	Greene's Rush				S1	3	31.0 ± 1.0	NB
P	*Juncus stygius ssp. americanus*	Moor Rush				S1	4	57.2 ± 0.0	NB
P	*Juncus subtilis*	Creeping Rush				S1	3	81.9 ± 1.0	NB
P	*Oreojuncus trifidus*	Highland Rush				S1	9	86.1 ± 0.0	NB
P	*Allium canadense*	Canada Garlic				S1	1	50.7 ± 1.0	NB
P	*Anticlea elegans*	Mountain Death Camas				S1	7	94.4 ± 0.0	NB
P	*Malaxis monophyllos var. brachypoda*	North American White Adder's-mouth				S1	4	78.2 ± 0.0	NB
P	*Platanthera macrophylla*	Large Round-Leaved Orchid				S1	1	69.6 ± 0.0	NB
P	*Bromus pubescens*	Hairy Wood Brome Grass				S1	2	27.3 ± 0.0	NB
P	*Calamagrostis stricta ssp. inexpansa*	Slim-stemmed Reed Grass				S1	2	45.1 ± 0.0	NB
P	*Catabrosa aquatica*	Water Whorl Grass				S1	3	88.3 ± 5.0	PE
P	*Dichanthelium xanthophysum*	Slender Panic Grass				S1	7	50.3 ± 0.0	NB
P	*Zizania aquatica var. brevis*	St. Lawrence Wild Rice				S1	26	7.0 ± 0.0	NB
P	*Potamogeton friesii*	Fries' Pondweed				S1	3	95.0 ± 0.0	PE
P	*Potamogeton nodosus*	Long-leaved Pondweed				S1	5	35.9 ± 0.0	NB
P	*Cystopteris laurentiana*	Laurentian Bladder Fern				S1	1	66.7 ± 0.0	NB
P	*Huperzia selago*	Northern Firmoss				S1	2	86.3 ± 0.0	NB
P	*Cuscuta campestris*	Field Dodder				S1?	3	51.2 ± 0.0	NB
P	*Polygonum aviculare ssp. neglectum*	Narrow-leaved Knotweed				S1?	5	8.3 ± 1.0	NB
P	*Carex laxiflora*	Loose-Flowered Sedge				S1?	1	96.2 ± 2.0	NB
P	*Eriophorum russeolum ssp. albidum*	Smooth-fruited Russet Cottongrass				S1S3	4	29.4 ± 0.0	NB
P	*Spiranthes cernua*	Nodding Ladies'-Tresses				S1S3	1	91.6 ± 0.0	NB
P	*Spiranthes arcisepala*	Appalachian Ladies'-tresses				S1S3	1	69.8 ± 0.0	NB
P	*Neottia bifolia*	Southern Twayblade			Endangered	S2	34	44.7 ± 0.0	NB
P	*Osmorhiza depauperata*	Blunt Sweet Cicely				S2	5	41.5 ± 1.0	NB

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P	*Betula minor*	Dwarf White Birch				S2	15	86.1 ± 0.0	NB
P	*Atriplex glabriuscula var. franktonii*	Frankton's Saltbush				S2	5	22.5 ± 5.0	NB
P	*Hypericum x dissimulatum*	Disguised St. John's-wort				S2	1	93.4 ± 1.0	NB
P	*Astragalus eucosmus*	Elegant Milk-vetch				S2	1	48.7 ± 0.0	NB
P	*Nuphar x rubrodisca*	Red-disk Yellow Pond-lily				S2	6	32.3 ± 0.0	NB
P	*Persicaria amphibia var. emersa*	Long-root Smartweed				S2	1	48.7 ± 0.0	NB
P	*Carex albicans var. emmonsii*	White-tinged Sedge				S2	10	18.6 ± 0.0	NB
P	*Schoenoplectiella smithii var. leviseta*	Smith's Bulrush				S2	60	35.2 ± 0.0	NB
P	*Galearis rotundifolia*	Small Round-leaved Orchid				S2	15	63.4 ± 1.0	NB
P	*Calypso bulbosa var. americana*	Calypso				S2	8	52.9 ± 0.0	NB
P	*Coeloglossum viride*	Long-bracted Frog Orchid				S2	1	87.2 ± 1.0	NB
P	*Cypripedium parviflorum var. makasin*	Small Yellow Lady's-Slipper				S2	2	16.4 ± 5.0	NB
P	*Platanthera huronensis*	Fragrant Green Orchid				S2	1	47.1 ± 0.0	NB
P	*Puccinellia nutkaensis*	Alaska Alkaligrass				S2	7	19.5 ± 0.0	NB
P	*Diphasiastrum sitchense*	Sitka Ground-cedar				S2	2	86.0 ± 0.0	NB
P	*Botrychium minganense*	Mingan Moonwort				S2	1	87.8 ± 0.0	NB
P	*Coryphopteris simulata*	Bog Fern				S2	1	26.9 ± 1.0	NB
P	*Toxicodendron radicans var. radicans*	Eastern Poison Ivy				S2?	5	29.7 ± 0.0	NB
P	*Symphyotrichum novi-belgii var. crenifolium*	New York Aster				S2?	1	51.1 ± 0.0	NB
P	*Humulus lupulus var. lupuloides*	Common Hop				S2?	3	46.2 ± 0.0	NB
P	*Crataegus macrosperma*	Big-Fruit Hawthorn				S2?	1	50.4 ± 0.0	NB
P	*Osmorhiza longistylis*	Smooth Sweet Cicely				S2S3	2	62.8 ± 0.0	NB
P	*Bidens heterodoxa*	Connecticut Beggar-Ticks				S2S3	42	39.8 ± 1.0	NB
P	*Cuscuta cephalanthi*	Buttonbush Dodder				S2S3	30	18.4 ± 1.0	NB
P	*Gentiana linearis*	Narrow-Leaved Gentian				S2S3	19	68.8 ± 0.0	NB
P	*Aphyllon uniflorum*	One-flowered Broomrape				S2S3	2	61.0 ± 1.0	NB
P	*Persicaria careyi*	Carey's Smartweed				S2S3	2	99.3 ± 2.0	NB
P	*Hepatica americana*	Round-lobed Hepatica				S2S3	4	52.9 ± 0.0	NB
P	*Ranunculus sceleratus*	Cursed Buttercup				S2S3	4	48.6 ± 0.0	NB
P	*Rosa acicularis ssp. sayi*	Prickly Rose				S2S3	103	44.2 ± 0.0	NB
P	*Galium obtusum*	Blunt-leaved Bedstraw				S2S3	10	45.9 ± 0.0	NB
P	*Carex crawei*	Crawe's Sedge				S2S3	1	38.7 ± 0.0	NB
P	*Carex rostrata*	Narrow-leaved Beaked Sedge				S2S3	4	59.8 ± 5.0	NB
P	*Carex vacillans*	Estuarine Sedge				S2S3	3	23.9 ± 10.0	NB
P	*Cyperus bipartitus*	Shining Flatsedge				S2S3	23	6.9 ± 0.0	NB
P	*Juncus ranarius*	Seaside Rush				S2S3	6	37.1 ± 0.0	NB
P	*Corallorhiza maculata var. occidentalis*	Spotted Coralroot				S2S3	3	57.5 ± 1.0	NB
P	*Corallorhiza maculata var. maculata*	Spotted Coralroot				S2S3	2	91.0 ± 18.0	NB
P	*Piptatheropsis canadensis*	Canada Ricegrass				S2S3	5	50.2 ± 0.0	NB
P	*Poa glauca*	Glaucous Blue Grass				S2S3	4	66.7 ± 0.0	NB
P	*Piptatheropsis pungens*	Slender Ricegrass				S2S3	11	50.2 ± 1.0	NB
P	*Isoetes tuckermanii ssp. acadiensis*	Acadian Quillwort				S2S3	1	82.2 ± 0.0	NB
P	*Panax trifolius*	Dwarf Ginseng				S3	15	31.0 ± 5.0	NB
P	*Artemisia campestris ssp. caudata*	Tall Wormwood				S3	5	19.0 ± 0.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
P	*Ionactis linariifolia*	Flax-leaved Aster				S3	95	37.4 ± 1.0	NB
P	*Symphyotrichum subulatum*	Annual Saltmarsh Aster				S3	172	5.7 ± 0.0	NB
P	*Pseudognaphalium macounii*	Macoun's Cudweed				S3	42	36.0 ± 0.0	NB
P	*Boechera stricta*	Drummond's Rockcress				S3	4	24.1 ± 1.0	NB
P	*Turritis glabra*	Tower Mustard				S3	9	45.9 ± 0.0	NB
P	*Arabis pycnocarpa*	Cream-flowered Rockcress				S3	8	36.3 ± 0.0	NB
P	*Cardamine maxima*	Large Toothwort				S3	4	87.5 ± 0.0	NB
P	*Sagina nodosa*	Knotted Pearlwort				S3	6	41.8 ± 0.0	NB
P	*Sagina nodosa ssp. borealis*	Knotted Pearlwort				S3	2	50.2 ± 0.0	NB
P	*Stellaria humifusa*	Saltmarsh Starwort				S3	12	32.4 ± 0.0	NB
P	*Stellaria longifolia*	Long-leaved Starwort				S3	3	49.2 ± 0.0	NB
P	*Oxybasis rubra*	Red Goosefoot				S3	56	5.7 ± 0.0	NB
P	*Hudsonia tomentosa*	Woolly Beach-heath				S3	395	14.9 ± 5.0	NB
P	*Oxytropis campestris var. johannensis*	Field Locoweed				S3	1	46.5 ± 10.0	NB
P	*Bartonia paniculata ssp. iodandra*	Branched Bartonia				S3	2	35.5 ± 0.0	NB
P	*Geranium bicknellii*	Bicknell's Crane's-bill				S3	8	23.0 ± 0.0	NB
P	*Myriophyllum farwellii*	Farwell's Water Milfoil				S3	8	35.7 ± 0.0	NB
P	*Myriophyllum humile*	Low Water Milfoil				S3	1	81.9 ± 1.0	NB
P	*Fraxinus pennsylvanica*	Red Ash				S3	3	87.9 ± 5.0	PE
P	*Rumex pallidus*	Seabeach Dock				S3	8	25.0 ± 0.0	NB
P	*Rumex occidentalis*	Western Dock				S3	3	65.2 ± 0.0	NB
P	*Podostemum ceratophyllum*	Horn-leaved Riverweed				S3	9	50.4 ± 1.0	NB
P	*Pyrola minor*	Lesser Pyrola				S3	13	10.8 ± 0.0	NB
P	*Clematis occidentalis*	Purple Clematis				S3	6	64.8 ± 1.0	NB
P	*Amelanchier canadensis*	Canada Serviceberry				S3	5	39.4 ± 0.0	NB
P	*Crataegus scabrida*	Rough Hawthorn				S3	2	50.4 ± 1.0	NB
P	*Rubus occidentalis*	Black Raspberry				S3	1	27.3 ± 0.0	NB
P	*Salix candida*	Sage Willow				S3	28	63.4 ± 0.0	NB
P	*Salix myricoides*	Bayberry Willow				S3	3	14.2 ± 5.0	NB
P	*Salix interior*	Sandbar Willow				S3	2	35.9 ± 0.0	NB
P	*Comandra umbellata*	Bastard's Toadflax				S3	83	6.1 ± 0.0	NB
P	*Agalinis purpurea var. parviflora*	Small-flowered Purple False Foxglove				S3	12	37.3 ± 0.0	NB
P	*Valeriana uliginosa*	Swamp Valerian				S3	8	78.2 ± 0.0	NB
P	*Viola adunca*	Hooked Violet				S3	9	79.6 ± 0.0	NB
P	*Sagittaria montevidensis ssp. spongiosa*	Spongy Arrowhead				S3	159	6.6 ± 0.0	NB
P	*Carex adusta*	Lesser Brown Sedge				S3	9	29.7 ± 3.0	NB
P	*Carex arcta*	Northern Clustered Sedge				S3	1	47.8 ± 0.0	NB
P	*Carex conoidea*	Field Sedge				S3	2	60.1 ± 10.0	NB
P	*Carex garberi*	Garber's Sedge				S3	21	44.1 ± 0.0	NB
P	*Carex granularis*	Limestone Meadow Sedge				S3	7	65.6 ± 5.0	NB
P	*Carex gynocrates*	Northern Bog Sedge				S3	12	78.2 ± 0.0	NB
P	*Carex hirtifolia*	Pubescent Sedge				S3	12	46.3 ± 0.0	NB
P	*Carex ormostachya*	Necklace Spike Sedge				S3	10	10.3 ± 1.0	NB
P	*Carex sprengelii*	Longbeak Sedge				S3	1	46.2 ± 0.0	NB
P	*Carex tenuiflora*	Sparse-Flowered Sedge				S3	5	30.7 ± 0.0	NB
P	*Carex vaginata*	Sheathed Sedge				S3	8	78.2 ± 0.0	NB
P	*Cyperus esculentus var. leptostachyus*	Perennial Yellow Nutsedge				S3	3	51.8 ± 0.0	NB
P	*Eriophorum gracile*	Slender Cottongrass				S3	6	5.5 ± 0.0	NB
P	*Blysmopsis rufa*	Red Bulrush				S3	61	29.3 ± 0.0	NB
P	*Juncus brachycephalus*	Small-Head Rush				S3	2	78.2 ± 0.0	NB
P	*Juncus vaseyi*	Vasey Rush				S3	33	13.1 ± 0.0	NB
P	*Cypripedium reginae*	Showy Lady's-Slipper				S3	32	15.4 ± 0.0	NB
P	*Goodyera oblongifolia*	Menzies' Rattlesnake-				S3	30	41.7 ± 1.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
		plantain							
P	*Neottia auriculata*	Auricled Twayblade				S3	16	31.2 ± 0.0	NB
P	*Platanthera grandiflora*	Large Purple Fringed Orchid				S3	13	46.1 ± 0.0	NB
P	*Platanthera orbiculata*	Small Round-leaved Orchid				S3	33	9.2 ± 2.0	NB
P	*Spiranthes lucida*	Shining Ladies'-Tresses				S3	5	22.8 ± 0.0	NB
P	*Agrostis mertensii*	Northern Bent Grass				S3	76	44.7 ± 0.0	NB
P	*Bromus latiglumis*	Broad-Glumed Brome				S3	7	35.3 ± 0.0	NB
P	*Dichanthelium linearifolium*	Narrow-leaved Panic Grass				S3	3	46.9 ± 0.0	NB
P	*Zizania aquatica var. aquatica*	Eastern Wild Rice				S3	7	28.7 ± 1.0	NB
P	*Adiantum pedatum*	Northern Maidenhair Fern				S3	2	62.8 ± 0.0	NB
P	*Asplenium trichomanes*	Maidenhair Spleenwort				S3	4	93.5 ± 0.0	NB
P	*Anchistea virginica*	Virginia chain fern				S3	28	31.0 ± 1.0	NB
P	*Woodsia alpina*	Alpine Cliff Fern				S3	4	84.6 ± 0.0	NB
P	*Woodsia glabella*	Smooth Cliff Fern				S3	12	94.1 ± 0.0	NB
P	*Isoetes tuckermanii ssp. tuckermanii*	Tuckerman's Quillwort				S3	5	36.1 ± 0.0	NB
P	*Diphasiastrum x sabinifolium*	Savin-leaved Ground-cedar				S3	14	19.2 ± 1.0	NB
P	*Huperzia appressa*	Mountain Firmoss				S3	14	24.1 ± 1.0	NB
P	*Sceptridium dissectum*	Dissected Moonwort				S3	3	89.7 ± 5.0	PE
P	*Botrychium lanceolatum ssp. angustisegmentum*	Narrow Triangle Moonwort				S3	5	46.9 ± 0.0	NB
P	*Botrychium simplex*	Least Moonwort				S3	11	46.0 ± 0.0	NB
P	*Selaginella selaginoides*	Low Spikemoss				S3	14	78.2 ± 0.0	NB
P	*Crataegus submollis*	Quebec Hawthorn				S3?	1	35.6 ± 1.0	NB
P	*Platanthera hookeri*	Hooker's Orchid				S3?	68	8.0 ± 1.0	NB
P	*Arnica lanceolata*	Lance-leaved Arnica				S3S4	42	41.6 ± 0.0	NB
P	*Bidens hyperborea*	Estuary Beggarticks				S3S4	189	7.1 ± 0.0	NB
P	*Symphyotrichum boreale*	Boreal Aster				S3S4	10	51.0 ± 5.0	NB
P	*Betula pumila*	Bog Birch				S3S4	160	27.3 ± 0.0	NB
P	*Mertensia maritima*	Sea Lungwort				S3S4	5	33.2 ± 0.0	NB
P	*Subularia aquatica ssp. americana*	American Water Awlwort				S3S4	1	94.1 ± 1.0	NB
P	*Callitriche hermaphroditica*	Northern Water-starwort				S3S4	4	11.1 ± 0.0	NB
P	*Viburnum edule*	Squashberry				S3S4	27	46.1 ± 0.0	NB
P	*Crassula aquatica*	Water Pygmyweed				S3S4	84	6.9 ± 0.0	NB
P	*Elatine americana*	American Waterwort				S3S4	31	6.9 ± 0.0	NB
P	*Hedysarum americanum*	Alpine Hedysarum				S3S4	5	44.8 ± 0.0	NB
P	*Fagus grandifolia*	American Beech				S3S4	99	10.9 ± 0.0	NB
P	*Geranium robertianum*	Herb Robert				S3S4	50	83.3 ± 0.0	PE
P	*Stachys pilosa*	Hairy Hedge-Nettle				S3S4	20	35.4 ± 0.0	NB
P	*Teucrium canadense*	Canada Germander				S3S4	92	18.4 ± 0.0	NB
P	*Utricularia gibba*	Humped Bladderwort				S3S4	1	30.2 ± 1.0	NB
P	*Fraxinus americana*	White Ash				S3S4	87	29.7 ± 0.0	NB
P	*Epilobium strictum*	Downy Willowherb				S3S4	7	38.8 ± 0.0	NB
P	*Fallopia scandens*	Climbing False Buckwheat				S3S4	55	20.8 ± 0.0	NB
P	*Rumex persicarioides*	Peach-leaved Dock				S3S4	74	14.5 ± 0.0	NB
P	*Littorella americana*	American Shoreweed				S3S4	1	99.2 ± 1.0	NB
P	*Samolus parviflorus*	Seaside Brookweed				S3S4	195	2.7 ± 0.0	NB
P	*Thalictrum confine*	Northern Meadow-rue				S3S4	1	71.7 ± 0.0	NB
P	*Drymocallis arguta*	Tall Wood Beauty				S3S4	7	46.9 ± 0.0	NB
P	*Rosa palustris*	Swamp Rose				S3S4	4	30.9 ± 1.0	NB
P	*Rubus pensilvanicus*	Pennsylvania Blackberry				S3S4	11	29.1 ± 0.0	NB
P	*Sanguisorba canadensis*	Canada Burnet				S3S4	47	59.5 ± 5.0	NB
P	*Galium boreale*	Northern Bedstraw				S3S4	2	34.7 ± 1.0	NB
P	*Galium labradoricum*	Labrador Bedstraw				S3S4	32	17.0 ± 0.0	NB
P	*Salix pedicellaris*	Bog Willow				S3S4	45	30.9 ± 0.0	NB
P	*Geocaulon lividum*	Northern Comandra				S3S4	88	18.4 ± 0.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
P	*Parnassia glauca*	Fen Grass-of-Parnassus				S3S4	14	49.4 ± 0.0	NB
P	*Limosella australis*	Southern Mudwort				S3S4	182	6.4 ± 1.0	NB
P	*Ulmus americana*	White Elm				S3S4	118	18.2 ± 0.0	NB
P	*Boehmeria cylindrica*	Small-spike False-nettle				S3S4	7	44.9 ± 0.0	NB
P	*Juniperus horizontalis*	Creeping Juniper				S3S4	8	57.9 ± 1.0	NB
P	*Carex capillaris*	Hairlike Sedge				S3S4	4	79.0 ± 0.0	NB
P	*Carex eburnea*	Bristle-leaved Sedge				S3S4	13	93.3 ± 0.0	NB
P	*Carex haydenii*	Hayden's Sedge				S3S4	6	24.2 ± 0.0	NB
P	*Carex lupulina*	Hop Sedge				S3S4	1	71.2 ± 1.0	NB
P	*Carex tenera*	Tender Sedge				S3S4	3	10.6 ± 0.0	NB
P	*Carex wiegandii*	Wiegand's Sedge				S3S4	55	5.2 ± 0.0	NB
P	*Carex recta*	Estuary Sedge				S3S4	18	5.6 ± 0.0	NB
P	*Carex atratiformis*	Scabrous Black Sedge				S3S4	7	61.2 ± 0.0	NB
P	*Cladium mariscoides*	Smooth Twigrush				S3S4	2	77.0 ± 0.0	NB
P	*Cyperus dentatus*	Toothed Flatsedge				S3S4	2	43.9 ± 10.0	NB
P	*Eleocharis quinqueflora*	Few-flowered Spikerush				S3S4	1	95.3 ± 0.0	PE
P	*Rhynchospora capitellata*	Small-headed Beakrush				S3S4	69	35.8 ± 0.0	NB
P	*Trichophorum clintonii*	Clinton's Clubrush				S3S4	70	44.2 ± 0.0	NB
P	*Triglochin gaspensis*	Gasp ├⌐ Arrowgrass				S3S4	101	5.7 ± 0.0	NB
P	*Lilium canadense*	Canada Lily				S3S4	51	21.2 ± 1.0	NB
P	*Triantha glutinosa*	Sticky False-Asphodel				S3S4	8	51.8 ± 0.0	NB
P	*Corallorhiza maculata*	Spotted Coralroot				S3S4	15	42.0 ± 1.0	NB
P	*Liparis loeselii*	Loesel's Twayblade				S3S4	35	27.0 ± 0.0	NB
P	*Neottia cordata*	Heart-leaved Twayblade				S3S4	26	16.3 ± 1.0	NB
P	*Platanthera obtusata*	Blunt-leaved Orchid				S3S4	35	11.0 ± 0.0	NB
P	*Calamagrostis pickeringii*	Pickering's Reed Grass				S3S4	1	55.0 ± 0.0	NB
P	*Calamagrostis stricta*	Slim-stemmed Reed Grass				S3S4	36	5.7 ± 0.0	NB
P	*Calamagrostis stricta ssp. stricta*	Slim-stemmed Reed Grass				S3S4	6	65.2 ± 0.0	NB
P	*Stuckenia filiformis*	Thread-leaved Pondweed				S3S4	1	67.0 ± 1.0	NB
P	*Potamogeton praelongus*	White-stemmed Pondweed				S3S4	5	60.3 ± 0.0	NB
P	*Potamogeton richardsonii*	Richardson's Pondweed				S3S4	5	65.9 ± 4.0	NB
P	*Xyris montana*	Northern Yellow-Eyed-Grass				S3S4	197	21.2 ± 0.0	NB
P	*Cryptogramma stelleri*	Steller's Rockbrake				S3S4	19	36.2 ± 0.0	NB
P	*Asplenium viride*	Green Spleenwort				S3S4	30	66.7 ± 0.0	NB
P	*Dryopteris fragrans*	Fragrant Wood Fern				S3S4	69	36.2 ± 0.0	NB
P	*Equisetum palustre*	Marsh Horsetail				S3S4	1	96.6 ± 0.0	NB
P	*Polygonum oxyspermum ssp. raii*	Ray's Knotweed				SH	7	50.3 ± 10.0	NB
P	*Montia fontana*	Water Blinks				SH	1	11.5 ± 1.0	NB
P	*Brachyelytrum erectum*	Bearded Shorthusk				SH	1	99.5 ± 2.0	NB
P	*Botrychium campestre*	Prairie Moonwort				SH	1	94.5 ± 0.0	NB
P	*Agalinis maritima*	Saltmarsh Agalinis				SX	2	54.9 ± 50.0	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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36	Glen, W. 1991. 1991 Prince Edward Island Forest Biomass Inventory Data. PEI Dept of Energy and Forestry, 10059 recs.
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33	Neily, T.H. 2017. Maritmes Lichen and Bryophyte records. Atlantic Canada Conservation Data Centre, 1015 recs.
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16	Majka, C. 2009. Université de Moncton Insect Collection: Carabidae, Cerambycidae, Coccinellidae. Université de Moncton, 540 recs.
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15	Patrick, A.; Horne, D.; Noseworthy, J. et. al. 2017. Field data for Nova Scotia and New Brunswick, 2015 and 2017. Nature Conservancy of Canada.
14	Erskine, D. 1960. The plants of Prince Edward Island, 1st Ed. Research Branch, Agriculture Canada, Ottawa., Publication 1088. 1238 recs.
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10	Blaney, C.S. 2018. Atlantic Canada Conservation Data Centre Fieldwork 2018. Atlantic Canada Conservation Data Centre.
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10	Tremblay, E. 2001. Kouchibouguacis River Freshwater Mussel Data. Parks Canada, Kouchibouguac NP, 45 recs.
9	Curley, F.R. 2005. PEF&W Collection 2003-04. PEI Fish & Wildlife Div., 716 recs.
9	Edsall, J. 2001. Lepidopteran records in New Brunswick, 1997-99. , Pers. comm. to K.A. Bredin. 91 recs.
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9	McMullin, R.T. 2015. Prince Edward Island's lichen biodiversity and proposed conservation status in a report prepared for the province of PEI. Biodiversity Institute of Ontario Herbarium, University of Guelph, 776 records.
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7	Chaput, G. 2002. Atlantic Salmon: Maritime Provinces Overview for 2001. Dept of Fisheries & Oceans, Atlantic Region, Science Stock Status Report D3-14. 39 recs.
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7	Doucet, D.A. 2008. Wood Turtle Records 2002-07. Pers. comm. to S. Gerriets, 7 recs, 7 recs.
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5	Edsall, J. 2007. Personal Butterfly Collection: specimens collected in the Canadian Maritimes, 1961-2007. J. Edsall, unpubl. report, 137 recs.
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4	Cowie, Faye. 2007. Surveyed Lakes in New Brunswick. Canadian Rivers Institute, 781 recs.
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3	Grondin, P. & Blouin, J-L., Bouchard, D.; et al. 1981. Description et cartographie de la vegetation du cordon littoral. Parc National de Kouchibouguac. Le Groupe Dryade, 57 pp.
3	Mazerolle, D. 2003. Assessment and Rehabilitation of the Gulf of St Lawrence Aster (Symphyotrichum laurentianum) in Southeastern New Brunswick. Irving Eco-centre, la Dune du Bouctouche, 13 recs.
3	McAlpine, D.F. 1998. NBM Science Collections databases to 1998. New Brunswick Museum, Saint John NB, 241 recs.
3	Nelson Poirier. 2009. Rare plant finds in the Exmoor & Lyttleton areas. Pers. comm. to S. Blaney. 4 recs, 4 recs.
3	Sabine, M. 2016. NB DNR staff incidental Black Ash observations. New Brunswick Department of Natural Resources.
3	Sollows, M.C,. 2009. NBM Science Collections databases: Coccinellid & Cerambycid Beetles. New Brunswick Museum, Saint John NB, download Feb. 2009, 569 recs.
3	Spicer, C.D. 2004. Specimens from CWS Herbarium, Mount Allison Herbarium Database. Mount Allison University, 5939 recs.
3	Spicer, C.D., Popma, T.M. 2003. UPM Kymmene site survey 2003
3	Vladimir King Trajkovic. 2018. Brook Floater (Alasmidonta varicosa) records from MREAC surveys 2010-2017. Miramichi River Environmental Assessment Committee.
2	Anon. Dataset of butterfly records for the Maritime provinces. Museum of Comparative Zoology, Harvard University. 2017.
2	Basquill, S.P. 2003. Fieldwork 2003. Atlantic Canada Conservation Data Centre, Sackville NB, 69 recs.
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2	Donelle, R. 2007. Bouctouche Dune Rare Coastal Plant Data. Irving Eco-centre, la Dune du Bouctouche, 2 recs.
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2	Gagnon, J. 2003. Prince Edward Island plant records. Societe de la faune et des parcs Quebec, 13 recs.
2	Godbout, V. 2000. Recherche de l'Aster du St-Laurent (Aster laurentianus) et du Satyre des Maritimes (Coenonympha nepisiquit) au Parc national Kouchibouguac et a Dune du Bouctouche, N-B. Irving Eco-centre, 23 pp.
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2	Richardson, D., Anderson, F., Cameron, R, Pepper, C., Clayden, S. 2015. Field Work Report on the Wrinkled Shingle lichen (Pannaria lurida). COSEWIC.
2	Speers, L. 2001. Butterflies of Canada database. Agriculture & Agri-Food Canada, Biological Resources Program, Ottawa, 190 recs.
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1	Belliveau, A.G. E.C. Smith Herbarium Specimen Database 2019. E.C. Smith Herbarium, Acadia University. 2019.
1	Blaney, C.S. 2019. Atlantic Canada Conservation Data Centre Fieldwork 2019. Atlantic Canada Conservation Data Centre.
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1	Boyne, A.W. 2001. Portage Island National Wildlife Area inspection visit. Canadian Wildlife Service, Sackville, 1 rec.
1	Bredin, K.A. 2002. NB Freshwater Mussel Fieldwork. Atlantic Canada Conservation Data Centere, 30 recs.
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1	Clayden, S.R. 2012. NBM Science Collections databases: vascular plants. New Brunswick Museum, Saint John NB, 57 recs.
1	Collins, H. 2014. Email to John Klymko regarding CHELserp record from Miramichi watershed. Miramichi River Environmental Assessment Committee, 1 record.
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1	DeMerchant, A. 2019. Bank Swallow colony observation. NB Department of Energy and Resource Development, Pers. comm. to J.L. Churchill.
1	Desilets-Starrak, J. 2015. Wood Turtle record. Pers. comm. to E. Tremblay, Parks Canada.
1	Doucet, D.A. 2007. Fieldwork 2007: Insects (minus Odonata). ACCDC Staff, 1 rec.
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1	Godbout, V. 2001. Recherche de l'Aster du St-Laurent (Symphyotrichum laurentianum) dans les marais sales du sud-est du Nouveau-Brunswick. Irving Eco-centre, la Dune du Bouctouche, 23 pp.
1	Goltz, J.P. 2007. Field Notes: Listera australis at Kouchibouguac National Park. , 7 recs.
1	Harding, R.W. 2008. Harding Personal Insect Collection 1999-2007. R.W. Harding, 309 recs.
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APPENDIX

H

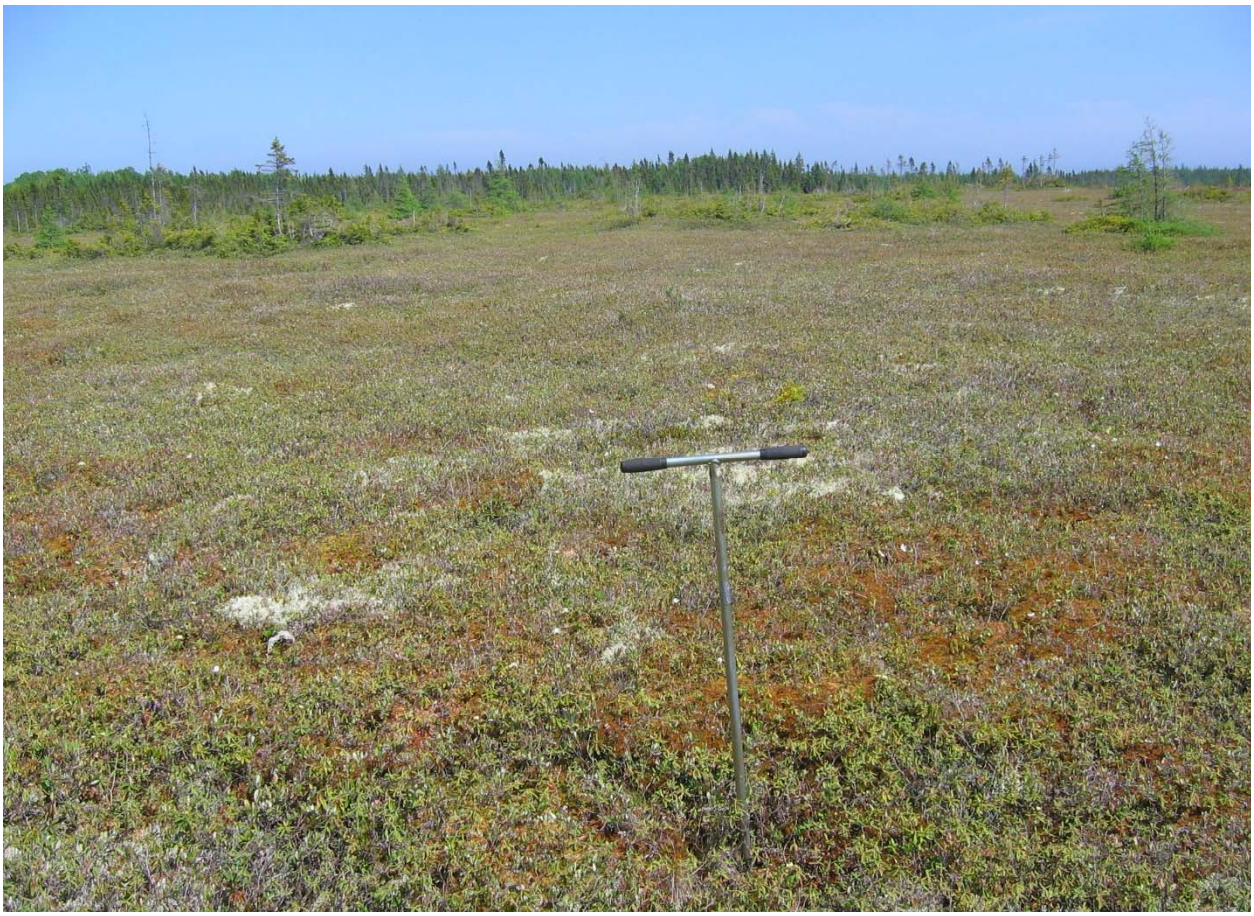
REVISED ENVIRONMENTAL PROTECTION PLAN

SUN GRO HORTICULTURE CANADA LTD.
PROJET N^{O}: 221-05720-00

PEATLAND 343 DEVELOPMENT PROJECT

REVISED ENVIRONMENTAL PROTECTION PLAN

DECEMBER 2022



PEATLAND 343 DEVELOPMENT PROJECT

REVISED ENVIRONMENTAL PROTECTION PLAN

SUN GRO HORTICULTURE CANADA LTD.

PROJECT NO.: 221-05720-00
DATE: DECEMBER 2022

WSP CANADA INC.
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PREPARED BY

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REVIEWED BY

2022-12-09

François Quinty, M.Sc. Project Director

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The conclusions presented in this report are based on work performed by trained, professional and technical staff, in accordance with their reasonable interpretation of current and accepted engineering and scientific practices at the time the work was performed.

The content and opinions contained in the present report are based on the observations and/or information available to WSP at the time of preparation, using investigation techniques and engineering analysis methods consistent with those ordinarily exercised by WSP and other engineering/scientific practitioners working under similar conditions, and subject to the same time, financial and physical constraints applicable to this project.

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CLIENT

SUN GRO HORTICULTURE CANADA LTD.

Natural Resource Coordinator – Eastern Canada	Stephane Doiron

PRODUCTION TEAM

WSP CANADA INC. (WSP)

Reviewer	Pascal Guérin, M.Sc. Biologist
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Editing	Cathia Gamache

Reference to be cited:

WSP. 2022. *PEATLAND 343 DEVELOPMENT PROJECT. REVISED ENVIRONMENTAL PROTECTION PLAN*. REPORT PRODUCED FOR SUN GRO HORTICULTURE CANADA LTD. 25 PAGES AND APPENDICES.

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APPENDICES

1 INTRODUCTION

This Environmental Protection Plan (EPP) was originally prepared by SNC-Lavalin Environment Inc. for FPM Peat Moss Ltd. (FPM) as part of the Environmental Impact Assessment (EIA) submitted in 2011 for the development of Peatland No. 343. The EPP was prepared in accordance with Appendix 3 of the "Additional Information Requirements for Peat Development Projects," which is a supplement to the Registration Guide for submission of registration documents pursuant to Section 5 (2) of the *Environmental Impact Assessment Regulation* (N.B. Reg. 87-83). In 2013, Sun Gro Horticulture Canada (herein after "Sun Gro") bought FPM Peatland No. 343 operations including Peatland No. 343. This document is a revised version of the EPP that includes change required during a review of an updated version of the EIA conducted in 2022.

The EPP includes Contingency Plans for use by managerial personnel who have decision-making responsibility related to the environment (production manager, site engineer, environmental inspectors / monitors, environmental emergency response team). The Plan provides guidance and protocol for fuel spills and fire events.

2 CONSTRUCTION ACTIVITIES

2.1 CONSTRUCTION SCHEDULE AND SEQUENCING OF CONSTRUCTION ACTIVITIES

The following is a summary of the originally planned construction activities and it has not been updated. As of 2022, an area of 29 ha was in operation and an area of 24.5 ha was being prepared for peat harvesting.

DEVELOPMENT PHASE

- Access Road Clearing and Grubbing winter 2011
- Access Road Construction winter 2011
- Office, Garage, Warehouse Construction anytime

OPERATION PHASE

- Ditch Construction winter and spring 2011
- Vegetation Clearing (if necessary) winter and spring 2011
- Bog Road Construction winter and spring 2011
- Peat Field Profiling winter and spring 2011
- Harvesting (conditions permitting) summer 2011

Environment Canada recommends avoiding vegetation clearing and other construction activities between mid-April and August 31st to avoid the critical breeding period for numerous bird species. FPM will schedule major construction activities involving vegetation clearing to avoid these periods.

It is worthwhile to note that peatland 343 does not include waterfowl habitat. Moreover, Fisheries and Oceans Canada did not issue a directive to conduct electrofishing studies within the development area. Electrofishing was performed on the Oyster River and Whites Brook and their tributaries.

Clearing, grubbing, and excavation for construction of the access road and service compound will be conducted between September and mid-April.

Construction of the office and garage buildings within the service compound may take place anytime once the access road is constructed; however, building construction is not expected to result in negative impacts on wildlife.

Peat field development will be performed between September and mid-April. Vegetation clearing and ditching will typically be performed during the month of March.

2.2 EROSION CONTROL AND SURFACE WATER MANAGEMENT STRATEGY

2.2.1 GENERAL MEASURES

Industry-standard best management practices and standard operating procedures for erosion control will be applied during construction activities, including ditching, grubbing, access road construction, culvert installation, and building construction.

Watercourses will be monitored visually to ensure that peat is not entering the watercourses.

Sun Gro will apply generic erosion and sedimentation control measures included in the *Guidelines for Roads and Watercourse Crossings* (New Brunswick Natural Resources, 2004) where appropriate, at the discretion of the Environment Coordinator and Site Engineer.

No smoking will be allowed in peat bog fields.

2.2.2 SCHEDULING TO AVOID SEASONAL CONSTRAINTS

Sun Gro will schedule construction activities to avoid seasonal constraints such as periods of heavy precipitation where possible. Snowmelt / spring freshet runoff is presumed to occur from late March through late April. Sun Gro will avoid as much as possible planning construction activities during this period. The maximum extreme daily rain/snowfall at Miramichi was recorded in January; the lowest extreme daily rain/snowfalls were recorded in February, August, October, and November. Sun Gro will plan annual construction activities (particularly ditching) for the February-mid-April period if possible. Initial clearing, grubbing, excavation and road construction are planned for winter.

2.2.3 TEMPORARY SURFACE WATER DRAINAGE

Installation of diversion ditches, diversion berms, or similar measures will be included in the construction specifications to ensure that surface water is diverted around areas where grubbing and excavation activities are taking place.

2.2.4 PERIMETER CONTROL STRUCTURES

There is little topographic variation within the project study area. For this reason, it is not possible to provide site plans that identify the locations where silt fences will be installed in advance. The construction specifications will include a requirement for installation of silt fencing on the downgradient side of active work zones that are likely to generate silt, or where soil will be exposed, at the discretion of the Environment Coordinator or Site Engineer. Proper installation methods will be included in the construction specifications and will be inspected by the Environment Coordinator.

One set of four sedimentation ponds was planned and it was constructed prior to ditching to receive runoff water during main and secondary ditch construction.

Water bars or French drains may be installed across access roads to prevent rill and gully formation on slopes, where required.

2.2.5 BUFFER ZONES

A 50-m buffer zone of undisturbed peat will surround the harvesting area as a matter of sound environmental planning practice. No resources at risk that require protection by a buffer zone were identified.

2.2.6 SOIL STABILIZATION

Grubbing waste (rootstocks) and cut vegetation will be chipped and spread on road surfaces and open areas as soon as possible to limit soil exposure.

2.2.7 MAINTENANCE OF SEDIMENT CONTROL STRUCTURES

All sedimentation protection measures will be inspected during and following heavy rainfall events, and at least daily during periods of prolonged rainfall. Any deterioration due to major storm events will be rectified as soon as possible to the satisfaction of the Production Manager.

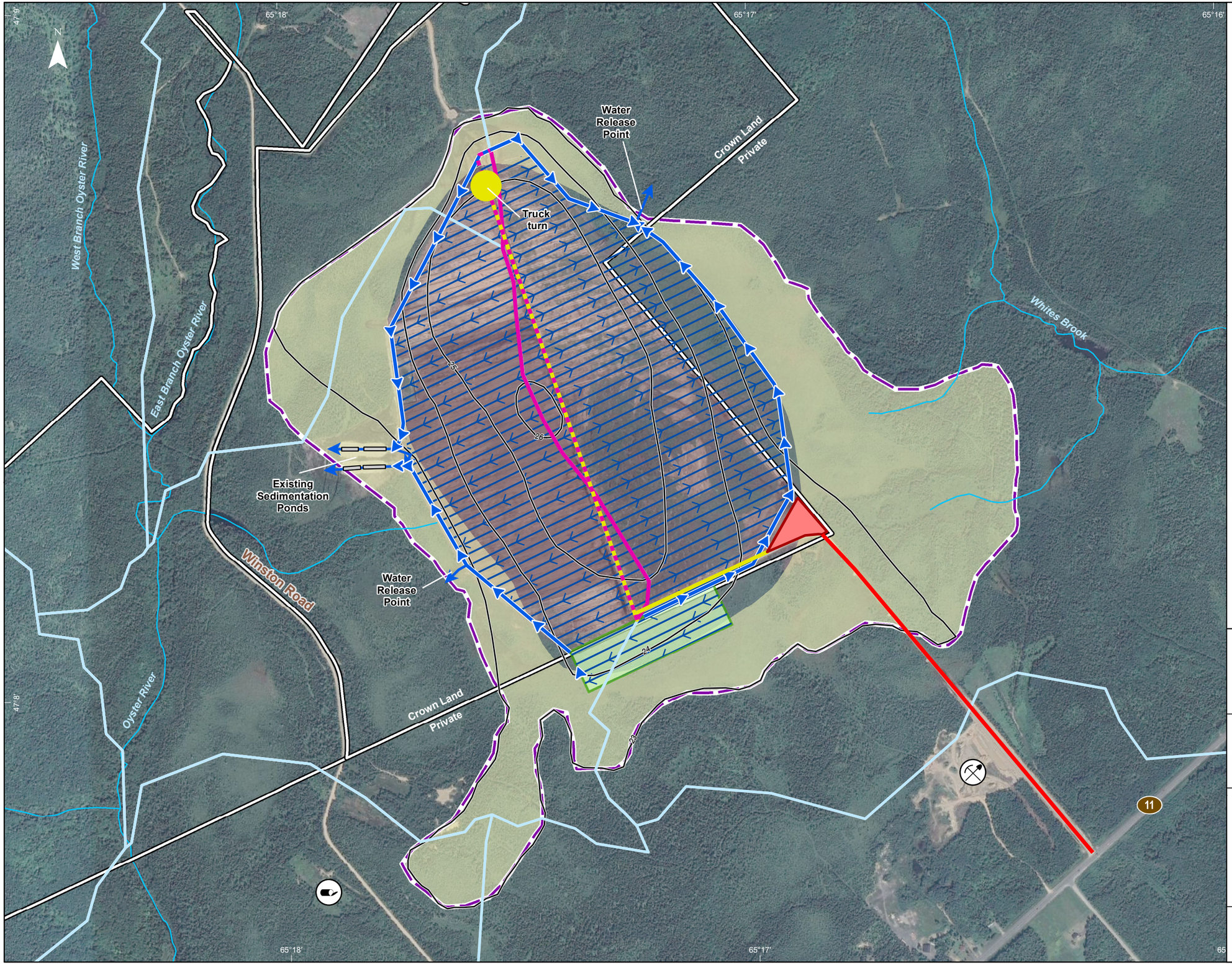
Sediment retained in ditches will be excavated as required and will be added to the excavated peat and spread over the peat fields at closure.

2.2.8 WATER QUALITY

Appendix 3 of the "Additional Information Requirements for Peat Development Projects" specifies that on-site water be diverted through a sedimentation pond and sampled for suspended solids prior to discharge. Water samples will be collected, and corrective actions taken to ensure that suspended solids concentrations in the effluent do not exceed 25 mg/L.

2.3 CLEARING AND GRUBBING

Residual material from clearing and grubbing, as well as from peat screening operations, will be used as fill for road construction or maintenance within the site. No burning is anticipated.



Project Layout

- Perimeter of Local Peatlands (Department of Natural Resources NB, 1977)
- Peat Thickness between 0 and 1 m (Department of Natural Resources NB, 1977)
- Elevation Contour (Department of Natural Resources NB, 1977)
- Harvest Area (Added 2022) 427 x 120 m (5,1 ha)
- Service Area
- Sand Pit
- Landfill (Closed)

Watersheds

- Modified Watershed Divide within Peatland
- Interpretated Watershed Divide
- Watershed Divide

Drainage

- Main Ditch
- Secondary Ditch
- Expected Overland Flow Direction
- Sedimentation Pond

Roads

- Bog Road
- Access Road

Basemap

- Watercourse
- Provincial Crown Land

sungro HORTICULTURE

Sun Gro Horticulture Ltd. Peatland No. 343
Revised Environmental Protection Plan

Map 1
Infrastructure

Sources:
Basemap: SNB GeoNB, Data Extraction on December 7, 2020 ;
Imagery, Google Earth 2021
CanVec, 1:50 000, NRCan, 2008
Peatlands Contour: Department of Natural Resources NB, 1977
Watershed: Atlantic Data Warehouse, 2010

0 100 200 300 m

Projection: N-B Stereographic, NAD83 SCRS

December 2022

Designed by: F. Quinty
Drawn by: É. Rémillard
Checked by: F. Quinty
221_05720_00_EIA_c1_infra_221208.mxd

wsp

Project no: 221-05720-00

The accuracy of the boundaries and measurements shown on this document are not intended to be used for engineering or land delineation purposes. No land analysis has been performed by a land surveyor.

2.3.1 WATERCOURSE PROTECTION

In addition to the standard erosion control and stabilization measures (Section 2.2), the following measures shall apply within 30 m of any watercourse:

- No waste or debris will be allowed to enter any watercourse.
- Hazardous materials shall not be stored within 30 m of a watercourse or other sensitive area.
- With the exception of vehicle or machinery fuel tanks or vehicles transporting petroleum products, liquid petroleum products are prohibited within 10 m of any watercourse or water body (pond, drainage channel, stream, river).
- Any fixed or mobile storage tank, or shelter designed to contain quantities of petroleum exceeding 50 L, must not be located within 30 m of any seasonal or permanent watercourse or water body (pond, lake, stream, river).
- It is prohibited to fill the fuel tank of a vehicle, construction equipment or power tools within 25 m of any seasonal or permanent watercourse or water body.

2.3.2 EXISTING DRAINAGE PATTERNS

Culverts will be installed where appropriate to ensure that existing channelized flow is conveyed beneath the access road. Locations where diffuse runoff is likely to concentrate will be identified during construction, and culverts will be installed in these locations. While localized changes may occur in runoff paths that cross the road alignment, the overall surface drainage pattern of the areas on either side of the alignment is expected to remain unaltered.

2.4 STOCKPILING OF PEAT

Peat will be stockpiled along bog roads in rows that will measure approximately 15 m in width and 4 m in height and that should exceed 120 m in length.

Sun Gro intends to cover peat stockpiles with plastic as a stabilization measure to prevent dust generation.

2.4.1 APPLICABLE LOCAL, PROVINCIAL AND FEDERAL REQUIREMENTS

Sun Gro obtained an approval from New Brunswick Environment for the petroleum storage system, as required under the New Brunswick Petroleum Product Handling and Storage Regulation for tanks with a capacity of 2000 L or more. The site application is renewed annually.

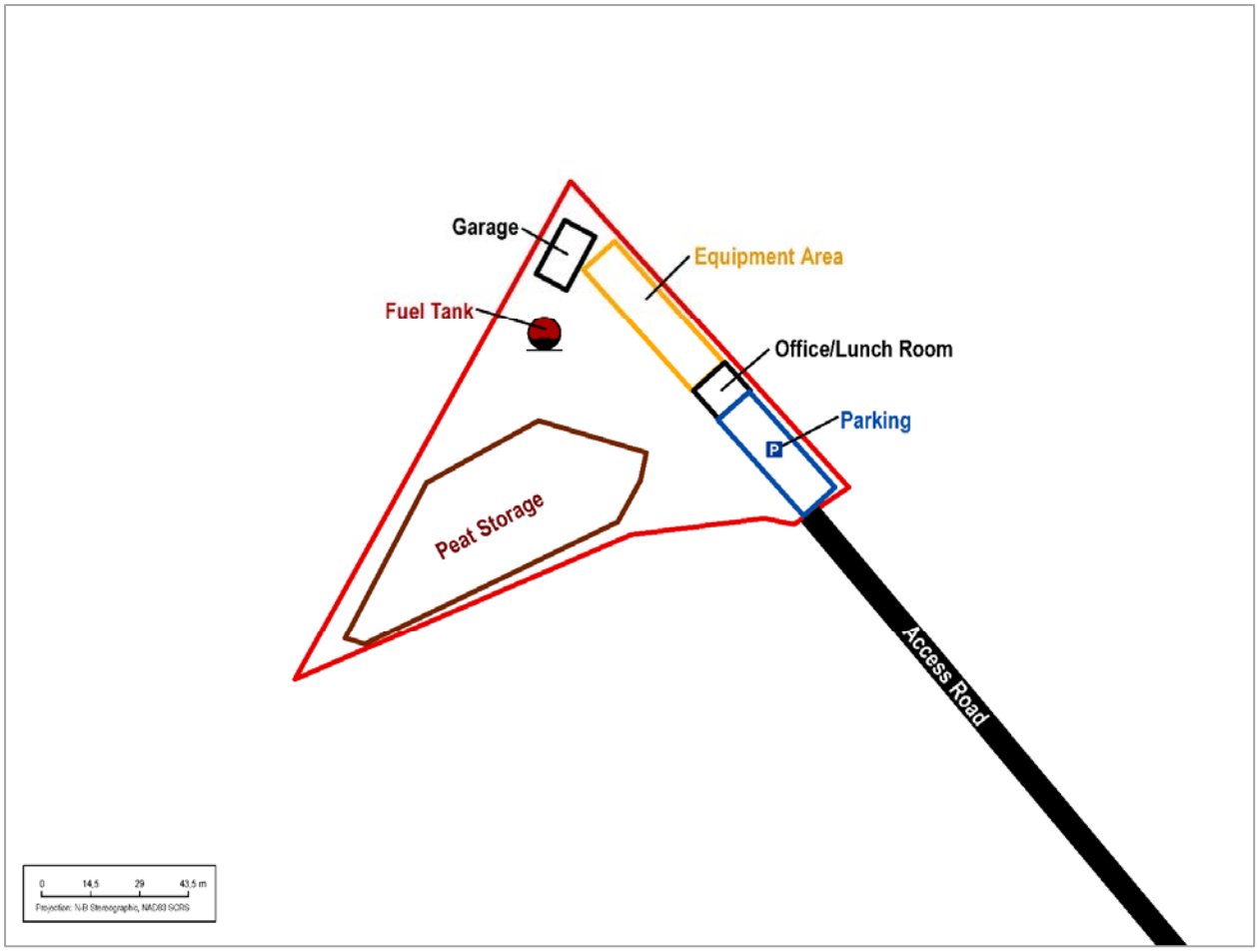


Figure 1 **Service Area Layout**

Sun Gro will follow the New Brunswick "Construction Standards for Installation and Removal of Petroleum Storage Systems" for installation of petroleum storage tanks. All work related to the installation will be supervised by a licensed petroleum tank installer. The tank(s) installed will be manufactured and installed in accordance with applicable CSA/ULC standards. Waste oil collection systems and storage systems for lubricants and other products used in vehicle and equipment maintenance will likewise adhere to CSA/ULC standards where applicable.

STATUTES AND REGULATIONS

Federal Statutes:

- Transportation of Dangerous Goods Act, 1992 (1992, c. 34)

New Brunswick Statutes:

- Clean Environment Act (S.N.B., chap. C-6)
- Clean Air Act (S.N.B., chap. C-5.2)
- Transportation of Dangerous Goods Act (S.N.B.. chap. T-11.01)

New Brunswick Regulations:

- Petroleum Product Storage and Handling Regulation - Clean Environment Act (NB Reg. 87-97, O.C. 87-646)
- Used Oil Regulation - Clean Environment Act (N.B. Reg. 2002-19, O.C. 2002-95)
- Designated Materials Regulation - Clean Environment Act (N.B. Reg. 2008-54, O.C. 2008-180)
- Air Quality Regulation - Clean Air Act (N.B. Reg. 97-133, O.C. 97-923)
- Specific provisions regarding sulfur content of fuel, maximum permissible ground level concentrations, prohibitions respecting volatile compounds, and prohibitions respecting gasoline

CSA/ULC standards for tanks:

- Aboveground Tanks, ULC-S601, -S630, ULC/ORD-C142.18, ULC-S653
- Overfill Protection Devices, ULC/ORD-C58.15
- Leak Detection Equipment, ULC/ORD-C107.12, C58.12, C58.14
- Shop Fabricated Steel Aboveground Horizontal Tanks for Flammable and Combustible Liquids, ULC-S601
- Aboveground Steel Tanks for Fuel Oil and Lubricating Oil, CAN/ULC S-602-M
- Shop Fabricated Steel Aboveground Vertical Tanks for Flammable and Combustible Liquids, CAN/ULC-S630
- Shop Fabricated Steel Aboveground Utility Tanks for Flammable and Combustible Liquids, CAN/ULC-S643-M
- Aboveground Steel Contained Tank Assembles for Flammable and Combustible Liquids, ULC-S653
- Protected Aboveground Tank Assemblies for Flammable and Combustible Liquids, ULC-S655
- Contained Steel Vertical Aboveground Tank Assemblies for Flammable and Combustible Liquids, ULC/ORD-C142.22

CSA/ULC Standards for Waste Oil Collection Systems and Storage Systems for Lubricants and Other Products:

- Aboveground Waste Oil Tanks, ULC/ORD-C142.23
- Tanks for Used Oil, ULC-S652
- Tank Assemblies for Collection of Used Oil, ULC-652
- Storage Cabinets for Flammable Liquid Containers, ULC/ORD-C1275
- Bulk Containers, Nonmetallic, for Combustible and Non-combustible Liquids {containers-Tanks}, ULC/ORD-C142.14

Other:

- National Fire Code
- Canadian Sphagnum Peat Moss Association Basic Firefighting Guidelines
- NB DNR Fire Equipment Requirement on Peat Bog Operations
- Municipal zoning requirements (counties of Kent and Northumberland)
- Municipal building permit requirements (counties of Kent and Northumberland)

2.4.2 STANDARD OPERATING PROCEDURES FOR PETROLEUM STORAGE AND HANDLING

With the exception of vehicle or machinery fuel tanks or vehicles transporting petroleum products, liquid petroleum products shall be prohibited within 10 m of any watercourse or water body (pond, drainage channel, stream, river).

Multiple containers placed together totaling more than 50 L shall be considered as exceeding 50 L (see directives below).

Any container that contains petroleum or petroleum reside must be equipped with a leak-proof cover or cap. The container must be sealed at all times when not in use. This measure shall also apply to empty containers, and containers to be disposed of in leak-proof waste or recycling bins.

QUANTITIES OF 50 L OR LESS

Quantities of 50 L or less of petroleum must be kept in a dedicated petroleum storage container.

Containers must not be placed directly on exposed soil or other natural surfaces. Containers must be placed on a flat surface covered by a tarp or other impermeable material.

Containers should be placed at the edges of work areas, or out of the way of vehicles or machinery.

Containers must be stored overnight in a locked vehicle or shelter.

Personnel responsible for petroleum must have a spill kit available in the area (within 10 minutes or less).

Empty disposable or recyclable containers must be collected and placed in a large leak-proof container. These wastes must be removed from the site within a reasonable time period.

QUANTITIES GREATER THAN 50 L

Any fixed or mobile storage tank, or shelter designed to contain quantities of petroleum exceeding 50 L, must not be located within 30 m of any seasonal or permanent watercourse or water body (pond, lake, stream, river).

Drums with a capacity of 205 L must be placed on a pallet on a level surface covered by a tarp or other impermeable material.

Any shelter for petroleum storage must be equipped with an impermeable floor covering.

Quantities of hydrocarbons greater than 205 L must be stored in a fixed or mobile tank rather than a drum.

Containers must not be placed directly on exposed soil or other natural surfaces. Containers must be placed on a flat surface covered by a tarp or other impermeable material.

Containers should be placed at the edges of work areas, or out of the way of vehicles or machinery.

Containers (including drums) must be stored overnight in a locked vehicle or shelter.

Personnel responsible for petroleum must have a spill kit available in the area (within 10 minutes or less).

2.4.3 STANDARD OPERATING PROCEDURES FOR VEHICLE AND EQUIPMENT FUELLING

It is prohibited to fill the fuel tank of a vehicle, construction equipment or power tools within 25 m of any seasonal or permanent watercourse or water body (pond, lake, stream, river).

A tarp or other impermeable material at least 2 m x 2 m in size must be placed on the ground beneath any tank opening (including vehicle fuel tanks) or container when transferring petroleum by pumping or pouring.

Personnel responsible for petroleum must have a spill kit available in the area (within 10 minutes or less).

2.4.4 STANDARD OPERATING PROCEDURES FOR DISPOSAL OF FILTERS, ABSORBENT MATERIALS, AND OTHER MATERIALS IN CONTACT WITH HYDROCARBONS

Any material that has come in contact with petroleum, including filters, absorbent materials, rags and paper towels, must be placed in a waste can or bin intended solely for this purpose, and not in a regular garbage container. The waste bin for petroleum-contaminated materials must be lined with a clear plastic bag at least 6 µm in thickness, which must be sealed to render it leak-proof when the waste is collected.

3 CONTINGENCY PLANS

3.1 EMERGENCY TELEPHONE NUMBERS

Sun Gro Horticulture Canada

Zoel Gautreau
Director of Eastern Canadian Operations
P 506-336-9715
F 506-336-9300
Email: zoel.gautreau@sungro.com

Stéphane Doiron
Production Manager
P 506-336-9715
F 506-336-9300
Email: steff.doiron@sungro.com

9-1-1:

For all human health and safety emergencies. May also serve as coordinator for other agencies required to respond to environmental emergencies.

RCMP:

General Emergency: 9-1-1
Neguac Detachment: 506-776-3000

Local Police: none present in the municipalities involved

Fire Services: Dial 9-1-1 (calls dispatched to local fire departments)

New Brunswick "One Window" Environmental Emergency number (federal / provincial emergency coordination centre): 800-565-1633

CANUTEC (Transport Canada Emergency Centre): 613-996-6666 or *666 (cellular)

Free 24-hour information service for questions related to chemical emergencies. Advance registration required. Collect calls accepted.

CHEMTREC (Chemical Product Transport Emergency Centre) (800) 262-8200

Subscription fee-based 24-hour information service for questions related to chemical transportation emergencies. Advance registration required.

3.2 FUEL SPILL OR LEAK PROTOCOL

Sun Gro will adhere to Standard Operating Procedures for fuel storage and handling. If a spill or leak occurs, the fuel spill or leak protocol must be applied as soon as the spill is detected. **This protocol is applicable to both petroleum and other forms of contaminants.**

The spill or leak protocol should be available in a location readily accessible to workers on site. The **Production Manager** is responsible for applying the site cleanup and rehabilitation measures included in this protocol.

The **priorities for protection** (in order of decreasing importance) are:

- Assure human health and safety
- Reduce soil and water pollution risk
- Minimize the surface extent of the effect
- Minimize wildlife disturbance
- Minimize inconvenience to nearby operations during the cleanup.

The main steps of the response plan include:

- Evaluate safety risks
- Control the leak
- Trigger the alert chain of command
- Check the extent of the spill
- Evaluate possible impacts and select a cleanup approach
- Contain the contaminant
- Remove the contaminant
- Manage contaminated waste and materials according to applicable environmental and safety standards
- Complete an incident report

Response Plan

In the event of a spill, the site supervisor will take immediate action to contain and absorb the material. A complete Spill Kit is to be kept on site at all times. The Production Manager will maintain a listing of Emergency contact telephone numbers prominently displayed on a poster at the site.

3.2.1 EVALUATE SAFETY RISKS

Anyone who becomes aware of a spill or leak must first evaluate the risk of explosion or fire due to volatile vapors, or other risks to human safety. If these risks are present, the only action is to evacuate the area and trigger the alert chain of command.

3.2.2 CONTROL THE SPILL

Anyone who becomes aware of a spill or leak should try to stop and confine it immediately, if doing so does not pose a safety risk.

3.2.3 TRIGGER THE ALERT CHAIN OF COMMAND

The Production Manager must be informed of any spill or leak immediately.

The Production Manager will inform the regulatory agencies that have responsibility for spills in accordance with applicable regulations. The “one window” environmental emergency coordinating center 800-565-1633 should be contacted for emergencies that are identified as being beyond the capabilities of the environmental emergency response team (EERT).

The Production Manager will assemble the EERT. He or she will choose the Site Incident Commander from among the individuals available onsite to deal with the spill or leak.

Minor drips and pills which can be easily contained and cleaned up with no potential to cause environmental damage do not need to be reported but should be recorded. Any spills over 1 L should be reported without delay.

3.2.4 CHECK THE EXTENT OF THE SPILL

The extent of the spill needs to be assessed and delineated by survey stakes, paint or other means, and notes taken for inclusion in the incident report.

3.2.5 EVALUATE POSSIBLE IMPACTS AND SELECT A CLEANUP APPROACH

This step involves evaluating the possible impacts of various cleanup options and selecting an approach to be followed for the remainder of the cleanup.

3.2.6 CONTAIN THE CONTAMINANT

The company has the authority to undertake necessary actions without delay. The goal is to prevent the spread of contamination beyond the initially impacted area. A rapid response will reduce the depth of affected soil.

Containment berms or booms should be placed at the boundaries of the contaminated zone to prevent the contamination from spreading.

Dikes, sump holes, temporary ditches or absorbent materials or booms will be used to control the leak as required.

3.2.7 REMOVE THE CONTAMINANT

Using the spill kit, apply absorbent materials, remove contaminated soil and dispose of it in empty drums.

3.2.8 MANAGE CONTAMINATED WASTE AND MATERIALS ACCORDING TO APPLICABLE ENVIRONMENTAL AND SAFETY STANDARDS

Small quantities of contaminated soils should be placed on a tarp. For larger quantities, the soils should be stockpiled on a stable surface at least 15 m from a watercourse for subsequent removal.

Other contaminated materials should be recovered and managed according to applicable regulations.

3.2.9 SUBMIT AN INCIDENT REPORT

An incident report sheet should be completed by the Production Manager and submitted to the General Manager the day of the incident.

The General Manager will submit an incident report (if required) to New Brunswick Environment. Contents and timeframe for submission shall be in accordance with applicable regulations.

The report will include:

- a description of the source, including the name of the operating company;
- the nature, extent, duration and environmental impact of the release;
- the cause or suspected cause of the release.

The General Manager will also evaluate the risk of recurrence of a similar incident and change standard operating procedures as required to minimize the risk of future incidents of the same type.

3.3 FIREFIGHTING PROCEDURES

Firefighting equipment requirements are listed in Section 3.4.2. The firefighting equipment should be available at all times, and should be centrally located. Use of this equipment for other than firefighting is not permitted.

Maintain communications with foreman, loader tractor and office at all times.

Peat dust, especially when inside a building, is generally very dry and therefore does not absorb water.

A strong water flow only spreads the burning peat. The strong water flow accelerates the fire by bringing extra oxygen to the fire;

The strong water flow could also increase the risk of a peat dust explosion.

The water should feature as small droplets as possible, with reduced pressure.

Use substances that reduce the surface tension of the water for fire extinguishment. Surfactants (e.g. wetting agents) can reduce the surface tension of water by a factor of 3 or more.

3.3.1 PEAT BOG FIRE

Ask for immediate assistance in order to get sufficient staff to fight the fire.

Use all the people available, with pails, shovels, extinguishers, hoses, etc.

Immediately have all equipment brought to the fire scene, such as water wagons, tooth harrows, loaders, shovels, pails, etc.

Always have your back to the wind to fight the fire.

Get water onto the fire as soon as possible.

Dig deeply using the tooth harrow, bring wet peat to the surface around the fire. If the ground is dry and wet peat is deep, use profiler to bring wet peat to the surface.

Make sure the extinguishers and hoses are used properly not to disperse the flying embers. Adjust the spray so to obtain a fine mist instead of a more powerful spray.

Use water to soak the surface around the fire to avoid spreading the fire.

Bring in the loader to carefully deposit wet peat on the fire.

3.3.2 PEAT PILE FIRE

Note: Peat piles are found (a) in the bog, (b) in the production plant yard and (c) inside buildings. The following procedures, calling for "bringing wet peat to the surface and using it to prevent the spread of fire as well as to assist in extinguishing the fire" are only applicable to fires in the bog.

Make sure that no one opens the burning pile.

Ask for immediate assistance in order to get sufficient staff to fight the fire.

Use all the people available, with pails, shovels, extinguishers, hoses, rakes, etc.

Immediately have all equipment brought to the fire scene, such as water wagons, tooth harrows, loaders, shovels, pails, etc.

Always have your back to the wind to fight the fire.

Get water onto the fire as soon as possible.

Dig deeply using the tooth harrow, bring wet peat to the surface around the fire. If the ground is dry and wet peat is deep, use profiler to bring wet peat to the surface.

Make sure the extinguishers and hoses are used properly not to disperse the flying embers. Adjust the spray so to obtain a fine mist instead of a more powerful spray.

Use water to soak the surface around the fire to avoid spreading the fire.

Slowly rake the peat in order to completely soak the pile.

On a calm and rainy day, use the loader to spread the pile while other members mist water on it.

On any other day, bring in the loader downwind to carefully deposit wet peat on the pile while other team members mist water on it.

Use the loader carefully, in order not to allow air entries into the pile.

Small embers and sparks are extinguished by picking up small quantities with the leather gloves on, then rubbing the hands together until the embers / sparks are extinguished.

3.4 EQUIPMENT

The Production Manager shall provide an updated list of materiel available and its location to the General Manager at the start of each week. The Production Manager is responsible for ensuring that the items and quantities listed below are available at all times. During the operational phase, a designated storage location of the materiel should be added to this section of the EPP.

3.4.1 SPILL KIT

The spill kit must be available on each active worksite, as well as all storage locations for fuels, lubricants, or bulk liquid products.

The spill kit includes:

- A 45-gallon drum with a lid for storing the spill kit components (below), as well as for disposal of contaminated materials following a spill.
- 100 quilted absorbent sheets (17" x 19" x 3/8").
- Two 2-cubic-foot bags of peat fiber treated to absorb petroleum products.
- 20 absorbent booms (3" x 48").
- Bags of liquid absorbent granules (Sorb-All brand or equivalent).
- Bags of vermiculite.
- 1 plastic basin for catching spills.
- 2 m x 2 m tarpaulin (non-woven, 6 µm polyethylene vapor barrier).
- Rolls of paper towels.
- A shovel, trowels, and mini-tool kit.
- Personal protective equipment (safety goggles, respirators, masks, nitrile gloves).

3.4.2 FIREFIGHTING EQUIPMENT

The firefighting equipment should be available at all times and should be centrally located. Use of this equipment for other than firefighting is not permitted.

- Water tank truck equipped with hoses (for dust control and firefighting).
- Multiple ABC and BC type fire extinguishers (min. 10 pound; number required varies with size of site).
- Hoses (minimum 500 feet of 1½ inch hose).
- Shovels (10).
- Rakes (10).
- Pails (20).

- Water filled back-packs, with pumps (7).
- Leather gloves (10 pairs).
- Minimum, one (1) 500 gallons mobile tank, or two (2) 250 gallons mobile tanks with a pump for each unit having a minimum pressure of 50 pounds per square inch (psi).
- A kit containing one (1) of each: Spark plug for the pump, wrench, screwdriver, vise grip, pliers.
- Any communication equipment (radio or other) required to maintain communications between foreman, loader tractor and office.

3.4.3 MECHANICAL EQUIPMENT

- Gasoline or diesel-powered water pumps
- 4 x 4 pickup trucks
- Tracked excavator
- Tractors

3.4.4 EROSION CONTROL MEASURES

- Burlap sand bags
- Straw bales (covered / protected from the elements)

3.4.5 CONSTRUCTION MATERIALS

The following materials intended for environmental emergency response should be stockpiled separately from other construction materials.

- Steel posts (T-section)
- Plastic snow fencing (in rolls)
- Survey stakes
- Empty drums

3.4.6 TOOLS AND HARDWARE

- Shovels
- Rakes
- Sledgehammer
- Buckets
- Tarps

— Roll of plastic vapor barrier (6 µm polyethylene sheeting)

— Baling wire

— Wire cutters

3.5 MITIGATION MEASURES FOR WILDLIFE

Several animal species including birds, mammals and herpetofauna at peatland level may be impacted by the Peatland 343 development project. Therefore, several mitigation measures will be applied during this project.

3.5.1 AVIAN WILDLIFE

A wide variety of birds were surveyed in Peatland 343 and its surrounding area. According to the "Maritime Breeding Bird Atlas" (2010), there are at least 62 bird species present within a 10 km radius of the study site. Among those species, 12 are considered as Species at Risk (SAR).

The main potential impacts of the project on avian wildlife are the following:

— Potential disruption during bird breeding season

— Habitat temporary removal and fragmentation

— Noise from construction and operation activities

— Accidental spill.

To prevent and minimize these impacts, several mitigation measures will be applied:

— Vegetation clearing will be completed before or after the typical bird-breeding season for New Brunswick (mid-April to August 31st) to ensure that the avian wildlife will not be disturbed during breeding season.

— If vegetation clearing must still be conducted during the bird-breeding season, a bird expert will need to complete a full and detailed bird survey of the project site to locate potential nests. These nests and a buffer area around them will delineated with visual indicators such as t-posts or flags. These areas will be left untouched during the bird-breeding season (mid-April to August 31st) if SAR species are present. Otherwise, operations will be limited until the nesting birds have fledged or vacated. Considering the study site is mainly an open bog, few trees are present and nest presence potential is expected to be limited.

— Once the operation phase of the project is completed (peat harvesting), the peatland will be restored using the moss layer transfer technique (MLTT) or any method in use at time of restoration. Thus, loss of habitat for avian wildlife will be temporary.

— All unnecessary clearing will be prevented by clearly delineating the areas to be cleared.

— All equipment used on site will be well maintained to mitigate noise impacts during construction and operation phases.

— During the project, no polluting substance will be emitted in the environment. As such, no mitigation measures will be applied to deter migratory birds from coming into contact with potential polluting substance produced during the project.

- If there is an accidental oil spill, the fuel spill or leak will be cleaned up as fast as possible as described in Section 3.2.
- All food scraps or garbage produced by the workers will be stored in appropriate containers to prevent attraction of predatory species that may also prey on avian wildlife.

3.5.2 TERRESTRIAL WILDLIFE

Although no surveys have in done in the sector near the study site, it is considered that several terrestrial wildlife species can potentially be found in Peatland 343 and the surrounding area. Although open bogs are poor habitats for most mammals, some species such as the American Black Bear (*Ursus americanus*), White-tailed Deer (*Odocoileus virgnianus*) and Red Squirrel (*Tamiasciurus hudsonicus*) are probably using the study area throughout the year. Moreover, considering data from the Canadian Amphibian and Reptile Conservation Network (2010), 15 amphibian species and 8 reptile species are likely to occur in the area.

Several mitigation measures will be taken to limit impact on terrestrial wildlife.

- Workers will not approach or disturb in any way wildlife encountered on the site.
- All garbage or food scraps produced by the workers on site will be stored in containers to avoid attracting wildlife and wildlife encounters.
- If there is an accidental oil spill, the fuel spill or leak will be cleaned up as fast as possible as described in Section 3.2.

REFERENCES

- Canadian Herpetological Society. 2022. On line: https://canadianherpetology.ca/about/index.html (accessed in October 2022).
- Canadian Sphagnum Peat Moss Association, 2010. Basic Firefighting Guidelines.
- Environment and Climate Change Canada, 2020. Guidelines for effective wildlife response plans. Gatineau. 34 pp.
- Maritimes Breeding Bird Atlas, 2010. Maritimes Breeding Bird Atlas Data Summaries - Species list for square 20LT40. On line: http://www.mba-aom.ca/jsp/datasummaries.jsp?lang=en&extent=Sq&summtype=SpList&square=20LT40 (accessed in October 2010).
- New Brunswick Natural Resources, 2004. Guidelines for Road and Watercourse Crossings. Fredericton: Natural Resources, Forest Management Branch. 81 pp.
- New Brunswick Natural Resources, 2006. Fire Equipment Requirement on Peat Bog Operations. Fredericton: Natural Resources.

APPENDIX

1

NEW BRUNSWICK DNR FIRE EQUIPMENT REQUIREMENT ON PEAT BOG OPERATIONS

SUBJECT:

Fire Equipment Requirement on Peat Bog Operations

1.1 Requirement Statement	It is the policy of the Department of Natural Resources to have standard requirements for fire equipment on all Peat Bog Operations.
1.2 Background	The purpose of this document is to provide clarification and uniform application Province wide by all involved.
1.3 Objectives	• Provide a standard department wide approach when dealing with fire equipment requirement on Peat Bog Operations. • To insure any fire starts are kept to a minimum by having the necessary fire equipment on site.
1.4 Definition Chapter F-20 Forest Fires Act.	"forest land" means *(a)* any land lying outside the boundaries of a city or town and not cultivated for agricultural purposes, on which trees, shrubs, grass or other plants are growing, together with roads, other than public highways, *(b)* any blueberry field lying outside the boundary of a city or town, or *(c)* any peat bog lying outside the boundary of a city or town;

2.0 Scope and Application

2.1 Peat Bog Operators

This applies to:

All peat bog operations conducted in New Brunswick.

3.0 Procedure

3.1 Fire Equipment Requirements

- Minimum, one (1) - 500 gallon mobile tank or two (2) -250 gallon mobile tanks with a pump for each unit having a minimum pressure of 50 pounds per square inch (psi).
- Five hundred (500) - feet of 1½ inch hose.
- A kit containing one (1) of each: Spark plug for the pump, wrench, screwdriver, vice grip, pliers.
- One (1) shovel.
- One (1) bucket.
- One (1) -10 pound extinguisher.
- Must have communications with foreman, loader tractor and office.
- All equipment to be centrally located.
- No smoking will be allowed in Peat Bog fields.

4.0 Inquiries

4.1 Inquiries can be directed to:

- Manager of Forest Fire Management Section, Regional Support Services.

APPENDIX

2

CANADIAN SPHAGNUM PEAT MOSS ASSOCIATION BASIC FIREFIGHTING GUIDELINES

Fire Prevention Guidelines

Developed by the members of the

Canadian Sphagnum Peat Moss Association

(CSPMA)

November 2006

Important information for local fire departments:

- **General information**
- **Plant area**
- **Buildings**
- **Bog area**
- **Fire department visits**
- **Other suggestions**

CSPMA Fire Preventive Guidelines

WHAT INFORMATION SHOULD BE PROVIDED TO LOCAL FIRE DEPARTMENTS?

The CSPMA recommends that peat producers plan a visit from their local fire department at least once a year and immediately following any major renovations. The production plant visit could occur anytime during the year but the tour of the bog should take place in the spring. During the tour, the following should be provided to the visiting official:

1. **General**
   - Provide a list of contact people, their phone numbers and a hierarchy of the company so that there is no confusion as to who is in charge. (For the both the fire dept and the peat employees, and keep each other informed of changes to key personnel).
   - Ensure that fire fighters are aware of any unique characteristics of a peat fire. For example,
     - Burning peat will float.
     - High-pressure sprays may worsen the situation. The flow of air that precedes a high-pressure water spray can sometime cause a small peat-dust fire to ignite rapidly; almost like an explosion.
   - Do not perform any unusual housekeeping procedures prior to a fire department visit. Allow them to see your premises as they usually are. It could save you an expensive claim.
   - Ensure that the fire department has keys or access codes to all areas of your property.
   - Ensure that the fire department has easy-to-read instructions (large fonts on laminated paper) that they can carry with them to a fire that include sites maps, floor maps, bog layout, and access codes. (See #2, 3 and 4 below.)
   - Ensure that the emergency call list is POSTED at each telephone in your company.
   - Key employees should carry a short-list of emergency numbers (of others in the company and of the fire and police departments).
   - Ensure that any changes in your plant facility or layout of buildings, yard, etc. are forwarded to fire department in a timely fashion.
   - Ensure that management as well as the day and nighttimes personnel have all the information below on hand. (i.e. fertilizers, fire fighting equipment, etc.).

2. **Plan area**
   - Site map that shows:
     - The plant layout, including access points to the plant or bog site. Make sure it includes where the fences are and where the best access is to each building (include any blocked off areas – either temporary or permanent).
     - The location of any water sources.
     - The location of hazardous or flammable material storage such as gasoline, propane, oxygen, acetylene, plastic bags, etc.
     - The location of any buildings that might have peat dust in them.
     - The location of the firefighting equipment.

- The location of propane tanks, natural gas buildings, electrical transformer and electrical panel.
- Higher risk areas such as conveyors and dusty areas.
- The location of fertilizers, including the names, types, and amounts.
- The location of fire fighting equipment, including the type and size (e.g. 10 or 20 pounds fire extinguisher).

- Each building should be labelled with large easy to read numbers.
  - These numbers could also be color-coded and universal. For example:
    - **Office** – number **1**,
    - **Maintenance building** – number **2**,
    - **Screening plant and baling area** – number **3**, with the number painted in, for example, ***orange***, which would indicate that firefighters should use special techniques when fighting fire in this building. Special techniques mean that when there is peat dust in a building, do not spray with high-pressure hoses – it tends to inflame the peat fire (apparently, the rush of air that is ahead of the high-pressure spray ignites the peat and spreads it further throughout the building). A low pressure near-drizzle usually works better on peat dust fires. This is a technique that the fire departments should practice during a fire drill/training exercise.
    - **Hazardous material,** number **4,** with the number painted ***red.***
    - Etc.

3. Floor Map of buildings

- Within each building there should be an indication of the following:
  - Access points to each building (including locks ore areas with access codes).
  - Water sources.
  - Location of any hazardous or flammable material including gasoline, propane tanks, oxygen and acetylene, paint, empty bags, etc.
  - Location where there is a possibility of peat dust present.
  - Electrical panel.
  - The location of fertilizers, including the names, types, and amounts.
  - The location of fire fighting equipment, including the type and size (e.g. 10 or 20 pound fire extinguisher).

4. Bog area

- Make sure there is a map of the bog area that shows:
  - Bog layout including the field numbers (the number of each field should be easily recognized from a fast-moving fire truck).
  - Access points (including any blocked off areas – temporary or permanent).
  - Gates and fences (including any locked areas that need keys or access codes to gain access).
  - Water sources.
  - A list of fire fighting equipment the company has available on the bog.
  - How much weight the bog roads will carry (to give fire fighters confidence that their trucks won't get stuck).

HOW OFTEN SHOULD THE FIRE DEPARTMENT VISIT?

- Fire departments should visit at least once a year. In regions where there are both fire departments and natural resources fire fighters, have each of them come. Natural resource fire fighters should come in the spring. Regular fire department personnel should come at the beginning of the production season and immediately following a major renovation or a change in personnel at the fire department.
- At least once every three years, fire department officials should be on site and do a walk around of the entire area when a fire drill is performed.

MISCELLANEOUS SUGGESTIONS

- Fire department should be asked to help train employees in fighting certain types of fires.
- Prepare guidelines on how to fight a peat fire.
- Ask the Fire Chief for the hierarchy within the local fire department.
- Ask the Department of Natural Resources (where applicable) for the hierarchy within their fire-fighting department.
- Create a written plan showing who within your company is responsible during an emergency.
- If there is more than one fire department that could possibly respond to a fire alarm at your plant or bog, organize a meeting with all fire departments to determine who is in charge when more than one department responds to a fire.
- Encourage employees to be volunteer fire fighters.
- Cultivate relationships with the Chief and the fire prevention officer of your company.
- Ask your local government for assistance if you are having trouble scheduling a meeting with your local fire departments.
- Make a donation for fire fighting equipment.

APPENDIX

I

LETTER TO LANDOWNERS AND STAKEHOLDERS

Nom du propriétaire
Adresse

PID : xxxxxxxx

Madame, Monsieur,

Objet: Projet de développement de la tourbière 343

Suite à l'appel d'offres du ministère des Ressources naturelles (MRN) du Nouveau Brunswick pour l'acquisition du droit d'extraire de la tourbe sur les terres de la Couronne, FPM Peat Moss Co. Ltd. s'est vu accorder une licence d'exploration pour la tourbière no. 343 située près d'Oak Point.

Cette licence n'accorde aucun droit à la compagnie de débuter des travaux de récolte de la tourbe, mais confirme l'engagement du MRN d'examiner une proposition de développement que soumettra FPM Peat Moss Co. Ltd.

La localisation de la tourbière et l'étendue du développement sont présentées sur la carte accompagnant la présente lettre. La récolte de tourbe affecterait 104 ha sur les 213 ha que compte la tourbière no. 343. Le projet débuterait en 2011 et comprendrait une récolte de tourbe dès la première année. La tourbe récoltée serait acheminée à l'usine de transformation de FPM Peat Moss Co. Ltd à Inkerman. Les travaux de restauration de la tourbière débuteraient à la toute fin de la récolte prévue pour 2042.

FPM Peat Moss Co. Ltd. est présentement à préparer les plans et devis du projet, incluant le réseau de drainage et le plan de restauration sous la supervision du ministère de l'Environnement qui administre le *Règlement sur les études d'impact sur l'environnement* (Règlement 87-83 de la *Loi sur l'assainissement de l'environnement*).

À cette étape-ci du processus, je vous écris pour vous aviser de cette proposition d'usage des terres de la Couronne et vous invite à nous faire part de tout commentaire, question ou préoccupation concernant le projet de développement de la tourbière no. 343. Ceux-ci pourront être inclus dans l'étude d'impact environnemental en préparation.

Le cas échéant, nous apprécierions recevoir votre réponse à la présente lettre avant le 14 décembre 2010.

Bien à vous,

Denis Mallet
Directeur général
FPM Peat Moss Co. Ltd

P.J. Carte

Compagnie de Tourbe FPM ltée / FPM Peat Moss Co. Ltd
422 chemin Pallot / 422 Pallot Road, Inkerman (New Brunswick) E8P 1B5 Canada
Téléphone: (506) 336-9715 – Télécopieur/Fax: (506) 336-9300

Owner's name
Address

PID : xxxxxxxx

Dear Sir, Madam,

Object: Peatland No. 343 Development Proposal

In February 2010, Minister of Natural Resources (hereinafter "MNR") issued a request for proposal for the lease of New Brunswick commercial Crown peatland resource area. FPM Peat Moss Co. Ltd. was awarded a Peat Exploration License for NB Peatland No. 343 near Oak Point.

This exploration licence does not give the company any right to begin peat harvesting operations, but confirms the commitment by MNR to examine FPM Peat Moss Co. Ltd's development proposal.

The location and extent of the proposed development is shown on the enclosed map. Harvested area would represent 104 ha of the 213 ha of peatland. Peat harvesting preparation and operation would be expected to begin in 2011 and the harvested peat would be transported for processing to existing FPM Peat Moss Co. Ltd. Inkerman facilities. Abandonment and restoration of depleted peat fields would be done progressively throughout the duration of operations until the cessation of peat harvesting in 2042.

FPM Peat Moss Co. Ltd. is currently preparing site development, drainage, and restoration plans for submission and registration of the project with the Department of the Environment under the Environmental Impact Assessment Regulation (Regulation 87-83 of the *Clean Environment Act*).

At this early point in the process, I am writing to notify you of this proposed use of Crown land and invite you to share any concerns, questions or comments regarding the proposed peat harvesting project for inclusion and evaluation in the Environmental Impact Assessment report.

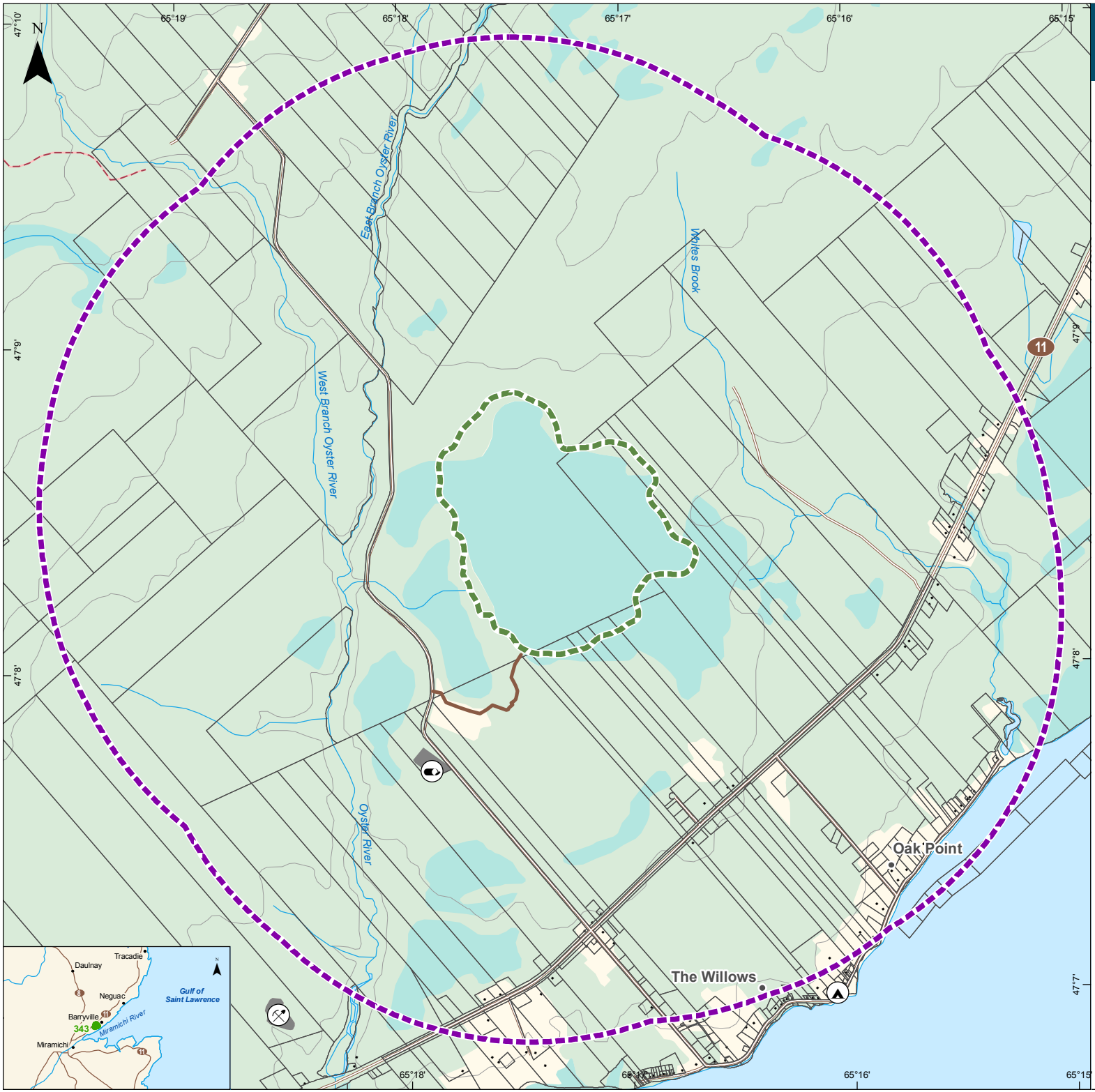
A response to this letter by December 14, 2010 would be appreciated.

Yours truly,

Denis Mallet
General Manager
FPM Peat Moss Co.Ltd.

Enc. Map

Compagnie de Tourbe FPM ltée / FPM Peat Moss Co. Ltd
422 chemin Pallot / 422 Pallot Road, Inkerman (New Brunswick) E8P 1B5 Canada
Téléphone: (506) 336-9715 – Télécopieur/Fax: (506) 336-9300



PEATLAND 343 DEVELOPMENT PROJECT

TOURBIÈRE 343 PROJET DE DÉVELOPPEMENT

PROJECT / PROJET

- Peatland / Tourbière
- Study Area 2 km / Aire d'étude de 2 km
- Access Road / Route d'accès

BIOLOGICAL ENVIRONMENT / MILIEU BIOLOGIQUE

- Wooded Area / Milieu boisé
- Wetland / Milieu humide

HUMAN ENVIRONMENT / MILIEU HUMAIN

- Trail / Sentier
- Campground / Terrain de camping
- Building / Bâtiment
- Road / Route
- Landfill closed / Dépotoir désaffecté
- Pit / Carrière

0 300 600 900 1 200 Meters

Projection New Brunswick Stereographic, NAD83
Contour Interval : 20 m

Sources :
New Brunswick Service, 1998
CanVec, 1 : 50 000, NRCan, 2008

Project : 606307
File : snc607193-343_001_101115.mxd

November 2010

SNC·LAVALIN Environnement