

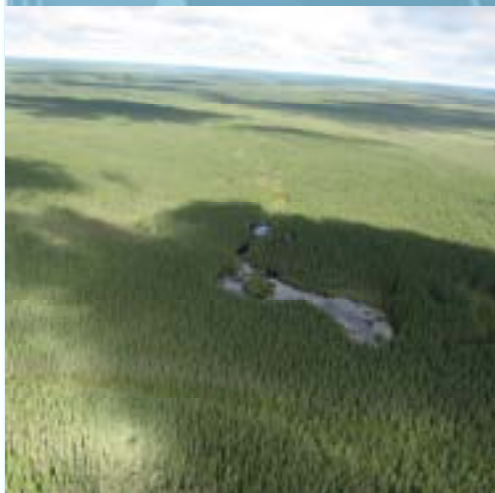
FINAL VERSION



Environment Act Proposal for Development
of Poplar Creek Bog, Haute Bog, and Boggy
River Bog

No. 606096

April 2010
Rev. 00



SNC•LAVALIN
Environment

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Environment

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EXECUTIVE SUMMARY

Jiffy Canada intends to develop three peatlands in southeastern Manitoba to harvest peat to produce horticultural peat products. The targeted peatlands are Poplar Creek Bog, Haute Bog and Boggy River Bog. Jiffy retained SNC-Lavalin to perform the required studies and prepare the Environment Act Proposal (EAP) under the Manitoba Environment Act (C.C.M.S. c. E125). The present study involves solely peat harvesting operations; a separate impact assessment will be prepared for the peat processing plant.

The project will consist of standard peat development and harvesting operations, similar to other existing operations in the area. Based on current technology and market information, Jiffy anticipates producing 1,000,000 bales/yr, or 320,000 m³/yr, at full production over a 400 ha surface area. This rate would require the equivalent of 25 full time jobs for peat harvesting operations, consisting of one administrator, one site manager, two technical staff and 35 field workers (operators).

All three sites are undisturbed peatlands located in the Whitemouth Ecodistrict of the Lake of the Woods Ecoregion in southeastern Manitoba, outside the boundaries of any municipality. No watercourses will be directly affected by the project. A previous study indicated Poplar Creek Bog covers 425 ha, although the study conducted for the purposes of this proposal suggests that the bog may extend over a much larger area. Haute Bog is estimated to cover 526 ha, and Boggy River Bog, 182 ha. Buffer zones of 520 ha, 450 ha and 367 ha will be retained in the undeveloped areas of the Jiffy leases surrounding Poplar Creek Bog, Haute Bog, and Boggy River Bog, respectively.

The development plan consists of a construction phase, an operation phase, and a decommissioning phase. The construction phase operations will be repeated periodically as long as new fields continue to be opened. Details of construction phase activities and harvesting methods are provided in the proposal text.

Bog roads will be built to provide access to the peat fields and stockpiles for peat harvesting equipment. Bog roads are designed in conjunction with the drainage networks, which are required to create suitable conditions for peat harvesting. The drainage network consists of secondary ditches and main ditches. The main purpose of the secondary ditches is to lower the water table within each harvesting field.

It is expected that 30 ha of peatland will be ditched on a yearly basis until the extent required for long-term harvesting is reached. Ditching will take place in the fall after peat harvesting season. The upper part of the deposit will drain progressively as water stored in the peat flows toward the secondary ditches.

The anticipated drainage discharge and surface runoff were evaluated using a conservative approach. At ditch outlets, drainage water will flow through sedimentation ponds before reaching the surrounding environment as overland flow. All transport, retention and release infrastructure for drainage water will be located on-site; no off-site drainage channels or other infrastructure will be constructed.

Progressive decommissioning will be implemented when peat harvesting ends on individual peat fields, based on guidelines developed by the New Brunswick Department of Natural Resources (Thibault 1998, NBDNR 2005). It includes three rehabilitation options, which are Peatland Restoration, Tree Planting and Creation of Open Water Bodies. Jiffy will also consider other rehabilitation options that may be acceptable and result in enhanced economic value, such as cranberry farming.

Jiffy estimates harvestable peat volumes to be 6.4 million m³ for Poplar Creek Bog, 8.4 million m³ for Haute Bog, and 3.4 million m³ for Boggy River Bog. 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 at a given site.

Existing environmental conditions were described, and potential impacts were assessed using SNC-Lavalin's standardized impact assessment methodology. Geology, hydrology and hydrogeology, and climatology were 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 particular emphasis. Social conditions, the economy, and other human environmental components of the region were also assessed.

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, special status plant species, wildlife, public safety, and worker health and safety. An Emergency Protection Plan, attached as Appendix K, includes preventive measures and standard operating procedures to minimize environmental impacts related to spills, accidents, and similar events. Current Manitoba Conservation policy requires that proposed projects be evaluated in accordance with the Manitoba Principles and Guidelines of Sustainable Development. The proposed peat developments were reviewed in terms of the principles of integration of environmental and economic decisions, stewardship, shared responsibility and understanding, prevention, conservation and enhancement, rehabilitation and reclamation, and global responsibility. Ways in which the proposed developments follow the guidelines for sustainable development, including efficient use of resources, public participation, access to information, integrated decision-making and planning, waste minimization and substitution, and research and innovation, are also discussed. The proposed peat harvesting operations were found to be in accordance with the Principles and Guidelines of Sustainable Development.

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 Poplar Creek Bog, Haute Bog and Boggy River Bog.

1 INTRODUCTION AND BACKGROUND

Jiffy Canada (hereinafter called “Jiffy”) intends to develop three peatlands in southeastern Manitoba to harvest peat to produce horticultural peat products (Map 1). The targeted peatlands are Poplar Creek Bog, Haute Bog and Boggy River Bog. Harvesting of peat is considered as a Class 2 Development under Manitoba Regulation 164/88, which requires that Jiffy prepare an Environment Act Proposal under the Manitoba Environment Act (C.C.M.S. c. E125). Jiffy retained SNC-Lavalin to perform the required studies and prepare the Environment Act Proposal (EAP).

The EAP follows the “Advice for the Preparation of an Environmental Act Proposal for a Class 2 Peat Mining Development” document prepared by Manitoba Conservation. It begins with an overview of peat harvesting in Canada and Manitoba, followed by information about the proponent and plans for the construction, operation and decommissioning phases of the proposed project. The next section describes the natural and human environment and the anticipated impacts, in which each element of the environment is presented with the associated impacts. Cumulative impacts and impact reversibility are addressed in the following section. The final part consists of mitigation measures and follow-up, and the principles and guidelines of sustainable development. The contingency plan and closure plan are separate documents that are included as appendices.

Poplar Creek Bog will be developed first, and its development plan and environmental setting are presented in greater detail. Development plans for Haute Bog and Boggy River Bog should be considered as conceptual due to a lack of information for these sites that are not accessible at present. Complementary information such as complete wildlife and plant surveys and piezometric data will be provided to Manitoba Conservation as soon as they are available. Final development plans and surveys for Haute Bog and Boggy River Bog will also be provided prior to any development, once access to these sites is possible.

1.1 PEAT AND PEATLANDS

1.1.1 Peat

Peat is created by accumulation of plant debris due to the saturated conditions present in peatlands, which result in a decomposition rate slower than the plant productivity rate. Peat can be used in variety of ways, depending on its botanical composition and the degree of decomposition. For instance, well decomposed peat has a high energy value and can be used for energy production, whereas poorly decomposed *Sphagnum* peat provides high water and nutrient retention capacities, and is therefore used in potting soil.

Peat is a highly valuable product as soil amendment. It outperforms compost and coir, its two main competitors. Furthermore, peat improves water and air exchange capacity, increases cation exchange capacity, has excellent buffering capacities, and retains moisture, which is released slowly.

1.1.2 Peatlands

Peatlands are a type of wetland that are characterized by an accumulation of peat (NWWG 1997). Peatlands can be divided into two groups, fens and bogs. Fens are peatlands that are fed by precipitation and runoff. Because runoff water comes in contact with mineral soils, it is enriched in base cations. For this reason, fens are also called minerotrophic peatlands. Fen vegetation communities vary considerably, but they are often dominated by sedges, which are the source of sedge peat. With the accumulation of peat, peatlands slowly become higher than the surrounding ground and reach a point where they are only fed by precipitation. At this point, plants no longer have access to mineral rich water coming from adjacent lands, which triggers a change toward development of a bog environment, in which mineral availability decreases significantly, acidic conditions develop, and *Sphagnum* dominated plant communities capable of supporting such conditions replace sedge vegetation. Bogs are targeted for peat harvesting due to the generally larger volume of peat, and because the quality of the peat present in bogs is more suitable for horticultural purposes.

1.1.3 Canadian Peatlands

The total area of peatland exceeding 30 cm in thickness worldwide is estimated to be 4.16×10^6 km², which represents 3% of the earth's land area (Rydin and Jeglum 2006). Approximately one-third of world's peatlands are located in Canada, which represents 1,235,000 km², or 12% of Canada's territory (Map 2). Climate is a major factor responsible for the distribution of peatlands, as peatland development requires a surplus of precipitation over evaporation. In Canada, peatlands cover extensive areas of northern Ontario, Manitoba, Saskatchewan, Alberta, and along the Mackenzie River (NWWG 1988). However, most northern peatlands are shallow, inaccessible and offer low potential for peat production.

1.1.4 Manitoba Peatlands

Wetlands cover approximately 233,340 km², or 43% of Manitoba's landscape, the highest proportion among Canadian provinces (Halsey et al. 1997, Oswald 2000). The highest concentration of wetlands occurs along the Hudson Bay Lowlands, where they contain permafrost and cover more than 70% of the land. Most Manitoba wetlands are peatlands, either bogs or fens. Peatlands are present in all parts of the province with the exception of the southwest, where shallow water and marshes are the dominant wetland types.

The southeastern corner of Manitoba corresponds to the Low Boreal wetland region as defined by Halsey et al. (1997). Wetlands cover 43% of the region and belong to the non-patterned wooded fens, wooded to forested bogs, fen and bog complexes and swamps. Fens are the most common peatland type in that area. Their tree cover is a combination of black spruce and tamarack. Wooded domed bogs also cover extensive areas, or occur as islands within large fen tracts. They are covered by homogenous forest stands dominated by black spruce. Swamps are also present as forested swamps within wetland complexes, while some marshes are found on the shores of Lake of Woods.

1.1.5 Peat Harvesting in Canada

Less than 0.02% (17,000 hectares) of Canada's peatland area is currently being used for horticultural peat harvesting. Peat harvesting operations are concentrated at the southern limit of the boreal forest. New Brunswick is the biggest producer, followed by Québec. Peat harvesting also occurs in Alberta, Manitoba and Nova Scotia, and on lesser scale in Ontario, Newfoundland, Saskatchewan and Prince Edward Island. After Germany, Canada is the second largest producer of peat for horticultural uses. Peat harvesting is a growing industry in Canada, and about 90% of the production is exported. The United States is the main market, however peat products are also exported to many Asian, European and the Middle Eastern countries.

1.1.6 Peat Harvesting in Manitoba

In Manitoba, peat harvesting occurs mostly in the southeastern region, with some operations north of Gimli along Lake Winnipeg. Peat production started as early as 1941, but remained modest for many years (Bannatyne 1980). It underwent an expansion phase at the beginning of the 1970's with the opening of the Elma and Evergreen bogs. Peat production tripled from 1968 to 1978. Peat production went into another phase of development in Manitoba with the opening of Giroux and Caribou bogs by Premier Tech in the 1980s. More recently, the St. Labre and Sprague Lake bogs were developed in the southeast region of the province, and Beaver Point bog along Lake Winnipeg. Most, if not all, of the peat is used for horticultural uses, namely as growing media.

1.2 THE PROPONENT

Jiffy is the proponent of the project. Established in Canada since 1976, Jiffy is part of the Jiffy Group, an international company based in Kristiansand, Norway (<http://www.jiffypot.com/>). The company first started a modest peat pot production facility in New Brunswick in 1976 to supply the North American market. Some 30 years later, Jiffy produces pots, pellets, plastic trays, and a wide variety of retail products. Peat pots and pellets are biodegradable value-added products made of *Sphagnum* peat.

Jiffy recently acquired the Tref Group, a European company that specialized in high quality peat potting soil. Jiffy also acquired McKenzie, a Manitoba-based seed company. Jiffy employs 400 people in New Brunswick, and the equivalent of 120 full time people in Manitoba (McKenzie).

Jiffy is a member of the Canadian Sphagnum Peat Moss Association (CSPMA). As such, Jiffy complies with CSPMA Preservation and Reclamation Policy, whose goals include reducing the impact of operations on the environment, and striving for maximum land restoration to the continuing benefit of the community.

Jiffy's New Brunswick peatland is led by Mr. Frédéric Chiasson, who has 13 years of experience as Operations Manager. Mr. Zoël Gautreau, Executive Vice-President, has 20 years of experience in peatland development and peat products. Mr. Bert Ruiters has 17 years of experience as manager of the peat business in Europe. He is responsible for the Jiffy Group's peat explorations worldwide.

1.3 REGULATORY FRAMEWORK

The following is a list of legislation and associated regulations applicable to the proposed peat harvesting development.

Environment Act (C.C.S.M. C. E125)

- Licensing Procedures Regulation, Man. Reg. 163/88
- Peat Smoke Control Regulation, Man. Reg. 226/89
- Litter Regulation, Man. Reg. 92/88
- Waste Disposal Grounds Regulation, Man. Reg. 150/91

Mines and Minerals Act (C.C.S.M. c. M162)

- Quarry Minerals Regulation 1992, Man. Reg. 65/92
- Mine Closure Regulation, Man. Reg. 67/99
- Operation of Mines Regulation, Man. Reg. 228/94

Dangerous Goods Handling and Transportation Act (C.C.S.M. c. D12)

- Environmental Accident Reporting Regulation, Man. Reg. 439/87
- Storage and Handling of Petroleum Products and Allied Products Regulation, Man. Reg. 188/2001
- Generator Registration and Carrier Licencing Regulation, Man. Reg. 175/87

Public Health Act (C.C.S.M. c. P210)

- Atmospheric Pollution Regulation, Man. Reg. 320/88
- Protection of Water Sources Regulation, Man. Reg. 326/88

Forest Act (C.C.S.M., c. F150)

- Forest Use and Management Regulation, Man. Reg. 227/88

Workplace Safety and Health Act (C.C.S.M. c. W210)

Contaminated Sites Remediation Act (C.C.S.M. c. C205)

Sustainable Development Act (C.C.S.M. c. S270)

Endangered Species Act (C.C.S.M. c. E111)

Highway Traffic Act (C.C.S.M. c. H60)

Federal Legislation:

Canadian Environmental Assessment Act (1992, c. 37)

Canadian Environmental Protection Act, 1999 (1999, c. 33)

Fisheries Act (R.S., 1985, c. F-14)

2 DESCRIPTION OF PROPOSED PROJECT

2.1 THE PROJECT

Jiffy intends to establish a peat production facility in Manitoba. With facilities in Manitoba, Jiffy will be closer to its markets in western North America, which consist mainly of home gardening customers. The combination of seeds (McKenzie), peat pots, pellets and peat products will also open new markets to Jiffy. Manitoba will become Jiffy's center for production and distribution for central and western regions of North America. However, the development of Jiffy's business activities in Manitoba requires access to substantial peat resources. Poplar Creek Bog, Haute Bog and Boggy River Bog have been identified as sources of high quality peat that meets Jiffy's standards. Based on anticipated consumer and professional demand, these sites could supply peat for Jiffy's operations for more than 50 years.

Based on current technology and market information, Jiffy anticipates producing 1,000,000 bales/yr, or 320,000 m³/yr, at full production. This rate would require the equivalent of 25 full time jobs for peat harvesting operations, consisting of one administrator, one site manager, two technical staff and 35 field workers (operators).

The field operation work schedule will be determined based on production objectives and peat harvesting conditions. Production could extend beyond regular business hours during the week and on weekends. However, none of the three peat bogs is located within an organized municipality or near a settlement. As a result, activities associated with peat harvesting will not create disturbance to the local population. The peat will be transported to a peat processing plant, the location of which has yet to be determined. The plant will be built either close to the Trans Canada Highway in the northern portion of the identified study area, or in the southern portion of the study area nearer the communities of Sprague or Piney.

2.2 PROJECT LOCATION

Jiffy proposes to develop Poplar Creek Bog, Haute Bog, and Boggy River Bog. All three sites are undisturbed peatlands located in the Whitemouth Ecodistrict of the Lake of the Woods Ecoregion in southeastern Manitoba, outside the boundaries of any municipality (Maps 3 and 4). The present study involves solely peat harvesting operations. A separate impact assessment will be prepared for the peat processing plant.

2.2.1 Poplar Creek Bog

Poplar Creek Bog is a 425 ha bog located along Route 308, 42.5 km south of the Trans Canada Highway at 95°18'29" W and 49°19'09" N. Jiffy holds peat leases QL-2091, QL-2092, QL-2227, QL-2228 and QL-2229 that cover parts of sections 23, 24, 25 26, 29 and 30, Township 4, Ranges 16E and 17E (Appendix A). Additional lease applications to cover the proposed project area are pending. All leases will be located on Crown land. At present, the area is undeveloped.



Poplar Creek Bog lies within the Lake of the Woods watershed. Peatlands are the dominant feature of the area within a 10 km radius (Map 5). The area has few watercourses or open water bodies. Harrison Creek, located 0.5 km to the north on the opposite side of Route 308, is the closest watercourse. Bannatyne (1980) cites Poplar Creek Bog as an example of a peat bog located down slope from the regional height of land. The surface of the bog is not domed: rather, it is a tongue shape flat bog according to the classification system developed by Zoltai et al. (1972; cited in Bannatyne 1980). It is covered by relatively homogenous dense black spruce stands, with open strips oriented in an east-west axis rather than in a radial pattern. The open strips correspond to a more open growth pattern of mixed black spruce-tamarack forest. Runoff from rainfall and snowmelt may concentrate along these strips.

According to Bannatyne (1980), the bog covers 425 ha with an average peat depth of 1.5 m of slightly humified *Sphagnum* peat mixed with sedge, based on one sample collected. However, the author recognizes that the sample was taken from an atypical area. A recent peat survey reported an average peat depth of 2.40 m, comprising H2 *Sphagnum* peat (0.65 m), H3-H4 *Sphagnum* peat (1.65 m) and more decomposed peat (0.10 m). The total volume of peat is estimated at 10,200,000 m³. Nonetheless, the recent survey also suggests that the bog may extend over a much larger area, and the volume could be greater than estimated.

A company known as Range Rider Resources owns mineral rights on parts of Jiffy's quarry leases. An agreement was signed between Jiffy and Range Ryder Resources stating that Jiffy will not hinder or unreasonably obstruct any future mineral exploration activities that Range Rider Resources may undertake on its claims (Appendix B).

2.2.2 Haute Bog

Haute Bog is a 526 ha bog located 9.5 km south of the Trans Canada Highway and 31.5 km north of Poplar Creek Bog at 95°20'42" W and 49°36' 08"N. It is bordered to the north by the Greater Winnipeg Water District Railway. Jiffy holds peat leases QL-2088, QL-2089 and QL-2090, which cover parts of Sections 27, 28, 29, 32, 33 and 34, Township 7, Range 16E (Appendix A). Additional lease applications to cover the proposed project area are pending. All leases are located on crown land in an undeveloped area that lies within the Shoal Lake Area of Special Interest.

Haute Bog is covered by a semi-open black spruce stand, which appears as a bog island within a large wetland complex (Map 6). This complex is bordered to the east by rock or mineral outcrops that represent the water divide between Shoal Lake and Birch River watersheds. Haute Bog lies within Birch River watershed and drains into Boggy River to the west.

Bannatyne (1980) estimated the surface of Haute Bog at 526 ha, but its northeastern limit could not be clearly defined. One sample collected from the northern part of the bog was composed of 1.0 m of *Sphagnum* peat underlain by 1.5 m of partly humified mixed *Sphagnum* – reed and sedge peat. Based on that depth, the bog would contain a total of 13,150,000 m³ of peat.



2.2.3 Boggy River Bog

Boggy River Bog is a 182 ha bog located 13.5 km south of the Trans Canada Highway between Poplar Creek Bog and Haute Bog at 95°18'24" W and 49°34'37" N. Jiffy holds peat leases QL-2086 and QL-2087 that cover parts of Sections 13, 14, 15, 22, 23 and 24, Township 7, Range 16E (Appendix A). Additional lease applications to cover the proposed project area are pending. Both leases are located on crown land in an undeveloped area that lies within the Shoal Lake Area of Special Interest.

Boggy River Bog is tongue-shaped and covered by a dense black spruce forest. Boggy River Bog lies within the same wetland complex as Haute Bog, and drains to the west into Boggy River, which is part of the Birch River watershed (Map 6). It includes a small lake and watercourse that runs from the east to the west in the northern part of the bog. It is bordered by Boggy River to the west, and by a tributary of Boggy River to the south.

Peat depth reaches 2.75 m according to the only sample collected east of the center of Boggy River Bog. The sample consisted of 2.0 m of poorly decomposed *Sphagnum* peat overlying 0.75 m of partly humified mixed peat. Bannatyne (1980) estimates the volume of commercial peat at 3,640,000 m³.

3 DEVELOPMENT PLAN

The project will consist of standard peat development and harvesting operations, similar to other existing operations in the area (Stantec Consulting 2004, KGS 2007). The development plan consists of a construction phase, an operation phase, and a decommissioning phase. The construction phase of the development plan describes the initial stages of the project, and a number of operations that will be repeated periodically as long as new fields continue to be opened. The operation phase presents the peat harvesting methods and associated operations. The decommissioning phase consists of the rehabilitation plan that will be implemented when peat harvesting ends on individual peat fields, and upon total shutdown of peat harvesting activities at one of the three sites included in the application.

Development layouts are presented for Poplar Creek Bog (Map 7), Haute Bog (Map 8) and Boggy River Bog (Map 9). The exact locations of service areas within each site may change in the future based on more accurate field data, especially for Haute Bog and Boggy River Bog, which will be developed at a later stage. If the locations differ substantially from the present plan, the final layout will be submitted to Manitoba Conservation for approval prior to undertaking construction work.

3.1 CONSTRUCTION PHASE

The construction phase consists of construction of access roads, bog roads and service areas, establishment of a drainage network, clearing trees, and preparation of peat fields.

3.1.1 Access Roads

Construction of an access road to each peatland will be required. Roads, including culvert installation, will be designed and constructed in compliance with applicable Manitoba Infrastructure and Transportation regulations (Figure 1).

The access road to Poplar Creek Bog will be relatively short (100 m approximately) and narrow (5 m wide) to allow passage of one vehicle at a time. It will also require installation of a culvert to reach Route 308. Haute Bog and Boggy River Bog will share the same access road, whose alignment has not yet been determined. However, this road is expected to be at least 10 km long and 10 m wide, and may cross watercourses or obstacles such as the Greater Winnipeg Water District Railway and aqueduct. The construction of the Haute Bog and Boggy River Bog access road will be conducted in close collaboration with Manitoba Infrastructure and Transportation.

3.1.2 Bog Roads and Service Areas

Bog roads will be built to provide access to the peat fields and stockpiles for peat harvesting equipment. Bog roads are designed in conjunction with the drainage networks. Most bog roads are built using non-commercial timber, top vegetation removed during preparation of peat fields, and a layer of mineral material (gravel). Bog roads will be 3-5 m wide and will allow transport trucks to access the peat stockpiles.

Approximately 2 ha per bog are required for the service areas, which will be constructed on mineral soil where possible (Figure 2). In general, service areas will consist of a parking area for harvesting equipment, an equipment maintenance area including a garage (approximately 8 m x 12 m), and an area with facilities for workers that will include a parking lot and construction trailer. The trailer will be used as a lunch room, office and washroom. Water for the washroom will come from a surface well, and the trailer will be equipped with a septic tank.

The service area for Poplar Creek Bog will be located between the bog and Route 308. Trees and vegetation will be cleared and used as fill material. A treed buffer zone will be left between Route 308 and the service area. If necessary, gravel or sand will be added and the site will be graded to allow drainage.

The service areas will also include an area for fuel storage and service. A 12,000 litre above ground storage tank (AST) for diesel fuel complying with CAN/ULC-S601 standards and equipped with an electric pump will be installed at each location. They will be installed on a 20 cm concrete slab surrounded by posts for protection. Installation, operation and maintenance of ASTs will follow the *Environmental Code of Practice for Aboveground Storage Tank Systems Containing Petroleum Products* (CCME 1994). Other petroleum products will be stored in a designated area within the garage.

Since there is no power supply at any of the sites, electricity will be provided by on-site generators.

Figure 1 Typical Access Road – Cross Section

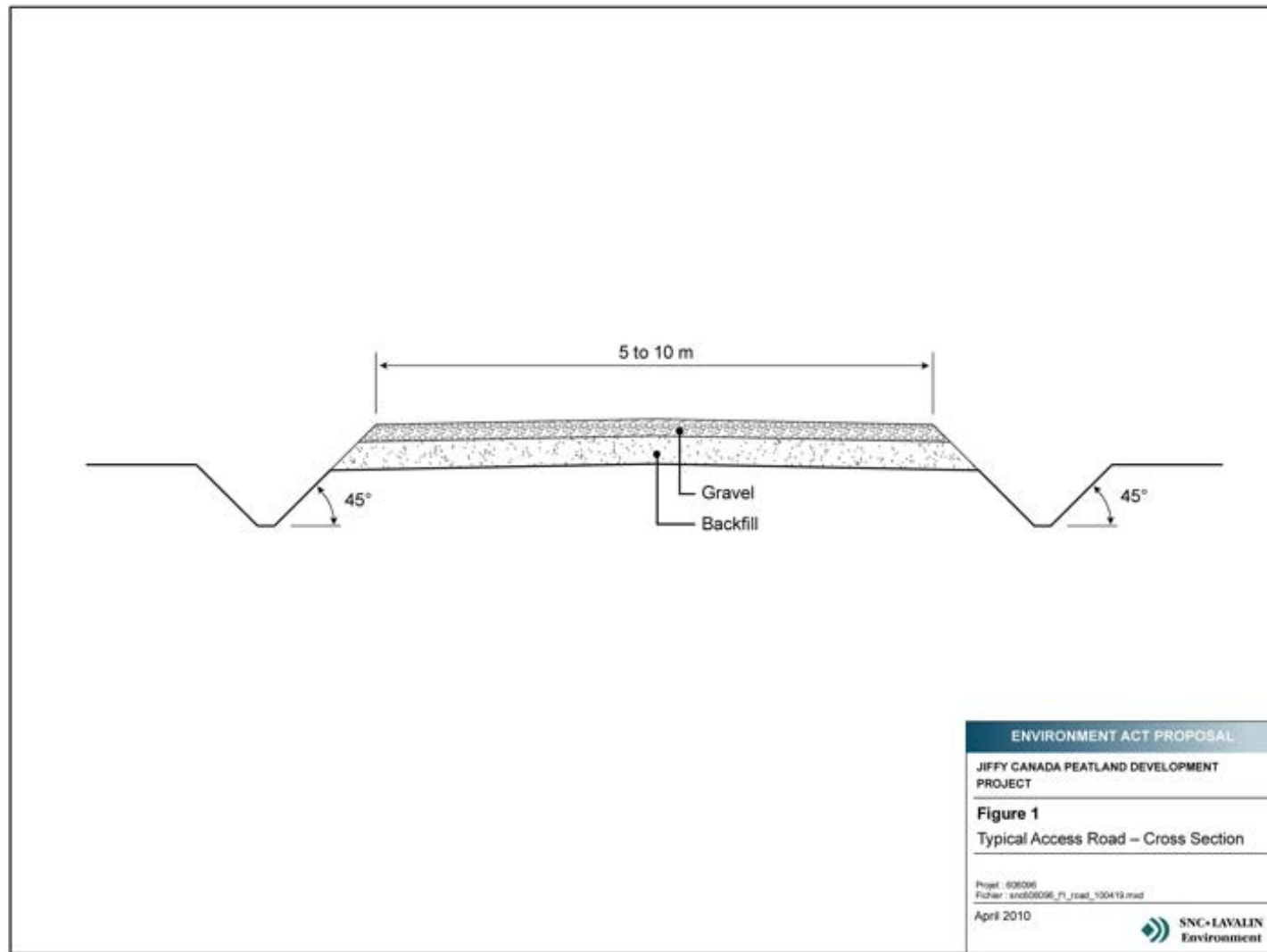
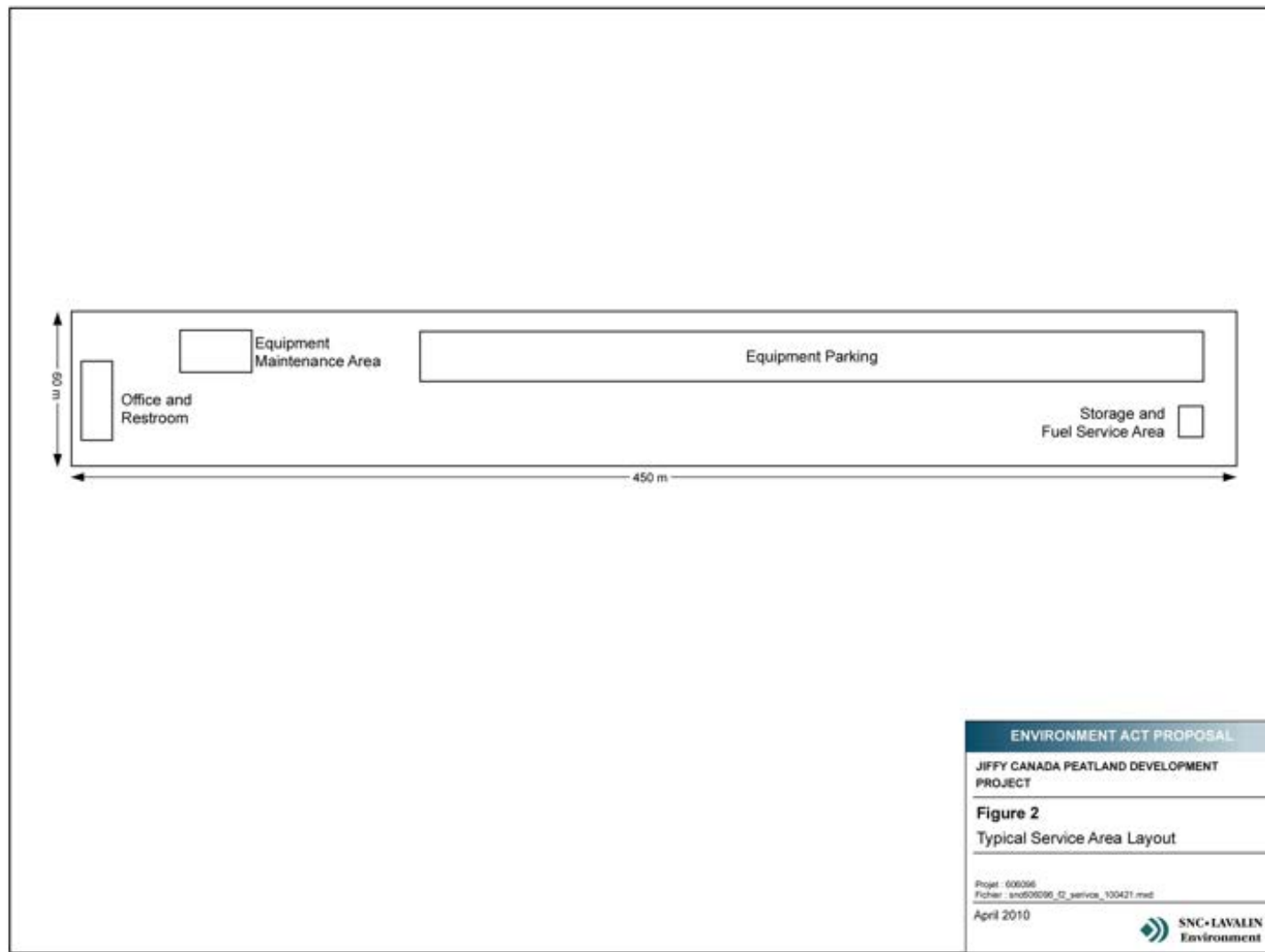


Figure 2 Typical Service Area Layout



3.1.3 Drainage Network

Proper drainage is required to create suitable conditions for peat harvesting. The drainage network consists of secondary ditches and main ditches. At ditch outlets, drainage water will flow through sedimentation ponds before reaching the surrounding environment as overland flow. If applicable, culverts will be installed under on-site roads at ditch crossing locations. Culverts will be 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 will be located on-site; no off-site drainage channels or other infrastructure will be constructed.

3.1.3.1 *Secondary Ditches*

Secondary ditches are V-shaped ditches roughly 1 m wide and 1 m deep. They are dug from the peat with a double-wheeled ditcher attached to a specially modified tractor. The peat cut from the ditches is then unloaded onto the adjacent peat fields. The ditch profiles will generally follow the local topographical gradient to allow gravitational flow toward the collectors (main ditches) and outlets. The secondary ditches are approximately 350 to 400 m long, and are spaced in parallel rows every 25 m (82 ft). The area between two secondary ditches is referred to as a peat field.

3.1.3.2 *Main Ditches*

Main ditches are dug with an excavator. They measure 3 m to 4 m in width; depth varies according to local slope and gradients (Figure 3). They collect water from the secondary ditches and discharge it into sedimentation ponds.

Figure 3 Photo of a Main Ditch



At Poplar Creek Bog, three main ditches will flow along the west-east axis of the bog (Map 7). The center ditch will collect water from two sets of secondary ditches, while those located along the northern and southern edges of the bog will receive water from a single series of secondary ditches. No main ditches will be excavated within 30 m of any rare species found outside the developed area.

At Haute Bog, four main ditches are planned. The ditches will run along the north-south axis, collecting water from two sets of secondary ditches (Map 8). The two ditches on the west side and the two on the east side of the bog will join at each end before leading to sedimentation ponds.

At Boggy River Bog, five main ditches will collect water from the secondary ditches, and will run along a generally northwest-southeast axis. The initial ditch layout was modified to reduce the potential impacts of constructing ditches parallel to an existing watercourse.

3.1.3.3 Sedimentation Ponds

Drainage water flows out of the peatland through sedimentation ponds, which are long rectangular basins that allow suspended sediments and floating debris to settle out prior to being released to adjacent natural areas. Single ponds or a series of ponds will be installed at the outlet of each drainage sub-network, depending on the area drained by the latter. When installed in series, the upstream pond will discharge into the downstream one (Figure 4).

The ponds will be built according to New Brunswick guidelines (Thibault 1998). Pond dimensions will be determined based on the area drained by the sub-network to which they are connected. A minimum of 25 m³ of pond volume per drained hectare will be used as a basis for design of the ponds. The maximum area that will drain into a pond or series of ponds will be limited to 100 ha. The pond or series of ponds will have sufficient volume to allow for a minimum retention time of two hours. Floating booms or curtains will be installed approximately one quarter of the pond's length upstream from the outlet of each pond to capture floating debris.

The ponds will be placed at strategic locations to minimize impacts on receiving watercourses, and will be positioned so that water flows along their longitudinal axis. The outlet will be placed in the upper surface of the downstream wall at a level that allows a minimum water depth of 1.5 m to be maintained. The shape of the outlet will be designed to spread the discharge water evenly over the surrounding lowlands (overland flow).

The preliminary design of the drainage infrastructure at Poplar Creek Bog calls for construction of 2 to 3 sedimentation ponds at the sub-network outlets, depending on the size of the area drained by each sub-network. Table 1 presents the design details for the sedimentation ponds at Poplar Creek Bog.

Figure 4 Sedimentation Pond Design

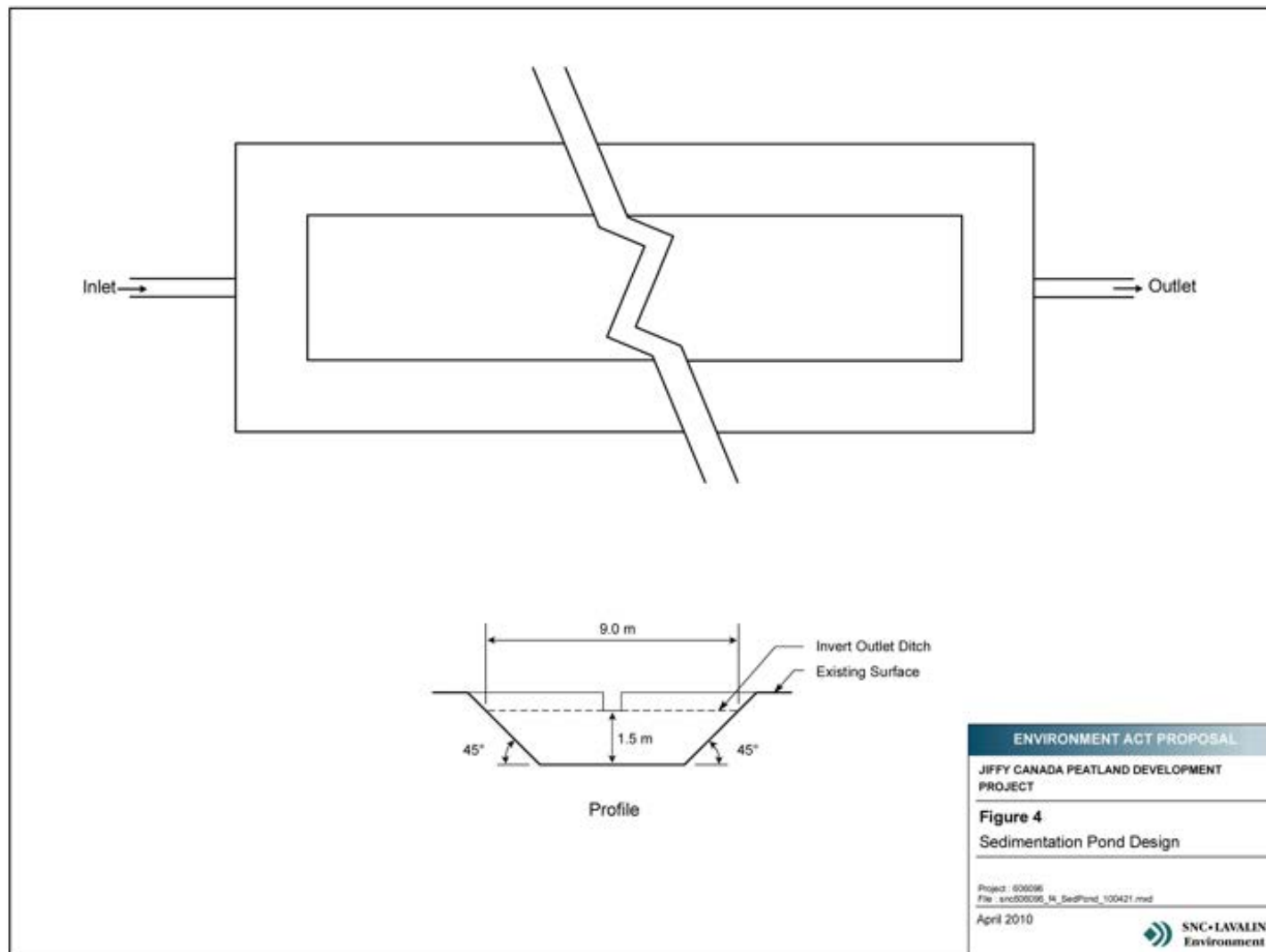


Table 1 Design Details of the Sedimentation Ponds for Poplar Creek Bog

Sub-Network	Area Drained (ha)	Required Pond Volume (m ³)	Number of Ponds	Pond Depth - D (m)	Pond Width - W (m)	Pond Length – L (m)	Ratio L/W
NW	117.1	2927	2	2	9	81	9
Central	214.4	5360	3	2	9	99	11
SE	98.4	2460	2	2	9	68	8

3.1.3.4 Functional Description of Drainage Infrastructure

The drainage infrastructure at each site will have two major complementary functions, namely water table management within the peat harvesting areas and surface runoff management.

The main purpose of the secondary ditches is to lower the water table within each harvesting field. The upper part of the deposit will drain progressively as water stored in the peat flows toward the secondary ditches. Drainage will continue until equilibrium is reached with water infiltration due to rainfall and snowmelt.

Rainfall and snowmelt will also generate runoff when the saturation capacity of the surface is exceeded. Surface runoff from each field will flow towards the secondary ditches, and subsequently to the main ditches.

3.1.4 Tree Clearing

Commercial and non commercial timber will be cut and made accessible to private or public organizations for beneficial use. A mulcher will be used to shred remaining stumps and top vegetation, which will be piled up in windrows and used on site.

3.1.5 Field Preparation

Peat field preparation involves removal of the top vegetation and the dome-shaped contour of the peat fields to favour drainage. The top vegetation layer has to be removed because it cannot be used in peat potting soil. A leveler attached to a tractor scrapes the surface vegetation and piles it into a windrow. The top vegetation will be used on site to build bog roads or used for restoration of abandoned fields at a later stage. The leveler is also used to profile dome-shaped peat fields by scraping and moving peat from the edges toward the center of the fields.

3.1.6 Buffer Zones

The buffer zones consist of the undeveloped area in the Jiffy leases for each peatland, with a minimum width of 50 m. This represents 520 ha for Poplar Creek Bog, 450 ha for Haute Bog, and 367 ha for Boggy River Bog. At Poplar Creek Bog, a recent peat survey suggests that buffer zones have a peat depth greater than 1 m.

3.2 OPERATION PHASE

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

3.2.1 Harrowing

Peat fields are first harrowed to a depth of 10 to 15 cm with special rakes attached to tractors to decompress the undisturbed compacted peat and break it up into small chunks. At the onset of dry weather following rain, fields are harrowed with another type of rake that turns over the surface of the peat to allow it to dry.

3.2.2 Harvesting

Once dry, peat is collected using a method referred to as pneumatic harvesting, which alternates with harrowing. Jiffy will use standard two-headed vacuum harvesters equipped with dust collection systems. Commonly, harvesters go up and down a field and dump the collected peat into stockpiles along the bog roads. Harvesting occurs between April and November. The annual rate of harvesting varies from 7 to 14 cm of peat. Weather conditions represent the major constraint since peat must be harvested when it is dry. A 50 cm layer of peat is usually left in place when harvesting stops, but it may be less than 50 cm if high quality peat is still present.

3.2.3 Stockpiling

Peat is first stockpiled at the ends of the peat fields where it is dumped from vacuum harvesters. It is then loaded into large trailers with a front end loader and moved to a stockpiling area along a main bog road. Stockpiles have a variable length and are 5-6 m high. Stockpiles may stay in the fields until the peat is transported to the processing plant. All stockpiles are preferably oriented on the same axis as the prevailing winds to minimize peat being blown away.

3.2.4 Transportation

Peat is loaded from stockpiles into tarpaulin-covered open box trailers to prevent loss of peat during transport. Peat will be transported to Jiffy's processing facilities at a location that has yet to be determined. On average, ten daily shipments are expected at full production.

3.2.5 Maintenance

Secondary ditches will be renewed yearly to maintain a constant depth, and accumulated debris will be removed. Main ditches will be cleaned when necessary.

Peat field maintenance will include reshaping (for dome-shaped fields) using a leveler. Branches, roots and other wood debris on the field surface will be collected with a special rake. These operations will be conducted yearly, preferably in the fall after harvesting season and prior to winter. However, any of these operations can be carried out when necessary.

All stockpiles will be continuously monitored for signs of heating. In such cases, heated peat will be removed with a front end loader or an excavator to prevent peat fires. Heated peat can be mixed with non-heated peat or used for bog roads depending on the degree of damage.

Regular cleaning of the sedimentation ponds will be carried out in order to maintain their efficiency. Additional cleaning between scheduled cleanings will take place when required, to ensure that peat accumulation does not exceed 50% of the total storage capacity of the ponds. Any peat recovered during pond cleaning will be stockpiled and used to backfill the ponds at final decommissioning.

3.2.6 Inputs and Outputs

Peat harvesting operations do not require any input of pollutants or other substances. The only inputs consist of fuel and miscellaneous petroleum products, and parts used for equipment operation and maintenance.

Since peat harvesting does not require inputs except for equipment maintenance, it does not produce outputs. The only foreseeable outputs will consist of sewage from the employee trailer and waste from equipment maintenance. No public services are available at any of the proposed site locations. Jiffy will engage local contractors to collect and dispose of waste outputs in respect of applicable regulations. As stated earlier, timber may be shipped to offsite users, otherwise timber will be used or disposed of on-site.

3.2.7 Drainage

3.2.7.1 Drainage Discharge

Peat fields will be drained by ditching and induced water table lowering in a progressive fashion. It is expected that 30 ha of peatland will be ditched on a yearly basis, until developed peatland reaches the extent required for long-term harvesting. Ditching will take place during the fall after the harvesting season. Ditching will take place over a number of days or weeks until the secondary ditches required for a harvesting area of 30 ha have been completed.

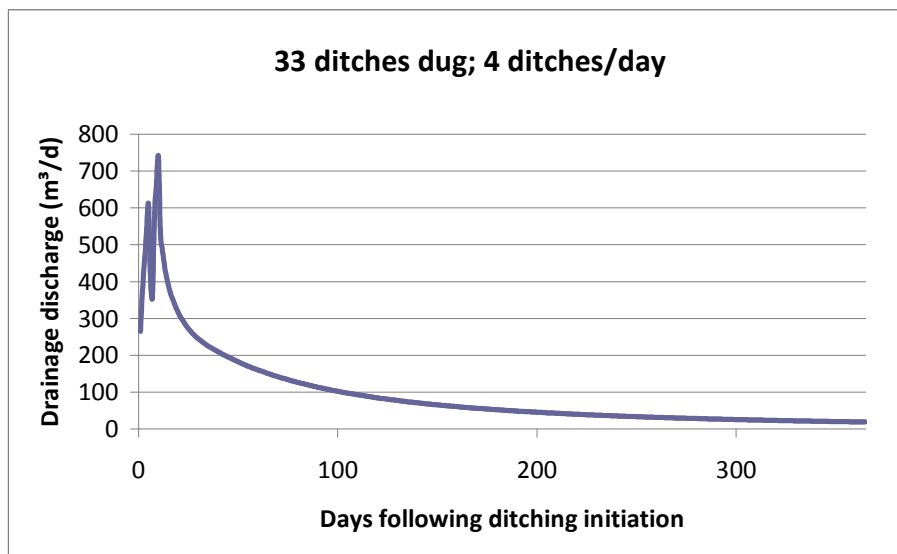
The anticipated drainage discharge during a ditching season has been evaluated using a conservative approach, which assumes completion of four secondary ditches per day over a short continuous period, with two day interruptions on weekends. This approach has the benefit of maximizing the peak drainage discharge that may be recorded during a ditching season.

Drainage discharge in the first stages of ditching was computed 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 computed 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 and Nieber (1977). The hydraulic properties of the peat were based on the stratigraphic and humification characteristics described by Bannatyne (1980) for Poplar Creek Bog. Correlation of these characteristics with corresponding average hydraulic properties presented in Carrier (2003) and Price et al. (2003) yielded a hydraulic conductivity value of 2.0×10^{-6} m/s and a specific yield of 0.15. These values were used in the computations, along with the geometric and spatial characteristics of the secondary ditches presented in section 3.1.3.

The drainage peak discharge for a ditching season was estimated to be 738 m³/day. This figure is equivalent to a rainfall event with an intensity of 0.1 mm/h over a 30 ha area with no infiltration, interception or storage loss (complete contribution of rainfall to surface runoff). The drainage peak discharge occurs on the last day of ditching, which represents the tenth day following initiation. A sharp decrease in drainage discharge occurs after the peak discharge, until the discharge rate declines more significantly about a month after initiation. The residual drainage discharge after 365 days is in the order of 19 m³/d, or about 2.5% of the peak discharge value.

Figure 5 presents the evolution of drainage discharge over a ditching season. Note that the trough in the curve between day 5 and day 8 corresponds to a suspension of ditching operations on the weekend.

Figure 5 Expected Peatland Drainage Discharge over a Ditching Season



The cumulative volume of water drained by ditching operations over a 365 day period is estimated at 34,245 m³. This volume is equivalent to an additional water input of 114 mm/y/m² over a 30-ha area. This represents an increase of less than 20% over the average annual precipitation for the area (586 mm/y). Note that the incremental water yield from the residual contribution of the previous ditching season to the drainage discharge of the subsequent ditching season would be marginal, as peat field drainage is nearly complete 365 days after initiation.

3.2.7.2 *Peatland Surface Runoff Discharge*

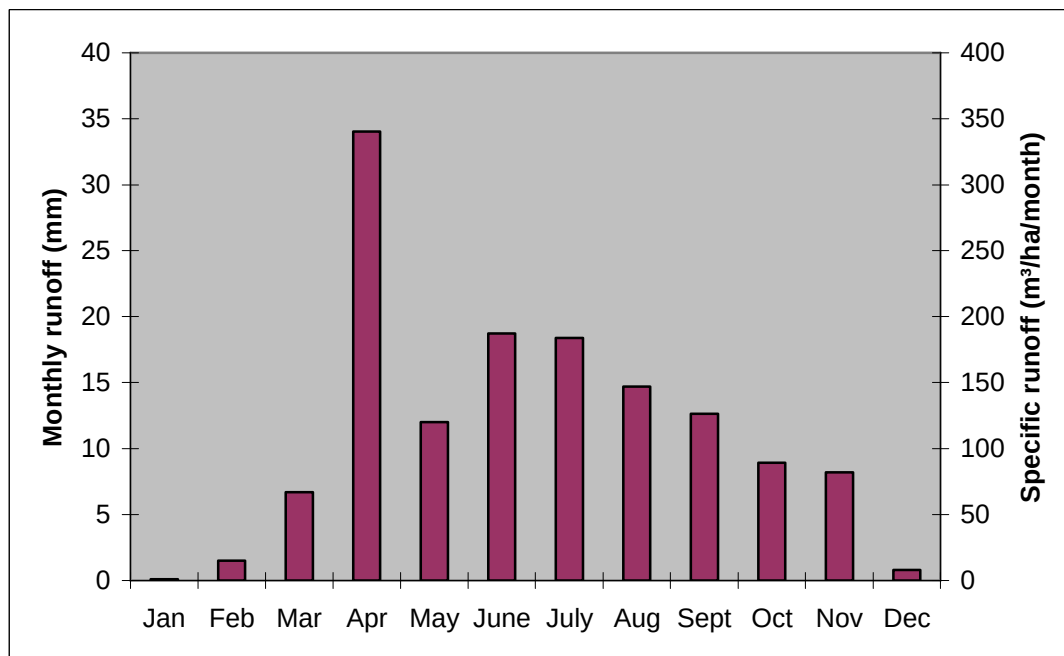
Site clearing and initiation of harvesting activities will modify the hydrological characteristics and behaviour of the surfaces where these operations will take place. Water interception and transpiration in the peat fields will decrease, but evaporation is expected to increase due to removal of the natural organic surface and increased direct exposure of the soil to solar radiation. Drainage of the peat fields and resulting water table lowering will significantly increase the infiltration and storage capacity of the peat deposits. As is the case for undisturbed peatlands, the relationship between rainfall, infiltration and runoff over peat fields remains complex: infiltration capacity in relation to a specific precipitation event will depend upon the antecedent moisture (saturation) conditions of the peat (Gemtec Limited 1991). In cases where a precipitation event occurs when the peat fields are in a close-to-saturated state (due to a prior precipitation/recharge event), infiltration capacity will be significantly lower, and thus higher surface runoff is expected.

Field measurements carried out by Gemtec Limited (1991) and Shantz and Price (2006a) in disturbed peatlands in maritime and humid continental climatic settings showed that equivalent surface runoff coefficients with respect to incident rainfall were systematically lower than 0.2. The total annual precipitation in southeastern Manitoba is close to half that of these climatic settings, with similar annual degree-days above 0 °C. Accordingly, the annual surface runoff for harvested peatland in southeastern Manitoba would likely be less than 0.2 times annual precipitation. Nevertheless, a runoff coefficient of 0.2 was used to evaluate the surface runoff discharge from the bogs during harvesting phases, in order to yield more conservative estimates of the total surface runoff outflow to the surrounding terrain.

Monthly runoff over Poplar Creek Bog, Haute Bog, and Boggy River Bog during the harvesting phases was estimated using the method of Thornthwaite (1948). The precipitation and temperature data that were used are presented in section 4.1.3.1. A maximum readily available soil water supply of 200 mm was considered for the peat deposits, similar to the regional value used by Smith et al. (1998). 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 November and March, in accordance with observations presented in Gemtec Limited (1994). In addition, November-to-March snowfall contribution to the annual hydrological budget was split between soil water recharge (75%) and April snowmelt runoff (25%), to represent both the high water storage capacity of drained peatlands in winter (Shantz and Price 2006b) and the important, often dominant process of spring freshet in Canadian peatland hydrology (Whitfield et al. 2009). However, the impact of these modifications on overall annual runoff volumes remains marginal.

The estimated monthly runoff pattern from a harvested peatland in the study area is presented in Figure 6. Runoff quantities are also presented in the form of specific runoff per unit hectare of harvested peatland. Total annual runoff is estimated at 137 mm of water per unit surface area. If one assumes that no surface runoff occurs in undisturbed peatlands in the area (most conservative assumption), initiation of peat harvesting activities would yield an additional water input of 137 mm/y per unit surface area of peat field during the harvesting phase. This represents about 23% of the average annual precipitation received over the area (586 mm/y).

Figure 6 **Estimated Monthly Runoff and Monthly Specific Runoff for a Harvested Peatland in the Study Area**



3.2.7.3 Peatland Drainage and Surface Runoff Water Quality

The quality of the water initially stored in the peat deposits largely determines the anticipated water quality of the initial drainage discharge. Analytical results from water samples collected at Poplar Creek Bog in January 2010 are used as a basis for the prediction of drainage water quality. These results are presented in detail in Section 4.1.2.4. As such, it appears that the metal and ion content of the drainage water will be lower than that of the receiving environment. Such will also be the case for surface runoff discharge, as its metal and ion content will essentially be controlled by the chemical content of the rainwater.

Initial drainage water discharge at the peatland's outlets will have a lower pH, and thus higher acidity, than that of the surrounding wetlands. As ditching progresses, surface runoff will begin contributing to the peatland discharge. It is expected that, as water discharge at the outlets evolves from bog storage water to surface runoff, the pH of bog discharge water will increase and its acidity will decrease accordingly (Gemtec Limited 1994).

Seasonal variations in the chemistry of the discharge water are expected during the harvesting phases. Base flow, i.e., peat water discharge to the drainage ditches through porous-medium flow, is expected to be highest in the spring and, to a lesser extent, in the weeks prior to freeze-up in the fall, owing to greater saturation of the peat deposit. Discharge water during these periods will thus bear a greater influence from the peat deposit, and will likely be more acidic (Gemtec Limited 1994). Conversely, direct snowmelt surface runoff (occurring mostly in late March and April) and runoff from intense summer rainfall events will exhibit chemical content close to that of rainfall/snowfall. Associated discharge water composition will thus bear little influence from the chemistry of the peat water.

Peatland drainage water will likely exhibit elevated concentrations of (total) suspended solids in the early stages following ditching operations due to the increased mobilization of peat particles caused by such operations. As detached particles are carried away by drainage water, the supply of readily-transportable particles will be reduced, and suspended solids concentrations will progressively decrease until reaching low levels.

Once ditching is completed, harvesting operations will also mobilize peat particles due to scarification and harrowing, which in turn result in airborne transport of fibers onto the surface of water in ditches (Gemtec Limited 1991). Intense rainfall events following harvesting activities will also detach and transport peat particles along with surface runoff, which will subsequently discharge to the drainage ditches, increasing concentrations of suspended solids in the water collected. Ditch erosion will be exacerbated during periods of high flow, which will in turn result in additional particles supplied to water flowing towards the outlets of the sub-networks (Gregory et al. 1984). Ditch maintenance will also contribute to mobilization of peat particles and increased concentrations of suspended solids in water collected in the ditch sub-network.

Discharge of drainage and surface runoff water to the sedimentation ponds will allow interception of suspended sediments and floating debris. The dimensions of the ponds will provide a water retention time sufficient to induce settling of the majority of the suspended peat particles. It is expected that under normal operating conditions, total suspended solid concentrations in water discharging to the surrounding lands (final effluent) will be below 25 mg/L.

Water discharged from the sedimentation pond outlets will spread into areas of flat topography in the neighbouring peatland. Diffuse sheet flow will occur on the peat surface, and porous medium flow within the acrotelm. The flow is expected to dissipate in a radial pattern from the point of discharge, decreasing in volume and intensity until no flow is observed at some distance from the outlet. Standing discharged water will thus become available for evapotranspiration and further infiltration in the peat deposit. Accordingly, drainage water from the harvested fields will not reach the local surface drainage network. No significant change in the hydrology or hydrological regime of the neighbouring watercourses is expected.

3.2.7.4 Surface Runoff Discharges from On-Site Infrastructure

On-site infrastructure will be limited to the service areas of each bog. The service areas (parking area, vehicle maintenance area, worker facilities) will occupy a total surface of about 2 ha. As all hazardous compounds (petroleum products) will be handled in closed or confined areas, no release of pollutants to the surrounding environment is expected. Hence, there are no potentially polluted surface runoff sources or pathways associated with the on-site infrastructure.

No water collection or transport structures will be built in or around the service areas. Surface runoff associated with rainfall or snowmelt will be allowed to drain freely to the surrounding undisturbed vegetated lands, where it will infiltrate to the sub-surface or evaporate.

Surface runoff discharge from a given service area in response to low-recurrence precipitation events was evaluated. A surface runoff coefficient of 0.25 was retained, given the coarse and porous nature of the fill material that will cover the bulk of the service area. A travel length of 100 m over the service areas and a slope similar to the local natural surface slope (0.4%) yielded an estimated concentration time of 5.4 minutes, based on the Kirpich equation. The corresponding rainfall intensities were 223 and 275 mm/h for return periods of 25 and 100 years, respectively (based on averaged IDF data from the Kenora and Winnipeg meteorological stations). Note that these figures probably overestimate the actual expected rainfall intensities for these return periods, as the corresponding precipitation event duration lies at the extreme low end of the duration interval covered.

Computed surface runoff discharges from a given service area were 0.31 and 0.38 m³/s for return period events of 25 and 100 years, respectively. Due to the short duration of such events, the overall volume of water that would actually be discharged to the surrounding lands would remain low, representing an equivalent water column height of 5 and 6 mm, respectively, over the entire service area. As such, the on-site infrastructure for conveyance of runoff discharge does not pose any capacity limitations.

3.2.7.5 Provisions for Runoff Diversion

Within the harvesting area, the shape of the field surface along the transverse axis will slope toward the closest secondary ditch to ensure proper drainage. Surface runoff will be collected via the ditch network, and flow through the ditch network toward the drainage outlet.

Given the fairly flat topography and type of plant cover of the surrounding areas, little natural runoff occurs on the ground surface of undisturbed areas. Therefore, only a negligible amount of surface runoff originating from undisturbed areas is expected to reach the harvest sites, where it will be intercepted by the ditch network.

3.2.8 Development Schedule

Jiffy has prepared a development schedule for the three peatlands based on the following assumptions:

- Constant area in production = 400 ha
- Annual peat production = 1,000,000 bales (320,000 m³)
- Harvesting rate = 8 cm/yr
- Loss of 40 cm of peat due to shrinkage of peat following drainage
- Leaving 50 cm of peat at the base of the peat field for site rehabilitation

Peat field life expectancy was determined based on the annual harvesting rate and the average harvestable peat depth, which varies from 1.5 m at Poplar Creek Bog to 1.85 m at Boggy River Bog (Table 2). Harvesting on a given peat field would stop when the remaining peat layer reaches an average thickness of 50 cm, at which point low quality peat layers are generally reached. According to this scenario, Jiffy estimates harvestable peat volumes to be 6.4 million m³ for Poplar Creek Bog, 8.4 million m³ for Haute Bog, and 3.4 million m³ for Boggy River Bog.

Table 2 Harvestable Peat Reserve, Bog Area, Harvesting Rate, and Life Expectancy

Site	Harvestable Area (ha) [*]	Average Peat Depth (m)	Total Peat Reserve (<i>in situ</i> million m ³)	Harvestable Peat Depth (m) [†]	Harvestable Peat Reserve (<i>in situ</i> million m ³)	Life Expectancy (yr) [‡]
Poplar Creek Bog	425	2.40	10.2	1.50	6.4	37
Haute Bog	525	2.50	13.2 [*]	1.60	8.4	45
Boggy River Bog	180	2.75	5.0 [*]	1.85	3.4	29

^{*} According to Bannatyne (1980)

[†] Harvestable peat depth = Total peat depth - 40 cm (shrinkage) - 50 cm left at abandonment

[‡] Life expectancy of the bog according to the development schedule

Jiffy will develop Poplar Creek Bog first, with the initial harvest taking place in 2011 (Table 3). Sections of 30 ha will be developed at the west end of the bog in 2011, and in the northern part in 2012, to avoid rare plant populations and to allow time to transplant them (Map 7). Later, peat fields will be developed at a rate of 30 ha/yr, including infrastructure (roads and ditches), until the area in operation reaches 400 ha in 2023. From then on, the overall production rate should remain the same since decommissioning of exhausted fields will be compensated for by development of new fields at Poplar Creek Bog, and later at Haute Bog and Boggy River Bog. According to the proposed development schedule, overall peat production will start declining by 2061. It is expected that the last new fields will be developed at Poplar Creek Bog in 2030, while fields will be progressively abandoned from 2030 to 2049. Final decommissioning of Poplar Creek Bog will take place in 2049.

Haute Bog will be the second peatland to be developed, with a first harvest occurring in 2030, at which time progressive decommissioning will begin at Poplar Creek Bog. Haute Bog should be in operation for 43 years, until 2073. Progressive decommissioning will start in 2050. Peat harvesting at Boggy River Bog will start in 2055, and will last until 2082. Final decommissioning of Boggy River Bog will take place in 2083.

Jiffy considers that the production rate may vary over time due to increased or decreased market demand. Production and decommissioning data will be provided to the Manitoba government upon request.

3.3 DECOMMISSIONING PHASE

Decommissioning will proceed in two stages. First, progressive rehabilitation of exhausted peat fields will be performed at various periods over the lifespan of the three peatlands. Second, final decommissioning of infrastructure will be performed once the harvestable peat supply of each site has been exhausted.

3.3.1 Progressive Decommissioning

Over the life cycle of a peatland, new peat fields are developed to sustain peat production while other peat fields are exhausted. The progressive 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 conceptual rehabilitation plan that relies mostly on life expectancy and anticipated conditions upon cessation of peat harvesting activities. It includes three rehabilitation options, which are Peatland Restoration, Tree Planting and Creation of Open Water Bodies. Jiffy will also consider other rehabilitation options that may be acceptable and result in enhanced economic value, such as cranberry farming.

Table 3 Development Schedule for Poplar Creek Bog, Haute Bog and Boggy River Bog

Total			Poplar Creek Bog (425 ha)				Haute Bog (525 ha)				Boggy River Bog (180)			
Year	Total Production Area (ha)	Total Peat Production (In situ m ³)	Field Development (ha)	Field Decommissioning (ha)	Area In Production (ha)	Peat Production (In situ m ³)	Field Development (ha)	Field Decommissioning (ha)	Area In Production (ha)	Peat Production (In situ m ³)	Field Development (ha)	Field Decommissioning (ha)	Area In Production (ha)	Peat Production (In situ m ³)
2011	30	24 000	30		30	24 000								
2012	60	48 000	30		60	48 000								
2013	90	72 000	30		90	72 000								
2014	120	96 000	30		120	96 000								
2015	150	120 000	30		150	120 000								
2016	180	144 000	30		180	144 000								
2017	210	168 000	30		210	168 000								
2018	240	192 000	30		240	192 000								
2019	270	216 000	30		270	216 000								
2020	300	240 000	30		300	240 000								
2021	330	264 000	30		330	264 000								
2022	360	288 000	30		360	288 000								
2023	400	320 000	40		400	320 000								
2024	400	320 000			400	320 000								
2025	400	320 000			400	320 000								
2026	400	320 000			400	320 000								
2027	400	320 000			400	320 000								
2028	400	320 000			400	320 000								
2029	400	320 000			400	320 000								
2030	400	320 000	25	30	395	316 000	5		5	4 000				
2031	400	320 000		30	365	292 000	30		35	28 000				
2032	400	320 000		30	335	268 000	30		65	52 000				
2033	400	320 000		30	305	244 000	30		95	76 000				
2034	400	320 000		30	275	220 000	30		125	100 000				
2035	400	320 000		30	245	196 000	30		155	124 000				
2036	400	320 000		30	215	172 000	30		185	148 000				
2037	400	320 000		30	185	148 000	30		215	172 000				
2038	400	320 000		30	155	124 000	30		245	196 000				
2039	400	320 000		30	125	100 000	30		275	220 000				
2040	400	320 000		30	95	76 000	30		305	244 000				
2041	400	320 000		30	65	52 000	30		335	268 000				
2042	400	320 000		40	25	20 000	40		375	300 000				
2043	400	320 000			25	20 000			375	300 000				

Total			Poplar Creek Bog (425 ha)				Haute Bog (525 ha)				Boggy River Bog (180)			
Year	Total Production Area (ha)	Total Peat Production (In situ m ³)	Field Development (ha)	Field Decommissioning (ha)	Area In Production (ha)	Peat Production (In situ m ³)	Field Development (ha)	Field Decommissioning (ha)	Area In Production (ha)	Peat Production (In situ m ³)	Field Development (ha)	Field Decommissioning (ha)	Area In Production (ha)	Peat Production (In situ m ³)
2044	400	320 000			25	20 000			375	300 000				
2045	400	320 000			25	20 000			375	300 000				
2046	400	320 000			25	20 000			375	300 000				
2047	400	320 000			25	20 000			375	300 000				
2048	400	320 000			25	20 000			375	300 000				
2049	400	320 000		25	0	0	25		400	320 000				
2050	400	320 000					5	5	400	320 000				
2051	400	320 000					30	30	400	320 000				
2052	400	320 000					30	30	400	320 000				
2053	400	320 000					30	30	400	320 000				
2054	400	320 000					30	30	400	320 000				
2055	400	320 000						30	370	296 000	30		30	24 000
2056	400	320 000						30	340	272 000	30		60	48 000
2057	400	320 000						30	310	248 000	30		90	72 000
2058	400	320 000						30	280	224 000	30		120	96 000
2059	400	320 000						30	250	200 000	30		150	120 000
2060	400	320 000						30	220	176 000	30		180	144 000
2061	370	296 000						30	190	152 000			180	144 000
2062	330	264 000						40	150	120 000			180	144 000
2063	330	264 000							150	120 000			180	144 000
2064	330	264 000							150	120 000			180	144 000
2065	330	264 000							150	120 000			180	144 000
2066	330	264 000							150	120 000			180	144 000
2067	330	264 000							150	120 000			180	144 000
2068	330	264 000							150	120 000			180	144 000
2069	305	244 000						25	125	100 000			180	144 000
2070	300	240 000						5	120	96 000			180	144 000
2071	270	216 000						30	90	72 000			180	144 000
2072	240	192 000						30	60	48 000			180	144 000
2073	210	168 000						30	30	24 000			180	144 000
2074	180	144 000						30	0	0			180	144 000
2075	180	144 000											180	144 000
2076	180	144 000											180	144 000
2077	180	144 000											180	144 000
2078	150	120 000										30	150	120 000

Total			Poplar Creek Bog (425 ha)				Haute Bog (525 ha)				Boggy River Bog (180)			
Year	Total Production Area (ha)	Total Peat Production (In situ m ³)	Field Development (ha)	Field Decommissioning (ha)	Area In Production (ha)	Peat Production (In situ m ³)	Field Development (ha)	Field Decommissioning (ha)	Area In Production (ha)	Peat Production (In situ m ³)	Field Development (ha)	Field Decommissioning (ha)	Area In Production (ha)	Peat Production (In situ m ³)
2079	120	96 000										30	120	96 000
2080	90	72 000										30	90	72 000
2081	60	48 000										30	60	48 000
2082	30	24 000										30	30	24 000
2083	0	0										30	0	0
Total		18 172 000	425	425		6 460 000	525	525		8 400 000	180	180		3 312 000

3.3.1.1 Peatland Restoration

The objective of peatland restoration is to re-establish a moss-dominated wetland ecosystem. A peatland restoration method was recently developed with the help of the Canadian peat industry (Quinty and Rochefort 2003). This method is currently applied successfully to abandoned peatlands in eastern and central Canada. This approach usually allows re-establishment of peatland vegetation cover and restoration of the local hydrologic cycle within five years.

This approach consists of shredding the top living vegetation layer in undisturbed peatland areas. This plant material is later spread over abandoned peat fields and covered by straw mulch. Light phosphorus-rich fertilizer is sometimes added to speed up plant establishment. Site specific field preparation is also required to favour uniform wet soil conditions.

This option has the best chance of succeeding where bog conditions still prevail, that is, where a 50 cm layer of peat has been left in place, acidic conditions are still present, and 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 peat roads or nearby fields that are still being harvested. Plant material is commonly collected from donor sites such as new peat fields being developed, or from shallow peat areas within lease limits. It is important to note that vegetation can recover rapidly after plants are collected from donor sites. It is expected that peatland restoration will be applied over 10% of the harvested area.

3.3.1.2 Tree Planting

Tree planting represents a suitable option in drier and/or minerotrophic conditions (Bussi res et al. 2008). The long-term objective of tree planting is to turn depleted peat fields into commercial forest or forested wetland habitats. These habitats will be comparable to those that are currently present in the region, especially in poorly drained areas that are less suitable for peatland restoration. Seedlings are planted at a rate of 1,200/ha, and are fertilized once at the time of planting. It is expected that tree planting will be applied over 80% of the harvested area. In general, the seedlings have a high survival rate, but growth is slower than in mesic conditions.

3.3.1.3 Creation of Open Water Bodies

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. Bog pools can also be used by birds and wildlife. In eastern Canada, it was shown that created bog pools are rapidly colonized by amphibians and certain insects, and that vegetation requires more time to become established (Mazzerolle et al. 2006). Open water body creation is a worthwhile option in depressions and low-lying zones where water accumulates and prevents peatland restoration or tree planting.

Open water bodies are planned to be created in most depressions with permanent standing water, which may represent 10% of the harvested area. Existing ponds may be enlarged to increase the surface of open water bodies, or reshaped to create favourable conditions such as shelter for waterfowl and wildlife. Leaving sedimentation ponds and some ditches open is another way to create open water bodies. All created water bodies will be shallow (less than 1 m in depth) with gentle slopes for safety.

3.3.2 Final Decommissioning

Final decommissioning involves the dismantling of infrastructure, namely service areas, main ditches, and sedimentation ponds.

Service areas will be cleared of all buildings, trailers 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 Manitoba regulations and standards. Finally, the area will be planted with tree seedlings.

At the time of decommissioning, Jiffy proposes to evaluate the possibility of leaving access roads intact for post-decommissioning monitoring and for use by other eventual land users, especially if doing so would result in potential economic use.

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

Sedimentation ponds might be only partly filled, with some parts left as open water bodies. In such cases, these portions will be reworked into more natural shapes, and steep slopes will be flattened if they are considered to present a risk to humans or wildlife.

3.3.3 Decommissioning Schedule

Jiffy will implement appropriate rehabilitation options as soon as the individual peat fields are abandoned, provided that doing so does not interfere with continuing operations. Jiffy has prepared a conceptual decommissioning schedule, which is presented in Table 3. This schedule is subject to change with the rate of peat production, which in turn will vary with increased or decreased market demand. Jiffy has also prepared a Closure Plan, which presents estimated rehabilitation cost and financial assurance posting schedule (Appendix C).

4 DESCRIPTION OF ENVIRONMENT AND IMPACTS

This section presents each element of the natural and human environment and the anticipated impacts. Geology, hydrology and hydrogeology, and climatology were 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 particular emphasis. Social conditions, the economy, and other human environmental components of the region were also assessed.

The impacts were evaluated using SNC-Lavalin's standardized impact assessment methodology, which is presented in Appendix D. Table 4 summarizes the source and description of impact, the value of the component, the intensity, extent, duration and significance of impacts, mitigation measures, and residual impacts for each component. Mitigation measures are presented in greater detail in Section 5.

4.1 PHYSICAL SETTING

Poplar Creek Bog, Haute Bog and Boggy River Bog are located in the Whitemouth Ecodistrict 379 of the Lake of the Woods Ecoregion. This Ecoregion extends from the south end of Lake Winnipeg to the east side of Rainy Lake on the Canada-United States border. It is marked by warm summers and cold winters, but is more closely identified with the warmer, more humid southeastern mixed forest region than with the colder, drier boreal regions to the north.

4.1.1 Geology

Poplar Creek Bog, Haute Bog and Boggy River Bog lie within the Canadian Shield geological province. Bedrock is formed by Precambrian intrusive and metamorphic rocks, namely tonalite, minor granodiorite, granite and related gneiss. Quaternary deposits and overburden thickness vary significantly over the area. Overburden thickness, and thus depth to bedrock, ranges between 40 and 50 m in the Poplar Creek Bog area. It gradually diminishes along a somewhat irregular northward trend, until reaching zero (i.e., a bedrock outcrop) at the northeastern end of Haute Bog (MSTEM 2006). Rock outcrops are also found several hundred meters east of Boggy River Bog.

A formation of sand diamicton of glacial origin discontinuously overlies the bedrock. The sand diamicton consists of a non-calcareous and often bouldery till composed of Precambrian crystalline rock fragments. It is discontinuously covered by thin veneers of glaciolacustrine sediments. The thickness of the sand diamicton diminishes along a southwest-northeast trend until becoming non-existent beneath Haute Bog (MSTEM 2006). Bannatyne (1980) however reports that a clay unit might be present below the peat deposit at a location sampled in the northern part of Haute Bog. Nevertheless, no information is known about its potential size or depth. The peat deposit forming Boggy River Bog lies above the sand diamicton formation.

Glaciolacustrine sediments overlie the sand diamicton in the Poplar Creek Bog area. Lower units are formed of offshore silt deposited in proglacial Lake Agassiz. Their exact thickness is unknown, but it may span between a few meters up to 20 m. The structure of the deposits varies between massive and laminated. Some clay and minor proportions of sand are present as well.

Offshore silt units are overlain by near-shore sand and gravel deposits originating from wave action at the margins of Lake Agassiz. Given the paleogeographical environment in which they were formed, these littoral deposits would have a limited thickness, ranging between one meter and several meters, in the Poplar Creek Bog area.

With the exception of rock outcrops, all mineral formations in the area are covered by organic deposits. They essentially consist of peat, with occasional muck. The vertical extent of peat in Poplar Creek Bog, Haute Bog and Boggy River Bog generally ranges between 2 and 3 m, becoming shallower in the northeastern part of Haute Bog.

Some higher permeability and water-bearing lenses or layers may be found locally in the sand diamicton or near-shore sand and gravel deposits in the Poplar Creek Bog area. However, the existence of such lenses or layers has not been identified. Their extent and hydrogeological significance would likely be limited. Given the limited total overburden thickness, and the discontinuous nature of the overburden in the area surrounding Boggy River Bog and Haute Bog, the presence of water-bearing lenses or layers below the peat deposits is improbable.

Geological data from the area of interest indicate that the bedrock aquifer would be the primary regional aquifer. In the absence of the water-bearing formations in the Quaternary cover, the bedrock aquifer would act as the local aquifer as well.

4.1.1.1 Impacts on Soil Quality and Integrity

Construction

Natural soil in the area is composed mainly of peat. It is valuable for both ecological and economic reasons, and is therefore assigned a medium environmental value. The intensity of the impacts is strong, mostly due to tree clearing, access road and service area construction, which will cause compaction and drainage changes. There is also a possibility of contamination by hazardous materials and petroleum spills. The extent of the impact is site specific and limited to the peat field areas. The duration of the impact will be short because it is limited to the construction period. The significance of the impact is considered medium.

Operation

Considering the environmental value, intensity and extent of the impact to be the same as for the construction period, the intensity should now be considered as strong because the soil will first become drier and will be gradually removed layer by layer. Extent of the impact is site specific but duration becomes long, resulting in an impact of strong significance.

Application of proposed mitigation measures is expected to lead to a low residual impact, as detailed in Table 4. Peatland restoration and tree planting will restore plant cover and habitat, and will promote recovery of natural soil properties and functions, including peat accumulation.

A 50 cm layer of peat is usually left in place when harvesting stops. Workers will receive training in leak and spill prevention. The spill response measures included in the Emergency Protection Plan will be implemented as needed. Fuel tanks will be double-walled and installed on an impermeable liner. Refuelling will be limited to designated areas.

Table 4 Impact Assessment Summary

Environmental or Socio-Economic Component	Impact Sources	Description of the Impact	Component Value	Intensity of the Impact	Extent of the Impact	Duration of the Impact	Significance of the Impact (+ indicates positive impact)	Mitigation Measures	Residual Impact (+ indicates positive impact)
SOIL QUALITY AND INTEGRITY	Construction	Compaction and drainage of soil modifying its integrity. Potential hazardous material and petroleum spills.	Medium	Strong	Site specific	Short	Medium	- Worker training on leak and spill prevention - Use of certified double-walled fuel tanks installed on impermeable liners - Implementation of spill response measures (see Appendix K Emergency Protection Plan) - Limiting refuelling to designated areas	Low
	Operation	Soil becomes drier and is gradually removed by layer. Risk of hazardous material or petroleum spills.	Medium	Strong	Site specific	Long	Strong	- Progressive decommissioning - Leaving a layer of peat when field is abandoned - Worker training on leak and spill prevention - Use of certified double-walled fuel tanks installed on impermeable liners - Implementation of spill response measures (see Appendix K Emergency Protection Plan) - Limiting refuelling to designated areas	Low
WETLANDS	Construction	Alteration of integrity by tree clearing, access road and service area construction and drainage.	Medium	Strong	Site specific	Short	Medium	Progressive decommissioning	Low
	Operation	Alteration of integrity by draining and gradual removing of surface soils	Medium	Strong	Site specific	Long	Strong	Progressive decommissioning	Low
STANDING WATER	Construction and operation	This component should not be impacted by construction or operation phases.							
FLOWING WATER (Boggy River Bog only)	Construction	Modification of flow regime of runoff which may potentially reach the river.	Medium	Low	Site specific	Short	Very Low	- Sedimentation ponds - Overland flow discharge - Progressive decommissioning	Very Low
	Operation	Modification of flow regime of runoff which may potentially reach the river.	Medium	Low	Site specific	Long	Low	Progressive decommissioning	Very Low
DRAINAGE PATTERN	Construction	Creation of a new drainage pattern	Low	Low	Site specific	Short	Very Low	Progressive decommissioning	Very Low
	Operation	Creation of a new drainage pattern	Low	Low	Site specific	Long	Low	Progressive decommissioning	Very Low
SURFACE WATER QUALITY	Construction	Potential increase of the rate of suspended solids in river downstream caused by works of construction. Potential hazardous material and petroleum spills.	High	Medium	Site specific	Short	Low	- Sedimentation ponds - Overland flow - Use of silt fences or other measures to trap sediment - Floating booms - Worker training on leak and spill prevention - Use of certified double-walled fuel tanks installed on impermeable liners - Implementation of spill response measures (see Appendix K Emergency Protection Plan) - Limiting refuelling to designated areas	Low
	Operation	Potential increasing of the rate of suspended solids in river downstream peat lands exploitation. Potential hazardous material and petroleum spills.	High	Medium	Site specific	Long	Medium	- Progressive decommissioning - Sedimentation ponds - Overland flow - Use of silt fences or other measures to trap sediment - Floating booms	Low

Environmental or Socio-Economic Component	Impact Sources	Description of the Impact	Component Value	Intensity of the Impact	Extent of the Impact	Duration of the Impact	Significance of the Impact (+ indicates positive impact)	Mitigation Measures	Residual Impact (+ indicates positive impact)
								- Worker training on leak and spill prevention. - Use of certified double-walled fuel tanks installed on impermeable liners - Implementation of spill response measures (see Appendix K Emergency Protection Plan) - Limiting refuelling to designated areas	
GROUNDWATER REGIME (BEDROCK AQUIFER)	Construction and Operation	No impact is expected on this component.							
GROUNDWATER REGIME (PERCHED AQUIFER)	Construction	Modification of the drainage pattern which may potentially cause a Lowering of the surrounding groundwater	Low	Medium	Site specific	Short	Low	- Sedimentation ponds - Overland flow - Progressive decommissioning	Low
	Operation	Modification of the drainage pattern which may potentially cause a Lowering of the surrounding groundwater	Low	Medium	Site specific	Long	Medium	- Leaving a layer of peat when field is abandoned - Sedimentation ponds - Overland flow - Progressive decommissioning	Low
GROUNDWATER QUALITY (BEDROCK AQUIFER)	Construction and operation	No impact is expected on this component.							
GROUNDWATER QUALITY (PERCHED AQUIFER)	Construction and operation	Risk of hazardous material and petroleum spills.	Low	Low	Site specific	Long	Low	- Worker training on leak and spill prevention - Use of certified double-walled fuel tanks installed on impermeable liners - Implementation of spill response measures (see Appendix K Emergency Protection Plan) - Limiting refuelling to designated areas	Low
MICROCLIMATE	Construction	Increased diurnal fluctuation in soil and water temperatures, and drying of soil due to vegetation clearing.	Medium	Low	Site specific	Short	Very Low	None	Very Low
	Operation	Drying of soil due to soil stripping	Medium	Low	Site specific	Long	Low	Progressive decommissioning	Low
AIR QUALITY	Construction	Dust generation and greenhouse gas emissions	High	Medium	Site specific	Short	Low	- Using dust control measures - Controlling vehicle speed	Low
	Operation	Dust generation and greenhouse gas emissions	High	Medium	Site specific	Long	Medium	- Using dust control measures - Controlling vehicle speed - Covering trailers with tarps - Reducing peat stockpiles exposure to most frequent winds - Covering peat stockpiles - Progressive decommissioning - Frequent, stringent equipment maintenance	Low
TERRESTRIAL VEGETATION (Trees, shrubs, herbaceous plants, mosses, lichens)	Construction	Vegetation clearing	Low	Medium	Site specific	Short	Low	Progressive decommissioning	Low
	Operation	Vegetation clearing	Low	Medium	Site specific	Long	Medium	Progressive decommissioning	Low
AQUATIC VEGETATION	Construction	Potential change of water quality of Boggy River Bog.	Low	Low	Site specific	Short	Very Low	Progressive decommissioning	Low
	Operation	Potential change of water quality of Boggy River Bog.	Low	Low	Site specific	Long	Low	Progressive decommissioning	Low +

Environmental or Socio-Economic Component	Impact Sources	Description of the Impact	Component Value	Intensity of the Impact	Extent of the Impact	Duration of the Impact	Significance of the Impact (+ indicates positive impact)	Mitigation Measures	Residual Impact (+ indicates positive impact)
SPECIAL STATUS PLANT SPECIES	Construction	Vegetation clearing, water table lowering, risk of destruction of individuals or their habitat.	High	Very Strong	Site specific	Short	Strong	- Transplantation program - Modification of development plan – extension of buffer zone - Progressive decommissioning	Low
	Operation	Vegetation clearing, water table lowering, risk of destruction of individuals or their habitat.	High	Very Strong	Site specific	Long	Very Strong	- Transplantation program - Modification of development plan – extension of buffer zone - Progressive decommissioning	Low
LARGE MAMMALS	Construction	Disturbance by noise , traffic and human presence	Medium	Low	Site specific	Short	Very Low	Progressive decommissioning	Very Low
	Operation	Disturbance by noise , traffic and human presence	Medium	Low	Site specific	Long	Low	Progressive decommissioning	Very Low
SMALL AND BURROWING MAMMALS	Construction	Disturbance of individuals and destruction of their habitat	Low	Medium	Site specific	Short	Low	Progressive decommissioning	Very Low
	Operation	Disturbance of individuals and destruction of their habitat	Low	Medium	Site specific	Long	Medium	Progressive decommissioning	Low
BIRDS	Construction	Reduced habitat availability and disturbance of individuals.	Medium	Low	Site specific	Short	Low	- Avoiding opening of new fields during nesting season - Progressive decommissioning	Very Low
	Operation	Reduced habitat availability and disturbance of individuals.	Medium	Low	Site specific	Long	Medium	- Avoiding opening of new fields during nesting season - Progressive decommissioning	Low
AQUATIC BIOTA (FISH)	Construction and operation	No impact is expected on this component							
REPTILES AND AMPHIBIANS	Construction and operation	Destruction of habitat by tree clearing and draining	Medium	Medium	Site specific	Long	Medium	Progressive decommissioning	Low
SPECIAL STATUS FAUNA SPECIES	Construction and operation	This component should not be impacted by construction or operation phases							
IMPORTANT HABITAT	Construction and operation	This component should not be impacted by construction or operation phases							
SERVICES	Construction and operation	There are no public services present in the study area.							
LAND USE	Construction and operation	Change of use by development of the peatlands	Low	Medium	Site specific	Long	Medium +	Progressive decommissioning	Medium +
EMPLOYMENT	Construction and operation	Creation of permanent and seasonal jobs	High	Medium	Regional	Long	Strong +	None	Strong +
BUSINESS OPPORTUNITIES	Construction and operation	Increased sales of equipment and maintenance or other associated business.	Medium	Low	Regional	Long	Medium +	None	Medium +
INCOME	Construction and operation	New income available for Manitoba by collecting royalties.	Medium	Low	Regional	Long	Medium +	None	Medium +
SOIL USE	Construction and operation	Soil is gradually removed by layer	Medium	Strong	Site specific	Long	Strong (+)	Progressive decommissioning	Strong (+)

Environmental or Socio-Economic Component	Impact Sources	Description of the Impact	Component Value	Intensity of the Impact	Extent of the Impact	Duration of the Impact	Significance of the Impact (+ indicates positive impact)	Mitigation Measures	Residual Impact (+ indicates positive impact)
ROADS	Construction	Increase in local traffic.	Medium	Low	Local	Short	Very Low	None	Very Low
	Operation	Increase in local traffic by trucks transporting peat and potential road deterioration.	Medium	Low	Local	Long	Low	None	Low
NOISE	Construction and construction	No impact is expected on this component							
HUMAN HEALTH	Construction and operation	No impact is expected on this component							
PUBLIC PERCEPTION / WELL BEING	Construction and operation	There are no known concerns about peat lands in the population in general. No impact is expected.							
PUBLIC SAFETY	Construction	Increased traffic on roads increasing risk of accidents	High	Low	Local	Short	Very Low	- Obey speed limits and other rules - Install truck exit warning signs	Very Low
	Operation	Increased traffic on roads increasing risk of accidents	High	Low	Local	Long	.Low	- Obey speed limits and other rules - Install truck exit warning signs	Low
WORKER HEALTH AND SAFETY	Construction	Risk of injuries and exposure to dust and noise and potential contact with hazardous material and petroleum spills.	High	Medium	Site specific	Short	Low	- Using dust control measures - Providing worker safety equipment and training for workers - Implementation of emergency measures and plan (see Appendix K Emergency Protection Plan)	Very Low
	Operation	Risk of injuries and exposure to dust and noise and potential contact with hazardous material and petroleum spills.	High	Medium	Site specific	Long	Medium	- Using dust control measures - Providing workers safety training and equipment - Implementation of emergency measures and plan (see Appendix K Emergency Protection Plan)	Low
AESTHETICS	Construction and operation	There are no known concerns about peat lands in the population in general. No impact is expected.							
TOURISM	Construction and operation	No impact expected on tourism.							

4.1.2 Hydrology and Hydrogeology

4.1.2.1 Surface Drainage Patterns

Poplar Creek Bog is located within Lake of the Woods watershed. No distinct surface drainage pattern is evident within the bog, nor is Poplar Creek Bog connected to any surface water body or watercourse. Harrison Creek starts to flow intermittently about 650 m NW of the bog's western (upstream) end. It then flows to the north, away from the bog, for about 5 km, before bending east towards Lake of the Woods. The closest stream flowing downstream from Poplar Creek Bog starts its course about 2.3 km north of the bog's eastern end. A small lake lies about 1.4 km to the SW of the bog's southern edge. Based on local terrain conditions, no hydraulic connection exists between the lake and the bog.

Haute Bog and Boggy River Bog are located within the Boggy River watershed. The Boggy River flows towards the Birch River and, eventually, to the Whitemouth River. While no distinct surface drainage pattern is evident over most of Boggy River Bog, a small lake or beaver pond was identified at its eastern end. The pond discharges into an intermittent stream that runs through the bog towards the WNW until it reaches the edge of the bog, and then runs along its northwest limit until discharging into the Boggy River. The channel of Boggy River becomes well-defined about 2.5 km south of the bog, and flows in a northwesterly direction. It runs along the southwest edge of Boggy River Bog for a distance of about 550 m. Another intermittent stream flows south of Boggy River Bog, towards the west, and runs along the bog's edge for about 250 m before discharging into the Boggy River.

Topographical and vegetation features of the Boggy River Bog suggest that only a narrow strip of peatland running along both banks of the northern intermittent stream would actually contribute to runoff to the stream. The contributing area would more or less correspond to the minerotrophic strip lining the stream, while surface runoff contribution from the rest of the bog would be marginal.

No distinct surface drainage pattern exists within Haute Bog, and surface runoff is very limited. Boggy River flows at a distance of 400 m or more from the southwestern edge of Haute Bog. No direct hydraulic connection exists between the two, nor between Haute Bog and other water body or watercourse.

4.1.2.2 Importance of the Mine Sites to Regional Surface Runoff Hydrology

Given the fairly flat nature and type of plant cover of the surrounding terrain, little naturally-occurring runoff takes place on the surface of undisturbed areas. Therefore, only negligible surface runoff originating from undisturbed areas might reach the harvested sites. Any naturally occurring runoff from the surrounding areas will be intercepted by the peripheral ditch network.

The natural contribution of the future harvesting sites to regional surface runoff is likewise minor, as the regional hydrological regime is heavily controlled by precipitation and evapotranspiration processes. Natural surface runoff that may occur at the Poplar Creek Bog, Haute Bog and Boggy River Bog is controlled by local microtopography, and is essentially discontinuous in terms of both space and time. Poplar Creek Bog and Haute Bog are isolated from any stream.

The portion of runoff that may be discharged in the transition zone between the bog and the surrounding uplands is likely lost through evapotranspiration, although some infiltration in the peat may also take place. Therefore, natural runoff at Poplar Creek Bog and Haute Bog does not play a role in the surface runoff system at the regional scale.

As mentioned previously, a small portion of Boggy River Bog likely contributes to surface runoff towards the intermittent stream in the northern part of the bog. This portion would essentially be restricted to the minerotrophic strips running alongside the stream. Since no ditching or peat harvesting will take place in these minerotrophic parts of the bog, no alteration of the natural surface runoff pattern in the stream is expected.

Initiation of ditching and peat harvesting will result in collection of drainage water and surface runoff in the drainage network. Water discharged from the sedimentation pond outlets will spread into areas of flat topography in the neighbouring peatland. Diffuse sheet flow will occur on the peat surface, and porous medium flow within the acrotelm. The flow is expected to dissipate in a radial pattern from the point of discharge, decreasing in volume and intensity until no flow is observed at some distance from the outlet. Standing discharged water will thus become available for evapotranspiration and further infiltration in the peat deposit. Accordingly, drainage water from the mined fields will not reach the local surface drainage network. No significant change in the hydrology or hydrological regime of the neighbouring watercourses is expected.

Particular care is being taken in the planning of the drainage plan for Boggy River Bog, as intermittent and perennial streams flow close to or within its limits. No main ditch will be constructed in the vicinity of any stream, in order to maintain its natural hydrological functions. Drainage water and collected surface runoff will be directed towards the southern and eastern margins of the bogs. Water discharge at the network outlets will also be directed to the surrounding vegetated peatland in the form of overland flow. Because release points will be located several hundred meters from the closest stream, overland flow is expected to disappear before reaching any stream channel. Hence, no runoff discharge to streams from the bog drainage network is expected.

The incremental contribution of peatland runoff to the local watersheds related to peat development at Poplar Creek Bog, Haute Bog and Boggy River Bog was evaluated. This evaluation considered the conditions corresponding to the harvesting phase, once ditching has been completed. Table 5 details the respective areas of the three peatlands, as well as the total area of the watersheds in which the bogs are located. For Poplar Creek Bog, only the portions of the watershed within Manitoba discharging directly to the Lake of the Woods were considered; areas included in the Shoal Lake watershed or located in Ontario or Minnesota were excluded. The Birch River watershed was considered for Haute Bog and Boggy River Bog.

Table 5 Evaluation of the Overall Incremental Contribution of Peatland Runoff to the Local Watersheds

	Developed Area (ha)	Watershed	Watershed Area (ha)	Total Bog Area – Watershed (ha)	Lumped Incremental Peatland Runoff (mm/y)
Poplar Creek Bog	425	Lake of the Woods (MB)	97,370	32,230	1.8
Haute Bog	525	Birch River	120,714	40,475	1.8
Boggy River Bog	180				0.6

The results show that the additional water input of 137 mm/y from Poplar Creek Bog, Haute Bog and Boggy River Bog would represent incremental runoff contributions of 1.8 mm, 1.8 mm and 0.6 mm, respectively, from the bogs to the corresponding watersheds. It is worth emphasizing that these estimates represent conservative figures; the actual additional water input to the two watersheds would likely be smaller, because of generally smaller equivalent runoff coefficients. As stated previously, the additional water input is expected to dissipate through evapotranspiration and infiltration.

4.1.2.3 Impacts on Surface Water Bodies and Drainage Patterns

Wetlands

Construction

In addition to their role in biodiversity and regulation of surface water, wetland ecosystems are generally protected by legislative or regulatory measures. A medium environmental value is assigned to this component. Tree clearing, access road and service area construction will alter the present ecosystem, resulting in impacts of strong intensity but limited area. The extent of the impact is site specific, and is limited to the peat field area and surrounding area. The duration of the impact will be short because it will be limited to the period required for tree clearing and construction of access roads and service areas. The significance of the impact is considered medium.

Operation

Retaining the same environmental value, the intensity of the impact should now be considered as strong, assuming that wetlands will be greatly changed by the effects of draining and peat harvesting. It is important to clarify that this change is limited to the harvestable peat fields and surrounding drainage ditches, because water drained from the peat fields is returned to the surrounding wetland. The extent of the impact is site specific and its duration will be long, resulting in an impact of strong significance.

Application of proposed mitigation measures is expected to lead to a low residual impact. All three of the proposed progressive decommissioning options, peatland restoration, tree planting and creation of open water bodies, will lead to a return of wetland conditions and habitat over most of the affected area.

Standing Water Bodies

No standing water bodies will be directly impacted at either Poplar Creek Bog or Haute Bog. Boggy River Bog has a small lake, which should not be impacted by the construction or operational phases.

Flowing Watercourses

As peat fields are drained, peat storage water will discharge to the ditches and flow towards the bog's outlets. Interventions to the peatlands surface will create conditions more favourable to surface runoff generation than the natural conditions. Peat field drainage through ditching will nevertheless induce significant water table lowering in the peat deposits, which will result in significantly greater pore storage availability in the peat fields. The actual absorption capacity of the peat deposits is likely to increase, and only specific hydrologic conditions (spring snowmelt, intense rainfall events, or rainfall events following important peat recharge events) are expected to induce surface runoff (Gemtec Limited 1993, Shantz and Price 2006a).

No drainage water or surface runoff from one bog or the other will discharge to any local watercourse. The natural hydrological regime of downstream watercourses will therefore be preserved, and no modification is expected on spring freshet magnitude or timing. The same conclusion can be extended to peak flow and peak flow timing associated with rainfall events. As a consequence, peat development projects will not have any impact on the erosion and deposition processes taking place in watercourses downstream from the sites.

In the case of Poplar Creek Bog and Haute Bog, no stream is present within or in the vicinity of the bogs. No drainage water or surface runoff will reach any watercourse. No impact is anticipated.

Potential impacts on flowing water are possible for the intermittent stream flowing through Boggy River Bog. Drainage of neighboring peat fields may reduce natural water discharge from groundwater resurgence and/or surface runoff. To reduce this potential impact, localized drainage is planned to minimize alteration of the natural hydrological functions of the stream. No main ditch will be dug near the stream, nor will there be any encroachment on the minerotrophic strips bordering the stream.

Construction

For Boggy River Bog, a medium environmental value is assigned to this component because the intermittent stream plays a role in the functioning of the ecosystem. The intensity of the impact is low, as drainage planning and infrastructure construction will limit modification of the hydraulic conditions and natural state of the surfaces (vegetation, topography) in the vicinity of the stream. The extent of the impact is site specific, and is limited to the peat fields and the area surrounding the stream. The duration of the impact will be short because it will be limited to the period during which tree clearing and construction of access roads and service areas take place. The significance of the impact is considered very low.

Operation

Considering the environmental value, intensity and extent of the impact to be the same as for the construction phase, the duration will now be long, resulting in an impact of low significance.

Drainage Pattern

Construction

A low environmental value is assigned to drainage because the drainage network is not developed in the area of proposed development. Considering that all drainage water will be discharged to surrounding natural areas as overland flow, and that no ditches will direct drainage water into existing watercourses, the intensity of the impact is low, and its extent is site specific, i.e., limited to the peat field area and surrounding area. The duration of the impact will be short because the impact will be limited to the period of tree clearing, construction of access roads and service areas. The significance of the impact is considered very low.

Operation

Using the same environmental value, intensity and extent of the impact, the duration will be long, resulting in an impact of low significance.

4.1.2.4 Baseline Limnological and Surface Water Quality Data for Receiving Waters

Water samples from the upper portion of the soil profile were collected at three locations in and around Poplar Creek Bog in January 2010. Samples PC1, PC2 and PC3 were collected in the northwestern part of the bog, at the outer edge of the lagg southwest of the bog, and about 500 m from the bog's northwestern edge, respectively (Map 7). The latter is considered to be upstream and outside of the bog's zone of influence. Note that the area sampled is entirely overlain by organic deposits, and that the water table in the deposits was very close to or at ground surface at the time of sampling.

A clear acidity gradient appears between the sampling locations, as chemical analysis yielded pH values of 4.1, 6.4 and 7.0 for samples PC1, PC2 and PC3, respectively (Appendix E). Total CaCO_3 alkalinity and bicarbonate (HCO_3) results exhibit the same trend. While conductivity data measured at PC1 and PC2 were approximately the same (57 versus 53 $\mu\text{mho/cm}$), conductivity measured at PC3 was significantly higher (256 $\mu\text{mho/cm}$). Analysis of metal concentrations was also carried out. An increasing trend in metal concentrations between samples PC1, PC2 and PC3 is observed for 26 of the 35 metals analyzed. Six other metal species were not detected in any of the three samples. Such results validate the ombrotrophic nature of the bog, while sampling location would be influenced by more mineralized waters.

Results of major cations Ca, K, Mg and Na, as well as anion P, are given in Table 6.

Table 6 Chemical Analysis Results for Major Ions in Soil Water Samples

	<i>PC1 Bog Area</i>	<i>PC2 South of Bog</i>	<i>PC3 North of Bog</i>
Ca (mg/l)	1.86	11	107
K (mg/l)	0.44	0.3	3.61
Mg (mg/l)	1.72	4.15	32.7
Na (mg/l)	1.15	4.15	7.39
P (mg/l)	<0.002	0.28	1.53

Analytical results from Poplar Creek Bog (Appendix E) were compared with water quality criteria defined by the CCME (2007). Ammonia concentrations recorded at PC1 (northwestern part of the bog) and PC3 (500 m away from the bog's northwestern edge) both exceeded the CCME criterion for ammonia by close to an order of magnitude. The ammonia concentration recorded at PC2 (outer edge of the transition zone, southwest of the bog) was below detection limits. Total suspended solids concentrations for the three samples exceed the CCME criterion, but this may be due to sampling conditions. While the metal content in the bog water is generally low, the CCME criteria for iron, lead and selenium were exceeded at the three sampling points. In addition, copper concentrations exceeded the CCME criterion for copper at sampling points PC2 and PC3. The water sample collected at PC3 also exceeded the CCME criteria for aluminum and zinc. On the other hand, pH values at sampling locations PC1 and PC2 were below the lower CCME threshold value, while the pH measured at PC3 was within the recommended interval.

Surface Water Quality

Peat harvesting does not involve use of chemicals or other hazardous material except for petroleum products for equipment. 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 will likely exhibit a certain acidity, especially for drainage water.

Sedimentation ponds and water discharge in the form of overland flow to adjacent undisturbed vegetated lands are two mitigation measures that proved to be efficient at limiting impact on water quality. They have been designed and tested at many harvested peatlands in New Brunswick. They trap peat particles that could otherwise be discharged to the surrounding environment.

Construction

Boggy River Bog and Haute Bog discharge into the Birch River watershed, and Poplar Creek Bog discharges into the Lake of the Woods watershed. No impact is anticipated for the City of Winnipeg water source at Shoal Lake. No drainage water or surface runoff from any bog will discharge to a watercourse, and outflow release points will be located at least 200 m from the nearest stream.

A high environmental value is assigned to surface water quality, even though there are no domestic or larger water intakes in the vicinity of any of the three sites. As a result of the high environmental value, the intensity value corresponding to a low degree of disturbance is medium. The extent of the impact is site specific, i.e., limited to the peat fields and areas where the outflow will be released to the surrounding vegetated lands. The duration of the impact will be short because it will be limited to the initial period of field opening, ditching operations, construction of access roads and service areas. The significance of the impact is considered low.

Operation

Using the same environmental value, the intensity of the impact is still medium. Extent of the impact is site specific and the duration will be long, resulting in an impact of medium significance. Mitigation measures targeting water, sediment and management of suspended solids will be implemented, resulting in a low residual impact.

Mitigation measures are not generally required for impacts of low significance. Nevertheless, industry-standard practices for erosion control, including use of silt fences or other measures to trap sediments, and floating booms in temporary or permanent sedimentation ponds, will further reduce impacts on surface water quality during both the construction and operation phases. In addition, measures related to leak and spill prevention, including worker training, use of certified double-walled fuel tanks installed on an impermeable liners, implementation of spill response measures from the Emergency Protection Plan, and limiting refuelling to designated areas will be applied to further reduce the significance of possible impacts during both the construction and operation phases. Residual impacts following application of the mitigation measures are expected to be of low significance.

4.1.2.5 Groundwater Conditions

Groundwater is present throughout the entire local stratigraphic sequence. However, the various geological formations exhibit different hydrogeological behaviour. In the peat deposits, the acrotelm permeability is several orders of magnitude higher than that of the catotelm. Hence, in saturated to nearly-saturated conditions, water flow mainly occurs within the acrotelm. Field observations have however shown that the natural water table elevation in the peat deposit was at or near the acrotelm-catotelm interface under drier conditions, which are expected to predominate. Significant water flow in the acrotelm would essentially be limited to periods following recharge events. 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 northeastward in the Poplar Creek Bog area, while it is generally oriented westward in the Boggie River Bog and Haute Bog area.

Silt diamicton and glaciolacustrine silt 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 silt diamicton or glaciolacustrine silt, as inhibition of downward surface water movement through underlying low permeability sediments (tills, offshore glaciolacustrine sediments) is a requirement for the development of peat bogs (SRGMP group 2009). Hence, the peat deposit essentially behaves as a closed groundwater system, independent from the bedrock aquifer.

Intrusive and metamorphic rocks forming bedrock are generally fractured (SGRMP group 2009). Most groundwater movement in the bedrock aquifer occurs along the fractures (joints, shears and faults) that pervade the rock mass, as these fractures represent zones of significantly higher porosity and permeability than the surrounding unfractured rock mass (Betcher et al. 1995). Large variations in fractures patterns, openings and degree of connectivity is however found on both local and regional scales, which in turn imply that hydraulic conductivity of the bedrock is equally variable (Betcher et al. 1995).

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 mineral overburden cover. Groundwater discharges occur into adjacent sediment or water-filled depressions (watercourses) (Betcher et al. 1995). Recharge rates to the bedrock aquifer are very low, as Thorne and Gascoyne (1993) estimated recharge to the granitic bedrock to be less than 5 mm/yr at a research site near Lac du Bonnet (Betcher et al. 1995). This estimated recharge rate indicates that groundwater flow in the bedrock aquifer would be fairly low.

Local geological and topographical data suggest that groundwater within the bedrock aquifer in the Poplar Creek Bog area would flow towards the southeast, from a recharge zone located between 15 and 20 km northwest of the bog. Bedrock in this zone is located at or near ground surface. Lake of the Woods would likely be the regional groundwater discharge area for the bedrock aquifer. Groundwater flow in the Boggy River Bog and Haute Bog area would likely be oriented towards the west. Zones of outcropping bedrock and thin mineral overburden located at the eastern edges of the bogs would act as the local recharge area. Downstream from these sites, groundwater in the bedrock aquifer would likely flow in a direction parallel to Boggy River.

Regional groundwater quality data for the Precambrian bedrock aquifer indicate that total dissolved solids concentrations are low (Betcher et al. 1995). Elevated concentrations of uranium and radium have been found in groundwaters from the Precambrian rock aquifers in parts of southeastern Manitoba (Betcher et al. 1995). Most of the bedrock wells where elevated uranium/radium concentrations had been measured were however drilled in a specific geological formation that is not present in the project area. Fluoride concentrations in exceedance of the Maximum Acceptable Concentration (MAC) of Health and Welfare Canada (1993) are occasionally found in groundwater from Precambrian rocks in southwestern Manitoba (Betcher et al. 1995).

No domestic nor municipal well is known to exist within a 10 km radius of Poplar Creek Bog or Boggy River Bog. Haute Bog lies 7 km south of the closest dwellings and water supply wells, which are located in the town of Falcon Lake. A portion of these wells withdraw water from a formation of glaciofluvial deposits which is not present in the Haute Bog area.

The remainder is installed in the Precambrian bedrock. They are however located in a different (groundwater) watershed than that of Haute Bog, hence precluding any hydraulic connection between groundwater flowing in the two areas.

4.1.2.6 Impacts on Groundwater

Groundwater Regime

The two types of groundwater considered are:

- Groundwater of the local aquifer, which is contained within the Precambrian 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.

Ditching and drainage activities will result in the lowering of the water table in the harvested peat deposits. The lowering of the water table will take place during the construction phase, and will be kept at a low level locally throughout the harvesting phase. The water table drop will not extend more than about 15 to 30 meters beyond the harvested area, as the majority of the peat deposits (catotelm) have a low hydraulic conductivity. A slight local rise in the level of the surficial water table is expected at the drainage network release points, due to greater infiltration resulting from increased water availability.

Construction

A low environmental value is assigned to this component considering its general characteristics. The intensity of the impact is strong, as induced drainage will result in a significant lowering of the peat water table. The extent of the impact is site specific, and is limited to peat field areas and an outer fringe of about 15 to 30 meters. The duration of the impact will be short because it will be limited to the ditching and initial drainage phases. The significance of the impact is considered medium.

Operation

Using the same environmental value, the intensity of the impact remains strong, mainly because the presence of drainage ditches will maintain a low water table level in the peat deposits throughout the operation phase. The extent of the impact is site specific and the duration will be long, resulting in an impact of strong significance.

Any peat remaining after harvesting has ended will remain saturated, and will maintain a perched water table on the harvested sites. Mitigation measures that are primarily intended to mitigate impacts related to surface water, such as construction of sedimentation ponds and discharge of water from the pond outlets as diffuse overland flow, also assist in returning water to the perched aquifer. Progressive decommissioning will lead to recovery of the surficial groundwater table as certain ditches are blocked and open water bodies are created. It is expected that the residual impact following application of these measures will be low.

Groundwater Quality

No hydraulic connection exists between the peat deposits and the underlying bedrock. Accordingly, no impact is expected on water quality in the bedrock aquifer.

Water quality in the surficial (peat) aquifer could be potentially affected by accidental petroleum spills during the construction and operation phases. The environmental value of this component is low, and the intensity of the impact from a petroleum spill would be low. Extent of the impact would be site specific, limited to the location of the spill. The duration of the impact would depend upon the types of clean-up and restoration procedures implemented. For the purposes of the current assessment process, the duration is considered to be long, in order to be more conservative. The resulting significance of impacts is low.

Mitigation measures are not generally required for impacts of low significance. Nevertheless, measures related to leak and spill prevention, including worker training, use of certified double-walled fuel tanks installed on a impermeable liners, implementation of spill response measures from the Emergency Protection Plan, and limiting refuelling to designated areas will be applied to further reduce the significance of possible impacts during both the construction and operation phases.

4.1.3 Climatology

From a general standpoint, peat bogs influence global climate by storing carbon and reducing the greenhouse effect (Chapman 2002). Peat is made of plant debris that contain carbon. For a peat accumulation rate of 1 mm/yr, the carbon capture rate is 68 g/m²/yr (Rydin and Jeglum 2006). 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 and Gautreau-Daigle 2001). The impact of the proposed project will be mitigated by the progressive decommissioning options, mainly tree planting and peatland restoration, which will resume carbon storage as wood and peat. Moreover, the harvested peat may likely be used for tree production, since every year over 150,000,000 trees that contribute to Canada's reforestation efforts start in Jiffy pellets. Hence, no impact is expected on global climate.

4.1.3.1 Monthly Meteorological Statistical Data

Poplar Creek Bog, Haute Bog and Boggy River Bog are located in the continental sub-humid climatic zone, which is characterized by marked temperature and precipitation contrasts between summer and winter. The bogs are positioned in an intermediate position between meteorological stations Sprague (ID 5022760) and Falcon Lake TCPL (ID 5030912). Accordingly, meteorological data from both stations, recorded between 1971 and 1998 (for Sprague) and 1997 (for Falcon Lake) are averaged to yield a more accurate picture of the prevailing conditions at the sites.

Mean yearly temperature is approximately 2.2 °C at the sites. Mean, minimum, and maximum temperatures for July are 18.7 °C, 12.0 °C and 25.4 °C, respectively. Mean, minimum and maximum temperatures for January are -17.9 °C, -24.1 °C and -11.6 °C, respectively. Overall precipitation fluctuates significantly through the year. Winter exhibits the lowest precipitation, while the end of spring and beginning of summer is the wettest period of the year.

February is generally the driest month, with total precipitation of 19 mm water equivalent (17.5 mm water equivalent in the form of snow and 1.5 mm in the form of rain). June is the wettest month, with total precipitation reaching about 94 mm, falling exclusively in the form of rain.

Details of the average monthly temperatures and precipitation are given in Table 7.

Table 7 Average Monthly Temperatures and Precipitation in the Study Area

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Temperature												
Daily Mean (°C)	-17.9	-13.8	-6.0	3.4	11.3	16.1	18.7	17.4	11.5	5.1	-5.5	-14.8
Daily Maximum (°C)	-11.6	-7.1	0.3	10	18.6	22.9	25.4	24.2	17.9	10.5	-0.9	-9.4
Daily Minimum (°C)	-24.1	-20.3	-12.2	-3.4	3.9	9.3	12.0	10.4	5.0	-0.5	-9.9	-20.2
Precipitation												
Rainfall (mm)	0.1	1.5	6.7	22.6	59.5	93.6	91.9	73.5	62.9	39.6	8.2	0.8
Snowfall (cm)	26.3	17.5	17.3	7.0	0.5	0	0	0	0.2	5.0	26.3	25.1
Total (mm water equivalent)	26.4	19.0	23.9	29.6	60.0	93.6	91.9	73.5	63.0	44.6	34.5	25.9

Impacts on Microclimate

Peatlands influence microclimate conditions in two ways. First, peatland vegetation determines the albedo and is responsible for evapotranspiration; both result in localized cooling effects (Rydin and Jeglum 2006). 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. These impacts are site specific. Re-establishment of peatland vegetation, tree cover and overall bog conditions following progressive rehabilitation will return harvested sites to pre-development conditions in terms of micro-climate.

Construction

In the context of this impact assessment, microclimate is considered at the scale of the peat bogs. This component of the environment is assigned a medium environmental value for its role in peatland ecosystem regulation. The intensity of the impacts is low, and will be due mostly to tree clearing, access road and service area construction, which will slightly modify the microclimate by increasing diurnal soil and water temperature fluctuations. Extent of the impact is site specific and limited to the peat field area. The duration of the impact will be short because it will be limited to the construction work period. The significance of the impact is considered very low.

Operation

Using the same environmental, intensity and extent values as above, the duration becomes long, resulting in an impact of low significance. The residual impact following the application of mitigation measures is likewise low.

Impacts on Air Quality

Peat dust generation is an important concern for air quality; harrowing, vacuum harvesting, peat handling and transport are all potential sources of peat dust. Exhaust emissions from equipment are another impact, but to a lesser degree.

The Canadian peat industry has developed management practices and equipment to reduce emissions of peat particles because peat harvesting operations are often located close to populated areas, especially in New Brunswick and Quebec. Leaving forested buffer zones, stopping harvesting in windy conditions, using vacuum harvesters equipped with dust collection systems, and avoiding idling engines are mitigation measures aimed at reducing air quality impacts that have become standard practices for the Canadian peat industry.

Construction

Considering the importance of this component for the ecosystem and quality of life in general and considering also the legislative or regulatory measures protecting it, a high environmental value is considered for this component. The intensity of the impacts is medium and is due primarily to dust generation. However, the fact that there are no residences or human activities close to the project area is also considered. The extent of the impact is site specific and is limited to the peat field area. The duration of the impact will be short, limited to periods of tree clearing and construction of access roads. The significance of the impact is considered low.

Operation

Using the same environmental value, the intensity of the impact is medium considering that dust is generated. The extent of the impact is site specific. The duration of the impact will be long. The significance of the impact is considered medium.

Impacts on air quality during the operational phase will be mitigated by applying dust control measures; controlling vehicle speed; covering trailers with tarps; reducing exposure of peat stockpiles to wind, and covering the stockpiles; peatland rehabilitation; and frequent, stringent equipment maintenance. Most impacts on air quality are generated by the operations themselves, and will stop when harvesting activities end. However, progressive decommissioning will result in the re-establishment of a plant cover that will stabilize bare peat surfaces and prevent further dust generation. The residual impact has a low significance.

4.2 BIOLOGICAL ENVIRONMENT

Poplar Creek Bog, Haute Bog and Boggy River Bog belong to the Lake of the Woods Ecoregion of the Boreal Shield Ecozone (Smith et al. 1998). Description of the biological environment of the project sites is mainly based on recent biological studies conducted in this Ecoregion. A plant survey was conducted on half of Poplar Creek Bog in June and August 2009; the other half could not be covered due to access problems, but will be completed in 2010. The preliminary plant survey report is presented in Appendix F. The final report will be submitted to Conservation Manitoba in the fall of 2010.

Wildlife surveys will be conducted in Poplar Creek Bog in 2010, prior to any surface disturbance or preliminary drainage of the harvesting area, except for an access trail. The purpose of the surveys will be to document the fauna inhabiting the project sites, and to confirm the presence or absence of any rare species within the project sites. The results will be forwarded to Manitoba Conservation to meet license issuance requirements.

Haute Bog and Boggy River Bog are remote peatlands that cannot be accessed to conduct plant and wildlife surveys. They will be surveyed when an access road is constructed, and prior to any peat development. At this time, a report will be prepared and submitted to Manitoba Conservation for approval of the license.

4.2.1 Vegetation

Characteristic vegetation of the Lake of the Woods Ecoregion includes a succession from quaking aspen, white birch, and jack pine to white spruce, black spruce, and balsam fir. Warmer portions of the Ecoregion support red and eastern white pine. Cooler and wetter sites support black spruce and tamarack. Peatlands are the predominant feature of the Whitemouth Ecodistrict. Black spruce forest stands with Labrador tea, bog rosemary and *Sphagnum* mosses dominate in bogs. Fen plant communities are characterized by grassy vegetation (sedges, reeds) and brown mosses, along with tamarack and shrubs such as willow and dwarf birch.

Poplar Creek Bog supports black spruce–*Sphagnum* communities. The black spruce (*Picea mariana*) on *Sphagnum* community covers about 90% of the bog. This plant community is more or less densely treed by black spruce and shows frequent wind-thrown trees. It includes ericaceous shrubs (*Rhododendron groenlandicum*, *Vaccinium* spp. and *Kalmia polifolia*) and an almost continuous moss carpet principally composed of *Sphagnum* mosses.

The second plant community, black spruce–tamarack–*Sphagnum*, covers 10% of the area at the west end of the bog. In this section, black spruce grows along with tamarack (*Larix laricina*), and dwarf birch (*Betula pumila* var. *glandulifera*) is commonly present with ericaceous shrubs.

According to aerial photos and visual observations, Haute Bog and Boggy River Bog seem to support plant communities similar to that of Poplar Creek Bog.

4.2.1.1 Impacts on Peatland Vegetation

Peat harvesting involves clearing of trees and all peatland vegetation from operation areas, which results in an important impact at site level. Southeastern Manitoba bogs are characterized by homogenous vegetation communities with low diversity. There will be no loss of exceptional tree stands or specific habitats, except for a few populations of special status species that are addressed separately. In general, tree planting, peatland restoration and open water body creation will ensure the recovery of the same plant communities that exist at present. Hence, residual impacts are expected to be low.

Construction

This component is assigned a low environmental value considering that no particular forest stand, plant communities or habitat is present in the study area. Present forest stands are widespread in the region, their commercial value is low, and cutting does not affect their regional integrity. Intensity of the impact is medium, extent of the impact is site-specific, and duration will be short, limited to the period of land clearing. The significance of the impact is low.

Operation

Considering the environmental value, intensity and extent of the impact to be the same as for the construction period, the duration of the impact is now long and its significance is medium.

4.2.2 Aquatic Vegetation

Construction

Considering the relative absence of lakes and watercourses within the development areas and the nature of the work to be performed, very few areas of aquatic vegetation should be affected. This component is assigned a low environmental value. Species and plant communities found in the study area are common in the region, and cutting does not affect their regional integrity. Intensity of the impact is low, extent of the impact is site specific, and duration will be short. The significance of the impact is very low.

Operation

Considering the environmental value, intensity and extent of the impact to be the same as for the construction period, the duration of the impact is now long and its significance is low.

Considering that progressive decommissioning involves the creation of open water bodies which will result in increased habitat diversity, the residual impact will be low but positive.

4.2.3 Special Status Plant Species

The Manitoba Conservation Data Centre does not have information regarding the occurrence of plant species at risk in Poplar Creek Bog. The response to our request for information is presented in Appendix G. The rare plant occurrences reported for the region belong to species not usually found in wetlands.

However, the plant survey did reveal the presence of rare plant species in Poplar Creek Bog. Five populations are located outside the development area, one to the north, four to the south, and two within the development area (Map 7).

One population of the drooping sedge (*Carex crinita*), a plant considered very rare in Manitoba that may be especially vulnerable to extirpation (S1), is present in the black spruce–*Sphagnum* community. The calopogon (*Calopogon tuberosus*), noted at station 15, is also present in the same community. This species is considered rare in Manitoba and may be vulnerable to extirpation (S2). It is not abundant, but rather scattered in the black spruce–*Sphagnum* community. The dragon's mouth (*Arethusa bulbosa*) and the ragged orchid (*Platanthera lacera*), two plants considered rare in Manitoba, have also been found in the tamarack–black spruce–*Sphagnum* community. The dragon's mouth has been observed in the southern channel bordering the bog, at three stations. It is thus clearly associated with the black spruce–tamarack–*Sphagnum* community. A small population of the ragged orchid has also been found north of Poplar Creek Bog.

Two other plants ranked as rare but of uncertain status in Manitoba (S2?) were also observed during the vegetation survey. The white cotton-grass (*Eriophorum scheuchzeri*) is not abundant, but rather frequent in all plant communities, while the green adder's-mouth (*Malaxis unifolia*) has been encountered in the black spruce–tamarack–*Sphagnum* community south of the bog.

All of these species are principally found in swamps, bogs or fens, and are rather common throughout their range, but rare in Manitoba. Drooping sedge, calopogon, dragon's mouth, ragged orchid and green adder's-mouth all share about the same range in North America and reach their northwestern limit of distribution in Manitoba. White cotton-grass is widespread all over northern North America, from Labrador to Alaska, but is apparently rare in Manitoba.

4.2.3.1 Impacts on Special Status Plant Species

Construction

A high environmental value is assigned to this component because there is a consensus in the scientific community that special status species should be conserved or protected.

Vegetation clearing, water table lowering, and other construction activities will strongly affect individuals or habitat of drooping sedge, calopogon, and white cotton-grass, resulting in impacts of very strong intensity. Extent of the impact is site specific. The duration of the impact for the construction phase will be short. The significance of the impact is considered strong. Appropriate mitigation measures are described below. Application of these mitigation measures is expected to result in a low residual impact for the construction phase.

Operation

Considering the environmental value, intensity and extent of the impact to be the same as for the construction period, duration of the impact is now long and its significance is very strong.

Jiffy intends to apply specific mitigation measures to address rare plant species. A transplantation program will be developed in collaboration with specialized organizations, such as the Manitoba-based Native Orchid Conservation Inc., to help preserve some plant populations of drooping sedge, calopogon, and white cotton-grass, which grow in the developed area. This program would include a monitoring plan for remaining rare plant populations of dragon's mouth, ragged orchid, green adder's-mouth located in the buffer zone. Jiffy has also modified development plans for Poplar Creek Bog development to limit impacts on plant populations located outside the operational zone. No main ditches will be excavated within 30 m of any rare species found outside the developed area. Application of these mitigation measures is expected to result in a low residual impact for the operation phase.

4.2.4 Mammals

Characteristic mammals of this ecoregion include moose (*Alces alces*), black bear (*Ursus americanus*), wolf (*Canis lupus*), lynx (*Lynx canadensis*), snowshoe hare (*Lepus americanus*), and woodchuck (*Marmota monax*). Based on studies conducted in the area, at least 22 species of terrestrial mammals could use the project sites (Hatch 2007, Krindle 1994; see Appendix H).

Hatch (2007) recorded 17 species in Sprague Lake Bog, Caribou Southwest Bog, and Northwest Angle Bog, which lie near the project sites. All species listed are common in Manitoba. Krindle (1994) reported the presence of 10 mammalian species on Whitemouth Lake Island, a few kilometers southwest of the project sites. Among those are red squirrel (*Tamiasciurus hudsonicus*), muskrat (*Ondatra zibethicus*), American beaver (*Castor canadensis*), river otter (*Lontra canadensis*), and white-tailed deer (*Odocoileus virginianus*). These species are likely to use the project sites as well. One of the species identified by Krindle (1994), the northern red-backed vole (*Clethrionomys rutilus*) is probably absent from the project sites as its known range is located farther north (Banfield 1977).

The impacts of the proposed peatland development will be different for large and small mammals. Large mammals cover large territories, and one particular peatland represents a fraction of their habitat, which they will avoid for the time it is in operation. The same peatland likely includes several small mammal territories that will be destroyed; some individuals may even perish. However, large mammals have a higher value than small mammals. In the long term, application of mitigation measures, namely progressive decommissioning, will ensure recovery of the existing habitat, and residual impact is expected to have a low significance.

Large Mammals

Construction

The main species that frequent the area are sought by hunters, and their populations may be subject to management plans. This component is assigned a medium environmental value. The intensity of the impact is low because it is limited to disturbance by noise and traffic generated by the work, and considering the fact that animals can move to avoid these impacts. Extent of the impact is site specific. The duration of the impact for construction phase will be short. The significance of the impact is considered very low.

Operation

Considering the environmental value, intensity and extent of the impact to be the same as for the construction period, duration of the impact will be long and its significance is low.

Small and Burrowing Mammals

Construction

A low environmental value is assigned to this component considering that no special status species are found, and that this type of ecosystem does not offer good habitat for many species. Impacts are expected mostly due to tree clearing, access road and service area construction, which will disturb individuals or their habitat. The intensity of these impacts is medium. Extent of the impact is site specific, and is limited to the peat fields and surrounding areas. The duration of the impact will be short because the tree clearing, construction of access roads and service areas will take place within a short period of time. The significance of the impact is considered very low.

Operation

Considering the environmental value, intensity and extent of the impact to be the same as for the construction period, the duration will be long, resulting in an impact of low significance.

4.2.5 Birds

At least 17 waterfowl species and 22 other aquatic bird species are present in the region (Krindle 1994, Hatch 2007; see Appendix H). In Boggy River Bog, one small beaver pond, the meandering stream connecting it to Boggy River, and a second stream draining the bog into Boggy River represent a possible breeding habitat for waterfowl species such as the green-winged teal (*Anas crecca*) and ring-necked duck (*Aythya collaris*) (Terres 1991). Haute Bog and Poplar Creek Bog consist exclusively of woodland vegetation, and do not provide suitable habitats for waterfowl and other aquatic birds.

Conversely, several land birds are likely to inhabit the forest habitats of all three project sites. At least 80 forest bird species and 13 raptor species have been recorded in the region (Krindle 1994, Hatch 2007; see Appendix H). Common species of land birds that inhabit black spruce-*Sphagnum* communities, which are the main habitat present at the project sites, include bay-breasted warbler (*Dendroica castanea*), yellow-rumped warbler (*Dendroica coronata*), Tennessee warbler (*Vermivora peregrina*), and ruby-crowned kinglet (*Regulus calendula*) (Poole 2010).

4.2.5.1 Impacts on Birds

Jiffy will avoid development of new peat fields during the nesting season whenever possible as a specific mitigation measure to protect birds. This measure will prevent the loss of eggs and chicks. The main impact on birds will be the loss of habitat for the period a particular zone is in operation, which ranges from 19 to 23 years depending on the bog in question. After this period, tree planting and peatland restoration will begin, a process that will lead to restoration of pre-development conditions and habitats.

Construction

A medium environmental value is assigned to this component considering the potential absence of protected species. The intensity of the impact is low, given that development of the bogs may disturb individuals, and will reduce the availability of bird habitat. However, this type of habitat is still widespread in the region. Extent of the impact is site specific, limited to peat fields and surrounding areas. The duration of the impact will be short because the tree clearing, construction of access roads and service areas will take place within a short period of time. The significance of the impact is considered low.

Operation

Considering the environmental value, intensity and extent of the impact to be the same as for the construction period, the duration will be long, resulting in an impact of medium significance.

Application of proposed mitigation measures, namely peatland restoration and tree planting, is expected to lead to a low residual impact.

4.2.6 Fish

Poplar Creek Bog and Haute Bog consist of terrestrial habitats only. Therefore, these two sites do not contain any potential habitat for fish, and no impacts should be noted.

The beaver pond at the west end of Boggy River Bog drains westward through a *Carex-Sphagnum* stream into Boggy River (Bannatyne 1980). These components of the hydrological network may support fish populations similar to those inhabiting the Boggy River. Department of Fisheries and Oceans Canada (DFO) mention that the area received little sampling effort, so limited information is available on fish presence (Todd Schwartz, DFO, personal communication, February 15, 2010). However, fish species such as blackside darter (*Percina maculata*), central mud minnow (*Umbra limi*), johnny darter (*Etheostoma nigrum*), western blacknose dace (*Rhinichthys obtusus*) and white sucker (*Catostomus commersonii*) were captured in the Boggy River in 2003, about 15 km downstream of Boggy River Bog. Other species sampled in the region are presented in Appendix H. The DFO draft fish habitat classification maps indicate that the stream crossing Boggy River Bog and the Boggy River are classified as Type A habitats for fish. However, drainage water from the developed area will not discharge into this watercourse, so no impact is expected.

4.2.6.1 Impacts on Fish

No impact on fish is expected during the construction, operation or decommissioning phases.

4.2.7 Amphibians and Reptiles

Based on the online distribution maps of amphibians in Manitoba (Nature North 2010), 10 amphibian species are likely to occur in the area. These species include the mudpuppy (*Necturus maculosus*), blue-spotted salamander (*Ambystoma laterale*), American toad (*Anaxyrus americanus*), gray treefrog (*Hyla versicolor*), spring peeper (*Pseudacris crucifer*), wood frog (*Lithobates sylvaticus*), leopard frog (*Lithobates pipiens*), green frog (*Lithobates clamitans*), boreal chorus frog (*Pseudacris maculata*), and mink frog (*Lithobates septentrionalis*). 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. At least five amphibian species have been officially reported in the region (Hatch 2007, Krindle 1994; see Appendix H).

The main species of reptiles that are likely to frequent the area are the snapping turtle (*Chelydra serpentina*), western painted turtle (*Chrysemys picta bellii*), red-bellied snake (*Storeria occipitomaculata*), and red-sided garter snake (*Thamnophis sirtalis*) (Canadian Amphibian and Reptile Conservation Network 2009). Both species of snake could be found throughout the study area, as they often live in forests (Desroches and Rodrigue 2004). Snapping and western painted turtles are, however, mainly aquatic species and could probably only be encountered in the beaver pond of Boggy River Bog. Only the red-sided garter snake was observed by Krindle (1994) and Hatch (2007) in the region.

Of these species, the snapping turtle has been classified as a species of special concern by COSEWIC since November 2008.

4.2.7.1 Impacts on Amphibians and Reptiles

Construction and operation

Except for the snapping turtle, which will be discussed separately, a medium environmental value is assigned to this component considering there is concern, although not consensus, for its conservation or protection. The intensity of the impact is medium, mainly caused by destruction of habitat by tree clearing and draining. Extent of the impact is site specific, limited to peat fields and surrounding areas. The combined duration of the impact for the two phases will be long because as soon as the habitat is destroyed, it will not be available for herpetofauna before the site is rehabilitated. The significance of the impact is considered medium.

Application of progressive decommissioning is expected to restore the habitat and lead to a low residual impact.

4.2.8 Special Status Fauna Species

As of September 2009, no occurrences of mammal, herpetofauna or fish species at risk are recorded for the study area in the Manitoba Conservation Data Centre rare species database (Appendix G). However, the absence of data does not necessarily mean that rare or endangered species or ecological communities of concern are not present in the area.

MCDC reported the occurrence of yellow rails (*Coturnicops noveboracensis*) in the Shoal Lake area, which is located within 10 km of the study area. The yellow rail is designated as a species of special concern in Canada under the *Species at Risk Act*. This species' nesting habitat typically consists of marshes dominated by sedges, grasses, and rushes, where there is little or no standing water and a saturated substrate throughout the summer (COSEWIC 2001). All three development sites lack this kind of habitat; the presence of the yellow rail is therefore very unlikely.

None of the animal species listed under the *Manitoba Endangered Species Act* (Manitoba Conservation 2009) are likely to inhabit the area, as their distribution throughout the province is either located farther north or west, or the habitats they usually frequent are not present in the project sites (e.g., piping plover habitat includes lakeshores and river sandbars, which are not present in the project sites).

However, as mentioned previously, the snapping turtle has been classified as a species of special concern by COSEWIC since November 2008. The probability that the project will affect individuals of this species or their habitat is low because it is mainly an aquatic species that would probably only be encountered in the beaver pond of Boggy River Bog. Considering that the proposed work will not affect this pond, no impact on this turtle is expected.

4.2.8.1 Impacts on Special Status Fauna Species

No impact on special status fauna is expected for the construction, operation or decommissioning phases.

4.2.9 Important Habitats

No important or legal habitat was noted in the study area, except for fish habitat which is universally protected under the *Fisheries Act*. As discussed before, considering that fish habitat will not be affected directly, no impact is expected.

4.3 HUMAN ENVIRONMENT

4.3.1 Social

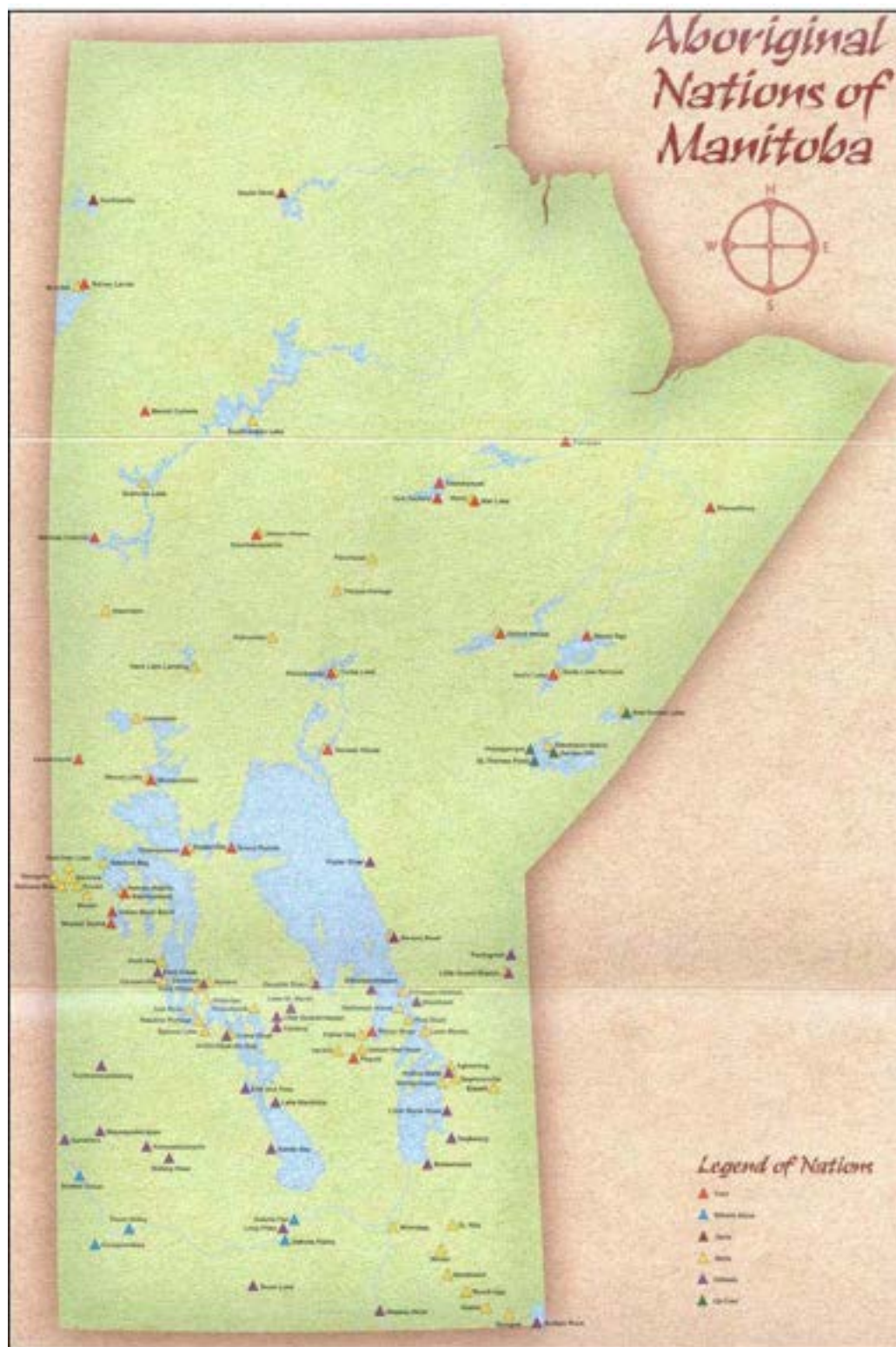
4.3.1.1 Communities

The proposed peat operations are located on Crown land, and there are no communities within the 3 km project study area of either location (Poplar Creek Bog in the south, and Haute Bog and Boggy River Bog in the north). The surrounding area has a relatively sparse population with very few communities. Communities near Poplar Creek Bog include Moose Lake (20 km southeast), East Braintree (25 km northwest) and Sprague (40 km southwest). Communities near Haute Bog and Boggy River Bog include East Braintree (20 km west), Falcon Lake (7 km northwest), and Reynolds (43 km west).

4.3.1.2 First Nations

All First Nation communities in the area are situated near the Manitoba-Ontario border, northeast or southeast of the proposed peat development (Figure 7). The Buffalo Point First Nation is the only one that is located in Manitoba. The main settlement of the community is 33 km south of Poplar Creek Bog along the Canada-USA border, and its population is 45 (Table 8). However, Buffalo Point First Nation Community land extends northward to the southern limit of the Jiffy quarry leases for Poplar Creek Bog (Map 3). The Northwest Angle No. 37 First Nation community is located in the Poplar Creek Bog regional study area, approximately 9 km to the northeast, but it is located in Ontario. Shoal Lake 40 is a First Nation community located approximately 5 km east of the Haute Bog and Boggy River Bog study area in Ontario.

Figure 7 **Aboriginal Nations of Manitoba**



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SNC-Lavalin Environment contacted Mr. John Thunder, Chief of the Buffalo Point First Nation (Appendix I), for comments regarding the proposed development project. Chief Thunder has not yet indicated whether there are traditional land uses (e.g., hunting, trapping, or plant harvesting) by the First Nation people near the proposed sites.

Table 8 Population Statistics for Surrounding First Nation Communities (INAC 2010)

Community	Population in Own Reserve (# of people)	Population on Other Reserve (# of people)	Population Off Reserve (# of people)	Total Population (# of people)
Shoal Lake No. 40	259	10	286	555
Northwest Angle No. 37 ¹	171	3	165	339
Buffalo Point	45	0	65	110

¹ Includes Lake of the Woods 34, 37 and 37B, Northwest Angle No. 34C, 37B, and Shoal Lake 34B1 and 37A

4.3.1.3 Métis

No Métis Nations communities are located within the regional study area, but some occur in the vicinity (Figure 7). SNC-Lavalin Environment contacted Ms. Denise Thomas, Vice-President Southeast Region of the Manitoba Métis Federation for comments, questions or concerns regarding the proposed project (Appendix I). Ms. Thomas has not yet indicated whether there are traditional uses near the project area. Mr. Dan Benoit of the same federation noted in 2007 that the area surrounding the proposed Poplar Creek Bog development has been used as traditional land for uses such as hunting and trapping by the Métis people (KGS 2007).

4.3.1.4 Population

The proposed development is located in an unorganized area, referred to as Division No. 1, which includes the area along the Manitoba/Ontario border up to and including parts of Whiteshell Provincial Park. Population information for the rural municipalities in the vicinity of the proposed peat developments is presented in Table 9. Demographic data for small towns located in the area of the project were not available; therefore, population information for rural municipalities relatively near the proposed sites is presented. Population information for First Nation communities located in the regional assessment area of the proposed peat mine project is presented in Table 8.

Table 9 Population and Dwelling Statistics for Surrounding Rural Municipalities (Statistics Canada 2010)

Population and Dwelling Information	Rural Municipality		
	Reynolds	Piney	Division No. 1
Population in 1996	1,314	1,604	693
Population in 2001	1,298	1,688	670
1996 to 2001 Population Change (%)	-1.2	5.2	-3.3
Total Private Dwellings	765	983	3,292
Population Density per km ²	0.4	0.7	0.2
Land Area (km ²)	3,573	2,434	4,131

4.3.1.5 Services

The proposed Poplar Creek Bog peat harvesting development is located approximately 145 km southeast of Winnipeg, and approximately 40 km south of the Trans Canada Highway along Provincial Route 308.

The proposed Haute Bog and Boggy River Bog peat harvesting developments are located approximately 130 km southeast of Winnipeg and less than 10 km south of the Trans Canada Highway. Haute Bog is also just south of the railroad and aqueduct operated by the Greater Winnipeg Water District Railway (GWWD). This 163 km long railway runs from Winnipeg to Shoal Lake, near the Ontario border. It was built to assist in the construction and maintenance of an aqueduct supplying fresh water to Winnipeg. It is owned by Winnipeg's municipal government, and the GWWD no longer operates passenger trains.

There are no on-site services, nor any service infrastructure in the regional study area other than Provincial Route 308. The Royal Canadian Mounted Police (RCMP) provides law enforcement services to the communities located in the area. The nearest hospitals to the proposed developments are located in Winnipeg, in Kenora, Ontario, and in Roseau, Minnesota.

Impacts on Services

No impact is expected because there are no public services present in the study area.

4.3.1.6 Land Use

The land in the Whitemouth Ecodistrict is predominantly covered by peatlands, and is used primarily for pulpwood and saw logs locally. The proposed development sites are located within the Northwest Angle Provincial Forest. Agricultural land use is limited to southern regions near Sprague due to poor drainage and coarse texture of the soils (Smith et al. 1998).

Premier Horticulture Ltd. (Premier) harvests peat to the north and west of the proposed peat harvesting operation. Premier's peat harvesting operations consist of harvesting at Caribou South Bog and Caribou Southeast Bog. Peat is transported from both sites to the processing facility at Richer. FPM Peat Moss is currently developing Sprague Lake Bog, Caribou Southwest Bog and Northwest Angle Bog for peat harvesting; Sprague Lake Bog is located just west of Route 308, 500 m from Poplar Creek Bog. FPM also operates a peat processing facility in Vassar.

Several mining claims and quarry leases are in the vicinity of the Poplar Creek Bog.

Impacts on Land Use

Construction and Operation Phases

A low socio-economic value is assigned to this component considering its current use. The intensity of the impact is medium, mostly due to a major change in use, i.e., development of the lands for peat harvesting. The extent of the impact is site specific, limited to peat fields, access roads and service areas. The duration of the impact will be long, and the significance of the impact is considered medium but positive.

4.3.1.7 Areas of Interest

There are no parks or protected areas in the immediate vicinity of the development areas. All three bogs are located within the boundaries of the Northwest Angle Provincial Forest. Poplar Creek Bog lies approximately 35 km south of Whiteshell Provincial Park, while Haute Bog and Boggy River Bog are approximately 5 to 10 km south of the park.

The Northwest Angle Provincial Forest, approximately 2,129 km² (212,900 ha) in size, was established in 1956 and contains numerous snowmobile trails and many plant species unique to Manitoba (Manitoba Conservation 2010).

The Sandilands Provincial Forest, which covers 2,772 km² (277,200 ha), was established in 1923 and is located approximately 25 km west of Poplar Creek Bog and 37 km southwest of Haute Bog and Boggy River Bog. Sandilands Provincial Forest contains the Sandilands Forest Centre, numerous cross-country ski, horse and snowmobile trails, Wampum and Popcock Lake, Whitemouth ecological reserves, and the Dawson Trail (Manitoba Conservation 2010). Whitemouth Island Ecological Reserve located within Whitemouth Lake is located approximately 25 km southwest of Poplar Creek Bog, while Moose Lake/Birch Point Provincial Park is located approximately 20 km south of Poplar Creek Bog.

A snowmobile trail passes about 5 km west of Poplar Creek Bog. Another snowmobile trail passes 2 km west of Boggy River Bog, and crosses the proposed Haute Bog development area. A golf course, beach, campground and marina are located in Falcon Lake, 5 km northwest of the Haute Bog and Boggy River Bog.

4.3.1.8 Heritage Resources

The Manitoba Historic Resources Branch has reviewed the proposed project development areas, and has determined that there are no heritage resources associated with the locations (Appendix J). In the event that heritage resources are discovered, construction will cease and the Historic Resources Branch of Manitoba Culture, Heritage and Tourism will be notified immediately, with further construction occurring as directed by the Historic Resources Branch.

4.3.2 Economy

Economic activities in the region include forestry, agriculture and peat harvesting. The Pineland Provincial Forestry Nursery, located near Hadashville, is one of two provincial nurseries. The peat harvesting industry has had a positive impact on the surrounding communities, in that it has been a significant rural employer.

The unemployment rate for Division No. 1 was 7.4% in 2001, compared to 6.1% in Manitoba. The median income for a person 15 years or older who worked a full year at full time was \$19,779. The median family income in Division No. 1 for 2000 was \$43,436, compared with the Manitoba median of \$50,934. The 2001 labour force numbered 550, of which 115 (20.9%) worked in sales and service, 65 (11.8%) in trades, transport and equipment operators, and 25 (4.5%) in occupations unique to primary industry (Statistics Canada 2010).

4.3.2.1 Impacts on Economic Components

Employment

Construction and Operation

A high socio-economic value is assigned to this component considering the importance of employment for people. The intensity of the impact is medium, mostly due to creation of 39 permanent and seasonal jobs. Extent of the impact is regional, because workers will spend their money in the region. The duration of the impact will be long and the significance of the impact is considered strong but positive.

Business Opportunities

Construction and Operation

A medium socio-economic value is assigned to this component considering the possibility of economic benefits and jobs indirectly derived from this project. The intensity of the impact is low, mostly due to positive impacts on equipment sales, maintenance, and other associated business. Extent of the impact is regional. The duration of the impact will be long and the significance of the impact is considered medium but positive.

Income

Construction and Operation

A medium socio-economic value is assigned to this component considering the possibility of new income for the province, since Manitoba collects royalties on peat. Income for workers will also mean new money for the region and for the province. The intensity of the impact is low, limited to the scale of this project. Extent of the impact is regional. The duration of the impact will be long and the significance of the impact is considered medium but positive.

4.4 OTHER HUMAN ENVIRONMENTAL COMPONENTS EVALUATED

Additional components were considered in the evaluation of potential impacts on the human environment, even though it was not considered necessary to describe the existing conditions in detail.

Soil Use

Construction and operation phases will greatly alter the use of the soil, which is not used intensively for human activities at this time. In its current state, the soil supports an ecosystem that is probably used only by a few hunters. A medium value is assigned to this component. The intensity of impact will be strong because the soil will be developed for intensive use. The extent of the impact is site specific and the duration for the combined phases is long. The significance of the impact is strong but positive considering the economic benefit of its use.

Roads

Construction

A medium environmental value is assigned to this component considering that roads are used by a significant portion of the population concerned. The intensity of the impact is low, mostly due to a slight increase in traffic during the construction phase. The extent of the impact is local, limited to local roads. The duration of the impact will be short because it is limited to tree clearing, construction of access roads and service areas. The significance of the impact is considered very low.

Operation

Using the same environmental values as were used for the construction period, the intensity of the impact is low, mostly due to truck traffic transporting peat on local roads. Extent of the impact will be local and its duration will be long, resulting in an impact of low significance.

Noise

Equipment produces noise, but there is no human settlement in the vicinity. No impact is expected.

Human Health

No significant effect is anticipated on this component because there is no human settlement or activities in the vicinity, nor will hazardous products be used or discharged to the environment.

Public Perception/Well Being

There are no known concerns about peatlands among the population in general. No impact is expected.

Public Safety**Construction**

A high environmental value is assigned to this component considering its importance for the population concerned. The intensity of the impact is low, mostly due to a slight increase in traffic during the construction phase. The extent of the impact is local, limited to local roads. The duration of the impact will be short because it will be limited to the period of tree clearing, construction of access roads and service areas. The significance of the impact is considered low.

Operation

Using the same environmental values, the intensity of the impact is low considering that it is expected that shipment of harvested peat will require an average of only 10 trips per day. Extent of the impact will be local and its duration will be long, resulting in an impact of low significance.

Worker Health and Safety

The health and safety of workers is an important issue for Jiffy, which implements a range of health and safety oriented programs for its peat processing plant in New Brunswick. Several specific mitigation measures address safety issues, such as worker training and the application of an Emergency Protection Plan.

Construction

A high environmental value is assigned to this component considering its importance for the people concerned. The intensity of the impact is medium, mostly due to risk of injuries and exposure to dust and noise during the construction phase, and possible exposure to hazardous materials and petroleum spills. The extent of the impact is site specific, limited to peat fields, access roads and service areas. The duration of the impact will be short because it will be limited to the period of tree clearing, construction of access roads and service areas. The significance of the impact is considered low.

Operation

Using the same environmental value, intensity is considered medium, extent of the impact is site specific, and duration will be long, resulting in an impact of medium significance.

Application of the mitigation measures described in Section 5 is expected to lead to a low residual impact.

Aesthetics

No foreseeable impact is considered for this component since there are no inhabited areas near the sites under consideration, nor will the sites be visible from a public highway.

Tourism

No impact is expected on this component.

4.5 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 Poplar Creek Bog in combination of those of Sprague Lake Bog, which is located about 1 km to the west across Route 308. In the case of Haute Bog and Boggy River Bog, cumulative impacts are expected to be limited to the combined effect of peat harvesting at the two bogs, since there is no other human activity within a 7 km radius.

The main impacts of peat harvesting on air quality result from dust generation during the construction and operation phases. At Poplar Creek Bog, the construction and operation phases will occur while Sprague Lake Bog is in operation (KGS 2007). Impacts on air quality during the construction and operation phases for both projects are considered to be low or not significant once mitigation measures are applied. In addition to Jiffy, FPM and Premier, which are currently present in the study area, operate peat harvesting sites in Eastern Canada close to populated areas where they are used to facing dust generation problems. In the present case, there is no human settlement in the vicinity of peatlands under consideration. Moreover, the Canadian peat industry has developed management practices and equipment to reduce dust generation, such as cyclones that catch dust emissions from vacuum harvesters.

There should not be noticeable cumulative impacts on water flow and water quality, since low or no significant impacts are expected from peat harvesting activities at peatlands in the region between East Braintree and Sprague (KGS 2007, Stantec 2004). From another standpoint, there are two other harvested peatlands (Sprague Lake Bog and Caribou Bog) in the same watershed as Poplar Creek Bog, namely Lake of the Woods at Warroad (Map 5). However, these two bogs discharge water into Harrison Creek, which flows north of the watershed. Haute Bog and Boggy River Bog will be the only harvested bogs in the Birch River at the Mouth watershed, and their cumulative impact on surface water flow and quality should not be significant. Implementation of mitigation measures such as sedimentation ponds and overland flow developed to address sensitive conditions in New Brunswick (Thibault 1998) contribute to lowering cumulative impacts to a non-significant value.

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

Increased traffic represents a potential impact for public safety that has the possibility of generating cumulative impacts. However, Jiffy's peat production rate is expected to be much lower than that of FPM and Premier in the area. Implementation of the recommended mitigation measures should keep the impact at a low or insignificant value. On the other hand, this element cannot be fully assessed at this time because the location of the access roads to Haute Bog, Boggy River Bog, and Jiffy's peat processing facilities has not yet been determined.

Impacts on workers' health are site specific, and there is no possibility of cumulative impacts.

The development of Poplar Creek Bog, Haute Bog and Boggy River Bog 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.

4.6 REVERSIBILITY OF IMPACTS

The impact assessment shows that Jiffy's peat development projects for Poplar Creek Bog, Haute Bog and Boggy River Bog will not result in significant residual impacts on the environment. The peatland rehabilitation options described in Section 3.3 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 functional peatland ecosystems. Research has shown that a peatland vegetation cover can re-establish itself over the entire surface of a harvested peatland within 7 years of the application of peatland restoration measures (Rocheffort et al. 2008), and that hydrological conditions also recover within a short period of time (Shantz and Price 2006a). Consequently, peatland harvesting does not result in irreversible impacts provided that appropriate mitigation measures are applied.

5 MITIGATION MEASURES AND MONITORING

Reduction of environmental impacts depends on applying mitigation measures in tandem with an appropriate monitoring plan that will determine if these measures are effective. Some of the mitigation measures that Jiffy intends to implement at its peat harvesting operations in Manitoba were briefly presented in previous sections and in Table 4. They are described in greater detail in the following section, along with the monitoring plan.

The mitigation measures developed by Jiffy for peat harvesting operations consist of a general comprehensive measure referred to as progressive decommissioning, and a series of measures that address specific situations. Jiffy will prepare an annual report that will describe eventual impacts and monitoring results. This report will be made available to Manitoba Conservation upon request.

5.1 PROGRESSIVE DECOMMISSIONING

Progressive decommissioning is described in Section 3.3. It consists of a peatland rehabilitation plan, which includes four options: peatland restoration, tree planting, creation of open water bodies, and other potential options such as cranberry farming. The long-term goal of the rehabilitation plan is to restore ecosystems currently present in the area, and to increase the commercial and social value of the area. In the short term, specific objectives are to re-establish plant cover and to restore the hydrological regime. Meeting these two objectives eliminates most impacts of peat harvesting on the peatland ecosystem.

Re-establishing the vegetation cover stabilizes the surface and prevents further generation of peat dust by wind, or deposition of peat particles 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 fragile equilibrium between vegetation and hydrology typical of peat bogs: *Sphagnum* mosses form a loose layer that can contain a large amount of water, thus limiting water table fluctuations and providing the *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 dykes 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. Newly created ponds may even increase biodiversity because open water bodies are rare features that provide habitat for specific plant and insect species and wildlife.

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

According to the *Peatland Restoration Guide* (Quinty and 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, Jiffy proposes to set up permanent plots where percent cover of each species is estimated. This is a recognized approach to monitor peatland restoration (Rochefort et al. 2008).

Tree planting success will be monitored by determining seedling survival. There is no method to monitor open water bodies. The annual report will present peatland rehabilitation activities, including monitoring of peatland restoration and tree planting success.

5.2 SPECIFIC MITIGATION MEASURES

5.2.1 Air Quality

Several measures are aimed at reducing impacts on air quality caused mainly by dust emissions. During the construction phase, Jiffy intends to use dust suppressant if required, and to control vehicle speed. During the operation phase, mitigation measures include dust control devices on vacuum harvesters, control of vehicle speed, use of tarpaulin-covered trailers, reducing exposure of peat stockpiles to wind, leaving a treed buffer zone of at least 50 m around the developed area, limiting peat handling in windy conditions, and ensuring proper maintenance of equipment. Site managers will conduct periodic inspections to make sure that these measures are applied.

5.2.2 Soil Quality

The potential for impacts on soil quality arises almost exclusively from leakage or spills of petroleum products. Jiffy will use double-walled fuel tanks that meet CAN/ULC S601 standards and comply with the CCME Environmental Code of Practice for Above Ground Storage Tanks Systems Containing Petroleum Products (CCME 1994). Jiffy has developed an Emergency Protection Plan (Appendix K) that addresses these problems, and that describes a series of measures to be applied in the event of spills. Worker training and availability of spill kits on site are among the measures included in the plan. Jiffy will report all incidents in the annual report.

5.2.3 Water Flow and Quality

Mitigation measures regarding water flow and quality consist mainly of sedimentation ponds, and discharge of drainage from the pond outlets to the surrounding vegetation as overland flow. Both methods contribute to controlling water flow and improving water quality. The New Brunswick peat mining guidelines consider overland flow to be the preferred method to reduce sediment load in drainage water, and present sedimentation ponds as an alternate method when site conditions do not allow overland flow. Jiffy considers that the use of both methods should prevent impacts of drainage on water flow and quality. Plans also call for periodic cleaning of the sedimentation ponds to maintain their efficiency, and use of floating booms in the ponds to catch large debris. In addition, silt fences will be used where appropriate to trap sediment during the construction phase.

Follow-up will include periodic inspection of the drainage network, monitoring of water quality at the exit of sedimentation ponds every second week, and inspection of vegetation at the outlet. Groundwater quality and levels will be monitored three times a year by means of a series of piezometers installed at the margins of the developed areas. Results will be presented in the annual report.

5.2.4 Special Status Plant Species

Because the proposed development will impact rare plant species at Poplar Creek Bog, Jiffy intends to set up a transplantation program in collaboration with specialized organizations such as Manitoba-based Native Orchid Conservation Inc. to preserve some plant populations. Jiffy intends to begin transplantation as early as 2011. The program would include a monitoring plan for rare plant populations located in the buffer zone. This program will be submitted to Manitoba Conservation for approval prior to conducting any activity that could damage the identified rare plant populations. Jiffy has also modified the development plan for Poplar Creek Bog to limit impacts on plant populations located outside the operational zone. No main ditches will be excavated within 30 m of any rare species found outside the developed area, i.e., beyond the surface expected to be affected by the water table drawdown. The transplantation program will include a follow up of these populations.

5.2.5 Wildlife

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 from May to August (precise dates to be determined).

Jiffy considers that there is sufficient undeveloped peatland in the surrounding area to serve as habitat for wildlife, which will subsequently re-colonize harvested peatlands during the rehabilitation process.

5.2.6 Public Safety

Peat harvesting will result in increased traffic on public roads during the construction and operation phases. As a mitigation measure, Jiffy will install truck exit warning signs at appropriate locations. It will also require that truck drivers observe speed limits and other rules.

5.2.7 Worker Health and Safety

Exposure to peat dust and the risk of work-related accidents are the main source of potential impacts with regard to worker health and safety. Jiffy intends to implement several mitigation measures to reduce the likelihood of potential impacts. In addition to dust control measures, use of tractors with air-conditioned cabs will reduce workers' exposure to peat particles. Jiffy will provide appropriate safety equipment and training for workers. Site managers will keep records of all incidents and implement appropriate prevention measures. Jiffy has developed an Emergency Protection Plan that will be applied in case of emergency.

6 PRINCIPLES AND GUIDELINES OF SUSTAINABLE DEVELOPMENT

6.1 PRINCIPLES OF SUSTAINABLE DEVELOPMENT

6.1.1 Integration of Environmental and Economic Decisions

The province of Manitoba, which is committed to a cooperative approach in addressing issues related to the environment and the economy, has developed an approach designed to facilitate sustainable development, where economic decisions adequately take into account economic, human health and social consequences. Jiffy is committed to following these principles of sustainable development. The site selection process for the proposed facility has taken into account the environmental and human health protection issues, social effects, and economics of the site location.

6.1.2 Stewardship

The economy, environment, human health and social well-being should be managed for the equal benefit of present and future generations. Manitobans are caretakers of the economy, the environment, human health and social well-being for the benefit of present and future generations; as such, today's decisions are to be balanced with tomorrow's effects.

Jiffy is committed to long-term management that provides economic benefits while ensuring the integrity of the environment. The proposed peatland development will provide the equivalent of up to 25 full time jobs. The natural soil conditions at the site will protect potential underlying groundwater sources. Site design will protect surface water quality and surrounding wildlife habitat. Negative long term effects on the environment, human health, and social well-being are expected to be negligible.

6.1.3 Shared Responsibility and Understanding

Jiffy acknowledges its role in sustaining the economy, the environment, human health and social well-being, while being accountable for decisions and actions in a spirit of partnership and open cooperation. Citizens share a common economic, physical and social environment, and should understand and respect differing economic and social views, values, traditions and aspirations. While planning this operation, Jiffy has considered the aspirations, needs and views of the people of the region. Jiffy will be responsible for the day-to-day operations at the proposed peatland development and will be responsible for keeping the general public informed about issues, actions, and decisions relevant to the facility.

6.1.4 Prevention

Jiffy should anticipate, and prevent or mitigate, significant adverse economic, environmental, human health and social effects of decisions and action, having particularly careful regard for decisions whose impacts are not entirely certain but which, on reasonable and well-informed grounds, appear to pose serious threats to the economy, the environment, human health and social well-being.

Jiffy takes a proactive approach to prevent environmental and socio-economic effects by developing concrete policies and programs such as a fire policy, health and safety and emergency protection plans. Jiffy will complete environmental investigations and monitoring at the proposed sites, and any additional monitoring specified in the Environment Act License. Compliance monitoring will enable early detection of potential environmental issues at the site and allow for mitigation measures to be implemented.

6.1.5 Conservation and Enhancement

Jiffy will maintain the ecological processes, biological diversity and life-support systems of the environment, harvest renewable resources on a sustainable yield basis, make wise and efficient use of renewable and non-renewable resources, and enhance the long-term productive capability, quality and capacity of natural ecosystems.

6.1.6 Rehabilitation and Reclamation

As member of the Canadian Sphagnum Peat Moss Association, Jiffy implements its Preservation and Reclamation Policy (www.peatmoss.com). The proposed developments will protect existing potential wildlife habitat areas by, for example, creating buffer zones around on-site water bodies and watercourses, and by implementing mitigation measures that should return sites back to original conditions.

6.1.7 Global Responsibility

Jiffy is committed to thinking globally while acting locally, recognizing that there is economic, ecological and social interdependence among provinces and nations, and works cooperatively, within Canada and internationally, to integrate economic, environmental, human health and social factors in decision making while developing comprehensive and equitable solutions to problems.

The proposed development will be operated using sound environmental management practices, thus protecting the environment and local ecosystems. Because Jiffy is an international company, environmental, human health, social, and economic issues will be addressed to ensure that the needs and concerns of the region are being met, while meeting their market needs around the world. For example, in an effort to reduce CO₂ emissions in line with the company's "Born Sustainable" strategy, Jiffy International AS has introduced a new "company car policy" at many of the companies that are part of the Jiffy International Group.

6.2 GUIDELINES FOR SUSTAINABLE DEVELOPMENT

6.2.1 Efficient Use of Resources

Jiffy encourages and facilitates development and application of systems for proper resource pricing, demand management and resources, and employing full-cost accounting to provide better information for decision makers. Jiffy's standard operating procedures encourage efficient use of resources, materials and operations.

6.2.2 Public Participation

Jiffy is committed to participating in forums that encourage and provide opportunity for consultation and meaningful participation in decision making processes by stakeholders, endeavoring to provide due process, prior notification and appropriate and timely redress for those adversely affected by decisions and actions, and striving to achieve consensus amongst citizens with regard to decisions affecting them.

Information regarding the proposed development is provided to the public in the region through various means including: telephone conversations with stakeholders and community representatives, letters to First Nation and Métis communities.

6.2.3 Access to Information

To promote a greater understanding of their peat operations and the related environmental and economic impacts, Jiffy provides relevant information to governments, the public and their employees. This encourages and facilitates the improvement and refinement of economic, environmental, human health and social information, and promotes the opportunity for equal and timely access to information by all Manitobans.

6.2.4 Integrated Decision-Making and Planning

Jiffy encourages involvement from all levels of its organization. This means encouraging and facilitating decision making and planning processes that are efficient, timely, accountable and cross-sectoral, and which incorporate an inter-generational perspective of future needs and consequences.

6.2.5 Waste Minimization and Substitution

This means encouraging and promoting the development and use of substitutes for scarce resources where such substitutes are both environmentally sound and economically viable, and reducing, reusing, recycling and recovering the products of society.

Jiffy fully embraces these concepts through several operating procedures. Jiffy reduces the need for outside resources during access and bog road construction by using non-commercial timber and waste vegetation. This practice also reduces the amount of waste required to be transported to nearby waste facilities. Jiffy peat harvesting operations will not require the use of any other material except for equipment maintenance.

6.2.6 Research and Innovation

Jiffy encourages and assists with research, development, application and sharing of knowledge and technologies, which further our economic, environmental, human health and social well-being.

Jiffy will monitor the site as directed in the Environment Act License. The monitoring results submitted to Manitoba Conservation are public documents. Additionally, Jiffy, as a member of the Canadian Sphagnum Peat Moss Association, continually researches new innovations in harvested peatland restoration procedures.



7 PUBLIC PARTICIPATION

Jiffy will undertake public participation if requested to do so following publication of the project as prescribed under Environment Act process for a Class 2 Peat mining development.

Contact has already been established with First Nations and Métis communities, one of which has confirmed its interest in a public information session, in addition to public hearings that may be held under the approval process.

8 CONCLUSION

The Class 2 peat mining development at Poplar Creek Bog, Haute Bog and Boggy River Bog will consist of standard peat development and harvesting operations. The proposed development is similar to other existing operations in the area, for which environmental impacts are known to be minor. Application of appropriate mitigation measures will further reduce identified impacts during both the construction and operation phases. Following application of the mitigation measures, all residual impacts on the physical, biological, or human environmental components were identified as low or very low.

Jiffy acknowledges its role in sustaining the economy, the environment, human health and social well-being. Current initiatives by the Canadian peat industry demonstrate that production companies are cognizant of their roles and responsibilities in environmental protection. The effects of peatland drainage on water quality and flow regime are being addressed through current regulatory programs and research. Site development guidelines are being developed and implemented by the peat industry to minimize environmental effects. Jiffy will operate the proposed development using sound environmental management practices, thus protecting the environment and local ecosystems.

Peat harvesting operations are expected to continue until 2049 at Poplar Creek Bog, until 2073 at Haute Bog, and until 2083 at Boggy River Bog. Progressive decommissioning, which includes peatland restoration, tree planting and creation of open water bodies, will be implemented when peat harvesting ends on individual peat fields. Wetland functionality is expected to return to pre-project conditions in restored areas. Jiffy will also consider other rehabilitation options that may be acceptable and result in enhanced economic value, such as cranberry farming. Accordingly, these projects will provide sustainable, long term benefits in accordance with the Manitoba Principles and Guidelines of Sustainable Development.

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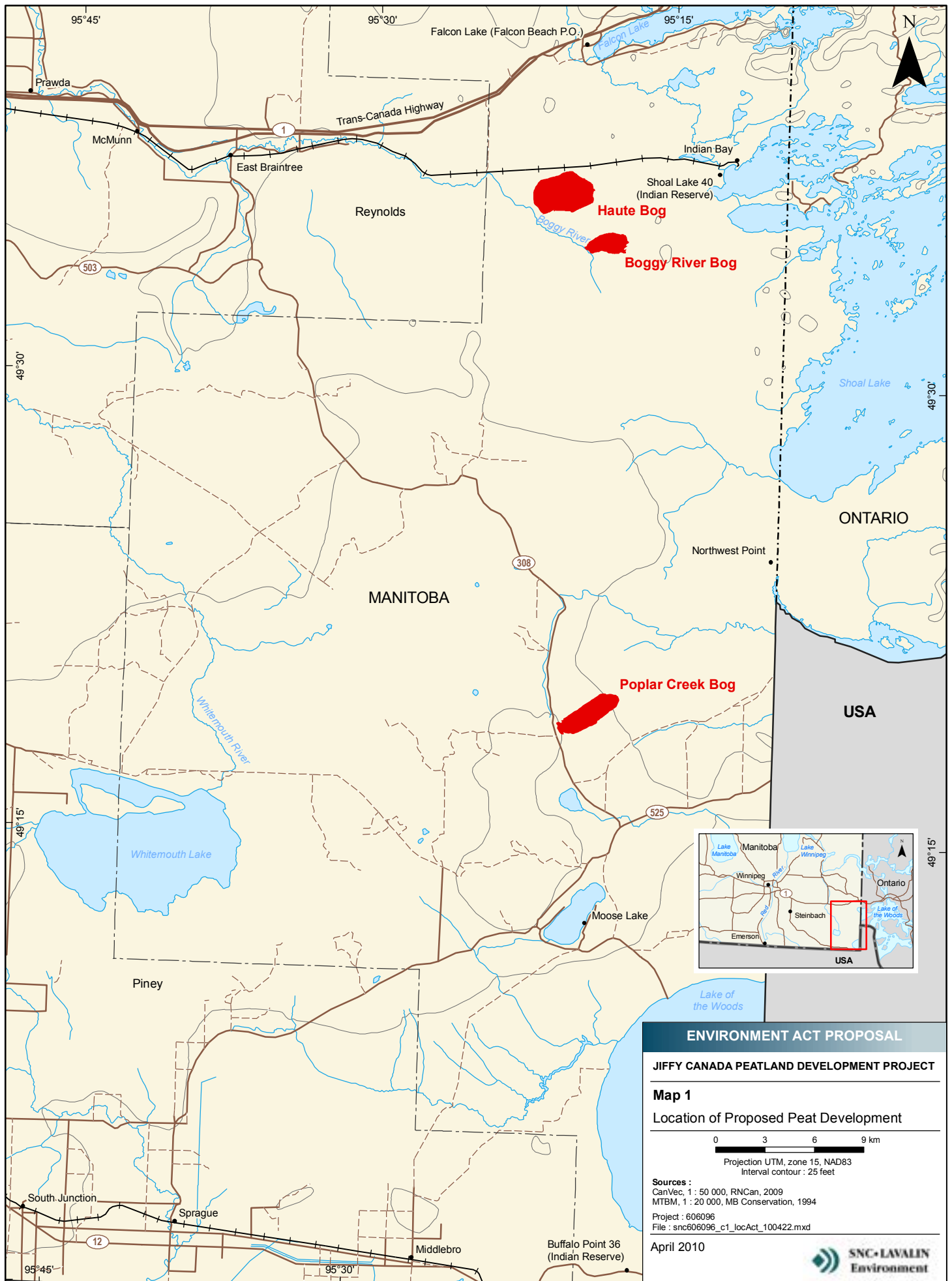
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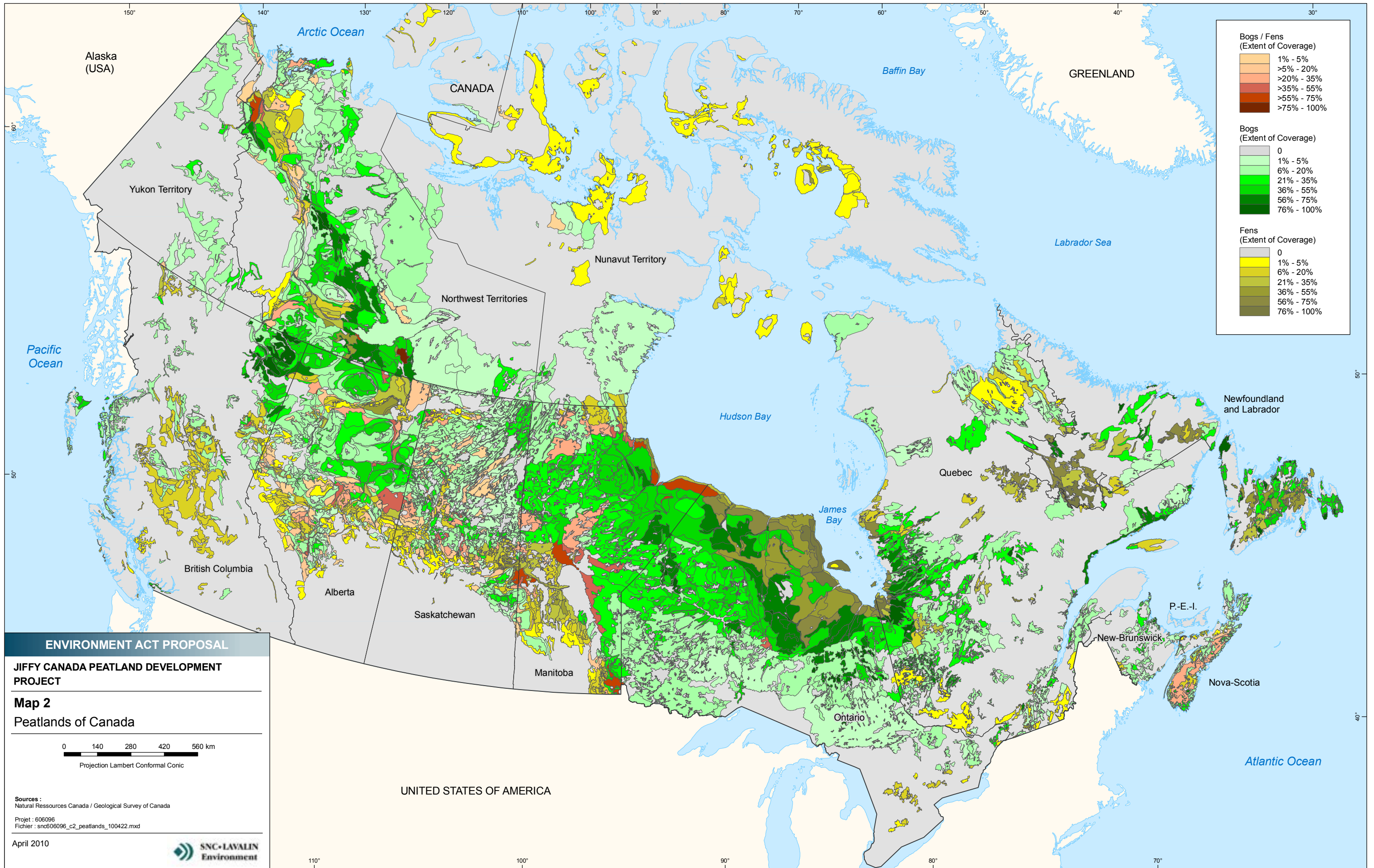
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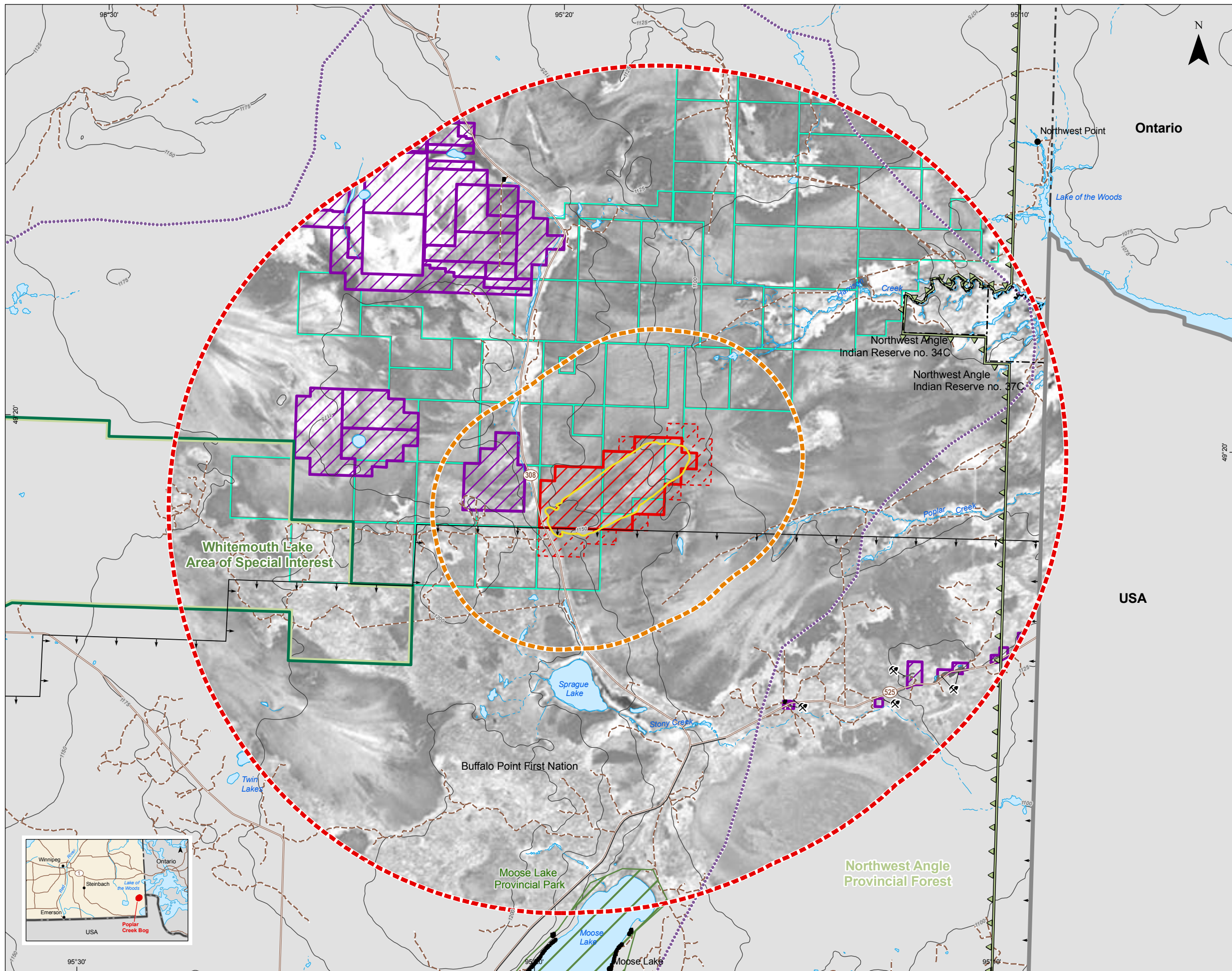
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Maps

Map 1	Location of Proposed Peat Development
Map 2	Peatlands of Canada
Map 3	Human Environment – Poplar Creek Bog
Map 4	Human Environment – Haute Bog and Boggy River Bog
Map 5	Physical Environment – Poplar Creek Bog
Map 6	Physical Environment – Haute Bog and Boggy River Bog
Map 7	Development Plan – Poplar Creek Bog
Map 8	Development Plan – Haute Bog
Map 9	Development Plan – Boggy River Bog







ENVIRONMENT ACT PROPOSAL

JIFFY CANADA PEATLAND DEVELOPMENT PROJECT

Map 3

Human Environment – Poplar Creek Bog

PROJECT

- Peatland
- Study Area 3 km
- Study Area 10 km

MINING CLAIMS

- Mining Claims

Quarry Leases

- Jiffy Canada
- Future Lease
- Others

LIMITS AND INFRASTRUCTURE

- Pit
- Building
- Secondary Road
- Tertiary Road
- Snowmobile Trail
- Transmission Line
- Provincial Park
- Area of Special Interest
- Provincial Forest
- Indian Reserve
- First Nation Community
- Provincial Boundary
- International Boundary

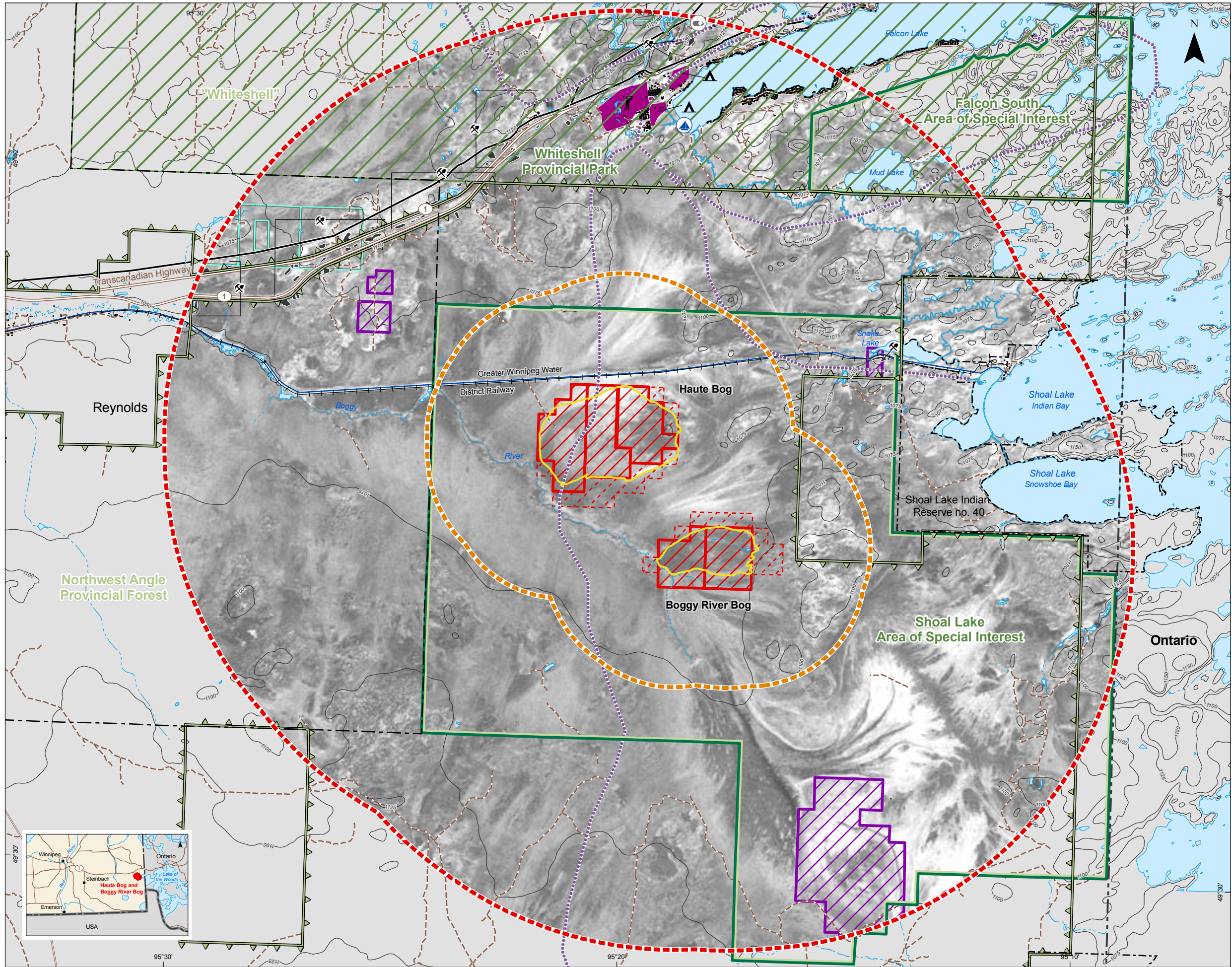
0 1 2 3 4 km

Projection UTM, zone 15, NAD83
Interval contour : 25 feet

Sources :
MTBM, 1 : 20 000, MB Conservation, 1994
CanVec, 1 : 50 000, RnCan, 2009
Digital Imagery : LandSat 7 ETM+, band 3, 1999 (Spatial Resolution : 30 m)

Project : 606096
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ENVIRONMENT ACT PROPOSAL

JIFFY CANADA PEATLAND DEVELOPMENT PROJECT

Map 4
Human Environment – Haute Bog and Boggy River Bog

PROJECT

- Peatland
- Study Area 3 km
- Study Area 10 km

HUMAN ENVIRONMENT

- Marina
- Campground / Campsite
- Golf Course

MINING CLAIMS

- Mining Claims

Quarry Leases

- Jiffy Canada
- Future Lease
- Others

LIMITS AND INFRASTRUCTURE

- Building
- Waste Disposal Site
- Pit
- Pipeline
- Water Pipeline
- Snowmobile Trail
- Principal Road
- Secondary Road
- Tertiary Road
- Railway
- Provincial Park
- Area of Special Interest
- Provincial Forest
- Municipality Boundary and Indian Reserve
- Provincial Boundary

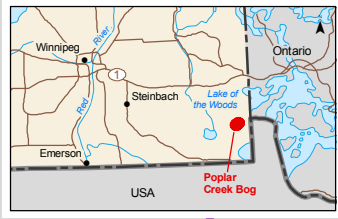
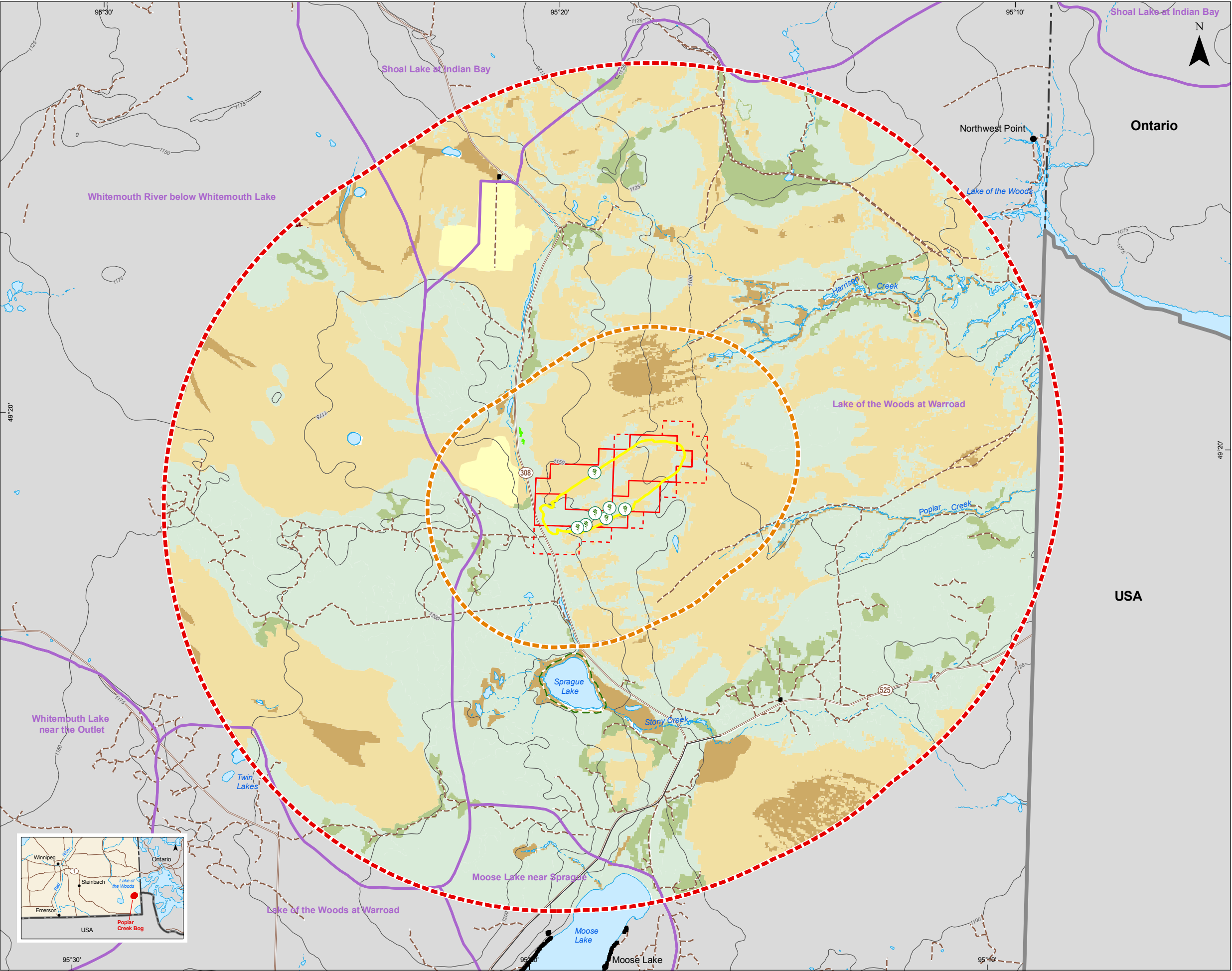
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Projection UTM, zone 15, NAD83
Interval contour : 25 feet

Sources :
MTBM, 1 : 20 000, MB Conservation, 1994
CanVec, 1 : 50 000, RnCan, 2009
Digital Imagery : LandSat 7 ETM+, Panchromatic Band, 1999 (Spatial Resolution : 15 m)
Project : 606096
File : snc606096_c4_mhBRHB_100420.mxd

April 2010

SNC-Lavalin Environment



ENVIRONMENT ACT PROPOSAL

JIFFY CANADA PEATLAND DEVELOPMENT PROJECT

Map 5
Physical Environment – Poplar Creek Bog

PROJECT

- Peatland
- Study Area 3 km
- Study Area 10 km

VEGETATION

- Rare Plant Surveyed
- Rare Plant Occurrence

QUARRY LEASES

- Jiffy Canada
- Future Lease

LAND USE

- Harvest Peatland
- Grassland
- Forest
- Forest Cutblocks
- Bog
- Wetland

LIMITS AND INFRASTRUCTURE

- Building
- Secondary Road
- Tertiary Road
- Transmission Line
- Watershed
- Provincial Boundary
- International Boundary

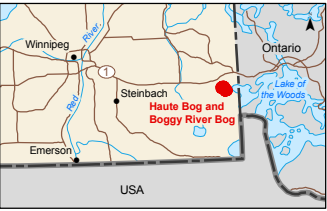
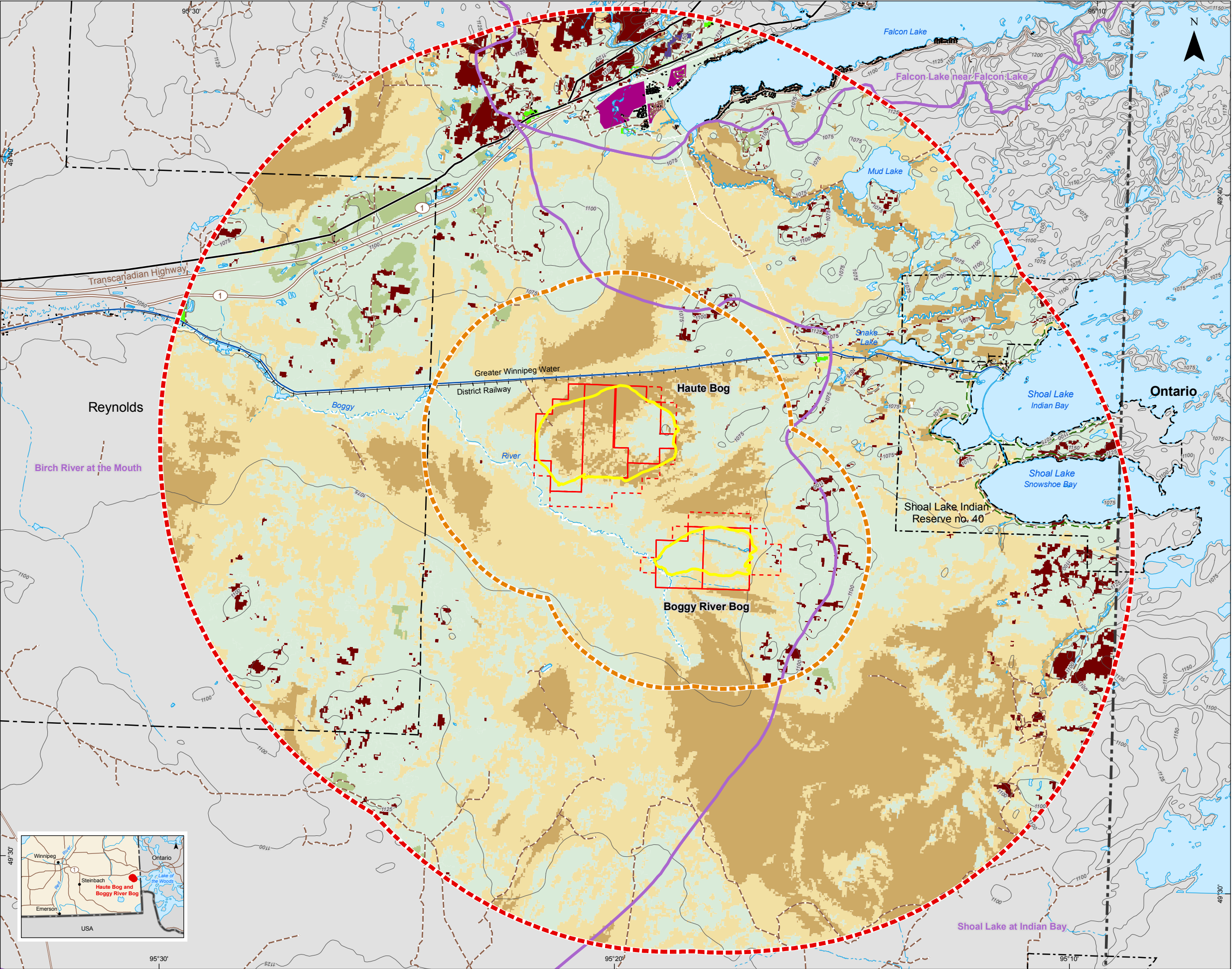
01234 km

Projection UTM, zone 15, NAD83
Interval contour : 25 feet

Sources :
MTBM, 1 : 20 000, MB Conservation, 1994
CanVec, 1 : 50 000, RnCan, 2009

Project : 606096
File : snc606096_c5_mnPCP_100420.mxd

April 2010



ENVIRONMENT ACT PROPOSAL

JIFFY CANADA PEATLAND DEVELOPMENT PROJECT

Map 6
Physical Environment – Haute Bog and Boggy River Bog

PROJECT

- Peatland
- Study Area 3 km
- Study Area 10 km

VEGETATION

- Rare Plant Occurrence

QUARRY LEASES

- Jiffy Canada
- Future Lease

LAND USE

- Recreational
- Grassland
- Forest
- Forest Cutblocks
- Bare Rock / Sand / Gravel
- Treed Rock
- Bog
- Wetland

LIMITS AND INFRASTRUCTURE

- Building
- Pipeline
- Water Pipeline
- Principal Road
- Secondary Road
- Tertiary Road
- Railway
- Watershed
- Municipality Boundary and Indian Reserve
- Provincial Boundary

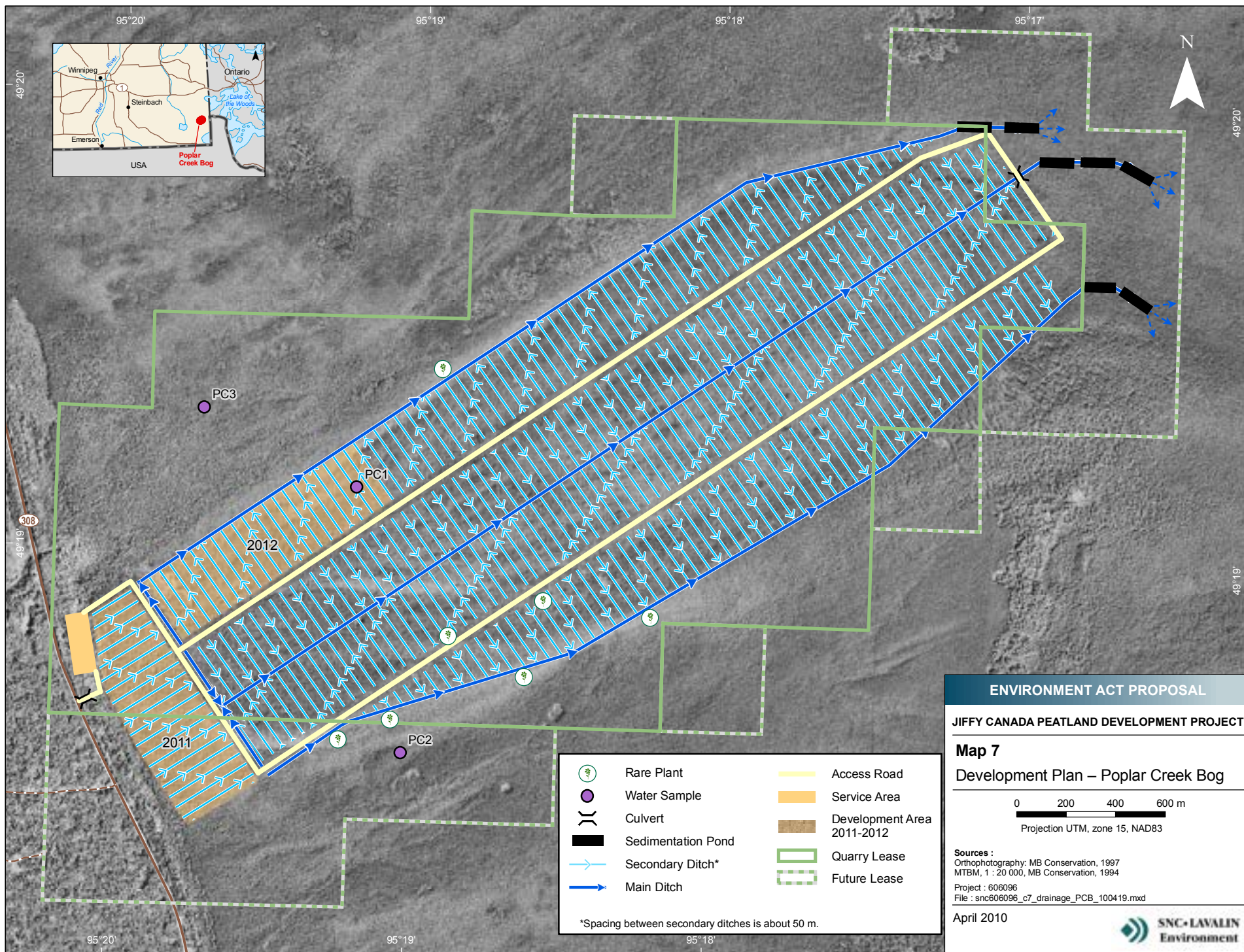
01234 km

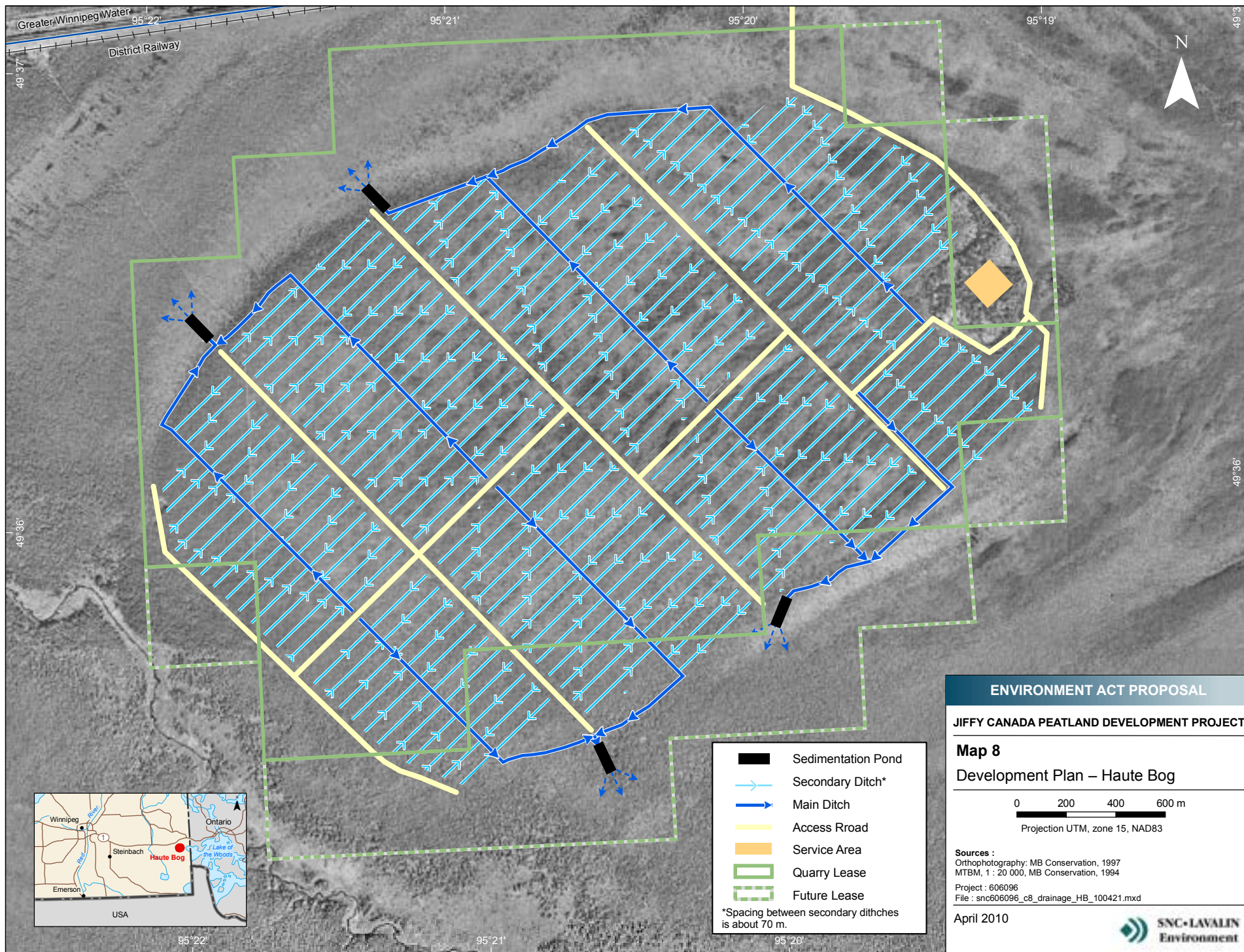
Projection UTM, zone 15, NAD83
Interval contour : 25 feet

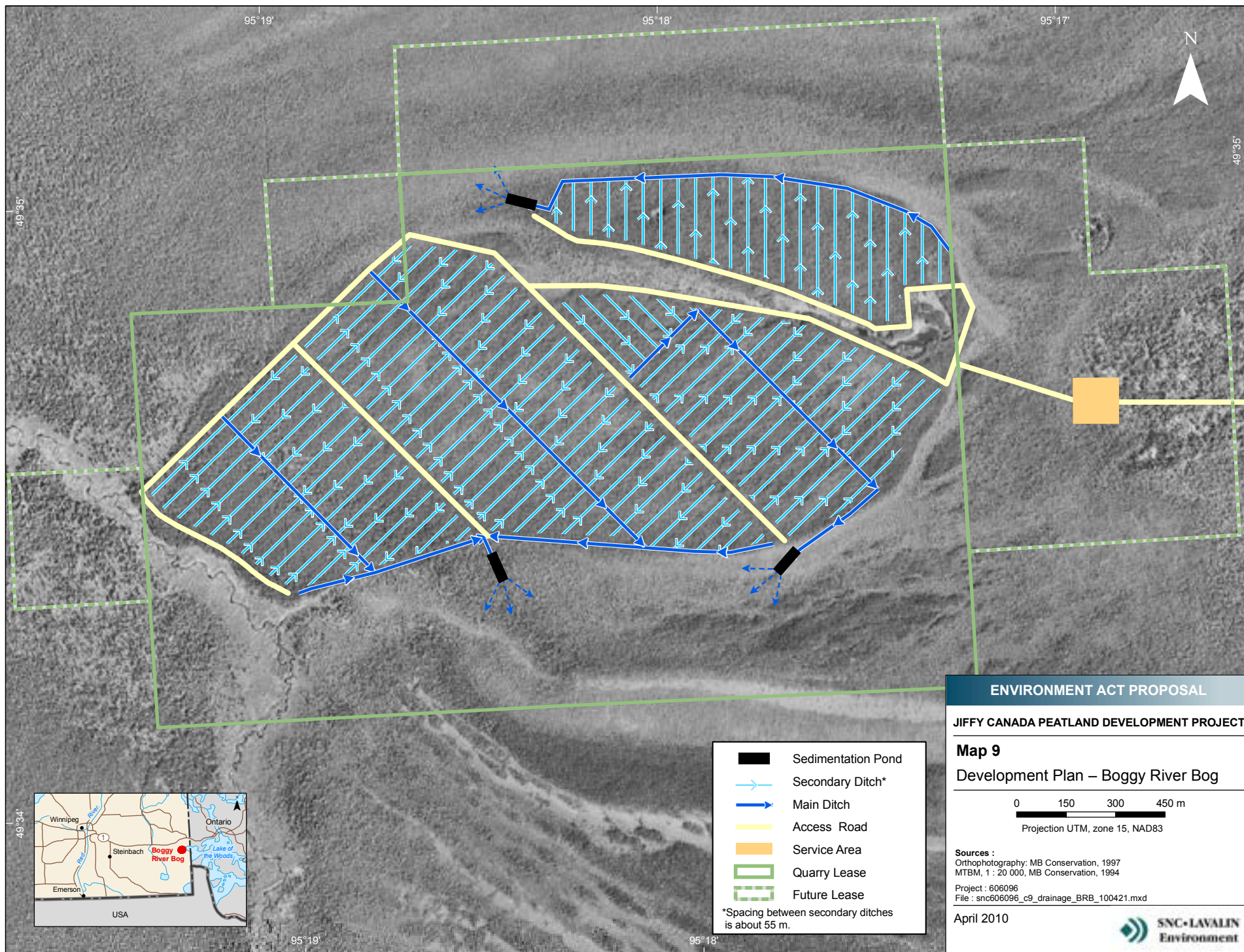
Sources :
MTBM, 1 : 20 000, MB Conservation, 1994
CanVec, 1 : 50 000, RnCan, 2009

Project : 606096
File : snc606096_c6_mnBRHB_100222.mxd

April 2010







Appendix A

Quarry Leases

QUARRY LEASE

Quarry
Lease No. QL-2086

THIS LEASE made in duplicate this 27th day of July, 2009

BETWEEN:

Her Majesty the Queen in right of the
Province of Manitoba, represented by the
Minister of Science, Technology, Energy
and Mines

(the "Minister")

of the First Part

- and -

JIFFY CANADA INC. C/O JIFFY
PRODUCTS (N.B.) LTD
P.O. BOX 2004
125, INDUSTRIAL PARK
SHIPPAGAN NB E8S 3H1

(the "Lessee")

of the Second Part

The parties agree as follows:

1. In this Lease:

- (a) "Act" means The Mines and Minerals Act, Cap. M162 C.C.S.M., as amended, revised or substituted from time to time;
- (b) "regulations" means regulations made pursuant to the Act, and as amended, revised or substituted from time to time;

2. Subject and pursuant to the Act and regulations, the Minister conveys to the lessee the exclusive right to explore for, develop, and produce the following quarry minerals, namely

PEAT AND PEAT MOSS-----

that are the property of the Crown and are found on or under the land described as:

Parcel 1:

THE NW ¼ OF SECTION 14, THE EAST HALF OF THE NE ¼ OF SECTION 15, LEGAL SUBDIVISION 1 OF SECTION 22, LEGAL SUBDIVISIONS 3, 4, AND 6 OF SECTION 23-7-16 EPM.

Parcel 2:

ALL THAT PORTION OF GOVERNMENT ROAD ALLOWANCE BOUNDED AS FOLLOWS: ON THE NORTH BY THE STRAIGHT PRODUCTION ELY OF THE NORTHERN LIMIT OF LEGAL SUBDIVISION 1 OF SECTION 22, ON THE EAST BY THE STRAIGHT PRODUCTION NLY OF THE EASTERN LIMIT OF THE NW ¼ OF SECTION 14, ON THE SOUTH BY THE STRAIGHT PRODUCTION ELY OF THE SOUTHERN LIMIT OF THE NE ¼ OF SECTION 15, AND ON THE WEST BY THE STRAIGHT PRODUCTION NLY OF WESTERN LIMIT OF LEGAL SUBDIVISION 16 OF SECTION 15-7-16 EPM. pc

(the "Lands") and being **169.25** hectares, more or less, for a term of 10 years, commencing the **5th day of May, 2009** renewable in accordance with the Act.

3. The Lessee shall comply with the Act and regulations; including, without restricting the generality of the foregoing, the payment of rent, royalty and rehabilitation levy prescribed thereunder.
4. The Lessee shall and does hereby indemnify and save harmless the Minister against any and all actions, suits, claims or demands that may be brought or made against the Minister for or by reason of any act or thing done or omitted to be done by the Lessee or its agents with respect to the Lands.
5. To be effective and binding, any waiver by the Minister of a breach by the Lessee of any term or condition of this Lease, the Act or the regulations must be in writing. Any such waiver shall extend only to the events of breach enumerated therein and shall not limit or affect the Minister's rights with respect to any other breach.
6. If the Lessee defaults, breaches, fails to perform or observe any term or condition of this Lease, the Act or the regulations, and any such event is not remedied within such notice period as the Minister may give, the Minister may cancel this Lease. Notwithstanding any such cancellation by the Minister, the rights of the Minister against the Lessee shall not be prejudiced and the Minister shall have the full remedies against the Lessee as if the Lease remained in full force and effect.
7. Any notice to a party hereto shall be in writing and may be delivered personally, sent by telegram, telex, telecopier or other means of electronic communication, or may be forwarded by mail subject to Canada Post confirmation of delivery to that party at the following address:

To the Minister:

To the Lessee:

Science, Technology, Energy and Mines
Unit 360-1395 Ellice Avenue
Winnipeg, Manitoba
R3G 3P2

JIFFY CANADA INC. C/O JIFFY
PRODUCTS (N.B.) LTD
P.O. BOX 2004
125, INDUSTRIAL PARK
SHIPPAGAN NB E8S 3H1

8. This lease shall be interpreted in accordance with the laws of Manitoba.
9. Any amendments to this Lease shall be in writing and signed by both parties.
10. The Lessee shall not assign this lease except with the prior written consent of the Minister which shall not be unreasonably withheld. Any obligations of the Lessee outstanding at the date of any assignment shall remain the responsibility of the Lessee, to the extent the obligations are not performed by the permitted assignee.
11. This Lease shall enure to the benefit of and be binding upon the heirs, executors, administrators, successors and permitted assigns of the parties.
12. Additional clauses:

Mining operations shall not commence on this lease until a Mine Closure Plan has been submitted by the lessee, accompanied by the required financial security deposit and approved by the Director of Mines.

Prior to the commencement of mining, the lessee shall obtain an Environment Act Licence in accordance with The Manitoba Environment Act (CCSM E125).

It is the lessee's responsibility to locate all utilities, (including but not limited to gas, electric and telecommunications) that may exist within the limits of this disposition prior to any excavation. "Call Before You Dig" and "611 Cable Locate Service". The lessee shall comply with all requirements imposed by the utility company.

The lessee shall comply with The Workplace Safety and Health Act and Regulation.

In witness whereof the Minister and the Lessee have executed this Lease on the dates shown below their respective signatures.

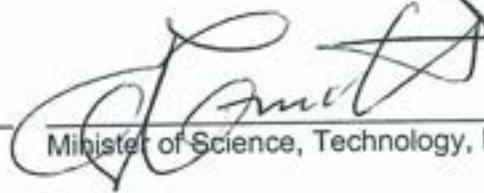
Signed, sealed and delivered
in the presence of:

Her Majesty the Queen in right of the Province Of
Manitoba

Witness



Minister of Science, Technology, Energy and Mines



Authorized Signing Authority
Ernest Armitt, P.Eng.
Director of Mines

Date

Aug 18 2009

Witness



Lessee JIFFY CANADA INC. C/O JIFFY PRODUCTS
(N.B.) LTD



Date

Aug 7th 2009

QUARRY LEASE

Quarry
Lease No. QL-2087

THIS LEASE made in duplicate this 27th day of July, 2009

BETWEEN:

Her Majesty the Queen in right of the
Province of Manitoba, represented by the
Minister of Science, Technology, Energy
and Mines

(the "Minister")

of the First Part

- and -

JIFFY CANADA INC. C/O JIFFY
PRODUCTS (N.B.) LTD
P.O. BOX 2004
125, INDUSTRIAL PARK
SHIPPAGAN NB E8S 3H1

(the "Lessee")

of the Second Part

The parties agree as follows:

1. In this Lease:

- (a) "Act" means The Mines and Minerals Act, Cap. M162 C.C.S.M., as amended, revised or substituted from time to time;
- (b) "regulations" means regulations made pursuant to the Act, and as amended, revised or substituted from time to time;

2. Subject and pursuant to the Act and regulations, the Minister conveys to the lessee the exclusive right to explore for, develop, and produce the following quarry minerals, namely

PEAT AND PEAT MOSS-----

that are the property of the Crown and are found on or under the land described as:

Parcel 1:
LEGAL SUBDIVISIONS 12 AND 13 OF SECTION 13, THE NE ¼ OF SECTION 14, THE SE ¼ OF SECTION 23, AND LEGAL SUBDIVISIONS 4 AND 5 OF SECTION 24-7-16 EPM.

Parcel 2:
ALL THAT PORTION OF GOVERNMENT ROAD ALLOWANCE BOUNDED AS FOLLOWS:
ON THE NORTH BY THE STRAIGHT PRODUCTION ELY OF THE NORTHERN LIMIT OF
THE SE ¼ OF SECTION 23, ON THE EAST BY THE STRAIGHT PRODUCTION NLY OF
THE EASTERN LIMIT LEGAL SUBDIVISION 13 OF SECTION 13, ON THE SOUTH BY THE
STRAIGHT PRODUCTION ELY OF THE SOUTHERN LIMIT OF THE NE ¼ OF SECTION 14,
AND ON THE WEST BY THE STRAIGHT PRODUCTION NLY OF THE WESTERN LIMIT
NW¼ OF SECTION 14-7-16 EPM.

(the "Lands") and being 202.839 hectares, more or less, for a term of 10 years, commencing the 5th day of December, 2008 renewable in accordance with the Act.

3. The Lessee shall comply with the Act and regulations; including, without restricting the generality of the foregoing, the payment of rent, royalty and rehabilitation levy prescribed thereunder.
4. The Lessee shall and does hereby indemnify and save harmless the Minister against any and all actions, suits, claims or demands that may be brought or made against the Minister for or by reason of any act or thing done or omitted to be done by the Lessee or its agents with respect to the Lands.
5. To be effective and binding, any waiver by the Minister of a breach by the Lessee of any term or condition of this Lease, the Act or the regulations must be in writing. Any such waiver shall extend only to the events of breach enumerated therein and shall not limit or affect the Minister's rights with respect to any other breach.
6. If the Lessee defaults, breaches, fails to perform or observe any term or condition of this Lease, the Act or the regulations, and any such event is not remedied within such notice period as the Minister may give, the Minister may cancel this Lease. Notwithstanding any such cancellation by the Minister, the rights of the Minister against the Lessee shall not be prejudiced and the Minister shall have the full remedies against the Lessee as if the Lease remained in full force and effect.
7. Any notice to a party hereto shall be in writing and may be delivered personally, sent by telegram, telex, telecopier or other means of electronic communication, or may be forwarded by mail subject to Canada Post confirmation of delivery to that party at the following address:

To the Minister:

Science, Technology, Energy and Mines

To the Lessee:

IFFY CANADA INC. C/O IFFY

Unit 360-1395 Ellice Avenue
Winnipeg, Manitoba
R3G 3P2

PRODUCTS (N.B.) LTD
P.O. BOX 2004
125, INDUSTRIAL PARK
SHIPPAGAN NB E8S 3H1

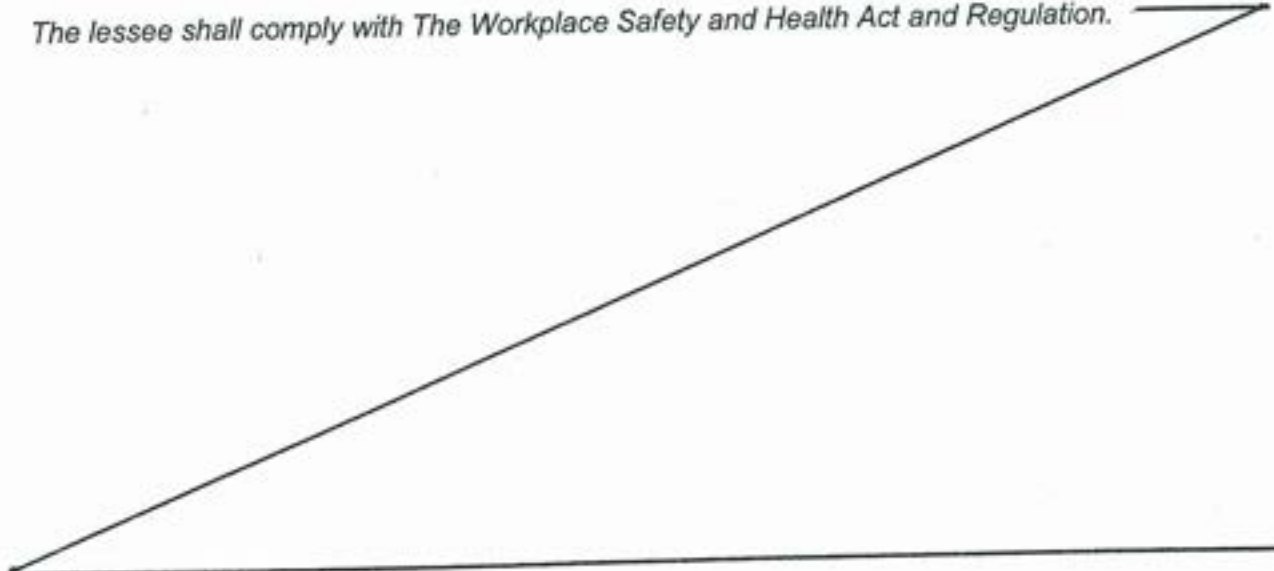
8. This lease shall be interpreted in accordance with the laws of Manitoba.
9. Any amendments to this Lease shall be in writing and signed by both parties.
10. The Lessee shall not assign this lease except with the prior written consent of the Minister which shall not be unreasonably withheld. Any obligations of the Lessee outstanding at the date of any assignment shall remain the responsibility of the Lessee, to the extent the obligations are not performed by the permitted assignee.
11. This Lease shall enure to the benefit of and be binding upon the heirs, executors, administrators, successors and permitted assigns of the parties.
12. Additional clauses:

Mining operations shall not commence on this lease until a Mine Closure Plan has been submitted by the lessee, accompanied by the required financial security deposit and approved by the Director of Mines.

Prior to the commencement of mining, the lessee shall obtain an Environment Act Licence in accordance with The Manitoba Environment Act (CCSM E125).

It is the lessee's responsibility to locate all utilities, (including but not limited to gas, electric and telecommunications) that may exist within the limits of this disposition prior to any excavation. "Call Before You Dig" and "611 Cable Locate Service". The lessee shall comply with all requirements imposed by the utility company.

The lessee shall comply with The Workplace Safety and Health Act and Regulation.



In witness whereof the Minister and the Lessee have executed this Lease on the dates shown below their respective signatures.

Signed, sealed and delivered
in the presence of:

Her Majesty the Queen in right of the Province Of
Manitoba

Witness



Minister of Science, Technology, Energy and Mines

Authorized Signing Authority
Ernest Armitt, P.Eng.
Director of Mines

Date

August 18 2009

Witness



Lessee JIFFY CANADA INC. C/O JIFFY PRODUCTS
(N.B.) LTD

Date

Aug 7th, 2009

QUARRY LEASE

Quarry
Lease No. QL-2088

THIS LEASE made in duplicate this 27th day of July, 2009

BETWEEN:

Her Majesty the Queen in right of the
Province of Manitoba, represented by the
Minister of Science, Technology, Energy
and Mines

(the "Minister")

of the First Part

- and -

JIFFY CANADA INC. C/O JIFFY
PRODUCTS (N.B.) LTD
P.O. BOX 2004
125, INDUSTRIAL PARK
SHIPPAGAN NB E8S 3H1

(the "Lessee")

of the Second Part

The parties agree as follows:

1. In this Lease:

(a) "Act" means The Mines and Minerals Act, Cap. M162 C.C.S.M., as amended, revised or substituted from time to time;

(b) "regulations" means regulations made pursuant to the Act, and as amended, revised or substituted from time to time;

2. Subject and pursuant to the Act and regulations, the Minister conveys to the lessee the exclusive right to explore for, develop, and produce the following quarry minerals, namely

PEAT AND PEAT MOSS-----

that are the property of the Crown and are found on or under the land described as:

Parcel 1:
LEGAL SUBDIVISIONS 10, 11,13,14,15, AND 16 OF SECTION 27, LEGAL SUBDIVISIONS 2, 7, 11, 12 AND THE SW ¼ OF SECTION 34-7-16 EPM.

Parcel 2:
ALL THAT PORTION OF GOVERNMENT ROAD ALLOWANCE LYING BETWEEN SECTION 27 AND SECTION 34-7-16 EPM WHICH LIES BETWEEN THE STRAIGHT PRODUCTIONS NLY OF THE WESTERN LIMIT OF SAID SECTION 27 AND THE EASTERN LIMIT OF LEGAL SUBDIVISION 15 OF SECTION 27-7-16 EPM.

(the "Lands") and being **230.267** hectares, more or less, for a term of 10 years, commencing the **5th day of December, 2008** renewable in accordance with the Act.

3. The Lessee shall comply with the Act and regulations; including, without restricting the generality of the foregoing, the payment of rent, royalty and rehabilitation levy prescribed thereunder.
4. The Lessee shall and does hereby indemnify and save harmless the Minister against any and all actions, suits, claims or demands that may be brought or made against the Minister for or by reason of any act or thing done or omitted to be done by the Lessee or its agents with respect to the Lands.
5. To be effective and binding, any waiver by the Minister of a breach by the Lessee of any term or condition of this Lease, the Act or the regulations must be in writing. Any such waiver shall extend only to the events of breach enumerated therein and shall not limit or affect the Minister's rights with respect to any other breach.
6. If the Lessee defaults, breaches, fails to perform or observe any term or condition of this Lease, the Act or the regulations, and any such event is not remedied within such notice period as the Minister may give, the Minister may cancel this Lease. Notwithstanding any such cancellation by the Minister, the rights of the Minister against the Lessee shall not be prejudiced and the Minister shall have the full remedies against the Lessee as if the Lease remained in full force and effect.
7. Any notice to a party hereto shall be in writing and may be delivered personally, sent by telegram, telex, telecopier or other means of electronic communication, or may be forwarded by mail subject to Canada Post confirmation of delivery to that party at the following address:

To the Minister:

Science, Technology, Energy and Mines
Unit 360-1395 Ellice Avenue
Winnipeg, Manitoba
R3G 3P2

To the Lessee:

JIFFY CANADA INC. C/O JIFFY
PRODUCTS (N.B.) LTD
P.O. BOX 2004

125, INDUSTRIAL PARK
SHIPPAGAN NB E8S 3H1

8. This lease shall be interpreted in accordance with the laws of Manitoba.
9. Any amendments to this Lease shall be in writing and signed by both parties.
10. The Lessee shall not assign this lease except with the prior written consent of the Minister which shall not be unreasonably withheld. Any obligations of the Lessee outstanding at the date of any assignment shall remain the responsibility of the Lessee, to the extent the obligations are not performed by the permitted assignee.
11. This Lease shall enure to the benefit of and be binding upon the heirs, executors, administrators, successors and permitted assigns of the parties.
12. Additional clauses:

Mining operations shall not commence on this lease until a Mine Closure Plan has been submitted by the lessee, accompanied by the required financial security deposit and approved by the Director of Mines.

Prior to the commencement of mining, the lessee shall obtain an Environment Act Licence in accordance with The Manitoba Environment Act (CCSM E125).

It is the lessee's responsibility to locate all utilities, (including but not limited to gas, electric and telecommunications) that may exist within the limits of this disposition prior to any excavation. "Call Before You Dig" and "611 Cable Locate Service". The lessee shall comply with all requirements imposed by the utility company.

The lessee shall comply with The Workplace Safety and Health Act and Regulation.

In witness whereof the Minister and the Lessee have executed this Lease on the dates shown below their respective signatures.

Signed, sealed and delivered
in the presence of:

Her Majesty the Queen in right of the Province Of
Manitoba

Witness



Minister of Science, Technology, Energy and Mines

Date

August 18 2008

Witness



Lessee JIFFY CANADA INC. C/O JIFFY PRODUCTS
(N.B.) LTD

Date

Aug 7th, 2009

QUARRY LEASE

Quarry
Lease No. QL-2089

THIS LEASE made in duplicate this 27th day of July, 2009

BETWEEN:

Her Majesty the Queen in right of the
Province of Manitoba, represented by the
Minister of Science, Technology, Energy
and Mines

(the "Minister")

of the First Part

- and -

JIFFY CANADA INC. C/O JIFFY
PRODUCTS (N.B.) LTD
P.O. BOX 2004
125, INDUSTRIAL PARK
SHIPPAGAN NB E8S 3H1

(the "Lessee")

of the Second Part

The parties agree as follows:

1. In this Lease:

(a) "Act" means The Mines and Minerals Act, Cap. M162 C.C.S.M., as amended, revised or substituted from time to time;

(b) "regulations" means regulations made pursuant to the Act, and as amended, revised or substituted from time to time;

2. Subject and pursuant to the Act and regulations, the Minister conveys to the lessee the exclusive right to explore for, develop, and produce the following quarry minerals, namely

PEAT AND PEAT MOSS-----

that are the property of the Crown and are found on or under the land described as:

Parcel 1:

THE W½ OF SECTION 28; LEGAL SUBDIVISIONS 9 AND 16 OF SECTION 29; LEGAL SUBDIVISION 1 OF SECTION 32; LEGAL SUBDIVISION 11 AND THE SW ¼ OF SECTION 33-7-16 EPM.

Parcel 2:

ALL THAT PORTION OF GOVERNMENT ROAD ALLOWANCE BOUNDED AS FOLLOWS: ON THE NORTH BY THE STRAIGHT PRODUCTION WLY OF THE NORTHERN LIMIT OF THE SW ¼ OF SECTION 33, ON THE EAST BY THE STRAIGHT PRODUCTION NLY OF THE EASTERN LIMIT OF THE NW ¼ OF SECTION 28, ON THE SOUTH BY THE STRAIGHT PRODUCTION WLY OF THE SOUTHERN LIMIT OF SAID SECTION 28, AND ON THE WEST BY THE STRAIGHT PRODUCTION NLY OF WESTERN LIMIT OF LEGAL SUBDIVISION 16 OF SECTION 29-7-16 EPM.

(the "Lands") and being 270.017 hectares, more or less, for a term of 10 years, commencing the **5th day of December, 2008** renewable in accordance with the Act.

3. The Lessee shall comply with the Act and regulations; including, without restricting the generality of the foregoing, the payment of rent, royalty and rehabilitation levy prescribed thereunder.
4. The Lessee shall and does hereby indemnify and save harmless the Minister against any and all actions, suits, claims or demands that may be brought or made against the Minister for or by reason of any act or thing done or omitted to be done by the Lessee or its agents with respect to the Lands.
5. To be effective and binding, any waiver by the Minister of a breach by the Lessee of any term or condition of this Lease, the Act or the regulations must be in writing. Any such waiver shall extend only to the events of breach enumerated therein and shall not limit or affect the Minister's rights with respect to any other breach.
6. If the Lessee defaults, breaches, fails to perform or observe any term or condition of this Lease, the Act or the regulations, and any such event is not remedied within such notice period as the Minister may give, the Minister may cancel this Lease. Notwithstanding any such cancellation by the Minister, the rights of the Minister against the Lessee shall not be prejudiced and the Minister shall have the full remedies against the Lessee as if the Lease remained in full force and effect.
7. Any notice to a party hereto shall be in writing and may be delivered personally, sent by telegram, telex, telecopier or other means of electronic communication, or may be forwarded by mail subject to Canada Post confirmation of delivery to that party at the following address:

To the Minister:

To the Lessee:

Science, Technology, Energy and Mines
Unit 360-1395 Ellice Avenue
Winnipeg, Manitoba
R3G 3P2

JIFFY CANADA INC. C/O JIFFY
PRODUCTS (N.B.) LTD
P.O. BOX 2004
125, INDUSTRIAL PARK
SHIPPAGAN NB E8S 3H1

8. This lease shall be interpreted in accordance with the laws of Manitoba.
9. Any amendments to this Lease shall be in writing and signed by both parties.
10. The Lessee shall not assign this lease except with the prior written consent of the Minister which shall not be unreasonably withheld. Any obligations of the Lessee outstanding at the date of any assignment shall remain the responsibility of the Lessee, to the extent the obligations are not performed by the permitted assignee.
11. This Lease shall enure to the benefit of and be binding upon the heirs, executors, administrators, successors and permitted assigns of the parties.
12. Additional clauses:

Mining operations shall not commence on this lease until a Mine Closure Plan has been submitted by the lessee, accompanied by the required financial security deposit and approved by the Director of Mines.

Prior to the commencement of mining, the lessee shall obtain an Environment Act Licence in accordance with The Manitoba Environment Act (CCSM E125).

It is the lessee's responsibility to locate all utilities, (including but not limited to gas, electric and telecommunications) that may exist within the limits of this disposition prior to any excavation. "Call Before You Dig" and "611 Cable Locate Service". The lessee shall comply with all requirements imposed by the utility company.

The lessee shall comply with The Workplace Safety and Health Act and Regulation.

In witness whereof the Minister and the Lessee have executed this Lease on the dates shown below their respective signatures.

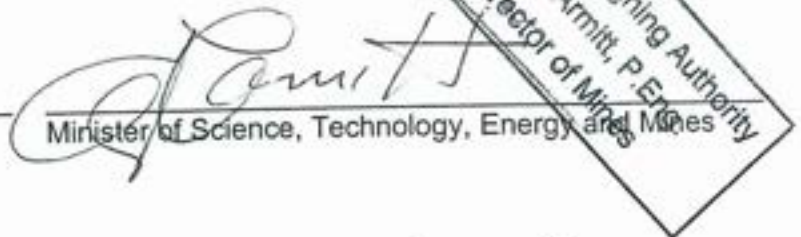
Signed, sealed and delivered
in the presence of:

Her Majesty the Queen in right of the Province Of
Manitoba

Witness



Minister of Science, Technology, Energy and Mines



Date

August 18 2008

Witness



Lessee JIFFY CANADA INC. C/O JIFFY PRODUCTS
(N.B.) LTD



Date

Aug 7th, 2009

QUARRY LEASE

Quarry
Lease No. QL-2090

THIS LEASE made in duplicate this 27th day of July, 2009

BETWEEN:

Her Majesty the Queen in right of the
Province of Manitoba, represented by the
Minister of Science, Technology, Energy
and Mines

(the "Minister")

of the First Part

- and -

JIFFY CANADA INC. C/O JIFFY
PRODUCTS (N.B.) LTD
P.O. BOX 2004
125, INDUSTRIAL PARK
SHIPPAGAN NB E8S 3H1

(the "Lessee")

of the Second Part

The parties agree as follows:

1. In this Lease:

(a) "Act" means The Mines and Minerals Act, Cap. M162 C.C.S.M., as amended, revised or substituted from time to time;

(b) "regulations" means regulations made pursuant to the Act, and as amended, revised or substituted from time to time;

2. Subject and pursuant to the Act and regulations, the Minister conveys to the lessee the exclusive right to explore for, develop, and produce the following quarry minerals, namely

PEAT AND PEAT MOSS-----

that are the property of the Crown and are found on or under the land described as:

Parcel 1:

LEGAL SUBDIVISIONS 5 AND 12 OF SECTION 27; LEGAL SUBDIVISIONS 7, 8 AND THE NE ¼ OF SECTION 28; LEGAL SUBDIVISIONS 9, 10 AND THE SE ¼ OF SECTION 33-7-16 EPM.

Parcel 2:

ALL THAT PORTION OF GOVERNMENT ROAD ALLOWANCE BOUNDED AS FOLLOWS: ON THE NORTH BY THE STRAIGHT PRODUCTION ELY OF THE NORTHERN LIMIT OF LEGAL SUBDIVISION 9 OF SECTION 33, ON THE EAST BY THE STRAIGHT PRODUCTION NLY OF THE WESTERN LIMIT OF THE NW ¼ OF SECTION 27, ON THE SOUTH BY THE STRAIGHT PRODUCTION ELY OF THE SOUTHERN LIMIT OF LEGAL SUBDIVISION 8 OF SECTION 28, AND ON THE WEST BY THE STRAIGHT PRODUCTION NLY OF WESTERN LIMIT OF NE ¼ OF SECTION 28-7-16 EPM.

(the "Lands") and being **236.346** hectares, more or less, for a term of 10 years, commencing the **5th day of December, 2008** renewable in accordance with the Act.

3. The Lessee shall comply with the Act and regulations; including, without restricting the generality of the foregoing, the payment of rent, royalty and rehabilitation levy prescribed thereunder.
4. The Lessee shall and does hereby indemnify and save harmless the Minister against any and all actions, suits, claims or demands that may be brought or made against the Minister for or by reason of any act or thing done or omitted to be done by the Lessee or its agents with respect to the Lands.
5. To be effective and binding, any waiver by the Minister of a breach by the Lessee of any term or condition of this Lease, the Act or the regulations must be in writing. Any such waiver shall extend only to the events of breach enumerated therein and shall not limit or affect the Minister's rights with respect to any other breach.
6. If the Lessee defaults, breaches, fails to perform or observe any term or condition of this Lease, the Act or the regulations, and any such event is not remedied within such notice period as the Minister may give, the Minister may cancel this Lease. Notwithstanding any such cancellation by the Minister, the rights of the Minister against the Lessee shall not be prejudiced and the Minister shall have the full remedies against the Lessee as if the Lease remained in full force and effect.
7. Any notice to a party hereto shall be in writing and may be delivered personally, sent by telegram, telex, telecopier or other means of electronic communication, or may be forwarded by mail subject to Canada Post confirmation of delivery to that party at the following address:

To the Minister:

To the Lessee:

Science, Technology, Energy and Mines
Unit 360-1395 Ellice Avenue
Winnipeg, Manitoba
R3G 3P2

JIFFY CANADA INC. C/O JIFFY
PRODUCTS (N.B.) LTD
P.O. BOX 2004
125, INDUSTRIAL PARK
SHIPPAGAN NB E8S 3H1

8. This lease shall be interpreted in accordance with the laws of Manitoba.
9. Any amendments to this Lease shall be in writing and signed by both parties.
10. The Lessee shall not assign this lease except with the prior written consent of the Minister which shall not be unreasonably withheld. Any obligations of the Lessee outstanding at the date of any assignment shall remain the responsibility of the Lessee, to the extent the obligations are not performed by the permitted assignee.
11. This Lease shall enure to the benefit of and be binding upon the heirs, executors, administrators, successors and permitted assigns of the parties.
12. Additional clauses:

Mining operations shall not commence on this lease until a Mine Closure Plan has been submitted by the lessee, accompanied by the required financial security deposit and approved by the Director of Mines.

Prior to the commencement of mining, the lessee shall obtain an Environment Act Licence in accordance with The Manitoba Environment Act (CCSM E125).

It is the lessee's responsibility to locate all utilities, (including but not limited to gas, electric and telecommunications) that may exist within the limits of this disposition prior to any excavation. "Call Before You Dig" and "611 Cable Locate Service". The lessee shall comply with all requirements imposed by the utility company.

The lessee shall comply with The Workplace Safety and Health Act and Regulation.

In witness whereof the Minister and the Lessee have executed this Lease on the dates shown below their respective signatures.

Signed, sealed and delivered
in the presence of:

Her Majesty the Queen in right of the Province Of
Manitoba

Witness

D. Masson

E. Armit
Minister of Science, Technology, Energy and Mines

Authorized Signing Authority
Ernest Armit, P. Eng.
Director of Mines

Date

August 18 2009

Witness

Claudette Hébert

JP
Lessee JIFFY CANADA INC. C/O JIFFY PRODUCTS
(N.B.) LTD

Date

Aug 7th, 2009

QUARRY LEASE

Quarry
Lease No. QL-2091

THIS LEASE made in duplicate this 27th day of July, 2009

BETWEEN:

Her Majesty the Queen in right of the
Province of Manitoba, represented by the
Minister of Science, Technology, Energy
and Mines

(the "Minister")

of the First Part

- and -

JIFFY CANADA INC. C/O JIFFY
PRODUCTS (N.B.) LTD
P.O. BOX 2004
125, INDUSTRIAL PARK
SHIPPAGAN NB E8S 3H1

(the "Lessee")

of the Second Part

The parties agree as follows:

1. In this Lease:

(a) "Act" means The Mines and Minerals Act, Cap. M162 C.C.S.M., as amended, revised or substituted from time to time;

(b) "regulations" means regulations made pursuant to the Act, and as amended, revised or substituted from time to time;

2. Subject and pursuant to the Act and regulations, the Minister conveys to the lessee the exclusive right to explore for, develop, and produce the following quarry minerals, namely

PEAT AND PEAT MOSS-----

that are the property of the Crown and are found on or under the land described as:

Parcel 1:

LEGAL SUBDIVISIONS 11, 14, 15, AND 16 OF SECTION 24; LEGAL SUBDIVISION 3 AND THE SE ¼ OF SECTION 25-4-16 EPM; LEGAL SUBDIVISION 13 OF SECTION 19; LEGAL SUBDIVISIONS 3, 4 AND 5 OF SECTION 30-4-17 EPM.

Parcel 2:

ALL THAT PORTION OF GOVERNMENT ROAD ALLOWANCE BOUNDED AS FOLLOWS: ON THE NORTH BY THE STRAIGHT PRODUCTION ELY OF THE NORTHERN LIMIT OF THE SE ¼ OF SECTION 25-4-16 EPM, ON THE EAST BY THE STRAIGHT PRODUCTION NLY OF THE EASTERN LIMIT OF LEGAL SUBDIVISION 13 OF SECTION 19-4-17 EPM, ON THE SOUTH BY THE STRAIGHT PRODUCTION WLY OF THE SOUTHERN LIMIT OF SAID LEGAL SUBDIVISION 13 OF SECTION 19, AND ON THE WEST BY THE STRAIGHT PRODUCTION NLY OF WESTERN LIMIT OF LEGAL SUBDIVISION 14 OF SECTION 24-4-16 EPM. *pc*

(the "Lands") and being **217.812** hectares, more or less, for a term of 10 years, commencing the **5th day of May, 2009** renewable in accordance with the Act.

3. The Lessee shall comply with the Act and regulations; including, without restricting the generality of the foregoing, the payment of rent, royalty and rehabilitation levy prescribed thereunder.
4. The Lessee shall and does hereby indemnify and save harmless the Minister against any and all actions, suits, claims or demands that may be brought or made against the Minister for or by reason of any act or thing done or omitted to be done by the Lessee or its agents with respect to the Lands.
5. To be effective and binding, any waiver by the Minister of a breach by the Lessee of any term or condition of this Lease, the Act or the regulations must be in writing. Any such waiver shall extend only to the events of breach enumerated therein and shall not limit or affect the Minister's rights with respect to any other breach.
6. If the Lessee defaults, breaches, fails to perform or observe any term or condition of this Lease, the Act or the regulations, and any such event is not remedied within such notice period as the Minister may give, the Minister may cancel this Lease. Notwithstanding any such cancellation by the Minister, the rights of the Minister against the Lessee shall not be prejudiced and the Minister shall have the full remedies against the Lessee as if the Lease remained in full force and effect.
7. Any notice to a party hereto shall be in writing and may be delivered personally, sent by telegram, telex, telecopier or other means of electronic communication, or may be forwarded by mail subject to Canada Post confirmation of delivery to that party at the following address:

To the Minister:

Science, Technology, Energy and Mines
Unit 360-1395 Ellice Avenue
Winnipeg, Manitoba
R3G 3P2

To the Lessee:

JIFFY CANADA INC. C/O JIFFY
PRODUCTS (N.B.) LTD
P.O. BOX 2004
125, INDUSTRIAL PARK
SHIPPAGAN NB E8S 3H1

8. This lease shall be interpreted in accordance with the laws of Manitoba.
9. Any amendments to this Lease shall be in writing and signed by both parties.
10. The Lessee shall not assign this lease except with the prior written consent of the Minister which shall not be unreasonably withheld. Any obligations of the Lessee outstanding at the date of any assignment shall remain the responsibility of the Lessee, to the extent the obligations are not performed by the permitted assignee.
11. This Lease shall enure to the benefit of and be binding upon the heirs, executors, administrators, successors and permitted assigns of the parties.
12. Additional clauses:

Mining operations shall not commence on this lease until a Mine Closure Plan has been submitted by the lessee, accompanied by the required financial security deposit and approved by the Director of Mines.

Prior to the commencement of mining, the lessee shall obtain an Environment Act Licence in accordance with The Manitoba Environment Act (CCSM E125).

This lease is issued pursuant to Subsection 14(6) of The Mines and Minerals Act on Crown mineral land that is withdrawn.

It is the lessee's responsibility to locate all utilities, (including but not limited to gas, electric and telecommunications) that may exist within the limits of this disposition prior to any excavation. "Call Before You Dig" and "611 Cable Locate Service". The lessee shall comply with all requirements imposed by the utility company.

The lessee shall comply with The Workplace Safety and Health Act and Regulation.

In witness whereof the Minister and the Lessee have executed this Lease on the dates shown below their respective signatures.

Signed, sealed and delivered
in the presence of:

Her Majesty the Queen in right of the Province Of
Manitoba


Witness


Minister of Science, Technology, Energy and Mines



August 18 2009
Date


Witness


Lessee JIFFY CANADA INC. C/O JIFFY PRODUCTS
(N.B.) LTD

Aug 1st 2009
Date

QUARRY LEASE

Quarry
Lease No. QL-2092

THIS LEASE made in duplicate this 27th day of July, 2009

BETWEEN:

Her Majesty the Queen in right of the
Province of Manitoba, represented by the
Minister of Science, Technology, Energy
and Mines

(the "Minister")

of the First Part

- and -

JIFFY CANADA INC. C/O JIFFY
PRODUCTS (N.B.) LTD
P.O. BOX 2004
125, INDUSTRIAL PARK
SHIPPAGAN NB E8S 3H1

(the "Lessee")

of the Second Part

The parties agree as follows:

1. In this Lease:

- (a) "Act" means The Mines and Minerals Act, Cap. M162 C.C.S.M., as amended, revised or substituted from time to time;
- (b) "regulations" means regulations made pursuant to the Act, and as amended, revised or substituted from time to time;

2. Subject and pursuant to the Act and regulations, the Minister conveys to the lessee the exclusive right to explore for, develop, and produce the following quarry minerals, namely

PEAT AND PEAT MOSS-----

that are the property of the Crown and are found on or under the land described as:

Parcel 1:

LEGAL SUBDIVISIONS 7, 8, 11, 12, 14 AND THE NE ¼ OF SECTION 23; LEGAL SUBDIVISIONS 5, 12, AND 13 OF SECTION 24; LEGAL SUBDIVISION 4 OF SECTION 25-4-16 EPM.

Parcel 2:

ALL THAT PORTION OF GOVERNMENT ROAD ALLOWANCE BOUNDED AS FOLLOWS: ON THE NORTH BY THE STRAIGHT PRODUCTION WLY OF THE NORTHERN LIMIT OF LEGAL SUBDIVISION 4 OF SECTION 25, ON THE EAST BY THE STRAIGHT PRODUCTION NLY OF THE EASTERN LIMIT OF LEGAL SUBDIVISION 13 OF SECTION 24, ON THE SOUTH BY THE STRAIGHT PRODUCTION WLY OF THE SOUTHERN LIMIT OF LEGAL SUBDIVISION 5 OF SAID SECTION 24, AND ON THE WEST BY THE STRAIGHT PRODUCTION NLY OF WESTERN LIMIT OF LEGAL SUBDIVISION 14 OF SECTION 23-4-16 EPM. *fc*

(the "Lands") and being **216.598** hectares, more or less, for a term of 10 years, commencing the **5th day of May, 2009** renewable in accordance with the Act.

3. The Lessee shall comply with the Act and regulations; including, without restricting the generality of the foregoing, the payment of rent, royalty and rehabilitation levy prescribed thereunder.
4. The Lessee shall and does hereby indemnify and save harmless the Minister against any and all actions, suits, claims or demands that may be brought or made against the Minister for or by reason of any act or thing done or omitted to be done by the Lessee or its agents with respect to the Lands.
5. To be effective and binding, any waiver by the Minister of a breach by the Lessee of any term or condition of this Lease, the Act or the regulations must be in writing. Any such waiver shall extend only to the events of breach enumerated therein and shall not limit or affect the Minister's rights with respect to any other breach.
6. If the Lessee defaults, breaches, fails to perform or observe any term or condition of this Lease, the Act or the regulations, and any such event is not remedied within such notice period as the Minister may give, the Minister may cancel this Lease. Notwithstanding any such cancellation by the Minister, the rights of the Minister against the Lessee shall not be prejudiced and the Minister shall have the full remedies against the Lessee as if the Lease remained in full force and effect.
7. Any notice to a party hereto shall be in writing and may be delivered personally, sent by telegram, telex, telecopier or other means of electronic communication, or may be forwarded by mail subject to Canada Post confirmation of delivery to that party at the following address:

To the Minister:

Science, Technology, Energy and Mines
Unit 360-1395 Ellice Avenue
Winnipeg, Manitoba
R3G 3P2

To the Lessee:

JIFFY CANADA INC. C/O JIFFY
PRODUCTS (N.B.) LTD
P.O. BOX 2004
125, INDUSTRIAL PARK
SHIPPAGAN NB E8S 3H1

8. This lease shall be interpreted in accordance with the laws of Manitoba.
9. Any amendments to this Lease shall be in writing and signed by both parties.
10. The Lessee shall not assign this lease except with the prior written consent of the Minister which shall not be unreasonably withheld. Any obligations of the Lessee outstanding at the date of any assignment shall remain the responsibility of the Lessee, to the extent the obligations are not performed by the permitted assignee.
11. This Lease shall enure to the benefit of and be binding upon the heirs, executors, administrators, successors and permitted assigns of the parties.
12. Additional clauses:

Mining operations shall not commence on this lease until a Mine Closure Plan has been submitted by the lessee, accompanied by the required financial security deposit and approved by the Director of Mines.

Prior to the commencement of mining, the lessee shall obtain an Environment Act Licence in accordance with The Manitoba Environment Act (CCSM E125).

This lease is issued pursuant to Subsection 14(6) of The Mines and Minerals Act on Crown mineral land that is withdrawn.

It is the lessee's responsibility to locate all utilities, (including but not limited to gas, electric and telecommunications) that may exist within the limits of this disposition prior to any excavation. "Call Before You Dig" and "611 Cable Locate Service". The lessee shall comply with all requirements imposed by the utility company.

The lessee shall comply with The Workplace Safety and Health Act and Regulation.

In witness whereof the Minister and the Lessee have executed this Lease on the dates shown below their respective signatures.

Signed, sealed and delivered
in the presence of:

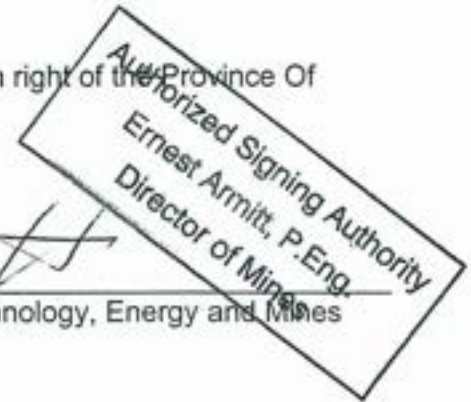
Her Majesty the Queen in right of the Province Of
Manitoba

Witness

D. Masson

E. Armitt

Minister of Science, Technology, Energy and Mines



Date

August 18 2009

Witness

Claudette Helmut

Lessee JIFFY CANADA INC. C/O JIFFY PRODUCTS
(N.B.) LTD

Date

Aug 7th, 2009

QUARRY LEASE

Quarry
Lease No. QL-2227

THIS LEASE made in duplicate this 16th day of March, 2010

BETWEEN:

Her Majesty the Queen in right of the
Province of Manitoba, represented by the
Minister of Innovation, Energy and Mines

(the "Minister")

of the First Part

- and -

JIFFY CANADA INC. C/O JIFFY
PRODUCTS (N.B.) LTD
P.O. BOX 2004
125, INDUSTRIAL PARK
SHIPPAGAN NB E8S 3H1

(the "Lessee")

of the Second Part

The parties agree as follows:

1. In this Lease:

(a) "Act" means The Mines and Minerals Act, Cap. M162 C.C.S.M., as amended, revised or substituted from time to time;

(b) "regulations" means regulations made pursuant to the Act, and as amended, revised or substituted from time to time;

2. Subject and pursuant to the Act and regulations, the Minister conveys to the lessee the exclusive right to explore for, develop, and produce the following quarry minerals, namely

PEAT AND PEAT MOSS -----

that are the property of the Crown and are found on or under the land described as:

Parcel 1: Legal Subdivisions 1 to 6, both inclusive, in Section 23 – 4 – 16 EPM.

Parcel 2: Legal Subdivision 4 in Section 24 – 4 – 16 EPM.

(the "Lands") and being **113.3** hectares, more or less, for a term of 10 years, commencing the **14th day of December, 2009** renewable in accordance with the Act.

3. The Lessee shall comply with the Act and regulations; including, without restricting the generality of the foregoing, the payment of rent, royalty and rehabilitation levy prescribed thereunder.
4. The Lessee shall and does hereby indemnify and save harmless the Minister against any and all actions, suits, claims or demands that may be brought or made against the Minister for or by reason of any act or thing done or omitted to be done by the Lessee or its agents with respect to the Lands.
5. To be effective and binding, any waiver by the Minister of a breach by the Lessee of any term or condition of this Lease, the Act or the regulations must be in writing. Any such waiver shall extend only to the events of breach enumerated therein and shall not limit or affect the Minister's rights with respect to any other breach.
6. If the Lessee defaults, breaches, fails to perform or observe any term or condition of this Lease, the Act or the regulations, and any such event is not remedied within such notice period as the Minister may give, the Minister may cancel this Lease. Notwithstanding any such cancellation by the Minister, the rights of the Minister against the Lessee shall not be prejudiced and the Minister shall have the full remedies against the Lessee as if the Lease remained in full force and effect.
7. Any notice to a party hereto shall be in writing and may be delivered personally, sent by telegram, telex, telecopier or other means of electronic communication, or may be forwarded by mail subject to Canada Post confirmation of delivery to that party at the following address:

To the Minister:

Innovation, Energy and Mines
Unit 360-1395 Ellice Avenue
Winnipeg, Manitoba
R3G 3P2

To the Lessee:

JIFFY CANADA INC. C/O JIFFY
PRODUCTS (N.B.) LTD
P.O. BOX 2004
125, INDUSTRIAL PARK
SHIPPAGAN NB E8S 3H1

8. This lease shall be interpreted in accordance with the laws of Manitoba.
9. Any amendments to this Lease shall be in writing and signed by both parties.
10. The Lessee shall not assign this lease except with the prior written consent of the Minister which shall not be unreasonably withheld. Any obligations of the Lessee outstanding at the

date of any assignment shall remain the responsibility of the Lessee, to the extent the obligations are not performed by the permitted assignee.

11. This Lease shall enure to the benefit of and be binding upon the heirs, executors, administrators, successors and permitted assigns of the parties.
12. Additional clauses:

Mining operations shall not commence on this lease until a Mine Closure Plan has been submitted by the lessee, accompanied by the required financial security deposit and approved by the Director of Mines.

This lease is issued pursuant to Subsection 14(6) of The Mines and Minerals Act on Crown mineral land that is withdrawn.

It is the lessee's responsibility to locate all utilities, (including but not limited to gas, electric and telecommunications) that may exist within the limits of this disposition prior to any excavation. "Call Before You Dig" and "611 Cable Locate Service". The lessee shall comply with all requirements imposed by the utility company.

The lessee shall comply with The Workplace Safety and Health Act and Regulation.

In witness whereof the Minister and the Lessee have executed this Lease on the dates shown below their respective signatures.

Signed, sealed and delivered
in the presence of:

Her Majesty the Queen in right of the Province Of
Manitoba

Witness  Minister of Innovation, Energy and Mines 

April 6 2010
Date

Witness  Lessee JIFFY CANADA INC. C/O JIFFY PRODUCTS (N.B.) LTD 

IN ACCORDANCE WITH SECTION 141(3) OF
THE MINES AND MINERALS ACT, THIS
QUARRY LEASE IS HEREBY RECORDED AND
THIS STAMP SHALL CONSTITUTE A
CERTIFICATE OF FILING AND RECORDING.

March 30th, 2010
Date

April 6/10 Alan
Dated Mining Recorder

QUARRY LEASE

Quarry
Lease No. QL-2228

THIS LEASE made in duplicate this 16th day of March, 2010

BETWEEN:

Her Majesty the Queen in right of the
Province of Manitoba, represented by the
Minister of Innovation, Energy and Mines

(the "Minister")

of the First Part

- and -

JIFFY CANADA INC. C/O JIFFY
PRODUCTS (N.B.) LTD
P.O. BOX 2004
125, INDUSTRIAL PARK
SHIPPAGAN NB E8S 3H1

(the "Lessee")

of the Second Part

The parties agree as follows:

1. In this Lease:

(a) "Act" means The Mines and Minerals Act, Cap. M162 C.C.S.M., as amended, revised or substituted from time to time;

(b) "regulations" means regulations made pursuant to the Act, and as amended, revised or substituted from time to time;

2. Subject and pursuant to the Act and regulations, the Minister conveys to the lessee the exclusive right to explore for, develop, and produce the following quarry minerals, namely

PEAT AND PEAT MOSS -----

that are the property of the Crown and are found on or under the land described as:

Legal Subdivision 9 and 10 in Section 24 - 4 - 16 EPM.

(the "Lands") and being **32.4** hectares, more or less, for a term of 10 years, commencing the **14th day of December, 2009** renewable in accordance with the Act.

3. The Lessee shall comply with the Act and regulations; including, without restricting the generality of the foregoing, the payment of rent, royalty and rehabilitation levy prescribed thereunder.
4. The Lessee shall and does hereby indemnify and save harmless the Minister against any and all actions, suits, claims or demands that may be brought or made against the Minister for or by reason of any act or thing done or omitted to be done by the Lessee or its agents with respect to the Lands.
5. To be effective and binding, any waiver by the Minister of a breach by the Lessee of any term or condition of this Lease, the Act or the regulations must be in writing. Any such waiver shall extend only to the events of breach enumerated therein and shall not limit or affect the Minister's rights with respect to any other breach.
6. If the Lessee defaults, breaches, fails to perform or observe any term or condition of this Lease, the Act or the regulations, and any such event is not remedied within such notice period as the Minister may give, the Minister may cancel this Lease. Notwithstanding any such cancellation by the Minister, the rights of the Minister against the Lessee shall not be prejudiced and the Minister shall have the full remedies against the Lessee as if the Lease remained in full force and effect.
7. Any notice to a party hereto shall be in writing and may be delivered personally, sent by telegram, telex, telecopier or other means of electronic communication, or may be forwarded by mail subject to Canada Post confirmation of delivery to that party at the following address:

To the Minister:

Innovation, Energy and Mines
Unit 360-1395 Ellice Avenue
Winnipeg, Manitoba
R3G 3P2

To the Lessee:

JIFFY CANADA INC. C/O JIFFY
PRODUCTS (N.B.) LTD
P.O. BOX 2004
125, INDUSTRIAL PARK
SHIPPAGAN NB E8S 3H1

8. This lease shall be interpreted in accordance with the laws of Manitoba.
9. Any amendments to this Lease shall be in writing and signed by both parties.
10. The Lessee shall not assign this lease except with the prior written consent of the Minister which shall not be unreasonably withheld. Any obligations of the Lessee outstanding at the date of any assignment shall remain the responsibility of the Lessee, to the extent the

obligations are not performed by the permitted assignee.

11. This Lease shall enure to the benefit of and be binding upon the heirs, executors, administrators, successors and permitted assigns of the parties.
12. Additional clauses:

Mining operations shall not commence on this lease until a Mine Closure Plan has been submitted by the lessee, accompanied by the required financial security deposit and approved by the Director of Mines.

This lease is issued pursuant to Subsection 14(6) of The Mines and Minerals Act on Crown mineral land that is withdrawn.

It is the lessee's responsibility to locate all utilities, (including but not limited to gas, electric and telecommunications) that may exist within the limits of this disposition prior to any excavation. "Call Before You Dig" and "611 Cable Locate Service". The lessee shall comply with all requirements imposed by the utility company.

The lessee shall comply with The Workplace Safety and Health Act and Regulation.

In witness whereof the Minister and the Lessee have executed this Lease on the dates shown below their respective signatures.

Signed, sealed and delivered
in the presence of:

Her Majesty the Queen in right of the Province Of
Manitoba

Witness




Minister of Innovation, Energy and Mines

Authorized Signing Authority
Ernest Armitt, P.Eng.
Director of Mines

Date

April 6 2010

Witness



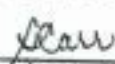

Lessee JIFFY CANADA INC. C/O JIFFY PRODUCTS
(N.B.) LTD

Date

March 30th, 2010

IN ACCORDANCE WITH SECTION 141(3) OF
THE MINES AND MINERALS ACT, THIS
QUARRY LEASE IS HEREBY RECORDED AND
THIS STAMP SHALL CONSTITUTE A
CERTIFICATE OF FILING AND RECORDING.

April 6/10
Dated


D/Mining Recorder

QUARRY LEASE

Quarry
Lease No. **QL-2229**

THIS LEASE made in duplicate this 16th day of March, 2010

BETWEEN:

Her Majesty the Queen in right of the
Province of Manitoba, represented by the
Minister of Innovation, Energy and Mines

(the "Minister")

of the First Part

- and -

JIFFY CANADA INC. C/O JIFFY
PRODUCTS (N.B.) LTD
P.O. BOX 2004
125, INDUSTRIAL PARK
SHIPPAGAN NB E8S 3H1

(the "Lessee")

of the Second Part

The parties agree as follows:

1. In this Lease:

- (a) "Act" means The Mines and Minerals Act, Cap. M162 C.C.S.M., as amended, revised or substituted from time to time;
- (b) "regulations" means regulations made pursuant to the Act, and as amended, revised or substituted from time to time;

2. Subject and pursuant to the Act and regulations, the Minister conveys to the lessee the exclusive right to explore for, develop, and produce the following quarry minerals, namely

PEAT AND PEAT MOSS -----

that are the property of the Crown and are found on or under the land described as:

Legal Subdivision 6 in Section 24 - 4 - 16 EPM.

(the "Lands") and being **16.2** hectares, more or less, for a term of 10 years, commencing the **14th day of December, 2009** renewable in accordance with the Act.

3. The Lessee shall comply with the Act and regulations; including, without restricting the generality of the foregoing, the payment of rent, royalty and rehabilitation levy prescribed thereunder.
4. The Lessee shall and does hereby indemnify and save harmless the Minister against any and all actions, suits, claims or demands that may be brought or made against the Minister for or by reason of any act or thing done or omitted to be done by the Lessee or its agents with respect to the Lands.
5. To be effective and binding, any waiver by the Minister of a breach by the Lessee of any term or condition of this Lease, the Act or the regulations must be in writing. Any such waiver shall extend only to the events of breach enumerated therein and shall not limit or affect the Minister's rights with respect to any other breach.
6. If the Lessee defaults, breaches, fails to perform or observe any term or condition of this Lease, the Act or the regulations, and any such event is not remedied within such notice period as the Minister may give, the Minister may cancel this Lease. Notwithstanding any such cancellation by the Minister, the rights of the Minister against the Lessee shall not be prejudiced and the Minister shall have the full remedies against the Lessee as if the Lease remained in full force and effect.
7. Any notice to a party hereto shall be in writing and may be delivered personally, sent by telegram, telex, telecopier or other means of electronic communication, or may be forwarded by mail subject to Canada Post confirmation of delivery to that party at the following address:

To the Minister:

Innovation, Energy and Mines
Unit 360-1395 Ellice Avenue
Winnipeg, Manitoba
R3G 3P2

To the Lessee:

JIFFY CANADA INC. C/O JIFFY
PRODUCTS (N.B.) LTD
P.O. BOX 2004
125, INDUSTRIAL PARK
SHIPPAGAN NB E8S 3H1

8. This lease shall be interpreted in accordance with the laws of Manitoba.
9. Any amendments to this Lease shall be in writing and signed by both parties.
10. The Lessee shall not assign this lease except with the prior written consent of the Minister which shall not be unreasonably withheld. Any obligations of the Lessee outstanding at the date of any assignment shall remain the responsibility of the Lessee, to the extent the

obligations are not performed by the permitted assignee.

11. This Lease shall enure to the benefit of and be binding upon the heirs, executors, administrators, successors and permitted assigns of the parties.
12. Additional clauses:

Mining operations shall not commence on this lease until a Mine Closure Plan has been submitted by the lessee, accompanied by the required financial security deposit and approved by the Director of Mines.

This lease is issued pursuant to Subsection 14(6) of The Mines and Minerals Act on Crown mineral land that is withdrawn.

It is the lessee's responsibility to locate all utilities, (including but not limited to gas, electric and telecommunications) that may exist within the limits of this disposition prior to any excavation. "Call Before You Dig" and "611 Cable Locate Service". The lessee shall comply with all requirements imposed by the utility company.

The lessee shall comply with The Workplace Safety and Health Act and Regulation.

In witness whereof the Minister and the Lessee have executed this Lease on the dates shown below their respective signatures.

Signed, sealed and delivered
in the presence of:

Her Majesty the Queen in right of the Province Of
Manitoba

Witness




Minister of Innovation, Energy and Mines

Authorized Signing Authority
Ernest Armit, P.Eng.
Director of Mines

Date

April 6 2010

Witness



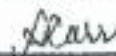

Lessee JIFFY CANADA INC. C/O JIFFY PRODUCTS
(N.B.) LTD

Date

March 30th, 2010

IN ACCORDANCE WITH SECTION 141(3) OF
THE MINES AND MINERALS ACT, THIS
QUARRY LEASE IS HEREBY RECORDED AND
THIS STAMP SHALL CONSTITUTE A
CERTIFICATE OF FILING AND RECORDING.

April 6/10
Dated


Mining Recorder

April 06, 2010



Ms Sherron Carr
Deputy Mining Recorder
Mining Recording Office
360-1395 Ellice Avenue
Winnipeg, MB R3G 3P2

Re: Application for Quarry Leases in accordance with subsection 139(1) of The Mines and Minerals Act

Ms Carr,

By the present, I wish to make application for 14 Quarry Leases all located in the South-eastern part of Manitoba. Enclosed, you will find all 14 application forms with their correspondent sketch and a synthesis of those applications.

If you have any question or need any specific information, please feel free to contact Luc Robichaud or myself.

Thank you,

Yours truly,
JIFFY PRODUCTS (N.B.) LTD.



Zoël Gautreau
Executive Vice-President

ZG / ch

QUARRY LEASES APPLICATIONS SYNTHESIS

Application #	Application area	L.S.	Sec.	Twp.	Rge.	Area (Ha)
1	Poplar Creek Bog	10, 11, 12, 13, 14, 15 & 16	14	4	16 E	135
		13	13			16.9
2	Poplar Creek Bog	2	24	4	16 E	16.9
3	Poplar Creek Bog	6	25	4	16 E	16.9
4	Poplar Creek Bog	2, 6, 7, 11 & 12	30	4	17 E	118
		14 & 15	19			16.9
5	Poplar Creek Bog	12	19	4	17 E	16.9
6	Boggy River Bog	5	23	7	16 E	16.9
7	Boggy River Bog	15	15	7	16 E	16.9
8	Boggy River Bog	9, 10 & 11	23	7	16 E	67.5
		12	24			84.4
9	Boggy River Bog	2, 3 & 6	24	7	16 E	16.9
		14 & 15	13			16.9
10	Haute Bog	8	29	7	16 E	16.9
11	Haute Bog	10	34	7	16 E	33.8
12	Haute Bog	1 & 8	34	7	16 E	16.9
13	Haute Bog	9	27	7	16 E	168.8
14	Haute Bog	3, 4, 6 & 7	27	7	16 E	742.7
		1 & 2	28			
		13, 14, 15 & 16	21			
					TOTAL (ha)	

Please note : As you'll see on the sketches, every Quarry Lease Applications are located in the immediate surroundings of existing Quarry Lease. Those existing Quarry Leases are represent by hatched Legal Subdivision on the sketches.

Appendix B

Agreement with Range Rider Resources



March 31, 2009

BY E-MAIL

Ms. Leah Martin
Range Rider Resources
Vancouver, Canada

Objet : Agreement for Manitoba quarry leases
N/Réf. : 606096

Dear Ms. Martin

Jiffy Products (N.B.) Ltd intends to develop peatlands in southeastern Manitoba to make peat base horticultural products. It has mandated SNC-Lavalin Environment inc. to perform the required procedures. Following a request for quarry leases to the Manitoba Department of Science, Technology, Energy and Mines, Ms Sherron Carr informed us that Range Rider Resources owns claims on some of the targeted land (see table).

Land description

L.S.	Section	Township	Range
11, 12, 13, 14	14	7	16E
9, 16	15	7	16E
1	22	7	16E
3, 4, 6	23	7	16E
11, 14, 15, 16	24	4	16E
1, 2, 3, 7, 8	25	4	16E
13	29	4	17E
3, 4, 5	30	4	17E
7-12, 14, 15, 16	23	4	16E
5, 12, 13	24	4	16E
4	25	4	16E
1	26	4	16E

.../2



Ms. Leah Martin
Range Rider Resources
March 31, 2009

page 2

As per our recent discussion, Jiffy Products (N.B.) Ltd and Range Rider Resources agree that Jiffy will not stand in the way of Range Rider or unreasonably obstruct any future mineral exploration activities that range rider may undertake on its claims.

Thank you for collaboration. Please contact us for any question.

SNC-Lavalin Environnement inc.

François Quinty
Project Manager

c.c. Sherron Carr, Manitoba Science, Technology, Energy and Mines
Zoel Gautreau, Jiffy Products (N.B.) Ltd

Appendix C

Closure Plan

FINAL VERSION



Closure Plan

N° 606096

April 2010
Rev. 00



SNC•LAVALIN
Environment

FINAL VERSION



Closure Plan

No. 606096

April 2010
Rev. 00



SNC-LAVALIN
Environment

Prepared by:

Reviewed by:


Alan Samostie, MES, P.Eng., Environmental Engineer


François Quinty, M.A., Geographer, Project Director

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1 INTRODUCTION

Jiffy Products (Jiffy) proposes to develop Poplar Creek Bog, Haute Bog and Boggy River Bog, which are located in southeast Manitoba, for peat harvesting. The project will consist of standard peat harvesting operations using the pneumatic (vacuum) harvesting method. The harvested peat will be transported to a processing plant, whose location has yet to be determined, where the peat will be transformed into horticultural products.

In compliance with *Manitoba Mines and Minerals Act*, Jiffy submits this Closure Plan for the proposed peatland development. This Plan has been prepared based on current knowledge, the *Mine Closure Guidelines Financial Assurance* and *General Closure Plan Guidelines* of the *Manitoba Mine Closure Regulation 67/99*. Jiffy believes that the proposed Closure Plan will meet the objectives of the general closure guidelines, which are:

- Eliminating unacceptable health hazards and ensuring public safety;
- Limiting the production and circulation of substances that could damage the receiving environment and, in the long term, eliminate the need for maintenance and monitoring;
- Restoring the site to a condition in which it is virtually acceptable to the community;
- Reclaiming for future use the areas where infrastructures are located.

The detailed decommissioning plan is presented in Section 3.3 of the Environment Act Proposal. The Closure Plan also includes an estimate of the Financial Assurance required, and a payment schedule based on the rehabilitation costs and the life expectancy of each peatland.

2 THE PROPONENT

Jiffy Canada (hereinafter called “Jiffy”) is the proponent of the project. Established in Canada since 1976, Jiffy is part of the Jiffy Group, an international company based in Kristiansand, Norway (<http://www.jiffypot.com/>). The company has been operating in New Brunswick since 1976, where it produces pots, pellets, plastic trays, and a wide variety of retail products for its North American market.

Jiffy recently acquired the Tref Group, a European company that specialized in high quality peat potting soil. The Tref Group’s history dates back to 1885, with peat exploration and harvesting in the De Peel area in the southern Netherlands. Jiffy also acquired McKenzie, a Manitoba-based seed company. Jiffy employs 400 people in New Brunswick, and the equivalent of 120 full time people in Manitoba (McKenzie).

Jiffy is a member of the Canadian Sphagnum Peat Moss Association (CSPMA). As such, Jiffy complies with CSPMA Preservation and Reclamation Policy, whose goals include reducing the impact of operations on the environment, and striving for maximum land restoration to the continuing benefit of the community.

For question related to this Closure Plan, please contact:

Mr. François Quinty
Project Director
SNC-Lavalin inc., Division Environment
5955, Saint-Laurent St.
Levis, QC G6V 3P5
Tel: 418-837-3621
Fax: 418-837-2039
Email: Francois.quinty@snclavalin.com

or

Mr. Zoël Gautreau
Executive Vice-President
Jiffy Products
P. O. Box 2004
125 Industrial Park Street
Shippagan, NB E8S 3H1
Tel: 506-336-2284
Fax: 506-336-1844
Email: jnbzg@nb.aibn.com

3 SITE DESCRIPTION

Jiffy Products owns quarry leases on three peatlands in southeast Manitoba. Jiffy also submitted additional applications for quarry leases in order to create buffer zones around the planned peat mining operations.

Poplar Creek Bog is a 425 ha bog located along Route 308, 42.5 km south of the Trans Canada Highway at 95°18'29" W and 49°19'09" N. Jiffy holds peat leases QL-2091, QL-2092, QL-2227, QL-2228 and QL-2229 that cover parts of sections 23, 24, 25 26, 29 and 30, Township 4, Ranges 16E and 17E. Additional lease applications to cover the proposed project area are pending. All leases will be located on Crown land.

Haute Bog is a 526 ha bog located 9.5 km south of the Trans Canada Highway and 31.5 km north of Poplar Creek Bog at 95°20'42" W and 49°36'08"N. It is bordered to the north by the Greater Winnipeg Water District Railway and Aqueduct. Jiffy holds peat leases QL-2088, QL-2089 and QL-2090, which cover parts of sections 27, 28, 29, 32, 33 and 34, Township 7, Range 16E. Additional lease applications to cover the proposed project area are pending. All leases will be located on Crown land.

Boggy River Bog is a 182 ha bog located 13.5 km south of the Trans Canada Highway between Poplar Creek Bog and Haute Bog at 95°18'24" W and 49°34'37" N. Jiffy holds peat leases QL-2086 and QL-2087, which cover parts of sections 13, 14, 15, 22, 23 and 24, Township 7, Range 16E. Additional lease applications to cover the proposed project area are pending. All leases will be located on Crown land.

The total anticipated harvested area represents 1,130 ha.

4 PRODUCTION SCHEDULE

Jiffy has developed a production schedule based on current market knowledge and on available peat volume and quality data. The production schedule is presented in detail in the Environment Act Proposal (Section 3.3). This schedule anticipates a constant production of 320,000 m³ of peat annually over an area of 400 ha.

Jiffy will first develop Poplar Creek Bog, which is the most accessible of the three. The development is scheduled to start during the winter of 2010-2011, with peat harvesting to begin during the summer of 2011.

Based on average harvestable peat depths of 1.50 m, 1.6 m and 1.85 m at Poplar Creek Bog, Haute Bog and Boggy River Bog, respectively, and an annual harvest of 8 cm, the life average life expectancy of peat fields at the three bogs is estimated at 19, 20 and 23 years, respectively.

According to this scenario, peat production will last from 2011 to 2048 at Poplar Creek Bog, from 2030 to 2073 at Haute Bog, and from 2055 to 2082 at Boggy River Bog. The estimated life expectancies of each bog are 37, 43 and 27 years, respectively.

5 DECOMMISSIONING SCHEDULE

Decommissioning will proceed in two stages. First, progressive rehabilitation of exhausted peat fields will be performed at various periods over the lifespan of the three peatlands. Second, final decommissioning of infrastructure will be performed once the harvestable peat supply of each site has been exhausted.

Progressive rehabilitation at Poplar Creek Bog should begin in 2030 and last until 2049, at which time all peat harvesting will end. Progressive rehabilitation will last from 2050 to 2074 at Haute Bog, and from 2078 to 2083 at Boggy River Bog. At all sites, final decommissioning will take place during the last year of progressive rehabilitation.

5.1 PROGRESSIVE DECOMMISSIONING

Four options are proposed for rehabilitation of abandoned peat fields based on the decommissioning guidelines developed by the New Brunswick Department of Natural Resources (Thibault 1998, NBDNR 2005), which are presented in detail in the Environment Act Proposal. Prevailing site conditions when production ends largely determine the preferred option.

Peatland restoration is the first rehabilitation option. Its aim is to restore bog ecosystem functions, as described in the Peatland Restoration Guide (Quinty and Rochefort 2003). It consists mainly of reshaping peat fields, reintroducing peatland plant communities, especially the moss layer, and blocking or filling ditches. Some shallow ditches may be left open and enlarged to create open water bodies. Peatland restoration should apply to approximately 10% of the abandoned area.

The second option is tree planting. The long-term objective of tree planting is to turn depleted peat fields into commercial forest or forested wetland habitats. These habitats will be comparable to those that already exist in the region, especially in poorly drained areas that are less suitable for peatland restoration. Tree seedlings may be planted over 80% of the surface of these areas.

The third option is to create open water bodies. Bog pools provide habitat for specific plant and insect communities, thereby contributing to increased biodiversity. Pools and ponds can easily be created in depressions where water accumulates by creating embankments or water retaining structures that will favour water level stabilization. These open water bodies can cover up to 10% of the surface.

The last option consists of any other use that adds value to previously-harvested sites. Cranberry and blueberry farming and fishing ponds are among the potential options. Rehabilitation for such uses will be considered when harvesting ends. It is not possible to estimate a surface area or cost for this option at this time.

5.2 FINAL DECOMMISSIONING

Final decommissioning involves the dismantling of infrastructure, namely service areas, main ditches and sedimentation ponds.

Service areas will be cleared of all buildings, trailers 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 Manitoba regulations and standards. Finally, the area will be planted with tree seedlings.

Jiffy intends to leave the access and bog roads intact, since they may provide some benefit to the public or to private organizations that may use the land for various purposes. Keeping the roads open will also facilitate monitoring.

Main and secondary ditches will be thoroughly blocked at intervals to avoid gully formation, and filled with peat in between. Sections of the ditches may be left open to become bog pools.

Sedimentation ponds will be partly filled with peat. Some parts may be left open to become bog pools. In such cases, pool margins will be reworked into more natural shapes, and steep slopes will be flattened if they present a risk for humans or wildlife.

Generators and electric wiring will be dismantled.



6 MONITORING

The Environment Act Proposal includes an environmental monitoring plan that applies to both the operational and decommissioning phases (Section 5). The monitoring program will focus on the testing of surface and groundwater quality during the operational phase. Sedimentation pond effluent will be sampled and analyzed periodically. A series of piezometers will be installed in two locations at the margin of the developed area of each bog. Water levels will be measured and water will be sampled and analyzed periodically.

During the post-operational phase, permanent plots will be established in each rehabilitated section for vegetation monitoring. Peatland vegetation and tree seedling establishment will be monitored over a minimum of 5 years. Water levels will be measured in the piezometers, and groundwater will be sampled and analyzed for a period of 2 years after final decommissioning.

Jiffy will also comply with all operational and decommissioning monitoring requirements included in the Environment Act Licence delivered for its peat harvesting project.

7 CLOSURE COSTS

Jiffy intends to post financial assurance as required by the *Manitoba Mine Closure Regulation 67/99*. Since the three sites will be developed at different periods of time, and because the Environment Act Licence for Haute Bog and Boggy River Bog is conditional on plant and wildlife surveys that will be performed in the future, Jiffy proposes to provide separate financial assurance for each of the three peatlands.

The costs of progressive rehabilitation and final decommissioning for each peatland have been estimated based on current knowledge. Table 1 presents the costs for both closure stages (progressive rehabilitation and final decommissioning), and for the three main options available for progressive rehabilitation. The costs are also presented separately for each bog.

The financial assurance was estimated at \$124,250, \$149,250 and \$63,000 for Poplar Creek Bog, Haute Bog and Boggy River Bog, respectively, for a total of \$336,500 (in 2010 dollars). These amounts were adjusted based on the inflation rate until the projected start of decommissioning for each bog, in part because the financial assurance contributions will be made over 14 years following bog development, and because the bogs will be developed at different periods. The adjustment was based on an annual consumer price index of 2.5%, which is the average rate for the 1985-2009 period, as estimated by Statistics Canada (2010). The adjusted financial assurance amounts are therefore \$139,781, \$231,337 and \$137,025 for Poplar Creek Bog, Haute Bog and Boggy River Bog, respectively, for a total of \$517,181.

The financial assurance will be posted according to the schedule recommended in the *Mine Closure Guidelines Financial Assurance*. Table 2 presents the payment schedule for each bog. Since the three peatlands have a life expectancy over 15 years, the financial assurance will be posted over an 11 year period starting the fourth year after the start of peatland development. According to that schedule, payments will extend from 2015 to 2025 for Poplar Creek Bog, from 2033 to 2043 for Haute Bog, and from 2058 to 2068 for Boggy River Bog. However, Jiffy intends to adapt this schedule in response to future changes in the development schedule.

Table 1: Progressive rehabilitation and final decommissioning cost estimate for Poplar Creek Bog, Haute Bog and Boggy River Bog

Peatland Restoration (10% of total area)	Poplar Creek Bog	Haute Bog	Boggy River Bog	Total
Cost per hectare	350	350	350	
Area (ha)	42.5	52.5	18	
Total Restoration Cost	\$ 14,875.00	\$ 18,375.00	\$ 6,300.00	
Tree Planting (80% of total area)				
Cost per hectare	250	250	250	
Area (ha)	340	420	144	
Total Restoration Cost	\$ 85,000.00	\$ 105,000.00	\$ 36,000.00	
Open Water Bodies Creation (10% of total area)				
Cost per hectare	150	150	150	
Area (ha)	42.5	52.5	18	
Total Restoration Cost	\$ 6,375.00	\$ 7,875.00	\$ 2,700.00	
Total area (ha)	425	525	180	1130
Total Cost Progressive rehabilitation	\$ 106,250.00	\$ 131,250.00	\$ 45,000.00	\$ 282,500.00

Final Decommissioning

				Total
Removal of site building	\$ 10,000.00	\$ 10,000.00	\$ 10,000.00	
Sedimentation ponds grading	\$ 1,000.00	\$ 1,000.00	\$ 1,000.00	
Fuel tank removal (including soil test)	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	
Generator and Electrical Wiring Removal	\$ 2,000.00	\$ 2,000.00	\$ 2,000.00	
Total Cost Final Decommissioning	\$ 18,000.00	\$ 18,000.00	\$ 18,000.00	\$ 54,000.00
Total	\$ 124,250.00	\$ 149,250.00	\$ 63,000.00	\$ 336,500.00

Total including annual increase (2.5%) \$ 139,781.25 \$ 231,337.50 \$ 137,025.00 \$ 508,143.75

Table 2 Financial Assurance posting schedule for Poplar Creek Bog, Haute Bog and Boggy River Bog

Year	Deposit (% of total)	PCB		HB		BRB	
		Year (AD)	Amount	Year (AD)	Amount	Year (AD)	Amount
1		2011		2029		2054	
2		2012		2030		2055	
3		2013		2031		2056	
4		2014		2032		2057	
5	0.01	2015	\$ 1,397.81	2033	\$ 2,313.38	2058	\$ 1,370.25
6	0.01	2016	\$ 1,397.81	2034	\$ 2,313.38	2059	\$ 1,370.25
7	0.02	2017	\$ 2,795.63	2035	\$ 4,626.75	2060	\$ 2,740.50
8	0.05	2018	\$ 6,989.06	2036	\$ 11,566.88	2061	\$ 6,851.25
9	0.063	2019	\$ 8,806.22	2037	\$ 14,574.26	2062	\$ 8,632.58
10	0.08	2020	\$ 11,182.50	2038	\$ 18,507.00	2063	\$ 10,962.00
11	0.1	2021	\$ 13,978.13	2039	\$ 23,133.75	2064	\$ 13,702.50
12	0.13	2022	\$ 18,171.56	2040	\$ 30,073.88	2065	\$ 17,813.25
13	0.15	2023	\$ 20,967.19	2041	\$ 34,700.63	2066	\$ 20,553.75
14	0.18	2024	\$ 25,160.63	2042	\$ 41,640.75	2067	\$ 24,664.50
15	0.207	2025	\$ 28,934.72	2043	\$ 47,886.86	2068	\$ 28,364.18
Total:			\$139,781.25	\$ 231,337.50		\$ 137,025.00	
Grand Total:							\$508,143.75

8 REFERENCES

- GOVERNMENT OF MANITOBA. 1999. The Mines and Minerals Act (C.C.S.M. c. M162). Government of Manitoba, Department of Mines and Minerals.
- MANITOBA INDUSTRY, TRADE AND MINES. 2006. Manitoba Mine Closure Regulation 67/99. General Closure Plan Guidelines. March 2006 REV 1. Manitoba Industry, Trade and Mines, Mines Branch
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- THIBAUT, J.J. 1998. Guidelines for peat mining operations in New Brunswick. New Brunswick Department of Natural Resources and Energy, Minerals and energy Division, Open File 98-7.



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Appendix D

Environmental Impact Assessment Methodology

**SNC-LAVALIN INC, ENVIRONMENT DIVISION -
ENVIRONMENTAL IMPACT ASSESSMENT
METHODOLOGY**

1 SOCIAL AND ENVIRONMENTAL IMPACT ASSESSMENT METHODOLOGY

The purpose of the social and environmental impact assessment is to evaluate the consequences and risks related to a specific project in a given social and environmental context.

The objectives of a social and environmental impact assessment are:

- To identify and evaluate the social and environmental impacts of a project, whether they are negative or positive;
- To enhance the positive impacts, and if they are negative, to avoid them or if they can not be avoided, to minimise, mitigate or compensate for them;
- To ensure that all of the relevant social and environmental issues are described in sufficient detail to appreciate the extent of their effect;
- To prepare a comprehensive and consistent social and environmental management plan.

The assessment of environmental impacts is carried out in two steps: their identification and their evaluation.

It should be noted that the terms “environmental effect” and “environmental impact” are used indifferently.

1.1 IDENTIFICATION OF SOCIAL AND ENVIRONMENTAL IMPACTS

The identification of positive or negative impacts caused by the project implementation is based on the analysis of effects resulting from interactions between the affected social and environmental components and the various types of equipment used or activities to be carried out. The proposed equipment and activities are thus considered as sources capable of producing changes in one or many of the sensitive social and environmental components.

Social and environmental issues are taken into consideration as early on as during the study of site location or technological alternatives, thus providing input to enhance project design, construction methods and operations of facilities. This allows the project to be tailored according to its technological and economic constraints while safeguarding the environment from potential adverse effects.



Every element of the project is thus enhanced and examined accordingly to its potential effects on each of the environmental components. The possible interaction between the different social and environmental components (indirect effects) are equally considered. The elements of the project linked to surveys, construction, operation, maintenance and closure phases are all considered.

During construction, the most relevant potential impact sources notably include:

- deforestation and management of residues;
- building access roads;
- development of the work site installations;
- transportation and traffic caused by the movement of labour, machinery and construction materials;
- earthwork and excavation, including dynamiting and drilling;
- extraction and disposal of excavated material;
- work in watercourses;
- the management of wastewater and the surface water drainage network;
- construction and development of facilities and related structures;
- contaminated and non-contaminated waste management;
- job creation;
- procurement of goods and services;
- etc.

During the operation, maintenance and closure period, activities that are sources of impacts are related to:

- operation of equipment (noise, liquid effluent, atmospheric emission, waste and dangerous goods management, purchase of goods and services, and job creation);
- equipment maintenance and eventually equipment restoration;
- equipment dismantling at end of its useful life.

The physical, biological or human components which may be affected by the project are the sensitive elements in the study area, that is, those likely to change or be affected significantly because of components or activities linked to the project. They include:

- air quality;
- noise;
- water supply and water quality (surface and groundwater);
- erosion;
- sediment quality;
- soil quality;
- terrestrial and aquatic vegetation;
- fauna;
- faunal habitats;
- threatened species;



- socio-demographic characteristics
- land use and allocation;
- public infrastructures;
- cultural and archaeological heritage;
- quality of life on the inhabitants including among others, health, safety, air quality and noise;
- landscape;
- economic activities;
- public safety.

Finally, the project's impacts on global issues such as greenhouse gases or biodiversity are also assessed.

1.2 IMPACT ASSESSMENT

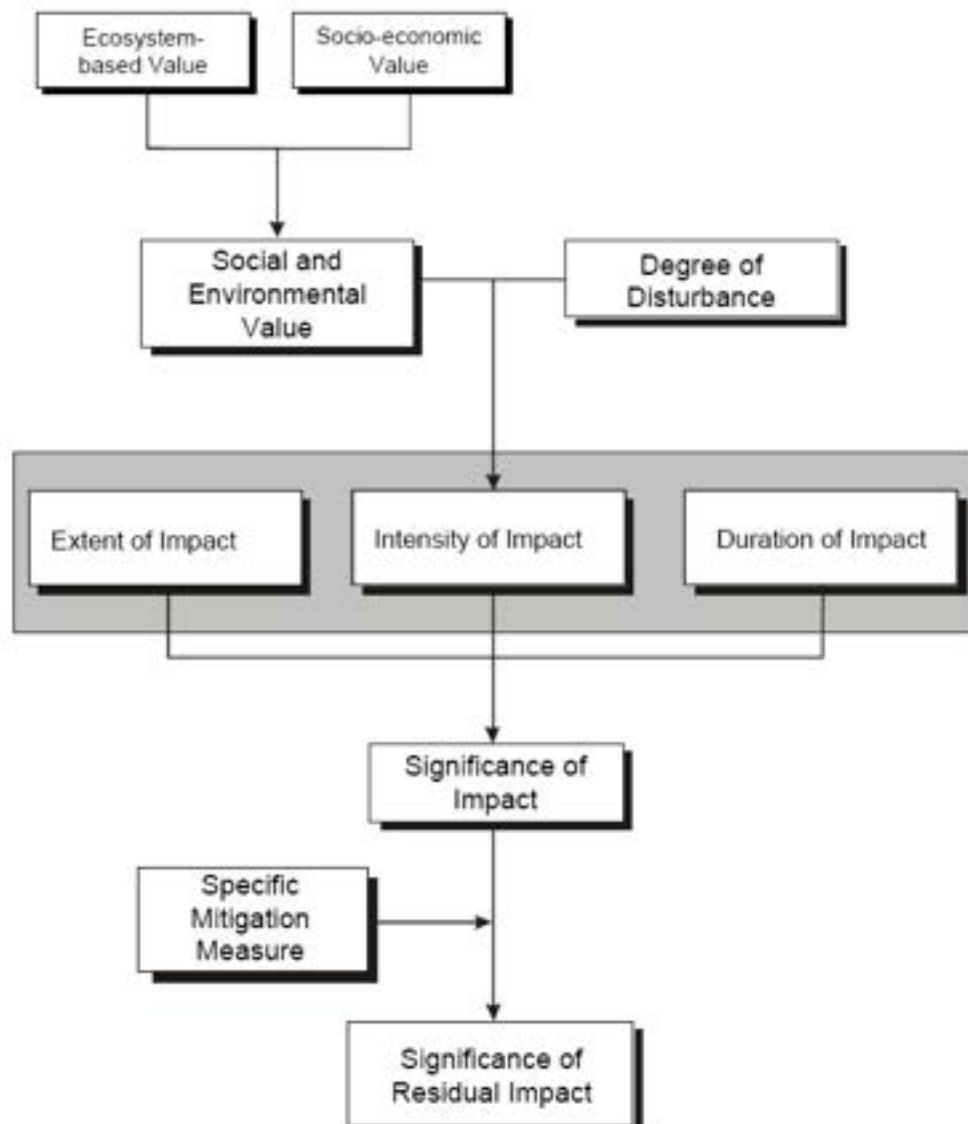
When all the potential effects of a project on a social or environmental component have been identified, the importance of the predicted modifications of this component is evaluated.

For this second step, the methodological approach followed is adapted from impact assessment methods recommended by Hydro-Québec (1990), by the *Ministère des Transports du Québec* (1990), by the World Bank (1991), by the *Ministère de l'Environnement et de la Faune du Québec* (1996), by the Canadian Environmental Assessment Agency (2000) and International Finance Corporation (2006).

The approach used to assess environmental impacts of the project determines the social and environmental value of the components and the **Intensity**, **Extent**, and **Duration** of the anticipated positive or negative impact. These three qualifiers are grouped under one synthesis indicator, the **Significance** of the impact. This indicator provides an overall assessment of the anticipated impacts on a given social or environmental component.

Error! Reference source not found. schematically presents the basic process leading to assessment of the impact **Significance and the inputs and outputs of each step.**

Figure 1 Environmental Assessment Process



1.2.1 Intensity of the Impact for the social and environmental components

The **Intensity** of an impact expresses the relative importance of consequences attributable to a change in an environmental component. For the majority of environmental components the **Intensity** of impact is an integration of the component's **Environmental Value** with its **Degree of Disturbance** and can be either positive or negative.

The **Environmental Value** of a component is the synthesis of its **Ecosystem-Based Value** and its **Socioeconomic Value**.

The **Ecosystem-Based Value** expresses the relative importance of a component to the ecosystem as measured by its function or role. It integrates other notions such as representativeness, patterns of use, diversity, and rare or unique characteristics. This value is the result of the judgment of specialists.

The **Ecosystem-Based Value** of a given component is considered:

- **High**, when the component is of major interest in terms of its ecosystem-based function, biodiversity, or exceptional qualities and there is a consensus in the scientific community that it should be conserved or protected;
- **Medium**, when the component is of strong interest and recognized qualities, and there is concern, although not consensus, for its conservation or protection; and
- **Low**, when the component holds little interest, has few notable qualities, and there is little concern for its conservation or protection.

The **Socioeconomic Value** of a component expresses the relative importance attributed to the component by the public, the various levels of government, or any other legislative or regulatory authority. It indicates the popular or political desire or will to conserve the integrity or the original character of a component. This will is expressed through the legal protection that the component is accorded, or by the concern of the local or regional public for the component. The **Socioeconomic Value** evaluation is based on information gathered during various public consultations in the study area and considers the relative sensitivity of the different stakeholders (disadvantaged or vulnerable groups, target or directly or indirectly affected groups, etc.).

The **Socioeconomic Value** of a given component is considered:

- **High**, when the component is the object of legislative or regulatory measures (threatened or endangered species, conservation parks, etc.) or is essential to human activities (e.g., potable water);
- **Medium**, when the component is valued or used by a significant portion of the concerned population, but is not legally protected; and
- **Low**, when the component is of little concern or is not used by the population.

The **Environmental Value** integrates the Ecosystem-Based Value and the Social Value and retains the higher of the two values as shown in **Error! Reference source not found.1**.

Table 1 **Grid for Determining Environmental Value**

Socioeconomic Value	Ecosystem-Based Value		
	High	Medium	Low
High	High	High	High
Medium	High	Medium	Medium
Low	High	Medium	Low

The **Degree of Disturbance** for a component defines the scope of the changes that affect the component given its sensitivity to the proposed project. The changes for a given component may be negative or positive and the effect on the environmental component may be direct or indirect. The cumulative, synergetic, or delayed impacts, beyond the simple relation of cause and effect, could amplify the degree of disturbance of an environmental component when the environment is especially fragile. The degree of disturbance is:

- **High**, when an impact affects the continued viability of the environmental component, strongly and irreversibly impairs the component, or restricts its use in a significant way;
- **Medium**, when the impact changes, either by reducing or increasing, the quality or use of the environmental component affected, without, however, compromising its integrity;
- **Low**, when the impact affects the quality, use or integrity of the environmental component in a way that is barely perceptible; and
- **Undetermined** when it is impossible to assess how and to what extent the component will be affected. When the **Degree of Disturbance** is undetermined, the impact assessment cannot be completed for that component. In this case, it is necessary to put additional effort towards the baseline characterization or to put in place an environmental monitoring system to follow the evolution of the environmental component after the implementation of the project.

The **Intensity** of the impact ranges from Very Strong to Low. It results from the interaction of the three **Degrees of Disturbance** (High, Medium and Low) with the three classes of **Environmental Value** (High, Medium and Low). Table 2 shows the possible combinations of these inputs and the resulting **Intensity**.

Table 2 Grid for Determining Intensity of an Impact

Degree of Disturbance	Environmental Value		
	High	Medium	Low
High	Very Strong	Strong	Medium
Medium	Strong	Medium	Low
Low	Medium	Low	Low ⁽¹⁾

Note: (1) This intensity should be quantified as "very low" to respect the grid logic, but to limit the number of categories this class has been replaced by low to reduce the number of combinations possible in the following steps of the assessment process. This leads to an overestimation of the impact intensity.

1.2.2 Extent of the Impact

The **Extent** of the impact expresses the spatial influence of the effects produced by an intervention on the environment. This refers either to a distance or an area over which a component will undergo changes. It could also refer to the portion of the population that will be affected by the changes.

The three levels of extent are:

- **Regional:** when an impact affects a large geographic area reaching a significant distance from the project site, or when it is experienced by the entire population or by a significant portion of the population in the study area;
- **Local:** when the impact affects a relatively restricted area located within, near, or at a limited distance from the project site; or when it is experienced by a limited portion of the population in the study area; and
- **Site-Specific:** when the impact affects only a very restricted area in the proximity of the project site; or is experienced by only a small number of individuals in the study area.

1.2.3 Duration of the Impact

The **Duration** of the impact describes the period of time during which a component undergoes changes due to the impact. **Duration** is not necessarily equivalent to the period of time during which the direct source of impact is active since the impact may last for a longer period. Its must also take into consideration the frequency and the duration of each event when the impact is intermittent. **Duration** is characterized as:

- **Long:** when the effects are experienced continuously for the life of the facility, or even beyond, if the effect is irreversible;
- **Medium:** when the effects are experienced over a relatively prolonged period of time, but less than the duration of the life of the facility; and
- **Short:** when the effects are experienced over a limited period of time, generally corresponding to the period of construction, the start-up period, a single season, etc.

1.2.4 Significance of the Impact

The interaction between the Intensity, Extent, and Duration defines the **Significance** of an impact on a given environmental component. Table 3 presents the grid for determining Significance and differentiates between five levels of significance, ranging from Very Strong to Very Low.

The relative importance of each impact is assessed, considering the general mitigation measures integrated into the baseline project. For example, if the project states as a general mitigation measure that a silencer should be installed on a chimney, the evaluation of noise impacts will take into account the noise reduction attributable to the silencer. However, if no such equipment was anticipated at the beginning of the project and that the noise level is unacceptable, a specific mitigation measure will be suggested (ex: installing a silencer on the chimney). When mitigation measures integrated *a priori* to project implementation reduce impacts to the point of rendering them negligible, they are excluded from further analysis.

Once the significance of an impact is established as more than negligible, it is described and additional, specific mitigation measures may be proposed to allow optimal integration of the project into the environment. Mitigation measures are implemented to avoid, minimize or compensate adverse social and environmental impacts by prioritizing, first and foremost, the avoidance of impacts. When the impacts are positive, the measures are meant to enhance or optimize the outcomes. The proposed measures naturally consider costs as well as financial, social and environmental benefits that follow their implementation.

The final assessment phase consists of determining the residual significance of the impact after all mitigation measures are taken into consideration. The issue here, then, is to clarify how the mitigation measure changes one or several of the inputs in the impact assessment process described above.

The thought processes leading to the impact assessment are summarized in **Impact Sheets** found in Appendix A, which are filled for each significant impact. When required, the uncertainty level that affects the assessment as well as the probability that the impact occurs are indicated on the Impact Sheet.

Table 3 Grid for Determining Impact Significance

Intensity	Extent	Duration	Significance
Very strong	Regional	Long	Very strong
		Medium	Very strong
		Short	Very strong
	Local	Long	Very strong
		Medium	Very strong
		Short	Strong
	Site-specific	Long	Very strong
		Medium	Strong
		Short	Strong
Strong	Regional	Long	Very strong
		Medium	Strong
		Short	Strong
	Local	Long	Strong
		Medium	Strong
		Short	Medium
	Site-specific	Long	Strong
		Medium	Medium
		Short	Medium
Medium	Regional	Long	Strong
		Medium	Medium
		Short	Medium
	Local	Long	Medium
		Medium	Medium
		Short	Low
	Site-specific	Long	Medium
		Medium	Low
		Short	Low
Low	Regional	Long	Medium
		Medium	Low
		Short	Low
	Local	Long	Low
		Medium	Low
		Short	Very low
	Site-specific	Long	Low
		Medium	Very low
		Short	Very low

Strong Significant adverse environmental impact according to the *Canadian Environmental Assessment Act*.

1.2.5 Significant Adverse Environmental Effects

For the purposes of this EIS according to the *Canadian Environmental Assessment Act*, strong or very strong residual negative impacts are considered as having significant adverse environmental effects

1.3 CUMULATIVE SOCIAL AND ENVIRONMENTAL IMPACTS

Addressing cumulative environmental effects has become an important component of the environmental assessment process under the *Canadian Environmental Assessment Act* (CEAA). This approach examines the effect on the environment which results from effects of the Project undergoing the environmental assessment, when combined with those of other past, existing and imminent projects and activities, including projects directly related to the main Project, either upstream or downstream of the supply chain.

Cumulative effects can be defined as changes to the environment that are caused by an action in combination with other past, present and future human actions. These human actions include projects and activities (Hegmann *et al*, 1999). The concept is simply a recognition of the complex ways in which the effects of individual projects and activities, current, past and future, interact and combine with each other over time and space, and are likely to create additional, direct or indirect, impacts on one or more of the environmental components.

When addressing a project's potential cumulative environmental effects, one must consider the following:

- The study area should be large enough to consider effects on Valued Ecosystem Components (VECs) due to interactions with other projects, and not just the effects of the single Project under review, including other past, existing and future projects;
- The effects from past action or projects are usually integrated in the social and environmental components descriptions;
- The important imminent or foreseeable projects (residential, commercial, industrial and infrastructures) are reviewed in order to assess any cumulative effect they may cause.

The planned projects likely to interact with the Project under review are identified during the baseline surveys or consultation process. However, projects stemming from the Project, either upstream or downstream of the supply chain, are identified during the analysis of the technology or process supporting each of the specific project. Based on the review of available information, it is necessary to identify the environmental effects that can combine and interact with those of the proposed Project and create cumulative environmental impacts.



The assessment of cumulative environmental effects is achieved using available information and the predictable environmental effects of future projects. Unless specific data exists, the environmental effects of projects, other than the project under study, are estimated based on known effects of similar projects.

2 REFERENCES

- CANADIAN AGENCY FOR IMPACT ASSESSMENT. 2000. *Guide de référence : Déterminer la probabilité des effets environnementaux négatifs importants d'un projet*. Up to date 2000-09-01. 12 p.
- HEGMANN ET AL, 1999. *Cumulative Effects Assessment Practitioners Guide*. Prepared for the Canadian Agency for Impact Assessment, February 1999, 69 pages et appendixes
- HYDRO-QUÉBEC. 1990. *Méthode d'évaluation environnementale, lignes et postes. Démarche d'évaluation environnementale et techniques et outils*. Montréal, Hydro-Québec. 332 p.
- INTERNATIONAL FINANCE CORPORATION, 2006. *International Finance Corporation's Guidance Notes : Performance Standards on Social & Environmental Sustainability* April 30 2006, 155 pages.
- MINISTÈRE DE L'ENVIRONNEMENT ET DE LA FAUNE DU QUÉBEC, April 1996. *Directive pour la réalisation d'une étude d'impact sur l'environnement d'un projet industriel*. 25 p.
- MINISTÈRE DES TRANSPORTS DU QUÉBEC (MTQ). 1990. *Outils d'estimation de l'importance des impacts environnementaux*. Québec, MTQ. 73 p. and appendixes.
- WORLD BANK. 1991. *Environmental Assessment Sourcebook. Vol. 1 : Policies, Procedures, and Cross-Sectoral Issues. Vol. 2 : Sectoral Guidelines. Vol. 3 : Guidelines for Environmental Assessment of Energy and Industry Projects*. Washington (DC), World Bank, Environment Department. 227 p., 281 p. et 227 p

APPENDIX A

FORM NO.:	PROJECT :	NAME:
ENVIRONMENT: ☐ Physical ☐ Biological ☐ Human		
AFFECTED COMPONENT:		
PROJECT PHASES: ☐ Construction ☐ Operation ☐ Decommissioning		
IMPACT ORIGIN:		
IMPACT DESCRIPTION:		
IMPACT ASSESSMENT (<i>Biological or Human Components Only</i>):		
Nature of impact : ☐ Positive ☐ Negative		
<u>ENVIRONMENTAL VALUE</u> ☐ High ☐ Medium ☐ Low <u>DEGREE OF DISTURBANCE</u> ☐ High ☐ Medium ☐ Low ☐ Und.		
<u>EXTENT</u> ☐ Regional ☐ Local ☐ Site-specific <u>INTENSITY</u> ☐ Very high ☐ High ☐ Medium ☐ Low <u>DURATION</u> ☐ Long ☐ Medium ☐ Short		
<u>IMPACT SIGNIFICANCE</u>		
☐ Very High ☐ High ☐ Medium ☐ Low ☐ Very Low ☐ Indeterminate		
SPECIFIC MITIGATION MEASURES: Natural gas is the least GHG-generating fuel.		
RESIDUAL IMPACT SIGNIFICANCE		
☐ Very High ☐ High ☐ Medium ☐ Low ☐ Very Low		
COMMENTS:		

IMPACT ON LANDSCAPE

FORM NO.:

NAME:

ENVIRONMENT: ☐ Human

AFFECTED COMPONENT: Visual Environment

PROJECT PHASES: ☐ Construction ☐ Operation

IMPACT ORIGIN:

IMPACT DESCRIPTION:

IMPACT ASSESSMENT:

Nature of impact : ☐ Positive ☐ Negative

LANDSCAPE VALUE

☐ High ☐ Medium ☐ Low

ABILITY TO DISSIMULATE

☐ High ☐ Medium ☐ Low

DURATION

☐ Permanent
☐ Temporary

RADIATION

☐ Regional
☐ Local
☐ Pinpoint

SENSITIVITY

☐ Large
☐ Medium
☐ Weak

EXPOSITION

☐ Strong
☐ Medium
☐ Weak

EXTENT

☐ Large ☐ Medium ☐ Low

RESISTANCE OF THE
LANDSCAPE UNIT

☐ High
☐ Medium ☐ Low

PERCEPTION OF THE
OBSERVER

☐ Strong ☐ Medium ☐ Weak

IMPACT SIGNIFICANCE

☐ Major ☐ Medium ☐ Minor ☐ None

SPECIFIC MITIGATION MEASURES:

RESIDUAL IMPACT SIGNIFICANCE

☐ Major ☐ Medium ☐ Minor ☐ None

COMMENTS:

•

Appendix E

Surface Water Chemical Analysis



Environmental Division

Certificate of Analysis

SNC-Lavalin Inc. (Levis, QC)

ATTN: Francois Quinty

5955, rue SAINT-LAURENT

BUREAU 300

LEVIS QC G6V 3P5

Report Date: 01-FEB-10 12:54 (MT)

Version: FINAL

Lab Work Order #: L856619

Date Received: 22-JAN-10

Project P.O. #: NOT SUBMITTED

Job Reference: 606096

Legal Site Desc: POPLAR CREEK BOG

CofC Numbers:

Other Information:

Comments:

Paul Nicolas
Account Manager

THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN AUTHORITY OF THE LABORATORY.
ALL SAMPLES WILL BE DISPOSED OF AFTER 30 DAYS FOLLOWING ANALYSIS. PLEASE CONTACT THE LAB IF YOU
REQUIRE ADDITIONAL SAMPLE STORAGE TIME.

Manitoba Technology Centre Ltd.

Part of the **ALS Laboratory Group**

1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4

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ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L856619-1 JIFFY POPLAR CREEK PC1							
Sampled By: F. QUINTY on 20-JAN-10 @ 15:30							
Matrix: GROUND WATER							
Miscellaneous Parameters							
Acidity (as CaCO3)	29.9		1.0	mg/L		27-JAN-10	R1143283
Ammonia (NH3) - Soluble	0.103		0.050	mg/L		25-JAN-10	R1141661
Biochemical Oxygen Demand	11.0		6.0	mg/L	23-JAN-10	28-JAN-10	R1143804
Hardness (as CaCO3)	11.7		0.30	mg/L		27-JAN-10	
Nitrate+Nitrite-N - Soluble	0.367		0.050	mg/L		25-JAN-10	R1141661
Phosphorus, Total	0.233		0.0010	mg/L		25-JAN-10	R1141103
Sulfur (S)-Total	<10	DLM	10	mg/L		29-JAN-10	R1145534
Total Dissolved Solids	124		5.0	mg/L		25-JAN-10	R1142128
Total Kjeldahl Nitrogen	5.42		0.20	mg/L	22-JAN-10	26-JAN-10	R1142201
Total Suspended Solids	200		5.0	mg/L		25-JAN-10	R1142128
Metal scan							
Silver (Ag)-Total	<0.0010		0.0010	mg/L	26-JAN-10	26-JAN-10	R1142433
Aluminum (Al)-Total	0.399		0.020	mg/L	26-JAN-10	26-JAN-10	R1142433
Arsenic (As)-Total	0.00107		0.00050	mg/L	26-JAN-10	26-JAN-10	R1142433
Boron (B)-Total	<0.030		0.030	mg/L	26-JAN-10	26-JAN-10	R1142433
Barium (Ba)-Total	0.00467		0.00030	mg/L	26-JAN-10	26-JAN-10	R1142433
Beryllium (Be)-Total	<0.0010		0.0010	mg/L	26-JAN-10	26-JAN-10	R1142433
Bismuth (Bi)-Total	<0.00020		0.00020	mg/L	26-JAN-10	26-JAN-10	R1142433
Calcium (Ca)-Total	1.86		0.10	mg/L	26-JAN-10	26-JAN-10	R1142433
Cadmium (Cd)-Total	<0.00020		0.00020	mg/L	26-JAN-10	26-JAN-10	R1142433
Cobalt (Co)-Total	0.00029		0.00020	mg/L	26-JAN-10	26-JAN-10	R1142433
Chromium (Cr)-Total	<0.0010		0.0010	mg/L	26-JAN-10	26-JAN-10	R1142433
Cesium (Cs)-Total	<0.00010		0.00010	mg/L	26-JAN-10	26-JAN-10	R1142433
Copper (Cu)-Total	0.0012		0.0010	mg/L	26-JAN-10	26-JAN-10	R1142433
Iron (Fe)-Total	0.776		0.050	mg/L	26-JAN-10	26-JAN-10	R1142433
Potassium (K)-Total	0.44		0.10	mg/L	26-JAN-10	26-JAN-10	R1142433
Magnesium (Mg)-Total	1.72		0.010	mg/L	26-JAN-10	26-JAN-10	R1142433
Manganese (Mn)-Total	0.0284		0.00030	mg/L	26-JAN-10	26-JAN-10	R1142433
Molybdenum (Mo)-Total	<0.00020		0.00020	mg/L	26-JAN-10	26-JAN-10	R1142433
Sodium (Na)-Total	1.15		0.030	mg/L	26-JAN-10	26-JAN-10	R1142433
Nickel (Ni)-Total	<0.0020		0.0020	mg/L	26-JAN-10	26-JAN-10	R1142433
Phosphorus (P)-Total	<0.20		0.20	mg/L	26-JAN-10	26-JAN-10	R1142433
Lead (Pb)-Total	0.00176		0.00050	mg/L	26-JAN-10	26-JAN-10	R1142433
Rubidium (Rb)-Total	0.00172		0.00020	mg/L	26-JAN-10	26-JAN-10	R1142433
Antimony (Sb)-Total	<0.00050		0.00050	mg/L	26-JAN-10	26-JAN-10	R1142433
Selenium (Se)-Total	0.0021		0.0010	mg/L	26-JAN-10	26-JAN-10	R1142433
Tin (Sn)-Total	<0.0010		0.0010	mg/L	26-JAN-10	26-JAN-10	R1142433
Strontium (Sr)-Total	0.00580		0.00010	mg/L	26-JAN-10	26-JAN-10	R1142433
Tellurium (Te)-Total	<0.0010		0.0010	mg/L	26-JAN-10	26-JAN-10	R1142433
Titanium (Ti)-Total	0.00560		0.00090	mg/L	26-JAN-10	26-JAN-10	R1142433
Thallium (Tl)-Total	<0.00010		0.00010	mg/L	26-JAN-10	26-JAN-10	R1142433
Uranium (U)-Total	<0.00010		0.00010	mg/L	26-JAN-10	26-JAN-10	R1142433
Vanadium (V)-Total	<0.0010		0.0010	mg/L	26-JAN-10	26-JAN-10	R1142433
Tungsten (W)-Total	<0.00050		0.00050	mg/L	26-JAN-10	26-JAN-10	R1142433
Zinc (Zn)-Total	<0.010		0.010	mg/L	26-JAN-10	26-JAN-10	R1142433
Zirconium (Zr)-Total	<0.00040		0.00040	mg/L	26-JAN-10	26-JAN-10	R1142433
pH, Conductivity and Total Alkalinity							
Alkalinity							
Alkalinity, Total (as CaCO3)	See Comment	MP	1.0	mg/L		22-JAN-10	R1140444
Bicarbonate (HCO3)	See Comment	MP	2.0	mg/L		22-JAN-10	R1140444
Carbonate (CO3)	See Comment	MP	0.60	mg/L		22-JAN-10	R1140444

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L856619-1	JIFFY POPLAR CREEK PC1							
Sampled By:	F. QUINTY on 20-JAN-10 @ 15:30							
Matrix:	GROUND WATER							
Alkalinity Hydroxide (OH)		See Comment	MP	0.40	mg/L		22-JAN-10	R1140444
Note: The pH of this sample is less than 4.5 pH units, therefore a result for alkalinity cannot be reported.								
Conductivity Conductivity				58.6	umhos/cm		22-JAN-10	R1140444
pH pH		4.05		0.10	pH units		22-JAN-10	R1140444
L856619-2	JIFFY POPLAR CREEK PC2							
Sampled By:	F. QUINTY on 20-JAN-10 @ 15:30							
Matrix:	GROUND WATER							
Miscellaneous Parameters								
Acidity (as CaCO3)		6.8		1.0	mg/L		27-JAN-10	R1143283
Ammonia (NH3) - Soluble		<0.050		0.050	mg/L		25-JAN-10	R1141661
Biochemical Oxygen Demand		6.8		6.0	mg/L	23-JAN-10	28-JAN-10	R1143804
Hardness (as CaCO3)		44.5		0.30	mg/L		27-JAN-10	
Nitrate+Nitrite-N - Soluble		<0.050		0.050	mg/L		25-JAN-10	R1141661
Phosphorus, Total		0.382		0.0010	mg/L		25-JAN-10	R1141103
Sulfur (S)-Total		11	DLM	10	mg/L		29-JAN-10	R1145534
Total Dissolved Solids		68.0		5.0	mg/L		25-JAN-10	R1142128
Total Kjeldahl Nitrogen		11.7		0.20	mg/L	22-JAN-10	26-JAN-10	R1142201
Total Suspended Solids		451		5.0	mg/L		25-JAN-10	R1142128
Metal scan								
Silver (Ag)-Total		<0.0010		0.0010	mg/L	26-JAN-10	26-JAN-10	R1142433
Aluminum (Al)-Total		1.04		0.020	mg/L	26-JAN-10	26-JAN-10	R1142433
Arsenic (As)-Total		0.00161		0.00050	mg/L	26-JAN-10	26-JAN-10	R1142433
Boron (B)-Total		<0.030		0.030	mg/L	26-JAN-10	26-JAN-10	R1142433
Barium (Ba)-Total		0.0133		0.00030	mg/L	26-JAN-10	26-JAN-10	R1142433
Beryllium (Be)-Total		<0.0010		0.0010	mg/L	26-JAN-10	26-JAN-10	R1142433
Bismuth (Bi)-Total		<0.00020		0.00020	mg/L	26-JAN-10	26-JAN-10	R1142433
Calcium (Ca)-Total		11.0		0.10	mg/L	26-JAN-10	26-JAN-10	R1142433
Cadmium (Cd)-Total		0.00035		0.00020	mg/L	26-JAN-10	26-JAN-10	R1142433
Cobalt (Co)-Total		0.00025		0.00020	mg/L	26-JAN-10	26-JAN-10	R1142433
Chromium (Cr)-Total		0.0010		0.0010	mg/L	26-JAN-10	26-JAN-10	R1142433
Cesium (Cs)-Total		0.00019		0.00010	mg/L	26-JAN-10	26-JAN-10	R1142433
Copper (Cu)-Total		0.0025		0.0010	mg/L	26-JAN-10	26-JAN-10	R1142433
Iron (Fe)-Total		0.566		0.050	mg/L	26-JAN-10	26-JAN-10	R1142433
Potassium (K)-Total		0.30		0.10	mg/L	26-JAN-10	26-JAN-10	R1142433
Magnesium (Mg)-Total		4.15		0.010	mg/L	26-JAN-10	26-JAN-10	R1142433
Manganese (Mn)-Total		0.0395		0.00030	mg/L	26-JAN-10	26-JAN-10	R1142433
Molybdenum (Mo)-Total		0.00020		0.00020	mg/L	26-JAN-10	26-JAN-10	R1142433
Sodium (Na)-Total		1.44		0.030	mg/L	26-JAN-10	26-JAN-10	R1142433
Nickel (Ni)-Total		<0.0020		0.0020	mg/L	26-JAN-10	26-JAN-10	R1142433
Phosphorus (P)-Total		0.28		0.20	mg/L	26-JAN-10	26-JAN-10	R1142433
Lead (Pb)-Total		0.00386		0.00050	mg/L	26-JAN-10	26-JAN-10	R1142433
Rubidium (Rb)-Total		0.00209		0.00020	mg/L	26-JAN-10	26-JAN-10	R1142433
Antimony (Sb)-Total		<0.00050		0.00050	mg/L	26-JAN-10	26-JAN-10	R1142433
Selenium (Se)-Total		0.0021		0.0010	mg/L	26-JAN-10	26-JAN-10	R1142433
Tin (Sn)-Total		<0.0010		0.0010	mg/L	26-JAN-10	26-JAN-10	R1142433
Strontium (Sr)-Total		0.0210		0.00010	mg/L	26-JAN-10	26-JAN-10	R1142433
Tellurium (Te)-Total		<0.0010		0.0010	mg/L	26-JAN-10	26-JAN-10	R1142433

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L856619-2	JIFFY POPLAR CREEK PC2							
Sampled By:	F. QUINTY on 20-JAN-10 @ 15:30							
Matrix:	GROUND WATER							
Metal scan								
Titanium (Ti)-Total		0.0239		0.00090	mg/L	26-JAN-10	26-JAN-10	R1142433
Thallium (Tl)-Total		<0.00010		0.00010	mg/L	26-JAN-10	26-JAN-10	R1142433
Uranium (U)-Total		<0.00010		0.00010	mg/L	26-JAN-10	26-JAN-10	R1142433
Vanadium (V)-Total		0.0023		0.0010	mg/L	26-JAN-10	26-JAN-10	R1142433
Tungsten (W)-Total		<0.00050		0.00050	mg/L	26-JAN-10	26-JAN-10	R1142433
Zinc (Zn)-Total		0.011		0.010	mg/L	26-JAN-10	26-JAN-10	R1142433
Zirconium (Zr)-Total		0.00064		0.00040	mg/L	26-JAN-10	26-JAN-10	R1142433
pH, Conductivity and Total Alkalinity								
Alkalinity								
Alkalinity, Total (as CaCO3)		15.8		1.0	mg/L		26-JAN-10	R1142611
Bicarbonate (HCO3)		19.3		2.0	mg/L		26-JAN-10	R1142611
Carbonate (CO3)		<0.60		0.60	mg/L		26-JAN-10	R1142611
Hydroxide (OH)		<0.40		0.40	mg/L		26-JAN-10	R1142611
Conductivity								
Conductivity		52.5		0.40	umhos/cm		22-JAN-10	R1140444
pH								
pH		6.37		0.10	pH units		22-JAN-10	R1140444
L856619-3	JIFFY POPLAR CREEK PC3							
Sampled By:	F. QUINTY on 20-JAN-10 @ 15:30							
Matrix:	GROUND WATER							
Miscellaneous Parameters								
Acidity (as CaCO3)		15.7		1.0	mg/L		27-JAN-10	R1143283
Ammonia (NH3) - Soluble		0.150		0.050	mg/L		25-JAN-10	R1141661
Biochemical Oxygen Demand		20.5		6.0	mg/L	23-JAN-10	28-JAN-10	R1143804
Hardness (as CaCO3)		403		0.30	mg/L		27-JAN-10	
Nitrate+Nitrite-N - Soluble		<0.050		0.050	mg/L		25-JAN-10	R1141661
Phosphorus, Total		0.746		0.0010	mg/L		25-JAN-10	R1141103
Sulfur (S)-Total		18	DLM	10	mg/L		29-JAN-10	R1145534
Total Dissolved Solids		198		5.0	mg/L		25-JAN-10	R1142128
Total Kjeldahl Nitrogen		32.0		0.20	mg/L	22-JAN-10	26-JAN-10	R1142201
Total Suspended Solids		2630		5.0	mg/L		25-JAN-10	R1142128
Metal scan								
Silver (Ag)-Total		<0.0010		0.0010	mg/L	26-JAN-10	26-JAN-10	R1142433
Aluminum (Al)-Total		6.24		0.020	mg/L	26-JAN-10	26-JAN-10	R1142433
Arsenic (As)-Total		0.00496		0.00050	mg/L	26-JAN-10	26-JAN-10	R1142433
Boron (B)-Total		0.051		0.030	mg/L	26-JAN-10	26-JAN-10	R1142433
Barium (Ba)-Total		0.123		0.00030	mg/L	26-JAN-10	26-JAN-10	R1142433
Beryllium (Be)-Total		<0.0010		0.0010	mg/L	26-JAN-10	26-JAN-10	R1142433
Bismuth (Bi)-Total		<0.00020		0.00020	mg/L	26-JAN-10	26-JAN-10	R1142433
Calcium (Ca)-Total		107		0.10	mg/L	26-JAN-10	26-JAN-10	R1142433
Cadmium (Cd)-Total		0.00109		0.00020	mg/L	26-JAN-10	26-JAN-10	R1142433
Cobalt (Co)-Total		0.00244		0.00020	mg/L	26-JAN-10	26-JAN-10	R1142433
Chromium (Cr)-Total		0.0061		0.0010	mg/L	26-JAN-10	26-JAN-10	R1142433
Cesium (Cs)-Total		0.00086		0.00010	mg/L	26-JAN-10	26-JAN-10	R1142433
Copper (Cu)-Total		0.0106		0.0010	mg/L	26-JAN-10	26-JAN-10	R1142433
Iron (Fe)-Total		4.68		0.050	mg/L	26-JAN-10	26-JAN-10	R1142433
Potassium (K)-Total		3.61		0.10	mg/L	26-JAN-10	26-JAN-10	R1142433
Magnesium (Mg)-Total		32.7		0.010	mg/L	26-JAN-10	26-JAN-10	R1142433
Manganese (Mn)-Total		1.21		0.00030	mg/L	26-JAN-10	26-JAN-10	R1142433
Molybdenum (Mo)-Total		0.00113		0.00020	mg/L	26-JAN-10		

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L856619-3	JIFFY POPLAR CREEK PC3							
Sampled By:	F. QUINTY on 20-JAN-10 @ 15:30							
Matrix:	GROUND WATER							
Metal scan								
Sodium (Na)-Total		7.39		0.030	mg/L	26-JAN-10	26-JAN-10	R1142433
Nickel (Ni)-Total		0.0063		0.0020	mg/L	26-JAN-10	26-JAN-10	R1142433
Phosphorus (P)-Total		1.53		0.20	mg/L	26-JAN-10	26-JAN-10	R1142433
Lead (Pb)-Total		0.0210		0.00050	mg/L	26-JAN-10	26-JAN-10	R1142433
Rubidium (Rb)-Total		0.0152		0.00020	mg/L	26-JAN-10	26-JAN-10	R1142433
Antimony (Sb)-Total		0.00062		0.00050	mg/L	26-JAN-10	26-JAN-10	R1142433
Selenium (Se)-Total		0.0033		0.0010	mg/L	26-JAN-10	26-JAN-10	R1142433
Tin (Sn)-Total		<0.0010		0.0010	mg/L	26-JAN-10	26-JAN-10	R1142433
Strontium (Sr)-Total		0.184		0.00010	mg/L	26-JAN-10	26-JAN-10	R1142433
Tellurium (Te)-Total		<0.0010		0.0010	mg/L	26-JAN-10	26-JAN-10	R1142433
Titanium (Ti)-Total		0.152		0.00090	mg/L	26-JAN-10	26-JAN-10	R1142433
Thallium (Tl)-Total		0.00015		0.00010	mg/L	26-JAN-10	26-JAN-10	R1142433
Uranium (U)-Total		0.00060		0.00010	mg/L	26-JAN-10	26-JAN-10	R1142433
Vanadium (V)-Total		0.0130		0.0010	mg/L	26-JAN-10	26-JAN-10	R1142433
Tungsten (W)-Total		<0.00050		0.00050	mg/L	26-JAN-10	26-JAN-10	R1142433
Zinc (Zn)-Total		0.065		0.010	mg/L	26-JAN-10	26-JAN-10	R1142433
Zirconium (Zr)-Total		0.00322		0.00040	mg/L	26-JAN-10	26-JAN-10	R1142433
pH, Conductivity and Total Alkalinity								
Alkalinity								
Alkalinity, Total (as CaCO3)		135		1.0	mg/L		22-JAN-10	R1140444
Bicarbonate (HCO3)		164		2.0	mg/L		22-JAN-10	R1140444
Carbonate (CO3)		<0.60		0.60	mg/L		22-JAN-10	R1140444
Hydroxide (OH)		<0.40		0.40	mg/L		22-JAN-10	R1140444
Conductivity								
Conductivity		256		0.40	umhos/cm		22-JAN-10	R1140444
pH								
pH		7.03		0.10	pH units		22-JAN-10	R1140444

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLM	Detection Limit Adjustment For Sample Matrix Effects

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-LOW-WP	Water	Acidity	APHA Method 2310B
ALK-TOT-WP	Water	Alkalinity	APHA 2320B
Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. It is determined by titration with a standard solution of strong mineral acid to the successive HCO ₃ ⁻ and H ₂ CO ₃ endpoints indicated electrometrically.			
BOD-WP	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B
The sample is incubated for 5 days at 20 degrees Celcius. Comparison of dissolved oxygen content at the beginning and end of incubation provides a measure of biochemical oxygen demand. If carbonaceous BOD is requested, TCMP is added to the sample to chemically inhibit nitrogenous oxygen demand. If soluble BOD is requested, the sample is filtered prior to analysis. Surface waters have a DL of 1 mg/L. Effluents are diluted according to their history and will have a sample DL of 6 mg/L or greater, depending on the dilutions used.			
EC-WP	Water	Conductivity	APHA 2510B
Conductivity of an aqueous solution refers to its ability to carry an electric current. Conductance of a solution is measured between two spatially fixed and chemically inert electrodes.			
ETL-HARDNESS-TOT-WP	Water	Hardness Calculated	Calculated
MET-SCAN-TOT-LOW-WP	Water	Metal scan	EPA 200.8 REV 5.4 MAY 1994-T
Total Metals by ICP-MS			
This analysis is carried out using sample preparation procedures adapted from U.S. EPA-600/4-82-055 for hotblock digestion or U.S. EPA Test Methods for Evaluating Solid Waste SW846 3015 for microwave digestion, and procedures adapted from U.S. EPA Method 200.8 for analysis by inductively coupled - mass spectrometry.			
N-TOTKJ-WP	Water	Total Kjeldahl Nitrogen	Quickchem method 10-107-06-2-E Lachat
Samples are digested with a sulphuric acid solution, cooled, diluted with water, and analyzed for ammonia. Total Kjeldahl nitrogen is the sum of free-ammonia and organic nitrogen compounds which are converted to ammonium sulphate through this digestion process. Analysis is performed by Flow Injection Analysis (FIA). The pH of the digested sample is raised to a known, basic pH by neutralization with a concentrated buffer solution. This neutralization converts the ammonium cation to ammonia. The ammonia produced is heated with salicylate and hypochlorite to produce blue colour which is proportional to the ammonia concentration.			
N2N3-SOL-WP	Water	Nitrate + Nitrite Soluble	APHA4500;2005/LACHAT;1997,1999
NH3-SOL-WP	Water	Ammonia Soluble	LACHAT;2003
Ammonia - Colourimetric using Salicylate-nitroprusside and hypochlorite, in an alkaline phosphate buffer.			
P-TOTAL-WP	Water	Phosphorus, Total	APHA, 1998 P-T
Samples are digested using a sulphuric acid-persulphate mixture to convert organic phosphorous to orthophosphate. The samples are analyzed by either the Flow Injection Analysis (FIA) or the Segmented Flow Analysis (SFA) method. The absorbance measured by the instrument is proportional to the concentration of orthophosphate in the sample, and is reported as phosphorous. Samples are analyzed for total or total dissolved phosphorous depending on the sample pretreatment.			
PH-WP	Water	pH	APHA 4500H
pH of a sample is the determination of the activity of the hydrogen ions by potentiometric measurement using a standard hydrogen electrode and a reference electrode.			
S-TOT-WT	Water	Sulfur (S) -Total	EPA 200.8
SOLIDS-TDS-WP	Water	Total Dissolved Solids	APHA 2540
The residue remaining in a prepared casserole after passing the sample through a 1.2 um Whatman GF/C glass microfibre filter and drying at 180 degrees C. Samples may be dried at 105 degrees C if the client specifically requests this drying temperature.			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
SOLIDS-TOTSUS-WP	Water	Total Suspended Solids	APHA 2540
The residue retained by a prepared 1.5 um Whatman 934-AH glass microfibre filter dried at 105 degrees C.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS LABORATORY GROUP - WATERLOO, ONTARIO, CANADA
WP	ALS LABORATORY GROUP - WINNIPEG, MANITOBA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mk/kg ww - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Environmental Division

Page ____ of ____

L 856619

Report to: <u>FRANCOIS Quinty</u>		Report Format / Distribution		Service Requested: (rush - subject to availability)	
Company: <u>SNC-Lavalin environment</u>		Standard: ☒ Other: _____		☒ Regular (Default)	
Contact: <u>FRANCOIS Quinty</u>		Select: PDF ☐ Excel ☒ Digital ☐		Priority (2-3 Business Days) - 50% Surcharge	
Address: <u>5955, rue St-Laurent</u>		Email 1: <u>FRANCOIS.Quinty@snc-lavalin.com</u>		Emergency (1 Business Day) - 100% Surcharge	
<u>Levis, QC G6V 3P5</u>		Email 2: _____		For Emergency < 1 Day, ASAP or Weekend - Contact ALS	
Phone: <u>418-837-3621</u>		Fax: <u>418-837-2039</u>		Analysis Request	
Invoice To: Same as Report? ☒ Yes ☐ No		Client / Project Information:		(Indicate Filtered or Preserved, F/P)	
Company: _____		Job #: <u>606096</u>			
Contact: _____		PO / AFE: <u>Account W10348</u>			
Address: _____		Legal Site Description: <u>Poplar Creek bog</u>			
Phone: _____		Quote #: _____			
Lab Work Order # (lab use only)		ALS Contact: <u>C. Herrod</u>		Sampler: <u>F. Quinty</u>	
Sample #	Sample Identification (This description will appear on the report)	Date	Time	Sample Type	Number of Containers
	Jiffy Poplar Creek PC1	20-01-20	18:30	soil groundwater	4
	Jiffy Poplar Creek PC2	10-01-22	12:00	groundwater	4
	Jiffy Poplar Creek PC3	16-01-22		groundwater	4

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:
		<i>[Signature]</i>	2020/10/10	10:10	1.8°C		
						Observations: Yes / No ? If Yes attach SIF	

Appendix F

Preliminary Vegetation Survey Report

**PRELIMINARY
REPORT**

JIFFY CANADA

**Poplar Creek Bog Development Project
Vegetation Survey**

No. 606096-2000

**February 2010
Rev. 00**



**SNC•LAVALIN
Environment**

**PRELIMINARY
REPORT**

JIFFY CANADA

**Poplar Creek Bog Development Project
Vegetation Survey**

No. 606096-2000

**February 2010
Rev. 00**



**SNC•LAVALIN
Environment**

Prepared by :

Preliminary

Reviewed by :

Preliminary

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This document represents the professional opinion of SNC-Lavalin Inc., Environment Division (SLE), and has been prepared by individuals with specific knowledge and professional competence in the subject matter covered herein. This document is to be interpreted in light of the "Contract" agreed to between SLE and Jiffy Canada; the methodology, procedures and techniques employed; the professional opinion of SLE; and the circumstances and constraints present while the work covered by the Contract was being performed. This document is intended solely for the purposes defined in the Contract and is for the sole use of the Client, for whom remedies are limited to those stated in the Contract. It must be read as-is, and no portion or abstract therefore is to be interpreted in any other context.

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QUALITY ASSURANCE

SNC-Lavalin Inc. is certified under the ISO 9001 quality assurance protocol. In accordance with this certification, an internal review and quality control process is undertaken for every project task. Each document is reviewed carefully by key project personnel and approved by the Project Director before it is delivered to the Client. Draft documents are submitted to the Client for review and approval prior to issuing the final report.

SUMMARY

Authors and title:

BOUCHARD, D., H. GILBERT and F. QUINTY. 2009. *Poplar Creek Bog Development Project. Vegetation survey*. Report for Jiffy Canada. Lévis, SNC-Lavalin Environment Inc. 8 pp. and app.

Jiffy Canada is planning the development of Poplar Creek Bog in Manitoba for the extraction of peat moss. A vegetation survey was planned to provide a general inventory of the existing plant communities and to locate and identify any rare plants that may be present. Plant communities and present flora were surveyed twice during the summer of 2009. Mapping of the plant communities presenting the results of the survey was conducted. Poplar Creek Bog is a treed basin bog principally covered by a black spruce on sphagnum community. The border and the western point of the bog, where more minerotrophic conditions occur, are respectively occupied by a tamarack and black spruce on sphagnum community and a black spruce and tamarack on sphagnum community. Some rare plants of Manitoba, that are principally found in swamps, bogs or fens, are present. All are rather common throughout their range, but rare in the province. *Carex crinita* (S1), *Calopogon tuberosus* (S2), *Arethusa bulbosa* (S2), *Platanthera lacera* (S2) and *Malaxis unifolia* (S2?) reach their northwestern limit of distribution in Manitoba. *Eriophorum scheuchzeri* (S2?) is apparently rare in the province.

Keywords:

Bog exploitation, Poplar Creek Bog, vegetation, rare plants, plants at risk, Manitoba, Canada.

PROJECT TEAM

SNC-Lavalin Environment

Director	François Quinty, M.A., geographer
Project Manager	Denis Bouchard, M. Sc., biologist
Botanist	Hélène Gilbert, M. Sc., biologist
Field helper	Nathan Kehler
Cartography	Danielle Leclerc

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1 INTRODUCTION

Jiffy Canada is planning the development of Poplar Creek Bog in Manitoba for the extraction of peat moss. Thus, the company is required to meet a number of conditions respecting the pre-development phase of a proposed mine site in order to be licenced under the Environment Act. One of these conditions calls for a vegetation survey to be conducted prior to any surface disturbance or induced drainage within the project area. The primary purpose of the vegetation survey is to provide a general inventory of the existing plant communities and to locate and identify any rare plants that may be present. In Manitoba, a rare plant is defined as any plant species that is ranked as S1 or S2 by the Manitoba Conservation Data Center (CDC). This ranking of species follows a system designed by NatureServe to identify the status (rank) of a species based on documented information about species population size, distribution, growth trends and the potential threats to the species from human encroachment, disease or predation.

Therefore, the present report covers the results of the vegetation survey that has been conducted in Poplar Creek Bog during the summer of 2009. The methodology and the results of the survey are described hereinafter.

2 METHODOLOGY

A preliminary map of Poplar Creek Bog plant communities was created using available orthophotos in order to determine the location of appropriate sampling stations for the study area. Each plant community was surveyed in few stations locations and plant species were observed along all the walking paths between points. At each station a list was done of all the species present including an evaluation of extent of groundcover for of the communities. Peat depth was measured, samples were collected and photographs were taken. Unidentifiable plants in the field were collected for identification in a laboratory. Those specimens will later be offered to a herbarium. Conservation ranks of species were identified according to NatureServe website.

The survey was conducted twice during the 2009 growing season. H       Gilbert was responsible for the first field trip, from June 22 to 25. Denis Bouchard visited the area on August 5 and 6. Gilbert and Bouchard are both experienced botanists, with close to 20 years experience, specialized in plant ecology.

A request was also submitted to the CDC to inquire about the occurrence of rare plants within the study area.

Final mapping of the plant communities was achieved following the analysis of the vegetation found at all sampling stations.

3 RESULTS

Map 1 presents the location of the inventoried sampling stations, the final mapping of vegetation and the location of recorded rare plant species. During the field visits, information was collected from 28 stations, including 21 of the 36 planned stations prior to fieldwork. It is important to note that the farther part of the bog, located more than 2.5 km away from the only access road in the area (road 308), is unreachable on foot. An attempt was made to reach this area by helicopter, but proved to be impossible due to lack of landing sites in the forested landscape.

3.1 PLANT COMMUNITIES

Poplar Creek Bog belongs to the Lake of the Woods ecoregion which is part of the Boreal Shield ecozone. This ecoregion extends from the south end of Lake Winnipeg to the east side of Rainy Lake on the Canada-United States border. It is more closely identified with the warmer, more humid southeastern mixed forest region, than with the colder, drier boreal regions to the north. It is marked by warm summers and cold winters. Characteristic vegetation includes a succession from trembling aspen, paper birch, and jack pine to white spruce, black spruce, and balsam fir. Warmer portions of the ecoregion support red and eastern white pine. Cooler and wetter sites support black spruce and tamarack. The region is underlain by massive, crystalline, acidic, Archean bedrock, forming hummocky, broadly sloping uplands and lowlands. Lacustrine deposits forming level to undulating clay plains occur in lowlands. The ecoregion is also interspersed with areas of fluvioglacial outwash deposits. Significant inclusions are Mesisolic and Fibrisolic Organic soils and Gray Luvisolic soils on exposed clay deposits. The extent of wetlands is variable, being most extensive in the vicinity of Lake of the Woods. Treed bowl bogs and peat margin swamps are the predominant wetland forms.

Poplar Creek Bog, which is found on a large clay plain bordering Lake of the Woods, should be considered a treed basin bog according to the Canadian Wetland Classification System (National Wetland Working Group, 1997). It supports communities of black spruce and tamarack on sphagnum. The black spruce on sphagnum community, covering 367 ha, occupies the larger part of the bog (Photo 1). This community, which is more or less densely treed of black spruce (*Picea mariana*) depending of the sector and where windfallen trees are frequent, presents an undergrowth of ericaceous shrubs (*Ledum groenlandicum*, *Vaccinium* spp. and *Kalmia polifolia*) on a carpet, principally composed of sphagnum mosses. It grows on a peat layer close of 3 m deep.

The black spruce and tamarack on sphagnum community covers about 32 ha at the west end of the bog. This bog section is enriched by the movement of surface water and groundwater that apparently flows through the bog in westerly direction. There, the black spruce grows with tamarack (*Larix laricina*), and dwarf birch (*Betula pumila* var. *glandulifera*) is commonly added to the ericaceous shrubs of the undergrowth. The peat layer depth is about the same as in the black spruce on sphagnum community.

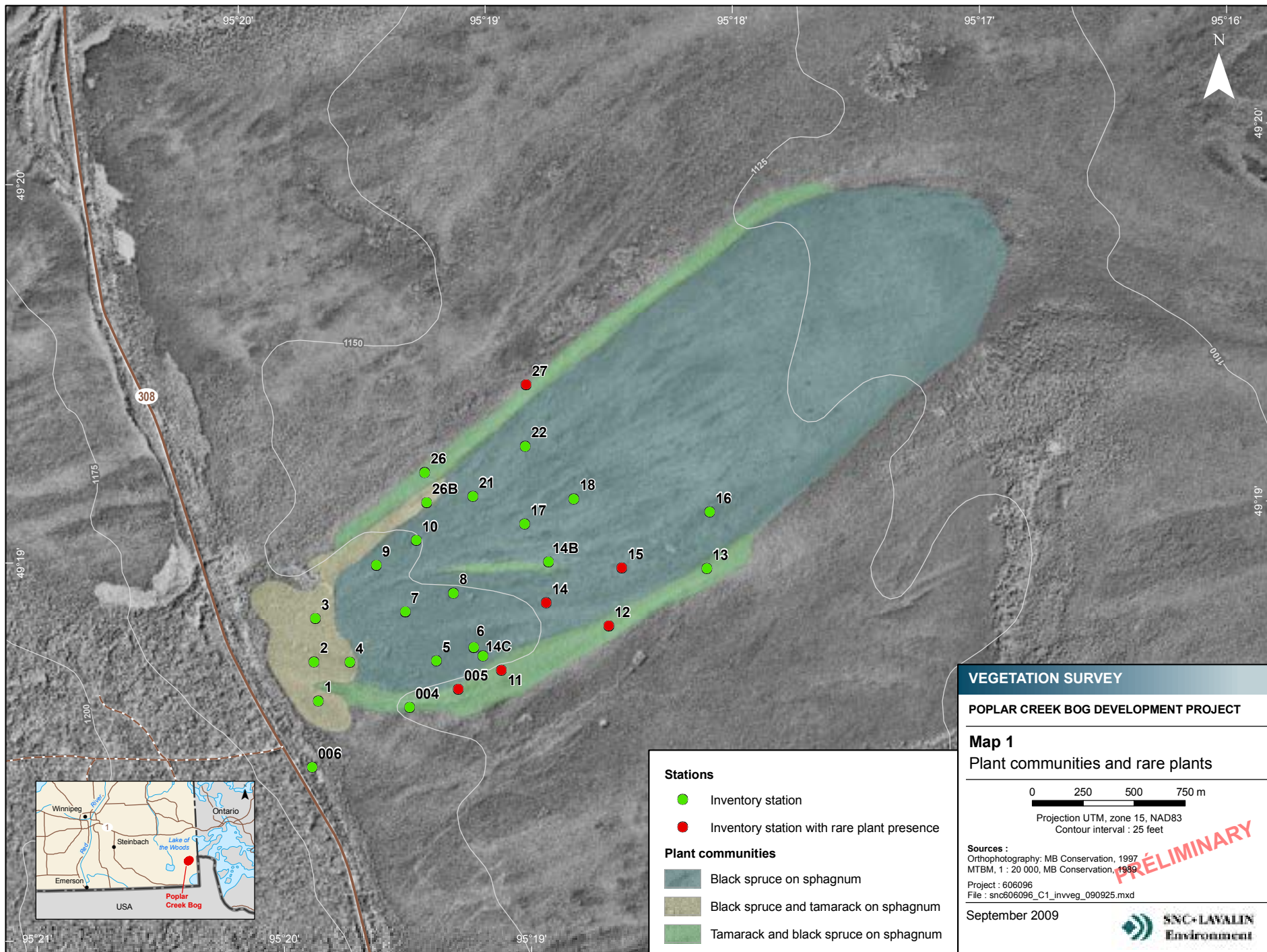


Photo 1 Black spruce on Sphagnum community (station 15; 08/05/2009)



The tamarack and black spruce on sphagnum community, that covers about 60 ha, is found in channels, mainly bordering the bog. Those sites, where water circulates and where water table stands closer to the surface, are much wetter. Tree cover is less important in these more minerotrophic conditions (Photo 2). Ericaceous shrubs and dwarf birch are still abundant, but the herbs, principally represented by water sedge (*Carex aquatilis*), buckbean (*Menyanthes trifoliata*) and pitcher-plant (*Sarracenia purpurea*), are more abundant. The peat layer is generally thinner than 3 m deep (average of 2.7 m) in sites occupied by this plant community.

Photo 2 Tamarack and Black spruce on Sphagnum community (station 13; 08/05/2009)



3.2 RARE PLANTS

The CDC does not have information regarding the occurrence of plants at risk for Poplar Creek Bog. The rare plant occurrences reported for the region belong to species not usually found in wetlands.

However, some rare plants of Manitoba have been found in the bog during the vegetation survey. One population of the drooping sedge (*Carex crinita*), considered a very rare plant in Manitoba that may be especially vulnerable to extirpation (S1), is present in the location of station 14 of the black spruce on sphagnum community (Map 1). The calopogon (*Calopogon tuberosus*), noted in station 15, is also present in the same community. That species has a status of rare plant in Manitoba and may be vulnerable to extirpation (S2). It is not abundant but rather scattered in the black spruce on sphagnum community. The dragon's mouth (*Arethusa bulbosa*) and the ragged orchis (*Platanthera lacera*), two plants considered rare in Manitoba, have been found in the tamarack and black spruce on sphagnum communities. The dragon's mouth was observed in the southern channel bordering the bog, in stations 11, 12 and 005. It is thus clearly associated with the tamarack and black spruce community. A little population of the ragged orchid was also found in that community, but in the northern section (station 27).

Two other plants uncertainly ranked as rare in Manitoba (S2?) have also been noticed during the vegetation survey. The white cotton-grass (*Eriophorum scheuchzeri*) is not abundant but rather frequent in all communities, while the green adder's-mouth (*Malaxis unifolia*) has been encountered in the southern tamarack and black spruce on sphagnum community (station 13).

All these plants, principally found in swamps, bogs or fens, are rather common throughout their range, but rare in Manitoba. Drooping sedge, calopogon, dragon's mouth, ragged orchis and green adder's-mouth all share about the same range in North America and reach their northwestern limit of distribution in Manitoba. White cotton-grass is widespread all over north of North America, from Labrador to Alaska, but is apparently rare in Manitoba.

4 BIBLIOGRAPHY

NATIONAL WETLAND WORKING GROUP. 1997. *The Canadian Wetland Classification System. Second edition.* Wetlands Research Center, Waterloo, Ontario.



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Suite 300
Levis QC, G6V 3P5
Tel.: 418-837-3621
Fax: 418-837-2039**

Appendix G

Manitoba Conservation Data Centre Report

From: Firlotte, Nicole (CON) [Nicole.Firlotte@gov.mb.ca]
Sent: September 30, 2009 12:46 PM
To: Quinty, Francois
Subject: RE: WWW Form Submission - Jiffy peatland development project

Attachments: Jiffy.xls



Jiffy.xls

Francois,

Thank you for your information request. I completed a search of the Manitoba Conservation Data Centre's rare species database for your area of interest.

I am attaching an excel table summarizing these occurrences. We do not provide shapefiles as a rule. These occurrences are on the periphery of your sites so I provide them as information and to serve as a guide for any field work you may conduct. The table includes scientific and common names, a directions field, the global (GRank) and provincial (SRank) rankings for each species as well as COSEWIC and SARA designations. Further information on these ranking systems can be found on our website at <http://web2.gov.mb.ca/conservation/cdc/consranks.html> and http://www.sararegistry.gc.ca/default_e.cfm. If you need further information on a specific record please let me know and reference the EO ID number from the table.

The information provided in this letter is based on existing data known to the Manitoba Conservation Data Centre of the Wildlife and Ecosystem Protection Branch at the time of the request. These data are dependent on the research and observations of our scientists and reflects our current state of knowledge. An absence of data does not confirm the absence of any rare or endangered species. Many areas of the province have never been thoroughly surveyed, therefore, the absence of data in any particular geographic area does not necessarily mean that species or ecological communities of concern are not present. The information should not be regarded as a final statement on the occurrence of any species of concern, nor should it substitute for on-site surveys for species or environmental assessments. Also, because our Biotics database is continually updated and because information requests are evaluated by type of action, any given response is only appropriate for its respective request. We would be very interested in receiving a copy of any survey results you may undertake of the area to update our database.

Please contact the Manitoba CDC for an update on this natural heritage information if more than six months passes before it is utilised.

Third party requests for products wholly or partially derived from our Biotics database must be approved by the Manitoba CDC before information is released. Once approved, the primary user will identify the Manitoba CDC as data contributors on any map or publication using data from our database, as the Manitoba Conservation Data Centre; Wildlife and Ecosystem Protection Branch, Manitoba Conservation.

If you have any questions or require further information contact me directly at (204) 945-6998. If you are conducting ground surveys within the area and encounter any rare species please provide us with this information to add to our data base.

Regards,
Nicole

Nicole Firlotte
Biodiversity Information Manager
Manitoba Conservation
945-6998
Note new email: nicole.firlotte@gov.mb.ca
Please consider the environment before printing this e-mail

-----Original Message-----

From: +WPG1212 - CDC_Wildlife (CON)
Sent: Wednesday, September 23, 2009 3:19 PM
To: Firlotte, Nicole (CON)
Subject: FW: WWW Form Submission - Jiffy peatland development project

From:
Sent: Wednesday, September 23, 2009 3:18:33 PM
To: +WPG1212 - CDC_Wildlife (CON)
Subject: WWW Form Submission
Auto forwarded by a Rule

Below is the result of your feedback form. It was submitted by
WWW Information Request () on Wednesday, September 23, 2009 at 15:18:33

DocumentID: Manitoba_Conservation
Project Title: Jiffy peatland development project
Date Needed: 2009/09/30
Name: Francois Quinty
Company/Organization: SNC-Lavalin environment inc.
Address: 5955, rue Saint-Laurent, bur. 300
City: Levis
Province/State: Quebec
Phone: 418-837-3621
Fax: 418-837-2039
Email: francois.quinty@snclavalin.com

Project Description: Jiffy product wants to harvest peat to produce peat
mix substrate to be used in horticulture. The information will be used
for the environmental impact assessment.

Information Requested: Any information, such as occurrence of designated
or endangered species that may help assess impact of the project

Format Requested: ArcView Shapefile

Location: I will send you shapefiles for the location

Thanks

action: Submit

EO_ID	ELCODE	EO_NUM	SCIENTIFIC NAME	COMMON NAME	DIRECTIONS	G_RANK	S_RANK	MB ESA	COSEWIC	SARA
2737	PDSOL0E010	7	Leucophysalis grandiflora	Large White-flowered Ground-cherry	Shoal Lake, southeastern Manitoba.	G4?	S3			
1091	PGPIN04120	13	Pinus strobus	Eastern White Pine	near Sprague Lake, Northwest Angle Provincial Forest.	G5	S2			
1338	PDBER03010	1	Caulophyllum thalictroides	Papoose-root	Waugh, MB.	G4G5	S2			
2180	PDAST0H0J0	1	Antennaria plantaginifolia	Plantain-leaved Everlasting	Shoal Lake, MB.	G5	S1S2			
520	ABNME01010	26	Coturnicops noveboracensis	Yellow Rail		G4	S3S4B		SC	SC Sched 1

Appendix H

List of Fauna Species Recorded in the Area

Appendix H Bird species present in the region of the project sites, according to previous studies

Family	Common Name	Scientific Name	Source			Global, National and Provincial Conservation Rank ¹
			Merkel, <i>in</i> Krindle (1994)	Krindle (1994)	Hatch (2007)	
<i>Accipitridae</i>	Bald eagle	<i>Haliaeetus leucocephalus</i>	X	X		G5 N5B,N5N S4S5B
<i>Accipitridae</i>	Broad-winged hawk	<i>Buteo platypterus</i>	X	X	X	G5 N5B S4S5B
<i>Accipitridae</i>	Cooper's hawk	<i>Accipiter cooperii</i>	X		X	G5 N4N,N5B S4S5B
<i>Accipitridae</i>	Northern goshawk	<i>Accipiter gentilis</i>	X			G5 N5 S4
<i>Accipitridae</i>	Northern harrier	<i>Circus cyaneus</i>	X		X	G5 N4N,N5B S4B
<i>Accipitridae</i>	Red-tailed hawk	<i>Buteo jamaicensis</i>	X			G5 N5B S5B
<i>Accipitridae</i>	Sharp-shinned hawk	<i>Accipiter striatus</i>	X			G5 N5B,N5N S5B
<i>Accipitridae</i>	Swainson's hawk	<i>Buteo swainsoni</i>	X			G5 N4B S3B
<i>Alcedinidae</i>	Belted kingfisher	<i>Megaceryle alcyon</i>	X	X		G5 N5B S4S5B
<i>Anatidae</i>	American black duck	<i>Anas rubripes</i>		X		G5 N5B,N5N S4B
<i>Anatidae</i>	American wigeon	<i>Anas americana</i>		X	X	G5 N5B,N5N S5B
<i>Anatidae</i>	Blue-winged teal	<i>Anas discors</i>	X	X	X	G5 N5B S5B
<i>Anatidae</i>	Bufflehead	<i>Bucephala albeola</i>			X	G5 N5B,N5N S4S5B
<i>Anatidae</i>	Canada goose	<i>Branta canadensis</i>	X	X	X	G5 N5B,N5N S5B
<i>Anatidae</i>	Canvasback	<i>Aythya valisineria</i>		X		G5 N3N,N5B S4B
<i>Anatidae</i>	Common goldeneye	<i>Bucephala clangula</i>	X	X	X	G5 N5B,N5N S5B

<i>Anatidae</i>	Common merganser	<i>Mergus merganser</i>		X		G5 N5B,N5N S5B
<i>Anatidae</i>	Green-winged teal	<i>Anas crecca</i>	X			G5 N5B,N5N S5B
<i>Anatidae</i>	Hooded merganser	<i>Lophodytes cucullatus</i>		X		G5 N5B S5B
<i>Anatidae</i>	Lesser scaup	<i>Aythya affinis</i>	X			G5 N5B,N5N S4S5B
<i>Anatidae</i>	Mallard	<i>Anas platyrhynchos</i>	X	X		G5 N5B,N5N S5B
<i>Anatidae</i>	Northern shoveler	<i>Anas clypeata</i>	X			G5 N4N,N5B S5B
<i>Anatidae</i>	Ring-necked duck	<i>Aythya collaris</i>	X			G5 N5N,N5B S5B
<i>Anatidae</i>	Ruddy duck	<i>Oxyura jamaicensis</i>	X			G5 N5B S5B
<i>Anatidae</i>	White-winged scoter	<i>Melanitta fusca</i>		X		G5 N5B,N5N S3B
<i>Anatidae</i>	Wood duck	<i>Aix sponsa</i>	X	X		G5 N5B,N5N S5B
<i>Ardeidae</i>	American bittern	<i>Botaurus lentiginosus</i>	X	X	X	G4 N3N,N5B S4B
<i>Ardeidae</i>	Great blue heron	<i>Ardea herodias</i>	X	X	X	G5 N5B S4S5B
<i>Bombycillidae</i>	Cedar waxwing	<i>Bombycilla cedrorum</i>	X	X	X	G5 N5 S5B
<i>Caprimulgidae</i>	Common nighthawk	<i>Chordeiles minor</i>	X			G5 N4B S4B
<i>Caprimulgidae</i>	Whip-poor-will	<i>Caprimulgus vociferus</i>	X			G5 N5B S4S5B
<i>Cathartidae</i>	Turkey vulture	<i>Cathartes aura</i>	X		X	G5 N5B S4S5B
<i>Certhiidae</i>	Brown creeper	<i>Certhia americana</i>	X		X	G5 N5 S5
<i>Charadriidae</i>	Killdeer	<i>Charadrius vociferus</i>	X			G5 N5B S5B
<i>Columbidae</i>	Mourning dove	<i>Zenaida macroura</i>	X	X		G5 N5 S5B
<i>Corvidae</i>	American crow	<i>Corvus brachyrhynchos</i>	X	X	X	G5 N5B,N5N S5B

<i>Corvidae</i>	Black-billed magpie	<i>Pica hudsonia</i>	X			G5 N5 S5
<i>Corvidae</i>	Blue jay	<i>Cyanocitta cristata</i>	X	X	X	G5 N5 S5
<i>Corvidae</i>	Common raven	<i>Corvus corax</i>	X	X		G5 N5 S5
<i>Corvidae</i>	Gray jay	<i>Perisoreus canadensis</i>	X			G5 N5 S5
<i>Emberizidae</i>	American tree sparrow	<i>Spizella arborea</i>			X	G5 N5B,N5N S5B
<i>Emberizidae</i>	Chipping sparrow	<i>Spizella passerina</i>		X	X	G5 N5B S5B
<i>Emberizidae</i>	Dark-eyed junco	<i>Junco hyemalis</i>			X	G5 N5B,N5N S5B
<i>Emberizidae</i>	Fox sparrow	<i>Passerella iliaca</i>			X	G5 N5B S5B
<i>Emberizidae</i>	Harris's sparrow	<i>Zonotrichia querula</i>			X	G5 N5B S4B
<i>Emberizidae</i>	Lincoln's sparrow	<i>Melospiza lincolni</i>			X	G5 N5B S5B
<i>Emberizidae</i>	Nelson's sparrow	<i>Ammodramus nelsoni</i>			X	G5 N5B S4B
<i>Emberizidae</i>	Savannah sparrow	<i>Passerculus sandwichensis</i>			X	G5 N5B S5B
<i>Emberizidae</i>	Song sparrow	<i>Melospiza melodia</i>		X	X	G5 N5B,N5N S5B
<i>Emberizidae</i>	Swamp sparrow	<i>Melospiza georgiana</i>		X	X	G5 N5B S5B
<i>Emberizidae</i>	White-crowned sparrow	<i>Zonotrichia leucophrys</i>			X	G5 N5B S5B
<i>Emberizidae</i>	White-throated sparrow	<i>Zonotrichia albicollis</i>		X	X	G5 N5B S5B
<i>Falconidae</i>	American kestrel	<i>Falco sparverius</i>	X		X	G5 N5B S4S5B
<i>Falconidae</i>	Merlin	<i>Falco columbarius</i>	X		X	G5 N4N,N5B S4S5
<i>Fringillidae</i>	American goldfinch	<i>Spinus tristis</i>			X	G5 N5B,N5N S5B
<i>Fringillidae</i>	Pine siskin	<i>Spinus pinus</i>		X		G5 N5 S5

<i>Fringillidae</i>	White-winged crossbill	<i>Loxia leucoptera</i>	X			G5 N5 S5
<i>Gaviidae</i>	Common loon	<i>Gavia immer</i>	X	X	X	G5 N5B,N5N S4S5B
<i>Gruidae</i>	Sandhill crane	<i>Grus canadensis</i>			X	G5 N5B S5B
<i>Hirundinidae</i>	Bank swallow	<i>Riparia riparia</i>		X		G5 N5B S5B
<i>Hirundinidae</i>	Barn swallow	<i>Hirundo rustica</i>	X			G5 N5B S5B
<i>Hirundinidae</i>	Tree swallow	<i>Tachycineta bicolor</i>	X			G5 N5B S5B
<i>Icteridae</i>	Red-winged blackbird	<i>Agelaius phoeniceus</i>		X	X	G5 N5B,N5N S5B
<i>Laridae</i>	Black tern	<i>Chlidonias niger</i>	X	X		G4 N4B S4B
<i>Laridae</i>	Bonaparte's gull	<i>Chroicocephalus philadelphia</i>		X		G5 N4N5N,N5B S5B
<i>Laridae</i>	Common tern	<i>Sterna hirundo</i>	X	X		G5 N5B S4S5B
<i>Laridae</i>	Franklin's gull	<i>Leucophaeus pipixcan</i>	X	X		G4G5 N5B S5B
<i>Laridae</i>	Herring gull	<i>Larus argentatus</i>	X	X		G5 N5B,N5N S5B
<i>Laridae</i>	Ring-billed gull	<i>Larus delawarensis</i>	X	X		G5 N5B,N5N S5B
<i>Mimidae</i>	Gray catbird	<i>Dumetella carolinensis</i>	X			G5 N5B S5B
<i>Paridae</i>	Black-capped chickadee	<i>Poecile atricapillus</i>	X	X	X	G5 N5 S5
<i>Paridae</i>	Boreal chickadee	<i>Poecile hudsonicus</i>	X	X	X	G5 N5 S4S5
<i>Parulidae</i>	American redstart	<i>Setophaga ruticilla</i>		X	X	G5 N5B S5B
<i>Parulidae</i>	Bay-breasted warbler	<i>Dendroica castanea</i>			X	G5 N5B S4S5B
<i>Parulidae</i>	Black-and-white warbler	<i>Mniotilta varia</i>		X	X	G5 N5B S5B
<i>Parulidae</i>	Blackburnian warbler	<i>Dendroica fusca</i>		X	X	G5 N5B

						S5B
<i>Parulidae</i>	Blackpoll warbler	<i>Dendroica striata</i>			X	G5 N5B S5B
<i>Parulidae</i>	Black-throated green warbler	<i>Dendroica virens</i>			X	G5 N5B S4S5B
<i>Parulidae</i>	Cape may warbler	<i>Dendroica tigrina</i>			X	G5 N5B S5B
<i>Parulidae</i>	Chestnut-sided warbler	<i>Dendroica pensylvanica</i>		X	X	G5 N5B S5B
<i>Parulidae</i>	Common yellowthroat	<i>Geothlypis trichas</i>		X	X	G5 N5B S5B
<i>Parulidae</i>	Magnolia warbler	<i>Dendroica magnolia</i>			X	G5 N5B S5B
<i>Parulidae</i>	Mourning warbler	<i>Oporornis philadelphia</i>			X	G5 N5B S5B
<i>Parulidae</i>	Nashville warbler	<i>Vermivora ruficapilla</i>	X		X	G5 N5B S5B
<i>Parulidae</i>	Northern waterthrush	<i>Seiurus noveboracensis</i>		X	X	G5 N5B S5B
<i>Parulidae</i>	Orange-crowned warbler	<i>Vermivora celata</i>		X	X	G5 N5B S5B
<i>Parulidae</i>	Ovenbird	<i>Seiurus aurocapilla</i>	X	X	X	G5 N5B S5B
<i>Parulidae</i>	Palm warbler	<i>Dendroica palmarum</i>	X		X	G5 N5B S5B
<i>Parulidae</i>	Tennessee warbler	<i>Vermivora peregrina</i>	X		X	G5 N5B S5B
<i>Parulidae</i>	Wilson's warbler	<i>Wilsonia pusilla</i>	X		X	G5 N5B S4S5B
<i>Parulidae</i>	Yellow warbler	<i>Dendroica petechia</i>		X	X	G5 N5B S5B
<i>Parulidae</i>	Yellow-rumped warbler	<i>Dendroica coronata</i>		X	X	G5 N5B S5B
<i>Pelecanidae</i>	American white pelican	<i>Pelecanus erythrorhynchos</i>	X	X		G4 N4B S3S4B
<i>Phalacrocoracidae</i>	Double-crested cormorant	<i>Phalacrocorax auritus</i>	X	X		G5 N5B S5B

<i>Phasianidae</i>	Ruffed grouse	<i>Bonasa umbellus</i>	X		X	G5 N5 S4S5
<i>Phasianidae</i>	Spruce grouse	<i>Falcapennis canadensis</i>			X	G5 N5 S4S5
<i>Picidae</i>	Black-backed woodpecker	<i>Picoides arcticus</i>	X			G5 N5 S5
<i>Picidae</i>	Downy woodpecker	<i>Picoides pubescens</i>	X	X		G5 N5 S5
<i>Picidae</i>	Hairy woodpecker	<i>Picoides villosus</i>	X	X	X	G5 N5 S5
<i>Picidae</i>	Northern flicker	<i>Colaptes auratus</i>	X	X	X	G5 N5B S5B
<i>Picidae</i>	Pileated woodpecker	<i>Dryocopus pileatus</i>	X	X	X	G5 N5 S5
<i>Picidae</i>	Yellow-bellied sapsucker	<i>Sphyrapicus varius</i>	X		X	G5 N5B S5B
<i>Podicipedidae</i>	Pied-billed grebe	<i>Podilymbus podiceps</i>	X			G5 N5B S4S5B
<i>Podicipedidae</i>	Red-necked grebe	<i>Podiceps grisegena</i>		X		G5 N5B,N5N S4S5B
<i>Rallidae</i>	American coot	<i>Fulica americana</i>	X			G5 N5B S5B
<i>Rallidae</i>	Sora	<i>Porzana carolina</i>	X	X	X	G5 N5B S5B
<i>Rallidae</i>	Virginia rail	<i>Rallus limicola</i>		X		G5 N5B S4B
<i>Regulidae</i>	Golden-crowned kinglet	<i>Regulus satrapa</i>		X	X	G5 N5 S4S5B
<i>Regulidae</i>	Ruby-crowned kinglet	<i>Regulus calendula</i>			X	G5 N5B S5B
<i>Scolopacidae</i>	American woodcock	<i>Scolopax minor</i>	X			G5 N5B S4B
<i>Scolopacidae</i>	Wilson's snipe	<i>Gallinago delicata</i>	X		X	G5 N5B S5B
<i>Scolopacidae</i>	Greater yellowlegs	<i>Tringa melanoleuca</i>	X			G5 N5B S5B
<i>Scolopacidae</i>	Lesser yellowlegs	<i>Tringa flavipes</i>			X	G5 N5B S5B

<i>Sittidae</i>	Red-breasted nuthatch	<i>Sitta canadensis</i>	X		X	G5 N5 S5
<i>Sittidae</i>	White-breasted nuthatch	<i>Sitta carolinensis</i>	X			G5 N5 S5
<i>Strigidae</i>	Barred owl	<i>Strix varia</i>		X		G5 N5 S3S4
<i>Strigidae</i>	Great horned owl	<i>Bubo virginianus</i>	X		X	G5 N5 S5
<i>Trochilidae</i>	Ruby-throated hummingbird	<i>Archilochus colubris</i>	X			G5 N5B S5B
<i>Troglodytidae</i>	House wren	<i>Troglodytes aedon</i>	X			G5 N5B S5B
<i>Troglodytidae</i>	Marsh wren	<i>Cistothorus palustris</i>		X		G5 N5B S5B
<i>Troglodytidae</i>	Sedge wren	<i>Cistothorus platensis</i>	X		X	G5 N5B S5B
<i>Turdidae</i>	American robin	<i>Turdus migratorius</i>	X		X	G5 N5B,N5N S5B
<i>Turdidae</i>	Hermit thrush	<i>Catharus guttatus</i>	X		X	G5 N5B S5B
<i>Turdidae</i>	Swainson's thrush	<i>Catharus ustulatus</i>	X	X	X	G5 N5B S5B
<i>Turdidae</i>	Veery	<i>Catharus fuscescens</i>	X	X		G5 N5B S4S5B
<i>Tyrannidae</i>	Eastern kingbird	<i>Tyrannus tyrannus</i>	X			G5 N5B S5B
<i>Tyrannidae</i>	Eastern phoebe	<i>Sayornis phoebe</i>	X			G5 N5B S5B
<i>Tyrannidae</i>	Great crested flycatcher	<i>Myiarchus crinitus</i>		X		G5 N5B S4S5B
<i>Tyrannidae</i>	Least flycatcher	<i>Empidonax minimus</i>	X	X	X	G5 N5B S5B
<i>Tyrannidae</i>	Olive-sided flycatcher	<i>Contopus cooperi</i>	X			G4 N5B S4B
<i>Vireonidae</i>	Philadelphia vireo	<i>Vireo philadelphicus</i>	X	X		G5 N5B S4S5B
<i>Vireonidae</i>	Red-eyed vireo	<i>Vireo olivaceus</i>	X	X		G5 N5B S5B

¹According to NatureServe (2009).

Appendix H Fish species present in the region of the project sites, according to previous studies ¹

Family	Common Name	Scientific Name	Site of Sampling				Global, National and Provincial Conservation Rank ²
			Boggy River (49° 37' 00" N, 95° 37' 45" W)	Boggy River (49° 37' 46" N, 95° 30' 02" W)	Stony Creek (49° 15' 48" N, 95° 16' 53" W)	Moose Lake (49° 12' 32" N, 95° 18' 57" W)	
Catostomidae	Shorthead redhorse	<i>Moxostoma macrolepidotum</i>	X				G5 N5 S5
Catostomidae	White sucker	<i>Catostomus commersonii</i>	X	X		X	G5 N5 S5
Centrarchidae	Black crappie	<i>Pomoxis nigromaculatus</i>				X	G5 N4N5 SNR
Centrarchidae	Largemouth bass	<i>Micropterus salmoides</i>				X	G5 N5 SNA
Centrarchidae	Rock bass	<i>Ambloplites rupestris</i>	X				G5 N5 S5
Cyprinidae	Fathead minnow	<i>Pimephales promelas</i>	X				G5 N5 S5
Cyprinidae	Finescale dace	<i>Phoxinus neogaeus</i>	X		X	X	G5 N5 S5
Cyprinidae	Mimic shiner	<i>Notropis volucellus</i>	X				G5 N5 S5
Cyprinidae	Northern redbelly dace	<i>Phoxinus eos</i>			X		G5 N5 S5
Cyprinidae	Pearl dace	<i>Margariscus margarita</i>	X		X		G5 N5 S5
Cyprinidae	Rosyface shiner	<i>Notropis rubellus</i>	X				G5 N5 ³
Cyprinidae	Western blacknose dace	<i>Rhinichthys obtusus</i>		X			G5 N5 S5

Family	Common Name	Scientific Name	Site of Sampling				Global, National and Provincial Conservation Rank ²
			Boggy River (49° 37' 00" N, 95° 37' 45" W)	Boggy River (49° 37' 46" N, 95° 30' 02" W)	Stony Creek (49° 15' 48" N, 95° 16' 53" W)	Moose Lake (49° 12' 32" N, 95° 18' 57" W)	
Esocidae	Northern pike	<i>Esox lucius</i>	X			X	G5 N5 S5
Gasterosteidae	Brook stickleback	<i>Culaea inconstans</i>	X		X		G5 N5 S5
Percidae	Blackside darter	<i>Percina maculata</i>	X	X			G5 N3N4 S5
Percidae	Iowa darter	<i>Etheostoma exile</i>				X	G5 N5 S5
Percidae	Johnny darter	<i>Etheostoma nigrum</i>	X	X			G5 N5 S5
Percidae	Walleye	<i>Sander vitreus</i>	X				G5 N5 S5
Petromyzontidae	Northern brook lamprey	<i>Ichthyomyzon fossor</i>	X				G4 N3 S2
Salmonidae	Brown trout	<i>Salmo trutta</i>	X				G5 NNA SNA
Salmonidae	Rainbow trout	<i>Oncorhynchus mykiss</i>	X			X	G5 N5 SNA
Umbridae	Central mudminnow	<i>Umbra limi</i>	X	X	X		G5 N5 S5

¹ Todd Schwartz, Fisheries and Oceans Canada, personal communication, February 15, 2010.

² According to NatureServe (2009).

³ No conservation status specified for Manitoba.

Appendix H Herpetofauna species present in the region of the project sites according to previous studies

Family	Common Name	Scientific Name	Source		Global, National and Provincial Conservation Rank ¹
			Krindle (1994)	Hatch (2007)	
Amphibians					
Bufonidae	American Toad	Anaxyrus americanus	x	x	G5 N5 S4S5
Hylidae	Boreal chorus frog	Pseudacris maculata		x	G5 N5 S5
Hylidae	Spring peeper	Pseudacris crucifer	x	x	G5 N5 S5
Ranidae	Leopard frog	Lithobates pipiens		x	G5 N5 S4
Ranidae	Wood frog	Lithobates sylvaticus	x	x	G5 N5 S5
Reptiles					
Colubridae	Red-sided garter snake	Thamnophis sirtalis	x	x	G5 N5 S4

¹ According to NatureServe (2009).

² No conservation status specified for Manitoba.

Appendix H Mammal species present in the region of the project sites according to previous studies

Family	Common Name	Scientific Name	Source		Global, National and Provincial Conservation Rank ¹
			Krindle (1994)	Hatch (2007)	
<i>Canidae</i>	Coyote	<i>Canis latrans</i>		x	G5 N5 S5
<i>Canidae</i>	Gray wolf	<i>Canis lupus</i>	x		G4 N4 S4
<i>Canidae</i>	Red fox	<i>Vulpes vulpes</i>		x	G5 N5 S5
<i>Castoridae</i>	American beaver	<i>Castor canadensis</i>	x	x	G5 N5 S5
<i>Cervidae</i>	Moose	<i>Alces alces</i>	x		G5 N5 S5
<i>Cervidae</i>	White-tailed deer	<i>Odocoileus virginianus</i>	x	x	G5 N5 S5
<i>Cricetidae</i>	Deer mouse	<i>Peromyscus maniculatus</i>		x	G5 N5 S5
<i>Cricetidae</i>	Meadow vole	<i>Microtus pennsylvanicus</i>		x	G5 N5 S5
<i>Cricetidae</i>	Muskrat	<i>Ondatra zibethicus</i>	x	x	G5 N5 S5
<i>Cricetidae</i>	Northern red-backed vole ²	<i>Clethrionomys rutilus</i>	x		G5 N5 S3
<i>Cricetidae</i>	Southern red-backed vole	<i>Clethrionomys gapperi</i>		x	G5 N5 S5
<i>Erethizontidae</i>	Common porcupine	<i>Erethizon dorsatum</i>		x	G5 N5 S5
<i>Geomyidae</i>	Northern pocket gopher	<i>Thomomys talpoides</i>		x	G5 N5 S5
<i>Leporidae</i>	Snowshoe hare	<i>Lepus americanus</i>		x	G5 N5 S5
<i>Mephitidae</i>	Striped Skunk	<i>Mephitis mephitis</i>		x	G5 N5 S5
<i>Mustelidae</i>	Long-tailed weasel	<i>Mustela frenata</i>		x	G5 N5 S5

<i>Mustelidae</i>	River otter	<i>Lutra canadensis</i>	x		G5 N5 S5
<i>Procyonidae</i>	Common raccoon	<i>Procyon lotor</i>		x	G5 N5 S5
<i>Sciuridae</i>	Eastern chipmunk	<i>Tamias striatus</i>		x	G5 N5 S5
<i>Sciuridae</i>	Red squirrel	<i>Tamiasciurus hudsonicus</i>	x	x	G5 N5 S5
<i>Sciuridae</i>	Woodchuck	<i>Marmota monax</i>	x		G5 N5 S5
<i>Ursidae</i>	Black bear	<i>Ursus americanus</i>	x	x	G5 N5 S5

¹ According to NatureServe (2009).

² The known range of this species is farther north according to Banfield (1977). Thus, it may be absent from the project sites.

Appendix I

First Nations and Métis communications

From: Quinty, Francois
Sent: February 23, 2010 10:13 AM
To: 'dthomas@mmf.mb.ca'
Subject: Peatland Development Project
Attachments: location_map_100223.pdf

Denis Thomas, Vice-President
Manitoba Métis Federation Inc.
Southeast Regional Métis Corporation

Dear Madam,

SNC-Lavalin Inc. Environment Division is conducting an Environment Act Proposal (EAP) for Jiffy Products' peatland development project. We are requesting any information the Manitoba Métis Federation (MMF) may have in regards to traditional land use in the area of the proposed peatland development. We would also like to know if the Buffalo Point First Nation has any concerns regarding Jiffy's proposed development.

Jiffy's project aims at developing three peatlands for peat harvesting located in the area between Sprague and the Trans Canada Highway (see attached map).

Poplar Creek Bog is a 425 hectare bog located along road 308, 42.5 km south of the Trans Canada Highway at 95°18'29" W and 49°19'09" N. Jiffy holds peat leases QL-2091 and QL-2092 that cover parts of sections 23, 24, 25 26, 29 and 30, Township 4, Ranges 16E and 17E.

Haute Bog is a 526 hectare bog located 9.5 km south of the Trans Canada Highway and 31.5 km north of Poplar Creek Bog at 95°20'42" W and 49°36'08"N. It is bordered to the north by the Greater Winnipeg Water District Railway. Jiffy holds peat leases QL-2088, QL-2089 and QL-2090 that cover parts of Sections 27, 28, 29, 32, 33 and 34, Township 7, Range 16E.

Boggy River Bog is a 182 hectare bog located 13.5 km south of the Trans Canada Highway between Poplar Creek Bog and Haute Bog at 95°18'24" W and 49°34'37" N. Jiffy holds peat leases QL-2086 and QL-2087 that cover parts of Sections 13, 14, 15, 22, 23 and 24, Township 7, Range 16E.

An access road ($\pm$ 10 km long) will be build to reach Haute Bog and Boggy River Bog. A peat processing plant will also be built in the same area at a place that still has to be determined. Peat will be used to produce horticultural products such as growing media or peat mixes.

The project is scheduled to start during the winter of 2010-2011. Poplar Creek Bog will be developed first as it is easily accessible. The project will create approximately 70 jobs (permanent and seasonal) and stimulate the local economy. It is anticipated that the development will have little impact on the environment. Peatland development should not negatively impact wildlife. Some rare plant species were identified and they will be transplanted as proposed by Conservation Manitoba. Water quality will not be affected since drainage water will flow through sedimentation ponds before reaching receiving watercourses. Drainage water from Poplar Creek bog will be directed into adjacent wetlands since there is no watercourse in the vicinity. Haute Bog and Boggy River Bog will

drain into Boggy River. No chemicals are used in the peat harvesting process. Developed peatlands will be restored back to wetlands/peatlands at cessation of peat harvesting activities.

Should you require any additional information about the development project, do not hesitate to contact me. A quick response would be greatly appreciated.

Best regards

François Quinty, Geographer, M.A.
SNC-Lavalin Environment
division of SNC-Lavalin

5955, rue Saint-Laurent
Suite 300
Lévis (Québec) G6V 3P5
Tel. : 418-837-3621 / Fax : 418-837-2039
francois.quinty@sncclavalin.com

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From: Quinty, Francois
Sent: February 23, 2010 10:12 AM
To: 'chief@buffalopoint.mb.ca'
Subject: Peatland Development Project
Attachments: location_map_100223.pdf

Chief John Thunder

Dear Sir,

SNC-Lavalin Inc. Environment Division is conducting an Environment Act Proposal (EAP) for Jiffy Products' peatland development project. We are requesting any information the Buffalo Point First Nation may have in regards to traditional land use in the area of the proposed peatland development. We would also like to know if the Buffalo Point First Nation has any concerns regarding Jiffy's proposed development.

Jiffy's project aims at developing three peatlands for peat harvesting located in the area between Sprague and the Trans Canada Highway (see attached map).

Poplar Creek Bog is a 425 hectare bog located along road 308, 42.5 km south of the Trans Canada Highway at 95°18'29" W and 49°19'09" N. Jiffy holds peat leases QL-2091 and QL-2092 that cover parts of sections 23, 24, 25 26, 29 and 30, Township 4, Ranges 16E and 17E.

Haute Bog is a 526 hectare bog located 9.5 km south of the Trans Canada Highway and 31.5 km north of Poplar Creek Bog at 95°20'42" W and 49°36'08"N. It is bordered to the north by the Greater Winnipeg Water District Railway. Jiffy holds peat leases QL-2088, QL-2089 and QL-2090 that cover parts of Sections 27, 28, 29, 32, 33 and 34, Township 7, Range 16E.

Boggy River Bog is a 182 hectare bog located 13.5 km south of the Trans Canada Highway between Poplar Creek Bog and Haute Bog at 95°18'24" W and 49°34'37" N. Jiffy holds peat leases QL-2086 and QL-2087 that cover parts of Sections 13, 14, 15, 22, 23 and 24, Township 7, Range 16E.

An access road ($\pm$ 10 km long) will be build to reach Haute Bog and Boggy River Bog. A peat processing plant will also be built in the same area at a place that still has to be determined. Peat will be used to produce horticultural products such as growing media or peat mixes.

The project is scheduled to start during the winter of 2010-2011. Poplar Creek Bog will be developed first as it is easily accessible. The project will create approximately 70 jobs (permanent and seasonal) and stimulate the local economy. It is anticipated that the development will have little impact on the environment. Peatland development should not negatively impact wildlife. Some rare plant species were identified and they will be transplanted as proposed by Conservation Manitoba. Water quality will not be affected since drainage water will flow through sedimentation ponds before reaching receiving watercourses. Drainage water from Poplar Creek bog will be directed into adjacent wetlands since there is no watercourse in the vicinity. Haute Bog and Boggy River Bog will drain into Boggy River. No chemicals are used in the peat harvesting process. Developed peatlands will be restored back to wetlands/peatlands at cessation of peat harvesting activities.

Should you require any additional information about the development project, do not hesitate to contact me. A quick response would be greatly appreciated.

Best regards

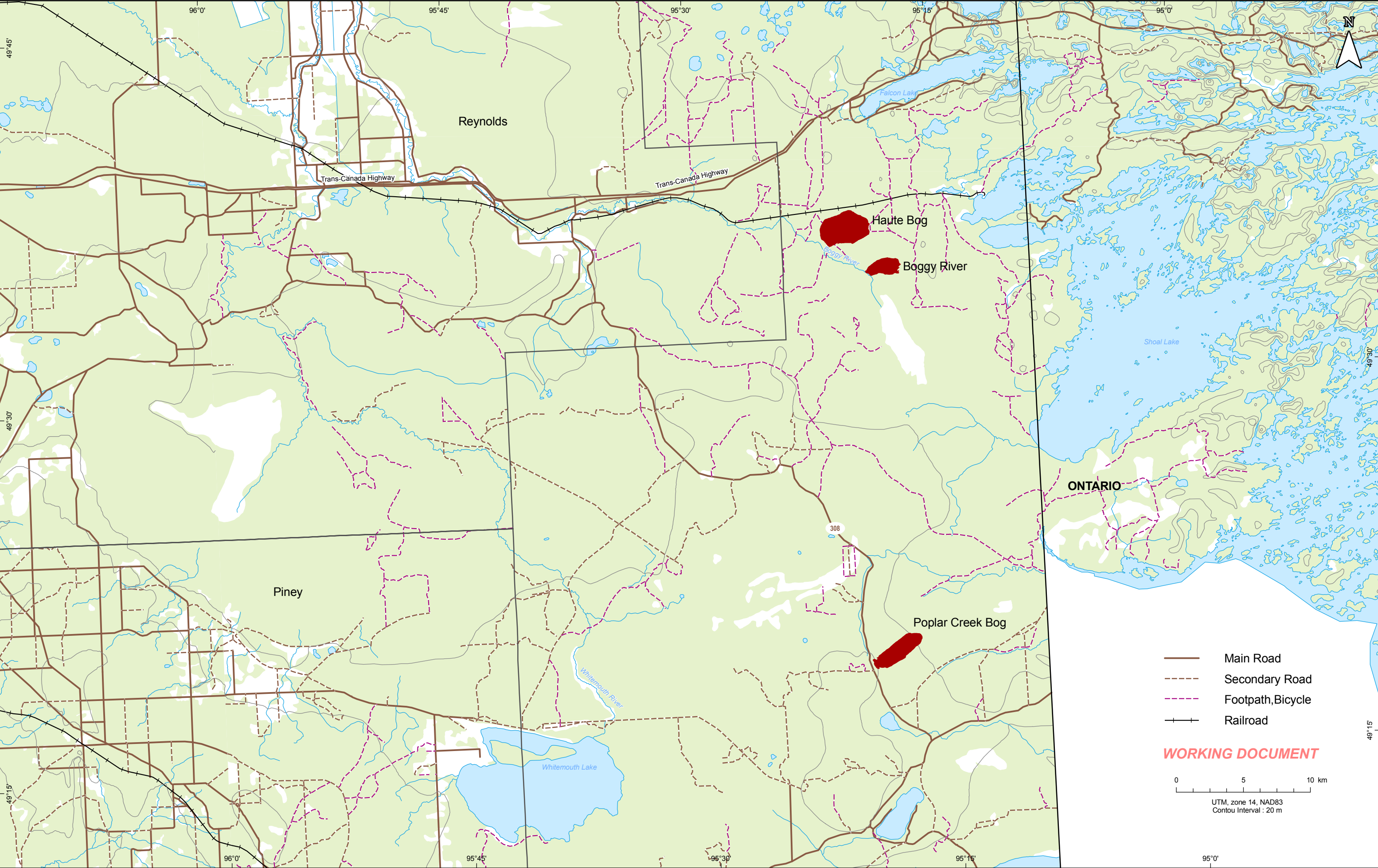
François Quinty, Geographer, M.A.
SNC-Lavalin Environment
division of SNC-Lavalin

5955, rue Saint-Laurent
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Appendix J

Government communications

From: Sitchon, Myra (CHTS) [Myra.Sitchon@gov.mb.ca]
Sent: February 17, 2010 11:20 AM
To: Senechal, Helene
Cc: Quinty, Francois
Subject: RE: Historic Resources and Proposed Peat Mining Development
Attachments: SNC-Lavalin - Peat bog - Feb 2010.pdf

Hello Helene,
 We have reviewed the records and determined that there are no heritage resources associated with the locations provided. I have attached a memo outlining these details for your records. If you need further assistance, please do not hesitate to contact me at any time.
 Thanks,
 Myra

Myra L. Sitchon,
Impact Evaluation Archaeologist,
 Archaeological Assessment Services Unit,
 Historic Resources Branch
 Main Floor- 213 Notre Dame Avenue, Winnipeg, MB R3B 1N3
 myra.sitchon@gov.mb.ca

Phone: (204) 945-6539
Toll Free: 1-800-282-8069+extension(6539)
Fax: (204) 948-2384
Website: <http://www.manitoba.ca/heritage>



From: Senechal, Helene [mailto:Helene.Senechal@snclavalin.com]
Sent: Thursday, February 11, 2010 11:47 AM
To: Sitchon, Myra (CHTS)
Cc: Quinty, Francois
Subject: Historic Resources and Proposed Peat Mining Development
Importance: High

Hello,

SNC-Lavalin is conducting an Environmental Act Proposal (EAP) for Jiffy for the proposed peat mining development of Poplar Creek Bog, Haute Bog and Boggy River Bog (see table below and attached figures). We need to describe the human environment of these bogs as part of the EAP. Could you please let us know if Manitoba Culture, Heritage and Tourism have any information regarding historic resources on the project sites? Thanks!

	Range	Township	Section	LS
Poplar Creek Bog	16E	4	23	1-12, 14-16
			24	4-6, 9-16
			25	1-4, 7, 8
			26	1
	17E	4	19	13

			30	3-5
Boggy River Bog	16E	7	13	12-13
			14	9-16
			15	9, 16
			22	1
			23	1-4, 6-8
			24	4,5
Haute Bog	16E	7	27	5, 10-16
			28	3-16
			29	9, 16
			32	1
			33	1-11
			34	2-7, 11, 12

Hélène Sénéchal, M.Sc.

Biologiste

SNC-Lavalin Environnement
division de SNC-Lavalin inc.

5955, rue Saint-Laurent
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Memorandum

DATE: February 17, 2010

TO: H  l  ne S  n  chal, M.Sc.
Biologiste
SNC-Lavalin Environnement
division de SNC-Lavalin inc.
5955, rue Saint-Laurent
Bureau 300
L  vis (Qu  bec) G6V 3P5

FROM: Myra Sitchon
Impact Evaluation
Archaeologist
Historic Resources
Branch
Main Floor 213 Notre
Dame Avenue
Winnipeg MB
R3B 1N3

PHONE NO: (204) 945-6539

SUBJECT: HERITAGE RESOURCES -Proposed Peat Mining Development

In response to your email regarding the above-noted proposed project, I have examined Branch records for information on heritage resources in the locations and areas of potential concern. There is no information on file regarding heritage resource in these locations. Further, the potential to impact significant heritage resources is low, and, therefore, the Historic Resources Branch has no concerns with the project.

If at any time however, significant heritage resources are recorded in association with these lands during development, the Historic Resources Branch may require that an acceptable heritage resource management strategy be implemented by the proponent to mitigate the affects of development on the heritage resources.

If you have any questions or comments, please contact me at 945-6539.

Myra Sitchon

From: Firlotte, Nicole (CON) [Nicole.Firlotte@gov.mb.ca]
Sent: September 30, 2009 12:46 PM
To: Quinty, Francois
Subject: RE: WWW Form Submission - Jiffy peatland development project

Attachments: Jiffy.xls



Jiffy.xls

Francois,

Thank you for your information request. I completed a search of the Manitoba Conservation Data Centre's rare species database for your area of interest.

I am attaching an excel table summarizing these occurrences. We do not provide shapefiles as a rule. These occurrences are on the periphery of your sites so I provide them as information and to serve as a guide for any field work you may conduct. The table includes scientific and common names, a directions field, the global (GRank) and provincial (SRank) rankings for each species as well as COSEWIC and SARA designations. Further information on these ranking systems can be found on our website at <http://web2.gov.mb.ca/conservation/cdc/consranks.html> and http://www.sararegistry.gc.ca/default_e.cfm. If you need further information on a specific record please let me know and reference the EO ID number from the table.

The information provided in this letter is based on existing data known to the Manitoba Conservation Data Centre of the Wildlife and Ecosystem Protection Branch at the time of the request. These data are dependent on the research and observations of our scientists and reflects our current state of knowledge. An absence of data does not confirm the absence of any rare or endangered species. Many areas of the province have never been thoroughly surveyed, therefore, the absence of data in any particular geographic area does not necessarily mean that species or ecological communities of concern are not present. The information should not be regarded as a final statement on the occurrence of any species of concern, nor should it substitute for on-site surveys for species or environmental assessments. Also, because our Biotics database is continually updated and because information requests are evaluated by type of action, any given response is only appropriate for its respective request. We would be very interested in receiving a copy of any survey results you may undertake of the area to update our database.

Please contact the Manitoba CDC for an update on this natural heritage information if more than six months passes before it is utilised.

Third party requests for products wholly or partially derived from our Biotics database must be approved by the Manitoba CDC before information is released. Once approved, the primary user will identify the Manitoba CDC as data contributors on any map or publication using data from our database, as the Manitoba Conservation Data Centre; Wildlife and Ecosystem Protection Branch, Manitoba Conservation.

If you have any questions or require further information contact me directly at (204) 945-6998. If you are conducting ground surveys within the area and encounter any rare species please provide us with this information to add to our data base.

Regards,
Nicole

Nicole Firlotte
Biodiversity Information Manager
Manitoba Conservation
945-6998
Note new email: nicole.firlotte@gov.mb.ca
Please consider the environment before printing this e-mail

-----Original Message-----

From: +WPG1212 - CDC_Wildlife (CON)
Sent: Wednesday, September 23, 2009 3:19 PM
To: Firlotte, Nicole (CON)
Subject: FW: WWW Form Submission - Jiffy peatland development project

From:
Sent: Wednesday, September 23, 2009 3:18:33 PM
To: +WPG1212 - CDC_Wildlife (CON)
Subject: WWW Form Submission
Auto forwarded by a Rule

Below is the result of your feedback form. It was submitted by
WWW Information Request () on Wednesday, September 23, 2009 at 15:18:33

DocumentID: Manitoba_Conservation
Project Title: Jiffy peatland development project
Date Needed: 2009/09/30
Name: Francois Quinty
Company/Organization: SNC-Lavalin environment inc.
Address: 5955, rue Saint-Laurent, bur. 300
City: Levis
Province/State: Quebec
Phone: 418-837-3621
Fax: 418-837-2039
Email: francois.quinty@snclavalin.com

Project Description: Jiffy product wants to harvest peat to produce peat
mix substrate to be used in horticulture. The information will be used
for the environmental impact assessment.

Information Requested: Any information, such as occurrence of designated
or endangered species that may help assess impact of the project

Format Requested: ArcView Shapefile

Location: I will send you shapefiles for the location

Thanks

action: Submit

EO_ID	ELCODE	EO_NUM	SCIENTIFIC NAME	COMMON NAME	DIRECTIONS	G_RANK	S_RANK	MB ESA	COSEWIC	SARA
2737	PDSOL0E010	7	Leucophysalis grandiflora	Large White-flowered Ground-cherry	Shoal Lake, southeastern Manitoba.	G4?	S3			
1091	PGPIN04120	13	Pinus strobus	Eastern White Pine	near Sprague Lake, Northwest Angle Provincial Forest.	G5	S2			
1338	PDBER03010	1	Caulophyllum thalictroides	Papoose-root	Waugh, MB.	G4G5	S2			
2180	PDAST0H0J0	1	Antennaria plantaginifolia	Plantain-leaved Everlasting	Shoal Lake, MB.	G5	S1S2			
520	ABNME01010	26	Coturnicops noveboracensis	Yellow Rail		G4	S3S4B		SC	SC Sched 1

From: Schwartz, Todd [Todd.Schwartz@dfo-mpo.gc.ca]
Sent: February 15, 2010 4:11 PM
To: Senechal, Helene
Subject: RE: Jiffy peat mining development EAP
Attachments: Moose Lake Fish Species.pdf; SNC Lavaline Boggy River and Sprague Lake areas Feb 15, 2010.ppt; Boggy River Fish Species.pdf

Hello Helene,

Unfortunately DFO has relatively little information to provide you. We have conducted relatively little sampling effort in this area and so don't have much information on fish use. I have attached a copy of the DFO DRAFT fish habitat classification maps for the area. Because of the lack of sampling, and relatively poor quality maps for showing the local waterways most of the waterways here are unknown (and unclassified) as to the quality of fish habitat they provide. Should any potential disruptions to these waterways be planned they should be thoroughly sampled for fish use as part of an Environmental Assessment.

We have no collection information from Poplar Creek itself. We have some information from sites in the area.

Downstream of Sprague Lake on Stony Creek on June 13, 2006 located at Latitude 49.26344 and Longitude -95.28133 DFO captured several species of forage fish including brook stickleback, central mudminnow, finescale dace, northern redbelly dace, and pearl dace.

At an unnamed tributary to Harrison Creek on the West side of hwy 308 on June 13, 2006 located at Latitude 49.34208 and Longitude -95.34502 (approximately N 27-4-16 E1M) we captured no fish but observed large bodied fish in the stream (potentially carp or sucker).

There is some fish collection information from Moose Lake from the Province of Manitoba (attached)

The Boggy River has been sampled, but mostly further downstream of your area of interest.

On the Boggy River at the confluence with an unnamed tributary on September 11, 2003 located at Latitude 49.62934 and Longitude -95.50059 (approximately 5-8-15 E1M) we captured blackside darter, central mudminnow, johnny darter, western blacknose dace and white sucker. I also know that northern pike are common at this location.

I have also attached fish collection information from the Boggy River from the Province (attached).

Should you have further questions please feel free to email me.

Todd Schwartz

Telephone/ Téléphone: 204 983-4231
 Facsimile / Télécopieur: 204 984-2402
 Email / Courriel: Todd.Schwartz@dfo-mpo.gc.ca

Fish Habitat Biologist.	Biologiste, Habitat du poisson
Manitoba District.	District du Manitoba
Winnipeg Office.	Bureau de Winnipeg
Central and Arctic Region.	Région du Centre et de l'Arctique
Fisheries and Oceans Canada.	Pêches et Océans Canada
501 University Crescent.	501 University Crescent
Winnipeg, MB R3T 2N6.	Winnipeg (Manitoba) R3T 2N6
Government of Canada.	Gouvernement du Canada

For more information on Fish and Fish Habitat and DFO Reviews Visit our Website
Oceans and Fish Habitat http://www.dfo-mpo.gc.ca/oceans-habitat/index_e.asp

From: Senechal, Helene [mailto:Helene.Senechal@snclavalin.com]

Sent: February 11, 2010 8:16 AM

To: Schwartz, Todd

Cc: Quinty, Francois

Subject: Jiffy peat mining development EAP

Importance: High

Dear M. Schwartz,

SNC-Lavalin is conducting an Environmental Act Proposal (EAP) for Jiffy for the proposed peat mining development of Poplar Creek Bog, Haute Bog and Boggy River Bog (see table below and attached figures). We need to describe the biological environment of these bogs as part of the EAP. Could you please let us know if DFO has any information regarding fish species and fish habitat for Boggy River or other rivers or waterbodies in or close to the study area? Thanks!

	Range	Township	Section	LS
Poplar Creek Bog	16E	4	23	1-12, 14-16
			24	4-6, 9-16
			25	1-4, 7, 8
			26	1
	17E	4	19	13
			30	3-5
Boggy River Bog	16E	7	13	12-13
			14	9-16
			15	9, 16
			22	1
			23	1-4, 6-8
			24	4,5
Haute Bog	16E	7	27	5, 10-16
			28	3-16
			29	9, 16
			32	1
			33	1-11
			34	2-7, 11, 12

Hélène Sénéchal, M.Sc.

Biologiste

SNC-Lavalin Environnement
division de SNC-Lavalin inc.

5955, rue Saint-Laurent

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Lévis (Québec) G6V 3P5

Tél. : 418-837-3621 / Téléc. : 418-837-2039

helene.senechal@snclavalin.com

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Waterbody: Moose Lake

Waterbody ID	Watershed Unit	Region	District	Map Sheet	Latitude / Longitude	
8856	5PDC	Eastern	Sprague	52E03	49° 12' 32"	95° 18' 57"
Species	Presence	Class		Use		
BLACK CRAPPIE	Unknown	Introduced		Overwinter Spawn and Hatch Nursery Year Round Resident		
		Sport		Nursery Overwinter Year Round Resident Spawn and Hatch		
FINESCALE DACE	Unknown	Non-Sport		Year Round Resident Overwinter Nursery Spawn and Hatch		
IOWA DARTER	Unknown	Non-Sport		Year Round Resident Overwinter Nursery Spawn and Hatch		
LARGEMOUTH BASS	Extirpated					
NORTHERN PIKE	Unknown	Sport		Year Round Resident Overwinter Nursery Spawn and Hatch		
RAINBOW TROUT	Extirpated					
WHITE SUCKER	Unknown	Non-Sport		Year Round Resident Overwinter Nursery Spawn and Hatch		



Contact:

Waterbody: Boggy River

Waterbody ID	Watershed Unit	Region	District	Map Sheet	Latitude / Longitude	
8874	5PHD	Eastern	Hadashville	52E12	49° 37' 0"	95° 37' 45"

Species	Presence	Class	Use

BLACKSIDED DARTER Common

BROOK STICKLEBACK Common

BROWN TROUT Extirpated

CENTRAL MUDMINNOW Common

FATHEAD MINNOW Common

FINESCALE DACE Common

JOHNNY DARTER Common

MIMIC SHINER Rare

NORTHERN BROOK LAMPREY Rare

Waterbody ID	Watershed Unit	Region	District	Map Sheet	Latitude / Longitude	
8874	5PHD	Eastern	Hadashville	52E12	49° 37' 0"	95° 37' 45"
Species	Presence	Class		Use		
NORTHERN PIKE	Common	Non-Sport		Year Round Resident Spawn Elsewhere Overwinter Nursery Spawn and Hatch		
PEARL DACE	Rare					
RAINBOW TROUT	Extirpated					
ROCK BASS	Common					
ROSYFACE SHINER	Rare					
SHORTHEAD REDHORSE	Common	Non-Sport		Year Round Resident Overwinter Nursery Spawn and Hatch		
WALLEYE	Unknown	Sport		Spawn and Hatch Overwinter Migration Route Nursery		
WHITE SUCKER	Common	Non-Sport		Year Round Resident Spawn Elsewhere Overwinter Nursery Spawn and Hatch		

Appendix K

Emergency Protection Plan

FINAL VERSION



Environmental Protection Plan

N° 606096

April 2010
Rev. 00



SNC•LAVALIN
Environment

FINAL VERSION



Environmental Protection Plan

No. 606096

April 2010
Rev. 00



SNC-LAVALIN
Environment

Prepared by:

Reviewed by:


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LIST OF ABBREVIATIONS

RCMP	Royal Canadian Mounted Police
EERT	Environmental Emergency Response Team
EPP	Environmental Protection Plan
EERP	Environmental Emergency Response Plan



1 INTRODUCTION

This document is a preliminary contingency plan for the proposed Jiffy Canada peat harvesting facility near Sprague, Manitoba (Figure 1).

The EPP includes:

- Standard operating procedures to ensure environmental protection during construction and operation of the peat harvesting facilities (including waste management, handling and storage of hazardous materials, watercourse protection, and dust control);
- An Environmental Emergency Response Plan (EERP).

The EPP is intended primarily 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 defines the standard operating procedures that will be in effect at the Jiffy Canada facilities. The Environmental Emergency Response Plan (EERP) includes guidance for events that may require implementation of the emergency measures provided.

Any employee who works on sites managed by the company, whether a permanent employee or employee of a contractor or sub-contractor, shall be made aware of the existence of this contingency plan during his or her health and safety orientation. He or she will also be made aware of the key personnel responsible for environmental emergencies, as well as the locations where printed copies of this plan are available for consultation. The employee shall acknowledge in writing that he or she has been made aware of this information during his or her orientation.



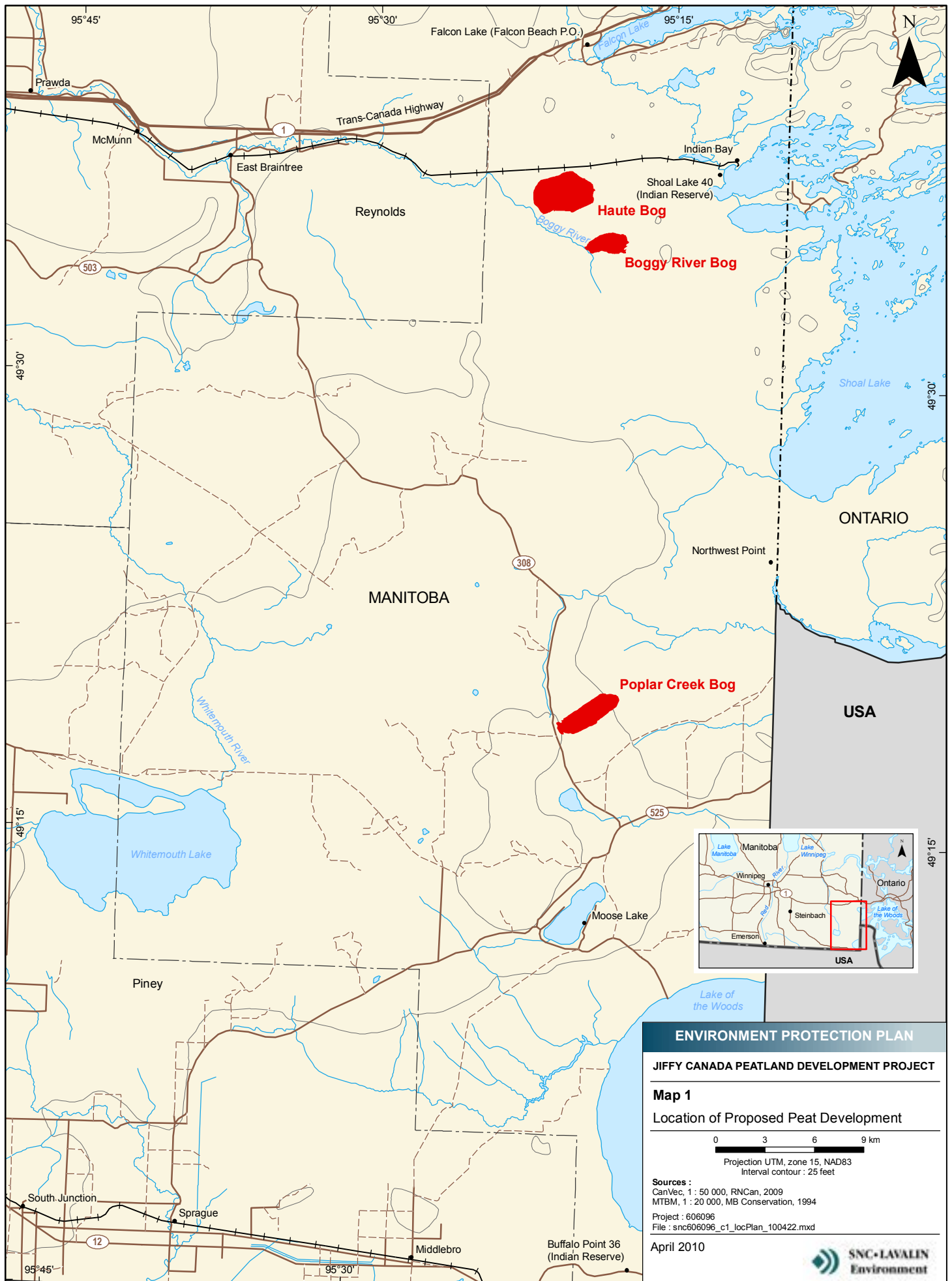
The emergency measures have been developed for specific events that may occur during the construction or operation of the peat extraction facility and associated maintenance garage. The following events are stipulated by the *Draft Advice for the Preparation of an Environment Act Proposal for a Class 2 Peat Mining Development* (Manitoba Conservation, 2007):

- Malfunction of drainage water treatment facilities;
- Fire occurrence response plan for fire suppression and control;
- Accidental spill or release of dangerous goods or hazardous wastes (petroleum fuel or used oil);
- Extreme (1 in 100 yr.) rainfall events.

The following additional measures are included as part of sound facility planning:

- Road accident (general, or involving overturned vehicles);
- Power failures;
- Fallen electric lines;
- Transformer leak;
- Transformer fire;
- Work in potentially hazardous terrain;
- Wildlife encounter;
- Accelerated erosion;
- Landslides or slumps;
- Other natural disasters (floods, tornadoes).

Additional emergency measures or events may be added during future revisions of the Plan (see Section 2.2) based on project experience or “lessons learned.”





1.1 APPLICABILITY AND EXEMPTIONS

One of the goals of this plan is to establish work practices and standard operating procedures for environmental protection. The company commits to adhere to these procedures for all project activities for the duration of the project. All contractors or sub-contractors hired during the project will also be required to adhere to these procedures.

The company has developed this EPP based on the regulatory and contractual obligations of the project, and in accordance with its corporate environmental policy. This Plan is intended to serve as a guide for all members of the company, contractors and their sub-contractors. All persons who engage in activities covered by this Plan within the scope of the project are required to follow and install the measures described in the Plan. The work supervisors or foremen must ensure that personnel under their direction receive the training required under this Plan.

This plan establishes the steps to be followed to ensure protection of the environment under normal operating conditions, and in the event that an accident likely to cause environmental damage occurs.

This plan covers all sites and activities during the construction and operational phases of the peat extraction facilities as shown in the plans and specifications, including construction of access roads, temporary working areas, equipment parking areas, construction of the garage and surrounding operation areas, installation of fuel tanks, and installation of electric lines. It also covers any offices or administrative buildings on site.

It is important to note that, regarding accidents, **only those that are likely to result in an *environmental* emergency are covered in this document.** A site health and safety plan for workers and visitors, including a workplace hazardous materials information system (WHMIS), will be submitted to the appropriate regulatory agencies for approval prior to startup of the facilities.



1.2 LEGAL FRAMEWORK

The Environmental Management plan and Environmental Emergency Response Plan have been prepared in consideration of the following requirements:

- Environment Act (C.C.S.M. c. E125);
- Water Resources Conservation Act (C.C.S.M. c. W72);
- Contract documents (plans and specifications);
- Other recommended practices: forest roads, bridges, culverts (consult Manitoba Conservation);
- Environmental impact assessment document.



2 ENVIRONMENTAL PROTECTION PLAN ADMINISTRATION

2.1 EFFECTIVE DATE

This version (Rev. 00) will take effect upon submission of the Environment Act Proposal (environmental impact assessment document) to Manitoba Conservation.

[Future versions will include an exact date upon which the revised document will take effect].

2.2 REVISIONS

The company is responsible for keeping all aspects of this plan up-to-date. This plan is intended to be a flexible document that will evolve over time as required.

An annual review of the EPP will be conducted by the Production Manager. However, changes may be made at other times as a result of orders from government authorities, personnel changes, or according to the needs of the project or the company.

The company's document control officer is responsible for control and tracking of changes to this document, and issuance and distribution of revisions. Addenda or revised editions may be issued as needed.

3 ORGANIZATION AND RESPONSIBILITIES

3.1 KEY PERSONNEL

Facility Owner:	Jiffy Canada Inc.
Owner's Representative:	Zoel Gautreau
General Manager:	Bert Ruiters
Production Manager:	To be determined
Construction Manager:	To be determined
General Contractor:	To be determined

3.2 CONTACT INFORMATION

Jiffy Canada
30th floor
360 Main Street
Winnipeg, Manitoba
Canada R3C 4G1

Attention: **Zoel Gautreau**, Executive Vice-President

Tel: 506-336-2284

Fax: 506-336-1844

jnbzg@nb.aibn.com



3.3 RESPONSIBILITIES OF KEY PERSONNEL

The company and contractor shall maintain a defined managerial structure throughout the duration of the work.

After individuals intended to fill key positions are hired by Jiffy and/or contractors, a list of personnel responsible for environmental emergencies will be compiled and updated following any changes in personnel.

3.3.1 General Manager, Jiffy

The General Manager is responsible for:

- Verifying compliance of the EPP through monitoring;
- Reviewing and approving revision requests;
- Conducting a review of the plan as required;
- Document control.

3.3.2 Production Manager

The Production Manager is responsible for:

- Advising all construction and operations personnel of the appropriate procedures outlined in the EPP and ensure that proper instructions are provided;
- Ensuring that all sub contractors are aware of and comply with the requirements of this document;
- Primary contact with the General Manager and regulatory authorities with regard to plan implementation and compliance issues;
- Initiating changes to improve the quality of the plan.

3.3.3 Contractors

The Contractors are responsible for:

- Familiarizing themselves and their personnel with the EPP;
- Providing training for their employees;
- Ensuring that revisions to the EPP are incorporated;
- Complying with the requirements of the plan.



4 EMERGENCY AGENCY CONTACT NUMBERS

One or more of the following organizations may be contacted by the Production Manager in the event an incident requiring a response occurs.

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

Sprague Detachment Emergency (204) 437-2135 (forwarded to Steinbach if local personnel unavailable)

Sprague Detachment Administration (204) 437-2041

Steinbach Detachment Emergency (204) 326-1234

Local Police : none present in the municipalities involved

Fire Services (for structure or vehicle fires):

Dial 9-1-1 (calls dispatched to Sprague or Piney fire departments)

Urgent Medical Care – Hospitals:

Vita & District Health Centre (Hospital): (204) 425-3545

Roseau Area Hospital (Roseau, MN, U.S.A.): (218) 463-1365

Medical Clinic (non-acute care cases only):

East Borderland Primary Health Centre (204) 437-3015

Manitoba HealthLinks (First Aid advice by phone): (888) 315-9257

Ambulance:

Dial 9-1-1; no need to contact the ambulance dispatch centre directly. The fire service or police can also request an ambulance if needed.

Due to distance from the nearest ambulance post (Vita or Steinbach), for extremely urgent cases contact the Roseau Area Hospital (Roseau, MN, U.S.A.) at 218-463-1365.

Manitoba “One Window” Environmental Emergency number (federal / provincial emergency coordination centre): (204) 944-4888

Fisheries and Oceans Canada:

Regional Office (Winnipeg): (204) 983-5163

Rural Municipality of Piney (Vassar, MB): (204) 437-2284

CANUTEC (Transport Canada Emergency Centre)

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

(613) 996-6666

*666 (cellular) or call collect.

CHEMTREC (Chemical Product Transport Emergency Centre)

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

(800) 262-8200

Nuisance Wildlife

Manitoba Conservation (800) 214-6497

5 PROJECT INFORMATION

5.1 PROJECT DESCRIPTION

Jiffy is to develop Poplar Creek Bog, Haute Bog and Boggy River Bog. All three sites are undisturbed peatlands located in southeastern Manitoba outside boundaries of municipalities (Figure 1). Jiffy operations are designed to have minimal environmental effects on its surroundings. The harvesting operation is intended to take place for several decades with a phased development to meet market demand.

Primary product will be raw peat for their manufacturing plant. The exact location of the Manitoba plant is yet to be determined.

5.2 DESCRIPTION OF CONSTRUCTION ACTIVITIES

The construction work will take place prior to commencement of peat extraction. Construction activities include:

- Building and upgrading of an access road from road 308 to Poplar Creek Bog. The location of the access to Haute Bog and Boggy River Bog is not determined.
- Building and upgrading of a service area (2 ha) at each site.
- Construction of settling ponds followed by construction of peripheral and main ditches.
- Grubbing, removal and placement of trees and brush from the production areas on the bog access road.
- Construction of the secondary V ditches (1m wide at top and 1m deep) on the bog.
- Crowning of the fields to facilitate drainage.

5.3 DESCRIPTION OF OPERATIONS AND MAINTENANCE ACTIVITIES

The peat harvesting operations will be conducted in a manner similar to the existing operations in the area (FPM Peat Moss and Premier Peat Moss). The peat will be harrowed, turned over with specialized harrows, vacuum harvested and stockpiled at the end of fields along access roads. The material will be loaded into covered highway trucks for transport to the Jiffy processing plant.



Maintenance will encompass routine planned maintenance on the mobile equipment, and repairs of breakdowns will be done at an off-site location. All stockpiles will be continuously monitored for signs of heating. Regular cleaning of the sedimentation ponds will be carried out in order to maintain their efficiency.

5.4 CONSTRUCTION SCHEDULE

Assuming regulatory approvals are in place by the end of 2010, it is planned to commence construction work on Poplar Creek Bog early in 2011 to benefit from winter conditions, with first production in August 2011. The two other sites will be developed at a later stage according to production rate and market demand.

6 STANDARD OPERATING PROCEDURES (PREVENTIVE MEASURES)

6.1 ENVIRONMENTAL CONCERNS

The predominant environmental concerns associated with construction activities include:

- Accidental release of petroleum, oils and lubricants (POL)
- Water management during construction and production
- Fugitive dust

The primary concerns during operations are:

- Dust from roads, harvesting, stockpiling, and transporting
- Siltation in the sedimentation ponds
- Hydrocarbon and other waste spills

6.2 SITE ACCESS

Speed shall be limited to 30km/hr on all unpaved roads. No personal vehicles will be allowed within the peatland boundary. The Production Manager will create and assign an area within the service area for employee parking. Any vehicle leaking fuel or lubricant will be banned from the peatland.

6.3 EROSION AND SILTATION PREVENTION

Boggy River Bog is the only site that is adjacent to watercourses. Jiffy will create buffer zones between the harvested peatland and the watercourses to limit the possibility of silt deposition in the Boggy River and its tributaries.

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 is to be rectified as soon as possible to the satisfaction of the Production Manager.

Sediment retained in ponds and ditches will be excavated as required, and will be added to the excavated peat and used to backfill the ponds at closure.



Watercourses will be monitored visually to make sure that peat is not entering them. Water monitoring stations will be set up and sampled prior to the start of production, midway through the production season, and at the end of production on an annual basis. In the event of extreme climatic conditions such as prolonged heavy rain, samples will be collected one day after the event.

6.4 SITE CLEANLINESS AND WASTE DISPOSAL

The Production Manager shall designate areas for the collection of solid waste, and shall provide suitable marked receptacles and bins for the various waste types. Waste shall be removed weekly. Maximum use shall be made of recycling facilities.

The Production Manager shall designate and use areas for the transfer and temporary storage of any hazardous materials and special wastes. These sites shall be labeled and controlled. Only qualified contractors shall haul hazardous materials.

Garbage shall not be dumped or burned on site.

No waste or debris will be allowed to enter any watercourse.

Any container that previously contained petroleum products or other harmful materials must be capped or covered and placed in an impermeable collection bin designed for this purpose. It is prohibited to dispose of these containers with regular garbage.

Materials that may pose a fire risk, including dry construction materials and cut wood, must be removed from the site upon or within 30 days of construction completion.

6.5 HAZARDOUS MATERIAL STORAGE HANDLING AND DISPOSAL

There should be very little need for the retention of hazardous material on site. Attempts should be made to utilize non-hazardous alternatives.

Hazardous materials will be handled only by personnel who are trained and qualified in the handling of these materials, and only in accordance with manufacturer's instructions and government regulations. The WHMIS program will be implemented in accordance with Manitoba regulations (Workplace Safety and Health Act, Regulation - Part 35 - Workplace Hazardous Materials Information System). All employees involved with hazardous materials will have WHMIS training.

Hazardous materials are not to be stored in proximity to a watercourse or other sensitive area.



Contaminated materials will be separated from uncontaminated materials and disposed of at approved facilities by qualified contractors.

6.6 AGGREGATE PITS

Where aggregate is required for preliminary road construction, it is to be obtained from provincially authorized quarries.

6.7 MANAGEMENT OF HYDROCARBONS (PETROLEUM PRODUCTS)

Definition: Hydrocarbons (petroleum products) include liquid fuels, lubricating oils, dielectric cooling oils, brake and power steering fluid, and hydraulic fluids.

6.7.1 Handling and Storage of Hydrocarbons

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 (canal, reservoir, 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 residue 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.

6.7.2 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.

6.7.3 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).

205 L drums 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).

6.7.4 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).

6.7.5 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.

6.8 DUST CONTROL

During construction, it is recognized that roads and other infrastructures will not be fully developed. As a result, increased vigilance is required to ensure that dust does not become a health hazard to employees, or a nuisance to neighbours.

Speed limit on all unpaved roads, whether public or private, shall be 30km/hr.

Unless necessary for direct access to the peat, trees are not to be removed or cut down, such that maximum benefits are gained from their use as wind and dust break.

6.9 COMMISSIONING

Commissioning the peat harvesting and its equipment presents some unusual challenges, since the full infrastructure may not be in place. In general, any conditions appropriate to either construction or operating phases is equally applicable to the commissioning phase.

Particularly, roadways are to be stabilized with a low dust surface prior to any significant traffic density. Equipment failures leading to excessive noise, dust or other environmental degradation are cause for shutdown and immediate investigation.



6.10 FIRE PROTECTION

Burning of cut brush might take place on site. This operation will be prohibited during periods of high or extreme forest fire risk. The Manitoba MNR will be informed in advance of these operations. A water tank truck equipped with hoses shall be on site to extinguish the fire.

All personnel working on the site will be informed of appropriate disposal methods for welding rods or any other hot or burning material.

Smoking outdoors will be prohibited during periods of high or extreme forest fire risk. It is prohibited to discard cigarette butts on the ground.

It is prohibited to discard empty bottles, jars, or other glass materials that could cause a fire by magnification of sunlight.

Vehicle and machinery exhaust systems must be in good condition. During periods of high or extreme fire risk, vehicles and equipment must not be parked in areas of brush or long grass.

All mechanical equipment must be maintained to avoid discharging sparks during normal operation.

Portable ABC-type fire extinguishers must be available at each construction site.

All petroleum or flammable material storage sites must be equipped with a portable ABC-type fire extinguisher at all times.

6.11 WILDLIFE ENCOUNTERS

Personnel are prohibited from disturbing wild animals. Any encounter is likely to be considered as a reportable environmental incident.

Personnel working on the site will receive training on how to avoid wildlife encounters, with particular emphasis on the following species: bears, moose, deer, wolves, skunks, porcupines, badgers, wolverines, birds of prey, and any animal that appears to show visible or behavioral evidence of rabies or other disease.

Personnel shall not approach, feed, or disturb wildlife.

Any food waste, including soiled wrapping or packaging, will be disposed of in dedicated containers. Waste will be emptied regularly and disposed at an approved disposal facility.



All personnel working on the site will be informed of the possible presence of rare or endangered species (if present). The Canadian Wildlife Service and/or Manitoba Conservation will be contacted for recommendations if any such species are encountered on site.

No pets will be permitted on site.

If large game animals (deer, moose) are struck by a vehicle or construction equipment, a Manitoba Conservation officer will be contacted.

Vehicles and equipment are required to yield right of way to wildlife.

Personnel should inform the Environment Coordinator if animals visit the site on frequent basis.

Recreational use of all-terrain vehicles and snowmobiles by personnel of the company, contractors or sub-contractors will be prohibited during the construction phase.

7 ON-SITE EMERGENCY MATERIEL

The contractor shall provide an updated list of materiel available and its location to the General Manager and Production Manager at the start of each week. The contractor 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.

7.1 SPILL KIT

A spill kit must be available on each construction site, 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
- 40 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)

7.2 MECHANICAL EQUIPMENT

- Gasoline or diesel-powered water pumps
- 4 x 4 pickup trucks
- Tracked excavator
- Tractors
- Water tank truck equipped with hoses (for dust control and firefighting)
- Portable ABC-type fire extinguishers

7.3 EROSION CONTROL MEASURES

- Burlap sand bags
- Straw bales (covered / protected from the elements)

7.4 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

7.5 TOOLS AND HARDWARE

- Shovels
- Rakes
- Sledgehammer
- Buckets
- Tarps
- Roll of plastic vapor barrier (6 µm polyethylene sheeting)
- Baling wire
- Wire cutters

8 ENVIRONMENTAL EMERGENCY RESPONSE PLAN (ERP)

8.1 SPILL OR LEAK OF CONTAMINANTS (INCLUDING PETROLEUM)

This emergency spill or leak plan must be applied as soon as the spill is detected. **This plan is applicable to both petroleum and other forms of contaminants.**

The spill or leak plan should be available in a location readily accessible to workers on site. The General Manager, Production Manager, as well as contractor foremen should have a copy on their person or in their vehicle. The **contractor** is responsible for applying the site cleanup and rehabilitation measures included in this plan.

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 detailed 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 is to 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 is to maintain a listing of Emergency contact telephone numbers prominently displayed on a poster at the site.

8.1.1 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.

8.1.2 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.

8.1.3 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 (204) 983-5163 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 litre should be reported without delay.



8.1.4 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.

8.1.5 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.

8.1.6 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.

8.1.7 Remove the Contaminant

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

8.1.8 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 the waste management measures in Section 5.2.5.



8.1.9 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 Manitoba Conservation. 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.

8.2 FIRE

Company personnel and the employees of contractors and their subcontractors will receive fire prevention and response training.

Site personnel are responsible for extinguishing small fires as soon as they are noticed to prevent spread. Site personnel who are able should fight the fire using portable extinguishers or hoses. Site personnel should not attempt to extinguish larger fires that require intervention by professional firefighters from the outset, or any fire that poses a risk to human safety. If the fire is not extinguished within five minutes, the Production Manager should inform the local fire service and evacuate personnel from the site.

8.2.1 Fires that do not Pose a Forest Fire Risk

The following steps should be followed if a fire develops that does not pose a risk of becoming an uncontrolled fire (small localized fires, equipment fires):

- Trigger the chain of command.
- Warn personnel in the area that a fire has started



- Personnel in the area should take immediate actions to put out the fire with portable extinguishers or hoses
- If the site personnel are unable to bring the fire under control, contact the local fire department.
- If there is a risk of the fire spreading into neighboring woodland or rangeland areas, follow the steps for forest fires.

8.2.2 Forest Fires

Immediately inform the Manitoba “one window” environmental emergency centre at (204) 944-4888, providing the following information:

- Name of the person who is reporting the fire to the department and his or her telephone number (cell phone number, if applicable)
- Time the fire was detected
- Approximate size of the fire
- Location of the fire (GPS coordinates, if available)

Evacuate all personnel (and construction equipment, if doing so does not pose a safety risk) from the area.

Call 9-1-1 if there are any injuries or medical emergencies.

8.3 SEDIMENTATION CONTROL FAILURE

The effluent from the sedimentation ponds is to be monitored weekly. If evidence of silt accumulation becomes apparent, corrective action is to be taken immediately by way of cleanout and maintenance of suspended solids levels.

The Production Manager is to ensure that the primary sedimentation pond is dredged regularly, usually prior to start-up and during the production season if necessary. The clean out during production will be determined from weekly inspections during this period.

8.4 MOTOR VEHICLE ACCIDENT (GENERAL, OR INVOLVING AN OVERTURNED VEHICLE)

Secure the accident scene. Control traffic and direct it around the site. Stabilize the vehicle if it is in an unstable position.



Call 9-1-1 if there are injuries. Do not move the victims unless there is an imminent threat to their survival.

Evaluate the environmental risk posed by the accident. Apply emergency measures for petroleum spills if required, and if doing so does not pose a risk of fire or explosion.

8.5 EMERGENCIES INVOLVING WILDLIFE

Contact the Canadian Wildlife Service and / or Manitoba Conservation if rare or endangered species are encountered.

If large game animals (deer, moose) are struck by a vehicle or construction equipment, contact Manitoba Conservation.

In case of attack by a large animal (deer, moose, bear), personnel must take responsibility for their own safety and that of those nearby and follow the instructions they received during their training.

8.6 CLIMATIC EVENTS

8.6.1 Thunderstorm (with Lightning)

When thunder is widespread or lightning is visible near the site, all site work must be suspended until the risk of lightning has passed as judged by the General Manager.

Crane or excavator operators must lower the boom and exit the equipment as soon as possible.



8.7 TRANSFORMER LEAK

Transformers (including both pad-mounted and pole-mounted transformers) contain an oil-based cooling liquid. They do not contain PCBs. (Technical data and chemical product data sheets will be attached as an appendix to this Plan during the final design phase).

If a leak or spill is detected, the employee should inform the Production Manager immediately.

The Production Manager will take the required steps to ensure that the power supply to the transformer is shut down. If the volume of the spill is small, the Production Manager will order a cleanup of the area surrounding the transformer (see Contaminant Spills) or will contact a specialized contractor for larger volumes.

8.8 TRANSFORMER FIRE

Whoever becomes aware of a transformer fire must immediately undertake evacuation of all personnel in the area, and then inform the Production Manager of the facility. He or she will take the required steps to ensure that the power supply to the transformer is shut down, and then call the local fire service or Manitoba Hydro to extinguish the fire.

8.9 EQUIPMENT LUBRICANT LEAK

Construction equipment, peat harvesting equipment and vehicles contain fuel and lubricants, and may contain hydraulic fluid. In the event that a lubricant leak is detected, stop the leak, and then apply Spill Containment Measures if required.

8.10 EQUIPMENT BREAKAGE OR MALFUNCTION

Construction or harvesting equipment will be shut down immediately in the event of any breakage or malfunction that poses a risk to worker safety or the environment.

8.11 ELECTRICAL POWER FAILURE

No environmental emergency is foreseen as a result of electrical power failure.



8.12 FALLEN ELECTRIC LINE

Anyone who becomes aware of a fallen electric line must inform Manitoba Hydro immediately.

If sparks from fallen lines result in fire, see the fire control emergency measures, keeping in mind that attention to safety is critical near fallen electric lines; do not attempt to approach or spray the fire with water until the current is shut down.

8.13 LANDSLIDE

This category includes all incidents related to stability of the land surface, including slope failure, formation of failure fissures or scarps, erosion of road embankments, mudslides and rock falls.

No one shall enter the area until the situation is stabilized. The immediate response is to evacuate personnel from the affected area, then to block access to prevent personnel and machinery from entering.

The Production Manager shall be called to evaluate the situation. Once stabilized, corrective measures may be taken such as placement of additional fill or grading of the land surface, under the direction of the Production Manager.

8.14 ACCELERATED EROSION

Incidents in this category include:

- Increased risk of sediment deposition in watercourses or water bodies;
- Accelerated erosion due to snowmelt or heavy rains;
- Gully formation;
- Failure of existing erosion control measures;
- Failure of surface materials and slopes;
- Wind erosion.

Contractors shall be responsible for installing and maintaining erosion control measures in the construction plans and specifications, in consultation with the Production Manager.



The Production Manager will specify corrective actions to be taken. Either the contractor or the Environmental Emergency Response Team may be called upon to apply them.

In the event of gully formation, it is essential to stabilize and reinforce the head of the gully first, followed by the gully bottom. A stable slope should be re-established, with or without additional fill.

Temporary rainwater control measures may include installation of filter fabric barriers ("silt fences"), construction of diversion ditches or temporary channels, construction of straw-bale or earthen dikes, pumping and installation of more resistant erosion control measures. The Production Manager shall be responsible for selection and application of these measures.

8.15 NATURAL DISASTERS

8.15.1 Extreme Rainfall Events (1 in 100 yr.) and Floods

If an extreme rainfall event occurs, suspend project work. Evacuate areas downstream of dams or weirs that have the potential to be overtopped. Do not approach watercourse banks.

If flood waters cross roads, or deep standing water accumulates on roads or graded areas, no one shall enter these areas. If flooding occurs on a public road, personnel shall notify the Sprague detachment of the RCMP at (204) 437-2135.

It is prohibited to ford watercourses where there is strong current.

8.15.2 Destructive Winds (including Tornadoes)

Secure any material that has the potential to become a projectile.

Evacuate the site until the storm passes. If evacuation is not possible, find the nearest low-lying area or ditch. Lie face down and cover the back of the head and neck with your hands.

Be aware of other dangers that may be present (fallen trees and power lines, flying debris).



Following a destructive windstorm, the General Manager will order a safety evaluation of the installations (including structures, trees and electric lines) before resuming operations. He or she will contact Manitoba Hydro or electric line installation contractors as needed.

8.15.3 Earthquake

Keep clear of any building, installation or object that could pose a human safety risk, including trees, rock cuts and slopes.

Evacuate the site.

Following an earthquake, the General Manager will order a safety evaluation of the installations (including structures, roads, and electric lines) before resuming operations. He or she will contact Manitoba Hydro or electric line installation contractors as needed.



9 REFERENCES

MANITOBA CONSERVATION. 2007. Draft Advice for the Preparation of an Environment Act Proposal for a Class 2 Peat Mining Development.



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Appendix L

Photos



Photo 1: Boggy River Bog



Photo 2: Haute Bog



Photo 3: Poplar Creek Bog



Photo 4: Poplar Creek Bog



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