SUN GRO HORTICULTURE

Ramsay Point Peat Mine Development
Manitoba Environment Act Proposal
FINAL REPORT
December 2010

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ATTENTION: Ms. Tracey Braun, M.Sc.
Director

RE: Sun Gro Horticulture Canada Ltd.
Ramsay Point Peat Mine Development
Environment Act Proposal

Dear Ms. Braun:

On behalf of Sun Gro Horticulture Canada Ltd. (Sun Gro), KGS Group is pleased to submit 24 paper and 9 electronic copies of the Environment Act Proposal submission for the proposed Sun Gro Horticulture Canada Ltd. Peat Mine Development at Ramsay Point Bog. As part of the licencing process a Manitoba Conservation Environment Act Proposal Form with the $5,000.00 application fee has been included with this Environmental Assessment report.

Please do not hesitate to contact Mr. Shaun Moffatt or the undersigned if you have any questions or require additional information.

Yours truly,

[redacted]

J.Bert Smith, P.Eng.
Principal

SM/jr
Enclosure

cc: Connie Proceviat (5 copies)

EXECUTIVE SUMMARY

Kontzamanis Graumann Smith MacMillan Inc. (KGS Group) was contracted by Sun Gro Horticulture Canada Ltd. (Sun Gro) to prepare a Manitoba Environment Act Proposal (EAP) for the proposed peat mining development at Ramsay Point Bog. Sun Gro would like to obtain an Environmental Act Licence for peat harvesting operations at the Ramsay Point Bog. The proposed peat mine development will not likely result in significant adverse environmental effects, based on the available information for this project, the environment, the assessment of environmental effects outlined in this environmental assessment report, and application of proposed mitigation measures, including conducting the required follow-up.

Sun Gro Horticulture Canada is the largest producer of peat moss in North America and the largest distributor of peat moss and peat-based growing media products. In order to sustain our current needs it is necessary to develop bog sites in the Interlake region for future peat moss harvesting. Sun Gro Horticulture Canada had secured these leases approx 16 years ago in anticipation of this future need. The purpose of the proposed development is to continue to provide quality peat-based growing media products to meet the demand of our distribution network in over 40 countries worldwide.

The scope of the project includes planning, designing, constructing, operating, maintenance and eventual decommissioning and restoration of the proposed peat development at Ramsay Point Bog. The scope of the assessment included identification, assessment and mitigation of adverse environmental effects of the project, and evaluation of the significance of residual environmental effects. The scope of the assessment also included consideration of direct and indirect biophysical and socio-economic effects, including cumulative environmental effects.

The Class 2 peat mining development will include an access road, bog roads, drainage ditch system with settling ponds and an on-site facility and equipment storage area,. Major project activities include providing access, clearing vegetation and surface soils, harvesting and stockpiling unprocessed peat, excavating and trenching, transporting and restoring harvested peatland.

The environmental assessment of the proposed peat development was carried out based on project information provided by Sun Gro and the advice document from Manitoba Conservation. Additional considerations included environmental information acquired from literature, internet searches, and publications by the peat industry and environmental organizations; contacts with federal and provincial government representatives; consultations with stakeholders; and site investigations by the project team.

Information regarding the proposed peat development project has been provided to the public in the region through various means, including letters to the Peguis First Nation community and to the Beaver Creek Cottager's Association and telephone conversations with community representatives. Concerns expressed by the public and mitigation measures to address them have been summarized in this EAP.

Potential environmental effects of the proposed peat mine development were identified using scoping methods, interaction matrix techniques, public comments, advice from specialists and professional judgment. Effects of accidents and malfunctions, effects of the environment on the project and cumulative environmental effects were also determined. Mitigation measures were identified to eliminate, reduce and control environmental effects determined to be adverse. Follow-up was proposed to verify the accuracy of the assessment and determine the effectiveness of the mitigation measures. Significance of the residual environmental effects remaining after mitigation was then evaluated.

Potential adverse environmental effects of the proposed peat mine development assessed to be major in the environmental assessment included the loss and disturbance of soil (harvested peat), risk of fire (and explosions), surface water contamination and potential for accidents during the transportation of peat. Additional environmental effects assessed to be potentially moderate included; increased dust and particulates; modified drainage pattern; increased sediment levels in surface water; change in receiving water quality; disturbance of fish habitat; loss of wetlands and herpetile habitat; clearing of vegetation; loss of wildlife habitat; contamination of soil and surface water; increased traffic and the associated public attitude. Positive effects identified included improvements in economic conditions, business opportunities and employment. As well as an increase in dust control, reduction of methane releases, and during restoration an increase in diversity of flora and fauna.

With mitigation and follow-up, the residual effects of the project for all of the potential adverse effects were determined to be not significant. There are no known historic resources or federally protected endangered plants and animals in the vicinity of the proposed peat mine development area.

Mitigation for potential adverse effects identified for the proposed peat mine development included a wide variety of design and proposed measures, regulatory requirements and management practices. Some of the more important mitigation measures to address the adverse effects included:

- Minimizing surface area disturbed and leaving non-commercial peat reserves in place;
- Draining water to sedimentation ponds and discharging to the existing drainage system;
- Instructing employees on proper harvest equipment operation to minimize dust;
- Moistening stockpiles, regular removal of stockpiled materials and covering loads being hauled from the site;
- Using low sulphur fuels, muffling vehicles and equipment, and requiring a high standard of maintenance of vehicles and equipment and limiting unnecessary long-term idling;
- Preventing leaks, spills and releases and requiring drip trays for equipment and secondary containment for fuel storage;
- Designating fuel storage and re-fueling areas and providing spill clean-up equipment and materials;
- Preparing and regular updates of emergency response plan including fire; and
- Implementing a mine closure plan to restore vegetation, surface water to predevelopment conditions;
- Ensure workers are aware of provincially rare orchid species outside of development area.

Follow-up identified for the proposed peat mine development included a variety of inspecting, monitoring, record keeping and reporting requirements. Proposed inspection involves periodic observations of the project and local areas for microclimatic changes, dust accumulation, VOC sources, leaks, spills and releases, potential soil contamination, noise levels, surface water runoff, erosion and maintenance of re-vegetated areas. Proposed monitoring includes periodic sampling of surface water quality as required and semi-annual monitoring of surface water quality. Record keeping includes maintaining operation files, documentation related to mitigation measures and follow-up implemented such as the mine closure plan and tracking public complaints. Reporting requirements for the proposed peat mine development will be placed in the public registry for the project and an annual summary of the detailed reports filed immediately following incidents that require implementation of the emergency response plan.

The proposed peat mine development project will not likely result in significant adverse environmental effects, based on the available information on the project and the environment, the assessment of environmental effects outlined in this environmental assessment report, and the application of proposed mitigation measures and conducting of required follow-up.

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1.0 INTRODUCTION

Kontzamanis Graumann Smith MacMillan Inc. (KGS Group) was retained by Sun Gro Horticulture Canada Ltd. (Sun Gro) to prepare a Manitoba Environment Act License Proposal for the proposed peat mining development. The proposed project consists of developing a peat mining operation in an area of undisturbed bog in the Interlake area of Manitoba. An Environmental Act Proposal (EAP) is required for all environmentally significant developments within the province of Manitoba, under the Environment Act (C.C.S.M. c. E125). The purpose of this EAP is to ensure that the proposed peat mining operation is designed, constructed and operated in an environmentally responsible manner consistent with provincial environmental legislation, policies and guidance. A peat mining operation such as the one proposed by Sun Gro is considered a mining development under Manitoba Regulation 164/88 and is therefore considered a Class 2 Development. The EAP will be prepared in accordance with *Manitoba Conservation's Advice for the Preparation of an Environment Act Proposal for a Class 2 Peat Mining Development*. An Environmental Impact Statement (EIS) will also be included as part of the EAP as required by the province of Manitoba, Mineral Resource Division.

1.1 CORPORATE INFORMATION

Sun Gro is the largest producer of peat in North America and the largest distributor of peat moss and peat-based growing media products to the North American professional plant growers market. Sun Gro sells products primarily to professional greenhouse, nursery and specialty crop growers throughout North America, as well as to golf course developers and landscapers.

Sun Gro was founded in 1929 in Vancouver, British Columbia as the Western Peat Company Ltd., as a producer of peat moss. Initial success enabled the company to grow and its operations expanded throughout British Columbia and eastward into central Canada. The business has had a number of owners over the years and was acquired by Hines in June 1993. In 1995, Hines was acquired by Madison Dearborn Partners II, L.P. ("Madison Dearborn"), a Chicago based private equity firm. Madison Dearborn introduced a new management team to Sun Gro in 1997, led by Mitch Weaver, as Chief Executive Officer.

Sun Gro operates in 28 separate locations throughout North America, many of which in small rural towns and are committed to providing jobs that are safe and pay a fair wage. Sun Gro employs over 800 people and contributes to the economic well-being of local communities. Sun Gro is also committed to minimizing the impact on the local environment and takes great pride in their stewardship of natural resources. Peat moss is a renewable resource, and Sun Gro manages their bogs so that less peat moss is harvested in any given year than is being naturally replenished.

1.2 ENVIRONMENTAL ASSESSMENT

The purpose of this EAP is to obtain an Environmental Act Licence for Sun Gro peat harvesting operations at Ramsay Point Bog located in the Interlake area of Manitoba.

1.3 PREVIOUS STUDIES AND ACTIVITIES

The study of peatland areas in southern Manitoba conducted by Bannatyne for the Manitoba Department of Energy and Mines was reported in 1980 entitled, *Sphagnum Bogs in South Manitoba and their identification by Remote Sensing,* included the Ramsay Point Bog proposed for development [(1)]. The study presented results of a survey of selected bog areas in southern Manitoba and evaluated their potential for commercial development of *Sphagnum* peat moss. A *Vegetation Inventory and Assessment of Environmental Issues "Beaver Point Horticulture Peat Bog"* was conducted during the summer of 1997 [(2)]. Beaver Point Bog is approximately 5 km northeast of Ramsay Point Bog and therefore representative of regional conditions. As well, KGS Group completed a field survey during the winter of 2010 which included sampling and testholing within the Ramsay Point Bog site to determine the potential peat volume and quality [(3)].

1.4 REPORT ORGANIZATION

The environmental assessment report on the proposed Ramsay Point peatland development project in the Interlake area of Manitoba is organized into ten chapters and appendices as follows:

1.0 Introduction

The purpose of the environmental assessment is discussed and the organization of the report is described. Corporate information for Sun Gro is also presented.

2.0 Scope

The scope of the project and the environmental assessment for the proposed peatland development is outlined.

3.0 Project Description

The proposed peatland development is described in general and specific terms. Project need, purpose and alternatives, as well as the proposed schedule and funding are discussed. The project is broken down into components and activities for the purpose of the environmental assessment.

4.0 Environment Description

The existing environment at the proposed peatland development and the surrounding area is described in general and specific terms. The environment is broken down into biophysical, social and economic components for the purpose of the environmental assessment. Valued Ecosystem Components (important, protected or valued components of the environment) or VECs are identified to focus the assessment of environmental effects.

5.0 Public Consultation

Consultations carried out as part of planning for the proposed peatland development and the environmental assessment of the project are reviewed. Comments and concerns expressed by the public and stakeholders are summarized, and actions taken or proposed to address issues and concerns are outlined.

6.0 Environmental Effect Analysis

Potential environmental effects of the proposed peatland development on biophysical, social and economic conditions are identified and assessed. Mitigation measures are proposed, follow-up needs are identified and significance of residual effects are evaluated. The effects of accidents and malfunctions, cumulative effects and effects of the environment on the project are also considered. Sustainability of the proposed peatland development is discussed in relation to Manitoba's principles and guidelines of sustainable development.

7.0 Mitigation Measures

Measures identified by the environmental assessment to mitigate potential adverse effects of the proposed peatland development are summarized.

8.0 Follow-up Summary

Follow-up requirements identified by the environmental assessment of the proposed peatland development are summarized.

9.0 Conclusions

Conclusions on the significance of residual environmental effects of the proposed peatland developments are presented.

10.0 References

Literature and websites consulted as part of the environmental assessment as well as contacts with governments, stakeholders and the public are listed.

The appendices contain background information on the proposed peatland development, existing environment, environmental effects and public consultation.

2.0 SCOPE

2.1 SCOPE OF THE PROJECT

The scope of the project includes planning, designing, constructing, operating, maintenance and eventual decommissioning and restoration of the proposed peatland development at Ramsay Point Bog. The scope does not include the construction of a processing or packaging plant at this time.

The proposed peatland project includes the development of Ramsay Point Bog, in the Interlake area of Manitoba. The entire production lifespan of the proposed development is estimated to be 35 to 45 years based on the estimated peat capacity at Ramsay Point Bog. The project includes development of an access road, bog roads, drainage ditch system with settling ponds and an on-site facility and equipment storage area. Major project activities include providing access, clearing vegetation and surface soils, harvesting and stockpiling unprocessed peat, excavating and trenching, transporting and restoring harvested peatland.

2.2 SCOPE OF THE ASSESSMENT

The scope of the assessment for the proposed peatland development includes identification, assessment and mitigation of adverse environmental effects of the project, and evaluation of the significance of residual environmental effects. The scope includes direct and indirect biophysical and socio-economic effects, including cumulative environmental effects. The need for the project, alternatives to the project and requirements for a follow-up are considered in the assessment.

The spatial boundary of the environmental assessment is the project study area and regional study area (Figure 2). The project study area includes the development area defined by the quarry lease boundary and the area within a 3 km radius of the quarry lease boundary (9,924 ha), whereas the regional study area includes the area within a 10 km radius of the quarry lease boundary (50,256 ha). Direct and indirect biological and physical environmental effects of the project are considered within the project study area, while socio-economic and cumulative environmental effects are considered in the regional study area.

The proposed development is located in an unorganized area of Crown land in Division No. 19. Although the RM of Bifrost, is outside of the regional study area, it will be considered during the assessment because of economic opportunities that will develop and also because the peat will be transported along provincial road (PR) 234 to the existing processing and packaging plant located near Elma, Manitoba.

The assessment considered comments received from government reviewers, stakeholders and the public. Public comments were received from mail-outs and via telephone correspondence.

3.0 PROJECT DESCRIPTION

3.1 OVERVIEW

The proposed peatland project includes the development of Ramsay Point Bog in the Interlake area of Manitoba. The entire production lifespan of the proposed development is estimated to be 35 to 45 years. Development of the Ramsay Point Bog is anticipated to begin in the winter of 2011 once the necessary approvals are received. Peat harvesting is anticipated to begin in 2013 with the development of the peat bog occurring in approximately 60 ha increments.

3.2 PEAT INDUSTRY IN CANADA

Peatlands are wetland ecosystems that are characterized by the accumulation of partially decomposed organic matter. It is estimated, that peatlands in Canada cover 113 million ha, and over the past 70 years a total of only 17,000 ha has been harvested. As well, over 70 million tonnes of peat accumulate each year within Canada, with only 1.3 million tonnes of this harvested by the sphagnum peat moss industry [(4)].

North American Wetlands Conservation Council Committee reported in 1999 [(5)] that approximately 85% of peat harvesting operations in Canada produced horticultural peat and approximately 99% of the national production came from the combined operations of 15 corporations. These 15 corporations currently form the Canadian Sphagnum Peat Moss Association (CSPMA).

Southern and southeastern Quebec and eastern and northeastern New Brunswick are the primary focus area of horticultural peat mining operations. Alberta, southern Saskatchewan and Manitoba as well as Nova Scotia, Prince Edward Island, Ontario and Newfoundland [(5)] have some peat mining operations.

Peat harvesting occurs primarily in the boreal wetland regions, in particular in the Atlantic and Low Boreal Regions [(5)]. These boreal regions, which are characterized by the bog wetland type are the focus of horticultural peat developments in Canada.

Weakly decomposed peat is the preferred choice for horticultural use. This type of peat is composed mainly of Sphagnum moss. A thick layer of weakly decomposed peat can only be found if the right combination of climatic and topographic conditions exists. Daigle and Gautreau-Daigle [(5)] list several issues that are considered in the selection of a peatland utilized for peat harvest. These issues include the following:

1. Peat quality must meet marketing requirement;
2. The thickness of the high quality peat layer must be sufficient to warrant development. An average depth of 2 m is a minimum;
3. The aerial extent of the peatland should be large enough to warrant development. An area of 50 ha is required, occasionally a smaller site area is also developed;
4. The peatland must have good potential for development of enhanced drainage;
5. Proximity to transportation infrastructure, low density of tree cover, availability of a labour force, access to electrical power and similar factors are preferred; and
6. Climatic factors must be suitable for drying of the peat layer during the harvesting period, such as, there being appropriate periods of consecutive days without rain.

In 2005, total world-wide peat production for horticultural, fuel and other purposes was over 26 million tonnes [(6)]. Approximately 16 million tonnes of peat production was used as fuel, whereas only 5 million tonnes was utilized for horticultural purposes. In 2005, on an international basis, Canada ranked first followed closely by Finland in the global production of horticultural peat production. At this time, none of the peat produced in Canada was utilized for fuel consumption [(6)].

Mr. Dunfield presented various methods for harvesting peat as described in *Methods of Harvesting Peat Moss at the 1975 Seminar on Peat: A resource in Manitoba's Agriculture and Industry*. Three main methods are summarized below [(7)]:

Block method – Is a method that utilizes manual labour or machines to dig peat blocks. The blocks are subsequently stacked in fields to dry and then stored in buildings during winter months.

Vacuum or Milling Process – Peat is vacuumed and stored in the field before being processed.

Dredging System – Is a continuous, direct line of extraction, dewatering and drying and delivery to the packing plant.

3.3 PEAT INDUSTRY IN MANITOBA

The peat moss industry in Manitoba has been discussed in several reports in the 1975 *Proceedings of the Seminar on Peat: A Resource in Manitoba's Agricultural and Industry* by Mr. Bannatyne, Mr. Lunan, Mr. Smith, Mr. Dunfield and many other experts at the time.

The first peat production in Manitoba was from the Julius Bog in 1941, which produced 1,480 tonnes of peat moss in its first year. In 1964, Western Peat Moss Ltd. obtained peat permits to mine at the "Medika" or Elma Bog. However, production of peat at Medika Bog was not in process until 1970. In 1973, Evergreen Peat and Fertilizer Ltd. brought the Evergreen Bog into production. Approximately 42,500 m^3 of moss were produced annually at the Evergreen Bog [(8)]. Lunan reported that Manitoba has an estimated 19 million ha of peatland, which is of similar size to the amount of agricultural land available in the province [(9)]. The three bogs that were in commercial production between the late 40's and 70's produced over 30,000 tonnes of peat, with a dollar value of approximately $1.8 million. The majority of peat moss produced during this time period was sold to the United States market for horticultural uses.

Manitoba has approximately 19.3 million ha of peatland, which makes up approximately 35% of Manitoba's land surface, ranking second to glacial till [(10)]. Approximately 5.1 million ha of these peatlands are located in the area north of Lake Winnipeg that is primarily used for agriculture. The organic deposits are distributed throughout the cool, Subhumid Boreal Forest Region of eastern and central Manitoba and in the cold, humid, Subarctic Region of the Hudson's Bay Lowland in the northeastern corner of the province (Figure 1). However, the quality and quantity of peat moss in some of these peatlands are unknown due to lack of studies and inaccessibility to the areas [(9)].

3.4 PROJECT LOCATION

The proposed peat development at Ramsay Point Bog is located in the Interlake of Manitoba, approximately 40 km northwest of Riverton and about 1.5 km west of PR 234 (Figure 2). The close proximity to the provincial road offers easy access. The entire development area is

located within the Peguis First Nation Community Interest Zone (CIZ), as well, portions of the development area fall within the Water Power Reserve and the Moose Creek Wildlife Management Area and provincial forest. The Beaver Creek Provincial Park is located adjacent to the development within the project study area. A surrounding landmark includes the Hecla/ Grindstone Provincial Park approximately 30 km southeast of the proposed development, which is outside of the regional study area (Figure 2).

As the proposed project lies on Crown Land, there are no Certificates of Titles available for the properties, however Sun Gro holds the mineral rights for the development area under Manitoba quarry leases as shown in Figure 2 and provided in Appendix A. The proposed development at Ramsay Point Bog includes quarry leases (QL) 1107 to 1110, 1156, 1761 and 1762 and pending QL 2441 and 2460. This covers an area of approximately 1,790 ha in size and is located on part of Sections 33 and 34 Township 27, Range 4, E1 and on all or parts of Sections 2 to 4, 9 to 11 and 14 to 16, Township 28, Range 4, E1. Within the total 1790 ha, approximately 1170 ha is proposed to be developed as shown in Figure 3 in approximately 60 ha sections. Only 840 ha, of the potential area for peat harvesting, has a depth greater than 1 m. The bog is estimated to contain approximately 35.8 million m^3 of *Sphagnum* moss in the first 2.5 m layer. This is equivalent to approximately 3.6 million tonnes of product assuming 0.1 tonnes of product per cubic metre of peat harvested. It has an absorptive value of 15.9 (22.3 dry) and contains very low sedge content, ranging from 2 to 20 percent [(1).] The quality of the moss is generally good, except for the upper layer of woody peat.

3.5 NEED AND PURPOSE OF PROPOSED DEVELOPMENT

Sun Gro Horticulture Canada is the largest producer of peat moss in North America and the largest distributor of peat moss and peat-based growing media products. In order to sustain our current needs it is necessary to develop bog sites in the Interlake region for future peat moss harvesting. Sun Gro Horticulture Canada had secured these leases approx 16 years ago in anticipation of this future need. The purpose of the proposed development is to continue to provide quality peat-based growing media products to meet the demand of our distribution network in over 40 countries worldwide.

3.6 PROJECT COMPONENTS AND ACTIVITIES

3.6.1 Project Components

The proposed peatland development project will include the following components:

Access Roads

The access road will be 10 m wide with a 2 percent minimum grade. Two ditches will be constructed with one on either side of the road and will have a slope of 4:1 and a width of 7.5 m. A typical road construction layout is shown in Figure 4. Topsoil and any other material not suitable for the road base will be stripped and spread on the sides of the road. Material excavated during ditching will be used to build the road base. Gravel will be hauled on-site from the nearest available source and spread to a thickness that will be determined on-site after evaluating the road base condition. Construction of the access road to the proposed development will start with site preparations and construction at the site. Approximately 400 m of road heading northwest from PR 234 to the southeast edge of Ramsay Point Bog QL 1108 (Figure 3) will be constructed during the winter of 2011/2012.

This proposed access road requires installation of a culvert to cross over the PR 234 roadside ditch. The roadside ditch functions as a main drain for the sub basin, as it collects the runoff and drains it south along the PR 234 roadside ditch to the PR 234 crossing approximately 3 km further south of the proposed access road for discharge to Lake Winnipeg. The natural drainage area for the proposed crossing is approximately 1.2 km^2, incorporating about half of an existing drainage area along PR 234 (Figure 5). The water appears very stagnant in this location under wet conditions, as the ditch lacks grade and backwater effects from downstream of the highway impedes flow.

The proposed access road culvert, as shown in Figure 3, will not affect the natural drainage pattern. The ditch at the proposed crossing location is approximately 1.3 m wide and 1.1 m deep. The proposed culvert has been designed to a 1 in 33 year storm event and has been designed to pass flow in accordance with Manitoba Infrastructure and Transportation (MIT) standards for PR roadside ditches.

The Rational Method was used for flow calculations, utilizing the nearest recorded precipitation data at the City of Gimli. This method considers the precipitation and the land characteristics to calculate the anticipated runoff. Due to the prevalence of bog area, a reduction factor was applied to the flow value to account for water retention. The Modified Rational Method, as established by the Province of Manitoba, was also used as a secondary method for calculating discharge rates. The more conservative design discharge was used. The flow calculated for the drainage area at the proposed access road location is 0.65 m^3/s. To convey this flow, while maintaining the headwater level at the pipe obvert, a 1.05 m diameter CMP culvert will be required. The design event would produce a headwater just below the top of the pipe with an exit velocity of 1.02 m/s.

The existing culvert crossing of PR 234 south of the proposed peat development conveys the drainage flow from the area that includes the Ranger Lakes. This area contains a large portion of the Sun Gro proposed development, and is approximately 26 km^2. The drainage plan for the Ramsay Point Bog will not affect the total overland flow to this culvert. The drainage plan has been designed to follow the natural runoff patterns, and will direct flow to the Ranger Lakes and the adjacent unnamed stream in a similar manner. However, a check to determine the capacity of this culvert crossing was done to ensure the design flow could be adequately conveyed.

The Rational Method was used to estimate the 1 in 33 year storm event, utilizing the nearest recorded precipitation data at the City of Gimli. Typically, the methodology for a drainage area of this size integrates the results of the Rational Method and a Frequency Analysis (as established by the Province of Manitoba) to calculate a design flow. However, it was determined that flow data for a representative watercourse did not exist, so the Rational Method was used with conservative reduction factors so that the presence of wetlands in the sub basin was not overestimated. The flow calculated for the drainage area at this location is 2.47 m^3/s. The existing PR 234 culvert crossing has adequate capacity to accommodate the flow. The design event would produce a headwater approximately 0.1 m below the top of the pipes with an exit velocity of 0.7 m/s.

Sedimentation Ponds

Sedimentation ponds will be constructed before starting main drainage ditch and field drainage ditch construction for each 60 ha section. The sedimentation pond is used to treat peatland drainage water by slowing down the water flow to maximize the settlement of suspended peat particles. The design, construction and maintenance of the ponds will be in accordance with the information submitted for the EAP for Sun Gro's Moss Spur Bog on May 25, 2005. The sedimentation ponds will be constructed 138 m long x 4 m deep in a V-shape that is 3 m wide at the bottom and 15 m wide at the top resulting in a total volume of approximately 5,000 m^3. The design of the sediment pond is shown on Figure 6 with the conceptual design of the sedimentation pond being based on the following criteria:

- Recommended basin volume of 25 m^3 per ha of peatland area;
- Minimum depth at outlet of 1.5 m;
- Optimum length to width ratio of 6.5:1 to 12:1;
- Minimum retention time of two hours;
- Boom required to contain floating debris and should be located at a distance of 25% of the pond length upstream of the pond outlet; and
- Five year maximum instantaneous discharge of 0.75 $m^3/sec/km^2$ resulting in a peak five-year flow of 0.148 m^3/sec (same as Julius Lake South Peat Bog).

Each sedimentation pond has the capacity to handle the drainage from a 168 ha operational peatland area. The production area at each peat bog determines the total number of sedimentation ponds for that bog based on these capacities. For example, Ramsay Point Bog will need up to seven sedimentation ponds to handle the peatland drainage for the total development area of 1170 ha. Sedimentation ponds will be constructed to ensure efficiency during cleaning and maintenance (Figure 3).

The sedimentation ponds will be constructed at the end of the main drainage ditches and will have an outlet ditch. Each sedimentation pond will be equipped with a 15 cm by 15 cm floating boom situated near the outlet to prevent escape of floating debris. Water leaving the sedimentation ponds through the outlet ditch will be drained into the natural drainage system.

A control culvert with a sliding gate will be placed in the inlet ditch upstream of the pond. The gate will be used to regulate water levels in the peat layer within the harvesting area. The gate

can also be used to reduce or stop inflow to the sediment pond in the event of a major precipitation event, which exceeds the design flow criteria. As a first step, the control culvert will be installed in the upper portion of the drain to limit the flow of water toward the pond location during construction. The control gate will remain closed until the pond construction is complete and the drain blocks have been removed. Excavation of ditches in the harvest area will not begin until the sediment pond is complete and functioning.

The sedimentation ponds will be cleaned periodically to ensure that the accumulated sediment volume does not exceed 25% of the total basin volume. Water levels will be monitored during periods of normal operation to ensure that there is always at least a 1 m depth of free water over a minimum 10 m distance from the pond outlet. Cleaning will take place before and after any significant ditch cleaning or cutting takes place within the upstream catchment area.

During cleaning operations the water level will be maintained below the bottom of the outlet culvert to ensure that sediment is not released into the outlet ditch. If required, the control gate on the inlet ditch will be closed before cleaning operations to ensure that additional flow does not raise the water level. The control gate would remain closed until the cleaning operation is complete and remaining disturbed sediment has an opportunity to settle.

Solids will be scooped from the pond with a backhoe. The recovered settlement will be reapplied to the harvest area.

Water quality will be monitored immediately downstream of the outlet culvert. Water samples will be taken on a monthly basis for analyses of total suspended solids and pH. Additional samples may be taken on an as required basis.

Main Drainage Ditches

Following the completion of the sedimentation ponds, main drainage ditches approximately 2 m wide and 3 m deep will be excavated around the perimeter of each harvesting area. The main drainage ditches are designed with a low gradient to maintain a slow flow so that they will be more conducive to settlement of suspended solids. These main drainage ditches connect the field ditches to the sedimentation ponds. Drainage water from the field ditches flows into the

main ditches around the harvesting area where water will then flow to the sedimentation ponds at the edge of the proposed development site. A site layout of the proposed area is shown in Figure 3.

Field Drainage Ditches

Field drainage ditches are used to remove interstitial surface water and prepare the peat surface for harvesting after clearing. A network of parallel ditches will be cut through the bog using a "V" ditcher. Each field ditch is excavated to 1.5 m deep and 1.5 m wide and spaced 33 m apart. Field drainage ditches will be constructed at 90º angles to the main drainage ditches. For each 60 ha section prepared for harvesting an additional 56 field ditches will be required. Therefore at the peak development in the year 2032, with all 1170 ha under operation, a total of 1092 field ditches will have been cut.

Water will drain from the field ditches into the main ditches, where it will eventually flow into the sedimentation pond. It takes approximately 1 day to cut each field ditch and once it has been cut water will drain rapidly from the bog for a period of approximately three weeks. After this period, water will drain more gradually; however, the rate at which water drains from the bog will depend on the amount of precipitation. Water will continue to drain from the bog until the arrival of frost. The storage volume of each development phase area was calculated to estimate the potential water discharge following the development of the field drains. The natural moisture content of peat at Ramsay Point Bog varies from 94.6 to 95.2 percent as described in the Manitoba Department of Energy and Mines report [(1)].

Ramsay Point Bog, as previously discussed, will be developed by opening 60 ha of peatland per year. Based on the field ditches being cut to a depth of 1.5 m the total volume of peat to be drained each year is approximately 900,000 m^3. This volume of peat will hold approximately 855,000 m^3 of water assuming an average 95 percent moisture content before drainage. Moisture content varies anywhere between 60 to 85 percent following drainage after the field ditches are cut [(11)]. Therefore, assuming an average of 70 percent moisture content remains after drainage (25 percent drains), the volume of drainage water from 60 ha of peatland will total approximately 215,000 m^3. It will take approximately 11 weeks to cut the 56 field ditches required for each 60 ha area. With the additional 3 weeks of initial draining, it will take

approximately 14 weeks to drain the entire 60 ha area, resulting in an average flow of 0.025 m^3/s. This initial water discharge flow rate for each 60 ha area of bog development is much lower than the predicted 33 years rainstorm event, of 2.47 m^3/s, which the downstream culvert crossings have sufficient capacity to accommodate.

Outlet Ditches

The outlet ditches convey the discharge from the sedimentation ponds for outlet to the surrounding environment. The flow will be directed by the ditches to natural discharge points in order to best integrate the drainage into the existing natural drainage system, and cause minimal change to the water regime. All of the drainage patterns in the development area eventually discharge into Lake Winnipeg.

For the northern section of the development, the outlet ditches from the sedimentation ponds will extend through NE Section 15, Township 28, Range 04 EPM towards the unnamed lake on Beaver Creek. For the eastern section of the development the outlet ditches will extend southeast adjacent to the proposed access road through SW Section 2, Township 28, Range 04 EPM towards the PR 234 roadside ditches. For the southern section of the development the outlet ditches will extend through NW and SW Section 3, Township 28, Range 04 EPM and SW Section 34, Township 27, Range 04 EPM into the Ranger Lakes drainage system.

Bog Roads

The bog roads connect the equipment parking area to the individual bog fields. The roads will be constructed using non-merchantable timber and surface vegetation that is removed from the fields as part of the preparation for harvesting. A clay base and gravel topping will be added to allow trucks access to the fields for loading purposes (Figure 3).

Facility and Equipment Required at Proposed Peat Development Site

The on-site facility and equipment storage at the proposed peat bog site will be contained in a four ha staging area in the southeast corner of QL 1108 and connected to the proposed access road called as shown in Figure 3. This area will be cleared, graded for drainage to match the

surrounding topography and will have gravel placed over top of the existing materials. Peat may be temporarily stockpiled in this staging area before it is hauled to the existing Sun Gro processing and packaging facility near Elma, Manitoba. A typical layout of the required facilities at a peat mining operation within the 4 ha staging area site is shown in Figure 7 and described below.

A 64 m^2 construction trailer will be located at the site to provide employees with a lunchroom and washroom equipped with a septic tank installed and maintained by a local authorized contractor. An 18 m^2 steel shipping container will be installed as an equipment repair and maintenance garage. A 400 m^2 wood framed building with a concrete foundation will be constructed to serve as a general repair facility. A groundwater well will be installed in the overburden till material to supply domestic water for use in the washrooms and for washing equipment. Once installed if the water quality meets the Canadian Drinking Water Quality standards it will also be used as a source of potable water otherwise bottled water will be used. Electricity will be supplied by a 30,000 watt generator.

All fuel required for this development will be stored in the 4 ha staging area in accredited (CAN/ULC S601) steel double walled diesel fuel aboveground storage tanks (ASTs). Ramsay Point Bog will have two 2,420 L portable diesel fuel ASTs, and one 13,800 L diesel fuel AST. All the ASTs will be equipped with a 90 L/m electric pump for dispensing fuel. The 13,800 L AST will be installed near the equipment storage area on a 20 cm thick concrete platform surrounded by 15 cm posts located at intervals of 60 cm for protection. Sun Gro Horticulture will comply with the Canadian Council of Ministers of the Environment (CCME) Environmental Code of Practice for Aboveground Storage Tank Systems Containing Petroleum Products. Manitoba provincial and municipal guidelines and regulations will also be observed and followed for the installation and operation of all ASTs. Small amounts of gasoline will also be stored at the site in two 20 L portable containers. The gasoline and other petroleum products, such as hydraulic oil, motor oil, and lubricants will be stored in a designated contained storage area within the service garage on site.

On-site equipment will include farm tractors to haul and power the different types of peat harvesting operation equipment, loaders to push stacks and load trucks, dozers and excavators to maintain bog operations.

3.6.2 Project Activities

Preliminary Site Investigations

Site investigations were completed by KGS Group between January 18th and August 5th, 2010. Activities conducted during these site investigations are as follows:

- Peat assessment and topographic surveys were performed between January and March 2010 in order to supplement and confirm the data collected by the 1980 investigation by Manitoba Department of Energy and Mines on the Ramsay Point Bog and to better determine the quality of peat located in the bog.

- Aquatic biota / habitat assessment was conducted from May 17th to May 19th, 2010 to determine the types, abundance, and life stage of fish species utilizing specific reaches within the study area during spring and summer. Additionally it was conducted to assess the fish habitat conditions within the study area and obtain basic water quality and water temperature information along defined reaches of the study area.

- Eleven baseline surface and bog water samples were collected in June 2010 from surface water within the peat area, from water bodies adjacent to the peat bogs and the downstream receiving water. These were submitted for laboratory analyses for metals and general water quality data.

- A detailed surface water hydrologic investigation and survey was completed in June 2010 at the Ramsay Point Bog. Visual inspections of water flow at the existing PR 234 culverts and the proposed crossing location were completed.

- A vegetation and wildlife survey was conducted over three site visits in June, July and August, 2010. A systematic approach was used to ensure that each plant community in the development area was included in the vegetation survey. Observations were made in the morning and evening to represent daytime and nocturnal bird species. The mammal survey was conducted by recording all mammalian species observed during the vegetation and bird surveys, as well as by sound or any visible evidence such as dens, tracks or scat. The amphibian and reptile survey was conducted by recording all species observed during the other surveys, as well as, by sound or any visible evidence such as tracks or shed skins.

Results of the hydrogeological investigations, surface water and bog water sampling events and biological surveys within the quarry leases are described in Section 4.0. The peat assessment and topographic survey is described in detail in a separate report which can be made available upon request [(3)].

Site Preparation

Pre-construction activities will include the development of detailed construction plans if required to be submitted to the Director of Environmental Approvals Branch. Prior to the start of site construction, a buffer zone with a minimum of 100 m will be identified and protected between the quarry lease limit and the area to be developed. The buffer zone will be used to prevent potential damage and disturbance to the surrounding environment. The buffer zone will also be used as a windbreak, a habitat corridor and a reference source of material for the restoration of abandoned areas at a later date. A 100 m vegetated buffer zone will also be established around the Ranger Lakes in the southern portion of the Ramsay Point Bog (Photos 1 and 2; Appendix B).

Construction

Construction activities at the Ramsay Point Bog will commence in the winter of 2011, once all environmental approvals have been received. Construction activities will include:

- Clearing a 30 m width for proposed access road and the two ditches one on either side of the road (Figure 4);
- Construction of the Ramsay Point Bog access road from PR 234;
- Layout of the site;
- Clearing trees and extracting merchantable timber, as authorized by Manitoba Conservation Forestry Branch, for peat harvesting areas during winter months when ground is frozen and can support heavy equipment;
- Construction of sedimentation ponds;
- Construction of main drainage ditches and outlet ditches connected to the sedimentation ponds;
- Construction of field drainage ditches;
- Stripping and stockpiling the upper 15 cm of the remaining vegetation after tree removal; and
- Construction of bog roads, utilizing non-merchantable timber and the upper 15 cm of surface debris.

Operation

Sun Gro operations follow the best practices developed by the CSPMA. Operational activities for the proposed development will start during the spring following tree clearing and will include the following:

- ***Field Preparation:*** The peat surface is prepared for harvesting as described above by drawing down the water table through construction of main drainage ditches, field ditches, sedimentation ponds and outlet ditches. Afterwards the roots, stumps and embedded logs will be removed from the uppermost layer of the peat (topspit). The areas located between the field ditches (peat fields) are then rotavated or milled and shaped into crown surface between the field ditches and left to dry by solar heat and natural air movement until the moisture content is reduced to the desired level for harvesting.

- ***Field Harrowing:*** Following field preparation, the surface is repeatedly harrowed to a depth of 0.15 m using a tooth rake to break capillary flow and enhance the drying process. This process separates the peatland surface and in-fills small depressions. The top 2 to 4 cm layer is turned over to allow the peat particles and fibers to dry by the sun and wind until the moisture content is reduced to the desired level for harvesting.

- ***Peat Harvesting***: Peat is harvested using a vacuum machine once the peat is sufficiently dry (about 40% to 55% moisture content). The harvesting is weather dependant, and when the moisture content of the peat moss is acceptable, all efforts are made towards harvesting. Over the course of the summer, the harvesters and harrows will pass over the bogs numerous times. The production levels are weather dependent; however, approximately 6-10 cm of the peat surface is expected to be harvested each summer.

- ***Peat Stockpiling:*** Harvested peat is unloaded at designated peat stockpile areas at the field end adjacent to the bog roads, on the bog roads or within the 4 ha staging area. The peat is pushed up by a front-end-loader into windrow shaped stockpiles with an approximate volume of 1,500 m^3. In Sun Gro's experience, harvested peat when exposed to rain forms a hard crust layer, which prevents peat particles from being carried into the drainage system or off the site.

- ***Transporting:*** Excavators or front-end loaders will load stockpiled peat into open-box trailers for transporting. The trailers will be covered by a tarp to prevent peat particles from escaping and minimize financial losses for Sun Gro. Harvested peat will be transported from the stockpiles along the access road and south along PR 234 to the processing and packaging facility near Elma, Manitoba. Approximately 5 truck loads are required to transport each hectare of peat under development. The estimated number of truck loads required for transporting peat to the processing and packaging plant is described in Table 1.

- ***Maintenance:*** Activities will be undertaken at regular intervals, including during weather conditions that prohibit harvesting, such as frost, high winds, or heavy rainfall. Field maintenance activities include cleaning and deepening the drainage ditches, profiling the fields for harvesting and weed control. Maintenance of the drainage ditches is done throughout the harvesting operation. Sun Gro will be responsible for maintenance and repair of all the drainage works involved with the bog operation to the time their reclamation works are completed. This includes the correction of any erosion or silting problems, the correction of any icing problems, the cleaning out of the ditches should the capacity become reduced due to vegetative growth, the removal of debris that interferes with the passage of water and the removal of any beaver dams (if required) that are

causing flow problems. Weed control is done manually without the use of any chemicals. Maintenance of sedimentation ponds includes inspecting them once a week to verify the overall functioning capacity of the pond, the position of the floating wooden boom, and the bank of the pond. The ponds will be cleaned on a regular basis to maintain optimal efficiency with sediments removed before 25% of the pond is filled with sediments. Excavated sediments will be transported to, and spread on the fields for harvesting. Sedimentation ponds will also be cleaned prior to cleaning field ditches.

- ***Monitoring:*** Sun Gro proposes that during the peat harvesting activity period, normally from April to October of each year, monitoring of the sedimentation ponds will include taking a 1 L water sample every month per outlet, or 24 hours after heavy rainfall (10 mm/hr for 6 consecutive hours) or after heavy wind with an average speed of 50 km/h or more. Water samples will be sent to an accredited laboratory for analysis. Results are reviewed, compiled and available for inspection on site at any time. A report will be filled out for every water sample collected and indicate the employee name, date and time of sampling, pond code #, present and past 24 hr weather conditions plus comments.

During the harvesting season, operational activities will occur seven days a week from sunrise to sunset. Sun Gro anticipates harvesting an average of 850 m^3 of horticultural grade peat each year per ha of land under development. Harvesting of peat continues until commercial peat resources are exhausted and the colour of peat changes from light brown to black-brown or when the density of the material in the field is too heavy to be harvested. For the purpose of peat regeneration process, a minimum of 1.0 m of peat will remain after harvesting, unless justification for a shallower depth can be provided to Manitoba Conservation.

Closure and Restoration

Under the provincial Mines and Minerals Act, Subsection 128(3) Non-aggregate Quarry Closure Plan, the holder of a quarry lease for materials other than an aggregate quarry must submit a Mine Closure plan for approval by the Director of Mines prior to commencement of mine development. Restoration aims at replacing lost elements due to peat harvesting, such as reintroducing peatland vegetation. Restoration is scheduled to begin once commercial grade peat has been removed or exhausted from the peatland development. Mined out areas will be restored based on the experience gained by Sun Gro from successful restoration of a demonstration site in Elma and Moss Spur, Manitoba and following the requirements of The Preservation and Reclamation Policy of the Canadian Sphagnum Peat Moss Association.

A mine closure plan for the proposed peat development as prepared by Sun Gro is provided in Appendix C. It has been developed in accordance with the Manitoba Mine Closure Regulation 67/99; General Closure Plan Guidelines [12] and Mine Closure Guidelines Financial Assurance [13,14]. The purpose of the mine closure plan is to define a program for the protection of the environment over the duration of peat mining activities and for site rehabilitation during the life of the mine and after mine closure. The plan describes the stages of closure (progressive and final), closure activities, closure costs and outlines operational and post operational monitoring.

3.7 SCHEDULE

The general peat mining schedule consists of site preparation of an area during winter months with peat harvesting to start the following spring typically during April and continue typically until October. Ramsay Point Bog development is anticipated to start during the winter of 2011/2012 once the appropriate approvals have been received. Approximately 60 ha of land will be cleared and prepared for peat harvesting. The mining plan proposes that peat mining operations start with harvesting of 60 ha in 2013. Development is proposed to increase, with consecutive 60 ha areas of development each year, to a maximum of 1170 ha of production area by 2032 once all areas within the bog have been developed. Peat mining operations will continue at this maximum production area of 1170 ha until approximately 2042 at which time sections of the Ramsay Point Bog area are expected to be mined down to the final planned depth of mining.

3.8 PEAT PRODUCTION DURING PROJECT LIFE

The lifespan of the proposed peat production is estimated to be at a minimum 36 years. This is based on the average peat production rate of 850 m^3/ha/year and a total of 35.8 million m^3 of harvestable peat. However, as Ramsay Point Bog will be developed in 60 ha stages the lifespan is estimated to have over 45 years worth of peat to harvest.

During the first year of peat development at the Ramsay Point Bog operation, the 60 ha is estimated to supply 51,000 m^3 of horticultural grade peat (Table 1). Once fully developed, in the 20th year of operation (2032), a total of 1170 ha of peatland will be in production and is estimated to provide a total volume of 994,500 m^3 of harvested horticultural grade peat per year (Table 1). By the end of 2032 a cumulative of 10.7 million m^3 of peat will be harvested. Based on

the average harvest rate of 850 m^3/ha/year during the peak years from 2032 to 2042 a total of approximately 1 million m^3 will be harvested each year such that by 2042 Ramsay Point Bog is expected to produce approximately 20.7 million m^3 of peat.

3.9 PEAT PROCESSING

The existing Sun Gro peat processing and packaging plant, with finished goods storage, is located 10 km south of Elma on Highway 11. Peat harvested from the proposed bog will be processed, bagged, placed on pallets and stored at this plant before transport to markets. Once development of the Ramsay Point Bog has started Sun Gro will evaluate the need for a processing plant located closer to the Ramsay Point Bog to reduce costs and impacts of transporting peat.

During the first year of peat development at the Ramsay Point Bog operation approximately 301 truck loads would be required to transport the 51,000 m^3 of peat harvested from the active 60 ha (Table 1). This is equivalent to approximately 10 trucks/week or 1.43 trucks/day based on the proposed 7 days/week operation schedule from April to October. An additional 301 trucks per year will be required to accommodate the proposed expansion of 60 ha per year. Once fully developed by 2032 and throughout the peak to 2042, approximately 5,870 truck loads would be required to transport the 994,500 m^3 of peat harvested from the active 1170 ha (Table 1). This is equivalent to approximately 196 trucks/week or 28 trucks/day.

3.10 EMPLOYEES

Approximately 5 full time jobs and 25 seasonal jobs will be created for opening and harvesting the peat bog. An additional permanent full time job will be created for the peat processing at the packaging plant. Jobs will also be created for transportation of the peat as discussed above. Permanent and seasonal employees will be obtained from the regional area as much as possible.

3.11 WASTE DISPOSAL

There are virtually no wastes produced from the peat harvesting operations. Trees, including branches and roots are saved and used as underlay for bog road construction. Petroleum, oils,

lubricants and hazardous wastes are disposed of through licensed companies. Domestic sewage from Ramsay Point Bog will be retained in holding tanks and pumped out on a regular basis by a local licensed contractor. Solid wastes such as paper, organics, plastics, packaging materials, etc. will be removed by a local licensed contractor. Wastes are taken to local licensed municipal waste disposal grounds for recycling.

4.0 ENVIRONMENTAL DESCRIPTION

4.1 BIOPHYSICAL

4.1.1 Physiography and Climate

The proposed peat mine development is located within the Grindstone Ecodistrict of the Mid-Boreal Lowland Ecoregion in the Boreal Plains Ecozone. The Grindstone Ecodistrict occupies the southern portion of the Mid-Boreal Lowland Ecoregion and consists of an area along the west shore of Lake Winnipeg [(15)].

The surface of the Grindstone Ecodistrict is characterized by ridge and swale topography trending north-south. The ridges range in width from 400 to 800 m and the swales are up to 800 m wide. Due to these characteristics the ecodistrict is poorly drained. As a result, the region is extensively covered in peat in the form of flat bogs, raised bogs and horizontal fens. The regional relief in the subject area is approximately 0.6 m per km and the relief between ridges and swales is approximately 0.5 to 3.0 m [(15)].

The Grindstone Ecodistrict is located within the Low Boreal Ecoclimatic region and is characterized by short, warm summers, and long, cold winters [(15)]. The Pine Dock weather station, located approximately 30 km north-northeast, is the closest active weather station to the proposed peat mining project. The weather data from the Pine Dock weather station is based on a 30-year record from 1971 – 2000 [(16)]. The mean annual air temperature at the weather station is 1.1 ºC and the daily mean temperature ranges between 18.9 ºC in July and –19.7 ºC in January [(16)]. The average growing season is 171 days with about 1470 growing degree-days and an average annual moisture deficit of 50 mm [(15)]. Precipitation at the station averages 612 mm annually, with 425 mm falling as rain and the rest as snow. August has the highest average rainfall (92.3 mm) and November has the highest average snowfall (42.7 cm) [(16)].

4.1.2 Air Quality

Maximum time-based pollutant concentration levels for the protection and preservation of ambient air quality within the Province of Manitoba are listed below for selected parameters [(17)].

Maximum Tolerable Levels denote a time-based concentration of air contaminant beyond which, due to a diminishing margin of safety, appropriate action is required to protect the health of the general population. Maximum Acceptable Levels are deemed essential to provide adequate protection for soils, water, vegetation, materials, animals, visibility, personal comfort and well being. Maximum Desirable Levels define the long-term goal for air quality and provides a basis for an anti-degradation policy for the pristine areas of Manitoba for the continuing development of pollution control technology. Maximum Tolerable Levels are used only for evaluation purposes to identify the severity of an anthropogenic or natural phenomenon in order to protect human health and institute appropriate corrective action. In general, Maximum Acceptable Levels are not to be exceeded in any urban centre including areas that are in the vicinity of industries with atmospheric emissions. Within rural areas, the goal is to maintain pollutant concentrations at or below Maximum Desirable Levels.

Table 2: Maximum Time-Based Pollution Concentration Levels - Province of Manitoba [(17)]

Name of Contaminant	Units of Concentration Measurement	Period of Time Contaminant is Measured	Maximum Tolerable Level Concentration	Maximum Acceptable Level Concentration	Maximum Desirable Level Concentration
Carbon Monoxide	Milligrams per cubic meter (parts per million) of air	1 - hour average 8 - hour average	- 20 (17)	35 (30) 15 (13)	15 (13) 6 (5)
Nitrogen Dioxide	Micrograms per cubic meter (parts per million) of air	1 - hour average 24 - hour average Annual arithmetic mean	1000 (0.53) - -	400 (0.213) 200 (0.106) 100 (0.053)	- - 60 (0.032)
Ground-level Ozone	Micrograms per cubic meter (parts per billion) of air	1 - hour average Annual arithmetic mean 8 - hour average *	400 (200) - -	160 (82) 30 (15) 128 (65)	100 (50) - -
Sulphur Dioxide	Micrograms per cubic meter (parts per million) of air	1 - hour average 24 - hour average Annual arithmetic mean	- 800 (0.31) -	900 (0.34) 300 (0.11) 60 (0.02)	450 (0.17) 150 (0.06) 30 (0.01)
Suspended Particulate Matter	Micrograms per cubic meter of air	24 - hour average Annual geometric mean	400 -	120 70	- 60
Particulate Matter <2.5 µm in diameter ($PM_{2.5}$)	Micrograms per cubic meter of air	24 - hour average *	-	30	-
Particulate Matter <10 µm in diameter (PM_{10})	Micrograms per cubic meter of air	24 - hour average	-	50	-

Notes: For details see http://www.gov.mb.ca/conservation/pollutionprevention/airquality/index.html.
"-" No Data
* - The objective used is the national Canada-wide Standard

Manitoba Conservation in cooperation with Environment Canada and the Manitoba Lung Association and with the assistance of Manitoba Health and Health Canada developed an Air Quality Index (AQI) for Winnipeg [17]. The AQI is a system for rating air quality in urban areas to provide a general idea of air quality to the public. It is provided in this EAP for reference purposes only as the study area is a remote location. The objective of the AQI is to provide a current description of air quality and the potential effect on the environment. The AQI considers five common pollutants that typically effect human health or the environment at specific air concentration levels. These include Caron Monoxide (CO), Inhalable Particulates (PM_{10}), Ozone (O_3), Soiling Index (COH) and Nitrogen Dioxide (NO_2) [17]. Manitoba Conservation monitors these pollutants each hour and converts the pollutant levels to the index scale resulting in a sub-index for each pollutant. The highest resulting sub-index value becomes the value for the overall AQI. Based on the air pollution levels Manitoba Conservation divided AQI values into four ranges with effects described as follows;

- Good (0 - 25) – No effects;
- Fair (26 to 50) – Noticeable health effect unlikely, some environmental effects may be observed;
- Poor (51 to 100) – Some people, especially those with pre-existing health problems may notice health effects, some environmental effects may be observed; and
- Very Poor (> 100) – Health effects may be experienced by all and especially those with existing respiratory conditions, some environmental effects may be observed.

It is expected that the AQI for the regional study area is typically good throughout the year; although there are no published sources of air quality data. Air quality in the area is generally excellent compared to large cities and commercial and industrial areas in Manitoba and Canada. Sunterra Horticulture Canada Inc. (Sunterra) is the only other industrial development in the regional study area. The only other developments in the regional study area, which is otherwise undeveloped wilderness, include cottages, a camp and Provincial Park/Campground. The AQI may be periodically reduced to fair during dry periods resulting in dust along PR 234, during periods of high winds affecting the peat harvesting area, or during forest fires that may result in increased particulates. However, Manitoba Conservation indicated that they generally do not have concerns with the air quality in the regional study area [18] (Personal Communication; Mr. Lyle Campbell).

4.1.3 Geology

The surficial geology of the Grindstone Ecodistrict consists of a mixture of silt diamicton and organic deposits. The silt diamicton is calcareous in composition and consists of Paleozoic rocks that come from the Hudson Bay Lowland and Interlake region of Southern Manitoba. The organic deposits are from the Quarternary period and are composed of peat and muck between 1 to 5 m thick. The site is characterized by low relief wetland deposits, with low lying areas where the organic deposits accumulate in fen, bog, swamp and marsh settings [(15)].

4.1.4 Soils

In January 2010 KGS Group completed thirty-one testholes at Ramsay Point Bog as part of the peat investigation. The majority of the testholes show a similar stratigraphy consisting of live sphagnum peat from surface to depths ranging from 0.15 to 0.6 m below ground surface. The top layer of sphagnum peat was followed by a layer of organic peat which ranged from 0.15 m to 11.9 m thick. Below the organic peat layer a clayey silt/clay/silty clay layer was encountered in several of the testholes ranging between 0.5 to 3.5 m thick, to depths below ground surface ranging between 3.1 and 7.6 m. Silty clay till and clay till were also encountered in a couple of testholes, ranging between 1.5 and 4.2 m thick, to depths below ground surface of 7.6 m [(3)]. This low permeability clay cover forms a very good barrier between the perched water within the peat layer and the groundwater in the underlying aquifers described in the following section.

4.1.5 Groundwater

Regional groundwater flow is presumably controlled by the close proximity of Lake Winnipeg which at the closest point is approximately 1 km east of the proposed development area; therefore, flow is assumed to be easterly. The groundwater in the Grindstone Ecodistrict is mainly from sand and gravel aquifers associated with till, beach and inter-till outwash and deposits [(15)]. The presence of overburden aquifers in the Beaver Creek area is limited to low permeable glacier deposits almost exclusively silt till. Groundwater is used as a potable water source in the regional study area by many of the cottagers and likely by the towns located beyond the regional study.

A search of the Provincial GWDrill Database [19] indicated upwards of 20 (mostly domestic) wells ranging in distance from less than 1 km to 3 kms away from the development area. The registered wells found in the GWDrill Database are carbonate limestone and/or shale bedrock aquifer wells. Wells are generally cased to depths of 7.6 m to 9.1 m below ground surface (bgs), with open borehole below the casing. The primary source of flow is from the Dog Head Member of the Red River Formation. Based on the GWDrill Database the water table ranges from 1.2 m to 3.0 m bgs with pumping rates of 0.38 L/s to 3.4 L/s. Water quality is generally potable and is of the magnesium-calcium-bicarbonate or calcium-magnesium-bicarbonate type with total dissolved solids (TDS) concentrations ranging from 300 mg/L to 600 mg/L.

4.1.6 Surface Water

The Grindstone Ecodistrict is located within the Lake Winnipeg watershed that is part of the Nelson River drainage system, with most drainage in the area into Lake Winnipeg through the numerous creeks [15]. As noted in section 4.1.1, the area has poor drainage, although overall surface water in the Grindstone Ecodistrict flows east towards Lake Winnipeg.

The Ramsay Point Bog has a ridge just north of the Ranger Lakes, which divides the runoff from the Ramsay Point Bog to flow in two different directions. Runoff appears to flow north from the north side of the ridge towards Beaver Creek and the east along the creek to Lake Winnipeg. In comparison, on the south side of the ridge runoff generally flows south towards the Ranger Lakes. However, a small portion of the eastern portion of the development area drain east towards Lake Winnipeg. The natural flow patterns in the development area are illustrated in Figure 5.

Water bodies within the development area include the north and south Ranger Lakes (Photos 1 and 2) and connecting streams located at the south portion of the quarry lease area and the Beaver Creek (Photos 3 and 4) and the unnamed lake along Beaver Creek at the northern edge of the quarry lease area. Additional water bodies within the project study area include Lake Winnipeg located to the east of the quarry leases and several unnamed lakes and streams south of the Ranger Lakes. Additional water bodies with the regional study area include Mill Creek to the northeast and Moose Lake to the north, however, these are not part of the same drainage system as the proposed development area and therefore will not be affected.

The KGS Group environmental assessment team collected baseline surface water samples on June 21 and 22, 2010. These were collected from the peat within the development area, the downstream receiving water bodies within the quarry leases, at downstream stations within the project study area, and at the confluence with Lake Winnipeg which is the receiving water for all surface water leaving the development area (Figure 8). Water samples were submitted for laboratory analysis for general surface water quality (Table 3) and metals (Table 4). These water quality results will form a baseline for comparison of any future surface water sampling at the development area.

Baseline surface water samples collected from the peat water at Ramsay Point Bog (P-RAM 1, P-RAM 2 and P-RAM 3) had acidic pH levels of 3.94, 4.06 and 3.92, respectively (Table 3). These pH levels are below the Manitoba Water Quality Standards, Objectives and Guidelines (MWQSOG) and the Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines for the Protection of Freshwater Aquatic Life which is between 6.5 and 9.0. The Ranger Lakes, which receive runoff from the peat are also slightly acidic with pH levels of 6.07 in the north Ranger Lake (R1) and 6.84 in the south Ranger Lake (R2). In comparison the drainage water from the Ranger Lakes is not acidic as indicated by the pH value of 7.39 measured where the drainage crosses PR 234 (R3). While the Beaver Creek receives runoff from the peat, the water is not acidic as indicated by the pH values of 7.21 and 7.14 measured from the unnamed lake along Beaver Creek (BC-1) and at the PR 234 bridge crossing (BC-2). Likewise the water quality measured in Lake Winnipeg where Beaver Creek dishcarges (BC-3) and where the Ranger Lakes drainage discharges (R4) where not acidic as they had pH values of 7.39 and 7.47, respectively. The water quality in the drainage from the Ranger Lakes, in Beaver Creek and in Lake Winnipeg at the outlet points is very similar to the pH values that ranged from 7.53 to 8.53 as recorded in Lake Winnipeg during 2008 and 2009 by Manitoba Water Stewardship (Appendix D).

Baseline surface water samples collected from the peat water at Ramsay Point Bog, in particular from the samples P-RAM 2 and P-RAM 3, had higher nutrient levels compared to the samples collected from Lake Winnipeg; however none of these exceeded the MWQSOG or CCME criteria (Table 3). Additionally, the nutrient concentrations in the downstream water bodies just before they discharge into Lake Winnipeg were very similar to the concentrations from the samples collected from Lake Winnipeg. During the sample collection at P-RAM 2 the

peat surface was disturbed resulting in artificially high total suspended solids (865 mg/L). This also resulted in the high concentrations of ammonia (0.191 mg/L) and total kjeldahl nitrogen (TKN; 8.4 mg/L) as nitrogen readily adheres to soil particles. While the nutrient concentrations in the peat water where higher than those measured in Lake Winnipeg during the sample event they were typically within the range of nutrient concentrations observed in Lake Winnipeg as measured during 2008 and 2009 by Manitoba Water Stewardship (Appendix D), with a few exceptions as follows;

- The ammonia concentration at P-RAM 2 (0.191 mg/L) was higher than the range of 0.003 to 0.09 mg/L;
- The total phosphorus concentration at P-RAM 3 (0.165 mg/L) was higher than the range of 0.032 to 0.136 mg/L;
- The total particulate phosphorus concentration at P-RAM 3 (0.14 mg/L) was higher than the range of 0.001 to 0.089 mg/L; and
- The TKN concentration at P-RAM 2 (8.4 mg/L) and at P-RAM 3 (1.71 mg/L) were higher than the range of 0.3 to 0.9 mg/L.

Baseline surface water sampling for metal concentrations indicate that some of the baseline concentrations of aluminum, iron and lead exceed the applicable MWQSOG and CCME criteria for the Protection of Freshwater Aquatic Life while cadmium only exceed the CCME criteria (Table 4). These exceedances were observed in the samples collected from the peat, downstream receiving waters and Lake Winnipeg. All other parameters were below the MWQSOG and CCME criteria. These elevated concentrations are typical of water quality in the region, with the exception of the elevated lead concentrations. The elevated baseline concentrations were typically within the range of metal concentrations observed in Lake Winnipeg as measured during 2008 and 2009 by Manitoba Water Stewardship (Appendix D), with a few exceptions as follows;

- The cadmium concentration at P-RAM 2 (0.00016 mg/L) was higher than the range of <0.00001 to 0.00004 mg/L;
- The iron concentration at P-RAM 2 (2.10 mg/L) was higher than the range of 0.22 to 1.80 mg/L; and

- The lead concentration at P-RAM 2 (0.0068 mg/L) and at P-RAM 3 (0.0017 mg/L) were higher than the range of <0.0002 to 0.00085 mg/L.

4.1.7 Vegetation

Wetlands are considered one of the most productive ecosystems, sustaining more life than any other ecosystem. Wetlands in Canada developed following the most recent retreat of glacial ice and are typically between 5,000 and 10,000 years old. According to the Conference on Wetlands Stewardship [5,20], Canada has more than 150 million ha of wetlands covering approximately 15 percent of Canada's land area in fifteen different ecozones. Canada has 25% of the world's wetland and covers 6% of the earth's land and freshwater surface [5,21].

The Grindstone Ecodistrict is dominated by peatland associated vegetation, however, well drained till areas have a variety of vegetation including trembling aspen, jack pine and white spruce as well as a mix of shrubs, grasses and herbs [15]. The proposed development area is primarily classified as a bog which is described as an ombrotrophic peatland. These are mineral-poor and involves surface vegetation obtaining nutrient from precipitation as they are isolated from groundwater [21,22]. A bog is characteristically acidic with the water table (perched) at or near the surface. It typically has a dense layer of peat usually covered with mosses, shrubs and sedges; trees may also be present. Typical vegetation dominating bog peatlands are stunted black spruce, *Sphagnum* moss and ericaceous shrubs.

Ramsay Point Bog can be described as a lightly to moderately treed raised bog area with open areas of *Sphagnum* moss [1] (Photo 5). A previous vegetation survey conducted in 1997 throughout the nearby Beaver Point Bog and the adjacent upland environment identified 44 plant species [2]. None of the species previously identified were listed as species of conservation concern (S1 – S2) by the Province of Manitoba. Regardless, Manitoba Conservation, Conservation Data Center (MBCDC) [23] was contacted to provide an updated list of vegetative species of concern located within the project study area. Currently there are no occurrences of vegetative species of concern listed within the MBCDC for the project study area; however, there were 4 species identified just northeast of Harrys Lake (approximately 25 km north-northeast of the project study area). These included Swamp-Pink (*Calopogon tuberosus*), Water Star-Grass (*Heteranthera dubia*), Fox Sedge (*Carex vulpinoidea*) and Round-leaved Bog Orchid (*Platanthera orbiculata*) (Appendix D). The habitat and terrain associated with the bog

environments where these species have been observed is similar to the development area and, therefore, could potentially occur. Manitoba Conservation stated that their does not contain records for the project study area; however, this does not indicate that these species are not present in the area

Vegetation surveys were conducted at the Ramsay Point bog during three site visits (June 7-11, July 21-23 and August 3-5) along transects established throughout the project study area (Figure 8). During the surveys plant communities were classified by 'V-type' based on the forest ecosystem classification (FEC) system developed for Manitoba and northwestern Ontario [(24)]. Most of the development area had a consistent cover type with the plant communities ranging from V31 to V33. These vegetation types include overstory species, primarily consisting of black spruce with some tamarack and occasional white cedar. Ground cover for these vegetation types are comprised of continuous cover of Sphagnum and feather moss over a range of poorly drained organic soils to wet peat deposits. A small section of upland area in the northwest portion of the subject property contained a distinctly different plant community which is more closely related to V21. This vegetation type is characterized by on overstory of white spruce, balsam fir, trembling aspen, black spruce tamarack, balsam poplar and white birch. The moist to fresh, well trained mineral soils support a ground cover with a more diverse community of shrubs and herbs than the wet areas described above.

During the vegetation surveys 91 species were identified within the project study area; 39 of which were only observed within the upland mixed forest along the north-northwest boundary (Table 5). The primary overstory species throughout the majority of the subject property was black spruce; however, the density of the stands ranged throughout, with taller more productive stands along the northern sections of the property. A few patches of dense tall trees were found in central and eastern sections of the property specifically in proximity to transects R4 and R6. However, most of the subject property was occupied by relatively small poorly developed black spruce and a few treeless areas of exposed sphagnum hummocks (R8, R13, and R14). The more abundant understory species included common Labrador tea, leatherleaf and peat moss. Leatherleaf was more dominant in the open exposed areas. Several other species including northern pitcherplant, narrowleaf cotton-grass, and roundleaf sundew were found in greater abundance in areas where black spruce canopy was either sparse or absent.

A single species considered by Manitoba Conservation to be of conservation concern, tuberous grass-pink was identified within the project study area during the current study (Photo 6). There were six occurrence of this species within the project study area; however, four of these were outside the proposed development footprint for the project. The remaining two were on the periphery of the proposed development footprint and, as such, may be impacted by activities associated with the proposed work. While this orchid species is provincially rare (S2), it is not listed under Committee on the Status of Endangered Wildlife in Canada (COSEWIC) or the federal *Species at Risk Act* (SARA); therefore, there is no provincial or federal legal protection for this species.

4.1.8 Mammals/Habitat

The Mid-Boreal Lowland Ecoregion typically includes terrestrial habitat for moose, black bear, wolf, lynx, red fox and snowshoe hare [(15)]. The MBCDC website identified the presence of a single species of conservation concern (S1-S2) within the ecoregion; the little brown myotis (S2N, S5B) [(25)]. Likewise the MBCDC website noted the woodland caribou Boreal population, which has a provincial rank of S4 (widespread and apparently secure), is also located within the ecoregion. Though not categorized as a species of conservation concern in Manitoba, this population of woodland caribou is listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as threatened as a result of habitat loss and increase predation [(26)]. However, the MBCDC [(23)] was contacted to request a list of wildlife species of concern located within the project study area. Currently there are no occurrences of wildlife species of concern listed within the MBCDC for the project study area (Appendix D).

Previous work conducted in 1997 throughout the nearby Beaver Point Bog and the adjacent upland environment identified the presence of moose, snowshoe hare, and red squirrel [(2)]. Wildlife surveys conducted at the Ramsay Point bog during the 2010 season identified the presence of six mammal species within the project study area (Table 6). American beaver, American black bear, northern grey wolf, moose, red squirrel and white-tailed deer were identified during the first site visit; no new species were identified during the subsequent site visits. All of these species were listed provincially as ether S4 or S5 (abundant and secure).

4.1.9 Birds/Habitat

The Mid-Boreal Lowland Ecoregion typically provides habitat for various raptor species, sandhill crane, ruffed grouse and waterfowl including various ducks, geese, white pelican and cormorant [(15)]. The MBCDC website identifies 11 bird species within the mid-boreal lowland Ecoregion; one of which is categorized as a species of conservation concern. The Piping plover has a provincial rank of S1B and is listed on COSEWIC as endangered. The nearest record of occurrence for Piping plover in Manitoba was approximately 8 km east-northeast of Riverton, Manitoba, which is approximately 40 km south of the project study area [(25)]. This species will occupy only open sandy shoreline habitat and does not rely on peat forming boreal wetlands for nesting or foraging purposes. Therefore the proposed peat mining activities at Ramsay Point Bog will have no affect on the preferred habitat or the conservation status of this species. Additionally, the MBCDC indicated that there were no current records within their database for any bird species of conservation concern within the regional study area (Appendix D) [(23)].

Bird surveys conducted at the Ramsay Point bog during the 2010 season from dawn to dusk identified a total of 53 bird species within the project study area (Table 6), none of which are provincially listed as species of conservation concern. The bird community within the development area consisted primarily of a small core group including the Connecticut warbler, dark-eyed junco, gray jay, hermit thrush, least flycatcher, ruby-crowned kinglet, and savannah sparrow. The dark-eyed juncos and least flycatchers were the most frequently encountered throughout the site. Gray jays and hermit thrushes tended to be more closely associated with taller black spruce stands occurring in patches throughout the area. Forest interior species, such as ruby-crowned kinglets and Connecticut warblers, were detected in the vicinity of transects, such as R11, R12 and R6 (Figure 8), where taller and relatively contiguous Black spruce stands occurred. Savannah sparrows appeared to be restricted to open, nearly treeless areas which were encountered in transects R8 and R14 (Figure 8).

As the vegetation cover within the project study area was generally consistent throughout the development area, the species distribution was fairly uniform and had relatively low diversity throughout. Species observed less frequently within the project study area were encountered either in proximity to open water, or along the few distinct variations in forest type. For example, song sparrow and common yellowthroat were encountered in immediate proximity to the Ranger

Lakes, while several species were found only in the upland mixed wood forest located northwest of the project study area. These species included the alder flycatcher, bay-breasted warbler, blackburnian warbler, cape-may warbler, red-eyed vireo, rose-breasted grosbeak, Swainson's thrush, veery thrush, white-breasted nuthatch, winter wren, and Yellow-rumped warbler. The sharp increase in species diversity associated with this small area is a reflection of a higher level of habitat opportunities afforded by greater structural complexity typical of mixed hardwood/softwood forest plant communities.

Previous work conducted in 1997 throughout the nearby Beaver Point Bog and the adjacent upland environment identified the presence of 32 species of birds, 13 of which were not identified in the current study [(2)]. These included the sharp-shinned hawk, black-billed cuckoo, yellow-bellied flycatcher, great crested flycatcher, American crow, red-breasted nuthatch, gray catbird, solitary vireo, Nashville warbler, northern oriole, purple finch, red crossbill, and white-winged crossbill.

4.1.10 Aquatic Biota/Habitat

Aquatic biota and habitat, particularly fish and fish habitat are protected under the *Fisheries Act*. In discussions with Mr. Todd Schwartz of Fisheries and Oceans Canada (DFO) [(27)], it was determined that there was no data regarding fish habitat or known fish species within Beaver Creek, the Ranger Lakes, or the tributary flowing from the south Ranger Lake to Lake Winnipeg. It was suggested that all water bodies/ watercourses be examined for fish and fish habitat availability (Appendix D). Further discussions with Laureen Janusz of the Aquatic Ecosystem Section of Manitoba Water Stewardship's Fisheries Branch [(28)] confirmed that no data existed for fish species present within any of the subject water bodies/ watercourses, however, the Ranger Lakes were stocked with walleye in 2000. Additionally, the Manitoba Water Stewardship website has fish stocking records from 2002 to the present and indicated that the Ranger Lakes were stocked in 2002 with 100,000 walleye fry (Appendix D) [(29)]. Further information regarding the Ranger Lakes was obtained through discussions with Rick Heuchert, President of the Beaver Creek Cottager's Association, who stated that some cottagers use the lakes for recreational fishing of northern pike (Appendix E).

Fish habitat assessments and fish surveys were conducted by KGS Group in 2010 within Beaver Creek, the Ranger Lakes and the unnamed tributary flowing south from the Ranger Lakes to Lake Winnipeg. Within Beaver Creek near the PR 234 bridge crossing (Photos 7 & 8), the channel bottom consisted primarily of fine sediment with some submergent vegetation in the back eddy, shallow, stagnant offshoots of the creek. The surrounding vegetation was primarily rushes and tall grasses with forested stands of spruce, pines and poplars far enough from the banks so as to not provide shade throughout the day. Two exceptions to the substrate condition in this section of the creek were identified at the bridge and approximately 75 m upstream from the bridge. Between the upstream and downstream approach to the bridge the substrate contained gravel and boulder/riprap providing increased cover for fish and substrate for a variety of benthic organisms used for food by numerous fish species. Starting approximately 75 m upstream there is a 200 m reach with sporadically placed boulders. This available fish habitat in Beaver Creek downstream of the development area is likely able to support forage species such as Canadian mudminnow, sculpin, and stickleback, additionally northern pike (sport fish) is likely to utilize this section of the creek. Approximately 2 km upstream of the bridge crossing, the substrate has approximately 10% rock/gravel with visible submergent vegetation within the main channel and the proximity of the forested over story to the bank provides more shade to the creek. Approximately 2.5 km upstream of the bridge crossing there was a significantly large sized beaver dam. Although there was some overland drainage on the north side of the dam the structure effectively acts as a barrier to fish passage (Photos 9 & 10; Figure 8). Upstream of the dam, the creek essentially became a lake with increased depth and little flow for approximately 250 m until approaching the confluence with a second unnamed creek flowing from the north (Figure 8). Upstream of the confluence with the second creek, water levels began to drop until the creek became a trickle at areas running through what is essentially a cattail and willow marsh (Photo 11). These marsh conditions continued for approximately 1.2 km to the creek mouth at the small lake which was directly north of the development area.

The lake on Beaver Creek had gradual slopes as did the subsequent littoral zone compared to many bog lakes which have deep drop offs with no apparent littoral zones. There were some patches of rushes and cattails around the outflow to the creek; however, the vegetation surrounding the remainder of the lake shore was indicative of bog habitat such as club moss, Labrador tea and pitcher plants. The substrate in the lake and creek was near completely

embedded with fine sediment. Fish species likely to use the available habitat in the upstream reaches of Beaver Creek would be similar to those using the downstream habitat.

A fish survey was conducted using minnow traps, gill nets and a backpack electrofisher in concurrence with the Manitoba Water Stewardship Branch Scientific collection permit #34-10 (Appendix F). Several fish species were captured and/or observed within Beaver Creek. In proximity to the bridge at PR 234, minnow traps and electrofishing resulted in the capture of 16 Canadian mud minnow, and two brook stickleback. Numerous northern pike (juvenile and adult) and white sucker were observed in the creek between the bridge and approximately 2.4 km upstream which is just downstream of a major beaver dam. No fish were captured, nor observed within the remaining 2.1 km upstream of the beaver dam, nor within the small lake at the west end of Beaver Creek.

The Ranger Lakes (Photo 12) are essentially large deep pothole acidic lakes that are surrounded by bog habitat. There are likely some shallow patches at the south end of the southern Ranger Lake as the channel/outlet flowing south from Ranger Lakes originates in a wetland. This would provide appropriate spawning and rearing conditions for northern pike, and perch; however, it is very unlikely that walleye are able to reproduce in these lakes as there were no apparent shallow rock shoals within the chain of lakes. Fish passage into the lake is likely blocked during the summer months due to numerous beaver dams further downstream and from excess vegetation and low water levels at the mouth of the creek. There may be some passage during the freshet allowing fish to enter the wetland and lake system and spawn, after which those fish that linger in the lake system and their progeny would remain confined for the duration of the year. The fish survey of the Ranger Lakes resulted in the capture of a single undersized adult perch with a total length of approximately 50 mm.

The unnamed tributary flowing from the Ranger Lakes collects water from land drainage ditches flowing from the north and south and meet at a confluence just upstream of the water crossing (dual culverts) at PR 234. The channel substrate is primarily covered with fine sediment with patches of approximately 50-70% submergent vegetation. There is a small dam approximately 200 m upstream, which cuts the flow to near stagnant conditions. Moving upstream, water levels drop off continually for approximately 220 m until the channel is completely dry for a stretch of 45 m ending at a large dam (Photo 13, Figure 8). Fish passage beyond this point is impossible

during the summer months. Passage may be available during freshet, particularly before damage to the dam from ice and excessive water levels/velocities are repaired in the early spring. Upstream of the dam is a flooded wetland area which continues for approximately 1 km until the open channel is choked out by surrounding vegetation (Photo 14). A fish survey of the unnamed tributary flowing south from the Ranger Lakes to Lake Winnipeg resulted in the capture of 10 Canadian mud minnow, 1 brook stickle back, and 2 Johnny darter. Several northern pike (juvenile and adult) were observed within the channel up to the first minor beaver dam approximately 200 m upstream. No fish were observed between the first and second much larger dam which resulted in a stretch of stagnant water and dry channel bottom.

4.1.11 Amphibians and Reptiles

Several reptile and amphibian species are typically found within the Interlake area of Manitoba generally found in wetlands, riparian zones and forested areas. The MBCDC indicated that there were no current records within their database for any amphibian or reptile species of conservation concern within the regional study area (Appendix D) [(23)]. Previous work conducted in 1997 throughout the nearby Beaver Point Bog and the adjacent upland environment identified the presence of wood frog and a species of garter snake [(2)].

Amphibian and reptile surveys conducted at the Ramsay Point bog during the 2010 season identified the presence of three amphibians; gray treefrog, northern leopard frog, and wood frog; and one reptile; red-sided garter-snake. None of the species identified are documented as being provincially very rare (S1) or rare (S2). However, the northern leopard frog is listed as a Schedule 1 SC species under the SARA as it has been listed by COSEWIC. While the northern leopard frog Eastern population is listed as Not at Risk (NAR), the Western Boreal/Prairie populations is listed under COSEWIC as a species of special concern (SC). This is defined as a wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats [(30)]. This species remains widespread but is of special concern as it has experienced a considerable reduction of range and loss of populations in the past, combined with increased isolation of remaining populations, particularly further west of Manitoba [(30)]. The species was formerly abundant along the southern shores of Lake Winnipeg and Lake Manitoba, and less common up to Southern Indian Lake and east of Lake Winnipeg; however, it had been virtually extirpated from the province by 1976 [(31)].

The species has reoccupied much of its historic range, although densities are far below previous levels, which is why it remains as Schedule 1 SC under SARA.

The Northern Leopard Frog uses a variety of habitats to meet its overwintering and breeding needs and in the summer is found in a wide variety of habitats, although the preferred habitat seems to be vegetation 15 to 30 cm tall that is relatively close to water [(31)]. Well-oxygenated water bodies, such as streams or larger ponds that do not freeze solid are used for overwintering sites. Temporary ponds that often dry up in late summer that are typically 30 to 60 m in diameter, 1.5 to 2.0 m deep, located in an open area, with a lot of emergent vegetation, and no fish are used for breeding sites. Therefore the species is adversely affected by habitat fragmentation and conversion, including wetland drainage and eutrophication, as well as game fish introduction, collecting and pesticide contamination. While the proposed development will alter the existing bog area; the Ranger Lakes, unnamed creeks connecting them and the unnamed lake along Beaver Creek will have a buffer of 100 m. This buffer will provide a substantial area of habitat with emergent vegetation along the shorelines which should mitigate any potential effects of the project on the northern leopard frog.

4.2 SOCIAL

4.2.1 Communities

The proposed peat operation is located on Crown land and there are no communities present within the 3 km project study area and the 10 km regional study. The surrounding area has a relatively sparse population with very few communities located in the region. Larger communities outside of the regional study area include Riverton located 40 km south, Pine Dock located 30 km north-northeast and Matheson Island located 40 km north of the development area. Peguis (40 km west) and Fisher River).

4.2.2 First Nations

There are no First Nation communities located in the project or regional study areas. Several First Nation communities are located beyond the study area. These include the Fisher River Cree Nation (Reserve No. 44 and No. 44A) located 25 km northwest and the Peguis First Nation

(Reserve No. 1B and 1C) located 40 km west. As previously noted the proposed development is located with the Peguis First Nation CIZ.

4.2.3 Population

The proposed development is located in an unorganized area, referred to as Division No. 19. Population statistics for the small towns of interest located outside of the regional study area were not available, with the exception of Riverton. Therefore population information for the Division No. 19, which includes Pine Dock and Matheson Island, has been presented. Population information is summarized in Table 7.

TABLE 7
POPULATION STATISTICS FOR SURROUNDING RURAL MUNICIPALITIES [32]

Population and Dwelling Information	Riverton	Division No. 19
Population in 2001	**537**	**3,255**
Population in 1996	**594**	**3,217**
1996 to 2001 Population Change (%)	**- 9.6**	**1.2**
Total Private Dwellings	**241**	**3114**
Population Density per km^2	**484.4**	**0.1**
Land Area (km^2)	**1.11**	**60,411**

Population information for First Nation communities located beyond the regional assessment area of the proposed peat mine project is presented in Table 8.

TABLE 8
POPULATION STATISTICS FOR SURROUNDING FIRST NATION COMMUNITIES [33]

Community	Population on Own Reserve (# of people)	Population on Other Reserve (# of people)	Population Off Reserve (# of people)	Total Population (# of people)
Peguis	3,625	37	5,066	8,728
Fisher River	1,756	7	1,501	3,264

4.2.4 Services

The proposed peat mine development is located along gravel PR 234 N approximately 160 km north of Winnipeg, Manitoba and approximately 30 km north of the intersection with Provincial highway 8 N. The on-site services in the regional study area besides PR 234 are a campsite, public beach, private cottages, the Beaver Creek Bible Camp and a transfer station for the cottages.

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 the towns of Hodgson (Peguis First Nation) and Arborg (RM of Bifrost), Manitoba.

Hazardous wastes such as petroleum, oils and lubricants as well as any domestic sewage will be disposed of through licensed companies. Solid wastes such as paper, organics, plastics, packaging materials, etc. will be removed by a local licensed contractor and taken to local licensed municipal waste disposal grounds for disposal and where possible recycling.

4.2.5 Land Use

The land use in the Grindstone Ecodistrict is predominantly crown land that is leased for pulpwood and saw log forestry [(15)]; however, at the time of the survey and based on aerial photos of the regional study area there was no evidence of commercial forestry occurring. In comparison, there is an active peat harvesting operation owned by Sunterra located approximately 5 km northeast of the proposed development. Additional land uses in the regional study area includes recreational land use through the Beaver Creek Provincial Park, cottage development along the shore of Lake Winnipeg and the Beaver Creek Bible Camp located at the confluence of Lake Winnipeg and Beaver Creek. The proposed development is located within the Peguis First Nation CIZ, as previously noted, which is a zone where trapping and fishing may occur.

4.2.6 Areas of Interest

The northwestern portion of QL 1761 is located within the Moose Creek Wildlife Management Area and Provincial Forest (Figure 2). Additionally the Beaver Creek Provincial Park which is used for cottaging, camping, picnicking, beach and day use is also located within the project study area approximately 500 m east of the development area and is approximately 28.14 ha in size along the shore of Lake Winnipeg and PR 234. Lake Winnipeg is of interest because in addition to recreational use it supports commercial fishery activities. Lake Winnipeg has an approximate surface area of 23,750 km^2 (23,750,500 ha) and is about 436 km in length [(34)]. There are seven provincial parks located in the south basin of Lake Winnipeg including Hecla/Grindstone, Beaver Creek, Camp Morton, Winnipeg Beach, Elk Island and Grand Beach [(34)].

4.2.7 Heritage Resources

The Manitoba Historic Resources Branch has reviewed the proposed project development area for Ramsay Point Bog, and has indicated a low potential to impact significant resources. Therefore, the Historic Resources Branch has no concerns with the project (Appendix D). 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 ECONOMY

Industries in the Mid-Boreal Lowland Ecoregion include forestry, fishing and hunting and trapping [(15)]. Lake Winnipeg, in particular, provides an important economic source in the area through fishing. During 2001 and 2002 there were 1,073 licensed fishers on Lake Winnipeg and the total value of commercial fish production was $20,380,350 [(34)]. Pickerel is the main fish harvested, followed by whitefish and sauger.

Division No. 19 sources of income in 2005 included: employment income (57.6%), government transfer payments (33.1%) and other or unknown sources (9.1%) with the average income for a person 15 years or older who worked a full year at full time was $13,422 [(32)]. The average family

income in Division No. 19 of all census families was $30,728 compared to the Manitoba average of $58,816 [(32)].

In Division No. 19 there were 2,320 people that were 15 years or older in 2006 with 1,080 of these people in the labor force resulting in a 47.2 % participation rate [(32)]. From this labor force, 900 people were employed resulting in an employment rate of 39.3 % of the population. The main industries of agriculture and other resource based industries, manufacturing, construction, wholesale trade, retail trade, finance and real estate, business services, educational services, health and social services and business services accounted for approximately 76 % of the jobs. Other services accounted for approximately 24 % of the jobs in Division No. 19 [(32)].

5.0 PUBLIC CONSULTATION

5.1 OVERVIEW

Stakeholders were invited to provide Sun Gro and KGS Group with their questions, concerns and comments about the proposed peatland development project. Information regarding the proposed peatland development project and potential effects associated with the project has been provided to the stakeholders and public in the region through various means including, telephone conversations with stakeholders and letters to the Peguis First Nation and the Beaver Creek Cottager's Association (Appendix E).

5.2 STAKEHOLDERS

The Peguis First Nation were considered a stakeholder as the proposed peat harvesting development at Ramsay Point Bog is located within the Peguis First Nation CIZ. Likewise Manitoba Conservation is a stakeholder, as the northern portion of QL 1761 is within the Moose Creek Wildlife Management Area and Provincial Forest.

Other stakeholders identified within the project study area include the Beaver Creek Bible Camp, located near the confluence of Beaver Creek and Lake Winnipeg and the Beaver Creek Cottager's Association, located east of the proposed development project within the Beaver Creek Provincial Park.

The Rural Municipality (RM) of Bifrost is also considered a stakeholder, even though they are outside the regional study area, as the transportation of peat will be south along PR 234 to Highway 8 through the RM of Bifrost. The RM will be used as the major transporting route and will potentially benefit from the new employment positions at the proposed development.

The Federal and Provincial governments are also stakeholders in the project as they will be required to provide project authorization and licencing. The DFO will need to review and potentially provide authorization for the proposed culvert installation. They have a responsibility to ensure that appropriate design and mitigation measures are implemented. It is the responsibility of Manitoba Conservation to approve or deny an Environment Act Licence for the

project and provide licence terms and conditions. Government officials were contacted to identify concerns with the proposed peat development. Concerns raised by government officials included issues such as, water quality, site drainage, fish habitat, fish use, linear developments and physical disruption or destruction of existing habitats. These concerns have been addressed in the EAP within Section 6.0.

5.3 STAKEHOLDER CONCERNS

Mr. Eric Dunmore of the Beaver Creek Bible Camp expressed concern for Beaver Creek which is the main waterway utilized by the campers, in particular related to potential increase in silt content and potential change in water elevations.

Mr. Rick Heuchert, president of the Beaver Creek Cottager's Association (BCCA), indicated that he and the members of the association were very opposed to the proposed development. He outlined comments and concerns expressed by members of the BCCA in a letter dated August 27, 2010 (Appendix E). These are summarized as follows:

- Provincial Road 234, which provides access for the cottagers and the permanent residents of Pine Dock and Matheson Island, is a gravel road that was not constructed with heavy commercial traffic in mind. In peak season product from an existing peat mine north of Beaver Creek is transported by 18-wheeler semi truck trailers, sometimes in excess of 40 semi trailers per day. These trucks substantially deteriorate the condition of PR 234 which would be further increased by a new peat mine development located on this road.

- Over the past few years there have seen several serious accidents on PR 234 caused by sight reduction due to the dust caused by the heavy semi truck traffic. For safety reasons the BCCA have requested Manitoba Infrastructure and Transportation (MIT) to apply dust control however MIT claim they have no budget funding for more than a single dust control application per year. Adding more heavy truck traffic will only increase the dust levels and potentially result in additional accidents and possibly deaths.

- The BCCA in conjunction with the community of Pine Dock, were successful having a seasonal speed limit introduced along PR 234 which reduced the speed limit adjacent the Beaver Creek Provincial Park from 90 kph to 70 kph. This was done mainly for safety reasons because of the heavy truck traffic.

- The BCCA feels that PR 234 would be much better suited to heavy commercial traffic, and the safety concerns would be much reduced if the road conditions were improved, such as black topping the road.

- Questions were raised regarding water drainage such as where will this water go, what impact will it have on an already fragile Lake Winnipeg and will there be any impact on the creeks, drainage ditches, cottage lots and wells in the Park area.

- The Beaver Creek Provincial Park and surrounding area has an abundance of wildlife including numerous species of birds, fox, wolves, coyotes, bears, deer, moose, and many more which the BCCA want to see protected. Additionally, the Ranger Lakes are home to several species of fish and some cottagers use these lakes for pleasure angling. The BCCA is concerned that the process for harvesting peat moss including drainage of the area, bulldozing the trees and bush, followed by scraping away the surface soil and vegetation will devastate the natural habitat for the wildlife that live there.

- The BCCA question if there will be any wildlife in this area after 35 years of peat harvesting and note it may be 50 years or more before the trees, forest and wildlife are restored to the area even with the required restoration.

The Village of Riverton has been in contact with Sun Gro for several years regarding the proposed development and has been in full support of the project. The Village of Riverton supports the proposed project as it will provide new economic opportunity in the region in the form of direct and indirect employment opportunities. A letter written to Manitoba Conservation, on behalf of the Village of Riverton, outlining the support for the project is included in Appendix E.

The Manitoba Conservation Crown Land Manager, Mr. Lyle Campbell (Gimli Office), was contacted and he indicated that as long as all of the Environmental Assessment Proposal guidelines were met then there were no concerns regarding the proposed project partially overlapping the Moose Creek Wildlife Management Area and Provincial Forest.

In response to the letter sent to the Peguis First Nation, Mr. Mike Sutherland the Land and Natural Resources Coordinator contacted KGS Group on September 1, 2010. He noted that the Peguis FN have been in contact with Manitoba Mines and Minerals Branch to deal with land ownership and treaty rights issues. The Peguis FN has requested a copy of the Quarry Lease permits that have been issued within their CIZ as they want to review when the QL's were issued and what form of consultation had been conducted. The Peguis FN feel a lot of the QL's that have been permitted within the last 10 years have not followed the proper consultation or treaty rights review process. He also noted that the Peguis FN thought a lot of the QL applications had been for gravel and not for peat. Mr. Sutherland indicated that the Peguis FN

were in the process of preparing a formal response letter with regards to the proposed Ramsay Point bog development, however, this to date this letter has not been received.

The potential effects of the project associated with concerns raised by the stakeholders are assessed and mitigation measures identified in Section 6.0, with a brief summary of mitigation provided in the following section.

5.4 MITIGATION MEASURES

The Beaver Creek Bible Camp and BCCA concerns regarding water quality and drainage are being addressed as follows. Proposed measures to mitigate potential effects on surface water generally include minimizing the surface area being drained or disturbed; avoid the destruction of water bodies by maintain a 100 m buffer; maintaining water levels on undisturbed lands; directing drainage to settling ponds prior to discharging to the natural drainage system; preventing leaks, spills and releases of contaminants such as fuels; providing spill clean-up equipment and materials; preparing an emergency spill response plan and implementing a mine closure plan to restore predevelopment water levels.

The BCCA concerns regarding increased traffic along the gravel PR 234 and associated effects including the deterioration of the quality of the highway, increased dust, and safety concerns are being addressed as follows. Sun Gro has indicated they will contact MIT to discuss the concerns outlined by the BCCA and express their support that MIT upgrade PR 234 to accommodate increased traffic. Proposed measures to mitigate potential effects associated with the increased truck traffic include, using an approved dust suppressant such as water on roads, directing all traffic associated with the development to drive according to road conditions and adhere to the posted speed limits, and in particular to note the reduced speed limit from 90 to 70 km/hr along the section of PR 234 adjacent to the Beaver Creek Provincial Park.

The BCCA concerns regarding potential impacts of the proposed development on wildlife, fish and their habitat are being addressed as follows. Proposed measures to mitigate the loss and disturbance of wildlife habitat include minimizing loss and disturbance of vegetation by limiting construction activities to designated areas, limit operation activities to areas disturbed during construction, maintaining habitat around the quarry leases and re-vegetating disturbed or

reclaimed areas during and after operation. An additional proposed measure to mitigate the loss and disturbance of migratory bird and waterfowl habitat includes retaining a 100 m buffer zone around the lakes and connecting creeks. Proposed measures to mitigate the disturbance of migratory and other birds and waterfowl during nesting and rearing periods includes conducting clearing during the winter outside of these critical times. The mitigation measures proposed to minimize the project effects on surface water quality will also mitigate the potential impacts of the project on fish and fish habitat associated with drainage. Proposed measures to mitigate the effects on aquatic biota and habitat associated with construction of the Ramsay Point Bog access road, including the installation of a new culvert at the PR 234 roadside ditch, includes following the Manitoba Stream Crossing Guidelines for the protection of Fish and Fish Habitat, following best management practices (regarding timing window, sediment/erosion control, revegetation of disturbed soils), and installing the culvert such that low flow connectivity is maintained (i.e. embedding the pipe below the ditch invert).

The Peguis FN concerns regarding land ownership and treaty rights are outside of the control of Sun Gro. The existing Sun Gro QL's have been held by them for approximately 16 years. Manitoba Mines and Minerals branch will need to address the concerns raised by the Peguis FN.

6.0 ENVIRONMENTAL EFFECT ANALYSIS

6.1 ENVIRONMENTAL ASSESSMENT METHODS

The environmental assessment of the proposed peat development was carried out based on: project information provided by Sun Gro and the advice document from Manitoba Conservation. Additional considerations included environmental information acquired from literature and internet searches, publications by the peat industry and environmental organizations; contacts with federal and provincial government representatives; consultation with stakeholders; and site investigations by the project team.

Requirements of Manitoba's Environment Act and regulations and the Manitoba Conservation advice for the preparation of an Environment Act Proposal for a Class 2 Peat Mining Development were followed in the preparation of this Environment Act Proposal.

The environmental effects of the proposed peat harvesting project on the environment in the project and regional study areas were identified using checklists, an interaction matrix (Appendix G) and professional judgment. Advice by government representatives, concerns expressed by the stakeholders, and brainstorming among the consultant team was also used to identify environmental issues and associated environmental effects. The adversity of environmental effects was determined based on categories presented in Table 9.

The cumulative environmental effects of the proposed peat harvesting operation with the effects of other projects and activities in the area were assessed following the methods prescribed by the Canadian Environmental Assessment Agency [(35)].

The significance of the residual environmental effects of the proposed peat harvesting operation were evaluated following the procedures outlined in the Canadian Standards Association draft environmental assessment standard. The degree of change from the existing conditions and the value of the environmental components being affected determine significance of an adverse effect. Criterion for this determination as referenced in Table 10 include: a) Societal value of affected environmental components, b) Ecological value or sensitivity of affected environmental components, c) Duration, d) Frequency, e) Geographic extent, f) Magnitude, and g)

Reversibility. For each criterion a particular level of significance rating (1, 2 or 3) is assigned. To judge the overall significance of an effect, the rating and criteria should be considered together. An effect is determined significant when: (1) it rates a "3" for at least four criteria, at least one of which must be criteria a or b; or (2) it is rated "2" or "3" for all criteria.

6.2 ENVIRONMENTAL ISSUES

Environmental issues associated with the proposed peat mine development project at Ramsay Point Bog are summarized below. The assessment team identified the issues by considering the nature of the project, the location and environmental effects typical of peat mining projects. Site specific environmental issues will be discussed in a regional context.

6.2.1 Loss of Wetland

Public concern regarding the loss of wetlands as a function of wildlife habitat and other ecological functions has become acute in some regions in Canada. This is due to land use changes such as urban development, increased population and in particular agricultural development, especially in the prairie regions of Canada, there are fewer wetlands remaining [(36)]. Already many wetland areas have been lost due to draining for agricultural land use. Overall, development has accounted for approximately 15 percent loss of Canadian wetlands [(36)]. Horticultural peat mining, in comparison, only accounts for a small portion of the loss of wetlands [(5,37)].

6.2.2 Loss of Wildlife Habitat

Loss of wildlife habitat, particularly waterfowl nesting areas, is another concern. Waterfowl and other wildlife species favour swamps, marshes and shallow open water wetland classes as habitat due to the diverse range of vegetation. In contrast, bogs have little importance as habitat for waterfowl and some wildlife species because they tend to have very little open water [(37)], low diversity of vegetation and limited cover for waterfowl or other bird nesting purposes. The number of waterfowl and wildlife species and the total wildlife populations in bogs are generally lower in comparison to other wetland classes or to mineral soil ecosystems.

A few small mammal species such as muskrat and beaver and game species such as caribou, moose and deer utilize peatland habitat. Rare or endangered bird and mammal species utilizing peatland areas on a seasonal basis include whooping crane, trumpeter swan, piping plover, and the wood bison.

Daigle and Gautreau-Daigle [5] evaluated natural peatlands (domed bogs) and peat harvesting areas in close proximity to each other in New Brunswick. It was found that some waterfowl use bog ponds during migration season and for staging. Usage was directly related to the availability of open water in the area. Overall, wildlife use of the bogs was found to be low due to low vegetation productivity of the bog habitat with little variation noted between the natural and developed areas. They also observed that moose populations use bog areas but again no population differences were observed between developed and undeveloped bogs [20].

6.2.3 Loss of Rare Vegetative Species

Protecting rare or endangered species and other vegetation has become a growing issue in regard to peat harvesting development. Peat mining affects vegetation that is unique to peatland bog environments such as pitcher plants (*Sarracenia* spp.), bladderworts (*Utricularia* spp.) and sundews (*Drosera* spp.) that are not found in other mineral soil environments. Many of these species are widely distributed throughout Canada's boreal wetland regions. These types of species occupy a niche that few other species are suited to and are found in many bog ecosystems. Several orchid species, some of which are rare, also occur in peatland environments [38].

The composition of vegetation in bogs tends to have a typical association of species adapted to the regional conditions. As such, the potential effects of a peatland development will depend on the regional environment. If there is a large area of undeveloped bogs in the region that will still support the unique vegetation types, then development of a peat bog that is only a small portion of the area will have minimal effects on rare vegetative species.

6.2.4 Release of Carbon

The release of carbon gases associated with peat development is another environmental concern. As *Sphagnum* grows, carbon is stored in the plant material. The plant material accumulates as peat because of the anaerobic conditions with low oxygen levels due to the high water table. Draining the area for peatland development lowers the water table. This results in decomposition of the peat that releases the stored carbon to the atmosphere in the form of carbon dioxide. Carbon dioxide is one of the greenhouse gases contributing to global warming. However, the greatest effects are associated with carbon release due to burning peat as a fossil fuel. The loss of the peat vegetation as a carbon sink is also a concern because it disturbs the carbon cycle [(39)]. However, as discussed already the amount of peat accumulated per year is substantially greater that the amount of horticultural peat harvested. Therefore, horticulture peat developments typically do not have a significant effect on the global carbon cycle.

6.2.5 Surface Water Contamination

Surface water contamination due to water draining from peatland developments has become a major concern. The exposed peat particles following the removal of surface vegetation can be transported into the drainage system, thus increasing suspended particles and other chemical parameters in the water. Settling ponds that slow down the flow of water enabling solids to settle out of the discharge water have become an integrated part of peat mining operations.

During initial drainage, there is an increase in runoff; however, this is over a limited period of time and well below the runoff of large rain events. Once the drainage is constructed, the rate of runoff is slower during a rain event compared to an undeveloped peat bog because of the absorption created by drained peat.

6.2.6 Reclamation and Restoration

Reclamation focuses on the potential after-uses of harvested peatland sites, whereas, restoration focuses more on re-establishment of the site as a peatland, with a functional natural ecosystem with characteristics as close as possible to the pre-harvesting conditions. Though reclamation and restoration requirements for peatland developments in Canada have not been

clearly defined, it has become an integral part of peatland management in this country. Canadian industries have little experience in reclamation and restoration of peatland developments because only a few developments have reached the end of their production life. Reclamation; however, is a very fundamental practice in some of the European countries such as Finland, Ireland and Germany because of their long term history of peat mining operations where reserves have been exhausted.

There are several methods for peatland reclamation such as transforming the site into a new functioning wetland that would be useful as waterfowl habitat, developing agricultural cropland or establishing a forestry plantation on site. Sun Gro proposes to restore the mined out phases based on their experience gained from successful restoration of the Elma demonstration site and following the requirements of The Preservation and Reclamation Policy of the Canadian Sphagnum Peat Moss Association.

6.2.7 Peat Fire

The Manitoba Clean Environment Commission conducted public hearings in 1977 on smoke problems encountered in southern Manitoba during 1976. The burning of peat deposits in 1976 were the primary cause and resulted in smoke causing traffic accidents and health concerns. Some fires were accidental and started from the overlying brush or grass. However, many fires were deliberately set to remove peat for cereal crop agriculture. The Commission recommended prohibiting the burning of peat moss deposits, with a provision for cases in which the proposed burning is demonstrated to be an acceptable agricultural practice, in which case, they must be executed with safety [(40)].

6.3 BIOPHYSICAL EFFECTS ASSESSMENT

6.3.1 Microclimate

The clearing in preparation for the proposed peatland development project will likely result in minor changes in airflow, wind speed and snow depositional pattern in and adjacent to the development area. The potential adverse effects of the project on microclimate were assessed as minor. The effects may be mitigated by installing snow fences to control snow deposition on

the property if required. Follow-up involves periodic observation of the changes in airflow patterns and snow deposition. The residual effect was determined to be not significant (Table 11).

6.3.2 Air Quality

Increases in fugitive dust will result in the local area during construction and operation of the project associated with access road construction, clearing, ditching and peat harvesting, stockpiling, loading and transporting activities. A total of approximately 1170 ha of peat will be exposed to potential wind erosion at the Ramsay Point Bog during peak operation. Handling of peat during harvesting and loading the harvested peat will potentially result in fugitive dust as well as increased truck traffic along PR 234. Dust is controlled as part of the routine operation and will reduce particulate matter in the air. It is unlikely that Manitoba's air quality guidelines would be exceeded during construction and operation phases of the project. The potential effects on air quality were assessed to be moderate. The effects may be mitigated by using an approved dust suppressant such as water on roads, minimizing peat harvesting and handling activities during high wind events, reducing the area of peat in fields and peat stockpiles exposed to prevailing winds, controlling vehicle speeds, instructing employees on proper harvest equipment operation to minimize dust, covering loads being hauled from the site, re-vegetating harvested areas and utilizing windbreaks (tree and brush barriers). Proposed follow-up involves periodic observations for fugitive dust levels, inspections of local area for accumulated dust and tracking of public complaints. The residual environmental effect of increased fugitive dust during construction and operation was determined to be not significant (Table 11).

Increased levels of NO_x, SO_2 and greenhouse gases may result from equipment and vehicle emissions during site preparation, peat harvesting and transporting activities. Additionally some construction materials and the use of fuel may release volatile organic carbons (VOC). The potential adverse effects on air quality in the local area were assessed to be minor. Proposed mitigation measures include using low sulphur fuels, requiring a high standard of maintenance for equipment and vehicles, limiting unnecessary long-term idling and using appropriate fuel dispensing equipment. Proposed follow-up includes periodic observation of air quality during construction, recording maintenance of heavy equipment and requiring submission of MSDSs

for all products used. Residual environmental effects of NO_x, SO_2, greenhouse gases and VOC on air quality were determined to be not significant (Table 11).

Increased releases of carbon dioxide into the atmosphere may result from clearing and peat-harvesting activities releasing stored carbon from the peat at the proposed development, however, the potential changes to the carbon cycle associated with horticultural peat operations is minor. While harvesting peat may release carbon dioxide and reduces the carbon sequestering the construction of ditches reduces the release of methane, a more serious greenhouse gas therefore resulting in an overall positive effect. Additionally, afforestation during restoration of the proposed development will also act as a carbon dioxide sink. Regardless, mitigation measures proposed to address greenhouse gas concerns include minimizing the areas cleared and preparing and implementing a restoration plan that restores the area to a carbon sink condition. The proposed follow-up involves adherence to licence terms and conditions. The residual effect of increased greenhouse gases during construction and operation was determined to be not significant (Table 11).

6.3.3 Soils

Site preparation and peat harvesting activities will result in an average loss of 2.5 m depth of surface cover and peat; however, the actual depth of loss will vary across the site as the peat thickness is variable and the harvesting depth will depend on what depth of peat is required to be retained undisturbed. The average harvesting of peat is estimated to be 850 m^3/ha/year. Starting in 2013, approximately 60 ha of peatland will be developed per year with the last 60 ha of land cleared and readied for peat harvesting by 2032. A total of 1170 ha of land will be ready for harvesting by 2032 with full peat production continuing until the end of 2042 at which time sections of the Ramsay Point Bog area are expected to be mined down to the final planned depth of mining. This removal of soil (peat) from the site through the process of harvesting was assessed to be major. Mitigation measures proposed to address the effects of soil loss include minimizing the surface area disturbed to the area being harvested, leaving non-commercial peat reserves in place, and preparing and implementing a Mine Closure plan to restore the area to natural conditions. Proposed follow-up includes annual monitoring and reporting on implementation of the progressive restoration activities. The residual effect of soil loss was determined to be not significant (Table 11).

Soils in the development area may become contaminated from accidental leaks, spills and releases of fuel or other hazardous substances during site preparation and peat harvesting activities. The potential adverse effects on soil quality were assessed to be moderate. Proposed mitigation includes preventing leaks, spills and releases, providing ULC Certified double-walled fuel storage tanks with spill prevention and leak detection, requiring drip trays for equipment, designating fuel storage and re-fueling areas, ensuring equipment arrives to site in good condition, providing spill clean-up equipment and materials, and providing an emergency spill response plan. Follow-up proposed involves periodic inspections for leaks, spills and releases, ensuring construction and operation crews adhere to designated areas, remediate and record fuel spills and releases, adherence to licence terms and conditions and periodic updates of the emergency response plan. The residual effect of accidental leaks, spills and releases on soil quality was determined to be not significant (Table 11).

6.3.4 Surface Water

Surface waters forming the wetlands such as small ponds and intermittent creeks within the harvesting area will be lost due to site drainage for peat harvesting operations. Approximately 1170 ha of land will be cleared and drained over the expected life of the Ramsay Point Bog. A 100 m buffer with no development will remain around Beaver Creek and the unnamed lake on Beaver Creek as well as around the Ranger Lakes and their connecting drainage channels and smaller water bodies. The unnamed stream that conveys flow along the west side of the development area will also have a 100 m minimum buffer from any development works. The restoration work to begin as sections of the mine are closed will result in development of wetland area that will offset the surface water areas lost during project development. Potential adverse effects on surface waters associated with drainage for the proposed development were assessed to be moderate. Proposed mitigation includes minimizing the area disturbed, formulating a drainage plan to maintain the natural drainage patterns, maintaining water levels on the adjacent undisturbed lands, and preparing and implementing a mine closure plan to restore water levels to predevelopment conditions. Follow-up proposed includes periodic inspection of surface waters and annual reporting on implementation of the mine closure activities. The residual effect of loss of surface waters was determined to be not significant (Table 11).

Site drainage and land profiling activities during construction will result in changes to the flow rate, however there will be minimal change to the direction of surface water runoff within the production area. As discussed in section 3.6.1, the drainage plan has been developed to maintain the direction and discharge points common to the natural drainage patterns. For example, outlet ditches from the sedimentation ponds along the north end of the development area will discharge flow to collection points within the natural drainage for conveyance to Beaver Creek. Outlet ditches from sedimentation ponds in the south portion of the development will also direct discharge into the natural collection areas towards the Ranger Lakes. Regardless as the rate and timing of drainage from the development area will be slightly modified during the extent of operation the effect of the project on the drainage pattern was assessed as moderate. No mitigation measures are proposed however, follow-up proposed includes monitoring of discharge flow rates from the peat development in accordance with licence terms and conditions. The residual effect of changes to the surface water regime was determined to be not significant (Table 11).

Suspended sediment levels in the surrounding wetlands, ponds and creek may become elevated during spring snowmelt and major precipitation events due to increased exposed peat area associated with harvesting. As discussed in section 4.1.6, baseline surface water samples collected from the water bodies/ water courses from within the quarry leases generally had total suspended solids below detection limits (<5 mg/L), except for P-RAM 2, P-RAM 3 and R2. The potential adverse environmental effects to surface water quality were determined to be moderate. Proposed mitigation includes directing drainage water into sedimentation ponds equipped with floating booms before discharging by an outlet to the existing drainage system. Proposed follow-up includes collecting surface water samples from each outlet monthly with analysis for suspended sediment levels, develop additional surface water sampling if required in consultation with Manitoba Conservation, cleaning of drainage ditches and sedimentation ponds on a regular basis, periodically inspecting for evidence of erosion and adherence to licence terms and conditions. The residual effect of increase surface water runoff on suspended sediments was determined to be not significant (Table 11).

The surface water chemistry in the downstream receiving water, in particular Lake Winnipeg, may become altered during site construction and operation associated with the draining of the peat bog. As discussed in section 4.1.6, baseline surface water samples collected from within

the peat bog at Ramsay Point had acidic pH levels that were outside of the MWQSOG and CCME criteria for the Protection of Freshwater Aquatic Life. In comparison the downstream receiving waters ranged from slightly acidic to not acidic with Lake Winnipeg also being not acidic and within the applicable criteria. While peat land pore water is typically nutrient poor the samples collected from the bog area had a few nutrients concentrations that are slightly higher than those measured in Lake Winnipeg, however, all of the nutrient concentrations were within the applicable criteria for the protection of freshwater aquatic life. Finally, the sampling indicated that the water in the bog and downstream receiving water had similar metal concentrations with aluminum, cadmium, iron and lead being elevated above the MWQSOG and CCME criteria. The proposed development will not alter the existing natural drainage pattern with water from the bogs discharging into the adjacent streams and lakes in the area. The proposed development will however alter the timing and rate of drainage, in particular during the initial drainage of each harvesting parcel. The volume of water discharged from each 60 ha area during initial drainage is minimal in comparison to the drainage area within the watershed and the volume of the receiving water body. Therefore, the potential adverse environmental effects to surface water quality were determined to be minor. Proposed mitigation includes using a sedimentation pond to control the rate at which drainage water is discharged into the existing drainage system. If the control of the discharge rate is not sufficient in maintaining the water chemistry, a limestone or carbonate lined drainage ditch can be installed to increase the pH of the draining bog water before entering the sedimentation pond. Proposed follow-up includes collecting surface water samples from each outlet monthly to carry out pH analysis. Any additional surface water sampling required will be developed in consultation with Manitoba Conservation. The residual effect of bog water runoff on surrounding water bodies was determined to be not significant (Table 11).

Surface water in the development area may become contaminated during construction and operation from accidental leaks, spills or releases of fuels or other hazardous substances. The surface water sampling in 2010 did not include contaminants such as hydrocarbons, however, it is assumed that they would not be present as there is minimal use of this area beyond the occasional fishing boat on the ranger lakes. The potential adverse effect of spills on surface water quality was assessed to be moderate. Proposed mitigation includes preventing leaks, spills and releases, providing secondary containment for fuel storage, requiring drip trays for equipment, providing spill clean-up equipment and materials, and preparing an emergency spill

response plan. Follow-up proposed involves periodic inspections for leaks, spills and releases, remediate and record any fuel spills and releases, periodic updates of the emergency response plan and adherence to license terms and conditions. The residual effects of accidental leaks, spills and releases on surface water quality were determined to be not significant (Table 11).

6.3.5 Groundwater

Groundwater in the development area may become contaminated during construction from leaks and accidental spills or releases of fuels or other hazardous substances. Groundwater quality in the development area has not been analyzed for hydrocarbons or contamination by other hazardous substances however it is assumed to be good quality as cottagers east of the development use it as a potable water source. The low permeability clay cover on-site, as discussed in section 4.1.4 forms a very good barrier between the perched water in the peat and the underlying local bedrock aquifer. This essentially isolates the peat from the groundwater so the proposed development will have minimal effects on the groundwater table. However, the proposed development does include the installation of a groundwater well in the staging area that if improperly installed could provide a conduit. Therefore, the potential adverse effects of the project on groundwater quality were assessed to be minor. Proposed mitigation includes ensuring the new supply well is properly sealed at ground level to prevent downward migration of surface contaminants, preventing leaks, spills and releases, providing secondary containment for fuel storage, requiring drip trays for equipment, providing spill clean-up equipment and materials, and preparing an emergency spill response plan. Follow-up proposed involves periodic inspections for leaks, spills and releases, remediate and record any fuel spills and releases, periodic updates of the emergency response plan and adherence to license terms and conditions. The residual effects of accidental leaks, spills and releases on groundwater quality were determined to be not significant (Table 11).

6.3.6 Vegetation

The proposed development activities will result in the loss and disturbance of terrestrial vegetation including tree, shrub, herbaceous and grass species. A total of 1170 ha of land will be cleared for the peat development. Manitoba Conservation Data Centre had no records of any rare or endangered plant species in the project study area, however, four occurrences of S2 and

S3 ranked plants were found northeast of Harrys Lake, in a similar environment. One of these species was observed within the within the quarry lease boundaries during the vegetation survey completed in 2010, prior to any disturbance. Six occurrences of the provincially rare (S2) orchid grass pink (*Calopogon tuberosus*) were observed; twice along the perimeter of the proposed development area and four times outside of the proposed development area. This species while being provincially rare is not listed under COSEWIC or protected under SARA, as discussed in section 4.17. Therefore the potential adverse effect of the project on vegetation loss was assessed to be moderate. Proposed mitigation measures include minimizing loss and disturbance of vegetation, protecting vegetation along the perimeter of the cleared areas from blow-down, limiting construction activities to designated areas, utilizing timber removed from site, and re-vegetating disturbed or reclaimed areas during and after peatland operations. An additional mitigation measure specifically for the rare orchid include ensuring that workers are aware of where the orchids are situated outside of the development area so that they are not disturbed. An inquiry was made to the Native Orchid Conservation regarding the potential for transplanting the grass pink orchids found; however, they indicated that the success rate of transplanting was very low, but will follow-up on the orchids located outside of the development area. The proposed follow-up involves periodic inspection for vegetation stress and mortality around the cleared area, invasion of nuisance or weed species, monitoring of the Grass pink orchids before construction starts and one and three years after it starts and annual reporting on restoration activities implemented. The grass pink monitoring will be carried out by the Native Orchid Conservation to ensure a continued existence, despite the proposed development within the quarry leases (Appendix E). Positive outcomes of the proposed development will prevail during the restoration as restoration of a site often results in increased diversity of flora and fauna. The residual effects were determined to be not significant (Table 11).

Increases in fugitive dust will result in the local area during construction and operation of the project, as previously noted, which can settle on and stress vegetation in the local area. The potential adverse effects of dust on vegetation were assessed to be minor. However, the effects may be mitigated by controlling dust and stopping operational activities during high wind events. Proposed follow-up involves periodic inspection of the local area for accumulated dust. The residual effects of dust on vegetation were determined to be not significant (Table 11).

Peat harvesting and restoration activities pose a risk of starting a peat fire. Sources of fire include spontaneous combustion, lightning strikes in drained areas, equipment and accidents. Sparks or dust accumulation on hot surfaces of the engine and exhaust are common causes of fire from equipment. Fire is a concern in the lease area as well as the local and regional areas. Uncontrolled fires can result in substantial loss of peat resources to Sun Gro, forest cover and wildlife habitat, property damage and the loss of life. Potential adverse effects from a peat fire, were assessed to be major. Mitigation measures proposed to address potential fires include preparation and implementation of a fire management plan. Sun Gro will form a First Responder Committee with employees from the different levels of operations. Committee objectives are to detect, prevent and make recommendations to company representatives and employees. This committee will work in full collaboration with provincial and municipal regulations, codes and guidelines to provide fire suppression equipment on-site, prepare, exercise and implement an emergency response plan that includes fire and explosion prevention, notification and response. The committee will notify Manitoba Conservation immediately if a fire or explosion occurs. Every piece of mobile equipment will be equipped with one 10 lb ABC fire extinguisher. Rake, conditioner, profiler and vacuum harvesters will also be equipped with one 12 L galvanized steel bucket with a 3 m rope, as well as, one long handle round shovel. A mobile suction water pump with sufficient discharge hose to cover an 60 ha peat harvesting area will be installed. In areas without a natural water source, a filled water tank wagon will be on site. Other on-site equipment will also include fire blankets and water backpacks. Proposed follow-up includes regular inspections, including routine examination of fire suppression equipment, and periodic testing and evaluation of the emergency response plan, as well as, checking all fire fighting equipment twice a month by the First Responder Committee. During extreme dry weather conditions this check will be performed twice a week. Preventative measures will include regular employee education and training in the use of this equipment. The residual effects of the project on the risk of fire were determined to be not significant (Table 11).

6.3.7 Wildlife/Habitat

Site preparation and harvesting operation activities will result in loss and disturbance of wildlife habitat. The 1170 ha area proposed to be cleared is less than 3% of the regional study area in which there is abundant undisturbed habitat as this is a relatively undeveloped region. Therefore, the potential adverse effects of clearing on habitat loss were assessed to be minor.

Proposed mitigation measures include minimizing loss and disturbance of vegetation, limiting construction activities to designated areas, limit operation activities to areas disturbed during construction and re-vegetating disturbed or reclaimed areas during and after operation. Proposed follow-up involves periodic inspection during construction and operation, maintenance of re-vegetated areas, and ensuring adherence to environmental guidelines and protocols. The positive aspect of the proposed development is that restoration of a site often results in a wider diversity of flora and fauna which will result in a wider variety of wildlife and habitats. The residual effects of wildlife habitat loss and disturbance were determined to be not significant (Table 11).

Construction activities and equipment use during operation may have adverse effects on large, small and burrowing terrestrial mammals. Some of the mammals may adapt, whereas most will avoid the area and use the surrounding undisturbed habitat. Manitoba Conservation Data Centre had no records of any provincially rare of endangered wildlife species in the development area and none of the species observed on site were listed under COSEWIC or protected under SARA. Therefore the potential adverse effects were assessed to be minor. Proposed mitigation measures include minimizing the area of disturbance by limiting construction activities to designated areas, limit operation activities to areas disturbed during construction, maintaining habitat around the quarry leases and implementing a closure plan to restore wildlife habitat. Follow-up proposed includes maintenance of re-vegetated areas and ensuring adherence to licence terms and conditions. The residual effects were determined to be not significant (Table 11).

Vehicle traffic associated with site preparation and mining operation activities, in particular transporting peat, may result in increased vehicle – wildlife interactions and associated wildlife mortalities, vehicle damage, and human injury or death. No local data are available on wildlife mortalities, vehicle damage or human injury/deaths. The potential adverse environmental effect of peat mining operations on vehicle – wildlife interactions was assessed to be minor. Mitigation measures proposed to address the effects on wildlife-vehicle interactions include operating transport trucks during daylight hours, providing wildlife awareness information to drivers and adhering to posted speed limits. Proposed follow-up includes maintaining records of vehicle-wildlife interactions. The residual effect was determined to be not significant (Table 11).

Domestic waste materials at the bog facility may attract problem or nuisance wildlife to the development area. Problem or nuisance wildlife may include black bear, porcupine, skunk, rodents or raccoons. The potential environmental effect was assessed to be minor. Mitigation measures proposed include use of bear-proof garbage containers and regular disposal of waste at existing waste facilities. As required, animal deterrents such as noise-makers, reflectors and scents may be used. Proposed follow-up includes maintaining records of problem or nuisance wildlife and adhering to licence terms and conditions. The residual effect of problem or nuisance wildlife associated with the peat mining operation was determined to be not significant (Table 11).

The proposed project may result in the loss and disturbance of migratory bird and waterfowl habitat. In addition to the tree clearing the potential habitat disturbed consists of the Ranger Lakes, unnamed creeks connecting them and the unnamed lake along Beaver Creek. However, these areas will be protected by a 100 m buffer zone of no development which will maintain the existing vegetation and habitat. The potential adverse environmental effects of habitat loss were assessed to be minor. Proposed mitigation measures includes avoiding ponds in the peatland development area, minimizing loss and disturbance of vegetation around ponds by retaining a 100 m buffer zone, limiting construction activities to designated areas, limit operation activities to areas disturbed during construction, and re-vegetating disturbed or reclaimed areas during and after operation. Proposed follow-up involves periodic inspection during construction and operation for signs of potential effects, (if directed, a biologist will be contracted), maintenance of buffer zone and re-vegetated areas. The residual effects of loss and disturbance of migratory bird habitat were determined to be not significant (Table 11).

Noise and vibrations associated with heavy equipment use during construction and operation of the proposed peat development may result in the disturbance of migratory and other birds and waterfowl during nesting and rearing periods. Spring and early summer are the most critical times for most of these bird species. The clearing will be conducted during the winter outside of these critical times. Manitoba Conservation Data Centre had no records of any provincially rare or endangered bird or waterfowl species in the area. Additionally, during the bird survey completed during 2010 none of the bird species identified on site were provincially rare, listed by COSEWIC or protected under SARA. Therefore the potential adverse effects of peat mining construction and operation on birds were assessed to be minor. Proposed mitigation measures

include locating peat mining components away from any identified critical migratory bird habitat and scheduling construction activities outside of critical nesting and rearing periods. Proposed follow-up involves periodic inspection of bird nesting and rearing activities, observations of bird nesting and rearing success, (if directed, a biologist will be contracted) and adherence to licence terms and conditions. The positive aspect of the proposed development is that restoration of a site often results in increased diversity of flora and fauna, thus, an increase in the variety of migratory and other birds as well as in water fowl. The residual effects on bird nesting and rearing were determined to be not significant (Table 11).

Peatland construction and operation activities, in particular site drainage and equipment and vehicle use may have adverse effects on amphibians and reptiles and their habitat in the development area. Manitoba Conservation Data Centre had no records of any provincially rare or endangered amphibians and reptiles in the area. Additionally, during the 2010 field survey none of the amphibians and reptiles identified on site were provincially rare. However, the northern leopard frog was observed on site and it is listed under COSEWIC and SARA as a species of special concern (SC). This is defined as a wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats. As discussed in Section 4.1.11, this species remains widespread but is of special concern as it has experienced a considerable reduction of range and loss of populations in the past. The Northern Leopard Frog uses a variety of wetland habitats to meet its overwintering and breeding needs therefore the species is adversely affected by habitat fragmentation and conversion, including wetland drainage. While the proposed development will alter the existing bog area; the Ranger Lakes, unnamed creeks connecting them and the unnamed lake along Beaver Creek will have a buffer of 100 m. This buffer will provide a substantial area of habitat with emergent vegetation along the shorelines which should mitigate any potential effects of the project on the northern leopard frog. The potential adverse effects were generally assessed to be minor, although the effects of harvesting on habitat were assessed as moderate. Proposed mitigation includes minimizing the area of disturbance by limiting construction activities to designated areas, limit operation activities to areas disturbed during construction and minimizing loss and disturbance of vegetation around ponds by retaining a 100 m buffer zone. Follow-up proposed includes keeping records of amphibians and reptiles observed on the site. The residual effects of the project on amphibians and reptiles were determined to be not significant (Table 11).

6.3.8 Aquatic Biota/Habitat

Construction and operation of the proposed project may have adverse effects on aquatic biota and habitat in the development area. As noted in section 4.1.10, fish habitat is present in the Ranger Lakes and the drainage system from the Ranger Lakes as well as along Beaver Creek and the unnamed lake at the north end of the Ramsay Point Bog quarry leases. This available fish habitat is likely able to support forage species such as Canadian mudminnow, sculpin and stickleback; additionally sport fish such as northern pike and perch are likely to utilize the creeks. The presence of northern pike (juvenile and adult), white sucker, Canadian mud minnow, brook stickle back, and Johnny darter were confirmed during the fish sampling program. While these water bodies are connected to Lake Winnipeg located to the east of the proposed development there are substantial physical barriers, primarily beaver dams, that likely block passage except during the spring freshet. As such no fish were observed or captured on the water bodies upstream of these barriers with the exception of a single undersized adult perch captured in the Ranger Lakes. No development will occur within 100 m of any of these water bodies within the development area therefore, the concerns are primarily associated with the drainage from the development area as described in the following paragraph.

Drainage and harvesting activities during operation of the project could result in increased sediment loads to adjacent water bodies. Elevated levels of suspended sediment can reduce water quality, which may interfere with fish spawning, navigation and the ability to locate food and escape predators. Settling suspended particles can potentially smother and kill fish eggs or larvae. Sedimentation ponds have been designed, as described in Section 3.6.1, to treat peatland drainage water by slowing down the water flow to maximize the settlement of suspended peat particles. Sedimentation ponds will be constructed at the end of the main drainage ditches and will be equipped with a floating boom situated near the outlet to prevent escape of floating debris. Water leaving the sedimentation ponds through the outlet ditch will be drained into the natural drainage system. A control culvert with a sliding gate will be placed in the inlet ditch upstream of the pond that can be used to reduce or stop inflow to the sediment pond in the event of a major precipitation event, which exceeds the design flow criteria. The potential adverse effects of sediments on aquatic biota and habitat were assessed to be minor. No additional mitigation is proposed beyond the use of settling ponds. Follow-up measures included periodically inspecting sedimentation ponds for debris, cleaning of drainage ditches

and sedimentation ponds and monitoring water discharge on a monthly basis as previously detailed in Section 3.6.1. The residual effects were assessed to be not significant (Table 11).

Installation of a culvert required for the proposed Ramsay Point Bog access road to cross the PR 234 roadside ditch may have potential adverse effects on aquatic biota and habitat within the roadside ditch. Construction activities could result in a Harmful Alteration, Disruption or Destruction (HADD) of fish habitat and therefore a separate submission is being made to the DFO for project review. If a DFO authorization is required, then construction activities would not begin until it has been obtained. The potential adverse effects were determined to be moderate. Proposed mitigation includes following the Manitoba Stream Crossing Guidelines for the protection of Fish and Fish Habitat, following best management practices (regarding timing window, sediment/erosion control, revegetation of disturbed soils), and installing the culvert such that low flow connectivity is maintained (i.e. embedding the pipe below the ditch invert). Follow-up includes periodic inspection of the new culvert to ensure that fish passage is not blocked. The residual effect of disturbance to aquatic biota and habitat was determined to be not significant (Table 11).

6.4 SOCIO-ECONOMIC EFFECTS ASSESSMENT

6.4.1 Economic Conditions

The economy in the regional area surrounding the proposed development is dependent on fishing, forestry, tourism and recreational related activities and government operations. The peat harvesting industry currently also has a positive impact in the development area, employing residents from the surrounding communities, supporting local businesses, contracting local companies for service works (e.g. trucking, sewage and waste disposal) and supporting the local economy through payment of property taxes. The proposed project will bring additional employment and money into the regional area. The proposed peat mining operation will create a total of 30 jobs for residents in the surrounding communities. As noted in section 3.7, five positions will be permanent and full-time and 25 positions will be permanent and seasonal with employees working from April to November each year. Therefore, the potential effect to the regional economy was determined to be positive (Table 11). As such no mitigation or follow-up activities are proposed.

6.4.2 Business Opportunities

Additional business opportunities for local contractors will include the contract for harvesting merchantable timber, constructing the access road with culvert installation, transporting harvested peat, disposal of sewage and domestic wastes as well as the eventual restoration. The potential effects were determined to be positive (Table 11). As such no mitigation or follow-up measures have been proposed.

6.4.3 Traffic

Construction activities will result in a small and temporary increased traffic while peat transportation during operation will result in more substantial increased traffic volumes on PR 234. Transport trucks will deliver the peat from the bog area to the processing and packaging facility near Elma by travelling south on PR 234 to highway 8. During the first year of peat development at the Ramsay Point Bog operation approximately 301 truck loads would be required which is equivalent to approximately 10 trucks/week or 1.43 trucks/day based on the proposed 7 days/week operation schedule from April to October. An additional 301 trucks per year will be required to accommodate the proposed expansion of 60 ha per year. Once fully developed by 2032 and throughout the peak to 2042, approximately 5,870 truck loads would be required which is approximately 196 trucks/week or 28 trucks/day. Increased truck traffic along PR 234 will increase dust, will further degrade the road requiring more frequent road maintenance and has the potential to increase the number of vehicle accidents and vehicle-wildlife interactions. The potential adverse effects associated with the increased traffic were assessed to be moderate. Sun Gro has indicated they will contact MIT to discuss the issues associated with deterioration of the gravel highway, increased dust, and safety concerns. Proposed mitigation measures include dust control by using an approved suppressant such as water and by reducing the number of vehicles traveling on PR 234 during high wind events, directing all traffic associated with the development to drive according to road conditions and adhere to the posted speed limits, operating transport trucks during daylight hours and providing wildlife awareness information to drivers. Follow-up measures proposed include recording the number of vehicles traveling along PR 234 associated with the mine operation and any public complaints and vehicle accidents. Further action will be considered as warranted. The residual effect was determined to be not significant (Table 11).

6.4.4 Noise and Vibration

Construction and operation activities including the use of heavy equipment and transport trucks will result in increased noise and vibration levels in the local area, as well, the transport trucks along PR 234 will result in increased noise and vibration. There is a buffer zone of forest between the proposed development area and the Beaver Creek cottage development, Beaver Creek Bible Camp and the Beaver Creek Provincial Park. However, construction of the access road and the transport trucks will not be buffered and therefore, the potential adverse effects were assessed to be minor. Proposed mitigation includes muffling vehicles and equipment, limiting unnecessary long-term idling and requiring a high standard of maintenance for heavy equipment. Proposed follow-up involves monitoring and periodically tracking noise levels and public complaints. The residual effects of noise and vibration during construction and operating were determined to be not significant (Table 11).

6.4.5 Human Health

Due to the relatively sparse population density within the vicinity of the proposed peatland development, there are very few people that would be affected by the operational activities. Regardless, the increased noise, vibrations and dust generated from the increased traffic transporting peat will affect the public attitude toward the project and may adversely affect their well being. Additionally, with the increased traffic there is an increase risk of vehicle collisions that could adversely affect the public and workers health. The potential adverse effects on human health and general public attitude/well being were assessed to be moderate. Proposed mitigation measures include applying dust control such as water, reducing the number of vehicles traveling on PR 234 during high wind events, driving according to road conditions, adhering to the posted speed limits and operating transport trucks during daylight hours. Proposed follow-up involves monitoring dust and tracking any public complaints. Further action will be considered as warranted. The residual effect on human health was determined to be not significant (Table 11).

Indoor air quality inside the trailer and service garage facilities may potentially be affected by volatile organic carbons (VOCs) and carbon monoxide (CO), propane gas, dust, refrigerants and moulds. VOCs and CO in the maintenance garage are of particular concern. The potential

adverse effects of indoor air quality on human health were determined to be minor. Mitigation measures proposed include providing adequate ventilation and ensuring a high standard of facility and equipment maintenance. Follow-up includes regular maintenance of the facility and equipment. The residual effect was determined to be not significant (Table 11).

Construction and operation of the proposed peat development may have adverse effects on public and worker safety. Due to the remote location and limited access to the project site, security measures will be limited. Signs indicating 'No Trespassing' and locked gates will be placed on the main access road. Signs indicating open ditches and receiving drainage water areas will be installed next to the designated areas and visible to employees and trespassers. The gates will remain locked at night and during inactivity at the site. As well, the main ditches surrounding the harvesting areas will limit access to trespassers. With the exception of the access road construction, the potential adverse effects on public safety are negligible, whereas the effects on worker safety were assessed as minor. Proposed mitigation to reduce worker safety includes compliance with Manitoba Workplace Safety and Health regulations, development and enforcement of standard operation procedure guidelines, provision of training to employees and ensuring all visitors to the site have reported in and are accompanied by an employee. Follow-up proposed includes recording the occurrence of workplace accidents and updating employee training and safety guidelines as required. The residual effect was determined to be not significant (Table 11).

6.4.6 Aesthetic Values

The proposed peat mining operation is located in a relatively remote location with very few local residents and is unlikely to be seen by regional visitors. Additionally, Ramsay Point Bog is only accessible by the proposed new access road and well separated from the public by a buffer zone of forest. Therefore any potential effects of the project on aesthetics is primarily associated with the presence of the access road and transportation of peat. The increased truck traffic on gravel roads will contribute to covering vegetation in a layer of dust between rain events. The potential adverse effects of the project on aesthetic values were assessed to be minor. Proposed mitigation measures include utilizing dust control methods and covering loads during transport to and from the site. While not visible to the public re-vegetation of the peat fields in accordance with provisions in the mine closure plan will return the aesthetics in the area to a

natural environment after peatland operation. Proposed follow-up includes observing dust levels and debris and recording public complaints. Further action will be considered as warranted. The residual effect of decreased aesthetics was determined to be not significant (Table 11).

6.4.7 Areas of Interest

The proposed project is commensurate with the land use in the regional area as there is an active peat harvesting operation owned by Sunterra located approximately 5 km northeast of the proposed development. Additional land uses in the regional study area includes recreational land use through the Beaver Creek Provincial Park, cottage development along the shore of Lake Winnipeg and the Beaver Creek Bible Camp located at the confluence of Lake Winnipeg and Beaver Creek. With the measures proposed to mitigate the environmental effects of the project the effect on these recreational land uses will be negligible, except for the increased traffic along PR 234. The proposed development is also located within various areas of interest that include the Wildlife Management Area (WMA) of Moose Creek Provincial Forest, the Water Power Reserve and the Peguis First Nation Community Interest Zone. The proposed development will result in clearing a small portion of the forest in the Moose Creek WMA. Additionally, the proposed development will be making land within the CIZ that may be used for trapping and hunting no longer accessible to the Peguis First Nation. The potential adverse environmental effect of the project on these areas of interest were assessed as moderate. Proposed mitigation measures include limiting construction activities to designated areas, marking maximum clearing width of the proposed development site, protecting adjacent trees from blow-down and re-using timber from clearing. Follow-up measures include periodically tracking the site during construction for signs of potential disturbances and ensuring construction crews adhere to designated areas. Residual environmental effects of the proposed development site on land use and areas of interest were evaluated to be not significant (Table 11).

6.4.8 Recreation/Tourism

The areas that surround the proposed peat mining operation to the east and north are prominent tourism and recreation areas. The Beaver Creek Bible Camp, Beaver Creek Provincial Park and the existing cottage developments along Lake Winnipeg attract a large

number of visitors each year during the summer season. Recreational activities including water sports, fishing, camping and outdoor adventures in the area provide employment and income to the regional area. The potential adverse environmental effects of the peat mining operation on these recreational areas were assessed to be negligible due to the nature of the activities and the distance to these areas. However, as these attractions are all accessed along PR 234 the increased traffic associated with transporting peat was assessed as having a minor impact on tourism. Proposed mitigation measures are those previously outlined for controlling dust and driving safety which include applying dust control such as water, covering loads during transport to and from the site, reducing the number of vehicles traveling on PR 234 during high wind events, driving according to road conditions, adhering to the posted speed limits and operating transport trucks during daylight hours. Proposed follow-up includes tracking public complaints. Further action will be considered as warranted. The residual effect was determined to be not significant (Table 11).

6.4.9 Heritage Resources

Historic Resources Branch of Manitoba Conservation has indicated a low potential to impact significant resources and therefore has no concerns with the project [41]. In the event that heritage resources are discovered, construction will cease and Historic Resources Branch of Manitoba Culture, Heritage and Tourism will be notified immediately. If this occurs, construction will occur as directed by the Historic Resources Branch. Therefore, the potential for adverse environmental effects of the project on cultural resources is unlikely and assessed as not significant.

6.5 EFFECTS OF ACCIDENTS AND MALFUNCTIONS

6.5.1 Fires and Explosions

Fires and explosions may result from spontaneous combustion, lightning strikes, equipment malfunctions, improper handling and storage of hazardous materials, as well as various construction and operation activities. Diesel fuel and small quantities of gasoline are stored, transported and dispensed as part of peat mining operations. Small quantities of hazardous materials and potentially flammable materials will be stored on-site. Fires and explosions can

cause serious harm to staff, construction workers, contractors, the public and the environment. Project delays and increased costs to Sun Gro are possible. Potential adverse environmental effects of fires and explosions were assessed to be major. Proposed mitigation includes complying with applicable provincial and municipal legislation, codes and guidelines, forming and First Responder Committee, providing and testing fire suppression equipment on-site, preparing, exercising and implementing an emergency response plan that includes fire and explosion prevention, notification and response, regular employee training on use of equipment and notifying the Manitoba Conservation immediately if a fire or explosion occurs. Follow-up proposed includes adhering to licence terms and conditions, regular inspections, routine examination of fire suppression equipment, and periodic testing and evaluation of the emergency response plan. The residual effect of fires and explosions was determined to be not significant.

6.5.2 Transportation Accidents

Heavy equipment, specialty equipment, large trucks and support vehicles are used during peat mining operation activities. Construction equipment and some materials will be brought onto the project site during construction. Once the peat mining development is operational, large trucks will haul peat to the processing plant. There is a risk of accidents involving trucks and other vehicles accessing the peat mine sites operated by peat mine staff, the public and others. Accidents may also occur while transporting fuel and other materials onto the project site. The potential adverse effects of ground transportation accidents were assessed to be major. Mitigation proposed includes safe transportation routes, speed restrictions and signage, compliance with applicable provincial and municipal legislation, an emergency spill response plan that includes transportation accident prevention and response, and notification of Manitoba Conservation immediately if an accident occurs. Proposed follow-up includes adhering to licence terms and conditions, periodic testing and evaluation of the emergency response plan, ensuring that dangerous goods carriers are licensed and inspecting all shipments for compliance with regulatory requirements. The residual effect of ground transportation accidents on the environment was determined to be not significant.

6.5.3 Petroleum Spills

During peat mine site preparation and operation activities, there is potential for petroleum spills as a result of improper storage, negligent fuelling or collision by a vehicle. Spills of petroleum products from leaking vehicles and large trucks are also possible. Contamination of soil, surface water and groundwater, and impaired air quality could result depending on the type of product as well as the nature, size and location of the spill. There is also possibility that spills and releases can flow along drainage channels and into surrounding vegetation and water where drains are discharged. Indirect effects of a spill on worker and public health and safety are also concerns. Potential adverse environmental effects associated with spills were assessed to be moderate. Proposed mitigation includes preventing spills, releases and accidents, ensuring compliance with applicable provincial and municipal legislation, using double wall storage tanks, providing protective barriers around fuel storage tanks, using drip trays, preparing and implementing an emergency response plan that includes petroleum spill prevention, notification and response, and notifying Manitoba Conservation immediately if an spill occurs. Follow-up proposed includes remediation of petroleum spills, adhering to licence terms and conditions, periodic testing and evaluation of the emergency response plan, inspecting fuel storage tanks for compliance with regulatory requirements, and maintaining records of fuel volumes delivered and used. The residual effect of fuel spills was determined to be not significant.

6.5.4 Hazardous Substances Release

Hazardous substances may be released during site preparation and operation. Common hazardous substances include fuels (diesel, gasoline and propane), waste oils and lubricants as well as chemicals, paints and solvents. Releases of hazardous substances may impair air quality, cause soil, surface water and groundwater contamination, and affect worker and public health. Remediation of soil and groundwater contamination would be costly for Sun Gro and could result in project and operational delays. The potential adverse effects were assessed to be moderate. Proposed mitigation includes preventing spills, releases and accidents, ensuring compliance with applicable provincial legislation, guidelines, codes and best practices, using licensed contractors, preparing an emergency response plan that includes hazardous substance release prevention, notification and response, and notifying Manitoba Conservation immediately

if a release occurs. Follow-up adhering to licence terms and conditions, includes periodic testing and evaluation of the emergency response plan, inspecting hazardous substance storage for compliance with regulatory requirements, and maintaining waste manifests and tipping receipts. The residual effect of hazardous substances releases was determined to be not significant.

6.6 EFFECTS OF THE ENVIRONMENT ON THE PROJECT

6.6.1 Climate

The cold continental climate of southern Manitoba produces very harsh environmental conditions for buildings, infrastructure and facilities. The Pine Dock weather station, located approximately 30 km north-northeast, is the closest active weather station to the proposed peat mining project. The mean annual air temperature at the weather station is 1.1 ºC and the daily mean temperature ranges between 18.9 ºC in July and –19.7 ºC in January [(16)]. The highest temperature ever recorded was 34.4 ºC in July 1979 whereas the lowest was –48.9 ºC in February 1967 [(16)]. The proposed infrastructure at the peat harvesting facility must be designed to withstand extreme high and low temperatures, damaging winds, significant precipitation events and hail, and even tornadoes.

High wind velocities can cause increased dust and blow loose peat materials off the property. Mitigation measures include limiting stockpiled material during high wind events, orienting peat stockpiles in the prevailing wind direction to minimize the area exposed, observing wind directions before unloading and loading of peat, ensuring peat stockpiles has a crusted layer on top, using a tree or brush buffer to act as a windbreak, modifying and equipping peat harvesters to reduce peat dust emissions, covering peat transport trucks with tarps to eliminate dust emissions during transport, instructing employees in proper harvesting equipment operation to reduce dust emissions and suspending operations during high wind events. The residual effect of wind on the project was determined to be not significant.

Heavy rains or abrupt snowmelt can potentially flood the peatland area, cause soil erosion and create unsafe working conditions, slippery surfaces, and reduced visibility. The resulting high volumes of surface water runoff can erode off-site drainage channels and wash out roads and culverts. Proposed mitigation includes designing adequate drainage channels, installing

sedimentation ponds, providing additional on-site pumping capacity, suspending work during high precipitation events and including flooding in the emergency response plan. The residual effect of precipitation on the project was determined to be not significant.

Manitoba is in a low seismic hazard area in Canada. Further consideration of the effects of an earthquake on the project is not warranted in this environmental assessment.

6.6.2 Flooding

The proposed peatland development site is not normally subjected to significant overland flooding during spring runoff, or following significant precipitation events. The site is typically wet in low lying locations, but the peat does contain a large capacity for absorption, and the surface water within the site tends to drain towards the Ranger Lakes and Beaver Creek. Temporary flooding may occur from extreme precipitation events when on-site drainage becomes overwhelmed. Mitigation measures are the same as those proposed to deal with heavy rains as noted in Section 6.6.1. The residual effect of flooding on the proposed project was determined to be not significant.

6.6.3 Wildfire

Wildfire is common in the region, with mid-Boreal uplands ecoregion forest composition and succession stages largely controlled by forest fire. Operation and construction of the proposed project can potentially be interrupted in the event of a forest fire burning adjacent to the construction area. Forest fires risk the safety and health of workers and may damage equipment. Potential effects of wildfire on the construction and operation of the project were assessed to be minor. Proposed mitigation measures include providing fire suppression equipment at construction areas and within buildings during operation and implementing an emergency response plan that includes fire prevention, notification and response. Follow-up includes periodic testing of fire suppression equipment during construction and operation, periodic assessment of wildfire risk during construction and operation and periodically updating the emergency response plan. The residual effect of wildfires on the operation and construction of the project was determined to be not significant.

6.7 CUMULATIVE ENVIRONMENTAL EFFECTS

Cumulative environmental effects are defined as effects that are likely to result from the proposed project in combination with the effects of other projects or activities that have been or will be carried out in the foreseeable future [(35)]. The Canadian Environmental Assessment Agency advocates a 5-step approach for assessing cumulative environmental effects [(35)]. The methodology involves five sequential steps: 1) scoping, 2) analysis of effects, 3) identification of mitigation, 4) evaluation of significance, and 5) follow-up.

6.7.1 Scoping

Scoping for a cumulative effects assessment (Table 12) involves determining regional issues, selecting appropriate regional Valued Ecosystem Components (VECs), defining spatial and temporal boundaries, describing other actions that may affect the VECs and identifying environmental effects of actions on VECs.

Regional Issues

The main regional issues identified in relation to the proposed peat harvesting are as follows:

- Loss of wetlands
- Loss of wildlife habitat
- Loss of rare vegetative species
- Surface water quality/contamination
- Increased traffic
- Impacts on Recreation/Tourism
- Reclamation and restoration

Valued Environmental Components

Valued Environmental Components (VECs) are components of the natural and human world that are considered to be valuable and should receive specific consideration in an environmental assessment. Value may be attributed for ecological, economic, social, cultural,

aesthetic or ethical reasons. VECs in the regional study area for the proposed peatland development project include the following:

Air Quality

Air quality in the region is good and there are no industrial sources of pollution. Particulate matter from fields and roads is the major source of air contamination. There are no known exceedences of Manitoba's ambient air quality objectives. Pristine air quality is valued by rural Manitobans for health and aesthetic reasons.

Soils

Soils in the region are poorly drained forming wetlands therefore the area is less suitable for agriculture and the potential for forestry operations is limited due to the nature of wetlands, making it less economically feasible.

Surface Water Quality

Surface water quality in the region is generally good and there are no industrial sources of contamination. Pristine surface water quality is valued by Manitobans for consumption, agriculture and recreation, and is important for migratory birds and aquatic biota. Surface water in the vicinity of bogs tends to be slightly acidic as was confirmed during the baseline surface water monitoring (Section 4.1.6). The baseline monitoring also indicated that a few parameter concentrations in the surface water were elevated above the applicable MWQSOG and CCME criteria for the protection of freshwater aquatic life.

Groundwater Quality

According to GWDRILL logs in the Beaver Creek region in Manitoba, the groundwater is generally potable with no known exceedences of Manitoba's water quality standards, objectives and guidelines. Sunterra peat mining operation at Beaver Creek Bog is the only potential

industrial sources of contamination within 10 km of the proposed mining site. Pristine groundwater quality is valued by Manitobans for consumption, industry and agriculture.

Recreation/Tourism Economy

The recreation/tourism economy in the regional study area is growing in importance. The industry benefits from a pristine environment with abundant and diverse natural resources and a general absence of industrial or other commercial development.

Wildlife/Habitat

Native wildlife species play an important role in the recreation and tourism industry in the regional area. Additionally, hunting is one of the traditional land-uses by the First Nations.

Aquatic Biota/Habitat

Native fish species also play an important role in the tourism, recreation and fishing industries in the regional area. Fish and fish habitat are protected under the Fisheries Act.

Quality of Life

The rural quality of life is of value to Manitobans. The quality of life is characterized by a remote setting with open spaces, peace and quiet, clean air, water and soil, and a general absence of industrial or other commercial development.

Spatial and Temporal Boundaries

Spatial and temporal boundaries for the proposed mining project cumulative effects assessment are as follows:

Spatial Boundary

The regional study area, which includes the area within 10 km from the edges of the Ramsay Point Bog covers a total area of approximately 50,256 ha (Figure 2). Because of the isolated location of the proposed development the spatial boundary for the cumulative effects assessment has been increased and is the area bounded by PR 325 to the south, Fisher Bay to the northwest, Stefansons Bay to the north and Washow Bay to the East (approximately 122,500 ha).

Temporal Boundary

The temporal boundary for the cumulative effects assessment is the life expectancy of the proposed peat mining operation. This is estimated to be approximately 35 years of production. Following the expected decommissioning of the peat mining site, monitoring would continue for a number of years until outstanding environmental issues are addressed or Manitoba Conservation is satisfied.

Other Projects and Activities

Existing Projects and Activities

The proposed peat mining development is located in a relatively isolated area in the interlake area of Manitoba. The following is a list of known development, projects and activities in the cumulative effects spatial boundary:

- Sunterra; existing Beaver Creek Peat Mine
- Beaver Creek Provincial Park
- Beaver Creek Bible Camp
- Beaver Creek transfer station
- Communities/Cottage Developments: Pine Dock, Matheson Island, Calders Dock, Bullhead, Little Bullhead, Leaside Beach and Beaver Creek
- Commercial trucking along PR 234
- Road maintenance of PR 234 and park access roads
- Recreation including hunting, fishing and camping
- Airports: Pine Dock and Matheson Island

Proposed (Known) Projects and Activities

There are currently two peat harvesting companies investigating potential peat mining developments in the area. These are being carried out by Sunterra and Berger Peat Moss Ltd. (Berger) with both companies looking to develop peat mines near Little Deer Lake, north of Ramsay Point Bog. Sunterra is also looking at expanding their existing Beaver Creek Bog and developing a new mine at Little Bullhead Bog. Additionally, new cottage developments are also being developed near Mill Creek and Little Deer Lake.

Potential (Rumored) Projects and Activities

The area has substantial peat reserves with much of the area parceled out through quarry leases, thus there are several potential peat mine projects that may arise. These include potential peat mine developments by Premier Horticulture and Tourbiers-Lambert Inc. in addition to the other companies already noted to be developing in the area.

Environmental Effects

Environmental effects of the proposed peat mining development project are summarized in Table 11 and described in Sections 6.3 and 6.4 of this report. The potential environmental effects used in the cumulative effects assessment are listed below:

- Increased particulates
- Increased greenhouse gases, SO_2, NO_x, etc.
- Contamination of soils / surface water (hydrocarbons and hazardous materials)
- Loss of soil (harvested peat)
- Loss of wetlands
- Change in drainage pattern
- Change in receiving water quality (TSS, ph and nutrients)
- Loss and disturbance of terrestrial vegetation
- Loss and disturbance of terrestrial wildlife and habitat
- Loss and disturbance of birds/waterfowl and habitat
- Loss and disturbance of aquatic biota and habitat
- Increased traffic and deterioration of PR 234
- Impacts to public safety / human health
- Increased wildlife mortalities
- Improved regional social conditions
- Improved regional economic conditions

6.7.2 Analysis

Analysis involves additional baseline information, assessing the effects of the proposed development on VECs and assessing the effects cumulative of all developments, projects and activities on VECs.

Baseline Information

Hydraulic assessments were completed to determine the existing drainage patterns in the area. Samples were collected from water bodies / watercourses within the quarry leases, at downstream stations within the project study area, and at the confluence with the Lake Winnipeg which is the receiving water for all surface water leaving the subject property. Biological surveys were conducted to obtain lists of plant, wildlife, bird, amphibian and reptile species present on site and to describe the fish and fish habitat within the water bodies. Additionally during the peat investigations the composition of the soil underlying the peat was described.

Environmental Effects

Environmental effects associated with project activities for the proposed peat mining development project are identified in Table 11. Effects are identified for the site preparation, construction, operation and decommissioning stages of the peatland development project.

Cumulative Environmental Effects

Environmental effects of the proposed peat mining development project and environmental effects of other projects and activities occur within the cumulative effects assessment area (Table 12). As such, there is some potential for the effects of the proposed project to be cumulative with the effects of other projects and activities within this area. While these projects and activities overlay in time most of them do not overlap in space. Therefore most of the potentially cumulative effects are negligible and none of the cumulative effects identified were assessed as major. Cumulative effects identified that were assessed as potentially minor include the loss of soil (peat harvesting) and increased traffic on PR 234 with the associated

deterioration of the road. These effects were assessed as minor as they overlay in time and do overlap in space with the other regional projects and activities.

The effects at the existing Sunterra peat mine and the proposed Sunterra expansion and new peat mine for Berger would be similar to those at the proposed peat mine and would likely be mitigated in a similar fashion. The magnitudes of the residual effects of the proposed peat mining project and the effects of other projects and activities are small relative to each other and the regional study area. The proposed peat mine development only accounts for 1,170 ha of peatland while the existing and proposed Sunterra and Berger peat mine developments account for approximately 1,900 ha and 2,500 ha of peatland, respectively. The three developments combined only account for 5,570 ha of peatland, which is about 4.5 percent of the overall 122,500 ha of land within the cumulative effects assessment area. The effects assessed as minor include the loss of soil associated with harvesting peat and the increased traffic and deterioration of PR 234 associated with transporting peat which could be cumulative with the commercial trucking along PR 234.

6.7.3 Mitigation

No additional mitigation measures are required as a result of the cumulative effects assessment. The mitigation measures proposed already provides elimination, reduction and control of adverse environmental effects including any potential cumulative effects with the Sunterra and Berger peat mine developments. However, mitigation measures may be required if follow-up identifies any significant cumulative environmental effects.

6.7.4 Significance

Potential cumulative effects associated with the proposed peat mining development were determined to be not significant.

6.7.5 Follow-up

No additional follow-up is required as a result of the cumulative effects assessment. The already proposed follow-up measures would potentially identify if any cumulative effects occur associated with the Sunterra and Berger peat mine developments.

6.8 SUSTAINABILITY

6.8.1 Principles of Sustainable Development

Integration of Environmental and Economic Decisions

Economic decisions should adequately reflect environmental, human health and social effects, and environmental and health initiatives should adequately take into account economic, human health and social consequences. Sun Gro is committed to following the principles of sustainable development at all of their peat mine operations. The site selection process for the proposed facility considered environmental and human health protection issues, social effects, and economics of the site location.

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. Today's decisions are to be balanced with tomorrow's effects.

Sun Gro is committed to long-term management that provides economic benefit while ensuring the integrity of the development. The proposed peatland development will provide up to 5 full time jobs, numerous seasonal positions and additional contracts (transporting) over the next 35 years of peat mining. The natural soil conditions at the site will protect potential underlying groundwater sources. Site design will protect surface water quality and surrounding wildlife habitat. Long term effects on the environment, human health, and social well-being are expected to be negligible.

Shared Responsibility and Understanding

Manitobans should acknowledge responsibility for sustaining the economy, the environment, human health and social well-being, with each 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. Manitobans should consider the aspirations, needs and views of the people of the various geographical regions and ethnic groups in Manitoba, including Aboriginal peoples, to facilitate equitable management of Manitoba's common resources.

Sun Gro 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.

Prevention

Manitobans should anticipate, and prevent or mitigate, significant adverse economic, environmental, human health and social effects of decisions and actions, having particular careful regard to 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.

Sun Gro takes a proactive approach to prevent environmental and socio-economic effects by developing concrete policies and programs such as fire policy, health and safety and emergency response planning rather than reacting to effects after they occur. Sun Gro will complete environmental investigations and monitoring at the site as proposed and any additional monitoring specified in the Environmental Act License. Compliance monitoring will enable early detection of potential environmental issues at the site and allow for mitigation measures to be implemented.

Conservation and Enhancement

Manitobans should 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.

The proposed development will protect existing potential wildlife and fish habitat areas by creating buffer zones around water bodies and watercourses within the development area. Additional measures, such as maintaining low flow connectivity at crossings and ensuring protection against erosion and sedimentation, will be included in all stages of construction and development.

Rehabilitation and Reclamation

Manitobans should endeavor to repair damage to or degradation of the environment, and consider the need for rehabilitation and reclamation in future decisions and actions.

The closure plan for the proposed development will enable the entire site to be restored back to a functioning wetland supporting a more diverse collection of native species and their habitat.

Global Responsibility

Manitobans should think globally when acting locally, recognizing that there is economic, ecological and social interdependence among provinces and nations, and working 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 for the protection of the environment and local ecosystem. Because Sun Gro is an international company, environmental, human health, social, and economic issues will be addressed by Sun

Gro to ensure that the needs and concerns of the region are being met, while meeting their market need around the world.

6.8.2 Guidelines for Sustainable Development

Efficient Use of Resources

This means encouraging and facilitating development and application of systems for proper resource pricing, demand management and resource allocation together with incentives to encourage efficient use of resources, and employing full-cost accounting to provide better information for decision makers. Sun Gro encourages efficient use of resources and materials and its operations through standard operating procedures established through past experience gained at the Elma demonstration site.

Public Participation

This means establishing forums which encourage and provide opportunity for consultation and meaningful participation in decision making processes by Manitobans, 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 has been provided to the public in the region through various means including: telephone conversations with stakeholders and community representatives; a letter to the Peguis First Nation community; and a letter to the Beaver Creek Cottager's Association.

Access to Information

This means encouraging and facilitating the improvement and refinement of economic, environmental, human health and social information, and promoting the opportunity for equal and timely access to information by all Manitobans. To promote a greater understanding of their

peat operations, Sun Gro provides relevant information to governments, the public and their employees.

Integrated Decision-Making and Planning

This means encouraging and facilitating decision making and planning processes that are efficient, timely, accountable and cross-sector and which incorporate an inter-generational perspective of future needs and consequences. Sun Gro encourages involvement from all levels of the organization through team design which supports decision making at the most appropriate levels. Sun Gro will continue to work closely with communities, local and provincial governments as with existing bog sites.

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.

Sun Gro is committed to the environment and fully embraces these concepts through its operating procedures such as composting, re-using a variety of materials once considered waste and recycling. Sun Gro reduces their need for outside resources during access and bog road construction by using non-marketable timber and waste vegetation.

Research and Innovation

This means encouraging and assisting the researching, development, application and sharing of knowledge and technologies, which further our economic, environmental, human health and social well-being.

Sun Gro will monitor the site as directed in the Environmental Act License for the facility. The monitoring results submitted to Manitoba Conservation are public documents as is this EAP. Additionally, Sun Gro continually researches new innovations in mine restoration procedures.

7.0 MITIGATIVE SUMMARY

Mitigation is defined under the Canadian Environmental Assessment Act as the elimination, reduction and control of the adverse effects of a project and includes restitution for any damage to the environment caused by such effects through replacement, restoration, compensation or any other means. Mitigation measures for the proposed peat mining development are identified in Sections 6.3 and 6.4 and are summarized in Table 13. The nature of the mitigation measures, whether they are design, proposed, regulatory or management is shown in the table and described in the following sections.

7.1 DESIGN MITIGATION

Design mitigation includes measures that are either already included in the design of the proposed development or are to be addressed as a result of this environmental assessment. The design of the proposed development incorporates components, systems, controls and features that will mitigate potential adverse environmental effects typically associated with peat mining operations. Design mitigation for the proposed peat mining development are summarized in Table 13. Responsibility for implementing design mitigation rests with the proponent and their contractors.

7.2 PROPOSED MITIGATION

Proposed mitigation includes measures that are identified in the environmental assessment report to address potential adverse environmental effects. These mitigation measures, while not required by legislation, serve to eliminate, reduce and control potential adverse environmental effects and render them not significant. These measures are summarized in Table 13. For the most part, the measures are operational in nature and require incorporation into specifications for construction and standard operational procedures.

7.3 REGULATORY REQUIREMENTS

The proposed peatland development is subject to various federal and provincial environmental legislations. Regulatory requirements serve to mitigate adverse environmental effects, which

may have potentially significant environmental and human health consequences. Environmental legislation applicable to this development includes the following:

Manitoba

- *Environment Act*
  - Peat Smoke Control Regulation
  - Litter Regulation
  - Waste Disposal Grounds Regulation
- *The Mines and Minerals Act*
  - Operation of Mines Regulation
  - Mine Closure Regulation
- *Dangerous Goods Handling and Transportation Act*
  - Environmental Accident Reporting Regulations
  - Storage and Handling of Petroleum Products and Allied Products Regulation
  - Generator Registration and Carrier Licencing Regulation
  - Manifest Regulation
- *Public Health Act*
  - Atmospheric Pollution Regulation
  - Protection of Water Sources Regulation
- *Ozone Depleting Substances Act and Regulations*
- *The Forest Act*
  - Forest Use and Management Regulations
- *Workplace Safety and Health Act and Regulations*
- *Contaminated Sites Remediation Act*
- *Sustainable Development Act*
- *The Endangered Species Act*
- *The Highway Traffic Act and Regulations*
- *Water Protection Act*

Canada

- *Canadian Environmental Assessment Act* and Regulations
- *Canadian Environmental Protection Act* and Regulations
- *Fisheries Act*
- *Species at Risk Act*

Regulatory mitigation applies to site preparation activities, mining operations, transport and storage of hazardous substances, reporting of spills and accidental releases, reporting as a licence condition, worker and public safety, etc. Table 13 includes mitigation measures that are regulatory in nature.

Guidelines followed in the preparation of an EAP for peat mining developments include the following:

- Manitoba Water Quality Standards, Objectives, and Guidelines
- Canadian Council of Ministers of the Environment, Canadian Environmental Quality Guidelines, Summary of Guidelines for Fresh Water Aquatic Life
- Advice for the Preparation of an Environment Act Proposal for a Class 2 Peat Mining Development

7.4 MANAGEMENT PRACTICES

Good environmental management practices can further protect the environment and human health and safety from potentially adverse effects of peat mining site preparation and operation activities. While many of the practices are not required by legislation, various policies, guidelines and procedures exist that provide direction in relation to environmental protection, environmental stewardship and sustainable development principles and guidelines. Examples of good management practices are summarized in Table 13.

Implementation of mitigation measures proposed by Sun Gro will be carried out through development of an Environmental Protection Plan that includes mitigation measures, follow-up requirements, licence and permit terms and conditions, and other related requirements. The

Environmental Protection Plan also provides for effective integration of environmental assessment results into contract specifications and operational procedures.

7.5 CONTINGENCY PLANNING

Sun Gro will prepare and implement a contingency plan for the proposed peat mining development site at Ramsay Point Bog. The plan will include provisions for fires, explosions, accidents, malfunctions, spills, storms and floods. Sun Gro will form a fully functional team at the site made up of employees from all levels of the operation. The team will work closely with communities, local and provincial governments on regulations, codes and guidelines as well as implement emergency response procedures as with their existing bog sites. These procedures will include training in emergency preparedness and evacuation plans for such emergencies as fire and explosion.

7.6 CLOSURE PLAN

A closure plan for the proposed mining sites has been developed in accordance with requirements of Manitoba Regulation 67/99 of the Mines and Mineral Act [(12)]. The mine closure plan outlines the restoration of the site and all final closure activities and cost (Appendix C).

8.0 FOLLOW-UP

Follow-up is defined under the *Canadian Environmental Assessment Act* as a program to verify the accuracy of the environmental assessment of a project and determine the effectiveness of measures taken to mitigate the adverse environmental effects of the project. Follow-up requirements identified for the proposed peat mining development in Sections 6.3 and 6.4 are summarized in Table 14. The primary nature of the follow-up, whether they are inspecting, monitoring, record keeping or reporting is shown in the table and described in the following sections.

8.1 INSPECTING

Inspecting involves periodic or regular observations of the project and local area during site preparation, construction and operation activities to determine whether mitigation measures are implemented and if they are effective in eliminating, reducing or controlling adverse environmental effects. Inspecting includes surveillance to identify problems, issues and concerns, and environmental effects not predicted in the environmental assessment report. Inspections may involve the use of checklists and should be maintained at the project site. Inspection requirements for the proposed peatland development during site preparations and construction are summarized in Table 14. Sun Gro staff is typically responsible for most of the inspections during the site preparation and operation phases.

8.2 MONITORING

Monitoring includes periodic or regularly scheduled collection or sampling for environmental information in the development or project area. Monitoring may be required by the environmental assessment or it may become necessary as a result of inspections that are carried out after the assessment. Follow-up monitoring for the proposed development during site preparation includes surface water quality after spring thaw. Monitoring during site operation includes surface water quality at sedimentation ponds monthly, surface water quality in adjacent water bodies three times a year or as directed by Manitoba Conservation in the Environment Act Licence. Additionally, the Native Orchid Society will conduct an initial survey of the rare orchids outside of the development area before operations have begun at the proposed development.

Follow-up will include a survey one year after operations have begun and a final follow-up will occur in the third year of operation to ensure the specimens identified are surviving during the operation of the Ramsay Point Bog. Sun Gro is normally responsible for monitoring during the site preparation and operating phases.

8.3 RECORD KEEPING

Record keeping includes maintaining files and documentation related to mitigation measures and follow-up implemented as well as recording public complaints. Record keeping requirements for the proposed development include monitoring and tracking complaints from local residents, submission of Material Safety Data Sheets (MSDSs) for all products used, number of vehicle-wildlife interactions, number of problem or nuisance wildlife situations, number of amphibians and reptiles observed on the site, fuel volumes delivered and used, maintaining peat transportation manifests, number of monitoring and testing samples collected and analytical data generated, details of incidents requiring implementation of the emergency response plan and updating the emergency response plan following testing.

8.4 REPORTING

Reporting in the context of environmental assessment follow-up includes documentation and communication that mitigation measures and follow-up are implemented and whether or not they have been effective. Such reports are normally required by the Manitoba Conservation Environment Act Licence and are placed in the public registry for the project. Reporting is also required in the event of an accidental spill or release of hazardous substances. Reporting requirements for the proposed development will also likely include an annual compliance surface water quality report, summary of annual generation of peat and a detailed report following incidents that require implementation of the emergency response plan. Sun Gro will be responsible for submitting all required reports to Manitoba Conservation as specified in the Environment Act Licence.

9.0 CONCLUSIONS

The Environmental Act Proposal (EAP) for the proposed peatland development project was prepared based on project information provided by Sun Gro. The report followed the requirements of the *Environmental Assessment and Licencing Process Under the Manitoba Environment Act*. A peat mining operation such as the one proposed by Sun Gro is considered a mining development under Manitoba Regulation 164/88 and therefore considered a Class 2 Development. The EAP was also completed in accordance with Manitoba Conservation's *Advice for the Preparation of an Environment Act Proposal for a Class 2 Peat Mining Development*.

The EAP was carried out using available biophysical, social and economic information for the regional assessment area. Potential environmental effects of the proposed peatland development were identified using scoping methods, interaction matrix techniques, public comments, advice from specialists and professional judgment. Direct biophysical effects and indirect social and economic effects were identified in accordance with the *Canadian Environmental Assessment Act*. Cumulative environmental effects for the project were also considered. Mitigation measures were identified to eliminate, reduce and control environmental effects determined to be adverse. Follow-up was proposed to verify accuracy of the assessment and determine effectiveness of the mitigation measures. Significance of the residual environmental effects remaining after mitigation was then evaluated.

The proposed peat mining operation at Ramsay Point Bog, will not likely result in significant adverse environmental effects based on the available information on the project and the environment, the assessment of environmental effects outlined in this EAP, and the application of proposed mitigation measures and the conduct of required follow-up. Similarly, the cumulative environmental effects of the project in combination with the effects of other projects or activities that have been and will likely be carried out in the reasonably foreseeable future were determined to be not significant.

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TABLES

TABLE 1
ESTIMATED PEAT PRODUCTION SCHEDULE
RAMSAY POINT PEAT MINE DEVELOPMENT

Production Year	Harvest Area (ha)	Total Volume (m^3) Harvested/Year	Truck Loads/Year
2013	60	51,000	301
2014	120	102,000	602
2015	180	153,000	903
2016	240	204,000	1,204
2017	300	255,000	1,505
2018	360	306,000	1,806
2019	420	357,000	2,107
2020	480	408,000	2,408
2021	540	459,000	2,709
2022	600	510,000	3,010
2023	660	561,000	3,311
2024	720	612,000	3,612
2025	780	663,000	3,913
2026	840	714,000	4,214
2027	900	765,000	4,515
2028	960	816,000	4,816
2029	1,020	867,000	5,117
2030	1,080	918,000	5,418
2031	1,140	969,000	5,719
2032	1,170	994,500	5,870

Note:

1. The total of 5870 truck loads per year will occur during the peak operation between 2032 and 2042.

TABLE 3
GENERAL WATER QUALITY
RAMSAY POINT PEAT MINE DEVELOPMENT

Sample No.	Date	Water Source	Parameters [1]																	
			pH (units)	E.C. (µS/cm)	Alkalinity as $CaCO_3$	Bicarbonate as $CaCO_3$	Carbonate as $CaCO_3$	Hydroxide as $CaCO_3$	Hardness as $CaCO_3$	Sulphate	Ortho-phosphate as P	Ammonia (as N)	Nitrate & Nitrite (as N)	B.O.D.	Total Phosphorus	Total Dissolved Phosphorus	Total Pariculate Phosphorus	T.D.S.	T.S.S.	T.K.N.	Acidity
Laboratory Detection Limits			*0.1*	*0.4*	*1*	*2*	*0.6*	*0.4*	*0.3*	*9*	*0.01*	*0.05*	*0.05*	*1*	*0.003*	*0.003*	*0.003*	*5*	*5*	*0.2*	*1*
P-RAM 1	21-Jun-10	Peat Bog	**<u>3.94</u>**	59.1	<1.0	<2.0	<0.60	<0.40	6.1	30.3	<0.010	<0.050	<0.050	1.6	0.0208	0.0185	<0.0030	108	<5.0	1.04	<25
P-RAM 2	21-Jun-10	Peat Bog	**<u>4.06</u>**	51.5	<1.0	<2.0	<0.60	<0.40	16.7	36.7	0.0174	0.191	<0.050	60	0.08	0.0395	0.0405	104	865	8.4	40
P-RAM 3	21-Jun-10	Peat Bog	**<u>3.92</u>**	61.3	<1.0	<2.0	<0.60	<0.40	7.49	24.9	<0.010	0.081	<0.050	6.6	0.165	0.0251	0.14	114	82	1.71	24.7
R1	21-Jun-10	Ranger Lakes	**<u>6.07</u>**	25.9	6.3	7.7	<0.60	<0.40	11.2	20.1	0.0176	0.058	0.055	1.3	0.041	0.0383	<0.0030	68	<5.0	0.76	4.4
R2	21-Jun-10	Ranger Lakes	6.84	30.9	10.9	13.3	<0.60	<0.40	13.8	13.5	0.0105	<0.050	<0.050	5.4	0.0587	0.0248	0.0339	62	19	1.06	2.3
R3	21-Jun-10	Ranger Lakes	7.39	98	45	54.9	<0.60	<0.40	54.2	11.9	<0.010	<0.050	<0.050	<1.0	0.0155	0.0132	<0.0030	82	<5.0	1.01	1.5
BC-1	21-Jun-10	Beaver Creek	7.21	68.1	30.8	37.6	<0.60	<0.40	36.9	16.2	<0.010	<0.050	<0.050	1.5	0.0142	0.0118	<0.0030	100	<5.0	0.74	2.1
	Field Dup.(DUP-1)	Beaver Creek	7.20	68.4	30.9	37.6	<0.60	<0.40	37.5	13.3	<0.010	<0.050	<0.050	1.5	0.0144	0.0112	0.0032	88	<5.0	0.86	2.7
BC-2	21-Jun-10	Beaver Creek	7.14	82.6	32.8	40	<0.60	<0.40	46.6	17.9	<0.010	<0.050	<0.050	1.6	0.0244	0.0147	0.0097	124	<5.0	1	3.1
BC-3	21-Jun-10	Lake Winnipeg	7.27	89.6	34.5	42	<0.60	<0.40	50.3	18.4	<0.010	<0.050	<0.050	1.7	0.0187	0.0149	0.0038	122	<5.0	1	2.5
R4	21-Jun-10	Lake Winnipeg	7.47	110	47.6	58	<0.60	<0.40	59.6	12.9	<0.010	<0.050	<0.050	1.3	0.0176	0.0137	0.0039	92	<5.0	0.91	1.7
Manitoba Surface Water Quality Objectives [2]																					
Freshwater Aquatic Life			6.5 - 9.0	-	-	-	-	-	-	-	-	[4]	-	-	-	-	-	-	-	[6]	-	-
CCME [3]																					
Freshwater Aquatic Life			6.5 - 9.0	-	-	-	-	-	-	-	-	1.54 [5]	-	-	-	-	-	-	-	-	-

Notes:
"-" = No Data
E.C. = Electrical Conductivity
B.O.D. = Biochemical Oxygen Demand
T.K.N. = Total Kjeldahl Nitrogen
T.D.S. = Total Dissolved Solids
T.S.S. = Total Suspended Solids

1. All values are expressed in milligrams per litre (mg/L) unless indicated otherwise.
2. Manitoba Surface Water Quality Objectives, Manitoba Conservation Report 2002-11, Manitoba Water Quality Standards, Objectives, and Guidelines (MWQSOG), November 22, 2002.
3. CCME 2007 - Canadian Council of Ministers of the Environment. Canadian Environmental Quality Guidelines, 1999. Update 7.0 - 2009.
   Guidelines for Canadian Drinking Water Quality.
   Chapter 4 - Aquatic Life
4. See Tier II Water Quality Objective.
5. Ammonia as N is pH and Temperature dependant. See Factsheet for details.
6. <u>Total Suspended Sediment Tier II</u>
   - Background TSS less than or equal to 25 mg/L: 5 mg/L induced change from background (30 day averaging duration)
   - Background TSS less than or equal to 250 mg/L: 25 mg/L induced change from background (1 day averaging duration)
   - Background TSS greater than 250 mg/L: 10% induced change from background (1 day averaging duration)

BOLD	- Exceedance of MWQSOG Freshwater Aquatic Life
Underline	- Exceedance of CCME Freshwater Aquatic Life

TABLE 4
METALS IN WATER
RAMSAY POINT PEAT MINE DEVELOPMENT

Sample No.	Date	Water Source	Parameter [1]																	
			Aluminum	Antimony	Arsenic	Barium	Beryllium	Bismuth	Boron	Cadmium	Calcium	Cesium	Chromium	Cobalt	Copper	Iron	Lead	Lithium	Magnesium	Manganese	Molybdenum
P-RAM 1	21-Jun-10	Peat Bog	0.2200	<0.0002	0.00101	0.00289	<0.0002	<0.0002	<0.010	0.000023	1.06	<0.00010	<0.001	<0.00020	0.00024	**0.323**	**0.000649**	<0.0020	0.841	0.01810	<0.0002
P-RAM 2	21-Jun-10	Peat Bog	1.3800	<0.0002	0.00230	0.05940	<0.0002	<0.0002	<0.010	0.000163	3.83	0.00038	<0.001	0.00056	0.00246	**2.100**	**0.006800**	0.0024	1.740	0.10100	<0.0002
P-RAM 3	21-Jun-10	Peat Bog	0.2900	<0.0002	0.00101	0.01100	<0.0002	<0.0002	<0.010	0.000055	1.23	0.00046	<0.001	<0.00020	0.00082	**0.524**	**0.001730**	<0.0020	1.070	0.01590	<0.0002
R1	21-Jun-10	Ranger Lakes	0.1250	<0.0002	0.00128	0.00378	<0.0002	<0.0002	<0.010	0.000010	2.06	<0.00010	<0.001	<0.00020	<0.00020	**0.349**	0.000184	<0.0020	1.480	0.03850	<0.0002
R2	21-Jun-10	Ranger Lakes	0.0837	<0.0002	0.00100	0.00397	<0.0002	<0.0002	<0.010	<0.000010	2.60	<0.00010	<0.001	<0.00020	0.00027	0.118	0.000265	0.0022	1.760	0.02800	<0.0002
R3	21-Jun-10	Ranger Lakes	0.0653	<0.0002	0.00037	0.00284	<0.0002	<0.0002	0.011	<0.000010	8.86	<0.00010	<0.001	<0.00020	<0.00020	0.058	<0.000090	0.0048	7.800	0.00637	<0.0002
BC-1	21-Jun-10	Beaver Creek	0.0227	<0.0002	0.00043	0.00144	<0.0002	<0.0002	<0.010	<0.000010	6.12	<0.00010	<0.001	<0.00020	<0.00020	0.048	<0.000090	0.0037	5.250	0.00721	<0.0002
	Field Dup.(DUP-1)	Beaver Creek	0.0224	<0.0002	0.00042	0.00147	<0.0002	<0.0002	<0.010	<0.000010	6.23	<0.00010	<0.001	<0.00020	<0.00020	0.046	<0.000090	0.0044	5.330	0.00714	<0.0002
BC-2	21-Jun-10	Beaver Creek	**0.1300**	<0.0002	0.00062	0.00515	<0.0002	<0.0002	<0.010	<0.000010	7.92	<0.00010	<0.001	<0.00020	0.00086	**0.366**	<0.000090	0.0059	6.520	0.01420	<0.0002
BC-3	21-Jun-10	Lake Winnipeg	**0.1540**	<0.0002	0.00063	0.00386	<0.0002	<0.0002	<0.010	<0.000010	8.78	<0.00010	<0.001	<0.00020	0.00032	0.250	<0.000090	0.0053	6.900	0.01030	<0.0002
R4	21-Jun-10	Lake Winnipeg	0.0833	<0.0002	0.00043	0.00343	<0.0002	<0.0002	0.011	<0.000010	10.30	<0.00010	<0.001	<0.00020	0.00035	0.084	0.000266	0.0058	8.230	0.01100	<0.0002
Laboratory Detection Limits			*0.005*	*0.0002*	*0.0002*	*0.0002*	*0.0002*	*0.0002*	*0.01*	*0.00001*	*0.1*	*0.0001*	<0.001	*0.0002*	*0.0002*	*0.02*	*0.00009*	*0.002*	*0.01*	*0.0003*	*0.0002*
MWQSOG [2]																					
Freshwater Aquatic Life			0.1 [4]	-	[5]	-	-	-	-	[6]	-	-	-	-	[6]	0.3	[6]	-	-	-	0.073
CCME [5]																					
Freshwater Aquatic Life			0.005 - 0.1 [7]	-	0.005	-	-	-	29 [8] 1.5 [9]	0.000017	-	-	0.0089 (III), 0.001 (VI)	-	0.002 - 0.004 [10]	0.3	0.001 - 0.007 [10]	-	-	-	0.073

Sample No.	Date	Water Source	Parameter [1]																	
			Nickel	Phosphorus	Potassium	Rubidium	Selenium	Silicon	Silver	Sodium	Strontium	Tellurium	Thallium	Thorium	Tin	Titanium	Tungsten	Uranium	Vanadium	Zinc	Zirconium
P-RAM 1	21-Jun-10	Peat Bog	<0.002	<0.20	0.313	0.00085	<0.001	3.250	<0.0001	0.762	0.00366	<0.0002	<0.0001	<0.0001	<0.0002	0.00259	<0.001	<0.00010	0.00079	<0.0050	<0.0004
P-RAM 2	21-Jun-10	Peat Bog	<0.002	0.68	3.190	0.00871	<0.001	4.700	<0.0001	0.814	0.01880	<0.0002	<0.0001	<0.0001	<0.0002	0.03510	<0.001	<0.00010	0.00263	0.0239	<0.0004
P-RAM 3	21-Jun-10	Peat Bog	<0.002	0.34	2.150	0.00749	<0.001	3.710	<0.0001	0.726	0.00276	<0.0002	<0.0001	<0.0001	<0.0002	0.00336	<0.001	<0.00010	0.00075	0.0090	<0.0004
R1	21-Jun-10	Ranger Lakes	<0.002	<0.20	0.907	0.00205	<0.001	1.390	<0.0001	1.270	0.00876	<0.0002	<0.0001	<0.0001	<0.0002	0.00127	<0.001	<0.00010	0.00053	<0.0050	<0.0004
R2	21-Jun-10	Ranger Lakes	<0.002	<0.20	0.948	0.00191	<0.001	0.532	<0.0001	1.340	0.01170	<0.0002	<0.0001	<0.0001	<0.0002	0.00113	<0.001	<0.00010	0.00042	<0.0050	<0.0004
R3	21-Jun-10	Ranger Lakes	<0.002	<0.20	0.400	0.00075	<0.001	2.300	<0.0001	2.180	0.03490	<0.0002	<0.0001	<0.0001	<0.0002	0.00251	<0.001	<0.00010	0.00028	<0.0050	<0.0004
BC-1	21-Jun-10	Beaver Creek	<0.002	<0.20	0.393	0.00069	<0.001	2.210	<0.0001	2.000	0.01990	<0.0002	<0.0001	<0.0001	<0.0002	0.00044	<0.001	<0.00010	<0.00020	<0.0050	<0.0004
	Field Dup.(DUP-1)	Beaver Creek	<0.002	<0.20	0.388	0.00070	<0.001	2.240	<0.0001	2.060	0.02000	<0.0002	<0.0001	<0.0001	<0.0002	0.00039	<0.001	<0.00010	<0.00020	<0.0050	<0.0004
BC-2	21-Jun-10	Beaver Creek	<0.002	<0.20	0.319	0.00072	<0.001	3.570	<0.0001	2.440	0.03180	<0.0002	<0.0001	<0.0001	<0.0002	0.00341	<0.001	0.00012	0.00047	<0.0050	<0.0004
BC-3	21-Jun-10	Lake Winnipeg	<0.002	<0.20	0.325	0.00073	<0.001	2.900	<0.0001	2.530	0.03410	<0.0002	<0.0001	<0.0001	<0.0002	0.00465	<0.001	0.00017	0.00053	<0.0050	<0.0004
R4	21-Jun-10	Lake Winnipeg	<0.002	<0.20	0.415	0.00075	<0.001	2.430	<0.0001	2.340	0.03680	<0.0002	<0.0001	<0.0001	<0.0002	0.00308	<0.001	<0.00010	0.00035	<0.0050	<0.0004
Laboratory Detection Limits			*0.002*	*0.2*	*0.02*	*0.0002*	*0.001*	*0.05*	*0.0001*	*0.03*	*0.0001*	*0.0002*	*0.0001*	*0.0001*	*0.0002*	*0.0002*	*0.001*	*0.0001*	*0.0002*	*0.005*	*0.0004*
MWQSOG [2]																					
Freshwater Aquatic Life			[6]	-	-	-	0.001	-	0.0001	-	-	-	0.0008	-	-	-	-	-	-	[6]	-
CCME [3]																					
Freshwater Aquatic Life			0.025 - 0.15 [10]	-	-	-	0.001	-	0.0001	-	-	-	0.0008	-	-	-	-	-	-	0.03	-

TABLE 4
METALS IN WATER
RAMSAY POINT PEAT MINE DEVELOPMENT

Notes:

1. All values are expressed in milligrams per litre (mg/L).
2. Manitoba Surface Water Quality Objectives, Manitoba Conservation Report 2002-11, Manitoba Water Quality Standards, Objectives, and Guidelines (MWQSOG), November 22, 2002.
3. CCME 2007 - Canadian Council of Ministers of the Environment. Canadian Environmental Quality Guidelines, 1999. Update 7.1 - 2009.
   Guidelines for Canadian Drinking Water Quality. Chapter 4 - Aquatic Life
4. The concentration of total aluminum should not exceed 0.1 mg/L in waters with a pH greater than 6.5.
5. Arsenic Tier II Objectives:
   0.15 mg/L = Duration 4 Days, Not more than once each 3 years, on average
   0.34 mg/L = Duration 1 Hour, Not more than once each 3 years, on average
6. See Tier II Objectives for calculations (averaging 4 day duration).

Sample No.	*Hardness*	*Cadmium*	*Copper*	*Lead*	*Nickel*	*Zinc*
P-RAM 1	6.1	0.000281	0.000821	0.00011	0.0049	0.011
P-RAM 2	16.7	0.000594	0.001940	0.00034	0.0114	0.026
P-RAM 3	7.5	0.000327	0.000978	0.00014	0.0058	0.013
R1	11.2	0.000442	0.001379	0.00022	0.0082	0.018
R2	13.8	0.000516	0.001649	0.00028	0.0097	0.022
R3	54.2	0.001423	0.005306	0.00128	0.0310	0.070
BC-1	36.9	0.001070	0.003821	0.00084	0.0224	0.051
BC-2	46.6	0.001272	0.004664	0.00109	0.0273	0.062
BC-3	50.3	0.001346	0.004978	0.00118	0.0291	0.066
R4	59.6	0.001526	0.005755	0.00143	0.0336	0.076

7. Total aluminum should not exceed 0.005 mg/L in waters with a pH below 6.5.
   The concentration of total aluminum should not exceed 0.1 mg/L in waters with a pH greater or equal to 6.5.
8. Short-term exposure periods (24 to 96 hours) on the impacts of severe transient situations (spill events to aquatic receiving environments and infrequent releases of short-lived/non persistent substances).
9. Long-term exposure guidelines that protect all forms of aquatic life for indefinite exposure periods (>7d exposures for fish and invertebrates, 24h exposures for aquatic plants and algae).
10. a. Copper Guideline b. Lead guideline c. Nickel guideline

Copper Criteria	Hardness as CaCO3
0.002	0-120
0.003	120-180
0.004	>180

Lead Criteria	Hardness as CaCO3
0.001	0-60
0.002	60-120
0.004	120-180
0.007	>180

Nickel Criteria	Hardness as CaCO3
0.025	0-60
0.065	60-120
0.11	120-180
0.15	>180

BOLD - Exceedance of MWQSOG Freshwater Aquatic Life Criteria
UNDERLINE - Exceedance of CCME Freshwater Aquatic Life Criteria

TABLE 5
VEGETATION SPECIES LIST
RAMSAY POINT PEAT MINE DEVELOPMENT

Species		Status		
Common Name	**Scientific name**	**Provincial (S)**	**COESWIC**	**National (G)**
Non Vascular Species				
Mosses				
Beaked moss*	*Eurynchium* spp.	-	-	-
Broom moss	*Dicranum* spp.	-	-	-
Feather moss	*Pleurzium schreberi*	SNR	-	G5
Hair-cap moss	*Polytrichum* spp.	-	-	-
Knight's-plume	*Ptillium crista-castrensis*	SNR	-	G5
Marsh magnificent moss*	*Plagiomnium* spp.	-	-	-
Neckera (no common name)*	*Neckera pennata*	SNR		G5
Peat moss	*Sphagnum* spp.	-	-	-
Shaggy moss	*Rhytidiadelphus triquetrus*	SNR		G5
Stairstep moss	*Hylocomium splendens*	SNR	-	G5
Stiff clubmoss	*Lycopodium annotinum*	S5	-	G5
Tree climacium moss*	*Climacium dendroides*	SNR	-	G5
Lichens				
Grey reindeer lichen	*Cladina rangiferina*	SNR	-	G5
Leaf lichen*	*Peltigera* spp.	-	-	-
Old man's beard	*Usnea* spp.	-	-	-
Pixie-cup	*Cladonia* spp.	-	-	-
Red pixie-cup	*Cladonia borealis*	SNR	-	G5
Vascular Species				
Woody Specimens -Trees				
Balsam fir*	*Abies balsamea*	S5	-	G5
Balsam poplar*	*Populus balsamea*	S5	-	G5
Black spruce	*Picea mariana*	S5	-	G5
Paper birch*	*Betula papyrifera*	S5	-	G5
Tamarak	*Larix laricina*	S5	-	G5
White spruce*	*Picea glauca*	S5	-	G5
Woody Specimens - Shrubs				
Beaked hazelnut*	*Corylus cornuta*	S5	-	G5
Bog rosemary	*Andromeda glaucophylla*	S4	-	G5T5
Canada gooseberry*	*Ribes oxyacanthoides*	S5		G5
Common Labrador tea	*Ledum groenlandicum*	S5	-	G5
Creeping snowberry	*Gaultheria hispidula*	S5	-	G5
Dwarf red raspberry*	*Rubus pubescens*	S5	-	G5
Leatherleaf	*Chamaedaphne calyculata*	S5	-	G5
Mountain ash*	*Sorbus scopulina*	-	-	G5
Mountain cranberry	*Vaccinium vitis-idaea*	S5	-	G5
Mountain maple*	*Acer spicatum*	S5	-	G5
Narrowleaf white meadowsweet	*Spiraea alba*	S5	-	G5
Pale laurel	*Kalmia Polifolia*	S5	-	G5
Red raspberry*	*Rubus idaeus*	S5	-	G5
Skunk currant*	*Ribes glandulosum*	S5	-	G5
Small cranberry	*Oxycoccus microcarpus*	S5	-	G5
Speckled alder	*Alnus rugosa*	S5	-	G5T5
Squashberry*	*Viburnum edule*	S5	-	G5
Swamp birch*	*Betula pumila*	S5	-	G5
Sweet bayberry	*Myirca gale*	S5	-	G5
Woods rose*	*Rosa woodsii*	S4	-	G5

TABLE 5
VEGETATION SPECIES LIST
RAMSAY POINT PEAT MINE DEVELOPMENT

Species		Status		
Common Name	**Scientific name**	**Provincial (S)**	**COESWIC**	**National (G)**
Vascular Species cont.				
Grassy Species				
Beaked sedge	*Carex rostratum*	S4	-	G5
Bebb's sedge	*Carex bebbii*	S5	-	G5
Blue-joint reedgrass	*Calamagrostis canadensis*	S5	-	G5
Broadleaf cattail	*Typha latifolia*	S5	-	G5
Hardstem bulrush	*Scirpus acutus*	S4	-	G5T5
Lake-bank sedge	*Carex lacustris*	S5	-	G5
Mud sedge	*Carex limosa*	S5	-	G5
Narrowleaf cotton-grass	*Eriophorum angustifolium*	S5	-	G5
Pod grass	*Scheuchzeria palustris*	S4	-	G5
Slender wood reedgrass*	*Cinnia latifolia*	S5	-	G5
Herbaceous				
Arrowleaf sweet-colt's-foot	*Petasites sagittatus*	S5		G5
Blue flag	*Iris versicolor*	S4	-	G5
Bog buckbean	*Menyanthes trifoliata*	S5	-	G5
Cloudberry	*Rubus chamaemorus*	S5	-	G5
Dwarf dogwood*	*Cornus canadensis*	S5	-	G5
Dwarf scouring rush*	*Equisetum scirpoides*	S5	-	G5
False solomon's seal	*Maianthemum stellatum*	S5	-	G5
Hooded scullcap	*Scutellaria galericulata*	S5	-	G5
Lesser bladderwort	*Utricularia minor*	S3	-	G5
Lindley's aster*	*Symphyotrichum ciliolatum*	S5	-	G5
Marsh bellflower	*Campanula aparinoides*	S5	-	G5
Marsh cinqfoil	*Comarum palustre*	S5	-	G5
Marsh-marigold	*Caltha palustris*	S5	-	G5
Naked bishop's cap*	*Mitella nuda*	S5	-	G5
Nodding begger's ticks	*Bidens cernua*	S5	-	G5
Northern bedstraw*	*Galium boreal*	S5	-	G5
Northern pitcherplant	*Sarracenia purpurea*	S5	-	G5
Northern starflower	*Trientalis borealis*	S5	-	G5
One flowered wintergreen*	*Monesis uniflora*	S5	-	G5
One-sided wintergreen*	*Orthilia secunda*	S5	-	G5
Palmate-Leaved Coltsfoot	*Petasites palmatus*	S5	-	G5T5
Pink wintergreen*	*Pyrola asarifolia*	S5	-	G5
Red baneberry*	*Actea rubra*	S5	-	G5
Roundleaf sundew	*Drosera rotundifolia*	S5	-	G5
Running club moss*	*Lycopodium clavatum*	S4	-	G5
Small enchanter's-nightshade*	*Circaea alpina*	S5	-	G5
Small northern bog orchid*	*Platanthera obtusata*	S5	-	G5
Sweet-scent bedstraw*	*Galium triflorum*	S5	-	G5
Tall bluebells*	*Mertenzia paniculata*	S5	-	G5
Three-leaved solomon's seal	*Maianthemum trifolium*	S5	-	G5
Tuberous grass-pink	*Calopogon tuberosus*	S2	-	G5
Twinflower*	*Linnaea borealis*	S5	-	G5
White-adder's mouth	*Malaxis brachypoda*	SNR	-	G4Q
Wild Calla	*Calla palustris*	S5	-	G5
Wild lily-of-the-valley*	*Maianthemum canadensis*	S5	-	G5
Wild sarsaparilla*	*Aralia nudicaulus*	S5	-	G5
Wintergreen species*	*Pyrola* spp.	-	-	-
Yellow avens*	*Geum aleppicum*	S5	-	G5

TABLE 5
VEGETATION SPECIES LIST
RAMSAY POINT PEAT MINE DEVELOPMENT

Species		Status		
Common Name	**Scientific name**	**Provincial (S)**	**COESWIC**	**National (G)**

Notes:

* Refers to those species only detected within the uplands area northwest of the project study area.

Provincial Status (S-Rank): S1= Very rare throughout range, S2= Rare throughout range, S3= Uncommon throughout range, S4= Widespread and apparently secure, S5= Abundant and secure, SNR = Rank not yet assigned.

Global Status (G-rank): G1= Critically Imperiled, G2= Imperiled, G3= Vulnerable, G4= Apparently Secure, G5= Secure, G#G# indicates range of uncertainty in status

Status modifiers: B = For a migratory species, rank applies to the breeding population in the province,
N = For a migratory species, rank applies to the non-breeding population in the province,
M = For a migratory species, rank applies to the transient population,
T = Ranking for subspecies or varieties.

COSEWIC descriptors E = Endangered; A Wildlife species facing imminent extirpation or extinction
T = Threatened; A wildlfe species likely to become endagered if no action taken
SC = Special Concern; Likely to be come endagered due to combination of identified threats
NAR = not at risk of extinction
DD= Data Deficient to determine status
PS = Status applies only to a portion of the species' range
LC = Least Concern
C = Candidate/identified species, not yet assessed

TABLE 6
WILDLIFE SPECIES LIST
RAMSAY POINT PEAT MINE DEVELOPMENT

Species			Site visit			Status		
Common Name	**Scientific name**	**Observation**	**1st**	**2nd**	**3rd**	**Provincial (S)**	**COESWIC**	**National (G)**
Avian (Birds)								
Anseriformes								
Canada goose	*Branta canadensis*	observed	•	•	•	S5B	-	G5
Common merganser	*Mergus merganser*	observed	•			S5B	-	G5
Double-crested Cormorant	*Phalacrocorax auritus*	observed			•	S5B	NAR	G5
Charadriiformes								
Bonaparte's gull	*Chroicocephalus philadelphia*	observed	•	•	•	S5B	-	G5
California gull	*Larus californicus*	observed	•	•	•	S4B	-	G5
Common Tern	*Sterna hirundo*	observed		•		S4B	NAR	G5
Forster's tern	*Sterna forsteri*	observed	•	•	•	S4B	DD	G5
Lesser yellowlegs	*Tringa flavipes*	observed		•		S5B	-	G5
Ring-billed gull	*Larus delawarensis*	observed	•	•		S5B	-	G5
Faloniformes								
Merlin	*Falco columbarius*	observed	•			S4S5	NAR	G5
Northern harrier	*Circus cyaneus*	observed	•	•	•	S4B	NAR	G5
Gaviiformes								
Common loon	*Gavia immer*	observed	•			S4S5B	NAR	G5
Ciconiiformes								
Great blue heron	*Ardea herodias*	observed	•			S4S5B	PS	G5
Gruiformes								
Sandhill crane	*Grus canadensis*	observed	•	•	•	S5B	PS	G5
Passeriformes								
Alder flycatcher	*Empidonax alnorum*	auditory	•			S5B	-	G5
American redstart*****	*Setophaga ruticilla*	auditory	•	•		S5B	-	G5
Bay-breasted warbler*	*Dendroica castanea*	auditory	•			S4S5B	-	G5
Blackburnian warbler*	*Dendroica fusca*	auditory	•			S5B	-	G5
Black-capped chickadee	*Poecile atricapillus*	auditory	•			S5	-	G5
Boreal Chickadee	*Poecile hudsonicus*	observed		•	•	S4S5	-	G5
Cape-may warbler*	*Dendroica tigrina*	auditory	•			S5B	-	G5
Cedar waxwing	*Bombycilla cedrorum*	auditory	•	•		S5B	-	G5
Chipping Sparrow	*Spizella passerina*	observed	•	•	•	S5B	-	G5
Common Raven	*Corvus corax*	auditory	•	•	•	S5	-	G5
Common yellowthroat	*Geothlypis trichas*	observed	•	•	•	S5B	-	G5
Connecticut warbler	*Oporornis agilis*	auditory	•			S4S5B	-	G4
Dark-eyed junco	*Junco hyemalis*	observed	•	•	•	S5B	-	G5
Gray jay	*Perisoreus canadensis*	observed	•	•	•	S5	-	G5
Hermit thrush	*Catharus guttatus*	auditory	•	•	•	S5B	-	G5
Least flycatcher	*Empidonax minimus*	observed	•	•	•	S5B	-	G5
Lincoln's sparrow	*Melospiza lincolnii*	auditory	•	•		S5B	-	G5
Palm warbler	*Dendroica palmarum*	auditory	•	•		S5B	-	G5
Pine siskin	*Carduelis pinus*	auditory	•		•	S5	-	G5
Red-eyed vireo*	*Vireo olivaceus*	auditory	•	•	•	S5B	-	G5
Rose-breasted grosbeak*	*Pheucticus ludovicianus*	auditory	•	•		S4S5B	-	G5
Ruby-crowned kinglet	*Regulus calendula*	auditory	•	•		S5B	-	G5
Savannah sparrow	*Passerculus sandwichensis*	auditory				S5B	PS	G5
Song sparrow	*Melospiza melodia*	observed	•			S5B	-	G5
Swainson's thrush*	*Catharus ustulatus*	auditory	•	•		S5B	-	G5
Swamp sparrow	*Melospiza georgiana*	auditory	•	•	•	S5B	-	G5
Veery	*Catharus fuscescens*	auditory	•			S4S5B	-	G5
White-breasted nuthatch*	*Sitta carolinensis*	auditory	•	•		S5	-	G5
White-throated sparrow	*Zonotrichia albicollis*	observed	•	•	•	S5B	-	G5
White-winged crossbill	*Loxia leucoptera*	auditory		•		S5	-	G5
Winter wren*	*Troglodytes troglodytes*	auditory	•			S5B	-	G5
Yellow-rumped warbler	*Dendroica coronata*	observed		•		S5B	-	G5
Piciformes								
Black-backed woodpecker	*Picoides arcticus*	observed		•		S5	-	G5
Downy woodpecker	*Picoides pubescens*	observed		•	•	S5	-	G5
Hairy woodpecker	*Picoides villosus*	observed		•		S5	-	G5
Northern flicker	*Colaptes auratus*	auditory	•	•		S5B	-	G5

TABLE 6
WILDLIFE SPECIES LIST
RAMSAY POINT PEAT MINE DEVELOPMENT

Species			Site visit			Status		
Common Name	**Scientific name**	**Observation**	**1st**	**2nd**	**3rd**	**Provincial (S)**	**COESWIC**	**National (G)**
Avian (Birds) cont'd								
Pelicaniformes								
American white pelican	*Pelecanus erythrorhynchos*	observed	•	•		S3S4B	NAR	G4
Strigiformes								
Great-gray owl	*Strix nebulosa*	observed	•			S4	-	G5
Reptiles								
Red-sided garter-snake	*Thamnophis sirtalis parietalis*	observed	•	•		-	-	G5T5
Amphibians								
Gray treefrog	*Hyla versicolor*	auditory	•			S4S5	-	G5
Northern leopard frog	*Rana pipiens*	observed	•	•		S4	SC,NAR	G5
Wood frog*	*Rana sylvatica*	observed		•		S5	-	G5
Mammals								
American beaver	*Castor canadensis*	dams, lodges	•	•	•	S5	-	G5
American black bear	*Ursus americanus*	tracks, scat	•	•	•	S5	NAR	G5
Northern Grey wolf	*Canis lupus*	scat	•			S4	NAR	G4
Moose	*Alces americanus*	tracks	•	•	•	S5	-	G5
Red squirrel	*Tamiasciurus hudsonicus*	observed	•	•	•	S5	-	G5
White-tailed deer	*Odocoileus virginianus*	tracks	•			S5	-	G5

Notes:

1st site visit = June 7 - 11, 2010, 2nd site visit = July 21 - 23, 2010, 3rd site visit = August 3 - 5, 2010.

* Refers to those species only detected within the uplands area northwest of the project study area.

Provincial Status (S-Rank): S1= Very rare throughout range, S2= Rare throughout range, S3= Uncommon throughout range, S4= Widespread and apparently secure, S5= Abundant and secure.

Global Status (G-rank): G1= Critically Imperiled, G2= Imperiled, G3= Vulnerable, G4= Apparently Secure, G5= Secure, G#G# indicates range of uncertainty in status

Status modifiers: B = For a migratory species, rank applies to the breeding population in the province,
N = For a migratory species, rank applies to the non-breeding population in the province,
M = For a migratory species, rank applies to the transient population,
T = Ranking for subspecies or varieties.

COSEWIC descriptors E = Endangered; A Wildlife species facing imminent extirpation or extinction
T = Threatened; A wildlfe species likely to become endagered if no action taken
SC = Special Concern; Likely to be come endagered due to combination of identified threats
NAR = not at risk of extinction
DD= Data Deficient to determine status
PS = Status applies only to a portion of the species' range
LC = Least Concern
C = Candidate/identified species, not yet assessed

TABLE 9

CATEGORIES OF ADVERSE BIOPHYSICAL, SOCIO-ECONOMIC AND CULTURAL EFFECTS

Adversity Category	Biophysical	Socio-Economic	Physical and Cultural Heritage
Negligible	Effect on the population or a specific group of individuals at a local project area and/or over a short period in such a way as to be similar to small random changes in the population due to environmental irregularities but having no measurable effect on the population as a whole.	Effect of either very short duration or affects a small group of people or which occurs in the local project area in a manner similar to small random changes to extraneous irregularities, but having no measurable effect on the population as a whole.	Effect on physical and cultural heritage resources of short duration and in the local project area. The effect on physical and cultural resources is not detectable. The resources are not publicly recognized or protected by legislation.
Minor	Effect on a specific group of individuals in a population in the project area and/or over a short period (one generation or less), but not affecting other trophic levels or the integrity of the population itself.	Effect either of short-term duration or affects a specific group of people in the local project area but not necessarily affecting the integrity of the entire group itself.	Effect on physical and cultural heritage resources of short duration but over the adjacent local area. The effect on physical and cultural resources is minor or repairable. The resources are publicly recognized but not protected by legislation.
Moderate	Effect on a portion of a population that results in a change in abundance and/or distribution over one or more generations of that portion of the population or any population dependent upon it, but does not change the integrity of any population as a whole. The effect may be localized.	Effect either of medium-term duration (which affects one or two generations and/or the portion of the population dependent upon it) or affects a moderate portion of the population without affecting the integrity of the population as a whole.	Effects on physical and cultural heritage resources of moderate duration. Resources affected over the adjacent local area. The effect on physical and cultural resources is reversible. The resources are protected by legislation.
Major	Effect on a whole stock or population of a species in sufficient magnitude to cause a decline in abundance and/or change in distribution beyond which natural recruitment would not return that population or species dependent upon it, to its former level within several generations.	Effect either of long duration (lasting several generations) or affecting an entire definable group of people in sufficient magnitude to cause severe change in economic, physical or psychological well-being or long established activity patterns that would not return to pre-project levels or patterns within several generations.	Effect on physical and cultural heritage resources of long duration. Resources affected over large regional area. There is an irreversible effect on physical/cultural resources. The resources are protected by legislation.

TABLE 10

CRITERIA AND RATINGS FOR EVALUATING SIGNIFICANCE

Criteria	Rating		
	1	2	3
a) Societal value of the affected environmental components – includes nature and degree of protection provided	Not valuable (no designation)	Moderately valuable (designated or protected locally, regionally or provincially)	Highly valuable (designated or protected nationally or internationally)
b) Ecological value – includes rarity and uniqueness, fragility, importance within ecosystem, importance to scientific studies	Not valuable	Moderately valuable	Highly valuable
c) Duration – length of time the project activity will last	Short-term (less than 1 year)	Moderate (between 1 and 100 years)	Long-term (more than 100 years)
d) Frequency – rate of reoccurrence of the project activity causing the effect	Rarely (less than once per year)	Sporadically (less than once per month)	Frequently (more than once per week)
e) Geographic extent – area over which the effect will occur	Single point	Localized	Regional or greater
f) Magnitude – predicted disturbance compared to existing conditions	No measurable disturbance	Measurable disturbance but no loss of function	Measurable disturbance with loss of function
g) Reversibility – time the environmental component will take to recover after the source of the effect ceases	Less than a year	Between 1 and 100 years	Irreversible

TABLE 11

ENVIRONMENTAL EFFECTS ANALYSIS SUMMARY FOR THE PROPOSED PEAT DEVELOPMENT

Environmental Effect	Adversity (Table 9)	Mitigation Measures	Follow-up	Significance (S)* (see Table 10)							
				a	b	c	d	e	f	g	S
Microclimate											
Changes in airflow, wind speed and snow deposition pattern	Minor	- Install snow fences to control snow deposition on the property if required	- Observe for changes in airflow patterns and snow deposition periodically	1	2	2	2	2	2	2	N
Air Quality											
Increased fugitive dust from site preparation, construction, operation and reclamation activities	Moderate	- Use approved dust suppressant - Minimize peat handling activities during high wind events - Reduce exposed peat area (harvesting fields and peat stockpiles) to prevailing winds - Controll vehicle speeds - Instruct employees on proper harvest equipment operation to minimize dust - Cover loads being hauled from the site - Re-vegetate harvested areas - Utilize windbreaks (tree and brush barriers)	- Observe site periodically for fugitive dust levels - Perform inspections of local area for accumulated dust - Track public complaints	2	1	2	3	2	2	1	N
Increased levels of NO_x, SO_2, greenhouse gases and VOCs from equipment and vehicle emissions during site preparation, peat harvesting and transporting activities, construction materials and fuel use	Minor	- Use low sulphur fuels - Require a high standard of maintenance of equipments and vehicles - Limit unnecessary long-term idling - Use appropriate fuel dispensing equipment	- Perform periodic inspections of air quality during construction - Record maintenance of heavy equipment - Require submission of MSDSs for all products used	2	1	2	3	2	2	1	N
Increased releases of carbon dioxide into the atmosphere from clearing and peat-harvesting activities	Minor	- Minimize the areas cleared - Prepare and implement a reclamation plan that restores the area to a carbon sink condition	- Adhere to licence terms and conditions	3	1	2	3	2	1	2	N

Table 11 Cont'd

Environmental Effect	Adversity (Table 9)	Mitigation Measures	Follow-up	Significance (S)* (see Table 10)							
				a	b	c	d	e	f	g	S
Soils											
Loss and disturbance of surface soil during site preparation and harvesting activities	Major	- Minimize the surface area disturbed - Leave non-commercial peat reserves in place - Prepare and implement a Mine Closure plan to restore the area to natural conditions	- Monitor annually and report on implementation of progressive restoration activities	1	2	2	3	2	3	3	N
Contamination of soils from leaks and accidental spills and releases of fuel or other hazardous substances	Moderate	- Prevent leaks, spills and releases - Provide ULC Certified double-walled fuel storage tanks with spill prevention and leak detection - Require drip trays for equipment - Designate fuel storage and re-fueling areas - Ensure equipment arrives to site in good condition - Provide spill clean-up equipment and materials - Provide an emergency spill response plan	- Perform periodic inspections for leaks, spills and releases - Ensurie construction and operation crews adhere to designated areas - Remediate and record fuel spills and releases - Adhere to licence terms and conditions - Update the emergency spill response plan periodically	3	1	2	1	1	2	1	N
Surface Water											
Loss of small ponds and intermittent creeks due to site drainage for peat harvesting operations	Moderate	- Minimize the area disturbed - Formulate a drainage plan to maintain the natural drainage patterns - Maintain water levels on adjacent undisturbed lands - Prepare and implement a mine closure plan to restore predevelopment water levels	- Perform periodic inspections of surface waters - Report annually on implementation of the mine closure activities	1	2	2	3	2	3	1	N
Modified surface water runoff flow rate due to site drainage and land profiling activities during construction	Moderate	- None proposed	- Monitor discharge flow rates from peat development according to licence terms and conditions	2	1	2	3	2	2	1	N

Table 11 Cont'd

Environmental Effect	Adversity (Table 9)	Mitigation Measures	Follow-up	Significance (S)* (see Table 10)							
				a	b	c	d	e	f	g	S
Increased suspended sediment levels in surface water	Moderate	- Direct drainage water into sedimentation ponds equipped with floating booms before discharging by an outlet to existing drainage system	- Collect surface water samples from each outlet monthly for analysis of suspended sediment levels - Clean drainage ditches and sedimentation ponds on a regular basis - Perform periodic inspections for evidence of erosion - Adhere to licence terms and conditions - Conduct additional water monitoring if required in consultation with Manitoba Conservation	3	2	2	3	2	2	1	N
Alteration of surface water chemistry of downstream receiving waters	Minor	- Use a sedimentation pond to control the discharge rate of drainage water into the existing drainage system - If necessary, install a limestone or carbonate-lined drainage ditch to increase pH of draining bog water	- Collect surface water samples from each outlet monthly for pH analysis	3	2	2	3	2	1	1	N
Contamination of surface water from leaks and accidental spills and releases of fuels or other hazardous substances	Moderate	- Prevent leaks, spills and releases - Provide secondary containment for fuel storage - Require drip trays for equipment - Provide spill clean-up equipment and materials - Prepare an emergency spill response plan	- Perform periodic inspections for leaks, spills and releases - Update the emergency response plan periodically - Remediate and record fuel spills and releases - Adhere to licence terms and conditions	3	2	2	1	1	2	2	N

Table 11 Cont'd

Environmental Effect	Adversity (Table 9)	Mitigation Measures	Follow-up	Significance (S)* (see Table 10)							
				a	b	c	d	e	f	g	S
Groundwater											
Contamination of groundwater from leaks and accidental spills and releases of fuels or other hazardous substances	Minor	- Ensure new supply well in staging area is properly sealed at ground level - Prevent leaks, spills and releases - Provide secondary containment for fuel storage - Require drip trays for equipment - Provide spill clean-up equipment and materials - Prepare an emergency spill response plan	- Perform periodic inspections for leaks, spills and releases - Update emergency response plan periodically - Remediate and record fuel spills and releases - Adhere to licence terms and conditions	3	1	2	1	1	1	2	N
Vegetation											
Loss and disturbance of terrestrial vegetation during site preparation and construction	Moderate	- Minimize loss and disturbance of vegetation - Protect vegetation along the perimeter of the cleared areas from blow-down - Limit construction activities to designated areas - Utilize timber removed from site - Re-vegetate disturbed or reclaimed areas - Ensure workers are aware of rare grass pink orchid outside project area	- Perform periodic inspections for vegetation stress and mortality around the cleared area - Perform periodic inspections for invasion of nuisance or weed species - Report annually on restoration activities implemented - Monitor the grass pink orchid prior to construction and 1 and 3 years after	1	2	2	3	2	2	2	N
Impairment of vegetation from dust accumulation during operation	Minor	- Control dust using approved suppressant - Curtail construction and operation during high wind events	- Perform periodic inspections of local area for accumulated dust	1	2	2	2	2	1	1	N
Risk of fire during construction and operation	Major	- Prepare and implement an emergency response plan - Provide fire suppression equipment on-site (extinguishers, shovels, hose, pumping equipment, etc.) - Notify Manitoba Conservation immediately if a fire or explosion occurs	- Examine fire fighting equipment twice a month - Conduct periodic testing, evaluation and updating of the emergency response plan - Provide employee education and training in the use of this equipment regularly	2	3	1	1	3	2	2	N

Table 11 Cont'd

Environmental Effect	Adversity (Table 9)	Mitigation Measures	Follow-up	Significance (S)* (see Table 10)							
				a	b	c	d	e	f	g	S
Wildlife / Habitat											
Loss and disturbance of wildlife habitat during site preparation activities	Minor	- Minimize loss and disturbance to vegetation - Limit construction to area designated - Limit operation activities to areas disturbed during construction - Re-vegetate disturbed or reclaimed areas	- Perform periodic inspections during construction and operation - Maintain re-vegetated areas - Ensure adherence to environmental guidelines and protocols	1	2	2	2	2	2	2	N
Loss and disturbance of large, small and burrowing mammals during construction and operation activities	Minor	- Minimize the area of disturbance by limiting construction to designated areas - Limit operation activities to areas disturbed during construction - Maintain habitat around the QL's - Implement a closure plan to restore wildlife habitat	- Adhere to licence terms and conditions - Maintain re-vegetated areas	1	2	2	3	2	2	2	N
Increased wildlife-vehicle interactions during peat transportation	Minor	- Operate trucks during daylight hours - Provide wildlife awareness information to drivers - Adhere to posted speed limits	- Maintain records of vehicle-wildlife interactions	1	1	2	3	3	1	2	N
Attraction of problem or nuisance animals	Minor	- Bear-proof garbage containers - Regular disposal of waste at existing waste facilities - Use animal deterrents such as noise-makers, reflectors and scents if required	- Maintain records of problem or nuisance wildlife - Adhere to licence terms and conditions	1	1	2	3	2	1	1	N
Loss and disturbance of migratory bird and waterfowl habitat	Minor	- Avoid ponds in the peatland development area - Minimize disturbance of vegetation around ponds with buffer zones - Limit construction to designated areas - Limit operation activities to areas disturbed during construction - Re-vegetate disturbed or reclaimed areas during and after operation	- Perform periodic inspections during construction and operation for signs of potential effects - Maintain buffer zones - Maintain re-vegetated areas	1	2	2	3	2	1	1	N

Table 11 Cont'd

Environmental Effect	Adversity (Table 9)	Mitigation Measures	Follow-up	Significance (S)* (see Table 10)							
				a	b	c	d	e	f	g	S
Disturbance of migratory and other bird nesting during construction activities	Minor	- Locate peat mining components away from critical migratory bird habitat - Schedule construction activities outside of critical nesting and rearing periods	- Perform periodic inspections of bird nesting and rearing activities - Observe bird nesting and rearing success - Adhere to licence terms and conditions	1	2	2	2	2	1	2	N
Loss and disturbance to amphibians and reptiles	Minor to Moderate	- Minimize the area of disturbance by limiting construction to designated areas - Limit operation activities to areas disturbed during construction - Minimize disturbance of vegetation around ponds by maintaining buffer zones	- Maintain records of on-site amphibian and reptile observations	1	2	2	2	2	1	2	N
Aquatic Biota / Habitat											
Disturbance to aquatic biota and habitat due to elevated levels of suspended sediment in peatland drainage water	Minor	- Use settling ponds	- Perform periodic inspections of sedimentation ponds for debris - Clean drainage ditches and sedimentation ponds on a regular basis - Monitor effluent on a regular basis	3	2	2	3	2	1	1	N
Disturbance of habitat due to construction activities involved in installation of culvert crossings	Moderate	- Follow the Manitoba Stream Crossing Guidelines for the protection of Fish and Fish Habitat - Follow best management practices (re: timing window, sediment/erosion control, revegetation, etc.) - Install the culvert such that low flow connectivity is maintained	- Perform periodic inspections of the installed culverts to ensure that fish passage is not blocked	3	2	1	1	1	2	1	N
Economic Conditions											
Creation of employment and introduction of money to the regional economy	Positive	- None proposed	- None proposed	3	1	2	3	3	1	2	N

Table 11 Cont'd

Environmental Effect	Adversity (Table 9)	Mitigation Measures	Follow-up	Significance (S)* (see Table 10)							
				a	b	c	d	e	f	g	S
Business Opportunities											
Creation of jobs and contracts for construction and operation requirements	Positive	- None proposed	- None proposed	3	1	2	2	3	1	2	N
Traffic											
Increased traffic may increase dust, the number of road kills, and it will require more road maintenance	Moderate	- Utilize dust control methods - Reduce speed and follow posted limits - Reduce the number of vehicles traveling during high wind events - Only travel during daylight hours - Provide wildlife information to drivers	- Monitor the number of vehicles traveling associated with mining peat production - Record public complaints and vehicle accidents - Consider further action as warranted	2	1	2	3	3	2	1	N
Noise / Vibration											
Increased noise and vibration levels from construction and operation activities	Minor	- Muffle vehicles and equipment - Limit unnecessary long-term idling - Require a high standard of maintenance for heavy equipment	- Monitor and periodically track noise levels and public complaints	2	1	2	3	2	2	1	N
Human Health											
Risk of adverse effects on public attitude and general health and well-being due to increased noise, vibrations and dust generated	Moderate	- Utilize dust control methods - Reduce number of vehicles travelling during high wind events - Drive according to road conditions - Adhere to posted speed limits - Operate transport trucks only during daylight hours	- Monitor dust levels - Track public complaints - Consider further action as warranted	3	1	2	3	2	2	1	N
Risk of effects to worker health associated with poor indoor air quality from VOCs, carbon monoxide, propane gas, dust, refrigerants and moulds	Minor	- Provide adequate ventilation - Ensure a high standard of facility and equipment maintenance	- Conduct regular maintenance of the facility and equipment	3	1	2	2	2	2	1	N

Table 11 Cont'd

Environmental Effect	Adversity (Table 9)	Mitigation Measures	Follow-up	Significance (S)* (see Table 10)							
				a	b	c	d	e	f	g	S
Potential threat to public and worker safety during construction and operation activities	Public - Negligible and Worker - Minor	- Locked gate signed with no trespassing - Warning signs for ditches and ponds - Compliance with Manitoba Workplace Safety and Health regulations - Develop and enforce standard operation procedure guidelines - Provide training to employees - Ensure visitors have reported in and are accompanied by an employee	- Record occurrence of workplace accidents - Update employee training and safety guidelines as required	3	1	2	3	2	2	1	N
Aesthetic Values											
Impaired aesthetic from new infrastructure (access road) and increased dust during peat mine operation from transport trucks	Minor	- Utilize dust control methods and cover loads during transport to and from the site - Re-vegetate the peat fields in accordance with provisions in the mine closure plan	- Observe dust and debris levels - Record public complaints - Take further action as warranted	2	1	2	3	2	2	1	N
Areas of Interest											
Disturbance and alteration to the Moose Creek WMA and the Peguis First Nation CIZ	Moderate	- Limit construction activities to designated areas - Mark maximum clearing width of the proposed development site - Protect adjacent trees from blow-down - Re-use timber from clearing	- Periodically inspect the site during construction for signs of potential disturbances - Ensure construction crews adhere to designated areas	3	1	2	3	2	2	2	N
Recreation / Tourism											
Increased truck traffic on PR 234 and resulting dust could cause decline in tourism to nearby recreational areas	Minor	- Utilize dust control methods - Cover loads during transport to and from the site - Reduce number of vehicles travelling during high wind events - Drive according to road conditions - Adhere to posted speed limits - Operate transport trucks only during daylight hours	- Track public complaints - Take further action as warranted	2	1	2	2	3	2	1	N

* S = significance
Y = significant - rated a "3" for at least four criteria, at least one of which must be criteria a or b; or rated "2" or "3" for all criteria
N = not significant

TABLE 12

PROJECT AND CUMULATIVE ENVIRONMENTAL EFFECTS FOR PROPOSED PEAT DEVELOPMENT

Project Activities	Residual Environmental Effects															
x Project effect (minor) X Project effect (moderate) P Project effect (major) o Cumulative effect (negligible) O Cumulative effect (minor) C Cumulative effect (major)	Increased particulates	Increased greenhouse gases, SO_2, NOx, etc.	Contamination of soils / surface water	Loss of soil	Loss of wetlands	Change in drainage pattern	Change in receiving water quality (TSS, pH, nutrients)	Loss and disturbance of terrestrial vegetation	Loss and disturbance of terrestrial wildlife & habitat	Loss and disturbance of birds/waterfowl & habitat	Loss and disturbance of aquatic biota & habitat	Increased traffic and deterioration of PR 234	Impacts to public safety / human health	Increased wildlife mortalities	Improved social conditions	Improved economic conditions
Proposed Peatland Development Project																
Site preparation	x	x	x					x	x	x	x					
Construction	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x
Operation	x	x	x	**X**	x	x	x	x	x	x	x	**X**	x	x	x	x
Decommissioning	x	x	x			x									x	x
Other Projects and Activities (existing and known)																
Sunterra; existing and proposed peat mine	o	o	o	**O**	o	o	o	o	o	o	o	**O**	o	o	o	o
Berger proposed peat mine	o	o	o	**O**	o	o	o	o	o	o	o	**O**	o	o	o	o
Beaver Creek Provincial Park												o			o	o
Beaver Creek Bible Camp												o			o	o
Beaver Creek transfer station	o	o	o										o			
Communities/Cottages: Pine Dock, Matheson Island, Calders Dock, Bullhead, Little Bullhead, Leaside Beach, Beaver Creek, Mill Creek and Little Deer Lake		o	o				o					o			o	
Airports at Pine Dock and Matheson Island		o	o							o			o			
Commercial trucking on PR 234	o	o					o					**O**	o	o		o
Road Maintenance of PR 234	o	o	o				o		o	o	o	o	o	o	o	
Recreation; hunting, fishing and camping									o	o	o	o			o	o

TABLE 13

MITIGATION MEASURES SUMMARY FOR THE PROPOSED PEAT DEVELOPMENT

Mitigation Measures	Design	Proposed	Regulatory	Management	
Microclimate					
Install snow fences to control snow deposition on the property if required		•			
Air Quality					
Cover loads being hauled		•			
Use an approved dust suppressant and control vehicle speed		•		•	
Limit peat handling activities during high wind events				•	
Orient peat harvesting and stockpiles with prevailing winds	•	•			
Re-establish vegetation on disturbed areas		•			
Instruct employees on proper equipment operation to minimize dust				•	
Require a high standard of maintenance for construction equipment and vehicles, use low sulphur-containing fuels and limit unnecessary idling				•	
Use appropriate fuel dispensing equipment			•	•	
Utilize windbreaks (tree and brush barriers)	•	•			
Implement a reclamation plan that addresses greenhouse gas emissions		•		•	
Minimize the area cleared	•				
Soils					
Minimize the surface area disturbed	•				
Leave non-commercial peat reserves in place	•			•	
Prepare and implement a mine closure plan			•	•	
Prevent leaks, spills and releases	•				
Provide drip trays for equipment and spill clean-up equipment and materials	•			•	
Prepare an emergency (spill) response plan		•		•	
Comply with provincial fuel storage and dispensing regulations and storing hazardous materials in approved containers (secondary containment)			•	•	
Provide ULC Certified double-walled fuel storage tanks with spill prevention and leak detection			•	•	
Ensure equipment arrives to site in good condition				•	
Designate fuel storage and refueling areas	•			•	
Surface Water					
Limit surface area disturbance	•				
Maintain water levels on undisturbed areas		•		•	
Implement a mine closure plan that restores predevelopment water levels			•	•	

Table 13 Cont'd

Mitigation Measures	Design	Proposed	Regulatory	Management	
Direct drainage water into sedimentation ponds equipped with floating booms before discharging at a controlled rate	•	•			
Formulate a drainage plan to maintain the natural drainage patterns	•				
Prevent leaks, spills and releases and provide fuel storage secondary containment	•			•	
Provide drip trays for equipment and spill clean-up equipment and materials	•			•	
Prepare an emergency (spill) response plan		•		•	
Comply with provincial fuel storage and dispensing regulations and storing hazardous materials in approved containers (secondary containment)			•		
Groundwater					
Ensure proper seal at ground level of new supply well in staging area	•		•		
Prevent leaks, spills and releases	•				
Provide drip trays for equipment and spill clean-up equipment and materials	•			•	
Preparing an emergency (spill) response plan		•		•	
Comply with provincial fuel storage and dispensing regulations and storing hazardous materials in approved containers (secondary containment)			•		
Vegetation					
Restrict activities to designated areas	•				
Minimize vegetation loss or disturbance		•			
Protect vegetation along perimeter from blow-down		•			
Utilizing timber removed from site		•		•	
Re-vegetate disturbed and reclaimed areas during and after operation	•				
Use an approved dust suppressant and limit construction activity during high wind events	•	•		•	
Provide on-site fire suppression equipment		•		•	
Prepare an emergency fire response plan		•		•	
Notify Manitoba Conservation immediately in event of a fire				•	
Wildlife / Habitat					
Minimize habitat (vegetation) loss or disturbance		•			
Limit construction to designated areas and operation activities to areas disturbed during construction	•				
Locate peat mining components away from migratory bird/waterfowl habitat (such as ponds) and avoid critical nesting and rearing periods	•				
Minimize disturbance around ponds by retaining buffer zones	•				
Maintain habitat around the Quarry Leases		•			
Provide wildlife awareness information to drivers	•			•	

Table 13 Cont'd

Mitigation Measures	Design	Proposed	Regulatory	Management	
Implement a closure plan to revegetate disturbed and reclaimed areas during and after operation	•		•	•	
Transport peat during daylight hours, post signs to warn and educate drivers to avoid wildlife on the highway and adhere to posted speed limits				•	
Regular disposal of waste at existing waste facilities		•			
Animal deterrents such as noise makers, reflectors and scents if required		•			
Bear-proof garbage containers	•				
Aquatic Biota / Habitat					
Follow the Manitoba Stream Crossing Guidelines for the protection of Fish and Fish Habitat	•		•		
Follow best management practices		•		•	
Install culvert such that low flow connectivity is maintained	•				
Ensure culverts are large enough to permit fish passage	•		•		
Economic Conditions					
No mitigation proposed					
Business Opportunities					
No mitigation proposed					
Traffic					
Reduce wildlife interactions by traveling only during daylight hours and providing wildlife information to drivers		•		•	
Road dust control by approved dust suppressant, reducing speed, following posted limits and reducing the number of vehicles during wind events		•		•	
Noise and Vibration					
Require a high standard of maintenance for construction equipment and vehicles, muffle vehicles and equipment and limit unnecessary idling				•	
Human Health					
Limit dust generation by using water, reducing number of vehicles travelling during high winds, adhering to posted speed limits and driving according to road conditions		•	•	•	
Provide adequate ventilation of buildings and a high standard of facility and equipment maintenance	•			•	
Provide locked gate with no trespassing signs and warning signs of ditches and ponds	•				
Comply with Manitoba Workplace Safety and Health regulations			•	•	
Provide employee training and develop and enforce standard operation procedure guidelines			•	•	

Table 13 Cont'd

Mitigation Measures	Design	Proposed	Regulatory	Management	
Ensure all visitors have reported in and are accompanied by an employee				•	
Aesthetic Values					
Utilize dust control methods and cover loads during transport to and from the site		•			
Re-vegetate the peat fields in accordance with provisions in a reclamation plan	•				
Areas of Interest					
Limit construction activities to designated areas, mark maximum clearing width of the proposed development site, protect adjacent trees from blow-down and re-use timber from clearing	•	•			
Recreation/Tourism					
Limit dust generation by using water, reducing number of vehicles travelling during high winds, adhering to posted speed limits and driving according to road conditions		•	•	•	

TABLE 14

FOLLOW-UP SUMMARY FOR THE PROPOSED PEAT DEVELOPMENT

Follow-up	Inspecting	Monitoring	Record Keeping	Reporting	
Microclimate					
Inspect airflow and snow deposition patterns	•				
Air Quality					
Observe fugitive dust levels during construction and accumulated dust during operation	•				
Perform periodic inspections of adjacent properties and access roads for dust and debris	•				
Track complaints from local residents			•		
Perform periodic inspections of air quality during construction	•				
Record maintenance of facility and equipment			•		
Require submission of MSDSs for all products used			•		
Adhere to licence terms and conditions	•				
Soils					
Conduct annual monitoring and report on implementation of the progressive restoration activities		•	•	•	
Perform periodic inspections for leaks, spills and releases	•				
Ensure construction and operation crews adhere to designated areas	•				
Remediate and record fuel spills and releases	•		•	•	
Update the emergency response plan periodically			•		
Adhere to licence terms and conditions	•				
Surface Water					
Perform periodic inspections of surface water bodies	•				
Report on implementation of the progressive restoration activities annually	•		•	•	
Monitor surface water runoff flows from the development area		•	•		
Perform periodic inspections for evidence of erosion	•				
During operation collect surface water samples from each outlet monthly for analysis of TSS		•	•		
Conduct additional water monitoring as developed with Manitoba Conservation		•	•	•	
Clean drainage ditches & sedimentation ponds on a regular basis	•				
Perform periodic inspections for leaks, spills and releases	•				

Table 14 Cont'd

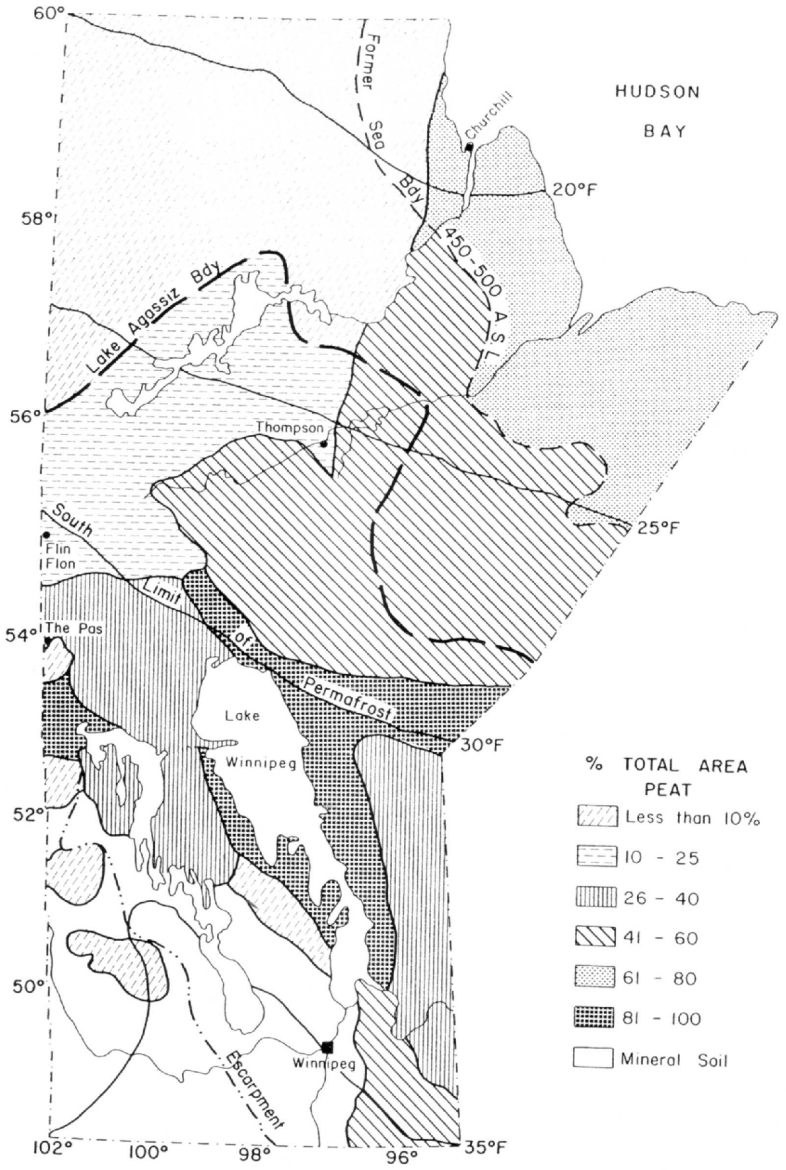
Follow-up	Inspecting	Monitoring	Record Keeping	Reporting	
Remediate and record fuel spills and releases	•		•	•	
Update the emergency (spill) response plan periodically			•		
Adhere to licence terms and conditions	•				
Groundwater					
Perform periodic inspections for leaks, spills and releases	•				
Remediate and record fuel spills and releases	•		•	•	
Update the emergency (spill) response plan periodically			•		
Adhere to licence terms and conditions	•				
Vegetation					
Perform periodic inspections for vegetation stress and mortality around cleared area and invasion of nuisance or weed species	•				
Conduct annual monitoring and report on implementation of the progressive restoration activities	•	•	•	•	
Observe accumulated dust on plants during operation	•				
Conduct periodic assessments of fire risk and updates to emergency (fire) response plan			•		
Examine fire fighting equipment regularly	•		•		
Conduct employee training in the use of this equipment regularly			•		
Wildlife / Habitat					
Perform periodic inspections of habitat during construction and operation	•				
Maintain re-vegetated areas and buffer zones	•				
Ensure adherence to environmental guidelines and protocols	•				
Perform inspections of bird nesting and rearing activities and success	•				
Maintain records of vehicle-wildlife interactions			•		
Maintain records of problem or nuisance wildlife situations			•		
Maintain records of amphibians and reptiles observed on the site			•		
Adhere to licence terms and conditions	•				
Aquatic Biota / Habitat					
Perform periodic inspections of installed culverts to ensure no blockage of fish passage	•				
Perform periodic inspections of sedimentation ponds for debris	•				
Clean drainage ditches and sedimentation ponds regularly	•				
Monitor effluent discharged from ponds on a regular basis		•	•	•	

Table 14 Cont'd

Follow-up	Inspecting	Monitoring	Record Keeping	Reporting	
Economic Conditions					
No follow-up proposed					
Business Opportunities					
No follow-up proposed					
Traffic					
Monitor the number of vehicles travelling associated with the peat mining	•		•		
Record public complaints and vehicle accidents			•		
Monitor situation and take further action as warranted	•				
Noise and Vibration					
Observe and periodically track noise levels and public complaints	•		•		
Human Health					
Observe dust levels	•				
Track health complaints from local residents			•		
Monitor situation and take further action as warranted	•				
Conduct regular maintenance of the facility and equipment	•		•		
Record workplace accidents			•		
Update employee training and safety guidelines as required			•		
Aesthetic Values					
Inspect dust and debris levels	•				
Track public complaints			•		
Monitor situation and take further action as warranted	•				
Areas of Interest					
Inspect site during construction for signs of potential disturbances	•				
Ensure crews adhere to designated construction areas	•				
Recreation/Tourism					
Track public complaints			•		
Monitor situation and take further action as warranted	•				

FIGURES

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PRELIMINARY
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Source: Smith, R.E. (1975) Organic Soil Resources in Manitoba and their Possibilities for Crop Production. Proceedings of the Seminar on Peat: A Resource in Manitoba's Agriculture and Industry.

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0	10/12/07	ISSUED WITH FINAL REPORT	LSA

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SUN GRO HORTICULTURE

PROPOSED PEAT MINE DEVELOPMENT

DISTRIBUTION OF PEATLAND IN MANITOBA

DECEMBER 2010 | FIGURE 01 | REV: 0

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630000 640000 650000 660000

5700000 5690000 5680000

N W E S

Fisher Bay Park Reserve

Moose Creek Wildlife Management Area

7 Km

3 Km

Sunterra Peat Mine

Lake Winnipeg

Beaver Creek Bible Camp

Beaver Creek Provincial Park

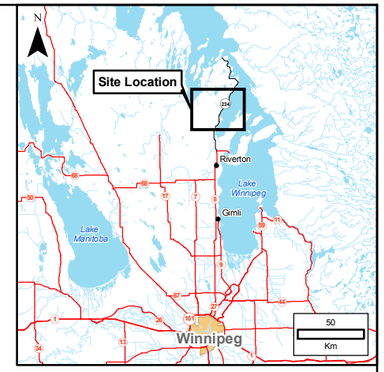
Hecla/Grindstone Provincial Park

1156 2441 1761 1107 1108 1109 1110 2460 1762

234

Area	Hectares
Project Study Area	9,924.00
Regional Study Area	50,255.74
Quarry Lease Area	1,790.10

Note:
Quarry Lease Area is included in Project and Regional Study Areas



LEGEND:

- Project Study Area
- Regional Study Area
- Quarry Lease
- Pending Quarry Lease
- Provincial Park
- Wildlife Management Area
- Cutline
- Trail
- Road

Note:
The Quarry Lease are Within the Peguis First Nation Community Interest Zone.
Information based on data from Mineral Resources Division, Innovation, Energy and Mines, Mines Branch, Province of Manitoba

1 0 1 2 3 4 5
Kilometres

SCALE: 1:120,000 METRIC 11"x17"

All units are metric and in metres unless otherwise specified.
Transverse Mercator Projection, NAD 1983, Zone 14
Elevations are in metres above sea level (MSL)
Image: SPOT5, from NRCAN (Natural Resources Canada), 2007

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PROPOSED PEAT MINE DEVELOPMENT

REGIONAL SITE LOCATION

PRELIMINARY
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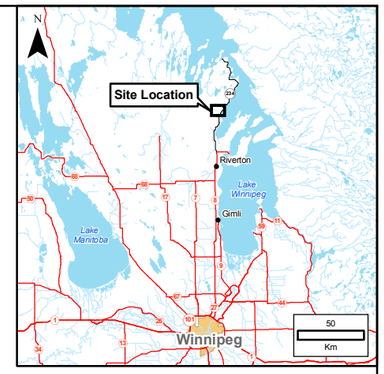
DECEMBER 2010 | FIGURE 02 | REV: 0

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639000
642000
645000
5697000
5694000
5691000

N
W
E
S

1156
2441
1761
1107
1108
1109
1110
2460
1762
234
Lake Winnipeg



LEGEND:

- Culvert Crossing
- Main Drainage Ditch/Flow Direction
- Field Drainage Ditch
- Access Road
- Bog Road
- Road
- Trail
- Cutline
- River

Site Contour

- 1m Index Site Contour
- 0.5m Site Contours

Regional Contour

- 4m Index Regional Contour
- 2m Regional Contour
- Quarter Section
- Quarry Lease
- Proposed Quarry Lease
- Sedimentation Pond
- Staging Area
- Outlet Ditch/Flow Direction

250 0 250 500 750 1,000 1,250
Metres

SCALE: 1:30,000 METRIC 11"x17"

All units are metric and in metres unless otherwise specified.
Transverse Mercator Projection, NAD 1983, Zone 14
Elevations are in metres above sea level (MSL)
Image: SPOT5, from NRCAN (Natural Resources Canada), 2007

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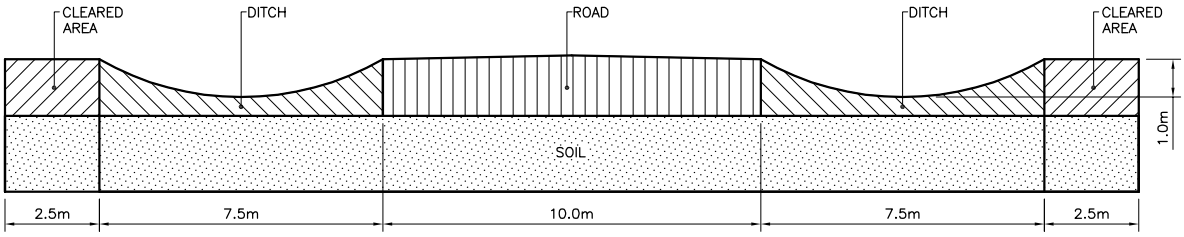
PROPOSED PEAT MINE DEVELOPMENT

GENERAL SITE DEVELOPMENT AREA

PRELIMINARY
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11"x17" PLOT SCALE 1:1



2.5 0 2.5 5.0 7.5m

SCALE: 1:200 METRIC

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PROPOSED PEAT MINE DEVELOPMENT

ROAD CONSTRUCTION LAYOUT

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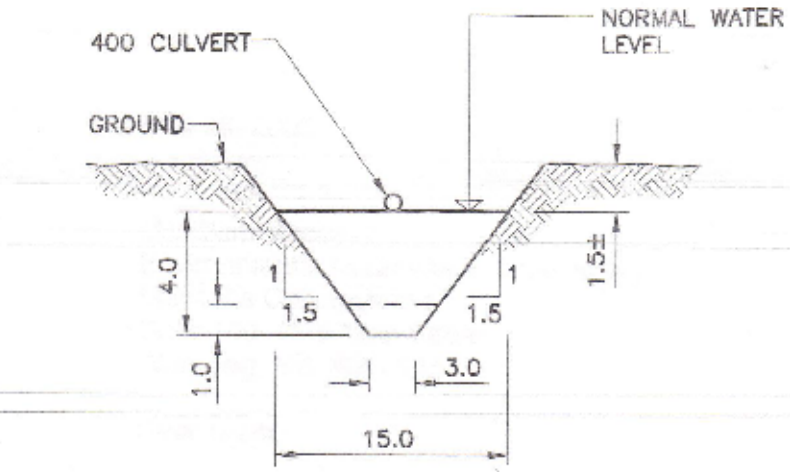
5700000

5690000

N W E S

294 220 224 228 224 226 224 228 224 228 224 228

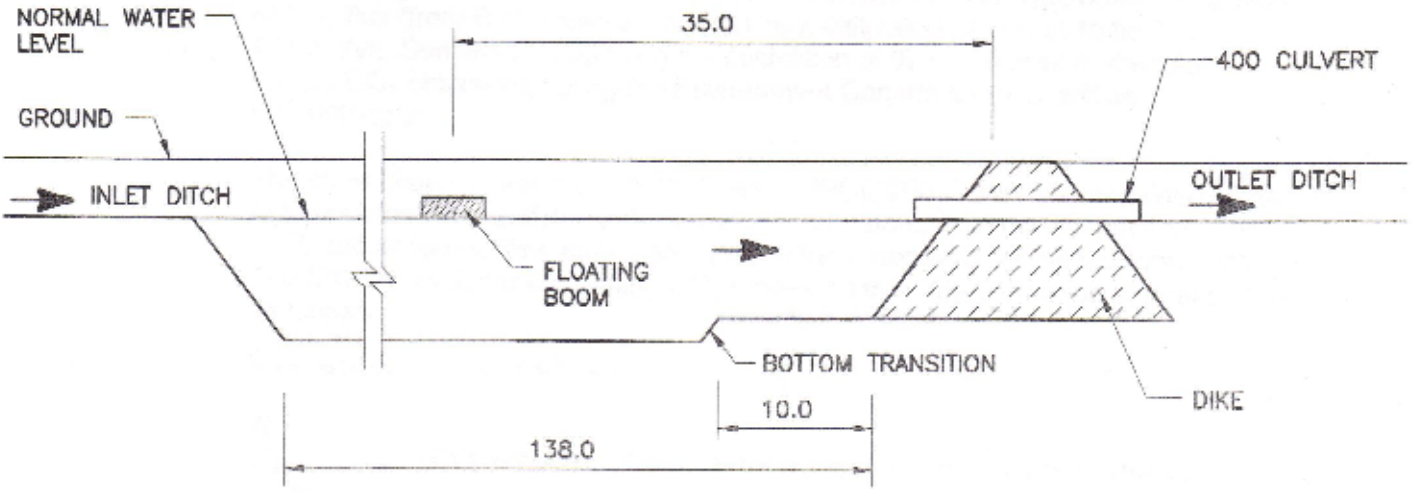
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NOTES:

1. 5 YEAR RETURN PEAK FLOW = 0.148 $m^3/sec.$
2. 9.9 HOURS RETENTION TIME AT PEAK FLOW.
3. RATIO OF POND LENGTH TO WIDTH = 9.2 : 1

A END VIEW
HOR. 1 : 500, VER. 1 : 250



B SIDE VIEW
HOR. 1 : 500, VER. 1 : 250

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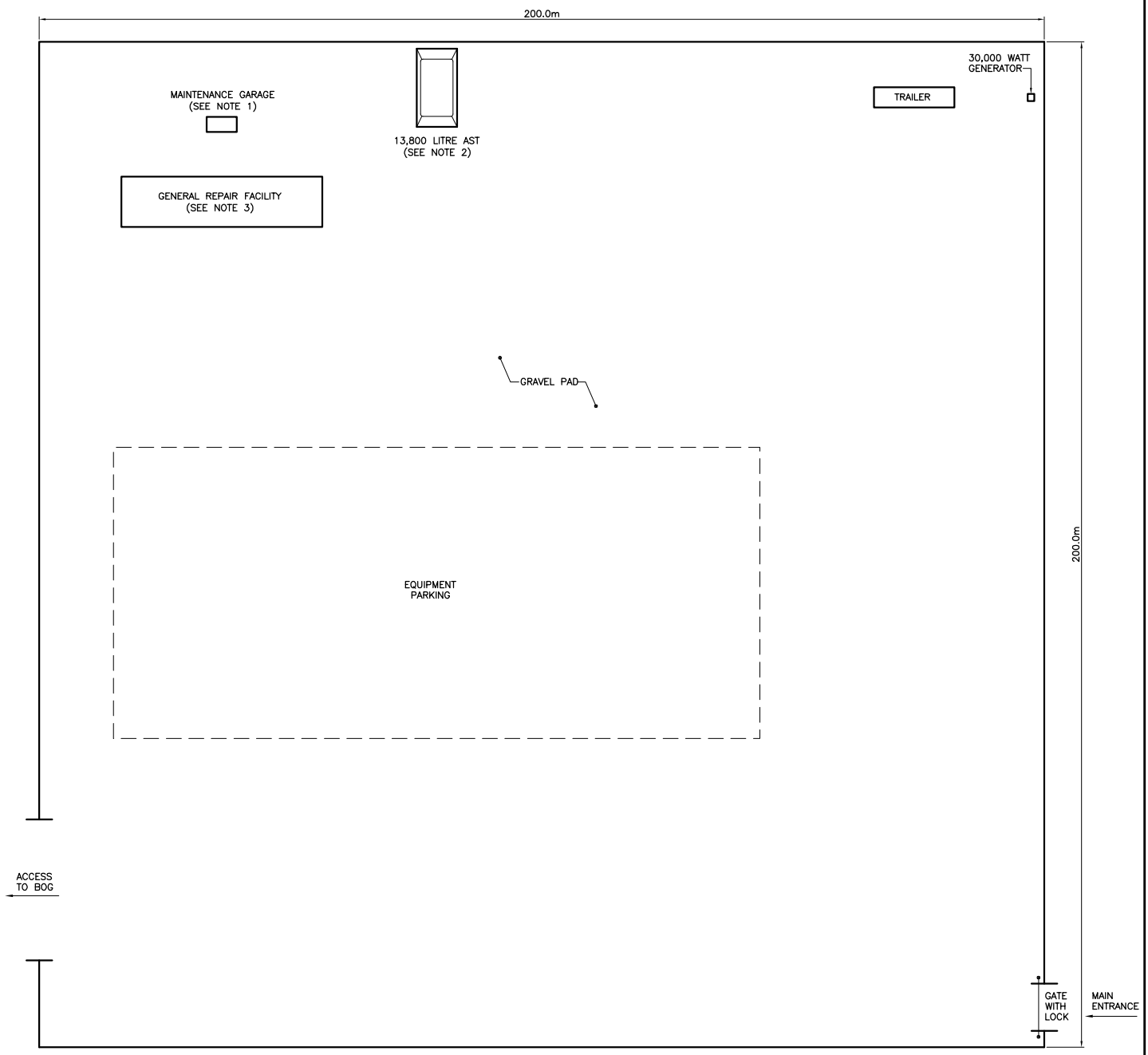
PROPOSED PEAT MINE DEVELOPMENT

DETAILS OF SEDIMENTATION PONDS

DECEMBER 2010 | FIGURE 06 | REV: 0

Source: Information provided by Sun Gro Horticulture

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20 0 20 40m

SCALE: 1:1200 METRIC

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PROPOSED PEAT MINE DEVELOPMENT

DETAILS OF TYPICAL SITE PLAN

DECEMBER 2010 | FIGURE 07 | REV: 0

NOTES:

1. AT RAMSAY POINT BOG AN 18m² STEEL CONTAINER WILL BE USED.
2. 2–2,420 LITRE PORTABLE ASTS WILL ALSO BE USED.
3. THE GENERAL REPAIR FACILITY IS A 400m² WOOD FRAMED BUILDING WITH A CONCRETE FOUNDATION.

8.5x11
FileName: P:\Projects\2010\10-0293-01\Dwg\Env\10-0293-01_F07.dwg — Tab: F01 Plotted By: SWedensky 10/12/07 [Tue 10:03am]

636000 639000 642000 645000 648000

5697000 5694000 5691000 5688000

N W E S

GN 3 & 4 EF 2 EF 1 GN 1 & 2 BC-1 P-RAM1 BC-2 EF 3 MT 1 - 10 BC-3

1156 2441 1761 1107 1108 1109 1110 2460 1762

R12 R22 R11 R21 R10 R23 R13 R9 R8 R15 R14 R7 R4 R5 R6 R24 R3 R18 R17 R16 R19 R20 R25 R26 R1 R2

GN 5 & 6 GN 7 & 8 P-RAM2 P-RAM3 EF 4 MT 11 - 15 R4 R3

220 216 224 236 234 232 228 230

Lake Winnipeg

N Site Location Riverton Lake Winnipeg Gimli Lake Manitoba Winnipeg 50 Km

LEGEND:

- Water Crossing
- Water Quality Sample Locations
- Fish Sampling
- Barrier to fish passage
- Transect Point
- Transect Line
- Road
- Trail
- Cutline
- River

Site Contour

- 1m Index Site Contour
- 0.5m Site Contours

Regional Contour

- 4m Index Regional Contour
- 2m Regional Contour
- Quarter Section
- Quarry Lease
- Pending Quarry Lease

500 0 500 1,000 1,500

Metres

SCALE: 1:40,000 METRIC 11"x17"

All units are metric and in metres unless otherwise specified.
Transverse Mercator Projection, NAD 1983, Zone 14
Elevations are in metres above sea level (MSL)
Image: SPOT5, from NRCAN (Natural Resources Canada), 2007

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SUN GRO HORTICULTURE

PROPOSED PEAT MINE DEVELOPMENT

2010 SAMPLING PROGRAM

PRELIMINARY

NOT TO BE USED FOR CONSTRUCTION

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11"x17" PLOT SCALE 1:1

APPENDICES

APPENDIX A

MINERAL RIGHTS - QUARRY LEASES

Manitoba Industry,
Economic Development
and Mines
Mines Branch

QUARRY LEASE

First Renewal

Quarry
Lease No.**QL-1107**

THIS LEASE made in duplicate this 20th day of June, 2006

BETWEEN:

Her Majesty the Queen in right of the
Province of Manitoba, represented by the
Minister of Industry, Economic Development
and Mines

(the "Minister")

of the First Part

- and -

SUN GRO HORTICULTURE CANADA LTD.
BOX 100
ELMA MB R0E 0Z0

(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:

   ALL THAT PORTION OF THE PROVINCE OF MANITOBA CONTAINED WITHIN THE FOLLOWING LIMITS, NAMELY COMMENCING AT GEOGRAPHICAL CO-ORDINATES 51°23'31.07" NORTH AND 96°56'41.52" WEST; THENCE SLY TO GEOGRAPHICAL CO-

ORDINATES 51°22'38.90" NORTH AND 96°56'42.65" WEST; THENCE WLY TO GEOGRAPHICAL CO-ORDINATES 51°22'39.27" NORTH AND 96°58'05.28" WEST; THENCE NLY TO GEOGRAPHICAL CO-ORDINATES 51°23'31.68" NORTH AND 96°58'05.04" WEST; THENCE ELY TO THE POINT OF COMMENCEMENT.

(the "Lands") and being **259.56** hectares, more or less, for a term of 10 years, commencing the **5th day of March, 2006** 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:
Industry, Economic Development and Mines Unit 360-1395 Ellice Avenue Winnipeg, Manitoba R3G 3P2	SUN GRO HORTICULTURE CANADA LTD. BOX 100 ELMA MB R0E 0Z0

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:

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

[redacted]

Witness

Minister of Industry, Economic Development and Mines

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

Date July 5 2006

[redacted]

Witness

Lessee SUN GRO HORTICULTURE CANADA LTD.

JUNE 29/06

Date

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.

[redacted]

Dated

Mining Recorder

QUARRY LEASE NOS. QL-1107 TO QL-1110 INCLUSIVE, QL-1137 TO QL-1152 INCLUSIVE, QL-1154 TO QL-1158 INCLUSIVE, QL-1196 TO QL-1199 INCLUSIVE, QL-1360, QL-1362, QL-1363, QL-1365 AND QL-1366

PROVINCE OF MANITOBA

APPENDIX "A" - Master Assignment Agreement (debenture) dated June 26, 1998, in the amount of $75,000,000 U.S. Funds.

APPENDIX "B" – Notice of Debenture dated September 8, 1995, in the amount of $75,000,000 U.S. Funds.

APPENDIX "C" – Discharge of Appendix "A" (Master Assignment Agreement) and Appendix "B" (Notice of Debenture).

CERTIFIED TRUE COPY OF ORIGINAL

[redacted]

Manitoba Industry, Economic Development and Mines

JUN 16 2006

QUARRY LEASE NOS. QL-1107 TO QL-1110 INCLUSIVE, QL-1137 TO QL-1152 INCLUSIVE, QL-1154 TO QL-1158 INCLUSIVE, QL-1196 TO QL-1199 INCLUSIVE, QL-1360, QL-1362, QL-1363, QL-1365 AND QL-1366

APPENDIX "D"

PROVINCE OF MANITOBA

I hereby certify that Mortgage of Leases dated June 10, 2004, in the amount to the maximum principal amount of $100,000,000 between Sun Gro Horticulture Canada Ltd. and Bank of Montreal was filed against Quarry Lease Nos. QL-1107 to QL-1110 inclusive, QL-1137 to QL-1152 inclusive, QL-1154 to QL-1158 inclusive, QL-1196 to QL-1199 inclusive, QL-1360, QL-1362, QL-1363, QL-1365 and QL-1366 in the Winnipeg Mining Recording Office of the Department of Industry, Economic Development and Mines on June 16, 2004 under Document No. 16779 in accordance with Subsection 217(1) of The Mines and Minerals Act.

[redacted]

Mining Recorder

Manitoba Industry,
Economic Development
and Mines
Mines Branch

QUARRY LEASE

First Renewal

Quarry
Lease No.**QL-1108**

THIS LEASE made in duplicate this 20th day of June, 2006

BETWEEN:

Her Majesty the Queen in right of the
Province of Manitoba, represented by the
Minister of Industry, Economic Development
and Mines

(the "Minister")

of the First Part

- and -

SUN GRO HORTICULTURE CANADA LTD.
BOX 100
ELMA MB R0E 0Z0

(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:

   ALL THAT PORTION OF THE PROVINCE OF MANITOBA CONTAINED WITHIN THE FOLLOWING LIMITS, NAMELY; COMMENCING AT GEOGRAPHICAL CO-ORDINATES 51°23'30.47 NORTH AND 96°56'03.48 WEST; THENCE SLY TO GEOGRAPHICAL CO-

ORDINATES 51°22'10.80" NORTH AND 96°56'03.18" WEST; THENCE WLY TO GEOGRAPHICAL CO-ORDINDATES 51°22'11.07" NORTH AND 96°56'43.31" WEST; THENCE NLY TO GEOGRAPHICAL CO-ORDINATES 51°22'38.90" NORTH AND 96°56'42.65" WEST; THENCE NLY TO GEOGRAPHICAL CO-ORDINATES 51°23'31.07" NORTH AND 96°56'41.52" WEST; THENCE ELY TO THE POINT OF COMMENCEMENT.

(the "Lands") and being **186.38** hectares, more or less, for a term of 10 years, commencing the **5th day of March, 2006** 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:
Industry, Economic Development and Mines Unit 360-1395 Ellice Avenue Winnipeg, Manitoba R3G 3P2	SUN GRO HORTICULTURE CANADA LTD. BOX 100 ELMA MB R0E 0Z0

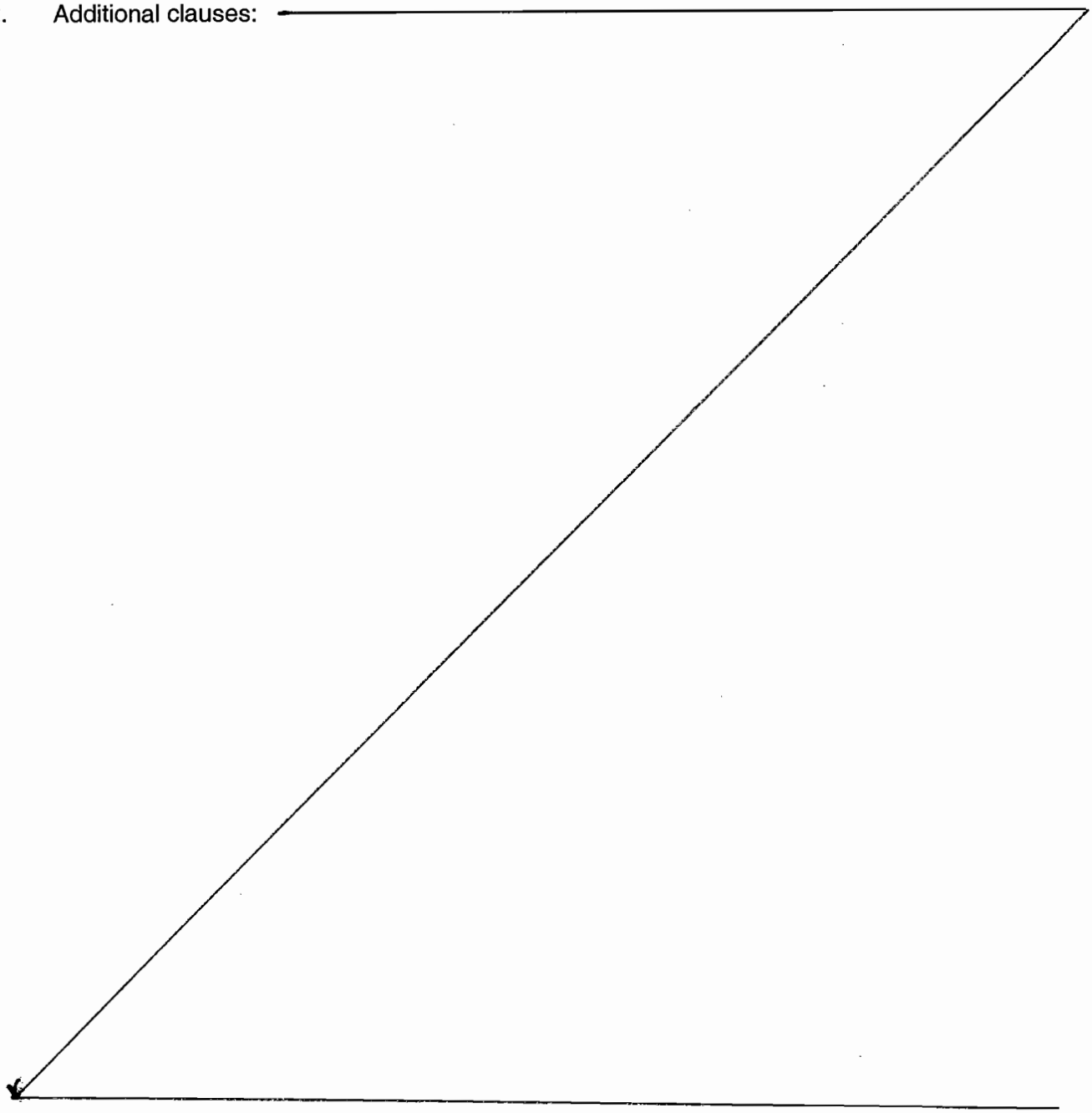
8. This lease shall be interpreted in accordance with the laws of Manitoba.

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:



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

[redacted]

Witness

[redacted]

Minister of Industry, Economic Development and Mines

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

Date July 5 2006

[redacted]

Witness

[redacted]

Lessee SUN GRO HORTICULTURE CANADA LTD.

JUNE 29/06

Date

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.

[redacted]

Dated Mining Recorder

QUARRY LEASE NOS. QL-1107 TO QL-1110 INCLUSIVE, QL-1137 TO QL-1152 INCLUSIVE, QL-1154 TO QL-1158 INCLUSIVE, QL-1196 TO QL-1199 INCLUSIVE, QL-1360, QL-1362, QL-1363, QL-1365 AND QL-1366

PROVINCE OF MANITOBA

APPENDIX "A" - Master Assignment Agreement (debenture) dated June 26, 1998, in the amount of $75,000,000 U.S. Funds.

APPENDIX "B" – Notice of Debenture dated September 8, 1995, in the amount of $75,000,000 U.S. Funds.

APPENDIX "C" – Discharge of Appendix "A" (Master Assignment Agreement) and Appendix "B" (Notice of Debenture).

CERTIFIED TRUE COPY OF ORIGINAL

[redacted]

Manitoba Industry, Economic Development and Mines

JUN 16 2004

QUARRY LEASE NOS. QL-1107 TO QL-1110 INCLUSIVE, QL-1137 TO QL-1152 INCLUSIVE, QL-1154 TO QL-1158 INCLUSIVE, QL-1196 TO QL-1199 INCLUSIVE, QL-1360, QL-1362, QL-1363, QL-1365 AND QL-1366

APPENDIX "D"

PROVINCE OF MANITOBA

I hereby certify that Mortgage of Leases dated June 10, 2004, in the amount to the maximum principal amount of $100,000,000 between Sun Gro Horticulture Canada Ltd. and Bank of Montreal was filed against Quarry Lease Nos. QL-1107 to QL-1110 inclusive, QL-1137 to QL-1152 inclusive, QL-1154 to QL-1158 inclusive, QL-1196 to QL-1199 inclusive, QL-1360, QL-1362, QL-1363, QL-1365 and QL-1366 in the Winnipeg Mining Recording Office of the Department of Industry, Economic Development and Mines on June 16, 2004 under Document No. 16779 in accordance with Subsection 217(1) of The Mines and Minerals Act.

[redacted]

Mining Recorder

Manitoba Industry,
Economic Development
and Mines
Mines Branch

QUARRY LEASE

First Renewal

Quarry
Lease No.**QL-1109**

THIS LEASE made in duplicate this 20th day of June, 2006

BETWEEN:

Her Majesty the Queen in right of the
Province of Manitoba, represented by the
Minister of Industry, Economic Development
and Mines

(the "Minister")

of the First Part

- and -

SUN GRO HORTICULTURE CANADA LTD.
BOX 100
ELMA MB R0E 0Z0

(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:

   ALL THAT PORTION OF THE PROVINCE OF MANITOBA CONTAINED WITHIN THE FOLLOWING LIMITS, NAMELY; COMMENCING AT GEOGRAPHICAL CO-ORDINATES 51°22'38.90" NORTH AND 96°56'42.65" WEST; THENCE SLY TO GEOGRAPHICAL CO-

ORDINATES 51°22'11.07" NORTH AND 96°56'43.31" WEST; THENCE WLY TO GEOGRAPHICAL CO-ORDINATES 51°22'11.42" NORTH AND 96°57'24.55" WEST; THENCE SLY TO GEOGRAPHICAL CO-ORDINATES 51°21'45.81" NORTH AND 96°57'25.14" WEST; THENCE WLY TO GEOGRAPHICAL CO-ORDINATES 51°21'45.78" NORTH AND 96°58'05.06" WEST; THENCE NLY TO GEOGRAPHICAL CO-ORDINATES 51°22'39.27" NORTH AND 96°58'05.28" WEST; THENCE ELY TO THE POINT OF COMMENCEMENT.

(the "Lands") and being **198.09** hectares, more or less, for a term of 10 years, commencing the **5th day of March, 2006** 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:
Industry, Economic Development and Mines Unit 360-1395 Ellice Avenue Winnipeg, Manitoba R3G 3P2	SUN GRO HORTICULTURE CANADA LTD. BOX 100 ELMA MB R0E 0Z0

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:

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

[redacted]

Witness

[redacted]

Minister of Industry, Economic Development and Mines

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

Date July 5 2006

[redacted]

Witness

[redacted]

Lessee SUN GRO HORTICULTURE CANADA LTD.

JUNE 29/06

Date

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.

[redacted]

Dated Mining Recorder

QUARRY LEASE NOS. QL-1107 TO QL-1110 INCLUSIVE, QL-1137 TO QL-1152 INCLUSIVE, QL-1154 TO QL-1158 INCLUSIVE, QL-1196 TO QL-1199 INCLUSIVE, QL-1360, QL-1362, QL-1363, QL-1365 AND QL-1366

PROVINCE OF MANITOBA

APPENDIX "A" - Master Assignment Agreement (debenture) dated June 26, 1998, in the amount of $75,000,000 U.S. Funds.

APPENDIX "B" – Notice of Debenture dated September 8, 1995, in the amount of $75,000,000 U.S. Funds.

APPENDIX "C" – Discharge of Appendix "A" (Master Assignment Agreement) and Appendix "B" (Notice of Debenture).

CERTIFIED TRUE COPY OF ORIGINAL

[redacted]

Manitoba Industry, Economic Development and Mines

[redacted]

2006

QUARRY LEASE NOS. QL-1107 TO QL-1110 INCLUSIVE, QL-1137 TO QL-1152 INCLUSIVE, QL-1154 TO QL-1158 INCLUSIVE, QL-1196 TO QL-1199 INCLUSIVE, QL-1360, QL-1362, QL-1363, QL-1365 AND QL-1366

APPENDIX "D"

PROVINCE OF MANITOBA

I hereby certify that Mortgage of Leases dated June 10, 2004, in the amount to the maximum principal amount of $100,000,000 between Sun Gro Horticulture Canada Ltd. and Bank of Montreal was filed against Quarry Lease Nos. QL-1107 to QL-1110 inclusive, QL-1137 to QL-1152 inclusive, QL-1154 to QL-1158 inclusive, QL-1196 to QL-1199 inclusive, QL-1360, QL-1362, QL-1363, QL-1365 and QL-1366 in the Winnipeg Mining Recording Office of the Department of Industry, Economic Development and Mines on June 16, 2004 under Document No. 16779 in accordance with Subsection 217(1) of The Mines and Minerals Act.

[redacted]

Mining Recorder

Manitoba Industry,
Economic Development
and Mines
Mines Branch

QUARRY LEASE

First Renewal

Quarry
Lease No.**QL-1110**

THIS LEASE made in duplicate this 20th day of June, 2006

BETWEEN:

Her Majesty the Queen in right of the
Province of Manitoba, represented by the
Minister of Industry, Economic Development
and Mines

(the "Minister")

of the First Part

- and -

SUN GRO HORTICULTURE CANADA LTD.
BOX 100
ELMA MB R0E 0Z0

(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:

   ALL THAT PORTION OF THE PROVINCE OF MANITOBA CONTAINED WITHIN THE FOLLOWING LIMITS, NAMELY; COMMENCING AT GEOGRAPHICAL CO-ORDINATES 51°22'39.27" NORTH AND 96°58'05.28" WEST; THENCE SLY TO GEOGRAPHICAL CO-

ORDINATES 51°21'45.78" NORTH AND 96°58'05.06" WEST; THENCE WLY TO GEOGRAPHICAL CO-ORDINATES 51°21'45.55" NORTH AND 96°59'28.26" WEST; THENCE NLY TO GEOGRAPHICAL CO-ORDINATES 51°22'39.99" NORTH AND 96°59'28.38" WEST THENCE ELY TO THE POINT OF COMMENCEMENT.

(the "Lands") and being **268.17** hectares, more or less, for a term of 10 years, commencing the **5th day of March, 2006** 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:
Industry, Economic Development and Mines Unit 360-1395 Ellice Avenue Winnipeg, Manitoba R3G 3P2	SUN GRO HORTICULTURE CANADA LTD. BOX 100 ELMA MB R0E 0Z0

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:

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

[redacted]

Witness

[redacted]

Minister of ~~Industry,~~ Economic Development and Mines

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

Date July 5 2006

[redacted]

Witness

[redacted]

Lessee SUN GRO HORTICULTURE CANADA LTD.

JUNE 29/06

Date

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

[redacted]

Dated Mining Recorder

QUARRY LEASE NOS. QL-1107 TO QL-1110 INCLUSIVE, QL-1137 TO QL-1152 INCLUSIVE, QL-1154 TO QL-1158 INCLUSIVE, QL-1196 TO QL-1199 INCLUSIVE, QL-1360, QL-1362, QL-1363, QL-1365 AND QL-1366

PROVINCE OF MANITOBA

APPENDIX "A" - Master Assignment Agreement (debenture) dated June 26, 1998, in the amount of $75,000,000 U.S. Funds.

APPENDIX "B" – Notice of Debenture dated September 8, 1995, in the amount of $75,000,000 U.S. Funds.

APPENDIX "C" – Discharge of Appendix "A" (Master Assignment Agreement) and Appendix "B" (Notice of Debenture).

CERTIFIED TRUE COPY OF ORIGINAL

[redacted]

JUN 16 2004

Manitoba Industry, Economic Development and Mines

[redacted]

QUARRY LEASE NOS. QL-1107 TO QL-1110 INCLUSIVE, QL-1137 TO QL-1152 INCLUSIVE, QL-1154 TO QL-1158 INCLUSIVE, QL-1196 TO QL-1199 INCLUSIVE, QL-1360, QL-1362, QL-1363, QL-1365 AND QL-1366

APPENDIX "D"

PROVINCE OF MANITOBA

I hereby certify that Mortgage of Leases dated June 10, 2004, in the amount to the maximum principal amount of $100,000,000 between Sun Gro Horticulture Canada Ltd. and Bank of Montreal was filed against Quarry Lease Nos. QL-1107 to QL-1110 inclusive, QL-1137 to QL-1152 inclusive, QL-1154 to QL-1158 inclusive, QL-1196 to QL-1199 inclusive, QL-1360, QL-1362, QL-1363, QL-1365 and QL-1366 in the Winnipeg Mining Recording Office of the Department of Industry, Economic Development and Mines on June 16, 2004 under Document No. 16779 in accordance with Subsection 217(1) of The Mines and Minerals Act.

[redacted]

Mining Recorder

Manitoba Industry,
Economic Development
and Mines
Mines Branch

QUARRY LEASE

First Renewal

Quarry
Lease No.**QL-1156**

THIS LEASE made in duplicate this 20th day of June, 2006

BETWEEN:

Her Majesty the Queen in right of the
Province of Manitoba, represented by the
Minister of Industry, Economic Development
and Mines

(the "Minister")

of the First Part

- and -

SUN GRO HORTICULTURE CANADA LTD.
BOX 100
ELMA MB R0E 0Z0

(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:

   ALL THAT PORTION OF THE PROVINCE OF MANITOBA CONTAINED WITHIN THE FOLLOWING LIMITS, NAMELY; COMMENCING AT GEOGRAPHICAL CO-ORDINATES 51°24'22.91" NORTH AND 96°56'42.17" WEST; THENCE SLY TO GEOGRAPHICAL CO-

ORDINATES 51°23'31.07" NORTH AND 96°56'41.52" WEST; THENCE WLY TO GEOGRAPHICAL CO-ORDINATES 51°23'31.68" NORTH AND 96°58'05.04" WEST; THENCE NLY TO GEOGRAPHICAL CO-ORDINATES 51°24'22.86" NORTH AND 96°58'05.78" WEST; THENCE ELY TO THE POINT OF COMMENCEMENT.

(the "Lands") and being **257.08** hectares, more or less, for a term of 10 years, commencing the **5th day of March, 2006** 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:
Industry, Economic Development and Mines Unit 360-1395 Ellice Avenue Winnipeg, Manitoba R3G 3P2	SUN GRO HORTICULTURE CANADA LTD. BOX 100 ELMA MB R0E 0Z0

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:

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

[redacted]

Witness

[redacted]

Minister of ~~Industry, Economic Development~~ and Mines

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

Date July 5 2006

[redacted]

Witness

[redacted]

Lessee SUN GRO HORTICULTURE CANADA LTD.

JUNE 29/06

Date

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.

[redacted]

Dated Mining Recorder

QUARRY LEASE NOS. QL-1107 TO QL-1110 INCLUSIVE, QL-1137 TO QL-1152 INCLUSIVE, QL-1154 TO QL-1158 INCLUSIVE, QL-1196 TO QL-1199 INCLUSIVE, QL-1360, QL-1362, QL-1363, QL-1365 AND QL-1366

PROVINCE OF MANITOBA

APPENDIX "A" - Master Assignment Agreement (debenture) dated June 26, 1998, in the amount of $75,000,000 U.S. Funds.

APPENDIX "B" – Notice of Debenture dated September 8, 1995, in the amount of $75,000,000 U.S. Funds.

APPENDIX "C" – Discharge of Appendix "A" (Master Assignment Agreement) and Appendix "B" (Notice of Debenture).

CERTIFIED TRUE COPY OF ORIGINAL

[redacted]

Manitoba Industry, Economic Development and Mines

JUN 16 2004

QUARRY LEASE NOS. QL-1107 TO QL-1110 INCLUSIVE, QL-1137 TO QL-1152 INCLUSIVE, QL-1154 TO QL-1158 INCLUSIVE, QL-1196 TO QL-1199 INCLUSIVE, QL-1360, QL-1362, QL-1363, QL-1365 AND QL-1366

APPENDIX "D"

PROVINCE OF MANITOBA

I hereby certify that Mortgage of Leases dated June 10, 2004, in the amount to the maximum principal amount of $100,000,000 between Sun Gro Horticulture Canada Ltd. and Bank of Montreal was filed against Quarry Lease Nos. QL-1107 to QL-1110 inclusive, QL-1137 to QL-1152 inclusive, QL-1154 to QL-1158 inclusive, QL-1196 to QL-1199 inclusive, QL-1360, QL-1362, QL-1363, QL-1365 and QL-1366 in the Winnipeg Mining Recording Office of the Department of Industry, Economic Development and Mines on June 16, 2004 under Document No. 16779 in accordance with Subsection 217(1) of The Mines and Minerals Act.

[redacted]

Mining Recorder

Manitoba Industry,
Economic Development
and Mines
Mines Branch

QUARRY LEASE

Quarry
Lease No.**QL-1761**

THIS LEASE made in duplicate this 26th day of April, 2005

BETWEEN:

Her Majesty the Queen in right of the
Province of Manitoba, represented by the
Minister of Industry, Economic Development
and Mines

(the "Minister")

of the First Part

- and -

SUN GRO HORTICULTURE CANADA LTD.
BOX 100
ELMA MB R0E 0Z0

(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:

   ALL THOSE PORTIONS OF UNSURVEYED SECTIONS 9, 10, 15 AND 16 IN TOWNSHIP 28-4 EPM, IN MANITOBA, CONTAINED WITHIN THE FOLLOWING LIMITS DETERMINED BY POINTS FROM NAD 83 (CSRS 98) UTM COORDINATES ZONE 14, EXPRESSED IN

METRES. NAMELY: COMMENCING AT A POINT OF COORDINATES OF 5 696 236N AND 641 317E, THENCE S'LY TO A POINT OF 5 693 774N AND 641 381 E, THENCE W'LY TO A POINT OF 5 693 767N AND 640 197 E, THENCE N'LY TO A POINT OF 5 695 370N AND 640 135E, THENCE E'LY TO A POINT OF 5 695 387N AND 640 541E, THENCE N'LY TO A POINT OF 5 696 220N AND 640 532E, THENCE E'LY TO THE COORDINATES AT THE POINT OF COMMENCEMENT.

(the "Lands") and being **259.3** hectares, more or less, for a term of 10 years, commencing the **9th day of February, 2005** 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:
Industry, Economic Development and Mines Unit 360-1395 Ellice Avenue Winnipeg, Manitoba R3G 3P2	SUN GRO HORTICULTURE CANADA LTD. BOX 100 ELMA MB R0E 0Z0

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 in accordance with subsection 128(3) of Act by the lessee and approved by the Director of Mines.

Mining operations shall be conducted in accordance with the approved plan or any approved amendment thereto.

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

[redacted]

Witness

[redacted]

Minister of Industry, Economic Development and Mines

May 6 2005

Date

[redacted]

Witness

[redacted]

Lessee SUN GRO HORTICULTURE CANADA LTD.

MAY 3/05

Date

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.

[redacted]

Dated

Mining Recorder

Manitoba Industry,
Economic Development
and Mines
Mines Branch

QUARRY LEASE

Quarry
Lease No.**QL-1762**

THIS LEASE made in duplicate this 26th day of April, 2005

BETWEEN:

Her Majesty the Queen in right of the
Province of Manitoba, represented by the
Minister of Industry, Economic Development
and Mines

(the "Minister")

of the First Part

- and -

SUN GRO HORTICULTURE CANADA LTD.
BOX 100
ELMA MB R0E 0Z0

(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:

   ALL THOSE PORTIONS OF UNSURVEYED SECTIONS 33 AND 34 IN TOWNSHIP 27-4 EPM AND UNSURVEYED SECTIONS 3 AND 4 IN TOWNSHIP 28-4 EPM NOT COVERED BY WATER AS SHOWN ON ORTHO PHOTO IMAGE NO. 6405690SWG IN MANITOBA,

CONTAINED WITHIN THE FOLLOWING LIMITS DETERMINED BY POINTS FROM NAD 83 (CSRS 98) UTM COORDINATS ZONE 14, EXPRESSED IN METRES . NAMELY: COMMENCING AT A POINT OF COORDINATES OF 5 692 169N AND 642 674E, THENCE S'LY TO A POINT OF 5 691 111N AND 642 702E, THENCE W'LY TO A POINT OF 5 691 055N AND 640 283E, THENCE N'LY TO A POINT OF 5 692 083N AND 640 257E, THENCE E'LY TO THE COORDINATES AT THE POINT OF COMMENCEMENT.

(the "Lands") and being **219.8** hectares, more or less, for a term of 10 years, commencing the **9th day of February, 2005** 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:
Industry, Economic Development and Mines Unit 360-1395 Ellice Avenue Winnipeg, Manitoba R3G 3P2	SUN GRO HORTICULTURE CANADA LTD. BOX 100 ELMA MB R0E 0Z0

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.

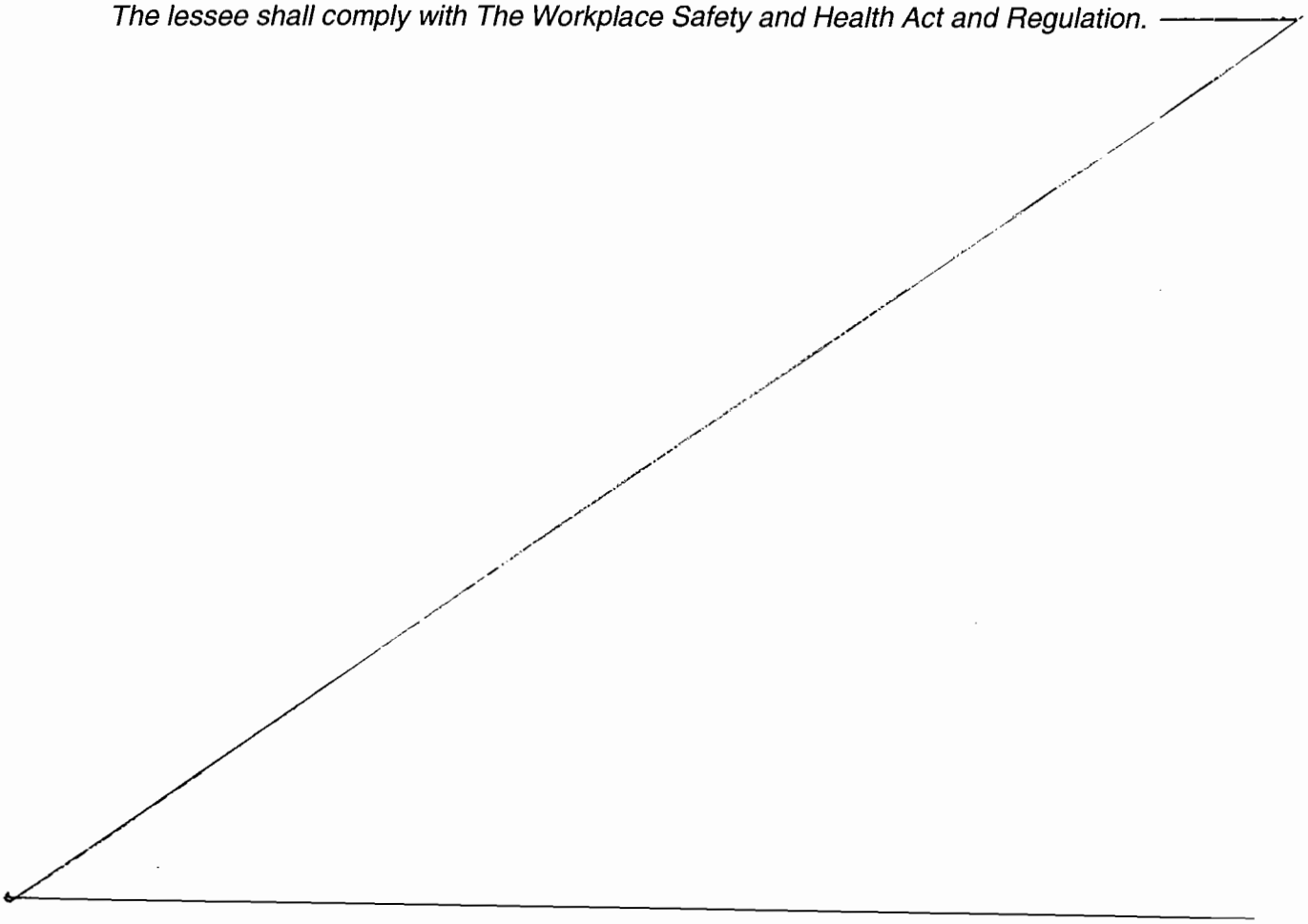
11. This Lease shall enure to the benefit of and be binding upon the heirs, executors, administrators, successors and permitted assigns of the parties.

12. Additional clauses:

Mining operations shall not commence on this lease until a Mine Closure Plan has been submitted in accordance with subsection 128(3) of Act by the lessee and approved by the Director of Mines.

Mining operations shall be conducted in accordance with the approved plan or any approved amendment thereto.

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

[redacted]

Witness [redacted] Minister of Industry, Economic Development and Mines

May 6 2005

Date

[redacted]

Witness [redacted] Lessee SUN GRO HORTICULTURE CANADA LTD.

MAY 3/05

Date

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.

[redacted]

Dated Mining Recorder

GIS TECHNICAL FLOWSHEET
FOR QUARRY LEASES & QUARRY EXPLORATION PERMITS

PENDING QL NO. 2441

AREA OF QUARRY EXPLORATION PERMIT OR QUARRY LEASE.....

IF UNSURVEYED

FIRST NATIONS CONCERNS (Within 30 k of Reserve,CIZ,TLE,RMA)

-

PEGUIS TREATY ENTITLEMENT AREA

OTHER LAND USE CONCERNS CONCERNS (RANK1 SITES/WMA/PARKS)

None

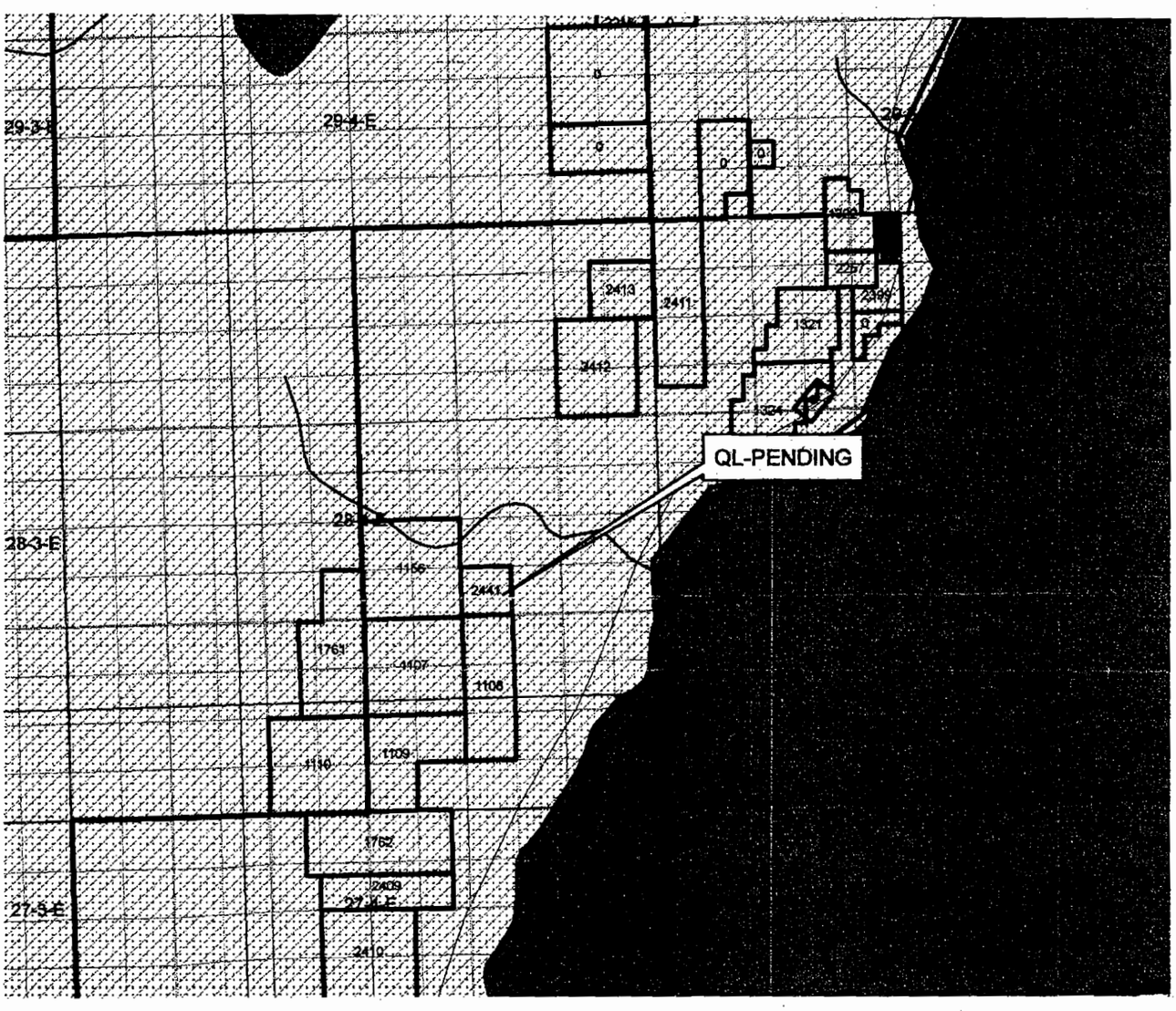
Coordinates (if in Unsurveyed Territory):

UTM COORDINATES

NE 5 696 214N 643 650E
SE 5 695 407N 643 673E
SW 5 695 382N 642 845E
NW 5 696 191N 642 821E

NAD 83 Z14

NTS SHEET...



Date Plotted : AUG 17 2010 By: MF

QL 2460

APPLICATION FOR QUARRY LEASE

(In accordance with subsection 139(1) of The Mines and Minerals Act)

Manitoba
Science, Technology, Energy and Mines
Mines Branch

Name of Applicant: Sun Gro Horticulture Canada Ltd Contact: Rob Smith

Address Box 100

City Elma Province MB Postal Code R0E 0Z0 Telephone No. 204-426-2121

Name of resident agent

(if applicant is not resident in Manitoba)

Address

City Province **MANITOBA** Postal Code Telephone No.

1. Describe area applied for:

   (a) Surveyed Territory L.S. SE 1/4 Sec. 3 Twp. 28 Rge. 04E1 WPM/EPM

   or (b) Unsurveyed Territory, latitude and longitude of corners.

	Latitude	Longitude
NE	N 51 22 11.65	W 96 56' 48.89
SE	N 51 21 46.03	W 96 56' 48.89
SW	N 51 21 45.99	W 96 57 30.71
NW	N 51 22 11.61	W 96 57 30.61

North American Datum NAD **Check:** UTM Zone ☐ 14 **or** ☐ 15

2. Attach plan or map showing location of area applied for and location and description of any structure, road trail, etc., in the area.

3. Describe the method to be used to mark the boundaries of the lease

4. State area in hectares 64

5. State the quarry mineral(s) applied for Peat Moss

6. State disposition numbers if these lands or portions thereof are presently under disposition

7. GST Registration Number or payment of GST.

I certify that the goods or services applied for will be used solely for commercial use/activity.

NOTE: The following should be submitted with this application:

(a) Application Fee of $60.00 (plus GST where applicable)
(b) First year's rental of $24.00 per hectare or fraction thereof (except for Peat at $6.50 per hectare).

Dated this 23rd day of August 20 10

[redacted]
Signature of Applicant

Application to be filed at the Office of the Recorder:

Unit 360 - 1395 Ellice Ave.
Winnipeg, MB R3G 3P2
Telephone: (204) 945-3152
Fax: (204) 948-2578

Barrow Building
143 Main Street
Flin Flon, MB R8A 1K2
Telephone:(204)687-1630

OFFICIAL USE ONLY

Cheque/Cash/Auth. No. _____ Date _____

Amount _____ Receipt No. _____

Payer _____ Amount: _____

Client No. _____

QLF1-applqml.doc(R2008/01)

APPENDIX B

SITE PHOTOGRAPHS



Photo 1. North view of the north Ranger Lake.



Photo 2. View of the south Ranger Lake.



Photo 3. West view of Beaver Creek.



Photo 4. View of the Beaver Creek confluence with Lake Winnipeg.



Photo 5. General view of the bog wetland environment at Ramsay Point Bog.



Photo 6. View of the rare orchid species tuberous grass-pink (*Calopogon tuberosus*).



Photo 7. East view of the bridge crossing at PR 234 on Beaver Creek taken from the upstream side.



Photo 8. West view of Beaver Creek taken from the top of slope on the south side of the bridge at PR 234 (May 18, 2010).



Photo 9. West view of the downstream side of the large beaver dam on Beaver Creek (May 18, 2010).



Photo 10. Foreground - west view of the downstream side of the large beaver dam on Beaver Creek; background - pooled water held back by the dam



Photo 11. West view of cattail marsh/wetland on west end of Beaver Creek taken approximately 500 m downstream of the lake that feeds the creek (May 18, 2010).



Photo 12. Southwest view of the shoreline on the pothole style bog lake located just south of the north Ranger Lake (May 19, 2010).



Photo 13. Foreground- South view of the top of the large beaver dam on the unnamed tributary flowing from the Ranger Lakes; Background - downstream view of the channel bed (May 19, 2010).



Photo 14. North view of the wetland that feeds/chokes out the channel flowing south from the Ranger Lakes (May 19, 2010).

APPENDIX C

MINE CLOSURE PLAN

SUN GRO™
HORTICULTURE

Bog Closure Plan
Ramsay Point Bog

Sun Gro Horticulture Canada Ltd. (Developer)

July 2010

The following is prepared to comply with section 9 of the Mine Closure Regulation 67/99.

a) Proponent: Sun Gro Horticulture Canada Ltd.
Box 100
Elma, Manitoba
R0E 0Z0
Contact: Walter Amerongen
Phone: 204-426-2121
Fax: 204-426-2131
e-mail: waltera@sungro.com

b) Name of Project: Ramsay Point Bog Horticultural Peat Harvesting

c) The Ramsay Point Bog is located approximately 50 kilometers northwest of Riverton, Manitoba in sections 02, 03, 04, 10, 15, 16 of township 028, range 04 EPM and section 34 of township 027, range 04 EPM.

d) N/A

e) Mineral rights for the Ramsay Point Bog are held by Sun Gro under the following Quarry Leases:

QL-1107, QL-1108, QL-1109, QL-1110, QL-1156, QL-1761, QL-1762

f) The Project Site is located on Crown Land and has no previous use.

g) No previous disturbances or other activities have occurred that could have resulted in contamination of the project site or land adjoining the site.

h) The Ramsay Point Bog is a raised bog and has a vegetative cover of black spruce, tamarack, ericaceous shrubs and sphagnum mosses. A gate will be installed and locked at night and whenever Sun Gro is not active at the site.

i) In order to harvest the bog, Sun Gro will have a staging area that is located close to the bog on mineral soil to be used as a base site to work from throughout the life of the bog harvesting operation. The location of the staging area is in southeastern section of QL 1108 at section 2, township 28 and range 04E EPM. The size of the staging area is 4 hectares (10 acres) or 200m by 200m. The staging area is used to park and/or store bog development equipment such as vacuum harvesters, wagons, tractors, harrows, crawler tractors, tools and

parts trailer, fuel and employee parking. If the soil in the staging area becomes contaminated it will be removed and placed into a designated and properly managed contaminated area so that it will not in perpetuity cause harm to public health or the environment.

j) Not applicable

k) Sun Gro's normal harvesting operation is as follows:

After the water table has been drawn down by the installation of the perimeter ditch, outlet ditch and lateral ditches, the peat surface is prepared for harvesting (summertime operation). This consists of removing the roots, stumps and embedded logs from the uppermost layer of the peat (the topspit).

The peat fields (areas located between the lateral ditches) are then rotovated or milled and shaped into a crown surface between the lateral ditches and left to dry by solar heat and natural air movement.

Once the peat is dry enough (about 40 to 55% moisture content) it is collected by a vacuum machine and stockpiled at the end of the lateral ditches or headland.

Spoon harrows are used to turn over the peat to increase exposure to the air and increase drying. Over the course of the summer, the harvesters and harrows will pass over the bogs numerous times and each summer they will vacuum a 6-10 cm layer of peat. The harvesting is weather dependent, and when the moisture content of the peat moss is acceptable, all efforts are made towards harvesting.

The ridge along the perimeter of the harvesting operation will be rototilled or milled under on a regular basis to prevent weed growth.

The CSPMA recommends that at least 1 m of peat be left on the bottom of the bog to help in restoration once harvest is complete.

The production levels are weather-dependent and approximately 6-10cm of the peat surface is expected to be harvested each summer.

l) The remaining life of the bog for harvesting is 35 years.

m) Not applicable

n) The Ramsay Point Bog has a ridge just north of the Ranger Lakes, which causes the water in the Ramsay Point bog to flow in two different directions. Water appears to flow north and then east from the north side of the ridge towards Beaver Creek. In comparison on the south side of the ridge water appears to flow south towards the Ranger Lakes. The general topography of the Ramsay Point bog shows a drainage divide just north of Ranger Lakes, where the surface water flows north and south at this point. The eastern quarry lease limits drain east towards Lake Winnipeg.. The drainage system involves the following components:

a. The lateral or cross drainage ditches
b. The perimeter ditch
c. The outlet ditches

a. Lateral or Cross Drainage Ditches

Lateral or cross drainage ditches are ditches constructed across the area to be harvested. Their function is to lower the water level within the peat to facilitate harvesting operations. These ditches are approximately parallel to one another and spaced 30 m apart. As the peat is harvested, the ditches are lowered so that there is always a minimum of 1.5m of depth from the top of the peat surface to the bottom of the ditch. The ditches have an average top width of 1.5m and an average bottom width of 0.4m. The lateral ditches generally follow the topography of the land. Since the land is fairly flat or gently sloping, the ditches would also be fairly flat or have mild slopes. The lateral ditches have very small contributing drainage areas and therefore the discharges in the ditches are small. Thus, because of the flat slopes and the small discharges, the stream velocities in the ditches are well below erosion-causing velocities.

b. Perimeter Ditch

The perimeter ditch is constructed around the outside perimeter of the harvestable peat area. It provides an outlet for the cross drainage ditches. These ditches are constructed to a design slope. These ditches will have an average top width of 1.5 m and an average bottom width of 0.4 m.

c. Outlet Ditches

The outlet ditches are the ditches that drain water away from the perimeter ditch. These ditches continue until the elevation of the bottom of the ditch is equal to the top of the natural ground (ditch "day-lights-out").

The outlet ditches run north into Beaver Creek from the harvesting area for the northern section of the bog through NE section 16, township 28, range 04 EPM and NW Section 15, township 28, range 04 EPM, south into the Ranger Lakes from the harvesting area for the southern section of the bog through SW Section 10, township 28, range 04 EPM and southeast into Lake Winnipeg from the harvesting area for the eastern section of the bog through NW section 2, township 28, range 04 EPM and SW section 2, township 28, range 04 EPM and NW section 35, township 27, range 04 EPM.

Construction and Maintenance of Drainage Ditches

All ditching will be done with either a ditching machine or a large tracked hoe. Ditches are constructed with a 0.4 meter bottom width and a 1.5 meter top. The ditch side slopes are steeper than what is normally constructed on mineral type soils. Our experience has shown that these steep side slopes are stable in fibrous and/or peat type soils. Maintenance of the drainage ditches is done throughout the harvesting operation. Sun Gro will be responsible for maintenance and repair of all the drainage works involved with the bog operation to the time their reclamation works are completed. This would include:

- The correction of any erosion or silting problems.
- The correction of any icing problems.
- The cleaning out of the ditches should the capacity become reduced due to vegetative growth.
- The removal of debris that interferes with the passage of water.
- The removal of any beaver dams (if required) that are causing flow problems.

o) Not applicable

p) Not applicable

q) Not applicable

r) Storage and Handling of Fuel, Lubricants, Antifreeze

The long-term storage of fuel products is in the staging area. During harvesting operations, the use of fuel products for equipment will adhere to all applicable Provincial and Federal Regulations. Fuel, lubricants and other potentially hazardous materials shall be stored and

handled within dedicated areas at work areas in full compliance with *The Dangerous Goods Handling and Transportation Act* and other regulatory requirements. The Team Leader will be in charge in the event of a spill. Materials required for spill containment and clean up will be available at the work area during pre-harvesting development and harvesting. In the event of a spill, the Team Leader shall be notified immediately and take action to contain the spill. A fuel storage facility (berms constructed around the double-walled fuel storage containers) will be in place.

Accidental Spill Response

In the event of a spill, the Team Leader shall be notified immediately and take action to contain the spill.

Garbage Handling

Garbage will be placed in proper storage containers, which are placed at designated areas in the plant yard. The garbage will be hauled to a local sanitary landfill site. Garbage will be cleaned up daily, so that wildlife is not be attracted to the work site.

s) Site Reclamation Goals and Plans

Following closure and rehabilitation, the Ramsay Point Bog project site will return to its natural state as a functioning raised bog eco-system. The techniques were prepared to comply with the requirements of The Preservation and Reclamation Policy of the Canadian *Sphagnum* Peat Moss Association. This policy recommends that harvested peat land areas be restored to an environment similar to the one that existed before harvesting. This reclamation plan focuses on the procedures involved in establishing a productive wetland ecosystem and through wetland succession will again return to a functioning raised bog ecosystem. The Manitoba Peat Industry is committed to a policy of restoring the harvested bogs back to the wetland inventory. However, the peat industry recognizes that the land is managed by the Crown and that the Crown will specify the final end use (specify the goal of reclamation) of the land, including the on-site access road, the bog, and the drainage ditch.

Several of the goals of peat land restoration include:

- The restoration of harvested peat land to functioning wetland ecosystems
- The enhancement of wildlife values of restored peat land / wetland ecosystems
- The initiation of restoration as soon as harvesting is completed
- The integration of bog development with restoration and restoration goals
- The modification of ditch systems to retain runoff in abandoned sections
- The development of low cost, maintenance-free restoration methods
- The establishment of habitats that complement the regional landscape ecology
- The utilization of natural features such as bog ponds and upland islands.

t) Bog Restoration Procedures

The reclamation plan for the Ramsay Point Bog includes a combination of production field changes, on-bog runoff retention, topspit application, and seeding or transplanting with higher plant species (including trees) if needed and as directed by Manitoba Conservation. Production field alterations are designed to facilitate wetland restoration and water fowl / water bird habitat enhancement. The methods are simple and cost-effective, and can be combined with routine maintenance.

After sections of production fields are abandoned, new shallow ponds should be placed at strategic locations in the bog to:

- help retain runoff on the bog
- fill lateral ditches to facilitate rewetting of abandoned areas
- provide habitat for waterfowl, other water birds, invertebrates, frogs, and salamanders,
- create wet areas that, if not filled with water, will provide good habitat for recolonization by sphagnum moss.

2. Level Production Fields

Abandoned production fields should be leveled or re-profiled (remove the crown in the center of the field) to rewet the entire field. This practice should be done in the fall when the bog is driest. The procedure can be combined with ditch filling where appropriate.

3. Fill Ditches

Ditches will be filled with ditch spoil to help retain water on the bog

An alternative to plugging ditches is widening some ditches to create broad, low habitat with a higher water table to facilitate sedge meadow development and *Sphagnum* moss regeneration. The microtopography will be comprised of alternating low, wet sedge/moss-filled depressions with raised, better-drained shrub and tree dominated blocks.

4 Topspit (Recycled bog surface)

Topspit removed from newly opened bogs provides a source of bryophyte spores and fragments that will regenerate, as well as higher plant seeds and live insects and invertebrates. Areas receiving recycled bog surface should have their production fields leveled and drainage ditches filled. The plant community types to be established following topspit application include ericaceous shrubs, moss lawn *(Sphagnum* moss dominated areas with a very high water table), and shrub heath. One to two years may be needed to rewet the bog before topspit can be applied.

Restoration Plan Plant Community Types

The plant community types to be restored on the Ramsay Point Bog are designed to have equal to higher ecological values than pre-development conditions. It will take time, however, for these values to be achieved. Studies have shown that plant species diversity is higher on naturally restored bogs than on undisturbed low-nutrient bogs (Famous et a/. 1993). In general, the density of vertebrate populations and living biomass can be higher on reclaimed bogs.

Final Plant Community Types

Criteria and factors used to select plant community types for the restoration plan included:

- Predominance of wetland vegetation
- High potential for rapid establishment for erosion control
- Establishment on naturally restoring peat lands

- Probability of success a Practicability & Low cost to the producer
- Moderate wildlife values
- Role in the regional landscape ecology,

Important consideration will be given to the ease in which the plan can be implemented, low maintenance, and potential to work in concert with the production plan.

Plant Community Succession

When a harvested bog is recolonized by plants the vegetation goes through a series of changes over time as new species continue to arrive and earlier colonizers mature and / or die. Bare peat is usually first colonized by herbaceous plants which form meadow dominated ecosystems, regardless of nutrient level. Bryophytes may eventually dominate under some environmental circumstances. With time, woody species invade and/ or replace the herbaceous species to form shrub dominated ecosystems with or without a well-developed moss layer. When fully dominated by tall shrubs (above 1 m) they form a shrub thicket plant community type and when fully dominated by low shrubs (> 1 m) they form a shrub heath, similar in form and size to the naturally occurring vegetation prior to development. With time, trees will eventually dominate the bog surface where water table depths are low enough.
Three moisture scenarios will be present; wet, damp and dry sections. The wet locations include ditches, shallow ponds, widened ditches, and leveled fields located in topographic depressions. Damp sections include leveled fields, ditch margins, and the lower slopes of unleveled production field crowns. Water tables may be near the surface during spring, early summer, late fall, and winter in damp sections. Dry locations include topographically high sections of leveled production fields and the crowns and upper slopes of unleveled production fields.

Progressive Restoration

As areas become depleted of harvestable peat, they will be reclaimed. The outside edge of the harvestable peat area contains the shallowest peat (0.5 m). Since this area contains the shallowest peat, it will be the first area to be reclaimed. As other areas become depleted of harvestable peat, they will be reclaimed as well.

Once all harvesting has been completed, the road within the bog will be removed. The clay and geotextile matting will be removed and the underlying peat will be salvaged.

Wildlife Populations

The restoration plans are designed to restore and enhance preexisting wildlife values for nesting and migratory land birds, waterfowl, invertebrates, amphibians, and small and large mammals.

Nesting land birds and Water birds

The creation of interspersed emergent marsh, shrub meadow, shrub thicket, and forested habitat will increase bird species diversity and result in higher nesting densities. Most typical bog species will recolonize (palm warbler, Lincoln's sparrow, savannah sparrow, alder flycatcher and common yellowthroat) as well as non-bog edge and forest nesting species (magnolia warbler, white-throated sparrow, Wilson's warbler, and grey catbird).
Species diversity and nesting densities will increase because of the large increase in volume of foliage (leaves serving as feeding substrates for most bird species which are insect eating leaf gleaners), number of vegetation layers (ground, low shrub, tall shrub, and tree canopy), and number of habitat types. Diverse, restored habitat types collectively result in more 'niches' or places for birds to feed and breed.

The natural bog ponds will provide limited food for water birds, however they will serve primarily as resting and stopover areas for migrants. Black ducks, wood ducks, and green-winged teal are expected to utilize these ponds during the nesting season.

Small Mammals, Amphibians and Invertebrates

Small mammal, amphibian, and invertebrate populations will be restored through immigration from refugia, migration corridors and, for invertebrates, the addition of chopped, living bog surface (topspit). Undeveloped sections of bog surrounding ponds and in wet, shallow sections serve as refugia and migration corridors for small mammals, amphibians and invertebrates.

Migration corridors can be identified prior to or during bog development or can be established during the restoration process.

u) Surface water quality will be monitored at the following locations:

- within the outlet ditch;
- at the overland flow site;

The monitoring would be conducted at least three to four times a year during the following events:

- the spring freshette;
- at the mid-summer when most chemical parameters with seasonal variability peak;
- during the autumn base flow; and
- when there is an above normal rainfall runoff event.

The chemical parameters that would be monitored are the chemical parameters that might be expected to show an effect as a result of peat land operation. The chemical parameters that would be monitored are:

- the metals iron and aluminum;
- the nutrients, dissolved organic carbon, ammonium and total dissolved phosphorous; conductivity;
- the anion sulphate;
- pH, alkalinity, BOD, and TDS.

Once reclamation begins, the water quality will move in the direction of where it was prior to operation.

v) Closure Cost

The closure cost of reclaiming the Ramsay Point Bog is approximately $800,000. The financial assurance for the mine closure document “Mine Closure regulation 67/99 Mine closure guidelines financial assurance section 15 – Corporate financial test” will be considered to have been provided for the entire life of the mine as Sun Gro has a current D&B corporate credit rating of 5A2.

Appendix A

Sun Gro follows the Canadian Sphagnum Peat Moss Association Preservation and Reclamation Policy (CSPMA 1999). The Preservation and Reclamation Policy sets out the procedures for opening, harvesting and closing a bog.

The highlights of the policy are as follows:

Before Harvesting

- Reduce impact on environment
- Record flora and fauna
- Cooperate with environmental groups
- Choose bogs for reserves

During Harvesting

- Minimize acreage
- Leave buffer zone
- Leave layer of peat moss
- Design drainage so water levels can be restored

After Harvesting

- Primary goal: Restore bogs to wetlands
- Secondary goal: Reclaim bogs for beneficial crops

It is the Canadian Sphagnum Peat Moss Association's policy and Sun Gro's to leave a buffer zone of original vegetation around the outside of the peat land. Leaving a strip of undisturbed peat land is not very practical because the peat harvesting areas are smaller than they used to be. Leaving areas in the centre part of a peat land undisturbed is not economically feasible. There is increased cost associated with having to harvest around strips of land and not being able to harvest the undisturbed land is an economic loss.

Introduction

From an ecological perspective, peat land reclamation is broadly defined as the process of returning a disturbed peat land to a former or improved condition. Reclamation includes all efforts,

either natural or man induced, to return an abandoned harvested peat land to a functioning wetland system. In most cases, a wetland system will recolonize by typical peat land species either at an early stage or later stage of succession.

Sun Gro, along with the University of Manitoba has conducted reclamation trials at other peat harvesting locations in Manitoba (results are summarized in Section 3.6.2). As well, the University of Laval in Quebec, the University of Waterloo in Ontario and the University of Alberta in Edmonton have conducted several studies in Canada on peat land restoration forming the basis for the procedures proposed here.

The Bog Environment

One of the intended results of the reclamation of the Ramsay Point Bog is to restore the area to a *Sphagnum*-based bog. A bog in its mature state is defined by its location and appearance in the landscape, its species composition, and the environmental factors that influence its development. This shape is created by organic matter production that exceeds the rate of decay. Bogs have a high water holding capacity and they typically occur in flat sites such as infilled glacial lake basins in the cool temperate zones of the Northern Hemisphere.

Raised bogs are nutrient-poor environments and are ombrotrophic, which means they receive water and nutrients solely from inputs derived as precipitation. These areas are rather harsh environments as they are typically acidic, and as a result are species-poor in both plant and animal composition. *Sphagnum* mosses are considered the “key species” in peat land formation since their dominance is essential for peat bog formation.

Soil stratigraphy in a raised bog is functionally divided into two layers, the catotelm (lower black peat layer) and the acrotelm (upper brown or white peat layer). These layers form under different conditions and perform different functions in the bog environment. The catotelm is permanently waterlogged and composed of decayed peat material. It functions as an almost impermeable seal for the bottom of the bog and as the primary water storage unit forming the perched water mound. The acrotelm is the active layer of the bog ecosystem where most of the biotic activity occurs as well as the active hydrologic fluctuations. It is the most porous layer and is composed of living and slightly decomposed *Sphagnum* moss and has a high water holding capacity that helps regulate the water level of the bog (Price 1996). The functions of the acrotelm include providing a viable seed bank, protecting the catotelm from evaporation, providing additional water storage, and providing the location of biotic activity.

Assessment Process

The success of the restoration process of any wetland depends on satisfying two main conditions:

- Re-establishing environmental conditions suitable to the desired ecosystem, and
- Providing a source of propagule material of the desired species.

Wetland ecosystems are always evolving and thus each type of wetland represents a point along a continuum of development. For example, in the case of a raised bog, the original ecosystem often begins as an open water progressing through to a swamp, fen, fen carr and finally to a raised bog (Wheeler 1995). While attempting to return a site to its immediate previous state is the most desirable approach, it has been argued that it must be realized and accepted that returning a site to a somewhat earlier developmental stage is all that can be practically and economically achieved (Wheeler 1995). Therefore, the ultimate goal of this reclamation plan is to reclaim the disturbed peat land areas to a functioning wetland that will eventually succeed to a *Sphagnum* bog.

The Elma Demonstration Site

During the summer of 1996, black spruce saplings and jack pine saplings were planted at the site. A survey of the saplings indicated that 98% of the 4395 transplants on the site survived the first winter (Stewart *et al.* 1998). Transplant plugs (approximately 1 square m) of *Sphagnum, Polytrichum* and ericaceous shrubs were transplanted in 1996 as well. In 1997, a survey indicated that due to the highly exposed conditions and lack of maintaining the high water regime required for *Sphagnum* regeneration, the success of the bog transplant material was minimal. Only the ericaceous shrubs and some moss species survived on the site. The water level is low due to the drainage for on-going peat extraction adjacent to the site and until the hydrology can be restored, only the ericaceous species will survive.

In 1997, topspit composed of *Sphagnum* and *Polytrichum* species, and ericaceous shrubs were transplanted onto the site from a site being cleared for harvest. The plant material survives today, but is limited by an insufficient supply of water.

In 1998, field corn and fall rye were planted onto the site in hope of providing shelter for transplants which were struggling under the dry, windy and hot environmental extremes. An intensive fertilization program was necessary for establishing the crops as nitrogen and phosphorus was

limited. The field corn was planted in windrows perpendicular to the prevailing winds. In 1999, field investigations indicated the field corn to be quite successful in trapping of wind-borne seeds. The fall rye crop provided sufficient cover and protection for many species as well.

Elma Restoration Site

In the summer of 1995, 18 square m of *Sphagnum* transplants were planted at the site. An October evaluation indicated that 'green' *Sphagnum* was still present. Black spruce and jack pine saplings were planted at the site as well.

In the summer of 1996, more black spruce and jack pine saplings were transplanted onto the site. An evaluation of the success of the trees on the sites indicated the trees had tripled in height and doubled in their bud count by the end of the 1996 growing-season (Stewart *et al.* 1998). The *Sphagnum* plots that were planted in 1995 were revisited and all plots had excellent growth, which was attributed to the raised and stabilized water table of the area.

In the summer of 1997, the success of the transplants on the Elma plantation site was high. After 27 months of growth, trees planted at the site quadrupled in height and bud count.

In the summer of 1998, the survival and growth of the trees planted in previous years was monitored. The survival success of the transplants was again found to be quite high. Trees growing on this site have suitable hydrological conditions, depth of peaty soil, and natural bog and weed species growing on the site provided shelter for the transplants. The species count of this site is approximately 90 species, which is remarkable as there are normally about 140 species in a bog (Stewart *et al.* 1998).

In the summer of 1999, on-site investigations indicated the *Sphagnum* plugs to have grown and have spread. The black spruce and jack pine transplants are still successful and natural revegetation of tamarack and bog birch is occurring.

h-iv-iii) Moss Spur

In the summer of 1995, approximately 29 square m of mixed *Sphagnum* species were transplanted in three different moisture regimes at the site. An October evaluation indicated all quadrats to have 'green' *Sphagnum* present. Black spruce saplings were transplanted throughout the site. The natural revegetation of tamarack and jack pine was observed throughout the site.

In the summer of 1996, there was variable success in the *Sphagnum* plots established at the site in 1995. More black spruce and jack pine saplings were planted. The trees planted in 1995 more than doubled in height and bud count.

In the summer of 1997, transplant survival decreased on the site as the trees suffered severe flood damage. The trees located on the drier sites were quite successful and had more than tripled in height and more than quadrupled their bud count on average (Stewart *et al.* 1998).

In the summer of 1998, the trees on the drier sites were still doing well.

In the summer of 1999, an on-site investigation indicated complete cover of vegetative species (mainly *Scirpus* and *Typha latifolia*) in the wetter areas. Black spruce transplants were growing well on high areas but the ground cover is less than 40%. Transplanted *Sphagnum* moss plugs are doing very well and are spreading. Natural establishment of orchids including *Arethusa bulbosa* (dragon's mouth orchid), a rare orchid in the province and *Spiranthes romanzoffiana* (hooded ladies'-tresses) is occurring.

Restoration Process

The main challenge in the restoration of harvested peatlands is overcoming the hydrophysical changes that have occurred due to the drainage of the bog and the loss of vegetative cover (Holtslag *et al.* 1998). The slow rate of natural revegetation on vacuum harvested peatlands is due to several factors. The drainage of the peatland alters the natural hydrology of the bog ecosystem by lowering the water table. The peat remaining in the bog after harvesting is more decomposed and is subject to shrinkage, oxidation and compression due to exposure from anaerobic to aerobic conditions (Price 1996). The water table on post-harvested sites is also more variable and fluctuates more so than on natural sites. The site is also subject to erosion by wind and water until cover is established. On bogs in which the vacuum-harvesting method was used to harvest the peat, the rate of revegetation tends to take a long time as the abandoned field has a rather flat topography. Studies on natural revegetation at vacuum-harvested sites show that revegetation is rather sparse with only a few species such as *Eriophorum* sp. and *Betula papyrifera* and *Betula poplifolia* (Lavoie and Rochefort 1996).

The upper layer of vegetation known as the topspit or the acrotelm containing the viable seed bank is removed during the harvesting process. The exposed peat layer now relies upon seed rain for their natural revegetation. However, natural regrowth by *Sphagnum*, the peat mosses

responsible for peat accumulation and formation of bogs, does not generally occur, even after many years of abandonment (Ferland and Rochefort 1997).

The hydrologic regime plays one of the most important roles in determining the revegetative success of the post-harvested peat land as water plays a critical role in the formation of raised bogs. A major hindrance to typical peat land vegetation re-establishment on abandoned peat fields is the lowered water table caused by drainage associated with peat harvesting. The building of the drainage system impacts the ecosystem by restricting the ability of a *Sphagnum* dominated vegetation type to re-establish. Case history studies of naturally revegetated peat lands indicate that water table depth determines plant community structure and the presence or absence of *Sphagnum* regeneration.

Sphagnum moss is the key species to restore peat land function as *Sphagnum* mosses are responsible for peat accumulation and bog formation. However, natural regrowth of *Sphagnum* mosses on abandoned sites generally does not occur, even after many years. Vascular plants tolerant of dry, acidic conditions usually recolonize abandoned sites. The re-establishment of *Sphagnum*-based vegetation on post-harvested fields is a desirable aim for ombrotrophic peat lands restoration because it is a necessary step to restore ecological values such as water filtration, carbon storage, and wildlife habitat (Ferland and Rochefort 1997). Therefore, to manage the peat land as a sustainable resource it is essential to restore the *Sphagnum* mosses.

Sphagnum moss is an ectohydric species and is dependent on high atmospheric humidity and wet conditions for growth and survival (Ferland and Rochefort 1997). If the drainage system is still in place, the hydrology of the peat land will not reflect the pre-harvest conditions and it will therefore be difficult to reestablish native peat land species. The most common method of rewetting the post-harvested peat land is to either block or fill the drainage ditches which run parallel and along the perimeter of the harvested field. The water table should remain between 0.5 – 1 m below the surface for the re-establishment of *Sphagnum* mosses (Quinty and Rochefort 1997a).

The surface topography can be restored to reflect the hummock and hollow form of a natural raised bog. The micro-relief provides varied microenvironments that can be advantageous for the establishment of bog vegetation, especially *Sphagnum* mosses. The hummocks act as windbreaks and the hollows act as collection basins for rain water and snow, which provides wet and humid conditions in which *Sphagnum* moss can become re-established (Rochefort *et al.*

1997). A study conducted by Rochefort and Campeau (1997) showed *Sphagnum* re-establishment is favoured in the depressions of an area with enhanced microtopography in comparison to flat areas seeded with *Sphagnum* diaspores at a similar density. They also showed that using a protective covering such as artificial covers, straw mulch, or companion species provide cover to effectively promote *Sphagnum* re-establishment.

Another possible reason for the low rate of natural revegetation of abandoned sites is that the remaining peat field is almost devoid of plants (Rochefort and Campeau 1997). The availability of species for recolonization is also a factor in the revegetation process. Harvested peat lands lose their viable seed bank and therefore depend on the seed rain for their natural revegetation. For some species, wind borne seeds enhance the recolonization process. Other species propagate by less mobile methods. Transplants of rhizomes could be considered as a method of recolonization of some species. Transplants of clumps of shrubs and herbs also are a potential method of recolonization (Campeau and Rochefort 1997).

Various experiments have been performed to introduce other bog species besides *Sphagnum* mosses. One important source of seeds is to trap the seed rain and help in the revegetation process. The seed rain has been a very important source of seed at the Elma bog sites in Manitoba as more than 90 species have revegetated the area by this method (J. Stewart, Pers. comm.). Black spruce and jack pine saplings were planted on site and have provided wind breaks for many species. The trees decrease wind turbulence allowing wind borne seeds to fall and establish. At the Elma Demonstration Site, a row of field corn was planted to help trap the seed rain. Both of these methods were successful in accelerating the revegetation process.

Protective mulches and windbreaks have also been used to maintain moist soil conditions on the peat soil surface. Protective mulch has proved to create conditions that will be favourable to the survival and growth of *Sphagnum* mosses. Without the protection of a mulch, the *Sphagnum* fragments dry very rapidly and die (Quinty and Rochefort 1997a). Straw mulch application is the most commonly used mulch in peat land restoration, and unlike some other mulches that have been used, straw can be left on-site and allowed to decompose naturally (Rochefort *et al.* 1997).

Sphagnum moss is able to regenerate vegetatively or asexually from leaf, stem and branch fragments referred to as diaspores (Rochefort *et al.* 1995). Rochefort *et al.* (1995) found that an external source of diaspores will significantly enhance *Sphagnum* establishment and mineral additions will help it to spread more rapidly. The external source of living *Sphagnum* moss, which

is collected from living bogs, is referred to as the 'topspit'. Campeau and Rochefort (1996) showed that only the surface layer (0-10 cm) of a peat profile contained enough viable material to be of practical use as a source of *Sphagnum* diaspores. Their results also indicate that a density of at least 450 plants per m^2 is needed to re-establish a *Sphagnum* carpet effectively within one growing season.

The use of companion species has also been shown to increase the success of *Sphagnum* diaspores in peat land reclamation. Good establishment of *Sphagnum* diaspores was obtained under a cover of cotton grass *(Eriophorum angustifolium)*, which, of all companion species tested, was the most successful (Ferland and Rochefort 1997). The other companion species tested in this experiment were ericaceous shrubs and brown mosses. Ferland and Rochefort (1997) concluded that cotton grass enhanced *Sphagnum* establishment by modifying the microclimate, i.e., by keeping more moisture at the peat – air interface of the substratum and by providing shade. Cotton grass can also help stabilize the substratum with it's interlacing rhizomes.

In summary, we know that harvested peat lands can be revegetated and the restoration process is largely dependent upon the hydrological regime of the area. To reclaim a harvested *Sphagnum* bog to a functioning *Sphagnum* bog will take time. The primary goal is to restore the water table (J. Stewart pers. Comm.). The most cost-effective revegetation method is the "assisted natural" method which involves natural seeding, with assistance to accelerate tree cover. Once the water table is stable, trees should be transplanted on the higher areas to slow down the wind and trap seed rain. Topdressing with topspit dressings of *Sphagnum* species and other typical bog species can be planted in the wetter areas. If it is not possible to restore the natural water table then the focus should be on establishing black spruce transplants in order to speed the natural succession of the field (Stewart et. al 1998). Research is still ongoing and reclamation techniques are available which will facilitate the return of the harvested peat lands to functioning bogs.

Wildlife Habitat Enhancement

Very few studies have been done on bird populations in North American peat lands, let alone about their response to anthropogenic habitat changes such as peat harvesting (Desrochers *et al.* 1998). Desrochers *et al.* (1998) compared vegetation structure and bird species richness, abundance and assemblages between naturally revegetated and undisturbed bog sites. They found that certain plants and associated birds were recognized even in post-vacuum harvested sites where all the

live vegetation had once been removed. However, even though bird recolonization occurred in harvested sites, it differed from those in natural sites. Most of the differences in vegetation and bird occupancy were caused by the contrast between post-vacuum and other sites, as post-vacuum sites were sparsely vegetated and colonized by different sets of plant species (Desrochers *et al.* 1998). One species of particular interest was the palm warbler *(Dendroica palmarum)*, because it was not only rarely found in post-harvesting sites, but is also known to depend primarily on peat lands in most regions (Wilson 1996). Given the current pressure on peat lands by agriculture, urban development, and peat harvesting, the status of the palm warbler points to the necessity of conserving large expanses of natural bog near harvested sites (Desrochers *et al.* 1998).

Famous et al. (1993) noted that bird species diversity tends to increase when restoration techniques increase the habitat diversity. Diverse, restored habitat types collectively results in more 'niches' or places for birds to feed and breed.

Establishment of waterfowl habitat is also a peat land reclamation option in certain circumstances (Clarke-Whistler and Rowsell 1983 IN Keys 1992). When the configuration of the base of the peat land is suitable, the drainage system can be blocked to create ponds or lakes. The sedimentation ponds, and junctions of main drains can be widened to create ponds for waterfowl.

SITE RECLAMATION GOALS AND PLAN

The techniques were prepared to comply with the requirements of The Preservation and Reclamation Policy of the Canadian *Sphagnum* Peat Moss Association (Appendix C). This policy recommends that harvested peat land areas be restored to an environment similar to the one that existed before harvesting. This reclamation plan focuses on the procedures involved in establishing a productive wetland ecosystem and through wetland succession will again return to a functioning raised bog ecosystem. The Manitoba Peat Industry is committed to a policy of restoring the harvested bogs back to the wetland inventory. However, the peat industry recognizes that the land is managed by the Crown and that the Crown will specify the final end use (specify the goal of reclamation) of the land, including the on-site access road, the bog, and the drainage ditch.

Several of the goals of peat land restoration include:

- The restoration of harvested peat land to functioning wetland ecosystems
- The enhancement of wildlife values of restored peat land / wetland ecosystems
- The initiation of restoration as harvesting is completed on this site

- The integration of bog development with restoration and restoration goals
- The modification of ditch systems to retain runoff in abandoned sections
- The development of low cost, maintenance-free restoration methods
- The establishment of habitats that complement the regional landscape ecology
- The utilization of natural features such as bog ponds and upland islands.

APPENDIX D

GOVERNMENT CORRESPONDENCE

Shaun Moffatt

From: Loni Andres [LAndres@kgsgroup.com]
Sent: Thursday, September 30, 2010 1:34 PM
To: 'Shaun Moffatt'
Subject: FW: Lake Winnipeg - Water Quality Data Request
Attachments: Map of Stations near Grindstone Point.jpg; LakeWpgChemData.2010.LAndres_2010.09.10.xls; LAndres.September 10 2010.doc

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From: Page, Elaine (WSD) [mailto:Elaine.Page@gov.mb.ca]
Sent: Friday, September 10, 2010 4:20 PM
To: Loni Andres
Subject: RE: Lake Winnipeg - Water Quality Data Request

Hi Loni. Please see attached for your data request. I have also attached a quick map of the sampling locations, and the station coordinates are also included in the data file. I have included the two most recent years of data (2008 and 2009) for four stations in the vicinity of Grindstone Point. Station 13B is the closest to your site of interest. However, if you are interested in looking at metals and ions data, your next best bet would be Station W13. An extended suite of chemistry variables are collected at this station, as it is a part of our long term water quality monitoring network on Lake Winnipeg.

We have very little data from the 1970s on Lake Winnipeg – much of the chemistry data has been collected intensively since 1999. The reference to the 1970s relates to a trend analysis on nutrient concentrations collected from 1978 to 1999 in rivers that are tributary to Lake Winnipeg. Interim nutrient reductions for Lake Winnipeg are based on the finding that nutrient levels have increased in the major tributary rivers from 1978 to 1999.

I hope these data will be helpful. Please give me a call of send and email if I can help out with anything else.

Thanks,

Elaine

Elaine Page (Shipley)
Water Quality Modelling Specialist
Manitoba Water Stewardship
Suite 160, 123 Main Street
Winnipeg, Manitoba R3C 1A5
Phone: (204) 945-5344
Fax: (204) 948-2357

From: Loni Andres [mailto:LAndres@kgsgroup.com]
Sent: Friday, September 10, 2010 1:46 PM
To: Page, Elaine (WSD)
Subject: RE: Lake Winnipeg - Water Quality Data Request

Hi Elaine,

I think the most recent lab data and maybe 1970 (1970 levels are the targets for Lake Winnipeg right?) The routine chemistry, nutrients, major ions, and metals are the results that I am looking for, thanks. The area is west of Grindstone, near Beaver Creek provincial park.

Loni

From: Page, Elaine (WSD) [mailto:Elaine.Page@gov.mb.ca]
Sent: Friday, September 10, 2010 1:29 PM
To: LAndres@kgsgroup.com
Subject: Lake Winnipeg - Water Quality Data Request

Hi Loni. Thanks for your email. Nicole has asked me to respond on her behalf. We do have stations located near Grindstone Point. What years are you looking at? I just wanted to clarify that you would be interested in routine chemistry, nutrients, major ions, and metals. Is this correct?

Thanks,

Elaine

Elaine Page (Shipley)
Water Quality Modelling Specialist
Manitoba Water Stewardship
Suite 160, 123 Main Street
Winnipeg, Manitoba R3C 1A5
Phone: (204) 945-5344
Fax: (204) 948-2357

From: Loni Andres [mailto:LAndres@kgsgroup.com]
Sent: Friday, September 10, 2010 1:00 PM
To: Armstrong, Nicole (WSD)
Subject: Lake Winnipeg Water Quality

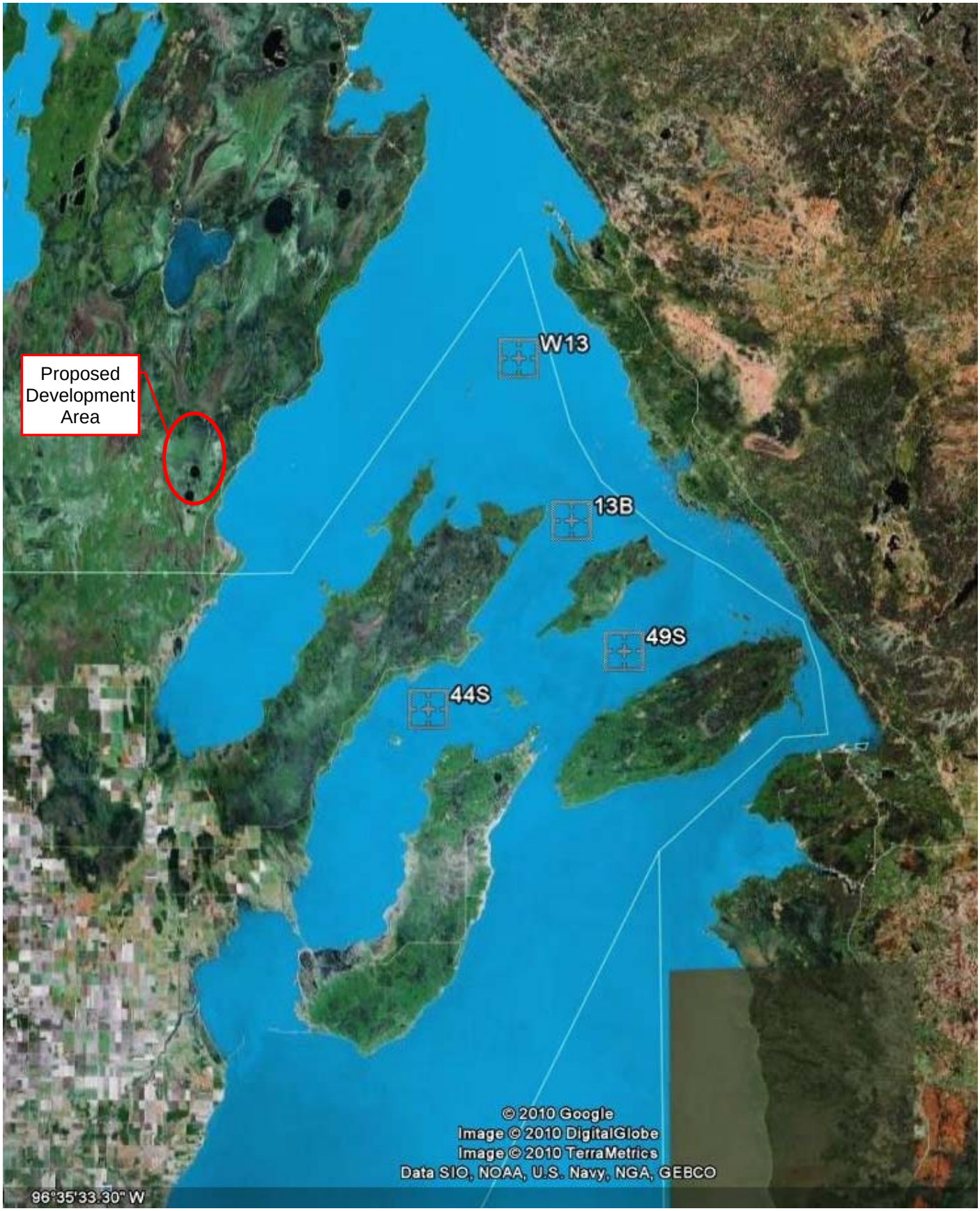
Hi Nicole,

I am currently writing an EAP for a proposed peat mine near the south basin of Lake Winnipeg. We are looking for water quality results for Lake Winnipeg, including general parameters and metal analyses, specifically of the surface water quality west of Grindstone Point. If you don't have any within that exact region I will take whatever you have for the south basin.

Regards,

Loni

Loni Andres
Geo-Environmental Scientist
KGS Group
(204) 896-1209 ext.299


Proposed Development Area
W13
13B
49S
44S
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Data SIO, NOAA, U.S. Navy, NGA, GEBCO
96°35'33.30" W

GENERAL WATER QUALITY
LAKE WINNIPEG

Sample No.	Date	Parameters [1]																	
		pH (units)	E.C. (µS/cm)	Alkalinity as $CaCO_3$	Bicarbonate as $CaCO_3$	Carbonate as $CaCO_3$	Hydroxide as $CaCO_3$	Hardness as $CaCO_3$	Sulphate	Ortho-phosphate as P	Ammonia	Nitrate & Nitrite (as N)	B.O.D.	Total Phosphorus	Total Dissolved Phosphorus	Total Particulate Phosphorus	T.D.S.	T.S.S.	T.K.N.	Acidity
W13	3-Mar-08	7.81	250	83	-	-	-	105	28.8	-	<0.01	0.22	<1	0.095	0.067	0.028	168	1	0.4	-
	3-Mar-08	7.80	269	88	-	-	-	112	33	-	<0.01	0.23	-	0.109	0.08	0.029	184	2	0.5	-
	12-Jun-08	8.08	159	58	-	-	-	70	14	-	0.01	<0.01	-	0.032	0.011	0.021	118	6	0.6	-
	12-Jun-08	8.07	159	58	-	-	-	70	13.9	-	0.01	<0.01	1	0.032	0.013	0.019	99	6	0.6	-
	1-Aug-08	7.77	208	70	-	-	-	91	21.3	-	0.02	0.15	-	0.105	0.047	0.058	154	11	0.7	-
	1-Aug-08	7.79	207	70	-	-	-	91	21.3	-	0.03	0.09	<1	0.102	0.044	0.058	151	10	0.6	-
	28-Sep-08	7.86	192	67.9	-	-	-	83	18	-	0.02	0.11	-	0.091	0.047	0.044	134	10	0.3	-
	28-Sep-08	7.89	192	67.9	-	-	-	83	18.1	-	0.02	0.1	<1	0.099	0.046	0.053	139	10	0.3	-
	2-Feb-09	7.62	227	81.8	-	-	-	97	24.5	-	0.02	0.11	-	0.086	0.056	0.03	160	4	0.4	-
	2-Feb-09	7.64	216	79.8	-	-	-	92	21.8	-	0.02	0.09	<1	0.073	0.049	0.024	156	4	0.5	-
	4-Jun-09	7.98	218	78.5	-	-	-	91.6	27	0.0234	0.072	-	2.3	0.081	0.048	0.033	152	14	0.71	-
	4-Jun-09	8.08	216	78.8	-	-	-	97.3	26.3	0.0315	0.036	-	-	0.0674	0.0668	<0.001	154	16	0.64	-
	23-Jul-09	8.17	266	96.3	-	-	-	137	36.9	0.0815	0.0083	-	-	0.11	0.107	0.003	196	8	0.63	-
	23-Jul-09	8.17	277	96.6	-	-	-	131	37.5	0.0835	0.008	-	<1	0.108	0.0967	0.0113	190	8	0.74	-
	26-Sep-09	8.17	248	89.5	-	-	-	125	31.4	0.123	0.012	-	<1	0.136	0.0914	0.0446	188	12	0.67	-
	26-Sep-09	8.16	248	89.3	-	-	-	124	28.9	0.087	0.0048	-	-	0.13	0.092	0.024	188	12	0.52	-
13B	12-Jun-08	8.27	203	-	-	-	-	-	-	-	0.03	<0.01	1	0.044	0.016	0.028	-	7	0.6	-
	1-Aug-08	7.81	194	-	-	-	-	-	-	-	0.03	0.08	2	0.095	0.044	0.051	-	7	0.7	-
	28-Sep-08	8.11	234	-	-	-	-	-	-	-	0.02	0.07	<1	0.1	0.05	0.05	-	9	0.4	-
	6-Jun-09	8.22	250	-	-	-	-	-	-	0.0808	0.017	-	2.1	0.13	0.0851	-	-	11	0.55	-
	23-Jul-09	8.16	291	-	-	-	-	-	-	0.0867	0.0089	-	1	0.105	0.0912	-	-	<5	0.62	-
	26-Sep-09	8.14	212	-	-	-	-	-	-	0.114	0.006	-	<1	0.121	0.0756	-	-	14	0.54	-

GENERAL WATER QUALITY
LAKE WINNIPEG

Sample No.	Date	Parameters [1]																	
		pH (units)	E.C. (µS/cm)	Alkalinity as $CaCO_3$	Bicarbonate as $CaCO_3$	Carbonate as $CaCO_3$	Hydroxide as $CaCO_3$	Hardness as $CaCO_3$	Sulphate	Ortho-phosphate as P	Ammonia	Nitrate & Nitrite (as N)	B.O.D.	Total Phosphorus	Total Dissolved Phosphorus	Total Pariculate Phosphorus	T.D.S.	T.S.S.	T.K.N.	Acidity
49S	11-Jun-08	8.53	196	-	-	-	-	-	-	-	0.09	<0.01	2	0.037	0.015	0.022	-	4	0.8	-
	11-Jun-08	8.52	196	-	-	-	-	-	-	-	0.03	<0.01	1	0.033	0.018	0.015	-	4	0.9	-
	1-Aug-08	7.85	201	-	-	-	-	-	-	-	0.02	0.07	2	0.087	0.042	0.045	-	4	0.6	-
	1-Aug-08	7.89	201	-	-	-	-	-	-	-	0.02	0.07	1	0.091	0.043	0.048	-	6	0.6	-
	28-Sep-08	8.07	251	-	-	-	-	-	-	-	0.02	0.06	<1	0.083	0.053	0.03	-	6	0.2	-
	28-Sep-08	8.06	246	-	-	-	-	-	-	-	0.02	0.06	<1	0.088	0.053	0.035	-	5	0.3	-
	5-Jun-09	8.06	245	-	-	-	-	-	-	0.0732	0.036	-	2.2	0.101	0.0803	-	-	19	0.55	-
	5-Jun-09	7.53	244	-	-	-	-	-	-	0.073	0.024	-	2.5	0.102	0.0766	-	-	15	0.58	-
	26-Sep-09	8.11	200	-	-	-	-	-	-	0.0808	0.0068	-	1	0.113	0.0781	-	-	17	0.52	-
	26-Sep-09	8.10	187	-	-	-	-	-	-	0.113	<0.003	-	1	0.124	0.0747	-	-	18	0.56	-
44S	11-Jun-08	7.99	170	-	-	-	-	-	-	-	0.02	<0.01	<1	0.016	0.01	0.006	-	5	0.6	-
	1-Aug-08	7.88	199	-	-	-	-	-	-	-	0.02	0.07	2	0.107	0.045	0.062	-	6	0.7	-
	28-Sep-08	8.04	236	-	-	-	-	-	-	-	0.04	0.07	<1	0.137	0.048	0.089	-	14	0.4	-
	5-Jun-09	7.99	257	-	-	-	-	-	-	0.0863	0.03	-	1.9	0.107	0.0915	-	-	11	0.62	-
	26-Sep-09	8.17	227	-	-	-	-	-	-	0.123	0.015	-	<1	0.123	0.0731	-	-	20	0.6	-

Notes:
Data Summary prepared using data provided by Manitoba Water Stewardship
"-" = No Data
E.C. = Electrical Conductivity
B.O.D. = Biochemical Oxygen Demand
T.K.N. = Total Kjeldahl Nitrogen
T.D.S. = Total Dissolved Solids
T.S.S. = Total Suspended Solids

1. All values are expressed in milligrams per litre (mg/L) unless indicated otherwise.

METALS IN WATER
LAKE WINNIPEG

Sample No.	Date	Parameter [1]																	
		Aluminum	Antimony	Arsenic	Barium	Beryllium	Bismuth	Boron	Cadmium	Calcium	Cesium	Chromium	Cobalt	Copper	Iron	Lead	Lithium	Magnesium	Manganese	Molybdenum
W13	3-Mar-08	0.4400	0.0005	0.00160	0.02300	<0.0002	-	0.02	<0.00004	-	<0.0001	0.0004	0.0002	0.0023	0.410	0.000200	0.009	10.400	0.01300	0.001
	3-Mar-08	0.5000	0.0004	0.00180	0.02500	<0.0002	-	0.03	<0.00004	-	<0.0001	0.0006	0.0002	0.003	0.470	0.000300	0.01	11.200	0.01600	0.001
	12-Jun-08	0.1400	0.0003	0.00100	0.01400	<0.0002	-	<0.01	0.000040	-	<0.0001	0.0004	<0.0002	0.0016	0.220	<0.0002	0.0048	6.570	0.01300	0.000
	12-Jun-08	0.1400	0.0004	0.00090	0.01300	<0.0002	-	0.01	<0.00004	-	<0.0001	0.0003	<0.0002	0.0014	0.200	<0.0002	0.0048	6.580	0.01300	0.000
	1-Aug-08	0.5300	0.0004	0.00170	0.02200	<0.0002	-	0.02	<0.00004	-	0.0001	0.0011	0.0005	0.0026	0.800	0.000500	0.0074	9.010	0.04400	0.001
	1-Aug-08	0.5400	0.0004	0.00170	0.02200	<0.0002	-	0.02	<0.00004	-	<0.0001	0.0012	0.0005	0.0026	0.800	0.000500	0.0073	8.990	0.04400	0.001
	28-Sep-08	0.4900	0.0004	0.00180	0.02200	<0.0002	-	0.01	<0.00004	-	<0.0001	0.0008	0.0003	0.0024	0.610	0.000400	0.0062	8.230	0.04700	0.001
	28-Sep-08	0.4900	0.0004	0.00170	0.02200	<0.0002	-	0.01	<0.00004	-	<0.0001	0.0009	0.0003	0.0023	0.620	0.000500	0.0063	8.240	0.05100	0.001
	2-Feb-09	0.4100	0.0003	0.00180	0.02200	<0.0002	-	0.02	<0.00004	-	<0.0001	0.0009	0.0003	0.0025	0.560	0.000300	0.0075	9.700	0.02000	0.001
	2-Feb-09	0.3500	0.0003	0.00170	0.02100	<0.0002	-	0.02	<0.00004	-	<0.0001	0.0007	0.0002	0.004	0.420	0.000400	0.0069	9.100	0.01300	0.001
	4-Jun-09	0.4080	<0.0002	0.00144	0.02630	<0.0002	-	0.018	0.000020	-	<0.0001	<0.001	0.00055	0.0023	0.411	0.000340	0.0082	9.240	0.02180	0.001
	4-Jun-09	0.3920	<0.0002	0.00148	0.02320	<0.0002	-	0.019	<0.00001	-	<0.0001	<0.001	0.00054	0.0021	0.371	0.000250	0.0083	9.910	0.02600	0.001
	23-Jul-09	1.0800	<0.0002	0.00166	0.03160	<0.0002	-	0.017	0.000020	-	0.00013	0.002	0.00049	0.003	1.130	0.000540	0.0107	13.700	0.04830	0.001
	23-Jul-09	0.7500	<0.0002	0.00158	0.02930	<0.0002	-	0.017	0.000010	-	<0.0001	0.0016	0.00041	0.0028	0.873	0.000530	0.011	13.200	0.04270	0.001
	26-Sep-09	1.1300	<0.0002	0.00212	0.04020	<0.0002	-	0.045	0.000040	-	0.00013	0.0015	0.00077	0.0043	1.060	0.000850	0.0166	12.300	0.07380	0.001
	26-Sep-09	2.3100	<0.0002	0.00205	0.04370	<0.0002	-	0.036	<0.00001	-	0.00026	0.0032	0.00093	0.0036	1.800	0.000850	0.0221	12.500	0.07880	0.001

Sample No.	Date	Parameter [1]																	
		Nickel	Phosphorus	Potassium	Rubidium	Selenium	Silicon	Silver	Sodium	Strontium	Tellurium	Thallium	Thorium	Tin	Titanium	Tungsten	Uranium	Vanadium	Zinc	Zirconium
W13	3-Mar-08	0.0018	-	2.68	0.00220	<0.0004	-	<0.00002	9.30	-	<0.0002	<0.00002	<0.0001	<0.0002	0.012	-	0.0007	0.002	0.00300	<0.002
	3-Mar-08	0.0018	-	2.95	0.00240	<0.0004	3.81	<0.00002	10.20	0.07	<0.0002	<0.00002	<0.0001	0.0009	0.015	-	0.0007	0.003	0.00400	<0.002
	12-Jun-08	0.0010	-	1.50	0.00130	0.0006	0.58	<0.00002	5.20	0.05	<0.0002	<0.00002	<0.0001	<0.0002	0.006	-	0.0003	0.001	0.00500	<0.002
	12-Jun-08	0.0010	-	1.52	0.00130	<0.0004	0.57	<0.00002	5.20	-	<0.0002	<0.00002	<0.0001	<0.0002	0.005	-	0.0003	0.001	0.00300	<0.002
	1-Aug-08	0.0024	-	2.21	0.00290	0.0009	2.79	<0.00002	7.80	0.06	<0.0002	<0.00002	<0.0001	<0.0002	0.024	-	0.0005	0.002	0.00500	<0.002
	1-Aug-08	0.0023	-	2.17	0.00300	0.0009	2.83	<0.00002	7.80	-	<0.0002	<0.00002	<0.0001	<0.0002	0.025	-	0.0006	0.002	0.00600	<0.002
	28-Sep-08	0.0020	-	1.97	0.00270	0.0005	3.31	<0.00002	6.80	0.06	<0.0002	<0.00002	<0.0001	<0.0002	0.019	-	0.0005	0.002	0.00300	<0.002
	28-Sep-08	0.0020	-	1.96	0.00280	<0.0004	3.3	0.00014	6.80	-	<0.0002	<0.00002	<0.0001	<0.0002	0.021	-	0.0005	0.002	0.00300	<0.002
	2-Feb-09	0.0018	-	2.23	0.00230	<0.0004	3.79	<0.00002	7.90	0.06	<0.0002	<0.00002	0.0001	0.0005	0.017	-	0.0006	0.002	0.00300	<0.002
	2-Feb-09	0.0016	-	2.03	0.00200	<0.0004	3.44	<0.00002	7.40	0.06	<0.0002	<0.00002	0.0001	<0.0002	0.014	-	0.0006	0.002	0.00500	<0.002
	4-Jun-09	0.0023	-	3.57	0.00197	<0.001	-	0.0001	7.53	0.06	<0.0002	<0.0001	0.00029	<0.0006	0.015	<0.0002	0.00104	0.002	0.00510	0.001
	4-Jun-09	0.0024	-	3.75	0.00194	<0.001	4.89	<0.0001	8.02	0.06	<0.0002	<0.0001	0.00022	<0.0006	0.017	<0.0002	0.00112	0.003	<0.005	0.001
	23-Jul-09	0.0034	-	4.74	0.00385	<0.001	4.89	<0.0001	11.50	0.09	<0.0002	<0.0001	0.00033	<0.0006	0.039	<0.0002	0.00142	0.005	<0.005	0.001
	23-Jul-09	0.0031	-	4.49	0.00320	<0.001	-	<0.0001	11.00	0.09	<0.0002	<0.0001	0.00022	<0.0006	0.027	<0.0002	0.00136	0.004	<0.005	0.001
	26-Sep-09	0.0029	-	3.97	0.00410	<0.001	-	<0.0001	9.68	0.10	<0.0002	<0.0001	0.00034	<0.0006	0.045	<0.0002	0.00134	0.005	0.00660	0.002
	26-Sep-09	0.0034	-	4.16	0.00609	<0.001	10.7	<0.0001	9.83	0.09	<0.0002	0.00017	0.00062	<0.0006	0.091	<0.0002	0.00137	0.007	0.00600	0.002

Notes:

1. All values are expressed in milligrams per litre (mg/L).

Data Summary prepared using data provided by Manitoba Water Stewardship

Shaun Moffatt

From: Firlotte, Nicole (CON) [Nicole.Firlotte@gov.mb.ca]
Sent: Monday, July 19, 2010 11:37 AM
To: Shaun Moffatt
Subject: RE: Request for list of potential species of interest
Attachments: Tourbiers_Lambert.xls

Shaun,

Thank you for your information request. I completed a search of the Manitoba Conservation Data Centre's rare species database and found no occurrences at this time for Area 1 and 2 noted on the map you provided.

There were four occurrences northeast of Harrys Lake. I am attaching an excel table summarizing these occurrences. They are in the Tourbieres Lombard Inc. and Sun Gro lease areas. The table includes scientific and common names, and the global (GRank) and provincial (SRank) rankings for each species. Further information on these ranking systems can be found on our website at http://web2.gov.mb.ca/conservation/cdc/consranks.html. None of these species are listed by SARA, COSEWIC or under the Manitoba Endangered Species Act. I provide them for your information and to serve as the basis for any surveys you may undertake.

The information provided in this letter is based on existing data known to the Manitoba Conservation Data Centre at the time of the request. These data are dependent on the research and observations of CDC staff and others who have shared their data, and reflect our current state of knowledge. An absence of data in any particular geographic area does not necessarily mean that species or ecological communities of concern are not present; in many areas, comprehensive surveys have never been completed. Therefore, this information should be regarded neither as a final statement on the occurrence of any species of concern, nor as a substitute for on-site surveys for species as part of environmental assessments. Also, because the Manitoba CDC's 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.

Please contact the Manitoba CDC for an update on this natural heritage

information if more than six months pass before it is utilized.

Third party requests for products wholly or partially derived from Biotics 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 Biotics data, as follows as: Data developed by the Manitoba Conservation Data Centre; Wildlife and Ecosystem Protection Branch, Manitoba Conservation.

We would be interested in receiving a copy of the results of any field surveys that you may undertake, to update our database with the most current knowledge of the area.

If you have any questions or require further information please contact me directly at (204) 945- 6998.

Regards,
Nicole

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

From: Shaun Moffatt [mailto:SMoffatt@kgsgroup.com]
Sent: Thursday, July 15, 2010 11:02 AM
To: Firlotte, Nicole (CON)
Subject: Request for list of potential species of interest

Nicole

As discussed on the phone I would like to receive the list of potential very rare and rare species from the Conservation Data Centre database within two areas as shown in the attached figure and described in greater detail below;

Area 1 – The orange highlighted Quarry Leases south and east of Deer Lake and Little Deer Lake and west of highway 234. This area is primarily within Townships 29 and 30 Range 5 East with a small portion located in the northeast sections of Township 29 Range 4 East.

Area 2 – The pink highlighted Quarry Leases immediately west of highway 234. This area is primarily within Township 28 Range 4 East with a small portion (south end) located within Township 27 Range 4 East.

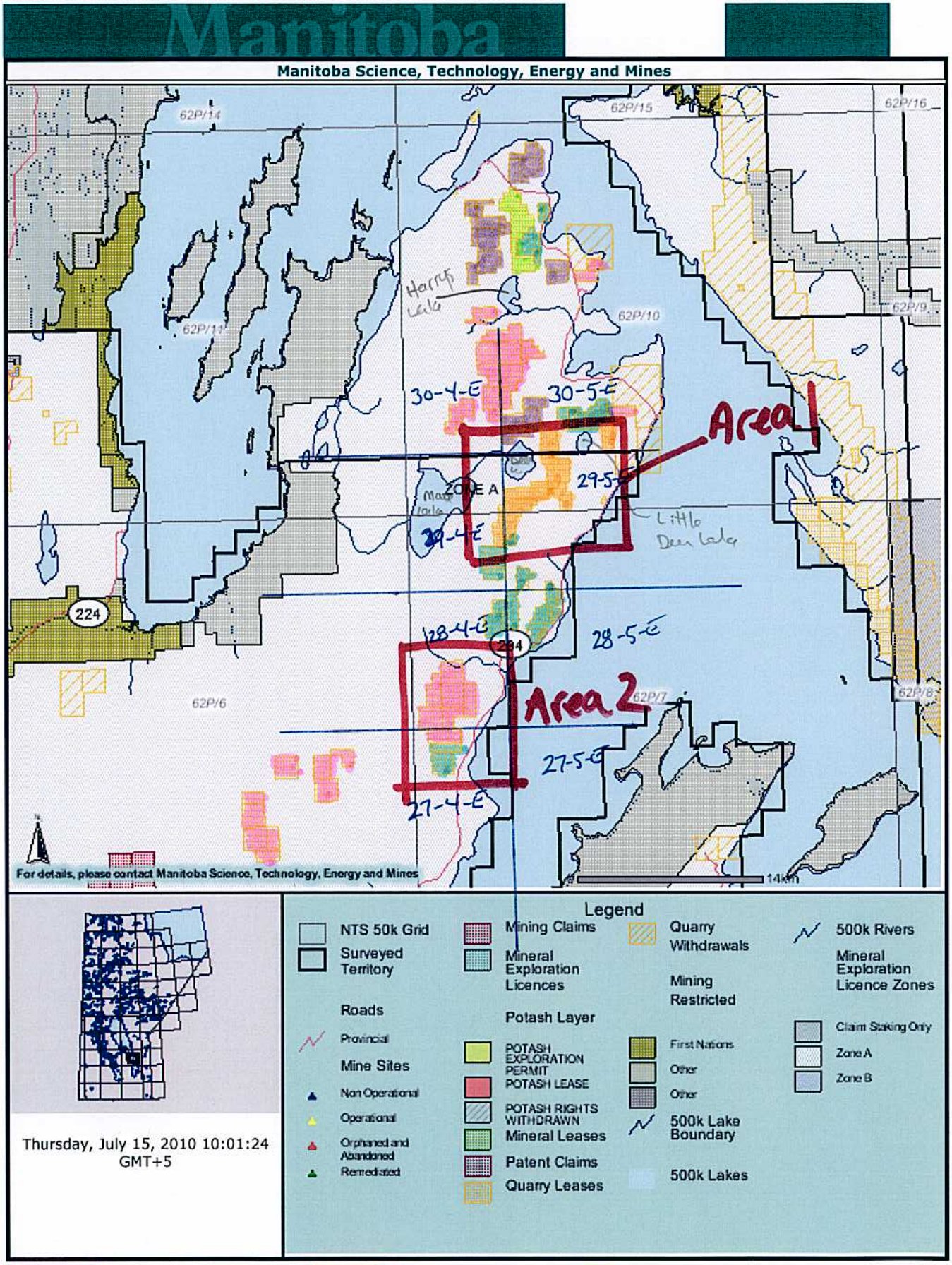
When you provide the list of species (in excel) can you please separate into Area 1 and Area 2 or note in the table which area the species occurs in. If the species lists are the same for both areas then a single table is okay.

Once again thanks for your assistance.

Shaun Moffatt, M.Sc.
Senior Environmental Scientist
KGS Group
3rd Floor - 865 Waverley St.
Wpg. MB. R3T 5P4

Phone: 204-896-1209 ext 467
Fax: 204-896-0754

EO ID	ELCODE	EO NUMBER	SCIENTIFIC NAME	COMMON NAME	AME CATEGOR	G_RANK	S_RANK
2587	PMORC0C040	3	Calopogon tuberosus	Swamp-pink	Vascular Plant	G5	S2
3519	PMPON03010	6	Heteranthera dubia	Water Star-grass	Vascular Plant	G5	S2
968	PMCYP03EN0	4	Carex vulpinoidea	Fox Sedge	Vascular Plant	G5	S3?
2487	PMORC1Y0K0	12	Platanthera orbiculata	Round-leaved Bog Orchid	Vascular Plant	G5	S3



San Gro Berger Premier
Santerra Tourbieres Lambert Inc

Manitoba

Manitoba Conservation Data Centre

Occurrence of Species by Ecoregion

Return to Map

Mid-Boreal Lowland

Animal Assemblage			
Bat Colony	GNR		SNR
Snake Hibernaculum	GNR		SNR
Invertebrate Animal			
Strophitus undulatus	G5		SNR
Terrestrial Community - Other Classification			
Boreal inland alkaline cliff sparse vegetation	GNR	Boreal Inland Alkaline Cliff SparseVegetation	S2
Distichlis stricta-hordeum jubatum-puccinellia nuttalliana-plantago maritima saline herbaceous vegetation	GNR	Alkali Grass-wild Barley-nuttall's Salt Meadow Grass-seaside Plantain SalineHerbaceous Vegetation	S2
Inland lake cobble-gravel shore sparse vegetation	GNR	Inland Lake Cobble-gravel Shore Sparse Vegetation	S3
Thuja occidentalis-(picea mariana, abies balsamea)/alnus rugosa wetland forest	GNR	Eastern White Cedar-(Black Spruce, Balsam Fir)/speckled Alder Wetland Forest	S2
Vascular Plant			
Arethusa bulbosa	G4	Arethusa	S2
Botrychium multifidum	G5	Leathery Grape-fern	S3
Calopogon tuberosus	G5	Swamp-pink	S2
Carex communis	G5	Fibrous-rooted Sedge	SNA
Carex flava	G5	Yellow Sedge	S2S3
Carex garberi	G5	Elk Sedge	S1?
Carex hystericina	G5	Porcupine Sedge	S3?
Carex pedunculata	G5	Stalked Sedge	S3?
Carex projecta	G5	Necklace Sedge	S2?
Carex vulpinoidea	G5	Fox Sedge	S3?
Cypripedium arietinum	G3	Ram's Head Lady's-slipper	S2S3
Drosera anglica	G5	Oblong-leaved Sundew	S3
Drosera linearis	G4	Slender-leaved Sundew	S2
Dulichium arundinaceum	G5	Three-way Sedge	S2
Eleocharis engelmannii	G4G5Q	Engelmann's Spike-rush	S1
Eriophorum callitrix	G5	Beautiful Cotton-grass	S2
Galium aparine	G5	Cleavers	SU
Goodyera tesselata	G5	Tesselated Rattlesnake Plantain	S2
Gymnocarpium jessoense	G5	Northern Oak Fern	S3S4
Gymnocarpium robertianum	G5	Limestone Oak Fern	S1
Heteranthera dubia	G5	Water Star-grass	S2
Leucophysalis grandiflora	G4?	Large White-flowered Ground-cherry	S3
Liparis loeselii	G5	Yellow Twayblade	S3S4
Listera auriculata	G3G4	Auricled Twayblade	S1

Malaxis monophyllos	G5	White Adder's-mouth	S2?
Malaxis unifolia	G5	Green Adder's-mouth	S2?
Nymphaea odorata	G5	Fragrant Water-lily	S2
Onoclea sensibilis	G5	Sensitive Fern	S3S4
Parietaria pensylvanica	G5	American Pellitory	S4
Pellaea glabella ssp. occidentalis	G5T4	Cliff-brake	S2
Plantago maritima	G5	Seaside Plantain	S2
Platanthera lacera	G5	Fringed Orchid	S2
Platanthera orbiculata	G5	Round-leaved Bog Orchid	S3
Potamogeton strictifolius	G5	Straightleaf Pondweed	S3
Pyrola americana	G5	Round-leaved Pyrola	S2
Rhynchospora alba	G5	White Beakrush	S3?
Rhynchospora capillacea	G4	Horned Beakrush	S2
Taxus canadensis	G5	Canada Yew	S3
Thalictrum sparsiflorum	G5	Few-flowered Meadow-rue	S2S3
Vaccinium caespitosum	G5	Dwarf Bilberry	S2
Viola selkirkii	G5?	Long-spurred Violet	S2
Woodsia glabella	G5	Smooth Woodsia	S2
Vertebrate Animal			
Aechmophorus occidentalis	G5	Western Grebe	S4B
Ardea herodias	G5	Great Blue Heron	S4S5B
Aythya marila	G5	Greater Scaup	S5B
Charadrius melodus	G3	Piping Plover	S1B
Coregonus zenithicus	G3	Shortjaw Cisco	S3
Haliaeetus leucocephalus	G5	Bald Eagle	S4S5B
Ichthyomyzon castaneus	G4	Chestnut Lamprey	S3S4
Macrhybopsis storeriana	G5	Silver Chub	S3
Myotis lucifugus	G5	Little Brown Myotis	S2N,S5B
Nycticorax nycticorax	G5	Black-crowned Night-heron	S3S4B
Pelecanus erythrorhynchos	G3	American White Pelican	S3S4B
Phalacrocorax auritus	G5	Double-crested Cormorant	S5B
Rangifer tarandus caribou	G5T4	Caribou	S4
Sterna caspia	G5	Caspian Tern	S3S4B
Sterna forsteri	G5	Forster's Tern	S4B
Strix varia	G5	Barred Owl	S3S4

Top of Page

From: Jason Sorenson [JSorenson@kgsgroup.com]
Sent: Monday, August 30, 2010 10:53 AM
To: 'Loni Andres'
Cc: 'Shaun Moffatt'
Subject: FW: Peat Bog Development

From: Schwartz, Todd [mailto:Todd.Schwartz@dfo-mpo.gc.ca]
Sent: Tuesday, January 05, 2010 5:33 PM
To: Jason Sorenson
Subject: RE: Peat Bog Development

Hi Jason,

I have quickly looked at our database, and there is essentially no fisheries information for these areas. Because of this all streams, lakes and wetlands that are potentially impacted should be assessed for habitat quality and fish use. This means that proper fisheries assessments by qualified fisheries consultants should be done. Assessments of seasonal (spawning) and year round fish use should be made.

Concerns with peat mining are the same as most mines and includes linear developments (roads, pipelines, cables or overhead lines), water management (increases or decreases in flow), physical disruption or destruction of existing habitat etc.... Constructing and sizing stream crossings for flows is often difficult in these bog watersheds. Controlling sediment from mining operations.

This is a project in an area where lots of background field date will have to be collected.

That's about all I can offer at this point. If you have specific questions I may be able to provide more specific answers.

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: Jason Sorenson [mailto:JSorenson@kgsgroup.com]

Sent: January 5, 2010 4:39 PM
To: Schwartz, Todd
Cc: Shaun Moffatt
Subject: Peat Bog Development

Hi Todd

I was hoping you could give me some general DFO perspectives on a peat bog development proposed for the areas known as Hay Point and Ramsay Point. These locations, depicted on the attached figures, are located along the west side of Lake Winnipeg within the Hecla/Grindstone Provincial Park. Each of the proposed sites has what is believed to be significant peat sources. Each site also has bodies of water that drain through the site towards Lake Winnipeg.

Currently, our client is investigating the feasibility of developing these areas for peat, and is trying to determine the processes and issues that will be involved in attaining all environmental approvals associated with this. We have acknowledged that DFO, MWS and Manitoba Conservation will all need to be involved, and a full EA will be part of the process, along with a DFO application and approval process.

To hit the ground running and provide to the client a rough idea of what may be some of DFO's concerns, any input you can provide would be much appreciated.

Thanks in advance.

Jason

Jason Sorenson, EIT
Water Resources Engineer

KGS Group Consulting Engineers
3rd Floor - 865 Waverley St.
Winnipeg, MB, Canada
R3T 5P4

ph: (204) 896-1209 (ext. 253)
fax: (204) 896-0754

e-mail: jsorenson@kgsgroup.com

Please consider the environment before printing this email

2002 Manitoba Fish Stocking Final Report

Region	Waterbody	Date	Species	Size	Number	Description
Interlake	Bell Pond	May 14	Rainbow Trout	18+ cm	1,000	0.5 km north of Hecla Village off Hwy 8
	Chitek Lake	May 27	Walleye	Fry	4,000,000	35 km air miles north of Skownan
	Clandeboye Pond	May 14	Rainbow Trout	18+ cm	1,000	First north gravel road west of Clandeboye on PR 515
	Fort Whyte (Lake Cargill)	May 15	Rainbow Trout	18+ cm	1,500	At Fort Whyte Centre
		May 15	Brook Trout	18+ cm	2,000	
	Gull Pond	May 14	Rainbow Trout	18+ cm	250	4 km north of Camp Morton on east side of PTH 8
	Inland Lake	May 27	Walleye	Fry	4,000,000	About 35 km north of Skownan
	Lake Manitoba	May 24	Walleye	Fry	21,551,000	Distributed to various locations around Lake Manitoba
		May 22	Walleye	Fry	17,600,000	
		May 22	Sauger	Eyed eggs	400,000	
	Lake St. Andrews	May 31	Walleye	Fry	250,000	12 km south of Jackhead Indian Reserve
	Lake St. George	May 24	Walleye	Fry	500,000	1.5 km north of Fire Tower at Lake St. George
	Lake St. George's Pond	June 4	Brook Trout	18+ cm	250	1.5 km north of Fire Tower at Lake St. George
		June 4	Rainbow Trout	18+ cm	300	
	Lake St. Martin	May 22	Walleye	Fry	150,000	About 10 km east of the town of Fairford
		May 28	Walleye	Fry	1,000,000	
	Lake Winnipeg	May 28	Walleye	Fry	3,000,000	At town of Grand Rapids
		May 7	Lake Whitefish	fry	480,000	
	Limestone Pond	May 14	Rainbow Trout	18+ cm	375	10.7 km north of PR 233 on road into Grindstone Provincial Recreation Park
	Mantago Lake	May 26	Walleye	Fry	250,000	2.4 Km west of the junction of PR 233 and PR 325; then north on municipal road to Mantagao Lake
	Quartz Pond	May 14	Rainbow Trout	18+ cm	375	7.2 km north of PR 233 on road into Grindstone Provincial Recreation Park
	Ranger Lakes	May 31	Walleye	Fry	100,000	Lat. 51° 21'N, Long. 96° 58'W
	Saskatchewan River	May 13	Walleye	Green eggs	200,000	At Grand Rapids Fish Hatchery
		May 20	Walleye	Eyed eggs	1,000,000	
		May 30	Walleye	Fry	12,850,000	

Manitoba

Memorandum

DATE: September 1, 2010

TO: Loni Andres
KGS Group
3rd Floor-865 Waverley St.
Winnipeg MB

FROM: Gordon Hill
Impact Assessment Archaeologist
Historic Resources Branch
Main Floor 213 Notre Dame Avenue
Winnipeg MB
R3B 1N3
PHONE NO: (204) 945-7730

SUBJECT: HERITAGE RESOURCES

YOUR FILE:

HRB FILE: AAS-10-904

RAMSAY POINT BOG
HORTICULTURAL PEAT HARVESTING

In response to your memo regarding the above-noted proposed project, I have examined Branch records for areas of potential concern. 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 developer to mitigate the affects of development on the heritage resources.

If you have any questions or comments, please contact me at 945-7730.

C. Gordon Hill

APPENDIX E

PUBLIC CONSULTATION

KGS GROUP
CONSULTING ENGINEERS

3rd Floor
865 Waverley Street
Winnipeg,
Manitoba
R3T 5P4
204.896.1209
fax: 204.896.0754
www.kgsgroup.com

August 20, 2010

File No. 10-0293-01

Beaver Creek Cottage Association
[redacted]
R2V 2H3

ATTENTION: [redacted]

RE: Sun Gro Horticulture Canada Ltd.
Environment Act Proposal, Peatland Development, Ramsay Point Bog

Dear [redacted]

KGS Group, is submitting this letter on behalf of Sun Gro Horticulture Canada Ltd. (Sun Gro) as part of an Environment Act Proposal (EAP) for a peatland development of the existing Sun Gro quarry lease at Ramsay Point Bog. KGS Group is issuing this letter, as requested during our telephone conversation on August 20, 2010 to provide a brief description of the project and potential environmental concerns that will be considered during the Environment Act Proposal process.

The Environmental Assessment process will be carried out based on project information provided by Sun Gro and advice documents from Manitoba Conservation. Additional considerations will include environmental information acquired from literature and internet searches, publications by the peat industry and environmental organizations, contacts with federal and provincial government representatives, consultation with stakeholders, and site investigations which have been conducted by the project team.

The proposed peat development is in close proximity to Lake Winnipeg and is located west of Hwy 234 approximately 40 km north of Riverton, Manitoba. The bog contains the Ranger Lakes which drain through an unnamed creek into Lake Winnipeg, and a drainage network locally referred to as Beaver Creek that is located at the northern end of the proposed development area. The spatial boundary of the environmental assessment will consist of the regional study area which includes the area within a 10 km radius of the quarry lease boundary. The project study area covers a 3 km radius surrounding the quarry lease boundary (Figure 1).

The scope of the project will include planning, designing, constructing, operating, maintenance and eventual decommissioning and restoration of the proposed peatland development at Ramsay Point Bog. The entire production lifespan of the proposed development is estimated to be 35 years. Ramsay Point Bog has over 35 years of peat capacity and can be harvested over this time starting once all

licensing and permitting requirements have been fulfilled. As well, the project will include development of access roads, site drainage, on-site facilities and an on-site stockpiling area. Major project activities will include providing access, clearing vegetation and surface soils, stockpiling unprocessed peat, excavating and trenching, transporting and restoring and reclaiming harvested peatland.

The assessment for the proposed development will include identification, assessment and mitigation of adverse environmental effects of the project, and evaluation of the significance of residual environmental effects. This will consist of both direct and indirect biophysical and socio-economic effects, including cumulative environmental effects. The need for the project, alternatives, to the project and requirements for a follow-up will be considered in the assessment.

Potential environmental concerns being considered in the Environmental Act Proposal include air quality, noise and vibrations, soil integrity and quality, surface water quality, wetland health, groundwater quality, aquatic and terrestrial vegetation (with special emphasis on species of conservation concern), wildlife (with special emphasis on species of conservation concern), fish and fish habitat, and social and economic conditions associated with the proposed development.

Concerns including increased traffic and the associated impacts to Hwy. 234, dust control and safety concerns as expressed during the telephone conversation will be addressed in the EAP. However, KGS Group would like to offer the Beaver Creek Cottage Association the opportunity to provide any further comments or concerns regarding the proposed development so that they can be addressed and incorporated into the EAP. As a draft of the EAP is being issued for review, we would appreciate any comments to be available by August 31, 2010. Any comments received after that date would be included into the final EAP submission to Manitoba Conservation who will post the document on the Public Registry for review. Should you have any questions, comments or concerns, please do not hesitate to contact the undersigned at (204) 896-1209, via e-mail at smoffatt@kgsgroup.com, or by mail.

Yours truly,

[redacted]

Shaun Moffatt, M.Sc.
Environmental Scientist

LA/jr

630000 640000 650000 660000

5700000

5690000

5680000

N W E S

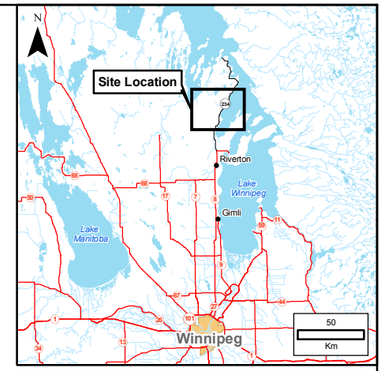
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1156 1761 1107 1108 1109 1110 1762

234

Lake Winnipeg



LEGEND:

- Project Study Area
- Regional Study Area
- Quarry Lease
- Cutline
- Trail
- Road

DRAFT

1 0 1 2 3 4 5

Kilometres

SCALE: 1:120,000 METRIC 11"x17"

All units are metric and in metres unless otherwise specified.
Transverse Mercator Projection, NAD 1983, Zone 14
Elevations are in metres above sea level (MSL)
Image: SPOT5, from NRCAN (Natural Resources Canada), 2007

NO.	YY/MM/DD	DESCRIPTION	BY
B	10/08/18	ISSUED FOR INFORMATION	EYB
A	10/08/11	ISSUED FOR INFORMATION	EYB

REVISIONS / ISSUE

KGS GROUP CONSULTING ENGINEERS

SUN GRO HORTICULTURE

PEAT MINE DEVELOPMENT

REGIONAL SITE LOCATION

AUGUST 2010 | FIGURE 01 | REV: B

PRELIMINARY

NOT TO BE USED FOR CONSTRUCTION

FileName: P:\Projects\2010\10-0293-01\Dwg\GIS\MXDs\EA_Aug_2010_RevB\Figure_1_RevB.mxd
11"x17" PLOT SCALE 1:1

KGS GROUP
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fax: 204.896.0754
www.kgsgroup.com

August 16, 2010 File No. 10-0293-01

Peguis First Nation
P.O. Box 10
Peguis, Manitoba
R0C 3J0

ATTENTION: Chief Glenn Hudson and council

RE: Sun Gro Horticulture Canada Ltd.
Environment Act Proposal, Peatland Development, Ramsey Point Bog

Dear Chief Hudson:

KGS Group, is submitting this letter on behalf of Sun Gro Horticulture Canada Ltd. (Sun Gro) as part of an Environment Act Proposal (EAP) for a peatland development of the existing Sun Gro quarry lease at Ramsey Point Bog. Manitoba Mines Branch previously consulted with the Peguis First Nation regarding the subject property during the process required for issuing the quarry lease as there was overlap between the quarry lease and the Peguis First Nation community interest zone. KGS Group is issuing this letter to provide a brief description of the project and potential environmental concerns that will be considered during the Environment Act Proposal process.

The Environmental Assessment process will be carried out based on project information provided by Sun Gro and advice documents from Manitoba Conservation. Additional considerations will include environmental information acquired from literature and internet searches, publications by the peat industry and environmental organizations, contacts with federal and provincial government representatives, consultation with stakeholders, and site investigations which have been conducted by the project team.

The proposed peat development is in close proximity to Lake Winnipeg and is located west of Hwy 234 approximately 40 km north of Riverton, Manitoba. The bog contains the Ranger Lakes which drain through an unnamed creek into Lake Winnipeg, and a drainage network locally referred to as Beaver Creek that is located northern end of the proposed development area. The spatial boundary of the environmental assessment will consist of the regional study area (1, 659 ha) which includes the area within a 10 km radius of the quarry lease boundary. The project study area covers a 3 km radius surrounding the quarry lease boundary (Figure 1).

The scope of the project will include planning, designing, constructing, operating, maintenance and eventual decommissioning and restoration of the proposed peatland development at Ramsay Point Bog. The entire production lifespan of the proposed development is estimated to be 35 years. Ramsay Point Bog has over 35 years of peat capacity and can be harvested over this time starting once all

licensing and permitting requirements have been fulfilled. As well, the project will include development of access roads, site drainage, on-site facilities and an on-site stockpiling area. Major project activities will include providing access, clearing vegetation and surface soils, stockpiling unprocessed peat, excavating and trenching, transporting and restoring and reclaiming harvested peatland.

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Potential environmental concerns being considered in the Environmental Act Proposal include air quality, soil integrity and quality, surface water quality, wetland health, groundwater quality, aquatic and terrestrial vegetation (with special emphasis on species of conservation concern), Wildlife (with special emphasis on species of conservation concern), fish and fish habitat, and social and economic conditions associated with the proposed development.

KGS Group would like offer the Peguis First Nation the opportunity to provide any comments or concerns regarding the proposed development so that they can be addressed and incorporated into the EAP. As a draft of the EAP is being issued for review, we would appreciate any comments to be available by August 27, 2010. Any comments received after that date would be included into the final EAP submission to Manitoba Conservation who will post the document on the Public Registry for review. Should you have any questions, comments or concerns, please do not hesitate to contact the undersigned at (204) 896-1209, via e-mail at smoffatt@kgsgroup.com, or by mail.

Yours truly,

[redacted]

Shaun Moffatt, M.Sc.
Environmental Scientist

SO/jr

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5690000

5680000

N W E S

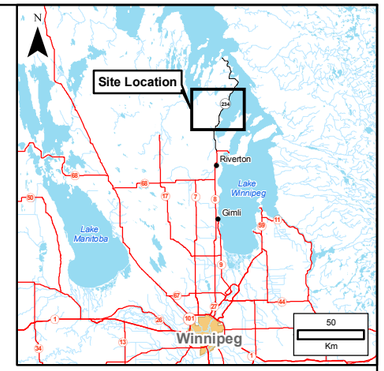
7 Km

3 Km

1156 1761 1107 1108 1109 1110 1762

234

Lake Winnipeg



LEGEND:

- Project Study Area
- Regional Study Area
- Quarry Lease
- Cutline
- Trail
- Road

DRAFT

1 0 1 2 3 4 5

Kilometres

SCALE: 1:120,000 METRIC 11"x17"

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Transverse Mercator Projection, NAD 1983, Zone 14
Elevations are in metres above sea level (MSL)
Image: SPOT5, from NRCAN (Natural Resources Canada), 2007

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A	10/08/11	ISSUED FOR INFORMATION	EYB

REVISIONS / ISSUE

KGS GROUP CONSULTING ENGINEERS

SUN GRO HORTICULTURE

PEAT MINE DEVELOPMENT

REGIONAL SITE LOCATION

AUGUST 2010 | FIGURE 01 | REV: B

PRELIMINARY

NOT TO BE USED FOR CONSTRUCTION

FileName: P:\Projects\2010\10-0293-01\Dwg\GIS\MXDs\EA_Aug_2010_RevB\Figure_1_RevB.mxd
11"x17" PLOT SCALE 1:1

BEAVER CREEK COTTAGER'S ASSOCIATION

[redacted]

August 27, 2010

Mr. Shaun Moffat

Senior Environmental Scientist

KGS Group

3rd Floor – 865 Waverly St.

Winnipeg, MB.

R3T 5P4

Dear Shaun

RE: Peatland Development at Ramsay Point Bog

Thank you for your phone call and follow up letter dated August 20, 2010.

As I stated in our telephone conversation, the Beaver creek Cottager's Association is strongly opposed to the Peatland Development at Ramsay Point Bog as proposed by your client, Sun Gro.

First, a bit of background before I express our major concerns. Your letter asks for comments by August 31, 2010. This does not leave much time to contact our Association members and other key stakeholders. However, I was able to speak to a number of our members on the weekend. All were very opposed to this development for the reasons I will describe below.

In addition, a few of our members spoke to residents of Pine Dock and Matheson Island, two full year communities just north of Beaver Creek. These residents who reside full time in these communities were also strongly opposed to your client's proposed development.

There are also cottage developments at Pebblestone Beach (almost directly across from the proposed development site, and at Little Deer just north of Beaver Creek. I have not been able to contact these groups to advise them of our concerns. I am sure they will also voice strong opposition to Sun Gro's proposed development.

The following outlines our major concerns and I trust they will be conveyed in your report.

1. Provincial Road 234 -- This is a gravel road running north from Highway #8 to Pine Dock/Matheson Island. This road was not constructed with heavy commercial traffic in mind. A peat moss mine already exists north of Beaver Creek. In peak season product from this mine is trucked out by 18-wheeler semi truck trailers, some days in excess of 40 semi trailers per day. These trucks have a devastating impact on P.R. 234.

   A new mine located on this road could double or possibly triple the semi trailer traffic.

   For safety reasons we have requested Infrastructure and Transportation to apply dust control to reduce the heavy dust kicked up by the semi's. I & T do apply some dust control (once per year) and they claim they have no budget funding for additional applications, or even "spot" applications.

   Over the past few years there have seen several serious accidents on this road caused by severe sight reduction in both directions, due to the dust caused by the heavy semi truck traffic. Adding more heavy truck traffic will only cause additional accidents – and possibly deaths.

   Also, I would like to bring to your attention that it's not only cottagers that use this road. The permanent residents of Pine Dock and Matheson Island have to cope with this road on a year round basis.

   It should be noted that the Beaver Creek Cottager's Association made a recent representation at a hearing and were successful in having a seasonal speed limit introduced which reduced the speed limit in the Park from 90 kph to 70 kph. This was done mainly for safety reasons because of the heavy truck traffic. To the date of this letter the signs have not yet been erected by I & T.

   As I mentioned to you on the phone, perhaps your client would consider black topping the road, or partnering with the Province and the existing peat plant on the black topping endeavour. P.R. 234 would then be much better suited to heavy commercial traffic, and the safety concerns would be much reduced.

2. The Environment (Water Drainage) - Much of the bog is saturated with water. It also houses a number of permanent lakes eg. Ranger Lakes in the Park area. I believe your client's process will involve drainage of most or all of the bog. Where will this water go? What impact will it have on an already fragile Lake Winnipeg? What about the impact on the creeks, drainage ditches, cottage lots and wells in the Park area? Will the Park area now become the new bog area?

3. The Environment (Wildlife) - The Park and surrounding area is blessed with an abundance of wildlife which we all want to protect. We have fox, wolves, coyotes, bears, deer, moose, and many more; as well as numerous species of birds. Many of the permanent interior lakes eg. Ranger Lakes are home to several species of fish. Some cottagers use these lakes for pleasure angling. The process for harvesting peat moss will involve drainage of the area, bulldozing the trees and bush from a large portion of the forest, followed by scraping away the surface soil and

vegetation. This will absolutely devastate the natural habitat for the wildlife that live there. Their source of food, water, and shelter will be destroyed. Will there be any wildlife in this area after 35 years of peat harvesting and forest destruction?

You claim there will be a restoration process. It may be 50 years or more before the trees, forest and wildlife are restored to the area.

Our Association, as well as permanent residents in Pine Dock, Matheson Island are extremely concerned with this development going ahead – and we strongly oppose it. In addition I am certain stakeholders at Pebblestone Beach and Little Deer cottage areas will also strongly oppose this development when they are advised.

We request that we be kept up-to-date on the status of this proposed development; and ask that we be invited to attend any public information sessions or hearings relating to this matter.

I can be reached at the above address, by phone at [redacted], or by e-mail at [redacted].

Thank you for your consideration.

Yours truly,

[redacted] President

C.c. Darrell Ouimet – Manitoba Conservation

Trevor Smith – Manitoba Infrastructure and Transportation

Manitoba Conservation, Deputy Minister

Manitoba Infrastructure and Transportation, Deputy Minister

[redacted] – BCCA

[redacted] – BCCA

Village Of Riverton

P.O. Box 250, Riverton, MB R0C 2R0 • Phone (204) 378-2281 • Fax (204) 378-5616

August 19, 2010

Manitoba Conservation
Province of Manitoba
330 – 450 Broadway
Winnipeg, Manitoba
R3C 0V8

Attention: Manitoba Conservation and Sun Gro Horticulture Canada Ltd

RE: Sun Gro Horticulture Canada Ltd and Ramsey Point and Hay Point Peat Bog Development

Sun Gro Horticulture Canada Ltd. first consulted the Council of the Village of Riverton a number of years ago regarding their plans to develop peat bogs in the area.

Since that time we have had numerous follow-up meetings and communications with them as they've continued to keep us informed of their development plans.

It is our understanding that Sun Gro Horticulture Canada Ltd is currently working on the licensing process of the Ramsey Point and Hay Point bogs.

On behalf of the Village of Riverton, Council is fully supportive of Sun Gro Horticulture Canada's plans for peat moss development and harvest operations as it will provide much needed economic opportunity to our region in the form of immediate jobs as well as potential for various indirect employment benefits.

We look forward to continuing to work closely with Sun Gro Horticulture Canada Ltd. in the future and are committed to support as needed.

Yours truly,

[redacted]

Colin Bjarnason, Mayor
Village of Riverton
[redacted]
Riverton, MB
R0C 2R0
[redacted]

From: [redacted]
Sent: Monday, August 23, 2010 3:20 PM
To: [redacted]
Cc: [redacted]
Subject: Re: Ramsay Point Rare Species Observed

[redacted]
Sun Gro Horticulture

Hi [redacted]:

Thank you for letting us know about the Grass Pink(Calopogon tuberosus) occurrences in Sun Gro's Ramsey Point peat harvesting licence area and for asking us to comment on their conservation. We agree that plants at locations 1,3 and 6 outside the development footprint should be left undisturbed by drainage ditches placed close to them or in any other way and they should be monitored for any change in their condition.
We don't believe that the Grass Pink at locations 4 and 5 within the development footprint should be transplanted to another location as they are unlikely to survive transplanting. This kind of small orchid with fragile roots grows in the moss and is unable to survive transplanting from one location to another in the wild in the way the more robust Cypripediums do. Growers in milder climates like North Carolina for instance have had some success with transplanting such orchid species into their bog gardens or greenhouses but not from one wild location to another.
All other orchid locations within the licence area should be reported to the Manitoba Conservation Data Centre. Again we appreciate your letting us know about the location of these rare orchids for our records and for allowing us to comment on their conservation.

[redacted], president
Native Orchid Conservation Inc.
[redacted]
www.nativeorchid.org

----- Original Message -----
From: [redacted]
To: NOCI-President
Cc: [redacted]
Sent: Thursday, August 19, 2010 3:17 PM
Subject: Ramsay Point Rare Species Observed

Hi [redacted]

As discussed, please provide comments (Map attached)

Thanks much,
[redacted]

From: Shaun Moffatt [mailto:SMoffatt@kgsgroup.com]
Sent: Tuesday, August 03, 2010 8:46 AM
To: [redacted]
Cc: [redacted]
Subject: Ramsay Point Rare Species Observed

[redacted]

For discussion purposes I wanted to bring the following information to your attention. During the most recent site visit our terrestrial biologist observed and marked the location of Grass Pink (Calopogon tuberosus) a provincially rare orchid species. Six occurrences were observed with three of them tightly clustered on the west side of the property as shown in the attached figure.

I contacted Manitoba Conservation Data Centre to discuss the implications of this species presence and possible mitigation measures, what follows is a summary of that discussion. While this orchid species is provincially rare (S2 – between 6 to 20 occurences) it is not listed under COSEWIC or the Species at Risk Act and therefore there is no provincial or federal legal protection for this species. Therefore it will not prevent Sun Gro from developing the Ramsay Point bog area.

What was suggested is that in the EA report we note the presence of the species and indicate that while the species is present the locations 1 to 3 and 6 are outside of the development footprint and therefore will not be impacted. While locations 4 and 5 are located within the proposed development footprint the impact on the species will be minor as the other species occurence will not be impacted. Mitigation measures will include ensuring the locations of the species are known and preventing any disturbance of the areas outside of the footprint development. As for the occurrences within the development area it was suggested that prior to disturbing the area the Manitoba Orchid Society could be contacted to attempt to transplant the orchids to suitable locations outside the development footprint. Recommended follow-up includes annual observations (or every 2nd year) to confirm the continued success of the transplanted orchids and the orchids outside of the development area when development occurs in those areas.

Please confirm that you are okay with the suggested mitigation and follow-up so that it can be included in the EA report. If you would like to discuss further please give me a call.

Shaun Moffatt, M.Sc.
Senior Environmental Scientist
KGS Group
3rd Floor - 865 Waverley St.
Wpg. MB. R3T 5P4

Phone: 204-896-1209 ext 467

APPENDIX F

MANITOBA WATER STEWARDSHIP SCIENTIFIC COLLECTION PERMIT

MANITOBA WATER STEWARDSHIP
AQUATIC ECOSYSTEM SECTION

SCIENTIFIC COLLECTION PERMIT

Issued under the authority of the Fisheries Act (Manitoba) and the Fishing Licence Regulation and Fishing Licence Fee Regulation made thereunder.

Issued to: Steve Offman

of: KGS Group, 3rd Floor – 865 Waverly St., Winnipeg, MB. T 896-1209 F 896-0754

is hereby authorized to collect, transport and possess fish within the Province of Manitoba subject to the following conditions:

1. Release live fish only in the water from which they were taken.
2. Fish may not be sold, traded or bartered.
3. The use of chemicals and explosives as aids in collecting fish is prohibited.
4. This permit expires on 31-Oct-10 following date of issue.
5. A report must be submitted to Fisheries Branch, Box 40, 200 Saulteaux Crescent, Winnipeg, MB R3J 3W3 (email: Laureen.Janusz@gov.mb.ca) indicating; location, species, number and disposition of the collected specimens, by the end of February, 2011.
6. Project Title: Ranger Lakes and unnamed water bodies re Sun Gro Horticulture
7. Special Conditions: See attachment. Please contact appropriate district offices prior to commencing field activities.

Laureen Janusz [redacted]
Issued by

Fisheries Biologist
Title

[redacted]
Signature of Permittee

May 14, 2010
Date of Issue

Permit Number: 34-10

RECEIVED TIME MAY. 14. 9:17AM PRINT TIME MAY. 14. 9:19AM

Attachment to Scientific Collection Permit No. 34-10

- Permittee is authorized to capture fish to assess fish and fish habitat as part of an Environmental Act proposal.

- Only fish required for scientific purposes may be retained. All other fish must be released at site of capture, or, if dead, disposed of as approved by local Natural Resource Officer or Regional Fisheries staff. Dead fish must not be discarded along the shoreline as this contravenes section 36 of the federal *Fisheries Act.*

- Permit does not authorize the collection of any SARA species. Unless a permit is obtained from DFO, all SARA species are to be released immediately: size (fork length) and location must be noted in collection report.

- All sturgeon to be released alive immediately to the waters they were collected from once data is collected unless the retention of sturgeon is authorized by this permit. No sturgeon may be purposely killed without prior written approval of the Regional Fisheries Manager (RFM). Any incidental mortality must be reported to the RFM within seven days of the mortality occurrence. Data must be collected in a manner that does not cause undue stress or mortality to the sturgeon.

- Permittee may fish in the following waters: Ranger Lakes and unnamed drainage network within the Ramsay Point Bog and unnamed water body within Hay Point Bog.

- Permittee may use the following gear: backpack electrofisher, hoop nets, gill nets, seine net and minnow traps. All gear must be clearly marked with permitee's name and contact information.

- Given the potential to transfer introduced fish species and other unwanted biota that are now present in some water bodies there is to be no transfer of water and snails between sampling locations. The permittee must ensure all equipment and personal gear, if not new, has been cleaned, disinfected and visually inspected prior to first use and between water bodies (if warranted).

- Permittee is to **immediately** report (within 24 hours) to 1-877-867-2470 the date and location of any observations / incidental catch (on gear) of an aquatic invasive species (not including carp or rainbow smelt) or suspect AIS species or species not familiar to the area. In particular the Province is interested in rusty crayfish, spiny water flea and zebra mussels. Please retain a sample and or take close up digital images of the species. This information is to be included in the collection report. **Please note confirmation of a species is not required prior to reporting.**

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- Permittee is to **immediately** report (within 24 hours) to Water Quality and Aquatic Habitat Protection (945-0002 or 945-8146) any observation of fish kills or fish exhibiting stress/disease in the waterbodies they are sampling. Retention of diseased/dead fish and/or digital images may be required. This information is to be included in the collection report.

- The permit covers employees who are working under the direction of the individuals identified on the permit. They must retain a copy of the permit if sampling on their own.

- The appropriate district office **must be notified** of collection activities prior to commencing.

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APPENDIX G

INTERACTION MATRIX

PROPOSED PEATLAND DEVELOPMENT PROJECT ACTIVITY - ENVIRONMENTAL COMPONENT INTERACTION MATRIX

	. = Neglig.			□ = Minor			■ = Mod.			○ = Major			+ = Positive											
Site Preparation	.	.	.	.																.	.	.			
Construction		.	.	.	.	.	.	.						.	.	.	.	.	.	.	.	.	.		.
Operation			.	.	.	.	.		.	.	.	.	.				.	.	.	.	.	.		.	.
Decommissioning		.	.																.	.	.	.		.	.
Project Activities → / **↓ Environmental Components**	Surveying	Drilling/Sampling	Constructing Access Road	Clearing	Constructing Sedimentation Ponds	Constructing Main Ditches	Constructing Field Ditches	Culvert installation	Profiling	Harrowing	Harvesting	Stockpiling Peat	Transporting Peat	Transporting Constructinon Materials	Storing Construction Materials/Equipment	Using Construction Materials	Using Hazardous Materials	Storing Hazardous Materials	Using Light/Heavy Equipment	Controlling Dust	Storing Fuel	Dispensing Fuel	Pouring Concrete	Restoration	Placing Soil/Planting trees
Atmosphere																									
Particulates		.	■	□	□	□	□	.	■	■	■	■	■	□		□			.	+			.	■	□
NOx / SOx		.	□	□	.	.	.		.	.	.		□	□		.			□		.	.			
VOC																□		.			□	□			
GHG		.	□	□		+	+				.			□					.					.	+
Microclimate			□	□																					□
Geological Features																									
Bedrock		.																							
Soils																									
Soil Integrity		.	□	.	□	■	■		■	■	○														.
Soil Quality		.									.				.		.	■	.	.	■	□	.	■	.
Surface Water																									
Wetland		.		.	■	■	■	.	■	■	■	.	.	.						.				■/+	
Creeks/Lakes					■	■	■	■	■	■	■									.				■	
Drainage Pattern			□	.	■	■	■	■	■	■	■												.	■	.
Water Quality				.	■/+	■	■	■	■	■	■				.		□	■	□	+	■	□	□	■	.
Groundwater																									
Groundwater Regime				.	.	.	.																		.
Groundwater Quality		.	□		.	.	.								.		□	□	□		□	□			.
Vegetation																									
Trees/Shrubs	.		■	■	.	.	.												□	+				+	□
Herbacious/Grass	.	.	■	■	□	□	□												□	+				+	□
Aquatic Vegetation	.	.	■	■	■	■	■																	+	.
Important Community																									
Protected Species																									
Mammals																									
Large Mammals	.	□		□	□	□	□		□	□	□		□	□					□					+	.
Small/Burrowing Mammals	.	□		□	□	□	□	□	□	□	□	□	□	□					□					+	□
Protected Species																									
Important Habitat																									

PROPOSED PEATLAND DEVELOPMENT PROJECT ACTIVITY - ENVIRONMENTAL COMPONENT INTERACTION MATRIX

	. = Neglig.	☐ = Minor	■ = Mod.	○ = Major	+ = Positive

Project Activities / Environmental Components	Surveying	Drilling/Sampling	Constructing Access Road	Clearing	Constructing Sedimentation Ponds	Constructing Main Ditches	Constructing Field Ditches	Culvert installation	Profiling	Harrowing	Harvesting	Stockpiling Peat	Transporting Peat	Transporting Constructinon Materials	Storing Construction Materials/Equipment	Using Construction Materials	Using Hazardous Materials	Storing Hazardous Materials	Using Light/Heavy Equipment	Controlling Dust	Storing Fuel	Dispensing Fuel	Pouring Concrete	Restoration	Placing Soil/Planting trees
Site Preparation	.	.	.	.																.	.	.			
Construction		.	.	.	.	.	.	.						.	.	.	.	.	.	.	.	.	.		.
Operation			.	.	.	.	.		.	.	.	.	.				.	.	.	.	.	.		.	.
Decommissioning		.	.																.	.	.	.		.	.
Birds																									
Birds of Prey		.	☐	☐	☐	☐	☐		.	.	.		.	.					☐					+	☐/+
Ducks and Geese		.	☐	☐	☐	☐	☐		.	.	.								☐					+	.
Gulls and Terns		.	☐	☐	☐	☐	☐		.	.	.								☐					+	.
Perching Birds		.	☐	☐	☐	☐	☐		.	.	.		.	.					☐					+	☐/+
Protected Species																									
Important Habitat					☐						☐														
Herpetiles																									
Species				☐	☐/+	☐	☐	☐			☐		.	.					☐						
Habitat				☐	☐/+	☐	☐	☐			■								☐						
Aquatic Biota/Habitat																									
Species			☐	☐	☐/+	☐	☐	■		☐	☐		.	.			☐	■			■	☐	☐	☐/+	
Habitat		.	☐	☐	☐/+	☐	☐	■		☐	☐						☐	■			■	☐	☐	☐/+	
Social Conditions																									
Services													■	☐	.	.	.	.	.	.	.	.	.		.
Noise Concern		.	☐	.	.	.	.	☐	.	.	.		☐	.					.				.	.	
Human Health																.	☐	☐		+	.	.	.		.
Public Attitude/Well-being		.	☐		.			☐	.		./+		■	☐	.	.	.	.	.	+	.	.		.	
Public Safety	.	.	☐								.		■	☐			.	.	.	+	.	.	.	.	
Worker Safety			☐	☐		☐	☐	☐		☐	☐	.	☐	☐		☐	☐	☐	☐		.	☐	.	☐	☐
Aesthetics	.	.	☐	.	.				.	.	.	.	☐	.						+	.		.	+	+
Economic Conditions																									
Land Use		.	.	■	.	■	☐	.	.	☐	■	.	.	.	.			☐	.	.	.	.	.		.
Employment		.	+	+	+	+	+		+	+	+	+	+	+						+				+	+
Business Opportunities		.	+		.								+											+	+
Income			+		+	+	+	+	+	+	+	+	+	+								+		+	+
Tourism													☐	☐											