ENVIRONMENTAL IMPACT STATEMENT

Volume 2 – Main Report

Project Description, Environmental and Social Impact Assessment

Mistissini Beam Plant

Council of the Cree Nation of Mistissini

June 20, 2006

Project No. 1005414

Project No. 1005414

REPORT TO	**Council of the Cree Nation of Mistissini** **187 Main street, Mistissini, Quebec, G0W 1C0**
FOR	**Mistissini Beam Plant Environmental Impact Statement**
ON	**Category 1A lands in the vicinity of the community of Mistissini**

June 20, 2006

Jacques Whitford
8170 Montview Road, Suite 100
Royal Mount, Quebec
H4P 2L7

Phone: 514 739-0708
Fax: 514 739-8499

www.jacqueswhitford.com

MISTISSINI BEAM PLANT
ENVIRONMENTAL IMPACT STATEMENT

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To be determined based on the questions and comments from the Authorities

ENVIRONMENTAL IMPACT STATEMENT
MISTISSINI BEAM PLANT

Volume 2

Chapter 1: Introduction

Jacques Whitford / DDM PROJECT 1005414 June 20, 2006

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ENVIRONMENTAL AND SOCIAL IMPACT STATEMENT MISTISSINI GLUE LAMINATED BEAM PLANT

1.0 INTRODUCTION

1.1 Project Overview

The Council of the Cree Nation of Mistissini (CCNM) and Chantiers Chibougamau Ltd. (Chantiers) of Chibougamau are the promoters for the construction of a glue laminated beam manufacturing plant (Mistissini Beam Plant) to be located on Category 1A lands in the vicinity of the community of Mistissini (Figures 1-2 and 1-2)

The Cree Nation of Mistissini will supply trained labour for the operation of the plant and Chantiers will supply the technology and the management skills necessary for the successful start-up and operation of the Plant. The annual production of the Plant will be an estimated volume of 12 million board feet of beams or 28,000 m3. Once in full operation the plant is projected to provide around 30 full-time jobs for Cree residents and will become the largest single private employer of Mistissini.

Funding for the project will be sourced from a mix of investments, including the promoters themselves and possibly, existing Federal and Provincial programs available as well as a certain portion from financial institutions.

The site of the proposed project is located at kilometre 10.8 of the Mistissini road (Figure 1-3).

1.2 Proponents

The CCNM is acting as the proponent, on behalf of the joint venture with Chantiers, for the purposes of the environmental authorization for the construction of the Mistissini Beam Plant.

The community of Mistissini is located 130 kilometres northeast of Chibougamau, on the southeast shore of Lake Mistissini, the largest natural lake in Québec. Mistissini is accessible by vehicle from Chibougamau through highway 167, a newly paved road. The Community covers approximately 1 380 square kilometres with a population of 3 814, of which 674 reside outside the community. The principal languages spoken are Cree and English. The band council consists of a chief, a deputy chief and eight councillors elected in accordance with local by-laws. Major business activities and services for the town of Mistissini include forestry, tourism, mining, trapping, art and handicraft, convenience store, banking, daycare centers and restaurants.

Founded in the early sixties by Mr. Lucien Filion, Chantiers is located in Chibougamau, in the heartland of the Boreal Forest. Since its beginning, it has become a successful international exporter employing more than 500 people. Today, more than 90% of its total production of wood product is exported to the United States, Europe and Asia. In 2000, Chantiers founded the Nordic Division of Engineered Wood product. At the same time, it acquired the necessary equipment to initiate a new line of engineered products, glue laminated beams and headers.

The project annual production of the plant is estimated at 12 million board feet of beams or 28 000 m^3.

1.3 Mandated Consultants

For this mandate, Jacques Whitford Ltd (JW) conducted this study in collaboration with Del Degan, Massé Inc. (DDM), and sub-contracted the socio-economic aspects to Vincent Roquet & Associates.

A comprehensive list of the study team can be found in Appendix A.

1.4 Regulatory Context

The Cree Nation of Mistissini is one of the nine communities of the Cree Nation of Quebec that signed the James Bay and Northern Québec Agreement (JBNQA). The boundaries of the area and the related rights were set out in the JBNQA. The Agreement, which addresses issues such as housing, infrastructure, environmental protection and social and economic development, influences the way in which planning takes place in the nine Cree communities.

As part of the project described in this document, the promoters want to build a Glue Laminated Beam Plant on Category 1A lands, lying in an area of approximately 1,906 square kilometres, over which the Cree Nation of Mistissini has exclusive use, exercising powers similar to those of a municipality.

Chapter II of the Environment Quality Act (EQA) lays down special environmental assessment provisions applicable to the territory covered by the JBNQA and the Northeastern Québec Agreement signed by Native nations in Northern regions of Québec. The special environmental assessment procedure for these areas requires the active involvement of local Native residents. The JBNQA sets up a committee known as the James Bay Advisory Committee on the Environment, composed of Native, provincial and federal representatives. The Committee oversees the application and enforcement of the protective measures set out in the Agreement.

An Evaluating Committee (COMEV) is also responsible for examining preliminary information provided by the initiators of projects located within the area governed by the JBNQA and the North-Eastern Québec Agreement located south of the 55th parallel. Based on the information it receives, the Evaluating Committee makes a recommendation to the Local Environmental Administrator of the Mistissini community (LEA or Administrator) stating whether or not the project should be subjected to an assessment of its environmental and social impacts, pursuant to Chapter II of the Environment Quality Act.

On February 7, 2002, the Québec Government and the Cree Nation signed a political and economic agreement covering a period of 50 years. The agreement, commonly known as the “New Relationship Agreement” or ”Paix des Braves”, marks the beginning of what is perceived as a new era in relations between Québec and the Crees, based on:

- A new partnership aiming at ensuring full development of the territory;
- Increased autonomy and assumption of responsibility, by the Cree, for economic and community development; and
- Compliance with the principles of sustainable development and the traditional way of life of the Crees.

It is within this context that construction of the Mistissini Beam Project will be carried out. The Project will have to comply with the following:

- Guidelines received from the Evaluating Committee;
- Federal orientations and provincial environmental assessment requirements for the James Bay area; and,
- The requirements of the Canadian Environmental Assessment Act (CEAA) and the Regulation respecting the environmental impact assessment and review (RREIAR).

Guidelines for the preparation of the Environmental Impact Statement (EIS) for the project were issued in May 2005 by the COMEV and transmitted to Jacques Whitford by the LEA. An addendum to the guidelines was issued by Canada Economic Development (CED) in September 2005. JW and DDM were selected in September 2005 by the Council of the Cree Nation of Mistissini to prepare the EIS for the proposed Plant Project in Mistissini. Mr. Andy Baribeau acted as the interim coordinator for the CCNM before Mr. Richard Shecapio, Director of Community Development for the Cree Nation of Mistissini, was selected by the Council in October 2005 to act as study coordinator for the community.

1.4.1 Whitout Prejudice Statement

CEAA's Applicability within the Context of the Current Court Proceedings and the Rights of the Cree

On March 30, 2006, the Superior Court declared that the Canadian Environmental Assessment Act violates the provisions of the James Bay and Northern Québec Agreement and, consequently, declared inapplicable the provisions of this Act to the proposed Vanadium project. Canada appealed from this decision before the Québec Court of Appeal.

Therefore, the decision of the Council of the Cree Nation of Mistissini to comply with the request of Canada Economic Development to subject the Mistissini beam Plant Project to the provisions of the Canadian Environmental Assessment Act is made "without prejudice" of the Crees' treaty rights in this regard. Moreover, this decision must not be interpreted as an acceptance or acknowledgement, of any nature whatsoever, of the application of the Canadian Environmental Assessment Act to development projects in the territory contemplated by the James Bay and Northern Québec Agreement.

Applicability of Federal and Provincial Regulations and Standards on Category 1 Lands

Paragraph 22.2.3 of the James Bay and Northern Québec Agreement ("JBNQA") provides that all applicable federal and provincial laws of general application, including their regulations, respecting environmental and social protection shall apply in the Territory to the extent that they are not inconsistent with the provisions of the JBNQA.

Moreover, section 4 of the Cree-Naskapi Act S.C. 1983-84, c.18 states that provincial laws do not apply if they are in conflict with the Cree-Naskapi Act or a regulation or a by-law adopted by a Cree Band or if they cover subjects or matters which are already covered in the Cree-Naskapi Act.

Therefore, the decision of the Council of the Cree Nation of Mistissini to comply with the requirements of any federal or provincial regulation in regard to the Mistissini Beam Plant Project is made "without prejudice" of the Crees' treaty rights in this regard. Moreover, this decision must not be interpreted as

an acceptance or acknowledgement, of any nature whatsoever, of the application of federal or provincial regulation to projects located on Category 1A lands.

1.5 Report Structure

The EIA includes three volumes consisting of the following:

- Volume 1 includes the Executive Summary, which will focus on the main elements of the proposed project, the environmental issues identified and the environmental management, or mitigative measures being proposed by the CCNM;
- Volume 2 describes the project, the environmental setting, the EIS methodology, the environmental and social impact assessments, the follow up program and comprises all appendices pertaining to the EIS;
- Volume 3 will be a complement to the environmental impact statement, with details determined at a later date, based on the questions and comments from the authorities.

1.6 Volume 2 Structure

Volume 2 includes nine (9) chapters as follows:

- Chapter 1: Introduction
- Chapter 2: Project Description
- Chapter 3: Environmental Effects Assessment Methods
- Chapter 4: Environmental Effects Assessment Scoping
- Chapter 5: Environmental Setting (physical, biological, human and socio economic components)
- Chapter 6: Environmental Effects Analysis of Valued Environmental Components
- Chapter 7: Follow-up Program
- Chapter 8: Conclusion
- Chapter 9: References

ENVIRONMENTAL IMPACT STATEMENT
MISTISSINI BEAM PLANT

Volume 2

Chapter 2: Project Description

Jacques Whitford / DDM

PROJECT 1005414 June 20, 2006

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ENVIRONMENTAL AND SOCIAL IMPACT STATEMENT MISTISSINI GLUE LAMINATED BEAM PLANT

2.0 PROJECT DESCRIPTION

2.1 Purpose of the Project

2.1.1 Project Rationale

The Mistissini Beam Plant Project rationale is largely based on a Business Plan produced in April 2004, entitled *"Business plan of a joint venture for a glulam plant in Mistissini between the Council of the Cree Nation of Mistissini and Chantiers Chibougamau Ltd*" (Appendix C).

Traditionally, the Canadian Softwood Lumber Industry has been largely oriented towards the production of construction materials, namely 2x4 studs, used in the North American Construction Industry. Market wise, the major part of the Canadian production of construction lumber has been exported to the United States market, where the number of housing projects is much more important than its equivalent on the Canadian domestic market.

Through the past ten to fifteen years, new pressures on the availability of the forest resource as well as the extreme variations of the lumber market have prompted some Canadians producers to orientate their research and development of new wood products towards second and third transformation of the original lumber. These new products are called Engineered Wood Products, or Value-Added Products. They are named engineered products because of the major research and development cost necessary to bring these products to the general construction market.

Recently, the American Lumber Producers have exerted a very influential lobby on the United States Government which has resulted in the implementation of an export tax of 27%. This decision has created a major commercial conflict between the two countries.

In Québec, new pressures on the availability of the forest resource are coming from the Provincial Government, who has brought forward a new set of more stringent standards regarding forest exploitation. These new standards are expected to lower the availability of forest resources by 15% to 20%. In addition, the "Paix des Braves" is imposing additional standards on the exploitation of the commercial forest in a major section of the Boreal Forest. These new standards will be enforced this year and may affect the availability of the forest resource by another 5%.

However, Chantiers's facility of finger jointing has sufficient capacity to supply the projected new plant in Mistissini. As to wood volume necessary to transform 48 000 m^3 into twelve million board feet of flange material, the actual CAAF common area 026-05 allocated to Chantiers for a volume of 722 000 m^3 is largely sufficient for this new production.

But it should be noted that, as mentioned previously, this allocated volume from Public Lands may suffer a decrease of 20% by year 2006 for a net volume allocated of 577 600 m^3. Therefore, in order not to jeopardize the Mistissini Beam Plant Project, it would be beneficial to both partners if part of the

volume to be allocated to the Cree Nation of Mistissini as a result of “La Paix des Braves”, be subject to a forestry partnership agreement between the Mistissini community and Chantiers Chibougamau. Such a forestry agreement would stabilize and guarantee the forestry activities of both parties, hence Cree jobs and their economic impacts.

The immediate combined effects of these new Forest Management Standards create a substantial decrease of the volume of forest available for commercial exploitation and its transformation, and bring the need for a much needed intervention in the exploitation of the forest resources, especially in the Boreal Forest sector, in order to improve forest management. Hence the necessity to develop better wood transformation processes to generate the maximum use of each piece of lumber produced and eliminate waste.

The proposed Plant will be located alongside the road between Chibougamau and Mistissini, at an economical distance from the community. At first, the beams will be principally distributed in eastern Canada and to the north-eastern United States, and subsequently to the southern States and European markets.

In 1994, a socio-economic profile for the community of Mistissini was produced. The general conclusions of the report showed that the demand for job creation was higher than in previous studies, that more than half of the population was under 29 years old and that the unemployment rate was estimated to be in the range of 33.2% to 45.3%, as opposed to 9.7% in Canada and 12.2% in Québec. The wage income (from sources other than Band entities) also decreased significantly.

Hence the importance of the creation of over 30 full-time positions for Cree personnel. In addition, indirect jobs deriving from this economic activity could grow to a ratio of 0.5 job per permanent one created at the Plant.

Although not resolving entirely the unemployment and economic problems of the community, the opening of the plant will improve the general economic situation while providing several trained recognized positions and participation pride. A detailed assessment of the socio economic effects on the Mistissini community is presented in Chapter 6 (section 6.6). The Training Program developed in collaboration with Ministère de l’Éducation du Québec is presented in Appendix K.

The economic impacts will also be significant for Chantiers who will enhance its knowledge of Engineered Wood Product Technology, widen its product base in order to reach a wider market and develop new technical and marketing employment in Chibougamau. Chantiers will also become less dependant of the market driven lumber industry, and the production of glue laminated beams will increase its portion of engineered wood products above the actual 60% of its total production of forestry products.

Finally, at the regional level, the Mistissini Plant will increase economic activities, mainly in the transport and services sectors, such as restoration, lodging and petroleum supplies. The new plant will also enlarge and confirm the Chibougamau territory as one of the most important manufacturers of forest products in eastern Canada.

2.1.2 Sustainable Development

Chantiers is making a commitment to continuously improve the environmental performance of its forest activities under its responsibility.

Management's guidelines for setting up the policy apply to all personnel and service providers as follows:

- Conform to the requirements of applicable environmental laws and regulations and, in particular, act in all circumstances according to the principal of due diligence (ordinarily prudent person);
- Conform to the requirements of the international ISO 14001:1996 standard;
- Prevent forest pollution by using products and forestry practices that prevent, reduce, or control pollution;
- Train personnel and service providers and make them aware of their responsibility and the importance of their roles, as individuals, on the positive or negative impact of their activities on the environment;
- Set environmental targets and objectives at all levels and tasks of forestry operations as part of the above policy.

As part of their objectives and measurements indicators, Chantiers makes a commitment to:

- Apply their Forestry Environmental Management System (FEMS), certified ISO 14001:1996; to the Project;
- Establish a complete inventory of all products and forestry practices having a significant impact on the environment and a continuous improvement plan in this regard; and
- Establish a policy and a general training plan for human resources assigned to forestry activities.

2.1.3 Social Acceptability of the Project

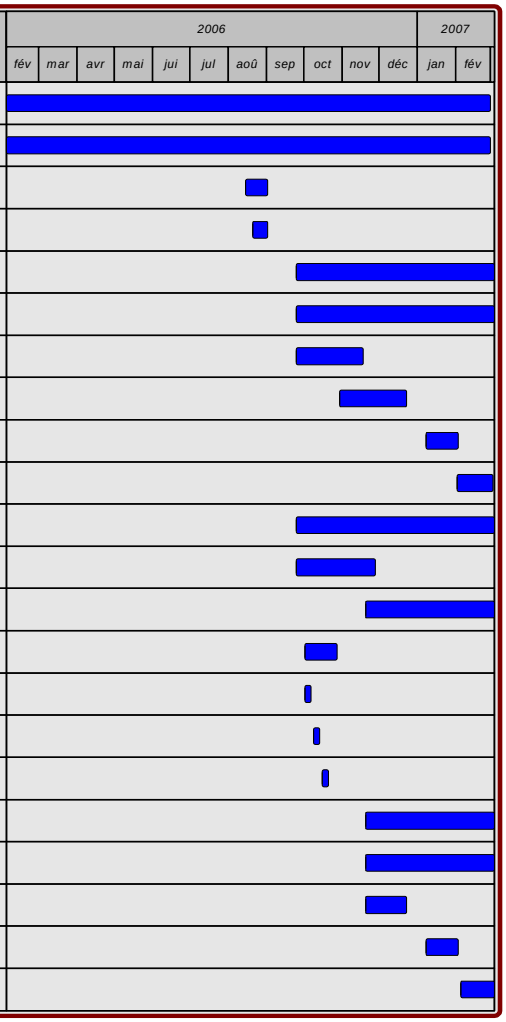
Although some key stakeholders and informants expressed concerns over potential impacts of the Plant (potential consequences of air pollution on human health, on wildlife and fish, on the taste of game and of fish, and the impacts of increased road traffic on the safety of other road users and mainly on children) most of the participants interviewed were pleased that the project would create employment in the community. They wanted to see many young people employed at the plant as employment of young adults remains an important issue in the community.

2.1.4 General Implementation Schedule

The general implementation schedule for the Plant is presented in the following table:

Table 2-1: General implementation schedule, Chantiers Chibougamau

ID	Task	Start	End	Length
1	Glulam project	2006-02-03	2007-02-28	279J
2	Project's management and engineering	2006-02-03	2007-02-28	279J
3	Land's preparation	2006-08-15	2006-09-01	14J
4	Tree's cutting	2006-08-21	2006-09-01	10J
5	Building	2006-09-25	2007-04-13	145J
6	Construction	2006-09-25	2007-04-13	145J
7	Foundations	2006-09-25	2006-11-17	40J
8	Walls and roof	2006-10-30	2006-12-22	40J
9	Lightning	2007-01-08	2007-02-02	20J
10	Concrete slab	2007-02-02	2007-03-02	21J
11	Electricity	2006-09-25	2007-04-13	145J
12	Station installation	2006-09-25	2006-11-27	46J
13	Electrical installation	2006-11-20	2007-04-13	105J
14	Boiler	2006-10-02	2006-10-27	20J
15	Purchase	2006-10-02	2006-10-06	5J
16	Foundations	2006-10-09	2006-10-13	5J
17	Installations	2006-10-16	2006-10-20	5J
18	Production equipement	2006-11-20	2007-04-13	105J
19	Finger-jointing and glulam line	2006-11-20	2007-04-13	105J
20	Purchase	2006-11-20	2006-12-22	25J
21	Installations	2007-01-08	2007-02-02	20J
22	Starting	2007-02-05	2007-04-13	50J



2.2 Site Selection Methodology and Analysis

2.2.1 Preliminary Study

In the winter of 2005, four sites were chosen for the first selection phase: sites 1, 2, 3 and 4 (Figure 2.1). Site 4, located on the northern part of the town of Mistissini and adjacent to its wastewater treatment system, was eliminated early since the transport of materials between the Plant and Chantiers would have had to be done through the town center, and because the soils were not determined to be favourable to the construction of a plant, mainly because of the presence of wetlands.

Site 3, at the entrance of Mistissini, on the south-east corner, is located in a light industrial development area. This site was also rejected, mainly because of its restricted size and its location near the heart of the town. In addition, a stream located on this site complicates the project feasibility from an environmental impact point of view.

Sites 1 and 2 are very similar, and the choice of one site over the other was ultimately based on soil composition and adjacent land use. On February 14, 2005, both sites were visited by a representative of Chantiers to determine the composition of surficial deposits. Several holes were made at regular intervals with a power shovel, in a way to cover the entire area. Holes were two to three meters deep and dug at 35 meter intervals.

The soils at Site 2 are made of fluvio-glacial surficial deposits: till (fine sand and clay) for the first 40 centimeters, and coarse sand for the following 2.6 meters. In certain places, only till was found. In addition, the first meter of soil at the southern edge of the site (the bottom quarter of its total length) is composed of organic matter (non-decomposed, water-saturated mineral matter such as leaves, needles, wood debris and humus). The bedrock was readily located under this meter of organic matter.

Although site 2 looked promising at first, the site visit and the surficial deposits and soil composition assessments raised a few concerns. First, to be able to use this site for the construction of the Plant, gravel would have to be spread on its entire area. Second, the site appears to be regenerating after being cleared for timber, and some people had mentioned using it as a landing strip. Finally, site 2 was found to be restricted in size with little or no possibility of extension since it is a plateau located at the top of a small mount. In addition, the soils were saturated with water and shallow on the south side. The west side of the site also seems to be used for recreational purposes, since several residences and cabins have been built along the banks of the lake. For all these reasons, site 2 did not show promising features for the construction of the Plant.

The study of surficial deposits on site 1 showed that they are made of a mix of fine gravel (10% silt, fine sand and rock) for the first meter, followed by coarse gravel (40% silt and sand and 60% 10-cm diameter rocks). This site show good potential for water drainage and the ground is solid for the construction of the Plant. The area available is of adequate size and could even be enlarged. It is important to mention that the site is an old gravel pit presently used by the community as a solid-waste dump (reinforced concrete, chairs, tables, wood products and several other items). Therefore, the site would have to be cleared of debris and levelled with the appropriate machinery, but this should not hinder the construction process. There is also a small 150 by 75 meter wetland on the south west side of the site and a rock outcrop on a small portion of it. Although there is a need to consider this outcrop, it is however not big enough to eliminate site 1 as a potential building area.

After reviewing the four proposed sites, and conducting surficial deposits studies on site 1 and 2, site 1 was determined to have the most desirable characteristics for the construction the Plant.

The site is near the Town of Mistissini without being too close, it is not being use for recreational purposes, and the size of the area available and the soils are adequate. However, a second phase of investigation was determined necessary to compare site 1 to other sites of interest for the project.

2.2.2 Second Phase Investigation

Following the preliminary investigation of four sites for the implantation of the Plant, site 1 was selected as the most desirable location based on location, soil composition and adjacent land use. On September 29, 2005, site 1 was visited by Jacques Whitford. Following recommendations by Jacques Whitford and according to their technical and environmental site selection process, five new areas were examined and compared to site 1 to assure that all options were being considered (Figure 2-1).

The study areas selected for the second phase investigation are all located on 1A lands on the eastern side of the road leading to the Town of Mistissini, between kilometre 7 and kilometre 12. Since the bedrock was readily detected during the preliminary study of sites 1 and 2, and because all these sites are close to one another, the composition and depth of surficial deposits varies according to the elevation and the relief for each location, and therefore, site assessment results were greatly influenced by the depth of the soil covering the bedrock and the constraints that shallow soils would present.

Sites 5 to 9 were chosen because they are relatively leveled, according to the contour line map, and also because they meet the minimum standards defined in the Site Selection Spreadsheet (Table 2-2). This spreadsheet contains a list of criteria that have different value considering the importance of certain elements for this type of project. For example, criteria like distance from significant aquatic habitat, dimension of the site and its flatness were assigned higher rating multiplier. Total points for each site correspond to the sum of the points already weighted for each criterion. The ratings of the sites are presented in Table 2-2.

On October 11, 2005, these five sites were visited by a representative of Chantiers, They were subsequently evaluated according to the Site Selection Spreadsheet,

Site 5 is located approximately 250 meters from the side of the road leading to Mistissini, on the east side, at kilometre 10.8. It consists of an elevated plateau of approximately 400 by 350 metres, with gentle down sloping edges towards the road. It is composed mostly of mature forest, and there are no rivers or streams on or near the Site. However, a four-metre high rock wall is located on the southern part of the Site, which is also the northern part of Site 6. To use this location for the Plant, an access road would have to be built (250 meters), and the land would have to be cleared and filled.

Site 6 is forested and located 200 meters from the access road to Mistissini, on the east side at kilometre 10.2. Site 6 is more elevated that site 5 and is separated from it by a four meter high cliff on the northern side. The northern part of the site is flat but very humid since the bedrock is close to the surface. In the middle of the site, there is an elongated soil cluster which extends for 200 meters from east to west. This cluster is the most elevated point on site and the southern part of the site is a steep south-west slope. This site does not show any potential for the plant's location.

Site 7 is forested and located 125 meters from the access road to Mistissini, on the east side, at kilometre 9.3. There is no access to it, and it is a little more elevated than the access road to the town but less elevated than Site 6. A small stream runs from east to west, and the northern part of the site slopes down towards the stream. Even though this site has some relatively flat features, it is unlikely to be chosen because of the stream.

Site 8 is located 40 meters from the access road to Mistissini, on the east side at kilometre 8.2. The western side of the site slopes down towards the road. The land is swampy, there is no adequate building surface, and the relief is uneven. This site shows little to no possibility of development for this project.

Site 9 is located 200 meters from the access road to Mistissini, on the east side at kilometer 7.5. There is an access road to the site, leading to a borrow pit. This site is currently being mined and rock extraction and crushing was identified. The crushed stone is stocked at the centre of the site. This site showed the best potential for the implantation of the Plant, but the presence of the borrow pit prevented us from choosing it.

Site 1 is located 200 meters from the access road to Mistissini, on the east side at kilometer 7.3. There is also an access road to the site, which leads to a cleared, flat area. The surface soils are adequate and the bedrock is not too close to the surface. This site is interesting, but is covered with solid wastes. There is also a small 150 by 75 meter wetland on the south west side of the site. Following the site visit, questions were raised with regards to the wetland and with the possibility of contamination as it is presently used as a solid-waste dump.

The evaluation of each site according to the criteria previously established lead to the conclusion that site 5 is the most appropriate for the construction of the Plant. However, it was decided that a surficial soil investigation had to be done to confirm that the soil composition is adequate for the construction of the Plant.

Surficial soil deposits on site 5 were investigated by a representative of Chantiers on Friday October 21, 2005, by way of trenches dug by a power shovel. The tests showed uniformed surficial deposits. The bedrock was not reached during this preliminary study.

All five trenches showed that the soils on site 5 are made of two types of surficial deposits. The first layer, the initial 50 centimeters, is made of decaying organic matter and the second layer, at least three meters deep, is made of till. Then, the till becomes interspaced with larger, round rocks.

Dry till was found along the rock wall that borders the southern edge of the plateau, on its entire length (500 meters wide) from east to west, and on its entire width (375 meters) from north to south. On the north side, the landscape is gently sloping downward, and the trenches revealed humid till, with water accumulating at the bottom of the hole, likely from the 75 centimeters layer of organic matter. Therefore, we can assume that, in that area, there is natural drainage of the soil to the north, following the slope.

Site 5 measures more than 2 000 000 square feet, and is almost rectangular in size. It is a little elevated from the road leading to Mistissini, and is located approximately 250 meters from it. The site is approximately five kilometers away from the village, at good distances from existing occupied areas on each side of the peninsula, thus preventing any effect of the Plant operations to interfere with the

actual environmental conditions. Finally, the surficial soil investigation confirmed that site 5 is the most appropriate site for the construction and operation of the Plant.

Table 2-2: Site Selection Spreadsheet – Glue Laminated Beam Plant, Mistissini, Quebec

Selection Criteria	Rating Multiplier	Site 1		Site 5		Site 7		Site 9	
		Raw	Weighted	Raw	Weighted	Raw	Weighted	Raw	Weighted
Technical Selection Criteria									
Possible access to route 167	3	3	9	2	6	2	6	3	9
1 million square feet area with 0,1%<local slopes<2%	3	3	9	3	9	2	6	3	9
Value of actual soil usage	3	1	3	3	9	3	9	1	3
Municipal zoning	2	1	2	1	2	1	2	1	2
Bedrock (proximity)	1	2	2	3	3	2	2	2	2
Surface soil (nature)	3	2	6	2	6	2	6	2	6
Surface drainage	2	3	6	3	6	2	4	3	6
Environmental Selection Criteria									
Distance from significant aquatic habitats	3	2	6	3	9	2	6	3	9
Distance from nearby houses/occupied areas (noise, impact on wells)	2	2	4	3	6	3	6	3	6
Distance from communities	2	3	6	3	6	3	6	3	6
Distance from nearby houses/occupied areas with regards to wind direction	2	3	6	3	6	3	6	3	6
Distance from communities with regards to wind direction	2	3	6	3	6	3	6	3	6
Water table	2	2	4	3	6	1	2	3	6
Area already deforested	2	3	6	2	4	2	4	3	6
Absence of visual impact on nearby occupied areas	2	2	4	3	6	3	6	2	4
Absence of existing environmental nuisance	2	1	2	3	6	3	6	2	4
Financial, Socio-economical and Operational Selection Criteria									
Electrical supply	3	3	9	3	9	3	9	3	9
Water supply	3	1	3	1	3	1	3	1	3
Low road construction costs	1	3	3	2	2	2	2	3	3
Labour force proximity	1	3	3	3	3	3	3	3	3
Total of weighted scores			99		113		100		108
Raw scoring values: 3: Good; 2: Average; 1: Low									
Rating: 3: High; 2: Medium; 1:Low									

2.3 Facilities Overview and Footprint

For the purpose of this EIS, Chantiers outlined their business operation plan for the Plant (engineering process, materials used, and waste/recycling matter produced). Several appendices are presented at the end of this volume as supporting documentation for the plan. By the third year of operation, the Plant is projected to optimize 20,000,000 pmp which will result in a production of 12,000,000 pmp over a period of 45 weeks (675 shifts). See Figures 2-2 and 2-3 in Appendix B for plans of the Site and the Plant, respectively.

The following table summarizes the general parameters of the Plant and includes a detailed mass balance:

Table 2-3: General parameters and mass balance

Production Parameters	Imperial		Metric		Industry Unit	
Annual production	999 600	pi^3	29988	m^3	12000	Mpmp
Weeks of production	45	weeks / year	-	-	-	-
Days of production	225	days / year	-	-	-	-
Hours of production per day	22.5	hr / day	-	-	-	-
Factors	IMPERIAL		METRIC		INDUSTRY UNIT	
1 pmp	0.0833	pi^3	0.002499	m^3	1" x 12" x 1 ' = 1	pmp
Facteur de copeaux (H=18%) =(1800 livres / 2000 livres) / Mpmp:	1800	lb /Mpmp	818	kg/Mpmp	0.9	t / Mpmp
Masse / Mpmp	1850	lb / Mpmp	840.9	kg / Mpmp		
Production / workshift entry	54815	lb	24916	kg	29 630	pmp
Raw materials						
Spruce (85%) density:	28.04	lb / pi^3	450	kg / m^3	-	-
Jack pine (15%) density:	24.92	lb / pi^3	400	kg / m^3	-	-
Specifications	AFTER DRYNG					
SIZE	Thickness (")	Width (")	Thickness (mm)	Width (mm)	Volume of material / length	
1X3	1.173	2.653	30	67	0.250	pmp / foot
1X4	1.174	3.613	30	92	0.333	pmp / foot
2X3	1.647	2.692	42	68	0.500	pmp / foot
2X2	1.732	2.231	44	57	0.333	pmp / foot
2X4	1.630	3.664	41	93	0.667	pmp / foot
2X6	1.660	5.700	42	145	1.000	pmp / foot
2X8	1.660	6.700	42	170	1.333	pmp / foot
Package entry						
1X3	594	pieces / package	75 to 100	laths/package		
1X4	432	pieces / package	75 to 100	laths/package		
2X3	418	pieces / package	51 to 68	laths/package		
2X2	494	pieces / package	51 to 68	laths/package		
2X4	304	pieces / package	51 to 68	laths/package		
2x6	160	pieces / package	-	laths/package		
2x8	160	pieces / package	-	laths/package		

Table 2-3: General parameters and mass balance – continued

Machine	Imperial		Metric	
Semi-automatic feeder				
Speed	up to 180	lugs/minute	-	-
Double shaper				
Block length	5 to 10	feet	305 to 3050	mm
Block width	1,5 to 6	inches	63,5 to 205	mm
Block thickness	3/4 to 6	inches	25,4 to 51	mm
Joint length	1.113	inches	28.575	mm
Number of shaper	2	-	-	-
Diameter of shaper	13 1/2"	inches	34.3	cm
Wood Loss (sawdust)	3.49088	%	-	-
Speed	up to 180	lugs/minute	-	-
Trim saw	14"	inches	25.4	cm
Trim wood loss	Include in the percentage of the wood loss of double shaper.			
Adhesive mix UX-100/WD3-A322	Ratio: 4 parts ISOCET UX-100 to 1 part ISOCET WD3-A322			
Automatic transfer				
Loss	0	%	-	-
Speed	up to 180	lugs/minute	-	-
High capacity crowder				
Retaining tunnel	20	feet	6	m
Planer				
Loss	41.5	%	-	-
Speed	100 to 600	' / minute	-	-
Flying saw				
Saw kurf	0.190	inches	4.826	mm
Loss / cutting	0.00912	%		
Adhesive system				
Adhesive mix WD3-A322/CX-47	Ratio: 6 parts ISOCET WD3-A322 to 1 part ISOCET CX-47			
Glue spread	60 -80	lb / 1000 ft^2	-	-
Stacking beam system	-	-		
Oven line	-	-		
Cooking time	3 to 7	minutes / 16' section	3 to 7	minutes / 4,88m section
Dead time	2	minutes	-	-
Nominal Length	8 to 52	feet	2,4 to 15,9	m
Nominal Width	1 3/4 to 7 1/2	inches	44,4 to 190,5	mm
Nominal Heigth	3 1/2 to 30	inches	88,9 to 762	mm
Minimum temperature	149	^oF	65	^oC
Maximum temperature	194	^oF	90	^oC
Hydraulic pressure	1100 to 1500	psi	6985 to 10342	kPa
Precision end trim saw				
Loss	2.75	%	-	-
Saw kurf	0.250	inches	6.35	mm
Planer				
Sizing	4 faces	-	-	-
Loss	Include in the percentage of the first planer.			

Table 2-3: General parameters and mass balance - continued

Mass Balance	Imperial		Metric		Industry Unit	
Package entry						
Flow of raw material	7309	lb/hr	3322	kg/hr	3.95	Mpmp/hr
Semi-automatic feeder						
Flow of material	7309	lb/hr	3322	kg/hr	3.95	Mpmp/hr
Double shaper						
Loss for joints machinig	255	lb/hr	116.0	kg/hr	0.14	Mpmp/hr
Flow of material	7054	lb/hr	3206.1	kg/hr	3.81	Mpmp/hr
Adhesive application						
WD3-A322 woodbonding resin	24.72	lb/hr	11.24	kg/hr	-	-
UX-100 polyurethane adhesive	6.18	lb/hr	2.81	kg/hr	-	-
Automatic corner transfer						
Loss	0	%				
Flow of mateiral	1457	lb/hr	3206.1	kg/hr	3.81	Mpmp/hr
Aaaembly machine						
Flow of material	1457	lb/hr	3206.1	kg/hr	3.81	Mpmp/hr
High capacity crowder						
Flow of material	7054	lb/hr	3206.1	kg/hr	3.81	Mpmp/hr
Planer						
Loss for wood sizing	2927	lb/hr	1330.5	kg/hr	1.58	Mpmp/hr
Flow of material	4126	lb/hr	1875.6	kg/hr	2.23	Mpmp/hr
Flying saw						
Loss by kurf of flying saw	0.4	lb/hr	0.2	kg/hr		Mpmp/hr
Flow of material	4126	lb/hr	1875.4	kg/hr	2.23	Mpmp/hr
Adhesive system						
Flow of material	4126	lb/hr	1875.4	kg/hr	2.23	Mpmp/hr
WD3-A322 woodbonding resin	89.84	lb/hr	40.84	kg/hr	-	-
CX-47 crosslinking agent	15.75	lb/hr	7.16	kg/hr	-	-
Stacking beam system						
Flow of material	852	lb/hr	1875.4	kg/hr	2.23	Mpmp/hr
Oven line						
Flow of material	852	lb/hr	1875.4	kg/hr	2.23	Mpmp/hr
Precision end trim saw						
Loss of wood	23	lb/hr	51.6	kg/hr	0.06	Mpmp/hr
Flow of material	829	lb/hr	1823.8	kg/hr	2.17	Mpmp/hr
Planer						
Flow of material	829	lb/hr	1823.8	kg/hr	2.17	Mpmp/hr
Loss	Include in the percentage of the first planer.					

2.4 «Construction

2.4.1 Construction Schedule

The project itself will be divided in two phases: first, there will be the Site preparation (see section 2.3.2) and second, the installation and construction of the Plant (see section 2.3.4). The construction and alteration work (second phase) is scheduled to begin at the end of the summer of 2006. Constructions will be spread over a period of 7 to 8 months and we estimate to be able to begin production in April of 2007. The construction and implementation schedule is presented in Table 2-1.

2.4.2 Site Preparation and Lay Down Areas

The alteration work normally includes work of digging, filling and leveling of the ground. The Site occupies an area of approximately 94 900 square meters (365m x 260m); this is equivalent to 9,6 ha. Presently, there is around 80 cubic meters of wood material per hectare; which means a total of approximately 800 cubic meters of wood material is located on the Site. During the Site's preparation, trees cut will be sent to the Chibougamau plant to be transformed.

2.4.3 Temporary Facilities

A mobile home will be installed at the construction site for the management crew. During the construction of the Plant, workers will eat and sleep in the town of Mistissini.

2.4.4 Building Construction and Equipment Installation

The construction of the Plant will include the erection of an industrial building of approximately 10 000 square meters. Activities for construction and start-up will be in this order:

- Building construction: foundations, walls and roof, lightning, concrete slab;
- Water supply installation: wells, septic tank, sand filter, pumping station, water tank for fire;
- Electricity: station and electrical installation;
- Equipments: installations and starting;
- The installation of an access road;
- The installation of ditches of drainage of rainwater.

For details on the implementation schedule, see Table 2-1.

2.4.5 Labor Requirements and Working Schedule

Employees from the local area (probably between 50 and 80) are expected to be hired and will work from Monday to Thursday, from 8:00 AM until 6:00 PM during the construction phase.

2.5 Operation

2.5.1 Manufacturing Process Description

A simplified flow diagram of the manufacturing process is presented in Figure 2-4 of Appendix B, and a mass balance schematic process diagram is shown in Figure 2-5 of Appendix B. A list of equipment to be used in the assembly, polishing, and cutting processes is presented in Table 2-4. This table presents the supplier of the equipment, provides a brief physical and/or mechanical description, and describes its use. Tables 2-5 and 2-6 provide a list of the fixed and mobile equipment, respectively, to be used at the Plant. It is important to note that a water tank will be necessary as part of the fire prevention plan.

A description of the processes and principles to be applied at the Plant is described below.

Glue laminated beams are manufactured by gluing sections of lumber together to form larger structural pieces, to be used for applications such as ridge beams, garage door headers and floor beams. The manufacturing process consists of four phases:

- sawing, drying and grading the lumber (at the Chibougamau Plant);
- finger-jointing process to obtain longer and stronger laminations;
- planer and flying saw;
- face gluing (or edge gluing) the laminations; and
- completion and expedition.

Table 2-4: List of equipment to be used in the assembly, polishing and cutting processes

Package Entry	Supplier	Description	Utility
Conveyor entry (#1)	Gemofor	rolls (7)/5 Hp	Reception of raw materials.
Conveyor entry (#2)	Gemofor	rolls (7)/5 Hp	
Conveyor entry (#3)	Gemofor	2 transfers	
Package elevator	Joulin	rolls (5)	
Package elevator	Joulin	rolls (5)	
Lath recovery conveyor	Gemofor	1 strap & 2 chains	
Lath picker		6 chains/ 3 Hp	
Lath transfer			
Lath basket with strap			
Exit lath transfer		2 chains/3Hp	
Bottom transfer "joulin" feeder	Joulin	4 chains/3Hp	
Top transfer "joulin" feeder	Joulin	4 chains/3Hp	
Grips feeder	PLC inc.		
SEMI-AUTOMATIC FEEDER			Providing wood for finger joining line
Speed	Conception RP	Up to 180 lugs per minute, adjustable by a variable frequency drive	
Bottom conveyor		Skate wheels and chains	
Top conveyor		8" (200mm) wide waved nylon brushes	

Table 2-4: List of equipment to be used in the assembly, polishing and cutting processes - continued

Double Shaper	Supplier	Description	Utility
Lug speed (with 12" (305mm) spacing	Conception RP	Up to 180 lugs per minute, adjustable by a variable frequency drive, including dynamic braking	Joint machining (1.125") and glue application inside joint.
(2) spindle units For 16 bolt ACEco fingerjoint heads		50hP (37.5kW), 3600 RPM, 3" (76mm) diameter, adjustable by a variable frequency drive, including dynamic braking.	
(2) x 10" (250mm) trim saws		Each mounted on a high precision spindle fixed speed at 6000 RPM	
(4) x 8" (200mm) scoring saws		Each mounted on a high precision spindle fixed speed at 6000 RPM	
(2)x 10 HP(7.5kW)		Electric motors drive the saws via a flat belt (each motor drives 2 scoring and 1 trim saw).	
Digital readouts (mechanical)		On saws and spindles	
Glue applicator		Injection PLC controlled (almost no waste)	
AUTOMATIC CORNER TRANSFER	-		Transfer.
Speed	Conception RP	Up to 180 lugs per minute, adjustable by a variable frequency drive	
Bottom conveyor		Chains (6)	
Top conveyor		4"(100mm) wide waved nylon brushes	
Accumulation		Up to 12 pieces of 3 1/2" (89mm) wide	

Table 2-4: List of equipment to be used in the assembly, polishing and cutting processes - continued

Assembly Machine	Supplier	Description	Utility
Top conveyor	Conception RP	Pineapple wheels and rollers	Joints insertion one by one.
Bottom conveyor		Flat top chain	
Side conveyor (Fixed)		One rectilinear side chain (for straight reference)	
Side conveyor (mobile)		One side chain with pneumatic pressers to prevent offsets and misalignements	
Speed of chains		Adjustable by a variable frequency drive	
Length		17' (5,18m) (long to accumulate enough pieces)	
HIGH CAPACITY CROWDER	-		Application of pressure
Feed and retarding rolls (8)	Conception RP	Top: 17" (432mm) diameter, urethane coated	
Speed		Bottom: 17"(432mm) diameter, smooth finished steel	
Retaining tunnel		20'(6m) long, with straight edge & pneumatic pressure guide	
PLANER	-		To ensure clean and parallel surfaces for gluing.
Speed	Gemofor	100 to 600 '/minute	
Motion		Lineal roll bearing	
FLYING SAW	-		
14" (356 mm) cut off saw	Conception RP	5Hp (3.75kW), 3600RPM	To obtain desired length for glulam
Speed		Up to 400' (120m) per minute)	
Synchronism		By a SEW Eurodrive servomotor	
Motion		Linear bearing slides	
ADHESIVE SYSTEM	-		Application of adhesive on each laminations.
Conveyor feeder for adhesive application	Gemofor	rolls (11)	
Adhesive distribution system		application on surface	
STACKING BEAM SYSTEM	-		Final lay-up pattern.
Stacking system	Gemofor	Accumulation of laminations	
Elevator			
OVEN LINE	-		Adhesive hardening
Conveyor oven entry	Gemofor	Chains / Panel push rod	
Lamination oven		Radio frequency technology	
Hydraulic oven system		Application of pressure	
Exit conveyor		rolls (5)/Hydraulic	
Beam recovery system		Hydraulic/60'	
Beam accumulation transfer		10 chains	
FINITION			
Conveyors	Gemofor	rolls (11)	
Planer	Gemofor	Four faces	Commercial sizing
Precision end trim saw:1 adjustable 14" (356MM) re-trim saw	Conception RP	3Hp (2.25kW), 6000 RPM	Trim
Conveyors	Gemofor	rolls (11)	Wrapping
Exit transfer	Gemofor	chains (10)	Attached/expedition

Table 2-5: List of fixed equipment

Name	Supplier	Description	Utility
Wood chipper	-	75 Hp	To transform crop wood into woodchips
Metal chipper	Signode	1,5 Hp	To recycle metal belt into little chips
Electrical chamber	-	3500 MW	Provide, convert, electricity
Boiler (1)	-	200 Hp / 36 078 794 BtU	To heat the plant
Closed sawdust tank	-	-	Sawdust accumulation and distribution for trucks
Closed sawdust conveyor	-	-	Connection between multi-cyclone and Closed sawdust tank
Multi-Cyclone	-	-	Sawdust aspiration
Oil Tank	-	19 000 L	To heat the plant
Basin of water (emergency)	Sedac	Cylinder: diameter: 10' length: 18' (54 000 L)	To keep water in case of fire

Table 2-6: List of mobile equipment

Name	Quantity	Utility	Type Of Fuel	Consumption
Loader	1	Loading, unloading of debris	Diesel (They will fill tank in Mistissini)	5 - 8 L / hr
Lift	1	Loading, unloading & cleaning	Propane	± 45 kg per day
Hoist	2 (5t)	To move package in the factory.	Electricity	-

The lumber used for manufacturing will have been previously dried at the Chibougamau plant. The moisture content of the lumber entering the glue laminated beam manufacturing process will be determined with a continuous inline meter that checks the moisture of each board.

The moisture content of laminations shall not exceed 16% at the time of bonding. An exception can occur, when it is known that the equilibrium moisture content of the laminated timber in use will be 16% or more. In this case, the moisture content of laminations at the time of bonding shall not exceed 20%. The average range of moisture content of laminations to be assembled into a single beam shall not exceed 5 %. Moisture content shall be based on the average content of the cross section whereas, the moisture content of a lamination shall be the average moisture content along its length.

The boards with moisture content greater than the given threshold (20%) will be removed from the process and re-dried. Re-drying may be accomplished through air drying or kiln drying. The use of lumber kilns at the Chibougamau plant could be an option. However, a better alternative would be to dry the humid boards in ambient air inside the Plant, in Mistissini. To manufacture glue laminated beams in lengths beyond those commonly available for sawn lumber, the lumber must first be finger-jointed (end-jointed). By definition, a finger joint is lumber that has its imperfection removed. The finger jointing process involves the joining of short lengths of timber to produce longer lengths, which are then machined on both ends with a special shaper (cutter head). A structural resin is

applied and the joints are mated. The resin is cured with the joint under end pressure (crowder and assembly machine).

Just before the gluing process, the end-jointed lumber is planed on both sides to ensure clean, parallel surfaces for gluing. Once the wood has been planed, the flanges are cut by a flying saw to obtain the desired beam lengths. The adhesive (resin) is spread onto the lumber with a glue extruder. The "resined" lumber is assembled into a specified lay-up pattern inside a stacking beam system. There, a hydraulic system brings the lumber into close contact inside a radio frequency oven. The beam will then be pressed at a maximum of 16 feet length sections. Pressure shall be maintained for a sufficient period of time to ensure close contact between laminations and not over-stress glue-lines during the development of bond strength.

After the beams are removed from the oven (removed by a hydraulic system), the wide faces (sides) are planed or sanded to remove beads of resin that have squeezed out between the boards. The narrow faces (top and bottom) of the beam may be lightly planed or sanded depending on appearance requirements. Edges (corners) are usually squared (90 degrees). The specified appearance of the beam dictates whether additional finishing is required at this point in the manufacturing process. Knot holes may be filled with putty patches and the beams may be further sanded. Some (or all) finished products are protected with end sealers. At completion, finished products are wrapped, attached and shipped.

2.5.2 Unloading Facility

Figures 2-2 and 2-3 in Appendix B show that the unloading facility is located on the south-east side of the Plant and is made of a concrete slab. The unloading facility will be use for two (2) purposes:

- Reception of the raw material;
- Reception of all adhesives and other products.

2.5.3 Storage Facilities

Table 2-7 outlines all the products that will be in the storage area. Figure 2-3 (no. 44), shows the storage areas for the adhesives (UX-100, WD3-A322, CX-47) and the wax emulsion. All adhesives and wax emulsion are in individual returnable tanks and must be stored at temperatures between 45° and 75° F. Hydraulic oil, paints, grease and lubricants, solvents and thinner with lacquer will be stored in the small warehouse (Figure 2-3, no. 23). Propane will be stored in a steel closet (10' x 6' x 38''; see Figure 2-2, outside of the Plant). Heating oil will be stored in a closed tank, outside the Plant (Figure 2-3, no. 42).

2.5.4 Chemicals

In the finger joining lines, a polyurethane polymer adhesive (UX-100) with a wood bonding adhesive resin (WD3-A322) is used. Glue laminated beam lines use a cross linking agent, CX-47 with a wood bonding adhesive resins, WD3-A322. Table 2-7 lists the name, the supplier, the use and the annual consumption for each adhesives and products that will be used at the Plant. All the products listed in this section will be use on a weekly basis. It is recommended by Ashland to store adhesives at temperatures between 45° and 75° F. Containers must be kept away from heat and direct sunlight. For

these reasons, adhesive containers will always be kept inside the Plant (see Figure 2-3, Appendix B). Table 2-8 lists the typical physical properties of the adhesives that will be used at the Plant.

Table 2-7: List of chemical products and other products to be used at the Plant

ADHESIVES	SUPPLIER	UTILITY	ANNUAL CONSUMPTION	STORAGE AREA
UX-100 Polyurethane polymer adhesive	ASHLAND SPECIALTY CHEMICAL COMPANY	Structural fingerjoints application	31290 pounds	Individual reusable tank stored at temperatures between 45 and 75 °F inside the plant.
WD3-A322 Woodbonding adhesive resin		Structural fingerjoints application (Mix with UX-100) and resin for wood to wood laminations with crosslinker (CX-47).	580000 pounds	
CX-47 Cross linking agent		hardener for glulam with resin	79751 pounds	
OTHER PRODUCTS				
Wax emulsion (474-237)	Laurentide	Glulam sealing	144 000 L	Closed park
Hydraulic oil	Esso	Oven system	715 L	
Paint (blue, green, orange, red)	Shield	Wood identification	455 L	
Grease + lubricant	Esso	Bearings & chains lubrication	380 L	
Solvents	Wurth	Parts cleaner glulam line	140 L	
Thinner with lacquer	Dupont	Parts cleaner finger line	213 L	
Propane	Esso	Mobile equipment	± 10 000 kg	Outdoor in a steels closet
Metal belts (3/4" x ,023)	Samuel système de cerclage	Package strapping	1200 kG	Inside
Wrapping bags	-	Package wrapping	-	Inside
Heating oil	ESSO	To heat the plant	± 360 000 L	Outside

Each Isocet adhesive contains ingredients which, if mishandled, can be harmful. Contact with skin and eyes should be avoided and necessary protective equipment and clothing should be worn (glasses, gloves, boots). For additional health, safety and handling information, consult Ashland Chemical's Material Safety Data Sheet (MSDS) in Appendix J, which also provide additional information regarding health and/or safety measures for each product containing chemical and/or harmful substances.

Table 2-8: Typical adhesive physical properties

Adhesive name	Appearance	Solids (%)	Viscosity, brookfield, cps	Spindle	Specific gravity	pH @ 25 °C	Flash point °F	Pounds per gallon	Freeze thaw stability
WD3-A322 Woodbonding adhesive resin	White, opaque fluid	53,5 - 57,0	1000 - 2000	N° 4 @ 10 rpm. 25 °C = 3000 - 6000	1,09	4,5 - 6,0	>200	9,1	Yes
CX-47 Cross linking agent	White, opaque fluid	43,0 - 46,0	4500 - 6000	N° 4 @ 10 rpm. 25 °C	1,15 - 1,25	6,0 - 7,0	>200	10	None
UX-100 Polyurethane polymer adhesive	Amber Viscous liquid	100% Solvent free	-	N° 4 @ 10 rpm. 25 °C = 3,000 - 6,000	1,10 - 1,20	-	460	9,3 - 10,0	-

2.5.5 Raw Materials and Finished Products

The main species of wood used for the beams are black spruce and jack pine which will be harvested from the boreal forest. The wood will be transported by trucks from Chibougamau to Mistissini, and will be kept inside the Plant, even during the summer.

The wood, which will have been sawn and dried, can then be planked either in one by three or one by four. It can also be in pieces of two by two, two by three, two by four, two by six and even two by eight.

Tables 2-9 and 2-10 give a brief description of the raw materials and finished products. Initially, as mentioned previously, planked is the preferred use. However, wood pieces may also be used in the future.

Table 2-9: Raw materials

SIZE	AFTER DRYING		Pieces / package
	Thickness (")	Width (")	
1X3	1,173	2,653	594
1X4	1,174	3,613	432
2X3	1,647	2,692	418
2X2	1,732	2,231	494
2X4	1,630	3,664	304
2X6	1,660	5,700	160
2X8	1,660	6,700	160

Table 2-10: Finished products

Products	Dimensions
Length	8' to 52'
Width	1 3/4" to 7 1/2"
Height	3 1/2" to 30"

The finished product, structural glue laminated beams, will comply with the AINSI/AITC A190.1 to obtain a finished product with high standard. Standards shall be distinctively marked before the following: identification of the AINSI A190.1-2002 Standard, qualified inspection and testing agency EWS, laminating plant MILL ID, the species of lumber in the timber ES, the applicable laminating specification and combination symbol (ex. 24F-E/ES1M1). The structural use denoted by the symbol CB – continuous or cantilevered span bending member, the appearance grade denoted by either Ind-Industrial, or Arch – Architectural, Proof Loaded End Joints if the member has the required laminations proof loaded, For Dry Use Only, and the lot number. The production lot number refers to the production line, the year, followed by the day of the year. For example, 104231 means the glue laminated product has been produced on production line 1 on the 231st day of 2004. Trademarks, a stamp approximately 2 in. high, shall be placed on top of beams at intervals of approximately 8 ft to ensure that each piece cut from a longer piece will have at least one of the required marks. The products provided can have a maximum length of 52 feet, a width between 1 ¾'' and 71/2'' and a height between 31/2 and 30''.

2.5.6 Electrical Power Supply

Electrical power for the Plant will be supplied by Hydro-Québec. A connection will be built between the Plant and the actual power line that supplies the community of MIstissini.

Details of that connection will be provided by Hydro-Québec on a later date.

2.5.7 Water Supply (Potable Water, Firewater, Service Water)

Water at the Mistissini Plant will be used for the following purposes;

- For the sprinkler system and the water tank, in case of fire;
- For the manufacturing process (wash water and boiler); and
- For domestic purposes.

Water supplies will originate from two wells. The Plant is expected to use, for all its activities, approximately 5750 litres of water per day. However, this is an estimate and total water consumption is likely to be less. In order to evaluate the maximum water volume needs, calculations have been made for 50 people even though there will be a total of 30 -35 people a day working at the plant after 3 years.

Table 2-11 outlines the proposed water consumption for the Plant. Additional information is provided in Figure 2-6 of Appendix B. This Appendix shows the entire water process.

Table 2-11: Water supply and consumption

	Consumption			
	per day		per year	
Use	Imperial (us gal)	Metric (Liters)	Imperial (us gal)	Metric (Liters)
Human capacity	50 persons			
Boiler (Heating Oil)	288.6	1092	64935	245669
Domestic use	991.2	3750	223020	843752
Process	240	908	54000	204298
Sum	1519.8	5750	341955	1293718
Fire	900 L per/minute for one hour			
Basin of water	54 000 L			
Sprinklers (Vicking)	960	6in, (152,4mm)	max.: 1000 gal.us /min.	
Water process description	Amount	Description		
Septic tank	1	8.6m^3 = 3.9m x 1.8m		
Station of pumping	1	3.4m^3 = 2.6m x 1.3m		
Field of purification (Sand filter)	4 sections	220 m^3 = 4 sections of 55 m^2		
Well of collecting	2	200m from field of purification		
Basin of fire	1	Diameter = 10' ; length = 18'		

2.5.8 Waste Water Treatment Process

A system using ambient air will be used as a cooling mechanism, therefore, no wastewater will be generated at the Plant from equipment cooling.

2.5.9 Access Road

Figure 2-2, in Appendix B, shows the access road, located on the east side of the Plant. The access road will be developed according to regulatory requirements and built by Chantiers.

2.5.10 Ancillary Facilities

Administrative Building (Canteen, Training Room, Administration and Control Room)

The administrative area is well represented on Figure 2-3 (nos. 26 to 36), Appendix B. A reception area, a lunch room, six offices, a meeting room and toilets have been planned.

Workshop and Warehouse

A workshop and a warehouse are shown on Figure 2-3 (nos. 2 and 23, respectively), Appendix B. Mechanical spare parts, miscellaneous equipments (i.e. glasses, gloves…) and the following chemical products will be stored in the workshop:

- Paint
- Grease and lubricant, solvents
- Thinner with lacquer
- Hydraulic oil

Guard House

A guardian will be hired to provide security services for the Plant. Figure 2-2 in Appendix B show the fences which have been planned around the Site (261m x 368m) and security will be provided inside these limits. The guardian will provide:

- Security: non authorized people will be asked to leave the Site;
- Protection of the property.

Labor Requirements and Working Schedule

The factory and the majority of the equipment will be operating twenty four (24) hours a day, seven (7) days a week. However, transport trucks (on average 3 or less per day) will only circulate during day between 7:00 AM and 5:00 PM, five days a week, Monday to Friday, 45 weeks per year. By the third year, the Plant will operate with approximately 30 permanent employees. Chantiers and the Cree Community of Mistissini hope to find all labour in the community of Mistissini.

2.6 Commissioning Phase

2.6.1 Start-up Sequence of the Facilities

The opening of the Plant is scheduled to occur immediately at the end of the construction work. Before operation can start, the equipment and various systems will be tested to ensure that they are working properly. Start-up and testing are expected to begin in April of 2007 (see Table 2-1). The start up sequence will begin by heating the Plant, the equipment inspection will follow, and finally wood processing in the finger joining line will start. After start up, the facilities will begin continuous operations. From experience, six months are probably enough to reach an acceptable production pace.

2.7 Decommissioning and Abandonment

The lifespan of the Plant is estimated to be 50 years, approximately. When the facilities will no longer be needed, they will be shut down or decommissioned. A decommissioning plan will be developed according to regulatory requirements. To develop the plan, consultations will be conducted with the communities concerned and other uses of the sites and facilities will be evaluated.

2.7.1 Facilities Removal

After the decommissioning plan has been developed with the communities, it is expected that all the equipment (tanks, machines, products) will be kept and/or recycled. Machinery, equipments and products could be reused at the Chibougamau plant.

2.8 Emissions and Waste during Construction

2.8.1 Noise Sources

During the construction phase of the Project, a number of activities will generate noise emissions including the use of construction equipment (*e.g.*, excavators, concrete mixers, cranes), and heavy vehicles (*e.g.*, trucks and mixers). Noise emissions generated will follow the guidelines in relevant provincial regulations or standards. Procedures for noise control are necessary as unmitigated noise emissions disturb wildlife and local residents.

The following procedures to minimize dust emission will be taken:

- controlling the timing and location of noise emitting activities;
- employing, where possible, noise-minimizing equipment.

Details on procedures can be found in the Environmental Management Plan (Appendix I).

2.8.2 Dust Sources

A number of sources of dust emissions will be generated during the construction phase of the project. The emission of particulate matter (dust) will occur as a result of on-site preparatory work and the intensive use of transportation of vehicles to and from the site. Dust may be specifically generated through site excavation, grading, aggregate handling and vehicle movement on unpaved site access roads. Weather conditions can also increase the amount of dust emissions at the site. Procedures for dust control are necessary as dust emissions are an environmental concern for aquatic systems, health and safety and aesthetics.

The following procedures to minimize dust emission will be taken:

- application of dust suppression agents;
- paving access roads (where applicable),
- ensuring proper management of machinery.

Details on procedures can be found in the Environmental Management Plan (Appendix I).

2.8.3 Wastewater Sources

During the construction phase, there is the potential for contaminated water discharge to be produced by various Project activities such as wastewater from cleaning, oily water discharge, rainwater or storm water runoff from the site and carrying sediments and waste on site. These water emissions could have impacts on local ecosystems by introducing suspended sediments, changing chemical or temperature quality, or introducing toxic substances. The management of water emissions for the site will follow the guidelines in the applicable regulations and quality criteria established provincially.

The following procedures to minimize contaminated water discharge will be taken:

- water emissions such as wastewater and drainage water will be treated before released into the environment;
- treatment for wastewater will include the application of a settling stage (in a basin) and filtration;
- waste on-site will be managed and stored appropriately to reduce the potential of debris entering the watercourse;
- oily water will be stored in secured tanks and will be discarded by authorized firm.

Details on procedures can be found in the Environmental Management Plan (Appendix I).

2.8.4 Solid Waste Sources

A number of solid wastes will be generated during the Project's site preparation and construction. Types of waste include wood (lumber), metal, concrete residues, domestic waste, paper and cardboard. Construction wastes, if not properly handled, can lead to health and safety, and aesthetic issues. Uncontrolled hazardous wastes can have a negative impact, potentially contaminating soils, surface and groundwater, as well as potentially being toxic to various species (fauna, flora). Procedures and activities related to the management of construction waste will be in conformance with the waste disposal requirements of the Province of Québec. The waste plan will also be in keeping with the overall waste strategy of the 3 Rs (reduction, reuse, recycle).

The following procedures to minimize the impact of solid waste are deemed necessary:

- ensure the application of the overall waste strategy (reduction, reuse, recycle);
- ensure that domestic waste is collected and stored in closed containers so as not to attract wildlife;
- ensure that concrete residuals are sent to dry materials disposal sites;
- ensure proper hazardous waste handling, storage and disposal.

Details on procedures can be found in the Environmental Management Plan (Appendix I).

2.9 Emissions and Waste during Operation

2.9.1 Air Emissions

Due to an increase in the use of adhesives in industry applications as well as requests from customers, chemical companies have an obligation to provide all necessary information regarding their products. The following information comes from the Environmental, Health and Safety Department of Ashland Chemical Company.

At the Plant, all adhesives will be mixed using a specific ratio. It is important to know that adhesive reactivity is different once it has been cured. In fact, the mixed adhesives, once fully cured, become chemically inert.

Atmospheric emissions will be generated by the use of WD3-A322, CX-47 and UX-100 adhesives. For each chemical, MDI emissions are estimated to be 0.002% of the total amount used. Emissions from the use of A322 will be toluene. They are estimated to be 0.321% of the total amount of A322 used.

From table 2-12, we can see that the air emission rate is quite low and that there are not many emission sources. The two main sources are the oven, at the time of heating, and the finished product.

Table 2-12: Inventory of atmospheric emission sources and air emission rate

Name	Air emissions	Source	Air emission rate (g/s)
UX-100	MDI	Oven and Finished products	0,0000147
WD3-A322	Toluene		0,044
CX-47	MDI		0,0000372

With the following two equations, we can determine the annual amount of gaseous emissions from adhesives released each year into the atmosphere:

- Equation 1 Annual emissions of toluene:

  (total pounds WD3-A322 used/year) * (0.00321) = pounds of toluene released/year

- Equation 2 Annual emissions of MDI

  (total pounds (CX-47 or UX –100) used/year) * (0.00002) = pounds of MDI released/year

Facility purchases for the third year will be 580 000 pounds of ISOCET WD3-A322, 79 751 pounds of CX-47 and 31 290 pounds of UX –100.

With equation 1 from the previous section, we will find that:

(580 000 pounds of WD3-A322/year)*(0.00321) = 1861.8 pounds

The emissions of toluene will be 1861.8 pounds for the third year.

With equation 2 from the previous section, we will find that:

(79 751 pounds of CX-47/year)*(0.00002) = 1.59 pounds

The emissions of MDI will be 1.59 pounds for the third year for CX-47.

With equation 2 from the previous section, we will find that:

(31 290 pounds of UX-100/year)*(0.00002) = 0.63 pounds

The emissions of MDI will be 0.63 pounds for the third year for UX-100.

The total emissions of MDI will therefore be (0.63 pounds of ux-100 + 1.59 pounds of cx-47) 2.22 pounds released per year.

Ashland uses toluene as a part of the adhesive system. Toluene is identified as the most likely component to volatilize as the adhesive cures. The test results indicate 48% of the available toluene in the adhesive remains in the adhesive matrix, while 52% of the available toluene evaporates. In the previous section (2.4.3.2), the emissions for all adhesives were calculated. In practice, MDI emissions are extremely small due to its minute vapour pressure and reactive nature (cross-links) within the adhesive matrix. In addition, UX-100 contains a smaller amount of MDI than CX-47.

Ashland has participated in monitoring potential MDI exposures for customers using Isocet adhesives, dating back to 1984. Data from personnel and area monitoring were obtained in a variety of millwork, engineered wood and laminating plants. Independent laboratories analyzed the data and concentrations were found to be below the detection limit of 0.002 (they found 0.00007 ppm of MDI). Regarding air emission treatment equipment, Ashland is not aware of any of its customers being required to install air pollution controls. However, it is obvious it would be beneficial to install air extraction and ventilation systems for good air circulation.

2.9.2 Noise Emissions

Various noises emitted from the activities at the Plant will come from fixed and mobile equipment. Table 2-15 present a detailed list of the noise (power) emitted by equipment from inside and outside the Plant.

Table 2-13: Noise power inside and outside of the Plant

SECTION	Power sound (dB)	
Equipment inside the factory	**Only motor started**	**All machine Running**
Assembly machine & trim saw	84,8	85,0
Dust collector (2)	85,6	92,1
Shaper # 1	84,5	91,9
Shaper # 2	86,5	92,1
Dust collector (2)	88,2	90,1
Corner transfer	88,7	89,8
High capacity crowder	84,7	86,7
Dust collector (4)	82,6	87,5
Planer	100,9	101,9
Dust collector (1)	82,6	87,5
Flying Saw	79,2	84,1
Flying saw exit	79,6	84,1
Completion trim saw & dust collector	84,6	85,0
Completion planer	100,9	101,9
Lift	90,0	90,0
Equipment outside the factory	Only motor started	
Loader	90,5	
Trucks	± 85,0	

2.9.3 Odours

We do not really expect that it will smell wood around the Plant as a result of the processes or dust in the air. Indeed, sawdust coming from the multi-cyclone will be directed to a closed tank on a closed conveyor.

2.9.4 Water Management

Run Off

As shown on Figure 2-1, rain water will be directed to a drain ditch. Once the Plant is in operation, a diversion may be needed to handle surface runoff flowing onto the property from upslope. For slopes steeper than two percent, or where large amounts of water are expected, the diversion channel will require an erosion resistant lining. However, the actual slope is 0.5%. To prevent groundwater pollution, two settling basins will be installed.

Sanitary Water

Domestic wastewater will be oriented to a septic tank and seepage field that are the two components of a conventional on-site wastewater treatment system. This system relies heavily on the soil for treatment of the wastewater.

The septic tank component is an enclosed watertight container designed to collect wastewater and segregate solids from floating solids. Up to 50% of the solids retained in the tank decompose. The remaining solids accumulate as sludge in the bottom of the tank. Below, (approximately 20 meters from the septic tank), there is a sand filter that is a biological and physical wastewater treatment component consisting of an under drained bed of sand divided in four sections. The sand filter purifies the water through three main mechanisms: filtration, chemical absorption, and assimilation.

Washing Water

See the waste chemical products description in section 2.9.5

Potentially Contaminated Water

Industrial wastewater can be divided into two categories: wastewater from boiler and wastewater from the process itself. Wastewater from boiler will first go to a decantation recipient immediately after the boiler inside the factory. For more details, see the water runoff section and Figure 2-2.

Wastewater from the process is the wash water mixed with sawdust. This wastewater will not be released into the soil. See section 2.8.3 regarding the handling of waste chemical products.

Each month, water analysis will be performed by SEDAC, an environmental engineering firm.

2.9.5 Solid and Liquid Wastes

Table 2-13 outlines the waste and recycling per year:

Table 2-14: Type and quantity of waste/or recycling materials that will be produced at the Plant

Item	Amount/year	Type of material	Disposal		Atmospheric emissions
			Waste	Recycling	
Domestic garbage (lunch rooms, offices, washrooms)	Not defined	Solid	x		
Metal belts from raw materials	7800kg	Solid		X	
Metal belts from finished products	60kg	Solid		X	
Sawdust from the process	7400 Mkg (8200 t)	Solid		X	
Adhesive container	± 600	Solid		X	
Paint cans	± 1125	Solid		X	
Propane containers	± 675	Solid		x	
Wrapping bags	0,05%	Solid		x	
Mix (wash water + adhesive + sawdust)	82 000kg	Semi-solid	x (clean wash water)	x (adhesive)	
Wax emulsion	720 L	Semi-solid		x	
Mix from joining line	Not defined	Liquid		x(Mtl)	
MDI	1,01kg/2,22lb	Gaseous			x
Toluene	847kg/1861lb	Gaseous			x

Table 2-15, below, is the list for our dust filtering systems. The sawdust coming from the finger joining line, planer, and trim saw will be used to heat the plant for the year. Figure 2-4 of Appendix B illustrates a simplified flow diagram process, and table 2-4 present a detailed mass balance for this diagram.

Table 2-15: List of dust filtering systems

PROCESS SECTION	Quantity
Trim saw on assembly line	1
Shaper #1	2
Shaper #2	2
Planer Moro	4
Flying saw	1
Completion trim saw	1
Completion planer	4
Wood chipper	1

**All previous filtering system are connected with pipe (negative pressure) and oriented to a cyclone, followed by a closed conveyor and a sawdust tank. Sawdust will be transported to the Chibougamau Plant.

Domestic and Office Wastes

All domestic garbage will be picked up by the municipality's sanitary treatment facility of Mistissini.

Packaging Material

Many people are concerned about the amount of packaging products and try to avoid goods that they consider are 'over-packaged'. Most packaging materials can be collected for recycling, including paper, glass and plastic bottles. Chantiers try not to ''over-package'' their products and when old wrapping materials accumulates, it is sent to a recycling facility.

Waste Oil or Solvent

Waste oil and solvent contain small quantities of substances that could contaminate the air, the soil and the groundwater. Used oil may especially contain trace metals, chlorinated solvents, gasoline, polynuclear aromatic hydrocarbons, glycols and PCBs. For this reason, these used products will be recycled and sent to Chibougamau.

Waste Chemical Products

The mixed adhesive, once fully cured, becomes chemically inert. The wash water (water + adhesive residue + sawdust) for A322 and CX-47 can be handled in different ways. One of the options, for small amounts, is to dispose of it down the drain. However, this method will not be used. For our purposes, we will collect the wash water and mix it with sawdust. According to Ashland, the wash water should be thoroughly mixed with the sawdust at a ratio of at least three parts of sawdust to one part wash water. After mixing, the sawdust plus wash water should be placed in a suitable open container. After a minimum holding period of 72 hours (it will deactivate the MDI), the water absorbs into the sawdust. Once dried it can then be disposed of in a landfill (it will be send at Chibougamau). For UX adhesive, there is no possible water clean up. Consequently, adhesive residue of this kind will be sent to an incineration company, Recyclex, located in Montreal. All adhesive waste (UX-100, CX-47 or WD3-A322) will be sent to be incinerated in Montreal.

The metal belts and cans (paint, part cleaners, and any other cans) will be recycled and sent to PA Transports in Chibougamau.

Sanitary Sludge

The principal septic tank problem occurs when the inert-solids accumulation occupies too much of the septic tank and greatly reduces the treatment volume of the septic tank. Also, if excessive quantities of sludge are present, the sludge may be discharged to the drain field.

Because of the variety of conditions that can be found on industrial sites, it is better to predict and do septic tank cleaning at regular intervals. Therefore, the septic tank will be cleaned twice a year and the sludge transported to the Chibougamau sanitary landfill.

2.9.6 Visual Annoyances

To be completed

(when the plant design and it's visibility from the road will be decided)

2.10 Accidental Events

An Emergency Response Plan (ERP) has been developed specifically for the Mistissini Beam Plant, taking into account the identified potential risks, external risks as well as those associated with the phases of the Project (See Appendix J).

The objectives of this ERP are to:

- Identify the sensitive elements of the environment and document appropriate protection measures;
- Provide concise and clear instruction to personnel regarding procedures for protecting the human life and/ or health and the environment;
- Ensure that the project promoter commitments to minimize environmental impacts will be met.

The ERP includes three (3) sections consisting of the following:

- Section 1
- The Introduction section includes:
- Objectives and Scope;
- Legal Framework;
- Definitions; and
- ERP Structure.
- Section 2
- The General Administrative Information section includes:
- Site Description;
- Identification of Sensitive Elements of the Environment
- Identification of Potential Risks
- General Roles;
- Responsibilities and Resources; and
- Training, Drills and ERP Updates.
- Section 3
- The Emergency Response Procedures includes:
- Emergency Response Flowchart;
- Emergency Contact List;
- Specific Site Plan; and
- Emergency Response Procedures.
-

The following sections outline the proponent's approach to accident prevention and emergency response.

2.10.1 Identification of the Sensitive Element of the Environment

Sensitive Elements of the Environment near the plant are presented in the following table.

Table 2-16: Sensitive Elements of the Environment

Sensitive Element of the Environment	
Residences, public use areas and recreational sites	Residences along or near the access road to Mistissini
	Town of Mistissini
Road infrastructures	Access road to Mistissini
Environmental elements	Baie du Poste and Lac Mistassini
	Drinking water (water intakes located in Baie du Poste)
	Surface water at the sedimentation basins discharge point
	Groundwater
	Forest

2.10.2 Identification of Potential External Risks

Forest Fire

The study area is located in a fire hotspot (Natural Resources Canada 2006). Since the risk of forest fire is high, it is recommended to control the vegetation by maintaining a deforested area (fire division) around the plant, outside of the fence. It is also recommended to install a water line for fire protection around the plant, between the plant fence and the deforestation limits.

The dimension of the fire division and the type of water line for fire protection will be determined in collaboration with the Mistissini Fire Brigade.

Therefore, a specific emergency response procedure is presented in the ERP in case of forest fire (Appendix J).

Seismicity

Eastern Canada is part of the stable interior of the North American Tectonic Plate and, as a consequence, has a relatively low rate of earthquake activity. Each year, approximately 450 earthquakes occur in eastern Canada. Most of them are minor, while perhaps four will exceed magnitude 4, thirty will exceed magnitude 3, and about twenty-five events will be reported felt.

Although earthquakes can and do occur throughout most of eastern Canada, regions presenting more important earthquake activity have been identified (Natural Resources Canada, 2006). The eastern seismic zones are:

- Northeastern Ontario
- Southern Great Lakes
- West Quebec
- Charlevoix-Kamouraska

- Lower St-Lawrence
- Northern Appalachians
- Laurentian Slope

The study zone is not located in or near the eastern seismic zones.

Flooding and Landslide

The Site limit is located at approximately 300 m from the Baie du Poste. The risks of flooding are evaluated to be inexistent because the Site is located at more than 15 m higher than the Baie du Poste water mean level.

The Site relief is relatively flat and the Site geology is characterized by morainal accumulation and proterozoic rock without the presence of clay. No water bodies near the Site are located at a higher elevation.

Therefore, landslide issues are not expected in the study zone.

Road Transportation of Dangerous Goods

There are few dangerous goods passing through Mistissini access road. The dangerous goods transiting to Mistissini are those typically used by villages, including fuel oil, fuel, and solvent. However the traffic of trucks or vehicles transporting dangerous goods to the Plant may increase the risk of collision, explosion / fire and spills of hazardous material.

Therefore a specific emergency response procedure is presented in the ERP for a potential Transportation Incident (Appendix J).

Vandalism and Civil Disorder

The potential risk associated with vandalism and civil disorder are damages to the hazardous material storage area (such as propane storage closet) or critical safety/emergency equipment (such as water line for fire protection).

Therefore a specific emergency response procedure is presented in the ERP for vandalism and civil disorder (Appendix J).

Bomb and Terrorist Threat

The risks of a bomb threat are low. However, air, soil and water quality can also be potentially affected (by fire, explosion) if a bomb was to explode or an intentional fire was ignited.

Therefore due to the gravity of subsequent environmental impacts and consequences on human health and business continuity, a specific emergency response procedure is presented for Bomb and Terrorist Threat in the ERP (Appendix J).

2.10.3 Identification of Potential Risks Associated with the Phases of the Project

The potential risks associated with the construction and operation phases include fire and explosion, spills of hazardous materials, spill of suspended materials and gas (propane) release. Additionally, some major injuries/ illness may occur during the emergency response, or during the construction and operation phases of the Project.

Fire and explosion

- Construction Phase

Sources of potential fire and explosion during the construction phase are:

- Hydrocarbons;
- Fuel and oil;
- Operation phase.

Operation activities will require the handling, storage and disposal of materials and chemical products that could generate fire or explosion, including:

- Wood dust;
- Propane;
- Hydraulic oil;
- Heating oil;
- Other chemicals (wax emulsion, adhesive, paints, solvents, etc.)

The risks of fire and explosion will be higher during this phase as operation activities will require a higher number and volume of products presenting a risk of fire or explosion. Therefore a specific emergency response procedure is presented for fire and explosion in the ERP (Appendix J).

Spills of Hazardous Materials (Liquid Chemicals, Petroleum products)

- Construction phase

The presence of trucks, vehicles and heavy equipment on Site represent the major source of potential spills of hazardous materials (collision, refuelling, waste oil storage, etc.). Spills in the environment can potentially affect air, soil and/or water quality with indirect issues with health and safety and wildlife.

- Operation phase

All hazardous materials will be stored and used inside the plant or warehouse except for propane and heating oil, they will be stored in closed parks. Heating oil spill in the environment could affect air, soil and water quality. Proper environmental protection measures will be taken to prevent the release of heating oil to the environment, such as the use of containment areas.

Air, soil and water quality can also potentially be affected by spills of hazardous materials from trucks and vehicles on Site.

Therefore two specific emergency response procedures are presented for liquid chemical spills and petroleum spills in the ERP (Appendix J).

Spills of Suspended Solid Material (to the Atmosphere or Surface Water)

- Construction Phase

No spill of particulate is likely to occur during the construction phase.

- Operation Phase

No spill of particulate is likely to occur during the operation phase. Wood dust is not considered a risk to the atmosphere and surface water because sawdust generated during operations activities will be in transit between the cyclone and a closed tank, via a closed sawdust conveyor. The closed sawdust tanks will be loaded in the trucks for proper disposal.

However, the event of confined explosion of the cyclone, some suspended materials (sawdust, particle of the cyclone) may be released to the atmosphere.

Therefore a specific emergency response procedures is presented for spills of suspended solid material (to the Atmosphere or Surface Water) in the ERP (Appendix J).

Gas (Propane) Release

- Construction Phase

No release of gas is likely to occur in during construction phase.

- Operation Phase

Propane bottles will be used in the operation phase for mobile equipment. The propane bottles will be stored outside the Plant, in a steel closet. However, mishandling of the propane bottles may be considered as a risk. When exposed to any ignition source, the release of propane may result in fire or explosion and may have a negative impact on the environment.

Therefore, a specific emergency response procedure is presented for Propane release in the ERP (Appendix J).

Major Injury/Illness

Injuries may occur during an explosion, fire or spill during the construction or the operation phase. First aid will have to be provided rapidly and in a safe way.

Therefore a specific emergency response procedure for major injury / illness is presented in the ERP (Appendix J).

Power Outage

- Construction Phase

No power outage is likely to occur in during construction phase.

- Operation Phase

The Mistissini Glue Beam Plant will be equipped with an emergency backup generator. Under typical circumstances, the generator will provide enough power to accommodate the evacuation of the offices and production areas toward the defined exit.

However, in the event of a failure of utility or backup power, a specific emergency response procedure is presented for Power Outage in the ERP (Appendix J).

2.10.4 Accidents Prevention and Security Measures for Installations

Les Chantiers Chibougamau are regulated under the CSST (Commission de la Santé et Sécurité du Travail) with Quebec's government.

Risk Management Program

Les Chantiers Chibougamau Ltée places a high value on the safety of its employees. Les Chantiers Chibougamau Ltée is committed to providing a safe workplace for all employees and has developed this program for injury prevention to involve management, supervisors, and employees in identifying and eliminating hazards that may develop during our work process.

It is the basic safety policy of this company that no task is so important that an employee must violate a safety rule or take a risk of injury or illness in order to get the job done.

Employees are required to comply with all company safety rules and are encouraged to actively participate in identifying ways to make our company a safer place to work.

Supervisors are responsible for the safety of their employees and as a part of their daily duties must check the workplace for unsafe conditions, watch employees for unsafe actions and take prompt action to eliminate any hazards.

Management will do its part by devoting the resources necessary to form a safety committee composed of management and elected employees. We will develop a system for identifying and correcting hazards. We will plan for foreseeable emergencies. We will provide initial and ongoing training for employees and supervisors. And, we will establish a disciplinary policy to insure that company safety policies are followed.

Protection Equipment

Les Chantiers Chibougamau Ltée follows rules from CSST and all employees must have in permanence the following equipments:

- Helmet;
- Boots (with steel);
- Glasses;
- Auditive protections;

Moreover, all employees must know where are and how to use the following equipments:

- Lock;
- Extinguisher.

2.11 Environmental Management

The Environmental Management Plan (EMP) provided in Appendix I, documents management approaches for potential environmental impacts from the proposed Project. The EMP provides a orporate framework for documenting, evaluating and communicating the Plant's environmental performance. It is also an overall guidance document which summarizes the detailed plans of action to be used by Plant personnel in order to avoid or mitigate potential impacts.

The objectives of the EMP are to:

- Ensure that the Plant's activities are undertaken in accordance with all legal and corporate requirements ;
- Ensure that a system is in place so that impacts on the environment are minimized and monitored;
- Ensure mitigation measures are addressed and implemented, specifically in relation to requirements of the environmental impact assessment and to other relevant environmental approvals; and
- Ensure procedures exist for various phases of the project (*e.g.*, construction phase and operational phase of the Plant) which address potentially adverse impacts on the environment.

Specifically, the EMP has been developed to:

- Support the Plant's commitments to sound environmental management for the Project;
- Identify environmental issues related to the construction and operation of the Project and outline planning and procedural approaches required to manage these issues;
- Outline responsibilities for key project personnel related to the EMP;
- Provide requirements for environmental awareness training for the Plant and Contract personnel;
- Provide guidance on communication;
- Identify environmental audit elements; and
- Outline corrective activity changes and procedures;

2.11.1 Environmental Commitment

Environmental protection is a key element of the Project. CCNM and CC are committed to managing and operating the Project in a manner that protects the health and safety of people and the environment. The Project will meet or improve upon James Bay and Northern Quebec Agreement (JBNQA) requirements and Federal and Provincial requirements as applicable. This EMP has been developed in order to communicate the Project's environmental commitments to personnel, contractors, regulators and stakeholders (public). These initiatives will be reflected in how the Project is managed, and the environmental and sustainable approaches are reflected within the EMP.

This EMP has been designed with some flexibility to update and add new sections in order to meet changing environmental protection needs as the Project progresses.

2.11.2 Scope of the EMP

The EMP applies to the pre-construction, construction and operation phases of the Mistissini Beam Plant.

For the pre-construction phase, contracts and environmental clauses to be agreed upon with contractors are described in this document.

For the construction phase, specific activities are examined for environmental considerations and addressed through protection procedures. They include:

- Construction wastes;
- Noise sources;
- Water discharges;
- Accidental spill response;
- Sanitary installation;
- Visual Impacts; and
- Archaeological resources.
- For the operation phase, specific management plans are defined to prevent adverse effects on human health and safety and on the environment. They include:
- Waste Management Plan;
- Hazardous Materials Management Plan;
- Workplace Health and Safety Management Plan; and
- Injuries and Accident Management Plan.

The EMP applies to all current and future Project activities, including on-going operation, maintenance, and as well as any future construction activities.

2.11.3 Organizational Responsibilities

This section outlines the organizational responsibilities related to the EMP. It will guide personnel in respect to their roles and responsibilities for the environmental management of the Project. The EMP is relevant to all employees working on the Project, including Plant personnel and contractor personnel. Each level of management and operations has specific responsibilities for the maintenance and implementation of procedures under the EMP. By establishing roles and responsibilities related to environmental management, there is increased awareness and enhanced level of accountability and responsible decision-making.

Key roles and responsibilities related to the EMP are described as follows:

- **Project Manager / Environmental Manager (Plant):** The individual with primary responsibility for the Project including environmental issues, and health and safety. The Project Manager will provide overall resources and support to ensure environmental commitments are met and also provide input annually on the performance of the EMP. The Project Manager will work with the Site Supervisor and the Contractor(s) to ensure the EMP is followed and ensure work and operations are carried out in an environmentally sound manner.
- **Site Supervisor (Plant):** The individual designated by the company to oversee all operations at the Project site. The site supervisor is entrusted with promoting and demonstrating commitment to environmental plans and procedures among employees and Contractors at the site. They work closely with the Contractor to provide monitoring of procedures and assist in tracking performance.
- **Contractor(s):** The individual with environmental management responsibilities for the Project. The Contractor(s) will ensure that environmental commitments are met within their operations and among their staff and ensure that sub-contractors are meeting environmental requirements.

2.11.4 EMP Strategy

Environmental surveys have been completed to provide baseline information for the Mistissini Beam Plant EIS and to provide guidelines for further follow-up studies to be conducted during the construction and operation phases. This EIS evaluates potential project impacts which are documented prior to the beginning of construction activities.

Pre-Construction, Construction and Operation

The EMP will use the information gathered through the EIS process including baseline information on environmental conditions. It is understood that the implantation of environmental management procedures during the pre-construction, construction and operation phases of the project can reduce overall impacts on the environment.

Training and Environmental Awareness

The EMP includes a description of the basic training requirements related to the Project.

Continual Improvement

A basic element of the EMP is the concept of continual improvement, which includes reassessment, redefinition and enhancement of the original document. Continual improvement is important because it provides objectives for the EMP, driving plans and procedures, and ensures that the EMP, as a document, remains relevant to the Project and environmental management activities.

One of the continual improvement measures for the EMP will be to review the document periodically or as regulations and/or incidents occur. A review of the environmental management practices of the EMP will also take place regularly.

Communication and Result Disclosure

Establishing a communication plan is an important aspect of the EMP as it ensures that there are systems in place to disseminate relevant Project related information (procedures, activities, results) among personnel, the Contractor, regulators, and the public.

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GLULAM BEAM PLANT

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Chapter 3: ENVIRONMENTAL EFFECTS ASSESSMENT METHODS

Jacques Whitford / DDM PROJECT 1005414 June 20, 2006

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3.0 ENVIRONMENTAL EFFECTS ASSSSMENT METHOD

3.1 Issues Scoping and Rationale for Selection of Valued Environmental and Socio-economic Components (VEC)

The potential for change in the environment is evaluated by undertaking an issues scoping process that is used to identify VECs. VECs are components of the environment, both natural and social that are valued by society. They are used to focus an environmental assessment (CCEA 1994; Beanlands and Duinker 1983). To that end, biophysical and socioeconomic issues associated with the proposed project are identified through an issues scoping process. Comprehensive issues scoping requires input from regulators, stakeholders, the public and the proponent, and should be conducted as early as possible in the process to ensure a focused, thorough assessment.

3.2 Outline of the Environmental Effects Assessment

The environmental assessment is conducted to meet the requirements of the COMEV Guidelines as well as any other applicable requirement of the provincial and federal governments. The approach and methods used are based largely on the work of Beanlands and Duinker (1983), CEAA (1994; 1999), and Barnes and Davey (1999), as well as the study team's experience in conducting environmental assessments. The approach and methods to be used have proven very effective for assessments conducted under both the federal and provincial processes.

The potential environmental effects for this project are presented on a VEC-by-VEC basis. The VECs represent those components of the environment that are valued for ecological and/or socio-economic reasons, and have the potential to be adversely affected by the proposed undertaking. In this method, each VEC is addressed in a single section, which describes the baseline conditions, potential effects, mitigation measures and monitoring programs. This type of organization allows the reader to easily follow a single issue through the assessment process from start to finish, and reflects a rigorous sequence of steps that ensures a logical, comprehensive and defensible evaluation of potential effects.

The project VECs have to be confirmed through the issues scoping exercise and by the final guidelines to be issued for the EIA. This is a critical step in the environmental effects assessment methodology. By assessing potential interactions with VECs within the study boundaries, a meaningful evaluation of project effects on relevant environmental parameters is achieved. Traditional environmental knowledge (TEK) of the existing environment forms an integral part of the existing environment discussions.

The specific steps followed in the assessment of each VEC are:

- determine study boundaries;
- describe the existing environment;
- define effects significance criteria;

- outline existing knowledge regarding the potential Project-VEC interactions and identify issues and concerns;
- assess and evaluate environmental effects;
- assess and evaluate cumulative environmental effects;
- identify mitigation measures;
- summarize residual effects; and
- identify monitoring and follow-up requirements.

3.2.1 Boundaries

Study boundaries focus on the environmental assessment and help ensure that study resources are used most effectively.

Project, ecological and socio-economic boundaries are defined by the spatial and temporal characteristics of the project and the VECs under consideration. They encompass those periods and areas within and during which the VECs will likely interact with the project. These boundaries may extend well beyond the limits of the project site, particularly in the case of extensive natural or socio-economic systems.

Administrative and technical boundaries also help to define the scope of an environmental assessment, and are imposed by such factors as applicable laws and regulations, resource management areas and processes, as well as finite resources of data, time, cost and labor. Specific assessment boundaries are identified for each VEC to focus the assessment.

3.2.2 Description of Existing Conditions

The exhaustive description of the existing (baseline) environmental conditions for each of the VECs under consideration is included in Chapter 5 of this volume. The descriptions of the baseline conditions draws on the information gathered through key informant interviews, literature review, aerial photographs and topographic maps, field work, data obtained from government departments and other relevant organizations, and any other available and reliable information source.

In Chapter 6, for each VEC, we refer to the specific section in Chapter 5 where to look for the description of the existing conditions for that VEC.

3.2.3 Residual Environmental Effects Rating Criteria (Significance)

As required by federal environmental legislation, effects are rated as either significant or not significant. However, to accommodate the range of effects which can occur within the natural environment, significant effects are further divided as either major or moderate, and not significant effects ranked as either minor or negligible. Effect significance criteria are developed for each effect category examined (e.g. biological, physical, economic, social, cultural and archaeological). The criteria indicate to whom these concerns are important and the reason why, including social, economic, recreational, cultural, spiritual and aesthetic considerations.

3.2.4 Potential Interactions between Project and VEC

The interactions between the VECs and project components are identified within the applicable temporal and spatial boundaries for each project phase.

3.2.5 Environmental Effects Analysis, Mitigation and Cumulative Effects

The potential effects of project construction, operation, modification, decommissioning and accidental/unplanned events are assessed. Potential effects are defined in terms of their nature, spatial extent, frequency, duration, magnitude (quantitative and qualitative), significance and level of certainty. Potential effects are identified as negative or positive, direct or indirect, and short and long term. The predicted adverse effects for each VEC is then evaluated for significance on the basis of the effects significance criteria identified for that VEC.

Cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out are also considered. The concept of cumulative environmental effects recognizes that the environmental effects of individual human activities can combine and interact with each other to cause aggregate effects that may be different in nature or extent from the effects of individual activities. The study team predicts the long-term effects including socio economic and cultural effects. The cumulative effects assessment considers but is not necessarily limited to the following:

- future infrastructure development scenarios in the area;
- recreation and tourism; and
- Cree land and resource use.

Mitigation measures are proposed for the construction, operation and decommissioning phases of the project. Discussion of mitigation measures includes comments on their effectiveness, and risk and severity of consequence in the event of their failure. The latter is covered through a discussion of accidental/unplanned events. In the event that losses are identified which cannot be mitigated, the need for compensation is discussed.

3.2.6 Determination of Significance of Residual Effects

The significance of the effects is presented for each project phase, based on the environmental effects analysis and the significance criteria. The significance rating includes cumulative effects.

The Canadian Environmental Assessment Act (CEAA) has been used to provide the framework for the early identification, prevention or mitigation of adverse environmental effects potentially resulting from the proposed Project. In addition to consideration of the likelihood of occurrence, significance is determined based on consideration of the nature, magnitude, scale, duration, reversibility, and ecological context of any potential environmental effects. Only those residual environmental effects that remain after applying mitigation measures that are technically and economically feasible are considered. The Reference Guide entitled “Determining Whether A Project is Likely to Cause Significant Adverse Environmental Effects”, included in the Responsible Authority's Guide (CEAA Agency, 1994) provides a framework, utilized in this EIA, to determine whether the Project is likely to cause significant adverse environmental effects.

As required by federal environmental legislation, effects are rated as either significant or not significant. However, to accommodate the range of effects which can occur within the natural environment, significant effects are further divided as either major or moderate, and not significant effects are ranked as either minor or negligible.

Residual effects include those which were reduced but not eliminated, and those for which mitigation measures are not possible or not implemented. Residual effects are defined in terms of nature, spatial extent, frequency, duration, magnitude (qualitative and quantitative), significance and level of certainty.

The project's contribution to sustainable development is considered with respect to the following objectives:

- preservation of ecosystem integrity, including the capability of natural systems to maintain structure and functions, and support biological diversity;
- respect for the right of future generations to be able to use renewable resources; and
- achievement of durable and equitable social and economic benefits.

Specifically, the EIA identifies the project's overall contribution to ecological and community sustainability; how the sustainable development objectives are addressed in project planning and design; how monitoring, management and reporting systems is aimed to ensure continuous progress towards sustainability; and appropriate indicators for monitoring progress.

3.2.7 Monitoring and Follow-up

Specific monitoring programs are recommended for each VEC, during each project phase. A follow-up program is detailed based on existing knowledge of Project/VEC interactions.

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Chapter 4: Environmental Effects Assessment Scoping

Jacques Whitford / DDM PROJECT 1005414 June 20, 2006

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4.0 ENVIRONMENTAL EFFECTS ASSESSMENT SCOPING

4.1 Regulatory Consultation

4.1.1 COMEV

The Evaluating Committee (COMEV) is a tripartite Quebec/Canada/Cree agency responsible for assessing and drawing up guidelines for the impact study of projects located south of the 55th parallel.

The COMEV is made up of six members, two from the Cree Regional Authority (CRA), two from the Québec government, and two from the Canadian government. The Committee evaluates the need for an environmental impact assessment, the extent of it, the guidelines, and the stage at which it is required.

The LEA provided guidelines for this project in May of 2005. The objectives of these guidelines were to direct the proponents with respect to the preparation of a detailed environmental impact assessment statement. The directive was formulated based on the preliminary information submitted by the proponent in February of 2005.

In order to obtain more details on the interpretation to be given to some elements of the guidelines for this project, a conference call was held in August of 2005, between Ginette Lajoie of the CRA, Francine Fortin of JW and René Nault of DDM with the participation of representatives from the COMEV and MDDEP (Ministère du développement durable, de l'environnement et des parcs), respectively Michael O'Neil, Daniel Berrouard and Raymond Houle.

A copy of the original guidelines from the COMEV is provided in Appendix C.

4.1.2 Canada Economic Development

For this project, an application for a funding contribution was submitted to Canada Economic Development (CED). At the federal level, the CEAA applies to projects for which the federal government has decision-making authority under section 5 of the CEAA, whether it be as a proponent, administrator of federal lands, source of funding or regulatory agency.

Consequently, the application for funding assistance submitted to CED by the proponent of this project constitute a trigger under subsection 5(1) of the CEAA and makes CED a responsible authority (RA) within the meaning of the CEAA. Before approving funding for the project, RAs shall ensure that all requirements are fulfilled in accordance with the CEAA and determine that the project will probably not have significant adverse environmental effects.

As federal environmental assessment coordinator (FEAC), CED will carry out coordinating procedures under the CEAA. Based on their terms of reference and expertise, each federal authority involved will participate in the federal environmental assessment process.

The CED provided an addendum to supplement the directive issued by the COMEV for carrying out the environmental impact assessment for this project. A copy of the addendum and the directives from the CED is provided in Appendix C.

4.1.3 COFEX

The COFEX is a committee of five members, two from the CRA and three from the Canadian government. The committee will verify that the environmental impact statement follows the directives set out by the COMEV and the CED, and make a recommendation to the Local Environmental Administrator (LEA) as to whether the project can proceed and under what conditions, or whether further review by the proponents is required.

4.2 Public Consultation and Information Process

4.2.1 Information and Consultation Meetings

As described in further detail in the Public Consultation Plan (Appendix D), three public consultation activities were planned and carried out in Mistissini:

- a first public consultation meeting, which was held in mid-December 2005;
- a consultation workshop in mid-January 2006 with concerned land users and/or elders in order to collect Traditional Ecological Knowledge (TEK) related to the study area from users of the study area, including the Tallyman of trapline M50, Mr. Charlie Iserhoff;
- a second public consultation meeting which was held at the beginning of June 2006.

Besides these public consultation activities, individual and group interviews were carried out with Cree administration representatives, representatives from local community associations and with the tallyman of the trapline concerned by the project in order to obtain information regarding socio-economic conditions in the community, current and future land uses in the study area and to scope potential issues raised by the project (Figure 4-1).

4.2.2 Consultation Objectives

Information and comments provided by participants during the two public consultation meetings and the TEK workshop as well as during interviews with key stakeholders and informants constituted critical inputs to:

- the inventory of biophysical and socio-economic resources potentially affected by the project;
- the assessment of impacts of the proposed project on identified biophysical and socio-economic resources; and
- the identification of required mitigation and enhancement measures as well as monitoring activities to ensure the environmental and social sustainability of the project.

4.2.3 Consultation Subjects

The purpose of the first consultation meeting was to:

- announce the purpose and nature of the MIstissini Beam plant;
- give information on the required EIA; and
- obtain preliminary comments from interested and concerned parties.

The purpose of the TEK workshop was to:

- gather information on lake water and spring water uses by concerned land users in the study area;
- gather information on fish, wildlife, waterfowl and plant species in the study area as well as their location and quantities in the study area and their uses by the Crees; and
- gather information on current and future land uses in the study area.

The subject of the second public consultation was to:

- obtain further comments from interested and concerned parties on the environmental and social impacts and benefits of the project; and
- obtain comments from interested and concerned parties on proposed mitigation and enhancement measures (such as noise abatement measures, safety measures, measures to optimise local employment benefits, etc.).

4.3 Information Tools

For the first public consultation meeting, a community radio announcement was made by the Cree study co-ordinator and written invitations to the meeting were posted in public areas (refer to contents of announcements in Appendix D). A first public information bulletin was also prepared (see Appendix D). This bulletin contained information on the project, on the EIA, and on the consultation process. It was distributed during the first consultation meeting and during the TEK workshop.

Two posters were prepared for the presentation of the project during the first public consultation meeting. One of these showed the location of the project and the other showed the Mistissini Beam Plant Beam Plant products and applications. These posters were also used during the TEK workshop to inform the participants about the project.

For the TEK workshop, a large scale topographic map of the Watson Peninsula was used as a basis for discussion and for noting information provided by participants. Color photos of rare species and plants were also used to assist participants in the workshop.

For the second public information meeting, 9 posters were prepared to address both the main concerns expressed by Mistissini residents in the previous consultations and interviews and the answers to those concerns provided in the Environmental Impact Statement report (see appendix D). Three other posters were prepared with maps of the project. One map presented the revised plan of the plant, one map presented the vegetation of the study area (see figure 5-2) and another map presented the current land use on the Watson peninsula according to information provided in interviews in the community (see figure 5-5).

4.4 Public Information Meetings

4.4.1 First Public Consultation Meeting

Project Description, Site Location and Issues Scoping

The first public consultation meeting in December 14th, 2005 was attended by 29 residents from Mistissini including representatives from the Band Office and the Public Safety Department. During the meeting, the study co-ordinator presented the project and the required Environmental Impact Statement (EIS) and described the site selection process. A representative from Chantiers Chibougamau explained the technology involved in the Mistissini Beam Plant Beam Plant process. Representatives form the project proponents (Cree Nation of Mistissini and Chantiers Chibougamau) and from the consultant (Jacques Whitford Ltd) answered questions about the project and the EIS and noted concerns expressed by the participants (refer to public consultation report in Appendix D).

TEK Workshop

The TEK workshop held in the afternoon of January 17th 2006 was attended by 10 camp owners located close to the project site as well as by the tallyman. Most if not all of the participants could be considered as Elders. As most participants were not aware of the project, the project was briefly presented to them before proceeding with the workshop. Participants were subsequently asked to share their knowledge about the wildlife, waterfowl, fish and plants present in the study area and to describe former and current land uses in the area. Their concerns and questions about the project were also noted (refer to TEK workshop report in Appendix D).

4.4.2 Second Public Consultation Meeting

The second consultation meeting in June 1st, 2006 was attended by approximately 20 residents from Mistissini including representatives from the Band Office. During the meeting, the study coordinator presented the project. Representatives from Chantiers Chibougamau presented the revised plan of the plant and the production process. Representatives form the consultant (Jacques Whitford Ltd) presented the main conclusions of the Environmental Impact Statement (EIS). Representatives form the project proponents (Cree Nation of Mistissini and Chantiers Chibougamau) and from the consultant (Jacques Whitford Ltd) answered questions about the project and noted concerns expressed by the participants (refer to public consultation report in Appendix D).

4.4.3 Meetings with Key Stakeholders

Three types of key stakeholders and informants were identified in the context of the EIS:

- land users of the study area, i.e. the tallyman and local camp owners.
- representatives of concerned local associations;
- representatives of concerned Cree administrative departments and services;

Tallyman

The tallyman of the project area was met during an individual interview held on the morning of January 17th 2006. He was asked to describe his own and his family's current and future land uses in the study area, to discuss wildlife management practices on the trapline and to share his knowledge about the wildlife, waterfowl, fish and plants present in the study area (refer to Tallyman Interview report in Appendix D).

The tallyman was also present during the TEK workshop held on the afternoon of the same day.

Community Groups

A total of three representatives from the Elders Council, four representatives from the Youth Council and two representatives from the Women's Association were met separately in group interviews between January 13th and 18th, 2006. Representatives of these local associations were asked to describe their interests and concerns as well their current and future activities and land uses in the study area (if any). Their concerns and questions about the project were also noted.

Municipal/Community Sectors Representatives

Representatives from concerned Cree administrative departments and services were met in December 2005 and January 2006. Representatives met in December 2005 included persons in charge of the Tourism Sector, Land Use Planning (Land Registrar), Economic Development and Eskan Corporation

(forestry sector) at the Mistissini Band Office as well as the Human Resources Advisor of the Cree School Board. A representative from the Recreation Department of the Mistissini Band Office was met in January 2006. They were asked to discuss current and future land uses in the study area and the potential impact of the project on their respective field of activity. Issues raised by the project were also noted by certain representatives.

4.5 Summary of Issues Raised during Public Consultations

4.5.1 First Public Consultation Meeting

The main questions and concerns expressed during the first public consultation meeting are summarized in Table 4-1. These included the effects of the project on air and water quality and on public safety issues. There were also some questions about the project's viability.

Table 4-1 : Main Questions and Concerns Expressed During First Public Consultation Meeting

Themes	Concerns	Questions
Effect on air quality		
Bad odors from the plant	X	X
Smoke and particle emissions	X	X
Effect on noise levels		
What about noise pollution ?	X	X
Effect on water quality		
Effect on water quality in the lake	X	X
Potential impact on community sources of drinking water	X	X
Effect on economic activity		
How long will the plant keep operating?		X
Where will wood supply to the plant come from ?		X
Effect on public safety		
Impact of presence of toxic components on fire fighting procedures	X	X
Impact on road conditions	X	X
Effect on human health		
Occupational health and safety issues	X	

Note: Questions are issues that participants wanted to have more information about. Concerns are issues that participants considered could negatively affect their quality of life.

4.5.2 TEK Workshop

The main questions and concerns expressed during the TEK workshop are summarized in Table 4-2. These included the effects of the project on wildlife and fish, on local land uses, economic benefits, public safety along the road and smoke emissions from the plant.

Table 4-2 : Main Questions and Concerns Expressed by Local Land Users During the TEK Workshop

Themes	Concerns	Questions
Effect on air quality		
Smoke and particles	X	
Effect on wildlife and fish		
What will be the effect on small animals?	X	X
The smoke will affect the fish	X	
Compatibility with other land uses		
Will there be a by-law preventing construction of other camps in the project area?		X
Animals wont taste as good because of the smoke	X	
Will camps located close to the project site stay suitable to live in?	X	X
Effect on economic activities		
Positive spin-off effects on the local economy	X	
Effect on public safety		
Safety of the many road users (snowmobile, bicycle, pedestrians) and mainly of the kids using the road	X	
Effect on human health		
Effect of the smoke on project neighbours suffering from asthma	X	X

Note: Questions are issues that participants wanted to have more information about. Concerns are issues that participants considered could negatively affect their quality of life.

4.5.3 Second Public Consultation Meeting

The main questions and concerns expressed during the second public consultation are summarized in Table 4-3. These included the effects of the project on air and water quality, on the quality of life of nearby residents and on the economic activities.

Table 4-3 : Main Questions and Concerns Expressed During Second Public Consultation Meeting

Themes	Concerns	Questions
Effect on air quality		
Smoke and particles from the plant	X	X
Dust from the plant	X	X
Odors from the plant	X	X
Effect on water quality		
Effects on water quality in the nearby creeks	X	X
Effect on wildlife and fish		
Effects on fish and streams	X	
Compatibility with other land uses		
Will the nearby camps have to relocate?	X	X
Will the rehabilitation of the Mistissini road affect the plant?		X
Effect on economic activities		
Long term viability of this plant	X	X
How will people be informed about positions offered at the plant?		X
Will employment for all position be available for Crees at the plant?	X	X
Effect on public safety		
Risk of flooding of plant access road		X
Will the nearby camps be affected in case of accident?	X	X
Effect on human health		
Ventilation for workers in the plant	X	X

Note: Questions are issues that participants wanted to have more information about. Concerns are issues that participants considered could negatively affect their quality of life.

4.5.4 Meetings with Other Key Stakeholders and Informants

The main concerns expressed by other key stakeholders and informants met during individual and group interviews are summarized in Table 4-4. These included the possible impact of the plant on air quality, and mainly of bad odors and of smoke and particles. The potential consequences of air pollution on wildlife and fish health, on the taste of game and of fish and on human health were mentioned by a number of persons. Participants in interviews also expressed concern about the impacts of increased road traffic on the safety of other road users and mainly on children. Most participants in interviews were pleased that the project would create employment in the community. They wanted to see many young people employed at the plant as employment of young adults remains an important issue in the community.

Table 4-4 : Main Concerns Expressed by Other Key Stakeholders and Informants

Themes	Recreation Dept. (CNM)	Human Resources Advisor (CSB)	Youth Council	Elders Council	Women's Association	Tallyman
Effect on air quality						
Bad odors from the plant	X		X	X	X	
Smoke and particle emissions				X		
Effect on water quality						
Wastewater emissions from plant				X		
Compatibility with other land uses						
Will take away one purpose of the hiking trail which is to enjoy fresh air	X					
Compatibility with future community residential growth			X			
Local camp owners are Elders and should be relocated away from the plant					X	
Where will the wood used at the plant come from?			X			
Effect on economic activities						
Interest in starting small businesses that would provide services to the plant			X			
Positive spin-off effects on the local economy			X	X		X
How long will the plant keep operating?				X		
Jobs at the plant could cause salary inflation in the community		X				
Women's interest in employment at the plant remains to be confirmed		X			X	
Youth's interest in employment at the plant will depend on the salary offered			X			
Manpower attracted by jobs at the plant will have a low level of schooling		X	X			
Crees should be employed in the management of the plant			X			
The plant should employ members of the tallyman's family				X		X
How will profits from the plant going to Mistissini be managed and used?		X				

Table 4-4 : Main Concerns Expressed by Other Key Stakeholders and Informants (Continued)

Themes	Recreation Dept. (CNM)	Human Resources Advisor (CSB)	Youth Council	Elders Council	Women's Association	Tallyman
Effect on public safety issues						
Handling of the glue and toxic spill risks	X					
Safety of the many road users (snowmobile, bicycle, pedestrians) and mainly of the kids using the road				X	X	
Increase of availability of drugs due to presence of non-Natives at the plant					X	
Effect on human health						
Effect of the smoke on pregnant women and on children					X	
Effect on family life						
Positive impact if workers transfer from the EM-1 work site to the Mistissini Beam Plant Beam Plant			X		X	
Effect on landscapes						
The visual presence of the plant will have a negative impact on the existing landscape	X				X	
Seeing the plant would show that things are moving in Mistissini			X			

Note: The representatives from the following department of the Cree Nation of Mistissini were also met but didn't expressed concerns about the project: Land Registrar, Eskan Corporation, Tourism Sector and Economic Development.

4.6 Selection of Valued Environmental and Socio-economic Components (VEC's)

The EIS process is designed to focus on the identification of Valued Environmental and Socio-economic Components (VEC's). VEC'S are components of the environment, both natural and social, that are valued by the society.

Selection of the Project VEC's was made based on a consideration of the environmental setting, issues scoping professional judgment, and as a result of issues raised during stakeholder consultation. The VEC selection process also considered the nature, temporal and spatial scope of the Project, and anticipated potential Project – environment interactions.

From these scoping activities, the following VEC's have been selected:

- Air Quality and Greenhouse Gas Emissions
- Noise
- Groundwater and Soil Quality
- Hydrography and Surface Water
- Fish and Fish Habitat

- Public Health and Safety
- Employment and Socio Economic Effects
- Compatibility with Land Use and Landscape
- Special Status Species and their Habitat

In addition to the above VEC's, an assessment of potential changes to the Project caused by the environment was completed.

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Chapter 5: Environmental Setting

Jacques Whitford / DDM PROJECT 1005414 June 20, 2006

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5.0 ENVIRONMENTAL SETTING

5.1 Study Area

Two study areas were delineated for this project to assess the parameters to be studied:

- The Study Area, which will be assessed more extensively, comprise the future construction site of the Plant as well as an approximate area of 2.5 km2 around the projected plan installations.
- A Local area covering Land 1A on the Watson peninsula. A general description of the biophysical environment as well as the human environment will be presented for this area.

Also, when some information and data are important to understand either biophysical or human environment issues, they are presented geographically even though they may be located further away.

5.2 Physical Environmental Components

5.2.1 Climate

The Lac Mistassini region is characterized by a subarctic or taiga climate, with an average annual temperature of -2.5°C and an estimated frost-free season of 80 days. Based on the value of the average daily temperature (using a thermal threshold of 5.5°C), the Lac Mistassini region has approximately 1,400 growing degree-days (Pena 1981).

5.2.2 Air Quality

In order to evaluate the environmental impact of the future Mistissini Beam Plantoperations on the ambient air, background levels of targeted atmospheric gaseous and particulate contaminants must be documented for the Mistissini area. In the Environmental Effects Analysis (Chapter 6.0) of this EIS, the background levels of targeted contaminants will be added to the maximum concentrations emitted by the Mistissini Beam Plant future operations in order to compare these results with regulatory norms.

Sampling Stations

On the Quebec territory, federal as well as provincial sampling stations monitor the predominant atmospheric contaminants such has CO, NOx, SO_2, O_3, VOCs, TSP, PM_{10} and $PM_{2,5}$. The National Air Pollution Surveillance (NAPS) network is a cooperative program of the federal, provincial and territorial governments monitoring air quality across Canada.

On the provincial level, the MDDEP produces an Air Quality Index (AQI) for various regions of the province of Quebec. To achieve this, the MDDEP uses a network of sampling stations which monitor O_3, $PM_{2,5}$, SO_2, NO_2 and CO. Furthermore, the MDDEP has issued in March 2006 a report entitled "Volatile Organic Compounds (VOC) in Québec's Ambient Air: 1989-1999 Results" which establishes tendencies and evolutions of total VOCs as well as specific VOC compounds concentrations between 1989 and 1999.

No federal or provincial sampling stations are present in the area of the future Mistissini Beam Plant. Background concentrations were therefore estimated by using data from similar environmental settings as the ones found in the Mistissini area.

Norms and Standards

The MDDEP Air Quality Regulation (R.R.Q., c. Q-2, r.20) is the regulatory framework which defines the primary obligations concerning air quality in Quebec. This regulation establishes norms for various contaminants, however does not cover VOCs.

The MDDEP is in the process of elaborating a draft of a new air quality regulation targeting atmospheric emissions. This new regulation will come into force realistically at the end of 2006, early 2007. Although that this regulation is not presently into force, it is all the same used for the deliverance of certificates of authorization for new industrial projects.

Gaseous Contaminants (CO, NOx, SO2, O3 and VOCs)

Based on federal and provincial monitoring stations networks, concentration levels of CO and SO_2 are usually measured in urban areas, where vehicle traffic is heavy. No information on background levels of CO or SO_2 were found for rural and wooded areas similar to the Mistissini area. As for O_3 and VOC, there are many sampling stations located in rural and wooded areas throughout the province of Quebec that monitor these contaminants (Table 5-1).

Table 5-1: Background concentrations in rural areas for the targeted gaseous contaminants

Contaminant	Concentration
CO [1]	n/a
NOx [2]	19 ug/m^3
SO_2	n/a
O_3 [3]	54 ug/m^3
VOCs [4]	8 ppb

1) Not available
2) Source: Report from the Ministry of Sustainable Development, the Environment and Parks entitled "Les COV dans l'air ambiant au Québec". Concentration value is the median of 1999.
3) Source: Monitoring station "La Dorée" of the National Air Pollution Surveillance network. Concentration value is the average of yearly averages from 1991 to 2003.
4) Source: Report from the Ministry of Sustainable Development, the Environment and Parks entitled "Les COV dans l'air ambiant au Québec". Concentration value is the average of yearly averages from 1993 to 1998.

Particulates Contaminants (TSP, PM10, PM2,5)

The NAPS network as well as the MDDEP possess sampling stations in rural and wooded areas that monitor TSP, PM10 and PM2,5 (Table 5-2).

Table 5-2: Background concentrations in rural areas for the targeted particulate contaminants

Contaminant	Concentration
TSP [1]	10 ug/m^3
PM_{10}	n/a
$PM_{2,5}$ [2]	2,7 ug/m^3

1) Source: Monitoring stations "Lac-Édouard" and "Ferme neuve" of the National Air Pollution Surveillance network. Concentration value is the average of these monitoring stations for 2003.
2) Source: Monitoring station "La Dorée" of the National Air Pollution Surveillance network. Concentration value is the average of the months of October through December of 2003.

5.2.3 Noise

We received data from the Ministère des Transports du Quebec (MTQ, 2006) which showed that the average annual daily traffic on the road leading to the village of Mistissini was 720 vehicles in 2004, and that the percentage of transport truck recorded on the road was 11.6% in 2000. These data were taken by MTQ at the intersection of Road 167 and Mistissini access road.

Table 5-3: Anticipated average increase in annual daily traffic between Chibougamau and the Mistissini Beam Plant

	Average annual daily traffic (all traffic)	Percentage of car traffic	Percentage of truck traffic	Average number of cars on the road	Average number of trucks on the road
Pre-Plant Construction	720[1]	88.4%[2]	11.6%[2]	636.5	83.5
Post-Plant Construction	757	88%	12%	666.5 (4.5% increase)	90 (7% increase)

Source: Roger Savard, Service des Inventaires et du Plan, MTQ
1) 2004 data
2) 2000 data

With the construction of the Plant, the traffic is expected to increase on the road leading to Mistissini and to the Plant (both from cars and transport trucks). For the purpose of this estimate, it is assumed that the percentage of truck traffic stayed relatively constant, at 11.6%, between 2000 and 2004.

With an average of 5 people per shift coming from Chibougamau to work at the Plant during the first few years of operation, we calculated that the average annual daily traffic would increase by 30 cars (5 people, two ways, three shifts), an increase in car traffic of 4.5% compared with 2004.

The kind of transport trucks traveling to the Plant will include general delivery/pick up trucks (hazardous waste materials, recycling, heating oil) and transport trucks for wood and finished products. We estimated that the operations at the Plant would result in an increase in daily truck traffic of approximately 6.5 trucks per day, over a five day period (3.2 trucks per day, two ways), an increase of 7% from 2000.

5.2.4 Physiography, Geology and Geomorphology

The sector under study is located in the geologic province of Superior, which encompasses most of the James Bay area and the Ungava peninsula. It comprises some of the Earth's oldest rocks (between 3.5 and 2.5 billion years old). Relief-wise, it is fairly flat with some dominant plateaus including the Mistassini highlands.

The site is located in the physical region of the Mistassini hills, an area comprising parallel ranges of hills and valleys. The valleys are partially covered by the waters of Lac Mistassini. Most of the hills, composed of sedimentary rock, are north-facing cuestas with an average altitude of 400 m. However, a number of drumlins, partially covering the old sedimentary rocks, bear witness to the region's glacial dynamics (Dimroth 1981).

The proposed factory site is characterized by a layer of proterozoic rock (limestone, quartzite, dolomitic limestone, conglomerate, sandstone and shale). This morainal accumulation group lies parallel to ice movement patterns, i.e. northeast-southwest. As a lacustrine set, it is extensive and runs along an indented coastline with numerous islands.

There are no rivers or streams on the site. According to Figure 5-1 and 5-2, main surface drainage is toward the west. A 4-metre high rock wall was observed along an area of the southern part of the site. This topographic feature represents the boundary of the proposed location of the Plant. On the north side, the landscape is gently sloping downward where there is natural drainage of the soil. According to topographic maps and local observations, part of the site is also draining to the east of the Péninsule Watson into Baie Cabistachouane. Marshy areas are located to the northeast and northwest of the site, at about 300 m and 250 m, respectively from the limits of the site Plant, as shown on Figure 5-1.

5.2.5 Hydrogeological Context, Groundwater and Soil Quality

An Environmental Site Assessment (ESA) for soil and groundwater quality was carried in December 2005. The purposes of the ESA were:

- To verify the environmental quality of the soil, groundwater and surface water located within the retained site for Plant;
- To define the regional and local hydrogeological context;
- To assess the groundwater resource potential, and to determine its vulnerability to contamination;
- To identify hydraulic connections or links between the aquifer and the potential receptors (private wells, wetlands, lake and watercourse);
- To define a proper protection level for the groundwater resource and mitigation measures in order to minimize potential impacts (real or apprehended) on groundwater and existent receptors; and

- To recommend an environmental groundwater follow-up (analytical program, water level survey) and surface water survey.

In order to asses soil quality, three (3) boreholes were drilled within the site and one (1) borehole was drilled 300 m down gradient from the site in the direction of the groundwater runoff. Monitoring wells were installed in all boreholes to assess groundwater quality. Subsurface conditions were logged based on examination of soil samples that were retrieved during the drilling operations. Soil samples were collected for chemical analysis from the four (4) boreholes.

Sampling locations and groundwater flow are presented in Figure 5-2.

The parameters analyzed in laboratory are as follow:

- for the soil samples : metals (Ag, As, Ba, Cd, Co, Cr, Cu, Sn, Mn, Mo, Ni, Pb, and Zn), pH C_{10}-C_{50}, Monocyclic Aromatic Hydrocarbons (MAH), polycyclic aromatic hydrocarbons (PAH), and phenols;
- for the groundwater samples : PH C_{10}-C_{50}, metals (Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Li, Mg, Mn, Hg, Mo, Ni, K, Se, Si, Ag, Na, Sr, Tl, Sn, Ti, V, Zn), VOC (volatiles), formaldehyde, phenols, BOD, COD, resin and fatty acids, sulfur anion, total & fecal coliforms, chloride, sulfates and other physico-chemical parameters (conductivity, pH, hardness, alkalinity, total dissolved solids, and total suspended solids);

Hydrogeological Context

The study indicates a general groundwater flow toward the Baie du Poste of Lac Mistassini to the southwest, which is consistent with the anticipated groundwater flow. Due to the low permeability of the glacial soil deposits and the high groundwater level, groundwater level is anticipated to be at less than 1 metre below ground surface over much of the site. However, it should be noted that these results are valid for the period considered (investigation done in December 2005). Groundwater levels can vary according to the seasons, precipitation and modifications to the physical conditions of the site.

According to the topographic map and local observation, part of the site is also draining to the east of the Watson Peninsula into Lac Mistassini. This portion is probably equal to 30% of the surface of the plant site. Monitoring well MW05-4 is probably very close to the limit of the two adjoining water sheds present along the Watson Peninsula.

Soil Quality

Selection of the appropriate soil criteria was conducted in accordance with the prescribed protocol in the *Soil Protection and Contaminated Sites Rehabilitation Policy*, MDDEP, 1999, rev. 2001 (Policy). In addition, the CCME soil criteria (industrial use) were also used as a reference.

The intended land use at the site is industrial. Therefore, concentrations of contaminants must not exceed the applicable MDDEP C Policy Level criteria (industrial land use). However, the Level A (Generic Background) and Level B (Residential) soil criteria are also provided in order to establish background concentrations prior to the development of the site.

Analytical results for selected soil samples revealed that concentrations were all below the MDDEP Level A soil criteria. In fact most concentrations were below the detection limits of the analytical methods, except for some metals (Barium, Total Chromium, Copper (one sample), Manganese, Nickel and Zinc (one sample)) and one sample for petroleum hydrocarbons.

Groundwater Quality

The MDDEP Policy presents two sets of groundwater quality criteria based on the use, or final receptor, of groundwater in the environment: (1) drinking water criteria and (2) surface water and sewer (SWS) criteria. Cabins and summer camps are located along the shoreline on the west side of Péninsule Watson in a radius less than 1 km from the site. The municipal authority of Mistissini stated that nearby cabin owners are using surface water from Baie du Poste for their own water supply. Based on the above, the applicable groundwater criteria for the site are the MDDEP Drinking Water Criteria. The CCME Criteria for supplying water in Communities (Guidelines for Canadian Drinking Water Quality, Chapter 2) are also provided as a reference.

The results of the laboratory analyses for groundwater quality assessment were compared to the Drinking Water Criteria and the Surface Water and Sewer (SWS) Criteria of the MDDEP Policy. The CCME Criteria for supplying water in Communities (Guidelines for Canadian Drinking Water Quality) were also provided as a reference although not directly applicable.

Analytical results from submitted groundwater samples revealed that measured concentrations of selected parameters were significantly below the MDDEP Drinking Water Criteria, except for Manganese (0.053 mg/L to 0.16 mg/L compared to a criteria of 0.05 mg/L). In fact, most concentrations were below the detection limits of the analytical methods, except for some metals (Barium, Calcium, Magnesium, Manganese, Potassium, Silicon, Sodium, Strontium and Zinc (one sample)) and one sample for Volatile Organic Compounds and Formaldehyde (concentration at detection limit). Formaldehyde is naturally occurring in the environment and is the result of the interaction between the light and humic acids. Measurable values of formaldehyde are not uncommon in the natural environment.

Groundwater Vulnerability to Contamination

The vulnerability of the groundwater to potential contamination was assessed in this study.

Jacques Whitford has established that the aquifer has the following characteristics:

- The depth to the groundwater is minimal (less than 1 metre);
- The water recharge rate is relatively high;
- The hydraulic conductivity is low; and
- The vadose zone is thin (thus low attenuation available).

Therefore, Jacques Whitford has estimated that the aquifer at the site has a moderate vulnerability to contamination originating from potential surface activities (such as the activities that will occur at the location of the future Mistissini Beam Plant).

Hydraulic Links to Potential Receptors

The following groundwater receptors are located within a 2 km radius distance from the site:

- Baie du Poste (nearby residents take their drinking water from the lake);
- Water wells that might be located in the future along the western shoreline; and
- The marshy area located to the northeast of the site.

This study has determined that there are hydraulic links to the identified potential receptors. Therefore, a protection level and specific management practices will be required for the protection of the aquifer considering that no natural protection currently exist (such as a overlying natural clay unit) for the unconfined aquifer located on site. However, migration of potential contamination toward a receptor (Baie du Poste or private wells) would be low. Based on the estimated hydraulic gradient, approximately 18 years would be required for potential groundwater impacts to travel a horizontal distance of 300 m.

5.2.6 Hydrography and Surface Water Quality

The site examined for the purposes of this study is located between Baie Cabistachouane and the Lac Mistassini station in Baie du Poste. Lac Mistassini is the largest body of freshwater in Québec, covering an area of 2,115 km^2 (Figure 1-1). The lake is located in the Rupert River tributary basin (43,430 km^2) and hydrographic region 8, comprising the Harricana, Bell, Nottaway, Broadback and Rupert rivers. Secondary drainage basins were identified for the sector under study, and are shown in Figure 5-1. The proposed site for the plant is located in sub-drainage basin 1, which flows westwards into Lac Mistassini.

Analysis shows that Lac Mistassini's waters are of type A for aquatic life (Hydro-Québec 2004). They are poor in phosphorus, with low organic content (oligotrophic water) and low turbidity, and are very clear. Their pH is neutral, with a moderate buffering capacity and low mineral levels.

The environmental assessment of surface water quality in the area of the proposed development was accomplished by collecting one (1) surface waster sample from a small brook located near the site. It should be noted that, as field investigation was conducted in winter conditions (December 6 to December 10, 2005), it was not possible to investigate more surface water bodies around the site.

The MDDEP Surface Water Criteria[1] for Protection of the Aquatic Life Acute Toxicity and Chronic Toxicity, and the Canadian Water Quality Guidelines for the Protection of the Aquatic Life were used. Analytical results from the submitted surface water sample revealed that measured concentrations of selected parameters were below the MDDEP Surface Water Criteria. In fact, most concentrations were below the detection limits of the analytical methods, except for some metals (Calcium, Magnesium, Manganese, Silicon and Sodium) and Formaldehyde (0.02 mg/L). Formaldehyde is naturally occurring in the environment and is the result of the interaction between the light and humic acids. Measurable values of formaldehyde are not uncommon in the natural environment.

As knowledge of baseline conditions of surface water is limited, a water sampling program will have to be conducted before the site preparation phase to obtain baseline information on the quality of surface water, at least for the following areas:

- In Du Poste Bay on the west coast of the Watson peninsula, in the area where nearby cabins drinking water intakes are located;
- In the water course where the site drainage system will be discharged (exact location of the discharge point is not determined yet).

[1] The MDDEP Criteria related to the protection of the aquatic life are listed in the document entitled Critère de qualité de l'eau de surface au Québec (MDDEP, 2001).

5.3 Biological Environmental Components

5.3.1 Vegetation

Description

The forest in the study area forms part of the black spruce *(Picea mariana),* balsam fir *(Abies balsamea)* and herbaceous domain and is part of the Lac Chibougamau ecological region. This typically boreal forest domain is characterized by a predominance of black spruce, along with secondary species such as balsam fir, white birch *(Betula papyrifera)* and trembling aspen *(Populus tremuloides),* along with several herbaceous species.

In this bioclimatic domain, mossy black spruce and mossy black spruce/fir forests on sloping and flat mesic sites are the most common forest communities in the study area. These forests are usually dense (coverage in excess of 40%) and dominated by black spruce (mossy black spruce). Fir trees are also present locally (black spruce/fir).

Light-seeking hardwoods appear sporadically and never account for more than 25% of the cover, while shrub species (*Vaccinium angustifolium, V. myrtilloides, Ledum groendlandicum, Kalmia angustifolis*) remain below 40%. Herbaceous species appear sporadically and are represented mainly by a small number of boreal plants, including *Clintonia borealis* and *Maianthemum canadense*. The forest floor is carpeted with hypnaceous mosses, mainly *Pleurozium schreberi, Ptilium crista-castrensis* and *Dicranum spp*. (Forestry Manual, 1996).

Table 5-4 contains a description of the forest stands and their sizes, derived from an analysis of aerial photographs of the study area taken in 1998. The sector, measuring nearly 470 hectares, covers a strip of more than 1 km north and south of the proposed site (Figure 5-3).

The results show that 65% of the study area is covered by softwood stands, 63% of which are black spruce. Mature (M) stands 70 years of age or older, along with old-growth stands of different ages (VN), account for 75% of the area. Unforested land accounts for 20% of the area, and comprises mainly bare wetlands, while regenerated stands account for 14%.

Wetlands

Wetlands account for nearly 14% of the study area. Where drainage conditions deteriorate to such an extent as to prevent the black spruce from reaching the tree strata (over 4 metres), other communities dominate the unforested wet sites, mainly shrub spruce stands with *Chamaedaphne calyculata* and *Sphagnum fuscum*, and the *Carex oligosperma* and *Sphagnum fallax* community (Forestry Manual, 1996). Where the black spruce presence varies between 10% and 24%, the wetlands are described as “wet sites with scattered trees (10-24%)”.

Table 5-4: Description of the vegetation in the study area

Cover type			Age	Area (ha)	%
Forested land	Softwood stand	Spruce stand	J	12	3
			JN	146	31
			M	18	4
			VN	13	3
		Spruce stand with balsam fir	J	88	19
			JN	1	<1
			VN	1	<1
		Fir stand with spruce	JN	3	<1
			VN	18	4
		Larch stand with spruce	M	1	<1
		Sub-total		302	65
	Mixedwood stand	Softwood with white birch	J	1	<1
			VN	5	<1
		Sub-total		6	<1
	Regenerated stand	Mixed hardwood	J	1	<1
		Conifer	J	63	13
		Sub-total		64	14
Total forested land				372	80
Unforested land	Wet site			38	8
	Wet site with scattered trees (10-24%)			29	6
	Dry site with scattered trees (10-24%)			29	6
Total unforested land				95	20
Total				468	100

M Mature forest (70 years and more)
J Young forest (less than 70 years)
JN Young uneven aged forest
VN Old uneven aged forest

Landscape Evolution

Landscape evolution over the last 40 years (1954-1998) was analyzed using aerial photographs of the study area. The results reveal that the canopy has been altered over time by major fires, beginning in the late 19th century.

The aerial photographs from 1954 show that the vegetation communities existing at the time grew as a result of these fires. Over time, however, the forest stands have evolved:

- Based on the chronology of the four aerial sweeps, bare boglands have gradually taken over the study area.
- The presence of lichen (1954) declined over time due to intense fires that broke down the soil, making it more conducive to bare dry sites and mossy spruce stands. Today, these sites have stabilized and mossy spruce stands have colonized the best areas.
- The balsam fir has become more common over the years.

- Numerous intolerant hardwood stands, mostly composed of trembling aspen, colonized the best sites after the fires. The 1954 photographs show pure hardwood cover or hardwood forests with an under coverage of black spruce. More recently, the softwood under-coverage (spruce and fir) has tended to take over from the hardwoods as they reach maturity.

The 1967 photographs show the road providing access to Mistissini, along with several logging sectors. Logging extends to within 1.5 kilometers on either side of the road. Over the years, the presence of the road has led to the construction of numerous buildings that have changed over the years (abandoned or replaced by new constructions). Lastly, the balsam fir, which was virtually wiped out by the fires, gradually returned to the sector and, by 1967, can be seen in the spruce stands and mixed stands in the study area. Fir trees have also colonized the best mesic and subhydric sites, but are absent from poorly drained sites and those with organic deposits.

The 1986 photographs show the greatest changes. This is due mainly to the logging that took place in the 1970s and early 1980s. Although none of the individual logging sites are large, they are scattered over a large portion of the area. In addition, in the early 1980s, numerous mature mixed and softwood stands were overturned by windfall. A spruce budworm infestation also decimated the pure fir stands and any mixed stands containing fir.

The 1998 photographs show a slowdown of human disturbance. By 1998, the forest stands have been able to recover from the disturbances of the previous years. The dominant species at this time are black spruce, fir and some mixed stands composed of softwoods and intolerant hardwoods. A few large poplars (+ 20 metres) are still present in places. Lastly, a fire ravaged the south-eastern sector of the study area in the early 1990s.

Provincial Threatened Or Vulnerable Plant Species

Based on the information available from the “Centre de données sur le patrimoine naturel du Québec” (CDPNQ 2005), no threatened or vulnerable plant species, or species likely to be designated as threatened or vulnerable, have been identified in the area. A species is threatened when extinction is thought likely, and is vulnerable when its survival is threatened, even if it is unlikely to become extinct.

Only one of the 59 threatened and vulnerable plant species in Québec, the Sparrow-egg lady’s-Slipper *(Cypripedium passerinum*) (Table 5-5 and Photo 5-1), may potentially be found in the Lac Mistassini region, in glance of is potential habitat (Figure 5-4). The traditional ecological knowledge (TEK) workshop revealed that a person who has owned a cabin in the Watson Peninsula for approximately 15 years has observed some sparrow-egg lady’s-slipper patches near the gravel pit to the south of the study area (Figure 4-1). However, this area is now cleared of such plants.

Table 5-5: Threatened or vulnerable plant species likely to be found in the study area

Name	French name	Latin name	Distribution in Québec	Habitat
Sparrow-egg lady’s-slipper	Cypripède oeuf-de-passereau	Cypripedium passerinum Richardson	James Bay (historical occurrence) and the Mingan Archipelago, in the Gulf of St.Lawrence	Heath (open environments dominated by a low shrub carpet and interspersed with limestone gravel) and screen patches, both shaded and unshaded, at the foot of ancient cliffs

Source: Ministère du Développement durable, de l’Environnement et des Parcs du Québec (MDDEP), 2005

Because the habitat around the site under study is composed of old-growth black spruce forests, it is unsuitable for the plant in question. Therefore, the sector under study would be unlikely to shelter designated plant species.

Photo 5-1: SPARROW-EGG LADY'S-SLIPPER

Source: MDDEP, 2005

Federal Species at Risk (Endangered, Threatened, And Special Concern Risk Categories)

At the federal level, species at risk are protected by the Species at Risk Act. The Species at Risk Act (SARA) was proclaimed in June 2003, and is one part of a three part Government of Canada strategy for the protection of wildlife species at risk. This three part strategy also includes commitments under the Accord for the Protection of Species at Risk and activities under the Habitat Stewardship Program for Species at Risk (COSEPAC 2004).

A search was performed on the list published by Environment Canada to detect the presence of plant species at risk (endangered, threatened, and special concern risk categories) in the study area. This mapping application is based on two types of species distribution data, namely species occurrences and species ranges. The search revealed no endangered, threatened or special concern plant species within the area in question.

5.3.2 Wildlife

Fish and Fish Habitat

Description

The fish species generally living in Lac Mistassini and specifically in Baie du Poste are those that are typically found in boreal forest lakes (Table 5-6).

All the species listed have been observed by TEK workshop participants, as have the following: trout-perch (*Percopsis omiscomaycus*), burbot (*Lota lota*) and shorthead redhorse (*Moxostoma macrolepidotum*).

Fishing occurs during the summer and net fishing is carried out all year round along the shore. There is no fishing in the small brooks shown on the map of the study area (Figure 5-4 and 5-6).

Table 5-6: List of fish species found in Lac Mistassini

Name	French name	Latin name
Walleye	Doré jaune	Stizostedion vitreum
Northern pike	Grand brochet	Esox lucius
Lake whitefish	Grand corégone	Coregonus clupeaformis
White sucker	Meunier noir	Catostomus commersoni
Longnose sucker	Meunier rouge	Catostomus catostomus
Brook trout	Omble de fontaine	Salvelinus fontinalis
Lake trout	Touladi	Salvelinus namaycush

Source: Ministère des Ressources naturelles et de la Faune du Québec, 2005

A fall 2005 map of spawning areas drawn up by the MRNFQ in 2005 shows a walleye spawning ground located less than 3 kilometres from the study area (see Figure 5-4 and Appendix G). The TEK workshop revealed that known spawning areas are located at the mouth of the perch river for the walleyes, suckers, whitefishes, burbot and possibly pike. There is another spawning area at the mouth of the Chalifour River.

The study area is located close to Baie-du-Poste and several permanent watercourses. It is therefore possible that it contains suitable fish habitats close to the project site.

Threatened or Vulnerable Fish Species

Based on the information available from the Quebec Ministry of Natural Resources and Wildlife and Species at Risk Act, no vulnerable wildlife species were found in the Lac Mistassini region.

Mammals

Main Species

The Lac Mistassini sector is home to most of the fur animals associated with the boreal forest. A short description of the principal species found in the study area appears below. A complete list of all the species likely to be found in the area appears in Appendix G.

According to the information obtained from the TEK workshop, animals seen in the study area are mainly martens *(Martes americana)*, snowshoe hare *(Lepus americanus)*, foxes *(Vulpes vulpes)* and ermines *(Mustela erminea)*. There is no recent observation of bear *(Ursus americanus)*, wolf *(Canis lupus),* lynx (*Lynx canadensis)*, moose *(Alces alces)*, beaver *(Castor canadensis)* and mink *(Mustella vison)*. Presently, there is no hunting in the study area. Some snaring for snowshoe hare and some trapping for martens in the fall is possible.

- Moose (Alces alces)

The area's moose population declines in density from south to north. According to the 2004-2010 Moose Management Plan, the moose population in hunting and trapping zone 22 is estimated at 6,321 animals (giving a density of 0.31 animal/10 km^2) (Lamontagne and Lefort 2004). In Québec, the highest densities (1-2 animals/10km^2; 5-10 animals/10km^2 in the parks and reserves) are usually seen

in the mixed forests and the transition forests resulting from disturbances such as logging, forest fires and insect infestations (Desrochers 2001).

In winter, the moose tend to congregate in stands able to provide food (deciduous shoots) and shelter (sufficiently dense softwood and mixed forests). In summer, they use a variety of habitats and prefer areas containing tracts of water (Desrochers 2001).

The MRNFQ's capture data for trapping zone M-50, which covers the entire study area, are indicative of a moose population. Some 13 animals were captured in the period 1988-2004 (MRNFQ 2005).

The high percentage of mature forest stands, especially spruce and fir stands, and the presence of regenerated mixed wood stands, is conducive to the presence of moose within the region of the Lac Mistassini.

As mentioned, no moose has been observed or hunted in the vicinity of the study area (TEK workshop, Appendix D).

- Black bear (Ursus americanus)

In Northern Québec, the current density of the black bear population is estimated at 0.20 animals/10 km^2, although according to the 1998-2002 Black Bear Management Plan, their numbers appear to be increasing (Lamontagne et al. 1999). The bear's habitat is confined mainly to the forest, which provides both food and shelter. Generally speaking, the best habitat is a regenerating or mixwood forest containing a broad variety of trees and shrubs of different ages. Hardwood and mixed stands, along with riparian environments, are also appreciated. Because the black bear is omnivorous, its diet depends entirely on which foods are available, and tends to vary with the seasons (Hydro-Québec 2004).

The presence of spruce and fir stands, regenerated stands, larch stands and dry sites is conducive to the presence of black bear in the region of the Lac Mistassini.

Black bear capture data are not available for trapping zone M-50. No black bear has been observed or hunted in the study area (TEK workshop, Appendix D).

- Beaver

For beaver, habitat quality depends on both physical and biological factors. The animal is able to adapt to environments that offer very little food, but finds it difficult to live in places where the physical conditions are less suited to its activities, such as large lakes and fast-flowing rivers (Hydro-Québec 2004).

The beaver population density in this sector is comparable to densities in adjacent sectors, estimated at 1.36 colony per 10 km^2 (Hydro-Québec 2004). MRNFQ beaver capture data for trapping zone M-50 is indicative of the presence of beaver; 44 animals per year were captured in the period 1987-2004 (MRNFQ 2005).

The study area is likely to host a beaver population, due to proximity of tracts of water such as Baie du Poste and Cabistachouane Bay, as well as the presence of other watercourses and wetlands.

The proximity of lakes and rivers around the sector is also conducive to the presence of beaver. No beaver has been observed or hunted in the study area (TEK workshop, Appendix D).

- Marten (Martes Americana)

For its habitat, the American marten prefers dense softwood stands that are open or under regeneration, mixed stands dominated by regenerating softwoods, mature hardwood stands and mixed stands dominated by mature hardwoods (Hydro-Québec 2004). It seeks areas with numerous fallen trees, stumps and snags, since it prefers to move around under the snow cover (Gauthier and Guillemette 1991). In James Bay, Legendre et al., in their aerial survey of winter trails, noted that 76% of all trails were located in black spruce stands (Belles-Isles et al. 1991).

The high percentage of mature forest stands, particularly black spruce, is conducive to the presence of marten in the study area (see Table 5-4). The average annual capture in trapping zone M-50 for the period 1987 to 2004 was approximately 48 animals (MRNFQ 2005). There could be some trapping for marten in the fall, according to the information obtained from the TEK workshop.

- River otter (Lutra Canadensis) and Mink

The river otter's choice of habitat is influenced mainly by the presence of prey and ice-free water, since its diet mostly comprises fish and shellfish (Hydro-Québec 2004). The riparian vegetation around lakes, watercourses and other wetlands is a compulsory part of its habitat. Fallen trees or trees that are partially submerged in the spring provide shelter for the animal and its prey, as do the cavities between tree roots, shrugs or thick grasses (Gauthier and Guillemette 1991).

Mink are also usually found in aquatic environments, although they are able to consume land-based prey (hares, small rodents, birds) (Hydro-Québec 2004). The mink's habitats, in addition to the banks of watercourses and lakes, include forest strips, softwater marsh and salt marsh (Gauthier and Guillemette 1991)

The proximity of lakes around the study area is conducive to the presence of both species. The average annual capture in trapping zone M-50 for the period 1987 to 2004 was approximately 6 river otter and 9 mink (MRNFQ 2005). However, no river otter or mink have been observed in the study area (TEK workshop, Appendix D).

- Ermine (Mustela erminea)

This species prefers mature mixed stands dominated by softwood species. It also uses open spruce stands, pine stands, riparian environments and wooded peat bogs (Hydro-Québec 2004). Environments such as these account for nearly 60% of all vegetation communities in the study area (MRNFQ 2005). According to the information obtained from the TEK workshop, ermines are occasionally seen in the study area. However, there is no ermine hunting in this area (TEK workshop, Appendix D).

- Muskrat (Ondatra zibethicus)

The environments that are generally conducive to the muskrat are aquatic environments including shallow lakes and calm stretches of streams (Hydro-Québec 2004). The study area, which is surrounded by lakes, is therefore a suitable habitat for the species. The MRNFQ's capture data for trapping zone M-50 is indicative of a muskrat presence. The average annual capture for the period 1987-2004 was 7 animals.

- Red fox (Vulpes vulpes)

The red fox is not associated with any particular environment, since it follows its prey. Generally speaking, the size of the red fox population is dependent on the size of the ptarmigan and snowshoe hare populations (Hydro-Québec 2004). In Québec's Middle North region, 90% of red fox trails were located in black spruce stands, black spruce/jack pine stands and willow stands, where hare populations live (Gauthier and Guillemette 1991). Stands of this type dominate the forestry landscape of the study area.

The MRNFQ's capture data for trapping zone M-50 are indicative of a red fox presence. The average annual capture for the period 1999-2004 was approximately 3 animals. According to the information obtained from the TEK workshop, red foxes are occasionally seen in the study area. However, there is no red fox hunting in this area (TEK workshop, Appendix D).

- Snowshoe Hare (Lepus Americanus)

For the snowshoe hare, a quality habitat is usually a compromise between the availability of food and the availability of protective shelter. In the James Bay sector, the hare appears to prefer mixed stands (both mature and regenerating) dominated by softwoods, as well as dense mature softwood stands (Hydro-Québec 2004). In riparian environments, the animal thrives in willow stands. Its home range is limited to a few hectares.

As shown in Table 5-4, the study area contains a large number of stands able to offer a quality habitat for the snowshoe hare. According to the information obtained from the TEK workshop, snowshoe hares have been seen in the study area and there could be some snaring in the fall (TEK workshop, Appendix D).

- Common Porcupine (Erithizon Dorsatum)

Very little research has been done on the common porcupine in the James Bay area (Groupe Roche Boréal 1991). It is therefore difficult to estimate the animal's numbers, especially because the porcupine tends to remain in the trees that provide it with food.

Surveys of forests and riparian areas have shown that the stands most commonly used by the porcupine are the dense, open mature softwood stands that cover more than 60% of the study area.

Threatened or Vulnerable Mammals Species

Based on the information available from the Quebec Ministry of Natural Resources and Wildlife and Species at Risk Act, only one vulnerable wildlife species, and eight species likely to be designated as threatened or vulnerable, may potentially be found in the Lac Mistassini region (Table 5-7).

Table 5-7: Threatened or vulnerable mammals species likely to be found in the Lac Mistassini region

Name	French Name	Latin name	Distribution in Québec	Habitat
Threatened or vulnerable wildlife species				
Woodland caribou	Caribou forestier	Rangifer tarandus caribou	Can be found as far south as 46o north latitude	The caribou lives in northern boreal forests
Species likely to be designated as threatened or vulnerable				
Least weasel	Belette pygmée	Mustela nivalis	Around province	This weasel is found throughout the prairies, temperate and northern forests
Rock vole	Campagnol des rochers	Microtus chrotorrhinus	Ranges from Labrador west to southern Quebec	Rock voles are found primarily among mossy rocks and logs or in cool, moist talus areas
Southern bog lemming	Campagnol-lemming de Cooper	Synaptomys cooperi	Distribution in Québec delimited to the north by the black spruce climatic domain	Southern bog lemmings have been taken in grassy openings in woods, among mossy boulders in spruce forests, in bogs, in clearcuts, pastures, and power line rights-of-way
Eastern Red Bat	Chauve-souris rousse	Lasiurus Borealis	Present up to the black spruce domain	Eastern red bats are solitary and normally roost in trees and shrubs. Roosting sites near water seem to be preferred
Hoary Bat	Chauve-souris cendrée	Lasiurus cinereus	Present up to the black spruce domain	The hoary bat is usually found in forested areas where it roosts in trees. During the summer, it is normally found in areas of northern coniferous forests where it roosts in hemlock, spruce, and fir trees
Silver-Haired Bat	Chauve-souris argentée	Lasionycteris noctivagans	Present up to the black spruce domain	The silver-haired bat is associated with forest and grassland habitats and is often abundant in old-growth forests (Kunz, 1999)

Table 5-7: Threatened or vulnerable mammals species likely to be found in the Lac Mistassini region

Name	French Name	Latin name	Distribution in Québec	Habitat
Pygmy Shrew	Musaraigne pygmée	Sorex hoyi	Present up to the northern boundary of the boreal forest	Pygmy shrews range from old fields to hardwood and coniferous forests. They have been taken under decaying logs as well as in deep leaf litter
Canada lynx	Lynx du canada	Lynx canadensis	Found in all Québec's large forests	Its habitat is bound to that of the snowshoe hare, which is the preferred prey of the lynx

Source: MRNF 2005 and Environnement Canada 2006

- Woodland Caribou (*Rangifer tarandus*)

An aerial survey carried out in 2002 confirmed the presence of woodland caribou in the study area, a species designated as vulnerable (Société de la faune et des parcs du Québec 2002). The surveyed sector covered an area of 5,470 km^2 located along the Témiscamie River between Lac Albanel and the watershed. The sector in question is located approximately 36 km northeast of the study area. The survey results confirmed that woodland caribou were in fact present, with a herd density (0,2 caribou/10km^2) similar to most of Québec's other woodland caribou populations (Société de la faune et des parcs du Québec 2002). In Québec, herds are located mainly in the North Shore, Saguenay and James Bay regions. Predation, hunting and habitat alterations all have an impact on population size.

The woodland caribou lives in the boreal forest throughout the year. Its winter habitats and calving areas are regarded as limiting the caribou population. The animal uses winter habitats that offer protective cover against predators. It eats mostly ground lichen and, to a lesser extent, tree lichen (Hydro-Québec 2004).

The study area could provide protective cover for the caribou, since more than 50% of its forest comprises mature or old-growth stands made up of spruce and fir trees. The area's numerous bare wetlands and peat bogs would provide suitable calving grounds.

The MRNFQ's capture data for trapping zone M-50 is indicative of a caribou presence. In the period 1989 to 1991, a total of 21 caribou were harvested in the zone, for an annual average of seven animals (MRNFQ 2005). According to the information obtained from the TEK workshop, no woodland caribou has been observed or hunted recently in the study area. (TEK workshop, Appendix D).

- Least weasel (*Mustela nivalis*)

The least weasel, like the ermine, prefers softwood-dominated mature mixed stands. It also uses open spruce stands, pine stands, riparian environments and wooded peat bogs (Hydro-Québec 2004).

Environments such as these account for nearly 60% of the total vegetation community in the study area. The average annual capture for the period 1987 to 2004 in hunting zone M-50 was 3 animals (MRNFQ 2005). According to the information obtained from the TEK workshop, no least weasel has been observed recently in the study area (TEK workshop, Appendix D).

Photo 5-2: Least weasel
Source: Manfred Danegger

- Pygmy Shrew (*Sorex hoyi*), Rock vole (*Microtus chrotorrhinus*) and Southern bog lemming (*Synaptomys cooperi*)

These three species are particularly fond of wet and mesic sites – i.e. sites that are neither too wet nor too dry. The southern bog lemming tends to be found in peat bogs, grassy marshlands or the mixed damp forests around peat bogs, while the rock vole lives more on cliffs and rock outcrops.

- The study area may offer interesting potential for these species, due to the presence of wetland areas (Table 5-4).

According to information from the “Centre de données sur le patrimoine naturel du Québec” (CPDNQ), these three species have been observed in the region of the Lac Mistassini, in the locations shown in Appendix G. According to the information obtained from the TEK workshop, no pygmy shrew, rock vole, or southern bog lemming have been observed recently in the study area (TEK workshop, Appendix D).

- Bat

Acoustic surveys of bat populations were carried out in the region of the Lac Mistassini in 1999. In addition to the three vulnerable species presented in Photo 5-4, the big brown bat (*Eptesicus fuscus*) was also observed.

The bat’s habitat generally lies within wooded and semi-wooded areas where it can hunt insects above glades and tracts of water. In the daytime it shelters in trees, hanging upside down from branches or hidden in cracks in the bark (MRNFQ 2005).

The region of the Lac Mistassini is a likely site for these bat species, due to the proximity of tracts of water, including Baie du Poste and Cabistachouane Bay, and the presence of wetlands.

Photo 5-3: Pygmy Shrew, Rock Vole and Southern Bog Lemming

Pygmy Shrew	Rock vole	Southern bog
		
© Copyright The Smithsonian Book of North American Mammals	© Copyright R.W. VanDevender	© Copyright Roger Barbour

Photo 5-4: Threatened or Vulnerable Bat Species Likely to be Found in the Area Under Study

SILVER-HAIRED BAT	HOARY BAT	EASTERN RED BAT
		
Photo : Brock Fenton	Photo : Brock Fenton	Photo : Brock Fenton

Source: MRNFQ 2006

There are small brown bat's breeding areas in the study area (Alexandra Riverin, pers. comm. 2006, Ministère des Ressources naturelles et de la Faune, Région Nord-du-Québec).

- Lynx (Lynx Canadensis)

The lynx lives in the boreal forest (Gauthier and Guillemette 1991). Like the red fox, it is not associated with any particular environment because it tends to follow its prey. There is a correlation between lynx populations and populations of its main prey, the snowshoe hare (Hydro-Québec 2004).

The lynx has been observed in the region of the Lac Mistassini. Although capture rates are low; only seven animals have been captured since 1982 (MRNFQ 2005). According to the information obtained from the TEK workshop, no lynx has been observed or hunted in the study area (TEK workshop, Appendix D).

Bird Life and Waterfowl

General Description

According to the ÉPOQ database, daily bird observation reports from the Lac Mistassini sector indicate the presence of numerous bird species. In all, 67 different species have been observed in the sector, including confirmed sightings of 23 species of nesting birds (Association québécoise des groupes d'ornithologues 2005). Appendix G contains a list of all the bird species present at Baie-du-Poste and in the vicinity of Mistissini.

Waterfowl

Waterfowl, such as ducks and geese, depend on wetlands for food, shelter and breeding grounds. Nearly 20 species of wildfowl and other aquatic birds were identified during surveys carried out in 2002 in sectors adjacent to the study area (Hydro-Québec 2004). The most common were the Brent goose (*Branta bernicla*), the American black duck (*Anas rubripes)*, the common merganser (*Mergus merganser*) and the green-winged teal (*Anas crecca*).

In spring, the Canada goose *(Branta Canadensis)* and the black duck make extensive use of small tracts of water, such as beaver ponds, natural ponds and small lakes under 5 hectares. Lac Mistassini appears to be a staging area for the Canada goose (UQCN 2005).

However, these habitats are gradually abandoned during the summer, in favour of rivers and, to a lesser extent, large lakes (more than 100 ha).

The common merganser uses many different habitats in the spring, including the large lakes (more than 100 ha) that it tends to prefer in the summer.

The green-winged teal lives in shallow inland waters with an abundant supply of emerging and floating vegetation. It builds its nest in drier habitats, usually not far from a softwater supply, often between 40 and 100 metres from a small lake, pond, marsh, bog or watercourse

Unlike the nesting species, the migratory species gather first on larger lakes (more than 100 ha), and then on smaller tracts of water and rivers (Hydro-Québec 1991)

The study area is a suitable host site for many species of nesting and migratory birds, due to the proximity of tracts of water such as Baie du Poste and Cabistachouane Bay, and the presence of wetlands.

According to information from the TEK workshop, waterfowl identified close to the study area by the participants are Canada goose, common loon (Gavia immer), Artic loon (Gavia artica), American black duck, common merganser, mallard (Anas platyrhynchos) and common goldeneye (Bucephala clangula). Ducks and geese are hunted mainly during the spring time. In the fall, people go hunting in other areas. Willow ptarmigan (*Lagopus lagopus*) and ruffed grouse (*Bonasa umbellus*) are observed on the Watson peninsula in the spring (Figure 4-1).

Threatened Bird and Waterfowl Species

Based on the list of threatened bird and waterfowl species in Québec (AQGO, 2006) and the federal database, there are no threatened species nesting areas in the sector under study.

However, there may be some bald eagles (*Haliaeetus leucocephalus)*, since the nesting area of this particular species covers the whole of southern Québec up to the 56º parallel. One of the participants at the TEK workshop reported seeing a bald eagle steal a fish drying at his camp (Figure 5-4 and Appendix D).

Table 5-8: Threatened or Vulnerable Bird Species Likely to be Found in The Area Under Study

Name	French Name	Latin name	Distribution in Québec	Habitat
Threatened or vulnerable wildlife species				
Bald eagle	Pygargue à tête blanche	Haliaeetus leucocephalus	Its nesting area covers the whole of southern Québec up to the 56th parallel.	Breeds in forested areas near large bodies of water.

Photo 5-5 : Bald Eagle

Photo : Catherine Poussart
Faune et Parcs Québec

Amphibians and Reptiles

Description

The Atlas of Amphibians and Reptiles (1996) lists four species for the area around the Town of Mistissini (Table 5-9, Photo 5-6)

The study area is conducive to the presence of amphibians and reptiles due to its proximity to tracts of water such as Baie du Poste and Cabistachouane Bay, and the presence of numerous wetlands.

According to the information obtained from the TEK workshop, there are frogs (American toad has been seen frequently) and snake are abundant in the study area (TEK workshop, Appendix D).

Threatened Amphibian and Reptile Species

Based on the information available from the Quebec Ministry of Natural Resources and Wildlife and Species at Risk Act, no vulnerable amphibian and reptile species were found in the region of the Lac Mistassini.

Table 5-9: List of amphibian and reptile species found in the Lac Mistassini region

Name	French Name	Latin Name	Habitat
American Toad	Crapaud d'Amérique	Bufo americanus	The American toad is found in many different land-based habitats, ranging from cut grass areas and gardens to dense woodlands (MRNF 2005)
Wood Frog	Grenouille des bois	Rana sylvatica	The wood frog is found in hardwood and mixed forests close to tracts of water (MRNF 2005)
Northern leopard Frog	Grenouille léopard	Rana pipiens	The northern leopard frog is not usually found in dense forests, sites with grass more than a metre high or open sandy areas. It appears to prefer environments close to water where the vegetation grows to between 15 and 30 cm in height (Environnement Canada 2005)
Common Garter Snake	Couleuvre rayée	Trachemys sirtalis	The common garter snake lives in open areas in woodlands, fields, close to farms, along roads, on marshy land or along the shores of lakes, ponds or streams (UQCN 2005).

Source: Atlas of Amphibians and Reptiles: Vicinity of Mistassini, 2004

Photo 5-6: Amphibian and Reptile Species found in the Lac Mistassini Region

AMERICAN TOAD	WOOD FROG
	
A. Resetar	Anonymous
NORTHERN LEOPARD FROG	COMMON GARTER SNAKE
	
Tom Tyning Mass Audubon	Hammerson, 1986.

Summary of Data on Land-Based Wildlife, Fish and Birds

In all, 32 mammal species, nearly 70 bird species, seven fish species and four amphibian and reptile species were observed in the large territory of region of the Lac Mistassini according to the resources consulted for the purpose of the analysis. According to the information obtained from the TEK workshop, the animals seen in the study area are mainly martens, snowshoe hare, foxes and ermines.

There is no recent observation of bear, wolves, lynx, moose, beaver and mink. Presently, there is no hunting in the study area.

According to historical data on home ranges in Québec, ten species that appear on the federal or provincial lists of species or habitats at risk (COSEPAC 2005) are likely to live in the region of the Lac Mistassini. Except for the bald eagle steal that has been observed in the TEK, no other specie at risk has been observed in the study area.

65% of the study area is covered by softwood stands, 63% of which are black spruce. Mature (M) stands 70 years of age or older, along with old-growth stands of different ages (VN), account for 75% of the area. Unforested land accounts for 20% of the area, and comprises mainly bare wetlands, while regenerated stands account for 14%.

The mosaic of potential habitats formed by the various vegetation communities in the region of the Lac Mistassini hosts different species with a range of ecological requirements.

Table 5-10 summarizes the potential habitats of the species studied, while Figure 5-5 presents a map. The potential habitat classes reflect the number of species that may be present in the study area, as shown in Table 5-10. The classes are defined as follows:

- Low 1 or 2 species
- Moderate 3 or 4 species
- High 5 species or more

These potential habitats do not take into account the human pressure from hunting and land use by residents of Mistissini. The term “potential” means that area in question could provide a habitat suited to the needs of the animals in question, but does not necessarily mean that the animals are present in the area.

Table 5-10: Summary of the potential habitats of studied species

	Spruce stand Spruce stand with balsam fir Fir stand with spruce	Regenerated stand – Conifer Larch stand with spruce Softwood with white spruce Windthrown	Wet Site	Dry Site	Regenerated Stand – Mixedwood	Willow Stand
Moose						
Marten						
Snowshoe hare						
Black bear						
Spruce grouse						
Willow ptarmigan						
Waterfowl						

= Favourable

5.4 Human and Socio-economic Environmental Components

5.4.1 Administrative Context

The administrative context of the James Bay Territory is in a number of ways quite different from that of the rest of the province of Québec. The following brief overview focuses: 1) on the particular regulatory regime brought about by the JBNQA, the Cree-Naskapi Act and the "Paix des Braves" and 2) on local and regional entities involved in wildlife management; forestry resources management; conservation and environmental protection; tourism; community development; and health, social services and education; and human resources development.

JBNQA, Cree and NASKAPI Act and New Relationship Agreement ("Paix Des Braves")

In the context of planned development of the La Grande hydroelectric complex in the early 1970s, the Crees, the Inuit and the Governments of Canada and Québec (in addition to Hydro-Québec, the James Bay Development Corporation and the James Bay Energy Corporation) signed the James Bay and Northern Quebec Agreement (JBNQA) in November 1975. The purpose of this agreement was to define land rights in the James Bay and Northern Québec regions. The JBNQA also introduced new administrative structures for the James Bay Crees and provided them with more powers to manage community services and to develop their economy. The JBNQA provided new regulations and structures among which the Land Regime, the Hunting, Fishing and Trapping Regime, the Outfitting Regime and the Environmental Protection Regime. It also provided for an Income Security Program for Hunters and Trappers (ISP).

The JBNQA Land Regime distinguished the rights of the Crees according to three different categories of lands:

In Category 1A and 1B lands[2] , the Cree Nations have powers resembling that of a municipality. These lands are reserved for the exclusive use of the Crees. The Category IA and IB lands of the Cree Nation of Mistissini measure approximately 1,906 square kilometres.

Category II lands are public lands where the Crees have exclusive fishing, hunting and trapping rights. However, these lands can be used for other economic development as long as they are replaced. Category II lands of the Cree Nation of Mistissini cover an area of 7,636 square kilometres.

Category III lands are public lands where the Crees have exclusive trapping rights and where they can pursue their traditional activities without any legal constraints (they can hunt, fish and trap without permits at any time). Mistissini Category III lands cover approximately 350,000 square kilometres.

The JBNQA established a Hunting, Fishing and Trapping Regime that gave special wildlife harvesting rights to the Crees and also a Outfitting Regime providing some rights to the Crees regarding the establishment of outfitters in the James Bay territory. The JBNQA provides for two Environmental Protection Regimes, one on either side of the 55th parallel, that stipulate rules concerning social and environmental impact assessment of projects in the JBNQA territory.

[2] Category IA Lands are under federal jurisdiction, while IB lands are under provincial jurisdiction

The JBNQA provided for the establishment of many Cree entities to manage different governmental responsibilities that were transferred to the Crees such as the Cree School Board and the James Bay Cree Board of Health and Social Services. The JBNQA also provided for the establishment of the Cree Regional Authority (CRA), a public corporation which manages the responsibilities and compensations[3] provided by the JBNQA and the subsequent agreements. According to the JBNQA, the CRA also has responsibilities in respect to environmental protection, the hunting, fishing and trapping regime, economic and community development as well as other matters as decided by the Board of Directors[4] . The CRA represents the Crees in the many bi-party committees set up by the agreement. The CRA is the administrative arm of the Grand Council of the Crees. The CRA is composed of four departments: Community Services, Administrative Services, Human Resources Development (see above) and the Traditional Pursuit Agency.

Following the JBNQA, the Government of Canada passed three laws and the Quebec National Assembly passed 29 laws to enforce the provisions of the JBNQA. Among the new federal laws, the Cree-Naskapi (of Quebec) Act adopted in 1984 pursuant to Section 9 of the JBNQA and to the Northeastern Quebec Agreement signed in 1978 with the Naskapis, defined the respective powers of the Cree and Naskapi Bands and their jurisdiction over Category IA Lands. By virtue of this Act, the Councils of Cree Nations are authorized to enact legally binding regulations and acts through resolutions and by-laws on Category 1A lands. They can also establish committees (when necessary), to assist in the administration of the Nations and of their Councils.

An “Agreement concerning a new relationship between the Government of Québec and the Grand Council of the Crees of Québec-Eeyou Istchee (GCCQ-EI)” was signed on February 7, 2002. Beside settling different disputes, the object of this agreement, which is also known as the “Paix des Braves”, was to pursue the exploitation of natural resources, namely forestry, mining and hydroelectricity in Cree territory with the participation of the Crees. The “Paix des Braves” provided for a new forestry regime and the creation of a Cree-Quebec Forestry Board. In the mining sector, the agreement provided for the creation of a Minerals Exploration Board. Complementary agreements were also signed between the Crees and Hydro-Québec[5] .

Wildlife Management

By virtue of the JBNQA’s Hunting, Fishing and Trapping Regime, the Crees have the right, subject to the principle of conservation, to hunt fish and trap any species in the JBNQA Territory except species requiring total protection. A Hunting, Fishing and Trapping Co-ordinating Committee (HFTCC) was created to manage and oversee the application of the Hunting, Fishing and Trapping Regime and the Outfitting Regime set up under the JBNQA. According to the Cree-Naskapi Act, Cree band councils can make by-laws respecting Cree hunting, fishing and trapping activities and the protection of wildlife in Category I lands.

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3 The Board of Compensation manages funds from the 1975 James Bay Agreement. It funds economic ventures directly and manages Air Creebec, the Cree Construction and Development Company, Valpiro, and Cree Energy through its holding company, Creeco.

4 The CRA Board of Directors is composed of the members of the Grand Council of the Crees of Québec-Eeyou Istchee (GCCQ-IE).

5 Including the *Nadoshtin Agreement* for the Eastmain-1 hydroelectric project, the *Boumhounan Agreement* for the Eastmain-1A and Rupert diversion hydroelectric project, the Cree Employment Agreement (Apatisiiwin) to promote Cree employment at Hydro-Québec and the Mercury Agreement.

The Cree Trappers Association (CTA), which was incorporated in 1978, also deals with wildlife management on the traplines. The CTA is in charge of fur commercialisation, the improvement of traplines and the training of trappers. The regional CTA head office is located in Eastmain but every Cree community has it's own local CTA. Each local CTA manages it's own subsidy programs for Cree trappers. The CTA membership is composed of Cree hunters and trappers including those participating in the Income Security Program for Hunters and Trappers (ISP). In 2002-2003, the Mistissini CTA had 475 members.

In the 2002 "Paix des Braves" agreement, the Government of Québec committed to raise the number of wildlife conservation officers on the James Bay Territory by training and employing Cree wildlife conservation officers. Tallymen were also granted the powers of auxiliary game wardens. In Cree communities, there are no official or written rules concerning wildlife management beside the fact that, since the creation of the beaver preserves, management of beaver resources are under the tallyman's responsibility.

According to Cree traditions, fur bearing animal management is the responsibility of the tallyman. The tallyman co-ordinates activities on his trapline, including the harvesting of resources and the designation of areas to be harvested (Hydro-Québec, 2006). The authority of the tallyman is non-dominant and non-hierarchical (Berkes, 1995 in Whitman, 1998). All hunters and trappers are responsible for respecting animal resources and for not over hunting. The authority of the tallyman regarding aspects other than trapping fur bearing animals is subject to controversy. For some Crees, the authority of the tallyman also extends to hunting and fishing activities and they carry out such activities in consultation with the concerned tallyman but this point of view is not shared by all. Tallymen see themselves as caretakers of the land and they prefer to know what is going on their trapline. Many tallymen deplore the erosion of their authority and the fact that more and more hunters do not consult them in their hunting and trapping activities (Hydro-Québec, 2004).

Even if Category I lands are officially included within the trapline system, they are generally seen as "community areas". Tallymen recognise that they have little control over what is going on such lands and that other hunters and trappers from the community can do as they please with the exception of trapping beavers without their permission.

Forestry Resources Management

By virtue of the JBNQA, Category I lands are reserved for the exclusive use of Cree communities and only they can carry out forestry activities on such lands. The Québec Department of Natural Resources and Wildlife (Ministère des Ressources naturelles et de la Faune) is responsible for the management of forestry resources on Category II and III lands.

Following the signing of the "Paix des Braves" in 2002, a new Forestry Regime was set up in the James Bay Territory. Forestry resources management is now carried out on a trapline basis. Mosaic cutting with protection of regeneration and soils (CPRS) is obligatory. A new "40% disturbance rule" stipulates that no more than 40% of the productive forest of a trapline can be removed by forestry operations or by fire in a given 20-year period. Tallymen also have the right to preserve 1% of the productive forest on their trapline as "Special interest sites" where no forestry activities are allowed. Furthermore, tallymen can designate 25% of the productive area of their trapline as "Areas of wildlife interest" where forestry activities have to follow special regulations. In "Areas of wildlife interest", cutting must be done in consultation with the tallyman and 50% of the productive forest must be left standing.

A Joint Working Group on Forestry has been set up to consult the tallymen and relay the information to the forestry companies. Joint Working Groups are also established at the local level to set up consultations, to follow-up on the application of the Forestry Regime and to analyse land use conflicts. This new regime also requires Cree tallymen to establish firm boundaries for their traplines as some trapline limits were formerly subject to debate between neighbouring tallymen. Without the new regime, forestry companies would have pursued harvesting on 50 traplines in 2002-2003 but with the new rules they were only allowed to work on 14 traplines. The Government of Québec has also committed to provide the Crees, five years after the signing of the Agreement, with 5% of forestry harvesting possibilities (approximately 350,000 m3) in the form of Forest management contracts, also known as "CAAF". The objective is that 15% of direct forestry employment in the James Bay Territory will be occupied by the Crees in the 10 years following the signing of the Agreement.

Conservation and Environmental Protection

According to Section 45 of the Cree-Naskapi (of Quebec) Act adopted in 1984, Cree Nations have the authority to adopt by-laws respecting the protection of the environment and natural resources on Category I lands. Since 1986, the Cree Nation of Mistissini has such a by-law (By-Law No. 12).

The Local Environment Administrators (LEAs) are the prime contact for all environmental affairs in Category I lands. By virtue of the JBNQA, the LEA acts as the « administrator » in the Environmental and Social Protection Regime set up under Section 22 of the agreement. They have the authority to accept or reject projects. The LEA is also responsible for the application of Cree band council by-laws concerning the protection of the environment. They also intervene on files that may have an impact on the traplines regardless of land categories.

The Environment Department of the CRA, which falls under the Traditional Pursuits Agency, provides backup expertise to the Cree representatives on the various environmental and wildlife committees set up under the JBNQA, including the James Bay Advisory Committee on the Environment[6] . It also provides similar expertise to the new Forestry Regime. The Environment Department also works with Cree communities and the local and regional Cree entities in the writing of impact assessment reports or studies that are done in respect to local environmental matters.

Tourism

The Cree Outfitting and Tourism Association (COTA) was set up in 2000. It represents Cree outfitters and other tourism stakeholders. COTA's mission is to "develop and implement a collective vision for a world-class sustainable tourism industry in Eeyou-Istchee in harmony with Cree culture and values, and involving a partnership among Cree communities, institutions and businesses". COTA has the following objectives:

- Implement Section 28.6 of the JBNQA ("provide marketing, booking and promotion services, provide business, management, accounting and professional services and conduct feasibility studies related to the establishment or siting of individual outfitting or tourism facilities or a network of outfitting or tourist facilities") ;

[6] The other Committees derived from the JBNQA and supported by the Environment Department are the Evaluating Committee, the Federal Review Panel and the Provincial Review Committee (Section 22 of the JBNQA) as well as the Hunting Fishing and Trapping Co-ordinating Committee (Section 24 of the JBNQA).

- Promote tourism industry development (includes representing the interests of COTA members at meetings with government agencies, commissions, etc.) ;
- Promote Community Awareness and Capacity Building ;
- Marketing the Cree tourism products ;
- Ensure effective communications between COTA's members and Cree stakeholders such as tallymen, communities and industries and between COTA members and external agencies and stakeholders ;
- Promote financial development by seeking funding and other resources from governments, the private sector and others and by developing, where appropriate, revenue-generating activities.

In Mistissini, COTA has three members: Awashish Outdoor Adventures, the Mistissini Lodge and the Tourism Sector of the Economic Development Department of the Cree Nation of Mistissini.

Community Development

Cree Community Development is under the responsibility of each Cree Nation. The CRA also has a Community Service Department that provides a wide range of technical support services and expertise to Cree communities and that manages funding provided for community development under the different agreements. The Council of the Cree Nation of Mistissini is responsible for promoting economic and community development and has two distinct departments that manage those responsibilities.

To provide direction and directives for the development of businesses and enterprises, the Mistissini Cree community has adopted some by-laws among which are:

- By-Law No.6: Regulation of construction projects;
- By-Law No.12: By-Law concerning the protection of the environment;
- By-Law No. 109: By-Law respecting the establishment and operation of businesses and enterprises within the community of Mistissini and the surrounding category 1A land; and
- By-Law No. 117: By-Law amending By-Law No. 9 concerning the operation and speed of vehicles and the regulation of traffic.

Health, Social Services and Education

The Cree Board of Health and Social Services of James Bay (CBHSSJB) was established by the JBNQA in 1975 but was only formally constituted in 1978. The CBHSSJB is responsible for dispensing health and social services in Cree communities. It operates the Chisasibi regional hospital and two "CLSC" that provide local health and social services in the nine Crees communities. Mistissini is home of the Inland CLSC and also hosts a group home for young people. Every Cree community has a Health Committee that assists with local implementation of CBHSSJB programs.

The Cree School Board (CSB) was established by the JBNQA in 1975 but was also only formally constituted in 1978. The Cree School Board has full jurisdiction and responsibility for education within the Category I and Category II lands of all Cree communities. Sabtuan Continuing Education Services is the Cree School Board's department in charge of adult education. Sabtuan offers Upgrading Courses in basic skills, Distance Education and Skills and Trade courses. Skills and Trade courses are offered

in the different communities according to local demand and also at the regional level. A new Regional Vocational Training Centre was built in Waswanipi in the fall of 2005.

Human Resource Development

In 1996, Human Resources Development Canada transferred most of its programs to the Cree Regional Authority. Cree Human Resources Development (CHRD) was instituted as a department of the Cree Regional Authority (CRA) in April 2002. CHRD has the mandate to provide skills development, training programs and services and employment insurance services in the nine Cree communities and throughout the JBNQA Territory. The goal of CHRD is to help Crees and non-Crees living in the Territory to prepare for, obtain and keep jobs. CHRD can provide support and financial assistance to help individuals to improve their jobs search skills, to gain work experience, to upgrade their skills and vocational education, to start their own business and to encourage employers to hire them. CHRD also helps employers to create new jobs and to upgrade their employees' skills.

5.4.2 Socio Economic Context

This section presents an overview of socio-economic trends in Mistissini from 1990 up to 2005. The information comes from two sources: 1) interviews and public consultations carried out in Mistissini and 2) the available reference literature. The reference data comes from statistics that are available through governmental and Cree agencies and from the reference literature. It shows the evolution of the situation from 1991 to 2006 when data are available. However, federal census data from Statistics Canada is presented from 1996 to 2001 as the 1991 census in Mistissini did not have a sufficient answering rate for the data to be published. The population of Mistissini referred to in this report includes all the residing population, including the non-Native population.

History

The Mistissini area has probably been occupied continuously from at least 4,500 BCE to the present (Cree Nation of Mistissini web site). The James Bay Crees, who are also referred to as Eastern Crees, speak the East Cree which is an Algonquian family language. Few things are known about the way of life of the Crees before first contact with the Europeans except that they were small hunting groups living a nomadic life and carrying out subsistence activities based on hunting, fishing and trapping.

As is the case for many aboriginal communities in Québec, the village site of the community of Mistissini is the product of the history of fur trading. Starting in the 17th century, Europeans fur traders established trading posts in the James Bay territory. The first trading post on Lac Mistassini was established in 1673 by French traders (White 1926 and Voorhis 1930, in Duhaime ed. 2001). The post was later abandoned but reopened under the name of Dorval House in 1728. In the 18th century, different posts were opened by different traders in the Lac Mistassini, Albanel Lake and Témiscamie River areas for different lengths of time. According to the Cree Nation of Mistissini web site, the North West Company established a post on the Akiyapit peninsula from 1786 to 1817.

In 1803 or 1808, the North West Company opened a post near the present village site referred to as Patagoosh but in 1814 it was moved to lake Albanel (Voorhis, 1930 in Duhaime ed. 2001). In 1821, the North West Company was absorbed by the Hudson's Bay Company and in 1835, the Mistassini post was moved to its actual site at Baie-du-Poste (Potier 1965 in Duhaime ed. 2001) and this site will be continuously used up to the present day.

In what manner and to what extent the contact with Europeans traders changed the Cree way of life is still the subject of debate. However, it would appear that technological changes were introduced gradually (Duhaime ed., 2001). During the trading period, the Crees continued to lived a nomadic life. They trapped during the fall and winter on their hunting and trapping grounds and returned in the summer to the post that was usually located at a traditional summer gathering place. The population that used the Mistissini Post and that later settled around it were part of the Inland James Bay Crees, which is a sub-group of the James Bay Crees (Duhaime, 2001).

The first Anglican missionary arrived in the Mistissini region in 1835 (Cree Nation of Mistissini web site). However, it was only at the start of the 20th century that the missionaries strengthened their presence by building a church (1910), and by offering dispensary and school services. The 20th century was an important period of changes for the Crees. In the first half of the century, the depletion of certain animal resources (caribou and beaver) combined with epidemics and episodes of starving caused many Crees to search for the missionary assistance provided at the trading post.

In the 1930s, a decline in the beaver population led the provincial government to set up a system of beaver preserves in Northern Quebec. In the James Bay area, Crees were allocated a monopoly over the harvesting of fur bearing animals in beaver preserves. Inspired by the traditional role of the "Nituuhuuchimaau" (the hunting boss), the Government delegated to certain Cree trappers the responsibility of tallying beaver populations and of controlling trapping on the parts of the beaver preserve that were allocated to them. The delimitation of trapping lots or traplines followed most of the time traditional family hunting grounds. Following requests from the Mistissini Band Council, the Mistassini beaver preserve was created in 1948. It was composed of 71 traplines, each of which was headed by a tallyman chosen from among the 185 trappers recorded at that time.

In the 1940s, the federal government introduced social welfare programs to Cree communities. In the 1950s, the Crees started living on a more permanent basis near the trading post and a permanent settlement was established near the Mistissini trading post[7] (Hydro-Québec, 2004). In the second half of the 20th century, the federal and provincial governments took over the health and education services provided by missionaries and introduced many other changes that affected the way of life of the Crees. These included the obligation of schooling for Cree children that led them to be sent to residential schools outside their community[8] , the provision of transfer payments (such as old age pensions) and the construction of houses and of new community infrastructures[9] . Those changes, combined with the emergence of local government through community Band councils and of other sources of salaried income in the mining sector[10] , led, "for the first time since colonisation, to a social reorganisation of the Crees" (Duhaime ed., 2001). Nevertheless, the Cree way of life in the 1960s and 1970s still depended a lot on hunting, trapping and fishing activities. In 1970, two thirds of the Cree population was still going into the bush for long periods of time for hunting, fishing and trapping and most available employment was seasonal and low-paid (Salisbury, 1986).

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7 The main factors leading to the settling of the Crees were the decline in fur prices, the necessity to live in a permanent settlement to benefit from social welfare programs and the influence of the Church (Hydro-Québec, 2004).

8 The residential school system that promoted a policy of assimilation often led to physical and psychological abuse of Native children. This system had a negative effect on Native culture and on the children's identity and well-being and actions are being taken today to repaired the damage caused by this system.

9 After Mistissini obtained the official status of Indian reserve in 1962, the federal government built houses, a dispensary and a school. A saw mill was also built but it burnt down some years later.

10 Chibougamau, which was founded in 1945, became an important mining centre in the 1950s and in 1962 a new road linked Mistissini to Chibougamau.

As mentioned earlier, the signing of the JBNQA in 1975 resulted in a new administrative context and provided Cree communities with more powers than before. The head offices of the Cree School Board, of the James Bay Cree Communication Company and of the Cree Construction and Development Company (CCDC) were established in Mistissini[11] . The JBNQA also increased the number of permanent jobs available in the Cree communities.

Mistissini is now considered the inland metropolis of the Crees. In the 20th century, many Cree families from the Nichequon and Neokweskau trading posts settled in Mistissini as these other inland trading posts were closed. Mistissini also used to be the home of some members of the Nemaska and Oujé-Bougoumou Nations but those Crees moved to their own community when they were reinstalled. Nemaska was built at the end of the 1970s and Oujé-Bougoumou at the beginning of the 1990s.

The members of the Oujé-Bougoumou Nation are still considered part of the Mistissini Band population for the Department of Indian and Northern Affairs Canada (INAC). Negotiations are currently underway with regards to the sharing of Mistissini Category I and II lands between Mistissini and Oujé-Bougoumou.

Population

- Population growth and migration

In this report, two types of data are used to describe the Cree population in Eastern James Bay:

- Statistics Canada data which is based on censuses carried out every 5 years of the Native and non-Native population living in Mistissini
- The Registry of the Crees Beneficiaries of the JBNQA compiled by the Quebec Department of Health and Social Services, which is a retroactive database (i.e. data collected at different periods of time can be slightly different but tend to average out over time). The Registry is considered to be the most accurate source of data concerning the Cree population (including Crees living outside the community).

Mistissini has the second largest Cree population in the James Bay territory. From 1991 to 2005, the Cree population of Mistissini grew by 35 % (see Table 5-11). The Cree population has a higher birth rate (23.9 per 1000 in 1999) than the Quebec population (10.0 per 1000 in 1999) and women tend to have their children younger (Hydro-Québec, 2004). Between 1991 and 2001, the Mistissini population, as recorded by the Statistics Canada censuses, grew by 24 % while the Quebec population grew by 17 %.

[11] The CCDC head office was recently moved to Chisasibi.

Table 5-11: Evolution of the Cree Population Living in Mistissini, 1991 to 2005

Years	Men	Women	Total
1991	1 089	1 072	2 161
1995	1 184	1 170	2 354
2001	1 337	1 345	2 682
2005	1 452	1 474	2 926
Variation	33 %	38 %	35 %

Source : Department of Health and Social Services (Québec), Registry of the Crees Beneficiaries of the JBNQA, Data for the January 1st of each year. From 1991 to 2002: Data collected on July 18th, 2002. From 2003 to 2005 : Data collected on December 5th, 2005.

As is the case in other northern remote communities, part of the Mistissini population tends to migrate to the South for training or education purposes or to find employment. However, this trend is less pronounced in Cree communities. This may be partly due to cultural and language differences that make the perspective of living in the South less appealing. In 2005, only 6% of the members of Mistissini community were living outside a Cree community (see Table 5-12) and only half of those (3%) were living outside the James Bay Territory (i.e. the territory governed by the JBNQA).

Table 5-12: Members of the Cree Nation of Mistissini According to their Place of Residence (1991-2002)

Years	In Mistissini	In other Cree Communities	Outside a Cree Community			Total
			In JBNQA territory	Outside JBNQA territory*	Total	
1991	2 116	21	78	40	117	2 254
1995	2 322	65	105	81	169	2 556
2001	2 618	85	105	120	190	2 893
2005	2 859	119	99	94	193	3 171
Variation	35%	467%	27%	135%	65%	41 %

* Including Crees living outside the JBNQA territory since more then 10 years

Source : Department of Health and Social Services (Québec), Registry of the Crees Beneficiaries of the JBNQA, Data for the January 1st of each year. Data collected on July 18th, 2002 (In JBNQ territory data 1991-2002), on November 21st, 2005 (Outside JBNQA territory data 1991-2005) and on November 29th, 2005 (In JBNQ territory data 2003-2005).

One of the major aspects of the Cree population is its age composition. The Mistissini Cree population is rather young (see Table 5-13). In 2005, 51% of the population was less than 25 years old. However, since 2001 the relative size of the age group from 15 to 24 years old has started to decline while the age groups from 25 to 34 years old and from 35 to 49 years old have registered the most important increases. The important group of Cree teenagers from the 1990s have now entered the work market. In 2001, according to the Statistics Canada census, 90 persons declared themselves as non-Native in Mistissini, which represents 3.5% of the total population recorded (see Table 5-14).

Table 5-13: Cree Population Living in Mistissini by Age Groups, 1991 to 2001

	1991		1996		2001		2005		Variation 1991-2005
	Number	%	Number	%	Number	%	Number	%	
0 to 14 years	791	36 %	814	34 %	870	32 %	953	33 %	20 %
15 to 24 years	571	26 %	602	25 %	555	21 %	514	18 %	-10 %
25 to 34 years	342	15 %	414	17 %	511	19 %	565	19 %	65 %
35 to 49 years	284	13 %	305	13 %	420	16 %	509	17 %	79 %
50 to 64 years	129	6 %	179	7 %	211	8 %	142	5 %	10 %
65 years and more	93	4 %	101	4 %	115	4 %	138	5 %	48 %
Total	2 210	100 %	2 415	100 %	2 682	100 %	2 926	100 %	32 %

Note : These data represent the Cree population living in Mistissini (including Crees from other communities)
Source : Department of Health and Social Services (Québec), Registry of the Crees Beneficiaries of the JBNQA, Data for the January 1st of each year. Data collected on July 18th, 2002.

Table 5-14: Mistissini Population by Ethnic Identity, 1996 to 2001

	1996	2001
Total population	2335	2580
Native	2225	2490
Non-Native	110	90
Non-Native in proportion of total population	4.7 %	3.5 %

Note : The numbers are randomly rounded. The non-Native population is the total population minus people declaring themselves as having an aboriginal identity.
Source : Statistics Canada, 1996 and 2001 censuses.

Housing and Infrastructures

- Housing

Two different sources of data can be used regarding housing in Cree communities : census data from Statistics Canada and Cree Nations data compiled in 2000 by Norman D. Hawkins and Associates Inc. The Cree Nations data is considered to be the more accurate as it consists of first hand data.

The problem of overcrowding is worse in Mistissini than in other James Bay Cree Communities both in terms of the number of persons by unit and in terms of the number of units failing to meet the Canadian standard of one person per room (Norman D. Hawkins and Associates Inc., 2000). The Crees have requested funding for the construction of more houses since the beginning of the 1980s. Since then, however, the situation has worsened as the housing backlog rose. In Mistissini, the housing backlog represented 97% of the existing stock in 1999. According to Norman D. Hawkins and Associates Inc.(2000), the number of persons per unit rose from 5.8 to 5.9 between 1994 and 1999 (see Table 5-15).

Table 5-15: Evolution of Housing Conditions in Mistissini, 1983 to 1999

	1983	1994	1999	Variation 1983 to1999
Number of units	279	423	484	73 %
Person per units	n.a.	5.8	5.9	--
Proportion of housing overcrowded (1)	n.a.	n.a.	79 %	--
Number of housing requiring renovations	n.a.	n.a.	100	--
Housing Backlog (2)	144	215	470	226 %

(1) Number of houses failing to meet the Canadian standard of one person by room.
(2) The housing Backlog as calculated to meet the current year demand.
n.a. : not available
Source : Norman D. Hawkins & Associates Inc., 1997, Norman D. Hawkins & Associates Inc., 2000

As is the case in many Native communities, most of the houses in Mistissini (95%) are houses built under the Canadian Mortgage and Housing Corporation's (CMHC) aboriginal housing program (see Table 5-16). Theses houses are built through funding and loans provided by INAC and the CMHC and tenants pay a rent. Recently many private houses have been built in Mistissini following the introduction in 1996-97 of a new federally-funded program for progressive access to housing. According to this program, the construction of private houses funded by the Band office is repaid by the home owners with interest (Site web www.ainc-inac.gc.ca).

Table 5-16: Types of Housing Available in Mistissini, 1999

	Number	%
CMHC	461	95
Private	13	3
Other	10	2
Total	484	100

Note : "Other " includes housing belonging to band councils, SEBJ and other contractors mobile home, log houses and cedar houses.
Source : Norman D. Hawkins & Associates Inc., 2000

- Community Infrastructure and Services

Mistissini is connected to the provincial power grid by a 69 kV power transmission line that runs along the Mistissini access road linking the community to Highway 167. The community's water intake is located in Baie du Poste close to the community and is connected to a treatment plant. Because of the poor quality of water withdrawals from the existing intake, the Band council plans to relocate the water intake to a site farther to the South of the community. The community is equipped with sewers and a wastewater treatment system based on aerated ponds. Garbage collection services are provided and waste is put in a landfill located on the Watson peninsula. The community has a fire station, a police station and a community radio station. Police services are provided by a Cree police force. Phone and cell phone services, banking services and grocery stores are available in the community. The Mistissini Lodge provides first class lodging to visitors.

The Recreation Department of the Cree Nation of Mistissini is in charge of recreation facilities in Mistissini. The main recreation facilities used by Mistissini residents such as playing grounds, the arena and the gymnasium are located in the community. A community beach that is the most popular recreation facility in the summer is located to the south of the Watson peninsula near the Perch River mouth (see Land Use Map). On hot summer days, from 500 to 1000 persons go to the community beach and some families camp there. In winter, snowmobile trails are also popular recreation facilities. A snowmobile trail links Mistissini to Chibougamau via the Abatagouch Peninsula (see Land Use Map). On the Watson peninsula, snowmobiles follow the access road and from there, follow many smaller trails going to cabins located on the lakeshore.

The Tourism Sector of the Economic Development Department of the Cree Nation of Mistissini is in charge of promoting tourism in Mistissini. The main tourism services offered by the community of Mistissini are the outfitters located around Lac Mistassini which offer mainly fishing trips (see Table 5-17). The community's main tourism infrastructure is the new Mistissini Lodge which offers quality lodging in 20 rooms along the lakeshore. Since the opening of the lodge in 2003, the number of tourists in Mistissini has increased a lot as many tourists arrive by boat in the summer or by snowmobile in winter. The Cree Nation of Mistissini operates Waasheshkun Airways Ltd., a company that offers bush flights and charter services with an Otter. Most of the outfitter's clients arrive by road to Mistissini and fly out with an outfitter. At the peak of tourism season, when Waasheshkun Airways operate at full capacity, some clients fly directly from Chibougamau with another company. A Cultural camp is located on the Abatagouche peninsula across Baie du Poste just in front of the community (see Figure 5-6 on Land Use).

Table 5-17: List of Mistissini Outfitters, 2006 (to be validated)

Outfitters	Activities	Location
Osprey Excursion Inc. *	American Plan and European Plan Fishing Package	On Guillaume Couture Island on Lac Mistassini and at the Louis-Joliet Fishing Camp at the head of the Rupert River
Awashish Outdoor Adventure *	European Plan Fishing Package Outdoor Excursions	On the Rupert River at 120 km of Mistissini
Vieux-Poste	Fishing	Between the Mistassini and Albanel Lake
Papaskwasati (Before known as Papas Camp)	Fishing	North of Lac Mistassini at the mouth of the Papaskwasati River
Mwaak Outdoor Adventure	Adventure, ecotourism, hunting and fishing	
Papaamisjau Adventures	Adventure, tourism and guided tours	
Adventures Yostin (start-up)	Fishing	

* Affiliated to the Lac Mistassini Outfitting Camps Association (MLOCA)
Source : Cree Nation of Mistissini Web Site, 2006

The community is surrounded by the Albanel-Mistissini-&-Waconichi-Lakes Wildlife Reserve and by the Assinica Wildlife Reserve. Tourism plays an important role in Mistissini's economy and it's role might increase in the future with the development of the new Albanel-Temiscamie-Otish (ATO) Provincial Park. This Park could open in 2007 under the co-management of the Cree Nation of Mistissini and the Government of Québec. Even if the community is not established within the limits of the proposed park, it would be located at the entrance to the park. The proposed park would contain a few sections of the Albanel-Mistissini-&-Waconichi-Lakes and Assinica Wildlife Reserves. It would be the first provincial park established in a boreal environment and the first inhabited provincial park as Cree land users would continue living on the land and pursuing their hunting, fishing and trapping activities in all sections of the park. The proposed park would emphasise Cree culture and would promote Cree employment the creation of a Visitors service centre in Mistissini.

Education and Training

- Education level

Mistissini is one of the first Cree communities, with Chisasibi, where all the levels of the elementary cycle were taught. Secondary cycle schooling in Mistissini started in the early 1980s but at that time students who wished to finish their secondary level had to pursue schooling in Chibougamau, Chapais or Val d'Or (Salisbury, 1986). In 1990, all levels of the elementary and secondary cycles were taught in Mistissini. From kindergarten to the third year of elementary school, classes are taught in Cree. After the 3rd year, students can choose between English and French as the main language of learning while still following certain classes in Cree.

According to CHRD data (see Table 5-18), Mistissini has the second highest rate of persons with a high school diploma (24 %) in the Cree communities just behind Chisasibi (25 %). The most popular fields of specialisation in Mistissini are social sciences, business administration and education (see Table 5-19).

As in other Cree communities, the drop out rate is generally high among secondary school students. In 2003, only 33% of the population aged 15 to 24 was attending school (see Table 5-20). Many factors can explain this situation : 1) the fact that most of the schooling is provided in a second or a third language; 2) the lack of employment available in the community for young people; 3) the high frequency of teenage pregnancy. Many Crees in their late twenties pursue adult education programs. This is due to the recognition that available jobs in the community require some level of specialisation. One of the most appreciated ways to acquire new qualifications is through professional training programs offered in the community.

- Educational and training activities

There is no post-secondary education available in Mistissini. Some professional training is available in the community through the Sabtuan Continuing Education Services. For instance, according to the Cree School Board's 2001-2002 Annual Report, in 2001-2002, 20 Mistissini residents followed Trade and Skill's courses given by Sabtuan (5 followed a course in Heavy machinery mechanics, 7 followed a course in Secretarial skills and 8 followed a Landscaping course). In 2003-2004, 15 Mistissini residents graduated from the Health and Safety on Construction Sites course and 4 persons graduated from an Accounting course (Cree School Board, 2005).

Hunting, Fishing and Trapping

In Cree communities, hunting, fishing and trapping are carried out by most of the population and are an important part of Cree identity. Some Crees practice such activities as their main economic activity while others practice them part-time or during holidays or weekends as a way to provide bush food to their family and as a valued leisure activity. Hunting, fishing and trapping are valued as activities that provide spiritual and cultural sustenance and that strengthen family ties.

In 2003-2004, 13% of the Crees of Mistissini (293 adults and 110 children) were beneficiaries of the Income Security Program for Hunters and Trappers (ISP), e.g. hunting, fishing and trapping represented their main economic activity. The number of Mistissini residents registered in the ISP has diminished over the last ten years (see Table 5-21) but hunting, fishing and trapping still represents a significant share of Mistissini's economy.

Between 1993-1994 and 2003-2004, ISP income by beneficiary unit increased by 14% (see Table 5-22). In 2003-2004, the coming into force of a new agreement on the ISP program raised the amount provided by the program in daily allowances by 5% plus the inflation rate and added a new allowance (30% of the daily allowance) for trappers using traplines located far from the community. Overall, total income derived from the ISP in Mistissini decreased by 22% between 1993-1994 and 2003-2004 as the total number of adult participants decreased by 31 % over that period of time.

Table 5-18: Highest Level of Schooling for the Population Aged 15 to 64 years old in Mistissini, 2003

	2003	
	Number	%
None	80	5
Less than Grade 9	805	47
Grade 9 and over	460	27
Without a high school diploma	375	22
With a high school diploma	90	5
Trade school certificate or diploma	20	1
Other non-university education only	225	13
Without a certificate or diploma	115	7
With a certificate or diploma	115	7
University without degree	25	2
Without a certificate or diploma	0	0
With a certificate or diploma	25	3
University with B.A. or higher	75	3
Total	1,700	

Note : Due to data rounding, the figures may not always add up to total. Data exclude Whapmagoostui. Data represent native and non native population
Source : CHRD, 2005.

Table 5-19: Field of Specialisation of Manpower Aged 15 to 64 years old in Mistissini , 2003

	Number	Proportion
Educational, recreational and counselling services	60	27%
Fine and applied arts	0	0%
Humanities and related fields	0	0%
Social sciences and related fields	65	29%
Commerce, management and business administration	65	29%
Agriculture and biological sciences and technologies	5	2%
Engineering and applied sciences	10	4%
Engineering and applied sciences technology and trades	15	7%
Health professions, sciences and related fields	0	0%
Mathematics and physical sciences	0	0%
No specialisation and all other, n.e.c.	10	4%
Total	225	

Note: Due to data rounding, the figures may not always add up to total. Data exclude Whapmagoostui and represent Natives and non-Natives
Source : CHRD, 2005

Table 5-20 : School Attendance of the Population Aged 15 to 24 Years old in Mistissini, year 2002-2003

	Attending school			Not attending School	Total
	Mid-time	Full-time	Total		
Number of persons	5	165	170	340	510
In proportion of the population aged 15 to 24 years	1 %	32%	33 %	67 %	

Note : Data has been subjected to random rounding. Data includes Native and non-Native population. The Cree population exclude Whapmagoostui.
Source : CHRD, 2005

Table 5-21: Participation in the Income Security Program (ISP) in Mistissini, 1993-1994 to 2003-2004

	1993-1994	1998-1999	2003-2004	Variation 1993-2004
Number of participants Adults Children	744 423 321	648 407 241	403 293 110	- 46 % - 31 % - 66 %
In proportion of total population(1)	30%	24%	13 %	- 17 %
Number of units	266	261	182	- 32 %
Persons per units	2,8	2,5	2.2	- 21 %
Number of days	81 554	73 384	49 439	- 39 %
Number of days per adult	193	180	169	- 12 %

(1) Based on the total of members residing on the CBJNQ territory as given by the Registry of Cree Beneficiaries.
Source : Cree Hunters and Trappers Income Security Board, Annual Reports 1993-1994, 1998-1999 and 2003-2004.

Table 5-22: Income from the Income Security Program (ISP) in Mistissini, 1993-1994 to 2003-2004

	1993-1994	1998-1999	2003-2004	Variation 1993-2004
Total revenue	3 602 165 $	3 497 399 $	2 802 229 $	- 22 %
Revenue by units	13 542 $	13 400 $	15 397 $	14 %
Revenue by adults	8 516 $	8 593 $	9 564 $	12 %

Source : Cree Hunters and Trappers Income Security Board, Annual Reports 1993-1994, 1998-1999 and 2003-2004.

In 1997-98, the local Cree Trappers Association in Mistissini had 551 members (539 adults and 12 youth) who included ISP beneficiaries but also other Crees actively engaged in hunting, fishing and trapping. According to the Statistics Canada 2001 Aboriginal Peoples Survey, 67% of the Cree adult population had hunted and 71% had fished in the year before the survey. In Mistissini, moose hunting is popular during the fall and waterfowl hunting is popular during the spring. Fishing is carried out mostly in summer and fall but it can occur all year round as the Crees set nets under the ice in winter. Cree hunters and trappers also engage in bear hunting as well as in small game hunting and

snaring. Trapping of fur bearing animals is a less important source of income now than in the 1950s and 1960s but it is still practised by many Crees. In 1997-1998, 230 trappers from Mistissini had registered sales of furs with the community Fur Officer.

Economic Activities

- Employment level

According to CHRD (2005) data, 1100 persons aged 15 to 64 years old in Mistissini were employed and 430 were unemployed and looking for work in 2003 (see Table 5-23). The unemployment rate in Mistissini (28% in 2003 according to CHRD data) is similar to the average for all Cree communities. However, the participation rate in Mistissini (90% in 2003 according to CHRD data) is the second highest in the Cree communities.

According to Statistics Canada census data, the active population in Mistissini increased by 10% between 1996 and 2001 while participation and unemployment rates stayed approximately the same (see Table 5-24). This means that new jobs created during that period were nullified by the influx of community residents into the labour force with the result that the unemployment rate (22% in 1996 and 21% in 2001) remained practically unchanged. Unemployment is particularly high among 15 to 24 year olds where half (52%) of the active population is seeking employment.

Table 5-23: Main Economic Activity Indicators in Mistissini, 2003

	15-24 years old	15 to 64 years old
Total population	510	1,700
Active population (in labour force)	365	1,530
Participation rate	72 %	90 %
Employed	175	1,100
Unemployed	190	430
Unemployment rate	52 %	28 %

Note: Data represents the Native and non-Native population aged 15 to 64 years old . Data excludes Whapmagoostui
Source : CHRD, 2005

Table 5-24: Evolution of Main Economic Activity Indicators in Mistissini, 1996 to 2001

	1996	2001	Variation 1996-2001
Active population	975	1,075	10.3%
Participation rate	62.5%	61.4%	52.6%
Unemployment rate	22.1%	21.4%	10%

Note: Data represents the Native and non-Native population aged 15 years old and over.
Source : Statistics Canada, 1996 and 2001 Censuses

Among the occupied labour force recorded by the CHRD in Mistissini in 2003, 23% were employed on a seasonal basis, 66% benefited from full time employment and 11% were employed on a part-time basis. Based on the demographic structure of the population, the CHRD (2005) estimated that new 132 jobs were needed from 2003 to 2008 just to preserve the current rate of employment and that 616 new jobs were needed in order to attain a full employment level. However, some local

representatives have indicated that since the start of construction on the Eastmain-1 hydroelectric project in 2002, most if not all of the qualified manpower in Mistissini has been fully occupied. It is expected that this situation will continue if construction of the Eastmain-1A and Rupert diversion hydroelectric project proceeds as planned in 2007.

- Employment by industries

Data on employment by industry subdivision collected by the CHRD in 2003 (see Table 5-25) reveal that the five most important types of industries in Mistissini are:

- Agriculture, forestry, fishing and hunting which provide 21% of employment;
- Public administration which provides 16% of employment;
- Educational service industries which provide 15% of employment;
- Health and social service industries which provide 14% of employment;
- Construction industries which provide 11% of employment.

In Mistissini, as in other Cree communities, most employment is provided by the tertiary or services sector (see Table 5-26). There is actually little employment in an industrial setting available in Mistissini and few workers have experience of such types of employment. For instance, few Cree workers have the experience of working on night shifts besides a few who have worked at the Eastmain-1 construction site. Many Cree workers tend to prefer working in outdoor settings.

Table 5-25: Employment Distribution by Industry in Mistissini, 2003

	2003	
	Number	%
Agriculture, forestry, fishing and hunting	220	21
Mining and oil extraction	45	4
Manufacturing	0	0
Construction	115	11
Transportation and warehousing	25	2
Utilities	0	0
Wholesale trade	85	8
Retail trade	25	2
Finance and insurance	15	1
Real estate, rental and housing	0	0
Management of companies and businesses	0	0
Information and cultural industries	0	0
Professional, scientific and technical services	0	0
Administrative and support, waste management and remediation services	0	0
Educational services	160	15
Health care and social assistance	150	14
Arts, entertainment and recreation	5	1
Accommodation and food services	50	5
Other services (except public administration)	0	0
Public administration	175	16
Total	1070	

Note: Industry division based on the 2001 NAICS. Data represents the Native and non-Native population aged 15 to 64 years old.
Source : CHRD, 2005

Table 5-26: Employment Distribution by Industry sector in Mistissini, 2003

	Number	%
Primary sector	265	25
Secondary sector	140	13
Tertiary sector	664	62
Total	1070	

Note: Data represents the Native and non-Native population aged 15 to 64 years old.
Source : CHRD, 2005

The main source of industrial-type employment that is available to Mistissini residents is provided by the Troilus mine, a gold and copper open-pit mine located 125 km by road from Mistissini.

The Troilus mine has been considered as a success in integrating Cree manpower (Baribeau, 1996). The developer of the mine, Inmet Mining, set as an objective that Crees should represent 25% of the manpower at the site and special measures were set up by the employer to attain this objective, such as: signing of an Agreement with the Mistissini Band Council and maintaining a close and open relationship with the Band Council; modifying position requirements to eliminate barriers to Cree employment such as language and education levels; hiring a Cree employment co-ordinator; adapting the selection process to the Cree language and reality; giving employment priority to Crees fulfilling position requirements and to family members whose trapline was affected by the mine operation; setting-up a Cree culture awareness program; providing information sessions about employment opportunities in Mistissini; promoting professional training courses.

Part of the reasons for success in attaining the Cree employment objective at the Troilus mine also lie in the fact that working schedules (4/3 or 7/7) gave Cree workers time to practice traditional activities and that non-Native workers adopted a non-judgmental approach and made efforts to establish friendly relationships (Baribeau,1996). The commitment of the Mistissini Band Council towards this project was also one of the underlying reasons of this success. The Band Council is now aiming towards providing more industrial-type employment for the community through the planned development of a new factory-built housing plant on the site of the old community arena.

- Revenues

According to Statistics Canada census data, the individual income in Mistissini rose by 9% between 1995 and 2000, and the share of employment income in total income increased by 3% (see Table 5-27). CHRD (2005) data confirms the rise in the share of income derived from employment as well as the rise in individual mean incomes which was estimated at 27 997 $ in 2003 (see Table 5-28).

- Business and economic development initiatives

Through different companies of which it is the sole shareholder, the Cree Nation of Mistissini operates in the following fields of activities: forestry, aviation, radio, outfitting and construction. Eskan Corporation, the community's economic development corporation, manages, among others, Makaahiikan, a construction company and Enatuck, a forestry company. There is some private ownership of businesses in the community and many youths are interested in starting up their own businesses. Table 5-29 provides a list of businesses currently operating in Mistissini.

Table 5-27: Evolution of Value and Composition of Income in Mistissini, 1995 to 2000

	1995	2000	Variation 1995-2000
Composition			
Employment income	69 %	72 %	3 %
Transfer payments	29 %	25 %	- 4 %
Other revenue	2 %	3 %	1 %
Mean Individual revenue	18 722 $	20 438 $	9 %

Note: Data represents the Native and non-Native population aged 15 years old and over.ISP revenues are considered to be transfer payments. Revenue are in currant $
Source : Statistics Canada, 1996 and 2001 censuses.

Table 5-28: Value and Composition of Income in Mistissini, 2003

	2003
Composition	
Employment income	77 %
Government transfer payments	23 %
Other revenue	1 %
Mean Individual revenue	27 997 $

Note: Data represents the Native and non-Native population aged 15 to 64 years old.
Source : CHRD, 2005

Table 5-29: List of Businesses Operating in Mistissini, 2005

Businesses	Sector of activity
Forestry and Mining	
Exploration J.A McLeod	Mining Exploration
Troilus Mine	Mining
Neebin Enterprises	Forestry
Construction	
CCDC (Cree Construction Company)	Construction
Eskan Company/Makaahiikan Construction	Construction
Mwaak Renovation	Construction
Wapachee Enterprises	Construction
Nisk Carpentry Construction	Construction
Johnny Gunner Registered	Heavy machinery and Equipment
C.I.N Transport	Heavy machinery and Equipment
Udapiskucheu Road Maintenance Registered	Heavy machinery and Equipment
RJC Equipment Registered	Contractors
Transportation and Energy	
KC Equipment Services	Contractors
Painting and Plastering (Francois Iserhoff)	Painting and Plastering
Coonishish Coon Excavation Registered	Excavation
Waasheshkun Airways	Air Transportation
R&P Transport Services	Transport
Transport Petawabano	Transport
Petawabano/Trapper Transport Registered	Transport
Pimi Plus Esso	Gas Station

Table 5-29: List of Businesses Operating in Mistissini, 2005

Businesses	Sector of activity
Chiiwandin Gas / Depaneur	Gas Station and Convenience Store
Go-Kart/Small Engine Repair	Small Engine Repair
Meeyobin Taxi	Taxi
Communication	
CINI FM 95.3 & MLTA	Radio station
Canada Post	Postal Services
James Bay Cree Communication	Telecommunication
Ooshtaa Web Design	Web site Design
Lodging and Restaurant	
Mistissini Lodge	Hotel
Denise Restaurant	Restaurant
Quick Stop Cafeteria	Restaurant
AMT Dairy Bar	Dairy Bar
Outfitting and Tourism	
Lac Mistassini Outfitting Camps Association (MLOCA)	Outfitting
Awashish Outdoor Adventure	Outfitting
Osprey Excursion Reg'd	Outfitting
Retailing	
Meechum Reg'd (Axep) Store	Grocery Store
Maamuu Ataawaukamikw	General Store
K's Corner Store	Convenience Store
Shoe & Clothing Store	Shoe & Clothing Store
Cree Sports & Outdoors	Sports Store
Cree Commercial Cleaning products	Cleaning Products
Andrew Iserhoff Art Painting	Art Shop
Video World	Video Rental
S & S Office supplies	Office Supplies
Finance	
Caisse Populaire Desjardins	Bank
Services	
Awash Day Care	Daycare
Elders Home	Elders Home
Gordon and Sandy Memorial Youth Center	Youth Center
Fitness Center	Fitness Center

Source : Mistissini Local Contractors, Entrepreneurs & Entities, Economic Development Department of the Cree Nation of Mistissini, Updated September 2005, 2p.

The Economic Development Department of the Cree Nation of Mistissini plans to use part of the old arena as a business incubator. The other half of the arena would be used for a factory-built housing plant. The plant's primary market would be to provide houses for Cree communities. A secondary market for the plant would be to build cabins that could be air-lifted to the traplines. The first stage of the project planned for early 2007 would be the training of manpower for the plant. This project would provide a number of full-time jobs in the community.

Social and Health Concerns

The mortality rate in Cree communities is close to the provincial rate but deaths related to respiratory problems (pneumonia and flu) are three time higher in Cree communities than in the province of Québec and are the third most important cause of mortality in Cree communities. Cancer and circulatory system problems represent the most important causes of mortality in Cree communities but the death rate associated with those problems is similar or inferior to the provincial rate.

The number of diabetes cases has risen rapidly since 1975 and is one of the main health concerns in Cree communities. In 2003, 13% of the Cree population aged 15 and over (16% in Mistissini) were diagnosed with diabetes (CBHSSJB, Cree Database on Diabetes, 2003 in Hydro-Québec, 2004). In 2001, 54% of the Cree population had an excess of weight and 33% were obese (Statistics Canada, Aboriginal Peoples Survey 2001, in Hydro-Québec, 2004). The rise of obesity cases in Cree communities is linked with a decrease in physical activity and to an increase in the consumption of store-bought food and of fast food (CBHSSJB in Hydro-Québec, 2004). The prevalence of clamydia and gonorrhoea are higher in Cree communities than in Québec which raise concern about the threat that can represent AIDS in Cree communities (CBHSSJB in Hydro-Québec, 2004).

In terms of mental health, depression and alcoholism were the most often reported problem at the end of the 1980s and no recent data are available (CBHSSJB in Hydro-Québec, 2004). According to the Aboriginal Peoples Survey 2001 carried out by Statistics Canada, 80% of Cree adults consider that alcohol abuse is a problem in their community and 73% are concerned about drug abuse. They are the main community concerns reported in that survey. Alcohol consumption is a recent phenomenon in Cree communities and it has increased with the opening of access roads to the communities. Only 27% of the Cree population are habitual drinkers compared to 60% of the Québec population, but 92% of habitual Cree drinkers do binge drinking periodically (Statistics Canada, Aboriginal Peoples Survey 2001 in Hydro-Québec 2004). Alcohol consumption is higher among the youth and among the male population. The suicide rate in Cree communities is lower than the provincial suicide rate and than the average Canadian First Nations suicide rate. The number of cases reported according to the Loi de la protection de la jeunesse increased a lot in the 1980s, probably due to a rise in social worker services but it has stabilised since then (CBHSSJB in Hydro-Québec, 2004).

Cree Values and Community Support Structure

An understanding of Cree values and community support structures is relevant for assessing the potential insertion of the project into the community and for optimizing Cree employment benefits related to the project.

Maintaining the Cree culture and traditions has become an important issue for the Crees over the past half century because of more frequent contacts with the Canadian culture through the opening up of access roads and the introduction of public television and radio. Faced with such influences, certain aspects of the Cree culture have been transformed but the Cree culture itself has not disappeared as Crees still tend to have different sets of beliefs and practices then the mainstream euro-canadian society (James, 2001).

Even if the maintaining of Cree culture may take many forms, the preservation of hunting, fishing and trapping activities (also called the traditional Cree way of life) remains one of the most important aspects – even though current economic conditions are not favourable in these regards. For the Crees, preserving the land and the animals are an essential part of maintaining the traditional way of life. The

preservation of the Cree language is also an important part of the effort made to keep the Cree culture alive and thriving. The threats are less important in this respect as the Cree language is still predominant in Cree communities and is taught in school. According to the Statistics Canada Aboriginal Peoples Survey 2001, 92% of the Crees use their language at home all the time or most of the time.

Sharing and helping each other are frequently mentioned as important Cree values. Bush food is often shared between family members. Exchanges in Cree society have been described as generally reciprocal[12] (Scott 1989). According to the 2001 Statistics Canada census, 36% of Mistissini residents over 15 (as compared to 17% in the province of Québec) reported providing several hours per week of unpaid care or assistance to seniors.

Honesty, humility and respect of nature and other persons, especially the Elders, have also been described as important Cree values (Jacobs 2001 and Bobbish, Atkinson and Magomet, ed. 1990). Elders are often asked to give support and advice. For example, some of them participate in a justice panel where they exchange with young offenders in order to raise their awareness. Personal responsibility and self-reliance are other important values of the Crees (Jacobs 2001). Crees will tend to think that once someone is given a responsibility he will do it and that he don't need direct overseeing. As such, Cree authority is often indirect. Direct blaming such as saying that someone's work is not good can be seen as an offence. Remarks and observations on other people's work or behaviour will be voiced using humour. Traditionally, teaching was done by setting an example rather than by theoretic explanations and still today, on-the-job training is preferred to training in class settings.

Traditionally, Cree society was kinship based and decision-making was done on a consensus basis. Cree leaders were chosen among the best hunters and this position brought more responsibility than privilege as they would not take any important decision without consulting the others. Still today, the population in general likes to be consulted on decisions regarding the community. The Cree Nation of Mistissini holds a general assembly once a year where many important subjects are presented to the whole community.

Traditionally, men's and women's roles where different but complementary. No hunter could succeed in the bush without the help of a woman skinning the pelts, cooking meals, cutting wood, fetching water and also fishing and snaring. The complementary roles of men and women were diluted with the adoption of the wage economy where the focus was originally put on men's employment. Women are seen as the focal point of the family. In the 1980s and 1990s, more divorces and single-headed families were seen and more and more women entered the workforce to provide for their family.

[12] In a generally reciprocal system there is a high solidarity between the members of the community. The importance of the value or quantities of things received is low and the giver can wait a long time before the return of his/her gift because he/she will take into account the capacity of the receiver (Bonte & Izard, 1991).

The formal associations or support groups that exist in Mistissini are the following :

- the Elders council,
- the Youth council,
- the Cree Trappers Association;
- the Mistissini Women's Association.

As mentioned earlier, sharing and helping each other is an important Cree value and people will tend to help others in need even outside the formal associations and support groups. People can get support from their family and relatives, from their friends or from their religious community. There are three churches in Mistissini: the Anglican church, the Pentecostal church and the Bible Faith Church (Baptist).

In the event of health or social problems, Mistissini residents can get help from the local clinic offers the services of social workers services in addition to proximity health services. A Healing Circle (Maamouwiinwachiwehwiin) is also in place to help people on the basis of Cree traditions and beliefs. The Healing Circle often meets at Murray's Lodge, a camp located along the Mistissini access road (see Land Use Map).

5.4.3 Land Use

Study Area Occupants and Land Uses

The Watson peninsula is part of the trapline M50 for which Mr. Charlie Iserhoff is the tallyman. The trapline M50 covers 1,024 km2 and the Watson peninsula is located in the middle of it. When the beaver preserve containing the trapline was established, the trapline was given to Mr Iserhoff's grandfather. It was later passed on to his father and subsequently to him. While Mr Iserhoff's ancestors used the Watson peninsula for hunting, fishing and trapping in the past, today, he and his family no longer use the area of the trapline that is contained within the peninsula. They mostly use the part of the trapline that is located to the north of the peninsula while a cousin of Mr Iserhoff uses the part of the trapline that is located to the south of the peninsula (see Land Use Map).

The main users of the study area are a few part-time residents of cabins located in Category I lands along the Baie du Poste lakeshore on the western side of the peninsula (see Figure 5-6 on Land Use). The Cree Nation of Mistissini has set aside a number of lots for future cabins along the shorelines of the Watson peninsula (see Land Use Map). The process of staking the lots was started 10 years ago. However, some Crees already had a cabin along the shore before the lots were designated. The lots are given out upon request and close to half of the approximately 138 lots have been allocated for future use to Mistissini residents. There are 10 to 15 new requests per year and it is possible that a new site assessment will be carried on in the next years to designate new lots.

On the western side of the peninsula, from Mistissini to the Kaa Yaayeuweshimuhch Bay, 19 lots have been designated in four areas (areas B, C, D and E). Among these lots, 7 are equipped with cabins but there are also 27 cabins in these areas that are not built on any lot (see Table 5-30). On the eastern side of the peninsula, from Mistissini to the gravel pit, 33 lots have been designated in two areas (areas I and H) but only 2 of them have been allocated and only one is equipped with a cabin.

Another cabin has been built outside the boundaries of the designated lots. There are not many cabins on the eastern side of the peninsula because there are no roads to access the shoreline. People go there by snowmobile during wintertime.

Table 5-30: Lots and Cabins on the shore of the Watson peninsula

	Area B	Area C	Area D	Area E	Area H	Area I	Total
Number of lots							
Total number of lots	10	7	16	15	15	18	81
Number of lots allocated	4	5	10	0	1	1	21
Number of lots constructed	2	3	2	0	0	1	8
Number of cabins							
Number of cabins on lot	3	3	2	0	0	1	9
Number of cabins not on lot	1	4	4	18	0	1	28
Total number of cabins	4	7	6	14	0	2	37

Source : Personal communication, Land Registrar, Cree Nation of Mistissini, 2006

The owners of the cabins near the study area are either ISP beneficiaries that use it mostly from September to June or workers that use it on week-ends or during holidays. Many lots have been given to Elders registered with ISP as they are not to far from the community services. In area C which is the closest to the project site, at least three cabin owners are Elders registered with ISP. These ISP beneficiaries do not stay in their cabins full-time and the number of days that they spend there depends on the number of days they need to complete in order to be eligible for ISP payments (in 2003-2004, it was necessary to spend 120 days in the bush in order to be qualified). Some of the cabin owners registered with ISP also spend some days on other traplines further in the bush during the late fall and early winter and they return to their cabin near the project site from January to June.

The study area is mainly used by cabin owners to collect firewood. The concerned cabin owners, who are mostly beneficiaries of the ISP, carry out various harvesting activities close to their camp. They snare rabbits or trap marten when they are available but small game are rarely sufficient in numbers to justify the effort of setting traps or snares. No duck or goose hunting is carried out in the study area as it is located too close to the community. Ptarmigan and grouse can be hunted when they are found along the road. The main harvesting activities of cabin owners registered with ISP in the study area are related to net fishing. Their nets are set in the lake near the shore. No berry picking activities occur in the study area as berries do not grow there. Cabin owners may collect some plants for medicinal purposes such as Labrador tea. The study area is not used to collect wood for traditional tool-making as there is no tamarack or birch available. Cabin owners in the study area who work in the community also use their cabins to rest with family and friends and to go from there for snowmobile rides or on long hikes.

Infrastructure and Services

The western shoreline of the Watson peninsula is crossed by the access road to Mistissini which is partially paved. Many smaller trails irradiate from the Mistissini access road to reach camps located along the eastern or western shore of the peninsula. The road linking Mistissini to Highway 167 is also used by many residents for hiking, bicycling or running. Many children and teenagers walk, cycle or hitch-hike from the community to the beach. A power transmission line follows the right-of-way of the

access road to the community but no electricity is provided to the camps located along the shores of Watson peninsula. The cabins are not equipped with running water or septic tanks.

Community Activity, Recreation and Tourism

Murray's Lodge, a site located near the access road south of Kaa Yaayeuweshimuhch Bay (see Land Use Map), is used for many community uses such as meetings of the Healing Circle and of the CBHSSJB and also for the Justice Panel meetings. A children's Summer camp organised by the Pentecostal church is organised near the mouth of the Perch river.

The Recreation Department of the Cree Nation of Mistissini plans to build a hiking/snowmobile trail that would link the community to the beach (see Land Use Map). This trail would be used by hikers and cyclists in summer and by snowmobile users during winter. No precise route has been defined to date for the trail but it would most likely follow along the access road with some detours along the lakeshore. In winter, this trail could be part of a big loop that would link Mistissini to Chibougamau. A small snowmobile loop project on the Watson peninsula is also under consideration but it requires further consultations with cabin owners as many of them have experienced break-ins and might not want an easier access to their camp.

There are no tourism facilities located in the project area as such. However there is a plan to develop the Chalifour Campground on the eastern side of the Watson peninsula, on the shores of Cabistachouane Bay, approximately 2 km north of the project site (see Figure 5-6). This campground would be accessible from the Mistissini access road. The Chalifour Campground project is at the pre-feasibilty stage. The campground would be connected to the community by a snowmobile and hiking trail. It would accommodate tourists looking for fishing activities or only for camping activities. It could also host visitors in transit to the future Albanel-Témiscamie-Otish Provincial Park.

Sites and Areas of Importance

Key informant interviews and public consultations carried out in Mistissini did not reveal the existence of a sacred site, burial place or birth place in or near the study area on the Watson peninsula. As mentioned earlier, the preservation of the land represents an important value for the Crees as it is linked to their identities in many ways including the pursuit of traditional activities. Some Crees met during the consultations and interview mentioned that all land is valued and important. Others mentioned that areas where people have set up their camps are considered as valued areas.

Land Use Planning

A low intensity industrial zone has been designated on the community's outskirts by the Cree Nation of Mistissini's Land Use and Zoning Plans (Figure 5-6). However, recent discussions with the Land Registrar indicate that the current zoning of the industrial area on the outskirts of the community will most likely be changed to a commercial zoning to preclude future industrial development that could be incompatible with surrounding residential uses. In view of this, the Band Council considers that the proposed site for the Mistissini Beam Plant is located in an area that is much more appropriate for the future development of an industrial park. It is far enough from the community to minimise disturbances while still being provided with an easy access to the Mistissini road. The physical configurations of the site also allow for future industrial expansion if and as required.

Summary of proposed projects

Regionally, the main project in the Mistissini area is the creation of the Albanel-Témiscamie-Otish Provincial Park that could open in 2007 under the co-management of the Cree Nation of Mistissini and the Government of Québec. Locally, the Cree Nation of Mistissini is planning the construction of a hiking/snowmobile trail that would link the community to the beach and the creation of a campground on the eastern side of the Watson peninsula (see Figure 5-6).

5.4.4 Archaeological Potential and Heritage Site

Regional

Many archaeological surveys in the Mistassini and Albanel Lakes area have revealed dozens of archaeological sites that show an occupation dated over more than 5000 years ago. These sites would be linked with areas located further south. According to Mr David Denton, responsible for Archaeology and Cultural heritage at the Cree Regional Authority, based on evidence from adjacent areas, it can be surmised that the Lac Mistassini area was first occupied 6000 or 6500 years ago and it is likely that this area has been occupied more or less continuously since then (see Appendix H[13]). In the fur trade period, the Lac Mistassini area was a crossroad where Crees encountered English traders coming from James Bay and French traders coming from the Lac-Saint-Jean and the St-Lawrence Valley. Many archaeological projects have been carried out since 1986 by the CRA archaeology program in collaboration with the different Cree Nations. Archaeological surveys were carried out in the proposed ATO park area in 2002-2003 and notably in the area located between Lakes Albanel and Mistassini, called Uupiichuun in Cree, where many trading posts were established in the late 17th and early18th century.

Local

According to Mr Denton, few archaeological surveys have been carried out on the Watson peninsula. The only surveys carried out to date have been in the village of Mistissini. The only site known in the project surroundings is the site of the 19th century Hudson Bay Company Post (site EcFl-4) located on the Hudson Bay point in the community of Mistissini (see Appendix H). Another trading post site is located on the other side of the Uupaachikus Pass but this site has not been surveyed yet. The location of the North West Company Post near the Perch River mouth has not been found yet. According to Mr. Denton, all shores around Lac Mistassini present a certain archaeological potential for pre-historic sites (prior to the contact with Europeans) and for historic sites. Most of the known sites in the Lac Mistassini area have been located less than 100 meters from the shore. Although it can not be assumed that their is no site further than 100 meters from the shore, the archaeological potential of sites located further inland is much lower. In conclusion, the archaeological potential of the Watson Peninsula shores is high but the potential of the Mistissini Beam Plant site itself is quite low because it is located 200 meters from the shore.

[13] David Denton (2006) Notes on Archeological Potential of Proposed Site for Mistissini Beam PlantBeam Plant. Memorandum presented to Richard Shecapio, Director of Community Development, Cree Nation of Mistisini March 20, 2006.

5.4.5 Landscape

Characteristics of the Landscape

The study area is located in a spruce forest area located uphill from the Baie du Poste shore, in the Mistissini Highlands natural province which is characterised by highlands with scattered hills dominated by coniferous forest with peat bog (FAPAQ, 2003). It is crossed by the access road to Mistissini but because of the difference in level between the road and the project site, the site cannot be seen from the road. In the study area, the visual experience of road users would be marked by some views of the lake. The camps located in the study area along the western shore of the Watson peninsula all face Lac Mistassini.

Landscape Units of the Study Zone

It is important to note that the understanding by Crees of the concept of "landscape" has been poorly documented in the scientific literature to date. An attempt was made to gain an understanding of Cree values related to landscapes in the context of the Environmental impact statement produced for the Eastmain-1A dam and Rupert diversion project. Discussions with Cree representatives on this subject resulted in talking about the landscape in terms of environmental interactions between the landscape and the presence of various types of fauna or flora or in terms of the past and present use of landscapes rather than in aesthetics terms. Crees value the integrity of the landscape as the concept of "landscape" is linked to their identity and sense of ownership of the land (Hydro-Québec, 2004).

If we select landscape units according to their uses by the Crees, the following seven landscape units could be defined in the Watson peninsula :

- the community of Mistissini;
- the access road to Mistissini;
- the Baie du Poste shore on the western side of the Watson peninsula where many cabins are located, including Kaa Yaayeuweshimuhch Bay and the elevation south of it where there are nice views;
- the community beach;
- the Perch River mouth;
- the Baie Cabistachouane shore on the east of the peninsula where fewer cabins are located, and;
- Lac Mistassini.

Valued Landscapes

During interviews with different community groups and with concerned land users, participants were asked to identify valued landscapes on the Watson peninsula. Only the Elders identified three specific sites with valued landscapes (see Land Use Map) Most of these sites are located south of the study area, such as a site where the access road runs close the lakeshore. The bay located there is called Kaa Yaayeuweshimuhch which means "where the road goes by the shore".

Most of the interview participants valued the preservation of landscapes that they can see when they use the access road and would prefer that the proposed Plant be not be visible from the road. Certain youths offered differing points of view as they mentioned that the sighting of the plant would prove to visitors from outside that "things are moving" in Mistissini.

ENVIRONMENTAL IMPACT STATEMENT
MISTISSINI BEAM PLANT

Volume 2

Chapter 6: ENVIRONMENTAL EFFECTS ANALYSIS OF VALUED ENVIRONMENTAL COMPONENTS (VEC's)

Jacques Whitford / DDM

PROJECT 1005414 June 20, 2006

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6.0 ENVIRONMENTAL ANALYSIS OF VALUED ENVIRONMENTAL COMPONENTS (VEC'S)

6.1 VEC – 1: Atmospheric Environment

6.1.1 Rationale for Selection as a Valued Environmental Component

The Atmospheric Environment is the component of the environment that comprises the layer of air near the earth's surface to a height of approximately 10 km. The Atmospheric Environment is typically characterized by climate, air quality and sound quality (noise). In the context of this EIS, Atmospheric Environment is defined as the chemical and physical attributes of air and climate including, but not limited to, gaseous and atmospheric particulate emissions (dust), and noise.

The Project may result in noise and the release of various contaminants to the Atmospheric Environment. These vary depending on the Project activity (*e.g.*, potential noise and dust during the construction activities; and gaseous emissions during operation). The Atmospheric Environment is an important pathway that could transport contaminants or transfer environmental effects to the freshwater, terrestrial and human environments.

The Atmospheric Environment has been selected as a VEC not only due to the nature of potential Project-related atmospheric emissions, but also because of its intrinsic importance to the health and well being of humans, wildlife, vegetation and other biota. Furthermore, residential properties occupy the surrounding land of the Project area (cabins are present on the west bank of the Watson peninsula). Atmospheric Environment was also selected because of concerns related to the Project that were raised during public consultations.

This EIS focuses on the following key aspects of the Atmospheric Environment which have been selected on the basis of consideration of the Project description (Chapter 2) and public concerns:

- Particulates and Gaseous Emissions
- Noise
- Odours

The potential environmental effects of the Project activities on the Atmospheric Environment are hereby assessed, including cumulative environmental effects, resulting from construction and operation, as well as malfunctions, accidents or unplanned events.

6.1.2 Environmental Assessment Boundaries

Spatial

Particulates and Gaseous Emissions

The spatial boundaries for the assessment of the atmospheric emissions consist of the zone of influence associated with the Project (the "Study Area") defined as a 5 km X 5 km (25 km^2) square area surrounding the center of the proposed Plant site.

Noise

In regards to noise, the spatial boundaries of the effects assessment consists of a 500 m radius surrounding the center of the proposed Plant site herein defined as the "Study Area". Even though the nearest residence is located at approximately 300 m, this boundary takes into account the possibility of future developments within the 500 m radius.

Odors

The spatial boundaries of the odors effects assessment consists of a 500 m radius surrounding the center of the proposed Plant site herein defined as the "Study Area".

Temporal

The temporal boundaries are established by determining the period of time over which the Project-specific and cumulative environmental effects are to be considered. These include periods of Construction and Commissioning (seven to eight months), and subsequent Operation of the Project throughout its expected life span (minimum 50 years) for atmospheric emissions and noise.

Administrative and Technical

The technical factors for the Atmospheric Environment VECs pertain mainly to regulatory limits with respect to the release of air contaminants of concern to the ambient environment. These standards are set by regulatory authorities to reflect environmental protection objectives with the intent of being protective of air quality as well as human and environmental health.

Air Quality

Air quality will be assessed in the context of project related emissions and ground-level concentrations for the contaminants of interest. Project-related air quality contaminants of interest include:

- Total Suspended Particulates (TSP) and Dust;
- Particulate Matter less than 10 microns (PM_{10});
- Particulate Matter less than 2.5 microns ($PM_{2.5}$);
- Sulphur Dioxide (SO_2);
- Nitrogen Oxides (NO_X);
- Carbon Monoxide (CO);

- Greenhouse Gases (CO_2, Methane and N_2O); and
- Volatile Organic Compounds (VOC's).

The National Ambient Air Quality Objectives (NAAQOs) and the Québec Ambiant Air Quality Standard norms for specified contaminants of interest are presented in Table 6-1 for reference and comparison with calculated data. The NAAQOs identify benchmark levels of protection and have been established also to provide guidance for federal, provincial and regional governments in making risk management decisions. NAAQOs are viewed as long-term air quality goals.

The Canada Wide Standard for $PM_{2.5}$ (i.e., Particulate Matter < 2.5 μm) for a 24-hour averaging period is also provided in Table 6-1. It should be noted that this latter standard does not come into effect until the year 2010.

Table 6-1: Quebec Regulatory Ambiant Air Quality Standard and Canadian Ambiant Air Quality Objectives

Contaminant	Averaging Period	Quebec Ambiant Air Quality Standard [1] (μg/m3)	National Ambient Air Quality Objectives, Maximum Desirable / Acceptable Levels [2] (μg/m3)
TSP	24-hr	n/a [3]	- / 120
	Annual	70 [4]	60 / 70
PM_{10}	24-hr [5, 6]	n/a	50
	Annual [6]	n/a	30
$PM_{2,5}$	24-hr	30	30 [7]
SO_2	1-hr	n/a	450 / 900
	24-hr	228	150 / 300
	Annual	52	30 / 60
NO_x As	1-hr	414	- / 400
	24-hr	207	n/a
	Annual	103	60 / 100
CO	1-hr	34 000	n/a
	8-hr	12 700	n/a
VOCs [8]	15-min	1 000	n/a
	Annual	400	n/a

1) Regulatory standards (annual averages) presented in this table are the lowest available between the Air Quality Regulation (R.S.Q., c. Q-2, r.20) and the ones proposed in the new draft Air Quality Regulation (R.S.Q., c. Q-2, s.31) which is not in force at the time of the issuing of this report.

2) Canadian Environmental Protection Act, Clean Air Act, Ambient Air Quality Objectives Order, No. 1, Schedule 1, 1998.

3) n/a : no regulatory norm or objective available.

4) Geometric mean.

5) Greater Vancouver Regional District (GVRD) (2001) 2000 Lower Fraser Valley Ambient Air Quality Report, Acceptable Objectives, September 2001.

6) CCME (1998) Canada Wide Accord on Environmental Harmonization of the CCME and Canada Wide Environmental Standards Sub-Agreement (optional values), 1998.

7) CCME (2000) Canada Wide Standards for $PM_{2,5}$ and Ozone, endorsed by the Council of Ministers of the Environment (CCME), June 5-6, 2000, Quebec City.

8) The VOCs emitted at the Plant will be mostly composed of toluene (>90%).Therefore, the criteria value for toluene taken from the "Fiche de qualité de l'air" of the MDDEP (2002) is used.

Noise

Outdoor noise may be defined as unwanted sound and is often present at several different frequencies. The audible frequencies for humans are in the range 500-20,000 Hertz (Hz). The sound level pressure level or noise level is measured in decibels on three different scales: A, B and C. The A-weighted scale is generally used for most sound measurements, since it discriminates against frequencies less than 600 Hz, and measures sound levels which come closest to approximating risk of hearing damage in humans. Measured sound parameters are generally expressed as an "equivalent sound level" (Leq) over a specified period of time (e.g., 1 hour or 24 hour).

There is no specific regulation pertaining to noise in the Environment Quality Act (EQA) of the Ministère du Développement durable, de l'Environnement et des Parcs (MDDEP). However, the EQA indicates that the Quebec government as the power to introduce regulations to:

- Prohibit or limit abusive or useless noise inside or outside a building;
- Determine the terms and conditions of use of any vehicle, engine, piece of machinery, instrument, or equipment generating noise;
- Prescribe standards for noise intensity.

Generally, noise regulatory standards are adopted by municipal entities. Quebec City, for example, has a specific noise regulation (R.V.Q. 978) in which noise level standards are defined for different types of inhabited spaces.

In the absence of provincial regulation, Quebec City noise standards will be used as guidelines within this EIS. Table 6-2 presents the maximum noise levels not to be exceeded for different time frames as indicated in article 29 of the Quebec City noise regulation.

Table 6-2: Maximum noise levels (dBA) from the Quebec City noise regulation (R.V.Q. 978)

Inhabited space	07h00 – 19h00	19h00 – 23h00	23h00 – 07h00
Bedroom	45	40	38
Living room	45	40	40
Other room	45	45	45
Non-built space	60	55	50

Odors

Aside from the natural wood odors, the only substance with a significant odor component would be toluene found in one of the adhesives, the WD3-A322, used in the process. (oven and finished products). Toluene is used in most solvent and smell much like it, reminiscent of the sweet smell of the related compound benzene The odor threshold for toluene is 25 400 µg/m^3 (microgram by cubic meter) Below this threshold, toluene is not considered to pose odor nuisances (ref.: American Industrial Hygiene Association 1989).

6.1.3 Residual Effects Rating Criteria

Particulates and Gaseous Emissions

The residual environmental effects rating criteria for atmospheric emissions, including conventional air contaminants and greenhouse gases are based on the current and historical emission in the assessment area. A *significant residual environmental effect* is a Project induced decrease in air quality, resulting in disturbance to the nearby residents and users.

The potential for air quality degradation can be evaluated by comparing estimated contaminant concentrations coming from on-site emission sources with provincial ambient air quality regulations which are:

- The Air Quality Regulation (R.S.Q., c. Q-2, r.20);
- The new draft of the Air Quality Regulation (R.S.Q., c. Q-2, s.31) which was not in force at the time of the writing of this report.

In the absence of specific regulatory guidance on greenhouse gas emissions or ambient greenhouse gas concentrations, a significant residual adverse environmental effect on air quality will be considered in this EIS to be a substantive increase compound to provincial releases.

Noise

A *significant residual environmental effect* with respect to noise may be defined a frequent exceedance of the noise guideline level at a noise sensitive area, with “frequent” defined as 1 day per month or 12 days per year, and sensitive area defined as residences and users within the study area.

Sounds generally become noise when the sound level (dBA, a frequency-weighted measurement) rises over 60 dBA. It is above this sound level that residents may complain that the noise is disruptive. Based on noise levels presented in the above table, a noise level of 55 dBA is sufficiently conservative to be used as a pass / fail threshold at the surrounding residential areas in order to evaluate the impact of sound coming from the Plant.

The noise sensitive area in the VEC boundaries consists mainly of the properties with cabins and the access road used for walking, cycling, etc.

Odors

A *significant residual environmental effect* with respect to odors may be defined as any uncompensated perception of odors over a sustained period (24-hour) at a Sensitive Area such as nearby residences and users in the study area.

6.1.4 Existing Conditions

The description of the exiting conditions of the atmospheric emissions, noise and odors emissions is detailed in Chapter 5 (section 5.2.2 and 5.2.3).

6.1.5 Project – VEC Interactions

Construction

Particulates and Gaseous Emissions

There is the opportunity for adverse effects to air quality resulting from dust and vehicle/equipment emissions during construction of the plant and access roads.

Under dry conditions, there is potential for dust to be generated as vehicles travel back and forth along the access roads, and by material blowing off of stockpiles. Vehicles and equipment have the potential to emit higher than normal levels of emissions. Depending on wind direction, and the level of dust and/or emissions, these could become an annoyance for nearby residents and users.

Noise

Outdoor sound quality can be influenced by vehicle traffic and the use of heavy equipment, and by weather conditions such as temperature, humidity, wind direction and wind speed. Local topographical features such as hills or wooded areas may serve to attenuate sound levels. There may be sound reflections if the atmospheric mixing height (ceiling) is low (a few hundred meters), or if solid structures are located near the source of noise emissions.

The outdoor sound quality, represented by existing noise levels at the proposed Project site, is expected to be influenced by the use of construction equipment (*e.g.*, bulldozers, excavators, concrete mixers, etc.), and heavy vehicles (*e.g.*, trucks and mixers) on the site of the Plant and on the access road to Mistissini. Unmitigated noise emissions can potentially disturb local residents and users, and wildlife.

Operation

Particulates and Gaseous Emissions

There is the opportunity for adverse effects to air quality resulting from dust and vehicle emissions that are expected to occur from the access roads and from particulate matter, and gaseous contaminants that are expected to occur from the plant.

Plant Emissions

Table 6-3 gives an overview of the emissions sources and pollutants for the proposed facility which could have a significant impact on the atmospheric environment during the operational phase. Potential sources and pollutants were identified based on the process design of the plant.

Table 6-3: Emission Sources and Pollutants Released

Emission source	Source type	Pollutants							
		TSP	PM_{10}	$PM_{2.5}$	CO	CO_2	NOx	SO_2	VOCs
Multi-cyclone	Point source	X	X	X	-	-	-	-	-
Fuel oil boiler	Point source	X	X	X	X	X	X	X	X
Oven and finished products	Fugitive	-	-	-	-	-	-	-	X

The Plant design includes a multi-cyclone system that collects sawdust at different points of the production line (double-shaper process, planers, the flying saw and the trim saw). The only air quality pollutant released in significant amounts from this piece of equipment will be particulate matter (PM).

The fuel oil boiler will be used for heating purposes during winter (approximately six months annually). Emissions from this combustion source contain PM, CO, CO_2, Nitrogen Oxides (NOx), SO_2, and VOCs.

The oven process and finished products are the two main sources that will produce fugitive VOC emissions.

Access Roads Emissions

The Plant operation will generate an increase of traffic from the transportation of general delivery/pick up, wood and finished products and from private vehicle of people coming from Chibougamau to work at the Plant during the first few years of operation. With an average of 5 people per shift coming from Chibougamau to work at the Plant during the first few years of operation, we calculated that the average annual daily traffic would increase by 30 cars (5 people, two ways, three shifts), an increase in car traffic of 4.5% compared with 2004.

The type of transport trucks traveling to the Plant will include general delivery/pick up trucks (hazardous waste materials, recycling, and heating oil) and transport trucks for wood and finished products. It was estimated that the operations at the Plant would result in an increase in daily truck traffic of approximately 6.5 trucks per day, over a five day period (3.2 trucks per day, two ways), an increase of 7% from 2000.

Noise

There is the opportunity for adverse effects to ambient sound quality resulting from noise emitted inside and outside of the Plant. Equipment located outside of the Plant, loaders and trucks are sources of noise. The starting and running of equipments located inside the Plant are sources of noise that can potentially disturb users located nearby.

Odors

Toluene and sawdust are sources of odors that can potentially affect the residents and users located in the study area.

Toluene is a clear, water-insoluble liquid with the typical smell of paint thinners, reminiscent of the sweet smell of the related compound benzene. It is an aromatic hydrocarbon that is widely used as an industrial feedstock and as a solvent (CCOHS, 2006).

Accidental Events

The environmental effects of accidents events on atmospheric emissions could result from fire and explosion, and accidental releases of hazardous materials (gaseous and particulate). These accidental events may occur during all the phases of the Project.

6.1.6 Environmental Effects Analysis and Mitigation

Construction

Particulates and Gaseous Emissions

There is the opportunity for adverse effects to air quality resulting from dust and vehicle/equipment emissions during construction of the Plant and access road.

Under dry conditions, there is potential for dust to be generated as vehicles travel back and forth along the access roads, and by material blowing off of stockpiles. Vehicles and equipment have the potential to emit higher than normal levels of emissions. Depending on wind direction, and the level of dust and/or emissions, these could become an annoyance for nearby residents and users and within Mistissini community.

General measures have been integrated in the Project design (see Section 2.8.2) to reduce the level of dust generation, such as:

- Application of dust suppression agent;
- Ensuring proper management of machinery;

Mitigation

Several measures will be applied to reduce the level of dust generation, such as:

- Cover stockpiles with tarpaulins or plastic sheeting;
- Cover truck loads of materials which could generate dust, as necessary;
- Minimize activities that generate large quantities of fugitive dust during high winds; and

To minimize the air pollution from vehicles and equipment, equipment and machinery will be inspected and maintained on a regular basis. By ensuring that equipment is running properly, such action will reduce emission levels.

Noise

With common construction machinery noise levels ranging between approximately 75dBA and 90 dBA, and given the undeveloped nature of the Study Area, there is potential for the construction noise, depending on wind direction, to be a disturbance to the community during the construction hours (8.00 am to 6.00 pm).

Common noise levels and typical human reactions are summarized in the following table. A noise level of 40 dBA is characterized as quiet, similar to that of a public library. When the sound level reaches 60 dBA it is perceived as intruisive. Table 6.4 show different sound sources along with their noise level and the related typical human reaction.

Table 6-4: Common Noise Levels and Typical Reactions

Sound Source	Noise Level (dB)	Apparent Loudness	Typical Reaction
Military jet	130	Sixty-four times as loud	Limit amplified speech
Jet takeoff at 50 m	120	Thirty-two times as loud	
	110	Sixteen times as loud	Maximum vocal effort
Jet takeoff at 500 m	100	Eight times as loud	
Rock Crusher	95		
Heavy truck or bulldozer	90 - 95	Four times as loud	Hearing damage (8 hr)
Back hoe or dump truck	80 - 85	Twice times as loud	Annoyance
Highway traffic at 15 m	70	Base reference	Telephone use difficult
	60	Half as loud	Intrusive
Noisy office	50	Quarter as loud	Speech interference
Public library	40	Eighth as loud	Quiet
Soft whisper at 5 m	30	Sixteenth as loud	Very quiet
	10	Sixty-fourth as loud	Just audible
Threshold of hearing	0		

Adapted from: Road Traffic Noise Effects on Housing, published by the Canadian Mortgage and Housing Corporation (CMHC), 1981 AND Columbia Street Pump Station Replacement Project, Greater Vancouver Regional District

Although, sound levels at the Project site will be higher than normal throughout the construction phase, sound level reduction over distance will help to minimize the degree of disturbance. Sound levels tend to decrease following the "inverse square law". At distances greater than 15 m from a sound source, every doubling of the distance results in a 6 dB (general unit for measuring sound, not frequency-weighted) reduction in the sound (NY State Department of Environmental Conservation, 2001.). Therefore, a sound level of approximately 85 dB (*i.e.,* backhoe) at 15 m would have a sound level of approximately 79 dB at 30 m.

Mitigation

The degree of disturbance to residents and users in the Study area can be minimized during the construction period by the following:

- Undertake the construction activities in as short a time period as is feasible;
- Limit activities to the Project area; and
- Construction vehicles used at the site will have limited idling time;
- Incorporate heavy machinery equipment options with lower noise emitting capabilities; and
- Ensure that equipment and machinery are inspected and maintained on a regular basis. This will ensure that equipment is running properly, and will keep noise to acceptable levels.

Operation

Particulates and Gaseous Emissions

Plant Emissions

Dispersion modeling was performed to assess the cumulative impact of the three sources of atmospheric contaminants (multi-cyclones, fuel and oil boiler, oven and finished products). Given the relative flat topography, the absence of neighboring structures, and very few significant sources, the US EPA SCREEN3[1] model was chosen for this purpose. The model was used to calculate a hypothetical "worst-case scenario" by estimating the maximum hourly ground level concentration (GLC) for each species of interest. This is accomplished in SCREEN3 by subjecting source data to a variety of meteorological conditions which result in different ground level concentrations at different distances from the source. The model also takes building downwash into account. Building downwash occurs when the aerodynamic turbulence, induced by nearby buildings, causes pollutants emitted from an elevated source to be rapidly mixed toward the ground. This results in higher ground-level concentrations.

In general, results given by the SCREEN3 model are usually conservative as the model is designed to overestimate ambient concentrations.

The SCREEN3 model was used to calculate maximum hourly ground level concentrations for emissions originating from each source listed in Table 6-1 in separate simulations. For the boiler, TSP, $PM_{2,5}$, CO, NOx, SO_2 and VOCs were all modeled. For the cyclone, the only emissions modeled were TSP and $PM_{2,5}$. For the oven and finished products source, the only emissions modeled were VOCs.

[1] SCREEN3 is a Gaussian atmospheric dispersion model developed by the U.S. Environmental Protection Agency (US EPA) and is available at the following web site: www.epa.gov/scram001/tt22.htm.

As for PM, it should be noted that the technical specification sheet for the multi-cyclone indicates that particulate emitted from the exhaust of the multi-cyclone is composed of approximately 90% of particles less than 25 microns in diameter. Furthermore, based on the technical data sheet, the relative proportion of PM_{10} (PM less than 10 microns in diameter) in the exit gas of the multi-cyclone is approximately 44%. No information was available concerning the relative proportion of $PM_{2.5}$ (PM less than 2.5 microns in diameter) in the multi-cyclone particulate matter emissions. Since there are only air quality standards for $PM_{2,5}$ and TSP, Jacques Whitford has assumed that 100% of the PM_{10} would be $PM_{2,5}$ to calculate the maximum ground level concentrations (refer to sections *Dispersion model Initialization* and *Dispersion Model Results*). Therefore, only TSP (Total Suspended Particulates) and $PM_{2,5}$ emissions from this device are considered as atmospheric emissions.

The emission rates used to initialize the SCREEN3 model are shown in Table 6-5. Other model parameters, including source characteristic information, terrain, and building downwash parameters are shown in Table 6-6.

Table 6-5: Emission Rates Used in SCREEN3

Source	Species	Emission Rate (g/s)
Cyclone	TSP	0.37
Cyclone	$PM_{2,5}$	0.16
Boiler	TSP	0.05
Boiler	$PM_{2,5}$	0.03
Boiler	CO	0.04
Boiler	NOx	0.15
Boiler	SO_2	1.1
Boiler	VOC	0.002
Oven and finished products	VOC	0.038

Table 6-6: SCREEN3 Model Inputs

Model parameter	Multi-cyclone	Boiler	Oven
Source type	Point	Point	Volume
Stack height	13.41 m	15.2 m	0 m
Stack diameter	0.85 m	0.6 m	N/A
Stack exit velocity	22.3 m/s	27,5 m/s	N/A
Stack exit gas temperature	343 K (70°C)	473 K (200°C)	N/A
Ambient air temperature	293 K (20°C)	293 K (20°C)	N/A
Receptor height [1]	0 m	0 m	0 m
Urban / Rural option	Rural	Rural	Rural
Terrain option	None	None	None
Building height	9.1 m	9.1 m	9.1 m
Minimum horizontal building dimension	24.4 m	24.4 m	24.4 m
Maximum horizontal building dimension	168.6 m	168.6 m	168.6 m

1) Receptor height was set at 0 m to estimate maximum concentrations at ground level.

The model was configured to estimate ground level concentrations at intervals of 100 m at distances from 0 and 5000 m from the emission source. The model also determines the distance between the emission source and the location where the maximum GLC occurs, regardless of the spacing interval chosen for receptor grids.

Dispersion Model Results

The maximum GLCs calculated by the SCREEN3 model for all three sources are shown in Table 6-7. In the case of TSP and $PM_{2,5}$, the maximum GLCs obtained from both runs and the background annual average concentrations (when available) were summed to provide a conservative estimate of the cumulative impacts of both sources. Note that as such maxima may occur at different spatial locations; this total value probably overestimates GLCs and the effects of the proposed facility.

For all species modeled, the estimated maximum hourly GLCs were added to background amounts, and then scaled to the appropriate averages (15 minutes, hourly, 24 hour or annual averages) for comparison with the regulatory standards.

The maximum GLCs originating from the multi-cyclone and boiler stacks were found to be located at distances of 200 m and 92 m from each source, respectively. The maximum GLC from the oven & finished products source (volume source) is located at less than 20 m from the building. This allows for the possibility that the maximum GLC could occur outside the property line.

Table 6-7: SCREEN3 model maximum GLC results ($\mu g/m^3$ maximum over one hour)

	TSP	$PM_{2,5}$	CO	NO_x	SO_2	VOCs
Multi-Cyclone	23	10.1	-	-	-	-
Boiler	2.6	1.6	2.1	7.8	57.2	0.1
Oven & Finished products	-	-	-	-	-	505.4
Background concentration [1]	10	2.7	n/a [2]	19	n/a	31.2 [3]
Total hourly maximum concentration	35.6	14.4	2.1	26.8	57.2	536.7

1) Background concentrations of contaminants presented in this table are presented in Chapter 5 of Volume 2, section 5.2.2. The background concentrations are annual averages.

2) None available.

3) Background concentration is available in ppb (Parts per billion). Concentration in $\mu g/m^3$ is obtained by multiplying by a factor of 3,9 which is the average of factors for Benzene, Toluene, Ethyl benzene and Xylene.

Table 6-8 presents the total maximum concentration per contaminant expressed in the appropriate time average for comparison purposes with the regulatory standards.

Table 6-8: Contaminant concentrations and the regulatory standard

Contaminants	Concentration (µg/m^3)				Regulatory standard [1] (µg/m^3)			
	15 min	1 hour	24 hour	Annual	15 min	1 hour	24 hour	Annual
TSP	-	-	-	1.4 [2]	-	-	-	70
$PM_{2,5}$	-	-	5.9 [3]	-	-	-	30	-
CO	-	2.1	-	-	-	34 000	-	-
NO_x	-	26.8	11	1.1	-	414	207	103
SO_2	-	-	23.5	2.3	-	-	228	52
VOCs [4]	736 [5]	-	-	21.5 [2]	1 000 [6]	-	-	400 [6]

1) Regulatory standards (annual averages) presented in this table are the lowest available between the Air Quality Regulation (R.S.Q., c. Q-2, r.20) and the ones proposed in the new draft Air Quality Regulation (R.S.Q., c. Q-2, s.31) which is not in force at the time of the issuing of this report.

2) Multiplying the model output hourly concentrations by a factor of 0.04 converts the concentration to an annual average. This conversion factor was taken from Schedule H in the draft of the new Air Quality Regulation (R.S.Q., c. Q-2, s.31).

3) Multiplying the model output hourly concentrations by a factor of 0.41 converts the concentration to a 24 hour average. This factor comes from the "Air Dispersion Modelling Guideline for Ontario".

4) The VOCs emitted at the Plant will be mostly composed of toluene (>90%).

5) The VOC concentration over 15 minute was calculated using the hourly concentration (536,7) and the equation

1) $C(t)=C(1\ hour) \times 0,97\ T^{-0,25}$ taken from the atmospheric dispersion modeling guide of the MDDEP.

6) Given that the VOCs are composed primarily of toluene, the criteria value for toluene taken from the "Fiche de qualité de l'air" of the MDDEP (2002) is used.

As can be seen in the results of Table 6-8, converted values are well below the regulatory standards for air quality. Thus, it follows that emissions from the proposed facility should not cause an exceedance of any Quebec ambient air quality regulations in the Study Area.

Mitigation

Based on the contaminant concentrations modeled and the comparison of these with regulatory standards, no mitigation measures are recommended for the sources of emission such has the multi-cyclone, the fuel oil boiler and the VOC fugitive emissions.

Noise

Activities will occur 24 hours per day, five days a week inside the building while activities outside the building will be limited to daytime. Noise levels associated with the equipment and vehicle running are ranging between approximately 85 dBA and 102 dBA. With such levels, there is potential for the operation noise, depending on wind direction, to be a disturbance to the residents and users of the Study area.

As mentioned in the previous construction section, sound levels tend to decrease following the "inverse square law". At distances greater than 15 m from a sound source, every doubling of the distance results in a 6 dB (general unit for measuring sound, not frequency-weighted) reduction in the sound (NY

State Department of Environmental Conservation, 2001.). Therefore, a sound level of approximately 85 dB (*i.e.,* backhoe) at 15 m would have a sound level of approximately 79 dB at 30 m. Although, sound levels at the Project site will be higher than normal throughout the Plant operation, sound level reduction over distance will help to decrease the degree of disturbance.

Mitigation

The noise levels in the Study area can be minimized during the operation period by the following:

- Localise noise sources (equipment) inside the building as much as feasible;
- Keep all the doors and windows closed all the time;
- Selection of types of material for the shell of the building that can absorb acoustic vibrations efficiently;
- Ensure that equipment and machinery are inspected and maintained on a regular basis. This will ensure that equipment is running properly, and will keep noise to acceptable levels.

Odors

The main potential source of odors is the emission of VOCs, represented at 90% by toluene. According to the dispersion model presented in the above, the average VOC concentration emitted in the atmosphere of the study area is at the maximum 563.7 µg/m^3 over one hour. The threshold limit of odor perception for toluene is 25 400 µg/m^3. Therefore, odors emission from the Plant is not considered to be a concern.

Mitigation

Based on the very low VOC concentration, no odor mitigation measures will be required regarding the emissions of VOC from the Plant.

Greenhouse Gases Emissions (GHG)

Predicted sources of GHGs coming from the Plant operations consists of the heating oil fired boiler and the daily truck traffic between the Plant and the Chantiers Chibougamau plant located in Chibougamau.

Emission rates for each GHG emitted by the boiler are presented in Table 6-9 as well as data used for the calculation. It was assumed that the boiler, used for heating purposes, will be in operation 6 months per year.

Table 6-9: GHGs emissions from the boiler

Boiler heating oil consumption for 6 months (per year)		**259,896 gal/year [1]**
Emission factors [2]	CO_2	11.4 kg/gal
	N_2O	0.00005 kg/gal
	Methane	0.00045 kg/gal
Emission rates	**CO_2**	**2 953 tons/year**
	N_2O	**0.013 tons/year**
	Methane	**0.114 tons/year**

1) The yearly heating oil consumption is calculated using the data obtained from the boiler spec sheet (59.5 gal/hour).

2) The emission factors taken from the Environmental Protection Agency (EPA) document AP42, Chapter 1 "External Combustion Sources", Section 1.3 "Fuel Oil Combustion".

Emission rates for each GHG emitted by the truck traffic are presented in Table 6-10 as well as data used for the calculation. The emission factor used to estimate CO_2 emissions from the truck traffic was determined by using the "MOBILE 6.2" model developed by the U.S. Environmental Protection Agency (EPA). This model uses input data such as vehicle type, fuel type and ambient temperature to calculate the emission rate.

Table 6-10: GHGs emissions from the truck traffic

Daily truck traffic coming to and from the Plant	3 trucks/day
Round trip distance between the Plant and Chibougamau	150 km/truck
Modeled emission factor [2] for CO_2	0.886 kg/km
Emission rate for CO_2	**104 tons/year [1]**

1) The emission rate is based on 5 days per week and 52 weeks working schedule.

2) The emission factor was modeled using the software MOBILE ver.6.2 developed by the EPA.

Table 6-11 presents the total emission rates for each GHG resulting from the operation of the heating oil boiler and the truck traffic. The table also indicates the project contribution to the total Quebec province GHG emissions.

Table 6-11: Total emission rates for the project per individual GHG

GHG	Total emission rate (tons/year)	Quebec total emission (million tons/year)	Project contribution to the Quebec emissions (%)
CO_2	3 057	66.9	0.0045
N_2O	0.013	6.4	2.0×10^{-7}
Methane	0.114	9.9	1.2×10^{-6}

Table 6-11 shows that GHGs produced from Plant operations are significantly lower than the threshold values and thus, the environmental impact of GHG emissions from the Plant are considered negligible.

Mitigation

Based on the very low annual emission rate of GHG, no mitigation measures will be required regarding the emissions of GHG from the Plant.

To minimize the GHG from vehicles (trucks) and equipment (loaders), mitigation measure will be to ensure that they are inspected and maintained on a regular basis. This will ensure that the vehicles are running properly, and will reduce emission levels.

Accidental Events

Particulates and Gaseous Emissions

The environmental effects of accidents events on atmospheric emissions would include fire and explosion, accidental releases of hazardous materials including fuel and other chemicals and accidental releases of particulates including wood dust. The potential risks associated within the phases of the Project are detailed in Section 2.10.3

For fires, the potential for environmental effects is due to the emission of fine particles and unburned chemical.

Potential for environmental effects associated with spills are the emission of contaminants volatilized in the atmosphere with a significant decrease in air quality.

Mitigation

Accidental events will be minimized by the following means:

- Intrinsically safe design;
- Effective emergency planning and preparedness; and
- Implementation of operational procedures and training.

Safety features are incorporated into every aspect of the design of the proposed facility. The proposed facility will be designed and equipment selected to meet strict design codes and standards. Operational procedures will be prepared to ensure the transport, handling and process systems are operated within the design parameters and with the highest regard for safety.

The Project will follow an Environmental Management Plan (presented in Appendix I) to ensure that the Plant Environmental, Health and Safety policy objectives are achieved. The Project will also develop an Emergency Response Plan for Operations to ensure that the policy objectives are achieved throughout all phases of the Project.

Accidental events, including forest fires, will be mitigated by the implementation of these plans. All employees will be trained in operational procedures and environmental emergency response procedures to ensure safe operation.

Cumulative Environmental Effects

The future projects that could potentially affect the atmospheric environment are:

- Construction of a hiking/snowmobile trail;
- Development of the Chalifour Campground;
- Development of a new factory-built housing plant on the site of the old community arena.

Particulates and Gaseous Emissions

Emissions sources (dusts, vehicle emissions) would result from the increase of traffic (vehicles, trucks and snowmobile) generated by the future projects. However, they are not expected to result in any significant adverse environmental effects.

The cumulative environmental effects of the Project on atmospheric emissions, in combination with the identified future projects, are considered minor and are not expected to result in any significant adverse environmental effects.

Noise

Noise emissions would result from the increase of traffic (vehicles, trucks and snowmobile) generated by the future projects. However, they are not expected to result in any significant adverse environmental effects.

The cumulative environmental effects of the Project on noise, in combination with present and future projects that are likely to be carried out, are considered minor and are not likely to result in any significant adverse environmental effects.

Odors

There are no odors emissions anticipated from the identified future projects that could potentially cumulate with the predicted Project emissions.

6.1.7 Determination of Significance

Particulates and Gaseous Emissions

Due to the low magnitude of emissions expected and the application of mitigation measures for dust control, the residual environmental effects related to particulate and gaseous emissions are considered as not significant minor and therefore they are not predicted to cause significant adverse effects to the nearby residents and users.

Noise

Based on the information presented in the above sections on potential effects of noise and the proposed mitigation measures to minimize the disturbances, the residual environmental effects are considered not significant and minor. Therefore no significant adverse effects to nearby residents are anticipated.

Odors

The residents and the users of the Study area will not detect the presence of VOC emitted by the operation activities. The VOC concentration in the atmospheric environment will be significantly lower than its threshold limit of smell. The residual environmental effects are therefore considered not significant and will be negligible. Odors are not expected to result in any significant adverse environmental effects on nearby residents and users.

6.1.8 Monitoring and Follow-up

In order to insure that the Plant does not cause any nuisance to local residents, a specific follow-up program will be put in place consisting in the consultation of nearby residents on a regular basis. Regular communication with residents will also provide information on the efficiency of the proposed mitigation measures.

Also,a grievance committee will be set up at the Plant with designated persons responsible for responding to concerns or complaints expressed by local land users or community members regarding unforeseen nuisances or disturbances caused by the Plant.

6.2 VEC - 2: Groundwater and Soil

6.2.1 Rationale for Selection as a Valued Environmental Component

Groundwater and soil quality were selected because they are recognized for their intrinsic importance to human health-related and ecological values, especially because of their relationship with surface water conditions, with groundwater supply from future private wells for the nearby residents, and with groundwater supply for the plant. Water quality is also a concern expressed during the initial public consultations and meetings.

The potential environmental effects of the Project activities on groundwater are hereby assessed, including cumulative environmental effects, resulting from construction and operation, as well as malfunctions, accidents or unplanned events, specifically the accidental spillage of oil or fuel from vehicles, or hazardous cargos from trucks.

6.2.2 Environmental Assessment Boundaries

Spatial and temporal

The proposed plant area is located on the boundary between two sub-basins (1 and 3), as shown in Figure 5-1. This means both coasts (east and west) of the Watson peninsula (Mistassini Lake) are vulnerable to potential contamination.

Analysis of the potential impacts has been carried out for the construction and operation phases. Construction is expected to take between seven and eight months, while the anticipated life of the plant is approximately 50 years.

Administrative and Technical

Groundwater quality, soil quality and drinking water quality that might be drawn from groundwater are protected through federal and provincial legislation and guidelines.

The quality of drinking water is assessed and regulated by the CCME criteria for supplying water in communities from the Guidelines for Canadian Drinking Water Quality and the Regulation respecting the quality of drinking water prepared by MDDEP.

The quality of groundwater is assessed and regulated under the provincial authority by the ministère du Développement durable, Environnement et Parcs du Québec (MDDEP) through the Soil Protection and Rehabilitation of Contaminated Sites Policy. The applicable criteria for the proposed site are the Drinking Water Criteria and the Surface Water and Sewer Criteria.

The soil quality is assessed according to the Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health (CCME) and the Soil Protection and Contaminated Sites Rehabilitation Policy (MDDEP).

The Technical boundary for this VEC is the Baseline information obtained through a Groundwater and Soil Quality Investigation conducted on the proposed Site (see Appendix F - Environmental Assessment Report: Phase 2 –Soil and Groundwater Quality). In order to assess superficial groundwater quality and soil quality, boreholes were drilled, monitoring wells were installed in all the boreholes and soil samples were collected for chemical analysis.

A superficial groundwater resource was found in the unconsolidated glacial deposits located above the bedrock. This unconfined aquifer is located at a depth of about 1 meter with a hydraulic conductivity of 1.7×10^{-4} cm/s (relatively low permeability), but has the minimum requirement for providing water supplies to private wells (*Class II* aquifer as per the MDDEP regulation).

Groundwater quality from the superficial aquifer (found in the unconsolidated glacial deposits located above the bedrock) was examined and the analytical results from submitted groundwater samples revealed that measured concentrations of selected parameters were significantly below the MDDEP Drinking Water Criteria, except for Manganese (0.053 mg/L compared to 0.16 mg/L).

Groundwater vulnerability to potential contamination was assessed, and it is estimated that this aquifer at the site has a moderate vulnerability to contamination originating from potential surface activities (such as the activities that will occur at the location of the future Mistissini Beam Plant). However, migration of potential contamination toward a receptor (Du Poste Bay or private wells) would be low. Based on the estimated hydraulic gradient, approximately 18 years would be required for potential groundwater impacts to travel a horizontal distance of 300 m.

The following groundwater receptors are located within a 2 km radius from the site:

- Du Poste Bay (nearby residents take their drinking water from the lake).
- There is no water wells in a perimeter of 2 km around the Site, but private wells might be located along the western shoreline at some point in the future;
- The marshy area located to the northeast of the site.

It should be noted that the bedrock aquifer (deep aquifer) was not investigated as it was not requested in the EIS Guidelines received from COMEV. A water supply study to investigate the bedrock aquifer (to supply water for the plant) will be conducted before the construction of the Plant.

6.2.3 Residual Effects Rating Criteria

A significant residual environmental impact on groundwater and soil quality is one that alters groundwater and soil quality to such an extent that there is a long term contamination problem, which in turn can impact humans (e.g. consumption from a well). A project-related residual environmental impact

that would reduce the quantity of groundwater recoverable from the aquifer on a sustainable basis to meet the present and future needs of current users is also considered significant.

Residual environmental impact evaluation criteria for groundwater are based on the Guidelines for Canadian Water Quality - Criteria for supplying water in Communities (CCME) and on the MDDEP Soil Protection and Contaminated Sites Rehabilitation Policy – Drinking water and Surface Water and Sewer Criteria. In the event that concentrations of a parameter currently exceed these regulations, any project-related increase in the parameter concentration is considered significant.

Residual environmental impact evaluation criteria for soil quality are based on the MDDEP's Soil Protection and Rehabilitation of Contaminated Sites Policy. This policy provides the necessary framework for preserving soil integrity. It sets out guidelines for assessment and rehabilitation through risk analysis and management. Any project-related environmental impact that would alter soil quality to such an extent that groundwater / surface water and / or human health is at risk is considered significant.

6.2.4 Existing Conditions

Existing conditions for Groundwater and Soil Quality are described in Chapter 5: Environmental Setting (Section 5.2.4).

The bedrock aquifer (deep aquifer) was not investigated. The groundwater supply study has not been conducted yet. It will be done before the construction.

6.2.5 Project-VEC Interactions

The plant's building plans were designed so as to allow run off water on the site to be recovered and channelled via roof drains and drain ditches to the waste water treating element and decantation basin located east of the plant. These ditches and the sedimentation basin will be put in place after site preparation (deforestation and grading), before the construction phase so as to prevent transportation of suspended materials or contaminants into surrounding water courses.

The plant is also designed as to keep all wastewater or sanitary water from entering into the environment.

Construction

Groundwater

Construction activities that have the potential to affect groundwater quality include clearing, grubbing and stripping of vegetation during site preparation and excavation during construction.

The clearing, grubbing and stripping of vegetation may lead to increased surface runoff, since there is no vegetation to intercept precipitation or impede the flow of water. As well, increasing the amount of surface runoff reduces the amount of infiltration into the ground, thereby decreasing the amount of groundwater recharge. Excavation works will be done near or into the superficial aquifer and may interfere with groundwater discharge.

These interactions could only take place between the beginning of the site preparation and the implementation of water management (ditches and sedimentation basin) which will be in place before construction. Therefore, no environmental effects are expected as the plant is designed to prevent them.

Soil

During site preparation and construction, the vegetation cover and excavated soil will be removed and stored on site. Erosion and sedimentation are of concerns for newly exposed soils.

Also mobile equipments will be used to level the site, dig drainage ditches, install the septic tank and build the sedimentation basin. The circulation of these equipments may alter soil surface around the site. However, these effects will be of limited duration, in the construction phase only and the soil properties will be restored naturally after construction. No impacts are therefore expected from these activities.

The soil properties on the project footprint will be altered in result of the crushed stone bed that will be put in place.

Operation

Groundwater

During the operation phase, no activity will generate contaminants that could potentially affect groundwater quality on the proposed beam plant site. No VEC-Project interaction is anticipated with groundwater quality during the operation phase. However, accidental hazardous material spill may occur during activities involving fuel and oil. Accidental events are assessed in a separate section presented below.

Groundwater Supply

The Groundwater Supply Study will be conducted before the construction phase. As there might be private water wells installed nearby in the future, the Water Supply Study that will be conducted before the construction of the plant should assess the potential effects of the Plant water wells on potential other users. The assessment that will be done will evaluate if the quantity of groundwater recoverable from the aquifer on a sustainable basis will interfere with the present and future needs of current or future users.

Soil

During the operation phase, no activity will generate contaminants that could potentially affect soil quality on the proposed beam plant site. No VEC-Project interaction is anticipated with soil quality during the operation phase. However, accidental hazardous material spill may occur during activities involving fuel and oil. Accidental events are assessed in the following section.

Accidental Events

Accidental events that may occur during the construction, and operation phases and that have a potential for adverse environmental effects on groundwater and soil resources include:

- Hazardous materials spills;
- Erosion and sediment control failure; and
- Fire.

6.2.6 Environmental Effects Analysis and Mitigation

Construction

Groundwater

During the construction phase, no activity will generate contaminants that could potentially affect groundwater quality on the proposed plant site. However, accidental hazardous material spill may occur during activities involving fuel and oil. Accidental events are assessed in a separate section presented below.

Mitigation

No mitigation are deemed necessary to minimize effects on groundwater quality and supply during construction.

Soil

Baseline conditions of soil revealed that soil samples analytical results were below the criteria set out in the MDDEP Soil Protection and Rehabilitation of Contaminated Sites Policy (Level A soil criteria).

The project's potential impacts on soil quality relate to site preparation work during the construction period.

During site preparation and construction, the vegetation cover and excavated soil will be removed and stored on site. There is a potential for erosion and/or sedimentation coming from the stocked piled soils and as a result of loose and newly exposed soils.

The proposed site will be partially covered by a crushed stone bed (0-20mm) over an area of 261m x 268m. Natural soil properties on the project footprint will be altered in result of the crushed stone bed that will be put in place. Accordingly, the soil properties on the project footprint will be altered during the life of the plant.

Mitigation

Excavated soil is of concern as it has potential environmental impacts with regard to erosion and/or sedimentation of nearby watercourses. Procedures to ensure that loose and newly exposed soils are managed properly during excavation activities are described in the EMP (Appendix I) such as:

- Erosion control barriers are in place prior to the commencement of excavation;
- Excavated soil requiring storage will be kept at a safe distance from watercourses and be surrounded by a sediment control device(s);

- Ensure that excavated soils for subsequent use are transported to other locations of the project site in a secure manner, aimed at minimizing the dispersion of loose soil;
- Stockpiles of soil will be sloped and compacted to prevent ingress of moisture and protected from erosion with mulch, plastic or geotextiles;
- Any additional excavated soil generated at the site that cannot be used for other construction activities will be removed off-site for appropriate disposal and transported in a vehicle that has suitable containment capacity;
- During excavation, personnel will be made aware of the procedures related to archaeological features ;
- As a precautionary measure, the personnel will be made aware of the procedures that will apply if contaminated soils are discovered during excavation - for example, identification, assessment, securing materials, and remediation.

Operation

Water Supply

There are no private wells located in a perimeter of 2 km around the site. Nearby residents take their drinking water from Du Poste Bay.

The plant will be supplied with water from two wells to be located in the extreme south-western portion of the proposed site, at a distance of approximately 120 m from the plant. For all its activities, the plant is expected to use approximately 5750 litres of water per day (Table 2-11). This water will be used for three purposes, namely the sprinkler system and water tank in case of fire, the manufacturing process and domestic use.

The Water Supply Study will be conducted before the construction phase. However, it is expected that the bedrock aquifer will supply for the needs of the plant and that this will not affect the nearby residents in the short term as none of them uses groundwater for drinking.

Accidental Events

Hazardous material spills

Spill of hazardous materials may result from an accident, malfunction or unplanned event. A spill of hazardous materials has the potential to substantially affect the quality of the soil resulting in contamination of the groundwater and nearby water courses. Hazardous material spills could be the result of construction activities (*e.g.*, equipment fuelling, collision, or faulty vehicle components), operation activities (*e.g.*, transport truck accident). The plant has been designed to prevent or minimize most of the accidents that could occur (see Chapter 2 – Project Description).

Procedures to ensure that accidental spills are minimized and that spill response occurs quickly and efficiently are described in the EMP (Appendix I) and include the following:

Mitigation

- Proper management and good cleaning practices for road access and drainage ditches;
- All chemical products should be properly stored in a specific designated area with secondary containment in order to prevent spills from entering the environment;

- Ensure proper hazardous waste handling, storage and disposal;
- Ensure that an intervention kit is permanently available to deal with accidental spillage of petroleum products including confinement tubes, absorbent rollers and other items (gloves, etc.) needed to deal with small accidental spills and recover and store the contaminated material.

In case of accidental spillage of hazardous materials, the site will be decontaminated and the materials disposed of at a specially authorized site.

Cumulative Environmental Effects

The future projects considered by CCNM are the following:

- Construction of a hiking/snowmobile trail;
- Development of the Chalifour Campground
- Development of a new factory-built housing plant on the site of the old community arena; and
- Development of a new drinking water supply intake in the esker south of Watson peninsula.

In consideration of the project locations and with the application of mitigation measures for the Mistissini Beam Plant, the considered projects are not expected to result in any cumulative environmental effects on groundwater and soil, even in combination with past, present and future projects.

6.2.7 Determination of Significance of Residual Effects

There is no anticipated conflict of use between the proposed plant and local residents, because neither currently uses the superficial aquifer in the vicinity of the site, and there are no private wells located in a perimeter of 2 km around the site. In addition, the anticipated protective measures and the proposed groundwater quality monitoring program will ensure that the project will not have a noticeable impact for residents of the area bordering Du Poste Bay.

Based on consideration of the Project related and cumulative environmental effects, it is concluded that the groundwater supply resource from the superficial aquifer which flow in Du Poste Bay in the vicinity of the Project will not affect the quality of Du Poste Bay as a drinking water source.

The residual environmental effects on groundwater quality, water supply from superficial groundwater aquifer and soil quality, including cumulative environmental effects, are rated not significant for all Project phases. The significance of potential residual environmental effects, including cumulative environmental effects, resulting from the interaction between Project activities and this VEC, after taking into account all proposed mitigation measures, is considered minor.

However, potential hazardous material spills for the Project are rated as significant for hazardous material spills, but unlikely.

Consequently, the residents' use of Du Poste Bay as a source of drinking water will not be affected by site preparation, construction, infrastructure or operation activities.

6.2.8 Monitoring and Follow-up

Groundwater quality

To ensure the protection of groundwater sources, a follow-up program on groundwater quality will be established at the Project site (see Chapter 7.0).

Soil quality

No specific monitoring and follow-up program is required with regard to soils.

6.3 VEC – 3: Surface Water

6.3.1 Rationale for Selection as a Valued Environmental Component

Surface Water was selected as a VEC because of the potential for interactions between Project activities and the physical aquatic environment. Surface Water was also selected because it is a component with acknowledged health-related (drinking water) and ecological values (aquatic habitat).

Drinking water

The fact that the village of Mistissini draw it's drinking water from Du Poste Bay (intakes located downstream of the Project site – See Figure 5-6) along with the fact that some cabins are located on the west bank of the Watson peninsula approximately 300 to 500 metre west of the proposed site, and that the residents draw their drinking water from Du Poste Bay, were factors in selecting this particular VEC.

It should be noted that, even though the quality of the treated water delivered to the community members does meet all the drinking water quality parameters, the raw water currently drawn from Du Poste Bay is problematic and the CCNM plans to relocate the community drinking water intake in an esker located south of the Watson peninsula near Perch River. A Feasibility Study have been conducted by Stavibel in 2004 for that future project (see Appendix E).

Aquatic habitat

This VEC was selected because aquatic habitats and species are recognized for their ecological and cultural values by the Cree community. Several watercourses are present in the vicinity of the site. However, no permanent watercourse has been found on the site of the new plant. It was also selected as a VEC because of concerns that were raised at the TEK workshop.

6.3.2 Environmental Assessment Boundaries

Spatial and Temporal

The proposed plant area is located on the boundary between two sub-basins (1 and 3), as shown in Figure 5-1. This means both coasts (east and west) of the Watson peninsula are vulnerable to potential contamination.

Analysis of the potential impacts has been carried out for the construction and operation phases. Construction is expected to take between seven and eight months, while the anticipated life of the plant is approximately 50 years.

Administrative and Technical

Surface Water is protected through federal and provincial legislation and guidelines.

Drinking water

Water intakes are located in Du Poste Bay. The quality of drinking water is assessed and regulated by the Guidelines for Canadian Drinking Water Quality (GCDWQ) prepared by the Federal-Provincial-Territorial Committee on Drinking Water (CDW) and the Regulation respecting the quality of drinking water prepared by the ministère du Développement durable, Environnement et Parcs du Québec (MDDEP). It should be noted that each of the Cree local governments is in the process of adopting a by-law on the Quality of drinking water, as provided under the Cree-Naskapi Act powers.

The technical boundary for this VEC regarding water quality is limited to data available in the community regarding drinking water quality and through a field investigation for groundwater and soil quality in December 2005 where only one surface water sample was collected from a small brook in the vicinity of the proposed site. It should be noted that, as field investigation was conducted in winter conditions December 6 to December 10, 2005), it was not possible to investigate more surface water bodies around the site.

The water delivered to the community is monitored on a regular basis to make sure that it meets the quality standards.

Analytical results for the one sample collected in December 2005 revealed that measured concentrations of selected parameters were below the MDDEP Surface Water Criteria for aquatic life.

As the knowledge of baseline conditions of surface water is limited, a water sampling program will be conducted before the site preparation phase to obtain baseline information on the quality of surface water, at least for the following areas:

- Du Poste Bay on the west coast of the Watson peninsula, in the areas where nearby residents drinking water intakes are located;
- In the water course where the site drainage system will be discharged (the exact location of the discharge point is not determined yet).

This information will then be made public in order that people are aware of the prevalent condition of surface water quality in the surroundings of the Project before the installation of the Plant.

Aquatic habitat

The quality of water from an aquatic perspective is assessed in relation to the *Canadian Water Quality Guidelines for Aquatic Life* (CCME 1999a) and in respect of the *Fisheries Act*, deleterious substances. Under the provincial jurisdiction, MDDEP Surface Water Criteria for Aquatic Life establish surface water quality standards for the protection of the aquatic life.

The technical boundary for this VEC regarding water quality is limited to the Baseline information obtained through Hydro-Quebec sampling programs for the Eastmain 1-A / Rupert derivation EIA (Hydro-Québec 2004) for Lake Mistassini surface water quality and through a field investigation for groundwater and soil quality in December 2005 where only one surface water sample was collected from a small brook in the vicinity of the proposed site. It should be noted that, as field investigation was conducted in winter conditions December 6 to December 10, 2005), it was not possible to investigate more surface water bodies around the site.

Hydro-Québec analytic results show that Lake Mistassini waters are of type A. They are poor in phosphorous, with low organic content (oligotrophic water) and low turbidity, and are very clear.

There is no fishing in the small brook located south west of the Project Site, and no permanent watercourses and no fish habitats were identified on the proposed site.

Fishing occurs during the summer and net fishing is carried out all year round along the shores of Watson peninsula. However, net fishing does not take place on the western shoreline of the study area. The TEK workshop revealed that known spawning areas are located upstream from the study area for walleye, suckers, whitefish, barbot and possibly pike. One is located at the mouth of the Perch River. The other spawning area is located at the mouth of the Chalifour River which is located on the South Eastern side of the Watson peninsula.

6.3.3 Residual Effects Rating Criteria

Drinking water

A significant residual environmental impact on surface water quality is one that alters surface water quality to such an extent that there is a long term contamination problem, which in turn can impact humans (i.e., drinking water consumption from the lake). Residual environmental impact evaluation criteria are based on the Guidelines for Canadian Drinking Water Quality and the Quebec Regulation respecting the quality of drinking water. In the event that concentrations of a parameter currently exceed these guidelines and regulations, any project-related increase in the parameter concentration is considered significant.

Aquatic habitat

A significant residual environmental impact on aquatic habitat alters valued habitat quality physically, chemically and/or biophysically, in quality or extent, in such a way as to cause an adverse change in the ecological function of that habitat, or an adverse change (caused by avoidance and/or mortality) in the distribution or abundance of a fish species or community that is dependent upon that habitat.

Residual environmental impact evaluation criteria are based on the Fisheries Act, the Canadian Water Quality Guidelines for Aquatic Life (CCME, 1992) and the MDDEP Surface Water Criteria for Aquatic Life. In the event that concentrations of a parameter currently exceed these guidelines and regulations, any project-related increase in the parameter concentration is considered significant.

6.3.4 Existing Conditions

Existing conditions for Surface Water Quality are described in Chapter 5: Environmental Setting (5.2.4 and 5.2.5). Analytical results for one surface water sample collected near the proposed site of the new plant are presented in Appendix F.

Existing conditions for Aquatic Habitats are described in Chapter 5: Environmental Setting (5.3.2).

6.3.5 Project-VEC Interactions

Drinking water

Environmental effects related to surface water supplies can result from development activities as they can affect water quality. Surface water resources are hydraulically linked to groundwater resources (Section 6.2). Surface water quality can be directly affected by the volume and quality of groundwater flowing to the surface water. Conversely, surface water quality and quantity may affect groundwater quality and quantity.

The key environmental issues of that VEC with potential interactions with the Project are:

- Water management on site (including wastewater);
- Degradation of the water quality for surface water resources

The plant's building plans were designed so as to allow run off water on the site to be recovered and channelled via roof drains and drain ditches to the waste water treating element and decantation basin located east of the plant. These ditches and the sedimentation basin will be put in place after site preparation (deforestation and grading), before the construction phase so as to prevent transportation of suspended materials or contaminants into surrounding water courses.

The plant is also designed as to keep all wastewater or sanitary water from entering into the environment.

Aquatic Habitat

No aquatic habitats are located in the Project footprint and no valued aquatic habitat is located in the Study area. Spawning grounds identified in the Study area were all located upstream of the project location. Taking into account the plant design for water management, potential environmental effects on aquatic habitats located downstream to the Project site could occur only in case of a major spill, but unlikely.

Construction

Site preparation activities may lead to the transportation of suspended matter into surface water if the work is not carried out in accordance with current environmental protection standards.

During the construction phase, there is the potential for contaminated water discharge to be produced by various activities, such as wastewater from cleaning, sanitary installation, oily water discharge. These water emissions could have impacts in local ecosystems by introducing suspended sediments, changing chemical or temperature quality, or introducing toxic substances and thereby potentially affect aquatic habitat and alter drinking water quality in Lac Mistassini.

Operation

Transportation of suspended matter

The drainage system and related sedimentation basin can accumulate sediments and various materials due to heavy rainfall, leading to potential overflow of water containing suspended matters.

Solid and liquid wastes

There will be variety of wastes generated during operation of the Project, including domestic waste, waste oil and solvent, wood waste, packaging waste, waste chemical products and sanitary sludge. Solid wastes, if not handled properly, can be carried away and obstruct the ditches, and contaminate the water resources.

Snow removal activities

Snow from clearance activities in traffic areas and buildings (parking lot, roofs, etc.) will be piled in two snow dump areas. It will contain materials such as wood chips and sand.

Accidental Events

Accidents, malfunctions and unplanned events that may occur during the construction, and operation phase and that have a potential for adverse environmental effects on surface water resource include:

- Hazardous materials spills;
- Erosion and sediment control failure; and
- Fire.

6.3.6 Environmental Effects Analysis and Mitigation

The activities that may have a negative impact on surface water quality will take place during the construction and operational phases.

Construction

Transportation of suspended matter

The potential interference with the local drainage by the site preparation and construction of the proposed new plant may consist of the blockage or alteration of existing drainage patterns or the creation of new drainage channels over previously undisturbed terrain.

Baie du Poste on the western portion of the site and wetlands on the eastern portion are probable receptors of the additional suspended solids generated by water runoff from the construction activities. These environmental effects would mainly occur between the beginning of site preparation and the presence of ditches and sedimentation basin on site.

Mitigation

Several measures have been integrated in the Project design to avoid transportation of suspended materials during construction work. The Environmental Management Plan (Appendix I) describes supplementary measures to be implemented, such as:

- Application of a sweeping compound (dust suppressant) on access road and circulation area, if necessary;
- Conservation of vegetation along watercourses;
- Drainage work to direct surface water towards the sedimentary basin before it reaches the watercourse;
- Installation of a sediment barrier at the runoff discharge point while the sedimentation basin is being installed;
- Storage of excavation debris more than 30 m from watercourses, and protection from erosion.

Solid and liquid wastes

Site preparation and construction activities will generate solid and liquid wastes that, if not handled properly, can lead to surface water contamination. The concerned solid wastes include: concrete residues, domestic and sanitary wastes, and uncontrolled hazardous wastes. Liquid wastes generated by the construction activities include washwater from cleaning and concrete production, from sanitary installations and oily water discharge. If such wastewaters were allowed to infiltrate into the ground and reach the water table, they could affect groundwater quality. If such wastewaters were allowed to reach surface water, they could affect surface water quality.

Washwater from concrete production operations are expected to have a high pH. The presence of such wastewater or concrete residues in surface water would alter its quality and affect the ecosystem.

Potential effects from sanitary installations include spills or leaks from portable toilets. Released sanitary wastewater could enter local water stream, potentially attract wildlife, and represent a health and safety concern for employees.

Potential effects of uncontrolled hazardous wastes are described in the section regarding accidental events below.

Mitigation

As mentioned in the Project design, procedures and activities related to the management of construction waste will be in compliance with the waste disposal requirements of the Province of Québec. The waste plan will also be in keeping with the overall waste strategy based on the 3 Rs (reduction, reuse, recycle).

The Environmental Management Plan (Appendix I) describes supplementary measures to be implemented, such as:

- Ensure the application of the overall waste strategy (3 Rs)
- Ensure that domestic waste is collected and stored in closed containers so as not to attract wildlife;
- Ensure that concrete residuals are sent to dry material disposal sites;
- Identify suitable locations for the portable toilets away from watercourses; and
- Establish a schedule with a licensed firm to empty the contents of sanitary installation on a regular basis to avoid leakage and spills.

Operation

Transportation of suspended matter

The only risk pertaining to transportation of suspended matter into surface water could only happen in case of a major and unpredictable rainfall, causing the drainage system and sedimentation basin to overflow in the water course at the discharge point.

Mitigation

Mitigation measures for this potential event are discussed in the section on accidental events below.

Solid and liquid wastes

There will be variety of wastes generated during operation of the Project, including domestic waste, waste oil and solvent, wood waste, packaging waste, waste chemical products and sanitary sludge. Solid wastes, if not handled properly, can be carried away and obstruct the ditches, and contaminate the water resources.

Mitigation

Measures already integrated in the plant design for solid and liquid wastes management are described in sections 2.9.3. Briefly, they can be summarized as follows:

Table 6-12: Mitigation measures proposed for solid and liquid waste

Activities	Mitigation
Domestic and office waste	All domestic garbage will be picked up by the municipality's sanitary treatment facility in Mistissini
Wood waste	Wood waste will be conserved in a hermetic container and sent to Chibougamau
Packaging materials	Avoid "over-packaging" and use a recycling facility
Waste oil or solvent	These used products will be recycled and sent to Chibougamau
Waste chemical products	Collect the wash water, mix it with sawdust (ratio 1-3), place it in a suitable container and send it to Chibougamau. UX adhesive will be sent to an incineration company. Metal belts will be recycled and sent to PA Transports in Chibougamau.
Sanitary sludge	The septic tank will be cleaned twice a year and the sludge transported to the Chibougamau sanitary landfill.

Snow removal activities

The risk of contamination from the storage of snow removed from traffic areas and buildings adjacent to the plant is almost inexistent. As per the plant design, the melting snow will be carried away by a drain ditch situated behind the snow dump area and then evacuated towards the sedimentation basin.

Mitigation

No mitigation measures are required.

Accidental Events

Accidental events that may occur during the construction, and operation phases and that have a potential for adverse environmental effects on surface water resource include:

- Erosion and sediment control failure;
- Hazardous materials spills; and
- Fire.

Erosion and sediment control failure

A potential exists of failure of erosion and sediment control structures due to precipitation events. In case of a major and unpredictable rainfall, the drainage system and sedimentation basin may overflow. Such a failure could result in the release of a large quantity of sediment runoff to receiving watercourses and the marshland.

Hazardous material spills

Despite the use of proper safety facilities and procedures, it is possible to have a spill of hazardous materials during an accident, malfunction or unplanned event. A spill of hazardous materials has the potential to substantially affect the quality of the local surface water resources. Hazardous material spills could be the result of construction activities (*e.g.*, equipment fuelling, collision, or faulty vehicle components), operation activities (*e.g.*, transport truck accident, equipment fuelling). Most of hazardous materials used during the plant operation will be stored and used inside the plant or warehouse (e.g. wax emulsion, adhesive) except for propane and heating oil, they will be stored in closed parks. Heating oil spill in the environment could affect water quality.

Fire

Fire may be caused as a result of construction activities (*e.g.*, hot equipment), operation activities (*e.g.*, use and presence of wood dust and flammable chemicals, faulty equipment components). Water required to fight the fire could affect surface water quantities. Potential environmental effects to surface water quality could result from the uncontrolled discharge of surface runoff (from fire fighting water) that may contain a wide range of contaminants from the fire.

Mitigation

Accidental events will be minimized by the following means:

- Intrinsically safe design;
- Effective Emergency Response Plan and Preparedness (Appendix J); and
- Implementation of the Environmental Management Plan - EMP (Appendix I).

For issues of importance identified, the EMP defines procedures such as the following:

Erosion and sediment control failure

Ditches and the sedimentation basin will be regularly inspected to prevent the accumulation of debris that could potentially obstruct the water flow, reducing the risk of overflow due to precipitation events.

Hazardous material spills

- No machinery maintenance work or refuelling activities involving fossil fuels will take place within 30 m of a watercourse;
- Hazardous materials and petroleum products will be stored inside the plant in appropriate receptacles equipped with secondary containment devices. They will be handled and disposed of in compliance with applicable regulations and requirements;
- Proper environmental protection measures will be taken to prevent the release of hazardous materials to the environment, such as the use of containment areas;
- Substances such as waste oils and lubricants and potentially hazardous materials (*e.g.*, greasy or oily rags) will be kept inside the plant in appropriate receptacles equipped with secondary containment devices. They will be disposed of regularly at authorized disposal facilities;
- Intervention kit will be permanently available to deal with accidental spillage of petroleum products including confinement tubes, absorbent rollers and other items (gloves, etc.) needed to deal with small accidental spills and recover and store the contaminated material; and
- Personnel handling hazardous materials will have Transportation of Dangerous Goods training.

Fire

The layout of the Plant has been designed to minimize risks related to accidental outbreaks of fire. A buffer zone cleared of trees will be created around the project site and a sprinkler system will be installed to rapidly put out fires if and when they occur. Fire suppression responsibilities will be clearly set out and practiced through regular planned drills in collaboration with the Mistissini fire Department.

Cumulative Environmental Effects

The future projects considered by CCNM are:

- Construction of a hiking/snowmobile trail;
- Development of the Chalifour Campground;
- Development of a new factory-built housing plant on the site of the old community arena; and
- Development of a new drinking water supply.

The snowmobile trail may have some effects on surface water quality if any spill of fuel occurs and subsequently flow in the Du Poste Bay after the snow melts.

Surface water from the Chalifour Campground project could potentially have a negative impact on water quality in Lac Mistassini (Baie Cabistachouane), however, this project is located upstream of the Mistissini Beam Plant.

No effects on the surface water quality are expected for the new factory-built housing plant and the new drinking water supply. The waste water from the new factory-built housing plant will be collected in the municipal collector system.

In consideration of the project locations and with the application of mitigation measures for the Mistissini Beam Plant, the considered projects are not expected to result in any cumulative environmental effects on surface water regarding the drinking water quality and the aquatic habitats, even in combination with past, present and future projects.

6.3.7 Determination of Significance of Residual Effects

Based on consideration of the Project related and cumulative environmental effects, it is concluded that the surface water resources in the vicinity of the Project have the capacity to meet the needs of the present and those of the future.

Consequently, the Mistissini community and the nearby residents' use of Du Poste Bay as a source of drinking water will not be affected by site preparation, construction, infrastructure or operation activities.

No aquatic habitats are located in the Plant footprint. No spawning grounds were identified in the project area or in the permanent watercourses located downstream of the project location. Consequently, no specific mitigation measures will be required. However, all recommended measures pertaining to maintaining surface water, groundwater and soils quality will play a role in maintaining aquatic habitat quality in Du Poste Bay.

The significance of potential residual environmental effects, including cumulative environmental effects, resulting from the interaction between Project activities and surface water resources, after taking into account any proposed mitigation, is considered not significant and minor for all Project phases regarding drinking water and aquatic habitat.

However, potential hazardous material spills for the Project are rated as significant for hazardous material spills, but unlikely.

6.3.8 Monitoring and Follow-up

As knowledge of baseline conditions of surface water is limited, a water sampling program will have to be conducted before the site preparation phase to obtain baseline information on the quality of surface water, at least for the following areas:

- In Du Poste Bay on the west coast of the Watson peninsula, in the area where nearby residents drinking water intakes are located;
- In the water course where the site drainage system will be discharged (exact location of the discharge point is not determined yet).

A surface water follow-up program will be developed for the Project site (e.g. surface discharge points) and is discussed in Chapter 7.0.

The management of the quality of the water emissions on the site will follow the guidelines in the applicable regulations and the quality criteria established by the Guidelines for Canadian Drinking Water Quality. The water discharge sampling program will comply with these standards.

6.4 VEC- 4: Special status species and habitats

6.4.1 Rationale for Selection as a Valued Environmental Component

Special status species and habitats were selected as a VEC because of the potential interaction of Project activities to interact with terrestrial habitats (undeveloped lands) and species of special conservation concern. This VEC was also selected because special status species are protected through laws and regulations as they are of high ecological value.

In this section, the environmental effects of the Project activities on the special species and habitats in the zone of influence of the Project, including cumulative environmental effects, resulting from Construction, Operation and Accidental Events, are assessed.

6.4.2 Environmental Assessment Boundaries

Spatial and temporal

As for previous VECs, the spatial boundary for this VEC includes the proposed site, which covers approximately 30 hectares.

Analysis of the potential impacts has been carried out for the construction and operation phases. Construction is expected to take between seven and eight months, while the anticipated life of the plant is approximately 50 years.

Administrative and Technical

Wildlife is protected through federal and provincial legislation.

Wildlife species of special conservation concern are protected federally under the Species at Risk Act (SARA). As defined in the SARA, "wildlife species" means a species, subspecies, variety or geographically or genetically distinct population of animal, plant or other organism, other than a bacterium or virus, that is wild by nature and is native to Canada; or has extended its range into Canada without human intervention and has been present in Canada for at least 50 years. The purpose of this act is to protect wildlife species at risk, and their critical habitat. The SARA is administered by Environment Canada, Parks Canada Agency and Fisheries and Oceans Canada. Wildlife species potentially found within the assessment area and protected under SARA include woodland caribou. No plant species with federal special conservation concern are potentially present within the Lac Mistissini region.

Migratory birds are protected federally under the Migratory Birds Convention Act. The purpose of this act is to protect migratory birds and active nests. The Migratory Birds Convention Act is administered by Environment Canada

Species of special conservation concern are protected provincially under the Quebec Act respecting threatened or vulnerable species. A species is threatened when extinction is though likely, and is vulnerable when its survival is threatened, even if it is unlikely to become extinct. The purpose of this act is to provide protection to endangered species and their habitats. The Quebec Act respecting threatened or vulnerable species is administered by MDDEP for vascular plants and by ministère des Ressources naturelles et Faune (MRNF) for wildlife species (animal).

Information used in support of the assessment of wildlife, including the potential of the area for harbouring rare and endangered species, was obtained from forest inventory mapping (1996/2000), COSEWIC (2006) and other information from stakeholders and government departments with applicable expertise. Knowledge of the habitats affected by the Project is based on information provided by the above sources, and the professional judgment of the study team.

6.4.3 Residual Effects Rating Criteria

A significant adverse residual environmental effect is one that affects special status wildlife species (direct mortality, change in migratory patterns, habitat avoidance) or wildlife habitat (loss or change) in such a way as to cause a decline in abundance or change in distribution of population(s) of special status species over one or more generations within the Study area, and natural recruitment may not re-establish the population(s) to its original level.

With regards to special status vascular plant species, a significant adverse residual environmental effect is one that alters the terrestrial habitat within the Study Area physically, chemically, or biologically, in quality or extent, in such a way as to cause a change or decline in the distribution or abundance of a viable plant population that is dependent upon that habitat, such that the likelihood of the long-term survival of the population within the region is substantially reduced as a result.

6.4.4 Existing Conditions

Existing conditions for Special Status Species and Habitat are described in Chapter 5: Environmental Setting (5.3.1 and 5.3.2).

6.4.5 Project-VEC Interactions

Species with conservation concern

No occurrence of species of special conservation concern is known for the footprint of the Project in the provincial and federal database (MRNF, 2005; Environment Canada, 2006). According to the information obtained from the TEK workshops, no species with special status have been observed or hunted in the study area (TEK workshop, Appendix D).

No potential VEC-Project interactions are anticipated with vascular plants with special conservation concern. The Study area does not presents any suitable habitat for the only threatened of vulnerable plant specie that may potentially be found in the Las Mistassini region, the Sparrow-egg lady's-slipper (Cypripedium passerinum).

According to information gathered in the section describing the environmental settings of the project (Chapter 5, section 5.3.2), a total of ten animal species with special status are likely to be found in the Lac Mistassini region (least weasel, rock vole, southern bog lemming, eastern red bat, hoary bat, silver-haired bat, pygmy shrew, woodland caribou and Canada lynx) and birds (bald eagle).

No potential VEC-Project interactions are anticipated with the woodland caribou or the Canada lynx. According to local knowledge obtain through the TEK workshops, no woodland caribou or Canada lynx has been observed or hunted within the Watson Peninsula.

As well, no observations by local residents were made in relation to small games identified as special status species. However, it is possible that these animals have not been observed because they are not hunted by local residents. If this is the case, there would be VEC-Project interactions on these small animals. Deforestation of the plant footprint, noise and lighting would be the main factors disturbing their habitat.

6.4.6 Environmental Effects Analysis and Mitigation

Construction and operation

As the plant will not produce any toxic emissions and as it will not pump untreated waste water into the surrounding waters, it should not have an impact on wildlife and waterfowl habitat.

The construction and operation of the plant will cause some disturbances to the small animals living nearby the plant site, including the special status small games if they are present on the Project footprint. However they will relocate themselves to a different location like they usually do when there is a new human settlement.

It should be noted that the Mistissini community is growing fast. Urbanized areas are developing toward the south of the actual community settlement and cabins are constructed along the shores of the Watson peninsula. As well, areas of services for the community have developed throughout the Watson peninsula (wastewater treatment areas, domestic and solid waste landfills, quarry and gravel pits, etc).

Although there is a zoning plan project for the community settlement, there is no precise land use planning for the whole Watson peninsula.

As the Project footprint constitutes a small area compared to whole Watson peninsula, and a very small area compared to the whole Mistissini region, and as the Albanel-Témiscamie-Otish National Park has been announced in January 2006, the effects of the Project on the potential presence of special status small animals is negligible.

Mitigation

The development of a Land Use Master Plan for the Watson peninsula would be a mean to create different levels of conservation of the natural ecosystems if evaluated necessary in the context of the whole Mistissini region.

Cumulative Environmental Effects

The future projects considered by CCNM are:

- Construction of a hiking/snowmobile trail;
- Development of the Chalifour Campground;
- Development of a new factory-built housing plant on the site of the old community arena; and
- Development of a new drinking water supply.

The hiking / snowmobile trail and the Chalifour Campground may have some negative effects on the potential presence of special status small animals.

No effects are expected for the new factory-built housing plant and the new drinking water supply.

In consideration of the project locations and with the application of mitigation measures for the Mistissini Beam Plant, two of the considered projects may result in cumulative environmental effects on the potential presence of special status small animals.

6.4.7 Determination of Significance of Residual Effects

Special status species, if present in the study area, will be affected by site preparation, construction, or operation activities but will relocate in the vicinity or further away in the surroundings of the Watson peninsula.

As the Project footprint constitutes a small area compared to whole Watson peninsula, and a very small area compared to the whole Mistissini region, and as the Albanel-Témiscamie-Otish National Park has been announced in January 2006, the effects of the Project on the potential presence of special status small animals is negligible.

Based on consideration of the Project related and cumulative environmental effects, it is concluded that the special status species potentially present and their habitat resources in the Mistissini region have the capacity to meet the needs of the present and those of the future.

The residual environmental effects of the Project on special status species, including cumulative environmental effects and after taking into account any proposed mitigation, are considered as not significant for all phases and for the Project overall.

6.4.8 Monitoring and follow-up

A specific monitoring and follow-up program is not required for special status species and habitats.

6.5 VEC – 5: Public Safety

6.5.1 Rationale for Selection as a Valued Environmental Component

Public safety was selected as a Valued Environmental Component (VEC) because of concerns related to the proposed Glulam Plant that were raised during public consultations and meetings with key informants in the community. These concerns were related primarily to the following aspects:

- Potential safety risks or disturbances caused by emissions from the Plant;
- Industrial accidents or fires at the Plant;
- Accidents along the Mistissini road used to access the Plant.

6.5.2 Environmental Assessment Boundaries

Spatial and Temporal

The spatial boundaries for the VEC-5 assessment include the areas bordering the access road to Mistissini between the intersection with Highway 167 (to the south of the Project site) and the community of Mistissini (to the north of the Project site). They extend to the western and eastern shores of the Watson Peninsula.

The temporal boundaries are established by determining the period of time over which the Project-specific and cumulative environmental effects are to be considered. These include periods of Construction and Commissioning (seven to eight months), and subsequent Operation of the Project throughout its expected life span (minimum 50 years).

Administrative and Technical

Baseline information used for this assessment is limited to traffic data along the Mistissini access road collected by the ministère des transports du Québec (MTQ) in 2000 (for trucks) and in 2004 (for passenger vehicles). It is the professional judgement of the study team that the data available is sufficient to characterise the extent of effects on public safety generated by the Project to support the environmental assessment.

6.5.3 Residual Effects Rating Criteria

In the case of the Public Safety assessment, a *significant residual environmental effect* would occur where serious injury (e.g., permanently disabling) or a fatality could arise as a result of an accident, malfunction, or unplanned event.

The sensitive area in the VEC boundaries consists mainly of the lots occupied by cabins facing the Baie du Poste along the western shores of the Watson peninsula and the Mistissini access road that is used by community residents for walking, cycling, etc.

6.5.4 Existing Conditions

The potential risks associated with the phases of the Project are detailed in Chapter 2 (section 2.10.3). The description of existing conditions for atmospheric emissions is detailed in Chapter 5 (sections 5.2.2 and 5.2.3). The description of existing land uses in the Study area is also provided in Chapter 5 (section 5.4.3).

6.5.5 Project-VEC Interactions

Construction

Work Site Safety

Construction of the Plant may attract youngsters to the Project site. Children and teenagers in Cree communities are frequently attracted by the activities and equipment on construction sites and occasionally put themselves at risk during or after construction periods.

Road Safety

Construction of the Plant will result in an increase of traffic along the access road to Mistissini. The road linking Mistissini to Highway 167 is used by many residents for hiking, bicycling or running. Many children and teenagers walk, cycle or hitch-hike from the community to the public beach located near the mouth of the Perch River. This is likely to raise road safety concerns in the community. Traffic accidents along access roads to Cree communities are already a concern and are often linked to driving at excess speeds and/or to driving under the influence of alcohol.

Particulates Emissions

There is the opportunity for adverse effects to public safety resulting from dust emissions during construction of the Plant and of access roads to the Plant. Under dry conditions, there is potential for dust to be generated as vehicles travel back and forth along the access roads to the Plant, and by material blowing off of soil stockpiles. Depending on wind direction, and the level of dust and/or emissions, these could become an annoyance for nearby residents and land users or a safety risk for drivers on the access road to Mistissini.

Operation

Work Site Safety

The Plant's activities will be operated 24 hours per day, five days. Noise levels associated with the equipment and vehicle running range between approximately 85 dBA and 102 dBA. With such levels, there is potential for the operation noise to be a disturbance to the Plant's workers. Even if most of the work at the Plant will involve "push button" operations and should not involve repetitive movement operations, working in an industrial environment tends to lead to more frequent aches such as backaches.

Road Safety

The Plant operation will generate an increase of traffic from the transportation of general delivery/pick up, wood and finished products and from private vehicle of people coming from Chibougamau to work at the Plant during the first few years of operation. With an average of 5 people per shift coming from Chibougamau to work at the Plant during the first few years of operation, we calculated that the average annual daily traffic would increase by 30 cars (5 people, two ways, three shifts), an increase in car traffic of 4.5% compared with 2004.

The type of transport trucks traveling to the Plant will include general delivery/pick up trucks (hazardous waste materials, recycling, and heating oil) and transport trucks for wood and finished products. We estimated that the operations at the Plant would result in an increase in daily truck traffic of approximately 6.5 trucks per day, over a five day period (3.2 trucks per day, two ways), an increase of 7% from 2000.

Accidental Events

Effects of accidental events on public safety could result from fire and explosion, and accidental releases of hazardous materials (gaseous and particulate). These accidental events may occur during all the phases of the Project.

6.5.6 Environmental Effects Analysis and Mitigation

Construction

Work Site Safety

Children and teenagers from Mistissini may be attracted by the activities and equipment on the Project site and occasionally put themselves at risk during or after construction periods.

Mitigation

The Project site will be fenced off and security guards will be provided during the construction phase to minimise risks to children and teenagers that might be attracted to the site.

Road Safety

Construction of the Plant will generate an increase of traffic linked to the use of construction equipment (*e.g.*, bulldozers, excavators, concrete mixers, etc.), and heavy vehicles (*e.g.*, trucks and mixers) on the site of the Plant and on the access road to Mistissini. Construction-related vehicles and machinery will move back and forth between the Project site and Highway 167 linking Mistissini to Chibougamau. Safety concerns and disturbances resulting from an increase of traffic during construction of the Plant could affect the few part-time residents of cabins located along the Baie du Poste on the western side of the Watson Peninsula. They could also affect drivers using the access road to Mistissini and community residents that use the road for hiking, bicycling or running, including children and teenagers that walk, cycle or hitch-hike from the community to the public beach.

Mitigation

The level of public safety risks and disturbances for residents and road users in the Study area can be minimized during the construction period by the following:

- Undertake the construction activities in as short a time period as is feasible;
- Limit activities to the Project area;
- Provide advance notice to neighbouring land users before proceeding with potentially disruptive construction activities (*e.g.*, use of explosives, etc.);
- Educate company and sub-contractors' personnel on the applicable traffic, road-use, dust suppression and safety regulations for all Project-related vehicles using the access road to Mistissini;
- Limit the speed of all vehicles used for construction activities on the access road to Mistissini in order to minimise the risk of traffic accidents;
- Place signage along the access road to Mistissini to notify other road users that construction vehicles are in the vicinity;
- Provide key road users and emergency service providers with information pertaining to anticipated traffic volumes at different periods during the construction period.

Particulates Emissions

There is the opportunity for adverse effects to public safety resulting from dust emissions during construction of the Plant and access road. Under dry conditions, there is potential for dust to be generated as vehicles travel back and forth along the access roads to the Plant, and by material blowing off of stockpiles. Depending on wind direction, and the level of dust and/or emissions, these could become an annoyance for nearby residents and land users and for drivers along the Mistissini Access Road.

Mitigation

Several measures have already been integrated in the Project design (see Section 2.8.2) and in the Environmental Management Plan (presented in Appendix I) to reduce the level of dust generation, such as:

- Application of dust suppressants on roads, site and stockpiles;
- Cover stockpiles with tarpaulins or plastic sheeting;
- Cover truck loads of materials which could generate dust, as necessary;
- Minimize activities that generate large quantities of fugitive dust during high winds; and
- Paving of the site and access roads to the Plant.

Operation

Work Site Safety

For the workers at the plant, ambient noise levels will require proper protective gear and the risks inherent to industrial processes will have to be adequately managed. Most of the work will involve "push button" operations and should not involve repetitive movement operations. Nevertheless, working in an industrial environment tends to lead to more frequent aches such as backaches. To minimise such problems, health and safety procedures will be put in place at the plant.

Mitigation

No mitigation measures are required during the operation stage.

Road Safety

Safety conditions along the access road to Mistissini should not be affected by a slight increase in traffic along the road and at the Project site during operation of the Plant.

Mitigation

No mitigation measures are required during the operation stage.

Accidental Events

The industrial processes at the Plant will involve mainly "push button" operations with "state-of-the-art" machinery, thereby minimizing risks to personnel. Nevertheless, the industrial processes at the plant could lead to occasional safety risks for workers. Effects of accidental events on public safety would include fire and explosions, accidental releases of hazardous materials including fuel and other chemicals and accidental releases of particulates including wood dust. The potential risks associated within the phases of the Project are detailed in Chapter 2 (section 2.10.3).

The layout of the Plant has been designed to minimise risks related to accidental outbreaks of fire. A buffer zone cleared of trees will be created around the project site in order to minimise the risks of brush or forest fires and a sprinkler system will be installed to rapidly put out fires if and when they occur. Fire suppression responsibilities and procedures will be clearly set out and practised through regular drills planned in collaboration with the Mistissini fire department.

Mitigation

Accidental events will be minimized by the following means:

- Intrinsically safe design;
- Effective emergency planning and preparedness; and
- Implementation of operational procedures and training.

Safety features are incorporated into every aspect of the design of the proposed facility. The proposed facility will be designed and equipment selected to meet strict design codes and standards. Operational procedures will be prepared to ensure the transport, handling and process systems are operated within the design parameters and with the highest regard for safety.

The Project will follow an Environmental Management Plan (presented in Appendix I) to ensure that the Plant's Environmental, Health and Safety policy objectives are achieved. The Project will also develop an Emergency Response Plan for Operations to ensure that the policy objectives are achieved throughout all phases of the Project.

Accidental events, including forest fires, will be mitigated by the implementation of these plans. All employees will be trained in operational procedures and environmental emergency response procedures to ensure safe operation.

Cumulative Environmental Effects

The future projects that could potentially interact with public safety issues at the Plant are:

- Construction of a hiking/snowmobile trail along the access road to Mistissini;
- Development of the Chalifour Campground;
- Development of a new factory-built housing plant on the site of the old community arena.

Increased risks of road accidents and dust emissions would result from the increase of traffic (vehicles, trucks and snowmobile) generated by the future projects. However, they are not expected to result in any significant adverse environmental effects.

The cumulative environmental effects of the Project on public safety, in combination with the identified future projects, are considered minor and are not expected to result in any significant adverse environmental effects.

6.5.7 Determination of Significance of Residual Effects

Work Site Safety

In order to protect children and teenagers from Mistissini that may be attracted by the activities and equipment on the Project site during or after construction periods, the Project site will be fenced off and security guards will be provided during the construction phase to minimise risks to children and teenagers that might be attracted to the site. The residual effects on public safety related to the presence of a large construction site near the community are therefore considered as not significant and minor and they are not predicted to cause significant adverse effects to the nearby residents and users.

To minimise the risks related to working in an industrial environment, health and safety procedures will be put in place for the workers at the Plant. Therefore the residual effects on public safety related to industrial processes during Plant operations are considered as not significant and minor and they are not predicted to cause significant adverse effects to the Plant's workers.

Road Safety

Based on the information presented in the above sections on the potential effects of the Plant's construction and operation on road safety and the proposed mitigation measures to minimize related risks and disturbances, the residual environmental effects are considered not significant and minor. Therefore no significant adverse effects on residents and road users in the Study area are anticipated.

Particulates Emissions

Due to the low magnitude of emissions expected and the application of mitigation measures for dust control, the residual effects on public safety related to particulate emissions are considered as not significant and minor and therefore they are not predicted to cause significant adverse effects to the nearby residents and users.

6.5.8 Monitoring and Follow-up

In order to insure that the Plant does not cause any safety risk to local residents, a specific follow-up program will be put in place consisting in the consultation of nearby residents on a regular basis. Regular communication with local residents and also with Mistissini Public Safety Department will provide information on the effectiveness of the proposed mitigation measures.

6.6 VEC – 6: Employment and Socio-economic Conditions

6.6.1 Rationale for Selection as a Valued Environmental Component

Employment and socio-economic conditions was selected as a Valued Environmental Component (VEC) because of concerns related to the Plant that were raised during public consultations and meetings with key informants in the community. These concerns were related primarily to the following aspects:

- Number and quality of jobs for Cree residents at the Plant;
- Potential for Cree personnel (including women) to adapt to an industrial environment;
- Integration of Native and non-Native personnel at the plant;
- Long-term sustainability of the plant, both in terms of competition from other producers and of access to forestry inputs.

6.6.2 Environmental Assessment Boundaries

Spatial and Temporal

The spatial boundaries for the VEC-6 assessment extend to all of the community of Mistissini.

The temporal boundaries are established by determining the period of time over which the Project-specific and cumulative environmental effects are to be considered. These include periods of Construction and Commissioning (seven to eight months), and subsequent Operation of the Project throughout its expected life span (minimum 50 years).

Administrative and Technical

Baseline information used for this assessment is largely based on social and economic data for the community of Mistissini obtained from the 1996 and 2001 Statistics Canada censuses. Additional demographic data was obtained from the Registry of Cree Beneficiaries of the JBNQA (under the responsibility of the Québec Department of Health and Social Services).

Data on Cree education levels, school attendance and fields of specialisation in Mistissini as well as main economic activity indicators, data on Cree employment by industry subdivision and data on value and composition of income in Mistissini were obtained from a Cree Human Resource Development (CHRD) funded Cree Labour Market Survey carried out in 2003 (CHRD, 2005).

Data on participation by Mistissini residents in the Income Security Program was obtained from the Cree Hunters and Trappers Income Security Board (1993-1994 to 2003-2004). Data on the evolution of housing conditions in Mistissini was obtained from Norman D. Hawkins & Associates Inc. (1997 and 2000). A list of businesses operating in Mistissini in 2005 according to sector of activity was obtained from the Economic Development Department at the Cree Nation of Mistissini's Band Office. A list of Mistissini Outfitters was obtained from the Cree Nation of Mistissini Web Site (2006).

Available baseline data was completed by socio-economic information obtained through interviews carried out in Mistissini in January 2006 with community groups such as the Elders Council, the Youth Council and the Women's Association.

It is the professional judgement of the study team that the data available is sufficient to characterise the extent of effects generated by the Project on employment and socio-economic conditions to support the environmental assessment.

6.6.3 Residual Effects Rating Criteria

As in the case for biophysical and biological effects, socio-economic effects can, in most cases, be assessed on the basis of a number of attributes: 1) *direction*, which indicates whether an effect is positive (benefit) or negative; 2) *geographic extent*, which in the case of socio-economic effects is considered in terms of administrative units; 3) *duration*, which refers to the length of time over which an effect occurs; and 4) *magnitude*, which refers to the degree of change in a socio-economic parameter that an effect has the potential to produce.

However, unlike the case for biophysical and biological effects, the attributes of *reversibility* and of *probability* are not readily applied to socio-economic effects. In addition, a three level criteria system cannot be consistently applied to each of the attributes of socio-economic effects, for instance to *direction* and *geographic extent*. Because of their elusive nature, some socio-economic effects may not lend themselves to either being assigned attributes or to determining significance except in terms of potential (it is for instance very difficult to predict whether social change that may occur as a result of the Project will be positive or negative or both, and in what ways). As a result, socio-economic mitigation and enhancement measures need to include the putting into place of a process by which socio-economic effects are monitored and discussed with the parties concerned on an ongoing and adaptive basis.

In consideration of the above, in the case of the VEC-7 assessment, a *significant residual environmental effect* would be one where the proposed Project activities and related facilities were deemed to *potentially* involve meaningful *adverse* or *beneficial* effects on the well-being of the community's residents, taking into consideration all applicable mitigation, enhancement and/or compensation measures.

6.6.4 Existing Conditions

The description of the administrative context in Mistissini is provided in Chapter 5 (section 5.4.1). The description of existing socio-economic conditions in Mistissini is detailed in Chapter 5 (section 5.4.2).

6.6.5 Project-VEC Interactions

Construction

Local Employment

Construction of the Plant will provide some direct short-term employment opportunities to specialised and non-specialised construction workers from the community as well as contract opportunities to regional and local publicly and privately-owned companies. The Project will also create or support indirect and induced employment in the community and in the surrounding region through activities such as supplying goods and services needed during construction and through spending wage income in the community.

Provision of Goods and Services

Mistissini benefits from a relatively large number of qualified manpower resources in the construction sector (heavy machinery operators, truck drivers, carpenters, painters, etc.). Even if they are frequently busy on a number of projects in the James Bay region, it is most likely that several among them would be tempted to work on a major construction project in their own community. A number of regional and local construction, heavy machinery and equipment and transportation companies could also potentially take part in construction of the plant.

Operation

Local Employment

The Plant will create about 30 permanent jobs among which over 20 are expected to be filled by Mistissini residents. In-plant production jobs will involve the operation of machinery. These jobs will be open to men and women. Salaries provided at the Glulam Plant will be competitive with other salaries in the community. Cree employees will not be taxed as a tax exemption applies to work in Category 1 lands. Unlike most full-time jobs in the community that are frequently destined to office workers, Cree personnel at the plant would not be required to have completed their Secondary V schooling.

Provision of Goods and Services

A number of service companies in Mistissini should benefit from the presence of the Plant through activities such as supplying goods and services needed during operation and through spending wage income in the community.

Other Planned Developments

A factory-built housing plant planned for 2007 inside the old arena building in Mistissini could lead to positive cumulative environmental effects in regards to employment and socio-economic benefits.

Accidental Events

Effects of accidental events on employment and socio-economic conditions could result from fire and explosion, and accidental releases of hazardous materials (gaseous and particulate). These accidental events may occur during all the phases of the Project.

6.6.6 Environmental Effects Analysis and Mitigation

Construction

Local Employment

Construction of the Plant is expected to start in 2006 and is planned to take from 6 to 8 months. It will provide some direct short-term employment opportunities to specialised and non-specialised construction workers from the community as well as contract opportunities to regional and local publicly and privately-owned companies. The Project will also create or support indirect and induced employment in the community and in the surrounding region through activities such as supplying goods and services needed during construction and through spending wage income in the community.

Enhancement

In order to optimise local employment benefits during construction of the plant, procurement contracting procedures will be developed to facilitate the participation of local and regional Cree companies that are qualified to provide required goods and services at reasonable conditions. Open market businesses invited to bid on local goods and services contracts will be evaluated on the extent to which they intend to use local Cree labour in meeting their obligations.

Provision of Goods and Services

Mistissini benefits from a relatively large number of qualified manpower resources in the construction sector (heavy machinery operators, truck drivers, carpenters, painters, etc.). Even if they are frequently busy on a number of projects in the James Bay region, it is most likely that several among them would be tempted to work on a major construction project in their own community. A number of regional and local construction, heavy machinery and equipment and transportation companies could also potentially take part in construction of the plant.

Enhancement

In order to optimise local benefits during construction of the plant, procurement contracting procedures will be developed to facilitate the participation of local and regional Cree companies that are qualified to provide required goods and services at reasonable conditions. Open market businesses invited to bid on local goods and services contracts will be evaluated on the extent to which they intend to use local Cree goods and/or services in meeting their obligations.

Operation

Local Employment

- Number and quality of jobs for Cree residents at the Plant

The Plant is expected to start operating in 2007. The Plant will create 32 permanent jobs. It is expected that 24 of these new jobs (80% of workforce) will be filled by Mistissini residents. During the first three years, eight other positions would be filled by employees transferred from Chantiers Chibougamau's existing plant in Chibougamau. Over time, it is expected that most if not all of the manpower at the Plant in Mistissini would be composed of local residents. The market is slower in November and December and for this reason personnel would be employed 38 to 40 weeks per year. Personnel would work full-time at the Plant, five days per week, either on day shifts or on night shifts (jobs would be distributed among three 8 hour shifts). In-plant production jobs will involve the operation of machinery. These jobs are open to men and women. There will be only two or three office jobs in the Plant. Salaries provided at the Plant will be competitive with other salaries in the community. Cree employees will not be taxed as a tax exemption applies to work in Category 1 lands.

- Training of Cree personnel at the Plant

Training of Cree personnel from Mistissini will be provided in the community for a period of four to six months and will be completed by on-the-job training at the Plant for a few months. Unlike most full-time jobs in the community that are frequently destined to office workers, Cree personnel at the Plant would not be required to have completed their Secondary V schooling. Computers will be used in the Plant and personnel will be trained to work with the computers.

A Training Program for Cree Personnel has been prepared for the Project and is provided in Appendix K.

- Potential for Cree personnel (including women) to adapt to an industrial environment

Employment in an industrial setting is fairly new to the Crees but recent experience at the Troilus mine indicates that Cree workers can adapt to such types of employment. Furthermore, many Crees from Mistsissini have recently been employed in the construction of the Eastmain-1 hydropower project

which for some included night shift experiences. The fact that employment provided by the Plant would be located near the community and would not be subjected to revenue taxation is likely to attract a number of community residents. Adaptation of Cree workers will depend on their sense of ownership toward the Plant and on the quality of working relations with non-Native workers. Experience derived from the Troilus mine illustrates the importance of establishing good working relations involving humour and non-judgemental attitudes among workers (Baribeau, 1996).

Night time workers will probably experience a more difficult adaptation given that, unlike the situation at the Eastmain-1 work site where specific housing quarters were reserved for night shift workers, they will return home to rest during the day while most of the community is active. Group interviews with community groups indicate that most residents are aware that working night shifts would restrict their family and community activities during the day time.

- Integration of Native and non-Native personnel at the Plant

Experience gained over the last few years by Chantiers Chibougamau with integrating a few Cree workers at their existing plant in Chibougamau indicates that Native and non-Native workers could work together on a collaborative basis at the Plant in Mistissini. The Cree workers hired and trained in Chibougamau worked successfully at the Plant before leaving for personal reasons, which included working and living relatively outside their community. The integration of Cree personnel in Mistissini should be made easier by the fact that they would be working in their own community. However, concerns were raised during interviews with key informants in the community about the integration of non-Native workers in the event where a majority of the personnel employed at the Plant were non-Native residents of Chibougamau.

- Sustainability of employment offered at the Plant

Unlike the large-scale but short-term construction activities associated with the Eastmain-1 hydropower dam (which should be commissioned in 2006) and with the Eastmain-1A dam and Rupert River diversion project (whose construction could start in 2007), the Plant offers the opportunity to over 20 Mistissini residents to obtain a source of long term employment in their community. The Troilus mine, which has long been the largest source of long term employment outside of the public sector in Mistissini, has entered the closure phase and should be progressively winding down its operations over the next four years. Only about 10 Cree full-time employees still work at the mine.

The long-term sustainability of employment at the Plant is linked on the one hand to the evolution of the market for its products and on the other hand to the availability of forestry resources to supply the Plant. The forestry products industry in Québec is undergoing major transformations. Suppliers of non-transformed forestry products are faced with increased international competition and diminishing returns. Producers are also confronted with a changing environment with regards to access to forestry resources to supply their mills. A new Forest Act is being implemented on the basis of a system of Timber Supply and Management Agreements and it should enter completely into force in 2007. One of the practical consequences of this Act is a substantial reduction in the size of the annual allowable cut in the James Bay region – a change in policy with significant consequences for employment in the forestry sector.

The Plant aims to deliver transformed (or 'value added') forestry products to clients on the east coast of Canada and the USA. The demand for such products is currently quite high and they are not subject to export tariffs or quotas in the US. There are relatively few competitors in this market (e.g., a producer of

a different product in Amos and a few important Glulam producers in the southern United States). The question of availability of forestry inputs to supply the Plant in the mid to long term remains an issue and may lead to increased co-operation between Native and non-Native communities in the region in view of optimising the use of increasingly rare forestry resources.

- Impact of employment offered at the Plant on the community's labour market

Cree Human Resource Development data (CHRD, 2005) indicate that 1,100 persons aged 15 to 64 years old in Mistissini were employed and 430 were unemployed and looking for work in 2003. The unemployment rate in Mistissini (28% in 2003 according to CHRD data) is similar to the average for all Cree communities. However, the participation rate in Mistissini (90% in 2003 according to CHRD data) is the second highest in the Cree communities.

According to Statistics Canada census data, the active population in Mistissini increased by 10% between 1996 and 2001 while participation and unemployment rates stayed approximately the same. This means that new jobs created during that period were nullified by the influx of community residents into the labour force with the result that the unemployment rate (22% in 1996 and 21% in 2001) remained practically unchanged. Unemployment is particularly high among 15 to 24 year olds where half (52%) of the active population is seeking employment.

Among the occupied labour force recorded by the CHRD in Mistissini in 2003, 23% were employed on a seasonal basis, 66% benefited from full time employment and 11% were employed on a part-time basis. Based on the demographic structure of the population, the CHRD (2005) estimated that 132 new jobs were needed from 2003 to 2008 just to preserve the current rate of employment and that 616 new jobs were needed in order to attain a full employment level.

The Plant offers the community the possibility to offer over 20 permanent jobs to young unqualified workers who are currently entering the work market. These are most often the persons whom the community finds it the hardest to assist in finding jobs. Indeed, some local representatives have indicated that since the start of construction on the Eastmain-1 hydroelectric project in 2002, most if not all of the qualified manpower in Mistissini has been fully occupied and that it is expected that this situation will continue if construction of the Eastmain-1A Dam and Rupert River Diversion hydroelectric project proceeds as planned in 2007.

ENHANCEMENT

Employment priority during operation of the Plant will be given: 1) to Crees from Mistissini fulfilling position requirements; and 2) to Crees from other communities fulfilling position requirements. A specific training program, based on previously established requirements, has been developed by the CCNM (Appendix K). Procurement contracting procedures will be developed to facilitate the participation of local and regional Cree companies that are qualified to provide required goods and services at reasonable conditions. Open market businesses invited to bid on local goods and services contracts will be evaluated on the extent to which they intend to use local Cree labour in meeting their obligations. This should enable the community to optimise local employment benefits during operation of the plant.

Additional initiatives that will be put into place to enhance employment at the Plant through human resource policy and procedures include:

- Designing hiring procedures to reduce constraints to Cree employment;
- Putting in place career development, on-the-job management training programs and employee assistance programs to enhance retention and promotion of Cree personnel;
- Analysing workplace gender issues and the integration of the results of this analysis into other initiatives as relevant;
- Providing cross-cultural training to all employees and publicising and enforcing the plant's anti-discrimination policy;
- Facilitation of the use, as appropriate, of the Cree language in the workplace;
- Enforcing zero tolerance for controlled substances, alcohol and harassment in the workplace;
- Conducting exit interviews when Cree employees leave to increase the understanding of barriers to successful long-term employment, and integration of the results into other initiatives as relevant.

Provision of Goods and Services

A number of service companies in Mistissini should benefit from the presence of the Plant through activities such as supplying goods and services needed during operation and through spending wage income in the community. These include hotel and restaurant services, grocery stores, gas stations and mechanical repair shops, etc. A number of Cree youth interviewed in the community have indicated an interest in opening up service companies to cater to both the Plant and to a proposed new factory-built housing plant on the site of the old community arena.

Enhancement

Procurement contracting procedures will be developed to facilitate the participation of local and regional Cree companies that are qualified to provide required goods and services at reasonable conditions. Open market businesses invited to bid on local goods and services contracts will be evaluated on the extent to which they intend to use local Cree goods and services in meeting their obligations. This should enable the community to optimise local benefits during operation of the plant.

Cumulative Environmental Effects

A future project that could potentially interact with the Plant in regards to employment and socio-economic conditions in the community is:

- Development of a new factory-built housing plant on the site of the old community arena.

A factory-built housing plant planned for 2007 inside the old arena building in Mistissini could lead to positive cumulative environmental effects in regards to employment and socio-economic benefits. The plant's primary market would be to provide affordable pre-assembled houses for Cree communities. A secondary market for the plant would be to build cabins that could be air-lifted to Cree traplines. Wood beams produced at the new Glulam Plant would constitute major inputs for the factory-built housing plant. The first stage of the project would be the training of manpower for the plant. This project would provide a number of full-time jobs in the community.

The cumulative environmental effects of the Project on local employment and socio-economic conditions, in combination with the identified future project, are considered significant and are expected to result in significant *beneficial* environmental effects.

6.6.7 Determination of Significance of Residual Effects

A significant *positive* residual environmental effect on the well-being of the community's residents is associated with potential long-term employment of over 20 Cree workers at the Plant, subject to implementation of the enhancement measures mentioned above. This effect includes the increased income and skills base of individuals employed by the Plant.

6.6.8 Monitoring and Follow-up

Socio-economic monitoring of Plant operations is proposed for the construction, operation and decommissioning stages of the Project so that problems (actual or perceived) related to the Project can be effectively identified and dealt with in an appropriate and timely manner. The objectives of the monitoring program are to:

- Record the uptake of Native and non-Native employment, business and education and training opportunities over time, including follow-up on results;
- Analyse the trends in relation to Cree training and hiring expectations and targets;
- Analyse the trends in relation to the number, value and general content of contracts for goods and services by supplier location and according to Native or non-Native ownership;
- Maintain records of all formal consultations, meetings and grievance and dispute occurrences related to the Project and involving the public, community leadership, plant personnel and/or contractors, noting attendance, issues raised and resolutions;
- Annually review the results of the above in order to summarise lessons learned and to identify corrective actions, if and as required.

6.7 VEC – 7: Land Use, Landscapes and Cultural Resources

6.7.1 Rationale for Selection as a Valued Environmental Component

Land use, landscapes and cultural resources was selected as a Valued Environmental Component (VEC) because of concerns related to the Plant that were raised during public consultations and meetings with key informants in the community. These concerns were related primarily to the following aspects:

- Compatibility of the Plant with existing and planned land uses;
- Integration of the Plant into the surrounding landscape;
- Potential for archaeological findings near the Project site.

6.7.2 Environmental Assessment Boundaries

Spatial and Temporal

The spatial boundaries for the VEC-7 assessment include the areas bordering the Mistissini Road between the intersection with Highway 167 and the community of Mistissini. They extend to the western and eastern shores of the Watson Peninsula.

The temporal boundaries are established by determining the period of time over which the Project-specific and cumulative environmental effects are to be considered. These include periods of Construction and Commissioning (seven to eight months), and subsequent Operation of the Project throughout its expected life span (minimum 50 years).

Administrative and Technical

Baseline information used for this assessment includes information on existing land uses in the Study area as well as land use planning information provided by the Land Registrar of the Mistissini Band Council in December 2005. It includes information on archaeological potential and heritage sites in the Mistissini region and in the Study area provided by Mr David Denton, responsible for cultural heritage at the Cree Regional Authority. It also includes information on Cree cultural views regarding landscapes obtained through work carried out in the context of the Environmental Impact Assessment of Hydro-Québec/SEBJ's Eastmain-1A Dam and Rupert River Diversion Project.

Specific additional information on local Cree land uses, valued wildlife or plant resources, valued sites or landscapes, sacred sites, burial or birth sites, etc. was collected directly in the community in January 2006 on the basis of an interview with the local Tallyman and on the basis of a Traditional Ecological Knowledge (TEK) Workshop. Participants in the Workshop included the local Tallyman, interested Elders and local land users. The results of the Workshop were transcribed on a map of the Study area that was subsequently validated with Workshop participants. The results indicated that no significant hunting, fishing or trapping activities occurred in the Study area. There were no valued wildlife or plant resources, no valued sites or landscapes, no sacred sites and no burial or birth sites in the Study area.

It is the professional judgement of the study team that the data available is sufficient to characterise the extent of effects on land use, landscapes and cultural resources generated by the Project to support the environmental assessment.

6.7.3 Residual Effects Rating Criteria

In the case of the VEC-8 assessment, a *significant residual environmental effect* is one where the proposed use of land for the Project and related facilities is not compatible with adjacent land use activities and plans, and the proposed use of land for the Project will create a change or disruption that restricts or degrades present uses, such that activities cannot continue to be undertaken at current levels for extended periods of time, and cannot be compensated.

6.7.4 Existing Conditions

The description of existing land use, landscapes and cultural resources in the Study area is detailed in Chapter 5 (section 5.4.3).

6.7.5 Project-VEC Interactions

Construction

Hunting, Fishing and Trapping

Increased noise, dust and safety concerns that could result from an increase of traffic on the Mistissini Road and at the Project site during construction of the Plant could affect the few part-time residents of cabins located along the Baie du Poste on the western side of the Watson Peninsula. Owners of the four cabins that are relatively close to the practice traditional activities around their camp (which mainly involve net fishing, wood collecting, plant collecting and occasional small game hunting and snaring).

Community Activities, Recreation and Tourism

There are no tourism facilities located in the study area as such. However, increased noise, dust and safety concerns that could result from an increase of traffic on the Mistissini Road and at the Project site during construction of the Plant could affect activities at Murray's Lodge, a site located along the Mistissini Road south of *Kaa Yaayeuweshimuhch* Bay that is used for many community uses such as meetings of the Healing Circle and of the Cree Board of Health and Social Services of James Bay (CBHSSJB) and also for the Justice Panel meetings. A children's Summer camp organised by the Pentecostal church is also organised near the mouth of the Perch River along the Mistissini Road.

Archaeological Potential and Heritage Sites

The only known archaeological site in the Project surroundings is the site of the 19th century Hudson Bay Company Post (site EcFl-4) located on the Hudson Bay point in the community of Mistissini. All of the shores along the Baie du Poste present a certain archaeological potential for pre-historic sites (prior to the contact with Europeans) and for historic sites. Most of the known sites in the Mistassini Lake area have been located less than 100 meters from the shore. Although it cannot be assumed that their is no site further than 100 meters from the shore, the archaeological potential of sites located further inland is much lower. As a result, the archaeological potential of the Watson Peninsula shores is high but the potential of the Plant site itself is quite low because it is located more than 250 meters from the shore.

Operation

Hunting, Fishing and Trapping

Air emissions, noise and odours generated by operations at the Plant are a concern for the owners of the four cabins that are relatively close to the Project site. They hope that will be able to continue their traditional activities around their camp (which mainly involve net fishing, wood collecting, plant collecting and occasional small game hunting and snaring) – to the exclusion of the Project site itself.

Land Use Planning

Concerns were raised during interviews with key informants in the community about the compatibility of the Plant with surrounding land uses that are largely restricted to cabins used by local Elders for traditional activities such as net fishing, wood collecting, plant collecting and occasional small game hunting and snaring. Concerns were also raised about the compatibility of the Plant with a proposed hiking/snowmobile trail that would link the community to the public beach near the mouth of the Perch River and with other tourism projects such as the proposed Chalifour Campground on the eastern shore of the Watson Peninsula.

Landscapes

During interviews with different community groups and with concerned land users, participants were asked to identify valued landscapes on the Watson Peninsula. Only the Elders identified three specific sites with valued landscapes. These sites are located to the south of the Project site, including *Kaa Yaayeuweshimuhch* Bay (which means "where the road goes by the shore") and the elevation south of it where there are nice views. Most of the interview participants valued the preservation of landscapes that they can see when they use the Mistissini Road and would prefer that the Plant be not be visible from the road. Certain youths offered differing points of view as they mentioned that the sighting of the Plant would prove to visitors from outside that "things are moving" in Mistissini.

Accidental Events

Effects of accidental events on local land users could result from fire and explosion, and accidental releases of hazardous materials (gaseous and particulate). These accidental events may occur during all the phases of the Project.

6.7.6 Environmental Effects Analysis and Mitigation

Construction

Hunting, Fishing and Trapping

Increased noise, dust and safety concerns that could result from an increase of traffic on the Mistissini Road and at the Project site construction of the Plant could affect the few part-time residents of cabins located along the Baie du Poste on the western side of the Watson Peninsula. Nevertheless, owners of the four cabins that are relatively close to the Project site will be able to continue their traditional activities around their camp during the 6 to 8 month construction period (which mainly involve net fishing, wood collecting, plant collecting and occasional small game hunting and snaring) – to the exclusion of the Project site itself.

Mitigation

No specific mitigation measures are required at the construction stage.

Community Activities, Recreation and Tourism

Increased noise, dust and safety concerns that could result from an increase of traffic on the Mistissini Road and at the Project site during construction of the Plant could affect activities at Murray's Lodge, a site located along the Mistissini Road south of *Kaa Yaayeuweshimuhch* Bay that is used for many

community uses such as meetings of the Healing Circle and of the CBHSSJB and also for the Justice Panel meetings. A children's Summer camp organised by the Pentecostal church is also organised near the mouth of the Perch River along the Mistissini Road. Nevertheless, activities at these sites should be able to continue during the 6 to 8 month construction period.

Mitigation

No specific mitigation measures are required at the construction stage.

Archaeological Potential and Heritage Sites

Key informant interviews and public consultations carried out in Mistissini did not reveal the existence of a sacred site, burial place or birth place in or near the Project site. However, the potential for archaeological findings has been identified around the Project site, especially along the shores of Baie du Poste. Procedures for heritage and archaeological resource discovery are needed as there is a remote possibility that such materials may be discovered during the construction phase of the Project. Heritage and archaeological resources generally include structures, tools, butchered animal bones, graves, pottery and other features. These features are identified for special management and handling as they represent valuable cultural resources and disturbances may have a negative effect, resulting in loss of historical context or damage. Activities which have the highest likelihood of disruption include excavating, digging or grading.

Mitigation

A number of measures will be implemented to mitigate potential adverse effects on heritage and archaeological resources and have been integrated in the Environmental Management Plan (presented in Appendix I) :

- Prior to construction, personnel working on the site will be made aware of potential historical resources in the area and understand their responsibility should they find a resource;
- Personnel are advised to report any unusual findings to the Site Supervisor and leave these findings undisturbed;
- Work should be suspended in the immediate area should a potential resource be identified;
- If features are found using heavy equipment, the equipment shall not be moved to ensure that evidence is left intact;
- The area of findings will be flagged to ensure that it is protected;
- A qualified archaeologist will be contracted by the Site Supervisor to conduct an assessment.

Operation

Hunting, Fishing and Trapping

Air emissions, noise and odours generated by operations at the Plant are a concern for the owners of the four cabins that are relatively close to the Project site. They hope that will be able to continue their traditional activities around their camp (which mainly involve net fishing, wood collecting, plant collecting and occasional small game hunting and snaring) – to the exclusion of the Project site itself.

Results of the assessment of impacts of the Project on air emissions presented previously for VEC-1 indicate that the Project should not be the source of disturbances to the owners of the four cabins that

are relatively close to the Project site following implementation of the proposed mitigation and monitoring measures.

Mitigation

No additional mitigation measures are required at the operation stage.

Land Use Planning

In the Cree Nation of Mistissini's Land Use and Zoning Plans, a low intensity industrial zone has been designated on the south-eastern edge of the community. However, recent discussions with the Land Registrar indicate that the current zoning of the industrial development area on the outskirts of the community will most likely be changed to a commercial zoning to preclude future industrial development that could be incompatible with surrounding residential uses. In view of this, the Band Council considers that the proposed site for the Plant at Kilometre 7.3 of the Mistissini Road is located in an area that is much more appropriate for the future development of an industrial park. It is far enough from the community to minimise disturbances while still being provided with an easy access to the Mistissini Road. The physical configurations of the site also allow for future industrial expansion if and as required.

Concerns were raised during interviews with key informants in the community about the compatibility of the Glulam Plant with a proposed hiking/snowmobile trail that would link the community to the public beach near the mouth of the Perch River. Because of the difference in level between the road and the Project site, the plant should not be seen from the trail if it follows the power transmission line corridor as currently planned on a preliminary basis. Concerns were also raised by key informants about the compatibility of the plant with other tourism projects such as the proposed Chalifour Campground on the eastern shore of the Watson peninsula. Because of the distance involved (2 km), noise emitted by plant operations should not be heard from the future campground site. The visibility of the plant will be restricted by the presence of trees and by the use of lighting adapted to minimise glare.

Mitigation

No specific mitigation measures are required at the operation stage.

Landscapes

The Project site is located on a rise in a spruce forest area, about 250 meters to the east of the Mistissini Road and over 500 meters from the western shores of Baie du Poste. Because of the difference in level between the road and the Project site, the Plant will not be visible from the road. The Plant's smoke stack could be visible from certain places in Mistissini or along the road but its' emissions will look like white smoke as they will mainly consist of water vapour. In the Study area, the visual experience of road users is marked by occasional views of the western shores of Baie du Poste. The cabins located in the Study area along the western shore all face away from the Project site and towards the Baie du Poste. As a result, the Plant should not disturb local landscapes.

Mitigation

A number of measures will be implemented to mitigate potential adverse effects on landscapes and have been integrated in the Environmental Management Plan (presented in Appendix I) :

- Optimising the integration of the Plant into the surrounding landscape at the Project design stage;
- Maintenance of visual buffers such as trees, where practical, to serve as a natural barrier and to limit visual access to the Project site;
- Ensuring that trees and shrubbery are planted in pre-designated areas further to the site design plan;
- Ensure that during revegetation, natural or indigenous species are used, where practical.
- Lighting of the Project site will be adapted to minimise glare (e.g.: lighting focused on operational areas, light fixtures equipped to focus on the ground and not into the sky).

Cumulative Environmental Effects

The three future projects that could potentially interact with land use issues related to the Project in the Study area are:

- Construction of a hiking/snowmobile trail along the access road to Mistissini;
- Development of the Chalifour Campground;
- Development of the Albanel-Témiscamie-Otish Provincial Park.

The Recreation Department of the Cree Nation of Mistissini plans to build a hiking/snowmobile trail that would link the community to the beach. This trail would be used by hikers and cyclists in summer and by snowmobile users during winter. No precise route has been defined to date for the trail but it would most likely follow along the access road to Mistissini with some detours along the Baie du Poste. In winter, this trail could be part of a big loop that would link Mistissini to Chibougamau. A small snowmobile loop project on the Watson Peninsula is also under consideration but it requires further consultations with cabin owners as many of them have experienced break-ins and might not want an easier access to their camp.

There is a plan to develop the Chalifour Campground on the eastern side of the Watson Peninsula, on the shores of *Cabistachouane* Bay, approximately 2 km north of the Project site. This campground would be accessible from the Mistissini Road. The Chalifour Campground project is at the pre-feasibilty stage. The campground would be connected to the community by a snowmobile and hiking trail. It would accommodate tourists looking for fishing activities or only for camping activities. It could also host visitors in transit to the future Albanel-Témiscamie-Otish Provincial Park.

The community is surrounded by the Albanel-Mistissini-&-Waconichi-Lakes Wildlife Reserve and by the Assinica Wildlife Reserve. Tourism plays an important role in Mistissini's economy and it's role might increase in the future with the development of the new Albanel-Temiscamie-Otish (ATO) Provincial Park. This Park could open in 2007 under the co-management of the Cree Nation of Mistissini and the Government of Québec. Even if the community is not established within the limits of the proposed park, it would be located at the entrance to the park. The Albanel-Temiscamie-Otish (ATO) Provincial Park would contain a few sections of the Albanel-Mistissini-&-Waconichi-Lakes and Assinica Wildlife Reserves. It would be the first provincial park established in a boreal environment and the first inhabited

provincial park as Cree land users would continue living on the land and pursuing their hunting, fishing and trapping activities in all sections of the park. The proposed Albanel-Temiscamie-Otish (ATO) Provincial Park would emphasise Cree culture and would promote Cree employment through the creation of a Visitors service centre in Mistissini.

Overall, the Project, in combination with the identified future projects, will not result in significant adverse cumulative effects in regards to land use, landscapes and cultural resources. Mitigation measures such as those described above would be in place to minimise nuisances during construction and operation of the Plant.

6.7.7 Determination of Significance of Residual Effects

Hunting, Fishing and Trapping and Other Community Activities

The residual effects related to the presence of a large construction site on local land users occasionally engaged in hunting, fishing and trapping and on other community activities are considered as not significant and minor and they are not predicted to cause significant adverse effects to the nearby residents and users.

The residual effects of Plant operations on local land users occasionally engaged in hunting, fishing and trapping and on other community activities are also considered as not significant and minor and they are not predicted to cause significant adverse effects to the nearby residents and users.

Archaeological Potential and Heritage Sites

Based on the information presented in the above sections on the potential effects of the Plant's construction and operation on archaeological potential and heritage sites and the proposed mitigation measures to minimize related risks and disturbances, the residual environmental effects are considered not significant and minor. Therefore no significant adverse effects on cultural resources in the Study area are anticipated.

Landscapes

Due to the limited visibility of the Project site from the Mistissini Road and following application of measures to optimize the design of the Plant and to mitigate impacts on local landscapes, the residual effects on landscapes related to the presence of the Plant are considered as not significant and minor and therefore they are not predicted to cause significant adverse effects to the community members.

6.7.8 Monitoring and Follow-up

Although no specific monitoring and follow-up program is required in regards to land use, landscapes and cultural resources, a grievance committee will be set up at the Plant with designated persons responsible for responding to concerns or complaints expressed by local land users or community members regarding unforeseen nuisances or disturbances caused by the Plant.

ENVIRONMENTAL IMPACT STATEMENT
MISTISSINI BEAM PLANT

Volume 2

Chapter 7: FOLLOW-UP PROGRAM

Jacques Whitford / DDM PROJECT 1005414 June 20, 2006

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7.0 FOLLOW-UP PROGRAM

This section of the EIS outlines the objectives and requirements of a Follow-up Program (Program), as requested in the COMEV and CED Guidelines (Appendix C). The Follow-up program was developed in order to:

- Verify the accuracy of the environmental assessment of the project; and
- Determine the effectiveness of any measures taken to mitigate the potential adverse environmental effects identified.

The Program generally takes place during and after the construction phase.

When it is relevant, the Program will also determine which baseline information is necessary in order to fulfill its goals and meet its objectives.

In determining the appropriate measures to be implemented for monitoring of each VEC described in Chapter 6, the CCNM has considered a number of factors:

- the level of confidence in environmental effects predictions;
- previous experience with planned activities and knowledge of the effectiveness of mitigation strategies; and
- the susceptibility of the VEC to potential environmental effects.

The Program will focus on those potential environmental effects with the greatest risk of occurring or the uncertainty in their prediction.

Section 7.4 outlines the proposed follow-up elements for each VEC. The elements of the program are described, and as applicable, the location, frequency and duration of the follow-up is outlined. The Program will be implemented by the CCNM, however, CCNM may delegate this responsibility to its contractors or consultants, as applicable. When contractors have obligations related to this Program, they will be contractually required to follow its guidelines. Regardless, the CCNM is ultimately responsible and accountable for undertaking the Program.

Presently, the CCNM is outlining the preliminary version of the Program. It is anticipated that changes will be made to it after consultation with the Responsible Authorities and that a final copy will be approved prior to implementation. Over the development period, additional elements could be added to the Program, as necessary.

When non-compliance with the Program is identified, CCNM will take appropriate action. If contractors are at fault, they will be required, contractually to remedy or rectify the situation. If CCNM is found to be directly responsible, the non-compliance issue will be rectified as soon as possible.

7.1 Mitigation Strategy

Chapter 2 of the EIS describes the Project facilities and activities as designed by the Project proponents. The intrinsic design of the Project includes various design equipments, environmental management procedures and environmental mitigation strategies which are intended to mitigate potential adverse environmental effects. The environmental effect analyses presented in Chapter 6 present how these various mitigation measures and strategies will be implemented with respect to each potential environmental effect on each VEC. Chapter 6 also describes how the effects of the environment on the Project will be mitigated.

Environmental protection measures have been defined by the CCNM and are summarized in the Environmental Management Plan (EMP) appended to this EIS (Appendix I). These mitigation measures and environmental protection procedures have been developed as a result of legislative requirements, a desire to improve Plant design and to minimize the interaction between the Project activities and the environment.

The CCNM will be responsible for managing the construction and operation of the Plant and will be required to ensure that the Follow-up Program is developed and implemented through construction contracts and appropriate training of CCNM field staff.

The CCNM is also responsible for the preparation of environmental emergency response plans (ERP) for the construction and operation phases of the Project. This plan is included in Appendix J of Volume 2. The CCNM will ensure its contractor(s) implement the mitigation measures and emergency procedures described in the EMP and ERP.

7.2 Preparation of plans and specifications

The Follow-up Program will be planned from the beginning of planning activities and specifications preparation period. At this point, all the mitigation measures set out in the EIS report will be incorporated, along with the special requirements contained in the certificate of authorization, in the plans, specifications and bidding or any special “Environmental Protection” requirements.

7.3 Contracts and Environmental Clauses

During the construction phase, an engineer appointed by the CCNM will be responsible for monitoring construction work on site. This person will be responsible of the compliance with all environmental clauses and provisions to be set out in the contract with the chosen contractors and subcontractors (see EMP in Appendix I for elements to be incorporated in the contract).

The engineer will appoint a representative to act as on-site supervisor. This person will be present on the site on a daily basis, and will ensure that the chosen contractors and subcontractors are aware of the environmental conditions of the work.

Before construction begins, a preparatory meeting will take place, attended by CCNM and the contractors. The purpose of the meeting will be:

- To identify the roles and responsibilities of the various parties;
- To present the schedule and location of the work;

- To review the conditions of authorization and the related mitigation measures;
- To draw up a communication flow chart.

At the first site meeting, the CCNM representative will review the following points with the contractor:

- The environmental context of the project;
- The application of environmental protection measures as soon as work begins, including the following:
  - Emissions (dust and waste) from construction activities;
  - Noise levels on the site;
  - Control and treatment of site drainage water;
  - Management of excavated soils;
  - Protection against accidental spillage;
  - Proper operation of sanitary facilities;
  - Discharge of non-hazardous and hazardous waste materials from site activities;
  - Management of construction materials (combustibles, chemical products) and equipment;
  - A monetary penalty for failure to comply with environmental clauses.

7.4 Proposed Preliminary Follow-up Program

The following sections describe the elements of the monitoring program for each valued environmental component for which monitoring is required. For each component, preliminary program duration and survey frequency have been set, when possible, but could be revised in the future, based on the results obtained.

7.4.1 Atmospheric Environment

In order to insure that the Plant does not cause any nuisance to local residents, a specific follow-up program will be put in place involving the consultation of nearby residents on a regular basis. Regular communication with residents will also provide information on the efficiency of the proposed mitigation measures.

In addition, a grievance committee will be set up at the Plant with designated persons responsible for handling concerns or complaints expressed by local land users or community members with regards to unforeseen nuisances or disturbances caused by the Plant.

7.4.2 Groundwater

To ensure the protection of groundwater sources, a monitoring and follow-up program will be established at the Project site.

The monitoring program is based on protection of the quality of local supplies from an ecological and health perspective. In general, the groundwater monitoring program for the project will:

- Meet applicable regulatory standards or requirements;
- Involve the installation of monitoring wells on the periphery of the project site to monitor groundwater quality of the aquifers present on site (a superficial aquifer and a deep (bedrock) aquifer);

- Prepare a set of analytical parameters and sampling frequency;
- Include monitoring of the water table level;
- Analyse and report data.

For the superficial aquifer investigated on site, a follow-up program subsequent to the construction of the Mistissini Beam Plant will be required for a Class II aquifer. This program can be performed using the monitoring wells installed in the course of the current study (if not damaged during construction activities). Sampling frequency should be bi-annual and should cover the spring thaw and the end of summer (lower water level).

For this aquifer, the minimum list of parameters should be: Petroleum hydrocarbons (C_{10}-C_{50}), selected metals (Al, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Mo, Ni, Zn), phenols by GC/MS, resin and fatty acids, pH and conductivity, etc.

The monitoring frequency and list of parameters could be revised in the future based on the results obtained from the investigation of the bedrock aquifer that will be performed before the plant construction.

7.4.3 Surface Water

As knowledge of baseline conditions of surface water is limited, a water sampling program will have to be conducted before the site preparation phase to obtain baseline information on the quality of surface water, at least for the following areas:

- In Du Poste Bay on the west coast of the Watson peninsula, in the area where nearby cabins drinking water intakes are located;
- In the water course where the site drainage system will be discharged (exact location of the discharge point is not determined yet).

A surface water monitoring and follow-up program, based on the Guidelines for Canadian Drinking Water Quality (GCDWQ) and on the Canadian Water Quality Guidelines for Aquatic Life, will be developed for the project site to ensure there is minimal impact on local surface water resources.

To minimize disturbances on surface water resources, a number of procedures have been developed for water discharges during construction and operation (EMP - Section 4.4.6). The surface water monitoring program will assist in ensuring that operational controls (*e.g.*, erosion controls, sedimentation basin) are successful and that surface water quality remains at acceptable levels.

In general, the water monitoring and follow-up program for the project will:

- Meet any applicable regulatory criteria or standards related to ambient water quality (with federal and provincial regulations and requirements);
- Ensure monitoring and sampling includes GCDWQ water quality parameters such as microbiological parameters (protozoa, viruses, turbidity), chemical and physical parameters (total suspended solids (TSS) concentrations, pH, temperature, etc;
- Involve monitoring at various locations including receiving waters and diversion sources (*e.g.* sedimentation basin);
- Involve the preparation of a system for sampling frequency;

- Ensure that sampling schedules take into account events (*e.g.* heavy rainfall, snowmelt) or other periods where additional monitoring is required (*e.g.* construction period); and
- Analyse and report data.

The frequency and location of sampling will be determined when the construction schedule and final design is completed.

7.4.4 Public safety

In order to insure that the Plant does not cause any safety risk to local residents, a specific follow-up program will be put in place involving the consultation of nearby residents on a regular basis. Regular communication with local residents and also with the Mistissini Public Safety Department will provide information on the effectiveness of the proposed mitigation measures.

In addition, a grievance committee will be set up at the Plant with designated persons responsible for handling concerns or complaints expressed by local land users or community members with regards to unforeseen nuisances or disturbances caused by the Plant.

7.4.5 Employment and socio-economic effects

Socio-economic monitoring of plant operations is proposed for the construction, operation and decommissioning stages of the Project so that problems (actual or perceived) related to the Project can be effectively identified and dealt with in an appropriate and timely manner. The objectives of the monitoring program are to:

- Record the uptake of Native and non-Native employment, business and education and training opportunities over time, including follow-up on results;
- Analyse the trends in relation to Cree training and hiring expectations and targets;
- Analyse the trends in relation to the number, value and general content of contracts for goods and services by supplier location and according to Native or non-Native ownership;
- Maintain records of all formal consultations, meetings and grievance and dispute occurrences related to the Project and involving the public, community leadership, plant personnel and/or contractors, noting attendance, issues raised and resolutions; and
- Annually review the results of the above in order to summarise lessons learned and to identify corrective actions, if and as required.

7.4.6 Land Use, Landscapes and Cultural Resources

Although no specific monitoring and follow-up program is required with regards to land use, landscapes and cultural resources, a grievance committee will be set up at the Plant with designated personnel responsible for handling concerns or complaints expressed by local land users or community members regarding unforeseen nuisances or disturbances caused by the Plant.

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Chapter 8: CONCLUSIONS

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8.0 CONCLUSIONS

In accordance with the requirements of Sections 16 (1) and (2) of the *CEAA* and the guidelines provided by the Evaluating Committee (COMEV) (Appendix C), this environmental impact assessment includes:

- A description of the purpose of the project, of project proponents and owners, as well as sources of funding for the construction and operation of the Plant;
- A description of the process and criteria which lead to the decision to retain the preferred site, including the criteria used to establish the size of the study areas;
- A complete technical description of the project and its related infrastructure, including the purpose and need of the proposed facilities and activities, and the potential malfunctions or accidental events that may occur in connection with the Project;
- Information regarding the supply of wood, the construction and production phases and the marketing of finished products. This include an evaluation of the quantities of wood to be processed, of the quantities of by-products and residues produced and how they will be managed, a description of the operations of the Plant and an evaluation of the market;
- An evaluation of the human resources required for the project's construction and operation phases, including a discussion on jobs creation and training programs as well as economic impacts on the community of Mistissini;
- A summary of consultation mechanisms and issues raised during consultation (*i.e.*, issues scoping) as well as a description of the methodological approach to the environmental assessment;
- A discussion on wildlife management in the study area;
- A description of biophysical and social environmental settings for the area affected by the project;
- The identification of the tallyman and trapline on which the project is located, a description of existing land use patterns and of sites of importance, of activities to be potentially impacted by the project and of archeological potential in the area;
- A description of plant and animal communities, the location of moose yards, spawning grounds, rivers, lakes and stream, and the identification of any rare or endangered species;
- An hydrogeological study (Groundwater and Soil Quality Investigation);
- A review of public consultations and traditional ecological knowledge workshops conducted;
- An assessment of the environmental effects of the proposed project for each of the VECs and the significance of the effects for the construction, operation and dismantlement of the Plant;
- The methods and criteria used to identify and assess the environmental and social impacts;

- A description of residual impacts and their significance, as well as impacts that are difficult to assess or involve risks and uncertainties;
- A description of the mitigation and compensatory measures to be implemented during and after construction, including a discussion on hiring and training local manpower, safety and control measures, fire protection measures and air and water pollution prevention measures ;
- An Emergency Response Plan which provide security measures as well as a plan of emergency for the construction and operation phases, including a discussion on the possibility of a technological accident related to products used at the Plant;
- An Environmental Monitoring Program covering biophysical and social conditions, to be implemented during and after construction (surveillance program for monitoring work in relation to the anticipated impacts);
- A listing of all reference material and information sources used;
- Scaled maps and plans; and
- A summary of the environmental impact assessment (to be provided after receiving the comments from the authorities);

In addition, Canada Economic Development (CED) submitted an addendum to the guidelines provided by the COMEV (Appendix C). Although most of the requirements were addressed in the original directive from the COMEV, the following environmental components were added as requirement for the environmental impact statement:

- A discussion of the alternatives to the Project and the alternative means of carrying out the Project that are technically and economically feasible;
- A description of the acoustic environment, species at risk, avian fauna, migratory birds and wetlands;
- A discussion on cumulative environmental effects, especially for air quality, acoustic environment and health of the local population;
- An assessment of the effects of the environment on the Project; and
- Recommendations for a follow-up program.

Based on the results of the environmental assessment, it is concluded that the Project is not likely to cause significant adverse environmental effects.

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Chapter 9: References

Jacques Whitford / DDM PROJECT 1005414 June 20, 2006

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