PLAIN LANGUAGE SUMMARY

What is the Victor Diamond Project?

The Victor Diamond Project (VDP) is a proposed project, by De Beers Canada Inc. (De Beers) to build an open pit diamond mine approximately 90 kilometres west of Attawapiskat, Ontario.

Who is De Beers?

De Beers Canada Inc. is a Canadian mining company owned by De Beers Consolidated Mines Inc. De Beers of South Africa is an international mining company that has been in existence since 1888. De Beers' primary business is the exploration for, and the mining and marketing of diamonds. De Beers currently operates approximately 20 mines worldwide. De Beers has been exploring for diamonds in Canada for 40 years and is currently building or planning to build three mines in Canada one of which will be the Victor Diamond Project.

What will De Beers Build as Part of the Victor Diamond Project?

The major components of the Project located at the mine site include the following:

- Quarries, and sand and gravel pit;
- Open pit mine;
- Ore processing plant;
- Warehouse and service buildings;
- Muskeg, overburden, processed ore, and mine rock stockpiles;
- Water management facilities;
- Workforce accommodations;
- On-site all-weather access roads;
- All-weather airstrip;
- Fuel and power facilities; and,
- Laydown and storage facilities.

The major components of the Project located off of the mine site include the following:

- Storage yard for equipment and supplies in Moosonee;
- The existing coastal winter road between Moosonee and Attawapiskat
- A winter road between Attawapiskat and the mine site;
- New transmission lines from Otter Rapids to Kashechewan, and from Attawapiskat to mine site;
- Possible barge handling facilities and a storage yard in Attawapiskat for materials and equipment during construction; and,
- Office and training centres in Attawapiskat.

How will De Beers Obtain the Diamonds?

De Beers intends to construct buildings right beside the open pit, which will contain equipment to recover and process diamonds from the mined rock. In total, about 28.5 million tonnes of kimberlite, rock containing diamonds, would be mined from the open pit. This would result in an open pit about 200 metres deep and 1,000 metres across. The kimberlite will be processed at a rate of 2.5 million tonnes per year, resulting in a mine life of about 12 years. Kimberlite processing uses physical methods such as crushing, washing and gravity separation to recover the diamonds. Mineral wastes from the mining and processing of the ore will be stockpiled and later revegetated during mine closure.

How Long is the Life of the Victor Diamond Project?

Construction of the VDP would begin in the winter of 2006 and continue for three years. This would be followed by 12 years of production, with the potential for development of additional kimberlite ore reserves in the local area. Following production, mine site reclamation is expected to take an estimated two to three years, which would then be followed by an extended post-closure monitoring period. The total life of the Project, including construction, operations and active closure, will span a period of approximately 18 years, with the potential for extension if additional ore resources are found. The project workforce is expected to peak at about 600 persons during construction, and 390 persons during production.

How will De Beers Access and Provide Power to the Victor Diamond Project?

The mine site will be accessed from the south by railway to Moosonee, by winter road from Moosonee along the James Bay coast to Attawapiskat, and then by winter road to the mine site. Power for the project will be provided by a new 115 kV transmission line that will reinforce the existing 115 kV line between Otter Rapids and Kashechewan. Power from Kashechewan to Attawapiskat will flow along the existing line, and a new 115 kV line will be constructed from Attawapiskat to the Victor site.

What is an Environmental Assessment?

The Victor Diamond Project is required to undergo a federal environmental assessment under the *Canadian Environmental Assessment Act*. An environmental assessment is a process to predict the environmental effects of a project before it is built. The purpose of an environmental assessment is to minimize or avoid the negative environmental effects of a project before they occur, and to include environmental issues, concerns of First Nations, and concerns of the public in decisions made about a project.

What is a Comprehensive Study?

The specific type of federal environmental assessment followed for the Victor Diamond Project is called a comprehensive study. Projects assessed through a comprehensive study process are usually large projects that may have the potential for significant adverse environmental effects. Such projects may also be of concern to the general public.

What is a Responsible Authority?

A responsible authority (RA) is a federal department or agency that needs to make regulatory or funding decisions. An RA maybe a department that is required to issue a permit, license or authorization, or a department or agency that is providing funding for all or part of the project. The RAs must ensure that an assessment of the environmental effects is completed prior to issuing a permit or providing funding. Natural Resources Canada (Fisheries and Oceans Canada Transport Canada and Human Resources and Skills Development Canada are RAs for the VDP. Health Canada, Environment Canada and Indian and Northern Affairs Canada are helping the RAs by giving them expert advice.

What Licences or Other Approvals in Addition to the Federal Comprehensive Study does De Beers Require to Build the Victor Diamond Project?

Before building the project, De Beers must obtain both federal and provincial government approvals. The project would require the following:

- *Fisheries Act* authorizations;
- A *Navigable Waters Protection Act* permit;
- An *Explosives Act* storage and factory licence;
- Approval under the Class EA for Minor Transmission Facilities (Ontario *Environmental Assessment Act*);
- Leave to Construct under Section 92 of the Ontario *Energy Board Act*;
- Closure Plan approval under the Ontario *Mining Act;*
- Quarry permits under the Ontario *Aggregate Resources Act*;
- Provincial work permits, and tenure for Crown Land under the *Public Lands Act*;
- Location approval under the *Lakes and Rivers Improvement Act;*
- Permits to take water under the Ontario *Water Resources Act*; and,
- Certificates of Approval for air, water, and waste management under the Ontario *Environmental Protection Act*.

How was the Victor Project Comprehensive Study Completed?

In February 2004, the RAs, in consultation with, other federal departments and agencies, First Nations, and other parties, developed guidelines for the comprehensive study review process.

De Beers submitted a Comprehensive Study Environmental Assessment Report (CSEA) report in March 2004. The RAs then considered information contained in the CSEA and additional information such as:

- Comments from federal and provincial governments;
- Comments from First Nations and Aboriginal organizations;
- Comments from non-government organizations and the general public;
- Recommendations from meetings, workshops and technical sessions; and
- Written correspondence.

As part of the comprehensive study, information sessions, meetings and consultations with communities were conducted. Based on the information obtained through the comprehensive study, the RAs were able to reach conclusions about the likelihood and significance of the environmental effects of the Victor Diamond Project.

At the end of the comprehensive study, the RAs prepare a summary document, called the Comprehensive Study Report (CSR). The CSR contains information on the project, the environmental effects of the project, how De Beers plans to reduce the negative environmental effects of the project, how the RAs and De Beers will monitor the environmental effects of the Project, and how the project will be closed and the land rehabilitated.

What kind of Environmental Effects could the Project Create?

The CSR considers the potential effects of:

- The project on the natural environment (air quality, soil and bedrock, water flow and quality, fish, groundwater, plants and wildlife, heritage resources), and on socio-economic conditions that are linked to the natural environment;
- Environmental changes on human health, physical and cultural heritage, current use of lands and resources for traditional purposes by Aboriginal persons and significant structures or sites;
- Cumulative environmental effects;
- Project alternatives;
- The project on the sustainable use of renewable resources;
- The environment on the project; and,
- Possible malfunctions or accidents.

What Steps will De Beers take to Mitigate the Effects on the Environment?

De Beers has proposed a number of actions (called mitigating measures) to reduce the potential adverse environmental effects and to ensure that the environment is protected. The government agencies, the First Nation communities, and the general public have all suggested ways to improve the project, and, as a result, a better project design with improved environmental protection has been developed. An example of how comments changed the project is the decision to use transmission line power rather than on-site diesel power and eliminating the need for the transport of large quantities of diesel fuel in James Bay.

Mitigation also includes measures taken into account by De Beers in the design of the project such as locating the mine facilities close together and at least 200 metres away from area creeks and rivers (except at road crossings). De Beers also proposed to establish a site-specific environmental management system to assist in implementing the mitigation measures.

What Concerns were Raised by First Nations During the Comprehensive Study?

The following potential effects of the project were consistently raised as areas of concern by First Nations people:

- Risk of fuel spills;
- Effects on traditional activities and land uses;
- Effects on creek and river quality and fisheries resources;
- Effects on plant and wildlife communities, and especially on wildlife species such as caribou, moose, furbearers and waterfowl;
- How the land would be left at closure, so that it could continue to support plants, fish and wildlife, and traditional pursuits;
- Limitations to employment and training opportunities; and,
- Loss or reduction in social well-being.

What was the Role of the Provincial Government in the Comprehensive Study?

During the comprehensive study, the federal and provincial governments worked co-operatively. The primary provincial ministries involved in the comprehensive study were the Ministry of Northern Development and Mines, the Ministry of Natural Resources, and the Ministry of the Environment. Individual components of the project such as the power transmission line require separate provincial class environmental assessment approvals. De Beers supplied information during the comprehensive study to meet the requirements of the provincial environmental assessment process. Separate public consultations are conducted by the provincial government.

Of specific interest is the provincial requirement to have a mine closure plan. The closure plan outlines planned site reclamation and establishes a security deposit to be posted by De Beers to ensure that reclamation will take place.

How do We Know that De Beers is Going to do the Things They Say They Will?

Follow-up programs are required to ensure that De Beers actually puts in place the mitigation measures and to determine the effectiveness of these measures to reduce the adverse environmental effects of the project. Additional follow-up requirements outlined in Section 8 of the CSR will address specific environmental and socio-economic concerns.

What about Those Things that are not Part of the Regulatory Process? How will They be Monitored?

The design and implementation of follow-up measures specified in this CSR that are not attached to a regulatory instrument will be assured through an environmental and socio-economic agreement.

The environmental and socio-economic agreement for the VDP will be a key tool for ensuring that commitments and mitigation measures that are not part of any regulatory instruments are appropriately implemented. This agreement will be finalized after completion of the CSR.

What Happens now that the Comprehensive Study is Complete?

The RAs provide the CSR to the Minister of Environment and to the Canadian Environmental Assessment Agency. The Minister reviews the CSR and considers the actions, or mitigation measures that the RAs plan to take to reduce the environmental effects of the project, as well as any public comments received. The Minister then decides whether to refer the project to a review panel based on public concerns and/or the likelihood that the project will cause significant adverse environmental effects. If the Minister decides that referring the project to a review panel is not warranted, he refers the project back to the RAs, which may then issue permits or provide funding for the project.

What were some of the Conclusions of the RAs in the CSR?

The RAs are generally satisfied that the concerns raised during the comprehensive study process were addressed by De Beers. In some cases, such as hydrogeological (groundwater) issues, discussions between experts and additional information were required to answer all of the RAs' questions and concerns. The RAs consider the mitigation measures proposed by De Beers to address potential environmental effects to be appropriate.

What is the Final Recommendation of the RAs in the CSR?

The RAs have determined that there are not likely to be any significant adverse environmental impacts resulting from the project after mitigation is applied. In addition, no significant adverse cumulative effects are predicted to occur. De Beers will be required to conduct monitoring and follow-up according to the commitments in the Comprehensive Study Report, under permits and as part of the follow-up program. If any unforeseen adverse effects arise during the life of the project, measures will be taken to correct these effects and prevent them from occurring again in the future.

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ᐱᐠᑐᐡ ᑲᓴᐸᐧᐊᐱᐦᑭᔨᐟ ᒧᓇᐁ ᔓᓂᔭᓂᔨᐧᐃᐧᐁᐧᐃᐣ ᑕᐧᐁᓂᑕᐧᑲᐣ ᒋ ᐃᔑ ᑭᑐᑌᒪᑲᐠ ᑲᓇᑕ ᐊᐦᑭ ᑲᐃᔑᐅᒪᑲᐠ ᓇᑕᐧᐁ ᑭᐦᑫᓂᑕᒧᐧᐃᐣ ᐁᐃᑐᒋᑲᑌᐠ ᐁᓄᔨᓇᐃᑲᑌᓂᐠ ᑲᓇᑕ ᐊᐦᑭᐠ ᑲᐃᔑ ᐅᑭᒪᐧᐃᐠ ᓇᑕᐧᐁ ᑭᐦᑭᓂᑕᒧᐧᐁᐧᐃᓂᐠ ᑭᒋ ᐅᑭᒪᐧᐃᓂᐠ ᐧᐊᓇᔓᐧᐁᐧᐃᓂᐠ᙮ ᒥᑐᓂ ᒪᑲ ᐁᓄᔨᓇᐃᑲᑌᑭ ᐊᓂᐃ ᓇᓇᑲᐤ ᐧᐊᓇᔓᐧᐁᐧᐃᓇ ᑲᑎᑕᐧᐁᔓᐧᐁᒪᑲᑭ ᐅᒪ ᐅᒋ ᐱᐠᑐᐡ ᑲᓴᐧᐊᐱᑭᔨᐟ ᔓᓂᔭᐣᐊᔨᓂ ᐊᑐᐦᑫᐧᐃᐣ ᐃᔑᓂᑲᒋᑲᑌᐤ ᑭᒋ ᓇᑕᐧᐁ ᑭᐦᑫᓂᑕᒧᐧᐁᐧᐃᓂᐠ᙮ ᑕᑐ ᐊᐸᑎᔨᐧᐃᓇ ᑲᐱᒧᑌᒪᑲᑭ ᑭᒋ ᑭᐦᑫᓂᑕᒧᐧᐁᐧᐃᓂᐠ ᐁ ᐃᑐᒋᑲᑌᑭ ᐊᓂᐃ ᐁᓄᔨᓇᐃᑲᑌᑭ ᓇᓇᑲᐤ ᐅᓇᔓᐧᐁᐧᐃᓇ ᒧᓴᐠ ᑲᒥᓴᑭ ᐊᐸᑎᔨᐧᐃᓇ ᑲᐧᐃ ᐊᑎ ᐸᔨᑯᒪᑲᑭ ᒪᑲ ᐃᔑᓇᐧᑲᑭ ᐅᐅ ᑲᒪᓴᑭ ᐊᐸᑎᔨᐧᐃᓇ ᒋᒥᑯᐢᑲᒋᒋᑫᒪᑲᑭ ᐊᐦᑭᐠ ᒥᔨᐧᐃ ᐱᑯ ᐃᔑ ᑕᐧᐁᓂᑕᐧᑲᓇ ᒋᑭᒋ ᐊᐧᑲᒥᓇᑲᒋᑕᓂᐧᐊᑭ ᑭᒋ ᓇᑕᐧᐁ ᑭᐦᑫᓂᑕᒧᐧᐁᐧᐃᓂᐠ ᐧᐊᓇᔓᐧᐁᐧᐃᐣ ᑲᓇᑕ ᐊᐦᑭ ᑲᐱᒧᑕᑕᐟ᙮ ᓴᑯᐨ ᓀᐦᑕ ᐊᑎᐟ ᐅᐅ ᒧᓇᐁ ᔓᓂᔭᓂᔨᐧᐁᐧᐃᓇ ᐊᑐᐦᑫᐧᐃᓇ ᓀᐦᑕ ᐱᑯ ᑯᑕᑭᔭ ᐊᐸᑎᔨᐧᐃᓇ ᑲᐧᐃ ᐸᔨᑯᒪᑲᑭ ᑕᐧᐁᓂᑕᐧᑲᐣ ᓀᐦᑕ ᓴᑯᐨ ᒋ ᐊᔭᒥᐁᒋᐠ ᐧᒣᒋ ᐊᓂᑭ ᐃᓂᓂᐧᐊᐠ ᑫᒥᑯᐢᑲᒋᐃᑯᒋᐠ ᐅᐅ ᑕᑐ ᐊᐸᑎᔨᐧᐃᓇ ᑫ ᐊᑎ ᐸᔨᑯᒪᑲᑭ᙮

ᑕᓂ ᑫᐊᑎᐃᑭᐠ ᑭᐢᐧᑲ ᑭᒋ ᓇᑕᐧᐁ ᑭᐦᑫᓂᑕᒧᐧᐁᐧᐃᓂᐠ?

ᐁ ᐊᑎ ᑭᔑᐱᐸᓂᐠ ᑭᒋ ᓇᑕᐧᐁ ᑭᐦᑫᓂᑕᒧᐧᐁᐧᐃᐣ ᐊᐦᑭᐠ ᑲᐃᔑᐅᒪᑲᐠ ᑭᒋ ᐅᑭᒪᐧᐃ ᐧᐊᓇᔓᐧᐁᐧᐃᓂᓂᐤ ᑲᔭᐸᑎᔨᑲᑕᐠ ᓇᓇᑲᐤ ᐃᑌᑕᒧᐧᐃᓇ ᑲᐅᒋᒪᑲᑭ ᑕᐸᑭᑎᓇᑦ ᒪᔨᓇᐃᑲᓂᓂᐤ ᒋᑕᔨᓇᐃᑲᑌᓂᐠ ᐅᑐᓇᔓᐧᐁᐧᐃᐣ ᓀᐦᑕ ᒋ ᐊᔑᑕᔨᓇᑌᓂᐠ ᐅᑎᑌᑕᒧᐧᐃᐣ ᑕᓂ ᑫᐃᔑ ᐃᒋᒋᑫᒪᑲᓂᓂᐠ ᐅᒣᓄ ᐊᐸᑎᔨᐧᐃᓂᓂᐤ ᑲᐧᐃ ᐅᐸᐦᑭᑕᐧᐃᓂᓂᐠ ᓀᐦᑕ ᒋ ᐸᑭᑎᓇᐠ ᐅᑎᑕᔓᐧᐁᐧᐃᐣ ᑫᐃᑐᒋᑲᑌᓂᐠ ᓇᓇᑲᐤ ᒋᑭᐧᐁ ᑲᓇᐧᐊᐸᒋᑲᑌᑫ ᐊᓂᐃ ᑫᐧᑲᓇ ᑲᑭ ᐯᒋ ᓄᒋᑕᓂᐧᐊᑭ ᓀᐦᑕ ᓇᓇᑲᐤ ᐊᔓᐧᐃᓇ ᓀᐦᑕ ᐧᐃᓇ ᒋᐸᑭᑎᓇᐠ ᑕᐣᑌ ᑫᐃᔑ ᒥᓄᐸᓂᓂᐠ ᓀᐦᑕ ᐧᐃᓇ ᐁ ᐃᑌᓂᑕᐠ᙮ ᐊᐧᐊ ᐊᐦᑭ ᑲᐃᔑᐅᒪᑲᐠ ᐧᐊᓇᔓᐧᐁᐧᐃᓂᐠ ᑲᔭᑐᐦᑲᑕᐠ ᑕᑭ ᐃᑐᑕᑦ ᒋᑭ ᑐᑕᒪᐟ ᐊᐧᐊᔨᑌ ᓇᑕᐧᐁ ᑭᐦᑫᓂᑕᒧᐧᐃᓂᓂᐤ ᓀᐦᑕ ᐱᑯ ᐃᓂᓂᐧᐃ ᓇᐁᔨᑕᒧᐧᐁᐧᐃᓇ ᒋᓄᒋᑕᓂᐧᐊᑭᐠ ᒋᑕᔨᓇᐃᑌᓂᐠ ᐅᑕᔓᐧᐁᐧᐃ ᒪᔨᓇᐃᑲᓂᐠ᙮ ᐃᐦᐱᐠ ᐧᐊᓇᔓᐧᐁᐧᐃᐣ ᐁᐸᑭᑕᔑᐧᐊᒋᑲᑌᐠ ᑫ ᐊᑎ ᑐᒋᑲᑌᐠ ᐅᒣᓄ ᐊᐦᑭᓄ ᑲᐃᔑᐅᒪᑲᓂᓂᐠ ᐧᐊᓇᔓᐧᐁᐧᐃᓂᐠ ᑲᐃᔑ ᐊᑐᐦᑲᑕᐠ ᑕᑭᐧᐁ ᐃᑕᔑᐧᐊᑌᐤ ᐅᐅ ᑭᒋ ᑲᐢᑭᐅᓂᓂᐤ ᑲᐱᒧᑕᑕᓂᒋ ᒋ ᐊᑎ ᐱᒧᑕᑕᒋᐠ ᐅᒣᓄ ᐊᐸᑎᔨᐧᐃᓂᓂᐤ᙮

ᑫᐧᑲᐣ ᐊᓂᒪ ᑭᒋ ᑲᐡᑭᐅᓂᓂᐤ ᑲᓂᑲᓂᑲᑕᑭᐠ?

ᐊᓂᑭ ᑭᒋ ᓂᑲᓂ ᑭᐢᑫᓂᑕᒧᐧᐁᐧᐃᓂᐠ ᑲᓂᑲᓂᑲᑕᑭᐠ ᐅᒋ ᑎᐯᓂᑕᐧᑲᐣ ᑲᓇᑕ ᐧᐊᓇᔐᐧᐁᐧᐃᓂᐠ ᐅᒪ ᐊᑐᐢᑫᐧᐃᐣ ᑕᐧᐁᓂᑕᑦ ᒋᐸᑭᑎᓂᑲᑌᐠ ᒪᓯᓇᐃᑲᐣ ᐁᐸᑯᑕᔐᐧᐁᒪᑲᐠ ᐁᑯᑌ ᒪᑲ ᐁ ᐅᒋᐸᓂᐠ ᑭᒋ ᐅᑭᒪᐠ ᑲᓇᑕ ᑲᐅᒋ ᑎᐯᓂᑕᐧᑲᐠ ᓀᐢᑕ ᐁᐸᑭᑎᓇᐟ ᔐᓂᔭᓇ ᒥᓯᐧᐁ ᒋᐊᐧᑲᓇᐃᑫᐸᓂᓂᐠ ᓀᐢᑕ ᐱᑯ ᐸᐢᑭ ᐅᒣᓄ ᐊᐸᑎᓯᐧᐃᓂᓂᐤ ᑲᐧᐃ ᐊᑎ ᐸᓯᑯᒪᑲᐠ᙮ ᐊᒥᐢᑯᑲᒪᐧᐊᐠ ᓀᐢᑕ ᓇᒣᔪ ᓀᐢᑕ ᑭᒋᑲᒥᐠ ᑲᓇᑕ ᑲᓂᑲᓂᑕᑭᐠ ᓀᐢᑕ ᐱᑦᐱᓯᐧᐃᓂᐠ ᑲᓂᑲᓂᑕᑭᐠ ᓀᐢᑕ ᐃᓂᓂᐧᐃ ᑭᐢᑫᓂᑕᒧᐧᐃᓂᐠ ᓀᐢᑕ ᑲᐡᑭᐅᐧᐃᓂᐠ ᑲᑐᒋ ᐸᓯᑯᑲᒪᑭ ᑲᓇᑕ ᑲᐅᒋ ᑎᐯᓂᑕᐧᑲᑭ ᐁᐧᐊᑯ ᐅᐅ ᑭᒋ ᑲᐡᑭᐅᐧᐃᓂᐠ ᑲᓂᑲᓂᑲᑕᑭᐠ ᒣᓄ ᐅᒋ ᐱᐠᑐᓬ ᑲᔕᐸᐧᐊᐱᐢᑭᓯᐟ ᔐᓂᔭᐣᐊᓯᓂ ᐊᐸᑎᓯᐧᐃᐣ᙮ ᒥᓄᐱᒪᑎᓯᐧᐃᓂᐠ ᑲᓇᑕ ᑲᐧᐊᐧᐁᓂᔐᐧᐊᑕᐠ ᐊᐢᑭ ᑲᐃᔑᐅᒪᑲᐠ ᑲᓇᑕ ᑲᐧᐊᐧᐁᓂᔐᐧᐊᑕᐠ ᓀᐢᑕ ᔐᓂᔭᓂᑭᒪᐤ ᐃᒋᐃᐧᐊᐠ ᐁᐧᐊᑯ ᐅᐅ ᑭᒋ ᑲᐡᑭᐅᐧᐃᓂᐠ ᑲᓂᑲᓂᑲᑕᑭᐠ ᐁᐧᐊᐧᐃᑕᒪᒋᐠ ᓇᓇᑲᐤ ᑲᐡᑭᐅᐧᐃ ᑲᑫᐢᑭᒧᐧᐁᐧᐃᓇ᙮

ᑕᐣᑌ ᑲᑐᒋᑲᑌᐠ ᐱᐠᑐᓬ ᐊᐸᑎᓯᐧᐃᐣ ᑭᒋ ᓇᑕᐧᐁ ᑭᐢᑫᓂᑕᒧᐧᐃᓂᐠ ᑲᑭ ᑭᔑᑕᓂᐧᐊᐠ?

ᐊᓂᑭ ᑭᒋ ᑭᐢᑫᓂᑕᒧᐧᐃᓂᐠ ᑲᓂᑲᓂᑲᑕᑭᐠ ᐁᑭ ᐊᔭᒥᐊᒋᐠ ᑯᑕᑭᔭ ᓇᓇᑲᐤ ᑲᓇᑕ ᐧᐊᓂᔐᐧᐁᐧᐃᓂᐠ ᑲᐱᒧᑕᑕᓂᒋ ᑲ ᐊᔭᑐᐢᑫᑕᒥᓂᒋ ᓀᐢᑕ ᓂᐡᑕᑦ ᐅᑕᐢᑲᓀᓯᐧᐊ ᓀᐢᑕ ᓇᓇᑲᐤ ᐊᐣᑌᕆᐅ ᑲᐱᐢᑭᑕᐱᒋᐠ ᑲᐅᑭᒪᑲᑕᑭᐠ ᐧᐊᓂᔐᐧᐁᐧᐃᓇ ᑲᐅᔑᑕᐧᐊᐠ ᔓᓯᓇᐁᑫᐧᐃ ᒪᓯᓇᐃᑲᐣ ᐅᒪ ᐅᒋ ᑭᒋ ᓇᑕᐧᐁ ᑭᐢᑫᓂᑕᒧᐧᐁᐧᐃᐣ ᐁ ᑭᐧᐁ ᑲᓇᐧᐊᐸᒋᑲᑌᐠ ᐁ ᐃᑐᒋᑲᑌᐠ ᒪᑲ ᐁᑭᐧᐁ ᑲᓇᐧᐊᐸᒋᑲᑌᐠ᙮

ᑎᐱᓬᐢ ᑭᐸᑭᑎᓇᑦ ᑭᒋ ᓇᑕᐧᐁ ᑭᐢᑫᓂᑕᒧᐧᐃ ᐊᐢᑭ ᑲᐃᔑᐅᒪᑲᐠ ᑎᐸᒋᒧᐧᐃ ᒪᓯᓇᐃᑲᓂᓂᐤ ᒥᑭᓯᐧᐃᐱᓯᑦ ᓂᐧᔕᑭᒋ ᒥᑕᑐᒥᑕᓇ ᐁᐱᐳᓇᑲᐠ᙮ ᐅᑯ ᑭᒋ ᑲᐡᑭᐅᐧᐃᓂᐠ ᑲᓂᑲᓂᑲᑕᑭᐠ ᒪᑲ ᑭᑌᓂᑕᒧᐠ ᐊᓂᒣᓄ ᑎᐸᒋᒧᐧᐃ ᒪᓯᓇᐃᑲᓂᓂᐤ ᑎᐱᓬᐢ ᑲᑭᐸᑭᑎᓇᐠ ᓀᐢᑕ ᑯᑕᑭᔭ ᑎᐸᒋᒧᐧᐃ ᒪᓯᓇᐃᑲᓇ ᓀᐢᑕ ᐃᑌᓂᑕᒧᐧᐃᓇ ᑲᑭ ᐅᒋᒪᑲᑭ ᑲᓇᑕ ᓀᐢᑕ ᐊᐣᑌᕆᐅ ᑭᒋ ᐅᑭᒪᐧᐊᐠ ᓀᐢᑕ ᓂᐡᑕᑦ ᐅᑕᐢᑲᓀᓯᐧᐊᐠ ᐅᑕᑐᐢᑫᐧᐃᓂᐧᐃᐧᐊᐤ ᓀᐢᑕ ᐁᑲ ᑭᒋ ᐅᑭᒪᐠ ᑲᐅᒋ ᑎᐯᓂᑕᐧᑲᑭ ᐊᑐᐢᑫᐧᐃᓇ ᓀᐢᑕ ᑯᑕᑭᔭ ᓇᓇᑲᐤ ᐃᓂᓂᐧᐊᐠ ᑲᒥᑯᐡᑲᒋᐱᓂᒋ ᐅᒣᓄ ᐊᐸᑎᓯᐧᐃᓂᓂᐤ ᑭᐸᑭᑎᓂᑲᑌᐤ ᒪᑲ ᐃᑌᓂᑕᒧᐧᐃᐣ ᓀᐢᑕ ᐃᑌᓂᑕᒧᐧᐁᐧᐃᓇ ᑲᑭ ᐸᑭᑎᓂᑌᑭ ᑲᑭ ᐅᒋᒪᑲᑭ ᓇᑭᐡᑲᑐᐧᐃᓇ ᓀᐢᑕ ᓇᓇᑲᐤ ᐊᓂᐃ ᐅᒥᐢᑎᑯᔑᐧᐃᓂᐠ ᐃᑌᑫ ᑲᐃᔑ ᑲᓇᐧᐊᐸᑕᑭᐠ ᑫᐧᑲᓂᓂᐤ ᓀᐢᑕ ᒪᓯᓇᐃᑲᓂᐠ ᐃᑌᑫ᙮

ᑲᑭᔑ ᐊᔑᒋᐸᓂᑭ ᓇᓇᑲᐤ ᑫᐧᑲᓇ ᐁᑐᒋᑲᑌᑭ ᐅᒪ ᓇᑕᐧᐁ ᑭᐢᑫᓂᑕᒧᐧᐁᐧᐃᓂᐠ ᓀᐢᑕ ᐁᑐᒋᑲᑌᑭ ᐊᓂᐃ ᑭᐢᑫᓂᑕᒧᐧᐁᐧᐃᓇ ᑲᑭ ᒥᐢᑭᑲᑌᑭ ᑕᐱᐦᑯᐨ ᓇᓇᑲᐤ ᓇᑭᐦᑲᑐᐧᐃᓇ ᓀᐢᑕ ᐊᔭᒥᐁᑐᐧᐃᓇ ᓇᓇᑲᐤ ᐃᑕᐧᐃᓂᐠ ᑎᐱᕀᐢ ᑲᑭ ᐸᐸᑕᐧᐊᐸᑕᐠ ᓀᐢᑕ ᑲᓇᑕ ᓀᐢᑕ ᐊᐣᑌᓇᐅ ᑭᒋ ᐅᑭᒪᐧᐃ ᐊᐸᒋᐊᑲᓇᐠ᙮ ᐁᑯ ᒪᑲ ᒥᓯᐧᐁ ᐁᑲᓇᐧᐊᐸᒋᑲᑌᐠ ᑭᒋ ᑎᐸᒋᒧᐧᐃᐣ ᐁᐧᐊᑯ ᐅᑯ ᑭᒋ ᑲᐦᑭᐅᐧᐃᓂᐠ ᑲᓂᑲᓂᑲᑕᑭᐠ ᑭᑎᐱ ᑲᐦᑭᑕᐧᐊᐠ ᑭᒋ ᐊᑎ ᐧᐊᐧᐁᓂᑕᑭᐠ ᓀᐢᑕ ᐁᑯᑌᓂ ᑫᑕᔑᐃᔑᓇᐧᑲᑭᐸᐣ ᐁᐃᑌᓂᑕᑭᐠ ᓀᐢᑕ ᐊᓂᐃ ᑯᑕᑭᔭ ᓇᓇᑲᐤ ᐊᐢᑭᐧᐃ ᑫᐧᑲᓇ ᑲᐃᔑ ᒪᒥᐦᑯᒋᐸᓂᑭ ᑲᑭᐧᐁ ᑲᓇᐧᐊᐸᒋᑲᑌᑭ ᐅᒪ ᐅᒋ ᐊᐸᑎᓯᐧᐃ ᑲᐧᐃ ᐅᐸᐢᑭᑕᓂᐧᐊᐠ ᐊᑕᐧᐊᐱᐢᑲᑐᐠ᙮

ᐅᒪ ᑭᒋ ᓇᑕᐧᐁ ᑭᐢᑫᓂᑕᒧᐧᐃ ᑎᐸᒋᒧᐧᐃ ᒪᓯᓇᐃᑲᐣ ᐁᐧᐊᑯ ᐅᒪ ᒪᓯᓇᐃᑲᐣ ᑲᑭ ᐅᔑᑕᒋᐠ ᑭᒋ ᑲᐦᑭᐅᐧᐃᓂᐠ ᑲᓂᑲᓂᑲᑕᑭᐠ ᐁᐧᐊᑯ ᐅᑯ ᑲᐸᑭᑎᓇᑭᐠ ᑲᑭᔑ ᒥᐢᑲᑭᐠ ᐅᒣᓄ ᒪᓯᓇᐃᑲᓂᓂᐤ ᓀᐢᑕ ᐸᑭᑎᓇᒧᐠ ᐅᑎᑌᓂᑕᒧᐧᐃᓂᐧᐊᐧᐊ ᑕᓂ ᑫᐃᔑ ᒥᑯᐦᑲᒋᒋᑫᒪᑲᐠ ᐊᐢᑭᐠ ᐅᒪ ᐊᐸᑎᓯᐧᐃᐣ᙮ ᐁᐧᐊᑯ ᐅᒪ ᒪᓯᓇᐃᑲᐣ ᑲᓂᑲᓂᑲᑭᑕᐠ ᐊᐢᑭᐠ ᑲᐃᔑᐅᒪᑲᓂᓂᐠ ᒋ ᐊᐸᒋᑕᐟ ᐁᐧᐊᐧᐁᓂᔑᐧᐊᑕᐠ ᐅᒣᓄ ᐊᐸᑎᓯᐧᐃᓂᓂᐤ᙮

ᑕᓀᔑ ᐊᑐᐢᑫᐢᑕᒪᑫᐟ ᐊᐣᑌᓇᐅ ᑭᒋ ᐅᑭᒪᐤ?

ᑎᐱᕀᐢ ᑕᐣᑕᐧᐁᓂᑕᑦ ᐊᐣᑌᓇᐅ ᑭᒋ ᐅᑭᒪᐤ ᐸᑲᑕᓱᐧᐁᐧᐃᓇ ᑭᒋ ᐅᒋ ᐸᓯᑯᑕᐟ ᒧᓇᐃ ᓱᓂᔭᓂᐧᐃ ᐊᑐᐢᑫᐧᐃᓂᓂᐤ᙮ ᑭᒋ ᐅᒋ ᐱᑦᐸᓂᐧᑕᐟ ᑲᓇᑕ ᓀᐢᑕ ᐊᐣᑌᓇᐅ ᒋᑭ ᐅᒋ ᒪᒧ ᐊᐸᑎᓯᒋᐠ ᓇᑕᐧᐁ ᑭᐢᑫᓂᑕᒧᐧᐃᓂᐠ᙮ ᒪᐧᐊᐨ ᐊᓂᑭ ᐊᐣᑌᓇᐅ ᑭᒋ ᐅᑭᒪᐧᐃ ᑲᐸᐯᐢᑭᑕᐱᒋᐠ ᑭ ᐊᐸᑎᓯᐧᐃᐢᑕᒧᐠ ᑲᑭ ᑭᐧᐁ ᑲᓇᐧᐊᐸᒋᑲᑌᐠ ᑭᒋ ᓇᑕᐧᐁ ᑭᐢᑫᓂᑕᒧᐧᐃᓂᐠ ᐁᐧᐊᑯ ᐅᑯ ᑲᑭ ᐊᔑᒋᒋᐠ ᓇᓇᑲᐤ ᑲᒥᓭᑭ ᑲᐧᐃ ᐊᑎ ᐸᓯᑯᒪᑲᑭ ᓀᐢᑕ ᒧᓇᐁ ᓱᓂᔭᓂᐊᓯᐧᐁᐧᐃᓂᐠ ᓀᐢᑕ ᐊᒥᐢᑯᑭᒪᐧᐊᐠ ᓀᐢᑕ ᐅᒣᓂᐢᑭᐧᐃ ᐃᐦᑯᑌᐠ ᓀᐢᑕ ᐊᐢᑭ ᑲᐃᔑᐅᒪᑲᐠ ᑭᒋ ᐅᑭᒪᐧᐃᓂᐠ ᑲᐸᐯᐢᑭᑕᐱᒋᐠ᙮ ᑕᐧᑌᔦᐠ ᒪᑲ ᐁᐃᔑᓇᐧᑲᐠ ᐅᒪ ᐊᐸᑎᓯᐧᐃᐣ ᑎᒥᐠ ᐊᑕᐧᐊᐱᐢᑲᑐᐠ ᑲᐃᑕᐧᑲᐠ ᐊᓂᒪ ᑕᐱᐦᑯᐨ ᐅᒥᓂᐢᑯ ᐃᐦᑫᑌᐧᐃ ᐱᓭᑲᓇᐱ ᑕᐣᑕᐧᐁᓂᑕᐧᑲᐣ ᐸᑲᐣ ᐊᐢᑭ ᑲᐃᔑᐅᒪᑲᐠ ᓇᑕᐧᐁ ᑭᐢᑫᓂᑕᒧᐧᐃᓂᐠ ᑭᒋ ᐅᑭᒪᐤ ᐸᑭᑕᔑᐧᐁᐧᐃᓇ᙮ ᑎᐱᕀᐢ ᑭᐸᑭᑎᓇᑦ ᑭᐢᑫᓂᑕᒧᐧᐁᐧᐃᓂᓂᐤ ᑭᒋ ᓇᑕᐧᐁ ᑭᐢᑫᓂᑕᒧᐧᐁᐧᐃᓂᐠ ᐊᐢᑭ ᑲᐃᔑᐅᒪᑲᐠ ᑲᐃᔑ ᑕᐧᐁᓂᑕᐧᑲᐠ ᐁᐃᑐᒋᑲᑌᐠ ᑫᐧᑲᐣ ᐁᓄᓯᓇᐃᑲᑌᐠ ᑭᒋ ᐅᒋ ᓄᓯᓇᐃᑲᑌᐠ ᐧᑲᔭᐢᐠ ᐊᐣᑌᓇᐅ ᐊᐢᑭ ᑲᐃᔑᐅᒪᑲᐠ ᑲᐃᔑ ᓇᑕᐧᐁ ᑭᐢᑫᓂᒋᑲᑌᐠ ᐁᑐᒋᑲᑌᐠ ᐧᐊᓇᔑᐧᐁᐧᐃᓂᐠ᙮ ᐸᑲᐣ ᓀᐢᑕ ᐧᐃᓇᐧᐊ ᑭᓇᑭᐦᑲᐧᐁᐧᐊᐠ ᐃᓂᓂᐧᐊ ᓀᐢᑕ ᐸᑭᑕᔑᐧᐁᐧᐃᓇ ᑭᐸᑭᑎᓇᒧᐠ ᐊᐣᑌᓇᐅ ᑭᒋ ᐅᑭᒪᐧᐊᐠ᙮ ᐊᐣᑌᓇᐅ ᑭᒋ ᐅᑭᒪᐤ ᑕᐧᐁᓂᑕᑦ ᒋ ᐃᑕᐧᑲᓂᓂᐠ ᑭᓭᐨ ᑕᐣᑌ ᑫᐃᔑ ᓇᑯᑕᓂᐧᐊᐠ ᐃᐢᐱᐠ ᑭᔑᐱᐸᓂᑫ

ᒧᓇᐁ ᘚᓂᔭᓂᓯᐧᐁᐧᐃᐣ᙮ ᑕᐧᐁᓂᑕᐧᑲᐣ ᒋᒪᓯᓇᑌᐠ ᑫᑕᐃᑐᒋᑲᑌᐠ ᐃᐦᐱᐠ ᑭᐸᐃᑲᑌᑫ ᐅᒪ ᐊᐸᑎᓯᐧᐃᐣ ᑕᐣᑌ ᑫᐃᑐᒋᑲᑌᐠ ᒋᑯᒋ ᑭᐧᐁ ᐃᔑᓇᒣᑕᓂᐧᐊᐠ ᑲᑭᔑ ᒥᑯᐡᑲᒋᒋᑲᓂᐧᐊᐠ ᓄᐦᑕ ᑕᐧᐁᓂᑕᑯᓯᐤ ᑎᐱᓫᐦ ᒋᐸᑭᑎᓇᐠ ᐸᓇᐧᑫ ᘚᓂᔭᓇ ᑭᐦᑎᓇᐨ ᒋᒪᓯᓇᓱᓂᒋ ᑲᐧᐃ ᐃᔑᓇᒣᑕᓂᐧᐊᐠ ᑲᑭᔑ ᐊᐸᑎᓯᐧᐃᓇᓂᐧᐊᐠ᙮

ᑫᐧᑲᐣ ᐊᓂᒪ ᑭᒋ ᓇᑕᐧᐁ ᑭᐦᑫᓂᑕᒧᐧᐃᐣ ᑎᐸᒋᒧᐧᐃ ᒪᓯᓇᐃᑲᐣ?

ᐅᒪ ᑎᐸᒋᒧᐧᐃ ᒪᓯᓇᐃᑲᐣ ᐃᑕᐧᑲᐣ ᑎᐸᒋᒧᐧᐃᐣ ᐁᔭᓂᒧᒋᑲᑌᐠ ᑎᒥᐠ ᐊᑕᐧᐊᐱᐦᑲᐟ ᐊᐸᑎᓯᐧᐃᐣ ᑕᓂ ᑫᐃᔑ ᒥᑯᐡᑲᒋᐸᓂᐠ ᐊᐦᑭᐠ ᐅᒪ ᐅᒋ ᐊᐸᑎᓯᐧᐃᐣ ᓄᐦᑕ ᑎᐱᓫᐦ ᑕᓂ ᑫᐃᑐᑕᐠ ᓇᓇᐧᑲᔭᐠ ᒋ ᐊᒍᐧᐃᓇᐠ ᓇᓇᑲᐤ ᒥᑯᐡᑲᒋᐸᓂᐧᐃᓇ᙮ ᐅᒪ ᒪᓯᓇᐃᑲᐣ ᓄᐦᑕ ᐃᑕᐦᑌᐤ ᑕᐣᑌ ᑫᐃᑐᑕᐠ ᑭᒋ ᑭᐦᑫᓂᑕᒧᐧᐃᓂᐠ ᑲᓂᑲᓂᑲᑕᑭᐠ ᓄᐦᑕ ᑎᐱᓫᐦ ᐁᓇᑲᒋᐦᑕᒋᐠ ᐊᓂᐃ ᑫᐧᑲᓇ ᑫᒥᑯᐡᑲᒋᐸᓂᑭ ᐃᓂᑯ ᑫᐱᒧᑌᒪᑲᐠ ᐅᒪ ᐊᐸᑎᓯᐧᐃᐣ ᓄᐦᑕ ᑫᑐᒋᑲᑌᐠ ᑭᐡᐧᑲ ᑭᐸᐃᑲᑌᑫ ᓄᐦᑕ ᐁᐧᐃ ᑭᐧᐁ ᐃᔑᓇᒣᑕᓂᐧᐊᐠ ᑲᑭᔑ ᒍᒋᒋᑲᓂᐧᐊᐠ᙮

ᑕᐣᓂ ᑫᐃᔑᓇᐧᑲᐠ ᐊᐸᑎᓯᐧᐃᐣ?

ᐅᒪ ᐊᐸᑎᓯᐧᐃᐣ ᐧᐊᔦᐡ ᑯᐧᑕᓱᒥᑕᓇ ᑎᐸᐃᑲᐣ ᐊᐦᑭ ᐃᔑᓇᑲᐯᐊᒍᐠ ᐊᑕᐧᐊᐱᐦᑲᑐᐠ᙮ ᐅᒪ ᐊᐸᑎᓯᐧᐃᐣ ᑕᐃᔑ ᐧᐊᐧᐁᓇᐦᑌᐤ ᒪᐡᑫᑯᐧᐃ ᐊᐦᑭᐠ᙮ ᐊᐦᐱᐣ ᓇᓇᑲᐤ ᓇᑕᐧᐁ ᑭᐦᑫᓂᑕᒧᐧᐃᐣ ᑲᑭ ᐊᐸᑕᐠ ᑭᒥᐦᑲᐧᐊᑲᓂᐧᐊᐣ ᑲᓴᐸᐧᐊᐱᐦᑭᓯᐟ ᐊᓯᓂ ᐊᑕᒥᐠ ᐅᒪᐡᑫᑯᐧᐃ ᐊᐦᑭᐠ᙮ ᐊᐧᐊ ᐊᓯᓂ ᑲᑭᒥᐦᑲᐟ ᐧᐊᑭᒋᔑᐣ ᒪᑎᑎᓂ ᐧᒣᒋ ᐊᐣᑕ ᑲᐧᐃᔑ ᐊᐸᑎᓯᐧᐃᓇᓂᐧᐊᐠ᙮ ᒧᓇᐁ ᘚᓂᔭᓂᓯᓂᐧᐁᐧᐃᐣ ᐃᔑ ᒪᒥᑐᓄᓂᒋᑲᑌᐤ ᑭᒋ ᐅᒋ ᐅᑎᓂᐟ ᐊᐧᐊ ᐊᓯᓂ ᒋᒧᓇᐃᑲᓂᐧᐊᐠ᙮ ᐊᐧᐊ ᐊᓯᓂ ᑫᐅᑎᓂᐟ ᑕᐧᐁᓂᑕᐧᑲᐣ ᒋᔑᑲᐅᐟ ᑭᒋ ᑭᓫ ᓂᐧᓴ ᒥᑐᑕᒥᑕᓇ ᑎᐸᐯᐡᑯᒋᑲᐣ ᐊᓯᓂ ᐯᔭᐧᑲ ᐁᐱᐳᐠ ᐃᓂᑯ ᑫᐱᒧᑌᒪᑲᐠ ᐅᒪ ᐊᐸᑎᓯᐧᐃᐣ᙮ ᐅᒪ ᐊᐸᒋᐦᑕᐧᐃᐣ ᑫᔑᐧᑲᐁᑫᒥᒪᑲᐠ ᑕᐸᑲᓂᑫᐧᐃᐃᐸᐁᒪᑲᐣ ᐁᐅᑎᓂᐟ ᑲᓴᐧᐊᐱᐦᑭᓯᐟ ᘚᓂᔭᓂ ᐊᓯᓂ᙮ ᐊᓇ ᐊᓯᓂ ᑫᔑᐧᑲᐅᐟ ᐁᑲ ᑫᔭᑭᓱᐟ ᑕᑎ ᐱᐡᑯᔑᒪᑲᓂᐧᐊᐣ ᒋᓇᑫᔑᒥᐟ ᓄᐦᑕ ᑕᑎ ᓂᑕᐧᐃᑭᒋᑲᓂᐧᐊᐣ ᐊᑎ ᑭᒋ ᐸᓂᑫ ᐧᐃᐊᑎ ᑭᔑᐸᓂᑫ ᐅᒪ ᐊᐸᑎᓯᐧᐃᐣ᙮ ᐊᐧᐊ ᐊᓯᓂ ᑲᐅᑭᑕᐦᑲᒪᐅᐟ ᒧᓇ ᐧᐊᔦᐡ ᐃᔑ ᒥᐦᑲᐧᐊᑲᓂᐧᐊᐣ ᒋᐃᔑ ᓂᔑᐧᐊᓇᒋᒋᑫᐟ ᐧᐊᑲᑕᐦᑲᒥᑯᐠ᙮

ᓂᐦᑐ ᐱᐳᐣ ᐃᓂᑯᐠ ᐃᑕᑭᒋᑲᑌᐤ ᒋᐱᒧᑌᒪᑲᐠ ᐊᐸᑎᓯᐧᐃᐣ ᐸᑎᒪ ᒥᓯᐧᐁ ᒋᑭᔑᑕᓂᐧᐊᑭ ᐊᐸᒋᐦᑕᐧᐃᐣ ᐅᒪ ᐅᒋ ᒧᓇᐁ ᘚᓂᔭᓂᓯᐧᐁᐧᐃᐣ ᓂᐧᓴ ᑭᒋ ᒥᑐᑕᒥᑕᓇ ᑯᐧᑕᐦ ᐁᐱᐳᓇᑲᐠ ᐁᐱᐳᐠ ᑕᒪᒋ ᑭᒋᐸᓂᐤ ᐊᐸᑎᓯᐧᐃᐣ᙮ ᒥᓯᐧᐁ ᑭᐡᐧᑲ ᑭᔑᑕᓂᐧᐊᐧᑲᐧᐁ

ᐊᐸᒋᐦᑕᐧᐃᓇ ᐁᐧᐊᑯ ᑫᑭᒋᐸᓂᐠ ᒧᓇᐁ ᓱᓂᔭᓂᔨᐧᐁᐧᐃᐣ ᐧᐊᔦᐢ ᓂᓱᓴᑊ ᐱᐳᐣ ᒋᐱᒧᑌᒪᑲᐠ ᓴᑯᐨ ᑕᑭᑭᐣ ᒋᓇᑭᐅᒪᑲᐠ ᐁᐃᑕᒋᐠ ᑯᑕᑭᔭᐠ ᐊᔨᓂᔭᐠ ᑭᓂᐧᑲᓂ ᐊᐣᑕ ᑲᐧᐃᓯ ᒧᓇᐃᑲᓂᐧᐊᐠ᙮ ᐊᑎ ᑭᐸᐃᑲᑌᑫ ᒧᓇᐁ ᓭᓂᔭᓂᔨᐧᐁᐧᐃᐣ ᐧᐊᔦᐢ ᓂᓱ ᓀᐦᑕ ᐱᑯ ᓂᐦᑐ ᐱᐳᐣ ᓀᐦᑕ ᐱᑯ ᐧᐊᐧᐊᐨ ᑕᓂᑲᑕᐤ ᓇᓇᑲᒋᐦᑕᐧᐃᐣ ᐊᐦᑭᐠ ᑲᑭᓯᒥᑯᐢᑲᒋᒋᑲᓂᐧᐊᐠ᙮ ᒪᒧ ᒪᑲ ᐁᑲᓇᐧᐊᐸᑕᒪᐣ ᐁᐦᐧᑲᐸᑭᔭᐠ ᐅᒪ ᐊᐸᑎᔨᐧᐃᐣ ᐧᐊᔦᐢ ᓂᔭᓇᓀᐅᓴᑊ ᐱᐳᐣ ᓀᐦᑕ ᐱᑯ ᐊᐧᐊᔨᑌ᙮

ᑕᐣᓂ ᑫᐃᓯᓇᐧᑲᐠ ᐊᐣᑕ ᑫᐃᓯ ᐊᐸᑎᔨᓇᓂᐧᐊᐠ?

ᑲᐃᓯ ᐸᑯᓭᓂᒧᓇᓂᐧᐊᐠ ᐅᒪ ᐊᐸᑎᔨᐧᐃᐣ ᑫᐃᓯᓇᐧᑲᐠ ᑭᐃᓯᓇᒣᑕᓂᐧᐊᐣ ᒥᔨᐧᐁ ᐊᐸᒋᐦᑕᐧᐃᓇ ᒋᐯᓯᓇᐧᑲᑭ᙮ ᔨᐱᔭ ᓀᐦᑕ ᓯᐱᓯᓴ ᑕᔭᓱᑲᔪᓇᓂᐧᐊᐧᓇ ᓴᑯᐨ ᒪᑲ ᐧᒣᒋ ᑫᐃᓯ ᐊᐸᑎᔨᓇᓂᐧᐊᐠ ᐧᐊᔦᐢ ᓂᐦᐧᑕ ᒥᑕᑐᒥᑕᓇ ᒥᔨᐟ ᐱᑕᐧᐁ ᔨᐱᔭ ᓀᐦᑕ ᓯᐱᓯᓴ ᑕᐧᐁᓂᑕᐧᑲᐣ ᒋᐃᓯ ᒐᒪᑌᐠ ᐊᐸᑎᔨᐧᐃᐣ᙮ ᐅᒪ ᑲᑭᓯ ᒪᒥᑐᓀᓂᒋᑲᑌᐠ ᒥᐢᐧᑲᐨ ᐊᐱᓯᐢ ᐊᐸᑕᐣ ᐊᐦᑭ ᑲᐧᐃᓯ ᐊᐸᑎᔨᓇᓂᐧᐊᐠ ᓀᐦᑕ ᑫᐃᓯ ᒥᑯᐢᑯᒋᐸᓂᐠ ᐊᐦᑭᐠ᙮ ᒋᑭ ᐅᒋ ᐃᑐᑕᓂᐧᐊᐠ ᐊᐣᑕ ᑲᐃᓯ ᐊᐸᑎᔨᓇᓂᐧᐊᐠ ᓇᓇᑲᐤ ᐱᒧᑌᐧᐃᐣ ᑕᔭᐸᑕᐣ ᑕᐱᐢᑯᐨ ᐅᑕᐸᓂ ᒣᐦᑲᓇᐤ ᐱᓂᐢ ᒧᔨᓂᐠ ᐱᐳᓂ ᒣᐦᑲᓇᐤ ᒧᔨᓂᐠ ᐅᒋ ᐱᓂᐢ ᑎᒥᐠ ᐊᑕᐧᐊᐱᐦᑲᑐᐠ᙮ ᐅᒥᐦᑭᐧᐃ ᐃᐢᑯᑌᐤ ᐱᓴᑲᓇᐱ ᐅᒪ ᐅᒋ ᐊᐸᑎᔨᐧᐃᐣ ᑕᐸᑭᑎᓂᑲᑌᐤ ᑯᑕ ᐅᒥᐦᑭᐧᐃ ᐃᐢᑯᑌᐤ ᐱᓴᑲᓇᐱ ᐱᓂᐢ ᑭᓯᒋᐧᐊᓄᐠ ᒋᐃᐦᐧᑲᐱᑫᑕᒧᐠ᙮ ᐅᒥᐦᑭᐧᐃ ᐃᐦᑯᑌᐤ ᑕᐅᒋ ᑭᑐᑌᒪᑲᐣ ᑭᓯᒋᐧᐊᓄᐠ ᐱᓂᐢ ᐊᑕᐧᐊᐱᐦᑲᑐᐠ ᒋ ᐊᐸᑕᐠ ᐯᔭᐧᑲᐣ ᐱᓴᑲᓇᐱ ᑲᔭᐸᒋᑕᔭᐠ ᐊᓄᐨ ᒪᑲ ᒋ ᐅᒋ ᑭᑕᐱᑫᓂᑲᑌᐠ ᐅᐢᑭ ᐅᒥᐦᑭᐧᐃ ᐃᐢᑯᑌᐧᐃᔭᐱ ᐊᑕᐧᐊᐱᐦᑲᑐᐠ ᐱᓂᐢ ᑲᐃᓯ ᐊᐸᑎᔨᓇᓂᐧᐊᐠ᙮

ᑫᑯ ᐊᐸᒋᐦᑕᐧᐃᓇ ᑫᐅᓯᑕᓂᐧᐊᑭ?

ᒪᐧᐊᐨ ᐊᓂᐃ ᐊᐸᑎᔨᐧᐃᓇ ᑫᐃᑕᐧᑲᑭ ᐊᐣᑕ ᐊᐸᑎᔨᐧᐃᓂᐠ

ᐱᐠᑐᒼ ᐊᐸᑎᔨᐧᐃᐣ ᑫᐃᓯᓇᐧᑲᐠ

- ᑫᐅᑎᓂᐟ ᐊᔨᓂ ᓀᐦᑕ ᓀᑲᐤ
- ᒧᓇᐃᑫᐧᐃᐣ
- ᐊᔨᓂ ᑲᐃᓯᐧᑲᐁᑫᒪᑲᐠ
- ᐊᐦᑕᑯᐧᐃᑲᒥᐠ ᓀᐦᑕ ᐊᐸᒋᐦᑕᐧᐃᑲᒥᐧᑲ

- ᒥᓯᐧᐁ ᑫᐧᑲᐣ ᐧᐊᑭᑕᐢᑲᒥᐠ ᑫᒧᓇᐃᑲᑌᐠ ᑕᑎᐱᐢᑯᐢᑕᓂᐧᐊᐧᓇ
- ᓂᐱᔾ ᐁᐱᒥᑕᓂᐧᐊᐠ ᓇᓇᑲᐤ ᐊᐸᒋᐢᑕᐧᐃᓇ
- ᑲᔭᐸᑎᓯᒋᐠ ᑫᐃᔑ ᑕᔑᑫᒋᐠ
- ᐧᒣᒋ ᐊᐣᑕ ᑲᐃᔑ ᐊᐸᑎᓯᓇᓂᐧᐊᐠ ᐃᐢᑲᓂ ᐱᐳᐣ ᒣᐢᑲᓇᐧᐊ
- ᐃᐢᑲᓂ ᐱᐳᐣ ᑐᐅᐧᐃᐣ
- ᐱᒥ ᓀᐢᑕ ᐅᒥᓂᐢᑭᐧᐃ ᐃᐡᑯᑌᐤ ᐊᐸᒋᐢᑕᐧᐃᓇ
- ᑫᐃᔑ ᑕᑯᑕᐢᑌᑭ ᐊᐸᒋᐢᑕᐧᐃᓇ

ᐧᐊᓇᐧᐃᑎᒥᐠ ᐊᐸᑎᓯᐧᐃᐣ ᑲᐃᑕᐧᑲᑭ

- ᑲᐃᔑ ᐊᐧᑲᓇᓱᓇᓂᐧᐊᐠ ᒧᓯᓂᐠ
- ᐱᐳᓂ ᒣᐢᑲᓇᐧᐊ
- ᐅᒥᐢᑲᐧᐃᔭᐱᔾ
- ᒪᐡᑯᐨ ᑫᐃᔑ ᐊᐧᑲᓇᓱᓇᓂᐧᐊᐠ ᓀᐢᑕ ᑫᐃᔑ ᐊᐢᑕᓯᓇᓂᐧᐊᐠ ᐊᑕᐧᐊᐱᐢᑲᑐᐠ (ᐁᑎᑭᑕᐢᑭᑕᓂᐧᐊᑭ ᒧᓇᐁ ᓭᓀᔭᓂᐧᐃ ᐊᐸᒋᐢᑕᐧᐃᓇ)
- ᐊᑐᐢᑫᐧᐃᑲᒥᐠ ᓀᐢᑕ ᐊᐸᑎᓯᐧᐃ ᑭᐢᑭᓄᐊᒪᑯᐧᐁᑲᒥᐧᑲ ᐊᑕᐧᐊᐱᐢᑲᑐᐠ

ᐁᐯᑌᐧᐃ ᐧᐃᒋᑲᑌᑭ ᑕᓂ ᑫᐃᔑᓇᐧᑲᑭ ᐁᑎ ᐸᓯᑯᒪᑲᐠ ᐊᐸᑎᓯᐧᐃᐣ ᓀᐢᑕ ᐃᓂᑯᐠ ᑫᐱᐸᓂᑭ ᐅᐅ ᑕᐣᑐ ᐊᐸᑎᓯᐧᐃᓇ ᑫᐊᑎ ᑭᒋᑕᓂᐧᐊᑭ ᒥᓯᐧᐁ ᐯᐯᔭᐠ ᐧᐊᓇᓭᐧᐁᐧᐃᓇ ᑫᓄᓯᓇᐁᑫᒪᑲᑭ ᐃᔑ ᐃᑕᓯᓇᑌᐤ ᑭᒋ ᓇᑕᐧᐁ ᑭᐢᑫᓂᑕᒧᐁᐧᐁᐧᐃᓂᐠ ᑎᐸᒋᒧᐧᐃ ᒪᓯᓇᐃᑲᓂᐠ᙮ ᒪᐧᐊᐨ ᐅᔕᑦ ᐊᓂᐃ ᑎᐱᕐᐢ ᐅᑕᐸᒋᐢᑕᐧᐃᓇ ᑕᐃᔑ ᒪᓯᓇᑌᐤ ᒧᓇᐁ ᓭᓂᔭᓂᐧᐃ ᓇᐢᑯᒥᑐᐧᐃᐣ᙮

ᑕᐃᑕᐧᑲᐧᓇ ᓇ ᐅᐡᑭ ᐊᐸᑎᓯᐧᐃᓇ ᑫᐃᔑ ᒧᓇᐁᑲᓂᐧᐊᐠ?

ᐅᒪ ᐊᐸᑎᓯᐧᐃᐣ ᐃᔑ ᐃᑌᓂᒋᑲᑌᐤ ᑯᐧᑕᓱᐧᐊ ᒥᑕᑐᒥᑕᓇ ᐃᓂᓂᐧᐊᐠ ᒋ ᐊᐸᑎᓯᒋᐠ ᐊᑎ ᐸᓯᑯᒪᑲᑫ ᐊᐸᑎᓯᐧᐃᓇ ᐁᑯ ᒪᑲ ᐧᐃᓇ ᐧᐊᔦᐡ ᓂᐢᐧᑕ ᒥᑕᑐᒥᑕᓇ ᒥᓇ ᓴᑯᒥᑕᓇ ᑕᔭᐸᑎᓯᐧᐊᐠ ᑭᒋᐸᓂᑫ ᒧᓇᐁ ᓭᓂᔭᓂ ᐊᓯᓂᐧᐁᐧᐃᐣ᙮ ᓇᓇᑲᐤ ᐊᐸᑎᓯᐧᐃ ᑲᐡᑭᐅᐧᐃᓇ ᐅᒪ ᐅᒋ ᐊᐸᑎᓯᐧᐃᐣ ᑕᐧᐁᓂᑕᐧᑲᐣ ᒋᐃᑕᐧᑲᑭ ᑕᐱᐡᑯᐨ ᐅᑭᒪᐧᐃᓂᐠ ᐃᓂᓂᐧᐊᐠ ᑲᔭᐸᑎᓯᒋᐠ ᐃᓂᓂᐧᐊᐠ ᓀᐢᑕ ᐊᐸᒋᐢᑕᐧᐃᓇ ᑫᐸᓂᐧᑕᒋᐠ ᐊᐸᒋᐢᑕᐧᐃᓇ ᑫᐱᒥᑕᒋᐠ ᐅᒥᓂᐢᑭᐧᐃ ᐃᐡᑯᑌᐧᐃᓂᓂᐧᐊᐠ ᓀᐢᑕ ᑲᔭᐧᑲᑭᓯᑫᒋᐠ ᓀᐢᑕ ᑲᐱᐸᓂᐧᑕᒋᐠ ᓇᓇᑲᐤ ᐊᐸᒋᐢᑕᐧᐃᓇ ᑲᔭᐸᑕᑭ ᒥᓯᐧᐁ ᐊᓂᑭ ᑲᓂᑲᓂᐅᑕᒋᐠ ᑫᐃᔑᓇᐧᑲᓂᓂᐠ ᐅᒣᓄ

ᐊᐸᑎᓯᐧᐃᓂᓂᐤ ᓀᐢᑕ ᑫᐃᔑ ᒥᓄᐸᓂᐃᑯᓇᓂᐧᐊᐠ ᒥᓯᐧᐁ ᐱᑯ᙮

ᑫᑯ ᒥᑯᐦᑲᒋᐃᐧᐁᐧᐃᓇ ᑫ ᐅᒋᒪᑲᑭ ᐅᒪ ᐅᒋ ᐊᐸᑎᓯᐧᐃᐣ?
ᑭᒋ ᓇᑕᐧᐁ ᑭᐢᑫᓂᑕᒧᐧᐃᓇᐠ ᑎᐸᒋᒧᐧᐃ ᒪᓯᓇᐃᑲᐣ ᑭ ᐊᔑᑎᓂᑲᑌᐤ ᐁᑭ ᒪᒥᑐᓀᓂᒋᑲᑌᐠ ᐊᓂᐃ ᑫᐧᑲᓇ ᒪᐦᑯᐨ ᑫᒥᑯᐦᑲᒋᒋᑫᒪᑲᑭ

- ᐅᒪ ᐊᐸᑎᓯᐧᐃᐣ ᐊᐢᑭᐠ ᑲᐃᔑᐅᒪᑲᐠ ᑫᑲᓇᐧᐊᐸᒋᑲᑌᐠ ᓀᐢᑕ ᐃᓂᓂᐧᐃ ᐱᒪᑎᓯᐧᐃᓂᐠ᙮
- ᐊᐢᑭ ᐁᔭᒋᐸᓂᐠ ᐅᒪ ᐅᒋ ᐊᐸᑎᓯᐧᐃᐣ ᑕᐱᐦᑯᐨ ᐃᓂᓂᐤ ᐱᒪᑎᓯᐧᐃᐣ ᓀᐢᑕ ᐊᐢᑭᓄ ᑲᐃᔑ ᐊᐸᒋᐢᑕᐟ ᓀᐢᑕ ᑲᐃᔑᑕᔑᑫᐟ᙮
- ᑲᐊᑎ ᒪᐧᐊᒋᐅᒪᑲᑭ ᐊᐢᑭᐠ ᑫᐧᑲᓇ ᑫᒥᑯᐦᑲᒋᐸᓂᑭ᙮
- ᐊᐸᑎᓯᐧᐃᓇ ᓇᓇᑲᐤ ᐁᐃᔑᓇᒣᑕᓂᐧᐊᑭ ᐁᐧᐊᐧᐁᓇᐢᑕᓂᐧᐊᑭ ᑭᔕᐢᐱᐣ ᐧᐊᔦᐦ ᐃᑭᑫ᙮
- ᐊᐸᑎᓯᐧᐃᓇ ᒋᐃᑕᐧᑲᑭ ᒋᑭ ᐅᒋ ᐊᓇᐢᑯᒪᑲᑭ ᑯᑕᑭᔭ ᐊᑐᐢᑫᐧᐃᓇ᙮
- ᑫᐃᔑᓇᐧᑲᐠ ᐊᐸᑎᓯᐧᐃᐣ
- ᐊᑎᐟ ᑫᐃᑕᐧᑲᑭ ᑫᒪᓂᐸᓂᑭ ᐊᐸᒋᐢᑕᐧᐃᓇ ᓀᐢᑕ ᐱᑯ ᑫᑕᑐᐧᐃᐣ ᑫᐃᑭᐠ᙮

ᑫᐧᑲᓇ ᐊᓂᐃ ᑲᑭ ᒥᑯᐦᑲᑌᓂᒥᐃᑯᐟ ᓂᐦᑕᑦ ᐅᑕᐢᑲᓀᓯᐤ?
ᐁᐧᐊᑯ ᐅᐅ ᑫᐧᑲᓇ ᑲᑭ ᒥᑯᐦᑲᑌᓂᒥᐃᑯᐟ ᓂᐦᑕᑦ ᐅᑕᐢᑲᓀᓯᐤ᙮

- ᐁᓇᓂᐢᒋᒋᑲᑌᐠ ᒋᓯᑭᑎᐠ ᐱᒥ
- ᒋᒥᑯᐦᑲᒋᐱᓂᑭ ᐃᓂᓂᐧᐃ ᐱᒪᑎᓯᐧᐃᓇ
- ᑫᒥᑯᐦᑲᒋᐸᓂᑭ ᔑᐱᔑᔕ ᓀᐢᑕ ᓯᐱᔭ ᒥᓯᐧᐁ ᑫᐧᑲᓇ ᑲᐱᒪᑕᐠ
- ᒥᓯᐧᐁ ᐊᐧᐃᔭᔑᐦ ᐅᐱᒪᑎᓯᐧᐃᐣ ᑕᒥᑯᐦᑲᒋᐸᓂᓂᐤ
- ᑕᓂ ᑫᐃᔑᓇᐧᑲᐠ ᑭᐦᐧᑲ ᑭᐸᐃᑲᑎᑫ ᐊᐸᑎᓯᐧᐃᐣ ᒋᑭ ᐅᒋ ᐱᒧᑌᒪᑲᑭ ᐅᐅ ᑫᐧᑲᓇ
- ᒋᓇᓄᑌᐸᓂᑭ ᐊᐸᑎᓯᐧᐃᓇ ᓀᐢᑕ ᑭᐢᑭᓄᐊᒪᑫ ᐊᐸᑎᓯᐧᐃᓇ
- ᒋᐧᐊᓂᑕᓂᐧᐊᐠ ᐃᓂᓂᐧᐃ ᐱᒪᑎᓯᐧᐃᐣ

ᑕᓂ ᑫᐃᑐᑕᐠ ᑎᐱᔥᐢ ᐅᐅ ᑫᐧᑲᓇ ᑫᒥᑯᐦᑲᒋᒋᐸᓂᑭ ᐅᒪ ᐊᐸᑎᓯᐧᐃᐣ ᐅᒋ?
ᑎᐱᔥᐢ ᑭᐸᑭᑎᓇᑦ ᓇᓇᑲᐤ ᑫᐧᑲᓇ ᑫᑐᑕᐠ ᑭᔕᐢᐱᐣ ᐅᓴᒥ ᒥᑯᐦᑲᒋᐸᓂᑫ ᑫᐧᑲᐣ ᑫ ᐅᒋ ᐊᒍᐧᐃᓇᐠ ᒥᑯᐦᑲᑌᓂᑕᒧᐧᐃᓂᓂᐤ ᓀᐢᑕ ᐁᔭᐧᑲᒣᓂᑕᐠ ᐊᐢᑭᓄ᙮ ᑭᒋ ᐅᑭᒪᐤᐃ ᐊᑐᐢᑫᓇᑲᓇᐠ ᓀᐢᑕ ᓂᐦᑕᑦ ᐅᑕᐢᑲᓀᓯᐧᐊᐠ ᓀᐢᑕ ᑯᑕᑭᔭᐠ ᐃᓂᓂᐧᐊᐠ ᒧᔕᐠ

ᑭᐃᑐᐧᐁᐧᐊᐠ ᒋᐧᐃ ᑲᐧᑫᑐᒋᑲᑌᐠ ᐅᒪ ᐊᐸᑎᓯᐧᐃᐣ ᒋᑭ ᒥᓄᐸᓂᐠ ᐅᒪ ᒪᑲ ᐁᑭᐃᐧᑕᓂᐧᐊᐠ ᑭᐃᔑᓇᒉᑕᓂᐧᐊᐣ ᐅᒪ ᐊᐸᑎᓯᐧᐃᐣ ᐁᑲ ᐊᐧᐊᓯᑌ ᒋᒥᑯᐦᑲᒋᒋᑫᒥᑲᐠ ᑲᑭᔑᒥᐢᑭᑲᑌᐠ᙮ ᑭᐢᑭᓄᐧᐊᒋᒋᑲᐣ ᑕᑐ ᐊᔭᒧᐧᐃᓇ ᑲᑭ ᐃᑕᐧᑲᑭ ᐅᒪ ᐅᒋ ᐊᐸᑎᓯᐧᐃᐣ ᐅᒥᐢᑭᐧᐃ ᐃᐦᑯᑌᐤ ᐱᔕᑲᓇᐱ ᑕᐧᐊᐨ ᐊᐸᑕᐣ ᐃᐢᐱᐨ ᐧᐃᓇ ᐧᒉᒋ ᑲᐃᔑ ᐊᐸᑎᓯᐧᐃᓇᓂᐧᐊᐠ ᒋᐃᑕᐧᑲᐠ ᐃᐦᑯᑌᐧᐃᑲᒥᐠ ᑲᑕᐧᐁᓂᑕᐧᑲᑭᐸᐣ ᒥᐢᑕᐃ ᒋᐱᒥᐅᑕᓂᐧᐊᐠ ᐱᒥ᙮

ᑕᓀᑌᓂᑕᑭᐠ ᐧᐃᓇᐧᐊᐤ ᑭᒋ ᑲᐦᑭᐅᓂᐠ ᑲᓂᑲᓂᑲᑕᑭᐠ?

ᐊᓂᐃ ᒥᑯᐦᑲᑌᓀᑕᒧᐧᐃᓇ ᑲᑭ ᐸᓯᑯᒪᑲᑭ ᒉᐧᑲᐨ ᑭᒋ ᓇᑕᐧᐁ ᑭᐢᑫᓂᑕᒧᐧᐃᐣ ᑲᑭ ᐊᔦᑐᒋᑲᑌᐠ ᑭᓇᐦᑯᔑᐧᑕᐤ ᑎᐱᕀᐢ ᒋᓇᐁᑕᒥᓂᒋ ᑲᑭ ᑕᔑᐧᐊᑎᑯᒋᐠ ᑭᒋ ᑲᐦᑭᐅᓂᐠ ᑲᓂᑲᓂᑲᑕᑭᐠ᙮ ᐊᐢᑲᐤ ᓀᐢᑕ ᑭᐃᑭᐣ ᐁ ᑭᒋ ᐊᓂᒧᒋᑲᑌᐠ ᓇᓇᑲᐤ ᐃᑌᓂᑕᒧᐧᐃᓇ ᐁᑭ ᐃᑕᐧᑲᑭ ᐁᓇᑭᐦᑲᑐᒋᐠ ᓀᐢᑕ ᐊᐧᐊᓯᑌ ᐁᑭᑕᐧᐁᓂᑕᑭᐠ ᑭᐢᑫᓂᑕᒧᐧᐃᓂᓂᐤ ᒋᑭ ᓇᐦᑯᔑᐧᑕᐧᐊᓂᓂᑭ ᐅᒧᑯᐦᑲᑌᓂᑕᒧᐧᐃᓂᐧᐊᐤ ᐅᑯ ᑭᒋ ᑲᐦᑭᐅᓂᐠ ᑲᓂᑲᓂᑲᑕᑭᐠ᙮

ᑕᐣᑌ ᑫᑐᑕᐠ ᑎᐱᕀᐢ ᓇᓇᑲᐤ ᑫᐧᑲᓇ ᑫᒥᑯᐦᑲᒋᐸᓂᑭ ᐊᐢᑭᐠ?

ᐁᐧᐊᐧᐁᓂᑲᒋᑲᑌᐠ ᓀᐢᑕ ᑕᐣᑌ ᑫᑐᒋᑲᑌᐠ ᑫᐧᑲᐠ ᐃᑭᑫ ᑫᒪᓂᐸᓂᐠ ᐊᐸᑎᓯᐧᐃᓂᐠ ᑫ ᐅᒋᒪᑲᐠ ᒧᑯᐦᑲᒋᐃᐧᐁᐧᐃᐣ ᑎᐱᕀᐢ ᑭᐃᔑᓇᒉᑕᐤ ᐅᒉᓄ ᐊᐸᑎᓯᐧᐃᓂᓂᐤ ᓀᐢᑕ ᑭ ᐊᑎᑐᑕᑦ ᐧᒉᒋ ᐱᑯ ᐊᓂᒉᓄ ᐊᐢᑭᓄ ᑲᐃᔑᐅᒪᑲᓂᓂᐠ ᐁᑐᒋᑲᑌᐠ ᐁᓇᓇᑲᑕᐧᐁᓂᒋᑲᑌᐠ ᓀᐢᑕ ᐊᓂᐃ ᓇᓇᑲᐤ ᐧᐊᓇᔑᐧᐁᐧᐃᓇ ᑫᓄᓯᓇᐃᑲᑌᑭ᙮ ᐅᑯ ᑭᒋ ᑲᐢᑭᐅᐧᐃᓂᐠ ᑲᓂᑲᓂᑲᑕᑭᐠ ᑭᐃᑌᓂᑕᒧᐠ ᑲᑭᐃᔑᓇᒉᑕᓂᒋ ᑎᐱᕀᐢ ᐊᔐᐧᐃᓇ ᑫᐃᑐᑕᐠ ᑭᔕᐢᐱᐣ ᑫᐧᑲᓇ ᒪᓂᐸᓂᓂᑫ ᐊᐢᑭᐠ ᐃᑌᑫ ᓀᐢᑕ ᐊᐸᑎᓯᐧᐃᓂᐠ ᐃᑌᑫ ᒪᑲ ᑭᐃᑌᓂᑕᒧᐠ ᑭᒋ ᑲᐦᑭᐅᐧᐃᓂᐠ ᑲᓂᑲᓂᑲᑕᑭᐠ ᐁᑭ ᓇᐁᓂᑕᑭᐠ ᐊᓂᐃ ᑫᐧᑲᓇ᙮

ᑕᐣᑌ ᑫᐅᒋ ᑭᐢᑫᓂᑕᒥᐠ ᑎᐱᕀᐢ ᑲᐃᐧᑌᐟ ᑫᐧᑲᓇ ᑕᐧᐯ ᑐᑕᒧᐧᑫ?

ᑕᐧᐁᓂᑕᐧᑲᐧᓇ ᒋᐃᑕᐧᑲᐠ ᐧᐊᓇᔑᐧᐁᐧᐃ ᓄᓯᓇᐁᒧᐧᐃᐣ ᑭᐢᑎᓇᐨ ᑎᐱᕀᐢ ᒋᐱᒧᑕᑕᐟ ᐊᓂᐃ ᑫᐧᑲᓇ ᑲᑭᐃᐧᑌᐟ ᑫᑐᑕᐠ ᐅᒉᓄ ᐊᐸᑎᓯᐧᐃᓂᓂᐤ ᑕᐣᑌ ᐱᑯ ᑫᐃᔑ ᒥᑯᐦᑲᒋᐃᐧᐁᒪᑲᐠ᙮ ᓀᐢᑕ ᒪᑲ ᐃᔑ ᒪᓯᓇᑌᐤ ᓂᔭᓇᓀᐤ ᐁᐃᑕᓯᓇᑌᐠ ᐁᐱᐢᑭᑕᓯᓇᑌᐠ ᑭᒋ ᓇᑕᐧᐁ ᑭᐢᑫᓂᑕᒧᐧᐁᐧᐃᓂᐠ ᑎᐸᒋᒧᐧᐃᐣ ᒪᓯᓇᐃᑲᓂᐠ ᑕᐣᑌ ᑫᐃᑐᒋᑲᑌᐠ ᐧᒉᒋ ᐁᓄᒋᑕᓂᐧᐊᐠ ᐊᐢᑭ ᑲᐃᔑᐅᒪᑲᐠ ᓀᐢᑕ ᐃᓂᓂᐧᐃ ᐊᐸᑎᓯᐧᐃᓂᐠ ᓀᐢᑕ ᐱᒪᑎᓯᐧᐃᓂᐠ ᒧᑯᐦᑲᑌᓂᑕᒧᐧᐃᓇ ᑫᑭᐧᐁ ᑲᓇᐧᐊᐸᒋᑲᑌᑭ᙮

ᑫᐧᑲᓇ ᐊᓂᐃ ᑯᑕᑭᔭ ᐸᑭᑕᔑᐧᐁᐧᐃᓇ ᑎᐱᕐᐢ ᑲᑕᐧᐁᓂᑕᐠ?
ᑭᔕᐢᐱᐣ ᓇᐢᑯᒥᑌ ᐅᒪ ᐊᐸᑎᓯᐧᐃᐣ ᐅᐅ ᑕᐧᐁᓂᑕᐧᑲᐧᓇ ᑫᐧᑲᓇ:

- ᐧᐊᓇᔑᐧᐁᐧᐃᓂᐠ ᑲᐅᒋᑌᐯᓂᑕᐧᑲᐠ ᐁᓇᑲᒋᐃᐟ ᓇᒣᐢ ᐸᑭᑕᔑᐧᐁᐧᐃᓇ᙮
- ᐸᑭᑕᔑᐧᐁ ᐧᐊᓇᔑᐧᐁᐧᐃᐣ ᓂᐱᐠ ᐅᒋ ᐊᐸᑎᓯᐧᐃᐣ
- ᐸᑭᑕᔑᐧᐁ ᐧᐊᓇᔑᐧᐁᐧᐃᐣ ᐸᑭᓯᑲᐣ ᑫᐃᔑ ᐊᐢᑌᐠ ᓀᐢᑕ ᑫᐃᔑ ᐅᔑᑕᓂᐧᐊᐠ᙮
- ᐊᐢᑭ ᑲᐃᔑᐅᒪᑲᐠ ᐸᑭᑕᔑᐧᐁ ᐧᐊᓇᔑᐧᐁᐧᐃᐣ ᐁᑲ ᓇᐢᐱᐨ ᑲᒥᔕᐠ ᐊᐸᑎᓯᐧᐃᐣ ᐅᒪᓂᐢᑭᐠ ᐃᐡᑯᑌᐤ ᐃᑌᑫ (ᐊᐣᑌᕆᐅ ᐊᐢᑭ ᑲᐃᔑᐅᒪᑲᐠ ᓇᑕᐧᐁ ᑭᐢᑫᓂᑕᒧᐧᐃᐣ ᐧᐊᓇᔑᐧᐁᐧᐃᐣ)
- ᐊᐣᑌᕆᐅ ᐅᒥᓂᐢᑭᐧᐃ ᐃᐡᑯᑌᐠ ᑲᓂᑲᓂᑲᑕᑭᐠ ᐧᐊᓇᔑᐧᐁᐧᐃᐣ ᑲᐃᔑ ᐱᐢᑲᑕᓯᓇᑌᐠ ᔕᑯᒥᑕᓇᓂᔓ ᒋ ᐊᑎ ᑭᑐᑌᒪᑲᐠ ᐊᐸᑎᓯᐧᐃᐣ
- ᐊᐣᑌᕆᐅ ᒧᓇᐁ ᔓᓂᔭᐣ ᐊᓯᓂᐧᐁᐧᐃᐣ ᐧᐊᓇᔑᐧᐁᐧᐃᐣ ᑫᑐᒋᑲᑌᐠ ᐊᑎᑭᐸᐃᑲᑌᑭ ᐊᐸᑎᓯᐧᐃᐣ᙮
- ᐊᐣᑌᕆᐅ ᒧᓇᐃᑫᐧᐃᓂᐠ ᑲᐅᒋ ᐅᔑᑕᓂᐧᐊᐠ ᑫᐧᑲᐣ ᐁ ᐊᑎ ᒪᒧᐧᐃᐃᑲᑌᐠ ᐸᑭᑕᔑᐧᐁᐧᐃᓇ
- ᐊᐣᑌᕆᐅ ᐸᑭᑕᔑᐧᐁᐧᐃ ᒪᓯᓇᐃᑲᓇ ᓀᐢᑕ ᒋᑭ ᑕᑯᓇᐠ ᐊᓂᒣᓄ ᐊᐢᑭᓇᐤ ᐃᓂᑯᐠ ᑫ ᐊᐸᑎᓯᐟ᙮
- ᐁᐸᑭᑕᔑᐧᐊᒋᑲᑌᐠ ᐊᐸᑎᓯᐧᐃᐣ ᑭᒋ ᐅᒋ ᐱᒥᑕᒥᑲᐠ ᑫᐃᔑ ᒥᑯᐡᑲᒋᒋᑫᒪᑲᐠ ᓂᐱᐠ ᑕᐱᐡᑯᐨ ᓴᑲᐃᑲᐣ ᓀᐢᑕ ᓯᐱᐠ
- ᐊᐣᑌᕆᐅ ᓂᐱᔾ ᐁᐅᑎᓂᑲᑌᐠ ᐧᐊᓇᔑᐧᐁᐧᐃᐣ ᑕᐧᐁᓂᑕᐧᑲᓇ ᐸᑭᑕᔑᐧᐁᐧᐃ ᒪᓯᓇᐃᑲᓇ
- ᐸᑭᑕᔑᐧᐁᐧᐃ ᒪᓯᓇᐃᑲᓇ ᑕᐧᐁᓂᑕᐧᑲᐧᓇ ᓀᓀᐧᐃᐣ ᐅᒋ ᓂᐱᔾ ᓀᐢᑕ ᐧᐁᐱᓇᑲᐣ ᐁᐱᒥᑕᓂᐧᐊᐠ ᐊᐣᑌᕆᐅ ᐊᐢᑭ ᑲᐃᔑᐅᒪᑲᐠ ᑲᐃᔑ ᐊᔭᐧᑲᒥ ᓇᑲᒋᐢᑕᓂᐧᐊᐠ ᐧᐊᓇᔑᐧᐁᐧᐃᐣ

ᑕᐣᑕ ᐱᑯ ᑲᐃᔑ ᑕᐧᐁᓂᑕᐧᑲᐠ ᐅᒪ ᐊᐸᑎᓯᐧᐃᐣ ᒋᑭ ᑭᒋᐸᓂᐠ ᑕᐧᐁᓂᑕᐧᑲᐧᓇ ᓇᓇᑲᐤ ᑭᒋ ᐅᑭᒪᐧᐃ ᐸᑭᑕᐧᐁᔑᐧᐁᐧᐃ ᒪᓯᓇᐃᑲᓇ ᓇᓇᑲᐤ ᑲᐃᔑ ᑎᐯᓂᑕᐧᑲᑭ᙮ ᐊᑎᐟ ᐊᓂᐃ ᒋᑎᐸᒋᒧᐢᑕᒋᐠ ᐃᓂᓂᐧᐊᐠ᙮

ᐊᓂᐃ ᒪᑲ ᐧᐃᓇ ᑫᐧᑲᓇ ᐁᑲ ᑲᑎᐯᓂᑕᐧᑲᑭ ᑭᒋ ᐧᐊᓇᔑᐧᐁᐧᐃᓂᐦ ᓀᐢᑕ ᒪᑲ ᑕᐣᑌ ᑫᑐᒋᑲᑌᐦ ᐁᓇᑲᑕᐧᐁᓂᒋᑲᑌᑭ?

ᑲᑭ ᐃᔑᓇᒣᑕᓂᐧᐊᐦ ᓀᐢᑕ ᑫᑐᒋᑲᑌᐦ ᐁᓇᑲᑕᐧᐁᓂᒋᑲᑌᐦ ᑫᐧᑲᐣ ᐁᑲ ᑲᔭᓂᒧᒋᑲᑌᑭ ᐊᐣᑕ ᑭᒋ ᓇᑕᐧᐁ ᑭᐢᑫᓂᑕᒧᐧᐃᓂᐦ ᑎᐸᒋᒧᐧᐃ ᒪᓯᓇᐃᑲᐣ ᑭᐢᑎᓇᐨ ᑕᐃᔑᓇᐧᑲᐣ ᒋ ᐃᔑ ᐱᒧᑌᒪᑲᑭ ᐅᐅ ᐊᐢᑭᐦ ᑲᐃᔑᐅᒪᑲᐦ ᓀᐢᑕ ᐃᓂᓂᐧᐃ ᐊᐸᑎᓯᐧᐃᓂᐦ ᓇᐢᑯᒧᑐᐧᐃᓂᐦ᙮ ᐊᓂᒪ ᐊᐢᑭ ᑲᐃᔑᐅᒪᑲᐦ ᓀᐢᑕ ᐃᓂᓂᐧᐃ ᐊᐸᑎᓯᐧᐃᓂᐦ ᓇᐢᑯᒧᑐᐧᐃᐣ ᐅᒪ ᐅᒋ ᑎᒥᐦ ᐊᐸᑎᓯᐧᐃᐣ ᐁᐧᐊᑯ ᐅᒪ ᑫᐧᐊᐸᑎᓇᒣᒪᑲᐦ ᑭᐢᑎᓇᐨ ᒋ ᐊᑎ ᑐᒋᑲᑌᑭ ᐯᔭᐧᑲᐣ ᐊᓂᐃ ᑫᐧᑲᓇ ᑲᑐᒋᑲᑌᑭ ᑲᐃᔑ ᐊᐸᑎᓯᓇᓂᐧᐊᐦ᙮ ᐅᒪ ᓇᐢᑯᒥᑐᐧᐃᐣ ᑕᐧᐁᓂᑕᐧᑲᐣ ᒋ ᐊᑎ ᑭᔑᑕᓂᐧᐊᐦ ᐊᑎ ᑭᔑᐸᓂᑫ ᑭᒋ ᓇᑕᐧᐁ ᑭᐢᑫᓂᑕᒧᐧᐃᓂᐦ ᑎᐸᒋᒧᐧᐃ ᒪᓯᓇᐃᑲᓂᐦ᙮

ᑫᐧᑲᔪᐤ ᒪᑲᓂ ᐊᓂᒧᓂᐤ ᑲᑭᔑ ᐸᑭᑕᔑᐧᐊᑕᑭᐦ ᐅᑯ ᑭᒋ ᑲᐡᑭᐅᐧᐃᓂᐦ ᑲᓂᑲᓂᑲᑕᑭᐦ ᑲᑭ ᐅᑎᓇᑭᐦ ᑭᒋ ᓇᑕᐧᐁ ᑭᐢᑫᓂᑕᒧᐧᐃᓂᐦ ᑎᐸᒋᒧᐧᐃ ᒪᓯᓇᐃᑲᐣ?

ᐅᑯ ᑭᒋ ᑲᐡᑭᐅᐧᐃᓂᐦ ᑲᓂᑲᓂᑲᑕᑭᐦ ᐃᑌᓂᑕᐧᒪᐦ ᐁᑲ ᑫᐧᑲᓂᓂᐤ ᑫᒥᑯᐡᑲᒋᐸᓂᓂᐦ ᐊᐢᑭᐦ ᑲᐃᔑᐅᒪᑲᓂᓂᐦ ᐅᒪ ᐅᒋ ᐊᐸᑎᓯᐧᐃᐣ ᒥᓴᐧᐊᐨ ᐁᐃᑕᐧᑲᑭ ᓇᓇᑲᐤ ᑫᐧᑲᓇ ᑫᑐᒋᑲᑌᑭᐸᐣ ᐧᐊᔦᐡ ᐃᑭᑫ᙮ ᓀᐢᑕ ᒪᑲ ᒧᓇ ᑫᐧᑲᐣ ᐧᐊᐸᒋᑲᑌᐤ ᒋᐧᒪᐧᐊᒋᐅᒪᑲᐦ ᑫᐃᔑ ᓂᔑᐧᐊᒋᒋᑫᒪᑲᐦ᙮ ᑎᐱᕽᐢ ᑕᑕᐧᐁᓂᑕᑯᓯᐤ ᒋᔪᓯᓀᐧᐊᐦ ᐊᓂᐃ ᑫᐧᑲᓇ ᑲᑭ ᐃᐧᑌᐟ ᐅᑎᐸᒋᒧᐧᐃ ᒪᓯᓇᐃᑲᓂᐦ ᐅᒪ ᐅᒋ ᑫᑐᒋᑲᑌᐦ ᐁᓇᓇᑲᑕᐧᐁᓂᒋᑲᑌᐦ ᒥᓯᐧᐁ ᑫᐧᑲᐣ᙮ ᑭᔕᐢᐱᐣ ᒪᑲ ᐧᐃᓇ ᐁᑲ ᑲᐅᒋ ᐃᑌᓂᒋᑲᑌᑭ ᓀᐢᑕ ᐁᑲ ᑲᐅᒋ ᐧᐊᐸᒋᑲᑌᑭ ᑫᐧᑲᓇ ᑫᒪᓂᐸᓂᑭ ᒣᐧᑲᐨ ᐁᐸᓂᐦ ᐊᐸᑎᓯᐧᐃᐣ ᑕᑐᒋᑲᑌᐤ ᐧᐃᐸᐨ ᒋᔪᒋᐢᑕᓂᐧᐊᐦ ᑫᐧᑲᐣ ᓀᐢᑕ ᐧ ᐧᐃᐸᐨ ᒋ ᐊᒋ ᐧᐊᐧᐁᓂᐢᑕᓂᐧᐊᐦ ᑫᐧᑲᐣ ᐊᐣᑕ ᑫ ᐅᒋᐸᓂᐦ᙮

ᑭᐡᐧᑲ ᒪᑲ ᒥᓯᐧᐁ ᐃᑌᓂᑕᒧᐧᐃᓇ ᑲᑭ ᑕᑯᔑᓇᒧᒪᑲᑭ ᐊᐣᑕ ᑎᐸᒋᒧᐧᐃ ᒪᓯᓇᐃᑲᓂᐦ ᐅᒪ ᒪᑲ ᑫᑐᒋᑲᑌᑭᐸᐣ ᐧᑲᔭᐢᐦ ᑕᑭᐧᐁ ᑲᓇᐧᐊᐸᑕᒧᐦ ᑭᒋ ᑲᐢᑭᐅᐧᐃᓂᐦ ᑲᓂᑲᓂᑲᑕᑭᐦ ᐁᐧᐊᑯ ᒪᒋᐟ ᑫᐸᑭᑎᓇᑭᐦ ᐅᑎᑌᑕᒧᐧᐃᓇᐧᐊᐤ ᒋᑭᑭᓇᑭᐦ ᑎᐸᒋᒧᐧᐃ ᒪᓯᓇᐃᑲᓂᓂᐤ ᑲᑭ ᐊᐸᑎᓯᐧᐃ ᑲᑕᑭᐦ ᑕᑎ ᐃᔑᒋᔑᐊᒪᐧᐁᐧᐊᐦ ᐊᐢᑭ ᑲᐃᔑᒪᑲᓂᓂᐦ ᑲᐱᐢᑭᑕᐱᐟ ᐧᐊᓇᔑᐧᐁᐧᐃ ᐊᐸᒋᐊᑲᐣ᙮

SOMMAIRE EN LANGAGE CLAIR ET SIMPLE

Qu'est-ce que le projet de mine de diamants Victor?

Le projet de mine de diamants Victor (PMDV) est un projet proposé par De Beers Canada Inc. visant la construction d'une mine de diamants à ciel ouvert à environ 90 kilomètres (km) à l'ouest d'Attawapiskat, en Ontario.

Qui est De Beers?

De Beers Canada Inc. (De Beers) est une société minière appartenant à De Beers Consolidated Mines Inc., une société minière internationale qui existe depuis 1888 et dont le siège social est situé en Afrique du Sud. Son activité principale est l'exploration à la recherche de diamants, ainsi que l'exploitation minière et la commercialisation des diamants. De Beers exploite actuellement environ 20 mines dans le monde entier. La société se livre à l'exploration des diamants au Canada depuis 40 ans et travaille actuellement à la construction ou à la planification de trois mines au Canada, l'une d'entre elles faisant partie du PMDV.

Quelles seront les constructions dans le cadre du PMDV?

Les principaux éléments du projet qui se trouvent sur place sont :

- Des carrières, une sablière et une gravière;
- Une mine à ciel ouvert;
- Une usine de traitement du minerai;
- Des entrepôts et des bâtiments de service;
- Des amas de muskeg, de mort-terrain, de minerai traité et de roches excavées;
- Des installations de gestion de l'eau;
- Des locaux d'hébergement de la main-d'œuvre;
- Des routes praticables à longueur d'année sur place;
- Une piste d'atterrissage praticable à longueur d'année;
- Des installations pour le combustible et la production d'électricité;
- Des installations d'entreposage et des aires de déchargement.

Les principaux éléments du projet qui ne se trouvent pas sur place sont :

- Un parc de stockage pour le matériel et les fournitures à Moosonee;
- Un chemin d'hiver côtier existant entre Moosonee et Attawapiskat;
- Un chemin d'hiver entre Attawapiskat et le site;
- Des nouvelles lignes de transport d'électricité de Otter Rapids à Kashechewan, et d'Attawapiskat à la mine;

- Des installations de manutention pour barges et un site d'entreposage des matériaux et de l'équipement pour soutenir les activités de construction à Attawapiskat (possibilité);
- Des bureaux et des centres de formation à Attawapiskat.

Comment les diamants seront-ils extraits par De Beers?

De Beers entend construire des bâtiments juste à côté de la mine à ciel ouvert, qui contiendront l'équipement nécessaire pour récupérer et traiter les diamants de la roche extraite. Au total, quelque 28,5 millions de tonnes (Mt) de kimberlite (roche contenant des diamants) seraient extraits de la mine à ciel ouvert. Celle-ci aurait une profondeur d'environ 200 mètres (m) et un diamètre de 1000 m. La kimberlite serait traitée selon un débit annuel de 2,5 Mt, ce qui donne une durée de vie de la mine d'environ 12 ans. Le traitement de la kimberlite fait appel à des moyens physiques tels que le broyage, le lavage et des techniques de séparation par gravité pour récupérer les diamants. Les rejets minéraux de l'extraction et du traitement du minerai seront empilés et des travaux de remise en végétation seront réalisés lors de la phase de fermeture du site.

Quelle est la durée prévue du PMDV?

La phase de construction du PMDV commencerait à l'hiver 2006 et durerait trois ans. Cette phase serait suivie de 12 ans d'exploitation, avec la possibilité d'exploitation d'autres réserves de kimberlite dans la région. Une fois la phase d'exploitation terminée, la remise en état du site devrait prendre environ deux à trois ans et serait suivie d'une période prolongée de surveillance après la fermeture. Le projet, comprenant les phases de construction, d'exploitation et de fermeture de la mine, s'étendrait sur une période approximative de 18 années, avec possibilité de prolongation si des ressources supplémentaires de minerai sont découvertes. La main-d'œuvre affectée au projet devrait atteindre un point culminant de 600 personnes pendant la phase de construction, et de 390 personnes pendant la phase d'exploitation.

Quels seront les routes d'accès et les moyens de fournir de l'énergie au PMDV?

Le site sera accessible par voie ferrée du sud jusqu'à Moosonee, par chemin d'hiver de Moosonee à Attawapiskat, suivant la côte de la baie James, puis jusqu'au site. L'énergie électrique nécessaire pour le projet sera fournie par une nouvelle ligne de transport d'électricité de 115 kV qui viendra renforcer la ligne existante de 115 kV reliant Otter Rapids à Kashechewan. De Kashechewan à Attawapiskat, l'électricité circulera le long de la ligne existante, et une nouvelle ligne de 115 kV sera construite entre Attawapiskat et le site Victor.

Qu'est-ce qu'une évaluation environnementale?

Le PMDV doit faire l'objet d'une évaluation environnementale en vertu de la Loi canadienne sur l'évaluation environnementale. Il s'agit d'un processus permettant de prévoir les effets environnementaux d'un projet avant sa concrétisation. Son objectif consiste à réduire au minimum ou à éviter les effets environnementaux négatifs d'un projet avant qu'ils ne se produisent, tout en tenant compte des préoccupations d'ordre environnemental et de celles soulevées par les Premières nations ou par le grand public lors de la planification du projet.

Qu'est-ce qu'une étude approfondie?

Le processus d'évaluation environnementale fédérale suivi pour le PMDV est appelé « étude approfondie ». Les projets évalués par le biais de ce processus sont généralement de grande envergure et peuvent entraîner des effets environnementaux néfastes importants. Ces projets peuvent également être une source de préoccupations pour le grand public.

Qu'est-ce qu'une autorité responsable?

Une autorité responsable (AR) est un ministère ou organisme fédéral qui doit prendre des décisions en matière de réglementation ou de financement. Une AR peut être un ministère à qui l'on demande d'émettre un permis, une licence ou une autorisation, ou encore un ministère ou un organisme qui fournit du financement pour une partie ou la totalité d'un projet. Les AR doivent s'assurer qu'une évaluation des effets environnementaux est bien effectuée avant d'émettre un permis ou d'allouer des fonds. Ressources naturelles Canada, Pêches et Océans Canada, Transports Canada et Ressources humaines et Développement des compétences Canada sont des AR pour le PMDV. Santé Canada, Environnement Canada et Affaires indiennes et du Nord Canada aident les AR en leur donnant des conseils d'experts.

Outre l'étude approfondie exigée par le gouvernement fédéral, quels sont les permis et autres approbations dont De Beers a besoin pour réaliser le PMDV?

Avant la phase de construction, De Beers doit obtenir l'approbation des gouvernements provincial et fédéral. Le projet nécessitera les éléments suivants :

- Des autorisations en vertu de la *Loi sur les pêches*;
- Un permis en vertu de la *Loi sur la protection des eaux navigables*;
- Une licence de stockage et de fabrique en vertu de la *Loi sur les explosifs*;
- Une approbation en vertu du processus d'évaluation environnementale de portée générale pour les petites installations de transport d'électricité (*Loi sur les évaluations environnementales* – Ontario);
- Un permis de construction en vertu de l'article 92 de la *Loi de 1998 sur la Commission de l'énergie* de l'Ontario;
- Une approbation du plan de fermeture de la mine en vertu de la *Loi sur les mines* de l'Ontario;
- Des permis d'exploitation de carrière en vertu de la *Loi sur les ressources en agrégats* de l'Ontario;

- Un permis de travail provincial et un droit d'occupation de la concession minière en vertu de la *Loi sur les terres publiques*;
- Une approbation de l'emplacement en vertu de la *Loi sur l'aménagement des lacs et des rivières*;
- Des permis de prélèvement d'eau en vertu de la *Loi sur les ressources en eau* de l'Ontario;
- Des certificats d'approbation pour la gestion de l'air, de l'eau et des déchets en vertu de la *Loi sur la protection de l'environnement* de l'Ontario.

Comment l'étude approfondie du projet Victor a-t-elle été effectuée?

En février 2004, les AR, en consultation avec d'autres ministères et organismes fédéraux, les Premières nations et d'autres parties, ont élaboré des lignes directrices pour réaliser une étude approfondie.

De Beers a déposé une étude approfondie en mars 2004. Les AR ont alors examiné l'information contenue dans l'étude approfondie ainsi que des éléments supplémentaires tels que :

- Les commentaires des gouvernements fédéral et provincial;
- Les commentaires des organisations autochtones et des Premières nations;
- Les commentaires des organisations non gouvernementales et du grand public;
- Les recommandations formulées lors de réunions, d'ateliers et de réunions techniques;
- La correspondance écrite.

Dans le cadre de l'étude approfondie, des séances d'information, des réunions et des consultations avec les communautés ont été organisées. En se basant sur l'information obtenue pendant cette étude, les AR ont pu dégager des conclusions concernant la probabilité et l'ampleur des effets du PMDV sur l'environnement.

À la fin de l'étude approfondie, les AR préparent un résumé intitulé *Rapport d'étude approfondie* (RÉA). Celui-ci contient des renseignements sur le projet, sur ses effets environnementaux, sur les moyens que De Beers compte utiliser pour réduire les effets néfastes sur l'environnement, sur les mesures que les AR et De Beers mettront en œuvre pour surveiller ces effets et sur la façon dont le projet sera clos et le terrain remis en état.

Quels types d'effets environnementaux le projet peut-il générer?

Le *Rapport d'étude approfondie* envisage les aspects suivants :

- Les effets du projet sur le milieu naturel (qualité de l'air, sols et substratum rocheux, débit et qualité de l'eau, pêches, eaux souterraines, plantes et faune, ressources du patrimoine) et sur les conditions socio-économiques liées au milieu naturel;

- Les effets sur la santé humaine, le patrimoine physique et culturel, l'utilisation des terres et des ressources à des fins traditionnelles par les Autochtones et, enfin, sur les structures et sites importants;
- Les effets environnementaux cumulatifs;
- Les effets des solutions de rechange du projet;
- Les effets du projet sur l'utilisation durable des ressources renouvelables;
- Les effets de l'environnement sur le projet;
- Les effets des pannes ou accidents possibles.

Quelles mesures adoptera De Beers pour atténuer les effets sur l'environnement?

De Beers a proposé un certain nombre de mesures pour réduire les effets néfastes possibles sur l'environnement et assurer la protection de l'environnement. Les organismes gouvernementaux, les communautés des Premières nations et le grand public ont tous suggéré des moyens pour améliorer le projet. Grâce à ces suggestions, on a pu améliorer le plan du projet de manière à assurer une meilleure protection de l'environnement. Voici un exemple de modification apportée au projet à la suite des commentaires reçus : l'utilisation de l'électricité acheminée par une ligne de transport d'électricité plutôt que de l'électricité produite sur le site à partir de combustible diesel, afin d'éviter le transport de quantités importantes de combustible diesel dans la région de la baie James.

Les mesures d'atténuation comprennent des mesures prises en compte par De Beers lors de la conception du projet, par exemple l'emplacement des installations à peu de distance les unes des autres et à au moins 200 m des ruisseaux et rivières de la région (sauf aux intersections routières). De Beers a également proposé d'établir un système de gestion de l'environnement propre au site pour faciliter la mise en œuvre des mesures d'atténuation.

Quelles étaient les préoccupations des Premières nations?

Les aspects suivants du projet ont régulièrement été soulevés comme sources de préoccupations par des Autochtones :

- Le risque de déversements de combustible;
- Les effets sur les activités et utilisations traditionnelles des terres;
- Les effets sur la qualité et les ressources halieutiques des rivières et ruisseaux;
- Les effets sur la faune et la flore, particulièrement sur des espèces fauniques telles que le caribou, l'orignal, les animaux à fourrure et le gibier d'eau;
- Le niveau de remise en état des terres une fois le projet clos, de manière à ce qu'elles puissent continuer à soutenir les plantes, les poissons, la faune et les utilisations traditionnelles;
- Les limites en matière d'emploi et de possibilités de formation;
- La détérioration du bien-être collectif.

Quel était le rôle du gouvernement provincial dans l'étude approfondie?

Les gouvernements fédéral et provincial ont collaboré à l'étude approfondie. Les principaux ministères provinciaux qui ont participé à l'étude approfondie furent le ministère du Développement du Nord et des Mines, le ministère des Richesses naturelles et le ministère de l'Environnement. Certaines composantes du projet, dont la ligne de transport d'électricité, doivent faire l'objet d'approbations en vertu du processus provincial d'évaluation environnementale. De Beers a fourni de l'information pendant l'étude approfondie afin de satisfaire aux exigences provinciales du processus d'évaluation environnementale. Des consultations publiques distinctes sont organisées par le gouvernement provincial.

L'exigence provinciale relative au plan de fermeture de la mine présente un intérêt particulier. Le plan de fermeture décrit les mesures prévues pour la remise en état du site et établit le montant du dépôt de garantie que doit présenter De Beers pour assurer que les mesures de remise en état seront bien prises.

Comment savoir si De Beers respectera ses engagements?

Des programmes de suivi sont exigés afin de garantir que De Beers met bien en place les mesures d'atténuation et de déterminer l'efficacité de ces mesures pour réduire les effets environnementaux néfastes du projet. Des exigences de suivi supplémentaires décrites dans le chapitre 8 du *Rapport d'étude approfondie* traiteront de préoccupations environnementales et socio-économiques particulières.

Qu'en est-il des éléments qui ne font pas partie du processus de réglementation? Comment seront-ils surveillés?

La conception et la mise en œuvre des mesures de suivi précisées dans ce *Rapport d'étude approfondie* qui ne sont pas liées à un instrument de réglementation seront assurées par le biais d'une entente environnementale et socio-économique.

L'entente environnementale et socio-économique concernant le PMDV sera un outil essentiel pour veiller à ce que les engagements et les mesures d'atténuation qui ne font pas partie d'un instrument de réglementation soient appliqués de façon appropriée. Cette entente sera finalisée après l'achèvement du *Rapport d'étude approfondie*.

Que se passe-t-il maintenant?

Les AR présentent le *Rapport d'étude approfondie* au ministre de l'Environnement et à l'Agence canadienne d'évaluation environnementale. Le ministre examine le *Rapport d'étude approfondie* et considère les mesures d'atténuation que les AR prévoient prendre afin de réduire les effets environnementaux du projet. Il tient également compte des commentaires reçus du public. Le ministre décide alors si le projet doit être remis à une commission d'examen, compte tenu des préoccupations du public ou de la probabilité que le projet puisse entraîner des effets environnementaux néfastes importants. Si le ministre décide qu'il n'est pas nécessaire qu'un comité de révision examine le projet, il renvoie celui-ci aux AR, qui peuvent alors délivrer les permis nécessaires ou fournir du financement.

Quelles étaient certaines des conclusions des AR dans le *Rapport d'étude approfondie*?

De manière générale, les AR estiment que les préoccupations soulevées pendant l'étude approfondie ont été prises en compte par De Beers. Dans certains cas, comme les questions hydrogéologiques (eaux souterraines), des discussions entre experts et des renseignements supplémentaires ont été nécessaires pour répondre aux questions et aux préoccupations des AR. Les AR considèrent que De Beers a proposé des mesures appropriées pour atténuer les effets environnementaux possibles.

Quelle est la recommandation finale des AR dans le *Rapport d'étude approfondie*?

Les AR ont déterminé qu'il est peu probable que le projet ait des effets environnementaux néfastes importants une fois les mesures d'atténuation appliquées. De plus, aucun effet négatif cumulatif important n'est prévu. De Beers devra effectuer des travaux de suivi et de surveillance conformément aux engagements qui figurent dans le *Rapport d'étude approfondie*, sous forme de conditions d'obtention de permis et dans le cadre du programme de suivi. Si des effets imprévus se produisent au cours du projet, des mesures seront prises pour réduire ou éliminer ceux-ci et prévenir leur réapparition.

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1.0 INTRODUCTION

1.1 Project Overview and Background

De Beers Canada Inc. (De Beers, or the Proponent) has identified a diamond resource, approximately 90 km west of the First Nation community of Attawapiskat, within the James Bay Lowlands of Ontario, (Figure 1-1). The resource consists of two kimberlite (diamond bearing ore) pipes, referred to as Victor Main and Victor Southwest. The proposed development is called the Victor Diamond Project. Appendix A is a corporate profile of De Beers, provided by the Proponent.

Advanced exploration activities were carried out at the Victor site during 2000 and 2001, during which time approximately 10,000 tonnes of kimberlite were recovered from surface trenching and large diameter drilling, for on-site testing. An 80-person camp was established, along with a sample processing plant, and a winter airstrip to support the program.

Desktop (2001), Prefeasibility (2002) and Feasibility (2003) engineering studies have been carried out, indicating to De Beers that the Victor Diamond Project (VDP) is technically feasible and economically viable. The resource is valued at 28.5 Mt, containing an estimated 6.5 million carats of diamonds. De Beers' current mineral claims in the vicinity of the Victor site are shown on Figure 1-2.

The Proponent's project plan provides for the development of an open pit mine with on-site ore processing. Mining and processing will be carried out at an approximate ore throughput of 2.5 million tonnes/year (2.5 Mt/a), or about 7,000 tonnes/day. Associated project infrastructure linking the Victor site to Attawapiskat include the existing south winter road and a proposed 115 kV transmission line, and possibly a small barge landing area to be constructed in Attawapiskat for use during the project construction phase. Existing regional transportation systems (the Moosonee to Attawapiskat, west James Bay winter road and barging systems), and the Ontario Northland Railway (ONR) system, are also essential to the project. There is also a need to reinforce the existing 115 kV coastal transmission line system to provide power to the Victor site, by constructing a parallel 115 kV line from Abitibi Canyon (near Pinard) to Kashechewan, with appropriate tie-ins to the existing system.

Construction would be for a three year period starting in the winter of 2006, followed by a 12 year mine life, and a 5 year reclamation phase, with most reclamation occurring in the first 2 years of this period. The construction schedule is driven in part by access logistics, which currently allow winter access only, because of the site's isolation and pervasive muskeg terrain. The only current non-winter access to the site is by helicopter.

Various environmental baseline studies have been carried out by the Proponent in support of the work to date, and environmental permits for the advanced exploration program were obtained from the provincial government, including an approved closure plan.

The Proponent held consultations with the Attawapiskat First Nation (AttFN) and with provincial agencies throughout the advanced exploration program, as part of the permitting process. Members of the AttFN have also been actively involved in work at the Victor site, comprising up to 50% of the site work force during the advanced exploration program. In addition, members of the AttFN have assisted the Proponent in carrying out environmental baseline studies, and have received training in conducting environmental monitoring programs at the Victor site.

A Memorandum of Understanding (MOU) was signed by De Beers and the AttFN in 1999 to facilitate AttFN community involvement in the VDP. This agreement was later superseded by a Feasibility Partnering Agreement (FPA) in 2002, which will in turn be superseded by an Impact Benefit Agreement (IBA – currently being finalized). Another agreement, outlining how De Beers and the communities will work together to maximize job and procurement opportunities, will be developed with the other west James Bay area First Nations (Fort Albany, Kashechewan and Moose Cree First Nations).

Various components of the project require a number of federal regulatory approvals before it can proceed. Before issuing those federal approvals, the federal authorities are required to ensure that an environmental assessment is conducted pursuant to the *Canadian Environmental Assessment Act* (CEA Act). In addition, there are provincial environmental assessment requirements, as well as a number of environmental permits to be obtained from the provincial government.

1.2 Purpose of the Project

The Proponent has stated that the purpose of the VDP is to mine and process diamond-bearing kimberlite ore, of sufficient tonnage, grade and throughput, to provide a competitive return on investment, and to carry out these functions in an environmentally sustainable and socially responsible manner.

1.3 Project Need and Justification

De Beers has a corporate responsibility to its worldwide organization, owners, shareholders, suppliers, distributors and sightholders[1] to sustain the production of diamonds from its various operations. As existing mines approach exhaustion, new developments are required to replace or increase the supply of diamonds. In this capacity, De Beers has made a corporate decision to strengthen its presence in Canada, and following from this initiative, De Beers is pursuing a number of diamond prospects in Canada, one of which is the VDP. Developing the project would therefore contribute to the company's Canadian production and strategic goals.

Also, mining comprises an integral part of the northern Ontario economy. As ore bodies are mined out, there is a need to locate and develop new ore bodies to help maintain the existing economy. In addition, mining generates a considerable proportion of spin-off and trickle-down employment. It is estimated that development of the VDP will create 390 direct employment positions during operation, together with construction jobs for a period of nearly 3 years peaking at approximately 600, and additional employment opportunities associated with the closure and post-closure phases of the project. The project is estimated to add $6.7 billion to the Ontario economy.

The Proponent anticipates that a meaningful portion of the project labour force will derive from the west James Bay area Cree communities, most notably from the community of Attawapiskat that is

[1] Sightholders: World leading buyers with specialized diamond and marketing expertise that inspect and purchase diamonds on behalf of various organizations.

closest to the project site, and that the VDP will also bring training benefits and business opportunities to these areas.

1.4 Regional Setting

The following section is an introduction to the descriptions of the environment relating to Valued Ecosystem Components (VECs) that are presented in Chapter 5.

Physical and Chemical Environment

The physical and chemical environment includes: air quality and climate, geology and geochemistry, terrain and soils, surface water, groundwater, and ice regimes.

The air quality of the project area is considered to be typical of unimpaired, northern Ontario wilderness areas. The site area experiences cold winters and warm summers with an annual average precipitation of approximately 690 mm in water equivalents, composed of 480 mm rainfall and 240 cm equivalent snowfall. The dominant wind direction is from the west-northwest in winter and from the southwest in summer.

Geologically, the VDP is located within the seismically stable Hudson Bay Platform, with the area being subject to gradual isostatic uplift in the order of 1 m per century. Geochemical analysis of the Victor kimberlites and sedimentary host rock shows that the neutralizing (acid consuming) potential of both the kimberlite and host rock formations is very high, and that the acid generating potential is very low, such that there is effectively no potential for the development of acid mine drainage at the Victor site.

The terrain is exceedingly flat and poorly drained, resulting in the development of extensive organic soils (peatland, or muskeg). Better soils occur only in areas immediately adjacent to the rivers and major creeks, where improved drainage limits organic soil development. The only upland sites are small, scattered limestone bedrock outcrops (bioherms); scattered areas of slightly raised, permanently frozen ground (peat plateau bogs and palsa bogs), which constitute the only areas of permafrost in the region; complexes of glacial depositional features (eskers, outwash deposits, and kames) and raised beach ridges, which are common to the west, north and south of the Victor site.

The Victor site area is drained by two small creeks, North Granny Creek and South Granny Creek, which flow into the Nayshkootayaow River. The Nayshkootayaow River drains to the Attawapiskat River. The Granny Creek system is quite small, with a watershed area of approximately 90 km^2. The Nayshkootayaow River has a watershed area of 2,100 km^2, and the much larger Attawapiskat River has a watershed area of approximately 49,000 km^2 opposite the Victor site. Annual runoff yields for the region are in the order of 260 to 300 mm, with a pronounced seasonal flow regime. Water quality conditions in the Victor site area show no overt evidence of industrial influence and exhibit generally good water quality. Groundwater is moderately saline, with salinity concentrations generally increasing with depth.

The Attawapiskat River generally freezes over in mid to late November, and break-up typically occurs in May. Both freeze-up and break-up can range over a period of approximately 30 days. Ice jams are common on the major rivers, and can cause flooding and ice scour effects.

Biological Environment

Vegetation communities of the region are dominated by pervasive muskeg (peatland) terrain, underlain by clays and silts. The muskeg is saturated and consists of two principal vegetation community types: bog and fen. Tree growth in both community types is stunted by the wet conditions. Well-developed forests, consisting mainly of black spruce with lesser amounts of white spruce, balsam fir, poplar, and occasionally white birch and white cedar, are confined mainly to the river and creek margins where improved drainage occurs. Some developed tree growth also occurs on patches of frozen ground, on rock outcrops and at other such locations where a slight raise in the landscape produces improved drainage.

Excluding the James Bay coastal environment, which provides significant waterfowl and shorebird habitat (see below), the James Bay Lowlands provide comparatively modest environments for most wildlife species because of the vast expanses of low productivity muskeg. The three habitat types in the region, which do provide important wildlife habitat, are rich riverbank forests, creek margin forests, and northern ribbed fens with broad flarks (pools).

Reported moose and caribou densities for the whole of the Hudson/James Bay Lowlands are in the order of one moose for every 130 km^2 of land area, and one caribou for every 50 km^2. As far as is known, local caribou populations are non-migratory in the traditional sense, but they are known to move around extensively within the general area.

Wolves and black bear are the largest predators in the region. Local furbearers include beaver, muskrat, snowshoe hare, marten, mink, otter, red fox, and lynx, with marten and beaver being the most economically important species. Most furbearers tend to be concentrated along the watercourses, either because they are directly associated with aquatic habitats, or because they prefer forest and forest/shrubland habitats which border the creeks and rivers.

Waterfowl and shorebirds occur in extremely large numbers nearer to the James Bay coast, especially during the spring and fall migration periods. The James Bay coastal zone and near coast areas are a recognized international flyway for waterfowl and shorebirds. Waterfowl and shorebird numbers decrease further inland. A variety of raptors (eagles, osprey, hawks, and owls) also occur in the area, including bald eagles and osprey. Numerous other bird species also occur in the region, particularly in forest and open fen habitats.

Fisheries and aquatic resources of the James Bay Lowlands (excluding James Bay itself) are provided principally by riverine systems, and by scattered, comparatively small and shallow lakes and ponds. The Attawapiskat and Nayshkootayaow Rivers and Granny Creek are typical of large, intermediate, and small watercourses that occur throughout the region.

The Attawapiskat River is a large system that originates on the Canadian Shield far to the west. Riverbed materials throughout the river consist mainly of mixtures of gravel, cobble, and boulder, with bedrock exposures along upper reaches of the river, near the Victor site. Larger fish species inhabiting the Attawapiskat River include walleye, pike, sturgeon, whitefish, suckers and burbot. Brook trout are also common in many of the feeder creeks. A variety of minnow species are also present. The Nayshkootayaow River is a smaller system, and supports lake sturgeon, walleye, pike, whitefish, sucker, brook trout, and a variety of minnow species. Sturgeon and whitefish use the Nayshkootayaow River mainly during spawning.

Granny Creek is typical of the smaller creeks in the area, and exhibits bottom substrates consisting mainly of muck and clay/silt. Its fish community is composed mainly of minnow species, but also includes low numbers of brook trout, sucker and pike. Muskeg ponds may or may not support minnow populations depending on local conditions.

James Bay Coastal Zone

The west James Bay coastal zone is characterized by low-gradient, broad tidal mudflats, backed by salt and freshwater marshes. Water depths are extremely shallow, and the tidal range is in the order of 2 m. James Bay waters are saline, but less so than Hudson Bay. James Bay nearshore waters are turbid, and visibility is generally restricted to less than 0.5 m depth.

The coastal zones of the west and south James Bay areas provide important staging areas for vast numbers of geese, ducks, and shorebirds that migrate to and from their northern nesting grounds. Marine mammals (seals and beluga whales) and polar bears also inhabit the coastal zones. The marine coastal waters of James Bay are inhabited by a variety of fish species.

First Nation Communities

The First Nation communities with a principal interest in the project include, from south to north, New Post (Taykwa Tagamou First Nation), Moose Factory (Moose Cree First Nation and MoCreebec), Fort Albany, Kashechewan, and Attawapiskat. Members of the MoCreebec Council of the Cree Nation reside in Moose Factory and Moosonee. Table 1-1 summarizes the distance of these communities from the Victor site and population statistics.

TABLE 1-1
FIRST NATION COMMUNITIES OF INTEREST

	Distance from the Victor Site (Cross-country) (km)	Population
Moosonee	300	2,500 (approximately)
Moose Factory	300	2,500 (approximately)
Fort Albany	180	605
Kashechewan	180	1,561
Attawapiskat	90	1,293
New Post	500	97

MoCreebec members reside mainly in Moose Factory and Moosonee, and are included in population estimates provided in the table.

Each of the communities listed in Table 1-1 constitutes a First Nation in its own right, with the exception of Moosonee, which comprises a municipal government, namely the Moosonee Development Area Board, and the people of MoCreebec, who reside mainly in Moose Factory and Moosonee. The population of Moosonee is primarily Aboriginal, but Moosonee is a municipality and not a First Nation. MoCreebec people have no reserve lands in Moosonee or Moose Factory, or elsewhere in Ontario, and MoCreebec is designated as the 'MoCreebec Council of the Cree Nation', as apposed to a First Nation per se. MoCreebec members originated from the Quebec side of James Bay and are not part of the NAN alliance. A description and discussion of anticipated project effects on the communities are provided in Chapter 7.

The demographics of the west James Bay area First Nation communities are heavily weighted towards the younger age groups, and the local economies are focused mainly on providing services to the communities themselves, although less so for Moosonee and Moose Factory, where the economies are somewhat more diversified. Unemployment rates are high, as employment opportunities are limited, especially in the northernmost communities of Attawapiskat, Fort Albany and Kashechewan. A large number of community members participate in the traditional pursuits of hunting and fishing, and to a lesser extent trapping. Most of this activity is concentrated along or near the major rivers and creeks, and the James Bay coast. The one notable exception is caribou hunting, which takes place in more open country.

Cree culture and traditions, like those of many northern Aboriginal peoples, are tied to the land, and to traditional resources (hunting, fishing, and trapping) and spiritual well being derived from the land. This association between the people and the land is a collective one, in which the Cree view their role as custodial.

Social organization is based on the family group, in which Elders take a prominent role. Decision-making tends to be by consensus, but within the context of a Chief and Council leadership structure. Information tends to be handed down orally through experience and anecdote.

1.5 Regulatory and Planning Context

Following the environmental assessment, a number of federal and provincial environmental approvals, permits and authorizations will be required before the project can proceed. There is some overlap between federal and provincial jurisdictions, but there is a co-operative working relationship between the two levels of government, as to specific responsibilities and mandates. To limit regulatory duplication, including consultation needs, the federal and provincial regulatory agencies have agreed, to the extent practicable and allowed by current legislation, to co-ordinate their respective EA and permitting requirements.

Federal Requirements

Key environmental authorizations, approvals and licences required from the federal government before portions of the VDP can proceed, are listed in Table 1-2. Prior to a federal authority completing a power, duty or function, such as issuing an approval, authorization, or permit, an environmental assessment of the project must be conducted pursuant to the CEA Act. A comprehensive study level environmental assessment was conducted for the Victor Diamond Project. The information obtained and recommendations made through the environmental assessment process formed the basis for this comprehensive study report. Within this context, it is important to note that the VDP falls under CEA Act 1992 and subsequent amendments prior to those that came into force on October 30, 2003.

TABLE 1-2
FEDERAL ENVIRONMENTAL PERMITS AND APPROVALS FOR PROJECT CONSTRUCTION AND OPERATION

Permit/Approval	Project Components or Effects
Approval of Works in Navigable Waters *Navigable Waters Protection Act,* Canadian Coast Guard (CCG)	• Construction of creek and river crossings, barge handling facility, and intake/outfall structures on navigable waters
Authorization for Works Affecting Fish Habitat *Fisheries Act,* Department of Fisheries and Oceans (DFO)	• Destruction of fish habitat within muskeg ponds supporting minnow populations • Destruction of fish habitat within South Granny Creek • Destruction of fish habitat for the construction of inflow and outfall structures in the Attawapiskat River • Disruption of natural flows within the Nayshkootayaow as a result of groundwater dewatering and associated flow supplementation systems • Destruction of fish habitat as a result of the installation of various culverts associated with on-site all-season roads • Destruction of fish habitat for the construction of barge handling facilities near Attawapiskat
Licence for a Factory and Magazine for Explosives *Explosives Act,* Natural Resources Canada (NRCan)	• Construction and operation of an explosives factory and magazine(s)

The CEA Act is a planning and decision-making tool used by the federal government in respect of a project to:

- Identify environmental effects and mitigation measures; and,
- Determine if significant adverse environmental effects are likely.

Through careful study and consultation with government agencies, the local First Nations, and others, the objective is to develop a project plan that will protect the environmental and cultural values of the area, while at the same time providing economic benefits to the local and regional economies, and De Beers.

The CEA Act process was initiated due to the potential requirements for various federal approvals, authorizations and permits as identified in Table 1-2. The project was subject to a comprehensive study level environmental assessment because the following components were scoped into the federal environmental assessment:

- Construction of a facility for the extraction of 200,000 m^3/a or more of groundwater; and,
- Construction of an all-season runway with a length of 1,500 m or more.

Federal agencies participating in the CEA Act process include the decision makers or responsible authorities (RAs) and the expert federal Authorities (FAs). The RAs for this review include Natural Resources Canada (NRCan), Fisheries and Oceans (DFO), Transport Canada (TC), and Human Resources and Skills Development Canada (HRSDC). The FAs involved in this review include Environment Canada (EC), Indian and Northern Affairs Canada (INAC), and Health Canada (HC). The Canadian Environmental Assessment Agency (CEA Agency) is responsible for co-ordinating the environmental assessment review.

The principal steps in the CEA Act process include the following:

- Preparation of a project description by De Beers for review by federal authorities;
- De Beers pre-consultation with federal and provincial authorities, and other stakeholders;
- Development of a project scope, and guidelines for the conduct of the comprehensive study, for the EA by the RAs and the FAs;
- Consultation on the project scope and guidelines for the conduct of the comprehensive study by the RAs and the FAs;
- Preparation of a Comprehensive Study EA (CSEA) by the Proponent;
- Consultation and review of the CSEA by federal and provincial agencies and other stakeholders;
- Response by the Proponent (De Beers) to comments received from stakeholders;
- Preparation of a draft Comprehensive Study Report (CSR);
- Preparation of a final CSR by the RAs;
- Publication of the final CSR by the CEAA Agency for the mandatory public review period, and,
- Ministerial decision on the CSR.

Stakeholders involved in consultations in the environmental assessment include provincial government agencies, local First Nations (most notably the Attawapiskat, Fort Albany, Kashechewan, Moose Cree, Mocreebec, Constance Lake, and the Marten Falls First Nations), the Mushkegowuk Council and the Nishnawbe Aski Nation (NAN), the municipalities of Moosonee, Timmins, Cochrane, Hearst and Kapuskasing, the community of Sanikiluaq (Nunavut Territory), non-governmental organizations (Northwatch and MiningWatch Canada), and the general public.

Provincial Requirements

A number of provincial approvals are also required for the project. These approvals require the participation of the Ministry of Northern Development and Mines (MNDM), the Ministry of the Environment (MOE), the Ministry of Natural Resources (MNR) and the Ontario Energy Board (OEB). These agencies are participating in the CEA Act comprehensive study review of the proposed project.

The key provincial environmental permits that are likely to be required for the VDP are listed in Table 1-3. Much of the information required for provincial approvals will be included in the federal EA, and provincial approval applications will be made in parallel to the federal approvals process.

TABLE 1-3
PROVINCIAL ENVIRONMENTAL PERMITS AND APPROVALS FOR PROJECT CONSTRUCTION AND PRODUCTION

Major Permits/Approvals	Project Components
Approval of Industrial Sewage Works *Ontario Water Resources Act,* Ministry of the Environment	• In-pit sumps and linear fen systems for the treatment of quarry discharge water (3 quarries), and water from foundation excavations during construction • Construction and operation of the fine processed kimberlite containment (PKC) facility • Pit water settling pond (including oil water separator) for Years 1 – 6 • Pit water settling pond (including oil water separator) for Years 7+
Permit to Take Water *Ontario Water Resources Act,* Ministry of the Environment	• Withdrawal of water from quarries (3 sources) and foundation excavations during construction • Water supply (well) for the construction camp • Water supply for freezing winter roads (3 roads) • Withdrawal of groundwater via the dewatering well field for open pit dewatering • Withdrawal of water from the Attawapiskat River to provide process and potable water, and water for flow supplementation of the Nayshkootayaow River system during low flow periods • Withdrawal of water from the open pit sumps
Approval for Air Emissions *Environmental Protection Act,* Ministry of the Environment	• Air and noise emission control equipment associated with the quarry crushers (3 sites) • Air and noise emission control equipment associated with the incinerator • Air and noise emission control equipment associated with the construction phase generators (4 generators plus standby systems) • Air and noise emission control equipment associated with the processing plant
Approval of Drinking Water System *Safe Water Drinking Act,* Ministry of the Environment	• Treatment, storage, and distribution of potable water for the construction and operations phase accommodation complexes and ancillary facilities
Approval of Private Sewage Works *Ontario Water Resources Act,* Ministry of the Environment	• Treatment and disposal of domestic sewage from the construction and operations phase accommodation complexes and ancillary facilities

Major Permits/Approvals	Project Components
Approval of a Waste Management System *Environmental Protection Act,* Ministry of the Environment	• Establishment and operation of facilities for collecting, handling, transporting, storing, and processing (incineration) of domestic and industrial waste
Generator Registration *Environmental Protection Act, O. Reg. 347/00* Ministry of the Environment	• Temporary (seasonal) storage and transportation of hazardous wastes at the Victor site and at the Attawapiskat fuel farm (until accessible by winter road or barge)
Work Permit and/or Land Use Permit *Public Lands Act and/or Lakes and Rivers Improvement Act,* Ministry of Natural Resources	• General site clearing, infrastructure development, drainage works, etc. adjacent to Attawapiskat for a barge handling facility (if required) • Construction of new winter roads (west) and upgrading of the existing south winter road • Construction of two dykes/dams associated with the diversion of South Granny Creek and other in-water works associated with the diversion of South Granny Creek • Work permits for construction of transmission line corridor • Disposition of Crown Land for transmission line corridor
Approval of Fuel Oil and Handling *Technical Standards and Safety Act, 2000* Ministry of Consumer and Business Services	• Fuel storage tanks, vehicle dispensing stations and fuel oil delivery systems. They must comply with the Liquid Fuel Handling Code and the Fuel Oil Code.
Aggregate Permit *Aggregate Resources Act,* Ministry of Natural Resources	• Access to various aggregate sources for construction material (3 quarries, and 1 sand and gravel pit)
Mine Closure Plan *Mining Act,* Ministry of Northern Development and Mines	• Closure of the project site, including processing plant complex, open pit, stockpiles, fine PKC facility, etc.

In addition, there is a requirement for three provincial level EAs, as per the following:

- MNR Class EA relating to the disposition of Crown lands and rights thereto;
- MOE Screening level EA for construction phase, on-site diesel generating facilities (<5 MW); and,
- MOE Screening level EA for the construction of a new 115 kV transmission line from Abitibi Canyon (near Pinard) to Kashechewan, and from Attawapiskat to the Victor site.

MNR Class EA requirements substantively overlap with CEA Act requirements, and as a result, MNR has determined to screen the VDP based on the outcome of the federal environmental assessment process, to which they have been a party.

1.6 Roles of the Federal and Provincial Government Agencies in Carrying out the CEA Act

Each of the responsible federal and provincial government agencies has a mandate to review any and all aspects of the Victor EA, at its discretion and without restriction. Within this overall context, the different agencies have certain specialized interests, mandates and responsibilities.

Federal Agencies

The CEA Agency, in co-ordination with NRCan as the lead RA, has the responsibility to ensure that all process requirements of CEA Act are carried out in accordance with the applicable regulations and guidelines. The CEA Agency has been co-ordinating much of the work related to the environmental assessment of the project.

NRCan, as the lead RA, has co-ordinated the input of all other federal RAs, as well as that of the provincial government. DFO, HRSDC, and TC are also RAs for the VDP.

NRCan is also responsible for issuing federal permits related to the use, manufacture, and storage of explosives. DFO's primary responsibility is to ensure the protection of fish habitat and fisheries resources. TC has responsibility for the administration of the *Navigable Waters Protection Act*. HRSDC will be providing funding to assist with training Aboriginal people to access employment opportunities at the proposed Victor Diamond Mine. HRSDC will also provide advice on matters relating to the socio-economic impacts of the project and ensuring appropriate mitigation measures are implemented.

EC provides technical advice on matters relating to federal responsibilities involving migratory birds, species at risk, wetlands, water quality, toxics management, meteorology, climatology, and air quality. EC and NRCan will also assist DFO in matters pertaining to hydrology and hydrogeology. Health Canada (HC) provides specialist information on matters related to human health, including socio-economic aspects, First Nations health, and health impacts related to biophysical environmental effects, such as effects to country foods. INAC will assess the construction and operation of on-reserve facilities should the Proponent decide to locate any facilities on reserve lands.

Provincial Agencies

The provincial agencies bring added technical expertise and local knowledge to the federal process.

MNDM has a responsibility to ensure the orderly development of mineral resources in the Province, including the disposition of Crown lands for mining, as well as responsibilities for northern development generally, and First Nation interests. MNDM, as part of its general mandate, is also responsible for mine closure activities.

MNR has a broad mandate that includes the administration and management of Crown lands, and the resources associated with such lands, including aggregates, timber, fish, wildlife resources and surface waters, as well as more generalized aspects related to overall ecosystem quality, functioning, and management.

The MOE grants permits and approvals that address project aspects dealing with water and air quality (including noise), and waste management, and is responsible for application of the provincial *Environmental Assessment Act*.

The OEB is the regulator for Ontario's natural gas and electricity markets, and has responsibility for related approvals.

1.7 Roles of the First Nations in Carrying out the CEA Act

Attawapiskat First Nation

The Victor site and its access route west from Attawapiskat are located entirely within lands traditionally used by the AttFN. Traditional lands used by the community of Attawapiskat are shown in Figure 1-3 and include Akimiski Island in James Bay. Sharing of traditional lands occurs between the First Nations in boundary areas, but lands in the immediate vicinity of the VDP site, and along the Attawapiskat River area, are utilized solely by members of the AttFN.

The Proponent has consulted with the AttFN on all environmental matters relating to the VDP, and has thus far been the focus of all project-related First Nations' agreements, namely the MOU, the FPA and the IBA (nearing completion). Over 70 meetings have been held with the AttFN, and or their representatives, thus far on the project, and De Beers has made commitments that the project will not proceed without AttFN support. The major portion of the employment and training opportunities associated with the VDP is focused on providing direct benefit to the AttFN.

In an effort to understand First Nation concerns and issues with the proposed project, RAs and FAs held public consultations meetings and met with Chief and Council in Attawapiskat in October 2003, and issues raised during these meetings were taken into consideration during the development of the draft *Guidelines for the Conduct of a Comprehensive Study and the Preparation of a Draft Comprehensive Study Report* (the Guidelines). Further consultations were held with Attawapiskat on the draft guidelines in January 2004. Consultations were also held on the Comprehensive Study Environmental Assessment, and a satellite public registry has been operating in Attawapiskat.

Other First Nation and Aboriginal Communities

Although not a recognized First Nation community, Moosonee will be the primary staging area for the shipment of materials to the project site, since it has winter road and barge links to Attawapiskat, and rail links to Cochrane to the south. The diversity and strength of the Moosonee economy also carries over to adjacent Moose Factory.

The communities of Moose Factory, Fort Albany and Kashechewan are located along the winter road route from Moosonee to Attawapiskat. The Taykwa Tagamou Nation currently resides on the New Post No, 69A Reserve, in Brower Township, approximately 20 km southeast of Cochrane. The main Reserve (New Post No. 69), located between Moosonee and Cochrane, and just east of the Ontario Northland Railway and the Abitibi River, is unoccupied. MoCreebec has members within the communities of Moose Factory and Moosonee.

Based on the winter road linkage and the general regional proximity to the Victor site, it is expected that all of the west coast James Bay communities will derive some level of economic benefit (training, employment and service opportunities) from development of the VDP. They may also experience negative impacts from development. De Beers has committed to the development of a formal agreement, or agreements, with Moose Cree, Kashechewan and Fort Albany First Nations to cover how the company and communities will work together.

Priority for business, employment and training will also be extended to members of the other main affected communities in the region, including Moosonee, members of MoCreebec, and the Taykwa Tagamou First Nation.

Consultations were also held with the First Nation communities of Constance Lake and Ogoki Post (Marten Falls First Nation) in regard to other possible access and power alternatives that were considered by the Proponent further inland from James Bay.

The community of Sanikiluaq was also consulted in relation to the project alternative of shipping fuel through Hudson Bay and James Bay.

Regional First Nation Organizations

The west James Bay area First Nation communities of Moose Factory, Fort Albany, Kashechewan and Attawapiskat, as well as Taykwa Tagamou, form part of the Mushkegowuk Council group of First Nations. Mushkegowuk indicated that it would take responsibility for representing regional First Nation interests in the VDP, including those of the Fort Albany, Kashechewan, Moose Cree, and Taykwa Tagamou First Nations, and that the AttFN will represent local First Nation interests in the Victor site area. It should be noted that Mushkegowuk does not represent the interests of Mocreebec. Mushkegowuk in turn comprises part of the larger Nishnawbe Aski Nation (NAN) alliance. NAN evolved out of the Grand Council Treaty No. 9, and represents most of the Ontario Treaty No. 9 and Treaty No. 5 First Nations located within the area that drains to Hudson Bay and James Bay.

1.8 Roles of Non-Aboriginal Communities

The economic benefits of the VDP are expected to reach out to northeastern Ontario, Ontario and then Canada. Within this context, Timmins is notable as the regional mining centre and Cochrane is linked by rail to Moosonee. As previously mentioned, Moosonee will be the primary staging area for the shipment of materials to the project site. These three communities have been consulted and have expressed a strong interest in seeing the project proceed. Consultations also extended to Hearst and Kapuskasing in relation to access and power alternatives considered in the EA.

1.9 Scope and Timing of the Environmental Assessment

According to *Section 16 (1) of the Canadian Environmental Assessment Act 1992*, the EA must consider the "environmental effects of the project, including the environmental effects of malfunctions or accidents that may occur in connection with the project and any 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". This is an intentionally broad definition that is meant to be inclusive. At the same time, it is recognized that, in the interests of effective decision-making, it is important to scope the assessment to emphasize priority issues (CEAA1996).

The scope of the project, as defined in the *Guidelines for the Conduct of a Comprehensive Study and the Preparation of a Draft Comprehensive Study Report*, February 26, 2004, is as follows:

The RAs, in consultation with the expert FA and the Canadian Environmental Assessment Agency (Agency) and with input of First Nations communities (Attawapiskat, Fort Albany, Kashechewan and Moose Cree), have made a determination that the scope of the project for the purpose of the environmental assessment will include the construction, operation, modification, decommissioning, closure or other undertaking in relation to the following physical works:

- Access roads, including winter roads from Attawapiskat to the mine site, winter road from Moosonee to Attawapiskat, the west winter road and any new access roads to be constructed within the community of Attawapiskat;
- Accommodation complex;
- Aggregate, topsoil and muskeg storage facilities, excavation areas such as pits and quarries;
- Airstrip and any proposed modification to the existing airport facilities;
- Barge handling and staging areas, including any docks, wharfs, peers or any proposed modification to existing infrastructure;
- Facility for manufacture, storage and handling of explosives;
- Fuel pipeline and associated infrastructure;
- Fuel storage and handling areas;
- Kimberlite processing and management facilities;
- Laydown areas including container storage areas;
- Mine rock storage facilities;
- Mine water management facilities;
- Open pit;
- Chemical storage facilities;
- Sewage facilities;
- Utility area-power house (diesel generators), other power generation facilities and electricity transmission towers/line;

- Water inlet, outlet, sump, pumps and diversion structures;
- All waste management facilities, including incinerators and off-site disposal;
- Work camp and visitors centre;
- Workshops, warehouses and administration complexes;
- Emergency response facility;
- Fencing and lighting and other required buildings and infrastructure; and,
- Berms, dams, erosion control structures.

The scope of the project also includes a number of physical activities associated with these physical works, including the following:

- Water, waste, aggregate, chemical, explosives, resource, processed kimberlite and waste rock handling, storage and disposal, as appropriate;
- Shipping and transportation;
- Fuel storage, fuel handling and transfer (including James Bay and Attawapiskat);
- Dredging and dredgeate disposal and handling ;
- Relocation of South Granny Creek;
- Nayshkootayaow River flow supplementation;
- Reclamation;
- Environmental data collection; and,
- Aircraft and helicopter movements.

During the environmental assessment, De Beers investigated alternatives and made changes to the originally proposed project. The scope of the project was not amended because federal authorities believed that it still contained all the components of the project and alternatives. It should nonetheless be noted that the "access roads" include the alternative of a winter road from Hearst, and that the fuel items are now considered part of an alternative instead of being components of the proposed project.

1.10 Spatial and Temporal Boundaries

The project boundaries, as defined in the *Guidelines for the Conduct of a Comprehensive Study and the Preparation of a Draft Comprehensive Study Report,* February 26, 2004, are as follows.

The following two definitions shall be used when determining the spatial boundaries for the assessment project Study Area:

- The project study area will consist of the immediate geographical vicinity as determined by RAs (land and water) that encompasses all physical works and activities proposed by the Proponent for the Victor Diamond Project. This will include the mine site, the community of Attawapiskat (including Potato Island), all roads, pipeline, facilities in or near Attawapiskat, airstrip, the activities and roads near or along James Bay and the communities of Kashechewan, Fort Albany, and Moose Factory, shipping lane for diesel fuel in James Bay and Hudson Bay south of Belcher Islands south tip around 55o 40' N, and fuel lightering site in James Bay.

- Regional Study Area: The regional study area will encompass the maximum geographical extent (zone of influence) in which impacts from the project may be incurred for each valued ecosystem component (VEC). The selection of VECs will be agreed upon between the Proponent and the RAs. The geographical extent may vary depending on the VEC or issue examined however; each area will be defined and explained in the CS.

During the environmental assessment, De Beers investigated alternatives and made changes to the originally proposed project. The spatial and temporal boundaries of the project were not amended because federal authorities believed that the project study area and the regional study area still contained all the components of the project and alternatives. It should nonetheless be noted that the alternative of a winter road from Hearst/Constance Lake area is included in the regional study area, and that the alternative of shipping fuel in James Bay and Hudson Bay and the lightering site in James Bay are also now considered part of the regional study area.

Spatial boundaries are shown in Figure 1-4.

Project Phases

The CSEA Guidelines (NRCan 2004) indicate that the CSEA should address all phases of the project, including "construction, operations, closure, and post-closure".

The following list compares the temporal boundary definitions in the guidelines to these standard terms, as used throughout this CSR:

- "Immediate": equivalent to the construction and operation phases;

- "Near Future": equivalent to the closure and post-closure phases (addressed specifically in Chapter 2, which describes proposed reclamation activities, and Chapter 8 in regards to follow-up and monitoring programs); and,

- "Far Future": potentially within the post-closure phase, and beyond the post-closure phase.

1.11 Report Organization and Structure

The CSR organization and structure follow the format recommended by the CEA Agency for Comprehensive Study level assessments, as per the following Table of Contents:

Chapter 1: Introduction
Chapter 2: Project Description
Chapter 3: Evaluation of Alternatives
Chapter 4: Consultation
Chapter 5: Description of the Existing Environment
Chapter 6: Environmental Effects Analysis – Natural Environment
Chapter 7: Environmental Effects Analysis – Socio-economic Environment
Chapter 8: Follow-up Programs
Chapter 10: References
Appendices

More detailed assessments are provided in the CSEA (AMEC 2004a) and in the associated principal technical documents, as per the following:

- Civil Geotechnical Investigation, Victor Diamond Project, Feasibility Study, Attawapiskat, Ontario, Geotechnical Investigation Report (AMEC 2003);
- Environmental Baseline Study, Victor Diamond Project (AMEC 2004b);
- Processed Kimberlite Containment Facility, Feasibility Design Report (AMEC 2004c);
- Attawapiskat Facilities Geotechnical Investigation Report (AMEC 2004d);
- Fuel Spill Modelling in James Bay (AMEC 2004e);
- Fuel Spill Assessment in the Attawapiskat River (AMEC 2004f);
- Attawapiskat River Dispersion Modelling Study (AMEC 2004g)
- Air Quality Assessment, Victor Diamond Project (AMEC 2004h);
- Re-evaluation of Site Access and Power Supply Alternatives (AMEC 2004i);
- Economic Impact Study in Relation to Feasibility Work on the Victor Diamond Project (AMEC, and the Centre for Spatial Economics 2004);
- De Beers Victor Diamond Project Noise Assessment (HGC 2004);

- Dewatering of the Victor Diamond Project, Predicted Engineering, Costs, and Environmental Factors (Hydrological Consultants Inc. [HCI], Steffen Robertson and Kirsten [SRK] Consulting Inc. 2004a);

- Summary of Geochemical Characterization and Water Quality Estimates, Victor Diamond Project (Steffen Robertson and Kirsten [SRK] Consulting Inc. 2003);

- De Beers Canada Exploration, Victor Project TEK Study (Victor Project TEK Working Group 2004);

- Dewatering of Victor Diamond Project, Predicted Engineering, Cost, and Environmental Factors – Addendum 1, Update of Ground-Water Flow Model Utilizing New Surface-Water Chemistry and Flow Data from Nayshkootayaow River and Results of Sensitivity Analyses – September 2004 (Hydrological Consultants Inc. (HCI), Steffen Robertson and Kirsten (SRK) Consulting Inc. 2004b);

- Response to the November 3, 2004 Letter from Denis Lagacé, Director General NRCan, to Jeremy Wyeth of De Beers, Regarding "Victor Diamond Project Comprehensive Study Environmental Assessment Socio-economic Indicators"- December 10, 2004 (AMEC 2004 j); and,

- Nayshkootayaow River Fisheries Supplementation Module No. 1 (AMEC 2004 k).

Proponent responses to EA review comments received from federal and provincial government reviewers, First Nation reviewers, and members of the general public are documented in Chapter 4.

A glossary of terms and acronyms is provided in Appendix B.

Figure
1-1 Site Location

figure
1-2 Claim Map

figure
1-3 Traditional First Nations' Lands

figure
1-4 Study Areas Boundaries

2.0 PROJECT DESCRIPTION

This section provides a detailed description of the VDP, based on the Proponent's Feasibility level designs that have been updated through the Environmental Assessment process.

The proposed project site plan is shown in Figure 2-1. The general site layout was developed by the Proponent in a compact manner, and a buffer of at least 200 m has been maintained, to the extent feasible, between project facilities and area creeks and rivers.

There are seven principal components to the Victor Diamond Project as follows:

- Mining;
- Processing;
- Processed kimberlite (PK) management;
- Other on-site facilities;
- Winter roads;
- Transmission line system; and,
- Barge transport system.

Descriptions of these various components are provided in the following sections, along with discussions of construction phase activities, closure phase activities, and labour force and service requirements.

Construction will take place during 2006 to 2008; production will occur from late 2008 to 2020; and closure will take place immediately thereafter, unless ore resources are extended. Minor site preparation activities are planned for the winter of 2005. The timing of major construction activities is provided in Section 2.9.

2.1 Mining

2.1.1 Site Preparation

Before mining of ore can commence, a number of activities must occur as follows:

- Construction of access roads to, and surrounding, the open pit;
- Installation of a groundwater dewatering system and related facilities;
- Surface water management; and,
- Diversion of South Granny Creek away from the pit perimeter.

Rockfill used for road construction will be extracted from on-site limestone quarries, as mine rock[1] will not be available initially until after overburden is stripped from the pit area and mining commences.

[1] Mine rock is non-diamond bearing rock that must be extracted to access rock of value (ore).

Groundwater within the country rock and overburden surrounding the Victor kimberlite will require continual removal (dewatering) during construction and operation to maintain a safe and dry mining environment. A ring road and ditching will be established around the open pit perimeter to divert surface water runoff away from the pit, and a sump[2] will be developed in the base of the pit to remove excess water that enters the pit from direct precipitation and seepage.

The proposed open pit will also intersect a portion of South Granny Creek, which will need to be rerouted away from the pit for safety reasons.

2.1.2 Open Pit Dewatering

Groundwater investigations were conducted by Hydrologic Consultants Inc. (HCI) to assess dewatering requirements for the VDP (HCI 2004a,b). A numerical groundwater flow model was developed by HCI to simulate anticipated water inflow to the pit, and to develop an appropriate dewatering strategy using a pit perimeter well field. This model was reviewed and amended by NRCan and others to check the veracity of the model assumptions, including site investigations.

The final dewatering system is expected to comprise a ring of approximately twenty, 41 cm diameter dewatering wells around the pit perimeter (perimeter well field), drilled to the top of the mudstone unit (located about 220 m below the ground surface). Initial dewatering will occur at a rate of 40,000 to 60,000 m^3/d, followed by steady-state dewatering at 80,000 to 100,000 m^3/d. The well water will be moderately saline and will be discharged to the Attawapiskat River. If chloride values become sufficiently elevated, it may be necessary to treat the water by pre-blending it with river water, prior to final discharge, in order to meet provincial regulatory requirements.

During Phase 1 operations, a sump will be excavated in the base of the open pit to collect direct precipitation and overburden seepage. The sump will discharge to the Phase 1 settling pond that will provide a minimum 5-day retention time at the maximum pumping rate of 10,000 m^3/d. Sump water at this time will not be saline, as the well field will intercept all groundwater flowing towards the pit.

Subsequent to Phase 1 operations, significant groundwater inflow (termed residual passive inflow - RPI) is expected to bypass the pit perimeter well field. This RPI will be moderately saline, with water quality characteristics similar to that collected in the perimeter well field. The maximum pumping rate from the sump during Phase 2 operations has been set at 57,000 m^3/d, to accommodate precipitation inflow (10,000 m^3/d) and RPI (47,000 m^3/d).

Details regarding groundwater and mine water quality, and methods of treatment, are provided in Section 2.1.6.

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[2] Sumps are excavated cavities where drainage is directed, often with internal ditching, to maintain dry working areas at the base of the pit.

2.1.3 Mining Activities

Approximately 17.4 million tonnes (Mt) of overburden (clay, silt and sand) and 1.2 million cubic metres (Mm^3) of muskeg will need to be removed to access the diamond-bearing kimberlite ore. Overburden removal will start in 2007 and continue until approximately 2015. Overburden and muskeg will be stockpiled separately to ensure physical stability of the stockpiles, and to facilitate the use of these materials for site reclamation during operation and at closure of the mine.

The Victor kimberlite consists of two distinct pipes (deposits): Victor Main and Victor Southwest. The kimberlites are intruded into a sequence of flat lying limestones, dolostones and mudstones, comprising the Attawapiskat Formation, Ekwan River/Severn River Formations, Read Head Rapids/ Churchill River Group, and the Bad Cache Rapids Formation, which extend to a depth of 275 m below surface. Waste mine rock extracted during operations will be comprised of the upper Attawapiskat and Ekwan River/Severn River Formations only.

The Victor ore resource to be extracted during mining operations consists of 28 million tonnes (MT), grading an average 22 carats per hundred tonne, with a total resource of 6.3 million carats.

The production rate will average 2.5 Mt/a, and the maximum pit depth will be approximately 233 m below ground surface. The ore body will be extracted by conventional open pit mining (blast, load and haul), with transport to either the mine rock stockpiles, or to the primary crusher.

2.1.4 Ore and Mine Rock Geochemistry

Ore and mine rock geochemical characteristics were determined through: acid base accounting (ABA testing), whole rock analysis, mineralogical examinations, leachate extraction procedures, and saturated column (kinetic) testing (SRK 2003). Acid base accounting and whole rock analytical results are summarized in Tables 2-1 and 2-2.

TABLE 2-1
ORE AND HOST ROCK ACID GENERATION POTENTIAL

Rock Type	Paste pH	Sulphide Sulphur (%)	NP:AP Results	Number of Samples
Kimberlite (representing low grade ore, fine PK and coarse PK)	Mean 9.12 Min. 8.4 Max. 9.58	Mean <0.01 Min. <0.01 Max. 0.1	Mean 1,258:1 Min. 362:1 Max. 2,306:1	36
Attawapiskat River Formation (representing limestone mine rock)*	Mean 8.5 Min. 8.2 Max. 8.9	(Total sulphur) Mean <0.02 Min. <0.01 Max. 0.03	Mean 2,146:1 Min. 1,049:1 Max. 3,435:1	5*
Ekwan and Severn River Formations (representing limestone mine rock)	Mean 8.70 Min. 8.69 Max. 8.7	(Total sulphur) Mean <0.02 Min. <0.01 Max. 0.04	Mean 2,031:1 Min. 761:1 Max. 3,300:1	2

Table generated from data presented in SRK 2003
* Includes one sample only defined as limestone
NP = neutralizing potential, AP = acid producing potential; both measured as kg $CaCO_3$ equivalent/tonne rock

TABLE 2-2
ORE AND MINE ROCK WHOLE ROCK GEOCHEMISTRY

Parameter	Units	Ore (Observed Range) n = 35	Ore (Mean)	Mine Rock (Observed Range) n = 13	Mine Rock (Mean)
Aluminum	%	0.39 – 2.40	0.95	0.01 - 0.28	0.05
Antimony	µg/g	<5 – <20	<20	<5	<5
Arsenic	µg/g	<5 – <30	<30	<5	<5
Barium	µg/g	43 – 2,900	737	<10 – 30	<12.3
Beryllium	µg/g	0.5 – <2	<0.75	<0.5	<0.5
Bismuth	µg/g	<5 – <20	<20	<5	<5
Cadmium	µg/g	<1 - <10	<10	<1 – 1	<1
Calcium	%	4.8 – 21.0	10.3	>15.00	>15.00
Chromium	µg/g	40 – 1,100	570	3 – 20	7.5
Cobalt	µg/g	<5 – 70	<45.9	<1 – 3	<1.2
Copper	µg/g	23 – 110	81.3	<1 – 9	<2.2
Iron	%	1.30 – 5.70	4.3	0.06 – 0.62	0.18
Lead	µg/g	4 – <10	<10	<2 – 4	<2.5
Magnesium	%	5.80 – 21.0	14.8	0.27 – 8.93	2.5
Manganese	µg/g	300 – 1,100	735	45 – 130	73.5
Molybdenum	µg/g	<2 – <10	<10	<2	<2
Nickel	µg/g	<10 – 1,400	<667	1 – 11	3.2
Phosphorus	µg/g	400 – 3510	2,036	20 – 140	60.8
Potassium	%	0.03 – 3.1	0.35	0.01 – 0.23	0.04
Scandium	µg/g	4	4	<1 – 2	<1.1
Silver	µg/g	<0.2 – 31	<20	<0.2	<0.2
Sodium	%	0.04 – 0.23	0.14	0.01 – 0.03	0.01
Strontium	µg/g	63 – 1,150	458	85 – 328	217
Tin	µg/g	<10 – <50	<50	<10	<10
Titanium	µg/g	0.08 – 5,000	2,341	<0.01 – 0.01	<0.01
Tungsten	µg/g	<10	<10	<10	<10
Vanadium	µg/g	28 – 150	68.1	1 – 7	2.3
Yttrium	µg/g	<2 – 10	<5.6	<1 – 6	<1.6
Zinc	µg/g	19 – 58	37.7	3 – 11	6.1
Zirconium	µg/g	14 – 15	14.5	1 – 4	1.5
		Ore (Observed Range) n = 10	**Ore (Mean)**	**Mine Rock (Observed Range) n = 3**	**Mine Rock (Mean)**
Radium-226*	Bq/g	<0.01 – 0.04	<0.02	<0.01 – 0.01	<0.01
Uranium*	µg/g	0.7 – 3.9	1.5	0.3 – 0.6	0.47

Data from SRK 2003: Kimberlite – *Table A.2 – S, TIC and ICP Results* (n = 33) and *Table A.2 Solid Metals Analysis* (n=2); Mine Rock (limestone) – *Table A.2 Solid Metals Analysis* (Attawapiskat Formation, Ekwan River/ Severn River Formations; n = 13); and,

SRK 2004: *Uranium and Radium-226 Concentrations, Table 1*; Mine rock (limestone) – Attawapiskat Formation.

- Other natural-series radionuclides were not tested because they would not reasonably be expected to be in secular equilibrium with radium-226.

The potential for kimberlite ore or mine rock to generate acid is dependant on the balance of acid neutralizing minerals (neutralization potential - NP) and acid generating minerals (acid producing potential - AP). Carbonate minerals, such as those comprising limestone and dolostone, provide acid neutralization capability. Acid producing potential arises from the presence of sulphide sulphur minerals. It is generally accepted that rock with an NP to AP ratio (NP:AP) of greater than 4:1 will not generate acid (Price and Errington 1998). Mine rock samples from the Attawapiskat, Ekwan and

Severn River Formations (composed of limestones and dolostones) showed overwhelming neutralizing potential and low sulphide sulphur contents, with NP:AP ratios averaging greater than 2,000:1 (Table 2-1).

Kimberlite ore and waste rock samples also had consistently low sulphide sulphur concentrations and consistently high NP values, with NP:AP ratios averaging 1,258:1, and are therefore classified as having a negligible potential for acid generation. Some rock samples contained moderately elevated concentrations of certain heavy metals (cobalt, chromium, nickel and zinc), however, the leach extraction tests indicated that the solubility of these metals was very low, and therefore deemed not to be of concern. Uranium and radium-226 concentrations in the ore and mine rock were very low, and natural-series radionuclides were not enriched (SRK 2004).

2.1.5 Stockpiles

This section describes stockpiles required for the storage of muskeg, overburden, mine rock, and low-grade ore. Processed kimberlite (PK) stockpiles are addressed in Section 2.3.2. All site stockpiles will be designed to facilitate reclamation at closure.

Muskeg stockpiles will be developed south of the airstrip, east of the processed kimberlite containment (PKC) facility and polishing pond, and adjacent to the mine rock stockpile and north of the open pit. The three stockpiles will collectively contain 1.8 Mm^3 of muskeg, and occupy a total area of about 80 ha. The stockpiles will be developed by end-dumping, and will have an average final height of 2 to 4 m and side slopes of 3H:1V to 5H:1V (horizontal:vertical).

Overburden from the mine (and from plant site development) will be stored in a stockpile located north of North Granny Creek (Figure 2-1). The stockpile will be constructed in two, approximately 4 m high lifts, with design side slopes of between 3H:1V and 10H:1V, and an overall slope of approximately 25H:1V, including benches. The final overburden stockpile is expected to cover an area of approximately 190 ha and have a volume of about 11.3 Mm^3.

Approximately 26 Mt of mine rock (mainly limestone and dolostone) will be extracted to access the kimberlite (ore), of which approximately 11 Mt will be used to construct the PKC dams. The remainder will be stockpiled. The proposed mine rock stockpile is located northwest of the open pit, and will be developed in a series of three, 4 m lifts. The overall perimeter slope of the stockpile will be about 8H:1V, with approximately 1.3H:1V side slopes on individual lifts. The size of the stockpile is estimated as 8 Mm^3 and will cover an area of approximately 80 ha.

Approximately 10.4 Mt of low-grade kimberlite ore will be generated over the mine life. Most of this material (9.8 Mt) will be stockpiled south of the process plant, to be processed at a later date if economics warrant. About 0.6 Mt of this material will be used in construction. The final low-grade ore stockpile will have a maximum height of approximately 12 m, comprised of 4 m lifts, and will cover an area of approximately 60 ha. The design side slopes will be constructed to approximately 1.3H:1V, with an overall slope of approximately 7H:1V.

In all cases, passive wetland systems will be used to remove suspended solids contained in stockpile runoff. Water sprays or other dust suppressants will be used, as necessary, to control stockpile dust emissions during dry periods.

2.1.6 Mine Water Characteristics, Management and Disposal

The VDP will produce two types of mine water: groundwater pumped from dewatering wells, and a mixture of surface and groundwater that collects in sump(s) within the open pit.

Groundwater captured by the dewatering well field will be similar in quality to that of the 2002 and 2003 country rock groundwater pump tests (Table 2-3). Local groundwater is moderately saline and has total dissolved solids (TDS) averaging approximately 2,000 mg/L throughout the shallow and moderate depth bedrock formations that may be intersected by dewatering operations. Metal concentrations are below Ontario Drinking Water Standards (ODWS) with the exception of iron and sodium. Total suspended solids in the well field discharge for the 2003, 30-day pump test were low, averaging 5 mg/L once pumping stabilized.

The well field groundwater will be discharged to the Attawapiskat River by means of an approximately 6 km long pipeline. Above ground portions of the line will be insulated; the last approximately 1 km of line adjacent to the Attawapiskat River will be buried so as not to interfere with wildlife movement near the river. The Attawapiskat River is an extremely large hydrologic system (watershed of 49,000 km^2 opposite the mine site) that has a high assimilative capacity even under the lowest flow conditions. The mixing ratio of river water to saline well field water, at the maximum discharge rate of 100,000 m^3/d is expected to be in the order of 415:1 under average flow conditions.

A pit sump will collect mine water from inside the open pit. Up to Year 6 of mining, the pit water will be non-saline, but will contain suspended solids, trace ammonia and hydrocarbons. The sump water will be pumped to a Phase 1, below grade settling pond for the removal of total suspended solids (TSS). Effluent from the settling pond will discharge to a linear fen system, prior to release by natural drainage into the Nayshkootayaow River (Figure 2-1). Residual suspended solids not collected in the settling pond will collect in the fen. Fen plants and muskeg will also take up much of the residual ammonia with no negative biological effects. Oil skimmers or absorbent materials will be used as required for the removal of any residual hydrocarbons prior to pumping.

Pit sump water from approximately Year 6 and later will be saline, as a result of residual passive inflow, and will be pumped to a lined, above grade settling pond (Phase 2 settling pond). Phase 2 settling pond effluent will discharge via the well field pipeline to the Attawapiskat River, once suspended solids have been removed and once drainage water salinity meets regulatory standards.

TABLE 2-3
GROUNDWATER QUALITY

	Units	MDL	PWQO CRITERIA	CEQG PAL CRITERIA	ODWS CRITERIA	CDWQG CRITERIA	30 Day Pump Test (Country Rock) 216 m depth (n = 5 samples)	
							Mean	75th Percentile
GENERAL PARAMETERS								
Ammonia as N	(mg/L)	0.025					1.130	1.22
Bromide	(mg/L)	0.1					2.16	2.3
Chloride	(mg/L)	0.1			250 (AO)	250 (AO)	732.2	735
Conductivity	(μs/cm)	1					2974.0	3020
Hardness (CaCO3)	(mg/L)	0.3			80-100 (OG)		527.7	540
Nitrate as N	(mg/L)	0.1			10 *		<0.10	<0.10
Nitrite as N	(mg/L)	0.1			1		<0.10	<0.10
pH			6.5-8.5	6.5-9	6.5-8.5	6.5-8.5	7.564	7.57
Sulphate	(mg/L)	0.1			500 (AO)++	500 (AO)++	363.8	363
Total Alkalinity (CaCO3)	(mg/L)	1			30-500 (OG)		209.0	211
Total Dissolved Solids (Theo)	(mg/L)	10			500 (AO)	500 (AO)	1846.0	1870
Total Suspended Solids	(mg/L)	2					13.4	20
Total Phosphorus	(mg/L)	0.01	0.03[I]				0.148	0.10
TOTAL METALS								
Aluminum	(mg/L)	0.005		0.10	0.10 (OG)	0.1 (OG)	0.0876	0.140
Antimony	(mg/L)	0.001	0.02			0.006[II]	-	-
Arsenic	(mg/L)	0.001	0.1	0.05	0.025[II]	0.025[II]	<0.0018	<0.002
Barium	(mg/L)	0.005			1.0	1.0	0.0200	0.024
Boron	(mg/L)	0.01			5.0[II]	5.0[II]	0.405	0.45
Cadmium	(mg/L)	0.0001	0.0002	0.0002	0.005	0.005	<0.00010	<0.0001
Calcium	(mg/L)	0.05					86.66	87.8
Chromium	(mg/L)	0.001	0.0089 (as Cr III)	0.002	0.05	0.05	<0.0010	<0.001
Cobalt	(mg/L)	0.0005	0.0009				<0.00050	<0.0005
Copper	(mg/L)	0.001	0.005	0.002	1.0 (AO)	1.0 (AO)	<0.0010	<0.001
Iron	(mg/L)	0.01	0.3	0.3	0.30 (AO)	0.30 (AO)	0.646	0.85
Lead	(mg/L)	0.001	0.025	0.007	0.01	0.010	<0.0012	<0.001
Magnesium	(mg/L)	0.05					75.58	78.6
Manganese	(mg/L)	0.005				0.05(AO)	<0.0076	0.009
Mercury	(mg/L)	0.0001		0.0001	0.001	0.001	<0.00010	<0.0001
Molybdenum	(mg/L)	0.005	0.04[I]				-	-
Nickel	(mg/L)	0.005	0.025	0.025			<0.0050	<0.005
Phosphorus	(mg/L)	0.005	0.03[I]				-	-
Potassium	(mg/L)	0.05					17.34	17.5
Selenium	(mg/L)	0.001				0.010	<0.0010	<0.001
Silicon	(mg/L)	0.05					-	-
Sodium	(mg/L)	0.05			200 (AO), (20)[2]	200 (AO), (20)[2]	424.8	422
Zinc	(mg/L)	0.005	0.03	0.03	5.0 (AO)	5.0 (AO)	<0.0050	<0.005
DISSOLVED METALS								
Aluminum	(mg/L)	0.005	0.075^^		0.10 (OG)	0.10 (OG)	<0.0050	<0.005
Antimony	(mg/L)	0.001				0.006[II]	-	-
Arsenic	(mg/L)	0.001			0.025[II]	0.025[II]	0.0013	0.001
Barium	(mg/L)	0.005			1.0	1.0	0.0150	0.018
Boron	(mg/L)	0.01			5.0[II]	5.0[II]	0.300	0.38
Cadmium	(mg/L)	0.0001			0.005	0.005	<0.00010	<0.0001
Calcium	(mg/L)	0.05					86.20	86.8
Chromium	(mg/L)	0.001			0.05	0.05	<0.0010	<0.001
Cobalt	(mg/L)	0.0005					<0.00050	<0.0005
Copper	(mg/L)	0.001			1.0 (AO)	1.0 (AO)	<0.0010	<0.001
Iron	(mg/L)	0.01			0.30 (AO)	0.30 (AO)	0.0232	0.016
Lead	(mg/L)	0.001			0.01	0.010	<0.0010	<0.001
Magnesium	(mg/L)	0.05					74.36	78.4
Manganese	(mg/L)	0.005				0.05(AO)	<0.0066	0.009
Mercury	(mg/L)	0.0001	0.0002^^		0.001	0.001	<0.00010	<0.0001
Molybdenum	(mg/L)	0.005					-	-
Nickel	(mg/L)	0.005					<0.0050	<0.005
Phosphorus	(mg/L)	0.005					-	-
Potassium	(mg/L)	0.05					16.76	17.3
Selenium	(mg/L)	0.001				0.010	<0.0010	<0.001
Silicon	(mg/L)	0.05					-	-
Sodium	(mg/L)	0.05			200 (AO), (20)[2]	200 (AO), (20)[2]	417.8	406
Zinc	(mg/L)	0.005			5.0 (AO)	5.0 (AO)	<0.0050	<0.005

NOTES:

Anomalous values not included in Mean, and 75th Percentile calculations.
MDL Method detection limit
PWQO Provincial Water Quality Guidelines (for the protection of Aquatic Life)
0.04[I]: Interim PWQO
^^: PWQO is an Interim value, and is based on filtered samples.
CEQG PAL: Canadian Environmental Water Quality Guidelines for the Protection of Aquatic Life
ODWS: Ontario Drinking Water Standards   OG: Operational Guideline   AO: Aesthetic Objective
*: Where nitrate and nitrite are both present, the total of the two should not exceed 10 mg/L (as nitrogen)
++: When sulphate levels exceed 500 mg/L, water may have a laxative effect on some people.
2: Local Medical Officer of health should be notified when sodium concentration exceeds 20 mg/L, so that physicians caring for patients on sodium restricted diets may be informed.
II: Interim Maximum Acceptable Concentration. All other limits are Maximum Acceptable Concentrations.
CDWQG: Canadian Drinking Water Quality Guidelines   OG: Operational Guideline
(pink) Exceeds PWQO or CEQG PAL Criteria   For reference only, not applicable to groundwater samples.
(blue) Exceeds ODWS or CDWQG Criteria
(yellow) Exceeds CDWQG or ODWS, and PWQO or CEQG. PAL

Potential impacts to the environment resulting from the use of the groundwater captured by the pit dewatering wells will be required to be appropriately regulated by the issuance of Certificates of Approval under Section 53 of the *Ontario Water Resources Act*. The Proponent will be required to comply with the appropriate provincial regulations, standards and requirements. Where no provincial regulations exist, the effluent water quality and quantity will be evaluated in terms of the Ministries "Water Management Policies, Guidelines and Provincial Water Quality Objectives" (July 1994) and "Deriving Receiving Water Based Point-Source Effluent Requirements for Ontario Waters" (July 1994). Details will be negotiated at the time of application for the appropriate Certificate of Approval.

2.1.7 Air and Noise Emissions

Fugitive dust, vehicle emissions, and combustion products from explosives use are the principal air emissions associated with open pit mining. Blasting will release water vapour (48%), nitrogen (33%), carbon dioxide (18%), and trace gases to the atmosphere. Two to three blasts per week are likely. Fugitive dust will be released from: drilling and blasting; heavy equipment operation; and wind entrainment from stockpiles. Water and other dust suppressants will be used, as required, to control dust creation during dry periods. Vehicle and heavy equipment operation will release particulates, sulphur dioxide, and nitrogen oxides from the combustion of fuel (mainly diesel).

The major source of noise emissions will be from engine noise and backup beepers from general heavy equipment use, and from ore crushing. All heavy equipment will utilize appropriate mufflers and other equipment to control noise generation.

2.2 Processing

The processing plant will be housed within a heated and insulated building, and will be joined to many of the other site facilities by enclosed corridors as detailed in Section 2.4.2. The following sections describe the various process circuits.

2.2.1 Crushing and Screening

Ore from the open pit will be crushed, washed and screened to yield differing size fractions. Material in the 28 mm to 6 mm (-28 mm +6 mm) size range will be sent to the coarse dense medium separation (DMS) feed bin. Mid-sized material, -6 mm +1.5 mm, will be conveyed to the fines DMS feed bin. Material larger than 28 mm will be re-crushed and fed back through the process. Material smaller than 1.5 mm in diameter (fine PK) is waste, and after removal of excess water (thickening) will be disposed of (as a slurry) to the fine PKC facility, at approximately 50% solids by weight. Flocculant will be added to the thickener feed slurry to enhance the settling process. Clarified water (thickener overflow) will be recycled back to process. Flocculant (likely Percol 727) will be used to help settle solids in the thickeners.

2.2.2 Dense Media Separation

Feed to the DMS circuit will be mixed with a slurry of iron-glass powder (ferrosilicon - FeSi) for separation of the denser material including diamonds, that will sink within the cyclone (concentrate), and lighter (less dense) material that will float. This is the primary means of separating the denser diamonds from kimberlite, since the kimberlite has a lower specific gravity than diamonds. FeSi powder is composed of 79% iron, 15% silicon, 5% titanium and 1% aluminium, and is recovered by magnetic separation for reuse. FeSi powder is non-toxic, non-flammable and chemically stable.

All floats (less dense) material from the DMS cyclones greater than 6 mm will be re-crushed, screened and washed to liberate small diamonds. The finer (–6 mm to +1.5 mm) floats fraction will be conveyed to the coarse PK bin. The DMS cyclone sinks (coarse and fines concentrate) will be sent to the diamond recovery circuit for magnetic separation, and x-ray and laser sorting.

2.2.3 X-ray and Laser Sorting

Diamond recovery is conducted by x-ray and laser sorting machines. When diamondiferous gravels are irradiated with x-rays, the diamonds luminesce, allowing subsequent detection and sorting. At the Victor Diamond Project, the x-rays will be generated by x-ray tubes, which will be completely enclosed to prevent radiation from escaping.

The dried fine non-magnetic concentrate will be passed through x-ray machines operating in series, which will sort the material, and produce diamond-rich concentrate. The various size fractions will then be sent in batches to single particle laser sorting, sizing and counting, from which point, they will be stored in secured containers for shipment.

The actual quantity of diamonds in the ore is very small, in the order of 0.05 grams/tonne (g/t). As a result, virtually all of the ore that enters the mill will become either fine or coarse PK.

2.2.4 Water Balance and Management

The diamond recovery process at the VDP will require a daily maximum (peak demand) of approximately 7,000 m^3 of make-up water.

The process plant has been designed to maximize internal water recycling to the extent feasible, however, there will be a net loss of water associated with the pumping of fine PK to the PKC facility – average water loss 5,900 m^3/d; and with water lost with the coarse PK fraction – average water loss 300 m^3/d. The primary source of recycled water will be from the thickeners that will increase the solids content in the fine PK slurry from approximately 10% by weight to approximately 50% by weight. Fresh process water will be drawn from an intake structure in the Attawapiskat River.

2.2.5 Spill Control

All sections of the processing building will drain to internal sumps for spill control.

2.2.6 Air and Noise Emissions

Air emissions from the process plant will be minimal, because diamond recovery is largely a wet process. Where dust is present (conveyors, crushing circuit, and pneumatic drying processes), measures will be taken to minimize dust creation, and, where possible, to collect the dust.

The majority of processing will be conducted within the processing building, thereby reducing noise emissions. Other noise sources will be mitigated through a combination of source reduction (such as mufflers on equipment and insulation on buildings) and siting of facilities.

2.3 Processed Kimberlite Management

2.3.1 Processed Kimberlite Characteristics

Two types of PK materials will be produced - fine PK (-1.5 mm; silt to fine sand sized material), and coarse PK (1.5 mm to 6 mm; coarse sand and fine gravel sized material). Fine PK will comprise approximately 64% (by weight) of the PK stream and coarse PK, the remaining 36% (by weight).

The fine PK will have a chemical composition similar to the raw ore feed but will also contain trace concentrations of flocculants and ferrosilicon. Prior to disposal, the fine PK will be thickened to approximately 50% solids by weight, while the coarse PK will be dewatered to about 90% solids by weight. Approximately 18 Mt of fine PK will require storage over the life of the mine.

The ore, and hence, the fine and coarse PK materials, are not acid generating and will not leach metals in a concentration that would cause environmental concern.

2.3.2 PK Storage and Water Management

2.3.2.1 Fine PK

Fine PK will initially be stored in the quarry containment area (former central quarry) for approximately the first nine months of processing, while the stage 1 PKC Cell 1 dams are being constructed. Approximately 1.0 Mm^3 of fine PK will be stored in the quarry, leaving about one third of the quarry volume available for subsequent use as a polishing pond for PKC facility water management. Overflow from the quarry containment area will be directed via a surface drainage way to North Granny Creek.

For the remainder of processing operations, fine PK will be deposited in the fine PKC containment facility. This facility will comprise three adjacent cells (Cells 1, 2 and 3), formed by dams on the outer perimeter of the facility, and by internal dams separating the cells. The facility will provide storage for a minimum 18 Mt of fine PK, and will cover a surface area of about 260 ha. The containment dams will be constructed with mine rock and coarse PK, as materials become available.

During the first years of mine production, when limited mine rock and coarse PK are available for dam construction, fine PK will be deposited as a cone from an elevated central, rockfill ramp in the centre of Cell 1. This deposition strategy will maximize storage capacity and initially require only low height (2 m) perimeter containment berms.

Once mine rock becomes available (from the open pit), the Cell 1, 2 m high perimeter rockfill berm will be widened and raised to a height of 4 m (with subsequent staged raises to a maximum height of approximately 10 m). A fine rockfill transition zone and a 5 m wide bench of coarse PK will be constructed on the upstream face of the dam, to prevent the outward migration of fines, and to help control seepage. The final configuration of the dam will have overall upstream and downstream slopes (including benches) of approximately 6H:1V, pending optimization after further geotechnical investigation of in-situ conditions, with a crest width of 22 m. Once the dam is constructed to the 4 m elevation, the fine PK will be discharged off the perimeter dam, rather than from the central cone. Fine PK material will build up along the dam faces, limiting seepage through the dams. The dams are designed to conform to the Canadian Dam Association 1999 Guidelines and the Ontario Dam Safety 1999 Draft Guidelines.

PKC Related Infrastructure

Pipelines will transport the fine PK slurry from the thickener underflow to the PKC basin. Two pipelines will be installed, one operational, and one as backup. The pipelines leading from the plant site to the PKC facility will be a nominal 200 mm inside diameter insulated pipe. Within the quarry containment area and along the dam crest the pipeline will be a nominal 200 mm inside diameter HDPE pipe. Spill collection areas will be provided.

Runoff diversion ditches will be constructed around the north and west perimeters of the PKC facility. Drainage ditches will be provided around the perimeter of the PKC (inside of the runoff diversion ditches) to collect the seepage and local surface runoff. Collected seepage will report either to the polishing pond, or to the south seepage pond, for suspended solids removal. These ponds will discharge to North and South Granny Creek, respectively. The perimeter toe drainage ditches will consist of v-notch shaped channels, excavated through the muskeg layer into the underlying clayey silt stratum with an average depth of approximately 2.5 m.

Overflow/emergency spillways will be provided to discharge water from the PKC cells on a continuous basis, maintain retention time within the active cell(s), and to prevent overtopping of the perimeter dams at the PKC facility during storm events. These spillways (from Cells 1, 2 and 3) will report to the polishing pond. The spillways will be fitted with stoplog control structures to control PKC water levels, and will be designed to manage the 1,000-year return period, 24-hour rainfall event.

The polishing pond (after being filled to about 65% of capacity with fine PK) will provide a water volume of approximately 500,000 m^3, and will provide an average retention time of approximately 100 days, and a minimum 5-day retention time for the 100-year return period storm condition. The polishing pond will discharge via a drainage way to North Granny Creek. During low flow conditions, most or all of the polishing pond discharge is expected to seep through the bedrock to the pit perimeter well field, such that there would be little, if any, outflow to North Granny Creek.

2.3.2.2 Coarse PK Stockpile

The coarse PK will be dewatered to about 90% solids by weight, and transported by truck, either to the coarse PK stockpile for storage, or to the PKC facility for dam construction. The coarse PK stockpile will be located between the plant site and South Granny Creek. Coarse PK will be end dumped in approximately 4 m lifts with an estimated 1.5H:1V side slope, and 35 m bench widths, to achieve an overall slope of 7H:1V. Final slopes will be confirmed pending further geotechnical investigation of in-situ conditions. The final stockpile will have a design height of approximately 12 m, and will cover an area of approximately 70 ha and store approximately 9.1 Mt of coarse PK. The remaining 0.9 Mt of coarse PK will be used for construction of the PKC facility.

The coarse PK stockpile will be surrounded by a 100 m wide natural buffer of muskeg that will trap suspended solids, surrounded by a drainage collection ditch to allow environmental monitoring. Runoff from the coarse PK stockpile ditch will report passively to the South Granny Creek.

2.4 Victor Site Infrastructure

2.4.1 Aggregate Sources

Aggregate required for Victor site construction will include crushed limestone to be extracted from three bioherm areas (north, central and south quarries), and sand and gravel to be extracted from a pit within an esker located approximately 15 km west of the Victor site. Mine rock derived from the open pit will not be available during the construction phase of the project in significant quantities, but will be available during operation. Quarried rock will be used for construction of site access roads, yard areas, the airstrip and for pipeline bedding. Sand and gravel from the esker are needed mainly for concrete manufacture, as well as bedding material for lined structures and other construction needs.

2.4.1.1 Quarries

The main, or central, quarry is centred on a bioherm outcrop. The central quarry will produce an estimated 2 Mm^3 of placed rockfill, will be developed to a depth of approximately 24 m, and will have a surface area of about 12 ha. The quarry will only be used during the construction phase of the project, and will be subsequently used to store fine PK for the first nine months of processing (quarry containment area), after which time it will become the PKC polishing pond.

Groundwater inflow into the central quarry is expected to peak at about 4,900 m^3/d. The quality of the groundwater is anticipated to be quite good with low salinity values (chloride 4.9 mg/L, sulphate 1.6 mg/L, calcium 83.1 mg/L, magnesium 16.1 mg/L, and sodium 6.9 mg/L). Chloride and sodium concentrations are comparable to North Granny Creek background concentrations. Sulphate, calcium and magnesium concentrations are elevated compared with North Granny Creek background concentrations, but are well within Canadian Drinking Water Quality Guidelines (CDWQG) and the Ontario Drinking Water Standards (ODWS). There are no federal or provincial water quality guidelines for these parameters for the protection of aquatic life.

The north quarry will produce an estimated at 1 Mm^3 of placed rockfill material that will be used mainly for construction of the all-season airstrip. This quarry will be developed to a maximum depth of approximately 13 m, and will have a surface area of about 4 ha. Groundwater inflow into the north quarry is expected to peak at about 2,500 m^3/d, with the quality water entering the quarry being similar to that described above for the central quarry.

The existing south quarry is too small and not well positioned to provide large volumes of aggregate, and will therefore undergo modest expansion during the winter of 2005 to produce an estimated 360,000 t of material required for preparatory activities. It is expected that quarry expansion will require excavation to not more than 6 to 8 m below grade, and water management requirements will be modest, estimated at 1,800 m^3/d.

Sumps will be established in the base of the three quarries for water management, and will provide for coarse solids settlement; skimmers will be provided to capture any residual petroleum hydrocarbons, such as those that might arise from hydraulic hose leaks. Sump water will be pumped to fen/pond systems for the removal of remaining suspended solids and residual ammonia, prior to the water entering the Granny Creek system; or the Nayshkootayaow River in the case of the south quarry. Fen areas used for this purpose for the north and central quarries will later be overlain by mine rock and PKC stockpiles.

2.4.1.2 Esker Pit

A sand and gravel pit will be developed on an esker approximately 15 km west of the proposed plant site. This is the closest such feature to the Victor site. The esker measures approximately 3.5 km long and up to 0.5 km wide, and has an area of approximately 100 ha. Extraction of an estimated 75,000 m^3 of sand and gravel (120,000 t at a bulk density of 1.6 t/m^3) will occur from a small area of about 5 ha within the southern portion of the esker. Less than 5% of the deposit will be impacted, and material will not be extracted from below the groundwater table. Sand would only be extracted in the winter period, using the west winter road to access the site.

2.4.2 Buildings and Yard Areas

The following major developments and permanent facilities are planned for the Victor site (Figures 2-1 and 2-2):

- Processing plant and associated systems;
- Boiler house, emergency generators, electrical transformers and substations;
- Workshop/warehouse complex;
- Permanent accommodations complex;
- Sewage treatment plant;
- Incinerator, landfill, and associated waste management facilities;
- Diesel fuel tank farm and fuel dispensing stations;
- Potable water treatment plant, and fire water tank with pumps; and,
- Bulk emulsion plant, explosives magazines and ammonium nitrate storage building.

The proposed site layout is compact to limit environmental impact, and to provide for efficient operations. Adequate setbacks are provided from creeks, rivers, and other environmentally sensitive areas. Fencing will be localized to areas with special safety and security concerns.

The processing plant will be located at the centre of the plant site area where competent bedrock occurs close to the surface for suitable foundation conditions. The workshop/warehouse complex will be attached to the south end of the process plant, and the administration facilities will be attached to the east side, at the north end of the process plant.

A permanent accommodation complex, designed to accommodate approximately 300 persons, will be situated north of the process plant, in close proximity to all the plant site facilities and away from the main sources of noise. A separate dedicated facility will be used by construction personnel.

The emulsion explosives needed to operate the open pit mine will be prepared in a bulk emulsion plant, located approximately 2.5 km northeast of the open pit. The emulsion will be composed of ammonium nitrate and fuel oil. The components for explosives manufacture (fuel oil, ammonium nitrate, and detonators and boosters) will be stored in accordance with the Quantity Distance Principles User's Manual published by NRCan.

Communications on site will be by means of VHF radios. Off-site communications will be by means of a satellite communication system. Hand-held satellite phones will be provided for communications along the winter roads, as well as for emergency site use.

2.4.3 All-season Roads

A network of all-season access and haul roads (approximately 25 km) will be developed for access around the Victor site. To increase safety, large earthmoving vehicles will be generally restricted to separate, dedicated haul roads. Other traffic will use the network of standard access roads.

Standard site access roads will be 5 to 10 m wide with 2 m shoulders and 2% crown slopes. Haul roads will be 12 to 28 m wide with 3% crown slopes, and will be provided with 1.5 m high safety berms. All roads will be constructed to a finished elevation of 1 m above the adjacent muskeg in order to facilitate drainage and to mitigate the impact of snow accumulation. Quarried rock for road construction will generally employ an underlying geogrid and/or geotextile for improved stability.

Drainage ditches will be excavated along the sides of the roads (if required) to collect drainage from the road surface and to capture runoff from surrounding areas. Culverts will be provided for drainage, as appropriate.

Three creek crossings will be required on the Victor site, two involving North Granny Creek, and one involving South Granny Creek (Figure 2-1). Where creek crossings occur, it is currently proposed to route the creeks through multiple, 2 m diameter corrugated steel culverts, supported by rockfill, with crossing widths of 12 m. Final crossing details will be developed through consultation with the Attawapiskat First Nation, MNR and DFO and permitted through a *Fisheries Act* authorization. Culverts will be inspected regularly to remove any blockage, such as by beaver.

2.4.4 All-season Airstrip

An all-season gravel airstrip will be located approximately 2 km northwest of the plant site to provide principal access to and from the site for the work force during the construction and operational stages of the project. The facility will also be used for delivery of perishable foodstuffs and spare parts, and for emergency evacuations. The strip will be oriented in an east-west direction in accordance with prevailing wind directions.

The following transportation requirements have been established:

- 150 people will require weekly rotation during construction;
- 120 people will require weekly rotation during operations; and,
- 18,000 kg of food supplies will be shipped to site every week during operations, and more during the construction phase, depending on timing.

The runway centreline will be constructed of rockfill placed directly on the underlying overburden, after removal of the muskeg layer. Alternatively, centreline rockfill may be placed directly on grade (i.e., directly on the muskeg surface). Fill for the shoulders and the safety area of the airstrip will be placed directly on grade. Where rockfill is placed directly on grade, geogrid will be used to spread the loads and limit differential settlement.

The gravel airstrip at the Victor site will be designed to satisfy the requirements for L-100-30 Hercules aircraft, requiring a minimum 1,500 m long runway. The runway centreline will be 45 m wide as per the minimum requirements for Class C-IV aircraft. Shoulders on each side will provide a transition between the runway and the adjacent safety area. Stopways of 60 m length will be installed on each end of the runway. The safety area will be 90 m wide, extending 180 m beyond the end of the stop ways. The apron at the Victor runway will be located at the east end of the airstrip, and will provide for aircraft parking and service facilities, fuel and de-icing fluid storage, an airstrip electrical shed and sand storage area. An 18 m wide taxiway will link the runway to the apron. The main Victor site helicopter pad will be located east of the apron area.

The Victor airstrip will be designed as a non-instrumented runway, such that only visual approach procedures are possible. Navigational aids will be provided as appropriate. A qualified radio operator will be on duty any time a flight is anticipated to maintain radio contact with the approaching aircraft from the time of initial contact until the aircraft has landed, and to advise the pilots of current weather and runway conditions.

It is likely that Timmins will be the primary gateway airport for the Victor site, with smaller shuttle aircraft potentially transporting personnel from Attawapiskat, Kashechewan, Fort Albany, Peawanuck, and Moosonee.

2.4.5 Drainage Works

2.4.5.1 South Granny Creek Diversion

The south margin of the proposed open pit will intercept a portion of South Granny Creek. Therefore, it will be necessary to divert a linear distance of approximately 2 km of the creek (equalling 2.6 km of meandering creek habitat) away from the pit area for environmental and safety reasons (Figure 2-1). The new channel will measure approximately 2.6 km in length, and will be positioned a minimum of 300 m south of the pit perimeter to ensure integrity and stability of the new channel, and to avoid open pit operations. The new alignment will pass through open muskeg, and will be naturalized to provide like-for-like fish habitat replacement, and will be designed to accommodate the 100-year return period maximum design flow of 10 m^3/s. The new channel will become the permanent creek channel, even after closure.

Final diversion channel details will be developed though consultation with Attawapiskat First Nation, MNR and DFO and permitted through a *Fisheries Act* authorization.

2.4.5.2 Other Drainage Works

All areas of the site where hydrocarbons and other chemicals are regularly handled will be provided with internal containment and sumps for spill control. Drainage from these areas will report to oil/water separators for the removal of any residual hydrocarbons. Catchment ponds will be used to equalize peak storm flows and to allow solids to settle out of suspension prior to release. Drainage works associated with the PKC facility are considered in Section 2.3.2. Ditching around surface facilities will be used to capture and reroute storm water and other runoff.

2.4.6 Fuel and Related Liquids Storage and Management

This section focuses on the storage and distribution system for diesel fuel, but also considers: gasoline, aviation fuels, lubricants, waste oil, antifreeze, heating glycol, and other miscellaneous fluids at the Victor site. All fuels are considered hazardous, and their handling, transportation and storage will respect applicable regulations and good management practice.

All fuel storage and dispensing equipment will comply with applicable legislation, including the *Technical Standards and Safety Act* (2000).

2.4.6.1 Diesel

Diesel will be used for heavy equipment operation, site heating, construction diesel and back-up power generation, and other uses at the Victor site (Table 2-4). Fuel will be transported to the site from Moosonee along the coastal and south winter roads by tanker truck.

TABLE 2-4
DIESEL FUEL REQUIREMENTS

Location	Average (ML/a)
Open pit mining and support equipment	8.7
Plant support equipment	0.3
Boiler (occasional use)	4.3
Incinerators and heaters in buildings	1.0
Explosives preparation	0.2
Anticipated total demand	14.5

The total available bulk diesel storage capacity will be 16 ML. Two 8 ML fuel tanks will be constructed within a plastic lined and bermed containment area, designed to meet the applicable fire codes, API standards, and insurance underwriter requirements. The structure will be designed to contain the equivalent of 110% of the volume of the largest tank. The tanks will be field erected, single wall, conventional cylindrical style, steel tanks built to API-650 standards. The tank farm fuel pump system will be provided with a spill collection sump and pump out facilities.

All fuel storage and dispensing equipment will comply with applicable legislation, including the *Technical Standards and Safety Act* (2000).

2.4.6.2 Other Fuels and Related Liquids

All tanks used for other fuels and related liquids will be above grade installations, designed and operated to applicable standards.

Gasoline

Limited quantities of gasoline will be required at the Victor site for small vehicles, such as all terrain vehicles, snowmobiles, boats and gas-powered tools. All large vehicles for the construction and operation phases will be diesel-fuelled. Gasoline will be transported to site by tanker trucks or in Enviro tanks over the winter roads.

Aviation Fuel

Arctic Grade Jet B or equivalent aviation fuel will be transported to the site by a tanker truck, and stored in a self-contained 4,500 L Enviro tank at the airstrip. Jet-B fuel for helicopters will be stored in sealed drums inside a lined bermed area located at the helipad near the airstrip. Fixed wing aircraft are not expected to refuel at the Victor site airstrip, except in an emergency.

Lubricating and Waste Oil

Bulk lubricants such as engine oil, hydraulic oil, transmission fluid, and final drive oil will be stored in an annex building attached to the workshop, along with antifreeze stored in totes, multi-purpose greases, and gear oils stored in drums. Special lubricants, including special greases, compressor oil, and transformer oil, will be stored in containers in a caged and curbed area inside the warehouse. Waste oil will be removed for off-site disposal at a licensed facility.

Antifreeze/Glycol

A glycol heating circuit will be used for heating and will require an annual top-up of an estimated 20,000 L of 60% wt. propylene glycol. The storage tank for this facility will be a self-contained Enviro tank. Waste glycol will be stored on site, until a licensed transportation company can safely remove it for off-site disposal.

Propane

Some propane may be required at the Victor site. Any storage of pressurized gases will be according to applicable regulations.

All fuel storage and dispensing equipment will comply with applicable legislation, including the *Technical Standards and Safety Act* (2000).

2.4.7 Power Supply

The maximum electric power demand of the VDP during the operations phase is estimated to range from 16.4 MW in 2009 to 18.7 MW in 2020. This power will be provided by reinforcing the existing James Bay west coast Five Nations Energy 115 kV transmission line system with a new 115 kV transmission line that would be constructed parallel to, and immediately adjacent to, the existing system. The new system components will include:

- A new 115 kV line from Otter Rapids (or nearby Pinard) to Kashechewan, with appropriate tie-ins to the existing system at substations; and,

- A new line from Attawapiskat to the Victor site, with appropriate substation tie-ins, adjacent to the existing south winter road.

Power will be distributed around the site by 13.8 kV overhead powerlines and 13.8 kV cable systems. Emergency diesel generators will be installed to provide backup supply to these systems in the event of an outage on the 115 kV transmission line. Details regarding power supply during the construction phase are provided in Section 2.9.2.

The use of grid power reduces the previously forecast Victor site fuel demand during operations from about 45 ML/a, to about 15 ML/a, as some fuel would still be required for heavy equipment operation, heating, standby/emergency power generation, and other uses (but not for normal power generation). With reduced fuel demand, ocean-going tankers and barges will not be required for fuel delivery, as previously proposed in the CSEA. Further, there will no longer be a need for fuel storage facilities in Attawapiskat, as all fuel will be trucked directly to the Victor site from Moosonee, along winter roads.

2.4.8 Water Requirements and Supply

2.4.8.1 Water Requirements

Water will be required at the Victor site for:

- Fire protection (emergency use only);
- Process plant make-up (peak demand of 7,000 m^3/d);
- Domestic potable (240 m^3/d peak during construction for 800 persons, 90 m^3/d during operations for 300 persons);
- Maintenance of seasonal low flows in the Nayshkootayaow River (up to 22,300 m^3/d); and,
- Miscellaneous uses (1,920 m^3/d).

All water will be supplied from the Attawapiskat River pumphouse via pipeline, except during the early construction phase when well water will be used for fire protection, domestic potable, and other miscellaneous uses.

Mine dewatering will lower the water table beneath the Nayshkootayaow River and is expected to reduce flow in the river. Supplementary water will therefore be added to the river to compensate for this reduction at a maximum rate of 22,300 m^3/d. Water needed to supplement the flow in the Nayshkootayaow River will be drawn directly from the Attawapiskat River pipeline and will not be treated or stored. The pipeline will be insulated and heat-traced, and the supplementation water will be delivered to the Nayshkootayaow River system, indirectly by means of a small west and south flow creek, located west of the Victor site (Section 6.4.2.2).

2.4.8.2 Water Supply

An intake structure will be installed to draw water from the Attawapiskat River. The intake structure will accommodate variations in river flows and ice conditions, and will include screens to exclude fish and debris. Water will be pumped via a pipeline (nominal 60 cm diameter HDPE pipeline) to the site and from there, a 31 cm diameter HDPE pipeline will connect to the raw/fire protection water storage tank. A nominal 50 cm HDPE pipeline will provide supplementary flow to the Nayshkootayaow River system. All of these pipelines will be insulated and heat-traced, where appropriate.

The maximum required supply of fresh water from the Attawapiskat River to the Victor site is calculated at 31,460 m^3/d during periods of maximum Nayshkootayaow River flow supplementation (22,300 m^3/d), and 9,160 m^3/d at other times when flow supplementation is not required.

2.4.8.3 Water Treatment

The treatment plant for potable water will comprise: raw water storage, pre-filtration, reverse osmosis, ultraviolet disinfection, and chlorine disinfection (or an equivalent system); and treated potable water storage.

The system will be designed to provide potable water for a maximum site staffing of 800 persons, at a consumption rate of 300 L/d/person. As such, during peak periods of operation, it is expected that the Ontario *Safe Drinking Water Act* instantaneous threshold rate of 2.9L/s for large non-municipal non-residential systems will be exceeded, and that system approval will be required in accordance with requirements of the *Act.*

2.4.9 Explosives Manufacture and Handling

Explosives for mining and quarrying operations will primarily be ammonium nitrate based, most likely in an ammonium nitrate/fuel oil (ANFO) blended emulsion form suitable for use in the anticipated wet-hole conditions. Alternatively, a simple ANFO mixture may be used when deemed appropriate (under dry conditions, for example). Pre-packaged explosives may also be used as an alternative (during the construction phase at the quarries, for example).

Magazines for the storage of explosives and accessories will be designed and built in accordance with the "Magazine Standards for Blasting Explosives and Detonators" issued by the Explosives Regulatory Division of NRCan, as well as with the *Explosives Act* and all other applicable regulations.

The locations of these facilities will be in accordance with the guidelines set out in the Quantity-Distance Principles User's Manual published by the Explosives Regulatory Division of NRCan.

2.4.10 Reagent Storage and Handling

The main reagents used in the process are FeSi powder and flocculant. FeSi and flocculant will be transported to site in one-tonne tote bags for storage in the general laydown yard until needed. FeSi powder is non-toxic, non-soluble, non-flammable and chemically stable. Flocculant is non-toxic, non-flammable, and chemically stable. A small quantity of caustic soda may be required at the incinerator if a wet scrubber is utilized to treat scrubber effluent. Small quantities of lime and chlorine will be required for potable and sewage treatment.

In addition, it will be necessary to either hydrofracture or acidize the limestone at the pit perimeter dewatering well draw points (at depth) to improve well efficiencies. If acidizing is used, hydrochloric acid at 15% concentration will be transported to site in tanker truck(s) and stored in the trailers until needed. One tanker truck of approximately 30,000 L would be required for each of the approximately 20 wells. This would be a one-time occurrence, if used.

2.4.11 Domestic Sewage Treatment and Disposal

A sequencing batch reactor (SBR) or a membrane biological reactor (MBR) package sewage treatment plant is proposed for the Victor site. The plant will accommodate the peak demand of approximately 800 people during the construction/commissioning period and will continue to operate through the life of the project at a lower capacity. The plant will be designed to produce an effluent that meets Ontario effluent discharge standards, and will include reactor tanks with aeration diffusers and decanters, multimedia/membrane filtration, aerobic digestion, ultraviolet disinfection, and sludge dewatering.

Effluent from the sewage treatment plant will be discharged to a linear fen system reporting to North Granny Creek during the construction phase, and to the PKC facility via the fine PK pipeline during operations. Sludge from the plant will be incinerated.

The treatment system and discharge requires an MOE Certificate of Approval under the *Ontario Water Resources Act* (OWRA).

2.4.12 Waste Management

Project wastes (excluding mineral waste and waste water) will include:

- Domestic waste (food scraps, refuse, clothing);
- Combustible waste (wood, paper);
- Other inert waste (clean metal tins, scrap metal, clean glass, clean plastic); and,
- Special management waste (waste petroleum products, petroleum contaminated containers, waste glycol, waste explosives, biomedical waste) and, petroleum contaminated soil.

Most northern Canadian mine sites utilize a below grade landfill for on-site disposal of non-hazardous solid wastes. This technology is not appropriate for the Victor site because the water table is at, or near surface across the entire site area. The following waste management facilities will therefore be implemented.

2.4.12.1 Domestic Waste

Glass, tins and plastic will be separated from other domestic waste at source (to the extent practical) and the remaining waste will be incinerated. The incinerator will be fitted with a dry or wet scrubbing system for air emissions control. Bottom ash from the incinerator will be tested for leachate toxicity. If it is deemed non-hazardous, the ash will be trucked to the on-site landfill for disposal. If the ash is classified as hazardous waste, a licensed contractor will transport it off site to a licensed disposal facility.

Glass, tins and plastic sorted at source will be rinsed, and compacted, crushed or shredded, and stored in an on-site, above grade landfill created in the southeast portion of the mine rock stockpile. Scrap metal may be stored in a recycling area on the site until it can be shipped off site or reused, or alternatively, it may be deposited directly in the landfill.

A burn area will be established at the landfill for any open-air burning of clean wood packaging and similar materials.

2.4.12.2 Special Management Waste

All special management wastes will be stored in sealed containers in lined, bermed areas (or other means of secondary containment such as Enviro tanks) for shipment off site to licensed facilities, with the possible exception of:

- Used absorbents from the clean up of diesel and gasoline spills may be incinerated;
- Other materials suitable for on site incineration, or treatment within the SBR;
- Off-specification petroleum products used as fuel for the incinerator; and,
- Petroleum-contaminated soil that will be treated in a bioremediation area on site.

Special management wastes will include, or are likely to include: used glycol and lubricants, and spent cleaning solvents and degreasing agents. Waste oil tanks will be designed to hold one year's anticipated quantity, as off-site disposal will require transport by winter road.

An area will be established at the Victor site to store empty contaminated containers (such as fuel drums), until they can be returned to the vendor. Otherwise, the containers will be cleaned, crushed, and deposited in the landfill. Any fuel-contaminated soils associated with minor spills will be removed to a bioremediation area on the Victor site for treatment.

The storage, handling, transportation and final disposal of waste (both hazardous and non-hazardous) are subject to Ontario Regulation 347 (O. Reg. 247) – General Waste Management. The MOE requires storage, handling and disposal facilities and waste haulers to be licensed (via Certificates of Approval) and waste generators to be licensed. Transporters of hazardous materials are required to be trained/registered according to the federal Transportation of Dangerous Goods Regulation.

At the Victor site, De Beers will apply for a Certificate of Approval that will govern waste management activities at the site, including operation of the landfill, storage and handling of hazardous wastes for off-site disposal.

Hazardous wastes will be taken to the Clean Harbours licensed hazardous waste landfill in Lambton County (Sarnia). This landfill is currently the only licensed hazardous waste landfill in the province.

2.5 Winter Roads

The Victor site is accessible only by air (helicopter or winter airstrip), or by winter road during an approximately 60-day period each year. Permanent road access to the Victor site was evaluated and was considered cost-prohibitive. Reliance will therefore continue to be placed on winter road access.

A 268 km winter road currently operates between Moosonee and Attawapiskat from January to March each year. This winter road services the west James Bay coastal communities of Moosonee, Fort Albany, Kashechewan, and Attawapiskat. Funding to establish and maintain the road typically comes from an annual grant from the Northern Winter Access Road Program and from freight fees. The winter road is constructed and operated by the Services Company (3981584 Canada Inc.), which is owned equally by the AttFN, Kashechewan, and Fort Albany First Nations. A winter road Memorandum of Understanding covering the construction and management of the winter road exists between De Beers and the Services Company (Attawapiskat, Fort Albany, Kashechewan and Moose Cree First Nations, and the Town of Moosonee), to cover funding, technical specifications, De Beers' user safety protocols, and other matters.

The existing south winter road from Attawapiskat to the Victor site measures approximately 105 km (Figure 2-3). The road was designed to service the Victor site during the advanced exploration stage, and its use will continue during project construction and operations phases. Discussions involving a final alignment for the south winter road near the community of Attawapiskat are ongoing. Figure 2-3 shows two alignments, one that crosses the Attawapiskat River just south of the community, and a second alignment that does not cross the Attawapiskat River (the southern by-pass route). The first alignment was used in the winter of 2005, but De Beers has indicated its desire to develop an alignment closer to the southern by-pass.

Both roads will require upgrading to handle the heavier loads and traffic, as described below.

All freight shipments to site along the winter road will be subject to traffic scheduling, and payload and dimensional limitations, between Moosonee and Attawapiskat, and between Attawapiskat and the Victor site. Truckloads will be chosen to balance efficiency against road degradation by excess weight. Trucks linked to project activities will normally travel in convoys of from 5 to 6 vehicles. The projected rate of truck traffic for the VDP is approximately 1,500 loads per season during the three years of construction, and 700 loads per season thereafter.

A third winter road (west winter road) will also be required from the Victor site to access the esker sand and gravel pit during the construction phase.

Design specifications for the winter roads are the following:

- Travelled surface of up to 10 to 12 m, and not exceeding 15 m;
- Shoulders of from 3 to 5 m on either side to allow for snow management;
- Strength bearing to provide for a normal gross vehicle weight (GVW) of 40,000 kg, with occasional weights up to 65,000 kg;

- Peak construction traffic to average 25 round trips per day, to a maximum of 40 round trips per day, based on a 60-day functional road season (February 1 to March 31 of each year); and,
- Surfacing to consist of a minimum compacted snow pad of 150 mm, followed by the application of an approximately 75 mm ice cap.

Intermediate and large river crossings will be constructed as reinforced ice bridges, using controlled flooding and rig mats. Temporary bridges (platforms) may be used at floodway channel and at minor creek crossings. These temporary bridges, if used, will be installed at the beginning of road construction, after freeze-up, and will be removed each year, prior to winter break-up.

2.6 Transmission Line System

The proposed new transmission line facilities consist of the following:

- An approximate 100 km single circuit 115 kV transmission line between the Victor site and the Five Nations owned Attawapiskat distribution substation;
- An approximate 170 km single circuit 115 kV transmission line between the Moosonee substation in the Hydro One system, and the Kashechewan distribution substation in the Five Nations system;
- An approximate 180 km single circuit 115 kV transmission line between the Abitibi Canyon generating station (near Otter Rapids), and the Moosonee substation in the Hydro One system;
- Substation modifications at Five Nations Inc. owned Attawapiskat distribution substation and Kashechewan distribution substation; and,
- Substation modifications at the Hydro One owned Moosonee substation and at the Abitibi generating station (or construct a new 115 kV switchyard at the Pinard transfer station).

All new line sections will be built with wood pole structures and steel arms with sky-wire. The right-of-way (ROW) will be 30 m, immediately adjacent to the existing 30 m ROW wherever possible.

The Victor substation will be equipped with two 13.2 to 13.8 kV transformers to regulate the 13.8 kV bus voltage, and two 115 kV circuit breakers, and other equipment as required.

Modifications to the existing distribution substations at Attawapiskat, Kashechewan, and Moosonee will include additional breakers and disconnect switching. Minor physical expansion of each station facility will be required.

Upgrades will also be required at the Abitibi Canyon generating station and Pinard transformer station.

The new transmission line will be connected to the existing line through the substations to provide increased reliability to all existing users. With the twinned line, power would continue to flow through the second line while the problem in the first line is located and repaired.

Figure 2-3 shows two possible transmission line routings close to Attawapiskat, for that portion of the line that will be constructed between Attawapiskat and the Victor site. The final alignment will be selected in co-operation with the AttFN, and will depend in part on selection of a final alignment for the south winter road.

2.7 Barge Transport System

Moosonee Transportation Ltd. (MTL) operates a barge terminal located seven nautical miles from the mouth of the Moose River, and utilizes three, Series 1000 barges each with a gross registered tonnage of 1.15 Mt. These barges have a capacity of 580 t of deck cargo at a draft of 1.8 m for transit into Attawapiskat. The present barge route from Moosonee to Attawapiskat as shown on Figure 2-4 will continue to be used to support project construction efforts, if required. The historic barge-shipping season into Attawapiskat is June to October. One-way barge towing time from Moosonee to Attawapiskat is approximately 18 to 20 hours. The shallow depth of the approach to the Attawapiskat River from James Bay (and areas within the river) currently limits barges to a practical operating draft of 1.8 m.

2.8 Attawapiskat Area Facilities

The potential exists to construct a small barge landing and gravel laydown area in Attawapiskat, adjacent to the east side of the existing community sewage lagoons. This facility would only be constructed if it is determined that the coastal winter road was not able to effectively service the project. In such an instance, construction materials, but not fuel, would be brought into Attawapiskat by barge in the summer for transport to the Victor site the following winter. If constructed, the barge landing facility would only be utilized during the construction period, and the laydown area would occupy an area of not more than 4 ha. If the barge landing facility is constructed, the AttFN may elect to take over the facility following the project construction period, and use it to improve service to the community.

The barge landing facility, if constructed, would be fitted with a barge access ramp, a dredged barge berth, and an associated laydown/storage area. The barge access ramp would be cut into the riverbank, and would allow two barges to be docked simultaneously. Barges would be secured with steel cables, winched to shore.

An area of approximately 15,000 m^2 would be dredged at the barge berth to a depth of 2.75 m to provide sufficient manoeuvring depth for the tugs and barges. Dredgeate would be used for construction purposes if practical, or disposed of in a designated on-land facility.

Final dredging details will be developed through consultation with Attawapiskat First Nation, MNR and DFO and permitted through a *Fisheries Act* authorization.

The laydown area, if constructed, would be fenced and lit for safety and security reasons, and would be constructed with up to 1.5 m thick gravel pads, surrounded by perimeter ditches for drainage.

There will also be a small winter road staging area that will be developed on the south side of the Attawapiskat River, in the immediate vicinity of the existing coastal winter crossing. The staging area will be approximately 1 ha in size, and will be used to accommodate winter road building equipment and supplies (mainly fuel) on a seasonal basis. Equipment and supplies will be transported to the site by barge each fall, so as to be in place for the start of winter road construction each December. The equipment will be used to begin construction on that portion of the James Bay coastal winter road extending south from Attawapiskat to Kashechewan, and that portion of the south winter road extending west from Attawapiskat to the Victor site, depending on selection of a final alignment for the south winter road. The quantity of fuel brought to the south Attawapiskat River staging area each fall will be approximately 60,000 L, sufficient to fill six, 10,000 L EnviroTanks.

All equipment and materials, with the possible exception of the empty EnviroTanks, will be removed from the south Attawapiskat River staging area each winter, once the road is built. The empty EnviroTanks may be left on site on a permanent basis, to avoid redundant transportation to Moosonee.

The sequence of transportation of equipment and materials would be repeated each year. Staging equipment and materials in this manner will allow an earlier start on the winter roads each year from Attawapiskat, without having to wait for ice to become thick enough for safe crossing of the Attawapiskat River. Equipment and materials will be brought up the riverbank without the use of any specific infrastructure, such as a constructed barge landing facility, and there will be no dredging associated with the landing site, because of its limited use. There are also no plans to develop a gravel pad at the site, but a geogrid will likely be put down to keep equipment from sinking into the soil.

In addition, a permanent administrative office/resource and visitor’s centre and training facility are proposed for construction in Attawapiskat. An initial modular training centre was donated to the AttFN by De Beers, and has been constructed on reserve to provide a facility to train First Nations personnel for work at the Victor site. A second, larger training facility is planned as part of the main construction phase for the project. The larger training facility will potentially be located on reserve land in accordance with discussions with the AttFN and available space.

Any permanent facility in Attawapiskat that is determined to be located on reserve lands may require authorizations from INAC. As a result an environmental assessment may be required when such facilities are proposed for reserve lands.

2.9 Construction Phase

2.9.1 Summary of Activities

A significant amount of work will be required over a relatively short period to construct and prepare the VDP for operation in late 2008. Timing is critical in order to meet the limited transportation window.

Primary activities will include:

- Completing EAs (federal and provincial) and federal and provincial environmental permitting requirements;
- Proponent project funding;
- Logistics arrangements and procurement of material and equipment;
- Development and implementation of environmental protection and monitoring plans;
- Initiation and completion of detailed engineering;
- Movement of construction materials to the Victor site;
- Development of aggregate sources at the Victor site;
- Construction of the new transmission line elements;
- Construction of Victor site facilities;
- Preparation of on-site mineral waste handling facilities;
- Establishment of site drainage works; and,
- Stripping of muskeg and overburden, and the initiation of mine development.

2.9.2 Project Infrastructure

Prior to the main project construction phase, it will be necessary to prepare the Victor site for construction. This preparation phase is scheduled for the winter of 2005 and will involve the following aspects:

- Reopening the existing south winter road alignment, to move limited equipment and supplies to site, as a permitted activity under the land leases;
- Re-establishing the Victor site winter airstrip (first established in the winter of 2000);

- Developing foundations for the future fuel tanks and construction camp using rock from the existing south quarry;

- Transporting steel to the Victor site for future fuel tank construction (with such construction to occur after completion of the *CEA Act* and MOE EA processes);

- Construction of limited all-season gravel road links between the main construction camp pad and the future central quarry site, and between the fuel tank pad and the construction camp pad;

- Restocking site fuel supplies, including 7 additional, 65,000 L Enviro tanks; and,

- Undertaking further geotechnical and hydrogeological studies to support detailed planning, and engineering.

Preparatory activities are normally not required for new mine sites where competent ground conditions and access are typically present. The VDP, on the other hand, faces unusual challenges in this regard, as it is currently only possible to move around the site in winter, when the ground is frozen. Constructing limited rockfill pads to accommodate the future construction camp (to be built during the winter of 2006), and the future fuel tank storage area, will provide a dry base for establishing the camp and the tanks, as part of the main construction phase commencing in the winter of 2006. Otherwise, there will be no place to put facilities at the start of the 2006 construction season.

The first year of the main construction phase in 2006 will focus on basic site infrastructure. The central and north quarries will supply material for construction of the permanent all-season airstrip, on-site roads, and pad areas. Site capture will be supported by the existing exploration camp and re-established winter airstrip and south winter road, until the construction camp and permanent airstrip can be constructed.

Power supply for the construction phase will be provided by diesel-powered, air cooled, self-contained modular generating units. Peaked demand will be less than 5.0 megawatts (MW). Construction power will be augmented in late 2006 by the new 115 kV transmission line to be constructed from Attawapiskat to the Victor site.

A 350-person initial construction camp, complete with a well water supply, potable water treatment, sewage treatment, and incinerator will be established near the plant site in early 2006. The initial construction camp will be expanded in 2007 to accommodate an additional 250 people to carry operations through to development of the permanent accommodations complex.

Once basic access is established, the remainder of construction activities will be sequenced according to manpower and equipment availability and site conditions. Certain activities, such as muskeg stripping and construction of the South Granny Creek diversion are best carried out in winter.

During the second year of construction (Year 2007) pads and foundations for buildings will be completed, and buildings will be erected. The South Granny Creek diversion will be constructed and the existing creek route abandoned. The Phase 1 settling pond, dewatering pipeline, raw water supply pipeline from the Attawapiskat River, and the Nayshkootayaow River supplementation pipeline and related infrastructure, will be established to allow pre-production mine dewatering to start in late 2007.

The final year of construction (2008) will complete building construction, including electrical and mechanical aspects. Dewatering will be initiated at the open pit area and pre-production stripping of muskeg and overburden will start. Stockpiles will be established and construction of the fine PKC facility will commence.

2.10 Closure Phase

The *CEA Act* requires that all phases of a project be considered. The project as identified for this review included the construction, operations, modification, and final closure of the project. In addition the *Ontario Mining Act* and its associated Regulations and Codes govern mine site rehabilitation in Ontario. The *Act* requires that a closure plan (prepared separately) be filed for any mining project before the project is undertaken, and that financial assurances are provided to ensure that funds are in place to carry out the closure plan.

The objective of the closure plan is to provide measures for ultimate rehabilitation of the mine site area to a natural and productive condition on completion of mining activities. Specific details of the closure plan will change over time, and closure plans will be updated appropriately. It is expected that final closure of the Victor site will take approximately six years, although active (progressive) reclamation will be conducted primarily within the first two years of closure.

Figure 2-5 shows the Victor site after closure.

2.10.1 Open Pit

To close out the open pit, the pit will be actively flooded by pumping from the Attawapiskat River to create a pit lake. Prior to flooding the pit, all mining related infrastructure will be removed from the pit area, and the upper most slopes will be shaped and revegetated. Active filling (by pumping) will substantially decrease the time of infilling to less than 2 years. Otherwise, it will take an estimated 12 to 14 years for the pit to flood naturally. Actively flooding the pit will also reduce the number of years that flow supplementation of the Nayshkootayaow River will be required. Water quality in the resultant pit lake will start out as substantially fresh water, but over time will gradually become more saline, as groundwater seeps into the flooded pit from the surrounding bedrock aquifer. Increasing salinity of the pit lake over time will render it susceptible to oxygen-restricted conditions because of the effects of density gradients, leading to the formation of a meromictic lake. Meromictic lakes are not normally suited to development as aquatic habitat.

The final groundwater elevation in the pit lake is estimated at approximately 2 m below the surrounding ground surface, corresponding to the water levels in the exploration phase large diameter drill holes, which are connected to the same geological sequence as will be the open pit.

Outflow from the flooded open pit will be mainly subsurface, through the bedrock aquatic zone, to the adjacent rivers, as per groundwater currently occupying the bedrock zone that will become the open pit.

2.10.2 Buildings, Machinery, Equipment and Infrastructure

A separate, approved, landfill will be established at closure, within the mine rock stockpile, for the disposal of non-hazardous demolition wastes (such as concrete, steel, wallboard, and other inert materials).

Salvageable machinery, equipment and other materials will be dismantled and taken off site for sale or reuse if economically feasible. Alternatively, these items will be cleaned of oil and grease, where appropriate, and deposited within the on-site landfill. Gearboxes or other equipment containing hydrocarbons that cannot be readily cleaned will be removed from equipment and machinery and trucked off site for disposal at a licensed facility.

Buildings, including the accommodation complex, processing plant, incinerator, potable water treatment system, and sewage treatment system, will be demolished and disposed of in the landfill unless another economic alternative is available.

2.10.3 Roads, Airstrip, Pipelines and Power Lines

Project specific winter roads will naturalize passively over time. River crossing areas will be actively revegetated during operations, as required.

Permanent Victor site roads (access roads and haul roads) will be scarified, resloped as appropriate, covered with overburden, and revegetated. Culverts and/or bridges will be removed, and natural drainage restored. The airstrip will be scarified, covered with overburden, and revegetated.

Above ground, on-site pipelines will be purged, dismantled, and disposed of in the Victor site landfill. Buried pipelines, or pipeline sections, will be purged/cleaned and left in place, if not readily removed, to minimize additional disturbance to the landscape. Surface expressions of buried pipelines, such as valve stations, will be removed.

The 115 kV transmission line from Attawapiskat to the Victor site, and on-site power lines and other power equipment and materials including oil-filled transformers will be removed. The new transmission line from Otter Rapids (or Pinard) to Kashechewan will be left in place as a permanent upgrade to the local power grid system.

2.10.4 Petroleum Products, Chemicals and Explosives

All petroleum products and chemicals will ultimately be removed from the site by licensed haulers for reuse or appropriate disposal.

2.10.5 Contaminated Soil

An environmental site investigation will be conducted at the end of operation or early in the closure phase. Soil found to exceed acceptable criteria will be bioremediated on site, and the treated soil will be either deposited within the demolition landfill, or spread, contoured, and revegetated.

Acceptable criteria are herein defined as being in accordance with Table 1 of the Ontario "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the *Environmental Protection Act* – March 2004". These criteria will be applied to all contaminated soils, but would not apply to mineral stockpiles and related materials, which are exempt from waste designation in accordance with O. Reg. 347.

2.10.6 Ponds and other Water Structures

The Phase 1 mine water-settling pond will be decommissioned as part of progressive reclamation activities. The flooded pond may be developed into fish habitat, if practicable. The Phase 2 above grade mine water settling pond will be drained, the liner punctured to facilitate drainage, and berms will be reshaped (pushed in), covered with overburden and seeded. Infrastructure will be transferred to the on-site landfill. Intake and outfall structures at the Attawapiskat River (water intake and well field water discharge) and the Nayshkootayaow River (flow supplementation pipeline) will be removed.

2.10.7 Fine PKC Facility

The fine PK has no potential for acid generation or metal leaching (SRK 2003). The principal concerns associated with the closure of the fine PKC facility involve long-term slope stability, erosion control, drainage, vegetation cover, and aesthetics.

The PKC cells will be contoured to minimize ponding and promote natural drainage. Muskeg will be harrowed into the surface of the PKC facility, as appropriate, followed by revegetation (seeding and hand staking of tree seedlings). Perimeter and discharge ditches will be left in place. Progressive reclamation of Cell 1 and its associated dams will be completed during the operations phase. Cells 2 and 3 will be reclaimed at the end of mine operations.

2.10.8 Low Grade Ore, Mine Rock, Overburden and Muskeg Stockpiles

The low-grade ore, coarse PK, and mine rock have no potential to generate net acidity, or to leach metals in concentrations that would be of environmental concern (SRK 2003). The principal concerns associated with the closure of the stockpiles therefore involve slope stability, erosion control, vegetation cover, and aesthetics. Progressive rehabilitation will be undertaken, where possible. Muskeg not required for reclamation at mine closure will be covered with mine rock and/or overburden and revegetated to remove any long-term fire hazards. Reclamation of stockpiles will include, where appropriate: covering with overburden, seeding/hydroseeding, and hand planting of tree seedlings.

2.10.9 Aggregate Sources

Reclamation of the quarries and pit is governed by the permits obtained under the *Aggregate Resources Act*.

The north, central and south quarries will only be used for aggregate sourcing during the construction phase, and will subsequently flood and create pond features. The central (and potentially north quarry) will be partially filled with fine PK during the initial months of operation. Subsequently, the central quarry will serve as a polishing pond for the PKC facility. The north quarry will be allowed to flood naturally.

Water quality within the quarry ponds will be good and the ponds will be moderately deep, to a maximum of about 5 m. The pond shorelines will be enhanced to provide fish habitat and to improve fish support capability. The existing drainage ditch from the flooded central quarry to North Granny Creek will be enhanced to provide fish habitat, and to facilitate fish passage between the quarry pond and North Granny Creek, whereas the north quarry will be connected with a nearby muskeg pond. The flooded south quarry will not be developed as fish habitat because of its small size and isolated location (isolated from South Granny Creek).

Those portions of the sand and gravel esker that have been disturbed by excavation will be reshaped, amended with top soil as appropriate, and revegetated with jack pine and black spruce seedlings. The sand and gravel pit will be substantially reclaimed as part of progressive reclamation, unless a portion of the pit is left open to access material through operations.

2.10.10 Waste Management

The approved landfill located within the mine rock stockpile will be the primary repository for demolition wastes during closure. At the end of reclamation activities, the landfill will be capped with overburden and revegetated. It will be closed out in a manner consistent with Ministry of the Environment requirements as described in the landfill Certificate of Approval. The incinerator will be removed from the site for resale, if possible, or will be disposed in the landfill with the building.

2.10.11 Site Drainage

Site drainage will be restored to the extent practicable at the end of operations, including the removal of all culverts. The South Granny Creek diversion channel will naturalize over the project life, and will be retained as the new permanent creek channel.

2.10.12 Attawapiskat Facilities

Ownership of the barge berth and laydown area (if constructed), office and training complex, will likely be transferred to the AttFN after closure of the mine site, pending further discussion with the AttFN and government agencies to clarify liabilities.

All portions of the laydown area not required for use by the AttFN will be rehabilitated by grading, covering with overburden, and revegetating.

2.10.13 Revegetation

The primary aim of the mine site reclamation/revegetation program is to control erosion, establish an initial plant cover, and accelerate the migration of native vegetation into the reclaimed area to re-establish a self-sustaining, natural vegetative cover. Revegetation of disturbed areas will be accomplished by a combination of grass and herb seeding, hand planting of tree seedlings, and natural regeneration. Research is currently underway at Laurentian University in Sudbury to determine optimal species and strategies for revegetation. Only species native to the region will be used for revegetation. Revegetated areas will be monitored for up to 10 years after closure to ensure that a self-sustaining vegetation cover is successfully established.

2.10.14 Schedule

Progressive rehabilitation will occur as reasonable during the construction and operation phases. Final closure of the Victor site is expected to occur over a period of approximately six years, which includes two years of active reclamation (Years 1 and 2), three years of care and maintenance where flow supplementation to the Nayshkootayaow River will occur if needed (Years 3 to 5), a subsequent year of final reclamation (Year 6) for removal of the infrastructure required to support flow supplementation, additional reclamation, and demobilization from the site.

2.10.15 Landscape After Closure

The current Victor landscape consists of flat expanses of muskeg, intersected by creeks and rivers. There are numerous small to large ponds within the site area.

Following site area rehabilitation, the existing flat muskeg landscape will be replaced by a more diversified landscape of low hills (former stockpiles) interspersed with muskeg areas and ponds, including larger ponds associated with the central and north quarries and the pit lake. Creeks and rivers will remain as they are in the pre-development condition, with the exception of the diverted portion of South Granny Creek. The hills will be forested with mixtures of spruce and poplar, and possibly jack pine. These forested environments will eventually develop vegetation communities similar to those, which currently border the Attawapiskat River and Nayshkootayaow River, and will consequently provide comparatively productive forest habitat for wildlife.

2.11 Labour Force and Service Requirements

2.11.1 Construction Labour Force

Mine construction and development will occur over a 33-month period, from 2006 to 2008. During the construction period, the majority of employment opportunities will be filled directly by contractors. De Beers is, nonetheless, committed to maximizing the Aboriginal and northern employment opportunities during construction and operation, and to increasing business opportunities in the local and outlying regions. Principles by which contracts will be identified and structured are outlined below (subject to modification on finalization of agreements with First Nations):

- To the extent practicable, and recognizing the limitation inherent in larger contracts, efforts will be made to structure construction and operations contracts with scopes of work that can be reasonably accessed and managed by local businesses;

- De Beers will publish a business opportunities profile that will outline the goods and services required by the project. This profile will be given to local communities to give Aboriginal and northern businesses the first opportunity to respond;

- De Beers will require all contractors to disclose their policies and practices regarding preferential hiring to encourage the hiring and training of Aboriginals and area residents; and,

- Contracts for goods and/or services (such as operation, catering and maintenance of the accommodation complex, safety, and medical aid) will be awarded to contractors when it is clearly more economical than having De Beers' personnel provide the same services.

The larger construction contracts will generally be awarded to specialized contractors from outside the region. Subcontracting local businesses and hiring local labour will be encouraged to the extent practicable. Smaller contracts that could be awarded to local businesses include:

- Camp operations, catering, and maintenance;
- Site surveying (for construction);
- Air transport support;
- Winter road construction and maintenance; and,
- Site snow clearing.

Employment opportunities with contractors are expected to include: equipment operators, truck drivers, labourers, electricians, mechanics and other trades people. Actual positions will vary according to the work being conducted.

Labour requirements during the construction period are expected to peak at approximately 600 persons, and will focus on equipment operators, labourers, skilled tradesmen, catering and other support positions.

2.11.2 Operations Labour Force

A total of approximately 390 positions will be required for the VDP during operation, as summarized in Table 2-5.

Four general types of jobs are anticipated to be required during operations: entry level (technical and trades), trades, supervisory/middle management, and supervisory.

TABLE 2-5
VICTOR DIAMOND PROJECT LABOUR REQUIREMENTS DURING OPERATION

Occupation	Number of Positions
Management/supervisory	41
Administration	33
Equipment operators	68
Process operations	38
Mechanics/electricians/welders	48
Maintenance/camp operations	62
Systems operations	7
Security/first aid	38
Material handlers	15
Technicians	26
Engineering/geology/surveying	14
Total	**390**

Note: The total of 390 includes contractor positions (camp, security, earth moving, maintenance)

At this time, it is assumed that all positions, excluding higher supervisory positions, will be based on a biweekly turnaround (two weeks at site, two weeks out by air) with senior supervisory positions being based on a schedule of four days at site and three days out. Employees will generally work 12-hour shifts.

De Beers is committed to an Alcohol and Drug Free Policy. Security personnel will enforce a zero tolerance policy for these illicit substances. De Beers will support current initiatives and resources in the local communities for addressing alcohol and substance abuse problems.

Firearms will be prohibited at the Victor site, except for individual(s) who are authorized to carry a firearm for wildlife management purposes, as per the De Beers' Wildlife Management Plan/Policy.

2.11.3 Training

De Beers is committed to employing as many First Nations members and people from northern Ontario as possible, as long as job requirements are met. Requirements will vary from job to job but are listed generally in Section 2.11.3.

A recruitment strategy will be developed by De Beers in consultation with the AttFN and James Bay west coastal First Nations to maximize Aboriginal involvement in the VDP, and to provide progressive employment opportunities for mine employees. Assessments will be conducted in Attawapiskat and at other James Bay west coast communities to assess the education and skill levels available among the Aboriginal workforce. So far, human resource inventories have been carried out in two communities, with more to follow. Job descriptions and a capacity survey will be completed to facilitate training in advance of operations. Training will be conducted both at the Attawapiskat training centres, and on site.

De Beers will support pre-employment upgrading in partnership with the appropriate government agencies and communities to increase the number of people from Attawapiskat, and other local communities, eligible for employment at the VDP.

Training in site orientation, safety, environmental, materials handling, equipment operation, and workplace hazards will be mandatory for all employees. All employees will be expected to strictly observe the required safety and environmental management practices.

2.11.4 Suppliers

In addition to the direct employment opportunities, there will be a significant quantity of indirect jobs created from the VDP. The Mining Association of Canada (1993) estimated that three indirect jobs are derived from each direct mining job. This estimate does not include spin off benefits associated with the spending of wages or business income. De Beers is committed to working with communities and individuals to increase capacity for businesses located in the west James Bay area and in northeastern Ontario.

2.11.5 Impact Benefit Agreement

2.11.5.1 Attawapiskat First Nation

Negotiations are continuing to finalize an Impact Benefit Agreement (IBA) between the AttFN and De Beers. IBAs are generally private contractual agreements that provide economic and business opportunities, employment, education and training commitments, financial provisions and environmental protection commitments. IBAs have become a common step for mining companies seeking to open mines on traditional lands and have proven successful in securing benefits for both partners.

2.11.5.2 Other Affected First Nations

Other First Nation communities, namely the Fort Albany, Kashechewan, Moose Cree First Nation, The MoCreebec Council of the Cree Nation, and Taykwa Tagamou Nation may be affected to some extent by the project. Discussions have commenced with these communities and De Beers to determine how best to extend priority status for business, employment and training.

figure
2-1 Site Plan

figure
2-2 Site Plan Process Plant Area

figure
2-3 South Winter Road and Transmission Line (with Options)

figure
2-4 Winter Road Barge and Transmission Line Routes

figure
2-5 Post-closure Site Plan Schematic

3.0 EVALUATION OF ALTERNATIVES

Paragraph 16(2)(b) of the *CEA Act* requires alternative means of carrying out the project to be included in any comprehensive study level environmental assessment. Although the Guidelines for the conduct of a comprehensive study and the preparation of a draft comprehensive study report (February 26, 2004) for the Victor project did not specify a requirement to assess the alternatives to the project, such an assessment has been included in the comprehensive study report pursuant to paragraph 16(1) (e) of the *CEA Act*.

Under the *CEA Act*, “Alternative means” are defined as the various ways that are technically and economically feasible that can be used to implement or carry out the project.

The MNR Class EA process also specifies a requirement to assess project alternatives. This section includes both elements.

The evaluation of alternatives presented herein is based on results of project engineering studies, environmental input from the Victor project study team, and comments received from various stakeholders.

3.1 Alternatives Assessment Methodology

Evaluations of alternatives presented in this section are based on the development of a series of performance objectives and evaluation criteria, as provided in the Proponent’s CSEA. Performance objectives are meaningful attributes that are essential for project success. The following performance objectives (or a subset thereof, as appropriate) have been used in the evaluations:

- Cost-effectiveness;
- Technical applicability and/or system integrity and reliability;
- Ability to service the site effectively;
- Effects (adverse) to the natural environment;
- Effects (adverse) to the socio-economic environment; and,
- Amenability to reclamation.

For each performance objective, the Proponent defined a set of three criteria for preferred, acceptable, and unacceptable ratings, as per the following:

Cost-effectiveness:

- Facilitates a competitive return on investment (preferred);
- Facilitates an acceptable return on investment (acceptable); and,
- Cannot be financially supported by the project (unacceptable).

Cost-effectiveness relates to overall project costs, including capital, operation, maintenance, and closure/reclamation costs. Each aspect of the project has cost implications and thus cost-effectiveness is a performance objective common to all aspects.

Technical Applicability and/or System Integrity and Reliability:

- Predictably effective with contingencies if the alternative does not perform as expected (preferred);

- Appears effective based on modelling/theoretical results; contingencies are available if the alternative fails to perform as expected (acceptable); and,

- Effectiveness appears dubious or relies on unproven technologies (unacceptable).

"Technical applicability" and "system integrity and reliability" are used interchangeably, as appropriate to the issue, to describe the suitability or expected performance of a given alternative.

Ability to Service the Site Effectively:

- Provides a guaranteed access/supply to the site with a low risk of interruption (preferred);

- Provides the required access/supply to the site with contingency method(s) of delivery available (acceptable); and,

- Cannot reliably provide sufficient access/supply, or involves an unacceptable level of risk without contingencies (unacceptable).

This performance objective is relevant for those aspects of the project dealing with the provision of consumables or access to the project site. The reliable (guaranteed) supply of many consumables, such as fuel, is critical to the uninterrupted operation of the mine. In the same way, the ability of a site access alternative to service the site effectively is a critical project component.

Effects (adverse) to the Natural Environment:

- Minimizes adverse effects to the natural environment without mitigation (preferred);

- Minimizes adverse effects to the natural environment with mitigation (acceptable); and,

- Likely to cause significant adverse effects to the natural environment that cannot reasonably be mitigated (unacceptable).

The "natural environment" referred to in this performance objective is a broad term used to describe the air, bedrock, soil, water (surface and ground), and biological organisms. Primary considerations are in regard to Valued Ecosystem Components (VECs).

Effects (adverse) to the Socio-economic Environment:

- Minimizes adverse effects to the socio-economic environment without mitigation and provides positive effects (preferred);

- Minimizes adverse effects to the socio-economic environment with mitigation (acceptable); and,

- Likely to cause significant adverse socio-economic effects that cannot reasonably be mitigated (unacceptable).

The potential for negative socio-economic effects, such as the reduction of land use by AttFN members, is evaluated where appropriate for the alternatives for the various aspects of the project.

Amenability to Reclamation:

- Causes disturbance to the natural environment that requires limited reclamation (preferred);

- Causes disturbance to the natural environment that requires moderate to extensive reclamation (acceptable); and,

- Mitigation of disturbance to the natural environment is not practical or feasible (unacceptable).

This performance objective relates to the decommissioning or reclamation of the various project aspects at closure. It is relevant to those aspects of the project that alter the landscape (e.g., roads and stockpiles), and/or require dismantling and either removal from site, or disposal on site (e.g., buildings).

Once the criteria to evaluate individual performance objectives have been applied, there is still a need to provide an overall (or summary) evaluation for the specific alternatives under investigation. Various approaches to this summation task are possible, involving either numerical or qualitative processes. A qualitative summary is used herein, which is based on the following premises:

- All performance objectives are essential to project success and the decision making process;

- For an alternative to be preferred, it must, as a minimum, obtain preferred or acceptable ratings for all performance objectives; **an alternative is therefore rejected if it attains an unacceptable rating for any single performance objective;** and,

- The alternative that receives the greatest number of preferred ratings is not necessarily the best, or most preferred, overall alternative, as it may be that one or two performance objectives are more important and override all other objectives, so long as a minimum rating of acceptable is attained for the less important objectives.

The final evaluation of alternatives is therefore a reasoned process, in which the basis for the final selection of a given alternative is easily understood at all levels.

Alternatives were only considered that satisfied De Beers' requirements for employee, local residents and First Nations (and in particular AttFN) health and safety. All mining operations pose some unavoidable on-site safety risks, as do most industrial operations. De Beers is very conscious of this fact, and has placed a great emphasis on worker health and safety, and training programs.

3.2 Project Alternatives

Unlike many other types of projects for which a number of project alternatives might be available, mines are unique because ore bodies have a fixed location, and the only way to proceed with a mining venture is to mine the ore body in place. Consequently, the only project alternatives identified by the Proponent for the VDP are to:

1) Proceed with the project in the near-term, as planned;
2) Delay the project until circumstances are more favourable; or,
3) Abandon the project.

All other alternatives are regarded as constituting "**alternative means of carrying out the project**", and are addressed in sections below.

The Proponent has indicated that the following performance objectives are applicable to the assessment of project alternatives:

- Cost-effectiveness;
- Minimizes effects to the natural environment;
- Minimizes effects to the socio-economic environment; and,
- Amenability to reclamation.

Cost-effectiveness

The Proponent has indicated that abandoning the project would not fulfill the project purpose and provide a competitive return on investment. Project abandonment is therefore an unacceptable alternative for cost-effectiveness.

Depending on circumstances related to future project economics, further project investigations, permitting processes, and discussions with the First Nations, delaying the project cannot be ruled out. However, scheduling delays have the potential to delay the project for an undetermined period, as the VDP is one of several De Beers' projects worldwide that compete for corporate funding. The Proponent rated delaying the project as acceptable for cost-effectiveness.

Proceeding with the project in the near-term as planned is the preferred alternative from a cost perspective.

Minimize Effects to the Natural Environment

From a natural environment perspective, the Proponent rated abandoning the project as the preferred alternative, as abandoning the project at this stage would result in no further environmental effects. Proceeding with the project, either in the near-term or with a delay, was rated as acceptable.

Minimize Effects to the Socio-economic Environment

From a socio-economic perspective, the Proponent has indicated that proceeding with the project in the near-term was the preferred alternative, as this would bring much needed economic opportunity to the local and regional economies. Delaying, or abandoning the project, was considered acceptable.

Amenability to Reclamation

Amenability to reclamation was rated the same as for natural environment effects.

Based on the above, the Proponent selected proceeding with the project in the near-term as the overall preferred project alternative, delaying the project was considered acceptable, and abandoning the project was considered unacceptable, as this alternative received an unacceptable rating for cost-effectiveness.

Government Position

The Government of Canada is in agreement with the Proponent's positions in regards to cost effectiveness, minimizing effect to the environment, and to the socio-economic environment and the amenability to reclamation as outline in the previous section.

3.3 Project Schedule

3.3.1 Project Schedule Alternatives

The Victor site is accessible from Attawapiskat (the nearest community) only by winter road (January to March), or by air (currently helicopter or winter airstrip only), until such time as all-season access roads and an all-season airstrip can be constructed (termed site capture). Construction start-up for site capture can therefore only be initiated at the start of the winter season, and there are no reasonable alternatives to this schedule, other than to delay the project by one or more full years, but still starting in early winter. The only project scheduling alternative, other than this aspect, relates to the rate of mine production and project life, as discussed in Section 3.4.3.

3.3.2 Work Scheduling

3.3.2.1 Alternatives

Four work schedules were considered for De Beers' employees at the VDP for the construction and operation phases:

1) Three weeks at site, one week off-site (3 and1);
2) Two weeks at site, two weeks off-site (2 and 2);
3) One week at site, one week off-site (1 and 1); and,
4) Four days at site, three days off-site.

3.3.2.2 Performance Objectives and Evaluation

The Proponent applied the following performance objectives for assessing alternative employee work schedules:

- Cost-effectiveness;
- Ability to service site effectively;
- Minimize effects to the natural environment; and,
- Minimize effects to the socio-economic environment.

Cost-effectiveness: The first three alternatives, when adjusted for hours worked, have the same labour requirement. The primary difference is the ability to attract labour and the number of flights required to transport personnel. Alternatives 1 and 2 require the least number of flights and are the most cost effective. Alternatives 3 and 4 are generally not financially supportable by the project.

Ability to Service the Site Effectively: Alternative 2 is preferred based on experience at other sites because the workforce remains focused, without undue disruption from changeovers. Changeovers associated with Alternatives 3 and 4 are generally too frequent, and hence disruptive. Over the long-term, Alternative 1 can lead to lower employee performance and attentiveness because of a lack of appropriately spaced rest intervals.

Minimize Effects to the Natural Environment: Alternatives 1 and 2 are preferred since they require the least number of flights to and from the site. Alternatives 3 and 4 are acceptable.

Minimize Effects to the Socio-economic Environment: Alternative 1 has been found to be difficult (over long timeframes) for workers, their families and their communities at other remote projects. The workers have less time with their families and communities, and significant free time on site can lead to conflicts. Alternatives 2 through 4 are also likely to be the most compatible with schedules for carrying out traditional activities. The choice of work schedules is not expected to have any effect on health related emissions, physical or cultural resources, or historical, archaeological, paleontological or architectural features. As a result, Alternatives 2, 3 and 4 are preferred from the socio-economic perspective. Alternative 1 is acceptable.

Summary Evaluation

The work schedule of 3 and 1 is rated as preferred in two categories and acceptable in the remaining category (Table 3-1 – placed at the end of Chapter 3 for reader convenience), and has been selected for the construction phase, which has different time constraints compared with the operations phase. The schedule of 2 and 2 has been selected for the operations phase, because it is less disruptive to employee families and communities. The schedule of 1 and 1 (Alternative 3), and four days on site and three days off site (Alternative 4) were rejected for both the construction and operation phases, as being not financially supportable, with the exception of a limited number of very senior personnel, where staff duplication for longer-term rotations is not practicable.

Work scheduling does not influence potential environmental effects on the project.

Government Position

The Government of Canada agrees with the positions outlined by De Beers in the CSEA and as summarized in this section of the CSR.

3.4 Mining Operations

3.4.1 General Considerations

The choice of alternative mining operations is a function of the geometry and character of the ore body in relation to the surrounding geology and terrain; available technologies; environmental sensitivities; and, mining costs. The Victor ore body is a large (28 Mt) near surface intrusion that has a variable diamond grade and quality. Where the ore body comes to the bedrock surface, it is covered by from 10 to 30 m of overburden.

3.4.2 Mining Methods

3.4.2.1 Alternatives

The possible alternatives to mining the Victor ore body are:

1) Underground mining - shaft access;
2) Underground mining - ramp access; and,
3) Open pit mining.

Underground Mining - Shaft Access

Shaft mining requires the construction of a vertical, underground passage (shaft) from surface to the targeted depth. Horizontal tunnels (drifts) are driven from the shaft, at strategic levels, to access the ore body. Mining takes place off these drifts by drilling and blasting, and ore is transported to surface using a hoisting shaft. Shaft mining is best suited to deeper, often smaller, ore bodies, which are easily traceable underground. Where the ore is near surface and/or is not covered by host rock, underground mining must leave a substantial portion of the ore body in place (crown pillar[1]) to maintain ground stability. The cost of underground mining via shaft is typically in the order of $45/t of ore.

Underground Mining – Ramp Access

Ramp mining is a second type of underground mining, involving use of an inclined tunnel or ramp from surface to access the ore body. Ramp mining is more suited to shallower ore bodies compared with shaft mining, because of the time it takes to truck ore and mine rock up the ramp to surface. As with shaft mining, where the ore is near surface and/or is not covered by host rock, ramp mining must leave a substantial portion of the ore body in place (crown pillar) to maintain ground stability. The cost of underground mining is in the order of $45/t of ore.

Open Pit Mining

Open pit mining requires the removal of surface materials to expose the ore body, followed by the stepwise development of concentric levels (rings) into the ore body, using a continuous spiral roadway connecting the various mining levels or benches. Open pit mining is best suited to large ore bodies located close to surface that have a more uniformly distributed resource. Open pit mining methods are also well suited to shallow ore bodies that are exposed at surface, or are covered directly by overburden. The cost of open pit mining at the VDP is approximately $9/t ore.

3.4.2.2 Performance Objectives and Evaluation

Performance objectives evaluated by the Proponent for mining methods were the following:

- Cost-effectiveness;
- Technical applicability;
- Minimize effects to the natural environment;
- Minimize effects to the socio-economic environment; and,
- Amenability to reclamation.

Cost-effectiveness - Technical Applicability: The open pit mining method is the only alternative that allows the entire ore body to be mined effectively (technical applicability) at a cost that can be supported by the project ($9/t of ore). With underground mining, approximately 30% to 40% of the mineable deposit would have to be left in place as a crown pillar, resulting in a substantial resource loss. Neither of the underground mining methods is economically viable ($45/t of ore). Groundwater management in an underground mine hosted in limestone could also present safety concerns.

Minimize Effects to the Natural Environment: Underground mining methods cause less surface disturbance than open pit mining, and yield smaller quantities of waste overburden and mine rock, and are therefore preferred. Terrestrial habitat disturbances associated with open pit mining will include the 80 ha pit area, together with approximately 270 ha required for overburden and mine

[1] Crown pillar: a thickness of competent rock that must be left in place between the surface and the underground mine workings for safety reasons

rock stockpiles. Open pit mining will also require rerouting an approximately 2 km segment of South Granny Creek, in the area where the creek intersects the proposed pit. Effects to the natural environment can be minimized by siting overburden and mine rock stockpiles in lower productivity muskeg environments, away from creek and river forested margin habitat, and through restoration at closure. Open pit mining is therefore rated as acceptable.

Minimize Effects to the Socio-economic Environment: Underground mining methods have a smaller surface expression and reduced effects to wildlife (and thereby have potentially less effect to hunting and trapping) compared to open pit mining, and are therefore preferred. Open pit mining still allows for hunting and trapping and is therefore rated as acceptable. The different mining methods are not expected to have any effect on health related emissions, physical or cultural resources, or historical, archaeological, paleontological or architectural features.

Amenability to Reclamation: The two underground mining methods (shaft and ramp) are preferred from a reclamation perspective, as neither alternative has an appreciable effect on the surface environment. The open pit will be reclaimed to a pit lake on closure, and the overburden and mine rock stockpiles will be graded and vegetated, and returned to productive habitat (Section 2.10). Open pit mining is therefore rated as acceptable.

Summary Evaluation

The Proponent has indicated that open pit mining was the only viable alternative, being rated as preferred in two categories and acceptable in three categories (Table 3-1). Underground mining alternatives were rejected because they attained unacceptable ratings for two of the five performance objectives. All subsequent alternatives therefore refer only to open pit mining.

Underground mining is more susceptible to potential environmental effects on the project, as any sudden, temporary increases in groundwater flow would be more problematical for underground operations, as compared with open pit operations, because of the need to manage worker safety related to possible flooding.

Government Position

The Government of Canada agrees with the positions outlined by De Beers in the CSEA and as summarized in this section of the CSR.

3.4.3 Mine Production Rates

3.4.3.1 Alternatives

The Proponent modelled the mine plan using three mine production scenarios:

1) 2.0 Mt/a (mine life of 16 years)
2) 2.5 Mt/a (mine life of 13 years); and,
3) 3.0 Mt/a (mine life of 11 years).

3.4.3.2 Performance Objectives and Evaluation

Performance objectives applied to the assessment of alternative production rates were the following:

- Cost-effectiveness;
- Minimize effects to the natural environment; and,
- Minimize effects to the socio-economic environment.

Cost-effectiveness: The highest production rate (3.0 Mt/a production rate) provides the greatest economic return on investment and is preferred. The Proponent has indicated that the other production rate alternatives are acceptable.

Minimize Effects to the Natural Environment: All alternatives were considered to be similar in their overall natural environment effects and were rated as acceptable.

Minimize Effects to the Socio-economic Environment: The 2.0 Mt/a production rate will yield a longer mine life and extension of socio-economic benefits, and is therefore preferred. The higher production rate, on the other hand, will require a greater number of employees on site, likely beyond that available in nearby communities, and as a result, is not likely to maximize AttFN and other First Nation involvement with the project. Alternatives 2 and 3 are rated as acceptable. The different mine production rates are not expected to have any effect on health related emissions, physical or cultural resources, or historical, archaeological, paleontological or architectural features. A shorter mine life would also allow site reclamation to occur at an earlier date, thereby reducing the duration of any adverse effects on lands and resources used for traditional pursuits.

Summary Evaluation

The Proponent has indicated that a production rate of 2.5 Mt/a will provide the optimal balance between maximizing return on investment, and extending the mine life in the interests of sustainability and socio-economic benefits (Table 3-1). This alternative was consequently rated as preferred. All subsequent alternatives therefore relate to the 2.5 Mt/a production rate.

Mine production rates do not influence potential environmental effects on the project.

Government Position

The Government of Canada agrees with the positions outlined by De Beers in the CSEA and as summarized in this section of the CSR.

3.4.4 Overburden and Mine Rock Removal and Disposal

Open pit mining will require the removal of approximately 1 Mm^3 of muskeg, 11 Mm^3 of mineral soil overburden, and 26 Mt of mine rock. Options for disposal of these materials include reuse as construction materials (proposed use of 11 Mt of mine rock), reuse during reclamation, and/or permanent stockpiling. Stockpile locations have been determined on the basis of maintaining a compact site in close proximity to the pit (reducing transportation costs and environmental effects), and avoiding infringement on forested zones bordering area creeks and rivers (considered herein to be the most sensitive environments). Stockpile heights will be optimized for stability and long-term aesthetics at closure. No other consideration of alternatives is proposed.

Government Position

The Government of Canada agrees with the positions outlined by De Beers in the CSEA and as summarized in this section of the CSR.

3.4.5 Groundwater Control

3.4.5.1 Alternatives

Four technologies were considered by the Proponent for groundwater control at the open pit:

- Dewatering using perimeter dewatering wells (conventional perimeter well dewatering);
- Use of a slurry wall to isolate the local groundwater regime;
- Use of a perimeter grout curtain to isolate the local groundwater regime; and,
- Use of a perimeter freeze wall to isolate the local groundwater regime.

All of these alternatives require the use of internal sumps in the floor of the pit to collect direct precipitation, runoff and other inflows, to maintain safe and dry working conditions.

Dewatering Using Perimeter Wells

Conventional dewatering requires the pumping of groundwater from screened wells installed in a ring around the open pit. Approximately 20 perimeter wells would be required to dewater the pit area (Section 2.1.2). The Proponent estimated that project cost (capital and operating) of the perimeter-dewatering program at approximately $150 million ($5.23/t of ore).

Slurry Wall

The slurry wall alternative involves development of a continuous low permeability wall around the pit perimeter by placing a bentonite clay slurry into a trench excavated around the open pit. Under ideal conditions, slurry walls have been installed to a maximum depth of approximately 150 m (Bauer 2003); however, to attain this depth at the Victor site, specific geotechnical investigations and interpretations would be required to confirm that such depths were possible at the Victor site. Such studies have not been completed since, to be effective, the slurry wall would have to be developed to a depth of 220 m, which is beyond the limits of the technology.

Perimeter Grout Curtain

The grout curtain alternative involves injecting cement or cement/bentonite slurry into the ground at multiple locations around the pit to form a barrier to groundwater movement. Grouting typically will not form a continuous barrier, as there are inevitably void spaces in the bedrock that will be missed, but grouting may be used to help reduce groundwater flows towards the open pit. Grouting limestone is particularly difficult because fractures and cavities that convey groundwater are highly variable, and are typically difficult to locate.

Perimeter Freeze Wall

A series of closely spaced refrigeration pipes can be used to create a continuous frozen curtain (freeze wall) around an open pit to restrict groundwater movement. Freeze wall pipe spacing must be extremely close to be effective (approximately every 2 m), with very little tolerance for deviation. Even a 1% deviation in drill angles would make it impossible to achieve the required minimum spacing at depths of 220 m (as would be required for the VDP) leading to gaps in the wall. Freeze wall technologies are also extremely difficult, if not impossible, to use in limestone, where even very small fractures preclude application of the technology. Freezing is generally not feasible where groundwater velocities exceed about 0.5 to 1 m/d. The Proponent has indicated that a 1 mm wide fracture, in the pre-dewatered state at the Victor site, would translate to a groundwater velocity of 47 m/d. Fracture widths in excess of 0.1 mm would be problematic for the application of freeze wall technologies at the Victor site.

Based on the above, the Proponent indicated that slurry wall, perimeter grout curtain, and freeze wall technologies are not technically suitable as stand alone technologies, and are only potentially effective for use at the Victor site when used in combination with conventional perimeter well dewatering. As a result, the following alternatives were considered in detail:

1) Conventional dewatering using perimeter dewatering wells,
2) Conventional perimeter well dewatering with slurry wall application(s),
3) Conventional perimeter well dewatering with grouting; and,
4) Conventional perimeter well dewatering with freeze wall application for overburden stability.

3.4.5.2 Performance Objectives and Evaluation

Performance objectives for assessing alternative groundwater control strategies were the following:

- Cost-effectiveness;
- Technical applicability (system integrity and reliability);
- Minimize effects to the natural environment; and,
- Minimize effects to the socio-economic environment.

<u>Cost-effectiveness</u>: All groundwater control mechanisms for the VDP will be costly. In a comparative sense, however, the Proponent indicated that conventional dewatering is the most attractive (preferred) alternative, at a total estimated life of project cost of $150 million.

The Proponent did not develop costs for the application of other control mechanisms in isolation, as none are technically feasible. Conventional dewatering combined with limited application of either a grout curtain or freeze wall were both determined to have similar costs ($161 million to

$167 million). Freeze wall application in this instance would be for ground stability within the overburden bordering portions of the pit perimeter, and would not result in any meaningful improvement to water control within the bedrock aquifer. Supplemental application of slurry wall technology combined with conventional dewatering wells had a cost ranging from $240 million to $915 million. The Proponent indicated that such high costs were not financially supportable. All other combined alternatives were rated as acceptable from a cost perspective, although considerable technical uncertainties exist with some of these options.

Technical Applicability: The Proponent indicated that conventional dewatering is a proven technology and rated this technology as preferred for system integrity and reliability. None of the other alternatives are technically feasible in isolation, but can be considered in combination with conventional dewatering. Slurry wall technologies have proven integrity and reliability in unconsolidated sediments, but are less proven in bedrock, and have significant depth limitations. Grouting typically will not form a continuous barrier, as there are inevitably numerous spaces in the bedrock that would be missed, but supplemental grouting could be used to reduce groundwater flows towards the open pit in certain instances. Anticipated groundwater velocities make freeze wall technologies impractical and unreliable for use in fractured, microkarstic limestone. Development of freeze walls at depths approaching or exceeding 200 m is also highly problematical. For the Victor setting, slurry wall and freeze wall technologies could reasonably be applied to overburden conditions, but such applications would not meaningfully reduce dewatering requirements, and are not proposed.

Minimize Effects to the Natural Environment: Conventional dewatering will require discharging large volumes of moderately saline water to the Attawapiskat River. The Proponent indicated that the Attawapiskat River has sufficient capacity even under extreme low flow conditions to accept this discharge without the potential for adverse effects to aquatic life, or to the health of humans and wildlife (Section 6.4.1), but groundwater modelling indicated that well dewatering is likely to meaningfully reduce flows in the Nayshkootayaow River system during low flow periods (Section 6.4.2).

Barrier technologies (slurry wall, grouting or freeze wall), in theory, could potentially reduce the footprint of the zone of depressurization within the bedrock, thereby potentially reducing, or completely alleviating, adverse effects to surface water systems, and potentially also to muskeg systems in very localized areas bordering bioherms. However, the Proponent has indicated that none of these barrier technologies has any reasonable probability of success when used in combination with conventional well dewatering, with the possible exception of grouting under certain localized circumstances. The Proponent has committed to the investigation of grouting applications during open pit dewatering, when the benefits of grouting (if any) would become evident; and if these investigations show that grouting would be likely to meaningfully reduce well field dewatering effects, at reasonable cost, then grouting would be carried out in localized areas, as applicable.

Minimize Effects to the Socio-economic Environment: Groundwater barrier methods, if they were technically and economically feasible, would eliminate potential adverse effects on river flows and associated fish habitat, and therefore have a lesser potential effect on traditional pursuits related to fishing. Barrier control methods would also eliminate the need to discharge moderately saline groundwater to the Attawapiskat River. The different groundwater control methods are not expected to have any effect on, physical or cultural resources, or historical, archaeological, paleontological or architectural features. The barrier methods are rated as preferred, and the use of dewatering wells is rated as acceptable.

Summary Evaluation

Performance evaluations for groundwater control alternatives are summarized in Table 3-1. The overall acceptability of conventional dewatering using perimeter wells and in-pit sumps is indicated by achievement of acceptable or preferred ratings for all performance objectives. The use of slurry walls and freeze walls in combination with conventional dewatering was rejected by the Proponent. Grout curtain technology may be acceptable when used in conjunction with dewatering wells, pending further investigation as dewatering is being carried out.

Environmental effects on the project are problematic with freeze wall and grout curtain technologies because groundwater velocity and flow path considerations through the bedrock aquifer do not permit application of these technologies.

Government Position

The Government of Canada agrees with the positions outlined by De Beers in the CSEA and as summarized in this section of the CSR.

3.4.6 Mine Water Management and Disposal (Well Field Water)

The management and disposal of mine water generated from pit dewatering wells (well field water) is discussed in this section. The management and disposal of mine water generated from the pit floor (pit sump water) is discussed in Section 2.1.6.

The following volumes of groundwater will be collected by the well field and require disposal:

- Initial dewatering at 40,000 m^3/d to 60,000 m^3/d; and,
- Steady-state dewatering at 80,000 m^3/d to 100,000 m^3/d.

Well water will be of generally good quality with low concentrations of total suspended solids (TSS), but with moderate salinity (total dissolved solids of approximately 2,000 mg/L).

3.4.6.1 Alternatives

The management and disposal alternatives considered by the Proponent for well field water were the following:

1) Direct discharge to the Attawapiskat River;
2) Direct discharge to James Bay;
3) Desalination prior to discharge to the environment; and,
4) Groundwater injection.

Discharge to the Attawapiskat River

Direct discharge of well field water to the Attawapiskat River will require a 6.5 km pipeline from the open pit. Provided that well field water is not deleterious to fish, meets applicable standards and receives legislated approval. The water will be untreated and disposal will rely on the assimilative capacity of the river to provide sufficient mixing (dilution) to reduce natural salinity in the well water to those standards relevant to the protection of freshwater aquatic life and to drinking water. The Attawapiskat River is the largest local river system and thus has the greatest potential to accommodate well field discharge under all flow conditions. The Proponent estimated the capital and operating costs associated with this discharge at $21 million (excluding dewatering costs which are the same for all options).

As per Section 3.4.5, the Proponent has committed to the investigation of grouting applications during open pit dewatering. Benefits of grouting may also include reduced inflow of higher-salinity groundwater, which may reduce total dissolved solid loadings. If these investigations show that grouting would be likely to reduce well field dewatering effects, including any effects from discharge of well-field water, at acceptable costs, the Proponent has committed to carrying out grouting.

Direct Discharge to James Bay

Discharge of well field water to James Bay (the closest saline water body) would have virtually no aquatic impact since James Bay is already saline and has an enormous assimilative capacity. However, discharge to this water body would require an approximately 120 km pipeline, with terminal construction across the broad (2 to 5 km) James Bay tidal mud flats. The Proponent indicated that construction across the tidal mudflats was not technically feasible. Capital costs for this option, if technically feasible, would be greater than $80 million. Operating costs were not assessed.

Groundwater Injection

Groundwater injection involves the insertion of saline water into a distant aquifer capable of accepting the flow. The target aquifer should not be situated in the same bedrock unit that is being dewatered. The Proponent has indicated that groundwater injection is not technically feasible for the VDP, because there is no suitable site for groundwater injection.

If a suitable receiving aquifer existed, the costs associated with the installation and operation of an injection well field would be greater than $160 million.

Desalination Prior to Discharge

The desalination technologies in current use include pressurized membrane technologies (such as reverse osmosis) and distillation. Reverse osmosis is the most widely used of the two technologies because of the far higher energy costs associated with distillation. Both technologies produce water with low salinity; however, they also produce large quantities of concentrated brine solution (in the order of 15% of the feed volume) that would still require disposal, with no means of achieving such disposal. Capital and energy costs of both desalination technologies are extremely high. For a reverse osmosis facility (the less costly of the two options), total capital and operating cost would be greater than $630 million.

3.4.6.2 Performance Objectives and Evaluation

Performance objectives assessed by the Proponent for well field water management and disposal alternatives were the following:

- Cost-effective operation;
- Technical applicability;
- Minimize effects to the natural environment; and,
- Minimize effects to the socio-economic environment.

Cost-effectiveness: The Proponent indicated that the preferred disposal alternative to minimize costs is direct discharge to the Attawapiskat River, and that the other alternatives have unacceptably high infrastructure and energy requirement costs.

Technical Applicability: The Proponent has indicated that discharge to the Attawapiskat River is the only technically feasible option. Discharge to James Bay is not technically feasible due to the inability to construct a pipeline across the James Bay tidal mud flats. Desalination, while technically feasible, is not practical because large volumes of concentrated brine would be generated with no disposal option. Groundwater injection is not feasible because of the absence of an appropriate receiving aquifer.

Minimize Effects to the Natural Environment: Groundwater injection, if technically feasible, would be preferred as there would be no discharge to surface water systems. The only river with the assimilative capacity to receive the well field water is the Attawapiskat River; this alternative is rated by the Proponent as acceptable. Desalination prior to discharge to the Attawapiskat River, if feasible, would require disposal of a concentrated salt brine for which there is no obvious disposal option. Pipeline discharge to James Bay, if feasible, would be rated acceptable rather than preferred, because of the need to undertake construction activities within the James Bay shoreline and near shore environments.

Minimize Effects to the Socio-economic Environment: The direct discharge to James Bay option would require the construction and operation of an extended buried pipeline, which could have an incremental influence on the use of traditional lands. Discharging well field water directly to the Attawapiskat River has some potential to marginally exceed the provincial drinking water standard for sodium, for persons on sodium-reduced diets (20 mg/L), during extreme low flow conditions, if higher than expected salinity concentrations are encountered in the groundwater. The different well field water disposal alternatives would not be expected to have any effect on physical or cultural resources, or historical, archaeological, paleontological or architectural features. Desalinization and groundwater injection are rated as preferred, and direct discharge to either the Attawapiskat River or to James Bay are rated as acceptable for socio-economic considerations.

Summary Evaluation

The Proponent indicated that discharging well field water to the Attawapiskat River was the preferred and the only viable alternative (Table 3-1). The other alternatives all received one or more unacceptable performance objective ratings and were rejected. The preferred discharge location on the Attawapiskat River takes into consideration land tenure (i.e., within De Beers claims), bank stability, mixing efficiency, and fish habitat considerations (avoidance of deep water habitat as requested by DFO).

Higher than expected groundwater salinity could potentially increase treatment costs with the Attawapiskat River direct discharge option, and with desalination technologies. The latter alternative is already prohibitively expensive.

Government Position

The Government of Canada agrees with the positions outlined by De Beers in the CSEA and as summarized in this section of the CSR.

3.4.7 Mine Water Management and Disposal (Pit Sump Water)

Surface runoff, direct precipitation, and limited overburden seepage will collect in the open pit. In later mine life (approximately Year 6), saline groundwater will also partially bypass the pit perimeter well field (residual passive inflow – RPI) and enter the pit. Water that enters the pit from these sources will be collected in pit sumps and pumped to surface. Pit sump water during all phases will contain suspended solids (TSS), residual ammonia from blasting, and trace hydrocarbons from heavy equipment operation. Trace hydrocarbons will be retained in the sumps, and periodically removed using absorbent materials.

Two phases of pit sump water management were considered by the Proponent:

- Phase 1 – no meaningful RPI; and,
- Phase 2 – meaningful RPI, increasing to a maximum of approximately 47,000 m^3/d in later mine life.

The Proponent has set the maximum design daily pumping rate at 10,000 m^3/d during Phase 1, and 58,000 m^3/d for Phase 2. Storm water inflows, which exceed these capacities, will be temporarily stored in the pit sumps, until the pumps can catch up with the inflow rate.

3.4.7.1 Alternatives

Alternatives for the treatment of pit sump water focused on methods for removing TSS, with subsequent discharge to the appropriate receiving water depending upon salinity levels, and were defined by the Proponent to include:

1) Settling pond system (above or below grade); and,
2) Mechanical water treatment plant.

Settling Pond (Above or Below Grade)

Settling ponds are the most common means of treating mine water to remove TSS, and can be constructed as either below grade (excavated), or above grade (constructed with berms) structures, depending on material availability and cost. During Phase 1 operations, when construction materials (mine rock and coarse PK) are not readily available, the Proponent has proposed a below grade structure, with subsequent passive flow through a linear fen system to remove residual clay-sized particles, before discharge to the Nayshkootayaow River.

For Phase 2, with anticipated increased flows and moderately saline flows, the Proponent has proposed an above grade, bermed settling pond, as construction materials will be readily available at this time. Discharge in this case would be to the Attawapiskat River, because of the larger more saline flows. The estimated cost for the Phase 1 below grade settling pond is $1.7 million. The projected cost for the Phase 2 settling pond is $2.9 million.

Mechanical Water Treatment

As an alternative to settling ponds, a water treatment plant equipped with clarifiers and filters could be used to treat mine water. Such a system would be comparatively expensive (capital costs of $5 million to $8 million) and would not meaningfully improve treatment efficiency over that provided by settling ponds.

3.4.7.2 Performance Objectives and Evaluation

Performance objectives for assessing alternative pit sump water management and disposal alternatives were the following:

- Cost-effectiveness;
- Technical applicability;
- Minimize effects to the natural environment; and,
- Minimize effects to the socio-economic environment.

<u>Cost-effectiveness</u>: During both phases, a settling pond was the preferred pit sump water treatment alternative with respect to cost.

<u>Technical Applicability</u>: The settling pond alternative is rated as preferred with respect to technical applicability for both phases. Mechanical treatment plants require a higher level of technical support to ensure reliability, and pose greater risks during periods of shutdown or repair.

<u>Minimize Effects to the Natural Environment</u>: Both technologies were rated by the Proponent as providing equivalent and effective treatment efficiencies.

Minimize Effects to the Socio-economic Environment: The pit sump water management alternatives are not expected to have any meaningful effect on health related emissions, physical or cultural resources, lands and resources used for traditional pursuits, or historical, archaeological, paleontological or architectural features. Both alternatives are rated as preferred for socio-economic considerations.

Summary Evaluation

The Proponent's preferred alternative is to treat Phase 1 pit sump water using a settling pond, followed by passive wetland treatment and discharge to the Nayshkootayaow River. In Phase 2, when flows and salinity increase, treatment in an above grade-settling pond with discharge to the Attawapiskat River was selected by the Proponent as the preferred alternative (Table 3-1).

Pit sump water management alternatives do not influence potential environmental effects on the project.

Government Position

The Government of Canada agrees with the positions outlined by De Beers in the CSEA and as summarized in this section of the CSR.

3.4.8 Control of Air and Noise Emissions

Alternatives for the control of air and noise emissions were not assessed. The Proponent will incorporate best available air and noise controls where applicable.

3.5 Ore Processing - Wastewater Management

3.5.1 Plant Wastewater Management

Water will be extensively recycled within the processing plant thickeners, minimizing the need for wastewater disposal. The amount of wastewater requiring disposal will therefore be a function of thickener efficiency and desired properties of the fine PK slurry for effective disposal. Minimal water losses are expected for the coarse PK fraction (dewatered to about 90% solids by weight).

3.5.1.1 Alternatives

The Proponent considered three alternatives for discharge of the fine PK slurry:

1) 30% solids by weight (high volume, weak slurry);
2) 50% solids by weight (moderate volume, moderate thickness); and,
3) 70% solids by weight (low volume, very thick slurry paste).

3.5.1.2 Performance Objectives and Evaluation

Performance objectives used by the Proponent for assessing alternatives for wastewater management at the Victor site were the following:

- Cost-effectiveness;
- Technical applicability;
- Minimize effects to the natural environment; and,
- Minimize effects to the socio-economic environment.

Cost-effectiveness: The Proponent indicated that the 50% solids alternative was the most favourable (preferred) in terms of both capital and operating costs (Table 3-1). The 70% solids alternative would be more expensive because of the additional thickening and pumping infrastructure required, and associated higher power requirements. The Proponent did not develop a cost estimate for the 30% solids alternative, but this option would also be more costly, because of increased water management requirements.

Technical Applicability: The more extreme conditions (30% and 70% solids by weight slurries) present operational challenges. Fine PK at 30% solids is easiest to pump, but requires the management of unnecessarily large volumes of water. Conversely, the 70% solids by weight slurry will not spread effectively on discharge to the PKC facility, resulting in excessively steep depositional slopes, poor space utilization within the PKC facility, and a need to move the discharge pipeline frequently. The Proponent therefore selected the 50% slurry alternative as the preferred (optimal) mode of operation.

Minimize Effects to the Natural Environment: Ultimately the water that is contained in the fine PK slurry and discharged to the PKC facility will require discharge to the environment. The alternative resulting in the smallest discharge volume (70% solids by weight) is the preferred alternative in this regard. The other alternatives (30% and 50% solids by weight) are rated as acceptable.

Minimize Effects to the Socio-economic Environment: Ore processing alternatives are not expected to have any meaningful effect on health related emissions, physical or cultural resources, lands and resources used for traditional pursuits, or historical, archaeological, paleontological or architectural features. All alternatives are rated as preferred for socio-economic considerations.

Summary Evaluation

The Proponent selected the 50% solids alternative as the preferred option, based primarily on operational and cost aspects (Table 3-1). The other alternatives (30% solids and 70% solids) were rated as acceptable.

Ore processing alternatives do not influence potential environmental effects on the project.

Government Position

The Government of Canada agrees with the positions outlined by De Beers in the CSEA and as summarized in this section of the CSR.

3.6 Fine Processed Kimberlite Management

3.6.1 General Considerations

The principal functions of the PKC facility are to contain all fine PK produced within a stable environment, and to provide for effective wastewater management.

The Proponent proposes a single PKC facility, with siting based on the following criteria:

- Close proximity to the processing plant;
- Geotechnical suitable ground conditions;
- Suitable methods for treatment and location of wastewater discharge; and,
- Availability of sufficient area for facility construction, while avoiding interference with sensitive environmental habitats (such as watercourses and forested corridors).

The Proponent has indicated that the proposed PKC location is the only one that meets the above criteria. Therefore, no alternative locations were considered. Other alternatives have been identified with respect to both PKC design and PKC effluent management (Section 3.6).

3.6.2 PKC Design (Initial Phase)

3.6.2.1 Alternatives

The Proponent identified two alternatives for fine PK storage at the start of processing, before mine rock and coarse PK are available as construction materials:

1) Storage within the central quarry; and,
2) Construction of an above grade, bermed storage facility using quarried aggregate.

Central Quarry

The Proponent has calculated that once quarry operations are completed, the central quarry will provide an estimated 1.5 Mm^3 of available storage space for other functions. Approximately 65% of this capacity (1.0 Mm^3) could be used for fine PK deposition during the initial phase operations (approximately 9 months), while still providing a 0.5 Mm^3 residual capacity for development of a PKC polishing pond, for effluent treatment during subsequent PKC operations (Section 2.3.2). The central quarry is ideally positioned for these functions. Aside from basic infrastructure common to all alternatives (fine PK slurry discharge pipeline, etc.), the Proponent indicated that there would be a negligible cost associated with this alternative, since the central quarry will already exist.

Above Grade Storage Facility

An above grade fine PK storage facility could be constructed for the initial phase of fine PK deposition, but this would require additional costs associated with quarrying of construction materials to build berms as estimated by the Proponent at $15 million.

3.6.2.2 Performance Objectives and Evaluation

Performance objectives for assessing facility design and operation alternatives during the initial stage are the following:

- Cost-effectiveness;
- Technical applicability;
- Minimize effects to the natural environment; and,
- Minimize effects to the socio-economic environment.

Cost-effectiveness: It was determined that the use of the existing central quarry for fine PK disposal would significantly reduce costs, compared with the construction of containment berms using quarried rock, and is therefore the preferred alternative.

Technical Applicability: Both initial stage PK storage alternatives would be expected to operate with predictably good effectiveness, but the above grade facility would have the added benefit of using the adjacent central quarry as a polishing pond in the early production period.

Minimize Effects to the Natural Environment: The Proponent indicated that both options would avoid disturbance to forested zones along the creeks and rivers, and related aquatic environment. The above grade option, however, would require significant extra quantities of quarry material, and could necessitate development of a larger, or additional quarry, making this alternative less attractive, but acceptable.

Minimize Effects to the Socio-economic Environment: PKC initial phase design alternatives are not expected to have any meaningful effect on health related emissions, physical or cultural resources, lands and resources used for traditional pursuits, or historical, archaeological, paleontological or architectural features. Both alternatives are rated as preferred for socio-economic considerations.

Summary Evaluation

The Proponent has indicated that use of the central quarry is the preferred alternative (Table 3-1). This option has the lowest cost and will have the greatest operational ease. Additional discussions of PKC facility alternatives assume use of the central quarry for initial deposition, followed by subsequent use as a polishing pond during later operations phases.

PKC initial phase design alternatives do not influence potential environmental effects on the project.

Government Position

The Government of Canada agrees with the positions outlined by De Beers in the CSEA and as summarized in this section of the CSR.

3.6.3 PKC Design (Later Phases)

3.6.3.1 Alternatives

Two alternatives were identified by the Proponent for development of a fine PK storage facility subsequent to initial use of the central quarry. These are:

1) Central cone fine PK deposition, with shallower height containment berms; and,
2) Perimeter fine PK deposition requiring construction of more extensive perimeter containment berms.

Cone Deposition

For this alternative, fine PK would be deposited from an elevated ramp located in the centre of the cells (cone deposition). This deposition strategy has the advantage of delaying the need for larger perimeter dams until mine rock and/or coarse PK become more readily available, and is therefore most attractive for the early phase of Cell 1 operation when limited mine rock and coarse PK are available as construction materials. The disadvantage of this option, over the longer term, is that fine PK would not be deposited against the inside face of the perimeter dams, resulting in increased seepage passing through the perimeter dams during early PK storage phases.

Perimeter Deposition

With this alternative, PK slurry would be discharged by spigotting from the perimeter dam into the three containment cells. The build-up of fine PK against the cell walls would limit seepage through the walls over the longer term, and would provide an effective filter for PKC effluent that seeps through the dams to the perimeter collection ditches.

3.6.3.2 Performance Objectives and Evaluation

Performance objectives for assessing facility design and operation alternatives, after initial use of the central quarry for fine PK deposition, were the following:

- Cost-effectiveness;
- Technical applicability;
- Minimize effects to the natural environment; and,
- Minimize effects to the socio-economic environment.

Cost-effectiveness: The primary economic consideration involving fine PK storage during early PKC construction (Stage 1A) is the availability of suitable construction materials. The cone deposition method reduces construction material needs and costs until mine rock and coarse PK become readily available, with an estimated cost savings of $15 million. After Stage 1A, mine rock and coarse PK will be readily available as construction materials, significantly reducing the cost of berm or dam construction from the earlier stage. At this point, both alternatives become approximately equal from a cost perspective.

Technical Applicability: The Proponent considered that both fine PK deposition alternatives would be expected to operate with predictably effective results, and were rated as preferred.

Minimize Effects to the Natural Environment: With the perimeter discharge method, fine PK will be deposited against the internal faces of the dams, thereby reducing the rate of seepage passing through and under the dams. The fine PK material, being composed mainly of sand-sized particles, will also provide a good filter medium. Use of the cone deposition method would delay the development of fine PK beaches against the upstream dam faces. The perimeter discharge method has the disadvantage of requiring the quarrying of approximately 0.6 Mm^3 of additional material for dam construction, requiring expansion of the north quarry, or potentially a fourth quarry.

Minimize Effects to the Socio-economic Environment: PKC later phase design alternatives are not expected to have any meaningful effect on health related emissions, physical or cultural resources, lands and resources used for traditional pursuits, or historical, archaeological, paleontological or architectural features. Both alternatives are rated as preferred for socio-economic considerations.

Summary Evaluation

The Proponent indicated that use of the perimeter deposition method is the preferred longer-term alternative for fine PK deposition, because this method offers improved water management potential (Table 3-1). Cone deposition is proposed for the early phase of Cell 1 operation, because cone deposition at this stage offers considerable cost savings. All seepage through the Cell 1 perimeter dams will report via external perimeter collection ditches to the polishing pond, so water will be effectively managed at this stage with the cone deposition strategy. Also, if operational advantages are found during Stage 1A for cone deposition, the Proponent has indicated that cone deposition could be used in conjunction with the perimeter dam deposition in later project PKC management phases.

PKC later phase design alternatives do not influence potential environmental effects on the project.

Government Position

The Government of Canada agrees with the positions outlined by De Beers in the CSEA and as summarized in this section of the CSR.

3.6.4 PKC Effluent Management

3.6.4.1 Alternatives

The Proponent identified three alternatives for the discharge of treated effluent from the PKC facility to a local surface water body, as per the following:

1) Discharge to North Granny Creek, no recycle to process;
2) Pump direct to Attawapiskat River, no recycle to process; and,
3) Recycle to process plant; discharge excess water to North Granny Creek.

Overland Flow to North Granny Creek (No Recycle to Process)

This alternative involves the discharge of treated effluent from the PKC facility, specifically the polishing pond, through a constructed drainage way to North Granny Creek. Effluent quality is not expected to adversely affect the creek, and this alternative requires the least amount of infrastructure. The Proponent has also indicated that most or all of the polishing pond discharge would report via subsurface flow through the bedrock aquifer to the pit perimeter collection wells during low flow conditions. This condition would also apply to the other alternatives.

Pump Direct to Attawapiskat River (No Recycle to Process)

With this option, treated effluent from the PKC facility would be pumped from the polishing pond to the Attawapiskat River. The effluent would likely be combined with well field water for discharge, rather than using a separate dedicated pipeline. Additional infrastructure, such as an intake (floating barge) in the polishing pond, and a pipeline and manifold to the well field water discharge pipeline, would be required with this alternative.

Recycle to Process Plant, Overland Flow of Excess Water to North Granny Creek

This alternative is similar to Alternative 1 except that the treated effluent would be returned to the process plant for recycling. This alternative would provide for lower flow volumes reporting to North Granny Creek. A floating barge and pipeline to the processing plant would be required.

3.6.4.2 Performance Objectives and Evaluation

Performance objectives for assessing PKC effluent management alternatives during the initial stage were the following:

- Cost-effectiveness;
- Technical applicability;
- Minimize effects to the natural environment; and,
- Minimize effects to the socio-economic environment.

Cost-effectiveness: Alternatives 2 and 3 require added pumping infrastructure, and are therefore more expensive, but rated as acceptable. Alternative 1 is preferred.

Technical Applicability: Alternative 1 is the preferred alternative. Alternatives 2 and 3 are acceptable, but both have additional operational requirements.

Minimize Effects to the Natural Environment: Alternatives 1 and 2 involve no recycling of treated effluent (apart from the significant amount of recycling already occurring within the process plant). The water quality and quantity of the treated effluent would, however, have a negligible (acceptable) effect on both receiving waters (North Granny Creek and Attawapiskat River), especially considering that there would be little or no outflow from the polishing pond during receiver low flow conditions. Alternative 3 is nonetheless offers a slight advantage because there would be a smaller volume of excess water discharged to North Granny Creek.

High runoff conditions, such as the spring melt, would be problematic for Alternatives 2 and 3, because pump systems would have to be substantially oversized, if the objective was to manage all water from the PKC facility. Alternatively storage capacity within the PKC dams would have to be increased.

Summary Evaluation

The Proponent indicated that overland discharge without recycling from the polishing pond (Alternative 1) was the preferred alternative, being rated as preferred for three performance objectives and acceptable for one (Table 3-1). Alternatives 2 and 3 were rated as acceptable.

Government Position

The Government of Canada agrees with the positions outlined by De Beers in the CSEA and as summarized in this section of the CSR.

3.7 Coarse PK Storage

The processing plant will produce an estimated 10 Mt of coarse PK. Drainage from the coarse PK stockpiles is not expected to adversely affect surface waters, provided that extreme low pH and anoxic conditions (in combination) are avoided within stockpile foundations, otherwise iron and trace metal mobilization could become a local concern. Placing the coarse PK stockpile in a fen (as opposed to a more acidic bog) environment, with near neutral pH conditions, as proposed by the Proponent, will eliminate any such concerns. Otherwise, stockpile locations are a function of close proximity to the processing plant (reducing transportation costs), and non-interference with more sensitive areas, notably the forested zones bordering the creeks and rivers. Apart from these considerations, alternatives have not been developed with respect to coarse PK stockpile locations.

Government Position

The Government of Canada agrees with the positions outlined by De Beers in the CSEA and as summarized in this section of the CSR.

3.8 On-site Infrastructure

3.8.1 General Considerations

On-site infrastructure will be sited and operated to satisfy the following performance objectives:

- Situated on De Beers' held claims beyond the 500 m pit blast zone;
- Removed from sensitive habitats such as creeks, rivers and associated forested margins;
- Minimizes capital and operating costs, as well as travel/haul distances;
- Maintains a compact site but does not interfere with other project components; and,
- Facilitates site reclamation and final closure.

The Proponent assigned infrastructure ratings (preferred, acceptable, unacceptable) to the various alternatives based on the above performance objectives. In the majority of instances, ratings are relative, with nearly all alternatives achieving at least an acceptable rating. More detailed evaluations are not provided as the siting and operation of infrastructure facilities is largely incidental to, and dependent on, the siting and operation of the primary site facilities considered above. Also, infrastructure facilities, for the most part, present limited potential for environmental impact. A summary of the alternatives is provided in Table 3-1.

3.8.2 Aggregate Sources

The VDP will require two types of aggregates: sand and gravel, and quarried rock. The only locally available sand and gravel sources are glacial deposits, such as the esker located 15 km west of the project site (closest location). The alternative is trucking sand and gravel from similar, but more distant sources further to the west, for which there is no obvious advantage. Alternatives to the proposed sand and gravel pit west of the project site were therefore not developed by the Proponent.

Quarried rock is necessary to establish site infrastructure (roads, airstrip, laydown areas and building pads) prior to mining. Three alternative sources of quarried rock were considered for the construction phase, when mine rock is not available:

1) Limestone from bioherms at the project site;
2) Limestone extracted from below surface at the project site; and,
3) Limestone or other rock, extracted from a location off site and transported to site.

Limestone Extracted from Bioherms

There are a number of bioherms in the project site area that are capable of providing a ready source of quarried material. It is proposed that extraction will occur from three bioherms, none of which have unique characteristics from the perspective of the Karst Candidate ANSI. Extraction of rock from bioherms has the advantage of requiring less overburden stripping and reduced water management requirements, because of shallower excavation depths.

Limestone Extracted Below Surface

Limestone is relatively close to the surface at a number of locations at the project site, and could be quarried once muskeg and overburden were stripped away. Larger and deeper excavations would be required for these sources, compared with bioherm sites.

Limestone Extracted Off-site and Transported to Site

Limestone aggregate is available regionally, and could be extracted either from bioherms or other structures off site, and transported to the Victor site over winter roads.

3.8.2.1 Performance Objectives and Evaluation Criteria

The three aggregate rock alternatives were assessed according to:

- Cost-effectiveness;
- Minimize effects to the natural environment;
- Minimize effects to the socio-economic environment; and,
- Amenability to reclamation.

Cost-effectiveness: Detailed costs were not developed for these alternatives, but were assessed comparatively. Quarrying rock from off-site sources could have similar or greater quarrying costs than on-site sources, plus added transportation costs and was rated as unacceptable. The preferred option is to extract limestone from exposed bioherm(s) located at the project site.

Minimize Effects to the Natural Environment: All three options require disturbance of the landscape, but disturbance would be less with exposed features. The first two options require extraction of limestone within the candidate Attawapiskat Karst ANSI (Section 2.4.1. The third alternative would require additional truck traffic over winter roads, and potentially more disturbances to wildlife. The central quarry is uniquely positioned to provide the multiple functions of: quarry source, fine PK storage, polishing pond for PKC effluent, and fish habitat compensation at closure. The central quarry site is also a very poorly expressed bioherm, with almost no visible rock showing above the muskeg surface.

Minimize Effects to the Socio-economic Environment: The off-site aggregate source alternative would be potentially more disruptive to lands and resources used for traditional pursuits, depending on the location and conditions associated with any such facility. Meaningful differences among the alternatives would not be expected for effects relating to health related emissions, physical or cultural resources, or historical, archaeological, paleontological or architectural features. Alternatives 1 and 2 are rated as preferred for socio-economic considerations, and Alternative 3 is rated as acceptable.

Amenability to Reclamation: All three options will require reclamation at closure, likely as flooded ponds redeveloped as aquatic habitat. Given the scale of quarrying required, limited reclamation will be needed for all options.

Summary Evaluation

The Proponent indicated that the excavation of rock from bioherms on site is the preferred option overall. Excavation of rock from on site below grade structures was rated as acceptable. Transporting quarried rock from off site sources is rated as unacceptable because of costs (Table 3-1).

Selection of an off-site aggregate resource would be subject to temperature and snowfall effects involving winter road construction.

Government Position

The Government of Canada agrees with the positions outlined by De Beers in the CSEA and as summarized in this section of the CSR.

3.8.3 Buildings, Yards, and Access Roads

A single plant site complex is envisioned, with facilities being located near one another to reduce infrastructure requirements and travel distances; conserve space; and, to reduce environmental effects. The process plant is the most important site building as it has specific siting requirements, including adequate bedrock foundations for heavy equipment, and close proximity to the open pit to minimize hauling distances. The Victor fuel tank farm also has specific siting requirements for foundations and fire protection. Laydown and storage yards will be located in close proximity to the plant.

There are two locations where bedrock foundation requirements can be met: to the west of the open pit, and near the advanced exploration sample treatment plant to the south. The location to the west of the open pit is preferred. This location is also positioned en route to the proposed PKC facility, which reduces PK slurry pipeline and service road requirements. The south location is too far removed from the open pit and PKC facilities to be functional, and is too close to the Nayshkootayaow River. Road requirements and alignments are generally defined by the need to connect facilities, and do not require consideration of alternatives, other than means to minimize effects to sensitive environments where practicable, such as at creek crossings.

Government Position

The Government of Canada agrees with the positions outlined by De Beers in the CSEA and as summarized in this section of the CSR.

3.8.4 Airstrip

An all-season airstrip is required for personnel transport, the transport of fresh foodstuffs, safety, and to supply equipment and other materials in emergency situations. The criteria for selection of the location for an all-season airstrip include:

- Ability to move personnel, equipment, or other materials to/from the mine site in emergency situations;
- East-west orientation (prevailing winds are from the northwest in the winter and from the southwest in the summer);
- Sufficient size/length to provide for landing of large cargo aircraft;
- Safe approach and landing conditions; and,
- Avoidance of exceedingly wet areas such as fen muskeg.

The Proponent has indicated that the selected airstrip location is the only location that meets all of the above requirements.

The alternatives of utilizing the existing airstrip in Attawapiskat, or constructing a new airstrip in the vicinity of Attawapiskat, were considered. Neither of these alternatives is capable of providing access to the Victor site, in the absence of an all-season road linking Attawapiskat to the Victor site.

Government Position

The Government of Canada agrees with the positions outlined by De Beers in the CSEA and as summarized in this section of the CSR.

3.8.5 Drainage Works – South Granny Creek Diversion

The proposed open pit intersects South Granny Creek. Diversion of a portion of South Granny Creek is required to remove this hazard to mining operations and to ensure optimal ore recovery.

3.8.5.1 Alternatives

Two alternative realignments of South Granny Creek, as well as a no realignment scenario, were considered by the Proponent as per the following:

1) Realignment of a 2.6 km section of the South Granny Creek south of the existing alignment;
2) Diversion of South Granny Creek directly into the Nayshkootayaow River; and,
3) Restricting mining operations (no realignment).

Realignment of South Granny Creek

Realignment of South Granny Creek will require the replacement of a 2.6 km creek section with a 2.6 km diversion channel, and like-for-like fish habitat compensation as per DFO policy preferences. The new channel will be positioned a minimum of 300 m from the pit perimeter to ensure integrity and stability of the new channel and pit wall security. The realigned channel would become fully naturalized over the life of the project, and would become the permanent channel.

Diversion of South Granny Creek Directly into the Nayshkootayaow River

The alternative of diverting South Granny Creek directly into the Nayshkootayaow River has the potential to provide more effective drainage of the open pit area, but would compromise the functioning of downstream portions of the Granny Creek system, and would require reversal at closure to restore natural drainage.

Restricting Mining Operations

With this option, the Proponent has indicated that mining operations would have to be restricted to the point where the operation would no longer be viable.

3.8.5.2 Performance Objectives and Evaluation Criteria

The three diversion alternatives were assessed according to:

- Cost-effectiveness;
- System integrity and reliability;
- Minimize effects to the natural environment;
- Minimize effects to the socio-economic environment; and,
- Amenability to reclamation.

<u>Cost-effectiveness</u>: The preferred option with respect to cost is the realignment of South Granny Creek. The direct diversion of South Granny Creek to the Nayshkootayaow River would be more expensive, but acceptable. Restricting mining operations so as to maintain the current alignment of South Granny Creek would make the project uneconomic and is unacceptable.

Technical Applicability: All alternatives provide for system integrity and reliability.

Minimize Effects to the Natural Environment: Restricting mining operations is the preferred alternative from this perspective, as it would present no adverse effect to the Granny Creek system. Realignment of South Granny Creek is acceptable, as this option would not affect downstream flows and compensation for the destruction of fish habitat would be provided. Diverting South Granny Creek directly to the Nayshkootayaow River would result in substantial changes to the Granny Creek system and was considered unacceptable by the Proponent. Effects in the latter case would involve diverting half the creek flow away from the Granny Creek confluence area. This section of the creek exhibits a more varied substrates, compared with other areas of the Granny Creek system, including sand, gravel and cobble substrates, with a stepped riffle-pool morphology, and is therefore capable of supporting a more diverse fish and benthic invertebrate community.

Minimize Effects to the Socio-economic Environment: South Granny Creek diversion alternatives are not expected to have any meaningful effect on health related emissions, physical or cultural resources, lands and resources used for traditional pursuits, or historical, archaeological, paleontological or architectural features. All alternatives are rated as preferred for socio-economic considerations.

Amenability to Reclamation: Restricting mining operations and not altering the existing alignment of South Granny Creek is the preferred alternative with respect to amenability to reclamation (no reclamation required). Realignment of South Granny Creek is acceptable since it does not require modification or reclamation following mine closure.

Summary Evaluation

The Proponent indicated that realignment of South Granny Creek is the preferred alternative, being rated as preferred or acceptable for all performance objectives. Diversion to the Nayshkootayaow River and restricting mining operations were considered unacceptable and were rejected (Table 3-1).

South Granny Creek diversion alternatives do not influence potential environmental effects on the project.

Government Position

The Government of Canada agrees with the positions outlined by De Beers in the CSEA and as summarized in this section of the CSR.

3.8.6 Water Supply Systems

Water is required for processing, domestic potable supply, fire protection, and to maintain seasonal low flow in the Nayshkootayaow River. Fresh water supply varies from an estimated 8,400 to 31,000 m^3/d depending on requirements for Nayshkootayaow River supplementation. The alternative sources of water supply are the Attawapiskat River and groundwater from the dewatering well field.

Water Supply from the Attawapiskat River

The Attawapiskat River is a large nearby system, easily capable of providing all water supply needs. It will not be available in the early construction phase, however, until a pipeline can be constructed.

Groundwater from the Dewatering Well Field or Other Wells

Groundwater from the well field would also be readily available as the infrastructure will already be in place for dewatering of the open pit. However, well field water will be saline and is not well suited for many of the proposed uses, especially flow supplementation of the Nayshkootayaow River.

Summary Evaluation

The Attawapiskat River was selected by the Proponent as the only viable water supply alternative for the VDP once a pipeline is available. A dedicated groundwater well will be used in the early construction phase to meet project needs until the pipeline can be constructed. Flow supplementation to the Nayshkootayaow River system will not be required during pipeline construction.

Government Position

The Government of Canada agrees with the positions outlined by De Beers in the CSEA and as summarized in this section of the CSR.

3.8.7 Explosives Manufacture

Ammonium nitrate based explosives will be manufactured on site (Section 2.4.9). The explosives manufacturing plant will be sited and controlled according to federal regulations. Emulsion based ammonium nitrate explosives will be used because of the expected wet conditions. Emulsion based explosives are also preferred from an environmental perspective because they release less ammonia into the mine water compared with ANFO. Alternatives beyond the choice of emulsion based explosives, and standard safe siting and operating practices were not considered.

Government Position

The Government of Canada agrees with the positions outlined by De Beers in the CSEA and as summarized in this section of the CSR.

3.8.8 Domestic Sewage Handling

The existing exploration camp sewage treatment system has limited capacity and cannot reasonably be expanded. Alternatives considered by the Proponent for future sewage treatment needs included:

1) Sequencing batch reactor (SBR);

2) Rotating biological contractor (RBC); and,
3) Conventional lagoon system.

The first two alternatives are modular package plants that include an aerobic digestion stage followed by disinfection using ultraviolet or equivalent means to meet provincial standards. Both package plants have a very small surface area, allow treatment all year and are expandable. A conventional lagoon requires construction of large settling ponds for primary settling, followed by treatment through a combination of aerobic and anaerobic digestion, and ultraviolet disinfection by sunlight.

The Proponent indicated that an SBR is the preferred package plant for both the construction and operation phases of the project, because of better historical reliability and performance at remote mining camp environments. Lagoons are a proven cold climate technology (as demonstrated at the community of Attawapiskat); however, construction of a traditional in-ground lagoon system would be costly, and would require a comparatively large land base, and is therefore not the preferred alternative (Table 3-1).

Government Position

The Government of Canada agrees with the positions outlined by De Beers in the CSEA and as summarized in this section of the CSR.

3.8.9 Solid Waste Disposal

This section presents alternatives for disposal of non-hazardous domestic and industrial solid wastes. Up to 1,200 kg/d of non-hazardous waste will be generated during construction, and an estimated 500 kg/d during production. A smaller amount of hazardous wastes, such as used oil, spent cleaning solvents and spent degreasing agents, will also be generated. The Proponent has stated that hazardous wastes will be hauled off site by licensed contractors for disposal in licensed facilities. The government accepts the Proponent's commitment for the handling of solid wastes.

3.8.9.1 Alternatives (Non-hazardous Waste)

Most remote Canadian mine sites rely on a conventional below grade landfill for disposal of non-hazardous wastes, supplemented by controlled open burning of items such as wood wastes and some packaging. The Proponent indicated that conventional below grade landfill options were not suitable for the Victor site, because the water table is at or near surface across the general site area. Transporting non-hazardous waste off-site was not considered due to prohibitive costs, and because off-site access will only be available for about 60 days each year.

The alternatives considered by the Proponent for on site disposal of non-hazardous solid wastes for the construction and operation phases were:

1) Waste incineration; and,
2) Landfill (above grade).

Incineration cannot be used on its own, as not all wastes can be incinerated, or are suitable for incineration. Incineration would therefore be used in conjunction with an above grade landfill. Both alternatives would also be used in combination with recycling as practical, and open burning of large packaging materials (paper and wood only) if approved through permitting. The disposal of demolition wastes created during the reclamation phase is considered separately in Section 2.10.10.

Incineration

Incineration involves the burning of selected wastes at very high temperatures. Plastics, rubber, metals, glass, and similar inert materials would be crushed, shredded, and/or otherwise packaged as appropriate for disposal in the above grade landfill site. The primary benefits of incineration are volume reduction and the permanent destruction of putrescible wastes, which might otherwise attract wildlife. Ash from the incinerator will be disposed of within the landfill. The combined capital and operating cost of the incinerator alternative is in the range of $1.6 million. Incineration would also provide a safe and effective means for the disposal of SBR sewage sludge, the disposal of which would otherwise be problematic.

Above Grade Landfill

This alternative involves the construction of an above grade landfill. The landfill would be constructed as a sequence of alternating layers of compacted wastes and coarse fill cover material most likely arranged in cells, constructed on a raised base. Cover material would consist of quarried sand or limestone during the construction phase and mine rock during operations.

The total volume of wastes produced during the construction and operation phases requiring land filling is estimated at 3,725 m^3. Wastes deposited within the landfill would be covered daily in accordance with MOE guidelines. The total quantity of fill required would be approximately 10,000 m^3, assuming 1.0 m average cover thickness. A 75 by 75 m area would provide sufficient capacity for landfill development. The cost of constructing a landfill for domestic waste is estimated at $0.3 million. This excludes costs associated with environmental monitoring, over the longer-term, which the Proponent estimated to be in the order of $2.6 million, mainly because of the high cost of access during the post-closure phase.

The Proponent's plan provides for use of an above grade landfill even if an incinerator is used, because of ash production and because all wastes are not suitable for incineration.

3.8.9.2 Performance Objectives and Evaluation

The two solid waste disposal alternatives were assessed according to:

- Cost-effectiveness;
- Minimize effects to the natural environment;
- Minimize effects to the socio-economic environment; and,
- Amenability to reclamation.

Cost-effectiveness: Both alternatives facilitate a competitive return on investment and were thus rated as preferred by the Proponent.

Minimize Effects to the Natural Environment: The principal environmental advantages of incineration are that it:

- Reduces the volume of wastes requiring disposal;
- Eliminates organic wastes that can cause odour problems and attract wildlife;
- Can be used to effectively eliminate SBR sewage sludge; and,
- Reduces long-term leachate concerns from the on-site landfill.

The Proponent's air quality modelling data indicate that air quality standards would still be met with use of an incinerator (Section 6.2.1).

The landfill alternative, without incineration, was rated by the Proponent as being acceptable for minimizing effects to the natural environment, but a number of drawbacks were cited by the Proponent for this alternative, most notably:

- Increased potential for leachate generation over the long-term;
- Increased odour and wildlife concerns;
- Unacceptable method for the disposal of SBR sewage sludge; and,
- Increased volumetric storage requirements.

Potential scattering of wastes by the wind would be mitigated through proper operation of the landfill, including fencing and application of daily cover material. The landfill alternative was consequently rated as acceptable by the Proponent.

Minimize Effects to the Socio-economic Environment: Incineration has the potential to release contaminants into the air that could be viewed as being important to health considerations and would therefore require monitoring. In this connection it is noted that air quality monitoring predicts that with appropriate emission controls, air quality standards will be met at the Victor site with incinerator use. Use of a landfill, without incineration, would pose long-term leachate considerations, following closure. The alternatives are not expected to have any meaningful effect on physical or cultural resources, lands and resources used for traditional pursuits, or historical, archaeological, paleontological or architectural features. Both alternatives are rated as acceptable for socio-economic considerations.

Amenability to Reclamation: The incinerator would be dismantled and transported off site for sale, or disposed of during mine closure. Post-closure monitoring is not expected with this alternative.

The landfill would require capping with a low permeability cover at closure. The landfill, if used on its own, without being complemented by incineration, would continue to generate leachate following mine closure and would require monitoring for some period of time after closure, and therefore represents a potential long-term environmental liability. The landfill option is rated acceptable with respect to amenability to reclamation.

Summary Evaluation

Overall, the Proponent regarded incineration (in conjunction with landfill use) as the preferred alternative since it is rated as preferred or acceptable in all categories; the landfill alternative on its own is considered acceptable (Table 3-1).

Atmospheric dispersion affects incinerator placement and stack height requirements.

Government Position

The Government of Canada agrees with the positions outlined by De Beers in the CSEA and as summarized in this section of the CSR. The Government of Canada is working with the province of Ontario to ensure that waste is properly handled.

3.9 Off-site Infrastructure – Access and Power

3.9.1 General Considerations

Access and power are functionally related, and as such, alternatives to access and power were considered by the Proponent as integrated systems, rather than separately. In the Proponent's CSEA the preferred power alternative was on-site diesel generation, with fuel transport to the Victor site by means of a sequence of ocean-going vessels, barges, temporary fuel storage tanks in Attawapiskat, and a buried fuel pipeline. Access for materials other than fuel was by winter road and barge from Moosonee to Attawapiskat, and by winter road from Attawapiskat to the Victor site. During the construction phase, fuel was to have been shipped along the west James Bay coastal winter road, from Moosonee to the Attawapiskat, and from Attawapiskat to the Victor site along the winter road.

In response to public concerns regarding the handling of large quantities of fuel in James Bay (45 ML/a) and the associated potential for fuel spills, the Proponent redefined and re-evaluated VDP access and power alternatives. Results of this analysis were documented in the August 2004 "Re-evaluation of Site Access and Power Supply Alternatives" report (SAPA report). De Beers held further consultations because of the overall importance of the access and power alternatives to the project.

3.9.2 Alternatives

Alternatives considered in the Proponent's re-evaluation of access and power options were the following:

1) Coastal winter road access with on-site diesel power generation, marine transport of fuel to Attawapiskat, and a fuel pipeline from Attawapiskat to the Victor site;

2) Coastal winter road access with on-site diesel power generation, marine transport of fuel to Attawapiskat, and winter road trucking of fuel from Attawapiskat to the Victor site;

3) Coastal winter road access with transmission line hook-up to Otter Rapids (or Pinard);

4) Southwest alternative winter road (SWAWR) access with on-site diesel power generation and winter road trucking of fuel;

5) SWAWR access with transmission line hook-up along the coast to Otter Rapids (or Pinard);

6) SWAWR access with transmission line hook-up to Kapuskasing (or Calstock); and,

7) All-season road connection from Percy Lake to Ogoki Post, with winter road access from Ogoki Post to the Victor site, and with transmission line hook-up along the coast to Otter Rapids (or Pinard).

The seven alternative access and power scenarios are shown in Figures 3-1 through 3-7, respectively.

Coastal Winter Road Access with On-site Diesel Power Generation, Marine Transport of Fuel to Attawapiskat, and a Fuel Pipeline from Attawapiskat to the Victor Site (Alternative 1)

This alternative is the base case option, ranked as the preferred alternative in the CSEA. This alternative includes use of the existing west James Bay coastal winter road for general site access, with separate winter road access from Attawapiskat to the Victor site using the north and existing south winter roads.

Power would be generated on site using six, 4.4 MW diesel generators with four, 1.3 MW standby/emergency generators. Diesel fuel would be brought to Attawapiskat in barges, off-loaded from ocean-going tankers. The annual fuel demand at the Victor site would be about 45 million imperial litres (45 ML), two thirds of which would be for power generation. The rest of the fuel (about 13 to 15 ML/a) would be for heavy equipment operation, heating, backup diesel generation, and other uses. The ocean-going tankers would deliver fuel from eastern Canadian ports, through Hudson Strait and Hudson Bay to James Bay. The tankers would anchor in Akimiski Strait and off-load (lighter) the fuel on to barges for transport to Attawapiskat. To accommodate barge traffic, the James Bay entrance to the Attawapiskat River would require dredging.

Fuel from the barges would be off-loaded in Attawapiskat to 15 ML total capacity storage tanks. A 105 km long, 15 cm diameter, buried steel pipeline would transport fuel from Attawapiskat to the Victor site. Fuel at the Victor site would be stored in 45 ML total capacity storage tanks.

Associated Attawapiskat facilities would include a barge landing facility, a storage yard area, and a construction camp (up to 100 people, peaking at 250 people for one season to accommodate fuel pipeline construction).

Coastal Winter Road Access with On-site Diesel Power Generation, Marine Transport of Fuel to Attawapiskat, and Winter Road Trucking of Fuel from Attawapiskat to the Victor Site (Alternative 2)

This alternative is similar to Alternative 1, except that there would be no fuel pipeline from Attawapiskat to the Victor site. Instead, fuel would be trucked from Attawapiskat to the Victor site along the north winter road, with a return haul along the south winter road.

With winter road trucking, the entire annual 45 ML fuel supply would have to be temporarily stored in Attawapiskat to await the winter road season. This would require 45 ML storage tank capacity in Attawapiskat, and increased fuel storage capacity at the Victor site (total 60 ML) to provide contingency storage, to guard against unseasonably mild winters and correspondingly short winter road trucking seasons. The north and south winter roads would have to be constructed to high standards for security of access. Other facilities required in Attawapiskat would be the same as for Alternative 1, but with a smaller peak construction camp.

Coastal Winter Road Access with Transmission Line Hook-up to Otter Rapids (or Pinard) (Alternative 3)

With this alternative, the main transport artery would be the existing coastal and south winter roads. The existing James Bay west coast 115 kV transmission line system would be “reinforced” with a new 115 kV transmission line constructed parallel to and immediately adjacent to the existing system between Otter Rapids (or Pinard) and Kashechewan. A new 115 kV line would be constructed from Attawapiskat to the Victor site along the south winter road. Substation tie-ins, would link the new elements to the existing grid system.

In considering an alignment for the new system, the options were to place a line parallel to and immediately adjacent to the existing line, or to select an entirely new ROW. From the perspective of environmental effects and ease of construction, the Proponent indicated that it makes the most sense to expand an existing ROW, rather than to develop a new ROW through undisturbed terrain. Hence the decision was made to expand the existing 115 kV transmission line ROW by a further 30 m to accommodate new system elements.

A transmission line would reduce Victor site diesel fuel demand during operations from about 45 ML per year, to about 13 to 15 ML/a, as some fuel would still be required for heavy equipment operation, heating, standby power generation, and other uses (but not for normal power generation). With reduced fuel demand, ocean-going tankers and barges would not be required for fuel delivery. Instead, all fuel would be trucked up the winter roads directly from Moosonee to site, negating the need for fuel storage or re-handling in Attawapiskat.

A small barge landing area may still be required with this alternative, for receiving some materials (but not fuel) during the project construction phase. But, there would be no construction camp in Attawapiskat, except possibly a small one (not more than 30 people), for one winter, to build the transmission line. Also with this option, there would be no need to dredge the James Bay entrance to the Attawapiskat River. The existing coastal south and winter roads would be upgraded for improved service and safety.

Southwest Alternative Winter Road (SWAWR) Access with On-site Diesel Power Generation and Winter Road Trucking of Fuel (Alternative 4)

With Alternative 4, there would still be a need for 45 ML of fuel per year for power generation, and other uses, as for Alternatives 1 and 2, but all fuel for this alternative would be transported up the Southwest alternative winter road (SWAWR) from the Hearst/Constance Lake area. There would be no fuel handling in the James Bay area, except for the first one or two construction seasons, when 16 to 19 ML of fuel per year would be brought up the coastal winter road, until the SWAWR was ready for use. Fuel storage capacity at the Victor site would have to be increased to about 60 ML (as for Alternative 2) to provide for contingency storage.

The main advantage of an inland winter road route, over the coastal route, is the lack of tidal influences at water crossings. Water crossings along the coastal winter road are subject to daily tidal influences in the order of 2 m. To provide for effective use, the SWAWR would have to be constructed to a high standard. The Proponent also committed to maintaining the existing south winter road with this alternative, to provide winter access through to Attawapiskat.

The Proponent considered three routing alignments for winter road access from the Hearst/ Constance Lake area to the Victor site – an east, west and central route. To assist with route evaluations, the Proponent collected site data on terrestrial habitats, birds, other wildlife, fish and fish habitat, as well as TEK data and other cultural and heritage data. Details are provided in the August 2004 SAPA report. Of the three alignments, the Proponent selected the easternmost route as the best option, based on shortest distance (352 km) and constructability.

Similar to Alternative 3, with this alternative, there would potentially be a requirement for a small barge landing and storage yard in Attawapiskat to support construction activities, until the SWAWR could be built and made ready in the late winter of 2007.

Southwest Alternative Winter Road (SWAWR) Access with Transmission Line Hook-up Along the Coast to Otter Rapids (or Pinard) (Alternative 5)

With this option, there would be a winter road constructed to the Victor site from the Hearst/Constance Lake area (the same as for Alternative 4, along the easternmost route), but instead of on-site diesel generation, there would be a 115 kV transmission line constructed to the Victor site, routed up the James Bay coast, as for Alternative 3.

Also with this alternative, the same as for Alternative 4, there would likely be a need to use the existing James Bay coastal road for the first one to two construction seasons. The existing south winter road from the Victor site to Attawapiskat would also be retained with this alternative, as for Alternative 4.

Southwest Alternative Winter Road (SWAWR) Access with Transmission Line Hook-up to Kapuskasing (or Calstock) (Alternative 6)

This alternative is similar to Alternative 5, except that the 115 kV transmission line would be routed from Kapuskasing to the Hearst/Constance Lake area, and from there, up the SWAWR to the Victor site. Tie-in back to Kapuskasing would be required as there is not sufficient surplus power in the Hearst area to meet project needs. The Kapuskasing to Hearst area transmission line segment would be constructed parallel to and immediately adjacent to the existing 115 kV line running parallel to Highway 11.

All-season Road Connection from Percy Lake to Marten Falls, with Winter Road Access from Marten Falls to the Victor Site, and with Transmission Line Hook-up Along the Coast to Otter Rapids (or Pinard) (Alternative 7)

This alternative was suggested by the leadership of the Marten Falls First Nation, and involves site access from the Percy Lake area, connecting through to Nakina and Geraldton, and eventually to Thunder Bay. This alternative represents a radical departure from other options considered in this report, and was not considered in detail by the Proponent, for reasons described in the SAPA report.

3.9.3 Performance Objectives and Evaluation

Performance objectives assessed by the Proponent for access and power alternatives included:

- Cost-effectiveness;
- Technical applicability;
- System integrity and reliability;
- Minimize effects to the natural environment;
- Minimize effects to the socio-economic environment; and,
- Amenity to reclamation.

3.9.3.1 Cost-effectiveness

Capital and net present value (NPV) costs for the six alternatives are provided in Table 3-2. NPV (or life-of-mine) costs include capital and operating costs, calculated on the basis of a 10% discount rate.

From a capital cost perspective, on-site diesel generation with winter road trucking up the James Bay coastal winter road (Alternative 2) is the preferred alternative, with Alternatives 1 and 4 being the next most attractive. The transmission line alternatives are all considerably more expensive. From an NPV perspective, there is less difference between the options, but Alternative 2 is still the best option as it provides a projected $11.4 million increased revenue compared with Alternative 1 (the Base Case). Alternative 2 also provides an approximate $20 to 30 million NPV net benefit compared with Alternatives 3 through 6.

TABLE 3-2
COST ANALYSIS OF ACCESS AND POWER ALTERNATIVES

Alternative	Capital Cost Differentials ($ Cdn Millions)	Net Present Value Differentials ($ Cdn Millions)
1. Coastal WR, on-site power generation, fuel pipeline Attawapiskat to Victor site	Base Case	Base Case
2. Coastal WR, on-site power generation, winter trucking (of diesel) Attawapiskat to Victor site	-17.0	+11.4
3. Coastal WR, transmission line hook-up to Otter Rapids	+56.0	-9.7
4. SWAWR, on-site power generation, winter trucking (of diesel) to Victor site	-1.0	-9.4
5. SWAWR, transmission line hook-up along coast to Otter Rapids	+71.0	-12.4
6. SWAWR, transmission line hook-up to Kapuskasing	+83.0	-20.8

Note: All costs are shown relative to Alternative 1 (the Base Case). A negative capital cost relative to the Base Case indicates a less expensive condition. A negative NPV cost compared with the Base Case indicates a less favourable alternative (i.e., reduced project revenue by the amount shown). Capital costs for the SWAWR alternatives include the costs of potential schedule delays, which make these alternatives less attractive.

The Proponent indicated that the VDP is sensitive to capital costs, and the extra burden of $56 million to $83 million, associated with the transmission line alternatives, is a major project consideration. NPV differentials are less extreme but still cover a range of up to $32.2 million. Considering both capital and NPV figures, the on-site diesel generation alternatives were rated as preferred, and the transmission line alternatives were all rated as acceptable.

3.9.3.2 Technical Applicability

From a technical applicability perspective, the Proponent regarded all alternatives as being predictably effective, based on proven technologies, and with contingencies, if the alternative fails to perform as expected. The alternatives were therefore all rated as preferred for this attribute.

3.9.3.3 Ability to Service the Site Effectively

The Proponent identified risks associated with all of the alternatives, but determined that all risks could be managed.

Risks considered by the Proponent included:

- Fuel pipeline failure leading to a disruption in the fuel supply;
- Short winter seasons associated with winter road operations;
- Tidal effects on the coastal winter road water crossings;
- Prolonged line outage associated with transmission lines; and,
- Scheduling concerns.

All alternatives were rated as "acceptable" for ability to service the project, with no alternative being rated in the preferred category.

3.9.3.4 Minimize Effects to the Natural Environment

Substantive discussions were held between the Proponent and various stakeholders, including federal and provincial governments and the First Nations, on the potential for environmental effects associated with site access and power supply alternatives. Concerns raised through these discussions were the following:

- The potential for fuel spills associated with the marine transport;
- The potential for fuel spills associated with fuel storage at Attawapiskat;
- The potential for fuel pipeline leaks or failure;
- The potential for fuel spillage from tanker trucks using the winter roads;
- Disturbance of wilderness areas in the case of the SWAWR alternatives;
- Site clearing associated with transmission line construction;
- Truck traffic effects on wildlife, generally; and,
- Air and noise emissions, including the emission of green house gases.

Separate discussions of the alternatives relative to these concerns are presented below.

Alternative 1 brings the majority of concerns into play, but the main concern is the potential for fuel spills in James Bay (or elsewhere) during marine transport, and during fuel transfer (lightering). This aspect notwithstanding, all of the coastal communities expressed opposition to marine fuel transport, because of concerns over the "potential" for a spill, given the extreme sensitivity of the James Bay marine environment and coastal zones, and their associated wildlife. Federal and provincial agencies also expressed this concern. The Proponent recognized that if a major fuel spill were to occur, cleanup would be difficult in the James Bay environment.

The new north winter road associated with Alternative 1 would improve winter access to lands bordering the north side of the Attawapiskat River, possibly resulting in increased hunting and trapping pressure on local wildlife. Effects on vegetation communities, however, would be limited, as the vast majority of the ROW passes through open fen and bog communities. Truck traffic on existing and planned winter roads has the potential to disturb sensitive wildlife, especially caribou.

The Proponent expects air emissions associated with on-site diesel power generation to meet applicable federal and provincial standards at the claim boundary, and for on-site workers for workplace health and safety concerns. Noise modeling results showed that Class 3 (rural area) sound levels of 45 A-weighted decibels (45 dBA) during the daytime, and 40 dBA at night, would be generally met at the site claim boundary, and that lower sound levels approaching 30 dBA would be met at the outer boundary of the Victor site buffer zone. Noise levels along winter roads are not expected to adversely affect wildlife beyond the 1 km buffer zone. The Proponent estimated greenhouse gas emissions associated with on-site diesel generation and other project related fuel uses to be 120,200 tonnes per annum (t/a), as CO_2.

Alternative 2 would have essentially the same environmental effects as Alternative 1, except that there would be no fuel pipeline, but an increase in tanker truck transport of fuel. As a result, there would be no risks associated with fuel leaks from a buried pipeline, but the risk of a fuel spill from tanker truck traffic would increase slightly, estimated at two spills over the project life, based on an estimated 3,000,000 tanker truck kilometres.

There would also be a slight increase in CO_2 emissions, in the order of 700 t/a, associated with increased truck traffic to carry the fuel from Attawapiskat to the Victor site during the operations phase.

The other difference with Alternative 2, compared with Alternative 1, is that both the north and south winter roads would be required throughout the project life. This would prolong potential effects to wildlife associated with increased AttFN hunter access, and road noise or collisions.

Alternative 3 offers the principal advantage of reduced fuel consumption at site, down to an estimated 13 to 15 ML/a, compared with 45 ML/a with the on-site diesel generation alternatives. With this alternative, there would be no marine shipment of fuel, and there would be no requirement for a fuel pipeline. All site fuel would be delivered by tanker truck direct from Moosonee, without the need for fuel storage tanks in Attawapiskat. As a result, concerns 1 through 3, listed in the introduction to this section would not apply. Concern for fuel spills from tanker trucks with Alternative 3 would be comparable to that associated with Alternative 2 (i.e., approximately 2 spills over the project life, associated with approximately 3,000,000 tanker truck kilometres.

There would be no new winter road construction with Alternative 3, as reliance would be placed on the existing coastal and south winter roads. Truck traffic effects on wildlife in terms of the potential for collisions and noise effects would be similar to those of Alternative 2, because reduced fuel demands would offset increased trucking distance.

Air and noise emissions at the Victor site would be reduced compared with Alternatives 1 and 2, because there would be no combustion of diesel for power generation, except for standby operations, and power generation during the construction phase which is essentially common to all alternatives. Greenhouse gas emissions are estimated at 72,400 t/a as CO_2 for Alternative 3.

Transmission line construction associated with Alternative 3 would alter habitats, as the existing coastal transmission line ROW between Otter Rapids (or Pinard) and Kashechewan would have to be widened by 30 m, and a new line would have to be constructed from Attawapiskat to the Victor site along a second 30 m wide ROW. The total area encompassed by the new line would be 13.5 km^2, the vast majority of which would be fen and bog terrain, which would only be marginally affected. Construction of the transmission line at the location proposed (i.e., immediately adjacent to and parallel to the existing transmission line ROW) would be the least disruptive to birds and other wildlife.

Alternative 4 eliminates all needs for diesel fuel transport in the James Bay area, except for tanker truck transport along the coastal winter road during the first one to two years of the construction period, as with all SWAWR alternatives. The number of tanker truck fuel spills associated with this alternative is five over the mine life, based on an estimated 8,000,000 tanker truck kilometres.

Air and noise emissions associated with Alternative 4, at the Victor site, would be the same as those for Alternatives 1 and 2, because of the use of on-site diesel generation.

The primary difference in natural environment effects associated with Alternative 4, compared with Alternatives 1 through 3, would be the opening up of 344 km of new winter road, through currently inaccessible territory. Part of the route appears to pass through core winter caribou areas as indicated by TEK studies and comments provided by WCS Canada. Other potential effects to wildlife, as a result of improved access to hunters and trappers, would also be expected.

Alternative 5, as with all other SWAWR alternatives, eliminates the need for marine transport of fuel in James Bay. Use of a transmission line would also reduce overall fuel demands at the Victor site, the same as for Alternative 3. The risk of fuel spills from tanker trucks with Alternative 5 would be similar to that for Alternative 3. Construction and terrestrial habitat effects associated with transmission line construction and operation would also be the same for Alternatives 3 and 5. The major natural environment impact differential between Alternatives 3 and 5 would therefore be the opening up of a new 30 m wide transportation corridor along the SWAWR route, with effects of this action being the same as those described above for Alternative 4. Air and noise emissions, including greenhouse gas emissions associated with Alternative 5 would be the same as those described above for Alternative 3.

Alternative 6 would have essentially the same natural environment effects as those associated with Alternative 5. The transmission line associated with Alternative 6 would be parallel to and immediately adjacent to existing or proposed corridors (i.e., along the existing Kapuskasing to Heast 115 kV transmission line north of Highway 11, and along the SWAWR ROW). This condition is similar to Alternatives 3 and 5, where the transmission line would also follow along existing or proposed corridors.

Summary Assessment – Natural Environment: Based on the foregoing evaluations, the Proponent indicated that transmission line alternatives would reduce local fuel handling requirements, and eliminate the need for transporting fuel in James Bay, which is perceived as a significant risk by the coastal communities, and many government agencies, irrespective of planned safeguards. Transmission line alternatives also reduce greenhouse gas emissions compared with diesel power alternatives. Use of a transmission line would also eliminate the need for fuel storage in Attawapiskat, as would use of the SWAWR with on-site diesel generation.

Use of the existing coastal winter road route, and developing a transmission line parallel to and immediately adjacent to the existing James Bay coastal transmission line route (i.e., Alternative 3), eliminates the need to open up a new corridor through wilderness terrain, and is therefore considered the preferred overall alternative from all natural environment perspectives.

3.9.3.5 Minimize Adverse Effects to the Socio-economic Environment

The principal considerations involving socio-economic effects associated with site access and power supply alternatives are the following:

- Maintaining traditional lifestyles for the local Aboriginal communities;
- Quality of life issues related to general community living and disturbance;
- Minimizing potential adverse effects on human health and safety;
- Providing and maintaining access to traditional lands;
- Minimizing the potential for fuel spills, especially in James Bay;
- Protecting cultural and heritage resources;
- Maintaining and expanding employment and business opportunities;
- Servicing and supply costs for local communities;
- Maintaining and enhancing the regional economy; and,
- Non-interference with existing infrastructure systems.

Separate discussions of the socio-economic environment concerns associated with each alternative are presented below.

Alternative 1, like all of the alternatives, has the potential to affect traditional lifestyles, simply because the project will bring changes to the region. Alternative 1 would focus these changes heavily on Attawapiskat, as there would be no need to construct a transmission line, and use of the coastal winter road would be limited, once the fuel supply infrastructure for Alternative 1 is in place. Effects on other First Nation communities with Alternative 1 would be considerably less than for Attawapiskat.

Barring accidents, such as major fuel spills, there is no real potential for physical/chemical contaminant release by any aspect of transportation and power generation facilities, as all applicable standards will be met, including those for air emissions.

Development of the north winter road and pipeline route would improve AttFN access to traditional lands, but would also increase disturbance to those lands. Winter road access to the traditional lands of other First Nation communities would not change with Alternative 1. Development of Alternative 1 (and all other alternatives) is not expected to compromise cultural and heritage values.

Proceeding with Alternative 1 would maintain and enhance employment and business opportunities for the coastal First Nation communities, for Moosonee, and also likely for Cochrane. There would be general spin-off effects to other communities in northeastern Ontario and more broadly; but there would be little in the way of specific business opportunities to the communities of Hearst, Kapuskasing, Constance Lake or Marten Falls with Alternative 1.

Alternative 2 would have similar socio-economic environmental effects as Alternative 1, with the following exceptions:

- Less intrusion associated with a smaller construction camp, in the absence of pipeline construction;
- Increased winter road traffic between Attawapiskat and the Victor site;
- Maintenance of both north and south winter roads during the project life; and,
- Larger, more visually intrusive fuel tanks in Attawapiskat.

Alternative 3 was supported by all of the coastal communities. The main reasons for this support were the elimination of fuel handling in James Bay, enhancing infrastructure (improved winter road and transmission line systems) for improved sustainability, and optimization of employment and business opportunities. As well, Alternative 3 would result in less direct intrusion to Attawapiskat because there would be only limited facilities in the community, namely a smaller barge handling facility and lay down area (if required), no fuel tanks, and a much smaller construction camp with capacity for not more than 30 persons (likely needed for transmission line construction). Temporary construction camp facilities would also likely be required in Fort Albany and/or Kashechewan during two winters to build the transmission line. There would be no changes to the Constance Lake or Marten Falls First Nation communities with this alternative.

With Alternative 3, access to AttFN traditional lands would be maintained by the south winter road only, with opportunities to divert truck traffic traveling between Moosonee and the Victor site away from the community to reduce noise and other disturbance. There would be no change in access to the traditional lands of any of the other project area First Nations with implementation of Alternative 3.

Regarding employment and business opportunities, Moosonee would be the principal beneficiary of Alternative 3, as choice of this alternative would preserve and enhance the economics of this community. The coastal First Nation communities, and the Taykwa Tagamou Nation near Otter Rapids, would also derive increased employment and business opportunities associated with transmission line construction, compared with other alternatives. Employment and business opportunities associated with construction and maintenance of the coastal winter road would be the same as for other alternatives during the construction phase, as this road would have to be upgraded for the project construction phase, irrespective of the selected alternative. Beyond the construction phase, there would be greater use of the coastal winter road with Alternative 3, compared with Alternatives 1 and 2. Current traffic on the coastal winter road is estimated at about 5,000 round trips per winter, or about 85 trips per day. About 5 to 10% of this traffic involved heavier truck traffic. Increased project related road use is not expected to meaningfully interfere with existing road use because the road would be constructed to a higher standard, and because trucks would travel at modest speeds and frequently in convoys. Use of the winter road by snowmobiles is not expected to be affected, and provisions for coordinated use of the winter road has been developed as part of the Winter Road Agreement between De Beers and the coastal First Nation communities.

Selection of Alternative 3 would bring no direct benefits to either Hearst or Kapuskasing, or to the Constance Lake or Marten Falls First Nations.

Alternative 4 would result in a significant shift in activities away from the James Bay coast to inland areas, except during the first one to two years of construction, where reliance would be placed on the coastal winter road (possibly with some barge support). The result would be a substantive loss in economic potential for Moosonee, and possibly a modest loss in economic potential for the Moose Cree, Fort Albany and Kashechewan First Nations. There would be reduced employment and business opportunities in Attawapiskat itself, compared with those associated with Alternatives 1 and 2, but this change would be small, compared with employment and business opportunities available to the AttFN at the mine site. The AttFN would also retain employment and business opportunities associated with the annual construction of the south winter road, and would gain added employment and business opportunities associated with the annual construction of the northern portion of the SWAWR.

The largest economic beneficiaries of Alternative 4 would be the Constance Lake First Nation and the Town of Hearst, with lesser benefits potentially accruing to Kapuskasing and Marten Falls. Timmins would be unaffected, and Cochrane would see reduced opportunity.

Alternative 4 would reduce direct effects on Attawapiskat traditional lifestyles, as there would be no facilities in Attawapiskat beyond those required for construction, and these would be modest. Direct effects to traditional lifestyles of the other coastal communities would be very modest, and only during the construction phase. This excludes consideration of the broader contact between Aboriginal and non-Aboriginal persons that would take place at the mine site itself, regardless of the selected alternatives for site access and power. Adverse effects on quality of life issues associated with the Constance Lake First Nation are not anticipated with Alternative 4 as the selected road option bypasses the community.

Regarding access to traditional lands, the south winter road connecting the Victor site with Attawapiskat would still be maintained with Alternative 4. The major difference with Alternative 4 compared with Alternatives 1 through 3 would be improved access to the traditional lands of the Constance Lake and possibly Marten Falls First Nations.

In the longer-term, with a potentially upgradeable winter road, to an all-season road (by government working with the First Nations) there would be the potential to gain year-round road access to traditional lands of the Constance Lake, Fort Albany, Kashechewan and Attawapiskat First Nations, if desirable. Certainly in the case of the Constance Lake First Nation, a desire has been expressed for any assistance that would help with controlled access to the currently unoccupied English River Reserve, and to the Albany River. Many members of Attawapiskat have also expressed a long-term vision for all-season road access to their community from the Hearst/Constance Lake area.

Alternative 5, from a socio-economic perspective, entails a blending of the effects of Alternatives 3 and 4, whereby:

- Construction effects would be the same over the first one to two years of the construction phase, including upgrading of the coastal winter road;

- The coastal transmission line from Otter Rapids (or Pinard) to the Victor site would be built, which would provide employment to the coastal communities and increased security of power supply to the coastal communities; and,

- The SWAWR would be constructed with its associated effects, as described for Alternative 4, including lost opportunities to Moosonee.

Alternative 6, would have socio-economic effects that are similar to those of Alternative 5, except that there would be limited (if any) employment and business opportunities associated with construction of a coastal transmission line for the Taykwa Tagamou Nation and the Moose Cree First Nation. The Attawapiskat, Fort Albany and Kashechewan First Nations would still be involved in constructing a transmission line along the SWAWR, north from the Albany River. Constance Lake would have a major involvement in constructing the transmission line south of the Albany River. This alternative would also offer the opportunity for a spur line to be constructed to Ogoki Post that would reduce the community's dependence on diesel generation.

Summary Assessment - Socio-economic Environment: With many competing interests and perspectives there is no clear choice of a preferred alternative from everyone's perspective, aside from the fact that there was no support from any community for the transport of large quantities of fuel through James Bay.

From the perspective of the coastal communities, access along the coastal winter road, with transmission line hook-up to Otter Rapids (Pinard) appears to be the favoured alternative. This alternative would also benefit Cochrane. From the perspective of the Constance Lake First Nation, and the non-Aboriginal communities of Hearst and Kapuskasing, the preferred alternatives involve servicing the Victor site using the SWAWR, as this combination of alternatives would provide the greatest economic benefit to this area. There was little comment from Constance Lake, Hearst or Kapuskasing regarding the trucking of large quantities of fuel up the SWAWR, but it is assumed that given their preferences, most people would prefer to see a transmission line instead. Development of the SWAWR would also assist the Constance Lake First Nation with better access to their traditional lands.

Based on all of these considerations, Alternatives 3, 5 and 6 are regarded as being preferred, and all other alternatives are regarded as being acceptable, from a socio-economic perspective. The Government of Canada concurs with this conclusion.

3.9.3.6 Amenability to Reclamation

Vegetation communities along winter roads will readily regenerate on their own following completion of use; but tree planting will be required at river and creek crossings. This is a minor expense, and is not sufficient to distinguish between alternatives.

From the perspective of power supply, alternatives that involve on-site diesel generation are the simplest to reclaim. Transmission lines between Attawapiskat and the Victor site, and between Highway 11 and the Victor site would need to be removed. In this regard, the Attawapiskat to Victor site transmission line would be less costly to remove because it would be shorter (105 km), compared with a line following the SWAWR (385 km). It is not anticipated that a transmission line from Kapuskasing to Hearst would require removal at mine closure, as it would improve service to the local communities.

Alternatives 1, 2, 3 and 4 are therefore rated as preferred, and Alternatives 5 and 6 are rated as acceptable. This assumes that the pipeline associated with Alternative 1 would remain in place, and that that portion of the new coastal transmission line from Otter Rapids to Kashechewan (and possibly to Attawapiskat) would be left in place for use by the coastal First Nation communities.

3.9.3.7 Selected Alternative

The summary analysis of performance objectives favours Alternative 3 as the overall preferred alternative, based on preferred ratings for technical applicability, natural environment effects, and socio-economic effects, and acceptable ratings for cost and serviceability (Table 3-1).

Government Position

The Government of Canada agrees with the positions outlined by De Beers in the CSEA and as summarized in this section of the CSR.

3.10 Reclamation

3.10.1 General Considerations

The goals of reclamation and decommissioning for the VDP are to protect public health and safety, to provide physically and chemically stable conditions at closure, consistent with the surrounding environment, and to develop self-sustaining productive habitats for plants, wildlife, and fisheries resources. The following sections address the major project facilities that will remain in place after the completion of site reclamation.

3.10.2 Open Pit

3.10.2.1 Alternatives

Two reclamation alternatives are possible for the open pit:

1) Create/allow formation of a new pit lake; and,
2) Fill with overburden and mine rock.

Creation of a New Pit Lake

The open pit will naturally collect surface runoff and passive groundwater seepage once well dewatering ceases, filling or nearly filling the pit within approximately 14 years. Pumping water from the Attawapiskat River (through the dewatering pipeline) into the open pit is proposed by the Proponent to reduce the filling time to approximately 2 years. Active filling of the pit will also greatly assist with aquifer recovery in the bedrock, which will in turn reduce demands for flow supplementation of the Nayshkootayaow River during low flow periods. The cost of actively filling the open pit by pumping water from the Attawapiskat River is in the range of $3 million.

Backfill the Open Pit

Approximately 45 Mm^3 of mineral materials would be required to fill the open pit to surface. The principal limitation to such an undertaking is cost, estimated at well in excess of $100 million. There would also be the added cost of operating the dewatering pumps and the camp for an additional approximately 3 years during the period of backfilling, estimated at several 10's of millions of dollars.

3.10.2.2 Performance Objectives and Evaluation

Two performance objectives and evaluation criteria relative to reclamation of the open pit were considered by the Proponent:

- Cost-effectiveness;
- Minimize effects to the natural environment;
- Minimize effects to the socio-economic environment; and,
- Amenability to reclamation.

Cost-effectiveness: The most cost-effective (preferred) option (apart from natural flooding) is to actively flood the open pit at closure (cost estimate $3 million). A cost of well in excess of $100 million would be added to the project cost to backfill the open pit. The Proponent considered refilling the open pit with mineral waste to be prohibitively expensive and unacceptable.

Minimize Effects to the Natural Environment: The reader is referred to the section on amenability to reclamation for a discussion of effects on the natural environment.

Minimize Effects to the Socio-economic Environment: Backfilling the open pit could have a small, but not significant positive effect on lands and resources used for traditional pursuits. Neither alternative is expected to have any meaningful effect on health related emissions, physical or cultural resources, or historical, archaeological, paleontological or architectural features. Both alternatives are rated as preferred for socio-economic considerations.

Amenability to Reclamation: Reclamation of the pit area to aquatic habitat would be acceptable, recognizing that the resulting pit lake could be moderately saline. Restoring the open pit area to terrestrial habitat by backfilling would be preferred, but would involve a delay of several years in bedrock aquifer recovery compared with the pit flooding option, as the pit would have to remain at least partially dewatered while it was being backfilled, and it would take longer for the fill material to saturate once backfilling was complete.

Summary Evaluation

The Proponent indicated that developing a new lake in the open pit was the preferred reclamation option (Table 3-1). The alternative of infilling the pit with overburden and mine rock was considered cost prohibitive and unacceptable.

The need to manage groundwater inflow during pit backfilling would place a cost and scheduling environmental effect burden on the backfilling alternative.

Government Position

The Government of Canada agrees with the positions outlined by De Beers in the CSEA and as summarized in this section of the CSR.

3.10.3 Demolition Wastes

Non-hazardous demolition wastes that are not transported off site for reuse or sale would be disposed of on site, as off-site disposal would be cost-prohibitive and unacceptable.

3.10.3.1 Alternatives

The Proponent considered the following alternatives for the on-site disposal of demolition wastes:

1) Disposal of demolition wastes within the mine rock (or another) on-site stockpile;
2) Creation of a stand-alone landfill; and,
3) Disposal of demolition wastes in the open pit.

Disposal of Demolition Wastes within the Mine Rock Stockpile

This alternative involves the disposal of demolition wastes adjacent to the mine rock stockpile. The material would be subsequently covered with mine rock, soil and revegetated.

Disposal of Demolition Waste within a Landfill

With this alternative, an on-site, above grade landfill would be created at a location other than that associated with the mine rock (or other) stockpile.

Disposal of Demolition Wastes within the Open Pit

With this alternative, demolition wastes would be transported to the base of the dewatered pit, compacted, and covered with a layer of mine rock and/or overburden prior to flooding the pit to ensure that materials do not float to surface once the pit is flooded. Open pit dewatering (well field and sumps) and Nayshkootayaow River flow supplementation would continue until all demolition waste disposal operations were completed. The infrastructure required for these operations would still require subsequent disposal at another location.

3.10.3.2 Performance Objectives and Evaluation

Performance objectives evaluated by the Proponent for reclamation of the open pit were the following:

- Cost-effectiveness;
- Minimize effects to the natural environment;
- Minimize effects to the socio-economic environment; and,
- Amenability to reclamation.

Cost-effectiveness: Disposal of demolition wastes at the mine rock stockpile is the most cost-effective alternative, followed by the landfill alternative. The Proponent considered the transportation of wastes and cover material to the open pit to be cost prohibitive, and there would be a requirement to continue pit-dewatering operations during the reclamation phase.

Minimize Effects to the Natural Environment: The reader is referred to the section on amenability to reclamation for a discussion of effects on the natural environment.

Minimize Effects to the Socio-economic Environment: Demolition waste disposal alternatives are not expected to have any meaningful effect on health related emissions, physical or cultural resources, lands and resources used for traditional pursuits, or historical, archaeological, paleontological or architectural features. Both alternatives are rated as preferred for socio-economic considerations.

Amenability to Reclamation: Disposal of demolition wastes into the mine rock stockpile is the preferred alternative, as it is an environmentally safe and accepted disposal practice. Creation of a landfill at another undisturbed location would be acceptable, but would result in additional and unnecessary land disturbance. Disposal of demolition materials in the pit was regarded by the Proponent as unacceptable because buried demolition wastes have the potential to compromise water quality if maintained in a flooded condition.

Summary Evaluation

The Proponent indicated that disposal of demolition wastes in the mine rock stockpile was the preferred alternative (Table 3-1).

Disposal of demolition wastes within the open pit would generate a need to manage groundwater inflow during pit backfilling, placing a cost and scheduling environmental effect burden on the in-pit disposal alternative.

Government Position

The Government of Canada agrees with the positions outlined by De Beers in the CSEA and as summarized in this section of the CSR.

3.10.4 Stockpiles

All stockpiles will be contoured, covered with soil and/or peat, as appropriate, and revegetated using native species, either progressively during operation, or at closure. The Proponent indicated that there are no reasonable alternatives to this approach.

Government Position

The Government of Canada agrees with the positions outlined by De Beers in the CSEA and as summarized in this section of the CSR.

3.10.5 Infrastructure

On-site infrastructure such as access roads and the airstrip will be reclaimed once the majority of reclamation activities are completed. The Proponent considered that there were no other reasonable alternatives.

Off-site infrastructure at Attawapiskat (i.e., the barge landing facility, if constructed, the training centres, and the De Beers' office) would be transferred to the community. The transmission line from Attawapiskat to the Victor site would be dismantled unless another use for the line can be found.

Government Position

The Government of Canada agrees with the positions outlined by De Beers in the CSEA and as summarized in this section of the CSR.

3.10.6 Site Drainage

The realigned portion of South Granny Creek around the open pit will be maintained at closure, since fisheries habitat will have been established in the new (and longer) alignment.

TABLE 3-1
SUMMARY OF ALTERNATIVE MEANS OF CARRYING OUT THE PROJECT

Alternative	Cost-Effectiveness		Technical Applicability and/or System Integrity and Reliability		Ability to Service the Site Effectively		Effects (adverse) to the Natural Environment		Effects (adverse) to the Socio-Economic Environment		Amenability to Reclamation		Summary Rating
Work Scheduling													
Three weeks at site, one week off site	Lowest flight frequecy	P	na	-	Rest intervals not suited to long-term operation	A	Least disturbance	P	Difficult to workers and families	A	na	-	Acceptable
Two weeks at site, two weeks off site	Lowest flight frequency	P	na	-	Balances change-overs, and family life	P	Least disturbance	P	Increased family time	P	na	-	**Preferred**
One week at site, one week off site	Not financially supportable	U	na	-	Change-overs too disruptive to operations	U	No appreciable effect	A	Increased family time	P	na	-	Unacceptable
Four days at site, three days off site	Not financially supportable	U	na	-	Change-overs to disruptive to operations	U	No appreciable effect	A	Increased family time	P	na	-	Unacceptable
Mining Methods													
Underground shaft	Cost prohibitive	U	Leaves crown pillar behind	U	na	-	Minimal effect	P	Minimal effect	P	Minimal requirements	P	Unacceptable
Underground ramp	Cost prohibitive	U	Leaves crown pillar behind	U	na	-	Minimal effect	P	Minimal effect	P	Minimal requirements	P	Unacceptable
Open pit	Cost effective	P	Mines entire ore body	P	na	-	Loss of habitat and creek diversion	A	Effects traditional land use (open pits and stockpiles)	A	Land disturbance requires reclamation	A	**Preferred**
Mine Production Rate													
2.0 Mt/a	Least cost effective	A	na	-	na	-	Minimal effect with mitigation	A	Maximizes socio-economic benefits	P	Reclamation schedule acceptable	A	Acceptable
2.5 Mt/a	Intermediate financial return	A	na	-	na	-	Minimal effect with mitigation	A	Intermediate condition	A	Reclamation schedule acceptable	A	**Preferred**
3.0 Mt/a	Most cost effective	P	na	-	na	-	Allows reclamation to commence earlier	P	Minimizes socio-economic benefits	A	Allows reclamation to commence earlier	P	Acceptable
Groundwater Control													
Perimeter well field	Life-of-mine cost $150 million	A	Predictably effective and adaptable	P	na	-	Mitigatable effects to local river	A	Mitigatable effects to local river	A	na	-	**Preferred**
Perimeter well field with slurry wall	Life-of-mine cost $240 to $915 million	U	Slurry wall ineffective	U	na	-	Minimal effect	P	Minimal effect	P	na	-	Unacceptable
Perimeter well field with grout curtain	Life-of-mine cost $167 million	A	Grouting may assist with water control	A	na	-	Minimal effect	P	Minimal effect	P	na	-	**Preferred[1]**
Perimeter well field with freeze wall	Life-of-mine cost $161 million	A	Freeze wall ineffective	U	na	-	Minimal effect	P	Minimal effect	P	na	-	Unacceptable
Well Field Water Management and Disposal													
Direct discharge to Attawapiskat River	Life-of-mine cost $21 million	P	Predictably effective and adaptable	P	na	-	Receiver has adequate assimilative capacity	P	Minimal effect	A	na	-	**Preferred**
Direct discharge to James Bay	Life-of-mine cost $80 million	U	Construction in tidal flat zone not feasible	U	na	-	Adverse construction effects in James Bay	A	Greatest disturbance	A	na	-	Unacceptable
Treatment using membrane or distillation	Life-of-mine cost $630 + million	U	No viable means of brine disposal	U	na	-	No viable means of brine disposal	U	No adverse effects	P	na	-	Unacceptable

Alternative	Cost-Effectiveness		Technical Applicability and/or System Integrity and Reliability		Ability to Service the Site Effectively		Effects (adverse) to the Natural Environment		Effects (adverse) to the Socio-Economic Environment		Amenability to Reclamation		Summary Rating
Groundwater injection	Life-of-mine cost $160 million	U	No suitable injection aquifer	U	na	-	No adverse effects	P	No adverse effects	P	na	-	Unacceptable
Pit Sump Water - Years 0-6													
Settling pond with passive wetland treatment	Construction cost $1.7 million	P	Proven technology, low maintenance	P	na	-	Effective environmental protection	P	Minimal effect	P	na	-	**Preferred**
Mechanical water treatment	Higher capital and operating costs	A	Higher level of required maintenance	A	na	-	Effective environmental protection	P	Minimal effect	P	na	-	Acceptable
Pit Sump Water - Years 6+													
Settling pond with passive wetland treatment	Construction cost $2.9 million	P	Proven technology, low maintenance	P	na	-	Effective environmental protection	P	Minimal effect	P	na	-	**Preferred**
Mechanical water treatment	Higher capital and operating costs	A	Higher level of required maintenance	A	na	-	Effective environmental protection	P	Minimal effect	P	na	-	Acceptable
Process Waste Water Management													
30% solids by weight	Costs higher than Alternative 2	A	Increased water management	A	na	-	Increased water management	A	Minimal effect	P	na	-	Acceptable
50% solids by weight	Capital cost $9 million, operating cost $700 million/a	P	Optimal balance of water and solids	P	na	-	Improved water management over Alternative 1	A	Minimal effect	P	na	-	**Preferred**
70% solids by weight	Capital cost $11 million, operating cost $1.2 million/a	A	Operation difficulties with solids	U	na	-	least water management requirement	P	Minimal effect	P	na	-	Unacceptable
PKC Facility - Initial Phase													
Initial use of central quarry	Substantive cost deferral	P	Predictably effective	A	na	-	Minimal effect	P	Minimal effect	P	na	-	**Preferred**
Above ground storage	Substantially higher cost	A	Advantage of quarry as settling pond	P	na	-	More extensive quarry operations	A	Minimal effect	P	na	-	Acceptable
PKC Facility - Later Phases													
Cone PK deposition	Slightly lower costs than perimeter deposition	A	Proven technology	P	na	-	Less quarried rock in early phase, improved seepage control later stages	P[2]	Minimal effect	P	na	-	**Preferred[2]**
Perimeter PK deposition	Slightly higher costs than cone deposition	A	Proven technology	P	na	-	Requires more quarried rock in early stages	P[3]	Minimal effect	P	na	-	**Preferred[3]**
PKC Effluent Management													
Overland flow to North Granny Creek	Lowest cost alternative	P	Least infrastructure, contingencies available	P	na	-	Meets applicable water quality standards	A	Minimal effect	P	na	-	**Preferred**
Pump to Attawapiskat River	Higher cost similar to Alternative 3	A	Increased operational requirements	A	na	-	Avoids discharge to North Granny Creek	A	Minimal effect	P	na	-	Acceptable
Recycle with excess flow to North Granny Creek	Higher cost similar to Alternative 2	A	Increased operational requirements	A	na	-	Reduced water discharge	P	Minimal effect	P	na	-	Acceptable

Alternative	Cost-Effectiveness		Technical Applicability and/or System Integrity and Reliability		Ability to Service the Site Effectively	
Aggregate Supply						
Limestone from bioherms at site	Least extensive excavation	P	na	-	na	-
Limestone from below surface at site	More extensive excavation	A	na	-	na	-
Aggregate trucked to site from off-site source	Highest cost	U	na	-	na	-
Location of Buildings and Yard Areas						
West of open pit	Cost effective	P	Suitable foundations	P	na	-
Near Nayshkootayaow River	Not supportable	U	Suitable foundations	P	na	-
Airstrip Location						
North of PKC facility	Cost effective	P	na	-	Effective service	P
At or near Attawapiskat	Adds $180-$200 M dollars for road	U	na	-	Only suitable in combination with all-season road	U
Water Supply Systems						
Attawapiskat River	Highest cost	A	No limitations	P	Water quality suitable for needs	P
Groundwater from well field	System will already exist	P	Salinity cannot be effectively removed	U	Saline water not suited to river flow supplementation	U
Domestic Sewage Handling						
Package treatment plant	Cost effective	P	Proven technology	P	Proven technology	P
Lagoon system	Highest cost	U	Proven technology	P	Proven technology	P
Solid Waste Disposal						
Incineration with above grade landfill	Highest capital and operating costs	A	na	-	na	-
Above grade landfill	Lower capital and operating costs	P	na	-	na	-
Major Drainage Works - South Granny Creek						
Realignment of South Granny Creek	Lowest cost alternative	P	na	-	Provides adequate drainage	A
Divert South Granny Creek directly to Nayshkootayaow R.	Higher cost than Alternative 1	A	na	-	Provides improved drainage	P
Restrict mining operations	Renders Project uneconomic	U	na	-	Not sustainable	U

Alternative	Effects (adverse) to the Natural Environment		Effects (adverse) to the Socio-Economic Environment		Amenability to Reclamation		Summary Rating
Aggregate Supply							
Limestone from bioherms at site	Least disturbance and lowest water management	A	Minimal effect	P	Reclamation similar for all options	P	**Preferred**
Limestone from below surface at site	Increased disturbance and water management	A	Minimal effect	P	Reclamation similar for all options	P	Acceptable
Aggregate trucked to site from off-site source	Greatest environmental effect	U	Greatest environmental effect	A	Reclamation similar for all options	P	Unacceptable
Location of Buildings and Yard Areas							
West of open pit	Least disturbance	P	na	-	Close proximity	P	**Preferred**
Near Nayshkootayaow River	Too close to Nayshkootayaow R.	U	na	-	Added Distance	A	Unacceptable
Airstrip Location							
North of PKC facility	Reduced truck traffic	P	Increased disturbance, increased business	A	Close proximity	P	**Preferred**
At or near Attawapiskat	Increased truck traffic	A	No effects	P	Added Distance	A	Unacceptable
Water Supply Systems							
Attawapiskat River	Water quality suitable for needs	P	na	-	na	-	**Preferred**
Groundwater from well field	Saline water not suited to river flow supplementation	U	na	-	na	-	Unacceptable
Domestic Sewage Handling							
Package treatment plant	Least disturbance	P	na	-	Minimal requirements	P	**Preferred**
Lagoon system	Increased disturbance	A	na	-	Increased requirements	A	Unacceptable
Solid Waste Disposal							
Incineration with above grade landfill	Minimizes environmental effect	P	Minor air emissions	A	Reduced long-term liability	P	**Preferred**
Above grade landfill	Increased leachate, wildlife and odour issues	A	Minor leachate at closure	A	Increased long-term liability	A	Acceptable
Major Drainage Works - South Granny Creek							
Realignment of South Granny Creek	Limited disturbance, habitat compensation required	A	Minimal effect	P	No reclamation required	P	**Preferred**
Divert South Granny Creek directly to Nayshkootayaow R.	Disrupts downstream creek flows	U	Minimal effect	P	Requires drainage system restoration at closure	A	Unacceptable
Restrict mining operations	No effect	P	Minimal effect	P	No reclamation required	P	Unacceptable

Alternative	Cost-Effectiveness		Technical Applicability and/or System Integrity and Reliability		Ability to Service the Site Effectively		Effects (adverse) to the Natural Environment		Effects (adverse) to the Socio-Economic Environment		Amenability to Reclamation		Summary Rating
Access and Power													
On-site generation w. coastal winter road and fuel pipeline	Base case	P	Proven technology	P	Able to service site with contingencies	A	High fuel demand, marine transport of fuel, with pipeline	A	Marine fuel transport not supported by coastal communities	A	Limited reclamation costs and effects	P	Acceptable
On-site generation w. coastal winter road and winter trucking	Lowest cost alternative	P	Proven technology	P	Able to service site with contingencies	A	High fuel demand, marine transport of fuel	A	Marine fuel transport not supported by	A	Limited reclamation costs and effects	P	Acceptable
Transmission line along coast and coastal winter road	High capital and NPV costs	A	Proven technology	P	Able to service site with contingencies	A	Transmission line power, reduced fuel demand	P	Coastal community support	P	Limited reclamation costs and effects	P	**Preferred**
On-site diesel with SWAWR	Competitive costs	P	Proven technology	P	Able to service site with contingencies	A	High fuel demand, no marine transport	A	Increased fuel spill risk	A	Limited reclamation costs and effects	P	Acceptable
Transmission line along coast and SWAWR	High capital and NPV costs	A	Proven technology	P	Able to service site with contingencies	A	Transmission line power, reduced fuel demand	P	Support from inland communities	P	Increased costs for transmission line removal	A	Acceptable
Transmission line following along SWAWR	High capital and NPV costs	A	Proven technology	P	Able to service site with contingencies	A	Transmission line power, reduced fuel demand	P	Support from inland communities	P	Increased costs for transmission line removal	A	Acceptable
Closure - Open Pit													
Flood open pit to form pit lake	Cost effective	P	na	-	na	-	Results in meromictic lake; minor loss of terrestrial habitat	A	Minimal effect	P	Results in meromictic lake; minor loss of terrestrial habitat	A	**Preferred**
Fill open pit with mineral waste	Cost prohibitive >$100 M added costs	U	na	-	na	-	Allows redevelopment of terrestrial habitat	P	Minimal effect	P	Allows redevelopment of terrestrial habitat	P	Unacceptable
Closure - Demolition Wastes													
Dispose within mineral waste stockpile	Lowest cost alternative	P	na	-	na	-	Least intrusive	P	Minimal effect	P	Least intrusive	P	**Preferred**
Develop new above grade landfill	Costs higher than Alternative 1	A	na	-	na	-	More intrusive than alternative 1	A	Minimal effect	P	More intrusive than alternative 1	A	Acceptable
Dispose of within open pit	Requires operation of dewatering system for additional 2 yrs	U	na	-	na	-	Risk of debris and residual hydrocarbons in pit lake	U	Minimal effect	P	Risk of debris and residual hydrocarbons in pit lake	U	Unacceptable
Closure - Infrastructure													
Reclaim all infrastructure	Some reduced costs	P	na	-	na	-	na	-	Provides no direct benefit	A	No long-term proponent liability		To be assessed
Transfer some infrastructure to AttFN, as appropriate	Slightly higher costs	A	na	-	na	-	na	-	Facilities could be of benefit to AttFN	P	Long-term proponent liability to be defined		To be assessed

Notes:
1. Grouting to be used in combination with well field if operational data demonstrate that it is likely to be effective
2. Cone deposition most effective in early stages of PKC facility development because of lack of ready construction materials
3. Perimeter PK deposition is more effective in later stages, when construction materials readily available, because this method provides improved seepage control

figure
3-1 Access and Power – Alternative #1 (CSEA Base Case)

figure
3-2 Access and Power – Alternative #2

figure
3-3 Access and Power – Alternative #3

figure
3-4 Access and Power – Alternative #4

figure
3-5 Access and Power – Alternative #5

3-6 Access and Power – Alternative #6

figure
3-7 Access and Power – Alternative #7

4.0 PUBLIC CONSULTATION

Two main purposes of the *Canadian Environmental Assessment Act* are to promote communication and cooperation between responsible authorities and Aboriginal peoples with respect to environmental assessment and to ensure that there be opportunities for timely and meaningful public participation throughout the environmental assessment process.

At the beginning of the process, the responsible authorities determined that consultation with First Nations, the public and stakeholders would be necessary during the environmental assessment. The responsible authorities also determined that consultation was required before the development of guidelines, so as to be able to use information and concerns collected during consultation in the development of guidelines.

De Beers also undertook consultation with First Nations, the public and stakeholders on the project before and during the environmental assessment process.

Consultation on the project was carried out both prior to and following submission of the CSEA in March 2004. Consultation prior to the CSEA submission is referred to as “pre-consultation” in that it pre-dated the environmental assessment public review period. Consultation during and after the public review period is referred to as “EA consultation”.

Pre-consultation includes the meetings, discussions, and exchange of information that were carried out by the RAs and FAs starting in September 2003, before the Guidelines were drafted, as well as consultation by the Proponent starting in May 2001 with initiation of the Desktop Study.

EA consultation includes public notices, meetings, discussions, information sessions and written documentation related to the comprehensive study.

4.1 Environmental Assessment – Pre-consultation, Guidelines and Public Registry

4.1.1 Federal Government Consultation Preceding Guidelines

On August 3, 2003, NRCan assumed the position of lead RA, and the federal environmental process began. RAs and FAs decided to hold a series of consultations with First Nation communities before beginning work on guidelines for the conduct of the environmental assessment. Letters were sent to Attawapiskat First Nation, Kashechewan First Nation, Fort Albany First Nation, Moose Cree First Nation, Mocreebec Council of the Cree Nation, Webequie First Nation, Weenusk First Nation, Marten Falls First Nation, Nibinamik First Nation, Constance Lake First Nation, and Flying Post First Nation, on August 26, 2003. These letters made the First Nations aware of the environmental assessment and invited them to participate in consultations. Letters were also sent to the mayors of Cochrane, Timmins and Moosonee.

In an effort to understand First Nation concerns and issues with the proposed project, RAs and FAs held public consultations meetings and met with chiefs and their councils in Attawapiskat, Kashechewan and Fort Albany, in October 2003, in Moose Factory in November 2003, and met with the Mushkegowuk Council in December 2003. Concerns and issues raised during these meetings were taken into consideration during the development of the draft *Guidelines for the Conduct of a Comprehensive Study and the Preparation of a Draft Comprehensive Study Report* (the Guidelines).

4.1.2 Environmental Assessment Guidelines Review

The RAs developed the guidelines in consultation with federal expert departments, provincial government agencies, Aboriginal groups, the public and De Beers Canada. Draft guidelines were issued on December 12, 2003 and were made available for comment during a six-week public review period. This period was extended an additional three weeks at the request of the Attawapiskat First Nation (AttFN), and ended on February 13, 2004.

A table of issues raised during consultations in the October and November 2003 was prepared and translated into Cree. This table indicated the issues that were raised, where they were raised, and how they were addressed in the guidelines. This table was distributed and used by the RAs and FAs in public meetings and meetings with chiefs and councils in the communities of Attawapiskat, Kashechewan, Fort Albany and Moose Factory in January 2004.

NRCan also established a toll free telephone line and a separate e-mail account for the Victor Diamond Project. The telephone line was active during the public consultations on the guidelines but has seen very little use since. The e-mail account continues to be active with requests for information from the public registry.

The final guidelines were issued on February 26, 2004.

Environment Canada hosted a "Diamond Exploration and Mining in Northern Ontario" workshop in Timmins, Ontario on March 24 to 25, 2004. The workshop included participants from the five coastal First Nation communities, the Mushkegowuk Tribal Council, the Nishnawbe Aski Nation, other local First Nations, interested ENGOs and De Beers Canada. Workshop topics focused on the potential effects of diamond mines on the environment, with presentations from most of the federal departments and provincial ministries involved in the Victor Diamond Project, as well as from De Beers. A presentation from the Chief Archie Catholique of the Lutsel k'e Dene Band of the Deh Cho First Nation from the Northwest Territories on his community's experience with diamond exploration and mining was of particular interest to workshop participants.

4.1.3 Public Registry

Subsection 55(1) of the *Canadian Environmental Assessment Act* requires the responsible authorities to maintain a public registry for the environmental assessment. NRCan, as lead RA, established a public registry in Ottawa for the VDP. Satellite public registries were established in Attawapiskat, Moose Factory, and Timmins, where there are two public registries, one at the provincial government offices, and the other at the offices of the Muskegowuk Council. The *Act* requires that the public registry be established for the purposes of facilitating public access to records relating to the Comprehensive Study and is operated in a manner to ensure convenient public access.

The public registry includes all records produced, collected or submitted with respect to the environmental assessment of the project.

The public registry can be accessed through requests to NRCan, while the satellite registries may be accessed in person. In all cases, lists of requests have been kept.

4.1.4 De Beers Pre-consultation with Attawapiskat

Pre-consultations by the Proponent were held with the AttFN throughout planning for development of the VDP. As well, members of the AttFN have also been actively involved in work at the Victor site, comprising up to 50% of the site work force during the advanced exploration program and subsequent winter works programs, and 100% during care and maintenance phases. In addition, members of the AttFN have participated in carrying out environmental baseline studies, and have received training in conducting environmental monitoring programs.

A Memorandum of Understanding (MOU) was signed by De Beers and the AttFN on November 6, 1999 to address earlier advanced exploration activities at the Victor site, and to set out the general expectations of the parties. A steering committee was established at this time within the community to advise the chief and council on project-related matters. A compensation agreement was also developed pursuant to the MOU to cover project-related effects to site area traditional pursuits during the advanced exploration phase.

On October 22, 2002, the MOU was superseded by the Feasibility Partnering Agreement (FPA), which covers expectations and obligations between De Beers and the AttFN until June 30, 2004, or until such time as an Impact Benefit Agreement (IBA – currently under negotiation) has reached an “Agreement in Principle”.

In addition to consultation on advanced exploration activities, formal pre-consultation on the proposed project was initiated in 2001 with the community of Attawapiskat, at the time that De Beers undertook a desktop study of the project. Meetings were held with the community’s leadership and the steering committee that was established to discuss project-related issues. An environmental prospectus for the project was tabled in May 2002, for release to the local First Nations and to federal and provincial government agencies. The environmental prospectus provided a description of the VDP, and included a brief summary of likely environmental effects and proposed mitigating measures to reduce, or eliminate, any such effects. The Environmental Prospectus was based on project pre-feasibility studies, and input received from the AttFN during earlier discussions involving both the area and the planned project.

Mine feasibility studies were carried out in 2003 and a Preliminary Draft Environmental Assessment Report was submitted and presented to the community in May 2003. From June to August 2003, eight technical sessions were held between the Proponent and the AttFN, covering the following topics: proposed Attawapiskat facilities and infrastructure; Victor site access roads and airstrip; Victor site development; power options and fuel needs; project construction activities; logistics and transportation; and water management plans and impacts.

Since the fall of 2003, De Beers has operated a community channel broadcast in Attawapiskat. The community channel has communicated project updates and announcements of upcoming community meetings. A project animation was developed that graphically and verbally explains the project site, the depth of the pit, North and South Granny Creek diversions, the processing facilities and the closure plan. This was also broadcast over the television channel in both English and Cree. Videotapes and compact disks containing the project animation were made available as well.

4.1.5 De Beers' Pre-consultation with Other Communities

De Beers' pre-consultation with the coastal James Bay communities of Kashechewan, Fort Albany, and Moose Factory started in September 2003, following the release of the Preliminary Draft Environmental Assessment (May 2003). De Beers met with community leadership and provided public information sessions. De Beers also held consultation and information sessions with municipal leaders in Timmins, Cochrane and Moosonee.

4.2 EA Consultation

The consultations, which were done for the Comprehensive Study Environmental Assessment and the Re-evaluation of Site Access and Power Supply Alternatives, are discussed below.

4.2.1 Government Consultations

De Beers submitted its comprehensive study environmental assessment document (CSEA) in March 2004. This included technical studies and a summary translated in French and Cree. It did not include the traditional ecological knowledge study, which delayed the commencement of the public review period.

On April 15, 2004 the Attawapiskat First Nation agreed to release the non-confidential portions of the traditional ecological knowledge section of the CSEA. This made it possible for the federal authorities to initiate a 60-day public review period on the CSEA. The public review period was to extend until June 15, 2004.

On May 3, 2004 De Beers informed federal and provincial authorities that it was considering changes to the power supply and site access components of the project, in response to concerns of James Bay coastal First Nation communities regarding plans for marine shipment and transfer of diesel fuel in James Bay.

Federal and provincial authorities provided preliminary written comments to De Beers on the CSEA on May 19, 2004. The comments identified a number of issues including a few major deficiencies, especially with respect to the planned method for dewatering the mine pit and a need for additional socio-economic information.

On May 26, 2004 the RAs informed De Beers that the public consultation period would be extended until De Beers had decided on power supply and site access options, and had submitted complete, written information on any planned project changes. The RAs confirmed that they would set a new deadline for the submission of public comments once they had received new information.

On August 18, 2004 De Beers informed the federal and provincial governments of its revised proposal. Fuel shipping in James Bay and the construction of a fuel pipeline to the mine site had been replaced by the twinning of the coastal power line, and the use of the James Bay coastal winter road for site access was confirmed. After the Re-evaluation of Site Access and Power Supply Alternatives Report was received and placed on the public registry in Ottawa and the four satellite locations (completed September 2), the federal agencies announced that the public review period would extend until October 18, 2004. The public review period was later extended to October 29, 2004 at the request of Attawapiskat.

Federal and provincial authorities met with chiefs and councils in Attawapiskat, Kashechewan, Fort Albany and Moose Factory in October 2004. They also met with the Chief of Mocreebec.

4.2.2 Issues and Concerns Raised During the CSEA Public Review

During the public review period, which extended from April to October 2004, many questions, concerns and comments were received. All questions, concerns and comments were placed on the public registry and provided to De Beers for response.

A table of the issues raised during the public review has been prepared and is attached as Appendix C. This table lists all the questions, concerns and comments received. The following list is a summary of the issues raised during consultations, or received by mail (see Table 4-1)

As well as the specific concerns raised about the VDP (Listed above) all First Nations communities raised the issue of lack of trust in both the government agencies and De Beers. These concerns were raised through examples where past developments (Site 415 of the Mid-Canada Radar Line) and past accidents (Fuel spill in Attawapiskat) have had long-term impacts with an apparent unwillingness to fix the problems. They expressed the concern that the same will happen at the VDP site, in that the First Nations will be left to deal with the problems at the VDP site long after everyone else has left.

Federal and provincial authorities also sent questions, concerns and comments to De Beers. Major issues identified by governments included ground water, hydrology, fish habitat, wildlife, socio-economic issues and geochemistry issues. The table of governmental questions, concerns and comments is found as Appendix D. The following list summarizes the main issues identified by governments (see Table 4-1)

TABLE 4-1
TOPICS RAISED THROUGH GOVERNMENTAL CONSULTATION WITH FIRST NATION COMMUNITIES AND THE GENERAL PUBLIC, AND THROUGH GOVERNMENTAL AGENCY TECHNICAL REVIEW

Subject	Topics Raised by Communities/Public and by Government	Additional Topics Raised by Communities/Public	Additional Topics Raised by Government	Addressed
Water	Groundwater quantity and quality			5.3; 6.4; 6.5; 6.6; 6.10; 6.12; 8.5
	Surface water quality			5.1; 5.2; 5.3; 5.6; 6.4; 6.5; 6.6; 6.8; 6.12; 8.5
	Ice quality			6.4; 6.10
	Sediment quality			5.3; 6.4
	Acid rock drainage			
	Metal and particulate contamination			6.2; 6.4; 6.10; 6.11
	Water management			5.3; 6.4; 6.5; 6.10
	Diversion of South Granny Creek			5.3; 6.4
Socio-economic and cultural issues	Jobs, skills and education	Government functions		5.5; Appendix D
	Socio-economic impacts	Housing and community infrastructure		5.5; 7.1; Appendix D
	Impacts to human health			5.5; 7.2; 7.3
		Impact on youth		5.2
		Study area		5.2; 5.5
		Consultations and compensation		4.2; 7.2
			Local government finances	Outside scope of CSR
Wildlife	Wildlife and wildlife habitat			5.3; 6.6; 6.7
	Birds			5.3; 6.6; 6.7; 8.5
	Aquatic organisms and habitat			5.3; 6.4; 8.4
	Hunting			5.3; 5.5; 6.2; 6.6; 7.2
Air	Air quality issues			5.3; 6.2; 8.2
		Burning of fossil fuels		6.2
		Effects of incinerator		6.2
		Kyoto Agreement		6.2
			Transportation-related emissions	6.2
Noise	Noise			6.2; 6.6; 7.2; 8.5
Energy	Alternatives			6.8; 6.11; 7.2
	Cost/economics			7.2
Transportation	Construction of an all-weather road			6.4; 6.6
		Airstrip		5.5
	Transportation system			5.1; 5.5; 6.2; 6.4; 6.6; 6.9; 6.10; 6.11; 7.2; 7.3

Subject	Topics Raised by Communities/Public and by Government	Additional Topics Raised by Communities/Public	Additional Topics Raised by Government	Addressed
Physical environment	Muskeg, soils and terrains			5.3; 6.3; 6.4; 6.6; 6.8; 8.4
		Climate and meteorology		5.4; 6.10
	Vegetation			5.3; 6.5; 6.6; 8.4; 8.5
Exploration		Exploration activities		5.5
Traditional Ecological Knowledge	Quality of TEK			Not addressed in CSR, but reviewed in the CSEA process
		Uses of TEK		5; 5.1; 5.2; 5.3; 6.1
	Methodology			Not addressed in CSR, but addressed in the CSEA process
Mining	Processed kimberlite management			6.4; 6.5; 6.6; 6.11
		Water		6.4
	Domestic waste			5.5; 6.4; 6.6
	Dredging			6.4; 6.9
	Roads closure phase			6.4; 6.6; 7.6
			Mine water characteristics, management and disposal	6.4; 6.5; 6.11
Process-related issues	Mitigation measures and accountability			6.11; 7.5; 8.6
	Participation plan			
	Spatial and temporal boundaries			1.10
		Public registry and access to information		4.1
		Funding for review		
		Scope		
			Comprehensive Study Environmental Assessment Report	

De Beers was required to answer all questions, concerns and comments raised in connection with topics in Table 4-1, and in Appendices C and D, in writing. All of the responses were placed on the public registry.

Some issues required additional work. In some cases, there was a series of back and forth questions, responses and replies. Governmental officials and experts also met with De Beers officials and experts on several issues to clarify requirements and deal with specific requests. Technical meetings were held on hydro geological, wildlife, fish, lands, geochemical, and socio-economic issues.

4.2.3 De Beers Public Consultation Program

De Beers utilized a number of tools to communicate with local First Nations, government agencies and stakeholders about the content of the EA, including a computerized project animation, written documentation, a newsletter, a local community television channel in Attawapiskat, technical meetings, workshops, field site visits, and public information sessions.

The animation shows how the Victor kimberlites were formed and illustrates the stages in mine development and closure. The animation has been distributed in VHS and DVD formats and was played during public consultation sessions in all communities and on the local television station in Attawapiskat. It is available in both Cree and English.

Written documentation distributed prior to the CSEA, including the Environmental Prospectus (May 2002) and the Preliminary Draft Environmental Assessment (May 2003), provided Aboriginal groups and government representatives with an opportunity to review project concepts as they developed and provide input during pre-feasibility and feasibility study stages.

In Attawapiskat only, De Beers operated a local television channel, starting in the fall of 2003, to broadcast announcements of public information sessions, project updates and the project animation. De Beers has also maintained an office in Attawapiskat since 2003, staffed by local De Beers' employees who have been available to answer questions in English and Cree and provide project documentation.

Both Attawapiskat leadership and government officials have visited the project site. Numerous workshops, technical meetings and public information sessions have provided further opportunity to reach out to stakeholders and obtain input to project designs.

4.2.4 De Beers Public Consultation Sessions

De Beers carried out public consultation with Aboriginal groups and communities in the James Bay Lowlands, as well as with Aboriginal groups further west and south (Constance Lake First Nation and Marten Falls First Nation), and with the communities of Timmins, Cochrane, Hearst and Kapuskasing. Consultations were carried out in three separate phases as per the following: Phase 1 – March 2004, Phase 2 - May and June 2004, and Phase 3 – September and October 2004. Community consultation with First Nation communities generally consisted of meetings with the community leadership followed by public information sessions. Meetings held in Timmins, Cochrane, Hearst and Kapuskasing typically involved separate meetings with the mayors and councils in addition to general public meetings. De Beers originally proposed two phases of public consultation, but three phases were eventually completed due to project changes during the EA process related to access and power alternatives (Appendix E).

At the request of the RAs, De Beers prepared a plain language summary of the CSEA for use in consultations. This summary was also translated into Cree, and distributed to the communities.

Public information sessions consisted of PowerPoint presentations by De Beers followed by question and answer periods. The project animation was shown in the first session at each community, as well as to the leaderships of Aboriginal and non-Aboriginal communities. Additional showings of the animation were offered in subsequent sessions at the different communities. Several showings were done in Attawapiskat. The Proponent provided poster materials and key project documentation for review and reference at all public meetings. Minutes of each public information session were recorded and entered into a database. Meeting minutes were used to help evaluate and summarize the feedback and concerns expressed in the public information sessions. A summary of topics raised and their frequencies during De Beers' consultation sessions is provided in Table 4-2. Further details on the three sessions are provided below.

Phase 1

Initial public consultation by De Beers was carried out in the communities of Attawapiskat, Kashechewan, Fort Albany, Moosonee, Timmins and Cochrane in March 2004. Meetings were also held with the Mushkegowuk Council in Moose Factory. The Moose Cree First Nation declined to participate in this first round of consultation, instead choosing to issue a letter to the Proponent stating its concerns, mainly about the prospect of fuel handling in James Bay. The Taykwa Tagamou Nation [New Post] consistently refused to meet with De Beers. Offers were made to non-government organizations (NGOs), Mining Watch Canada, and Northwatch, but these organizations stated that they were not ready to meet.

Feedback during the first round of consultation focussed mainly on concerns over the Proponent's proposal to transport large volumes of fuel required for on-site diesel-fired power generation. The fuel transport plan provided for fuel to be delivered in tankers into James Bay with off-loading onto barges, as well as an associated 110 km buried steel fuel pipeline from Attawapiskat to the Victor mine site. As an alternative, Aboriginal groups and the Town of Moosonee expressed support for an electrical transmission line to provide site power, which would offset a substantial amount of the project fuel requirements.

Phase 2

De Beers carried out a second round of public consultation through the period of mid-May to mid-June 2004. While information on the overall project was presented, the Proponent's objective in this round of consultation was to obtain further feedback on potential alternatives for access and power that were under re-evaluation. De Beers was unable to meet with the community of Attawapiskat during the second round, first due to the threat of a flood in the community that required evacuation, and following that because the community was approaching elections for their leadership and they deemed it better that public consultation not be carried out during that period. The public information session held with the Moose Cree First Nation in Moose Factory was the first general public information session held with this community since release of the CSEA in March 2004.

TABLE 4-2
FREQUENCY OF TOPICS RAISED THROUGH PROJECT CONSULTATION WITH FIRST NATION AND NON-ABORIGINAL COMMUNITIES

Concern or Consideration	AttFN On Reserve	AttFN Off Reserve	Kashechewan FN	Albany FN	Moose Cree FN	MoCreebec	Constance Lake FN	Mushkegowuk	Moosonee	Cochrane	Timmins	Hearst	Kapuskasing
Aboriginal & Treaty Rights	1			2	1	1							
Air Quality													
Air Quality - general	2												
Dust	1												
Human health	1												
Power plant													
Wildlife	2												
Benefits													
Benefits - general	3	1	8	4	8					1	1	3	
Business opportunities	6	1	4	2	6								
Education	6		2		4		1		2				
Employment opportunities	21	2	7	6	6	2	1	1	3				
Employment wages	1												
Housing	3												
Training	14		6	2	3	1			1				
Revenue sharing				1									
Closure													
Closure - general	21	2	1		2			1					
Cost	1				1								
Site restoration	3		1										
Long-term monitoring	10												
Consultation													
Animation													
Cost	2												
Federal government													
General			1		1	2							
Information to Band members	4		2										
Meaningful consultation	18		6	1									
Physical model													
Project comprehension			1										
Provincial government													
Technical terms													
Translation	1			1									
Employment/Training													
Concerns			1	1			1						
Employment - unions			1			1	2			1			1
General	3		2	3			1						
Monitoring - contractors								1					
Environmental Assessment & Permits													
Consultation								1					
EA process	14		2			1	1				1		
Funding	2							1					
Environmental - Compensation	1		3										
Monitoring							1						
Fuel Management													
Fuel cost			3		1								
Fuel handling	18				3			1					
Fuel - general			1			2					2		
Fuel - land transportation	10	1	2	1	6	1				1			
Fuel - leak			1						1	1			
Fuel - marine transportation	17		1		4								
Fuel pipeline	43	5	1		2						1		
Fuel storage in Attawapiskat	10					1							
Fuel storage at Victor site	1												
Fuel - tanks									1				
Funding													
Education									1				
Training	1												
Health & Safety													
Health & safety - general	25		2	1	4								
Aircraft	4												
Criminal record	3	1											
Monitoring	1												
Substance abuse	2				1		2						
Truck traffic	8	1	1						2			2	
Impact Benefit Agreement (IBA)													
IBA - funding	12						1			3			
IBA - general	35	2	3	8	4				1				
Relationships with other FN	3		3	1	1			1					
Participation Agreement	1				3	3	1						
Land Use													
Compensation				1			1						
Traditional Territory					1	2	2						

Concern or Consideration	AttFN On Reserve	AttFN Off Reserve	Kashechewan FN	Albany FN	Moose Cree FN	MoCreebec	Constance Lake FN	Mushkegowuk	Moosonee	Cochrane	Timmins	Hearst	Kapuskasing
Mineral Resources													
Victor	1		1										
Other sites	6		1										
Negotiations	1									2			
Permits	1				1				1	1	1	1	
Power Alternatives	11		2		2								
Cost	1		2				1					1	
Coastal transmission line	1				4	1		1		1	3		1
Transmission line general						1		4		1	1		
Power generation					1								
Other					1						1		
Project Control				1									
Project Economics	7	2	1		1					1		1	1
Road													
Cost							2						
Monitoring							1						
Schedule	5							1					
Site Activities & Land Use	2		1										
Site Facilities													
Health Care/Safety	1												
Socio-Economic Impacts	7		1		3								
Agreement					1								
Compensation													
Health (in the community)							1						
Information					1			1					
Impact	1		2			2	1	2					
Monitoring	2												
More study needed / funding			1				1						
Solid Waste Disposal	1				1								
SWAWR/Hearst Winter Road	3				5				3				
Benefits									1		1		
Cost					2				1		2		
Consultation					1								
Funding				2									
General	3				3	2		1	3		2	8	
Impact					1				2				
Location							2			1			
Traditional Evironmental Knowledge													
Insufficient collection													
Wildlife													
Fish													
Travel													
Other			1										
Transportation													
Airstrip - general						2			1		3	2	2
Airstrip (all-season)	8												
Airline/craft					1					1			
Cost												1	
Cost - bridges			1										
Cost - Transportation			1			1							
Cost - all season road/rail			2			1	1						
Desire for all-season road	12	1	5	2	1		1						
Funding				1									
Fly											1	1	1
Monitoring							2						
Winter road - general	23		7	6	7		3		11		5	2	
Winter road - location	7						3				1		
Winter road & airstrip - public access	5			1									
Opportunities							1					1	
Truck				1								1	
Traffic					1								
Agreement										1			
Waste													
General									1				
Hazardous					1								
Water - Groundwater													
Drinking water	3												
Fisheries & aquatic resources	16						1						
Monitoring	7												
Water management	15												

Concern or Consideration	AttFN On Reserve	AttFN Off Reserve	Kashechewan FN	Albany FN	Moose Cree FN	MoCreebec	Constance Lake FN	Mushkegowuk	Moosonee	Cochrane	Timmins	Hearst	Kapuskasing
Water - Surface													
Drinking water	20												
Fisheries & aquatic resources	32												
Flooding	2		1		2								
Flow changes	7		1		1								
Impact	1												
General			2							1			
Guidelines	1												
Monitoring	14												
Dewatering wells							1						
Water management	19												
Wildlife													
Birds			1		1								
Caribou/moose	8		1										
Compensation	34		7	1	3								
General disturbance	14												
TEK	2												
Winter													
Program	1												
General										1	1		
Category Subtotals	639	19	108	50	108								

As one of the proposed site access and transmission line routes was from the Hearst/ Constance Lake area to the Victor site, the second round of De Beers' public consultation was expanded geographically to include the First Nation communities of Constance Lake, Marten Falls (Ogoki), and Taykwa Tagamou Nation (New Post), the latter consistently refusing to meet with De Beers. The Highway 11 communities of Hearst and Kapuskasing were also included in the second round of consultations. In the case of Marten Falls, the Chief and Council decided to meet with De Beers, but did not recommend any meetings with the community.

Phase 3

De Beers carried out a third round of public consultations with the communities involved in the first and second round, from September to October 2004. The focus of this round was to present the findings of the re-evaluation study completed by the Proponent and to obtain feedback on the proposed site access and power supply alternatives. Once again, the Taykwa Tagamou Nation refused to meet with De Beers. A public meeting with Marten Falls was cancelled because of a death in the community, but a further meeting with chief and council was held which enabled the Proponent to obtain feedback on the project's preferred alternatives.

Generally, the selected project power and access alternatives, to reinforce the existing transmission line along the James Bay coast, and build a transmission line from Attawapiskat to the Victor site, and the proposal to utilize the existing coastal winter road for site access were well received by the coastal communities. The communities of Constance Lake, Hearst and Kapuskasing expressed disappointment stating their preference for project access from the Hearst/Constance Lake area. Several Aboriginal groups expressed concern over what they viewed as inadequate evaluation of socio-economic effects that the project will have on the region and its inhabitants. The Mushkegowuk Council also indicated that it felt that the collection of traditional ecological knowledge (TEK) was both incomplete and flawed.

4.3 Traditional Knowledge

The CSEA EA guidelines specify that De Beers "shall make all reasonable effort to collect and/or facilitate the collection of traditional/community knowledge relative to the proposed project." De Beers recognized the importance of incorporating traditional knowledge into the project, and traditional knowledge was collected in both a formal and informal manner.

4.3.1 Formal TEK Collection by the Victor Project TEK Working Group

Formal collection of traditional knowledge was carried out through a traditional ecological knowledge (TEK) study within areas that are likely to be affected by the project. A Victor project TEK Working Group was established under the joint direction of the AttFN and the Proponent, to carry out collection of TEK. The Proponent and the AttFN Chief and Council signed a confidentiality agreement for the TEK study in August 2003.

Existing information was researched and a total of 65 respondents were interviewed from September 2003 through January 2004, followed by a data verification process exercise, and reporting. The maps and interview materials were then placed on public display in the community of Attawapiskat for broader community review, with public comments documented and incorporated into the study. The TEK study was focused principally on fisheries and wildlife aspects of the project environment, particularly in regard to traditional pursuits, but it also included consideration of a variety of other information aspects, such as those relating to climate, creek and river flows, and to cultural and heritage resources. This information was referenced in the CSEA where applicable.

As the TEK information is the intellectual property of the AttFN and release requires their expressed consent, references to TEK were initially withdrawn from the CSEA before release in March 2004. The AttFN subsequently provided authorization for the release of this information on April 16, 2004, and excerpts withdrawn from the CSEA were released in a letter from De Beers to the CEA Agency. The TEK study itself was released in an edited form shortly thereafter. The TEK information incorporated into the CSEA covered topics such as fisheries, vegetation, wildlife, surface and groundwater systems, and marine mammals and waterfowl. TEK was used in identifying Valued Ecosystem Components (VECs) in the CSEA. For example, the TEK study identified caribou and moose as critical environmental components, various fisheries aspects such as sturgeon in the Attawapiskat River (including spawning areas), as well as both lake whitefish and cisco as important resources for the community. Significant fishing areas and fish species usage were noted in the TEK study. By designating the entire Attawapiskat River as a VEC, all of the fish species and other forms of life that depend on the river, including wildlife and people, achieve recognition and status within the definition of the VEC.

Information on cultural and heritage resources was used to ensure that project related infrastructure avoided known and highly probable locations of such resources. For example, all the heritage resources identified through TEK and archaeological studies are along the main river corridors, which were also identified through both TEK and scientific methods to be the most significant habitat. Criteria utilized in project design were to not place any project infrastructure within 200m of a watercourse, allowing for exceptions such as a water intake/outfall and winter road crossings where there was no alternative. The identified sites were not near any known heritage sites.

4.3.2 Informal TEK Collection from Attawapiskat

The Proponent has described seeking informal TEK input to the project as well, commencing at the start of environmental baseline studies in 1999. AttFN members involved in field data collection who had knowledge of the Victor site provided valuable information to guide biologists in the collection of baseline data focused mostly on fisheries and wildlife, and on the behaviour of river systems.

The Proponent has also indicated that TEK was also collected informally through numerous meetings and workshops held in the community throughout project conceptualization with community members including Elders. Some of this information was used to make project decisions, and other information was used to guide future studies.

Referrals to TEK data were included in project documentation, such as the Environmental Baseline Study and the CSEA documents. However information gathered through the informal collection of TEK is frequently provided without reference. The Proponent's informal collection of TEK may increase the difficulty for the First Nation to verify whether information cited in project documents as their TEK is being presented correctly. For example, it may be more difficult to confirm that all TEK information shared informally by the community was considered by the Proponent, and if those who shared their community's TEK gave their informed consent to the Proponent to allow them to use this information.

4.3.3 Collection of TEK for the Southwest Alternate Winter Road

De Beers collected TEK in July to August 2004 for the inland winter road alignments under consideration in its re-evaluation of site access and power supply alternatives. The leadership of the communities of Marten Falls, Constance Lake, Fort Albany and Kashechewan were approached by the Proponent to determine their interest in having De Beers complete a TEK study along the inland road route. Attawapiskat was not included in this study as previously collected TEK data include information applicable to the alternative winter road alignments. In the end, TEK from only the Fort Albany and Constance Lake First Nations was included in the study; Marten Falls participated in TEK data collection but later indicated that the information could not be used for any subsequent report since the chief and council did not support any of the alternative winter road alignments from the Hearst/Constance Lake area to the Victor site. Kashechewan's economic development representative, who had previously agreed in writing to meeting dates and the names of proposed Elders to be interviewed, indicated to the Proponent's consultants upon their arrival in the community that the Kashechewan First Nation (KFN) would undertake its own TEK study over two years and that any input into the proposed alternate transportation corridor study requiring KFN TEK knowledge would have to wait until that time.

The TEK study documented a number of beneficial and adverse effects in the eyes of the participants. Some felt that the inland route, especially an all-season versus a winter road, would provide positive opportunities such as supporting economic development initiatives, bring tourists into the area (viewed as a positive effect), and would be beneficial to the younger generation. Some felt that better ground for roads lay inland as well. Conversely, others viewed the road as opening up the country to exploitation as a negative effect. Some felt that the coastal road should be favoured and that it should be upgraded to an all-season road, and some felt that more information was needed in terms of who would control the road, and the potential for spills on the environment. The inland winter road corridor, or southwest alternate winter road, was not selected as the preferred site access alternative.

4.3.4 Collection of TEK for the Coastal Transmission Line

Based on further study, and input from the various project stakeholders, the coastal transmission line alternative, adjacent to the existing line, was selected by the Proponent as the preferred power supply alternative. The existing 115 kV transmission line was constructed in 1998 and a federal environmental assessment was completed in 1997 with some traditional knowledge and land use information collected. De Beers, Five Nations Energy Inc. (FNEI) and

Hydro One are currently undertaking, as co-proponents, a provincial Class EA for Minor Transmission Facilities. To facilitate route selection and to better evaluate environmental effects associated with transmission line construction and operation, the collection of updated TEK was undertaken as part of both federal and provincial EA processes. The TEK studies were carried out by the Mushkegowuk Council under the direction of SNC-Lavalin. Participating communities in the study included Attawapiskat, Kashechewan, Fort Albany, Moose Factory (Moose Cree First Nation and MoCreebec), and New Post (Taykwa Tagamou Nation).

In the communities there was a sense that this consultation was a duplication of the CSEA, and site access and power consultations. New Post (Taykwa Tagamou Nation) elected to withhold their specific TEK information from public release.

4.4 Aboriginal Comments/Concerns

4.4.1 Attawapiskat

Socio-economics

The AttFN indicated that the Proponent had not described the socio-economic environment in accordance with the guidelines, although the AttFN acknowledged that they have not provided this information to the Proponent because they have not felt comfortable with the company or its representatives.

The guidelines include additional indicators which, although not related to biophysical environmental effects, were included because of concerns expressed by the First Nations, and although the RAs have clarified that this information is not required under the *CEA Act* to make a determination on the project, such information would be useful and would respond to First Nations concerns.

The AttFN has stated that "a cohesive, co-ordinated and co-operative socio-economic monitoring program is required" (Gartner Lee, October 2004 in AttFN letter dated October 29, 2004 to the CEA Agency), and has presented a socio-economic assessment and monitoring framework as a starting point for discussion between the AttFN, the Proponent and the federal and provincial governments. The AttFN proposed a legal agreement between these parties regarding the assessment and monitoring of socio-economic indicators, and while approval of the project would not depend on such work being completed, that the legal agreement to carry out this assessment and monitoring program be in place prior to issuance of permits or other federal or provincial regulatory instruments that would allow mine construction to begin.

Traditional Ecological Knowledge

The AttFN claim that the TEK study completed for the project both fails to meet the requirements of the EA guidelines and their own requirements. They believe that more study of TEK is required with respect to monitoring and mitigation of the environmental and socio-economic effects of the project. The AttFN believes the additional TEK is not necessary to make a decision about the project, but it is needed before permits or other regulatory instruments are issued, so that TEK is incorporated into monitoring and mitigation as outlined in the permits.

Environmental Monitoring

The AttFN believe that an environmental co-management agreement should be established between the AttFN and the federal and provincial governments. Also, that De Beers should be required to provide an environmental performance document that outlines terms and conditions upon which De Beers will operate and includes all commitments made by De Beers. The AttFN have expressed repeated concerns related to water quality, the ability of ice to support winter traffic such as snowmobiles downstream of the well field discharge to the Attawapiskat River, wildlife and traditional use of resources.

4.4.2 Kashechewan

The first rounds of consultation with Kashechewan, by both the federal government and De Beers highlighted a concern over marine shipping of fuel and the use of a fuel pipeline, especially since the communities have gone to a transmission line for power supply to get away from using fuel. There were questions regarding compensation for use of traditional lands and for any spills that may occur. There was also a clear interest in the upgrading of the existing coastal winter road to a permanent road.

During further consultations with the community of Kashechewan, there was a clear preference for upgrading of the existing coastal winter road or a permanent road over an inland winter road, although some individuals expressed support for an inland winter road from the Hearst/ Constance Lake area. Preference for the project to consider a transmission line for power was reiterated, as well as issues surrounding compensation.

Consultation with the KFN identified the need for further study of the socio-economic effects of the project. Questions arose regarding training and concerns about the people being ready to take advantage of the business, employment and training opportunities. It was also clear that the community wants to be empowered and involved in development in the region in a significant way. The desire for a permanent road or railway along the coast was reiterated, to provide better access for the communities, which would lower the cost of living and provide increased opportunities for youth. The desire of the community to have an agreement with De Beers was also often presented.

4.4.3 Fort Albany

In the first rounds of consultation, by both the federal government and De Beers, with the Fort Albany First Nation there was concern expressed over the marine shipping of fuel. There were also many questions and comments on exploration and land use by mining companies. There were also concerns that the Fort Albany First Nation had not been included in IBA negotiations as Attawapiskat had, and that they should receive benefits from the project as well. It was felt that one collective agreement should be concluded; that Attawapiskat will receive all the benefits from the project; and that the Proponent was following a divide and conquer approach.

During further consultations concern was again expressed at being excluded from an IBA, as opposed to some other form of agreement, as proposed by the Proponent based on its negotiations with the AttFN, wherein the AttFN maintained that there should only be one IBA – with Attawapiskat. There was indication of support for an inland winter road only if a connecting road was built to the community. There were also concerns expressed about the impacts of the project on traditional ways of life.

There was a sense of wanting to be more involved and prepared through education and training, and a desire to be able to see younger generations benefit. There was also discussion of compensation for the use of traditional lands. It was acknowledged that there were tensions between Fort Albany and Attawapiskat, and there was a feeling that the Fort Albany First Nation was being left out. There was interest in changing the winter road to an all-season road.

4.4.4 Moose Factory (Moose Cree First Nation)

The Moose Cree First Nation (MCFN) issued a letter on March 17, 2004 indicating that they would not meet with the Proponent for the purposes of consultation on the project until a number of conditions were met related to: the provision of resources for review; extension of the public review period; that resources be made available for negotiation of an IBA with De Beers; that fuel handling and transportation within James Bay and Hudson Bay waters be dropped; and that the use of a transmission line be seriously considered to power the project.

De Beers met with the MCFN during the second phase of consultation on the CSEA.

During consultations with both the federal government and De Beers, the MCFN expressed a concern over the limited positive economic effect that the construction of an inland winter road route would have on the coastal communities. There was also a question regarding the effect of increased traffic on the existing coastal winter road, and increased risk of fuel spills on the ONR rail line between Cochrane and Moosonee. There was inquiry into revenue-sharing opportunities. Other comments included the need to respect Treaty rights and that the emergency response centre, being built by MCFN, should play a role in the project.

The MCFN also indicated that all the communities should be treated similarly, and that a participation agreement (proposed for the coastal communities) was not adequate, and that De Beers should negotiate an IBA with the MCFN. It was asked if there is an agreement in place to ensure there is collaboration with the communities in the collection of the socio economic information for EA. It was also stated that the socio-economic assessment was carried out for Attawapiskat in detail and that there is a shortfall for the coastal communities.

Concern was also expressed about the effect of increased income on substance abuse. There were also concerns about training, that economic opportunities be made available to them and that non-Aboriginal owned businesses, especially from Timmins and other areas where people already have mining experience were going to get all the work. There were also many concerns expressed about water quality and the fact that the water flows down the bay from Attawapiskat towards Moose Factory. Members of the MCFN indicated that they are concerned that pollution may damage or alter their way of life.

The Taykwa Tagamou First Nation declined to participate in project related environmental assessment consultations. Attempts to meet with the Taykwa Tagamou First Nation have been documented by the Proponent and by the government agencies. Some members of the Taykwa Tagamou participated in the open house meetings in Cochrane, where issues related to employment were raised.

4.4.5 MoCreebec

De Beers was not able to meet with the MoCreebec First Nation, but met with the leadership of MoCreebec during the second and third phases of their consultation. The federal and provincial governments also met with the MoCreebec leadership. During these meetings, many questions were directed at ensuring that First Nation jobs be secured, that people be trained, and that cultural sensitivity training be provided. Mocreebec asked about the potential impact of labour unions reducing the availability of jobs for First Nations people. MoCreebec also asked about a participation agreement with De Beers. In terms of winter road access, there was support for the coastal winter road and not for the inland winter road route.

4.4.6 Mushkegowuk Council

The Mushkegowuk Council (MC) has a unique role in the region and the environmental assessment process. As a council of regional chiefs, MC is a decision maker influencing policy and establishing regional strategy. The MC also provides technical support services to the communities and other stakeholders. In the environmental assessment, they submitted interventions while providing technical assistance to the Proponent with TEK and through the Education and Training Services (METS) skills and labour market analysis.

The MC provided several written submissions to the federal government: on April 27, 2004, dealing with perceived deficiencies regarding TEK; on July 23, 2004 dealing with concerns over marine life in relation to fuel transport in James Bay; on July 23, 2004 dealing with socio-economic issues; and on October 29, 2004 dealing with access and power alternatives.

The April 27, 2004 submission regarding a lack of TEK data for communities other than Attawapiskat was subsequently addressed through the collection of TEK by the MC, under the direction of SNC-Lavalin in relation to the proposed twinning of the existing 115 kV transmission line. Concerns about marine life in James Bay in relation to potential fuel spills were viewed by the Proponent as being no longer applicable because of a change in project design, negating the shipment of large quantities of fuel in James Bay. Concerns regarding deficiencies in socio-economic data were addressed in part through the provision of additional socio-economic data.

MC has also indicated that it supports, in principle, the selected site access and power supply alternative, but that it felt that there were deficiencies in the Comprehensive Study documentation regarding the determination of environmental effects and mitigation measures relating to the other alternatives.

4.5 Non-Aboriginal Communities and Moosonee

In the public consultation sessions held by the Proponent with the non-Aboriginal communities of Timmins, Cochrane, Hearst and Kapuskasing, and with Moosonee (primarily Aboriginal), very strong support was expressed for the project. People from these communities saw clear economic advantages in the project going forward, and expressed concerns over project delays. The community leadership sent letters in support of the project to the federal and provincial governments.

In the consideration of alternatives for site access and power, Moosonee leadership and residents expressed clear and very strong support for use of the existing Ontario Northland Railway and coastal winter road, and were opposed to direct project access from the Hearst/ Constance lake area to the Victor site. The communities of Hearst and Kapuskasing, on the other hand, strongly supported access from that region directly to the Victor site, as a means of improving the their respective economies. Cochrane was supportive of the project, irrespective of the access route, but was most interested in economic benefits that could be obtained by its residents through the use of existing infrastructure linked to the ONR. Timmins was strongly supportive of the project, irrespective of the means of site access.

5.0 DESCRIPTION OF THE EXISTING ENVIRONMENT

Detailed descriptions of the VDP natural environment are presented in the CSEA (AMEC 2004a), the Environmental Baseline Study (EBS; AMEC 2004b), the Site Access and Power Supply Alternatives SAPA report (AMEC 2004i), the Traditional Ecological Knowledge (TEK) study (Victor project TEK Working Group 2004), and in other project technical documents. Details of the socio-economic environment are provided in the CSEA (AMEC 2004a).

The purpose for undertaking environmental baseline studies is to:

- Define pre-development environmental conditions and sensitivities;
- Define Valued Ecosystem Components (VECs);
- Provide information to assist with project planning and engineering;
- Provide information needed to complete environmental effects analysis; and,
- Provide a benchmark for monitoring.

Natural environment baseline studies addressed a broad spectrum of natural environment and land use components, with a particular focus on the aquatic environment (surface and groundwater systems), because of the general sensitivity of the aquatic environment to potential project related effects. A strong emphasis was also placed on terrestrial habitats and wildlife because of the inherent intrinsic value of these resources, and because of the importance of wildlife resources to local First Nations.

Socio-economic studies were focused on Attawapiskat as the primary affected community, and secondarily on the outlying coastal communities of Kashechewan, Fort Albany, Moose Factory and Moosonee. More limited data were collected from the Constance Lake and Ogoki Post (Marten Falls) First Nation communities. Data was also collected from the regional centres of Timmins, Cochrane, Hearst, and Kapuskasing.

5.1 Data Collection Methods and Tools – Natural Environment

Environmental baseline studies were carried out at the Victor site, along the Attawapiskat River corridor, and along possible winter road and transmission line corridors (AMEC 2004a,b). More limited studies were conducted in the immediate vicinity of the community of Attawapiskat. These various studies focused on:

- Air quality and climate;
- Geology and soils;
- Surface water hydrology;
- Water and sediment quality;
- Aquatic life;
- Groundwater quality;
- Vegetation;
- Wildlife; and,
- Land use.

Environmental baseline studies in the above areas were supplemented by separate specific studies designed to address:

- Traditional Ecological Knowledge (TEK);
- Geotechnical conditions relating to soils and bedrock;
- Geochemistry and the potential for acid mine drainage;
- Hydrogeology; and,
- Heritage resources.

Geotechnical surveys and assessments were carried out using electromagnetic imaging (resistivity) surveys, probes, borehole investigations, and laboratory test work to determine standard overburden geotechnical characteristics.

Geochemical testing included: acid base accounting to determine the balance of potentially acid generating and acid consuming minerals; solids analyses; leach extraction tests; mineralogical examinations; saturated column tests (kinetic tests); and reductive dissolution tests. Tests were performed on kimberlite and surrounding (host) rock samples. Details are reported in Steffen Robertson and Kirsten (Canada) Inc. (SRK)(2003). Representative samples for laboratory analysis were selected by SRK based on detailed drill logs.

Surface water surveys focused on flow determinations, water quality, and fisheries and aquatic resources. River and creek surface water flows were determined from regional flow data available from EC flow monitoring stations, together with data from project flow stations established on the Nayshkootayaow River and Granny Creek. Two additional flow-monitoring stations were established on the Nayshkootayaow River during the fall of 2004 and a single flow monitoring station was installed on the North River. Flow data were analyzed using standard statistical packages to derive average, high flow, and low flow statistics for watersheds of various sizes. Additional flow monitoring stations will be added to each of North and South Granny creeks, and to the water courses referred to as Tributary 3, Tributary 5, and Tributary 7, as well as to the Nayshkootayaow River (one additional station) and the North River (one additional station). Water samples were collected from Victor site area watercourses commencing in 1999. More limited water quality data were obtained for watercourses in other areas, and for the James Bay entrance to the Attawapiskat River. Fisheries and aquatic resource data were collected from site area watercourses, and at selected watercourse crossings along corridors considered for winter road development. Methods used included habitat assessments, netting of various types, electro-shocking, angling, and benthos sampling.

Groundwater conditions in the Victor site area were determined from:

- Drilling programs;
- Analysis of overburden and bedrock geological conditions;
- Pumping tests (3, 4, 10 and 30-day high volume tests, as well as short-term airlift tests);
- Groundwater and surface water quality assessments; and,
- Climatic data.

The data were integrated through use of a finite element, numerical groundwater flow model MINEDWC (HCI, 1993) to determine baseline groundwater conditions.

Investigations of terrestrial habitats relied on air photo imagery at different scales, including 1:10,000 scale colour air photos taken specifically for the Victor Diamond Project, satellite imagery on vegetation types provided by the Ministry of Natural Resources (MNR), site investigations, and literature sources.

Laboratory test work was used to assess:

- Baseline surface water, groundwater, and sediment quality conditions;
- Toxicity potentials of surface water and groundwater;
- Fish tissue metal levels;
- Ore mineralogy;
- Geochemical characteristics of the kimberlite and surrounding (host) rock; and,
- Leachate potential of the kimberlite and host rock.

Further details are presented in CSEA, the EBS, and in SRK (2003).

TEK studies were undertaken by the Proponent with the community of Attawapiskat during 2003, and involved interviewing approximately 65 community members. Information was collected on topics such as wildlife, fisheries, vegetation, climate, water, and cultural/spiritual sites. Details are presented in the CSEA, and in the TEK study.

Additional TEK studies were conducted with the coastal First Nation communities of Attawapiskat, Kashechewan, Fort Albany, and Moose Factory, to assist with permitting for the new 115 kV coastal transmission line between Otter Rapids (or Pinard) and Kashechewan. This new line will be developed immediately adjacent to and parallel to the existing ONR line and 115 kV line south of Moosonee to Otter Rapids (or Pinard), and the exiting coastal winter road and 115 kV transmission line north of Moosonee to Kashechewan.

5.2 Data Collection Methods and Tools – Socio-economic Environment

The methodology for the baseline included four components: i) definition of study areas; ii) consultations and socio-economic assessment workshops, the latter only with Attawapiskat as the community most directly affected by the project; iii) definition of key issues and derivation of VECs; and iv) data collection and analysis.

Definition of Study Area

The study areas, as defined in the *Guidelines for the Conduct of a Comprehensive Study and the Preparation of a Draft Comprehensive Study Report* are:

- Project Study Area: The project study area will consist of the immediate geographical vicinity as determined by RAs (land and water) that encompasses all physical works and activities proposed by the Proponent for the Victor Diamond Project. This will include the mine site, the community of Attawapiskat (including Potato Island), all roads, pipeline, facilities in or near Attawapiskat, airstrip, the activities and roads near or along James Bay and the communities of Kashechewan, Fort Albany, and Moose Factory, shipping lane for diesel fuel in James Bay and Hudson Bay south of Belcher Islands south tip around 55° 40' N, and fuel lightering site in James Bay.

- Regional Study Area: The regional study area will encompass the maximum geographical extent (zone of influence) in which impacts from the project may be incurred for each valued ecosystem component (VEC). The selection of VECs will be agreed upon between the Proponent and the RAs. The geographical extent may vary depending on the VEC or issue examined, however, each areas will be defined and explained in the CS.

Socio-economic Effect Assessment Workshops and Consultation

The AttFN decided to take the lead with respect to the collection of baseline data, with technical support as necessary from Golder Associates Inc. (Golder). As this is the first large project, and first EA, for the AttFN, a fuller understanding was necessary about what a socio-economic impact assessment is, what it is used for, what information is necessary to write the assessment, and how this information might be collected. Accordingly, a presentation was made to Chief and Council on socio-economic impact assessment in June 2003. Subsequently, Chief and Council appointed a working group, including representatives from Golder, to develop the planning for AttFN participation in the assessment. The working group conducted a number of focus group meetings (on the themes of business and employment; health; education; and family) to establish what issues were of special concern in the community regarding the proposed mine. The issues were then discussed in workshops to determine what the expected effects would be and how these might be mitigated.

The focus group meetings were first by invitation to key community members, including representatives of Elders, women and youth. A first round of focus groups was launched in August 2003. A second round (due to poor attendance at the first) was opened to the general public in September 2003 and was somewhat better attended; meetings for women and youth, however, were cancelled for lack of attendance. Workshops were then planned, again on the four themes of employment and business, health, employment, and family, with the family workshops broken into three: one each for women, Elders, and youth. The workshops took place in October 2003, again with poor attendance, despite door-to-door advertising, particularly to encourage participation women and youth.

Consultations with the other James Bay coastal Cree communities of Moosonee, Moose Factory, Fort Albany and Kashechewan included both meetings with Chiefs and Councils and then meetings with the interested general public. Consultation with the MoCreebec leadership was held in June 2004, and members of MoCreebec were able to participate in general public meetings held in Moosonee and Moose Factory. The community of Peawanuck advised that they felt their interests would be well represented by Attawapiskat and that as such they did not want consultations inside their community as yet. The Taykwa Tagamou First Nation leadership elected not to hold consultations with the Victor project team or to allow them to visit their community. Some members of the Taykwa Tagamou First Nation did, however, attend public meetings in Cochrane, where they were able to express their questions and concerns.

Definition of Key Issues

A review of the results of consultation with local First Nation communities identified the following key issues relating to the EA process:

- Employment and business opportunities;
- Education and training to enable people to participate more fully in employment and business opportunities;
- Equitable sharing of economic benefits and opportunities, recognizing that Attawapiskat is positioned to derive a greater share of economic benefits;
- Protection of traditional lands, life-styles, culture and language;
- Environmental protection at all levels;
- Obtaining suitable compensation for adverse environmental effects on traditional pursuits and life-styles;
- The potential for accidents and contamination, as a result of increased traffic along the winter road; and,

- Mine closure in terms of environmental implications and effects on socio-economic benefits and opportunities.

For Timmins, Cochrane, Hearst and Kapuskasing, the primary concerns were to see the project proceed with minimum delay, in the expectation of economic benefits, while still ensuring that environmental protection measures were fully implemented.

Data Collection

Consistent with the AttFN decision described above for participation in the socio-economic assessment, the MC also determined that the primary data collection needed for any analysis for the socio-economic components of the EA would be conducted through the Mushkegowuk Education and Training Service (METS). METS was in the early stages of a community strategic planning exercise, which included the development of a human resources inventory. This inventory was to be based on data on education, training and employment, and collected surveys of all working age adults in the Mushkegowuk communities, except for Peawanuck and Moosonee[1]. METS had already contracted for the services of consultants to guide and supervise the data collection.

The METS survey as originally planned was a human resource census, and therefore did not include many questions that would normally be included in a socio-economic baseline investigation. The Proponent therefore funded the additional costs of expanding the survey in the communities considered to be potentially affected by the project. The survey now consisted of three questionnaires: one each on human resources and business, household demography, and household income. The questionnaires were discussed with community representatives, translated into Cree, pilot tested, and finalized. Surveys were administered by people from the communities, who were trained by Statistics Canada.

There were some delays in implementing the surveys, and then in entering the data. The surveying started in June 2003. For Attawapiskat, only partial data were available by the time the CSEA was submitted. Baseline data for the CSEA was thus obtained largely from publicly available sources such as Statistics Canada, INAC, and various First Nation websites. Subsequent to the submission of the CSEA, more METS data have become available. Data on many indicators of community well being (rates of substance abuse, suicide, domestic violence, crime for example) cannot be collected by house-to-house surveys nor are they publicly reported. Also, AttFN did not allow the Proponent to interview community members on these topics.

With regard to the other James Bay coastal Cree communities, the surveys could not be completed in Fort Albany or Moose Factory because of decisions by the community leadership not to participate. METS has now been working with Moose Factory to begin the survey study sometime in 2005. The surveys were successfully completed in Kashechewan, although again delays meant that the information only became available after the submission of the CSEA.

[1] Peawanuck declined to participate and Moosonee is not formally a First Nation community.

Comments and Concerns Raised by Stakeholders

During the review of the CSEA, a number of deficiencies were noted in the baseline data by government reviewers, Gartner Lee on behalf of the AttFN, and by IER Planning Research and Management Services (IER) on behalf of the Mushkegowuk Council. The deficiencies related to a lack of TEK and socio-economic data. TEK data for the coastal communities were subsequently collected and provided by the Proponent, and additional Mushkegowuk Education and Training Service (METS) data were also provided.

5.3 Valued Ecosystem Components (VECs) – Natural Environment

Data from baseline studies and literature sources were used to identify Valued Ecosystem Components (VECs). VECs are those aspects of the natural and socio-economic environment that are particularly notable or valued because of their ecological, scientific, resource, socio-economic, cultural, health, aesthetic, or spiritual importance, and which have a potential to be adversely affected by project development. The identification of VECs helps to focus the environmental effects assessment.

5.3.1 Definition and Criteria

A natural environment VEC can be a particular habitat, an environmental feature, a particular assemblage of plants or animals, a particular species of plant or animal, or an indicator of environmental health. Natural environment VECs were defined on the basis of their meeting one or more of the following criteria:

- Area of notable biological diversity;
- Significant habitat for locally important species;
- Significant habitat for uncommon, rare or unusual species;
- Important corridor or linkage for fish and/or wildlife movement;
- Sensitive receiving water environment;
- Species at risk[2];
- Notable species or species groups;
- Indicator of environmental health;
- Important component to the function of other ecosystem elements or functions;
- Component is of economic or cultural significance;
- Component is of educational, scientific, or aesthetic interest; and,
- Component is of provincial, national or international significance.

The following sections provide a framework for describing natural environment VECs:

- Atmospheric systems;
- Geological systems;

[2] Endangered, threatened, special concern – as defined by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC); and the Committee on the Status of Species-at-risk Ontario (COSSARO).

- Surface water systems;
- Groundwater systems;
- Terrestrial environment;
- West James Bay coastal zone;
- James Bay marine system; and,
- Natural Heritage Systems.

Within each of these subsections a list of VECs and sufficient background information on each VEC to justify its inclusion as a VEC were provided. In general, the designation of VECs is focused on habitats, features, and specific species groups, rather than on individual species, with a few notable exceptions.

Socio-economic VECs are described in Section 5-5.

5.3.2 Atmospheric Systems

A single VEC was defined for atmospheric systems:

1) Air quality

   Victor site area air quality is currently considered to be unimpaired. The closest MOE air quality station to the Victor site is located at Hearst. Lower parameter air quality concentrations at this station (10th to 30th percentile range) were considered to be indicative of background conditions for the key pollutants of nitrogen oxides, sulphur oxides, and particulate materials (including PM 2.5 and PM 10). The Proponent used data from background stations from southern Ontario to estimate atmospheric concentrations of lead and cadmium (the monitored heavy metals), as these are not recorded at Hearst.

5.3.3 Geological Systems

A single geological system VEC was identified:

1) Attawapiskat Karst candidate Area of Natural and Scientific Interest (ANSI)

   Discussions related to this feature are provided in Section 5.3.9 under Natural Heritage Systems.

   General discussions of other geological system elements are presented below because of their importance to the assessment of surface water and groundwater VECs.

Bedrock formations to a depth of 220 m below surface consist of Silurian limestones. Deeper bedrock formations are more variable, consisting of mudstones, limestones, dolostones, and evaporites (potentially soluble deposits of material, such as gypsum) of Ordovician age. The younger diamond-bearing kimberlite pipes intrude the entire thickness of Palaeozoic sedimentary formations.

The Silurian limestones are overlain by a variably thick (0 to 200 m, but typically 10 to 30 m) sequence of clays and silts, capped with an approximately 2 m thick organic layer (muskeg). A thin sand layer (generally <0.3 m) frequently occurs at the muskeg/clay interface. Occasional rock outcrops (bioherms - fossilized reef structures within the Attawapiskat formation) protrude above the muskeg surface, and as rock exposures along portions of the larger rivers. The entire region is experiencing isostatic rebound at a rate of approximately 1 m vertical lift per century. As a result, areas that were formerly covered with shallow marine seas (the Tyrell Sea) at the end of the last glaciation (approximately 7,000 to 8,000 years ago), have gradually been uplifted, and are now exposed as muskeg covered, clay plains. Overburden compositions and structures in and around the community of Attawapiskat are similar to, but somewhat deeper than, those found at the Victor site, with no near-surface bedrock outcrops or subcrops.

Geochemical data on the Victor kimberlites and surrounding bedrock materials are summarized in Section 2.1.4. The ore and surrounding host rock are decidedly non-acid generating, and have a negligible potential to leach or release heavy metals in concentrations that could pose an environmental concern (SRK 2003).

5.3.4 Surface Water Systems

Surface water systems provide habitat for fish and other aquatic life, and for many wildlife species. Fish and wildlife associated with riverine systems are regularly harvested by First Nation members. Rivers also provide travel routes and a potential source of drinking water. The following sections describe the hydrology, water quality, and fisheries resources of site area surface water systems. Flow connections between surface and groundwater systems are described in Section 5.3.5.

5.3.4.1 Selected VECs

The following VECs related to surface water systems were identified:

1) Attawapiskat River (and tributaries);
2) Nayshkootayaow River (and tributaries);
3) Granny Creek system; and,
4) Rivers and creeks intersected by winter roads.

5.3.4.2 Hydrology

Area creeks and rivers exhibit highly variable seasonal flow conditions. Lowest flows occur in the mid to late winter, and less commonly in late summer. High flows occur in the spring, with a secondary high flow period in the fall. Regional flow data are available from six EC flow-monitoring stations, as well as from project flow monitoring stations on Granny Creek and the Nayshkootayaow River. The EC stations monitor flows from watersheds ranging in size from 1,890 km^2 (Muskabik River) to 36,000 km^2 (furthest downstream station on the Attawapiskat River). Project flow stations for the Nayshkootayaow River (station watershed area 1,840 km^2) and Granny Creek (station watershed area 87 km^2) were set up in the spring of 2000. Two additional flow-monitoring stations were established on the Nayshkootayaow River and one station on the North River during the fall of

2004. Monitoring stations will be added to Tributary 3, Tributary 5, Tributary 7, as well as additional stations to the Nayshkootayaow and North Rivers. Regional stations were utilized for assessing longer-term flow statistics.

Average annual flows for the Attawapiskat River, opposite the Victor site (watershed 49,000 km^2) were calculated at 480.5 m^3/s, or 41,500,000 m^3/d. The average annual flow for the Nayshkootayaow River was calculated at 17.31 m^3/s, or 1,496,000 m^3/d at the river mouth (watershed area 2,100 km^2). At a point opposite the Victor site (watershed area 1,840 km^2), the average annual flows for the Nayshkootayaow River were calculated at 15.17 m^3/s, or 1,311,000 m^3/d.

The 100-year return period, flood potential for the region was calculated at 20,000 m^3/d/km^2 (20 mm of runoff per day, per unit area). An extreme low flow condition (i.e., the 7-day average, 20-year return period, low flow condition - 7Q20) was calculated as 61.46 m^3/s, or 5,310,000 m^3/d for the Attawapiskat River, and 0.115 m^3/s, or 9,967 m^3/d for the Nayshkootayaow River opposite the Victor site. These values show the pronounced effect of watershed size on per unit area flows, and were developed from power function equations using regional data. Other low flow conditions were calculated for the 2, 5, and 10 year return periods (7Q2, 7Q5, and 7Q10) for the Nayshkootayaow River. Regression equations linking return period low flows to watershed area, for the four smaller regional stations showed high correlation (R^2 values from 0.916 to 0.997), indicating that watershed area is an extremely good predictor of flows for the region, although the applicability of this regression to the smaller project area watersheds (e.g., Nayshkootayaow River tributaries including the Granny Creeks, and the Northern Tributary of Lawashi River) is less certain.

Measured lowest 7-day low flows, measured for the Nayshkootayaow River opposite the Victor site for 2001, 2002, and 2003, were 47,100, 138,200, and 148,700 m^3/d, respectively.

For the Lawashi River (North Channel) with a watershed area of 1,550 km^2, average annual, 7Q2, 7Q5, 7Q10 and 7Q20 low flows were calculated at 1,100,000 m^3/d, 40,200m^3/d, 18,900 m^3/d, 11,900 m^3/d and 7,300 m^3/d, respectively.

5.3.4.3 Water Quality

The water quality of local river and creek systems is generally quite good, with PWQO and CEQG PAL values being met for all parameters in the Attawapiskat River, and for the majority of parameters in the Nayshkootayaow River and in Granny Creek. Deviations from PWQO and CEQG PAL for the Nayshkootayaow River and Granny Creek are due to natural causes.

One of the key considerations associated with local surface water systems, and the relationship of proposed site activities to these systems, is the concentration of dissolved salts (i.e., salinity parameters). The principal measures of salinity are total dissolved solids, conductivity, chloride, sulphate, calcium, magnesium and sodium.

Approximately 65% of the Attawapiskat River watershed, upstream of the project site, is located on the Canadian Shield. As a result, several of the salinity parameters occur in comparatively low concentrations in this river, most notably sodium, chloride, and sulphate. The Nayshkootayaow

River, in contrast, shows much higher natural dissolved salt concentrations, associated with groundwater input from the bedrock aquifer system. This aquifer is heavily influenced by fossil seawater contained in the local limestone aquifer (HCI 2004a). The smaller creek systems of the Nayshkootayaow River basin, including Granny Creek, generally show low dissolved salt concentrations, indicating that these systems are perched within the silty clay overburden, and therefore isolated from the deeper bedrock aquifer. There are, however, some exceptions, most notably the lower reaches of Tributaries 5 and 7, towards the downstream end of the Nayshkootayaow basin, which show elevated salinity values.

5.3.4.4 Fisheries Resources

Fisheries and aquatic resources of the James Bay Lowlands, excluding James Bay itself, are provided principally by riverine systems, and by scattered, comparatively small and shallow lakes, and ponds. A map showing the general fisheries classifications of the watercourses in the immediate project area is provided as Figure 5-1.

Attawapiskat River

The Attawapiskat River is a large system (total watershed area of 50,500 km^2), extending from the Pickle Lake area to James Bay over a distance of 750 km. The river has three primary reach types within the project study area (within 100 km of the coast).
Reach Types 1 and 2 encompass the lower approximately 6 km of the river, up to First Rapids. These reaches have summer wetted channel widths of from 350 to 700 m, and are characterized by "flats" with typically distinct deep-water channels (3 to 6 m in depth) closer to the river margins, and by long mid-channel bars. Bottom substrates are generally coarse. The primary distinction between Reach Types 1 and 2 is that Reach 1 extends from the river mouth through the coastal marsh zone, whereas Reach Type 2 is upstream of the coastal marsh zone. Both reaches are subject to tidal effect zone effects. Reach Type 3 extends upstream from Reach Type 2 past the Victor site. Within this extensive reach, the river is shallower, with frequent fast water riffle/run sections, and rapids. Substrates consist of sands, gravels, and clay/silt in the more sheltered areas, to large gravel, cobble, boulder, and fractured bedrock substrates in faster water habitats. Limestone outcrops are common. Active channel widths (including the width of instream islands) range from 200 to 1,500 m.

The Attawapiskat River supports the largest diversity of fish species in the project area, consisting of sport or harvestable fish such as northern pike, walleye, sturgeon, lake whitefish, cisco, suckers, and burbot. Brook trout (*Savelinus fontinalis*) are also supported at tributary creek and river inflows. The small fish community is represented mainly by sticklebacks, troutperch, dace, sculpin, darters, and shiners. Benthos (bottom dwelling insects and other invertebrates) include a variety of species, with good representation of the mayfly, stonefly, caddisfly species group (EPT species), which are indicative of good water quality.

Nayshkootayaow River

One of the principal considerations involving the Nayshkootayaow River system is the effect of open pit dewatering on river and tributary creek base flows, and associated fisheries resources. Of particular interest in this regard are whitefish species (lake whitefish and cisco) and brook trout, because these species deposit eggs that over-winter within the system, when base flows are critical to egg survival. Whitefish and cisco were reported by local harvesters to spawn within the lower Nayshkootayaow River main stem. Spring and fall fish sampling conducted by the Proponent in 2004, however, did not identify any spawning within the Nayshkootayaow River by either whitefish species, although spawning was identified in the adjacent Attawapiskat River. Unexpected high flows in the fall of 2004 made it impossible the install the proposed fish weir within the lower reaches of the Nayshkootayaow River. This weir will provide quantifiable data on the extent of whitefish spawning. It will be installed in 2005 and data collected from it will be utilized to refine and make decision within the framework of the Nayshkootayaow Adaptive Management Plan (AMEC 2005). Brook trout were observed in spawning condition mainly within the river's middle to upper watershed areas and feeder creeks, with some presence in the lower river.

The Nayshkootayaow River watershed can be divided into four zones, trending from west to east, with the western zone comprising approximately 40% of the watershed, and the remaining three zones approximately 20% each. The western zone is characterized by an abundance of raised beaches and/or glacial fluvial features, together with numerous small lakes. Virtually all creeks and the Nayshkootayaow River main stem in this zone are perched within the overburden. The next two zones consist of a western transition zone and an eastern bioherm zone. Creek waters in these two zones show modest and gradually increasing salinity values indicating that the bulk of the base flow is derived from the overburden aquifer, but with an increasing flow contribution from the bedrock aquifer. The eastern most zone, including the Victor site itself, includes a number of perched tributary creeks, such as Granny Creek, but also includes areas of increasing salinity, especially along the Nayshkootayaow River main stem, and the lower portions of Tributaries 5 and 7, indicating discharge of groundwater from the bedrock aquifer through riverbed seeps in bioherm or karstic features.

The Nayshkootayaow River, in the general vicinity of the project site area, down to its confluence with the Attawapiskat River, consists of four main channel (reach) types. The river through these reaches generally averages about 30 m in width, except in the reach furthest downstream, where the average channel width increases to about 50 m. Average depths through the river are in the order of 1 to 1.5 m, with depths approaching or slightly exceeding 3 m in pool areas. River morphology consists of sequences of flats, runs, rapids and scour pools in the faster flowing middle two reaches, closest to the Victor site area; and mainly flats and runs within the slower flowing downstream and upstream reaches. Bedrock exposures are common in the reaches closest to the Victor site, but much less so further upstream and downstream. River substrates consist mainly of limestone boulders and cobble, with lesser amounts of gravel and coarse sands, within faster flowing areas; and mainly of sands and gravels, with areas of organic deposits, in slower flowing areas.

Habitats in the upper watershed reaches are varied, but generally consist of faster flowing sections, with frequent meander pools, woody debris, and substrates dominated by sands and gravels. Feeder creeks also contain faster sections with sands and gravels, but with more frequently occurring sections of slower, silt /organic bottomed channels with numerous beaver dams.

Summer, spring and fall gill net and trap net sets resulted in the frequent capture of walleye, northern pike, and white sucker. Lesser numbers of long-nose and shorthead red horse sucker, were also captured. TEK data indicated the seasonal presence of lake sturgeon (spring), and whitefish and cisco (fall). Whitefish and sturgeon were captured within the river, but only in the lower reaches, and in low numbers relative to walleye and pike. Brook trout were captured throughout the watershed, but were observed most frequently in the middle to upper watershed and within the tributary creeks. Minnow traps and electrofishing efforts resulted in the capture of a diverse forage fish base, including species such as white sucker, longnose sucker, longnose dace, sculpin, logperch, trout perch, lake chub, Johnny darter, Iowa darter, finescale dace, together with juvenile walleye and pike. Brook trout inhabit several of the creeks flowing into the Nayshkootayaow River, especially from the south, and are often caught in the main river adjacent to creek confluence locations (TEK data).

Benthos communities of the Nayshkootayaow River were dominated by chironomids, with a significant representation of EPT species.

Other Attawapiskat River Tributary Systems

In addition to the Nayshkootayaow River, there are two other major Attawapiskat River tributary systems that occur within the potential area of project influence. These are Monument Channel that connects with the Attawapiskat River immediately upstream of the community; and a second system (referred to herein as the North River) that enters the Attawapiskat River from the north, approximately 62 km west of the community.

North River

The North River drains lands to the immediate north of the Attawapiskat River, north of the victor site, and has a watershed area of approximately 1,230 km^2. Aquatic habitat and biota for the North River were initially characterized in July 2002, with further sampling during the fall 2004 field program. The wetted channel (average summer condition) measured 20 m with average and maximum depths of 0.7 and 1 m, respectively, within the lower reaches of the river. Further upstream (30 km from mouth), channel widths are reduced to approximately 10- m, with average low flow depths of 0.5-0.7 m. Substrates were firm and dominated by sand, gravel, boulder, and cobble with infrequent bedrock exposures closer to the Attawapiskat River. The banks on both sides of the channel are vegetated with a shrub zone of sedge, grasses, alder and willow. Spruce comprises the main forested area along the river. The river waters are well oxygenated.

The fish community includes numerous juvenile white sucker, juvenile walleye, sculpin, and longnose dace. Lesser numbers of Johnny darter, logperch, and burbot were also captured. A community field assistant indicated that walleye, pike, and whitefish are captured at the mouth of the river, and that brook trout use the upper river reaches. The abundance of juvenile fish suggests use of the river by spawning walleye and sucker. Suitable spawning habitat for walleye, sucker, and whitefish was observed over much of the surveyed river. Fall sampling conditions in 2004 were poor and only troutperch were observed in baited minnow traps, with no catch in gill net sets.

Monument Channel

Monument Channel has a watershed area of 2,450 km^2. The south winter road previously traversed this watercourse, but with the new winter road alignment (winter of 2005) this is no longer the case. The suggested Attawapiskat by-pass south of the Attawapiskat River also avoids Monument Channel. The morphology and fisheries resources of Monument Channel are broadly similar to those of the North River.

The Lawashi River system, south of the Victor site, has two main branches referred to herein as the Lawashi River North Channel and the Lawashi River. Only the Lawashi River North Channel has the potential to be affected by well field dewatering. The Lawashi River North Channel has a watershed area of 1,550 km^2.

Aquatic habitat and biota for the Lawashi River system, in the vicinity of the formerly proposed winter road option, were characterized in June of 2004. The wetted channel (early summer condition), measured 30 to 68 m with average depths of approximately 1.5 m. Substrates were firm and dominated by gravel, boulder, and cobble, with finer substrates in backwater and other depositional zones. The banks on both sides of the channel are vegetated with a shrub zone of sedge, grasses, alder and willow. Spruce and poplar comprised the main forested area along the river. Dissolved oxygen is considered abundant due to the turbulent flowing conditions.

A total of three stations were sampled from within the Lawashi watershed and resulted in the capture of three larger warm water fish species including white sucker, northern pike, and lake sturgeon, together with six species of cyprinid/forage fish as well as several unidentified young-of-the-year fish.

Granny Creek System

Granny Creek consists of two approximately equal sized tributaries, North and South Granny Creeks. Both branches are believed to be largely perched within the overburden. The majority of the system consists of two main reach types (Reach Types 3 and 4), which alternate with one another, until the creek gradually fades into the background muskeg. Reach Type 3 is characterized by low gradient, frequently poorly defined channels, and associated beaver ponds. Reach 4 exhibits a better defined, but still low gradient channel with average summer wetted widths of 3 to 7 m. Water depths in both channel types average 1 to 1.5 m, with a maximum depth of 2 m in ponds. Bottom substrates consist mostly of detritus, overlying silty clay. A wide shrub zone (approximately 50 to 150 m) dominates the riparian community, backed by a variable zone of coniferous forest. Closer to the creek confluence with the Nayshkootayaow River, the two creek channels merge in to a zone of riffle/pool morphology and coarser bottom substrates (Reach Types 1 and 2).

The Granny Creek fish community is mainly composed of minnow species (lake chub, dace, stickleback, fathead minnows, and darters) along with white sucker and small numbers of brook trout and pike. Troutperch and sculpin occurred in Reach Type 1, and walleye were captured in the immediate confluence area of Granny Creek and the Nayshkootayaow River. The benthic community is dominated by chironomids, but also includes EPT species.

Other Watercourses along the Winter Road Alignments

Watercourses along the winter road alignments are variable, ranging from small creeks similar to Granny Creek, to large river systems such as the Attawapiskat and Albany Rivers. Minimal, if any, project related effects are expected with winter road crossings over these creeks and rivers, many crossings of which already exist (i.e., those along the south winter road and the west James Bay coastal winter road).

Muskeg Ponds

Muskeg ponds, ranging in size from a few square metres to approximately 10 ha, are abundant and widespread throughout the Victor site area, and in the surrounding region. Pond depths range from a few centimetres to as much as 1.5 m in some of the larger ponds. Many of the smaller, shallower ponds are seasonal. The majority of the shallower muskeg ponds are expected to freeze to bottom during extreme winters, but the deeper ponds are not expected to freeze completely. Ponds which have a high probability of being periodically inundated by creek flood waters, if sufficiently deep, are likely to contain minnows, mainly brook stickleback, but also possibly finescale dace and Iowa darter. Ponds which have a low, or negligible, probability of being inundated by creek flood waters (or are not well connected to ponds having such potential), or which have a high probability of freezing to bottom in winter, are unlikely to contain fish.

5.3.5 Groundwater Systems

Groundwater systems comprise an integral part of the hydrological cycle, and provide an important water supply source for area creeks and rivers, particularly during low runoff conditions.

5.3.5.1 Selected VECs

Two VECs related to groundwater systems were identified:

1) Shallow overburden aquifer; and,
2) Bedrock aquifer.

5.3.5.2 General Considerations

The shallow overburden aquifer is at, or near, surface because of the flat muskeg terrain, which is underlain by low permeability silts and clays. The Proponent has concluded that these low permeability materials isolate the shallow overburden aquifer from the deeper underlying bedrock aquifer. Small creek systems such as Granny Creek, that are only very weakly incised into the landscape, are connected to the overburden aquifer. The depth of the overburden aquifer is highly variable, but generally ranges from about 10 to 30 m. Areas of shallow overburden occur in the vicinity of bioherms, which tend to occur in bands, or clusters. These bioherms represent localized zones of enhanced recharge for the bedrock aquifer. Low height, buried beach ridges at the muskeg/clay interface provide potential flow paths for removing water from muskeg environments to creek and river systems, thereby helping to maintain creek and river baseflow and water quality, while aiding in muskeg drainage.

Deeper aquifers exist within the underlying bedrock units. These aquifers are connected to the major rivers such as the Attawapiskat and Nayshkootayaow Rivers, which are cut into the bedrock. Hydrogeological studies were undertaken at the Victor site during 2000 to 2003 to: define the bedrock groundwater environment; determine anticipated pumping rates for pit dewatering; and, to quantify hydraulic connections with nearby surface waters (HCI 2004a,b). A summary of HCI's findings is presented below.

5.3.5.3 Groundwater Flow Modelling

Groundwater systems at the Victor site were modelled using a fully three-dimensional, numerical ground-water flow model using the code MINEDW (HCI 1993). The model domain encompasses approximately 7,100 km^2, and utilizes a finite-element discretized grid to incorporate the key hydrogeologic features into the model including: the shape of the kimberlites, the relaxation zone in the country rock adjacent to the kimberlites, bedrock and overburden layers, faults and fractures, two deep overburden filled trenches, and bioherm zones.

The model predicts pit dewatering pumping rates in the order of 40,000 to 60,000 m^3/d during the first approximately 2 years of operation, increasing subsequently to between 80,000 and 95,000 m^3/d. For the purpose of impact evaluations, a maximum groundwater withdrawal rate of 100,000 m^3/d has been assumed.

In addition to predicting the volume of water that will have to be pumped to maintain a "dry" mining environment, the Proponent also used the model to predict the effect of dewatering activities on area surface waters (Section 6.4).

5.3.5.4 Groundwater Quality

Groundwater samples collected from the Victor site area showed that natural groundwater salinity varies both laterally and with depth. Two depth intervals were considered, 0 m to 75 m, and 75 m to 220 m. The 220 m depth interval corresponds to the contact between the more permeable limestone layers, and the less permeable lower mudstone layers, and also corresponds to the lower depth of the proposed open pit. Groundwater samples were collected from the 30-day pump test well, the overburden trench well, and from the central quarry area wells. The 30-day pump test well is included within the general exploration area, and the water quality data from this well (216 m depth) are consistent with water quality data from the deeper (75 to 220 m) zone.

Pumping wells for open pit dewatering will be installed to a depth of 220 m, within the lower limestone formations. The Proponent has indicated that groundwater quality from the 30-day pump test is likely to be most representative of groundwater extracted during pit dewatering, allowing for some adjustment to accommodate the potential for increased salinity values, as described below.

Groundwater from the general exploration area is moderately saline, and exceeds drinking water criteria for a number of salinity values (chloride, sodium, TDS), as well as for hardness and iron (unfiltered). Areas adjacent to the Nayshkootayaow River showed markedly higher groundwater salinity concentrations in both shallow and intermediate depth wells. Wells between the general exploration area and the Nayshkootayaow River area showed moderate salinity concentrations within the shallow wells, but increased salinity at depth, compared with the general exploration area. Groundwater from the area of proposed shallow limestone quarry operations (construction phase) showed low salinity values.

Modelling to determine expected chloride concentrations, in the pit perimeter well field discharge water, showed expected chloride concentrations in the range of 800 to 1,000 mg/L (somewhat greater than values measured from the 30-day pump test), with values under more conservative assumptions of from 1,400 to 1,800 mg/L.

Groundwater Toxicity Testing

Acute (short-term) toxicity tests for groundwater from all sources showed no effect on fish (rainbow trout), or invertebrates (*Daphnia magna*), with virtually 100% survival of all test organisms. For chronic (long-term) toxicity tests, the results showed no effect on fish (in this case fathead minnow), but there was a growth inhibition effect on a second invertebrate specie (*Ceriodaphnia dubia*). The above species are the standard organisms used for aquatic toxicity testing.

5.3.6 Terrestrial Environment

Terrestrial environments provide habitat for plants and wildlife, some of which, in addition to their intrinsic ecological value, provide important resources for local First Nations. Discussions provided in this section are confined to those dealing with inland environments. West James Bay coastal and marine environments are discussed separately in Sections 5.3.7 and 5.3.8.

5.3.6.1 Selected VECs

The following VECs related to terrestrial environment systems were selected:

1) Riverbank and creek margin forests;
2) Northern ribbed fens with broad flarks (pools);
3) Upland sites;
4) Moose and caribou;
5) Large predators and furbearers; and,
6) Migratory birds.

5.3.6.2 Vegetation Communities

Vegetation communities of the James Bay Lowlands are dominated by broad expanses of peatlands (muskeg fen and bog terrain), except where major creek and river systems have cut into the landscape. Along these watercourse corridors, improved drainage permits the growth of well-developed coniferous and mixed coniferous forests, with black spruce typically being the dominant tree species. Forested areas are normally confined to a zone that extends not more than 200 to 300 m from the river (or creek) margin. The only other areas which support well developed tree growth are better-drained areas associated with exposed beach ridges and glacio-fluvial features, scattered rock outcrops (bioherms), and mounded permafrost zones (peat plateau bogs and palsa bogs). The extensive presence of bog and fen communities is shown in Figure 5-2.

Various types of bog and fen communities are described for the Victor site area using ecological land classification (ELC) categories from (Warner and Rubec 1997; and Zoltai et al. 1988). Bogs receive all or most of their sustenance from rain (termed ombrotrophic), and hence are low in pH (pH 4 to 5), extremely nutrient poor, and support comparatively few plant species, which are of limited value to wildlife. Fens are also comparatively low productivity environments, but because of associated seepage pathways, they are influenced at least to some extent by the underlying mineral soil (i.e., they are minerotrophic), which contributes some minerals to the system, and reduced acidity (pH typically about 6). Fen communities, because of their association with seepage pathways, can also be structurally more complex than bog environments, and often contain a mosaic of ridges and flarks (pools). Small (typically <300 m diameter) permafrost mounds (peat plateau bogs and palsa bogs) often develop within fen terrain, typically rising from 1 to 5 m above the surrounding land (Warner and Rubec, 1997). These permafrost features comprise a small percentage (<5%) of the Victor area landscape.

Forest system ELC categories have not been developed for the James Bay Lowlands, but systems can be approximated from site types and vegetation types described by Taylor et al. (2000) for the adjacent areas of northeastern Ontario (i.e., the northeastern Ontario forest ecosystem classification, or NE-FEC), and the wetland classification system for northwestern Ontario (Harris et al. 1996), and are described in the CSEA and the SAPA report (AMEC 2004a,i). The majority of the site classifications are associated with fine (clay/silt) soil types, with the exception of upland sites (bioherm, esker and well-developed beach ridge sites).

The provincial Landcover database from MNR (Geomatics & Data Acquisition Services) provides a higher level, and somewhat different, classification of regional vegetation communities (Figure 5-2). The Landcover database is derived from satellite imagery, and has the advantage of being available for the entire region. Vegetation community data presented in the CSEA for the Victor and Attawapiskat site areas rely on all three classification systems. For extended linear corridors associated with the various winter road routes, provincial Landcover data were used because of their broad coverage. There is a generally good correlation between ELC components described by Warner and Rubec (1997) and Zoltai et al. (1988), and those available from the MNR satellite imagery.

With respect to rarities, there are no COSEWIC[3] or COSSARO[4] vascular plant species in the VDP area. There are, however, four vascular plant species that are considered to be rare in Ontario, which are not considered to be at risk by COSEWIC or COSSARO, that could potentially occur within Victor development areas (Argus et al. 1982 to 1987). These are the Hudson Bay sedge (*Carex helenastes*) and rye-grass sedge (*Carex loliacea)*, associated with fen (and bog) habitats; and the flat-petalled yellow lady's slipper (*Cypripedium calceolus var. planipetalum*) and pussy-toes (*Antennaria sp.*), which show a preference for limestone outcrops. Specific searches for the latter two species were carried out; neither species was found. Sjors (1963) reported the Hudson Bay

[3] Committee on the Status of Endangered Wildlife in Canada.
[4] Committee on the Status of Species-at-Risk Ontario.

sedge as occurring in one of his rich fen sites in the Attawapiskat region. The species was not identified in the 2004 vegetation surveys.

With respect to the use of plants by AttFN members, a variety of plants are sought for traditional use. Most plant harvesting occurs in closer proximity to the community of Attawapiskat. Very little plant harvesting occurs beyond a point approximately 50 km up river from the community (TEK Working Group 2004).

5.3.6.3 Wildlife

General Considerations

The James Bay Lowlands exhibit comparatively poor environments for wildlife compared with areas further south, because of the vast expanses of comparatively low productivity fen and bog habitats. However, there are three habitat types within the region that do provide important wildlife habitat. These are:

- Rich riverbank forests;
- Creek margin forests; and,
- Northern ribbed fens with broad flarks (pools).

Rich riverbank forests are important because of greater habitat structural complexity, proximity to water, and greater overall plant productivity and diversity. Creek margin forests are similar in many respects to rich riverbank forests; however, the diversity of plant species is less than that exhibited by rich riverbank forest communities, and overall productivity is lower. Rich riverbank and creek margin forests are also important because they provide travel corridors for birds and mammals. Northern ribbed fens with broad flarks are important to caribou (when intermixed into complexes with bog habitats, where lichens are readily available), and to waterfowl, sandhill cranes, shorebirds, and to a variety of songbirds. Riverbank and creek margin forests, and northern ribbed fens with broad flarks, were classified as vegetation VECs, based partly on their importance to wildlife.

Moose and Caribou

Moose and caribou comprise a critical resource to First Nation hunters. Woodland caribou have also been designated as being at risk (threatened) by COSEWIC and COSSARO.

Moose are associated with riverbank and creek margin forests, which provide adequate food and shelter for this species. Wildlife Management Unit 1D, which includes the project site area, supports a comparatively low moose density of approximately 1 moose for every 130 km^2, reflecting the limited availability of preferred moose habitat (riverbank and creek margin forest) in the region. TEK respondents indicated that moose populations vary from year to year, but there was a general feeling that moose populations in the area were increasing.

Woodland caribou, in contrast to moose, prefer more open fen/bog communities and are more common than moose, with reported densities in the order of one caribou per 50 km^2. Ahti and

Hepburn (1967) considered that available habitat to caribou in the region was not limiting. During the winters of 2001 through 2003, AMEC and AttFN assistants carried out aerial surveys for moose and caribou in the Victor area, with variable results. A telemetry (radio collar) program for caribou was proposed for the winter of 2004, but late winter conditions were not conducive to finding animals, and the study was deferred until the winter of 2004/2005.

AttFN members reported two different caribou herds – one north of the Ekwan River, and a second, more southern herd in the general Victor site area. In October, caribou from the southern herd tend to move south of the Attawapiskat River (south of the Victor site). In the spring (April), they move back north across the Attawapiskat River. Typical group sizes range up to about 30 animals. In general, it is believed that the caribou of this more southern herd do not migrate more than about 100 km in total. A number of TEK respondents indicated that activities at the Victor site, including aircraft, have scared caribou away from the area. Others expressed that winter roads have improved winter access to caribou, making it easier to hunt them.

Data on caribou concentration areas provided by the CPAWS Wildlands League and WSC Canada, through the consultation process, indicate that the VDP and its proposed winter road access and transmission line routes do not encroach upon high concentration caribou wintering grounds.

Large Predators and Furbearers

Wolves feed mainly on moose, caribou, and beaver and can be expected to occur in habitats where these species are found. Black bear are associated mainly with riverbank forests. The principal furbearers of the general project site area are beaver, muskrat, marten, mink, otter, red fox, and lynx, the majority of which are associated with forest/riverine environments, thereby supporting the designation of riverbank and creek margin forests as VECs.

Migratory Birds

A list of bird species observed within the general project area is provided in Section 6.6.2.3. A summary by functional guild is provided below.

<u>Waterfowl and Shorebirds</u>: Waterfowl occur in extremely large numbers nearer to the James Bay coast, especially during migration, and several species are known to nest in pond/small lake habitats of the interior James Bay Lowlands. However, only limited numbers of a comparatively few species were reported at inland areas along the coastal road route and at the Victor site, during the 2004 breeding season. The most commonly observed species of waterfowl included common loons, American black ducks, buffleheads, common goldeneye and red-breasted and common mergansers. Larger numbers of waterfowl, especially Canada geese, are present in the general site area during the spring and fall migration periods. Inland waterfowl are primarily associated with the larger rivers and with fen pools. TEK studies confirm that waterfowl and waterfowl hunting are concentrated in coastal areas.

Thirteen species of shorebirds were reported in the project study area, with the most common species being sandhill cranes, solitary sandpipers, spotted sandpipers, greater and lesser yellowlegs, Wilson's snipe, and the least sandpiper. Shorebirds were most commonly associated with fen and riverbank environments.

Raptors: Raptors sighted in the general project area were limited to: comparatively frequent sightings of bald eagles and osprey along the Attawapiskat and Nayshkootayaow Rivers; and to occasional sightings of red-tailed hawks (non-winter), northern harriers, boreal owls, northern hawk owls (year-round), great gray owls and rough legged hawks, associated with terrestrial environments. Single observations of a northern goshawk, short-eared owl and American kestrel were also noted. Helicopter stick-nest surveys conducted in 1999 and 2002 revealed a single active osprey nest in the Victor site area. Fenco MacLaren (1997) reported the observation of a golden eagle in the area of the James Bay winter road near Moosonee. AttFN members reported snowy owls as occurring mainly in coastal areas, and "darker" owls occurring inland in forested areas, and that hawks are common near the community, especially during migration, and that bald eagles are commonly sighted on the Attawapiskat River.

Passerines and Non-aligned Species: Sixty-nine passerine and non-aligned bird species were observed in the Victor site area. The more commonly observed species were belted kingfishers, common yellowthroats, alder flycatchers, ruby-crowned kinglets, thrushes (hermit, Swainson's, northern waterthrush and robins), gray jays, common ravens, boreal chickadees, white-throated sparrows, dark-eyed juncos, spruce grouse, and sharp-tailed grouse and a variety of warblers (orange-crowned, yellow-rumped, palm). The greatest diversity and numbers of species from this group are associated with mixed forest habitats bordering the creeks and rivers, with lesser concentrations occurring in fen and bog environments, and in uniform black spruce forests. TEK respondents attached little importance to passerine and non-aligned species, with the exception of grouse and ptarmigan, which are hunted for food.

Reptiles and Amphibians

Reptiles and amphibians seen or heard at the Victor site and along the coastal winter road and transmission line route included the common garter snake, American toad, northern chorus frog, spring peeper, wood frog, and leopard frog. The first four amphibian species were common and widespread, leopard frogs less so.

Rarities

Mammals - Of the mammalian species that occur, or potentially occur, in inland areas of the VDP area, COSEWIC lists three species as being at risk. These are:

- Woodland caribou (*Rangifer tarandus caribou*), ... threatened
- Eastern wolf (*Canis lupus lycaon*) .... special concern
- Wolverine (*Gulo gulo*) .... special concern

COSSARO also considers caribou and wolverines as provincial species-at-risk.

Woodland caribou are considered threatened in several provinces, including Ontario (COSEWIC 2002). The principal stresses on caribou are over-hunting and habitat alteration due to logging operations (Canadian Wildlife Service website). Wolves are widespread, but wary. They are vulnerable to changes in prey populations (mainly caribou and moose), and to hunting and trapping. Wolverines are unlikely to be present in the Victor site area.

Birds - Of the bird species that occur, or potentially occur, in inland areas of the VDP area, COSEWIC and COSSARO lists two species as being at risk. These are:

- Short-eared owl (*Asio flammeus*) .... special concern
- Yellow rail (*Coturnicops noveboracensis*) .... special concern

The short-eared owl prefers open country, where it nests in bogs (and fens) and marshes (Cadman et al. 1987), but is more likely to be found closer to James Bay, than further inland. This species has not been recorded at the immediate Victor site; however, a single observation was made during spring 2004 bird surveys along the north and south winter road closer to Attawapiskat. The yellow rail is more likely to be confined to coastal marsh areas bordering James Bay (Cadman et al. 1987).

The province lists the bald eagle as an endangered (COSSARO) species, and MNR regards the great gray owl as being rare. Bald eagles were observed fairly regularly along the Attawapiskat River and Nayshkootayaow River. COSEWIC lists the bald eagle as a species that is “not at risk”. Two great gray owls were noted in the Victor site area in treed fen habitats during the 2004 breeding bird surveys. COSEWIC has downgraded the status of the great gray owl from its former status as “rare/vulnerable” to “not at risk”.

Reptiles and Amphibians – There are no designated rare reptiles or amphibians in the area; however, identified specimens of the common gartersnake are of interest because the occurrence of this species at the Victor site represents a possible range extension.

5.3.7 West James Bay Coast Zone

5.3.7.1 Selected VECs

Valued ecosystem components identified for the west James Bay coastal environment are:

1) West James Bay coastal marshes and mudflats (including those of Akimiski Island); and,
2) James Bay coastal environment waterfowl and shorebirds.

With the change in the project design concept of abandoning on-site diesel power generation and the associated marine transport of diesel fuel, these VECs are retained only within the context of their applicability to project alternatives involving the marine transport of diesel fuel; and not within the context of the revised project description using transmission line power.

Details of the west James Bay marine environment are presented in Section 5.3.8.

5.3.7.2 Coastal Zone Vegetation Communities

The west James Bay coastal zone is characterized by low gradient, broad tidal mudflats, backed by salt marshes, grading to brackish and freshwater marshes further inland. The comparatively uniform coastal zone is interrupted by a small number of complex deltas associated with the larger rivers, namely the Moose, Fort Albany, Attawapiskat, and Ekwan Rivers.

COSEWIC does not recognize any plant species as being at risk (endangered, threatened, special concern) within the James Bay coastal environment. However, Argus et al (1982 to 1987) list a number of plant species as being rare in Ontario, because they are confined solely or largely to the James Bay coastal environment, and/or to the James Bay-Hudson Bay coastal environment. Many of these species are at or near their distributional limits, including a number of arctic species. A number of rare species also occur on Akimiski Island (Blaney and Kotanen 2000). Ten provincially rare species were recorded from James Bay coastal zones by MNR (2004). None of the rare species identified by Argus et al. (1982 to 1987), or MNR, are listed as COSSARO species.

5.3.7.3 Coastal Wildlife Focusing on Waterfowl and Shorebirds

The key element of coastal wildlife for the west James Bay area is bird life, although other wildlife forms are present.

Twelve Important Bird Areas are described for the west James Bay coastal zone (including Akimiski Island). Together, these areas encompass virtually the whole of the Ontario portion of the James Bay coastal zone, as well as the majority of the Akimiski Island coastline. Much of the east James Bay coastline is contained within a single Important Bird Area. The Twin Islands also comprise an Important Bird Area site. All of these Important Bird Areas are noted primarily for their representation of waterfowl and shorebirds. Waterfowl hunting by local First Nations is practised mainly in the coastal zones and is focused mainly on geese. Breeding bird distributions provided by Cadman et al. (1987) show that a number of bird species have breeding ranges in Ontario that are confined largely to the James Bay, or Hudson Bay/James Bay, coastal zones. These species include the yellow rail, little gull, Ross' goose, whimbrel, Hudsonian godwit, marbled godwit, least sandpiper, short-billed dowitcher, red-necked phalarope, arctic tern, and the sharp-tailed sparrow. The yellow rail is regarded as a species of "special concern" by COSEWIC and COSSARO (2003).

The importance of the James Bay coastal environments to bird life is further demonstrated by the presence of several migratory bird sanctuaries, which include three Ramsar sites located at Moose River, Hannah Bay, and at Polar Bear Provincial Park. Ramsar sites are wetlands of international importance that have been identified for conservation pursuant to the Ramsar Convention on Wetlands intergovernmental treaty signed in Ramsar, Iran in 1971, to which Canada is a signatory member.

5.3.8 James Bay Marine Environment

5.3.8.1 Selected VECs

Three VECs were identified for the James Bay marine environment, as follows:

1) Polar bear;
2) Marine mammals; and,
3) Waterfowl and marine birds.

Similar to discussions presented in Section 5.3.7.1, these VECs are only retained within the context of their applicability to project alternatives involving the marine transport of diesel fuel, and not within the context of the revised project description using transmission line power.

5.3.8.2 Marine Coastal Environment

Generally fine (uncontaminated) sediments, coastal mashes, and broad tidal mud flats, characterize much of the west and south coasts of James Bay. The east coast is characterized as a fine to intermediate divided headland-embayment coast type. The waters of western James Bay, and particularly those of the Akimiski Strait area, are naturally highly turbid.

Approximately 60 species of fish are known to inhabit the estuarine and marine communities of James Bay and southern Hudson Bay. Of particular note for the VDP are whitefish and cisco, which are sea run species that migrate into the Attawapiskat River system each fall to spawn. The domestic fishery in the James Bay area is mainly limited to subsistence and recreational fisheries.

5.3.8.3 Marine Mammals (including Polar Bears)

Seven species of marine mammals are known or reported to occur within the main body of James Bay. These include the beluga (white) whale, the bowhead whale (extra-limital - TEK), walrus (TEK), three species of seals (bearded, harbour, and ringed), and the polar bear. Marine mammals are sensitive to over-hunting, severe ice conditions, and to oil/fuel spills.

The Ontario polar bear population is classed by COSEWIC and COSSARO as being of “special concern”. Polar bear are relatively common in Polar Bear Provincial Park, on Akimiski Island, and on the Twin Islands in east central James Bay. AttFN TEK data indicate that polar bears very occasionally move far inland along the Attawapiskat River corridor, with past denning sites being recorded in the Victor site area during the 1960’s.

The beluga is the most common and widespread whale species in the Hudson-James Bay region, and the only species that regularly occurs in James Bay. The eastern Hudson Bay beluga whale population (bordering Quebec and the Arctic) is classed as “threatened” by COSEWIC because of past commercial hunting, and current harvesting by Inuit. The western Hudson Bay population is regarded as being not at risk. The James Bay beluga has not been assigned to either population, but its numbers appear to be increasing based on data provided by Kingsley (2000) and Pierre Richard (DFO, Winnipeg, personal communication, May 2003). Most belugas in James Bay occur north of Akimiski Island. Belugas occasionally enter the Attawapiskat River delta area. The bowhead whale (eastern arctic population) is classed as “endangered” by COSEWIC. Its range in the Hudson Bay region is typically seasonal (April to October) and confined mainly to Hudson Strait and northern Hudson Bay.

Walrus (eastern arctic population) are classed as “not at risk” by COSEWIC. Walrus occur most commonly further north in Hudson Bay. Further south in James Bay, walrus occur only rarely, with occasional sightings reported by AttFN members at the western and eastern ends of Akimiski Island. Ringed seals, bearded seals and harbour seals occur throughout the James Bay region. Seals (presumably harbour seals) were noted moving into the lower reaches of the Attawapiskat River during the fall in pursuit of spawning cisco and whitefish. Seals, once hunted for dog food, are no longer hunted by AttFN members in any meaningful way.

5.3.8.4 Migratory Birds Focusing on Waterfowl, Shorebirds, Seabirds

Waterfowl use of James Bay is described above (Section 5.3.7.3). Sea ducks, most notably the common eider, have some presence in James Bay, but there appear to be no colonies on the Ontario side of the Bay. King eiders are reported from Netitishi Point. Also of note are black scoters that concentrate in northern offshore James Bay waters in large numbers, during the late summer and fall. Colonial seabirds in James Bay are limited mainly to Caspian and artic terns, and herring and ring-billed gulls.

5.3.9 Natural Heritage Systems

Natural Heritage Values in the project area are shown in Figure 5-3 and include provincial park nature reserves, candidate provincial waterway parks, and candidate areas of natural and scientific interest (ANSI). A total of eight natural heritage features were identified as having close proximity to project corridors or facilities, namely:

- Attawapiskat Ekwan Ridge candidate ANSI;
- Attawapiskat Karst candidate ANSI;
- Chickney Point candidate ANSI;
- Southwestern James Bay candidate ANSI;
- Attawapiskat River proposed candidate waterway park (ARPCWP);
- Coral Rapids Wetland Conservation Reserve;
- Coral Rapids Provincial Park Nature Reserve;
- Sextant Rapids Provincial Park Nature Reserve; and,
- Pinard Moraine Conservation Reserve.

The ARPCWP would encompass the length of the Attawapiskat River between the existing Otoskwin-Attawapiskat River Provincial Park and the James Bay coast and the lands within 200 m of its banks. Withdrawal order W-P-15-04 and an Order-in-Council (EBR Registry Number XB04E2006) states that a 33 km contiguous section of the waterway has been removed from the “proposed candidate waterway park” where valid mining claims are held, including claims held by De Beers and including the Victor claim block. The existing south winter road crosses the ARPCWP near the community of Attawapiskat. The suggested new routing would stay south of the river and the ARPCWP. The transmission line from Attawapiskat to the Victor site would cross the Attawapiskat River at the existing transmission line crossing point. The Attawapiskat River water intake and discharge structures near the Victor site will be positioned within the 33 km section of river that has been withdrawn from the ARPCWP.

The Attawapiskat Karst candidate ANSI covers a broad area (580 km^2) and is centred approximately 4 km southwest of the Victor kimberlite. The ANSI description is given as:

> "National significance. The best developed and most extensive karst topography in Ontario, exceptional river cliffs and channels, and regionally representative wetlands complexed with outcropping bioherm uplands and sinkhole meadows. Exceptional aesthetic/interpretive values (Riley, 1981)."

The focus of the ANSI is on riverine exposures of karst topography, which occur mainly along the Attawapiskat River and secondarily along the Nayshkootayaow River. Bioherm outcrops are widespread and common throughout the region surrounding the Victor site (discussed in Section 6.6.1.3), with minor inclusions occurring within the proposed Victor development area. Three small bioherms on the Victor site are proposed sites for quarry development. Sinkhole meadows are less common with the nearest such feature being about 5 km or more to the east of the Victor site.

The Victor site, as well as the westernmost, approximately 20 km of both the south winter road and the transmission line from Attawapiskat to the Victor site, is located within the Attawapiskat Karst ANSI (Figure 5-3).

The Attawapiskat - Ekwan Ridge candidate ANSI is located approximately 45 km northwest of the Victor site, encompasses an area of 507 km^2, and is described as:

> "Provincial significance. Height of land separating lower Ekwan and Attawapiskat basins, part of the Lowland's largest subglacial river deposits. This jack pine upland is surrounded by a great diversity of marl fens, treed fens and, further afield, open bog systems (Riley, 1981)."

There are no project components within Attawapiskat – Ekwan Ridge candidate ANSI.

There are also two candidate ANSIs located along the James Bay coast that are transected by the existing coastal winter road and transmission line (Figure 5-3). The southernmost (southwest James Bay) candidate ANSI is located approximately midway between Moosonee and Fort Albany. The ANSI is regarded as having regional significance and is described as:

> "An excellent example of a coast with international significance in terms of waterfowl migration; with a complex series of coast-parallel and coast-perpendicular ridges and their concomitant wetland impounds proceeding tidal to bog series (Riley 1981)."

The second coastal candidate ANSI is the Chickney Point candidate ANSI, regarded as having provincial significance and is described as:

> "The most extensive display of coastal tidal/supertidal marsh and freshwater thicket/ meadow marsh along western James Bay; exceptional coastal waterfowl habitat (Riley 1981)."

This candidate ANSI borders the north side of the Fort Albany Indian Reserve (IR 67).

There are two provincial parks – nature reserves, and one conservation reserve located along the rail and power corridor, approximately 50 km north of Fraserdale, Ontario (Figure 5-3). The most southern feature is the Sextant Rapids Provincial Park Nature Reserve (4 ha) described as:

> " Notable for its Lamprophyre sills -- slabs of volcanic rock that have been injected into Paleozoic rock. The lamprophyre sills found here are the youngest known Paleozoic igneous occurrences in the Moose River Basin. Nearby sedimentary rock contains fossils. – Ontario Parks web site, 2004".

The Corral Rapids Wetland Conservation Reserve is a relatively large (62 km^2) area located on the west side, and abutting to the ONR rail line. The feature is described as being comprised of organic deposits, covered by wetlands, with dense coniferous forests. The western boundary is the Onakawana River, which contains a rare sea-run brook trout.

The Coral Rapids Provincial Park Nature Reserve is 12 ha in size and is described as:

> "The thickest exposure of Devonian bedrock in the Moose River basin lies within this nature reserve. At its maximum thickness14 m of rock is exposed. Also visible, is the type section for what geologists refer to as the Devonian Aged Stooping River formation. Its relationship with the underlying and overlying formations are also exposed. These rocks are 400 hundred million years old. – Parks Ontario web site, 2004".

The Sextant Rapids and Coral Rapids Provincial Park Nature Reserves are small and removed from the proposed project works involving the twinning of the existing power corridor.

5.4 Potential Environmental Hazards to the Victor Diamond Project

Winter Temperatures

Predictably cold winter temperatures are essential for winter road operations. Historic data and trends for the region suggest a potential concern over the length of season and quality of winter roads during unusually warm winters. For example, Moosonee Transport Limited (MTL) indicated that only a tractor-train road was established in 1987 along the coastal winter road route, and it was not possible to use haul trucks in that year, due to poor freezing conditions. The season was also quite short. Similarly, 1999 was also a poor winter road season. Various measures can be used to improve winter road operations, including improved watercourse crossings, use of a wider road to promote more effective ground freezing, and water sprays to create an ice road, as opposed to a snow road. Nevertheless, the data show cause for caution.

Cold temperatures have the potential to freeze (and damage) waterlines and decant structures, and to disrupt the flow of water in open areas and channels, as well as to damage building foundations.

Flooding

The Victor site area is prone to modest flooding during the spring melt, and in response to severe or prolonged rains, because the flat muskeg terrain provides for poor drainage. However, because the terrain is so flat there is little potential for floodwaters to increase in depth beyond about 0.4 m. Flooding at this level would be inconvenient, but not hazardous. There is also the potential for flooding caused by ice jams. However, if severe ice jams occur near the Victor site area, Attawapiskat River flood waters would not extend more than a few hundred metres inland. The Victor site would not be affected. Similar arguments apply to the Nayshkootayaow River. Flooding, particularly in response to ice jams, is more of a concern in Attawapiskat because the community is so close to the river, and because the riverbanks are not as high closer to the coast.

Fire

Natural (and man-made) fires are comparatively common in forested areas bordering the region's rivers, where soil conditions are somewhat drier. Lightning strikes are the primary source of fires in most summers.

Excessive Groundwater Inflow to the Pit

If significantly greater quantities of groundwater than anticipated are encountered during open pit dewatering, this would increase dewatering costs, and possibly the cost of additional mitigation, thereby impacting the economic viability of the project.

5.5 Valued Ecosystem Components (VECs) - Socio-economic Environment

5.5.1 Definition and Criteria

Socio-economic VECs are typically defined as being components of the socio-economic environment that are significant in terms of people's quality of life. In this document, socio-economic VECs are defined on the basis of their meeting one or more of the following criteria:

- Valued cultural or economic activity;
- Valued service or infrastructure;
- Valued cultural or heritage feature;
- Valued recreational or aesthetic feature; and,
- Valued quality of life characteristic.

In the case of First Nation communities, it may be argued that entire communities and their ways of life are a VEC. This is perhaps reflected particularly in workshop results in Attawapiskat. While subjects and questions were developed and posed by the AttFN, in order to elicit observations on particular issues of concern, workshop conversation tended rather to range more widely as people described their lives and thoughts more holistically. The interrelatedness of social and economic issues is perhaps particularly difficult to break up into individual components of analysis.

5.5.2 Attawapiskat

The mine site and most of its associated facilities would be located within Attawapiskat's traditional lands. Attawapiskat is therefore anticipated to be the community that will be most affected by development of the VDP, and consequently greater efforts were expended in defining baseline conditions associated with Attawapiskat, compared with those expended in association with other First Nation communities. Change to the community will occur through comparatively large numbers of jobs; business opportunities; increased income associated with employment and business opportunities; and increased contact with the non-Aboriginal world on the job site; and through compensation in consideration of adverse affects to traditional land uses.

Selected VECs

Valued ecosystem components related to the AttFN are listed below, not in order of importance but in an order that facilitates the description of potential socio-economic effects. The fundamental rationale for AttFN support for the project is that it will provide alternatives for livelihood strategies in a context where traditional strategies no longer meet the range of needs of people, but where people have few other options. The biggest change that the project represents is the introduction of the opportunity to participate in a greater context in the wage and business economies, and it is from this opportunity that many other potential effects – on traditional pursuits, individual and community well being and public health and security – may occur.

The following VECs regarding the socio-economic environment for the community of Attawapiskat were identified:

1) Local economy;
2) Traditional pursuits;
3) Aboriginal community;
4) Health;
5) Heritage resources; and,
6) Physical infrastructure.

Reserve Boundary and Traditional Lands

Reserve and traditional lands associated with the community of Attawapiskat include:

- Reserve 91A (235.8 ha), where the community of Attawapiskat is located (Figure 1-3).
- Reserve 90 (270.4 km^2), constituting the principal AttFN reserve lands on the Ekwan River, approximately 90 km north northwest of the Victor site, not permanently inhabited (Figure 1-3).

- The traditional lands of the AttFN encompassing an area of approximately 72,000 km^2, and encompassing almost all proposed development areas associated with the VDP.

Political Organization

Attawapiskat is a First Nation community as defined under the *Indian Act,* and is a member of the Mushkegowuk Council group of First Nations based in Moose Factory. Mushkegowuk Council is in turn one of seven tribal councils that make up the Nishnawbe Aski Nation (NAN) alliance. NAN evolved out of the Grand Council Treaty No. 9, and represents all of the Ontario Treaty No. 9 and Treaty No. 5 First Nations (49 in total) located within the Ontario arctic watershed.

The AttFN is governed by a Chief, a Deputy Chief, and 11 duly elected Councillors. Elections are held every three years by Band custom. Decisions affecting the AttFN are made by the Chief and Council in consultation with the elders, Band management and the community at large.

The AttFN receives annual funding from the federal government under a number of line items (for economic development, self government, community infrastructure, lands and trust services, education, social services and housing), in amounts of $12-15 million in recent years. Whereas for the past two years, Attawapiskat has under expended these funds, the AttFN had reportedly accumulated significant debt previously. Debt levels are not reported publicly; however, financial constraints have been recently evident in such events as assigning financial control of education to MC and the inability of the community to access the new power supply until just recently. Consultation results also refer to the AttFN debt.

The AttFN does not have a formal economic or community development plan, however, the AttFN must plan for capital expenditure as part of its annual submissions to the federal government for funds. It is clear, however, from the leadership and the population that the over arching goal is to increase participation in the formal wage economy while maintaining the integrity of traditional activity.

Socio-economic Status

Recent on-reserve population estimates for Attawapiskat range from 1,445 to 1,742, depending on the source. Approximately 40% of the population is under the age of 15, and it is likely that the population as a whole is growing comparatively rapidly. Over 98% of the Attawapiskat population is Aboriginal, and nearly all speak Cree, and most speak English to varying degrees. Over 75% percent of the adult population has not completed high school, although the METS data indicate that 60% of the population has completed Grade 10. However, the effective education level achieved is frequently much lower than the school leaving level indicates.

The unemployment rate is high, in the order of 30%, and only a low percentage of the workforce works full time. Discussions with community representatives suggest that the 30% unemployment figure is a gross underestimate if one considers all the unemployed who have given up looking for work, in an environment of limited economic opportunity. The more educated have much higher employment rates than the less educated, with the most educated almost all employed. Average earnings in Attawapiskat are $16,595, compared to average Ontario earnings of $35,185. About half of households report wage income and almost 80% report receiving government transfers, while less than 5% report business income. Wage employment generates levels of income that are high compared to other income sources. Almost half of households also engage in traditional harvesting, but very few report any cash income from such activity.

Occupational data show that by far the largest percentage of workforce is engaged in the service sector, rather than in primary or secondary industry. Training programs are required if Attawapiskat is to take maximum advantage of the employment and business opportunities that will derive from the VDP. Some progress has been made towards this goal through on-the-job training programs at the Victor site, and through funding to assist with bridging education programs for members of the AttFN to raise the education level to the equivalent of Grade 12.

The community reports that the primary barrier to employment is unavailability of jobs, with other barriers reported, less frequently, as lack of education and training, lack of childcare, family responsibilities, cultural insensitivity, and personal problems. There is especially strong interest in obtaining training.

Community Well Being

Although no quantitative data are available on the rates of incidence of social problems in Attawapiskat, results of consultations, observation and informal discussions over the years suggest the following:

Alcohol abuse has been of such concern in the past as to result in a ban, including a ban on baker's yeast, which had been used for home brewing. An alcohol and drug addiction program has been put in place and peacekeepers have been assigned responsibility to control bootlegging and alcohol consumption. Despite these measures, alcohol abuse continues to be of concern, not only on physical health grounds, including fetal alcohol syndrome and suicide, but also because it is related to crime, family violence, and child neglect. Circumventing the ban is costly to family incomes, and alcohol is often replaced by drugs, which are reportedly easily available, at prices comparable to those in urban centers.

- Substance abuse is considered to be symptomatic of deeper problems, including lack of employment, poor education and consequently educational achievement, and lack of recreational opportunities. The inter-relationships between specifically education and social challenges are complex and mutually reinforcing. For example, drug abuse, housing overcrowding, and poor parenting, all constrain educational achievement, which in turn closes options for livelihood.

- Public health and education officials deal with family violence and its consequences on a reportedly daily basis. Women and children are the main victims, however, child violence against parents is also significant.

- Teenage pregnancies have been characterized as a social norm. There are suggestions that this is at least in part encouraged by the welfare system, which increases monthly allowances when children are born. Sexually transmitted diseases are common, as are multiple partners.

- Environmental health is poor, which can be attributed to crowded housing, high costs of healthy foods, smoking, and poorly vented wood burning stoves for heating and cooking. Lifestyle onset diabetes, asthma, lice infections, and communicable diseases such as tuberculosis are consequently of major concern.

- The extent of social challenges is also at least in part due to an insufficiency of social services. Specialist services can only be accessed outside the community - doctors and dentists only visit the community periodically, facilities are understaffed, there is no financial support for traditional healing, and health care tends to be focused on cure rather than prevention. The healing centre and safe house for women have recently been closed. Special education needs are left unmet.

- Anecdotal information indicates that in many instances individuals undergo treatment and/or healing only to return to their families who did not undergo the same treatment or healing processes. Because of this, many therefore revert to their former ways and habits within a comparatively short time.

Consultations suggest that the above issues are of serious concern to many in the Attawapiskat population, but since substance abuse, crime, preventable disease, and family dysfunction at virtually any level must be considered important, this is perhaps not surprising. Observations, such as of the banning of alcohol and yeast, the shortage of housing and public behaviours, in combination with public statistics on educational levels, incomes and lone parent families, do, however, suggest that Attawapiskat is particularly stressed in the area of individual and community well being.

Gender

Education data indicate that women's educational performance has improved over the period 1996 to 2001, while that of men appears to be declining. The women's labour force participation rate is lower than men's, but is increasing faster, and women experience similar rates of unemployment. Women earn significantly more than men on average, even though most lone parent families are female headed and the income of these families is comparatively low. This is most likely a result of the high percentage of women employed in government services, that is, employed on a full time, full year basis at comparatively high wages.

Statistics Canada employment data indicate that women are more likely to be employed in health and education and less likely to be employed in primary industry, but are distributed across other sectors in more or less the same proportions as men. Female occupational distribution is also similar to that of men, with the exception that women are more likely to work in social science, education and government service occupations, whereas men are more likely to work in trades, transport and equipment operator occupations.

The METS data on employment and education history generally support the Statistics Canada data insofar as women appear to have better educational performance than men. The data also demonstrate that women with education are more likely to be employed than men. The METS data on training aspirations show an even more pronounced pattern in gender preferences than the occupational data of Statistics Canada with regard to training for employment. Very few females expressed interest in heavy equipment operation or trades, which are male preferences, but rather aspire to social service and office/computer employment. Few men or women appear interested in training in small business development.

With respect to barriers to training, women are just as likely to report barriers and the same number of barriers as men. Major differences are that women cite financial obstacles and lack of childcare more often than men, who most often cite lack of previous training. Both men and women cite family responsibility in the same proportion. Lack of training opportunities, for both men and women, was also frequently cited.

Business Capacity

Employment and occupation statistics (and Attawapiskat employers) lists indicate that most formal sector economic activity is related to local government. The Attawapiskat Economic Development Corporation has established enterprises, including a maintenance garage, warehouse and employment service; however, consultation results suggest that these enterprises are not very active. The low incomes and small size of Attawapiskat have severely constrained potential markets for small business development. Poor and/or expensive infrastructure services (transport and communications) constrain capacity to cost effectively serve outside markets. Private sector business is thus largely restricted to retail trade and accommodation and food services, which cater essentially to the consumption needs of residents, and are not presently prepared to provide the quality, quantity and timeliness of services required for a large project such as the VDP. Although people participating in consultations reported that funding is, in principle, available for small business development, the requirement to demonstrate how a business will achieve success, in the face of inexperience, high costs associated with remoteness and small markets, effectively has made such funding inaccessible.

Infrastructure and Services

Community infrastructure consists of buildings, yard areas, roads, air transport facilities, barge handling facilities, power supply systems, water and sewage distribution systems, telecommunications systems, solid waste disposal facilities, and similar elements.

All-season gravel roads link Attawapiskat community facilities. The community is serviced from Moosonee by the west James Bay winter road and by barge up the James Bay coast during the summer, as well as by air. The airstrip is a commercial all-season gravel strip measuring 1,067 m (3,500 ft). A 115 kV power line was recently constructed from Moosonee to Fort Albany, Kashechewan and Attawapiskat. The line is owned and operated jointly by Hydro One and Five Nations Energy Inc. (FNEI).

Water supplies are taken from a small lake northeast of the community (Dog Lake) and are treated in a recently constructed water treatment plant. Sewage is collected in feeder lines and directed to a four-compartment sewage lagoon located at the east end of the community. The current system has capacity to service a population of 2,430 (expected to be reached in 2009). Solid wastes are trucked to the local landfill, beside the sewage lagoon. Water, sewers and sewage facilities, and garbage pick-up are available to most households. Most households have telephone and television services.

Other local services provided to the community include fire protection and police services, medical services, education (elementary and secondary schools), social, religious and recreational services, and postal service. Adult education programs are available, focused toward high school completion and literacy training for those who never completed elementary school. INAC funding is available for post secondary education and distance education is offered by Northern College. Thus education and training opportunities are available, but accessing and/or succeeding at these opportunities is reportedly low, variously constrained by factors including high costs, lack of funding, adaptation difficulties, inadequate language skills and other social challenges.

The AttFN is broadly responsible for ensuring that the full range of services is provided to the community including health, education, family planning, recreation, cultural programs, and public works. The Attawapiskat Economic Development Corporation is responsible for community development. Attawapiskat Technical Services is responsible for administering community labour and resources for both Band administered and off-reserve projects, including the provision of services to date for the VDP.

Traditional Activity

Traditional activities (hunting, fishing, trapping, and gathering) are widely practiced by a portion of the AttFN population. Just over one-half of households harvest foods, although only about 3% report harvesting plants. Sharing is important. Ninety-five percent of household who harvest, share, and about 70% of households receive harvested food from others. Eighty percent of households report consuming harvested foods at least 1 day per week. Based on perhaps out of date (1989) information, harvests of moose and caribou may exceed 40 kg/person/year, equivalent to over $1,600/person/year. Fish and waterfowl harvesting increase these figures by perhaps about 20%. Since harvesting has been reported to be in decline somewhat in the recent past, these figures may be overestimated. They do, however, provide an indication of the importance of harvesting to household economies. The METS data on the costs of harvesting indicate that about 80% of harvesting households spend income on this activity, with about 40% of these spending over one-half of their income on harvesting. In addition to meeting subsistence needs, hunting and trapping also provide some cash income from hides and furs, although the METS data again indicate that this has not been important. These harvesting activities are also very important from a cultural and recreational perspective.

Most traditional harvesting is practiced along the James Bay Coast and along or near the major rivers and creeks, where resources are more abundant and accessible. The Attawapiskat River is the primary travel artery to the interior. The one notable exception to the above is hunting for caribou, which takes place in more open country removed from the rivers, especially in winter when better inland access is available by snowmobile. Waterfowl hunting, particularly for geese, is concentrated along or near the James Bay coast, and along lower reaches of the Attawapiskat River. Goose hunting is a major activity for the community during both the spring and fall migration periods. Furbearers are harvested within trapline boundaries. The principal furbearers are beaver and marten. Hunting is most heavily focused on caribou, moose, and waterfowl.

Statistics Canada reports that 97.2% of the Aboriginal population in Attawapiskat uses their Aboriginal language in the home. The METS data indicate that 92% of Aboriginal households speak Cree at home. Unlike many Aboriginal communities across Canada, Cree continues to be used in Attawapiskat by virtually the entire population.

Heritage Resources

The “Swampy Cree” have inhabited the James Bay Lowlands for thousands of years. The current village of Attawapiskat is based on a Hudson Bay trading post established near the mouth of the Attawapiskat River in 1901. However, people resident within the Attawapiskat area traded at Fort Albany for 200 years prior to this.

Studies of Victor area heritage resources were undertaken in 1999 and 2002 (as well as through TEK studies), and included the Victor site area, the Attawapiskat River corridor between the community of Attawapiskat and the Victor site, and the esker west of the Victor site. The studies consisted of background historical research of published sources, interviews with Attawapiskat community Elders familiar with the area, site visits, and archaeological testing at areas identified as having a high archaeological potential. Several campsites and burial sites were identified along the Attawapiskat and Nayshkootayaow Rivers in the general vicinity of the Victor site. These sites are all relatively recent. No archaeological sites were encountered in the locations that were subject to archaeological testing. However, there are several reasons why such sites might have been missed. It is recognized that the Elders might choose to not indicate an archaeological site that was adjacent to the study area for cultural privacy reasons.

5.5.3 Other James Bay Coastal Cree Communities

Development of the VDP has some potential to affect selected individuals in other James Bay coastal Cree communities, such that these communities require consideration in the assessment of socio-economic effects. Infrastructure construction and improvement will be along existing rights of way. Disturbance for the power line construction will be very short-term. Goods will be staged through Moosonee and traffic along the existing winter road will increase. Improved reliability of infrastructure will benefit these communities. Economic opportunity will be extended to the residents of these communities.

Selected VECs

VECs related to the James Bay coastal Cree communities of Moosonee, Moose Factory, Fort Albany, Kashechewan, are listed below. As for Attawapiskat, these VECs are not listed in any order of priority.

1) Local economy;
2) Traditional pursuits;
3) Aboriginal community;
4) Health; and,
5) Physical Infrastructure.

Political Organization

The other James Bay coastal Cree communities, with the exception of the members of MoCreebec, are part of the Mushkegowuk Council (MC) group of First Nations. Each of these communities constitutes a First Nation community in its own right, with the exception of Moosonee, which has a municipal government. The Cree of Moosonee (85% to 90% of the population) have formed the Moosonee Cree Alliance, which is attempting to establish itself as a registered First Nation. Moose Factory is the seat of the regional MC government. The MC member First Nations and the Weenusk First Nation in Peawanuck are part of the larger NAN alliance. Approximately 650 members of MoCreebec also reside in an off-reserve portion of Moose Factory, where the MoCreebec Council of the Cree Nation has its seat of government, and in Moosonee. MoCreebec members originated from the Quebec side of James Bay and are not part of the NAN alliance. MoCreebec has no reserve land base in Ontario.

Socio-economic Status

All of the James Bay coastal Cree communities are located a few kilometres inland from the coast on the major rivers. Moosonee is the key staging point for the region because of its position at the head of the ONR. From Moosonee, connections north to James Bay coastal Cree communities are available by barge during the open water season, and except for Peawanuck, by winter road. All communities, with the exception of Moose Factory, are serviced by scheduled air traffic. Responsibility for construction and maintenance of the James Bay winter road has recently been taken over by a consortium of interests put forward by the Fort Albany, Kashechewan, and Attawapiskat First Nations (the Services Company), together with the Moose Cree and the community of Moosonee. Background traffic data for the coastal winter road (unrelated to project activities) were obtained from the Service Company for the winter of 2004. The estimated traffic use was in the order of 5,400 round trips for the entire winter, or about 85 trips per day, inclusive of all vehicle types from snowmobiles and all-terrain vehicles (ATVs) to pickup trucks and haul trucks.

Grid power has been recently extended north from Moosonee and Moose Factory to Fort Albany, Kashechewan, and Attawapiskat. The transmission line south of Moosonee follows the Ontario Northland Railway (ONR) on its west side. From Moosonee north to Attawapiskat, the existing line follows the coastal winter road, crossing it at several points. The transmission line ROW is approximately 30 m.

Local governments provide a variety of services to the communities including public works, health, education, fire protection, family planning and recreation, and cultural programs. Medical facilities are available in all communities, with the regional focus of medical facilities being the Weeneebayko General Hospital in Moose Factory. Each community provides up to secondary level education, and post secondary education is available in Moosonee at a local branch of the Northern College. Police services in all communities are provided under the auspices of the Nishnawbe Aski Police Service, except at Moosonee where police protection is provided by the Ontario Provincial Police. A regional emergency response centre is being formed in Moose Factory.

The population of Moosonee is approximately 2,500, and is overall somewhat better educated than most of the other James Bay coastal Cree communities. There is a higher participation rate in the formal economy, the unemployment rate is comparatively low at 13.5%, and incomes are comparatively high. However, as for Attawapiskat, the unemployment rates in this and other James Bay coastal Cree communities are likely under-estimated. The economy of Moosonee is more prosperous and more diversified, compared with the communities further north along the James Bay coast, and includes not only government services, but also transportation, construction, and tourism. This community is perhaps best placed to take early advantage of business opportunities provided by the project.

The on-reserve population of Moose Factory is approximately 1,500, but the total Moose Factory population in approximately 2,500, including a substantive number of MoCreebec residents. Unemployment is estimated at about 20%. Moose Factory shares many of the characteristics of nearby Moosonee in terms of improved services and a more diversified economy.

Fort Albany and Kashechewan are located on opposite sides of the Albany River. Fort Albany is the smaller of the two communities, with a total population of about 600. Kashechewan has a population of about 1,600. It is estimated that about 40% of the population of these First Nations live off reserve. The socio-economic data on Fort Albany indicate that the population is comparatively well educated. Unemployment, at about 17%, is not as high as in other remote communities in the region and incomes are higher. Education and employment rates in Kashechewan are less encouraging. The local economies of both First Nations are focused on servicing the communities and on the traditional pursuits of hunting, fishing, and trapping. Like many First Nation communities, a large percentage of the population is young.

A high proportion of coastal community members still engage in the traditional activities of hunting, fishing, trapping, and berry picking. Most hunting focuses on moose, caribou and waterfowl. Moose are hunted mainly in the fall, caribou mainly during the winter, and waterfowl (most notably geese) during the spring and fall migration periods, and especially during the spring. The most important furbearers are marten and beaver, but a number of other species are also taken. Trapping tends to occur mainly during the late fall and early winter, but may extend into late winter. Pike and walleye are reportedly the most important fish species taken by members of the coastal First Nation communities south from Attawapiskat, with trout, sturgeon and whitefish also being important. Hunting, trapping and fishing areas are governed by accessibility, with access being provided by the major rivers, the winter road, and south from Moosonee/Moose Factory by the rail line. A high percentage of hunting, fishing and trapping is linked to short-term outing, often day-trips. A small number of cabins are located along the winter road/transmission line/rail line corridor that is used to support hunting, fishing and trapping activities.

5.5.4 James Bay Lowlands Interior First Nation Communities

Other First Nation communities that have had a direct involvement in the VDP included the Taykwa Tagamou First Nation near Cochrane, and the Constance Lake and Marten Falls (Ogoki Post) First Nations through the consideration of access and power alternatives. Access and power alternatives that were considered transected, or potentially transected, the traditional lands of both the Constance Lake and Marten Falls First Nations.

The Taykwa Tagamou Nation currently resides on the New Post No. 69A Reserve, in Brower Township, 20 km southeast of Cochrane. The main Reserve (New Post No. 69), located between Moosonee and Cochrane, and just east of the Ontario Northland Railway and the Abitibi River, is unoccupied. The current First Nation population is approximately 100 persons.

Constance Lake is located on the Kabinakagami River and is accessible by road, being located 32 km west of Hearst and 8 km north of Highway 11. The community has an on-reserve population of approximately 758, and is fairly well integrated into the general northeastern Ontario economy. The Ogoki Post is located at the confluence of the Albany and Ogoki Rivers, and approximately 170 km northeast of Nakina and 450 km northeast of Thunder Bay. The community is accessible by winter road and by air. The community has an on-reserve population of 263 residents, and the economy is based on traditional activities and services to the community. Both communities belong to the 10-community Matawa Tribal Council, affiliated with NAN.

5.5.5 Non-Aboriginal Communities

Project effects on the economy of northeastern Ontario will largely be felt in the two urban centres of Timmins and Cochrane. Timmins is the regional centre for mining sector activity. Cochrane is the closest road/railhead junction to the project site, and connects directly to Moosonee by rail, and on to Attawapiskat by barge and winter road. Other centres that have had an involvement in the VDP, through the consideration of access and power alternatives, were Hearst and Kapuskasing, which comprise an important part of the regional economy.

Selected VECs

The valued ecosystem components related to northeastern Ontario are:

1) Regional economy; and,
2) Mining industry as a viable economic activity (especially for Timmins).

Socio-economic Status

The City of Timmins was founded as a mining centre in 1909, and has grown predominantly in response to mining and forestry industries. Its population was 43,686 in 2001, which represents a decline of about 8% over the past 10 years, and is indicative of a need for additional employment and business opportunities. Active mining operations in the immediate Timmins area employ a workforce of slightly over 2,000 persons. In addition, there are several contractors and suppliers in Timmins who provide specialized services to, and are dependant upon, the mining industry. The city has excellent service capability to support mining ventures, including good highway and air service access. The city's elected representatives have expressed strong support for the VDP.

Cochrane has a population of about 6,000, and an economy focused on the transportation and forest industries and on government services. Cochrane is located at the junction of the Canadian National Railway (east-west orientation) and the ONR (north-south orientation). The ONR extends north to Moosonee, and is the only year-round ground link to that community. Cochrane is also located on Trans-Canada Highway 11, the main provincial highway through northeastern Ontario, and is serviced by an all-season airport.

5.5.6 Recreation and Aesthetics

The VDP area is remote and therefore receives limited recreational use, with such use focused on the Attawapiskat River canoe route. Further upstream on the watershed, the Otoskwin-Attawapiskat River Provincial Waterway Park extends from the headwaters of the Otoskwin River, downstream 420 km to the confluence of the Attawapiskat and Muketei Rivers. This confluence is 105 km west northwest from the Victor site, and therefore well outside of the proposed Victor development area (Figure 5-3). The goals of the Otoskwin-Attawapiskat River Waterway Park are to protect the significant natural and cultural features of the waterway, and to provide opportunities for wilderness recreation, principally canoeing. Part of the wilderness experience of canoeing down the Attawapiskat River lies in passing through the karst areas that border the Attawapiskat River in the general region of the Victor site.

Other recreational activities in the region are focused on moose hunting and potentially fishing. Some members of the AttFN offer limited guiding services to hunters and fishermen. Moose hunting takes place within forested areas bordering the Attawapiskat and Nayshkootayaow Rivers.

The valued ecosystem components related to recreation and aesthetic interest are included within Natural Heritage System VECs.

5.5.7 Socio-economic Environment – Sensitivities and Constraints

Culture and Traditions

The maintenance of Aboriginal tradition is a matter of fundamental importance to the James Bay coastal Cree communities, as it is to all First Nations across Canada. It is therefore critical that the VDP and its personnel be aware of and accommodates the cultural traditions of the local First

Nations. Cultural awareness programs and similar efforts will help build an atmosphere of mutual respect, understanding, and trust between the cultures.

Language and Familiarity with Mining and Engineering Concepts

Technical language related to the VDP presents a limitation for much of the local population, the majority of whom also lack familiarity with large industrial operations. A committee has consequently been set up to establish suitable Cree words and phrases for translating technical words and concepts. These efforts notwithstanding, the translation of technical terms into everyday language understandable to local First Nations remains a challenge that requires continued effort by all parties.

Several documents were translated during the environmental assessment process, including a plain language summary of the *Guidelines for the Conduct of a Comprehensive Study and the Preparation of a Draft Comprehensive Study Report*, (the Guidelines), February 26, 2004, a summary table of comments received during consultations on the draft Guidelines, and a plain language summary of the Comprehensive Study.

Education and Training

De Beers is committed to helping the local First Nations to improve levels of job-readiness and training, such that they might participate more fully in the employment and business opportunities associated with development of the VDP. To date, this commitment has taken the form of on-site training at the Victor site during the project exploration phases, as well as funding support for bridge training. Commitments have also been made by De Beers to fund a larger training centre, to be constructed at Attawapiskat as the project proceeds. Further, De Beers is a participant member of the James Bay Employment and Training Partnership, created by the Cree community leadership, seeking to increase the number of employable individuals in the communities. Effort and funding will be required on the part of all stakeholders to maximize training opportunities associated with the project, including support from government sectors and local education facilities such as Northern College in Moosonee and Timmins.

Disruptions to Fish and Wildlife Harvesting

It is acknowledged that disruptions to fish and wildlife harvesting, and possibly other traditional pursuits of AttFN, may occur as a result of project-related activities. De Beers is committed to fair and reasonable compensation for any such disruptions. An Impact Benefit Agreement is being developed with AttFN.

Heritage Resources

Heritage resources include gravesites, historic campsites, specific fishing sites, certain travel routes, sacred or spiritual sites, and archaeological sites. The majority of such sites are located either close to the community of Attawapiskat, or along the banks of the major rivers, such as the Attawapiskat River and Nayshkootayaow River. Many of these sites have been identified and if more are discovered prior to development, the AttFN will be consulted on any specific activities planned that might have the potential to affect any such sites. None of the known heritage sites are positioned within areas that would be affected by project development.

A number of heritage sites have been identified along the major rivers, and in the vicinity of the coastal communities south from Attawapiskat, as well as in the vicinity of Cockispenny Point and Longridge Point on the James Bay coast. Care will be required at the detailed planning stage to ensure that sites in the immediate vicinity of the planned new transmission line will not be affected.

5.6 VEC Summary

A summary of natural environment and socio-economic VECs is provided in Table 5-1.

TABLE 5-1
SUMMARY OF VICTOR DIAMOND PROJECT VECs

Natural Environment VECs
Atmospheric Environment   Air quality
Geological Systems   Refer to Natural Heritage Systems (below)

Surface Water Systems
    Attawapiskat River (and its tributaries)
    Nayshkootayaow River (and its tributaries)
    Granny Creek system
    Lawashi River system
    Rivers and creeks intersected by winter roads

Groundwater Systems
    Shallow overburden aquifer
    Bedrock aquifer

Inland Terrestrial Environment
    Riverbank and creek margin forests
    Northern ribbed fens with broad flarks (pools)
    Upland sites
    Moose and caribou
    Large predators and furbearers
    Migratory birds

James Bay Coastal Zone[1]
    James Bay coastal marshes and mudflats (including Akimiski Island)
    James Bay coastal environment waterfowl and shorebirds

Marine Systems[1]
    Aquatic environment
    Polar bear
    Marine mammals
    Waterfowl and seabirds

Natural Heritage Systems
    Attawapiskat River proposed candidate waterway park (ARPCWP)
    Candidate ANSIs
    Conservation and Nature Reserves

Socio-economic VECs

Attawapiskat First Nation
    Local economy
    Traditional pursuits
    Aboriginal community
    Health
    Heritage resources
    Physical infrastructure

James Bay Coastal Cree Communities
    Local economy
    Traditional pursuits
    Aboriginal community
    Health
    Physical infrastructure

Non-Aboriginal Communities
    Regional economy
    Mining industry

Note: 1 Defined as VECs only within the context of their applicability to project alternatives involving marine transport of diesel, and not within the context of the revised project description using transmission line power

Figure
5-1 General Fisheries Communities and Watershed Habitat Conditions

Figure
5-2 Regional Vegetation

Figure
5-3 Project Area Natural Heritage Values

6.0 ENVIRONMENTAL EFFECTS ANALYSIS – NATURAL ENVIRONMENT

Unless otherwise specified, the compilation and summary of data were undertaken by the Proponent and its consultants. The federal and provincial authorities relied on the accuracy of the information provided by the Proponent in providing specialist and expert information and knowledge.

6.1 Approach

6.1.1 Overview of Effects Analysis

This chapter documents the analysis of project-related effects on natural environment VECs. The analysis of project-related effects on socio-economic VECs is provided in Chapter 7. In a few instances an effects analysis has been completed for environmental elements, or aspects, that were not defined as VECs, but where concerns or issues had been raised by reviewers.

For each VEC, the analysis of effects is structured under the following headings:

- Environmental effects;
- Mitigation;
- Significance;
- Comments/concerns;
- Proponent response; and,
- RA conclusion.

Summary tables are provided at the end of the section, documenting significance ratings.

The environmental effects section provides a summary of the project-related environmental effects on a given VEC, taking into consideration the Proponent's original CSEA documentation, relevant project updates and modifications, and information provided by reviewer's comments and concerns, and the Proponent's responses to these comments and concerns.

Mitigation refers to any measures that the Proponent has proposed to eliminate, or reduce environmental effects, and includes elements inherent in the project design to prevent effects from happening in the first place. Mitigation within the context of CEAA also includes compensation.

The significance of environmental effects was determined for effects after the application of any appropriate mitigation measures, and was evaluated on the basis of criteria described in Section 6.1.4.

In the discussions of comments/concerns and associated Proponent responses, no attempt has been made to reiterate all of the comments and concerns received by the RAs, regarding any particular VEC. For this level of detail, reviewers are referred to the individual comment sets and response documents listed in Chapter 4. Instead, the approach taken here has been to highlight the major comments and concerns which are relevant to the overall assessment of significance, and which capture in general terms, the context of the concerns. In many instances, the same or similar comments or concerns on a specific item were received from several different sources. Where appropriate, the source of the comment has been identified in this section, but in many instances the comment or concern is stated without reference to a specific source.

The Proponent response section summarizes the Proponent's response to comments and concerns raised by the reviewers.

The RA conclusions section summarizes the collective opinion of the RA's and their provincial counterparts, regarding the overall effects assessment for each VEC.

6.1.2 Analytical Methods and Tools

In carrying out the environmental effects analysis, the Proponent has used a number of analytical methods and tools. Detailed descriptions of these various items are provided in the CSEA. For the most part the methods used included laboratory tests, mass balance calculations, statistical packages of various types, and various types of models, such as:

- Air quality effects – USEPA Industrial Source Complex Model Prime (ISC Primke);
- Noise – ISO 9613, Acoustics – Attenuation of Sound During Propagation Outdoors;
- Surface water flow dispersion – AQUASEA (1992); and,
- Groundwater flow modelling – MINEDWC (HCI 1993).

6.1.3 Utilization of Scientific and Traditional Ecological Knowledge

Considerable discussion regarding the VDP has focused on the relative roles of scientific data collection and analysis and Traditional Ecological Knowledge (TEK) in carrying out the environmental effects analysis. Suggestions had been made that the Proponent relied too heavily on scientific knowledge and not enough on TEK. In response to these suggestions the Proponent indicated that it had indeed incorporated TEK in the environmental effects analysis, and that the TEK so utilized did not constitute only the information included in the TEK document, itself, but also knowledge that was gained from AttFN assistants who participated in the collection of scientific data. In this sense, the Proponent viewed the collection of environmental data to be a collaborative effort between the Proponent's consultants and members of the AttFN that assisted in data collection.

At a meeting with the federal and provincial agencies in North Bay in October 2004, the Proponent cited several examples of this collaborative effort, such as:

- The collection of fisheries data;
- Caribou and moose aerial surveys;
- Small mammal tracking surveys;
- Soil and vegetation surveys;

- Analysis of creek and river flows; and,
- The collection of archaeological and heritage data.

During the collection of such data, there were discussions between the participants (environmental specialists and AttFN field assistants) on how best to collect and interpret the data. Field assistants provided a wealth of experience to the data collection efforts. Also, during many of the discussions with the Chief and Council of the AttFN, the project Steering Committee, and with the general membership of the AttFN, on project plans and anticipated environmental effects and sensitivities, the Proponent was provided with numerous insights as to the potential effects of the project on the environment.

As a result of these collaborative data efforts and discussions, the Proponent was provided additional information, upon which to assess project-related effects to the natural environment, and has incorporated both scientific and TEK perspectives in a manner they believe is both positive and affirmatory.

6.1.4 Significance Analysis

Significance criteria defined herein, and the associated methodology for criteria application, are used to determine whether or not a particular environmental effect is likely to be significant, after mitigation. The criteria used, and their method of application, are the same as those used in preparation of the CSEA, but with appropriate modifications, as presented in the Site Access and Power Alternatives (SAPA) report, to reflect greater precision of definition, and comments received from the agencies on the CSEA.

Also, while an attempt has been made to provide a defensible and traceable methodology for assessing project-related environmental effects, it is recognized that socio-economic effects are often somewhat more complicated, and not so simply defined. A discussion of the special concerns and considerations related to the assessment of socio-economic effects is provided in Chapter 7.

Criteria used to evaluate significance include consideration of magnitude/geographic extent, duration and frequency, and ecological/socio-economic context of each effect, as well as whether the effect is likely to occur (in accordance with CEAA protocols). The terms magnitude/ geographic extent, duration, etc., are referred to as attributes. Associated with each attribute is a set of criteria used to evaluate the attribute. Criteria are categorized into three levels (Levels I, II, and III), where Level I is indicative of a negligible or limited potential to contribute to an overall significant environmental effect, and Level III is indicative of a high potential to contribute to an overall significant environmental effect. Level II represents an intermediate condition. Attributes and criteria are defined in Tables 6-1 through 6-3.

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TABLE 6-1
ENVIRONMENTAL IMPACT SIGNIFICANCE CRITERIA

Significance Level	Context		Extent		Frequency	Reversibility	Likelihood of Occurrence
	Ecological	Socio-economic [1]	Magnitude/ Geographic Extent	Duration			
I	No meaningful adverse ecosystem effects	No meaningful adverse effects to socio-economic interests	See Table 6-2 for VEC specific criteria	See Table 6-3 for group specific criteria	Effect expected to occur infrequently, or not at all	Effect is readily reversible	Unlikely to occur
II	Adverse effects involve common species or communities, or resources of limited significance	Adverse effects involve meaningful disturbance to local residents or land users, or to community character or services	See Table 6-2 for VEC specific criteria	See Table 6-3 for group specific criteria	Effect expected to occur intermittently, possibly with some degree of regularity	Effect is reversible at substantial cost, or with difficulty	Could reasonably be expected to occur
III	Adverse effects involve locally or regionally important species, communities, or resources	Significant adverse effects to livelihoods and/or Traditional Use activities, or to community character or services	See Table 6-2 for VEC specific criteria	See Table 6-3 for group specific criteria	Effect expected to occur regularly or continuously	Effect is not reversible	Will occur, or is likely to occur

Note: 1 Environmentally (biophysical) induced socio-economic effects only.

TABLE 6-2
SIGNIFICANCE CRITERIA – MAGNITUDE AND GEOGRAPHIC EXTENT

Component	Level I	Level II	Level III
Air quality	Emissions consistent with applicable federal and provincial regulations and guidelines; or if guidelines exceeded, no, or minor, anticipated adverse environment effects[1] beyond project claim boundaries	Emissions have the potential to exceed federal or provincial guidelines for areas beyond project claim boundaries, resulting in potential for meaningful adverse environmental effects[1] to off-property residents, lands or waters (and their biota)	Emissions are likely to exceed federal or provincial guidelines for areas beyond project claim boundaries, resulting in meaningful, and unacceptable adverse environmental effects[1] to off-property residents, lands or waters (and their biota)
Noise	Hourly A-weighted sound levels at the margins of buffer zones of <40 dBA	Hourly A-weighted sound levels at the margins of buffer zones of 40 to 45 dBA	Hourly A-weighted sound levels at the margins of buffer zones of >45 dBA
Greenhouse gas emissions	Greenhouse gas emissions of <0.1% of Canada's target CO_2 emission rate reduction of 240 Mt/a [2]	Greenhouse gas emissions of 0.1 to 1.0% of Canada's target CO_2 emission rate reduction of 240 Mt/a [2]	Greenhouse gas emissions of >1.0% of Canada's target CO_2 emission rate reduction of 240 Mt/a[2]
Water quantity	Change to creek and river flows is <15% of seasonal norms	Change to creek and river flows is15 to 25% of seasonal norms	Change to creek and river flows is >25% of seasonal norms
Water quality	Water quality effects in receiving waters consistent with applicable federal and provincial regulations and guidelines; or if guidelines exceeded, no anticipated adverse environment effects[1] beyond any defined mixing zones	Water quality effects in receiving waters have the potential to adversely affect[1] drinking water uses, aquatic life, and/or wildlife, beyond any defined mixing zones	Water quality effects in receiving waters are likely to adversely affect[1] drinking water uses, aquatic life, and/or wildlife, beyond any defined mixing zones, likely resulting in an unacceptable effect
Aquatic habitat and fisheries resources	No net loss of the productive capacity of habitats[3]	Unacceptable loss of the productive capacity of local fish habitat[3]	Unacceptable loss of the productive capacity of regional fish habitat[3]
Groundwater systems	System alteration expected to result in <15% change to creek and river seasonal flow norms	System alteration expected to result in 15 to 25% change to creek and river seasonal flow norms	System alteration expected to result in >25% change to creek and river seasonal flow norms
Terrestrial habitat (including wetlands)	Effect considered to be minor, and/or solely confined to project lands	Activity has the potential to meaningfully affect off-property vegetation communities or species	Activity is likely to meaningfully affect off-property vegetation communities or species
Wildlife	Effect considered to be minor, and/or solely confined to project lands[4]	Activity has the potential to meaningfully affect off-property wildlife species	Activity is likely to meaningfully affect off-property wildlife species
Natural heritage features[5]	No meaningful change in ecological function of the feature[5]	Meaningful change in ecological function of ANSIs and candidate ANSIs[5]	Meaningful change in ecological function of parks and candidate parks[6]
Socio-economic (environmentally induced)	Selected parameter changes by <10% from baseline conditions within project study area	Selected parameter changes by 10 to 20% from baseline conditions within project study area	Selected parameter changes by >20% from baseline conditions within project study area
Socio-economic (not environmentally induced)[7]	Low	Moderate	High

Notes:
1. Adverse effect determined on the basis of best available scientific literature
2. Based on estimates of fuel sources used to generate power and tanker truck traffic on project-related roads north from Moosonee (or Highway 11)
3. Determined by DFO in consultation with MNR project lands are those lands that will be directly disturbed by project facilities such as the placement of buildings, stockpiles, the open pit, and other infrastructure, including the Victor site buffer zone in the case of wildlife
4. Includes parks, candidate parks, ANSIs and candidate ANSIs
5. Determined through consultation with MNR
6. Significance determinations are not provided for non-environmentally induced socio-economic and socio-cultural components

TABLE 6-3
CEAA SIGNIFICANCE CRITERIA – DURATION

Component	Level I	Level II	Level III
Biophysical environment	Short-term - Effect not measurable beyond construction period (3 years); or beyond active reclamation period, if directly linked to reclamation phase	Medium-term – Effect likely to persist for life of project	Long-term – Effect likely to persist beyond life of project
Socio-economic (environmentally induced)[1]	Short-term - Effect will occur for ≤3 years (construction phase)	Medium-term - Effect will occur over the life of the project (operations and closure phases)	Long-term - Effect will occur beyond the life of the project

Notes: 1 Significance determinations are not provided for non-environmentally induced socio-economic and socio- cultural components

For an effect to be defined as significant within the context of this assessment, the effect must be such that both of the following criteria are satisfied:

- A Level II or III rating is attained for ecological and/or socio-economic context; and,

- A Level II or III rating is attained for all of the attributes involving extent, duration and frequency.

Conversely, if a Level I rating is achieved for any of the attributes involving magnitude/ geographic extent, duration, or frequency; or, if a Level I rating is achieved for both ecological and socio-economic contexts (where applicable), then the effect is considered to be "not significant".

Effects are also assessed as to their likelihood, recognizing that there is some overlap in the concepts of duration, frequency and likelihood.

6.2 Atmospheric Systems

6.2.1 Air Quality

Air quality is a VEC. Potential project-related environmental effects on air quality include dust generation (suspended particulate matter), and emissions from the incinerator and fuel (diesel) combustion from heavy equipment and power plant operations. Related considerations include noise, and greenhouse gases from fuel combustion. In the following analysis of environmental effects separate subsections are described for general air emissions, noise, and greenhouse gas emissions.

6.2.1.1 Environmental Effects

6.2.1.1.1 General Air Emissions

Assessed parameters included:

- Suspended particulate matter (dust) as PM total, PM10 and PM2.5;
- Sulphur oxides (SO_x), mainly as sulphur dioxide (SO_2);
- Hydrogen chloride (HCl);
- Key metals (lead, cadmium and mercury);
- Dioxins and furans; and,
- Volatile organic carbon (VOC) compounds.

PM refers to total suspended particulate matter, PM10 refers to that portion of PM that is ≤10 microns in diameter, and PM2.5 refers to that portion of PM that is ≤2.5 microns in diameter (extremely fine dust).

The Proponent used the U.S. Environmental Protection Agency's (USEPA) Industrial Source Complex Model Prime (ISC Primke) air dispersion model to predict Victor site area air quality. Model inputs utilized calculated emission rates for each contaminant, background air quality estimates, and applicable climatic data. Modelled emission sources included material handling, vehicle exhausts, road emissions (re-entrained dust), heating equipment, and waste incineration. The model was run to determine air concentrations at the claim boundary ("fenceline"), and at locations within the Victor site area denoted as the maximum "residence" criteria, and has been updated to include the revised project power scenario (i.e., the use of transmission line power rather than on-site diesel generation). Updated results are provided in Table 6-4.

Separate modelling of air emissions was carried out for the construction phase of the project, based on the use of temporary diesel power generators. This information comprises part of the provincial process for the Environmental Assessment Requirements for Electricity Projects, in accordance with O. Reg. 116/01. Results of this analysis showed that applicable federal and provincial air quality standards will be met at the fenceline boundary.

Emission model results were compared against MOE A7 Guidelines (Combustion and Air Pollution Control Requirements for New Municipal Waste Incinerators), and Tier II and Tier III emission standards for mobile diesel equipment (standards currently being phased in). The Proponent has committed to the use of best available air and noise controls where applicable.

The model runs indicated that the only criteria that have the potential to be exceeded are the 24-hour total particulate (dust) standard at the claim boundary, and the 1-hour criterion for maximum NOx concentrations. The model predicted that the 120 $\mu g/m^3$ criterion for total particulate would be exceeded on one day out of two years. In calculating expected total particulate concentrations, the model assumed that standard dust suppression techniques such as water trucks would be used to control fugitive dust from areas such as roadways. Additional dust suppression methods are available, but were not factored into the model. The Proponent has indicated that dust from on-site roads and mineral stockpiles would be non-reactive (not acid generating) and low in contained heavy metals, and therefore poses minimal chemical risk to the environment.

Dispersion modelling results for short-term NOx concentrations also indicate the potential for extremely infrequent exceedances of the federal 1-hour acceptable levels. There are 4 hours in a meteorological data set of 17,520 hours (730 days) that exceed the 1-hour criteria.

It is important to note that the modelling is extremely conservative and assumes that all boilers, the incinerator and all mobile equipment (e.g., trucks) are operating at maximum levels at the same time. This is an overestimate of reasonable actual conditions, as the boilers, even if all are firing, are preferentially run at lower firing rates (typically 80 or 85%). Similarly, the estimates for the incinerator and all mobile equipment are based on maximum allowable levels (i.e., regulatory maximum emissions levels), not lower actual emissions levels.

TABLE 6-4
AIR QUALITY MODELLING RESULTS

Parameter	Jurisdiction	Standard	Maximum Fenceline	Maximum Residence	Fenceline % Criteria	Residence % Criteria
Total Particulate (µg/m^3)						
Annual	Ontario	60	9	17.1	15	29
24-hour (highest)	Ontario	120	137	111.7	114	93
24-hour (2nd highest)	Ontario	120	125	97.1	104	81
24-hour (3rd highest)	Ontario	120	66	85.3	55	71
Particulate Matter less than 10 um (PM10) (µg/m^3)						
24-hour (highest)	Ontario	50	46.4	31.2	93	62
24-hour (2nd highest)	Ontario	50	29.1	30.8	58	62
Particulate Matter less than 2.5 um (PM2.5) (µg/m^3)						
24-hour	Canada Wide Standard	30	12.0	11.6	40	39
Sulphur Dioxide (µg/m^3)						
Annual	Federal (acceptable)	30	1.10	5.30	4	18
24-hour	Federal (acceptable)	150	13.3	76.3	9	51
1-hour	Federal (acceptable)	450	124.2	199.0	28	44
Nitrogen Oxides (NO_X as NO_2) (µg/m^3)						
Annual	Federal (acceptable)	60	5.2	14.2	9	24
24-hour	Ontario	200	65.7	140.1	33	70
1-hour (max)	Federal (acceptable)	400	1,200	971	300	243
1-hour (2nd)	Federal (acceptable)	400	707	423	177	106
1-hour (5th)	Federal (acceptable)	400	332	381	83	95
Carbon Monoxide (µg/m^3)						
24-hour	Ontario	15,700	99.0	109.0	0.6	0.7
1-hour	Federal (acceptable)	15,000	2,019	1,594	13	11
Hydrogen Chloride (HCl) (µg/m^3)						
24-hour	Ontario	20	0.31	17.6	1.5	88.2
Cadmium (µg/m^3)						
24-hour	Ontario	2	0.00016	0.0091	0.008	0.46
Lead (µg/m^3)						
24-hour	Ontario	2	0.0016	0.093	0.08	4.6
Mercury (µg/m^3)						
24-hour	Ontario	0.5	0.0002	0.013	0.05	2.6
Dioxins and Furans (pg TEQ/m^3)						
24-hour	Ontario	5	0.0009	0.052	0.018	1.04

As well, short-term model results are typically used as “screening” levels for assessing emissions. If a facility can meet the short-term averages, then it is expected to meet longer-term averages as well. Since the effect levels for compounds are typically assessed for longer exposures, 24-hour and annual averages are better indicators of potential adverse effects. For NOx, both the annual and 24-hour predicted average concentrations are below their relevant criteria.

The only other contaminants, which are expected to even approach the applicable standards, are sulphur dioxide, and hydrogen chloride. Within this context, the Proponent assessed the potential impacts of sulphur dioxide (SO_2) on plant species and species groups known to occur in the Victor site area, including the more sensitive species such as lichens. SO_2 was the only contaminant considered to have a realistic potential of affecting vegetation in any meaningful way. The Proponent has indicated that there was no meaningful potential for site area SO_2 emissions to adversely affect vascular plants, mosses or lichens within or beyond the property boundaries.

With respect to human health, it is important to note that ambient air quality standards, while set to protect human health, are not applicable to the work place environment. Worker exposure is regulated by occupational health and safety standards. De Beers has indicated that they will follow all required workplace requirements defined under the Ontario *Occupational Health and Safety* Act and any other applicable regulatory instruments to comply with appropriate workplace practices.

6.2.1.1.2 Noise

The Victor site area is a Class 3 area for noise, defined as “a rural area with an acoustical environment dominated by natural sounds”. For a Class 3 area, the MOE guideline limits at the closest receptor (permanent or seasonal dwelling) are 45 A-weighted decibels (45 dBA) during the daytime, and 40 dBA at night. There are no permanent or seasonal residences in close proximity to the Victor site. Noise control is nevertheless still important because of its potential impact on wildlife and worker health.

Noise modelling was carried out for the Victor site based on international standard ISO 9613, *Acoustics – Attenuation of sound during propagation outdoors.* Principal noise sources used in the model included the power generation (standby), the processing plant, and heavy equipment (stationary and mobile). Model results reported in the CSEA show that MOE sound level criteria for a Class 3 condition are expected to be met at the Victor property boundary (i.e., at the fenceline), and that a lower 30 dBA sound level would be attained at the perimeter of a 3 km buffer zone around the Victor site development area. The buffer zone is contained within the DSA. For comparison purposes, a 45 dBA sound level corresponds to soft music from a radio, and the 30 dBA sound level corresponds to a soft whisper.

Sound levels associated with road traffic are expected to be <30 dBA at a distance of 1 km from the winter road, based on average hourly values. However, during the passage of truck convoys, short-term peak sound levels of 40 dBA would be expected at this distance, as trucks are passing. The expected level of truck traffic is 4 to 6 convoys of 5 to 6 vehicles per day, each way (i.e., to and from the site) during the construction phase for the project, and 2 convoys of 4 to 5 vehicles per day during the operations phase of the project. Noise associated with aircraft will be intermittent, with the number of expected flights being 3 to 4 per week during operation and 5 to 7 per week during construction, together with supplementary helicopter use for activities such as environmental sampling and monitoring at more remote sites.

Trucks moving up the winter road from Moosonee to the Victor site will generally be removed from residential areas, being 400 m to the nearest residence in the case of Moosonee; approximately 5 km in the case of Fort Albany and Kashechewan; and about 2 km in the case of Attawapiskat. The MOE typically applies an outdoor traffic noise guideline of 50 dBA for residential areas, based on averaged hourly values. Model predictions show that this value would not be exceeded for momentary maximum sound levels. Project-related winter traffic noise should therefore not have a meaningful effect on the communities (Table 6-5).

TABLE 6-5
PREDICTED MOMENTARY MAXIMUM SOUND LEVELS AT VARIOUS DISTANCES FROM A PASSING SIX-TRUCK CONVOY

Distance (m)	100	200	300	400	500	600	700	800	900	1,000	1,500	2,000
Predicted sound level (dBA)	63	56	52	49	47	45	43	41	40	39	33	<30

Note: Calculations are based on a sound power level of 108 dBA (equivalent to a sound pressure level of 76 dBA at 15 m

Discussions on the effect of noise on wildlife are presented in Section 6.6.2.

6.2.1.1.3 Greenhouse Gas Emissions

The Proponent has assessed the potential for project-related greenhouse gas emissions to influence climatic systems and to impact on Kyoto Accord emission reduction targets.

Greenhouse gas emissions (principally CO_2) would mainly derive, directly or indirectly, from fuel combustion. The projected annual CO_2 emission rate is 72,400 t/a from direct and indirect sources, during the project operations phase, and approximately 41,000 t/a during the construction phase (Table 6-6). The 72,400 t/a operations phase value is substantially less than the Proponent's earlier estimate of 120,000 t/a cited in the CSEA, that was associated with the former on-site diesel power generation scenario.

A comparison of projected Victor Diamond Project CO_2 emissions with typical emissions from the Canadian metal mining sector can be derived from data provided by the Mining Association of Canada (MAC 2003). The MAC data show an average annual CO_2 emission rate of 5,999 kt/a, for the period of 1990 through 2000, based on a mean annual mine production rate of 247.43Mt, equating to an emission rate of 24.3 kt of CO_2 per Mt of ore. The comparable figure for operations at Victor is 24.5 kt of CO_2 per Mt of ore, based on an annual production rate of 2.5 Mt of ore, and 72,400 tonnes/a of CO_2.

Canada has developed a CO_2 emission rate reduction target of 240 Mt/a as part of its commitment to the Kyoto Accord. Fuel consumption at the Victor Diamond Project would produce CO_2 emissions equivalent to 0.017% and 0.030% of the emission reduction target during the project construction and operations phases, respectively. Emissions would be temporary, extending only over the life of the mine.

TABLE 6-6
GREENHOUSE GAS EMISSIONS - VDP

Source / Condition	Units	Result
Trucks - Construction Phase		
Number of round trips	n	1,500
Route (Moosonee to Victor - one way)	km	378
Fuel consumption	L/a	360,000
Fuel consumption rate	L/km	3.15
Diesel volume to weight conversion	proportion	0.85
Diesel weight	tonnes/a	306
CO_2 weight conversion	proportion	3.14
CO_2 generated	tonnes/a	**960**
Trucks - Operations Phase		
Number of round trips	n	500
Route (Moosonee to Victor - one way)	km	378
Fuel consumption	L/a	120,000
Fuel consumption rate	L/km	3.15
Diesel volume to weight conversion	proportion	0.85
Diesel weight	tonnes/a	102
CO_2 weight conversion	proportion	3.14
CO_2 generated	tonnes/a	**320**
On-site Fuel Consumption		
Fuel consumption	L/a	15,000,000
Diesel volume to weight conversion	proportion	0.85
Diesel weight	tonnes/a	12,750
CO_2 weight conversion	proportion	3.14
CO_2 generated	tonnes/a	**40,040**
Off-site Fuel Consumption		
Fuel equivalent as diesel	L/a	30,000,000
Provincial average power frm fossil fuels	%	39.22
Line loss	%	2.00
Calculated theoretical fuel consumption at source	L/a	12,001,320
Diesel volume to weight conversion	proportion	0.85
Diesel weight	tonnes/a	10,201
CO_2 weight conversion	proportion	3.14
CO_2 generated	tonnes/a	**32,030**
Total Project		
Construction phase	tonnes/a	**41,000**
Operations phase	tonnes/a	**72,400**
Proportion Kyoto Target of 240 Mt/a		
Construction phase	%	**0.017**
Operations phase	%	**0.030**

6.2.1.2 Mitigation

6.2.1.2.1 General Air Emissions

The principal sources of dust associated with the Victor Diamond Project include:

- Road dust;
- Dust from overburden, coarse PK, and rock stockpiles;
- Dust from deposited fine PK stored within better drained portions of the PKC facility;
- Dust from the primary crusher; and,
- Dust from blasting.

Dust emissions from roads and mineral stockpiles will be controlled through the application of water sprays. One or more water trucks will be maintained at site for this purpose. Alternatively, surfactant applications, such as calcium chloride, will be used to control dust, particularly on roads, provided that such applications are acceptable to the MOE. Water sprays discharged by mobile trucks from perimeter PKC dams will be used to control dust emissions from the PKC facility. At closure, all exposed dust sources will be vegetated.

Anticipated Effectiveness of Mitigation Measures and Contingencies - These additional dust control measures are predictably effective, and are not prone to failure. If dust emissions are found to cause a significant adverse effect during the follow-up program the intensity of dust control measures will be increased.

6.2.1.2.2 Noise

There are no nearby residential receptors to the Victor site. Mitigation related to potential adverse effects to nearby residents is therefore not required. Victor site area noise mitigation strategies related to reducing effects on local wildlife are described in Section 6.6.2.

Truck traffic in the Moosonee area cannot reasonably be rerouted away from the nearest receptors, as the rail yards and roadways are already in existence. Traffic is remote from Fort Albany and Kashechewan, such that noise from truck traffic should not be a concern. The Proponent has indicated that options are available for rerouting truck traffic further away from the community of Attawapiskat, which would reduce noise and other disturbance effects. Thus far the community has indicated that it prefers De Beers to run its trucks near to the community.

Anticipated Effectiveness of Mitigation Measures and Contingencies – The Proponent has defined alternatives for routing truck traffic further away from Attawapiskat, but any such changes would require the support of the community.

6.2.1.2.3 Greenhouse Gas Emissions

The Proponent cites a number of specific planning measures aimed at reducing fuel and power consumption for the Victor Diamond Project, including:

- Use of transmission line power as opposed to on-site diesel generated power;
- Restricting open pit depth and associated dewatering requirements;
- Reducing transportation needs through development of a compact site; and,
- Using larger, more fuel efficient trucks for material transport;
- Using optimum insulation to reduce heat loss.

Fuel consumption will be minimized because of the high cost of delivering fuel to the site.

6.2.1.3 Significance

6.2.1.3.1 General Air Emissions

Fugitive dust emissions will be controlled to applicable standards at the project fenceline (i.e., within the DSA) using water sprays, and dust suppressants, as appropriate, and as per standard practice at mine sites. Atmospheric modelling studies show that applicable environmental standards will be met for air emissions both at and within the fenceline boundary. Air emission impacts are therefore regarded as not significant based on Level 1 ratings for magnitude/ geographic extent.

6.2.1.3.2 Noise

Noise emissions from site and along the winter access roads will meet applicable criteria for an MOE Class 3 setting, within the DSA boundaries. Noise emission Impacts are therefore regarded as not significant based on Level 1 ratings for magnitude/geographic extent.

6.2.1.3.3 Greenhouse Gas Emissions

The potential impact of the project on CO_2 emissions, climate change, and Kyoto greenhouse gas reduction targets, is minor and temporary (Level I for magnitude and duration) and therefore not significant. These findings are consistent with the federal-provincial-Territorial Committee on Climate Change and Environmental Assessment (2003), which states: “the contribution of an individual project to climatic change cannot be measured”. Nevertheless, in accordance with the aforementioned document, steps have been taken in project planning to reduce greenhouse gas emissions to the extent practicable.

6.2.1.4 Comments/Concerns

6.2.1.4.1 General Air Emissions

Comments received from the federal and provincial agencies on general air quality concerns were limited. There were questions as to whether or not air emissions from the proposed incinerator had been included in the emission modelling. There was also a suggestion that local rather than regional data should have been used in the modelling exercise.

A greater number of comments on air quality were received from Gartner Lee, acting on behalf of the AttFN, as per the following:

- De Beers should ensure that short-term concentrations of air contaminants are calculated and compared to the ½-hour Point of Impingement Standards as well as to the Ambient Air Quality Criteria;
- De Beers should assess the environmental effects of fugitive emissions from chemical storage and handling, off-site haul routes, and emissions from the on-site airport/airstrip;
- De Beers should assess the effects of construction effects on air quality;
- De Beers should clarify whether fibrous serpentine minerals occur in the alteration products of kimberlite, and if they are present, what precautions would be put in place for worker protection; and,
- De Beers should conduct an ecological risk assessment to address the potential effects on wildlife through the uptake of contaminants through various environmental pathways, including air.

6.2.1.4.2 Noise

Gartner Lee, on behalf of the AttFN, provided several comments on noise related issues. The majority of the comments were suggestions relating to noise monitoring during construction and operations phases of the project. Relative to potential noise effects on wildlife, Gartner Lee suggested that the Proponent should use a noise guideline limit of 40 dBA at a 1.5 km distance as the threshold of significance, as opposed to the 40 dBA at 3 km which was actually used; and that De Beers should provide the rationale for its selection of a 1 km buffer zone along the road corridors for the consideration of effects on the terrestrial environment, giving particular attention to issues of noise and disturbance to caribou.

Gartner Lee further suggested that De Beers should conduct noise modelling for both summer and winter conditions to ensure that worst-case noise effects are addressed, and that De Beers should assess noise levels at and within the dormitory.

Health Canada suggested that the Proponent should address the effects of noise on site workers, including the effects of aircraft noise.

6.2.1.4.3 Greenhouse Gas Emissions

federal and provincial agencies requested that the Proponent should include CO_2 emissions from transport components of the project (trucks, marine vessels and aircraft) in its calculations of greenhouse gas emissions. Gartner Lee made a similar comment on behalf of the AttFN. The suggestion was also made that general drying out of the muskeg in response to well field dewatering could lead to decomposition (oxidation) of the underlying amorphous muskeg, resulting in the release of carbon dioxide.

6.2.1.5 Proponent's Response

6.2.1.5.1 General Air Emissions

In response to questions as to whether or not air emissions from the incinerator had been factored into the air emissions model results, the Proponent responded that the incinerator had been factored in. With respect to the suggestion that the Proponent should have used local rather than regional data in its air quality modelling, the Proponent responded that the model used data from both local (Victor site) and regional sources. However, because of the requirements to determine climatic conditions for various return periods, greater reliance was placed on regional data because regional stations provide long-term records, which are unavailable as yet for the Victor site.

Relative to Gartner Lee's suggestion that De Beers should use the half-hour point of impingement standards in its air quality assessment, the Proponent responded that this standard is typically employed at the permitting stage. However, for the purpose of conducting the EA, the "effects based" standards are more appropriate. In fact, MOE has accepted these longer-term analyses over the ½ hour criteria in some cases where the ½ hour criteria are exceeded. The Proponent has committed to using half-hour points of impingement standards at the permitting stage.

In response to the request that De Beers should assess the environmental effects of fugitive emissions from chemical storage and handling, as well as off-site haul routes and emissions from the on-site airport/airstrip, the Proponent responded that there will be minimal on-site chemicals, and that emissions associated with the storage of these materials would therefore be insignificant. The Proponent also responded that emissions from aircraft operation will also be minor in comparison with the overall site emissions related to mining activities. The anticipated number of aircraft flights to the Victor site is three to four flights per week during the operations phase, and five to seven flights per week during construction. With regard to air emissions from haul trucks, the Proponent agreed to include these in the assessment of greenhouse gas emissions, but that otherwise air quality criteria are not applicable to mobile sources, other than to ensure that vehicle emission ratings are consistent with provincial vehicle licensing standards.

With regard to Gartner Lee's request that De Beers should assess the effects of construction effects on air quality, the Proponent responded that construction dust levels will be lower than operational dust levels.

With regard to the potential presence of fibrous serpentine minerals, the Proponent responded that coarse, fibrous serpentine has not been identified in the extensive petrography work that has been conducted on the Victor kimberlites to date, but that as part of the Victor Operational Health and Safety Management System, air quality monitoring will be conducted on site. This will consist of monitoring devices located on both personnel and equipment to determine the air quality to which employees will be exposed. Asbestos concentrations within airborne dust is not expected to reach threshold limits as defined by the Ontario Occupational Health and Safety guidelines, but precautionary measures will be implemented where necessary to ensure employee health and safety.

In response to Gartner Lee's request that the De Beers should conduct an ecological risk assessment to address the potential effects on wildlife through the uptake of contaminants through various environmental pathways, including air, the Proponent responded by conducting such an assessment, the results of which are provided in Section 6.6.2. The Proponent concluded that there are no credible air emission sources that would pose an environmental or health risk.

6.2.1.5.2 Noise

In response to Gartner Lee's requests regarding noise monitoring during construction and operations phases of the project, the Proponent generally agreed that such monitoring would be appropriate and would be carried out. Further details on this aspect are provided in Chapter 8.

With respect to Gartner Lee's suggestion that De Beers should use a noise guideline limit of 40 dBA at a 1.5 km distance as the threshold of significance, as opposed to the 40 dBA at 3 km, which was actually used, the Proponent responded that the reviewer might have misinterpreted the criteria and Figures contained in the HGC (2004) report. The 3 km buffer zone shown in the HGC (2004) report is an arbitrary line provided by AMEC for information purposes. The goal of the noise study was to achieve a sound level of 40 dBA at the closest site boundary, a distance of approximately 1,500 m. That goal ensures that 40 dBA will be effectively achieved at all offsite locations including the 3 km buffer area which includes the shoreline of the Attawapiskat River. In fact, the results of the HGC study indicate that with reasonable mitigation, the sound level at the 3 km buffer line will be less than 30 dBA.

With regard to the suggestion that De Beers should conduct noise modelling for both summer and winter conditions, to ensure that worst-case noise effects are addressed, the Proponent responded that in terms of ground cover, there was no consideration given in the acoustical model for bush, given the pervasive muskeg terrain. As a result, the model results were considered to be representative of both summer and winter conditions.

Regarding expected dormitory noise levels, the Proponent responded that the predicted sound levels outside the workers quarters are shown in the HGC (2004) report (De Beers Canada Victor Diamond Noise Feasibility Assessment) to be between 50 and 55 dBA, similar to a typical urban environment near a non-arterial roadway. Indoor sound levels can be maintained within comfort limits through typical insulated building constructions.

So far as the rationale for selection of the 1 km buffer zone along winter road corridors, and potential noise disturbance to caribou, the Proponent stated that the weighted average sound levels for areas beyond 1 km from the winter road were modelled at <30 dBA, with peak short-term sound levels of from 40 to 45 dBA as trucks are passing at a 1 km distance. Noise effects on wildlife are therefore expected to be modest. The main reason for the 1 km buffer zone, however, is worker safety in relation to hunting activities.

Regarding comments from HC concerning worker health and safety, the Proponent responded that operations at the Victor site will comply with Ontario Health and Safety Regulations, as they pertain to workplace noise exposures.

6.2.1.5.3 Greenhouse Gas Emissions

In response to requests that the Proponent should include CO_2 emissions from transport components of the project (trucks, marine vessels and aircraft) in its calculations of greenhouse gas emissions, the Proponent responded that this would be carried out within the limits of the PSA. The predominant contributing source is truck traffic along the winter roads. Data are provided in Section 6.2.1.1. The Proponent has not included emission data from aircraft because of the small number of flights, and emissions from marine transport sources are no longer relevant.

In response to concerns regarding the potential for muskeg decomposition to lead to the release of carbon dioxide, the Proponent agrees that peat which is stripped from the open pit surface and other areas such as the plant site and airstrip will partially decompose over a period of several years, leading to the gradual release of CO_2. The total organic carbon content of peat materials that will be stripped is estimated at approximately 100,000 t. However, the Proponent has presented evidence that, on a broader scale, peat materials that are not directly removed by construction will not be adversely affected by well field dewatering activities, or other activities, and are therefore not expected to decompose at rates appreciably different from natural rates of microbial decomposition (i.e., peat will continue to accumulate in these areas).

6.2.1.6 RA Conclusions

6.2.1.6.1 General Air Emissions

The RAs conclude that adverse environmental effects from general air emissions are not likely to be significant provided that the Proponent undertakes all reasonable measures, as described above, to limit, to the extent practical, the likelihood of emissions. The RAs have included a follow-up program related to the response to general air emissions, as outlined in Chapter 8.

6.2.1.6.2 Noise

The RAs conclude that adverse environmental effects from noise are not likely to be significant.

6.2.1.6.3 Greenhouse Gas Emissions

The RAs conclude that adverse environmental effects from greenhouse gas emissions are not likely to be significant.

6.3 Geological Systems

One geological VEC was defined, namely the Attawapiskat Karst candidate ANSI. An assessment of project-related effects on this feature is provided in Section 6.8.2, dealing with Natural Heritage Values, as suggested by MNR.

The only other geological feature of note that is likely to be affected by project development is the deep, overburden-filled trench to the immediate northeast of the Victor kimberlite. While this feature is not defined as a VEC it is likely to experience settlement of up to 5 m in its core area, in response to well field dewatering. North Granny Creek passes through the northern margin of the overburden trench, and may therefore be affected by this settlement process, as will the surrounding muskeg zone, encompassing an area of approximately 1.2 km^2. Environmental effects related to this settlement are addressed in Section 6.4.3.1, within the context of potential effects to the Granny Creek system.

6.4 Surface Water Systems

6.4.1 Attawapiskat River and its Tributaries

6.4.1.1 Environmental Effects

6.4.1.1.1 Hydrology

The mean annual flow was calculated for the Attawapiskat River opposite the Victor site at 41.5 Mm^3/d, and the 7Q20 low flow at 5.31 Mm^3/d. Based on computer modelling studies, groundwater will be removed at a maximum average, ongoing rate of approximately 100,000 m^3/d to maintain a dry pit, with this water to be discharge to the Attawapiskat River. This 100,000 m^3/d value will be partially offset by flow losses from the Attawapiskat River that will report to the well field, estimated at 14,200 m^3/d, once steady state conditions are attained. This maximum flow change (increase) of 85,800 m^3/d represents 0.21% of the average annual river flow, and 1.6% of the 7Q20 low flow condition. This information is from the regional flow model and does not incorporate recharge from bioherm zones.

Potential flow losses to the North River, located just north of the Attawapiskat River, were calculated. The extent of the predicted flow loss depends on model assumptions, and particularly on the hydrogeological connection with the Attawapiskat River. Values shown in Table 6-7 are for the model base case prediction, but the last row shows the 7Q20 condition for a more open connection with the Attawapiskat River. The base case results suggest a reasonable potential for well field induced flow losses to exceed 15% of base flow during later mine life, under extreme low flow conditions. The statistics associated with a more open (enhanced) connection with the Attawapiskat River suggest a much more limited potential to exceed the 15% threshold flow effect value.

TABLE 6-7
POTENTIAL WELL FIELD DRAW DOWN EFFECTS ON THE NORTH RIVER

Flow Condition	Expected Flow (m^3/d)	Expected Remaining Flow (%)		
		End Year 1	End Year 3.5	End Year 12
7Q average	40,160	99.3	95.5	90.5
7Q2	30,095	99.0	94.0	87.4
7Q5	13,285	97.7	86.5	71.4
7Q10	8,095	96.3	77.8	53.1
7Q20	4,750	93.7	62.1	20.0
7Q20*	4,750	93.7	85.3	72.6

Note: Projected base case flow loss: Yr 1 – 300 m^3/d, Yr 3.5 – 1,800 m^3/d, Yr 12 – 3,800 m^3/d
Projected flow loss – Enhanced connection (*) – Yr 1 – 300 m^3/d, Yr 3.5 – 700 m^3/d, Yr 12 – 1,300 m^3/d

6.4.1.1.2 Water Quality

The ground water testing and modelling studies have shown that the well field water discharge will be moderately saline, with expected chloride concentrations in the range of 800 to 1,000 mg/L prior to any blending of effluent that may be required. Under more conservative assumptions of much higher chloride concentrations at depth, and increased transmissivity near the kimberlite pipe, chloride levels could be as high as 1,400 to 1,900 mg/L. These more conservative assumptions allow for greater initial chloride concentrations at depth within the granitic basement, and enhanced "*K*" values in the lower kimberlite and relaxation zones. The Proponent has indicated that there is regional (Canadian Shield) evidence supporting increased chloride concentrations at depth within the deeper granitic basement; but the more conservative "*K*" values are not supported by site investigations.

Table 6-8 shows calculated well field discharge effects to the Attawapiskat River for key salinity parameters for average and 7Q20 low flow conditions. Nayshkootayaow River background water quality data are shown for comparative purposes.

Metal concentration predictions, other than for calcium and magnesium, are not shown in Table 6-8, since dissolved metal concentrations for other parameters in the well water before dilution by mixing in the Attawapiskat River, are already lower than federal and provincial standards for both the protection of aquatic life and for drinking water, with the minor exception of boron.

While there are no PWQO or CEQG PAL for salinity values, British Columbia (BC) recently developed water quality guidelines for chloride, including guidelines for the protection of aquatic life (Nagpal et al. 2003). The guidelines provide for a 30-day maximum average concentration of 150 mg/L to protect aquatic life from chronic exposures, and a 600 mg/L maximum concentration to protect aquatic life from acute exposures.

TABLE 6-8
CALCULATED WELL FIELD DISCHARGE EFFECTS TO THE ATTAWAPISKAT RIVER UNDER AVERAGE ANNUAL AND 7Q20 LOW FLOW CONDITIONS
WELL FIELD DISCHARGE RATE 100,000 m^3/d
(data expressed as mg/L)

Major Salinity Parameters	Canadian and Ontario Drinking Water Standards [1]	Attawapiskat River Baseline Water Quality		Groundwater Quality (from 30-d pump test, scaled up to Cl = 1,000 mg/L)	Attawapiskat River Projected Water Quality with Groundwater Inflow		Nayshkootayaow River Baseline Water Quality	
		75^{th} Percentile WQ Values	7Q20 Low Flow WQ Values		Average Annual Condition (Flow Ratio 415:1)	7Q20 Low Flow (Flow Ratio 53:1)	75^{th} Percentile WQ Values	7Q20 Low Flow WQ Values
TSS	500	123	195.8	2,522	**128.8**	**238.9**	251.0	499.3
Chloride	250	2.8	7.6	1,000	**5.2**	**26.0**	36.4	118.4
Sulphate	500	1.1	2.8	497	**2.3**	**12.0**	8.9	29.0
Calcium	-	26.3	37.7	117	**25.5**	**39.2**	38.8	66.5
Magnesium	-	4.57	7.0	101	**4.8**	**8.7**	8.09	17.3
Sodium [2]	200 (20) [2]	2.8	6.3	571	**4.2**	**16.8**	26.2	74.2

Note 1: There are no CEQG PAL or PWQO values for salinity values
Note 2: The ODWS for sodium is 200 mg/L for aesthetics and 20 mg/L for persons on sodium-reduced diets; the Federal standard for sodium is 200 mg/L

The US EPA (1988) suggested somewhat less stringent values for chloride, concluding that:

> "except possibly where a locally important species is very sensitive, freshwater aquatic organisms and their uses should not be affected unacceptably if the four-day average concentration of dissolved chloride, when associated with sodium, does not exceed 230 mg/L more than once every three years on the average and if the one-hour average concentration does not exceed 860 mg/L more than once every three years on the average."

The lower, BC chronic exposure limit of 150 mg/L was developed from the lowest observable effect concentration (LOEC) for *Cieriodaphnia dubia* (a species of water flea), and incorporates a five-fold factor of safety on an LOEC chloride value of 735 mg/L.

Acute toxicity test results for fish species from the literature showed that the chloride concentrations expected to cause mortality to 50% of the fish species exposed over a specified (i.e., LC50 values) ranged from 4,442 to 10,710 mg/L (US EPA 1988), and from 3,021 to 13,085 mg/L (Nagpal et al. 2003). US EPA (1988) acute chloride toxicity test results for invertebrate species (water fleas, midges, mosquitoes, and caddisflies), showed LC50 values ranging from 1,470 to 6,222 mg/L. Chloride LC50 values reported by Nagpal et al. (2003) ranged from 1,204 to 4,255 mg/L. Toxicity data for 17 species and subspecies of freshwater algae, from the US EPA, showed growth inhibition responses at chloride concentrations ranging from 71 to >36,400 mg/L, with an average of 17,910 mg/L. Only two of the 17 species/ subspecies showed growth inhibition at chloride concentrations of <1,000 mg/L. Aquatic vascular plant species showed growth inhibition responses to chloride concentrations at values above 1,820 mg/L.

Toxicity tests on Victor site groundwater, with chloride concentrations ranging from 703 to 3,470 mg/L, showed 100% survival for rainbow trout during acute toxicity testing at all test concentrations; and generally enhanced growth fathead minnows at higher salinity concentrations during chronic toxicity testing. LOEC, and no observable effect concentrations (NOEC), determined for *Ceriodaphnia dubia*, for chloride, showed that there was an adverse growth effect on this species. NOEC data suggested that a river water to well field water mixing ratio of 4:1 would be required to achieve a NOEC response, at the anticipated well field discharge chloride concentration of 1,000 mg/L. Acute toxicity testing for *Daphnia magna* (another water flea specie) showed 100% survival in all but two of the test cases.

The only other major ion of consideration is sulphate. BC is the only jurisdiction, which appears to have a freshwater aquatic life criterion for sulphate. The criterion is 100 mg/L and is reported as a “tentative value, based on effects on some species and life stages”.

Mixing Zone

The Proponent modelled the mixing of well field discharge within the Attawapiskat River using the AQUASEA model (AMEC 2004g). Mixing ratios are based on average and low flow estimates for the Attawapiskat River (watershed of 49,000 km^2 opposite the mine site) of 41.5 Mm^3/d and 5.31 Mm^3/d, respectively (Section 5.3.4). Updated model results for average and 7Q20 river flow conditions, for sodium and chloride, are shown in Tables 6-9 and 6-10, respectively. Data are shown relative to the expected well field discharge chloride concentration of 1,000 mg/L.

TABLE 6-9
SIMULATED CONCENTRATIONS OF SODIUM AND CHLORIDE AS A RESULT OF MINE WATER DISCHARGE INTO THE ATTAWAPISKAT RIVER DURING AVERAGE FLOW CONDITIONS FOR DISCHARGE AS POINT SOURCE AT 25 m OFF-SHORE

Distance Downstream from the Pipeline Outfall (m)	Predicted Attawapiskat River Chloride Concentration Based on an Initial Chloride Concentration of 1,000 mg/L							
	Sodium (mg/L)				Chloride (mg/L)			
Distance from Riverbank (m)	0	10	25	50	0	10	25	50
In pipe	572				1,000			
100[1]	0	3	40	0	1	4	70	0
500	10	16	20	19	18	27	34	34
1000	15	15	17	17	25	27	29	30
2000	17	16	16	10	29	29	27	18
3000	13	12	9	5	22	21	16	9
4000	11	11	11	9	20	19	19	16

Note: [1] Low numbers at the 0 m distance are due to the effluent plume being maintained away from the shore close to the discharge point.

TABLE 6-10
SIMULATED CONCENTRATIONS OF SODIUM AND CHLORIDE AS A RESULT OF MINE WATER DISCHARGE INTO THE ATTAWAPISKAT RIVER DURING THE 7Q20 LOW FLOW CONDITION FOR DISCHARGE AS POINT SOURCE AT 25 m OFF-SHORE

Distance Downstream From the Pipeline Outfall (m)	Predicted Attawapiskat River Chloride Concentration Based on an Initial Chloride Concentration of 1,000 mg/L							
	Sodium (mg/L)				Chloride (mg/L)			
Distance from Riverbank (m)	0	10	25	50	0	10	25	50
In pipe	572				1,000			
100[1]	16	58	284	72	27	101	404	284
500	154	155	157	137	269	271	272	246
1000	149	143	136	110	258	252	247	222
2000	82	81	75	58	143	141	131	100
3000	37	36	34	29	64	63	58	49
4000	33	31	33	32	58	58	57	55

Notes: [1] Low numbers at the 0 m distance are due to the effluent plume being maintained away from the shore close to the discharge point.

The Attawapiskat River has a very high flow volume, such that the mixing ratio of river water to well field water, at the anticipated discharge rate of 100,000 m^3/d, would be in the order of 415 parts river water to 1 part well field water under average river flow conditions, and 53 parts river water to 1 part well field water during the extreme, 20-year return period, low flow condition (i.e., the 7Q20 condition). The minimum-mixing ratio of 53 parts river water to 1 part well field water, for the 7Q20 low flow condition, is well above the 4:1 mixing ratio required to achieve a no effect response for effluent at a 1000mg/L chloride. The calculated receiving water chloride concentrations of 5.2 mg/L and 26.0 mg/L, corresponding to average and 7Q20 river flow conditions, are well below the BC guideline value of 150 mg/L, and the US EPA value of 230 mg/L.

The well field pipeline outfall arrangement previously carried in the CSEA has been changed to a new arrangement involving a single point discharge located 25 m off shore. The single point of discharge would be heavily armoured to protect structures against ice damage, and will result in improved mixing compared with the formerly proposed rockfill groin arrangement.

Mixing model data show that the more stringent 150 mg/L BC receiving water guideline for chloride is expected to be met within 100 m of the discharge in the river during average flow conditions, and within the general section of the river downstream of the pipeline outfall during the 7Q20 low flow condition, except for a narrow zone near the river shore within 2,000 m of the outfall. Toxicity test data and the BC and US EPA guideline values of 600 mg/L and 830 mg/L, chloride, respectively, suggest that conditions should not be acutely lethal at the point of discharge.

Drinking water standards for chloride (250 mg/L) would be met within <100 m of the pipeline outfall in the near shore area during average flow conditions, and within 1,000 m of the pipeline outfall in the near shore area during 7Q20 low flow conditions. For sodium, the 20 mg/L lowest threshold standard would be exceeded at the downstream boundary of the model (4 km downstream) in the immediate shoreline environment, during the low flow condition. Complete mixing of sodium, to a calculated concentration of 16.8 mg/L during the low flow condition, would be expected to occur at the downstream end of the island chain (a distance of approximately 8 km).

Mixing zones will be considered by the Province of Ontario through provincial approvals. Mixing zones are however not a consideration in whether the substance being discharged is a deleterious substance within the meaning of the federal Fisheries Act. It is anticipated that the establishment of any mixing zone within the provincial regulatory context will consider the following (CCME 2003):

- The mixing zone should not impinge on critical fish or wildlife habitats (e.g., spawning or rearing areas for fish, overwintering habitats for migratory waterfowl);
- Wastewater must not be acutely toxic to aquatic organisms;
- Conditions within the initial dilution zone should not cause acute or short-term chronic toxicity to aquatic organisms;
- A zone of passage for migrating aquatic organisms must be maintained; and,
- Mixing zones must not block migration into tributaries.

Adverse effects on the aesthetic qualities of the receiving water will be avoided.

Siltation

The remaining water quality consideration is siltation during construction of the Attawapiskat River water intake and discharge structures, and siltation associated with dredging at the Attawapiskat barge landing site, if this facility is constructed.

6.4.1.1.3 Fisheries Resources

Impacts to Attawapiskat and North River fish habitat associated with the VDP will include:

- A change to shoreline substrate conditions and profiles in the immediate water outfall and intake zones;
- The introduction of added salinity associated with the well field discharge;

- Flow Reductions greater than 15% within the North River, under low flow conditions, and,

- A change to substrate composition and bottom contour associated with dredging for the barge handling facility (if required).

There will be a minor change in near shore bottom contours and substrates over an area of approximately 600 m^2 to allow for installation of the water intake and the armoured discharge point (approximately 25 m off-shore). The Attawapiskat River near shore environment, in the area of the proposed well field pipeline outfall and water intake structures, consists mainly of rounded cobble/boulder habitat (normal and low water conditions), and adjacent stony clay till banks (flooded during high water conditions). Rock diameters range from 5 to 50 cm, with an average of approximately 15 to 20 cm. This area represents common and widespread habitat, not limiting within the river system; and, although mitigation will be required, the overall effect is not considered significant. The Proponent has committed to replacing surface layer native substrates with comparable materials to the extent practicable, during facility construction, with the exception of the outlet structure itself, which will be heavily armoured with concrete and/or armour stone to resist ice scour.

The construction related impacts would be controlled through the use of silt curtains and cofferdams, and by constructing the facilities during the summer low water condition. Appropriate considerations of sediment, erosion and fuel handling around work areas will effectively prevent any construction related impact.

Loss of flow to the North River will be mitigated by flow supplementation. Therefore there is not expected to be a meaningful change to fish habitat (Section 6.4.1.2).

Changes to aquatic habitat at the proposed barge handling area would be limited to depth alteration only (if constructed). The Proponent has committed to replacing surface layer native substrates with comparable materials to the extent practicable, as part of the dredging process.

There is not expected to be any meaningful effect on overall aquatic productivity of the river due to project works.

Based on proposed designs, impacts to fish habitat, outside of those associated with construction, will be minimal (i.e., Level I significance for ecological context). Mitigation measures associated with facility construction are described below.

6.4.1.2 Mitigation

6.4.1.2.1 Hydrology

The Attawapiskat River is a large, robust system, and no mitigation measures are proposed to maintain hydrological function of the river.

The Proponent has committed to providing flow supplementation to the North River, if required, to maintain base flows within 15% of seasonal norms. In such an instance, flow supplementation would be provided by a pumping system located at the Attawapiskat River, as shown in Figure 6-1. Arrangement details would be determined in consultation with federal and provincial governments and the AttFN, through an adaptive management plan (North River Adaptive Management Strategy). Flow supplementation is unlikely to be required prior to the end of Year 3 of well field operation (2011), and the potential need for such flow supplementation will be confirmed during the first year of well field operation.

Anticipated Effectiveness of Mitigation Measures and Contingencies – Flow supplementation to the North River, if required as described above, will be effective for maintaining river flows.

6.4.1.2.2 Water Quality

Mitigation measures involving well field water discharge, include use of a settling pond during Phase 2 mining operations for the removal of TSS, the use of a reinforced single point off-shore discharge for improved mixing in the Attawapiskat River, and maintaining the potential to blend saline effluent with non-saline surface water prior to discharge.

However, the Proponent will not rely on mixing within the Attawapiskat River where there are reasonable and practical pollution prevention options. The Proponent has also committed, as part of mine development, to identify major country rock fracture zones when dewatering wells are being installed. If, on the basis of this evidence and the advice of grouting experts, it appears that grouting will meaningfully assist with dewatering requirements and associated adverse environmental effects, then grouting will be undertaken in an attempt to better control groundwater.

The potential for siltation during construction of the Attawapiskat River water intake and discharge structures, and in association with dredging at the Attawapiskat barge landing site (if constructed), will be controlled through the use of a coffer dam in the case of construction of the intake and discharge structures, and through the use of silt curtains in the case of dredging.

Anticipated Effectiveness of Mitigation Measures and Contingencies – The Proponent concluded that settling pond technologies are predictably effective, and can be improved, if required, using silt curtains and flocculants. The single point offshore discharge for well water is expected to improve mixing in the river. If further measures are required, a small offshore rockfill berm ‘groin’ would be constructed that would deflect the point discharge further out into the river for enhanced mixing. The Proponent has further maintained a contingency to blend effluent prior to discharge to lower chloride concentrations at the point of discharge to maintain a non-deleterious effluent.

There are no plans to construct the rockfill groin at this time, as it is maintained as a contingency. However, if operational performance of the proposed well field outfall indicates that improved mixing is required, then one option would be to develop a groin (effectively an island) extending outward from the outfall location, that would push the effluent further out into the river.

It is understood that the construction of such a groin would involve fisheries and transport issues, and that a screening would have to be undertaken for this work pursuant to CEAA.

The groin, if required, would be constructed as an elongate, heavy rock fill island (or shoal) measuring approximately 35 x 8 m, and covering an area of approximately 300 m^2. Riverbed fish habitat displaced by the island would be offset by island margin substrates, structural diversity, and sheltering that the island would provide, and the activity would be generally consistent with the finding of studies on "infilling projects" carried out by Murphy (2001). The island perimeter zone would measure approximately 85 m.

The use of supplemental grouting, in combination with dewatering wells, will only be applied where it can be shown to have a reasonable prospect of success. However, at this time it is not clear whether or not grouting will meaningfully assist with groundwater control.

6.4.1.2.3 Fisheries Resources

It is proposed to mitigate the approximately 600 m^2 area of habitat disturbance by enhancing the areas downstream of the rock protected discharge point as a depositional zone. Depositional zones were the least common habitat type in this area of the river, and were observed to provide habitat for juvenile fish of several species, including *Coregonus sp.*, walleye, sucker and pike. With the exception of the immediate area of the well field discharge, the habitat alteration will be restricted to a deepening of the channel, and larger substrate diameters.

Water quality and salinity changes are not considered to represent a significant impact to fisheries (see above).

Measures that will be taken to protect the shoreline area during construction of the pipeline outfall, intake structures, or barge handling site, include:

- Construction will be undertaken during the summer low water period and outside of fish spawning periods, or isolated from river flows with cofferdams;
- Equipment refuelling will be strictly controlled;
- Construction access roads will be developed to minimize the potential for riverbank erosion;
- Lighter vehicles will be used where feasible to minimize riverbank load stress; and,
- Cofferdams and silt curtains will be used to contain the in-water construction area.

With respect to potential flow reductions in the North River, the Proponent has committed to providing flow supplementation, if required (Section 6.4.1.2.1).

Anticipated Effectiveness of Mitigation Measures and Contingencies – Contingencies will be developed as part of an adaptive management strategy (AMS), (Attawapiskat River Water Intake and Discharge Adaptive Management Strategy).

6.4.1.3 Significance

6.4.1.3.1 Hydrology

The magnitude of the maximum potential flow increase to the Attawapiskat River, ranging from 0.21% of background river flows for the average condition, to 1.6% of background river flows for the 7Q20 low flow condition, is well under the 15% flow reduction criteria, and is considered to be minor (Level I significance for magnitude), and therefore not significant.

Base flows will be maintained within 15% of seasonal norms for the North River, if required, through flow supplementation, and effects, if any, would end at closure.

6.4.1.3.2 Water Quality

The discharge of well field water to the Attawapiskat River will meet PWQO and CEQG PAL for all parameters. Where parameters are not addressed by these guidelines, expected chloride concentrations have been compared with BC and US EPA receiving water guideline values of 150 mg/L and 230 mg/L, respectively, and are expected to be met, except within narrow, near shore areas of the mixing zone. At these locations, the acute toxicity-based threshold guidelines of 600 mg/L (BC) and 830 mg/L (US EPA) are expected to be met although effluent blending or other mitigation measures may be required to achieve these concentrations near the point of discharge. Water quality effects to the Attawapiskat River associated with well field discharge are considered a Level 2 effect for magnitude/geographic extent and duration. However, the ecological context is considered a Level 1 effect. The resulting effects are therefore determined to be not significant (Table 6-11 – placed at the back of Chapter 6 for reader convenience).

Siltation effects associated with in-water construction of water intake and discharge structures, and dredging, would be temporary (construction phase only – Level 1 for duration), and the effects would be localized, and therefore not significant.

6.4.1.3.3 Fisheries Resources

Habitat alteration on fisheries is small in consideration of the overall abundance of similar available habitat type. The proposed mitigation has been designed to increase habitat diversity. The potential for construction related impacts are entirely preventable, and water quality is not anticipated to have a significant effect. Effect to fisheries is considered to be minor (Level I significance for magnitude), and therefore not significant.

6.4.1.4 Comments/Concerns

6.4.1.4.1 Hydrology

No concerns have been expressed by any of the reviewers regarding the likely effects of the project on Attawapiskat River, or North River, flows, per se. MNR questioned the potential effects of ice bridge formation (associated with winter road crossings) on the potential for ice jams to occur, thereby potentially impeding flows and causing flooding during spring break-up. It was suggested that De Beers should consider dismantling ice bridges. Gartner Lee, on behalf of the AttFN, indicated that the Proponent should further assess the flow connection between the Attawapiskat River and the bedrock aquifer, suggesting that the flow connection may well be stronger than provided for in the Proponent's base case model result. This latter aspect is addressed in Section 6.4.1.5.

6.4.1.4.2 Water Quality

In the May 20, 2004 set of preliminary comments, the federal and provincial agencies requested more detailed information on the likely effects of well field water discharge on the Attawapiskat River, focusing on salinity parameters, including considerations of No Observable Effects Levels (NOEL), and guidelines from other jurisdictions. The parameter of greatest concern is chloride.

NRCan requested that the groundwater model be revised to include more explicit consideration of the basal sandstone layer, and to consider further the possibilities of enhancing conductivity in the lower kimberlite and surrounding relaxation zone, as these elements could potentially affect the concentration of chlorides contained in the well field discharge water. NRCan also requested that the Proponent investigate the influence of dewatering well efficiency as it relates to the quantity and chloride concentration of residual passive inflow to the pit.

The suggestion was also made that the Proponent should consider the direct discharge of well field water to James Bay using a pipeline.

Gartner Lee (on behalf of the AttFN) suggested that De Beers should incorporate recent guidelines for chloride toxicity to aquatic life from other jurisdictions, and establish a monitoring program to assess potential effects. Consultants working on behalf of NAN suggested use of the recent BC freshwater guidelines for chloride, as defined by Nagpal et al. (2003). NAN consultants also supported concerns raised by NRCan that chloride levels in the groundwater could potentially be higher than indicated by the Proponent.

6.4.1.4.3 Fisheries Resources

Comments from reviewers focused mostly on the concern that the water quality resulting from the well field discharge would have an impact on the aquatic communities of the Attawapiskat River, downstream of the discharge. Some reviewers also expressed the concern that more data on fish and fish habitat should be collected, both at the Victor site area, and in the vicinity of the proposed dredging operations.

Comments from federal government reviewers recommended that invertebrate and fisheries monitoring programs should reflect the Environmental Effects Monitoring (EEM) protocols and endpoints.

6.4.1.5 Proponent's Response

6.4.1.5.1 Hydrology

In response to MNR's concerns about ice bridges, the Proponent responded that no dismantling of ice bridges is currently proposed; as such actions are not part of standard practice in the area. However, if this condition becomes a problem, the Proponent has agreed to hold further discussions with MNR concerning the possible annual dismantling of ice bridges, and incorporate these aspects in the winter road management plans.

With regard to Gartner Lee's suggestion that there could be a stronger groundwater flow connection between the pit area and the Attawapiskat River, the Proponent conducted sensitivity analyses to better define any such relationships (HCI 2004b). Sensitivity analysis (assuming a perfect connection between the Attawapiskat River and the wellfield) increased the flow contribution from the Attawapiskat River to 38,300 m^3/d from the base case value of 14,200 m^3/d. This change would increase the overall quantity of groundwater reporting to the wellfield by approximately 3%, but would substantially reduce water withdrawal effects on other area rivers (HCI 2004b).

6.4.1.5.2 Water Quality

With regard to requests for additional data on salinity parameters, most notably chloride, and its potential effects on Attawapiskat River water quality and its aquatic life, the Proponent provided additional test work data on LOEC and NOEC obtained from several site groundwater samples with chloride values ranging from 700 to 3,470 mg/L. Additional data were also provided from literature sources on chloride toxicity, and jurisdictional guidelines for chloride available from the US EPA and BC. Based on the data presented, the Proponent concluded that adverse effects to aquatic life in the Attawapiskat River, as a result of well field water discharge, are not anticipated.

In response to NRCan's request, that the groundwater model should be revised to incorporate specific considerations relating to the basal sandstone layer and the relaxation zone around the kimberlite pipe, the Proponent adopted the recommendations of NRCan, and conducted a series of sensitivity analyses, including those related to chloride values. In its base case model, the Proponent determined that chloride concentrations in the well field discharge water were most likely to be in the range 800 to 1,000 mg/L. However, under assumptions of greater initial chloride concentrations at depth within the basal granite, and enhanced "*K*" values in the lower kimberlite and relaxation zones, the Proponent calculated that chloride concentrations in the well field discharge water could potentially increase to 1,400 to 1,800 mg/L. The Proponent indicated that there is supporting evidence for increased chloride concentrations at depth within the deeper granitic basement, but that the more conservative "*K*" values are not supported by site investigations.

Regarding the suggestion of direct pipeline discharge of well field water to James Bay via an approximately 120 km long pipeline, the Proponent responded that it would be exceedingly difficult, if not impossible, to construct and maintain such a pipeline through the broad James Bay mudflats, and that such efforts were not justifiable given the very limited potential for environmental effects to the Attawapiskat River, even under the most conservative scenarios.

6.4.1.5.3 Fisheries Resources

With respect to the concern of water quality on aquatic life, this aspect is addressed as a component of the water quality discussion, presented above.

Regarding the need for further data, the Proponent collected such additional data during the spring and fall of 2004. The additional data support previous findings from the CSEA and the EBS. The Proponent has further committed to follow federal Environmental Effects Monitoring (EEM) protocols for aquatic system monitoring during operations.

The proposed dredging activities in the Attawapiskat River at the mouth of James Bay have been removed from the project description. Dredging will be required at Attawapiskat, for the barge landing facility, if this facility is constructed.

6.4.1.6 RA Conclusions

The RAs conclude that there will not likely be any significant adverse environmental effects on the Attawapiskat River and its tributaries. Prior to any in-water works a fisheries compensation agreement will be developed between De Beers and DFO in consultation with the province and AttFn. This agreement will put in place all mitigation and fish habitat compensation requirements to assure no net loss of fisheries productive capacity. Chapter 8 outlines follow-up requirements and adaptive management measures that will be required.

6.4.2 Nayshkootayaow River and Its Tributaries

6.4.2.1 Environmental Effects

6.4.2.1.1 Hydrology

Hydrogeological studies indicate that there is a hydraulic connection between the proposed open pit and the adjacent rivers through the bedrock aquifers, where these are incised into the bedrock. Modelling studies indicate that this connection could be significant for the Nayshkootayaow River, with the rate of river flow capture being estimated at 22,300 m^3/d (HCI 2004a). In the updated September 2004 base case hydrogeological model, the river flow capture estimate changed only slightly to 22,200 m^3/d (HCI 2004b). The term river flow capture refers to base flow that would be diverted away from the river, as a result of well field operation, as opposed to water that would actually drain out of the river.

For the average annual flow condition of 1,496,000 m^3/d, for the Nayshkootayaow River at its confluence with the Attawapiskat River (watershed area 2,100 km^2), a flow reduction of 22,300 m^3/d would not be measurable to any reasonable degree of accuracy. The concern, however, is for the low flow condition, where effects would be both measurable and meaningful. Based on the updated September 2004 hydrogeological model results, and the February 2004 water quality data reported in the CSEA, there is a meaningful potential for a reduction in river flows (i.e., a flow reduction of >15%), for that portion of the river mainstem upstream to a point partway between river stations 3 and 4 (Figure 6-1). Flow reductions of this magnitude (i.e., >15%) are expected to occur in most winters, and possibly during some extremely dry summers, and are expected to become evident as early as the first winter after the commencement of dewatering.

The February 2004 water quality data also indicate that there is a meaningful potential for flow reduction to the lower reaches of two tributary creeks that enter the Nayshkootayaow River on its south side, namely Tributaries 5 and 7 (Figure 6-1), with adverse flow effects potentially extending upstream as far as 5 km in the case of Tributary 5, and likely further upstream in the case of Tributary 7. The remaining tributary creek systems are effectively perched within the marine clay/silt overburden, and will not experience meaningful dewatering effects linked to well field dewatering.

Predicted impacts of mining to the Nayshkootayaow River and its tributaries are given in Table 8 of HCI's 2004b Addendum I report. The impact (flow loss) to Tributary 7 at the end of mining is 31% of pre-mining low flow. The impact (flow loss) to Tributary 5 at the end of mining is 42% of pre-mining low flow. Application of a two-fold safety factor to account for uncertainties in the flow estimates is suggested.

6.4.2.1.2 Water Quality

Environmental effects to Nayshkootayaow River water quality will derive from two sources: direct or indirect site discharges, and water withdrawal and flow supplementation effects associated with well field dewatering.

Effects relating to water withdrawal and flow supplementation, associated with well field dewatering, will occur because during low flow conditions (mainly in winter) naturally more saline groundwater sources that make up a substantive portion of the Nayshkootayaow River baseline flow will be replaced with less saline supplementation water from the Attawapiskat River. In the extreme condition, the Nayshkootayaow River water would take on the characteristics of low flow Attawapiskat River water as provided in Table 6-8. Projected Attawapiskat River 7Q20 values for the major salinity ions of chloride, sodium and sulphate are 30 to 45% of average Nayshkootayaow River upstream station values, and as such would be more indicative of Nayshkootayaow River higher flow (spring and fall) water quality conditions. Adverse effects to Nayshkootayaow River winter water temperatures, as a result of flow supplementation, are not expected.

Regarding direct and indirect site discharges, these will include treated open pit sump water released during Phase 1 mining operations, and indirect discharge from the Granny Creek system. Discharges conveyed through the Granny Creek system are addressed in Section 6.4.3.1. Adverse effects to Nayshkootayaow River water quality are not expected in relation to Granny Creek system discharges.

Phase 1 mining operations will include initial overburden stripping and the first approximately six years of mining. During this period pit sump water will be non-saline. Subsequent to Phase 1 operations, the pit sump water will gradually become more saline, due to residual passive inflow of groundwater not captured by the well field. Phase 2 mine water will be collected and treated by a different system that will discharge to the Attawapiskat River, along with well field water.

Phase 1 mine water from in-pit sumps will contain total suspended solids (TSS), low levels of ammonia from the use of ammonium nitrate based blasting agents, and residual hydrocarbons from minor fuel or hydraulic fluid leaks linked to heavy equipment operation. TSS concentrations are expected to be in the order of 2,000 mg/L to 3,000 mg/L, and ammonia and nitrate concentrations are expected to be in the order of 10 mg/L, as total ammonia-N and nitrate-N. Residual hydrocarbons will be removed using skimmers and/or absorbent materials within the in-pit sumps, prior to discharge to the mine water pond.

The Phase 1 mine water pond will provide a minimum 5-day retention time at the maximum design pumping rate of 10,000 m^3/d, and will remove the bulk of the TSS (>95%). Overflow from the mine water pond will be directed to a linear, ribbed fen system for final effluent polishing, prior to water release to the Nayshkootayaow River. Effluent discharged from the mine water settling pond prior to fen (wetland) filtration should not contain more than 25 mg/L of TSS as a monthly average, and not more than 50 mg/L of TSS as a daily maximum. Silt curtains and a flocculent addition system would be used to improve the settling efficiency for suspended solids, if needed.

After passing through the fen polishing system, the effluent is expected to contain not more than 15 mg/L of TSS as a monthly average, and not more than 30 mg/L of TSS as a daily maximum, and be non toxic, consistent with limits defined by Ontario Regulation 560/94 – developed for the Metal Mining Sector. The function of the fen polishing system will be to remove finer (clay and fine silt-sized) TSS fractions not removed by the settling pond, and to remove residual ammonia. The Proponent calculated that annual incremental sediment loadings to the fen system will be in of the order of 0.08 mm of mineral solids per year, and that the growing fen can readily accommodate this loading without adverse effect. Ammonia will be removed by the fen through nutrient uptake by plants, and through cation exchange with the peat (Walmsley 1977).

Final effluent discharge to the Nayshkootayaow River from the settling pond/linear fen treatment system will be such that provincial Water Quality Objectives (PWQO) and Canadian Environmental Quality Guidelines for the Protection of Aquatic Life (CEQG PAL), and/or background conditions, will be met in the river under all flow regimes. Little if any discharge from the system is expected during low flow conditions, as the inflow to the system during Phase 1 operations will be limited to runoff from precipitation events, and to minor seepage from the overburden zone during initial pit stripping.

6.4.2.1.3 Fisheries Resources

The resulting groundwater draw down in the vicinity of the Nayshkootayaow River has the potential to affect fisheries through a reduction of base flows, resulting mainly from decreased groundwater input through the bedrock incised channel areas, most significantly during the winter low flow months. The predicted flow reduction is discussed in Section 6.4.2.1.1 above.

In the upper reaches of the river, there is an isolating stratum of clays and silts that will prevent the draw down zone from extending to the riverbed. However, where the riverbed is more incised, and has cut through the clay layer into the underlying bedrock, the draw down zone is expected to extend to the riverbed, resulting in the removal of a portion of the river surface flow. Removal of surface flow will occur mainly as a result of groundwater source depletion, as opposed to direct leakage from the river to the depressurized aquifer. From a volume of flow perspective, it is expected that meaningful flow reductions would only occur during winter low flow in typical years and less commonly in very dry summers. Under extreme low flow conditions, there is the potential for river flow loss to exceed the actual surface flow volume.

A second consideration relating to dewatering activities is the expected loss of groundwater upwellings within the lower reach of the river. This may have implications for fish species that are dependant on groundwater flow.

The potential impact areas include the lower main stem Nayshkootayaow River (downstream of a point starting between Tributaries 3 and 4), as well as the lower sections of two other tributary creeks shown as Tributaries 5 and 7 in Figure 6-1.

The primary species affected by this flow reduction will be whitefish (*Coregonus spp.*), due to their reported use of the lower river reaches for spawning and egg incubation during the fall and winter seasons, respectively. Other species that utilize the watercourse are either well distributed further up in the watercourse in areas not effected by draw down (i.e., brook trout), or have life history requirements that would not be meaningfully influenced by the flow reductions (i.e., spring spawning species) such as walleye, sucker, pike and sturgeon. There is also the potential to affect brook trout habitat within the lower reaches of Tributaries 5 and 7.

6.4.2.2 Mitigation

6.4.2.2.1 Hydrology

To preserve the flow regime of the Nayshkootayaow River, flow supplementation will be required at any time when natural flows are reduced by more than 15%, due to well field dewatering. The Proponent has established four continuous flow monitoring stations along the Nayshkootayaow River to measure natural flows (Figure 6-1). One of these stations was set up in May 2000. The remaining three stations were set up in the fall of 2004.

For flow supplementation, the Proponent proposes to construct an approximately 8 km long, 50 cm diameter water line to convey Attawapiskat River water, from the plant site fresh water supply system, to the Nayshkootayaow River, by way of Tributary 3 (Figure 6-1). With this system, water would be added to the easternmost point on Tributary 3, located directly west of the Victor site, which then flows west and south to the Nayshkootayaow River, connecting to the area of Station 3 on the river mainstem. Station 3 is located upstream of the expected zone of influence on the Nayshkootayaow River, such that introducing flow supplementation water at this point would compensate for flow losses throughout the lower portions of the river.

Tributary 3 is a perched system, and its channel can easily accommodate a flow of up to 22,300 m^3/day, during low flow conditions, as the average annual creek flow for this creek segment is calculated at 32,000 m^3/day, based on a subwatershed area of 45 km^2, and an average annual runoff of 260 mm. The channel naturally accommodates much higher flows during the spring freshet. To prevent any potential for erosion, at the flow supplementation point, the pipeline discharge point to the creek will be armoured with mine rock, or timbers.

The flow supplementation waterline will be constructed with booster pumps to facilitate cross-terrain pumping. Air compressor hook-ups (or equivalent) will be provided to help drain the line when the system is not in use. Vacuum breakers will be provided to eliminate any potential for line collapse due to suction forces. The pipeline will be buried below the frost line to protect against freezing and the discharge from the pipeline to the creek will occur below the surface (i.e., below the ice) to prevent the formation of frazzle ice in the creek. The pipeline will be insulated and heat-traced, to protect against freezing. The water in the line will be maintained at $\geq 2^oC$ and the discharge will occur below the surface of the creek, to prevent the formation of frazzle ice in the creek.

Groundwater modelling studies indicate that at closure, once all mining activities cease, it will take an estimated 12 years for the open pit to fill with water from natural sources (natural groundwater inflow and surface runoff). To improve this condition, the open pit will be actively flooded by pumping water from the Attawapiskat River to the open pit. In so doing, water will be pumped from the river at an approximate average rate of 50,000 m^3/d, for a period of up to 24 months. The 50,000 m^3/d value represents 0.12% of the average flow of the river, and 0.94% of the 20-year low flow condition for the Attawapiskat River, and will therefore not have an effect on river flows. The well field discharge pipeline will be used to deliver water from the Attawapiskat River to the open pit. Actively filling the open pit in this manner will greatly assist in bedrock aquifer recovery, but it is still expected that Nayshkootayaow River flow supplementation will be required for a further approximately 3 years after the pit is filled, while water levels continue to recover in the outlying bedrock aquifer.

To supplement flows in Tributaries 5 and 7, the Proponent proposes to construct an approximately 20 cm diameter water line that will direct water to the two tributaries, as shown in Figure 6-1. The water line will originate from the Victor plant site area and will be buried below the frost line, with the possible exception of the Nayshkootayaow River crossing, where the crossing may occur above grade as an insulated trestle crossing. The alternative is to establish a small pump station on the south side of Nayshkootayaow River, at a point approximately 3 to 4 km downstream of Tributary 5's confluence with the Nayshkootayaow River. The pump station would feed a buried, approximately 20 cm diameter water line that would direct water to the two tributaries, as shown in Figure 6-1. An overhead transmission line linked to the Victor site grid would power the pump. As with the Nayshkootayaow River flow supplementation plan, flow supplementation will only be required during the winter months, and possibly during some extremely dry summers. Flow monitoring stations will be established on each of the two creeks to better assess flow needs, in advance of flow supplementation system activation.

Anticipated Effectiveness of Mitigation Measures and Contingencies – The groundwater model will be further updated on the basis of pump test results obtained from the prototype well program planned for the summer of 2006. This program will involve the development of one full-scale dewatering well, to test well efficiencies, and to confirm model predictions. The rate of water pumping will be at a nominal rate of 16,350 m^3/d, for a period of 2 to 3 months. If for any reason, the results of this test indicate the likelihood of a greater groundwater withdrawal rate from the Nayshkootayaow River system than currently envisioned, then the design of the flow supplementation system will be amended accordingly to supply the required change in flow supplementation volumes, all in accordance with the Nayshkootayaow River and Tributaries Adaptive Management Strategy. The Nayshkootayaow River flow supplementation system is scheduled for construction during the summer of 2007, which allows sufficient time for the implementation of any design changes.

6.4.2.2.2 Water Quality

Mitigation measures include the treatment system itself (i.e., in pit sumps for residual hydrocarbon removal, the settling pond and fen system for TSS removal, and the fen system for ammonia removal), as well as contingencies such as the use of silt curtains and flocculent addition in the mine water pond, if required. These measures are expected to be highly effective and reliable.

6.4.2.2.3 Fisheries Resources

Potential impacts to fisheries are flow related and as such, the proposed fisheries mitigation is to provide flow supplementation to affected river sections (and the two tributaries), such that no significant reduction in base flow occurs. Detailed flow mitigation is discussed in Section 6.4.2.2.1 above.

Anticipated Effectiveness of Mitigation Measures and Contingencies - The Proponent has committed to an AMS, to be defined in consultation with federal and provincial agencies, and the AttFN, that will define monitoring endpoints, and mitigation actions to be taken during project operation.

6.4.2.3 Significance

6.4.2.3.1 Hydrology

With the flow supplementation system proposed by the Proponent, flow rates within the Nayshkootayaow River and its two tributaries (Tributaries 5 and 7) will be maintained to within

15% of natural flows, resulting in a Level 1 effect for magnitude/geographic extent. Adverse flow effects to the Nayshkootayaow River system will also be limited in duration, being reversible by ending pumping at mine closure and flooding the open pit to restore local groundwater levels. Based on the proposed mitigation plan, it has been determined that adverse environmental effects will not be significant (Table 6-11).

6.4.2.3.2 Water Quality

Effluent discharges from the Phase 1 mine water treatment system will be consistent with limits defined by Ontario Regulation 560/94 – developed for the Metal Mining Sector, and that final effluent discharge to the Nayshkootayaow River will be such that PWQO and CEQG PAL, and/or background conditions, will be met in the river under all flow regimes. Adverse effects to Nayshkootayaow River water quality are also not expected in relation to Granny Creek system discharges. As such, there will be no significant environmental effects to Nayshkootayaow River water quality, based on a Level 1 rating for magnitude/geographic extent.

Replacing Nayshkootayaow River water with Attawapiskat River water, during winter flow supplementation, will alter the water quality of the system, especially during extreme years, but water quality conditions experienced by the Nayshkootayaow River as a result of this action will be within the range of natural variability for the system. The effect meets the criteria for a Level 1 rating for the magnitude/geographic extent attribute.

6.4.2.3.3 Fisheries Resources

Fish habitat within the Nayshkootayaow River will be protected from well field draw down effects during operations through flow supplementation, such that there will be no net loss of the productive capacity of habitats (i.e., a Level 1 magnitude effect). The Proponent's commitment to an adaptive management plan, which will monitor and adjust mitigation efforts according to observed effects, will ensure that fish communities are maintained during the operations and recovery of the groundwater zone (Nayshkootayaow River and Tributaries Adaptive Management Strategy).

6.4.2.4 Comments/Concerns

6.4.2.4.1 Hydrology

Several comments were received from federal and provincial government reviewers, and from consultants representing the AttFN and NAN, suggesting that there was insufficient hydrogeological data to fully assess the potential effects of well field dewatering on the local watercourses, including the Nayshkootayaow River system. There were also a number of comments from NRCan, suggesting changes to the hydrogeological model set-up, to better incorporate some of the different geological layers, such as the basal sandstone layer, into the model, and to consider the potential of bioherm areas to act as drain nodes, potentially increasing flow to the well heads and reducing flow to area creeks and rivers.

With respect to the flow supplementation plan itself, DFO expressed concern over the potential use of Tributary 3 as a mode of conveying supplementation water to the Nayshkootayaow River, indicating that the site of flow addition would have to be checked on the ground to assess specific habitat conditions associated with the pipeline discharge point. DFO also indicated that additional baseline data would be required on Tributary 3, to allow a more complete evaluation of the potential effects on this system.

DFO further expressed that the flow supplementation system would have to be capable of providing flow to all sections of the Nayshkootayaow River system that could potentially be affected by well field dewatering, as indicated by groundwater model predictions, and winter water quality data, including tributary creeks that were important to brook trout.

6.4.2.4.2 Water Quality

DFO has verbally expressed concerns related to potential changes to Nayshkootayaow River water quality related to flow supplementation, referencing both chemical and temperature considerations. Technical reviewers acting on behalf of NAN expressed concerns relating to water quality changes associated with flow supplementation, and Gartner Lee, acting on behalf of the AttFN, expressed concerns regarding potential temperature effects. NAN representatives also suggested that ammonia loadings to the Nayshkootayaow River might have been underestimated.

6.4.2.4.3 Fisheries Resources

federal and provincial reviewers, as well as GLL on behalf of the First Nation commented that additional information was required on the Nayshkootayaow River fish community and specifically on the reported whitefish run and brook trout distributions. Several provincial reviewers (MNR) questioned the Proponent’s conclusion that the lower reaches of the Nayshkootayaow River did not offer meaningful spawning habitat for brook trout, in comparison to the upper reaches of the watershed. Further comments were received from DFO requesting a more detailed life history for key species that could potentially be affected by the flow reductions.

Provincial comments included a question of how brook trout would be able to migrate within the lower river to maintain genetic dispersion, during flow reductions.

Comments from other reviewers questioned whether the water temperatures of the Nayshkootayaow River would be affected by the water supplementation strategy.

A general but encompassing comment from the federal government (DFO) pointed out that the Proponent’s interpretation of the policy of no net loss of fish habitat was over simplified, and that a more precise definition should be used.

Several reviewers commented that the proposed use of a fish culture facility as a mitigation method was not a preferred alternative.

Comments from federal government reviewers recommended that invertebrate and fisheries monitoring programs should reflect EEM monitoring protocols and endpoints.

Several reviewers commented that the 15% flow reduction used to indicate a significant effect needed justification as to why 15% was considered meaningful.

6.4.2.5 Proponent's Response

6.4.2.5.1 Hydrology

In response to concerns regarding the hydrogeological model, meetings were held with the federal and provincial agencies in June and again in July of 2004. Gartner Lee, on behalf of the AttFN, attended the June meeting. In follow-up to discussions at the July meeting, the Proponent made changes to the groundwater model as suggested by the federal and provincial agencies, incorporating into the model a series of sensitivity analyses directed, in part, at assessing the potential range of well field flow withdrawal effects on the Nayshkootayaow River system. The updated hydrogeological model report was submitted in September 2004 (HCI 2004b). The Proponent also suggested that a site visit would be helpful to federal and provincial reviewers, in their continued assessment of hydrogeological aspects of the VDP, and the site visits were hosted by the Proponent in September and October of 2004. Supplemental data were also submitted to the GCS in follow-up to the October site visit.

During the September 2004 site visit, DFO and MNR fisheries experts were provided with an opportunity to review the proposed location of the flow supplementation to Tributary 3, as a means of directing water to the Nayshkootayaow River. The Proponent also committed at this time to providing flow supplementation to Tributaries 5 and 7, as a means of protecting the flow regimes of these two smaller creek systems, and their associated brook trout populations.

6.4.2.5.2 Water Quality

Regarding concerns related to possible salinity changes to the Nayshkootayaow River associated with flow supplementation, the Proponent responded that during the most extreme condition, the Nayshkootayaow River water would take on the characteristics of low flow Attawapiskat River water. Calculated Attawapiskat River 7Q20 values for the major salinity ions of chloride, sodium, and sulphate are 30 to 45% of average Nayshkootayaow River upstream station values, and as such would be more indicative of Nayshkootayaow River higher flow (spring and fall) water quality conditions.

Regarding temperature considerations, field investigations during February 2004 showed that the ambient water temperatures of the mainstem Nayshkootayaow River were between 0.2 and 0.4°C. By supplementing the Nayshkootayaow River by way of Tributary 3, using a buried pipeline, it is expected that the supplemented water would also maintain this near zero water temperature. Although the few deeper groundwater seeps (characterized by higher salinity ions) identified within the mainstem Nayshkootayaow River did have temperatures of up to 3°C, the effect of the temperature increase was short lived. The more noticeable groundwater seeps entering the Nayshkootayaow River were also low in oxygen, limiting their value to fish. The

Proponent has committed to monitoring creek and river water temperatures in association with flow supplementation programs.

Regarding estimates of ammonia loadings, the Proponent responded that the ammonia calculations provided in CSEA did not allow for ammonia uptake by peatlands, as described in the CSEA text, and that the Proponent is quite confident that ammonia loadings to the Nayshkootayaow River will be very low, and not a threat to fisheries resources. The Proponent also stressed that there will be little if any mine water production during low flow conditions, during Phase 1 mining operations, as the only mine water during this period will be that deriving from direct precipitation and limited overburden seepage. When more substantial mine water is being produced (during Phase 1 operations) the Nayshkootayaow River flows will also be higher, with a correspondingly higher assimilative capacity.

The 15% value was determined from two perspectives. First, 15% is the practical limit for flow measurement accuracy for natural systems. More accurate flow determinations would require construction of a weir, or flume. Second, the Proponent determined that a less than 15% change in flows would have only a limited effect on aquatic habitat. Natural grade controls and backwater effects (even through rapids) would mean that a 15% flow reduction would result in a less than 15% effect in terms of water depth, wetted width, and cross-sectional flooded area.

The MOE regulations for mine effluent discharge (O. Reg. 560/94 and O. Reg. 561/94) specify a flow accuracy requirement of ±15%, reflecting accuracy limitations for flow monitoring under various conditions. Also, literature searches completed by the Proponent failed discover any typical percentage reduction that could be used. The standard practice in most legislation is reference to terminology such as maintaining fish and aquatic habitat, without attaching numerical values.

6.4.2.5.3 Fisheries Resources

In response to reviewer requests for additional fisheries data on the Nayshkootayaow River system, the Proponent collected such additional data during spring and fall 2004 periods. The additional data support data and interpretations originally provided in the CSEA and EBS documents. Further details are provided below.

Traditional ecological knowledge (TEK) and heritage resource studies (Adams Heritage Consultants 1999) indicated the presence of a substantial whitefish spawning run, during the fall in the Nayshkootayaow River. Spring larval drift sampling and fall netting studies were conducted during 2004 to determine the extent of the reported whitefish usage of the river. Results of the study indicated that the river might not be as significant to whitefish spawning as was originally thought, as no substantial evidence of spawning whitefish was observed in the Nayshkootayaow River during either the spring or fall 2004 works. Subsequent anecdotal accounts from harvesters also suggested that the whitefish run may not currently occur as it had in the past, and that there may have been a misunderstanding of the previous accounts.

With respect to the life history of whitefish in the Nayshkootayaow River, sampling by the Proponent has not resulted in any whitefish captures within the river during spring or summer, and only relatively low numbers of non-spawning whitefish captured during the fall period. Low numbers of non-sexually mature whitefish were captured within the lower Nayshkootayaow River, all within 5 km of the Attawapiskat River. Both larval and adult spawning condition whitefish were observed in the Attawapiskat River, which is considered year round whitefish habitat.

As a commitment to further assess the use of whitefish within the Nayshkootayaow River the VPT has committed to install a counting weir. The weir will be in place to assess the fall 2005 spawning run.

Spring, summer and fall fishing efforts were also used to identify habitat usage by brook trout. Brook trout are distributed through much of the upper watershed and its smaller headwater tributaries, although some tributaries appeared not to support brook trout such as Tributary 4 in Figure 6-1. No adult brook trout were observed in the lower sections of the main river during summer (1999, 2004) or spring (2004) sampling, although comparatively low numbers of adult trout were captured in the lower river mainstem during the fall 2004 program. Larval brook trout were observed during the spring in the main stem river in association with the tributary creeks and it is considered likely that the fish had drifted downstream out of the tributaries.

Brook trout were common in the upper reaches of the main river, and within the tributary creeks compared to the lower river, supporting earlier statements by the Proponent that the preferred brook trout habitat in is the upper watershed and the tributaries. Habitats within the upper reaches of the river showed a greater dominance of gravel and sands, with log habitat cover that also supported the determination of better trout habitat. Although there is a component of sand and gravel available in all reaches of the lower Nayshkootayaow River, the dominant substrates are larger, tightly knit and angular substrates that would make it difficult for brook trout to excavate redd sites. Although there is potential for some spawning to occur in the lower reaches of the river, it is restated that the more likely preferred habitats are present further up in the watershed and in the tributary creeks.

Brook trout spawning migrations occur during the fall, as supported by the capture of low numbers of brook trout in the lower reach of the Nayshkootayaow River during fall netting. The predicted flow reductions do not constitute a significant proportion of the natural flows during the fall period and as such there is no foreseeable impact to migration or movements between critical habitats. The only time that flows are predicted to be meaningfully reduced in the main channel, and in the lower reaches of Tributaries 5 and 7, is during winter low flow, or possibly during extreme summer drought conditions. Flow supplementation during these low flow periods would mitigate the potential for impact to fish movement, or the dewatering of winter habitats.

Studies conducted by the Proponent during February 2004 showed that the ambient water temperature of both the Nayshkootayaow River and the Attawapiskat River are consistently just above freezing (0.2°C), suggesting that supplementation water will closely match the existing Nayshkootayaow River temperatures. Summer temperatures are controlled largely by air temperature and muskeg seepage as shown by comparisons between the Nayshkootayaow River and Granny Creek system in the CSEA document. The ambient water temperature in the

Nayshkootayaow River will not be affected by the flow reductions and mitigating supplementation.

With respect to the potential importance of thermal refugia that may be created by local groundwater seeps, modelling of the seeps was conducted to determine the likely effects of the seeps on immediate downstream river temperatures during varying low flow winter conditions. Results of the modelling showed that under average winter low flow conditions (7Qaverage condition), temperature effects from the largest seep (ST4-Seep1) would dissipate to less than half a degree Celsius within 5 m of the seep, and to less than 0.15°C within 50 m. The smaller seep (ST5-Seep 1) temperature effect under the 7Qaverage condition dissipates more quickly. Under the more extreme, 7Q20 low flow condition, the larger seep has a less than 1°C effect at 50 m from the seep, and the smaller seep has a negligible effect at this distance. The minimal thermal effect of the seeps and the low oxygen content of the seeps (<3 mg/L) suggest that the seeps do not provide important refugia for Nayshkootayaow River fish. The Proponent has nevertheless committed to monitoring creek and river water temperatures in association with flow supplementation programs.

In response to the comment that the DFO no net loss policy was over simplified or misstated, the Proponent provides the following description of the policy interpretation as provided by DFO:

DFO will be guided by the following hierarchy of preferences to achieve no net loss of productive capacity:

1. Maintain without disruption the natural productive capacity of the habitat(s) by avoiding any loss or harmful alteration. Only after it proves impossible or impractical to maintain the same level of habitat productive capacity using the approaches outlined above would DFO accede to the exploration of compensatory options. First of all, the possibilities for like-for-like compensation should be assessed; that is replacing natural habitat at or near the site.

2. Off-site replacement habitat, or increasing the productivity of existing habitat for the affected stock.

3. In those rare cases where it is not technically feasible to avoid potential damage to habitats, or to compensate for the habitat itself, the Department would consider proposals to compensate in the form of artificial production to supplement the fishery resource, provided the following conditions are met:

    a) Such a solution will be in accordance with the objectives established in the local fisheries management plan, assuming one is available;
    b) Genetic and other biological factors are satisfied; and,
    c) Practical and proven techniques are available.

The fish hatchery concept has been rejected by DFO. Instead DFO representatives through various discussions with the Proponent have expressed support for the flow supplementation concept.

The Proponent has committed to make reasonable and best efforts to follow federal Environmental Effects Monitoring (EEM) protocols for aquatic system monitoring during operations, recognizing that EEM protocols apply to metal mines (by regulation) and not to diamond mines.

6.4.2.6 RA Conclusions

The RAs conclude that there will not likely be any significant adverse environmental effects. Prior to any in-water works a fisheries compensation agreement will be developed between De Beers and DFO in consultation with the province and AttFn. This agreement will put in place all mitigation and fish habitat compensation requirements to assure no net loss of fisheries productive capacity. Chapter 8 outlines follow-up programs to ensure conclusions are correct, adaptive management plans will be developed to address any unforeseen impacts.

6.4.3 Granny Creek System

6.4.3.1 Environmental Effects

6.4.3.1.1 Hydrology

Hydrological effects on the Granny Creek system potentially include:

- Changes to North and South Granny creek flows resulting from site development and overburden aquifer depressurization and ensuing decrease in runoff and base flow;
- Subsidence of the overburden trench bordering the northeast margin of the open pit, and its potential to form a depressional lake or pond adjacent to North Granny Creek;
- Changes to South Granny Creek flow resulting from the diversion of South Granny Creek; and,
- Changes to South Granny Creek for culverts for all-season roads.

Changes to Granny Creek Flows Resulting From Site Development and Aquifer Depressurization

Changes to North and South Granny creek flows will result from the combined effects of:

- PKC development and operation;
- Open pit development;
- Aquifer depressurization; and,
- Culvert placement

North Granny Creek

All water discharged from the PKC facility to North Granny Creek will pass through the polishing pond. A portion of this water (900 m^3/d to 5,000 m^3/d) is expected to leak subsurface to the pit perimeter well field. The exact magnitude of this leakage will depend on how fine PK is layered against the mined out quarry walls, prior to its use as a polishing pond. Leaving quarry walls substantially uncovered with fine PK will accelerate leakage. A more complete blanketing of the quarry walls with fine PK will limit leakage. The base case condition presented by the Proponent in the September 2004 groundwater model iteration (HCI 2004b) indicates a subsurface leakage of 2,700 m^3/d. When all PKC cells are in operation, the Proponent's water balance indicates that most PKC discharge water will continue to report to the polishing pond (estimated average 4,158 m^3/d), but an estimated average 2,203 m^3/d will also report as seepage to the south seepage collection pond, which will drain to South Granny Creek. Currently, approximately 85 ha of the future PKC basin drains to North Granny Creek and 175 ha drains to South Granny Creek, contributing respective inflows of 605 m^3/d and 1,245 m^3/d.

Based on limited subsurface leakage to the well field (900 m^3/d), and taking into account process water addition, water retained within the PK void spaces, seepage losses to the south polishing pond, and changes to watershed area and watershed characteristics, an annualized increase in flows to North Granny Creek from PKC development of 2,650 m^3/d has been calculated. At the maximum leakage rate of 5,000 m^3/d, the Proponent calculates an annualized loss in flow to North Granny creek of 1,450 m^3/d. For the base case leakage rate of 2,700 m^3/d, the calculated annualized change in North Granny Creek flows is a net increase of 850 m^3/d. This allows for an existing, pre-development watershed contribution of 605 m^3/d from that portion of the PKC basin (85 ha) that naturally drains to North Granny Creek. With either the base case leakage scenario, or the maximum case leakage scenario, there would be little or no outflow from the polishing pond to North Granny Creek, except during high water conditions (i.e., outflow would occur mainly during spring and fall conditions, and in response to more pronounced summer rainfall events). It is expected that the base case condition is most likely to occur, yielding a net flow increase to North Granny Creek of 850 m^3/d, on an annualized basis.

North Granny Creek exhibits average annualized flows of 32,000 m^3/d. The change in flow to North Granny Creek result from PKC development is therefore expected to be in the order of +2.7%, with a possible range of from –4.5% (ineffective fine PK seal) to +8.3% (effective fine PK seal).

In addition to these flow changes, well field operation will result in a partial depressurization of the overburden aquifer, leading to a calculated 4.8% reduction in natural flow to North Granny Creek. The 4.8% value is a weighted value derived for the Granny Creek basin, based on data from HCI (2004b) for the base case, variable precipitation model, which shows a 10.4 mm net change in precipitation infiltration for clay/silt zones over 91.5% of the watershed area, and a 33.2 mm net change in precipitation in infiltration for bioherm zones over 8.5% of the watershed area. No other major flow volume changes are anticipated to North Granny Creek.

Taking all of the above flow changes into consideration, the total annualized flow change to North Granny Creek is expected to be in the order of 2.1%, with a possible range in values of from -9.3% to +3.5%. All values equate to a deviation of less than 15% from baseline flows. During extreme low flow conditions (7Q20 condition), with the expected leakage rate of 2,700 m^3/d, it is expected that there would be no polishing pond discharge to North Granny Creek.

Culvert placement on North Granny Creek at the all-season road crossing to the overburden stockpile has the potential to impound creek flows during flood events. To limit any such temporary effects multiple culverts accompanied by adjacent swale construction will be used to pass high water. Regular inspections will also be undertaken to clear debris from the culverts, including that placed by beavers.

Culverts will be designed to assure fish passage. Any loss of fish habitat will be mitigated by embedding culverts by a minimum of 10% and backfilling with natural substrate as well as the development of inlet and outlet pools to enhance fish habitat. Details of these measures will be placed in a compensation agreement developed with DFO in consultation with MNR and the AttFN.

South Granny Creek

Seepage losses through the PKC facility dams to the south seepage collection pond will result in a calculated annualized flow increase of 780 m^3/d to South Granny Creek. A portion of the existing South Granny Creek watershed (175 ha) will also be redirected to North Granny Creek, as a result of PKC facility development. However, because of changing runoff conditions associated with PKC facility development (i.e., an increase from 260 mm/a to 575 mm/a), this change will actually result in a further small increase in flow to South Granny Creek, calculated at 180 m^3/d.

Further changes to South Granny Creek flows are expected to result from a withdrawal of 0.8 km^2 of the South Granny Creek watershed (i.e., that portion of the watershed contained within the pit perimeter) that will be diverted either to the Nayshkootayaow River, during Phase 1 operations, or to the Attawapiskat River during Phase 2 operations. In either case there will be a calculated loss in average annualized flow to South Granny Creek of 570 m^3/d from this effect.

The combined effect of watershed diversions associated with PKC facility and open pit water management will be the addition of 390 m^3/d of flow to South Granny Creek. This change is equivalent to a 1.2% increase in creek flows, based on a mean annual creek flow of 32,000 m^3/d (the same as for North Granny Creek). Offsetting this flow increase would be a decrease in flows of approximately 4.8%, expected to occur as a result of depressurization of the overburden aquifer as described above, resulting in a net flow reduction of 3.6%.

The culvert crossing on South Granny Creek will be managed as described above for North Granny Creek.

Overburden Trench Subsidence

The overburden trench adjacent to the northeast margin of the open pit is quite deep (maximum inferred depth 230 m), and consists of a mixture of clay, silt, sand and organic materials. Some depressurization of this feature will occur in response to depressurization of the surrounding bedrock aquifer during well pumping.

Based on the analysis presented in the HCI (2004b) report, the expected settlement in the deepest portion of the trench is 5 m. Settlement elsewhere, in areas where the overburden is 20 m or less in thickness, is expected to be minor ranging from 0.2 to 16 cm. The section of North Granny Creek that could be meaningfully affected by ground settlement, in response to dewatering is about 1 km in length, and represents only a small portion of the watershed. Subsidence along this portion of the creek could potentially be in the order of 1 to 3 m. Drainage through this area will be partly or wholly contained by stockpiles, it is therefore not clear at this stage whether or not the creek will need to be realigned, or the condition otherwise mitigated, in response to settlement in the area of the northeast overburden trench, and the condition will need to be monitored.

Changes to South Granny Creek Flow Resulting from Creek Diversion

Diverting South Granny Creek around and away from the south perimeter of the proposed open pit will change the creek flow path, but it will not alter the creek's flow regime. Changes to creek flows from this action, other than a minor change in flow alignment, are therefore not anticipated. Changes to the physical creek habitat are discussed below.

6.4.3.1.2 Water Quality

Potential project-related environmental effects to Granny Creek water quality include:

- Discharge of PKC facility effluent (including treated domestic sewage routed through the PKC facility) to North and South Granny Creeks;
- Release of runoff from overburden and mine rock stockpiles,
- Release of plant site area runoff to Granny Creek,
- Discharge of water during constructions, and,
- Discharge from landfill site.

Separate discussions of these potential environmental effects are presented below.

Discharge of PKC Facility Effluent to North and South Granny Creek

Fine PK will be discharged as a slurry at approximately 50% solids by weight, from the processing plant to the fine PKC facility, resulting in an annualized average transfer of 4,500 m^3/d of water (including 120 m^3/d of treated sewage water) to the PKC facility. Based on a settled solids density of 1.05 t/m^3, a solids specific gravity of 2.7 and a 90% saturation, it has been calculated that 2,240 m^3/d of this plant discharge water will be retained in the system as

PK pore water. The surplus water, totalling 2,260 m^3/d, together with excess basin runoff, will be discharged from the PKC facility to the environment.

Quantities of process water and runoff released to the environment will vary with the stage of operations. But during final stage operations, it is estimated that an average of 4,160 m^3/d of PKC facility effluent could potentially report to North Granny Creek, and that an average of 2,200 m^3/d will report to South Granny Creek. All seepage release to North Granny Creek will pass through the polishing pond. Seepage released to South Granny Creek will pass through the south seepage pond. The quantity of effluent actually discharged to North Granny Creek will be reduced by the amount of leakage reporting subsurface to the well field, estimated at 2,700 m^3/d (Section 6.4.3.1.1).

Process water released from the plant to the PKC facility, as a slurry, will contain elevated total dissolved solids (TDS), residual ammonia from the use of blasting agents, and very minor concentrations of heavy metals. The quality of water released from the PKC facility will depend on the source of process water (Attawapiskat River), the effectiveness of suspended particle settling within PKC facility internal ponds, and the potential for minerals to be leached from the fine PK dam and contained materials.

The expected quality of discharge water from the PKC facility was determined on the basis of sample treatment plant operations conducted at the Victor site during the summers of 2000 and 2001, as well as from geochemical test work. Based on these data, a high quality effluent will be generated by the PKC facility, with (for comparison purposes) Ontario Regulation 560/94 limits being met for all parameters.

Predicted water quality changes to North Granny Creek, for key parameters, following the addition of PKC effluent, calculated as annual averages, are shown in Table 6-12. Calculated values do not allow for subsurface leakage from the polishing pond, which would further reduce parameter loadings to the creek. Similar values were calculated for South Granny Creek. Under low flow conditions, which typically occur in winter, there would be limited release of effluent from the PKC facility, as much of the water entering the PKC cells would freeze, and the remaining discharge would be expected to report subsurface through the polishing pond to the dewatering wells.

Release of Runoff from Overburden and Mine Rock Stockpiles

Runoff from the overburden (clay) stockpile will contain clay and silt particles. The Proponent proposes to use passive muskeg (wetland) filtration to reduce TSS concentrations to below 15 mg/L before the runoff water enters North Granny Creek. The background 75th percentile TSS concentration for North Granny Creek is 9 mg/L. The treatment system includes a minimum 200 m intact muskeg perimeter buffer zone, flanked by a runoff collection ditch that will direct flow to a linear, ribbed fen for final polishing.

TABLE 6-12
CALCULATED IMPACT OF PKC FACILITY DISCHARGE
ON NORTH GRANNY CREEK WATER QUALITY
AVERAGE ANNUAL FLOW CONDITION
(data expressed as mg/L)

Key Parameters	North Granny Creek Mean Annual Baseline Water Quality (75th Percentile)	PKC Facility Discharge	North Granny Creek Projected Water Quality with PKC Facility Inflow (Flow Ratio 7.7:1)	PWQO	CEQG PAL	ODWS/ CDWQG
Flow/discharge	32,000 m^3/d	4,160 m^3/d				
PH	6.59	8 – 8.5	7 – 7.5	6.5 – 8.5	6.5 – 9	6.5 – 8.5
Total suspended solids	9	9	8.1	-	-	-
Chloride	6.5	<200	<28.7	-	-	250
Sulphate	0.2	<200	<20.2	-	-	500
Antimony	<0.001	<0.003	<0.002	0.02	-	0.006 F
Arsenic	<0.001	<0.001	<0.001	0.1	0.05	0.025
Calcium	13.3	50	17.5	-	-	-
Chromium	<0.001	<0.005	<0.002	.00889	.002	0.05
Cobalt	<0.0005	<0.0005	<0.0005	.0009	-	-
Copper	<0.001	<0.005	<0.002	0.005	0.002	1.0
Iron	1.62	<0.3	<1.5	0.3	0.3	0.3
Lead	<0.001	<0.001	<0.001	0.01	0.001	0.01
Magnesium	2.44	60	9.1	-	-	-
Manganese	0.345	<0.01	0.31	-	-	0.05 C
Molybdenum	<0.005	<0.005	<0.005	.04	-	-
Nickel	<0.005	<0.01	<0.006	0.025	0.025	-
Potassium	0.37	15	2.1	-	-	-
Sodium	6.65	<200	<28.9	-	-	200/20
Zinc	0.007	<0.01	<0.007	0.030	0.030	5.0

Note: Data assume that all polishing pond effluent drains to North Granny Creek, rather than subsurface to the well heads
C = Canadian
F = Federal only
Not specifically marked = provincial and Canadian

Runoff from the rock stockpiles (coarse PK, low grade ore and mine rock), which is expected to contain lesser concentrations of TSS, compared with the overburden stockpile runoff, will be treated using a minimum 100 m intact muskeg buffer zone flanked by a runoff collection ditch, the primary function of which will be to provide hydraulic containment for monitoring.

With the proposed use of perimeter muskeg buffer zones, adverse impacts to Granny Creek from suspended solids loadings draining from stockpiles are not expected.

The remaining consideration is chloride, sulphate and residual metal concentrations that will be contained in runoff from the low-grade ore and coarse PK stockpiles, and the effect that this leachate could have on South Granny Creek. Kinetic testing and scale-up studies were used to determine expected stockpile leachate concentrations based on two separate models: sulphide oxidation and sulphate dissolution, of which sulphide oxidation is likely the dominant mechanism for sulphate and metals release. Data from both models are presented in Table 6-13, and show a high quality effluent (runoff), and that protection of aquatic life (PWQO, CEQG PAL) guidelines would be met for all parameters under average flow conditions with the exception of iron, which is elevated in the natural condition. Adverse impacts to creek water quality are therefore not expected as a result of stockpile drainage.

TABLE 6-13
CALCULATED IMPACT OF RUNOFF FROM LOW GRADE ORE AND COARSE PK STOCKPILES ON SOUTH GRANNY CREEK – SULPHIDE AND SULPHATE MODELS
(data expressed as mg/L)

Key Parameters	Low Grade Ore Stockpile		Coarse PK Stockpile		South Granny Creek with PKC Seepage	South Granny Creek with Stockpile Runoff Contribution		PWQO	CEQG PAL
	Sulphide Oxidation	Sulphate Dissolution	Sulphide Oxidation	Sulphate Dissolution		Sulphide Oxidation	Sulphate Dissolution		
Stockpile area or watershed area (km^2)	0.62	0.62	0.70	0.70	43.68	45.0	45.0	-	-
Effective stockpile area or watershed area (km^2)	1.41	1.41	1.60	1.60	43.68	46.69	46.69	-	-
Chloride	97	457	86	405	<16.6	<21.4	<43.2	-	-
Sulphate	277	1,306	246	1,159	<13	<29.0	<91.3	-	-
Antimony	0.006	0.028	0.005	0.025	<0.002	0.002	0.004	0.02	-
Calcium	53	218	47	207	12.7	15.1	25.6	-	-
Chromium	0.025	0.12	0.022	0.11	<0.002	0.003	0.009	0.0089	0.002
Cobalt	0.002	0.007	0.001	0.006	<0.0005	0.0006	0.0009	0.0009	-
Copper	0.005	0.011	0.005	0.011	<0.002	0.002	**0.003**	0.005	0.002
Iron	0.002	0.002	0.002	0.002	1.47	**1.38**	**1.38**	0.3	0.3
Lead	0.0007	0.003	0.0006	0.003	<0.001	0.001	0.001	0.01	0.001
Magnesium	66	313	59	278	6.4	10.0	25.0	-	-
Manganese	0.007	0.033	0.006	0.029	0.08	**0.075**	**0.077**	-	-
Molybdenum	0.009	0.042	0.008	0.037	<0.005	0.005	0.007	0.04	-
Nickel	0.024	0.11	0.022	0.10	0.006	0.007	0.012	0.025	0.025
Potassium	226	1,067	201	947	1.6	15.2	66.18	-	-
Sodium	224	1,056	199	937	17.4	**29.9**	**80.3**	-	-
Zinc	0.014	0.066	0.012	0.058	0.007	0.007	0.011	0.03	0.03

Notes: **Bold** Exceeds Guidelines
C = Canadian; F = Federal only
Not specifically marked = provincial and Canadian

Background South Granny Creek values shown in Table 6-13 include provision for PKC seepage effects, upstream of low grade ore and coarse PK runoff input. Low flow (7Q20) conditions are not considered in Table 6-13 because during the winter and during summer dry spells, there would be negligible runoff release from the stockpiles.

Release of Plant Site Area Runoff to Granny Creek

All areas of the general plant site, where petroleum hydrocarbons and chemicals are to be used or handled on a regular basis, will be provided with internal containment and sumps for spill control. Drainages from these areas will report to oil-water separators for the removal of residual hydrocarbons. More generalized plant site drainage will report to settling ponds for the removal of residual TSS, with provision for the removal of residual hydrocarbons, where appropriate. As such, adverse impacts to the Granny Creek system from potential hydrocarbon releases at the plant site area are not expected.

6.4.3.1.3 Fisheries Resources

Effects to fisheries of the Granny Creek system may include:

- Alteration of approximately 2.6 km of South Granny Creek due to a realignment of the existing channel; and,
- Potential subsidence of the overburden trench bordering the northeast margin of the pit area, which may result in ponding of North Granny Creek flows.

Realignment of an approximately 2.6 km reach of South Granny Creek is required, to ensure stability of the open pit walls. This will result in the alteration of the physical habitat only, which will be replaced with similar, “like-for-like” habitat.

The depressurization of the overburden trench may result in subsidence of the existing creek by 1 to 3 m over a length of approximately 1 km. This would result in a localized ponding of the creek if left as is.

6.4.3.1.4 Discharge of Water During Construction

Site runoff water during the construction period (and during operations phases), where appropriate, will be collected in shallow ditches and directed through terminal settling ponds for the removal of residual suspended solids prior to entering area creeks or rivers. Because of the low gradient (generally less than 0.1%), the ditches will also tend to function as settling ponds, increasing the effectiveness of suspended solids removal. Best practice measures, such as silt curtain use, will be used to limit the potential for erosion from construction areas.

6.4.3.1.5 Discharge from the Landfill

The Victor site landfill will receive incinerator ash, scrap metal, plastics, glass and insulation. To the extent practicable, no biodegradable or putrescible wastes (i.e., wood, paper, food wastes) will be placed in the landfill. As such, there will be very little in the way of degradation processes occurring in the landfill, and thus minimal methane generation and no meaningful waste reduction and subsidence of waste in the landfill due to biological processes.

A moisture balance calculation was performed to estimate leachate generation at the landfill. The results of the moisture balance indicate a maximum leachate generation rate of 12 m^3/d in the first year of landfilling, with an ultimate leachate generation of 3.5 m^3/d post closure. The initial leachate generation of 12 m^3/d is a gross over estimate, as it presumes that all precipitation from the landfill pad will be in contact with the waste.

Assumptions in determining the landfill moisture balance were the following:

- Total waste placed into the landfill between 2006 and 2023 is estimated at 4,600 tonnes, including 4,000 tonnes of inert waste and 600 tonnes of ash;
- Landfill footprint is 80 by 80 m;
- Annual precipitation is 690 mm;
- Estimated initial moisture content of waste is 25%;
- Average moisture required to reach field capacity is 40%;
- Infiltration through interim cover is 690 mm per year (considered to be conservative); and,
- Infiltration through final cover is 200 mm per year (also conservative).

The leachate in the landfill is expected to be relatively benign compared with leachate from more typical non-hazardous domestic waste landfills, owing to the absence of putrescible or biodegradable wastes. Leachate concentrations are expected to be such that PWQO and CEQG PAL will be met in North Granny Creek, the receiving water. Toxicity characterization leachate procedure (TCLP) analysis will be performed on the incinerator ash and if the results prove to be leachate toxic the ash will be taken off-site for disposal.

Further details are provided in the Proponent's waste management plan.

6.4.3.2 Mitigation

6.4.3.2.1 Hydrology

Changes to Granny Creek Flows Resulting From Site Development and Aquifer Depressurization

Through design procedures, and to the extent practicable, the PKC facility has been centred on the watershed divide between North and South Granny creeks, therein limiting watershed drainage effects. No other mitigation measures are proposed, as the expected effects to creek flows are small (<15%). However, the Proponent does have the potential to increase or decrease polishing pond seepage losses to the well field collection points by altering the deposition pattern of fine PK within the mined out quarry (future polishing pond). Subject to direction from the MOE on PKC facility watershed management at the permitting stage, there are opportunities here to balance hydrological effects to North Granny Creek.

<u>Anticipated Effectiveness of Mitigation Measures and Contingencies</u> – The potential exists for further flow management from the polishing pond. If there are meaningful reductions in base

flow due to aquifer depressurization, including possible bioherm effects, flow supplementation will be provided to North and South Granny Creeks as described in the Granny Creek Adaptive Management Strategy.

Overburden Trench Subsidence

There are two alternatives for maintaining the integrity of North Granny Creek through the predicted overburden trench subsidence zone. The first is to contain the creek through stockpile/berm development on the south side. The second is to realign to creek about 300 m to the north, through the affected section. The first alternative is preferable, and details will be provided in the AMS for Granny Creek. Realignment of the creek will also work effectively. It is also important to recognize that subsidence within the overburden trench will occur gradually over the mine life, and that this subsidence will be monitored to guide mitigation efforts.

Anticipated Effectiveness of Mitigation Measures and Contingencies – The proposed mitigation strategy will be effective, and can be implemented in a progressive and responsive manner. The contingency exists to reroute North Granny Creek away from the subsidence zone, if this later proves to be a better option.

Changes to South Granny Creek Flow Resulting from Creek Diversion

Mitigation measures beyond those associated with the planned diversion itself are not proposed in connection with potential hydrological effects.

6.4.3.2.2 Water Quality

All project-related water discharges to the Granny Creek system are such that PWQO, CEQG PAL, are expected to be met with the exception of parameters, which are naturally elevated in the background condition, such as iron.

There is no anticipated use of Granny Creek for drinking water. There are no PWQO or CEQG PAL set for either chloride or sodium, and no adverse impacts to aquatic life are anticipated at the point of discharge. Chloride concentrations are expected to be <50 mg/L, which is below the 230 mg/L threshold suggested by the US EPA, and in the order of 75^{th} percentile chloride values observed in the background condition for the Nayshkootayaow River.

Anticipated Effectiveness of Mitigation Measures and Contingencies – Mitigation measures beyond those inherent in the project design are not proposed. Contingencies available for managing PKC effluent quality include:

- Use of splitter dikes, silt curtains, and/or flocculants for TSS control; and,
- Pumping polishing pond effluent to the Attawapiskat River, along with well field water, during average and low flow conditions, if water quality should deteriorate to levels unacceptable for discharge to Granny Creek.

6.4.3.2.3 Fisheries Resources

The South Granny Creek realignment will incorporate natural channel design principles, and "like-for-like" habitat creation of an equal length to mitigate the realigned channel section. The new channel will be constructed to maintain approximately 300 m between the new channel and the pit margin.

An adaptive management strategy (AMS) has been developed for the Granny Creek system. It includes monitoring and mitigation of the North Granny Creek channel in connection with possible ground subsidence, as well as contingency provisions for flow supplementation in the event of base flow reduction linked to well field dewatering. Lateral berms will be constructed to contain creek flows in the event that significant subsidence of the adjacent overburden trench occurs. The resulting depression outside the bermed creek will be systematically in filled with overburden from the pit to maintain the existing ground elevation and prevent ponding. When there is no further subsidence detected, the creek channel will either be left as is within the bermed features, or if substantial settlement has occurred, then a new realigned channel could be created using natural channel design similar to that proposed for the South Granny Creek realignment. The path of preferred mitigation is to be determined by the Proponent in consultation with federal and provincial governments and the AttFN in the AMS.

<u>Anticipated Effectiveness of Mitigation Measures and Contingencies</u> - The proposed mitigation strategy for addressing possible ground subsidence effects on North Granny Creek will be effective, and can be implemented in a progressive responsive manner as developed in the AMS (Granny Creek Adaptive Management Strategy). Similarly, the provision of flow supplementation to the Granny Creek system, if required as a result of any creek based flow reductions associated with well field dewatering is also expected to be effective as per provisions in the Granny Creek AMS.

6.4.3.3 Significance

6.4.3.3.1 Hydrology

Changes to Granny Creek Flows Resulting From Site Development and Overburden Aquifer Depressurization

The magnitude of the average annual flow changes to both North and South Granny Creeks is expected to be <15% and is therefore deemed to be not significant (i.e., the magnitude/ geographic extent of the effect is Level I).

Overburden Trench Subsidence

The effect of the predicted zone of subsidence is not expected to meaningfully alter the hydrology of North Granny Creek, as the creek will be contained through stockpile/berm development on the south side, as required to maintain the integrity of the creek channel. The magnitude/geographic extent of the effect is considered to be a Level 1 condition, and therefore not significant. Settlement, once it occurs, is likely to be permanent.

Changes to South Granny Creek Flow Resulting from Creek Diversion

Changes to the Granny Creek hydrological regime, associated with the diversion of South Granny Creek, are not expected, and the effects of this action are therefore regarded as being not significant.

6.4.3.3.2 Water Quality

All project-related water discharges to the Granny Creek system are such that PWQO, CEQG PAL are expected to be met, except when precluded from doing so by naturally elevated background conditions, such as for iron. Effects are therefore determined to be Level 1 for magnitude/geographic extent, and not significant (Table 6-11).

6.4.3.3.3 Fisheries Resources

Realigned fish habitat will be effectively mitigated by habitat reconstruction to meet DFO's policy of "no net loss of the productive capacity of habitats" and as such effects after mitigation are regarded as not significant. Similarly, actions will be taken to preserve fish habitat within the overburden trench subsidence zone.

6.4.3.4 Comments/Concerns

6.4.3.4.1 Hydrology

Several reviewers, including NRCan, MNR, Gartner Lee (acting on behalf of the AttFN), and NAN representatives, expressed a concern regarding the potential for increased ground water flow within the shallow overburden towards bioherms in response to dewatering of the bedrock aquifer, potentially resulting in greater creek flow reductions than anticipated.

DFO and Gartner Lee expressed that effects to creek flows resulting from the various project activities should be consolidated. MNR indicated a concern that in the longer-term, Granny Creek flows from the diversion channel could potentially revert back to the old channel, and that the Proponent should re-evaluate the need for rerouting the creek, such as considering a much smaller open pit operation.

Both DFO and Gartner Lee suggested that the Proponent should develop response plans to protect the integrity of North Granny Creek from expected subsidence zone effects associated with depressurization of the overburden trench in response to dewatering activities. Gartner Lee also suggested that a more complete analysis of flood frequencies should be provided, including estimated flood levels, typical cross-sections for Granny Creek.

Finally, consultants working on behalf of NAN expressed a concern regarding the potential for mass failure of the proposed Granny Creek diversion.

6.4.3.4.2 Water Quality

EC expressed concerns regarding:

- Effects of PKC discharge and stockpile runoff on the Granny Creek system during low flow conditions;

- TSS loadings to Granny Creek from the PKC facility discharge and from stockpile runoff; and,

- Effects of PKC effluent discharge on Granny Creek temperature regimes.

Gartner Lee (on behalf of the AttFN) also expressed concerns regarding PKC facility discharge to North Granny Creek during low flow conditions, as well as concerns regarding potential TSS loadings to North Granny Creek, and the need for contingency measures in the event that TSS levels exceed expected values.

EC and MOE further suggested that the Proponent should consider discharging PKC effluent directly to a larger receiver, rather than to North Granny Creek. MNR requested that the Proponent should determine expected ammonia levels in the PKC facility discharge, and the potential effect of this discharge on North Granny Creek.

Consultants acting on behalf of NAN expressed the following additional concerns regarding Granny Creek water quality effects:

- Seasonal water quality data, as opposed to means, observed ranges, and 75^{th} percentiles, should have been presented in the CSEA (or EBS) to better assess the seasonal effects of PKC facility effluent discharge and stockpile runoff on the Granny Creek system;

- Sediment data were insufficient to assess discharge effects; and,

- Low grade kimberlite and coarse PK stockpiles should be underlain with a layer of limestone to prevent any potential for the development of acidic conditions and metal leaching.

6.4.3.4.3 Fisheries Resources

Comments were received concerning the overall fisheries sampling effort for the project indicating that some reviewers felt that presence/absence data was insufficient for assessing impacts.

DFO expressed concerns that if the proposed South Granny Creek realignment was designed to accommodate the 1:100 yr storm event, then it would not represent “like-for-like” habitat.

DFO questioned whether apparent bedrock expressions shown close to both Granny Creek upper watercourse reaches could result in contact with the bedrock aquifer and therefore represent unpredicted flow loss. There was further concern that the potential subsidence of the overburden trench should be addressed as an AMS, to account for potential effects and that North Granny Creek effects should be brought forward as a potential adverse effect.

6.4.3.5 Proponent's Response

6.4.3.5.1 Hydrology

The potential for increased surface water transmissivity through more shallow overburden layers in the vicinity of bioherms, to the underlying bedrock aquifer, was addressed by the Proponent in its September 2004 response to detailed comments from NRCan (updated hydrogeological model incorporating sensitivity analyses). Further discussions on this aspect were held with government agency specialists during September and October 2004 site visits. Follow-up data submissions were also made by the Proponent, concerning water quality in the vicinity of bioherms, and the results of slug-test analyses at bioherm locations. The Proponent maintains that transmissivity of surface water through the more shallow overburden areas in the vicinity of bioherms has been suitably characterized by the groundwater flow model, and that net effects to Granny Creek flows are not expected to exceeded the 15% change threshold.

Regarding the request by DFO (and Gartner Lee) that all effects to creek flows resulting from the various project activities should be consolidated, the Proponent has agreed with this assessment, and has restructured the data as per this document.

Regarding MNR's concerns that in the longer-term, Granny Creek flows from the diversion channel could potentially revert back to the old channel (after closure), and that the Proponent should re-evaluate the need for rerouting the creek, the Proponent responded that the old channel should be backfilled for operational considerations, and that the realigned channel will have become a naturalized creek habitat by this time. Also, reducing the scale of mining operations so as not to disturb Granny Creek was not an option, as the project would no longer be economic.

The Proponent agreed with DFO and Gartner Lee's suggestion that the Proponent should develop response plans to protect the integrity of North Granny Creek from expected subsidence zone effects associated with depressurization of the overburden trench. Details are provided in Section 6.4.3.1.

The Proponent disagreed with Gartner Lee's request on the need for more detailed flood analysis of Granny Creek, given the flat topography and pervasive wetness of the project site, and that all infrastructure will be situated on rock pads raised a minimum of 1 m above the surrounding ground surface. However, the Proponent did agree that some additional flood level modelling may be of value at the detailed design stage, for the final sizing of culverts and the elevation of haul roads. Preliminary sizing of Granny Creek culverts and the dimensions for the Granny Creek realignment, as reported in the CSEA, were based on numerical flow modelling based on the Granny Creek hydrometric monitoring data.

Regarding the potential for a mass failure of the Granny Creek diversion, the Proponent responded that the potential for such a failure was extremely remote given the flat terrain (gradients in the order of 0.1%), and the Proponent's first hand experience with other similar diversions.

6.4.3.5.2 Water Quality

With regard to concerns expressed by EC and MOE regarding the effects of PKC facility discharge and stockpile runoff on the Granny Creek system, during low flow conditions, the Proponent responded that there would be little if any PKC facility effluent discharge to North Granny Creek during low flow conditions, and that the system could be set up to preclude discharge at such times. The Proponent further stated that PWQO and CEQG PAL are expected to be met, or approximately met, in the PKC facility effluent, prior to mixing, and as such, adverse water quality effects to the creek are not expected, regardless of flow. Regarding stockpile runoff, the Proponent responded that the rate of runoff from stockpiles would be directly proportional to runoff from the surrounding terrain, such that when Granny Creek is in a low flow condition there will effectively be no runoff from the stockpiles.

Regarding TSS concentrations in the polishing pond effluent, the Proponent responded that these are expected to be <15 mg/L, as the polishing pond (excluding consideration of the PKC facility itself) will provide a very long retention time, averaging >90 days. TSS contained in runoff from mineral stockpiles will be controlled through the proposed use of passive muskeg filtration and perimeter collection ditches. With regard to contingencies for TSS control, the Proponent has proposed the following measures:

- Use of rockfill separation berms within the PKC facility to minimize effluent short-circuiting and the re-entrainment of sediment fines due to wave or wind action;
- Use of improved passive filtration of the PKC dam constructed seepage faces opposite internal ponds;
- Use of silt curtains within polishing ponds; and,
- Use of coagulating and flocculating agents.

Regarding possible temperature effects, the Proponent responded that all discharges to the Granny Creek system would be at ambient temperatures.

With regard to the potential for discharging PKC facility effluent to a larger receiver, rather than to North Granny Creek, the Proponent responded that the contingency is available to pump water from the polishing pond back towards the plant site, for discharge to the Attawapiskat River along with the well field water, during low flow conditions; but that this contingency would only be implemented if there were a developing concern over Granny Creek water quality during operations.

Regarding ammonia, the Proponent estimated that the expected PKC facility total ammonia discharge was <0.5 mg/L, and that the expected Granny Creek un-ionized ammonia concentration, with PKC effluent input, was <0.02 mg/L, indicating that aquatic toxicity is not expected to be a concern.

Regarding NAN's request to present seasonal data, the Proponent responded that such data were available and could be provided, but in the interests of brevity, the data were summarized more concisely in both the CSEA and EBS. The rationale for utilizing 75th percentile values was explained as being standard practice in Ontario, as required by MOE.

Regarding NAN's suggestion that sediment quality data are insufficient, the Proponent responded that more extensive sediment data would be collected during construction and operations phases to assess the effects (if any) of specific effluent discharges. The Proponent regarded the existing data set as being adequate for environmental effects analysis, given general uniformity of results over the range of samples collected from all stations.

Regarding the need for limestone pads, the Proponent responded that concern here is the potential for the reductive dissolution and mobility of metals from surface deposited waste rock (kimberlite) piles, at low pH. However, where mine rock and coarse PK are deposited in contact with organic materials capable of generating reducing conditions, the pH is not expected to be below 6, where there is little potential for meaningful reductive dissolution of metals to occur. However, as a contingency, the project provides for the stockpiling of coarse PK on a limestone pad if there is any indication of a concern.

6.4.3.5.3 Fisheries Resources

The Proponent maintains that the fisheries information provided is sufficient for the environmental assessment of potential effects, and that additional more quantitative sampling is to be conducted for the purpose of effects monitoring during the construction and operation phase of the project.

Regarding DFO's comment on the channel sizing for the 100-year storm, the Proponent responded that "like-for-like" fish habitat is provided based on average annual flow regimes. More specifically, the channel realignment has been designed to provide like-for-like fish habitat for the majority of flow events, while maintaining the intended purpose of the realignment, which is to prevent accidental flooding of the pit. Although the realigned Granny Creek floodplain channel will be sized to accommodate a one hundred year storm event, the low flow channel habitat within the larger excavation will be constructed to emulate the existing low to moderate flow channel conditions observed in the existing undisturbed creek. This will be accomplished by comparatively matching channel width, depth, and gradient; and, by incorporating woody structure into the design. As such, the overall diversion channel will function in a like manner to that of the existing creek in that high flows will rise above the low flow channel, but will remain confined within the larger excavation similar to the way existing storm events would remain within the Granny Creek floodplain. The overall excavation will transition into the existing Granny Creek floodplain but will be more entrenched than the existing Granny Creek flood plain to reduce the extent of excavation required. However, the total excavation will be approximately twice the capacity required to convey the design storm to reduce flow energy, and provide a floodplain like function. The channel configuration would have an approximately 7 m wide low flow channel within a larger (i.e., 15 m wide) excavation. This will allow for some minor meandering pattern of the low flow channel within the larger excavation, as well as a flat bench on either side of the low flow channel to promote sedge and emergent plant growth.

With respect to the question of creek contact with the bedrock aquifer, further field-testing in summer 2004 showed that there is sufficient clay between the bedrock and the creek channel to prevent any meaningful interaction between the creek and the bedrock aquifer. Additional detail with respect to potential flow losses is provided in Section 6.4.3.5.1. The DFO recommendation to bring North Granny Creek potential impacts forward as an AMS mitigation component has been committed to by the Proponent. The Proponent will develop the AMS with DFO, MNR and the AttFN as a part of the overall fisheries agreements.

6.4.3.6 RA Conclusions

The RAs conclude that there will not likely be any significant adverse environmental effects. Prior to any in-water works a fisheries compensation agreement will be developed between De Beers and DFO in consultation with the province and AttFn. This agreement will put in place all mitigation and fish habitat compensation requirements to assure no net loss of fisheries productive capacity. Chapter 8 outlines follow-up programs to ensure conclusions are correct, adaptive management plans will be developed to address any unforeseen impacts.

6.4.4 Lawashi River System

6.4.4.1 Environmental Effects

The Lawashi River is located immediately south of the Nayshkootayaow River watershed. It has two main branches, referenced in the HCI 2004b report as the North Tributary of Lawashi (northernmost channel) and the Lawashi River (southernmost channel). Both channels are entrenched into the bedrock in sections, similar to that of the Nayshkootayaow River, such that there is a potential connection between this system and well field dewatering activities. The September 2004 update of the hydrogeological model (HCI 2004b) predicts that there will be a loss of 2,100 m^3/d in base flow to the North Tributary of the Lawashi River system, as a result of well field dewatering, during the last approximately 5 years of the mine life. Sensitivity analysis shows that the actual loss could be as little as 1,500 m^3/d, or as much as 2,600 m^3/d. The southernmost channel would not be affected, as the expected loss of water from this channel is only 200 m^3/d.

To put these values into perspective, the predicted 2,100 m^3/d figure represents the following percentage reductions of calculated low flow conditions: 7Qaverage – 3.1%, 7Q2 – 5.2%, 7Q5 - 11.1%, 7Q10 – 17.6%, and 7Q20 – 28.8%.

6.4.4.2 Mitigation

Mitigation measures are not proposed.

6.4.4.3 Significance

Flows within the Lawashi River system are expected to remain within 15% of natural flows, resulting in a Level 1 effect for magnitude/geographic extent, up to the 5-year return period 7-day low flow condition. For more extreme low flow conditions corresponding to the 10 and 20-year return periods, the loss from this system could potentially exceed 15% of natural flows, if such conditions were to coincide with the last few years of mine life. Any adverse flow effects to the system, should they occur, would be temporary and limited in duration, being reversible by ending pumping at mine closure and flooding the open pit to restore local groundwater levels. Adverse environmental effects are not significant.

6.4.4.4 Comments/Concerns

During the September 2004 site visit, DFO representatives indicated that based on flow comparisons, flow and fisheries related effects to the Lawashi River system were not likely to be of concern.

Reviewer's acting on behalf of NAN expressed concern about potential flow effects to the Lawashi River system, indicating that these effects were not adequately dealt with in the CSEA.

6.4.4.5 Proponent's Response

With respect to potential flow reduction effects to the Lawashi River system, the Proponent has updated predicted effects to this system, based on results of the September 2004 hydrogeological model.

6.4.4.6 RA Conclusions

The RAs have concluded that there will not likely be significant adverse environmental effects. Follow-up programs will assess the validity of this conclusion, and adaptive management measures will be applied if required. Chapter 8 outlines follow-up programs to ensure conclusions are correct and outline corrective measures if unforeseen impacts occur.

6.4.5 Rivers and Creeks Intersected by Winter Roads

6.4.5.1 Environmental Effects

Surface water system environmental effects related to winter road crossings will be limited to (1) water takings from several selected localities to supply water trucks with water needed to apply water sprays to winter road surfaces, in order to create an approximately 75 mm ice surface on the roads for improved trafficability, and (2) to the potential for ice bridges to obstruct creek and river flows during spring break-up, potentially leading to flooding of adjacent areas. Effects to riverbank and creek margin forest communities are addressed in Section 6.6.1.1.

With respect to water taking, the Proponent has indicated that water takings at all times will be limited to less than 15% of creek and river flows. With respect to the potential for ice bridges to obstruct creek and river flows during break-up, the Proponent believes that this potential effect is not a concern, and that the use of winter roads throughout the north is a common practice, and it is not the practice of winter road operators to actively remove ice bridges prior to break-up.

There is a potential for detrimental effect to watercourses for unintentional increases in sediment loading due to erosion at crossing locations.

6.4.5.2 Mitigation

The Proponent has agreed to monitor the break-up of winter roads where there is a potential to cause flooding, and if problem conditions are observed, then the Proponent will take actions to remove the ice bridges in consultation with the MNR.

Standard best management practices will be used for sediment and erosion control at winter road crossings, especially where banks will be cut back to improve approach grades.

6.4.5.3 Significance

There will be no significant adverse environmental effects to river and creek systems resulting from the annual construction and operation of winter roads (Table 6-11).

6.4.5.4 Comments/Concerns

Gartner Lee suggested that De Beers should conduct an analysis of the potential effects to water quality from winter road construction and operations, and should specify measures for construction, operation and closure of the winter roads.

6.4.5.5 Proponent's Response

With respect to the potential for effects to water quality as a result of construction and operation of winter roads, the only potential for detrimental effect to watercourses is for unintentional increases in sediment loading due to erosion at crossing locations. The Proponent has stated its intention to employ best management practices for sediment and erosion control at winter road water crossings.

6.4.5.6 RA Conclusions

The RAs have concluded there will not likely be any significant adverse environmental effects on watercourses that will be intersected by winter roads.

6.4.6 Muskeg Ponds

Muskeg ponds are ubiquitous throughout the James Bay Lowlands and were not identified as being a VEC. Nevertheless, a number of Victor site area muskeg ponds have been shown to support limited “minnow” species communities, and DFO has determined that the destruction of these ponds constitutes a Harmful Alteration Disruption or Destruction (HADD) of fish habitat, and that compensation for fish habitat loss is required in accordance with subsection 35(2) of the *Fisheries Act*. An assessment of environmental effects of pond loss, within this context, is therefore appropriate.

6.4.6.1 Environmental Effects

Adverse effects to the muskeg ponds will include the infilling of muskeg ponds during the development of mine infrastructure. Not all ponds contain fish, and those that do are typically associated with well developed fens near creeks and contain limited minnow communities. Approximately 19 ha of pond minnow habitat will be lost.

Regarding the potential for the draining of muskeg ponds due to general dewatering activities associated with well field operation, any such drainage effects are likely to be localized in the vicinity of bioherms.

6.4.6.2 Mitigation

Site infrastructure has been designed to minimize the overall footprint, thereby reducing the overall effect on pond habitat. Where pond losses are unavoidable, such as with the 19 ha of minnow bearing ponds, the Proponent has agreed to mitigate for the lost habitat by developing the central and north quarries into fish habitat. The aerial extent of the quarry ponds will approximately equal the lost pond habitat (18.5 ha) but will provide improved over wintering conditions by having a greater average depth than the existing muskeg ponds, which tend to freeze to bottom in severe winters.

6.4.6.3 Significance

Given the widespread and abundant presence of the muskeg ponds, the limited fisheries potential, and the proposed mitigation (in accordance with DFO policies regarding no net loss of the productive capacity of habitats), the effects to muskeg ponds area regarded as being not significant.

6.4.6.4 Comments/Concerns

Comments from MNR criticized sampling efforts in the ponds and suggested that all ponds to be effected by the project should be sampled regardless of their connection to creeks, or the likelihood of their freezing to the bottom.

Reviewers also requested that a clarification be made that the ponds would be lost, not displaced, and that the replacement of the ponds constituted compensation as opposed to mitigation. The Proponent agreed with this clarification.

6.4.6.5 Proponent's Response

With respect to the MNR comment regarding sampling effort, this comment may relate to the misinterpretation that large areas of muskeg will be dewatered. A total of 33 ponds reflecting a range of conditions were sampled. The collective results indicated a clear pattern of minnow occurrence. The Proponent believes that the sampling effort was reasonable, and in keeping with efforts for other similar projects.

6.4.6.6 RA Conclusions

The RAs have concluded that there are not likely to be any significant adverse environmental effects on muskeg ponds. Prior to any in-water works a fisheries compensation agreement will be developed between De Beers and DFO in consultation with the province and AttFn. This agreement will put in place all mitigation and fish habitat compensation requirements to assure no net loss of fisheries productive capacity.

6.5 Groundwater System

6.5.1 Shallow Overburden Aquifer

6.5.1.1 Environmental Effects

The ecological significance of the shallow overburden aquifer is defined by its relationship to surface water systems, including peatlands, which together with the underlying mineral soil comprise the shallow overburden aquifer system. The entire site area, except areas bordering the creeks and rivers, is comprised of muskeg (peatland) environments.

On a broad scale, there has been considerable discussion amongst reviewers concerning the potential of well field dewatering to actively dewater both the clay/silt overburden, as well as the overlying peat layer.

For muskeg zones underlain by marine clay/silt deposits, the Proponent predicted a net increase in recharge of 8.8 mm annually, in response to well field dewatering. This value represents 3.4% of the 260 mm annual runoff from the area. The 8.8 mm annual change is based on a vertical hydraulic conductivity ($K\nu$) value of 2.5×10^{-5} m/day for the marine clay deposits that underlie most of the project area. A 3.4% change in runoff is not expected to meaningfully alter the water balance within muskeg zones underlain by clay/silt materials.

A further consideration involves the possible role of bioherms to act as drain nodes or focalized points of recharge to the bedrock aquifer that could adversely affect the hydrology of local muskeg zones. Bioherms occur in bands, or clusters, typically within zones of slightly increased elevation (Figure 6-2), as the bioherms themselves are harder and hence more resistant to glacial scouring, compared with the surrounding limestone. In its hydrogeological model, the Proponent found the best model calibration with a Kv value of 0.01 m/day for the bioherms. A series of slug tests conducted in late October 2004 support this value. Use of the 0.01 m/d Kv value in the model indicated that there would be a mean annual reduction in runoff from the bioherm zones of 11.9%, indicating that bioherm zones would still generate considerable runoff and surficial overburden layers would remain wet.

Further details relating to muskeg drainage, and the potential for adverse effects to fen and bog communities are provided in Section 6.6.1.2.

The shallow overburden aquifer system also has a potential function in the maintenance of the Granny Creek system, through subsurface flow paths provided by the weakly expressed, buried beach ridges. There is some potential that if coarse substrate, poorly formed buried beach ridges, are intersected by ditching, or excavations (principally the open pit), then there could be a disruption to localized groundwater seeps to Granny Creek. Similarly, the placement of material stockpiles (processed kimberlite, mine rock) and the air strip, could potentially divert, or block shallow groundwater seepage pathways at the muskeg/clay overburden interface, thereby altering flows within local groundwater seeps. The reason for this is that these features are only weakly expressed, typically not more than 0.5 m in height, and most likely discontinuous. They also have a sufficiently high silt content that limits their ability to transmit water.

Well field operation will result in a partial depressurization of the overburden aquifer, leading to a calculated 4.8% reduction in natural flow to North Granny Creek (Section 6.4.3.1).

Construction of the PKC facility and other stockpiles also has the potential to interrupt local drainage through fens on the Victor claim block. However, most of the existing fen areas where local drainage effects are potentially of concern will be occupied by the various project stockpiles, and would cease to be fens in any event. Most of the fen systems bordering the stockpiles are expected to remain as fen systems, except where local mineralized drainages are permanently interrupted, in which case some fen areas might evolve over time into bog systems, as is already happening naturally in the area over the longer-term.

6.5.1.2 Mitigation

Mitigation measures related to effects involving shallow groundwater systems are not proposed.

6.5.1.3 Significance

Project-related environmental effects to the shallow overburden aquifer are expected to be such that effects on related surface water systems area expected to be limited to a 4.8% net annual reduction in Granny Creek flows. This flow reduction, in combination with other projected flow changes to Granny Creek is not considered to be significant (Table 6-11).

6.5.1.4 Comments/Concerns

A number of the federal and provincial government reviewers, most notably those from MNR, EC and NRCan, have expressed concern about the potential for mine dewatering activities to adversely affect the shallow overburden aquifer including its associated muskeg zone. This concern is in response to the large footprint of the cone of depression that is expected to result from dewatering, encompassing an estimated 2,575 km^2 to the limit of the 1 m draw down contour. Within a smaller zone of approximately 300 km^2 surrounding the pit, the overburden deposits will be completely underdrained as a result of dewatering activities. Concern has focused most specifically on bioherm zones. Specifically, representatives of NRCan have hypothesized that the bioherms could potentially act as conduits between surface and bedrock hydraulic systems, leading to a local "drying out" of surrounding muskeg zones in response to project dewatering. Accordingly, NRCan suggested that the Proponent should consider revising the February 2004 groundwater model (HCI 2004a) to more accurately reflect the potential role of the bioherms in the overall hydrogeological response to proposed dewatering activities. Gartner Lee, on behalf of the AttFN, has expressed these same concerns, regarding the potential to dewater large areas of muskeg.

6.5.1.5 Proponent's Response

In response to concerns raised regarding the potential for general muskeg dewatering, and particularly that involving bioherm zones, the Proponent issued a revised groundwater model report in September 2004 (HCI 2004b). The Proponent also invited representatives of the federal and provincial government agencies to visit the Victor site to further consider their concerns. Site visits were undertaken during September and October 2004. Further dialogue and exchanges of information followed the issuing of the revised groundwater model, and the site visits.

Based on the revised groundwater modelling efforts, and supplementary data, the Proponent has concluded that there is little potential for the bioherms to act as drain nodes in a manner that could potentially dewater meaningful areas of the shallow overburden aquifer and associated muskeg zones, or have an adverse effect on local creeks such as Granny Creek.

Additionally, the Proponent has agreed to monitor water levels within the shallow groundwater aquifer, throughout the zone of deeper aquifer draw down and at representative control sites, to assess the localized effects of bedrock dewatering on the shallow groundwater aquifer, if any.

Regarding other, physical effects on peatland drainage, such as from ditching, the Proponent provided evidence that Victor site area peatlands are resistant to such effects, citing evidence from the literature suggesting that the effects of open ditch drainage works typically extend only a few meters from the edge of the ditches (MacFarlane ed. 1969).

The Proponent's specialist in peat drainage - Mr. Pat Fitzgerald, of Bord Na Mona Energy Limited, Ireland – also advised that Victor area peatlands were not likely to be susceptible to meaningful lateral or under-drainage effects related to proposed mine activities. Mr. Fitzgerald had been involved in earlier planning for the project during the desktop study phase in 2001, when proposals were first put forward to drain the muskeg in the general Victor site area (to improve access around the site), using a complex arrangement of ditching. At that time, Mr. Fitzgerald advised that such a system would be ineffective, as the muskeg is extremely difficult to drain, even with closely spaced networks of ditches.

6.5.1.6 RA Conclusions

The RAs believe the effects may be different than what was predicted by the Proponent in some areas. Although the mining operations will have non-recoverable effects to the immediate mine area, these effects are not expected in the surrounding region. Furthermore the RAs anticipate some isolated underdraining, associated with bioherms, in the 300 km^2 area surrounding the pit. The RAs conclude that these adverse environmental effects are not likely to be significant.

6.5.2 Bedrock Aquifer

Similar to discussions involving the shallow groundwater aquifer, the ecological significance of the bedrock aquifer lies in its linkage to surface water systems. Of particular note in this regard is the linkage between the bedrock aquifer and local river systems, and the linkage between the bedrock aquifer system and the overlying overburden aquifer, and its associated muskeg (peatland) systems. Bedrock aquifer effects relating to river systems are addressed in Section 6.4. Effects linked to the shallow overburden aquifer system and to associated muskeg (peatland) systems are addressed in Sections 6.5.1 and 6.6.1, respectively.

6.6 Terrestrial Environment

6.6.1 Vegetation Communities – Victor Site Area

Effects to terrestrial environment vegetation communities are discussed under the following sub-headings:

1) Changes to riverbank and creek margin forests;
2) Changes to northern ribbed fen with broad flark (pool) communities;
3) Changes to upland sites; and,
4) Changes to other peatland habitats.

The first three habitat types (riverbank and creek margin forests, northern ribbed fens with broad flarks, and upland sites) are defined as VECs. The term “disruption” includes direct habitat displacement and significant adverse changes to habitats, including changes induced by changes in surface and subsurface drainage patterns and subsidence. Separate discussions of these potential environmental effects, and the need for mitigation, if any, are presented below. Summary evaluations are presented at the end of the section.

6.6.1.1 Changes to Riverbank and Creek Margin Forests

6.6.1.1.1 Environmental Effects

The importance of riverbank and creek margin forests is recognized because of:

- The greater productivity and structural diversity of plant species comprising riverbank and creek margin forests;
- Their role in providing bank stabilization and erosion control; and,
- Their provision of wildlife habitat.

In recognition of the comparative importance of riverbank and creek margin forests, and in recognition of the importance of the watercourses themselves, De Beers has adopted a policy of avoiding any infringement on riverbank and creek margin forests, except where such disturbance cannot reasonably be avoided.

Specific instances where it is not possible to avoid disturbance to riverbank and creek margin forests include:

- The rerouting of South Granny Creek;
- On-site all-season road and pipeline (waterline) crossings at watercourses;
- Development of access to the Attawapiskat River for the construction and operation of the well field outfall and pumphouse intake facilities;
- Development of access to the Nayshkootayaow River and tributary creek systems for creek flow supplementation;
- Existing developments associated with on-site advanced exploration activities;
- Existing and planned south winter road crossings at watercourses; and,
- Planned watercourse crossings associated with the new 115 kV transmission line construction following along the James Bay west coast, north from Otter Rapids (or Pinard), and inland from Attawapiskat to the Victor site along the south winter road.

Diverting South Granny Creek is necessary for the safety and stability of open pit mining operations. However, while South Granny Creek will be rerouted as described in Section 6.4.3, the forest habitats associated with the creek margins will be left largely intact, except in the immediate pit perimeter area, and at dike and road crossing areas. The total area of forested habitat that will actually be disturbed in this context is estimated at 13 ha. The specific forest type that will be disrupted is the F2 coniferous forest community type, dominated by black spruce with minor larch (or tamarack) (as shown in the CSEA).

Disruption to riverbank and creek margin forest habitats at road and pipeline crossings is unavoidable. The width of forest habitat that would be displaced at each crossing is in the order of 50 m for road/pipeline routes, 20 m for on-site access roads, and 35 m for on-site haul roads. The depth of forest development back from the river and creek margins averages approximately 100 m at both the smaller creek and river crossings, and the Attawapiskat River crossing. For all on-site crossings combined (one for South Granny Creek, two for North Granny Creek, and approaches to the Attawapiskat River [Figure 2-1]), the total amount of forest habitat that would be disrupted is estimated at approximately 5 ha. This includes habitats that would be disrupted in association with access development to the Attawapiskat River for the construction and operation of the well field outfall and pumphouse intake facilities. Specific forest types that will be disrupted include the F1 and F2 coniferous forest types (as shown in the CSEA), dominated by black spruce.

Development of access to the Nayshkootayaow River and tributary creek systems for creek flow supplementation will result in the disturbance of approximately 2 ha of mainly black spruce coniferous forest (F1 and F2 coniferous forest types).

In addition to planned disturbances to site area creek and river bank forests at crossing areas, previous disturbance to creek and river bank forests has occurred at Granny Creek winter road crossings, and at the exploration camp and test processing facility sites adjacent to the Nayshkootayaow River. The areal extent of disturbed habitats associated with passed activities is approximately 3 ha, consisting of F1 and F3 coniferous and mixed coniferous forest types (as shown in the CSEA), dominated by black spruce, and by trembling aspen and balsam poplar in the case of the F3 forest type.

Disruption to riverbank and creek margin forest habitat at winter road and transmission line crossings is unavoidable. For the south winter road alignment, which already exists, but would be expanded to accommodate an improved winter road and associated transmission line, there are up to 13 creek and river crossings, each with a corridor width of 60 m, and with a depth of forest on each bank averaging 100 m. The resultant area of displaced riverbank and creek margin forest is calculated at 0.16 km^2. If the 30 km south winter road re-alignment near the community of Attawapiskat (or an alignment generally following this route) is adopted, as shown in Figure 2-3, then the two existing crossings of the Attawapiskat River would not have to be widened, as they would no longer be required for the VDP, and vegetation communities at the two crossings could be actively restored. This action would marginally reduce the disruption to riverbank forest communities, as there would still be one new crossing of a forest-lined relict channel south of the Seal River with adoption of this option. There are no creek or river crossings associated with the west winter road. For the new coastal transmission line route, there are approximately 97 watercourse crossings (Otter Rapids to Attawapiskat inclusive), which for a 30 m wide ROW, results in a total of approximately 0.58 km^2 of displaced riverbank and creek margin forest.

The total area of creek and riverbank forest that will be disrupted by project-related developments (existing and planned) is therefore estimated as 0.97 km^2, which includes 0.23 km^2 of site area developments, and 0.74 km^2 of displaced creek and riverbank forest associated with winter road access and transmission line construction.

6.6.1.1.2 Mitigation

Where feasible, the Proponent has left a minimum 200 m buffer between project-related developments and creek and river habitat, so as not to unnecessarily encroach upon riverbank and creek margin forests.

Where encroachment on riverbank and creek margin forest habitat is unavoidable, such as for road access, and locating pump stations, the Proponent has committed to re-vegetating disturbed riverbank and creek margin areas at closure using native species seed mixes, together with a supporting nurse crop of oats, and plantings of black spruce seedlings at a density of one tree per 5 m^2. The native species mix or mixes for site revegetation will be determined through on-site test work programs currently being developed by Laurentian University for the Victor site area. These studies are being carried out under the direction of Professors G.M. Courtin and P.J. Beckett.

The soil will be scarified at reclamation prior to planting where the soil has become compacted due to heavy traffic (to the extent practicable) to improve plant growth conditions.

The combination of seeding with native species and the planting of spruce seedlings will initiate the forest regrowth process. Subsequent invasions of native plants will follow shortly thereafter because all disturbed riverbank and creek margin areas will be small, and will be closely flanked by native forest communities that will provide material for natural seeding.

Also with respect to developments along the Attawapiskat River, the Proponent has agreed to make best efforts to develop natural landscapes around any facilities constructed along the Attawapiskat River in the vicinity of the Victor claim block to improve overall project-related aesthetics.

There are no planned rehabilitation measures associated with development of the coastal transmission line, as this facility will be left in place to provide more reliable power service to the local communities.

Anticipated Effectiveness of Mitigation Measures and Contingencies – Vegetation restoration of riverbank and creek margin areas is readily achievable, especially given the planned work by Laurentian University, and no contingencies are required or proposed.

6.6.1.1.3 Significance

Magnitude of disturbance to riverbank and creek margin forest is low and therefore a Level 1 rating for magnitude/geographic extent. The effects of a substantial portion of this disturbance (all those effects except those associated with the coastal transmission line, which are deemed to be permanent) end at closure, resulting in a Level 2 rating for duration for much of the effect. On the basis of Level 1 rating for magnitude/geographic extent, the adverse effects to riverbank and creek margin forests are not significant.

6.6.1.1.4 Comments/Concerns

No specific concerns were raised by any of the government reviewers or by any members of the First Nations or the general public regarding the temporary loss of a limited amount of riverbank and creek margin forest, except by MNR in connection with the Attawapiskat River proposed candidate waterway park (herein referred to as the ARPCWP).

The ARPCWP is covered by Withdrawal Order W21/79, which provides for the removal of lands from mineral staking for a distance of 200 m from the north and south banks of the river. Due to incomplete government records for this area, claims were inadvertently allowed to be staked, and in recognition of the confused documentation, the validity of the Victor claims has been legitimized by a new Withdrawal Order (W-P-01/05) and by an Order-in-Council (MNDM letter to De Beers dated April 20, 2004), (EBR Registry Number XB04E2006).

The EBR registry states that a 33 km contiguous section of the waterway has been removed from the “proposed candidate waterway park” where valid mining claims are held, including claims held by De Beers and including the Victor claim block. The remaining portion of the ARPCWP remains subject to the withdrawal order, but it is further recognized that “some flexibility may be necessary to permit limited infrastructure requirements related to a planned new diamond mine (the project) and to address the development needs of the community of Attawapiskat”.

As a result, forested areas bordering the Attawapiskat River that will be disturbed by activities associated with on-site operations at the project site are excluded from the ARPCWP. This aspect notwithstanding MNR has concerns about aesthetics along the waterway, and has specifically requested that De Beers make its best efforts to maintain the Attawapiskat River shoreline communities intact to reduce erosion, protect known Karst geology associated with the shoreline, maintain fisheries communities and aquatic representation including sturgeon fishery and maintain aesthetics for First Nation culture, and existing and potential recreation and tourism objectives.

6.6.1.1.5 Proponent’s Response

The Proponent has agreed to work with MNR to minimize impacts to Natural Heritage Values, to the extent reasonably feasible, including those related to the ARPCWP, and take all reasonable steps to develop natural landscapes around any facilities constructed along the Attawapiskat River in the vicinity of the Victor claim block.

Possible rerouting of the eastern portion of the existing south winter road, as proposed by the Proponent to keep it south of the Attawapiskat River, removes the two existing road crossings of the ARPCWP.

6.6.1.1.6 RA Conclusions

Most wildlife values that could be affected by crossing the river margins are point values, e.g., raptor nest. Small areas of temporary habitat change are not considered limiting factors for wildlife. The RAs have concluded that there will no be likely significant adverse environmental effects to riverbank creek and margin forests. This conclusion will be evaluated through the follow-up program identified in Chapter 8.

6.6.1.2 Changes to Northern Ribbed Fen with Broad Flark (Pool) Communities

6.6.1.2.1 Environmental Effects

The current project design will result in the direct physical displacement of approximately 3.20 km^2 of fen habitat classed as “northern ribbed fen with broad flarks”. Physical displacement will occur mainly as a result of stockpile development, with some losses due to encroachment of the open pit, and losses are not considered to be reasonably avoidable. This habitat type has importance to wildlife, including migratory birds and caribou; however, such habitats are widespread and are not considered to be limiting to wildlife populations. More specifically, the northern ribbed fen with broad flark habitat type is essentially equivalent to the open fen habitat type shown in provincial Land Cover mapping.

South and west winter road, and transmission line, construction will potentially disturb an additional 1.44 km^2 of northern ribbed fen with broad flark habitat. This habitat type is equivalent to the open fen habitat type shown in provincial Land Cover mapping. Disturbance to open fen habitats from winter road and transmission line construction would be limited within the corridors themselves, and therefore of low magnitude, because most of the ground cover would remain intact (refer to CSEA Figure 8-22 for winter road effects; disturbance associated with transmission lines would also be less than for winter roads).

The combined direct physical disturbance to the northern ribbed fen with broad flark habitat type, associated with all project related developments, would therefore be restricted to approximately 4.64 km^2.

A second broader issue is the potential for general area wide muskeg drainage related to open pit dewatering and well field operation. This concern was raised by a number of government reviewers, and by some consultants working on behalf of the First Nations. Muskeg systems in the project area are underlain by marine clays and silts of the Tyrell Sea transgression, and are therefore effectively perched, or isolated from bedrock dewatering effects.

6.6.1.2.2 Mitigation

In an effort to limit environmental effects to all Victor site area habitats, including the northern ribbed fen with broad flark (pool) habitat, a compact site is being developed. This action notwithstanding, disruption to northern ribbed fen with broad flark habitats will occur within the areas of mineral stockpile placement; and that it will not be feasible to restore the original fen communities because the development of fen habitats is dependant on flat, waterlogged terrain. The stockpiles will be mounded to heights of up to approximately 12 m above the surrounding muskeg surface, and will therefore be better drained than the original terrain, with the exception of low areas within the PKC facility. These low areas can be rehabilitated as wetland environments; but otherwise, the stockpiles will be more suitable for rehabilitation to coniferous and mixed forest communities, possibly with locally wet areas in depressional zones.

The Proponent is proposing to use seed mixes similar to those proposed for restoring disturbed riverbank and creek margin areas, together with plantings of black spruce seedlings (possibly along with jack pine and trembling aspen seedlings) to initiate forest growth. Once developed, these forested “upland” areas will provide habitat for moose, marten, red fox, various small mammals, and a variety of migratory and non-migratory bird species. The ability of these newly created upland areas to sustain wildlife is expected to exceed that of the displaced fen habitat, because of increased system productivity. But the plants and wildlife that will ultimately occupy these new forested areas will be different from those of the fen communities, and will instead be more similar to those of the riverbank forest communities.

With respect to effects involving northern ribbed fen with broad flark habitats along the south winter road and transmission line routings relatively little disturbance would actually occur to fen communities within these zones, especially along transmission line routings, as the ground cover within the corridors would be left largely in tact due to winter construction and/or use of these facilities.

<u>Anticipated Effectiveness of Mitigation Measures and Contingencies</u> – With a plan to mimic existing forest habitats in the area, and with the aid of vegetation trials conducted by Laurentian University, there is little potential for mitigation failure. There are also opportunities to progressively closeout portions of the PKC facility and some portions of the overburden and rock stockpiles, during later stages of the operation, in advance of final closure. Also, because the stockpiles will not be chemically active, the likelihood of revegetation success at the Victor site is very high.

Concern has been expressed by the federal and provincial agencies that the rehabilitation measures specified in the Closure Plan may not be sufficient to promote effective vegetation re-growth. In response to this concern, and as part of the studies being carried out by Laurentian University, the need for amending overburden cover with peat materials will be further evaluated. If the results of this evaluation indicate that soil amendment with peat is required for effective plant growth, the Proponent has committed to carrying out such amendments, and to amend the Closure Plan accordingly.

6.6.1.2.3 Significance

The magnitude of disturbance to northern ribbed fen (with broad flark) systems will be low and therefore rated as Level 1 for magnitude/geographic extent. Portions of this effect associated with transmission line and winter road development would be of very low magnitude. Also, while the effects to fen habitats associated with Victor site area development are not reversible, disturbed fen habitats will be rehabilitated at closure to forest and other habitats that will support wildlife.

On the basis of a Level 1 rating for magnitude/geographic extent, the adverse effects to northern ribbed fen with broad flark habitats are not likely to be significant.

6.6.1.2.4 Comments/Concerns

As indicated above, a number of the federal and provincial government reviewers, most notably those from MNR, EC and NRCan, have expressed concerns about the potential for mine dewatering activities to adversely affect muskeg environments beyond those displaced by direct physical developments. This concern is in response to the large footprint of the cone of depression that is expected to result from dewatering, encompassing an estimated 2,575 km^2 to the limit of the 1 m draw down contour. Through subsequent discussions with the Proponent, the nature of this concern has come to focus most specifically on the bioherm zones identified in the area by the Proponent, and areas immediately surrounding individual bioherms. More specifically, as referenced above, representatives of NRCan have hypothesized that the bioherms could act as conduits between surface and bedrock hydraulic systems, leading to a local “drying out” of surrounding muskeg zones in response to project dewatering. Requests were put forward by NRCan representatives, through a set of detailed comments issued on June 10, 2004, for the Proponent to revise the February 2004 groundwater model (HCI 2004a), to more accurately reflect the potential role of the bioherms in the overall hydrogeological response to proposed dewatering activities. Further discussions regarding NRCan and MNR concerns, were held and are reflected in supporting documents.

Gartner Lee, on behalf of the AttFN, has expressed these same concerns, regarding the potential to dewater large areas of muskeg.

6.6.1.2.5 Proponent’s Response

In response to concerns raised regarding the potential for general muskeg dewatering, and particularly that involving bioherm zones, the Proponent issued a revised groundwater model report in September 2004 (HCI 2004b). The Proponent also invited representatives of the federal and provincial government agencies to come to the Victor site, so that they could view the site first hand. Site visits were undertaken during September 23 and 24, and again on October 5 and 6, 2004. Further dialogue and exchanges of information followed the issuing of the revised groundwater model, and the site visits. The Proponent also conducted slug tests at some of the bioherm sites to further characterize the potential for bioherm zones to act as hydraulic conduits, in response to GSC suggestions that this work would be helpful in reducing levels of uncertainty.

Based on the revised groundwater modelling efforts, the results of slug tests, and observations associated with the sinkhole meadow, eastern bioherm series, and the exposed, failing riverbank slope on the Nayshkootayaow River, as described in above, the Proponent has concluded that there is little potential for the bioherms to act as drain nodes in a manner that could potentially dewater meaningful areas of muskeg.

Additionally, the Proponent has agreed to monitor water levels within the muskeg throughout the zone of groundwater draw down and at representative control sites; and to establish a series of vegetation monitoring plots in the vicinity of bioherms, including control sites, to assess the localized effects of bedrock dewatering on muskeg systems in the vicinity of bioherms, if any.

In the September 2004 hydrogeological model update, HCI assigned recharge rates of 2.6 mm/a and 13 mm/a for pre-mining and mining conditions, respectively, to muskeg zones underlain by marine clay/silt deposits. Recharge rates were based on a vertical hydraulic conductivity (Kv) value of 2.5×10^{-5} m/day. Mean annual precipitation and runoff values for the Victor site area have been nominally calculated at 690 mm and 260 mm, respectively, based on data from the four smaller regional flow monitoring stations maintained by Environment Canada in the James Bay Lowlands (i.e., those for the Muswabik, Kwatoboahegan, Shamattawa and Ekwan Rivers). The predicted net increase in recharge of 8.8 mm annually represents a small percentage (3.4%) of the annual runoff from the area, and is not expected to meaningfully alter the water balance within muskeg zones underlain by clay/silt materials.

By way of comparison, statistical data for regional Environment Canada surface water flow monitoring stations show the following mean and standard deviation (SD) values for annual runoff: Muswabik River (249.9 ±113 mm), Kwatoboahegan (304.5 ±86 mm), Shamattawa River (257.8 ±80 mm) and Ekwan River (263.8 ±92 mm). Measured as a percentage, one standard deviation for the four stations averages 35% of the annual mean. Muskeg systems in the Victor area are therefore regularly subject to variations in annual runoff that far exceed the calculated 3.4% runoff capture rate from clay/silt areas.

A more focused consideration relating to the potential for muskeg drainage involves the possible action of bioherms to function as local drain nodes. Under this scenario, bioherms are viewed as conduits between surface and bedrock hydraulic systems, and there is potential for surrounding muskeg areas to drain towards the bioherm zones (in a depressurized state), resulting in a local "drying out" of surrounding muskeg zones.

In response to this potential concern, HCI (2004b) defined bioherm recharge areas based on the observation that bioherm expression occurs within bands, or clusters (Figure 6-2). HCI conducted a sensitivity analysis of potential bioherm recharge dynamics by assigning vertical hydraulic conductivity (*K*v) values to bioherm zones of 0.01 m/day, 0.1 m/day, and 10 m/day (i.e., a range of values covering three orders of magnitude). HCI achieved the best model calibration with a *K*v value of 0.01 m/day.

For the best-case model calibration (i.e., *K*v = 0.01 m/day), the model indicated that there would be a mean annual reduction in runoff from the bioherm zones of 11.9%. Corresponding annual reductions in runoff for the higher *K*v values 0f 0.1 m/day and 10 m/day were calculated at 19.4% and 38.5%, respectively. The calculations indicate that while there would be a reduction in runoff from the bioherm zones (estimated at 11.9% for the most probable scenario), these zones would still generate considerable runoff and would therefore remain wet.

A more detailed consideration relates to muskeg zones immediately adjacent to individual bioherms, as opposed to the bioherm zones themselves. At such locations there is the potential for local muskeg dewatering to occur to the extent that plant communities could potentially be affected. Within this context, the Proponent has drawn attention to certain specific features, located to the east of the Victor site. The specific features include a well-developed sinkhole meadow and a series of bioherms located about 8 km east of the Victor deposit, and an exposed, failing riverbank slope on the Nayshkootayaow River just upstream of its confluence with Granny Creek.

The sinkhole at the centre of the sinkhole meadow has developed within a zone of atypical karst, where down-cutting of the Attawapiskat and Nayshkootayaow Rivers, in close proximity to one another (2 km), over the past approximately 4,000 years has accentuated hydraulic gradients within the underlying limestone, with vertical to horizontal (V: H) gradients being in the order of 2V:100 H in the direction of the Attawapiskat River and 1V:100H in the direction of the Nayshkootayaow River. The radius of influence of the sinkhole is shown as being approximately 110 to 160 m. The affected area is still muskeg, but there is an obvious effect on pond development near the sinkhole (Figure 6-3).

The series of bioherms shows another functional aspect related to surface drainage in this same area. Each bioherm is flanked on northeast side by a crescent-shaped pond. Such pond development is unusual for area bioherms, and is regarded as having developed in response to local karstic conditions. The Proponent has hypothesized that karstic development associated with expression of the bioherms has resulted in a downward surface water gradient next to the ponds, with secondary surface water outflows to the rivers, as evidenced by drainage patterns in the photo (Figure 6-3). Downward, opposed to upward, surface water gradients were confirmed through water quality analysis, which showed the ponds to be low in dissolved salts (chloride 0.6 mg/L, sodium 0.54 mg/L, and sulphate 0.3 mg/L) associated with the deeper bedrock aquifer. Karstic conditions associated with the bioherm perimeters, within this naturally depressurized area, have not generated a noticeable change (i.e., drying out effect) in the adjacent muskeg. NRCan cautions about extrapolating such conclusions to the mining period when much higher downward head gradients are generated as a result of overburden underdraining caused by pit dewatering.

The final example showing the limits of muskeg drainage in response to adjacent drain nodes, noted by the Proponent, is the failing riverbank slope of the Nayshkootayaow River shown in Figure 6-3. At this location the Nayshkootayaow River has cut directly into the adjacent muskeg, such that the typical forest border found along the river at the muskeg edge is absent, and there is an approximate 10 m drop between the surface of the muskeg and the river, with exposed muskeg along an approximately 425 m open cut face. As such, the muskeg face is subjected to unimpeded lateral drainage under natural head gradients. Site measurements show that despite the adjacent face exposure, the muskeg is fully saturated within 10 to 20 m of the bank failure, and that there is no appreciable affect on plant community development except for slightly better tree growth within 5 to 10 m of the open cut.

Based on evidence provided by these naturally drained conditions, and the well-known resistance of muskeg (peatlands) to drainage (Ivanov 1981, Heathwaite 1993), the Proponent has concluded that there is little potential for peatland drainage adjacent to bioherms, in response to project dewatering activities, within the applicable timeframe of approximately 20 years.

6.6.1.2.6 RA Conclusions

The RAs conclude that there will not be likely significant adverse environmental effects to northern ribbed fen with broad flark communities. Follow-up programs outlined in Chapter 8 will ensure the adequacy of this conclusion.

6.6.1.3 Changes to Upland Sites

6.6.1.3.1 Environmental Effects

Three types of upland sites occur in the project development area: bioherms, permafrost mounds (peat plateau bogs and palsa bogs), and glaciofluvial features such as eskers.

Based on the CSEA, bioherms (limestone outcrops through the muskeg surface and associated upland soils) occur in a broad northwest-southeast trending band to the immediate east of the project; as a less developed, parallel band of features passing through the project site area; and as a much better-developed band/cluster located approximately 35 km to the west of the Victor site (Figure 6-2). As such, these features in various forms are common in the local area.

Project development associated with the Victor site will displace approximately 9 ha of bioherm sites associated with the north, central, and south quarry sites, only small portions of which

(<5 ha) comprise areas of rock outcrop. Winter roads and transmission lines will not directly traverse bioherms.

A principal consideration regarding bioherms in the Victor site area is the relationship of the bioherms to the Attawapiskat Karst candidate ANSI. This aspect is considered in Section 6.8.2. The Victor site area bioherms are not particularly good examples of regional bioherms.

With regard to the potential for bioherms to support unusual plant communities or species, plant communities that tend to be associated with the bioherms are generally similar to those found in better drained areas bordering the larger rivers, with the exception of species such as the common juniper (*Juniperus communis*) which tend to grow on rock and sandy sites. Two rare plant species - the flat-petalled yellow lady's slipper (*Cypripedium calcceolus var. planipetalum*) and pussy-toes (*Antennaria rosea*) were noted as potentially occurring on bioherm sites. Neither species was found on the Victor site.

Peat plateau bogs and palsa bogs constitute the only areas of permafrost development in the Victor site area. Both vegetation/terrain types are of sporadic and limited occurrence. Two small permafrost zones occur within the pit perimeter boundary. The largest of these areas is the site of the former exploration camp, with a diameter of approximately 250 m. The combined area of permafrost terrain (peat plateau bogs and palsa bogs) that will be disrupted by site development is approximately 6 ha. Project development is not expected to adversely affect other permafrost features in the area. Project-related winter road and transmission line routings, with minor possible exceptions, avoid peat plateau bogs and palsa bogs.

Glaciofluvial habitats that will be disrupted by project development are limited to a section of esker that will be used for aggregate removal. The esker is located 17 km to the west of the Victor site. Esker and other glaciofluvial habitats are virtually non-existent within that portion of the Attawapiskat River basin that lies east of the Victor site. The absence of such features in this area is an anomaly within the James Bay Lowland region. However, in the area just west of the Victor site, and in areas north and south, these features are common.

A maximum of 100,000 m^3 of sand and gravel will be removed from the esker for site construction, resulting in disturbance to not more than 5 ha of the feature. The entire esker measures some 3 km in length and approximately 100 ha in area. Effects resulting from removal of sand and gravel from the esker will be fully restorable at closure, as excavations within the esker will remain above the water table. The west winter road will access, but will not cross, the esker.

6.6.1.3.2 Mitigation

Bioherms associated with the three quarry sites will be lost due to excavation, and the mined out quarry sites will become ponds at closure. Limestone exposed habitats provided by the bioherms can be replaced at closure by leaving portions of the limestone mine rock stockpile exposed, as opposed to developing a soil cover on the entire stockpile. Since the entire mine rock stockpile will cover an area of approximately 100 ha, the replacement of approximately 5 ha of exposed limestone rock surface (the maximum loss of bioherm rock exposure) can easily be accommodated. The Proponent has committed to working with federal and provincial agencies and AttFN to develop a detailed site restoration plan for the mineral stockpiles, including the creation of specialized habitats, such as those mimicking bioherms.

The peat plateau bogs and palsa bogs located within the open pit area will be lost. There is no effective strategy to replace these specific permafrost features. However, site reclamation of mineral stockpile areas at closure will result in the development of an estimated 660 ha of new forested upland habitat, and as such the approximately 6 ha of structurally simple and low productivity coniferous forest habitat, provided by the displaced permafrost features, will be replaced by a far larger area of structurally more complex and more productive coniferous forest habitat.

The disturbed portions of the esker will be contoured and replanted with black spruce and jack pine at the end of the three-year construction phase.

Anticipated Effectiveness of Mitigation Measures and Contingencies – Natural and self-sustaining vegetation communities can be established at closure. Programs are underway with Laurentian University to better define optimal species and growing conditions for rehabilitation. Progressive reclamation of some stockpiles, or portions thereof, will be carried out prior to final closure, which will provide added information to assist with final closure.

6.6.1.3.3 Significance

The magnitude of disturbance to upland sites: bioherms, permafrost mounds, and glaciofluvial features will be limited, calculated at 9 ha, 6 ha, and 5 ha, respectively.

The area of bioherms within the project study area (PSA) is calculated as being not less than 21.3 km^2 based on mapped bioherms contained within the 1 m well field draw down contour shown in Figure 6-2. The Proponent has also committed to the restoration of bioherm-like habitats at closure, generating a Level 2 condition for duration.

The area of peat plateau bogs and palsa bogs within the mapped Victor site area represents 1.2% of the landscape. Extrapolating this value to the project study area of 22,400 km^2 generates an area of permafrost features equal to 270 km^2. Coniferous forest habitats provided by these features would be replaced by other types of forest habitat developed on the raised mineral stockpiles at closure.

The area of esker habitat within the PSA has not been determined, as the available data do not allow a distinction to be made between glaciofluvial features and prominent raised beaches. The habitat features at the esker site will be restored at closure.

On the basis of a Level 1 rating for magnitude/geographic extent, the adverse effects to all upland sites will not be significant.

6.6.1.3.4 Comments/Concerns

Government reviewers raised specific concerns regarding the uniqueness and ecological importance of both bioherms and the esker. No substantive concerns were raised regarding peat plateau bogs and palsa bogs.

With regard to the bioherms, three specific concerns were raised, notably: the importance of the bioherms as components of the Attawapiskat Karst candidate ANSI; the uniqueness of the bioherms and their associated vegetation communities; and the importance of bioherms to the hydrogeological regime of the area, in relation to planned dewatering activities. Considerations relating to the linkage between bioherms and hydrogeological concerns are addressed in Section 6.6.1.2.

With respect to the esker site, concerns were expressed by MNR regarding the potential sensitivity and uniqueness of this feature, including its potential importance to caribou. MNR also requested clarification on what alternatives had been considered for project sand and gravel sources.

6.6.1.3.5 Proponent's Response

With respect to bioherms, the Proponent has recognized the importance of bioherms to the overall expression of the Attawapiskat Karst candidate ANSI, but at the same time has determined that the three bioherms proposed as quarry sites (including the existing south quarry) are not particularly good examples of regional bioherms, and that there are an estimated 346 bioherms within the ANSI boundary, together with numerous other bioherms beyond the ANSI boundary (Figure 6-2).

With respect to the potential for bioherms to support unique vegetation communities, the Proponent has concluded that since bioherms are prevalent and widespread in the area surrounding the Victor site and especially to the west of the site, the associated plant communities by definition are not unique. Two rare plant species were noted by the Proponent as potentially being present in association with bioherms, but site investigations revealed that neither species occurred on bioherms that will be disturbed as a result of site development.

With regard to the esker and its uniqueness in the area, the Proponent has indicated that the esker is one of several such features in the region, which occur north, west and south of the Victor site area.

Regarding the potential importance of the esker to caribou, the Proponent has acknowledged that the esker is lichen-rich and is probably used by caribou. However, there was no evidence of extensive grazing that would suggest that this feature is heavily utilized by caribou, or that its lichen resources are in any way limiting for caribou. The Proponent also stated that only about 5% of the esker would be disturbed by aggregate (sand and gravel) extraction, and that disturbed portions of the site would be rehabilitated following the project construction phase. The Proponent has also indicated that there is an opportunity to generate additional jack pine – lichen rich environments through rehabilitation of the coarse PK stockpile, and perimeter portions of the fine PK stockpile, at closure. The Proponent has agreed to work with MNR, EC and the AttFN to develop a detailed rehabilitation plan for the disturbed portion of the esker.

6.6.1.3.6 RA Conclusions

The RAs have concluded that there will not be a significant adverse environmental effect, as the project will result in a net increase in upland habitat.

6.6.1.4 Changes to other Peatland Types

6.6.1.4.1 Environmental Effects

The "other peatland habitats" are bogs, northern ribbed fens with narrow flarks, and horizontal fens. These habitat types were not defined as VECs. Bogs are comparatively simple, low productivity habitats for both vegetation and wildlife. The two fen environments (northern ribbed fens with narrow flarks, and horizontal fens) are more productive for vegetation, but are less productive for wildlife compared with northern ribbed fens with broad flarks – defined as a VEC habitat. Aspects of lower productivity notwithstanding, the project development plan for the Victor Diamond Project seeks to minimize disturbance to the landscape generally by developing the site in compact fashion, in close proximity to the open pit.

Project activities associated with development of the Victor site are expected to directly displace 5.17 km^2 of "other peatland habitats". A further estimated 10.84 km^2 of these habitat types will be partially disturbed as a result of project developments associated with winter roads and transmission line construction. The 10.84 km^2 value includes 0.58 km^2 of principally horizontal fen habitat associated with the 30 km long south winter road by-pass, should this by-pass be constructed.

Concerns related to the broader issue of the potential for general area wide muskeg dewatering in response to well field operation are addressed in Section 6.6.1.2. The Proponent has concluded that there is limited potential for such effects, and in only very localized areas in the immediate vicinity of bioherms.

6.6.1.4.2 Mitigation

Where bog and fen habitats are displaced by mineral stockpiles, the Proponent proposes to vegetate the stockpiles at closure using native plant species. Soil covers will be used as appropriate to facilitate vegetation growth, so as to develop self-sustaining plant communities. Studies are currently being conducted through Laurentian University to determine the best species to use for site rehabilitation. Other disturbed and slightly raised areas, such as all-season on-site roads, and building and yard areas, will also be amended with soil covers and vegetated.

No mitigation measures are proposed for the rehabilitation of fen and bog communities traversed by the winter road corridors (south and west winter roads), or by the transmission line corridor from Attawapiskat to the Victor site, as it is expected that adverse effects to the ground cover in these areas will be limited, and the muskeg communities will be self regenerating over time following closure.

The open pit will be actively flooded at closure and will become a small lake with a closed drainage. The pit lake water level will stabilize at a point approximately 2 m below the existing muskeg surface, with outflow occurring as subsurface seepage through the bedrock sidewalls to the adjacent Attawapiskat River and Nayshkootayaow River as per existing groundwater flow paths. Pit slopes bordering the pit lake will be vegetated in the same manner as that described for disturbed riverbank and creek margin areas.

To the extent permitted by topography, the Proponent has committed to the development of wetlands within disturbed areas. Opportunities for wetland development at closure have been identified within low-lying portions of the PKC cells, around quarry and pit lake shoreline margins, within depressional zones of the various mineral stockpiles. The available area that could potentially be developed as wetland habitat has been estimated by the Proponent to be in the order of 150 ha. A tentative breakdown of this area is given as follows: PKC area – 75 ha, overburden stockpile – 50 ha, mine rock stockpile – 15 ha, low grade kimberlite stockpile – 5 ha, and pond margins – 5 ha.

Anticipated Effectiveness of Mitigation Measures and Contingencies – Natural, self-sustaining vegetation communities can be established at closure. Programs are underway with Laurentian University to better define optimal species and growing conditions for rehabilitation. Progressive reclamation of some stockpiles, or portions thereof, will be carried out prior to final closure, which will provide added information to assist with final closure.

6.6.1.4.3 Significance

Approximately 5.17 km^2 of other peatland types will be directly displaced by site infrastructure development, together with a further 10.26 km^2 associated with winter road and transmission line construction. The 5.17 km^2 figure includes 4.45 km^2 of bog terrain and 0.72 km^2 of fen terrain, mainly northern ribbed fens with narrow flarks. If the 30 km long south winter road by-pass is constructed, a further 0.58 km^2 of peatland habitat will be partially displaced, recognizing that groundcover along the winter road will remain largely intact.

The effects are considered to be of low magnitude and of limited duration in terms of habitats associated with winter road and transmission line corridors – low magnitude because ground cover would be left largely in tact, and of limited duration because tree heights in fen and bog terrain rarely exceed 5 to 8 m and therefore would not interfere with permanent transmission line function. For other peatlands disturbed at the Victor site itself, the disturbance would be limited to the life of the project (Level II) interms of wetland function for about 30% of the disturbed area. Effects are Level II for ecological significant, because the effects involve common species or communities. Remaining disturbed areas on the Victor site that cannot be restored to wetlands will be restored as forest communities.

On the basis of a Level 1 ratings magnitude/geographic extent, the adverse effects to other peatland types will not be not significant.

6.6.1.4.4 Comments/Concerns

Several reviewers including MNR, NRCan, EC, and Gartner Lee on behalf of the AttFN, have expressed concerns about possible muskeg dewatering, as a consequence of open pit dewatering. The focus of this concern is mainly in relation to the potential for bioherms to act as drain nodes, such that muskeg systems in the area of the bioherms become dewatered, leading to the alteration of plant communities associated with the muskeg environment.

MNR has suggested that all bog and fen systems should be considered as VECs, and not just fen systems described as “northern ribbed fens with broad flarks”.

EC has requested the Proponent to address considerations of the federal wetlands policy, and the maintenance of wetland functions. These functions include considerations relating to the provision of habitats for plants and animals, including fish; maintenance of hydrological functions; water quality function; and carbon cycle functions.

Gartner Lee on behalf of the AttFN has suggested that the Proponent should consider developing higher stockpiles to reduce the footprint of disturbance to the muskeg environment.

6.6.1.4.5 Proponent’s Response

Aspects relating to the potential for dewatering large areas of muskeg, as a result of well field operation, are addressed in Section 6.6.1.2.

Regarding MNR’s concern that the Proponent should have designated all bogs and fens as VECs because of their importance as habitat for plants and wildlife, the Proponent responded that the purpose of defining VECs is to help with project planning, part of which involves minimizing impacts to more productive, diverse, sensitive, and unusual habitats. As per the criteria used to define VECs, the Proponent did not considered bogs and fens (excluding peat plateau bogs and palsa bogs, and northern ribbed fens with broad flarks) as VECs, as such habitats are considered to be:

- Of generally limited diversity;
- Common and widespread, and therefore not limiting;
- Unlikely to contain species at risk, with the exception of woodland caribou, which occur throughout the region, including areas around the Victor site; and,
- Of limited educational, scientific or aesthetic interest.

The Proponent further responded that from a planning perspective, the goal is to direct developments away from the more diverse, sensitive and unusual habitats. Defining VECs, as per the CSEA, facilitates this process, and defining all available habitats as VECs would not be appropriate. Caribou, as a VEC (along with moose), are considered separately in Section 6.6.2.1.

To address the federal wetlands policy, and to respond to EC concerns in this regard, the Proponent has concluded that the physical displacement of 8.4 km of fen and bog terrain represents a very small proportion of the 17,000 km^2 of fen and bog habitats contained within the 22,400 km^2 PSA, and an even smaller proportion of the entire Hudson – James Bay Lowlands which extend across an area of 325,000 km^2. The Proponent has further indicated that conventional interpretations of wetland function and loss are not readily applied to vast wetland expanses such as the Hudson – James Bay Lowlands, in which wetlands comprise an essentially unbroken and dominant component of the terrain. The difficulty of applying conventional interpretations of wetland function to such vast areas was recognized by the Province in its development of the Ontario wetland evaluation system, Northern Manual (MNR 1993).

These limitations notwithstanding, the Proponent has committed to restoring Victor site area wetland environments at closure, to the extent practicable, and has agreed to work cooperatively with federal and provincial governments and the AttFN in this regard.

With regard to the concern raised by Gartner Lee, suggesting the stockpile heights should be increased to achieve smaller footprint areas, the Proponent has responded that stockpile locations and heights have been designed for long-term stability, and to provide a more effective landscape for the support of plants and wildlife at closure, with maximum stockpile heights of 10 to 12 m. Stockpile heights of up to 20 m were considered in earlier project design phases, but it was considered that stockpile heights in this range would be more problematic in terms of ground and slope stability, and that more importantly the vegetated stockpiles, at closure, would be less in keeping with surrounding areas. Bioherms and glaciofluvial features in the region generally do not exceed 10 m in elevation above the level of the surrounding muskeg. Wind exposure at increased elevations might also have an adverse affect on the success of tree growth on the stockpiles.

6.6.1.4.6 RA Conclusions

The RAs have considered the *Federal Policy on Wetland Conservation*, and have determined that the loss of wetland functions (e.g., habitat, hydrological functions, water quality) is not likely to be significant. There is not likely to be a significant adverse environmental effect on species at risk due to habitat changes. Therefore, the RAs have concluded that there will not likely be a significant adverse environmental effect. Chapter 8 outlines the follow-up program that will verify the accuracy of the EA predictions.

6.6.1.5 Vegetation Communities Associated with the Attawapiskat Barge Landing Facility

Depending on the outcome of the west James Bay coastal winter road test program to be carried out during the winter of 2005, a new Attawapiskat barge landing facility (to be located immediately east of the existing community sewage lagoons) may or may not have to be constructed. The Proponent has indicated that if the facility were to be constructed, it would occupy an area of approximately 4 ha, and would overlay predominantly disturbed shrublands and bare mineral soil. Vegetation communities comprising this area do not constitute any aspect of a VEC.

There will also be a small winter road staging area that will be developed on the south side of the Attawapiskat River, in the immediate vicinity of the existing coastal winter crossing, as described in Section 2.8. The exact staging area location will be determined on the basis of soil conditions, a suitable setback distance from the Attawapiskat River, and on consultations with MNR and the AttFN. Vegetation communities in the area are characterized by mixed successional woodlands and shrublands (white spruce, balsam poplar, alder, willow). Adverse environmental effects associated with the construction of the staging area would involve the clearing of approximately 1 ha of successional woodlands and shrublands, and are not regarded as being environmentally significant.

6.6.2 Wildlife

6.6.2.1 Moose and Caribou

6.6.2.1.1 Environmental Effects

Moose and woodland caribou are both found throughout the PSA, with moose tending to occur in forested areas bordering the creeks and rivers, and caribou utilizing more open habitats, with some utilization of wooded areas. Both species are important in their own right, and as a critical resource for Aboriginal peoples. The woodland caribou is designated as being at risk (threatened) by COSEWIC and COSSARO.

Adverse effects to ungulates from project-related activities could potentially occur as a result of the following:

- General disturbance to habitats utilized by ungulates;
- General disturbance from site activities, including noise and air emissions;
- General disturbance related to site access from both aircraft and traffic along the winter road, most notably from noise;
- Increased vulnerability to hunting due to improved hunter access along the south winter road; and,
- Disturbance caused by baseline and/or monitoring studies.

General Disturbance to Habitats Utilized by Ungulates

More detailed caribou studies, initiated in the winter of 2004/2005, including radiotelemetry studies, indicate that caribou in the region are focusing their activities to the west of the Victor site area within habitats of more complex terrain, consisting of mixtures of fen, bog and forest terrain, and that individuals sometimes range quite widely over several tens of kilometres within a few days. These studies are still ongoing, and will produce more definitive data as they progress.

Disturbance to ungulates at the Victor site will result mainly from direct habitat displacement associated with site construction and development. This work will take place primarily within bog and fen habitats between and adjacent to North and South Granny Creeks.

Caribou are the only large game species that consistently utilize bog and fen habitats, along with wolves that prey on the caribou. Bog habitats are considered to be among the least productive, and most common habitat types in the James Bay Lowland area, but they do support extensive lichen growth, mainly *Cladina rangiferina* and *C. stellaris*, which provide an important, though not limiting, food source for caribou. Lichens are most important as a food source for caribou in winter, when other richer food sources are less available. Fen habitats are somewhat more productive, and provide a greater variety plant food types for caribou. Northern ribbed fens with broad flarks are generally the most productive of the fen habitat types for wildlife, including caribou, because of their greater structural, and hence, biological diversity. Winter aerial surveys carried out at the Victor site during 2001 through 2003 suggested that caribou prefer fen complex areas where there is at least some scattered forest cover, and an intermixing of fen and bog habitats.

The Proponent has made attempts to limit disturbance to bog and fen habitats by developing a compact site plan. The total area of bog and fen habitats that will be directly displaced by developments at the Victor site has been calculated at 8.37 km^2. A further 11.7 km^2 of bog and fen habitats will be partially disturbed by construction of the south and west winter roads, and the new 115 kV transmission line.

Regarding habitats utilized by moose, most notably riverbank and creek margin forests, the Proponent has made attempts to avoid disturbance to these areas by allowing for a minimum 200 m buffer along all waterways, except where encroachment is unavoidable such as at all-season road and winter road crossings. The total area of riverbank and creek margin forest that will be disrupted by project-related developments is 0.97 km^2.

Since moose and caribou together potentially utilize all available habitat types within the PSA, to at least some degree, it is important to consider the total area that will be physically disrupted by project-related developments. This total area includes 8.7 km^2 associated with the Victor site, 13.4 km^2 associated with the coastal transmission line (including a contingency section from Kashechewan to Attawapiskat that is unlikely to be constructed), 6.3 km^2 associated with the south winter road and transmission line corridor including the existing south winter road, and 0.4 km^2 associated with the west winter road, for a total of 28.8 km^2.

General Disturbance from Site Activities - Including Air and Noise Emissions

Site activities will include the blasting, excavation and hauling of ore from the open pit, local site traffic, ore processing, and the operation of support facilities such as the accommodations complex and the incinerator. These activities will result in unnatural noise, light, vibration, and odour emissions. The recent decision of the Proponent to rely on transmission line power, as opposed to on-site diesel power generation, greatly diminishes these potential effects.

One of the most widely stated concerns from AttFN community members about the existing exploration camp facilities is the noise associated with generators and compressors used on site, as well as noise from helicopters, and the potential for these unnatural sounds to disturb or drive away wildlife. Specifically there is concern that caribou will be displaced by the unnatural noises until they become acclimated to the disturbance. Site observations and TEK studies suggest that moose are much less sensitive to these types of disturbances. TEK studies also indicate that caribou tend to move around from year to year, such that they may be present in some areas in some years, but not in others. An AttFN member indicated that he had harvested several animals from the immediate Victor site area a few years earlier.

Data from literature sources suggest that caribou are likely to avoid industrial sites and roadways, keeping up to 1 km away from such facilities. Additional studies and anecdotal evidence cited in the CSEA suggest that caribou are adaptable to disturbance, provided that they have sufficient adjacent areas for mobility.

The Proponent has proposed a 3 km zone around the Victor site development area, encompassing an area of 140 km^2, wherein some adverse effects to moose and caribou are considered possible or likely. Noise modelling studies also showed that low (30 dBA) noise levels will be reached at the outer perimeter of the 3 km zone. Beyond this distance there should be limited noise related disturbance to caribou.

General Disturbance Related to Site Access from both Aircraft and Winter Road Traffic

Some minor direct loss of habitat due to winter road construction will occur, as described above, with such loss being small in relation to total available habitat. However, the effect of winter road operation (seasonally between January and late March or early April) is likely to be more meaningful, and has been termed by researchers as the barrier effect. Despite the physical ability of animals to cross unfenced roads, they may be hesitant to do so, because of factors such as noise, light, vibration, and smell. There is also the potential for wolves and humans to utilize winter roads to gain better access to caribou and moose.

The effect of winter roads on barren-ground and woodland caribou has been shown to vary considerably depending on factors such as season, sex and age of the animals (Dyer 1999, and Jingfors and Gunn 1981).

The traffic pattern for winter road use in connection with the project has been designed to limit the potential for disturbance to wildlife, as well as to improve overall aspects of safety. Accordingly, traffic will typically be limited to about 4 to 5 convoys of trucks per day, each way, during the 3-year construction season, with each convoy typically consisting of 5 to 6 trucks, and much reduced traffic thereafter during the operations phase (averaging about 8 to 10 trucks per day). Convoys are safer, and by travelling in convoys, there will be long periods of inactivity along the winter roads (several hours between convoy passes at any given point) that will allow sensitive wildlife to cross the winter roads. Also, by using winter roads for site access, road-related disturbance will be limited to the winter season.

Aircraft traffic noise has been researched extensively in association with other resource projects and military training areas, and while results have varied, it is generally understood that aircraft do have a measurable effect on sensitive wildlife species such as caribou. Studies have found that 1% to14% of caribou reacted strongly to aircraft flying at 90 to 180 m altitude, compared to 13% to 56% showing strong reaction to flights at altitudes below 90 m (McCourt and Horstman 1974). The most sensitive periods for woodland caribou have been defined by Harrington and Veitch (1992a) as during and immediately following the calving period and during the period of insect harassment in the summer. Calving success during these periods has been negatively correlated to low-level jet aircraft. AttFN members have expressed a concern that noise related activities such as air traffic will adversely affect caribou.

Increased Vulnerability to Hunting due to Improved Winter Road Access

Attawapiskat community members have indicated that the south winter road has generally improved their access to the areas west of the community, and that this is a positive factor for resource gathering, including moose and caribou hunting. Studies suggest that the effects of hunting near the roads may be an important factor in terms of caribou avoiding roads, more so than the physical appearance of the road itself.

The hunting pressure applied to the areas adjacent to the winter road alignment is expected to increase due to improved winter road access.

Hunting is a traditional activity of the local First Nations, and as such the Proponent is not suggesting that this activity should be mitigated or controlled, except for purposes of worker safety. Project personnel will be prohibited from any form of hunting, except while carrying out legitimate traditional pursuits and while not on the job.

Disturbance to Wildlife Caused by Baseline and/or Monitoring Studies of Wildlife Populations

Active monitoring and baseline studies are likely to result in short-term disturbance to moose and caribou as a result of snowmobile and/or helicopter usage to access or survey sample stations or transects. Surveys have included helicopter and fixed-wing winter surveys of local moose and caribou populations. Radio-tracking studies of caribou started in the winter of 2004/2005, wherein the Proponent captured and collared 10 female caribou, as a means of providing more detailed information on caribou movements in the area. Due to the short-lived nature of these disturbances, there will be no meaningful disruption to the behaviour of the animals. The Proponent has and will take reasonable care not to unduly harass or impair animal activities during the necessary works, and is assisted in this work by AttFN members. The data collected during the baseline and monitoring works will be used in part to help plan effective wildlife mitigation strategies for mine development.

6.6.2.1.2 Mitigation

General Disturbance to Wildlife Habitats

Efforts will be made to minimize the area impacted by mine facilities and to mitigate any associated disturbance. Minimum buffer zones of 200 m will be maintained between the majority of the site infrastructure and the local creeks and rivers. Forested zones bordering creeks and rivers provide prime moose habitat. Works such as roads and waterlines that cross riverbank and creek margin forested habitat will be designed to minimize disturbance to wildlife by burying lines where possible, so as not to interfere with wildlife movement. Following the project life (approximately 16 years of development and operation) all disturbed areas will be reclaimed to a more natural state.

Site geography makes it impossible to avoid disturbance to the more pervasive bog and fen habitats, including the more diverse and productive northern ribbed fen with broad flarks habitat type, but all reasonable measures have been taken to limit the extent of impact. Also, as discussed in Section 6.6.1.2, it will be impossible to return the site to a flat bog and fen-dominated area, as it was prior to development. However, upon completion of the project and decommissioning of the site, the roads, work pads and other facilities will be restored to a vegetated and natural state. This will include the revegetation of stockpiles and other areas with seed mixes and/or seedlings to create a more diverse and complex habitat matrix than that which currently exists in proposed development areas, including where feasible the re-development of wetlands. The resulting habitat matrix will include greater topographic relief "upland areas" and the mixing of several habitat types including bog, fen, meadow and forest, which have been shown to result in the support of a more diverse wildlife community. The diversity of the area will also be enhanced by ponds developed in the three mined-out north, south, and central quarries. The increase in forest habitat associated with re-vegetated mineral stockpiles, and other more slightly raised areas, totalling an estimated 6 to 7 km^2, will provide excellent moose habitat.

It is recognized that caribou generally prefer more open areas, where mixes of fen and bog community types, with at least some tree cover, provide for foraging and cover needs. One of the principal foods of caribou is lichen, which is particularly important in winter. Lichen is associated mainly with bog communities, and with raised ridges in northern ribbed fen communities, especially those with broad flarks (ponds), but also with jack pine forests developed on sandy terrain. The coarse PK stockpile and the perimeter areas of the PKC facility will be comprised of sand and gravel sized materials, which will lend themselves to the development of jack pine forest with a lichen ground cover. If supported by the AttFN and MNR, and by revegetation studies, De Beers will actively restore those coarser substrate areas to jack pine/lichen communities that will provide improved caribou habitat, as opposed to spruce forests, which are attractive to moose but not to caribou.

To the extent feasible, progressive reclamation of disturbed areas will occur during the latter stages of operation to accelerate the return of the site area to a naturalized environment.

General Disturbance from Site Activities, Including Noise

There will be an increase in ambient noise levels and minor changes to air quality in the immediate Victor site area. There may also be factors such as visual disturbances from machinery and lighting, vibration from large equipment, and noise and vibration associated with blasting. In recognition of the potential for these activities to affect wildlife at distance, De Beers proposes to make effective use of appropriate mufflers on machinery, dust suppression technologies, and a wet scrubber (or equivalent dry scrubber) on the incinerator. Generators and compressors will be housed in either insulated buildings or containers to dampen noise generation, and other reasonable measures will be taken to minimize unnecessary noise emissions at the Victor site. Within the limits of natural terrain conditions, vegetated buffer zones will be maintained to further limit the transmission of noise and light. Site lighting will be directed inwards towards activity areas and away from peripheral buffer zones. Further mitigation will be realized through an environmental monitoring and protection program that will address policies such as equipment operation and usage to decrease unnecessary noise and idling, as well as sampling of emissions to ensure the continued effectiveness of emission reducing systems.

Noise modelling studies indicate that low sound levels, in the range of 30 dBA, will be achieved at the outer boundary of the 3 km buffer zone surrounding the Victor site. The use of areas outside of the buffer zone by sensitive species such as caribou will be monitored. Caribou and moose have shown the ability to acclimate to industrial noise and activity over time, particularly once daily operations become routine and predictable.

General Disturbance Related to Site Access from both Aircraft and Traffic along the Winter Roads – Most Notably from Noise

Traffic along the winter roads (south, west and the James Bay winter road), and the use of aircraft to transport supplies and material to and from site, will be a necessary component of the project. It is expected that there will be some localized disruption to wildlife along these corridors and that mitigation is warranted.

The most important aspect limiting the effects of road traffic on moose and caribou, and other wildlife, will be the use of winter roads, as opposed to all-season roads for site access; and the use of existing winter roads (west James Bay coastal winter road, and the south winter road), as opposed to the development of new winter roads. Wildlife has already had a chance to become accustomed to these existing winter roads. Disturbance to moose utilizing forested habitats bordering creeks and rivers will be minimized by setting winter roads a minimum of 500 m away from waterways where practicable - exceptions will be at the watercourse crossings themselves.

Also, TEK studies and data provided by the Wildlife Conservation Society (WCS) and the CPAWS-Wildlands League (October 18, 2004), in their October response to the SAPA report, suggest that winter roads accessing the Victor site, both along the James Bay coast and inland from Attawapiskat along the south winter road, avoid the major caribou winter areas within the James Bay Lowlands.

A Winter Road Management Plan will be developed to incorporate traffic control, equipment, timing, speed limits and frequency of shipments in order to mitigate winter habitat disruption. For example, it is planned to group trucks into convoys of approximately six vehicles, with typical one-way traffic being 4 to 5 convoys per day during the construction period winter road season, with lesser traffic volumes during the operations phase. Organizing traffic in this manner maximizes the time available to cross the winter roads without being disturbed, and it is also a safer practice.

Proper planning and usage of air traffic will also mitigate potential disturbances to wildlife. Studies have shown that there is a decreased response to aircraft at higher altitude, and that wildlife is less disturbed by fixed wing aircraft compared to rotary wing (helicopter) aircraft. The proposed all-season airstrip will allow for a more consistent use of fixed wing aircraft with larger cargo capacity, compared with the current condition that requires more frequent helicopter use. Air traffic to and from the Victor site will be subject to policies and procedures to help minimize disturbance, such as enforcement of minimum flight altitudes and realigning flight paths during some seasons to avoid known areas of sensitive wildlife habitat.

Traffic to and from site will be subject to a minimum altitude of 300 m except on approach and take off, or during emergency conditions, or when required for conducting environmental studies. Air traffic at this altitude is considered to have little potential for disturbing wildlife. The normal distance aircraft will need to descend below 300 m altitude on approach is less than 5 km based on discussions with Commercial Aviation in Timmins. The distance from take off to reach 300 m altitude or greater would be considerably less.

Despite best efforts to mitigate potential wildlife disturbance, it is recognized that there will be some minor effect to local wildlife, including moose and caribou. To further track these effects, the Proponent has developed a detailed monitoring program for caribou that involves the radio-collaring of 10 female caribou. The program is scheduled to commence in the winter of 2004/2005 and is planned as a joint undertaking between the Proponent, MNR and the AttFN. It is envisioned that this program will be carried out over several years.

Finally, any disturbance to wildlife that has the potential to affect harvesting activities of the AttFN will be addressed as traditional pursuits compensation.

Anticipated Effectiveness of Mitigation Measures and Contingencies – The Proponent has committed to working with federal and provincial governments and the AttFN to achieve effective results. Monitoring of caribou will provide further data on the potential response of animals to noise and other disturbances. Where there is an indication that such effects are likely to be adversely affecting caribou, the Proponent has committed to working with federal and provincial governments and the AttFN to develop response strategies.

6.6.2.1.3 Significance

The totality of habitats that will be directly displaced, or altered, by project-related developments encompasses an area of 28.8 km^2. If all areas within buffer zones bordering the Victor site and the south and west winter road corridors are considered, the maximum potential area of influence totals 373.4 km^2, and consists of 140 km^2 at the Victor site, 200 km^2 associated with the south winter road corridor, 20 km^2 associated with the west winter road, and 13.4 km^2 associated with the coastal transmission line. No buffer zone is attached to the coastal transmission line and existing winter road route, as the basic infrastructure along this routing already exists. Therefore from the perspectives of direct disturbance, or indirect disturbance within buffer zones, magnitude/geographic extent of the area of potential influence is small, and is consequently classified as a Level 1 effect.

At closure all disturbed sites will be rehabilitated to terrain types that can be utilized by either caribou or moose, and any disturbance effects influencing buffer zones, such as noise, will cease immediately upon closure, as such all effects are considered as being Level 2 for duration.

Project-related effects on moose and caribou are not significant (Table 6-11).

6.6.2.1.4 Comments/Concerns

Members of the AttFN have expressed on several occasions their concern for moose and caribou, and particularly for caribou, which they consider to be very sensitive to disturbances such as those involving noise from generators, aircraft, and other activities, as well as to other potential factors such as unnatural smells. Some members of the community have already expressed concerns that activities at the Victor site during the advanced exploration phase have already disturbed caribou in the area. Through information provided by the TEK study, it is clear that moose and caribou provide a critical resource for local residents, and that the hunting of moose and caribou is an essential component of traditional activities that are very much still practiced by AttFN members.

Gartner Lee, acting on behalf of the AttFN, has recommended that the Proponent should coordinate its caribou radio-collar study with AttFN members to ensure that AttFN members are part of the program, and that TEK is incorporated into the study. Gartner Lee has also suggested that data regarding the abundance and distribution of predators (wolves) in the study areas should be collected, to better assess ways in which the project might influence the predator-ungulate relationship.

The MNR, in their review of the CSEA, raised a number of points regarding caribou, as per the following:

- Caribou population estimates presented in the CSR should reference the Harris 1999 COSSARO report;

- The Proponent has discounted any significant negative potential to impact caribou (and other wildlife) on the basis of limited baseline and monitoring data;

- The possible importance of lichen stands associated with the esker (proposed as a sand and gravel source for the project) to caribou should be discussed;

- More details on the proposed caribou monitoring protocol are required; and,

- The Proponent should substantiate their claim in the CSEA that there will be no over all net increase in hunting effort as a result of increased access.

WCS Canada and the CPAWS-Wildlands League suggested that co-ordinated land use plans should be developed by government agencies, working in the local First Nations, regarding potential affects to caribou, before any further industrial development occurs. These groups also recommended that the SWAWR not be developed, unless absolutely necessary, and that the coastal winter road is the preferred access route from the perspective of potential disturbance to caribou.

Gartner Lee has also stated that the Proponent should carryout a risk assessment to assess the potential for project contaminants to adversely affect wildlife, including furbearers.

6.6.2.1.5 Proponent's Response

Regarding concerns expressed by the AttFN, the Proponent has acknowledged the importance of moose and caribou to members of the AttFN and their traditional pursuits. The Proponent has made best efforts to limit the footprint of the proposed mining operation, and to utilize existing infrastructure for access, so as to minimize direct habitat disruption. The Proponent has also recognized concerns over such aspects as noise, and has taken reasonable steps to control noise emissions so as limit the potential for disturbance, especially to caribou. These measures include effective use of appropriate mufflers on machinery, the use of insulated buildings (or structures) for housing generators and compressors, and where possible the use of vegetated buffer zones. Noise modelling studies conducted by the Proponent indicate that low sound levels, in the range of 30 dBA, will be achieved at the outer boundary of buffer zones bordering project-related activity zones. Further mitigation will be realized through environmental monitoring and protection programs.

To reduce the effects of winter road traffic on moose winter roads will be set back a minimum of 500 m away from waterways where practicable. Winter road routes also appear to avoid major caribou wintering grounds. Project-related traffic along winter roads will also travel in convoys for safety reasons and to reduce potential disturbance to wildlife. The Proponent proposes to work cooperatively with the local First Nations to prevent discharging firearms near roadways. Altitude restrictions will be placed on project-related aircraft to minimize the potential for disturbance to wildlife, particularly caribou.

Finally, any disturbance to wildlife that has the potential to affect harvesting activities of the AttFN will be addressed as traditional pursuits compensation.

Regarding comments provided by Gartner Lee, the Proponent has agreed to work cooperatively with the AttFN and the MNR to develop and implement a longer-term caribou monitoring program that will include radio-telemetry studies and TEK. Regarding Gartner Lee's comments relating to predatory-prey relationships, the Proponent has indicated that basic data on predator-prey relationships are provided in the CSEA and in the TEK study, and that aside from these data, no specific efforts were made to determine the abundance of predators in the Victor area, nor is it viewed that the collection of such data would be helpful to project evaluations or decision-making. The Proponent responded further that the collection of meaningful data on predator densities requires several years of separate study for each predator, and goes well beyond environmental assessment data collection needs, and is not proposed. Also, wolf-ungulate relationships have been extensively studied in the literature and are well known.

The following responses address comments raised by MNR concerning caribou. With respect to the request to reference the work of Harris (1999) and COSSARO, the reference has been cited as requested.

With regard to "limited data" concerning caribou, the Proponent has responded that reasonably extensive mid to late winter moose and caribou aerial surveys were undertaken 2001, 2002, and 2003. Also, winter radio-telemetry surveys were planned for 2003, but could not be undertaken because the requested support for these studies from the AttFN was not provided. In 2004, the AttFN provided written support for the radio-telemetry studies, but snow conditions during the winter of 2004 were not conducive to locating the animals (despite two separate attempts to do so) and further attempts were discontinued because of concern for potential interference with the upcoming calving season. The Proponent has since held discussions with MNR and the AttFN, and is planning to initiate caribou radio-telemetry studies during the winter of 2004/2005, and to continue these studies throughout the duration of the project.

Regarding caribou use of the esker the Proponent has responded that the esker is lichen rich and is probably used by caribou. However, there was no evidence of extensive grazing that would suggest that this feature is heavily used by caribou, or that its lichen resources are in any way limiting for caribou. Only a small portion of the esker will be disturbed, and this feature is only one of several such features in the region, which occur north, west and south of the Victor site area.

Regarding the claim in the CSEA that there is likely to be no overall net increase in hunting effort as a result of increased winter road access, the Proponent has acknowledged that this statement was premature and perhaps ill-advised. The Proponent has outlined a plan to address this issue, as part of the caribou monitoring program, but has also acknowledged that there is no presumption regarding any limitation on the right of Aboriginal peoples to hunt moose or caribou in the region. The Proponent has further stated that if monitoring studies suggest that caribou are being adversely affected by hunting along or near winter roads, then it might be appropriate for the MNR, the AttFN and the Proponent to work together to ensure the sustainability of regional caribou populations.

Regarding the recommendations of WCS Canada and CPAWS-Wildlands League, the Proponent did select the coastal winter road route as the preferred access alternative, based partly on lesser effects on caribou associated with this alternative. The Proponent has also committed to further, ongoing caribou studies, but disagrees with WCS Canada and CPAWS-Wildlands League that land use plans focused on caribou need to be completed before any further industrial development occurs in the region. Development of the VDP will use existing winter roads, as recommended by the MNR, the AttFN, and the Proponent, and the Victor site is fixed by the location of the ore body. Future land use plans would therefore not influence the VDP effects analysis.

Regarding the recommendations of WCS Canada and CPAWS-Wildlands League, the Proponent did select the coastal winter road route as the preferred access alternative, based partly on lesser effects on caribou associated with this alternative. The Proponent has also committed to further, ongoing caribou studies, but disagrees with WCS Canada and CPAWS-Wildlands League that land use plans focused on caribou need to be completed before any further industrial development occurs in the region. Development of the VDP will use existing winter roads, as recommended by the MNR, the AttFN, and the Proponent, and the Victor site is fixed by the location of the ore body. Future land use plans would therefore not influence the VDP effects analysis.

Regarding the request for a wildlife risk assessment, the Proponent provided such an assessment in its September 24, 2004 response to Gartner Lee's comments. In its assessment, the Proponent considered possible contaminant pathways involving air and water-borne transport focusing mainly on metals and metalloids.

With respect to air emissions, expected contaminant concentrations are well below applicable federal and provincial standards for both environmental and health effects (Table 6-4). As an example, maximum fenceline and on-site residence values for heavy metals such as cadmium and lead were shown as being effectively at background concentrations.

Sources of waterborne contaminants identified by the Proponent included:

- Mine water;
- PKC facility water discharge;
- Stockpile runoff water; and,
- Treated domestic sewage.

Potential water-borne contaminant concerns involving fish and wildlife were identified by the Proponent as being limited to ammonia and to the possible bioaccumulation of heavy metals. Un-ionized ammonia concentrations are expected to be below PWQO values in site area receiving waters. Metals that have the potential to bio-accumulate (i.e., cadmium, lead and mercury) are expected to be present in concentrations that are below standard detection limits in site drainages (before dilution) and that these elements therefore do not pose a risk.

Remaining metalloids/metals are expected to be essentially below PWQO/CEQG PAL values in all area receiving waters.

Consequently the source strength of metals and metalloids from both air and waterborne emissions is considered by the Proponent to be quite low, effectively at or approaching background levels. The Proponent has agreed to monitor metal concentrations in fish and wildlife flesh to confirm expectations. Details are provided in the attached risk assessment matrix (Table 6-14). Table 6-14 also considers fish in the interest of completeness, and because fish provide a potential contaminant pathway to fish eating mammals and birds.

6.6.2.1.6 RA Conclusions

The Proponent has agreed to collect additional data on area wolf populations as part of the caribou monitoring program, and in the context of predator - prey relationships in the Hudson Bay lowlands no significant adverse environmental impact is anticipated. Chapter 8 describes the necessary follow-up to verify the accuracy of the EA.

6.6.2.2 Large Predators and Furbearers

6.6.2.2.1 Environmental Effects

Potential projected related environmental effects to large predators and furbearers are essentially the same as those listed for moose and caribou. However, differences in the degree of likely effects occur because of the differing nature of the receptors.

For the most part, the distributions of large predators and furbearers tend to be associated with watercourses (aquatic furbearers - beaver, muskrat, mink and otter), and forested habitats bordering the watercourses (terrestrial species - wolf, black bear, marten, red fox, and lynx). The wolf and the red fox are the only species from this group that commonly range widely into more open muskeg terrain - wolves to hunt caribou, and fox to hunt grouse, ptarmigan, other bird species during the nesting period, and some species of small mammals. Given the preference of large predators and furbearers for riverine environments, the most effective means of limiting adverse effects to these species is to limit project-related effects to riverbank and creek margin forests and their associated watercourses.

The Proponent has made efforts to avoid disturbance to riverbank and creek margin forests, through maintenance of a minimum 200 m buffer along all waterways, except where encroachment is unavoidable such as watercourses crossings. Adverse effects to the watercourses themselves are not expected to occur as a result of effluent discharges, but there is a potential for flow related effects, linked to well field dewatering of the open pit area. The total area of riverbank and creek margin forest that will be disrupted by project-related developments is 0.97 $km^{2.}$ Elsewhere, the Proponent has made efforts to minimize the footprint of the project works so as to reduce potential effects to other habitat types.

TABLE 6-14
SUMMARY OF ENVIRONMENTALLY RELATED RISKS TO FISH AND WILDLIFE

Source	Contaminant	Contaminant Source Strength			Receptor			Contaminant Pathway			Risk
		Posses a Risk	Could Pose a Risk	No Credible Source Risk	Receptor Present	Receptor May be Present	No Credible Receptor	Likely Exposure Pathway	Potential Exposure Pathway	No Credible Exposure Pathway	
Air	Metals			Concentrations at fenceline and on-site residence location below Federal and Provincial environmental and health related standards	Local fish and wildlife			Air emissions with fallout on land and water			No credible source strength (RR - Negligible)
Water											
Mine Water (Well Field)	Salts (mainly Chloride)			Chloride concentrations in the well field discharge expected to average 800-1,000 mg/L, but could potentially be as high as 1,400-1,600 mg/L (September 2004 model results) - Toxicity testing at chloride concentrations up to 2,070 mg/L shows no acute toxic effects, and enhanced growth effects for chronic testing (see July 16, 2004 response to government comments)	Fish			Direct discharge to Attawapiskat River			No credible source strength (RR - Negligible)
Mine Water (Sump)	Ammonia			Ammonia at low concentrations meeting acute and chronic toxicity standards prior to release to rivers	Fish populations of the Nayshkootayaow and Attawapiskat Rivers			Phase 1 mine water pond, through ribbed fen (as part of treatment system) to Nayshkootayaow River. Phase 2 direct discharge to Attawapiskat River			No credible source strength (RR - Negligible)
PKC Discharge	Arsenic			Expected source concentration below Federal and Provincial Guidelines/Standards for PAL and DW	Local fish and wildlife			Discharge flows to local creeks and rivers with potential uptake by fish and wildlife			No credible source strength (RR - Negligible)
	Cadmium			Expected source concentration below Federal and Provincial Guidelines/Standards for PAL1 and DW	Local fish and wildlife			Discharge flows to local creeks and rivers with potential uptake by fish and wildlife			No credible source strength (RR - Negligible)
	Chromium			Expected source concentration at or below Federal and Provincial Guidelines/Standards for PAL and DW	Local fish and wildlife			Discharge flows to local creeks and rivers with potential uptake by fish and wildlife			No credible source strength (RR - Negligible)
	Copper			Expected source concentration at or below Federal and Provincial Guidelines/Standards for PAL and DW	Local fish and wildlife			Discharge flows to local creeks and rivers with potential uptake by fish and wildlife			No credible source strength (RR - Negligible)

Source	Contaminant	Contaminant Source Strength			Receptor			Contaminant Pathway			Risk
		Posses a Risk	Could Pose a Risk	No Credible Source Risk	Receptor Present	Receptor May be Present	No Credible Receptor	Likely Exposure Pathway	Potential Exposure Pathway	No Credible Exposure Pathway	
PKC Discharge (cont'd)	Lead			Expected source concentration below Federal and Provincial Guidelines/Standards for PAL and DW	Local fish and wildlife			Discharge flows to local creeks and rivers with potential uptake by fish and wildlife			No credible source strength (RR - Negligible)
	Mercury			Expected source concentration below Federal and Provincial Guidelines/ Standards for PAL and DW	Local fish and wildlife			Discharge flows to local creeks and rivers with potential uptake by fish and wildlife			No credible source strength (RR - Negligible)
	Nickel			Expected source concentration below Federal and Provincial Guidelines/Standards for PAL and DW	Local fish and wildlife			Discharge flows to local creeks and rivers with potential uptake by fish and wildlife			No credible source strength (RR - Negligible)
	Zinc			Expected source concentration below Federal and Provincial Guidelines/Standards for PAL and DW	Local fish and wildlife			Discharge flows to local creeks and rivers with potential uptake by fish and wildlife			No credible source strength (RR - Negligible)
Stockpile Runoff	Metals same as for PKC discharge			Expected source concentration slightly above, at or below Federal and Provincial Guidelines/Standards for PAL and DW	Local fish and wildlife			Discharge flows to local creeks and rivers with potential uptake by fish and wildlife			No credible source strength (RR - Negligible)

Note: For there to a meaningful environmental or health risk, it is required that there be a contaminant source, an exposure pathway, and a receptor. If any one of these area lacking, there is by definition no meaningful environmental or health risk to fish or wildlife, or to humans consuming fish or wildlife.

1 Detection limit higher than federal guideline, but lower than provincial guideline
RR Related Risk
PAL Protection of Aquatic Life
DW Drinking water

For the most part, the larger predators and furbearers appear to be less sensitive to these effects, compared with caribou, as there have been numerous observations in the immediate Victor site area of marten, otter, wolf and fox during the winter work periods. Black bear have also been seen passing through the site during the spring and summer months. Of the species considered in this section, wolves are perhaps the most wary and sensitive to human activities. Wolves are also listed by COSEWIC as being species of special concern, because they are vulnerable to changes in prey populations and to hunting and trapping.

In recognition of the potential for these activities to adversely affect wildlife at a distance, De Beers proposes to make effective use of noise control technologies and best practices, as described in relation to ungulates, including restrictions on aircraft travel. There is also the potential for site activities to attract wildlife such as fox and bears that tend to scavenge domestic waste. This behaviour is considered unnatural and undesired as it causes the animals to deviate from their usual foraging habits, and puts them at risk of injury through consumption of non-edible items (e.g., plastics) or from vehicle collisions. Also, it can become necessary to relocate or destroy nuisance bears if they become a safety concern. An incinerator is proposed for destruction of organic waste produced at the Victor site, which is expected to greatly reduce wildlife attraction to the facilities. Also, a strict environmental program will educate workers and enforce policies such as no feeding or harassing wildlife, and to promote proper waste disposal as per available guidelines.

There is some potential for road kills along winter roads by project-related traffic, but this effect is considered to be limited because of the low traffic volumes and reduced traveling speeds (typical speeds 35 to 50 km/h). Also, improved winter road access could potentially lead to an increase in trapping activity, as AttFN community members have indicated that the south winter road has already improved their access to the areas west of the community for resource gathering. However, it is also expected that there will be a decrease in trapping efforts in other areas that is roughly proportional to the increase near the roadway. This assumes that there will be no net increase in overall hunting pressure as a result of the road availability. Wolves and fox may take advantage of winter roads and trails to gain improved access to areas to prey species, as noted by James (1999).

6.6.2.2.2 Mitigation

Mitigation measures that will be used to reduce adverse effects to large predators and furbearers are essentially the same as those described in connection with moose and caribou, and will include the following:

- Minimizing the project footprint to the extent practicable;
- Maintaining a 200 m buffer zone adjacent to rivers and creeks to protect watercourses and their associated forested margins;
- Burying waterlines in areas passing through riverbank and creek margin forests so as not to interfere with wildlife movement along forested corridors;

- Restoring disturbed habitats to habitats capable of supporting a diversity of wildlife species, including large predators and furbearers;

- Effective use of appropriate control technologies and best practices to limit noise effects on wildlife;

- Use of an incinerator to dispose of wastes that could potentially attract wildlife;

- Use of dust suppression technologies, and a wet scrubber (or equivalent dry scrubber) on the incinerator, to control air emissions;

- Directing site lighting inwards towards activity areas and away from peripheral buffer zones;

- Accessing the site by winter roads, as opposed to all-season roads;

- Positioning winter roads a minimum of 500 m away from waterways, where practicable;

- Routing winter road traffic in convoys (to the extent practicable), and at low speeds;

- Controlling aircraft flight paths and altitudes, to reduce noise effects; and,

- Compensating the AttFN for interference with traditional pursuits involving hunting and trapping.

Details pertaining to the above mitigation strategies are provided earlier in relation to ungulates. Habitat restoration plans are discussed in Section 6.6.1.

Anticipated Effectiveness of Mitigation Measures and Contingencies – Mitigation measures described in this section will be effective for their intended purposes, and in many instances can be further optimized in response to monitoring data.

6.6.2.2.3 Significance

The area of riverbank and creek margin forest that will be disrupted by project-related developments is 0.97 km^2. The totality of habitats that will be directly displaced, or altered, by project-related developments encompasses an area of 28.8 km^2. If all areas within buffer zones bordering the Victor site and the south and west winter road corridors are considered, the maximum potential area of influence totals 373.4 km^2. Therefore from the perspectives of direct disturbance, or indirect disturbance within buffer zones, magnitude/geographic extent of the area of potential influence is small, being classified as a Level 1 effect.

At closure, all disturbed sites will be rehabilitated to terrain types that can be utilized by large predators and furbearers. Any disturbances influencing buffer zones, such as noise, will cease immediately upon closure, as such all effects are considered as being Level 2 effects for duration.

Project-related effects on large predators and furbearers are not significant (Table 6-11).

6.6.2.2.4 Comments/Concerns

Members of the AttFN, through various meetings and consultations, have expressed their strong concern for the preservation of wildlife in general, and particularly ungulates and furbearers, as these species are very important in their own right, and they are essential components of traditional lifestyles and the Aboriginal economy. The health of fish and wildlife is regarded as an indicator of the overall health of the environment. The furbearer that seems to receive the greatest attention is the marten, which is a valuable furbearer. Members of other First Nation communities have also stated the importance of furbearers to the Aboriginal economy and way-of-life.

Gartner Lee, on behalf of the AttFN, has raised concerns regarding the need to better define wolf-caribou relationships in the area.

MNR has expressed general concern for the protection of wildlife and wildlife habitat, including the need for an effective closure plan to restore wildlife habitat at the end of mining operations. MNR has also expressed concerns about the potential of food or refuse at the Victor site to attract nuisance wildlife – particularly black bears.

6.6.2.2.5 Proponent's Response

The Proponent has acknowledged the importance of large predators and furbearers, and has taken measures to restrict adverse effects to habitats where these species are most likely to occur, namely riverbank and creek margin forests and their associated watercourses. The quality of effluents contained in specific discharges and in site area runoff is also such that adverse effects to water quality are not expected to occur, with the Proponent's expectation being that PWQO and CEQG-PAL will be met or approximately met in all area receiving waters. Aquatic furbearers and their food sources should not therefore be adversely affected by project-related activities.

With respect to comments from Gartner Lee on behalf of the AttFN, the Proponent has addressed the comment concerning wolf-caribou relationships earlier in this section.

In response to MNR's general concern regarding the protection of wildlife and wildlife habitat, including the need for an effective closure plan to restore wildlife habitat, at the end of mining operations, the Proponent has documented its strategies for protecting wildlife habitat, as per discussions presented earlier in this section. Closure plan details are presented separately in the project closure plan, which has been released into the public domain by the Proponent. The Proponent has also indicated its willingness to work cooperatively with federal and provincial governments and the AttFN to develop more detailed restoration plans for the site. It is anticipated by the Proponent that this consultation should occur periodically as the project develops, and as results of the vegetation growth trials being conducted by Laurentian University become available.

With regard to MNR's concerns involving nuisance wildlife, the Proponent has indicated its intention not to have food or refuse on site in an exposed manner that would attract wildlife – especially black bears.

6.6.2.2.6 RA Conclusions

The RAs have concluded that there will likely not be significant adverse environmental effects on large predators and furbearers. The RAs have included a follow-up program related to large predators and furbearers, as outlined in Chapter 8.

6.6.2.3 Migratory Birds

6.6.2.3.1 Environmental Effects

Adverse effects to migratory birds from project-related activities could potentially occur as a result of:

- General disturbance to habitats; and,
- General disturbance from site activities, particularly noise emissions.

Adverse effects associated with winter road traffic are not anticipated to occur, as there are very few birds present in the project area in winter. The potential for increased vulnerability to hunting due to improved hunter access is similarly of limited concern for migratory birds, as there is little opportunity for hunting birds in winter other than for grouse and ptarmigan.

Results of breeding bird surveys conducted at the Victor site during the spring and early summer of 2004 are provided in Table 6-15. The data were obtained from 5-minute or 10-minute point counts during which all individuals (sighted or heard) were recorded on a habitat basis. The habitats for this work were structured as per the Ontario Land Cover database, to provide consistency with assessments of bird communities along the various access and transmission line routes addressed in the SAPA. Breeding bird survey data from the James Bay coastal transmission line route are included in the SAPA.

Data for the Victor site area show broad utilization of all major habitat types, with somewhat heavier use by the greatest numbers of individuals and species being associated with mixed forest and open fen habitats (Table 6-15). Open fen habitats defined by the Ontario Land Cover database are broadly comparable to the northern ribbed fen with broad flarks vegetation type. Less detailed observations of mid-summer (late July – early August) bird distributions showed reduced use of bog habitats during this period, and a comparatively higher use of both forested and shrub habitats bordering area watercourses, and northern ribbed fen with broad flark habitats.

TABLE 6-15
BREEDING BIRD DISTRIBUTIONS - VICTOR SITE AREA 2004

Common Name	Coniferous Forest			Mixed Forest			Treed Fen			Open Fen			Treed Bog			Open Bog		
	Number of Plots - 10			Number of Plots - 6			Number of Plots - 12			Number of Plots - 28			Number of Plots - 11			Number of Plots - 16		
	N[1]	Mean[2]	R. Abund.[3]	N	Mean	R. Abund.	N	Mean	R. Abund.	N	Mean	R. Abund.	N	Mean	R. Abund.	N	Mean	R. Abund.
Common Loon			0.00			0.00	2	1.5	0.25	1	1	0.04			0.00	1	1	0.06
Canada Goose	1	2	0.20	2	1	0.33			0.00	5	10.6	1.89	2	2	0.36	2	4	0.50
American Widgeon			0.00	1	2	0.33			0.00			0.00			0.00			0.00
Mallard			0.00			0.00			0.00	2	1	0.07			0.00			0.00
Northern Shoveler			0.00			0.00			0.00	1	2	0.07			0.00			0.00
Common Goldeneye			0.00			0.00			0.00			0.00			0.00			0.00
Hooded Merganser			0.00			0.00			0.00			0.00			0.00	1	1	0.06
Common Merganser			0.00	1	3	0.50			0.00			0.00			0.00	1	4	0.25
Bald Eagle			0.00	1	1	0.17			0.00	1	4	0.14			0.00			0.00
Northern Harrier			0.00			0.00	1		0.00	2	1	0.07			0.00			0.00
Northern Goshawk			0.00			0.00			0.00			0.00			0.00			0.00
Red-tailed Hawk	2	1.5	0.30			0.00	1	1	0.08	4	1.25	0.18			0.00	2	1	0.13
Rough-legged Hawk			0.00			0.00			0.00			0.00			0.00	1	1	0.06
Sharp-tailed grouse			0.00			0.00			0.00	2	1	0.07	2	1	0.18			0.00
Sandhill Crane			0.00	1	1	0.17	2	1.5	0.25	4	2.5	0.36			0.00	2	2	0.25
Semipalmated Plover			0.00	2	2	0.67			0.00	2	6	0.43			0.00			0.00
Killdeer	1	2	0.20			0.00			0.00	4	4	0.57	1	1	0.09			0.00
Greater Yellowlegs	4	1.5	0.60	1	2	0.33	4	2	0.67	17	1.8	1.09	2	1.5	0.27	7	1.1	0.48
Lesser Yellowlegs	2	1	0.20	1	6	1.00	1	2	0.17	4	1	0.14	1	1	0.09	2	2.5	0.31
Solitary Sandpiper			0.00	1	1	0.17	1	1	0.08	2	1	0.07			0.00	1	1	0.06
Spotted Sandpiper			0.00	1	2	0.33			0.00	1	10	0.36			0.00			0.00
Semipalmated Sandpiper			0.00			0.00			0.00			0.00	1	1	0.09			0.00
Least Sandpiper	2	1	0.20			0.00			0.00	6	4.8	1.03			0.00		2	0.00
Short-billed Dowitcher			0.00			0.00			0.00	1	1	0.04			0.00			0.00
Wilson's Snipe	1	1	0.10	1	1	0.17	3	2	0.50	9	2.3	0.74	2	1	0.18	1	1	0.06
Bonaparte's Gull			0.00	2	1	0.33			0.00	2	2.5	0.18			0.00			0.00
Arctic Tern			0.00			0.00	1	1	0.08	2	3.5	0.25			0.00			0.00
Great Gray Owl			0.00			0.00	1	2	0.17			0.00			0.00			0.00
Common Nighthawk			0.00	2	2	0.67			0.00			0.00			0.00	1	1	0.06
Yellow-bellied Sapsucker			0.00	1	1	0.17			0.00			0.00			0.00			0.00
Woodpecker			0.00			0.00			0.00			0.00			0.00	1	1	0.06
Black-backed Woodpecker	4	1.25	0.50			0.00	2	1	0.17			0.00			0.00	2	1	0.13
Northern Flicker	1	1	0.10			0.00			0.00			0.00			0.00			0.00
Olive-sided Flycatcher	2	3	0.60	2	1	0.33	2	1.5	0.25	3	1.6	0.17	4	2.5	0.91	5	1.2	0.38
Yellow-bellied Flycatcher			0.00	1	1	0.17	2	1.5	0.25	1	2	0.07	2	1.5	0.27	2	1.5	0.19
Alder Flycatcher			0.00	3	5	2.50	3	3	0.75	1	5	0.18			0.00			0.00
Least Flycatcher			0.00	1	1	0.17			0.00			0.00			0.00			0.00
Blue-headed Vireo			0.00	1	2	0.33	1	1	0.08	1	1	0.04			0.00	1	1	0.06
Philadelphia Vireo			0.00	1	1	0.17			0.00			0.00			0.00			0.00
Gray Jay	2	1.5	0.30	2	1	0.33	3	2	0.50	3	1.6	0.17	5	2.6	1.18	3	2	0.38
Common Raven	1	1	0.10			0.00	1	1	0.08	2	1	0.07	1	1	0.09	2	2	0.25
Tree Swallow			0.00			0.00	1	2	0.17			0.00	1	1	0.09			0.00
Boreal Chickadee			0.00			0.00			0.00			0.00	2	1	0.18	1	1	0.06
Brown Creeper			0.00	1	1	0.17			0.00			0.00			0.00			0.00
Winter Wren	2	1	0.20	1	1	0.17	1	2	0.17			0.00	1	1	0.09	1	2	0.13
Ruby-crowned Kinglet	5	1.6	0.80	5	1.8	1.50	4	2	0.67	2	1.5	0.11	5	1.4	0.64	5	1.4	0.44
Swainson's Thrush	3	1.3	0.39			0.00	1	1	0.08	1	1	0.04	1	1	0.09	3	1.6	0.30
Hermit Thrush	5	2.8	1.40	2	1	0.33	3	2.6	0.65	3	2.6	0.28	4	2	0.73	7	2.1	0.92
American Robin	2	1	0.20			0.00	1	1	0.08	2	1.5	0.11			0.00	2	1	0.13
Bohemian Waxwing			0.00			0.00			0.00	1	2	0.07	1	2	0.18			0.00
Tennessee Warbler	1	1	0.10	1	1	0.17			0.00			0.00			0.00			0.00
Orange-crowned Warbler	2	1.5	0.30	1	2	0.33	1	1	0.08	4	2	0.29	1	2	0.18	4	2.5	0.63
Nashville Warbler			0.00			0.00			0.00			0.00	1	1	0.09	1	1	0.06
Yellow Warbler			0.00	1	2	0.33	1	1	0.08	1	1	0.04			0.00			0.00
Magnolia Warbler			0.00	2	1	0.33	1	1	0.08	1	2	0.07			0.00			0.00
Yellow-rumped Warbler	3	1.3	0.39	4	1.5	1.00	1	1	0.08	4	2.5	0.36	6	2.3	1.25	6	1	0.38
Blackburnian Warbler			0.00			0.00			0.00			0.00			0.00			0.00
Palm Warbler			0.00			0.00			0.00			0.00	1	3	0.27			0.00
Blackpoll Warbler			0.00	3	2	1.00	3	3.5	0.88	2	1.5	0.11	3	2	0.55	1	2	0.13
Black-and-white Warbler			0.00	1	1	0.17			0.00			0.00			0.00			0.00
Ovenbird	1	1	0.10	1	1	0.17			0.00			0.00			0.00			0.00
Northern Waterthrush	1	1	0.10	4	1.75	1.17	1	3	0.25	2	2	0.14			0.00			0.00
Common Yellowthroat	1	2	0.20	3	1.6	0.80	2	2.5	0.42	3	2	0.21	1	1	0.09	2	1.5	0.19
Wilson's Warbler			0.00	3	5.3	2.65	1	1	0.08			0.00			0.00			0.00
Savannah Sparrow	1	2	0.20			0.00	2	3	0.50	12	2.8	1.20			0.00	3	3	0.56
Fox Sparrow	1	2	0.20			0.00	8	1.8	1.20			0.00	1	4	0.36	1	1	0.06
Lincoln's Sparrow	4	3	1.20	1	1	0.17	6	2.3	1.15	16	2.4	1.37	2	2	0.36	8	3.1	1.55
Swamp Sparrow			0.00	3	1.6	0.80	2	4.5	0.75	1	1	0.04	1	2	0.18	2	1.5	0.19
White-throated Sparrow	2	2	0.40	5	1	0.83	8	2.1	1.40	5	1.4	0.25	5	2.2	1.00	6	1.3	0.49
White-crowned Sparrow	1	2	0.20			0.00	4	1.25	0.42	10	1.8	0.64			0.00	3	2	0.38
Dark-eyed Junco	3	1.3	0.39	2	1	0.33	3	1.6	0.40	4	1.25	0.18	8	2.1	1.53	5	2	0.63
Rusty Blackbird	3	2.3	0.69	3	1.6	0.80	1	10	0.83	13	2.4	1.11	4	1.5	0.55	7	1.4	0.61
Pine Grosbeak			0.00			0.00			0.00	1	2	0.07			0.00			0.00
Common Redpoll			0.00	2	2	0.67	3	1.3	0.33	1	1	0.04	1	2	0.18	1	2	0.13
Pine Siskin	1	1	0.10			0.00			0.00			0.00			0.00			0.00
Average Number of Birds per Plot			10.96			23.22			15.08			15.20			12.33			11.66
Total Number of Species			31			41			39			47			31			39

Notes: 1. N = Number of plots where species observed. 2. Mean = Mean number of individuals in plots where species observed.
3. Relative (R.) Abundance (Abund.) = Mean number of individuals observed per plot - also colour coded as per the following:

Colour	Range
White	0.00
Yellow	0.01 - 0.25
Light grey	0.26 - 0.50
Medium grey	0.51 - 1.00
Dark grey	1.01 - 2.00
Red	>2.00

The most notable effect of the project on migratory birds will be the temporary and permanent loss of fen and bog habitat. Such habitat losses will be minimized to the extent practicable – mainly through development of a compact site. Where habitat disturbances are unavoidable, the disturbed areas will be rehabilitated to naturalized productive wildlife habitat at closure. In most cases the rehabilitated habitats will be different from those that presently exist, in that following closure, the majority of disturbed areas will be elevated above the muskeg landscape, mainly in the form of mineral stockpile areas. It will not be possible to return these areas to fen and bog environments at closure because of the elevation changes, but the Proponent has committed to the development of wetlands within disturbed areas, as part of the site rehabilitation program, to the extent practicable. It is estimated that approximately 150 ha of disturbed habitats can be restored as wetlands, as described in Section 6.6.1.4.2. Other disturbed habitats will be restored mainly as diverse forested habitats.

With regard to waterfowl and shorebirds, concentrations of these species generally occur along and closer to coastal areas. There is much more limited use of inland sites, such as at the Victor site, by shorebirds and waterfowl, despite the large numbers of muskeg ponds in the area. Waterfowl and shorebird habitats are also better expressed in the western half of the Nayshkootayaow River watershed, where a number of small lakes occur. This area will not be affected by development.

The total area that will be physically disrupted by project-related developments will include 8.7 km^2 associated with the Victor site, 13.4 km^2 associated with the coastal transmission line (including a contingency section from Kashechewan to Attawapiskat that is unlikely to be constructed), 6.3 km^2 associated with the south winter road and transmission line corridor including the existing south winter road, and 0.4 km^2 associated with the west winter road, for a total of 28.8 km^2. Much of the area that will be disturbed in association with transmission line and winter road facilities will still be available for use by birds, as the groundcover within these corridors will remain largely intact.

As with other forms of wildlife, the potential exists for adverse effects to birds due to unnatural noise and light conditions. There will be noise from sources such as heavy equipment operation, and limited aircraft use of 3 to 4 aircrafts per week during operation and 5 to 7 aircrafts per week during construction, together with supplementary helicopter use for things such as environmental sampling and monitoring.

Bird species respond variably to the periodic effects of noise from high intensity sources such as jet aircraft and helicopters, with some species acclimating fairly quickly, whereas others such as geese in an Alaskan study continuing to react to aircraft overflights.

Noise modelling studies indicate that low sound levels, in the range of 30 dBA, will be achieved at the outer boundary of the 3 km buffer zone surrounding the Victor site.

6.6.2.3.2 Mitigation

The primary mitigation strategy for limiting adverse effects to migratory birds will be maintaining a 200 m buffer zone along watercourses, to protect riverbank and creek margin forest habitats;

developing a compact site; and rehabilitating disturbed sites to productive wildlife habitat at closure. The Proponent has committed to concerted efforts to develop a diverse landscape at closure, with input from federal and provincial governments and the AttFN. To the extent feasible, progressive habitat reclamation will be undertaken during the project operations phase.

To further minimize impacts to migratory birds, all major tree clearing will take place outside of the main nesting period (from June 1 to July 23), and a policy will be put in place to restrict the lateral expansion of mineral stockpiles during the nesting period, to the extent practical, to limit the potential for disturbance to ground nesting birds.

To reduce noise and other disturbances, De Beers has committed to a number of noise and light mitigation techniques. Air traffic to and from site will be subject to a minimum altitude of 300 m except on approach and take off, or during emergency conditions, or when required for conducting environmental studies.

Anticipated Effectiveness of Mitigation Measures and Contingencies – Mitigation measures described in this section will be effective for their intended purposes, and in many instances can be further optimized in response to monitoring data.

6.6.2.3.3 Significance

The totality of habitats that will be directly displaced, or altered, by project-related developments encompasses an area of 28.8 km^2. If the area within the Victor site buffer zone is considered (encompassing 140 km^2) the maximum potential area of influence totals 159.7 km^2. Therefore from the perspectives of direct disturbance, or indirect disturbance within buffer zones, the magnitude/geographic extent of the area of potential influence is small - classified as a Level 1 effect.

At closure, all disturbed sites will be rehabilitated to terrain types that can be utilized by bird life. Any disturbances influencing buffer zones, such as noise, will cease immediately upon closure. As such all effects are considered as being Level 1 effects for reversibility.

Project-related effects on birds are not significant (Table 6-11).

6.6.2.3.4 Comments/Concerns

The coastal First Nations have expressed specific concerns relating to waterfowl and the potential for fuel spills within James Bay to adversely affect area waterfowl (and shorebirds) on a large scale. With the Proponent's decision to provide power to the site using a transmission line, such that fuel transport in James Bay is no longer required for the project, this concern is no longer applicable. Otherwise, the First Nations, and the AttFN in particular, have expressed concerns regarding the sensitivity of wildlife generally, and the need to protect wildlife resources, including bird life.

Gartner Lee, acting on behalf of the AttFN, indicated that additional data should be provided on bird communities, beyond that provided in the CSEA and the EBS, and that these data should include consideration of the habitats associated with the north, south and west winter road corridors, and the esker site proposed as an aggregate source.

LGL Limited, acting on behalf of Mushkegowuk Council, also expressed that further data were required on marine birds (and mammals) to more fully address the potential adverse effects associated with possible fuel spills during the marine transport of diesel fuel in Hudson and James Bay waters, again, a concern that is no longer applicable.

federal and provincial government agency reviewers expressed that the level of detail on birds, as presented in the CSEA, was inadequate and that more complete breeding bird surveys should be completed for the Victor site, as well as for the various site access routes. The request for additional data applied to both inland areas and to the coastal/marine environment. In subsequent discussions with the Proponent, the government agencies concluded that the need for additional data on birds inhabiting the coastal/marine environment would not be required if the Proponent changed its plans regarding the marine transport of fuel in Hudson and James Bays, which was the case, with such shipment of fuel no longer comprising part of the project.

First Nation community members also remarked that migratory birds and particularly waterfowl tend to follow along the transmission line corridor and not along the coast as they once did.

6.6.2.3.5 Proponent's Response

In response to concerns expressed regarding the inadequacy of bird data presented in the CSEA, the Proponent held discussions with federal and provincial agencies to determine an appropriate course of action, and on the basis of these discussions, and considerations relating to a further consideration of project access and power alternatives, the Proponent carried out an extensive breeding bird survey during the spring and early summer of 2004. The survey included the collection of large amounts of data from:

- The Victor site area;
- The coastal winter road and transmission line route;
- Winter road routes connecting between Attawapiskat and the Victor site;
- Potential winter road and transmission line routes between the Hearst/Constance Lake area and the Victor site; and,
- A possible transmission line route between Kapuskasing and Constance Lake.

Data from these surveys were reported in the SAPA report, along with detailed descriptions of vegetation communities associated with the sampling points. A total of 331 point counts were made during this work.

The subsequent response of the federal and provincial agencies to the results of these studies was positive, indicating that the Proponent had made efforts to collect the data utilizing appropriate methodologies.

Regarding concerns expressed by First Nation members that migratory birds, most notably waterfowl, now follow along the existing transmission line and not the coast, the Proponent has indicated that this pattern of behaviour, if properly characterized, is already in place, and would not be expected to change appreciably with the twinning of the existing transmission line south from Kashechewan. Moreover, if the observed trend represents a substantial deviation from previous waterfowl behaviour patterns, this is all the more reason to twin the existing line, and not to develop a new transmission line corridor some distance away from the existing line.

6.6.2.3.6 RA Conclusions

The RAs have concluded that there will not be any likely significant adverse environmental effects on migratory birds. The RAs have included a follow-up program related to migratory birds as outlined in Chapter 8.

6.7 Species at Risk - COSEWIC, SARA and COSSARO Species

The known "species at risk" within the project study area are the woodland caribou (boreal population), wolverine, the short-eared owl, and the yellow rail, in the case of COSEWIC (Committee on the Status of Endangered Wildlife in Canada, May 2003) species; together with bald eagles in the case of COSSARO (Committee on the Status of Species at Risk in Ontario) species. No fish, reptile, amphibian, mollusc, lepidopteran, plant, lichen or moss species at risk have been identified in the project study area.

Woodland caribou are comparatively common, but widely spaced in the Victor site area, typically occurring singly or in small groups. Recent surveys in the winter of 2004/2005 suggest a preliminary caribou density in the region in the order of 1 animal per 20 km^2. This density is about twice that of historical estimates, and remains to be confirmed through further study. The principal caribou concentration area appears to be to the west of the Victor site in more complex terrain. Potential adverse effects to this species were addressed in Section 6.6.2.1 and were considered not significant.

Wolverines occur at very low densities in Ontario, and are confined mainly to the northwestern portion of the Province, near the Manitoba border, and as such are unlikely to be present in the Victor site area. TEK studies indicated that wolverines once occurred in the Attawapiskat area, but no longer appear to occur. The likelihood of project related adverse effects to wolverine populations is therefore extremely low.

The short-eared owl prefers open country, where it nests in bogs and marshes (Cadman et al. 1987), and also presumably fens. It is more likely to be found closer to James Bay, than further inland. One short-eared owl was sighted in fen terrain just north of the Attawapiskat River, near where the Lawashi Channel splits off from the Attawapiskat River, approximately 55 km east of the Victor site. Short-eared owls are opportunistic predators, constructing rudimentary nests in open terrain, mainly in response to fluctuating vole populations. They commonly occur around airports, and similar areas, where short grass habitats are maintained. The construction of winter road and transmission line corridors would not be likely to adversely affect habitat use by this species.

The yellow rail is more likely to be confined to coastal marsh areas bordering James Bay (Cadman et al. 1987). No yellow rails were noted during avian surveys associated with the VDP, including areas along the proposed new transmission line route and existing coastal winter road. Significant project related adverse effects to this species are unlikely.

Bald eagles are fairly common in the region, and were observed fairly regularly along the Attawapiskat River and Nayshkootayaow River. COSEWIC lists the bald eagle as a species that is "not at risk". The Proponent has committed to maintaining a 200 m buffer away from creeks and rivers, where bald eagle nests are most likely to occur, and to clearing any substantive areas of trees during the non-nesting period. The Proponent has also committed to conducting further stick nest surveys in any areas of substantive forest that are proposed for clearing. Thus far, stick nest surveys at the Victor site have not identified any bald eagle nests in the immediate Victor area. With the mitigation measures proposed, adverse effects to bald eagles are unlikely to occur.

6.7.1 Significance

Wolverine and yellow rails are unlikely to occur within the project development areas, such that Level 1 ratings are assigned for ecological context and magnitude/geographic extent for these two species. Short-eared owls could potentially occur along the winter roads and within transmission line areas, mainly near the coast; however habitats and prey utilized by this species would not be adversely affected, also yielding Level 1 ratings for ecological context and magnitude/geographic extent.

Caribou are known to occur throughout the region. However, as described in Section 6.6.2.1.3, the magnitude/geographic extent of the area of potential disturbance is small in relation to the availability of habitat to caribou (Level 1 rating for ecological context and magnitude/geographic extent), and within the context of the broad movements that individual caribou are capable of making (up to several 10s of kilometres within a few days based on initial satellite readings). Effects were therefore considered to be not significant.

Bald eagles regularly occur as described above, but nesting areas used by this species would not be disturbed, and fisheries resources upon which the eagles are dependant for food will not be affected, yielding Level 1 ratings for ecological context and magnitude/geographic extent.

Based on the above, potential adverse effects to species at risk are not considered to be significant.

6.7.2 RA Conclusions

The RAs have concluded that there will not be any likely significant adverse environmental effects on species at risk as a result of this project. RA conclusions specific to caribou are described in Section 6.6.2.1, which notes that the follow-up program necessary to confirm the accuracy of the EA predictions with regard to caribou is outlined in Chapter 8.

6.8 Natural Heritage Systems

6.8.1 Attawapiskat River Proposed Candidate Waterway Park (ARPCWP)

6.8.1.1 Environmental Effects

The Attawapiskat River proposed candidate waterway park (ARPCWP) is an eastern extension of the Otoskwin-Attawapiskat River Provincial Waterway Park (OARPWP), which extends from the headwaters of the Otoskwin River, downstream 420 km to the confluence of the Attawapiskat and Muketei Rivers. This confluence is located 105 km west northwest from the Victor site, and the ARPCWP extends from this point eastward to James Bay, except as described below. The OARPWP and the ARPCWP are intended to protect the significant natural and cultural features of the waterway, and to provide opportunities for wilderness recreation, principally canoeing. Part of the wilderness experience of canoeing down the Attawapiskat River lies in passing through the karst areas that border the Attawapiskat River in the general region of the Victor site, which comprise part of the Attawapiskat Karst candidate ANSI.

The ARPCWP is covered by Withdrawal Order W21/79, which provides for the removal of lands from mineral staking for a distance of 200 m from the north and south banks of the river. Due to incomplete government records for this area, claims were inadvertently allowed to be staked, and in recognition of the confused documentation, the validity of the Victor claims has been legitimized by a new Withdrawal Order (W-P-01/05) and by an Order-in-Council (MNDM letter to De Beers dated April 20, 2004) (EBR Registry Number XB04E2006).

The EBR registry states that a 33 km contiguous section of the waterway has been removed from the “proposed candidate waterway park” where valid mining claims are held, including claims held by De Beers and including the Victor claim block (Figure 5-3). The remaining portion of the ARPCWP remains subject to the withdrawal order, but it is further recognized that “some flexibility may be necessary to permit limited infrastructure requirements related to a planned new diamond mine (the project) and to address the development needs of the community of Attawapiskat”.

The existing south winter road crosses the Attawapiskat River, from the north to the south side approximately 20 km west of the community of Attawapiskat. The existing coastal winter road also crosses the Attawapiskat River at the location of the community. The current arrangement for winter road access to the project site involves use of these two river crossings; however, the Proponent has indicated its desire to reroute the south winter road so as to keep all project-related winter road traffic on the south side of the river, and therefore not cross the river (Figure 5-3).

In addition to winter road crossings, there will be a need for a the new 115 kV transmission line from Attawapiskat to the Victor site to cross the Attawapiskat River, as the line must originate from the existing Attawapiskat substation. The Proponent proposes to cross the Attawapiskat River at the existing line crossing that services the community, so as not to generate a second crossing location (Figure 2-4).

The remaining effect on the Attawapiskat River and the associated ARPCWP will be water intake and discharge structures associated with the Victor site, although the structures themselves will be developed within the 33 km zone removed from the ARPCWP. Water flow and quality aspects related to these actions are addressed in Section 6.4.1.1. A water intake structure is proposed near the south bank of the river to supply the mine site with all water needs, including water needed for flow supplementation. A well field water discharge structure will be positioned approximately 25 m off shore for improved well field water mixing with the Attawapiskat River. Both of the water intake and discharge structures will be heavily armoured (encased in concrete and rip-rapped) to protect the structures from ice damage. Riprapping will be carried out in a manner that naturalizes the structures, for aesthetic purposes. Short pipelines connecting the intake and discharge structures to on shore facilities will be buried in the riverbed. On shore pumping facilities will be suitably screened for aesthetics.

6.8.1.2 Mitigation

The required river crossing for the new 115 kV transmission line leading from Attawapiskat to the Victor site will be positioned at the location of the existing line crossing that services the community. This action avoids the need for a new crossing area.

Planned water intake and discharge structures will be placed within the 33 km zone removed from the ARPCWP, and the facilities will be naturalized for aesthetic considerations. The on shore pump station will be screened so that it is not readily visible from the river. No other structures or facilities will be developed within 200 m of the river.

6.8.1.3 Significance

The level of intrusion on the Attawapiskat River and the associated ARPCWP will be minor, such that there will be no meaningful change to the ecological function of the system, generating a Level 1 rating for magnitude/geographic extent. Where facilities are required to be constructed in the river (water intake and discharge structures) these will be naturalized. At closure the facilities will be removed, and any associated disturbances will be fully restored, yielding a Level 2 rating for duration.

On the basis of Level 1 ratings for both magnitude/geographic extents, the effects are considered not significant (Table 6-11).

6.8.1.4 Comments/Concerns

The MNR Parks Branch made several comments on the CSEA to the effect that the Proponent did not properly and fully address the ARPCWP in the CSEA, and that Natural Heritage Values (NHV) should not be buried within a "recreation and aesthetics" section of the report, but should be given their own section commensurate with the value of these resources. More directly, MNR stated that the Proponent will have to address the 200 m withdrawal order which is in place on the Attawapiskat River downstream of the Victor site to James Bay, as interim protection policies apply to the ARPCWP. MNR indicated further that the Proponent will also need to consider alternatives to proposed works at Attawapiskat and within the waterway setback.

Specific concerns that were identified by MNR relative to the Attawapiskat River and the ARPCWP included maintaining shoreline communities to reduce erosion, maintaining fisheries communities and aquatic representation including the sturgeon fishery, and maintaining aesthetics for First Nation culture, and existing and potential recreation and tourism objectives.

6.8.1.5 Proponent's Response

In response to MNR's concern that NHV should be given their own section, the Proponent has accommodated this suggestion within the CSR. With respect to the Proponent's earlier omission of discussions related to the ARPCWP, the Proponent responded that at the time of preparation of the CSEA, there were conflicting messages from the provincial government as to whether or not the ARPCWP actually existed. The Proponent stated that they were previously informed from several different MNR sources prior to and during preparation of the CSEA that such a proposed candidate waterway park did not exist, and that there were no plans to extend the Otoskwin-Attawapiskat River waterway park east of its current boundary. The situation was subsequently clarified as per Section 6.8.1.1, and the Proponent agreed to incorporate discussions of the ARPCWP into the CSR.

With regard to MNR's request that the Proponent should include a further consideration of alternative means of carrying out the project that are less intrusive to park values, the Proponent initially responded that with planned Victor site access through Attawapiskat, there were no reasonable alternatives to a barge berth facility outside of the ARPCWP, and that without the necessary barge berth, marine transport of materials for the Victor Diamond Project would not be feasible. However, the Proponent subsequently undertook a re-evaluation of site access and power alternatives in response to the larger issue of fuel handling in James Bay, and the request of some First Nation members for De Beers to reconsider alternative access through the Hearst/Constance Lake area.

The Proponent's analysis of access and power alternatives, as reported in the SAPA document, resulted in a change to the project description, replacing the formerly proposed on-site diesel power generating system with transmission line power from the Otter Rapids area. This change has reduced marine transport needs to the extent that if a new barge landing facility is required in Attawapiskat, it will be a much scaled down version, and used only during the construction period for project purposes. However, it may be that the AttFN might wish to take over the use of this facility for servicing the community, once De Beers no longer needs the barge landing area.

6.8.1.6 RA Conclusions

Based on advice from the Ontario Ministry of Natural Resources, RAs have concluded that there is not likely to be any significant adverse environmental effects on Attawapiskat River Proposed Candidate Waterway Park.

6.8.2 Areas of Natural and Scientific Interest (ANSIs)

6.8.2.1 Environmental Effects

There are four candidate Areas of Natural and Scientific Interest (ANSIs) within the project vicinity, as per the following:

- Attawapiskat Karst candidate ANSI (nationally significant);
- Attawapiskat Ekwan Ridge candidate ANSI (provincially significant);
- Southwest James Bay candidate ANSI (regionally significant); and,
- Chickney Point candidate ANSI (provincially significant).

Additional candidate ANSIs were identified as occurring along, or near, winter road access alternatives from the Hearst/Constance Lake area. These were not considered because the access option from Hearst/Constance was not the one selected by the Proponent. Also, the Attawapiskat Ekwan Ridge candidate ANSI is located well north of the Attawapiskat River and outside of the potential project-related zone of influence (Figure 5-3), and hence will not be affected by the project.

The Attawapiskat Karst candidate ANSI measures some 540 km^2 and completely encompasses the Victor site. A description of the ANSI is provided in Section 6.8.2. The ANSI is defined as an area of National significance, being the

> "best developed and most extensive karst topography in Ontario, exceptional river cliffs and channels, and regionally representative wetlands complexed with outcropping bioherm uplands and sinkhole meadows. Exceptional aesthetic/ interpretive values".

With the Victor claim block being completely encompassed by the ANSI boundary, it is not possible to avoid intrusion upon the ANSI. However, the magnitude of the intrusion will be limited given that:

- The nearest sinkhole meadows associated with the ANSI are located approximately 5 km or more to the east of the Victor site, in an area where the Attawapiskat and Nayshkootayaow Rivers run close together and parallel to one another – no developments are proposed for this area other than the south winter road/transmission line route which passes through this zone, but does not traverse the sinkhole meadows; and,

- The larger clusters of bioherms, located approximately 10 km east and 35 km west of the Victor site, and trending southeast – northwest, are located well outside of the principal Victor development zone, although the south winter road/transmission line route passes through the east bioherm zone, and close to some prominent bioherm features.

Three quarries are proposed for development in connection with the project. These are the north, central and south quarries. All three quarries are positioned on bioherm features. The south quarry already exists, being developed during the advanced exploration phase of the project. The Proponent plans to complete development of this quarry to provide rockfill for site preparatory works. These works will involve removing the remaining surface exposures of the bioherm, and developing the quarry to an approximate depth of 6 to 8 m. The total amount of additional material that will be removed is estimated about 140,000 m^3. The central quarry will be the main project quarry and will supply an estimated 2 Mm^3 of placed limestone rockfill, and the north quarry will supply an estimated 1 Mm^3 of placed rockfill that will be used to construct the airstrip.

The south quarry bioherm is a well developed bioherm; the central quarry shows only very limited rock exposure (not more than a few 10s of square metres and only 1 to 2 m above the surrounding muskeg surface); and the north quarry bioherm shows intermediate expression. Exposed portions of all three bioherms will be removed, with the central and north quarries being developed to approximate depths of 24 and 13 m below grade, respectively.

The three bioherms proposed for quarry development constitute a small portion of 346 bioherms located within the ANSI boundary, and an even smaller portion of the many additional bioherms that extend beyond the ANSI boundaries, mainly to the south and west.

The existing south winter road and proposed associated transmission line route, pass through and by necessity, terminate within the ANSI boundaries. Development of the winter road and transmission line, however, is not expected to adversely affect the expression or function of the ANSI.

There are also two candidate ANSIs located along the James Bay coast that are transected by the existing coastal winter road and transmission line, and by the proposed new 115 kV transmission line. In the case of the Southwest James Bay candidate ANSI (Figure 5-3), the following aspects are of note.

The Southwest James Bay candidate ANSI is described as:

> "An excellent example of a coast with international significance in terms of waterfowl migration; with a complex series of coast-parallel and coast-perpendicular ridges and their concomitant wetland impounds proceeding tidal to bog series – Riley 1981."

Construction of a new transmission line immediately adjacent to and parallel to existing coastal winter road and transmission line will result in a widening of the existing 30 m transmission line corridor by a further 30 m to accommodate the new line. The line will pass through an approximately 25 km long section of the ANSI, resulting in the partial disturbance of 0.75 km^2 of land, the groundcover of which will be left essentially intact, as line construction will take place in the winter.

The Chickney Point candidate ANSI will not be disturbed by new construction, as it is not necessary to twin that portion of the existing 115 kV line that passes between Kashechewan and Attawapiskat to service project needs. In the SAPA report, it was stated that there was a potential to build such a line segment, and that it was therefore being retained as a contingency. Although an upgrade to the line between Kashechewan and Attawapiskat is not necessary at this time, the provincial environmental assessment is considering twinning this section as a contingency, should power demand in Attawapiskat increase in the future.

6.8.2.2 Mitigation

The Proponent has made efforts to avoid infringement on those portions of the Attawapiskat Karst candidate ANSI, which show the best expression of the features for which the ANSI was defined, namely limestone exposures along the Attawapiskat and Nayshkootayaow Rivers.

Use of the three bioherm features selected for quarry sites is essential for project success, as limestone waste rock that will be generated by open pit development will not be available until after all site infrastructure has been constructed. Hence there are no practical means of utilizing other aggregate sources. The central quarry will also have the dual function of serving as a fine processed kimberlite repository, and later will serve as a polishing pond, thereby providing for efficient and multiple uses. Development of two principal quarries (north and south) reduces the amount of disturbance to the landscape, as the amount of land that would be disturbed in association with quarry development increases disproportionately with increasing depth.

With regard to winter road and transmission line development, it is not reasonably possible to avoid passing through the east bioherm zone, as this zone extends well north and south of the Attawapiskat and Nayshkootayaow Rivers. However, as part of closure planning, the Victor site area will be rehabilitated to a natural (though different from present) condition. The area of south winter road/transmission corridor intersection with the east bioherm zone would, however, be allowed to revert back to a natural condition, as no other developments are planned for this section.

The new transmission line segment through the Southwestern James Bay candidate ANSI would become permanent. The Proponent has indicated that rerouting the transmission line around this ANSI would not be practical and would make little environmental sense, as the line follows existing ROWs, and creating an entirely new ROW in undisturbed terrain would be more intrusive.

Anticipated Effectiveness of Mitigation Measures and Contingencies – The Proponent has stated its willingness to consider realignment alternatives in consultation with federal and provincial governments, and the AttFN.

6.8.2.3 Significance

The level of intrusion on the Attawapiskat Karst candidate ANSI will be minor as the entire Victor site development will take place within an area of about 25 km^2, portions of which will not be developed. As such, there will be no meaningful change to the ecological function of the ANSI, generating a Level 1 rating for magnitude/geographic extent.

Winter road and transmission line intrusions on the Attawapiskat Karst candidate ANSI will have only a very minor effect that will end at closure. Transmission line intrusions on the southwestern James Bay will be permanent, but minor. Groundcover within the disturbed zones along winter road and transmission line routes will not be appreciably altered, thereby maintaining most of the biological function of disturbed areas even during operations.

On the basis of a Level 1 rating for both magnitude/geographic extents, the effects are considered not significant (Table 6-11).

6.8.2.4 Comments/Concerns

The MNR Parks Branch made several comments on the CSEA to the effect that the Proponent should more fully discuss the ANSIs, and project-related effects on the ANSIs, including a more comprehensive discussion of alternative means to reduce any adverse effects, as well as providing better mapping. Particular concern was expressed for the "type" organo-karst area east of the Victor site, as defined by Cowell (1983). MNR also expressed that these discussions should be included in a Natural Heritage Values section. It was also suggested by MNR that there are many bioherms in the greater area, including outside the ANSI, and that these need to be investigated for additional and/or alternate ANSI values.

More general concerns expressed by MNR were that the Proponent did not consider the broader effects of well field dewatering on natural systems within the Attawapiskat Karst candidate ANSI, or the effects of dewatering on the karst itself, over the full extent of the mine life.

In its review of the SAPA report, MNR suggested that the Proponent should consider rerouting the existing south winter road away from the Attawapiskat Karst core area, located between the Attawapiskat and Nayshkootayaow Rivers, east of the Victor site, and that the transmission line should be routed away from bioherms and that poles not be anchored within bioherms. Concerns were also expressed about the compaction of soils along the south winter road through the ANSI area.

6.8.2.5 Proponent's Response

The Proponent has provided more detailed mapping of the ANSI features as per this report. This information includes a map of all known or suspected bioherms outcroppings within and adjacent to the Attawapiskat Karst candidate ANSI, to the limits of the September 2004 hydrogeological model, base case 1 m bedrock draw down contour. The results show that there are numerous bioherms in the area, including 346 within the ANSI boundary, and 795 within the limits of the predicted 1 m draw down contour. The Proponent also hosted site visits with representatives of the various government agencies in September and October of 2004 to further review potential effects of the project on muskeg systems, and karst features within the ANSI boundary.

Relative to the potential effects of well field dewatering on muskeg systems within the ANSI, the Proponent has provided hydrogeological information to the contrary, and has shown specific sites to the government agencies indicating that muskeg does not readily dewater (Section 6.3).

Relative to the "type area" for organo-karst terrain, the Proponent has indicated that this area is located approximately 10 km east of the Victor site. This specific site already exists in a naturally depressurized state, and as such will not be meaningfully affected by project dewatering, or other project-related developments, other than by the south winter road, which already exists, and the proposed transmission line.

With regard to adverse effects to the karst itself, the Proponent has responded that the development of karst depends on the presence of suitable bedrock lithology, sufficient gradient, and chemically aggressive groundwater/water.

Effects of long-term (life of mine) groundwater draw down potentially include:

- The collapse of karst structures;
- Increased infiltration of surface waters from rivers and from the muskeg; and,
- Increased groundwater gradients.

The Proponent concluded that the potential for collapse of existing karst features is minor since in the area close to the Victor pit the cavities are small (typically less than 0.05 m in diameter) and developed in the uppermost parts of the Attawapiskat Formation where the existing hydraulic pressure is low and not considered to be a major structural element of the existing cavities. Areas along riverbanks where karst development is presently concentrated will not be affected since the cavities in these areas have stabilized by virtue of the fact that the area is currently above the existing water table and the river level.

With respect to increased infiltration into the bedrock aquifer, the Proponent expects that pit dewatering will produce only a minor change in infiltration rates, and only a small change in the chemistry of the shallow groundwater chemistry, likely by less than 10%. Hence, meaningfully increased rates of karst formation are not expected within the timeframes under consideration. Dewatering will change the groundwater gradients in the vicinity of the Victor pit, which could potentially affect the karst processes close to the rivers (because of stronger chemical gradients), but any such effects would be minor and quite localized.

The final consideration is the suggestion by MNR that the Proponent should consider relocating the south winter road (and proposed transmission line) away from the Attawapiskat Karst candidate ANSI core area, directing the road south of the Nayshkootayaow River through this area. In response to this suggestion, the Proponent has stated that doing so would be feasible, but it would involve an additional three creek crossings, and the realignment would still pass through the eastern bioherm belt, and a concentration of bioherms similar to that which the road already passes through (Figure 6-2). Therefore, since the south winter road already exists, including the Nayshkootayaow River crossing, the Proponent has expressed a reluctance to relocate the road, but is willing to consider the matter further. The Proponent indicated that MNR's concern over soil compaction along the road is not valid, since the ground will be frozen when used for winter road traffic, and there is little evidence of meaningful soil compaction along the existing coastal winter road, which has been in use for several years.

6.8.2.6 RA Conclusions

The RAs conclude that there will not be any significant adverse environmental effects on areas of natural and scientific interest.

6.8.3 Conservation and Nature Reserves

6.8.3.1 Environmental Effects

The Proponent's proposed transmission line alignment in the area just north of Otter Rapids passes near to the:

- Coral Rapids Wetland Conservation Reserve;
- Coral Rapids Provincial Park Nature Reserve;
- Sextant Rapids Provincial Park Nature Reserve; and,
- Pinard Moraine Conservation Reserve.

The proposed 115 kV transmission line does not intersect either of the two nature reserves. The alignment, as proposed (parallel and immediately adjacent to the existing 115 kV transmission line), would pass through the eastern boundary area of the Coral Rapids Conservation Reserve. If the transmission line was constructed to Pinard, rather than to Otter Rapids, the line would also pass near to the Pinard Moraine Conservation Reserve. The Pinard Moraine will be avoided, should the transmission line terminate at Pinard rather than Otter Rapids. The option exists to place the new line parallel to the east side of the ONR line, such that there would be 115 kV lines on both sides of the ONR through an approximately 20 km long segment of the route. The Proponent has committed to seeking guidance from MNR on which side of the ONR would be best for positioning the new line segment.

6.8.3.2 Mitigation

The Proponent has indicated its willingness to avoid constructing the new line through the Coral Rapids Wetland and Pinard Moraine Conservation Reserves, if so directed by MNR.

6.8.3.3 Significance

Constructing the new 115 kV line through the Coral Rapids Wetland Conservation Reserve, wherein the line would be placed immediately adjacent to and parallel to the existing 115 kV line and ONR railway would not meaningfully alter the function of the conservation reserve, nor would such action detract from the aesthetic function of the reserve. However, avoiding the reserve altogether is an alternative action, to which the Proponent is willing to commit.

6.8.3.4 Comments/Concerns

MNR has stated that the Proponent should not construct the new transmission line through any conservation or nature reserves.

6.8.3.5 Proponent's Response

The Proponent has stated its willingness to follow directions from MNR with respect to transmission line location. However, the Proponent has also suggested to MNR that it might be aesthetically more pleasing to have both transmission lines (existing and new) on the same side of the ONR line, rather than having lines on both sides of the railway, given that the ONR Polar Bear Express is a wilderness tourist attraction.

6.8.3.6 RA Conclusion

The RAs have concluded that there will be no significant adverse environmental effects on conservation and nature preserves.

6.9 James Bay Coastal Zone

6.9.1 Environmental Effects

With the Proponent's decision to provide for site power using a transmission line link to the Otter Rapids transfer station (or Abitibi Canyon Junction near Pinard), rather than on-site diesel generation (SAPA), the Proponent is no longer proposing to transport fuel within the marine environment, with the exception of very small amounts (approximately 60,000L/a) to assist with winter road construction, or to dredge the James Bay entrance to the Attawapiskat River. As such, planned activities within the James Bay coastal zone are limited to:

- Minor barging of materials between Moosonee and Attawapiskat using existing barge transport systems out of Moosonee and existing travel routes;

- Possible construction of a small barge landing area (approximately 4 ha) adjacent to the east side of the Attawapiskat sewage lagoons, with a second smaller staging area of approximately 1 ha to be constructed on the south side of the river at, or near, the existing winter road crossing;

- Widening of the existing coastal winter road ROW from an existing approximately 15 m to approximately 25 m; and,

- Construction of a new 115 kV transmission line ROW from Otter Rapids transfer station (or Abitibi Canyon Junction near Pinard) to Kashechewan, following beside the existing transmission line route.

Regular barge transport already exists between Moosonee and Attawapiskat. The amount of fuel transport for the project (approximately 16,000 L/a to assist with winter road construction out of Attawapiskat), is small in proportion to the approximately 2 ML shipped annually to Attawapiskat in the recent past. Fuel would be off-loaded from the barge to EnviroTanks using coupled hoses.

The approximately 4 ha barge landing facility adjacent to the existing Attawapiskat sewage lagoons would be constructed (if needed) on already disturbed ground. The 1 ha staging area on the south side of the Attawapiskat River will be constructed adjacent to the existing winter road ROW, and just outside of the 200 m buffer zone on the ARPCWP – soil conditions permitting. Dredging in front of the Attawapiskat barge landing area (north side) would be carried out as described in Section 2.8. There will be no dredging associated with the smaller south Attawapiskat River staging area.

The existing winter road has an average travelled width of 6 to 8 m, and a right-of-way (ROW) width averaging about 15 m. To provide for a safer and more serviceable winter road, the plan by the Services Company is to widen the travelled width to 10 m (an increase of from 2 to 4 m), and to increase the ROW to 25 m (an increase of approximately 10 m), for improved snow management at the road margins. Various other upgrades to the winter road are also planned, as described in Section 2.5.

The existing 115 kV transmission line from the Otter Rapids area follows the Ontario Northland Railway (ONR) line, on its west side, to Moosonee. From Moosonee north to Attawapiskat, the existing line follows the coastal winter road. The transmission line ROW is approximately 30 m, and the ROW for new transmission line from Otter Rapids (or Abitibi Canyon Junction near Pinard) to Kashechewan will also be 30 m, and will be placed adjacent to the existing ROWs. SNC Lavalin is currently conducting a provincial Class EA for the new transmission line components.

ROW expansions for both the transmission line (Otter Rapids to Kashechewan) and the winter road translate to an altered land base of 13.71 km^2 (Table 6-16). This area represents less than 0.1% of the 22,400 km^2 project study area.

TABLE 6-16
EXTENT OF HABITATS AFFECTED BY WIDENING OF THE WINTER ROAD ROW AND NEW TRANSMISSION LINE CONSTRUCTION

Vegetation/Terrain Type	Area Affected by Coastal Winter Road Widening and New Transmission Line Development (km^2)
Water	0.36
Marsh	0.08
Open fen / heath	0.62
Treed fen	3.42
Open bog	0.21
Treed bog	1.74
Deciduous forest / shrubland	1.73
Coniferous forest	4.77
Mixed forest	0.31
Cut / burned over	0.07
Developed	0.40
Total	13.71

Note: Area changes are based on winter road ROW increase of 10 m, and a transmission line ROW of 30 m

Aquatic habitats will not be affected by ROW changes, with the exception of tree cover clearing adjacent to creeks and rivers, and habitats for wildlife within the 13.71 km^2 affected area would only be partly altered, as marshes, fens and bogs would be left essentially intact. Cleared forest sections, estimated at 6.81 km^2, would be replaced by shrublands, which are productive for several species of wildlife, such as moose. Also, much of the 1.73 km^2 deciduous forest that is shown as being within the proposed ROW expansions is actually willow/alder shrubland, and not deciduous forest.

Disturbances to wildlife from noise already exist along the ONR and the winter road, and would not be expected to appreciably affect wildlife, as these travel routes have been in existence for several decades (1931/32 in the case of the ONR to Moosonee, and 1974 in the case of the coastal winter road).

Background traffic data for the coastal winter road (unrelated to project activities) have been obtained from the Services Company. The estimated traffic use is in the order of 5,000 round trips per winter, or about 85 trips per day, mostly involving smaller vehicles. The VDP will generate an estimated 1,500 round trips per winter during construction, and 700 round trips per winter during operations. Most of this traffic will involve heavy trucks, travelling in convoys of from five to six vehicles, translating to an average of five convoys per day during construction, and two convoys per day during operations. Predicted noise levels associated with this convoy traffic are addressed in Section 6.2.1.1.2. The data indicate that as the convoys are passing, instantaneous sound levels of 40 dBA would be achieved within 1 km of the winter road, and that sound levels of less than 30 dBA would be achieved within a 2 km distance. Average noise levels would be less. These sound levels are not expected to adversely affect wildlife in areas where wildlife has already become accustomed to anthropogenic noise.

6.9.2 Mitigation

Proposed mitigation measures designed to limit adverse environmental effects are the following:

- Developing the Attawapiskat barge landing facility on ground that is already disturbed;
- Replacing dredged substrates with comparable materials as per Section 6.4.1.1.3;
- Positioning the south Attawapiskat River staging area outside of the ARPCWP 200 m buffer zone – soil conditions permitting;
- Positioning the new transmission line elements adjacent to existing ROWs to minimize disturbance to new areas;
- Winter construction of the transmission line for improved access, and to avoid disturbance to nesting and migrating avifauna, and to avoid damage to soils and groundcover vegetation;
- Winter road traffic travelling mainly in convoys to reduce noise disturbance effects;
- Removal of cut timber and winter burning of slash to remove potential fire hazards; and,
- Non-use of herbicides for vegetation growth control, except possibly on the Hydro One controlled section of the line south from Moosonee (to be confirmed through the provincial Class EA process).

6.9.3 Significance

Regarding fisheries resources, habitat alteration associated with the barge landing area will be limited in consideration of the overall abundance of similar habitats in the river, and substrates will be replaced as described in Section 6.4.1.1.3, such that effects to fisheries resources will be minor (Level 1 significance for magnitude) and therefore not significant.

Adverse effects to terrestrial habitat and to associated wildlife are also expected to be of low magnitude, and therefore not significant.

6.9.4 Comments/Concerns

All of the James Bay coastal communities supported the use of transmission line power, as opposed to on-site diesel power generation and the transport of large quantities of fuel in the James Bay area. There was also general support for positioning the new transmission line adjacent to existing ROWs, although a couple of individuals suggested that moving the ROW further inland would reduce disturbance to forested habitats. Support for winter construction of the transmission line was also generally expressed as a means of reducing environmental impacts, including the removal of cut timber and slash.

6.9.5 Proponent's Response

The Proponent has agreed with the stated preferences of the local communities to construct a transmission line to provide power to the Victor site, rather than to develop on-site diesel generation requiring the marine transport of large quantities of fuel in James Bay. The Proponent disagrees with the suggestion from a couple of individuals that the new transmission line should be located further inland, as any such action would have a greater disturbance effect on the environment compared with twinning existing ROWs.

6.9.6 RA Conclusion

The RAs conclude that adverse environmental effects to the James Bay coast from the twinning of the transmission line are not likely to be significant provided that the Proponent undertakes all reasonable measures, as described above, to limit, to the extent practical, the likelihood of an impact.

6.10 Effects of the Environment on the Project

This section addresses the potential effects of the environment on the project relative to:

- Winter temperatures (warm and cold);
- Flooding and ice scour;
- Fire; and,
- Excessive groundwater flow or salinity.

6.10.1 Winter Temperatures

Effect of Warm Temperatures on Winter Road Conditions

The project is dependant on winter road access for the supply of fuel, construction materials, and various types of supplies. Unusually warm winters have the potential to adversely affect both the quality and duration of winter road access in any given year, and on the basis of historical temperature records for the region, and the predictions of general climate models, it appears that the risk of warmer winters is increasing. The concern is most acute for the west James Bay coastal winter road, because of tidal effects at the creek and river crossings, which exhibit an amplitude of approximately 2 m.

To offset the risk of warm weather effects on winter road construction and performance, the Proponent (and/or the Services Company responsible for the coastal winter road) is proposing to undertake the following measures:

- Optimize logistical arrangements to ensure that winter road construction and maintenance are carried out in a timely and effective manner;

- Widen winter roads from a travel width of 6 to 8 m, to a travel width of 10 to 12 m, to promote more effective ground frost penetration, and to leave room for vehicles to avoid poor sections of road (such as ruts) while these are being repaired;

- Apply water sprays to create an ice road, as opposed to a snow road;

- Cut back riverbank slopes to improve approach angles;

- Use portable bridge crossings for crossing creeks and smaller rivers, with such bridges to be installed on an annual basis as soon as creeks and rivers are frozen, and to be removed prior to annual road decommissioning;

- Actively freeze water crossings through flooding to create thicker ice surfaces, of greater strength;

- Use of rig mats at the larger water crossings to provide improved crossing strength, especially at tidal hinge points, with rig mats to be placed and removed annually;

- Control traffic to the extent practicable to minimize unnecessary traffic during warm spells, so as not to unnecessarily damage road surfaces; and,

- Use of an effective and proactive monitoring program to test and confirm road conditions.

These measures are designed such that the minimum winter road season would be not less than 6 to 8 weeks under any foreseeable climatic conditions, up to and including 100-year return period mild winter conditions. Under more favourable (colder) winter temperatures, the winter road season could extend to 10 to 12 weeks. Project logistics are based on a minimum six-week winter road season.

The most critical period for winter road access will be the three construction winters of 2006 through 2008, where an approximate 1,500 truck loads will travel the road each winter, not counting non-project-related local traffic. During the operations phase of the project, winter road traffic will be reduced to approximately 700 loads per season, reducing demands on the road.

Effect of Cold Temperatures on Water Management

Excessively cold temperatures have the potential to freeze (and damage) waterlines and structures, and to disrupt the flow of water in open areas and channels. To guard against waterline freezing, all winter use waterlines will be insulated and heat-traced, or buried below the frost depth, in accordance with standard, cold-climate engineering practice. Open channels (ditches) will be constructed with sufficient depth to allow for maximum ice cover while not interfering with water flow.

Back-up systems (e.g., a standby fine PK pipeline from the plant site to the PKC facility), spare parts (e.g., pumps and water line sections), and portable steam-thaw units will be available on site to respond to any unforeseen water line or decant freezing emergencies.

Effects of Frost Heave on Foundations and Structures

The Proponent proposes to protect facilities that are potentially sensitive to frost damage by using standard cold-weather engineering techniques such as constructing on bedrock, piling structures to bedrock, using deep footings, or providing insulation (principally styrofoam insulation), as required in each individual case.

6.10.2 Flooding and Ice Scour

Potential for General Site Flooding

The James Bay Lowlands, being flat and subject to the rigors of extreme climatic conditions, are prone to shallow, broad flooding during the spring melt, and following unusually heavy or prolonged rains. To protect facilities from broad, general flooding of the muskeg, buildings, yard areas, all-season roads, the all-season airstrip, and other similar features will be constructed, or founded on, rockfill pads raised a minimum of 1 m above the surrounding muskeg surface.

Effect of Ice Jams

There is a high potential for ice jamming on the Attawapiskat River, near the Victor site, where islands and associated narrows occur. However, if severe ice jams were to occur in these areas, the river would simply spill over into the adjacent surrounding muskeg downstream of the site area, and that flooding would not extend to sensitive project facilities. Similar arguments apply to the Nayshkootayaow River.

For the Attawapiskat area, which is more sensitive to flooding the project development plan provides for the possible construction of a barge landing area and an associated rockfill laydown area adjacent to the east side of the sewage lagoons, and a small staging area on the south side of the river, together with a training centre and an office in the community. The barge landing/laydown area will only be used (if at all) during the construction period, and will not have any associated structures. The staging area on the south side of the river will not have any associated structures or equipment other than empty EnviroTanks. The potential for damage to project-related facilities in Attawapiskat is therefore limited, because of the limited nature of the facilities.

Ice Scour

During break-up on the Attawapiskat River, the force of ice floes can be very high, and water intake and discharge structures will have to be sufficiently well armoured so as to be able to resist severe ice scour effects.

6.10.3 Fire

Fires can result from natural (lightning) and human causes. Most fires in the Attawapiskat region are lightning-related. Fires typically occur along rivers, and in association with areas of elevated topography such as bioherms, which offer comparatively drier environments, and which in the case of bioherms are more likely to be struck by lightning because of their elevation. Fires in the Attawapiskat area are typically allowed to burn unless people or structural values are threatened, in which case the fire would be actively controlled.

Also, while most fires occur along the forested margins of the rivers and creeks, and in association with bioherms, some fires do occasionally occur in areas of muskeg (mainly bog areas) during unusually dry years. The phenomenon of global warming could also have a significant effect on the frequency and severity of forest fires in the James Bay Lowlands. Several community members have observed that regional precipitation and water levels have been declining in recent years and that the number of forest fires has been increasing.

A fire at the Victor Diamond Project or in association with its support infrastructure would have varying impact depending on the location and severity of the fire. In the smallest instance there could be a fire that is put out in seconds causing no damage or harm to employees. In the largest instance, likely a catastrophic fire in the employee accommodation complex, there could be substantial loss of life, as with any major fire in any residence or public building. A major fire in the plant site could potentially cause serious equipment damage and also possibly loss of life, if personnel become trapped. A forest fire affecting the transmission line could potentially take out power to the Victor site.

To guard against the advent and severity of fires, various system and procedures will be put in place to prevent and respond to fires. These include such aspects as project design elements, emergency response procedures and equipment, and employee training. The main plant site and accommodations area will be fitted with an external fire ring line. Sprinkler systems will be installed in all major buildings. A foam fire suppression system will be installed at the fuel tank farm, and a fire truck will be on site to respond to emergencies where there is road access. De Beers will also carry appropriate fire insurance. Back-up diesel power will be available in the event of damage to the transmission line."

6.10.4 Increase Groundwater Flow Volumes and Salinities

Excessive Groundwater from Well Field Draw Down

The hydrologic model indicates that the pit perimeter well field will collect and discharge groundwater at a rate of up to 100,000 m^3/d.

The implications to the project of appreciably increasing the estimated rate of groundwater removal above that currently anticipated, would be:

- Increased power demands;
- A possible increase in pumping infrastructure (number of wells); and,

- Possible exceedance of pipeline discharge capacity.

All of these effects have potential cost implications to the project.

Excessive Groundwater Salinity in the Well Field Discharge

Current estimates of groundwater salinity are approximately 2,500 mg/L TDS, including an estimated 800 to 1,000 mg/L chloride (Section 2.1.6). However, the sensitivity analysis on chloride concentrations suggests that chloride concentrations could potentially increase to 1,400 to 1,900 mg/L under more conservative assumptions.

The implications of substantially increased groundwater salinity concentrations to the Victor Diamond Project would be the following:

- Possible increased power costs if blending well water with water from another source is required to reduce potential groundwater toxicity at source; and,

- Possible increased salinity loadings to the Attawapiskat River depending on associated discharge volumes.

6.11 Malfunctions and Accidents

This section addresses the impacts of malfunctions or accidents related to project activities.

6.11.1 Identification of Risks and Methodology

The Proponent identified the risk of potential malfunctions and accidents from a variety of sources, including government guidelines, comments from First Nations and reviewers, and from the Proponent's own risk assessment workshops. Only malfunctions and accidents that have a reasonable probability of occurring during the project were considered. Medical and similar emergencies while important, are unlikely to have an environmental impact and will be addressed within the EMS and Chapter 7 of the CSR.

The following potential malfunctions and accidents were identified:

- Diesel fuel release during truck transport;
- Fuel releases from storage facilities and dispensing areas;
- Transportation accident (non-fuel shipment);
- Open pit stability;
- Failure of water flow supplementation systems;
- Explosives accident;
- PK pipeline failure;
- PKC dam failure;
- Unexpected water quality concerns;
- Settling pond inefficiencies;

- Project-related fires, and,
- Excessive disturbance to wildlife.

The Proponent conducted a qualitative risk assessment to identify the potential risks associated with malfunctions and accidents.

6.11.2 Fuel Release During Truck Transport

Trucking of diesel fuel will occur along winter roads directly from Moosonee to the Victor site. Despite all reasonable safeguards, there remains a small potential for spills from tanker trucks due to collisions, trucks breaking through ice at river crossings, or other mishaps. Diesel tanker trucks will consist of either single units or as dual trailer units (B-trains). Single units typically hold 30,000 L, whereas B-trains hold about 50,000 L. The tanker trucks are typically compartmentalized, such that if there were to be an accident, only a portion of the load would be likely to be lost.

Historical data were provided on tanker truck transport of diesel fuel along the James Bay winter road and along Tibbitt-Contwoyto (T-C) Road in the Northwest Territories (NWT); the latter being the most heavily travelled winter road in Canada. MTL is the major transporter of fuel along the James Bay winter road, and has typically transported about 6 ML of fuel per year. MTL have never had a fuel spill while trucking on the winter road. There have, however, been three anecdotal (and unsubstantiated) spills along the James Bay winter road by other operators.

Up to approximately 4,000 tanker loads of fuel are delivered along the T-C winter road annually, with heavier traffic reported in recent years. The T-C winter road measures 570 km. Over 19 years of operation, there have been 26 reported diesel spills associated with the T-C winter road, with the average spill volume being approximately 2,500 L. Based on an assumed average of 4000 fuel tanker truck loads per season over the five year period from 1997 to 2001 (the last 5 years reported), and with seven reported diesel spills during this period, the Proponent calculated the frequency of diesel spills at one spill per 2,850 tanker loads along the T-C winter road, or one spill per 1,625,000 tanker truck kilometres.

With an average annual fuel consumption of 13,500,000 L/a, and an average tanker size of 30,000 L for the project, the Proponent calculated the average number of trips per year at 450. For a winter road route of 378 km, from Moosonee to the Victor site, this translates to 170,000 tanker truck kilometres per year, or approximately 3,000,000 tanker truck kilometres for the current 17-year mine life. Based on these statistics, the Proponent expects that there will be two fuel spills over the entire mine life, totalling 5,000 L. Gasoline and Jet-B fuel will also be delivered to the Victor site, but volumes will be too small to figure into spill calculations.

6.11.2.1 Potential Environmental Concerns

A diesel spill from a truck travelling to site could impact the surrounding muskeg, and could potentially enter a waterbody if the accident occurred on or near a water crossing.

Diesel is toxic to aquatic life when spilled in freshwater. A tanker spill would have the greatest environmental impact if the spill reached a watercourse that supports aquatic life. There would be no realistic potential to clean up that portion of a spill that reached a creek or river, once it moved under the ice, but the probability of such an event is very remote. A spill on land would be comparatively easy to contain and clean up.

6.11.2.2 Design and Operational Safeguards

Only appropriately licensed companies will be permitted to transport fuel and other hazardous materials on behalf of De Beers. The Proponent has also committed to maintaining spill containment and clean-up supplies in Moosonee, Attawapiskat, at the Victor site, and also at either Kashechewan or Fort Albany, subject to their agreement. Consideration will also be given to the temporary storage of spill response equipment at other locations on the winter roads, especially at major river crossings. A further possibility (on agreement of the First Nations communities) is that regular security/safety patrols occur on the winter roads, and that these personnel carry appropriate equipment and have training to respond to emergencies such as spills on a first response basis. The required supplies and equipment will be defined in the emergency preparedness plan of the EMS. Drivers will be required to have training in spill management and carry appropriate spill control equipment and supplies and participate in exercises to practice and improve the spill management plan. A large part of the spill prevention plan will involve the development of high quality, safe and reliable winter roads, especially at water crossings.

6.11.2.3 Contingency and Emergency Response Procedures

Emergency response procedures will be established in the emergency preparedness plan developed as part of the EMS. The goals of emergency response plan to a fuel spill will be to ensure public health and safety, to contain and clean up the spill, to extend proper notification to authorities and the First Nations, and to undertake appropriate follow-up actions, including the filing of a detailed incident report. The CSEA provides a general description of spill countermeasures, clean-up procedures, and final disposal practices.

6.11.2.4 RA Conclusion

The RAs conclude that adverse environmental effects from fuel spills during truck transport are not likely to be significant provided that the Proponent undertakes all reasonable measures, as described above, to limit, to the extent practical, the likelihood of a spill. Further, RAs will require the Proponent to develop contingency plans that outline how to deal with any fuel spills that do occur, to train personnel to apply these plans, and to review and exercise these plans to strengthen their effectiveness and ensure continuous improvement. The RAs have included a follow-up program related to the response to spills along the winter road, as outlined in Chapter 8.

6.11.3 Fuel Release from Storage Facilities and Dispensing Areas

6.11.3.1 Potential Environmental Concerns

The risk of a major environmental event associated with fuel storage and dispensing areas is typically reduced compared with that associated with truck transport, because of fixed locations (such as being isolated from waterbodies), and the availability of containment and clean-up facilities. Nevertheless, there is still the potential for the contamination of localized terrestrial sites.

6.11.3.2 Design and Operational Safeguards

To minimize the potential for fuel spills associated with fuel storage areas, the Proponent has committed to the following design measures:

- All tankage and storage areas will be constructed to recognized industry standards;
- Storage areas will be setback a minimum 200 m from watercourses, wherever possible;
- Lined containment berms (where applicable) will provide for 110% of the largest tank;
- Containment areas will be fitted with oil/water separator systems;
- Enviro tanks will be situated to minimize the risk from collision and puncturing; and,
- Facilities will be fitted with fire protection systems and will be inspected on a regular basis.

Fuel dispensing stations will be designed as lined compacted gravel (or concrete) pads with drive-on facilities capable of capturing minor spills during fuelling (for example pump left on, valve left open or line leaks), and will be fitted with spill containment equipment and clean-up facilities.

Operational procedures proposed to minimize the potential for accidents or malfunctions at fuel storage areas will be incorporated into the Proponent's EMS, and will include:

- No smoking in the vicinity of fuel storage areas;
- At least daily inspections of fuel tank farms (typically once per shift);
- Weekly inventory calculations; and,
- Fuel tanks not to be filled above 98% of capacity to allow for expansion.

For fuel dispensing activities, there is recognition that despite operational instructions and training, human error can occur. As a result, operational procedures are particularly important at dispensing locations, and will include the following additional measures:

- A fuelling procedure will be posted at all dispensing stations;
- No smoking;
- Constant attendance during fuelling;
- Use of drip collection systems;
- Use of automatic shut off valves that can not be tampered with or wedged open;

- Availability of clean-up and fire fighting equipment; and,
- Daily inspection procedures.

Procedures will be audited as part of the EMS.

With the above facilities and procedures in place, the likelihood of a serious fuel spill is low and as a result, no significant adverse effects are expected.

6.11.3.3 Contingency and Emergency Response Procedures

The emergency response procedures will be established in the emergency preparedness plan developed as part of the EMS. The CSEA provides a general description of spill countermeasures, clean-up procedures, and final disposal practices.

6.11.3.4 RA Conclusion

The RAs conclude that adverse environmental effects from fuel spills from storage areas are not likely to be significant provided that the Proponent undertakes all reasonable measures, as described above, to limit, to the extent practical, the likelihood of a spill. Further, RAs will require the Proponent to develop contingency plans that outline how to deal with any fuel spills that do occur, to train personnel to apply these plans, and to review and exercise these plans to strengthen their effectiveness and ensure continuous improvement.

6.11.4 Transportation Accident (Non-fuel Shipment)

This section addresses spills related to the transportation of materials other than fuel, including hazardous wastes. Key consumables that will be transported to the Victor site include lubricants, antifreeze, solvents, hydrochloric acid, flocculants, paints, ferrosilicon, cement, explosives, and waste oils, greases and solvents. Specifics of quantities and packaging are provided in the Proponent's CSEA.

6.11.4.1 Potential Environmental Concerns

Consumables will be transported by rail to Moosonee and from Moosonee to the Victor site by winter road, or possibly from Moosonee to Attawapiskat by barge for some items during the construction period. All materials of consequence will be shipped in sealed containers, and in compliance with regulatory requirements, including the *Transportation of Dangerous Goods Act* and associated Regulations.

Vehicle accidents on the James Bay winter road or the north or south winter roads could cause a spill of the materials in shipment (inert materials or hazardous materials). The consequences of the spill would depend on the type and quantity of material spilled, and the location and timing of the spill. Spills on land along a winter road are unlikely to have environmental consequences since the ground will be frozen and spilled material can be collected. The risk of a spill involving the aquatic environment would be more sensitive. The worse case, but improbable, spill scenario on a winter road would involve a collision of two trucks whereby, the entire shipment is spilled and enters a waterbody. The impact of the spill would depend on the material spilled. Several of the substances requiring transport are toxic to aquatic life. These include antifreeze, glycol, petroleum lubricants, varsol, ammonium nitrate, hydrochloride acid, and paints. Quantities and container details are provided in the Proponent's CSEA.

Aircraft (fixed wing and helicopters) will only be used to transport personnel and non-hazardous materials for the Victor Diamond Project. The exception is the potential slinging of limited quantities of fuel by helicopter for exploration purposes; and for small quantities of hazardous materials that the agencies prefer transported by air rather than stored at site until the next winter road season.

Materials transported by rail over the existing ONR tracks and transferred to trucks (or possibly barges) will be in sealed containers. Should an accident occur, there may be an impact to a localized area if containers break open. Materials shipped by barge in sealed containers, should be recoverable if they remain airtight and undamaged.

6.11.4.2 Design and Operational Safeguards

To minimize the potential for spills along the winter road, the Proponent, to the limit of its control over roads, will undertake the following measures that will also be incorporated into the EMS:

- Speed limits, to be posted and enforced by project security personnel;
- Oversized loads to travel during daylight, where practicable;
- Potentially hazardous materials to be shipped in sealed containers;
- Right-of-way procedures to be defined;
- Suitable convoy and vehicle spacing;
- Driver training, including spill response procedures;
- Vehicles transporting materials to have basic emergency response equipment; and,
- Penalties to be imposed for violations.

The need for compliance with the Winter Road Management Plan will be reinforced in all applicable contracts and vendor agreements.

Materials to be maintained in vehicles will be identified in the plan, but are likely to include absorbent materials and equipment to contain spilled material. Consideration is being given to establishing a cache of emergency response equipment at one or more locations along the James Bay winter road, as well as in Attawapiskat and at the Victor site (if the equipment can be reasonably maintained from vandalism and theft).

6.11.4.3 Contingency and Emergency Response Procedures

The Victor emergency response plan (ERP) consists of a single merged set of instructions to address safety, health and environmental emergencies. The ERP contains plans for the following:

- Emergency response contact information (government and company);
- Medical emergency or accident;
- Instructions for fatality or critical injury;
- Spills;
- Fire;
- Natural disaster (flood, earthquake, sever winds);
- Extreme cold or whiteout conditions
- Equipment or people falling through ice;
- Bomb threat and biological or chemical threat;
- Missing or overdue aircraft, and aircraft accident;
- Missing person(s);
- Hostile actions, vandalism and threats against De Beers staff, contractors, or property;
- Wild animal incursions into facility or camp and animal incident;
- Sewage system failure; and,
- Power outage.

In addition, there is also a 'generic emergency response procedure' to provide guidance for events that are not included in the above categories.

The ERP also involves periodic training, practice drills and awareness sessions (as part of the site orientation process) to ensure that all individuals on site (staff, employees, contractors and visitors) are adequately trained for emergencies.

The ERP is referenced as the "Victor Diamond Project, De Beers Canada, Care and Maintenance Emergency Response Plan (latest update November 30, 2004). The ERP will be updated and expanded upon at each new project stage.

6.11.4.4 RA Conclusion

The RAs conclude that adverse environmental effects from a transport accident are not likely to be significant provided that the Proponent undertakes all reasonable measures, as described above, to limit, to the extent practical, the likelihood of a transport accident. Further, RAs will require the Proponent to develop contingency plans that outline how to deal with any transport accidents that do occur, to train personnel to apply these plans, and to review and exercise these plans to strengthen their effectiveness and ensure continuous improvement. The RAs have included a follow-up program related to the response to spills along the winter road, as outlined in Chapter 8.

6.11.5 Open Pit Stability

Background

Geotechnical investigations were completed as part of the pit design by SRK Consulting and pit design criteria were determined in conjunction with the De Beers' South Africa Geotechnical department and Hydrologic Consultants Inc. (HCI, as subconsultants to SRK). Rock slope angles initially defined in the Prefeasibility Study were refined during the Feasibility Study.

6.11.5.1 Potential Environmental Concerns

Shallow open pit mines are subject to erosion and other slope stability issues. Improperly designed and operated open pits can pose a safety hazard to workers, and potentially the surrounding environment should a catastrophic collapse enlarge the pit perimeter. They are not, however, subject to catastrophic release of rock pressures such as rock bursts. Buckling and heaving of rock floors can potentially occur, but such movements of any appreciable magnitude are highly unlikely, given the geologic setting (i.e., shallow pit, seismically inactive area).

Prior to open pit development, South Granny Creek, which intercepts the proposed open pit, will be diverted away from the pit perimeter so that capturing of South Granny Creek will no longer be possible should a catastrophic pit wall collapse occur.

6.11.5.2 Design and Operational Safeguards

The open pit design provides for:

- Minimum factors of safety of 1.3 on pit walls;
- Bench heights of 12 m in rock, and 6 m in overburden; and,
- Use of catch or control berms.

Ramp widths will be maintained at 20 m, decreasing to 15 m in the lower benches, with maximum grades of 10%. Inter-ramp design slope angles in rock will be maintained at 50° to 55° (toe-to-toe) for exposed limestone units, and 45° for fractured limestone bordering the kimberlite, and 40° to 50° for kimberlite. Overburden slopes and slopes with weathered bedrock will be maintained at not steeper than 15°. Slope stability analyses assumed fully saturated conditions, with the phreatic water surface coincident with the excavated surface. Exposed overburden will be revegetated as soon as practical to assist with slope stability and erosion resistance.

Geotechnical monitoring of pit wall stability will be continuous during pit excavation, as directed by geotechnical engineers, and if required, surface monitors will be installed at strategic locations to monitor any ground movement.

6.11.5.3 Contingency and Emergency Response Procedures

The Proponent considered two primary slope failure modes:

- Failure of the overburden slopes caused by uncontrolled erosion; and,
- Failure of the bedrock slopes caused by improper mine design and operational procedures.

The overburden slope angles proposed are conservative such that failure of an overburden slope is only likely to cause overburden to slide over the upper bedrock face. A failure is unlikely to impact pit activities, and environmental consequences outside of the pit perimeter are not expected. There are no instances envisioned whereby instability of bedrock slopes could cause environmental consequences outside of the pit perimeters.

In the unlikely instance where workers are injured by slope failure, emergency response procedures, developed in detail prior to operation as part of the EMS, will be followed (Section 6.11.17).

6.11.5.4 RA Conclusion

The RAs conclude that adverse environmental effects from pit stability related accidents are not likely to be significant provided that the Proponent undertakes all reasonable measures, as described above, to limit, to the extent practical, the likelihood of a pit stability related accident. Further, RAs will require the Proponent to develop contingency plans that outline how to deal with any pit stability related accidents that do occur, to train personnel to apply these plans, and to review and exercise these plans to strengthen their effectiveness and ensure continuous improvement.

6.11.6 Failure of the Nayshkootayaow River Flow Supplementation System

6.11.6.1 Potential Environmental Concerns

Groundwater modelling studies show that mine dewatering is expected to reduce flow in the Nayshkootayaow River and in Tributaries 5 and 7 if no mitigation occurs. There is also the potential to reduce flows in the North River during later years of the mine life. Supplementary water from the Attawapiskat River will be piped to the Nayshkootayaow River system to compensate for anticipated flow reductions, to maintain flows within 15% of baseline conditions. River flow supplementation will be required primarily in the winter months, but possibly also during summer in extremely dry years. If the supplementation system fails, as a result of a pipeline breach on route, the added flow would not reach its destination, and the river could be stressed under extreme low flow conditions. Erosion of soils at the breach site might be possible in summer circumstances, until the pumps could be stopped.

6.11.6.2 Design and Operational Safeguards

Burying the supplementation flow delivery pipe below the frost line will eliminate the risk of freezing, and the system will be monitored on a continuous basis for both flows and temperature. The flow supplementation pipeline will also be designed with adequate check valves so that it can be readily repaired, with the anticipated appropriate parts maintained on site in order to reduce the repair time. With proper construction and operation, there is no reason to expect that failure would occur. Pipeline supplementation systems for Tributaries 5 and 7 will also be buried to protect against freezing.

6.11.6.3 Contingency and Emergency Response Procedures

No other form of flow supplementation is considered feasible. The aim will be to design the pipeline to avoid breaches, and to repair the pipeline as fast as possible in the event that a system failure occurs.

6.11.6.4 RA Conclusion

The RAs conclude that adverse environmental effects from the Nayshkootayaow River flow supplementation system are not likely to be significant provided that the Proponent undertakes all reasonable measures, as described above, to limit, to the extent practical, the likelihood of a malfunction of the flow supplementation system. Further, RAs will require the Proponent to develop contingency plans that outline how to deal with any malfunctions of the nay River flow supplementation system that do occur, to train personnel to apply these plans, and to review and exercise these plans to strengthen their effectiveness and ensure continuous improvement.

6.11.7 Explosives Accident

6.11.7.1 Potential Environmental Concerns

The project will utilize ammonium nitrate-based, emulsion explosives, to be manufactured on site during operation. The resultant emulsion product is water resistant, and suited for the wet conditions expected at the Victor Diamond Project. Other explosive types, including pre-packaged explosives, could also be used at various times, such as at quarries during site capture.

A dedicated Ammonium Nitrate – Emulsion Area will be established near the overburden stockpile. The area and its component structures, have been located in accordance with the guidelines set out in the *Quantity-Distance Principles User's Manual* published by the Explosives Regulatory Division of NRCan with respect to the nearest inhabited building, airstrip, road and blast site.

Explosive components are not individually explosive and cannot be inadvertently detonated. Emulsion will only explode if mixed in the correct proportions, placed under certain confined conditions, and detonated with an external device. Pre-packaged explosives also require detonation.

6.11.7.2 Design and Operational Safeguards

The transportation of explosives is controlled by the Explosives Regulatory Division (NRCan) and the Transportation of Dangerous Goods Directorate (Transport Canada). All companies that transport explosives materials for the project will be required to comply with the requirements of these agencies. Also, the Proponent has committed to utilizing one of the larger explosives companies that are well versed in the Canadian requirements, as dictated by the *Canada Explosives Act* and associated regulatory instruments and as enforced by NRCan.

A blasting plan will be developed as part of the EMS describing all proposed blasting operations at the Victor site. All personnel who handle explosives will have appropriate training; all other individuals will be restricted from access.

It is believed that by contracting an experienced explosives firm, by following the regulatory requirements, and ensuring good housekeeping in general, explosives will be well managed at the project.

Below are the terms and conditions NRCan will require.

- Current procedures are focussed on preventing spills during storage, transfer and manufacturing operations; however, any spills must be cleaned up immediately.

- To prevent spills or leaks from an above ground fuel tank, the tank shall be diked in accordance with Subsection 4.3.7 of the National Fire Code of Canada 1995.

- A written Emergency Response Plan shall be prepared in accordance with CAN/CSA-Z731-95.

- Sweepings and contaminated wash water shall be collected and disposed of in a manner which will have minimal impact on the receiving environment. Water gel/slurry or emulsion explosive residues or wastes shall not be discharged directly into the receiving environment.

- Drums of petroleum products or chemicals must be tightly sealed, protected against corrosion and rust, and kept in a dry building or shed with an impermeable floor.

- Operation must ensure compliance with Section 36 of the *Fisheries Act*, which prohibits the deposit of a deleterious substance into waters frequented by fish or in any place under conditions where a deleterious substance may enter such waters.

- Operation must ensure compliance with Section 6 of the Migratory Birds Regulations, which prohibits the disturbance, destruction or taking of a nest, egg or nest shelter of a migratory bird. Possession of a migratory bird, nest or egg without lawful excuse is also prohibited. Operation must also ensure compliance with Section 35 of the Regulations, which prohibits the deposit of oil, oil wastes or other substance harmful to migratory birds into waters or any area frequented by migratory birds.

6.11.7.3 Contingency and Emergency Response Procedures

The worst possible scenario would involve improper handling of explosives causing bodily harm. Emergency preparedness procedures for personnel injuries/ fatalities will be dictated by the EMS and the Safety and Health Management System, and will be followed. Damage to facilities and infrastructure may be possible, but could only occur in association with the explosives magazine and the quarries or open pit. Explosives will not be stored or used in close proximity to the accommodation complex, main plant site or airstrip as per the minimum distant requirements of the *Explosives Act*.

6.11.7.4 RA Conclusion

The RAs conclude that adverse environmental effects from an explosives accident are not likely to be significant provided that the Proponent undertakes all reasonable measures, as described above, to limit, to the extent practical, the likelihood of an explosives accident. Further, RAs will require the Proponent to develop contingency plans that outline how to deal with any explosives accidents that do occur, to train personnel to apply these plans, and to review and exercise these plans to strengthen their effectiveness and ensure continuous improvement.

6.11.8 PK Pipeline Failure

6.11.8.1 Potential Environmental Concerns

Fine PK will be transported in slurry from the processing plant to the PKC facility using a pipeline of up to 3.6 km length. PK solids are regarded as being geochemically inert (i.e., not acid generating or capable of leaching metals in concentrations that would be of environmental concern) and the associated slurry water will be of high quality, once solids are separated from the slurry.

The maximum credible spill scenario would result in the release of approximately 2,000 m^3 combined solids and liquid (including 570 m^3 solids) based on an undetected breach of the pipeline lasting for a maximum of 6 hours. A leak, as opposed to a breach, would produce minimal volumes.

A slurry spill would have differing environmental effects depending on the time of the year. If the spill occurred when the ground was frozen, spilled material could be readily cleaned up, and no environmental impact would be expected. During the remainder of the year, the spill could have a smothering effect on the immediate surroundings. The pipeline does not cross any watercourses and as a result only terrestrial impacts would be expected. The solids (essentially sand) contained in the slurry would be retained by the muskeg in close proximity to the pipeline rupture, irrespective of season. Liquid from the spill would tend to pool in the spill collection areas.

6.11.8.2 Design and Operational Safeguards

The fine PK slurry will be pumped through one of two, 200 mm diameter carbon steel, insulated and heat-traced slurry pipelines from the processing plant to the PKC facility. Only one pipeline will operate at any time; the other will act as a backup. The pipeline will be routed adjacent to the haul road between the process plant and the PKC basin for ease of operation and to facilitate visual inspection. The pipeline will be inspected at least twice per shift (every six hours, as well as incidentally). At least two spill collection areas (at processing plant and at the polishing pond) will be provided along the route, so that any significant leakage will concentrate at these locations.

6.11.8.3 Contingency and Emergency Response Procedures

On identification of a leak or rupture, discharge will be switched from the operating to the backup pipeline and pump system. PK solids spilled into the environment would be recovered, where practicable, and deposited in the PKC facility. The liquid would flow, or seep, through the muskeg or over the frozen surface and would not be captured. On discussion with government agencies, solids deposited on muskeg may be left in place and revegetated, rather than further disturbing the vegetation.

6.11.8.4 RA Conclusion

The RAs conclude that adverse environmental effects from PK pipeline failure are not likely to be significant provided that the Proponent undertakes all reasonable measures, as described above, to limit, to the extent practical, the likelihood of a pipeline failure. Further, RAs will require the Proponent to develop contingency plans that outline how to deal with any PK pipeline failure that do occur, to train personnel to apply these plans, and to review and exercise these plans to strengthen their effectiveness and ensure continuous improvement.

6.11.9 PKC Dam Failure

6.11.9.1 Potential Environmental Concerns

A partial or complete breach of a PKC dam would cause a release of fine PK and associated effluent into the surrounding muskeg. In a worst-case scenario, the breach could involve a portion of a cell's contained solids and all of the associated liquid. This volume could be up to 2.0 Mm^3 at maximum capacity, assuming that 25% of the solids contained in the largest cell at maximum capacity is released. Given the coarse texture of the fine PK (sand-sized) and the shallow height of the dams, it is likely that any breach would result in a much smaller release.

The flatness of the terrain, and the comparative coarseness of the fine PK (sand-sized), would keep the solids in close proximity to the PKC facility. Liquid from the breach would flow through the muskeg or across the frozen surface, eventually reporting to Granny Creek.

The impact of a spill would depend on the time of the year. The least impact would occur in the winter, as solids could be removed prior to snowmelt (depending on volumes), thereby limiting the smothering affect on vegetation. During the remainder of the year, a PKC dam breach would cause primarily terrestrial impacts, as the fine PK would smother the area downslope of the failure zone. The average distances from the PKC dams to North and South Granny Creek are 2 and 1 km, respectively. Even under an extreme spill scenario, only a small portion of the solids would be expected to reach Granny Creek, and significant water quality impacts to the creek would not be expected because of the high quality of the effluent.

6.11.9.2 Design and Operational Safeguards

The PKC facility dams will be designed for stability under all stages of construction, pond level variations and operating conditions; and will conform to the Canadian Dam Association 1999 Guidelines and the Ontario Dam Safety 1999 Draft Guidelines as applicable. Particular attention has been placed on foundation conditions, slope angles and engineered factors of safety. Dams are of low height (nominal 10 m maximum height) and will be surfaced with coarse material to prevent erosion. At least 2 m of freeboard (difference in height between the water level and top of the dam) will be provided under normal operating conditions, and emergency spillways will be constructed to prevent overtopping of the perimeter dams during extreme flood conditions.

The use of multiple cells reduces the potential magnitude of spills, and the ponds will be lowered each autumn to improve storage to better accommodate the spring melt. Visual inspection and instrumented monitoring will be performed on the PKC dams to assess structural performance and safety.

6.11.9.3 Contingency and Emergency Response Procedures

The Proponent has committed to the development of a remedial action plan, to be developed in consultation with the appropriate government agencies in the event of dam breach. Spill response actions are described above. Processing plant discharge would be directed to another cell in the case of damage to a dam to allow processing to continue while repairs are made to the damaged cell.

6.11.9.4 RA Conclusion

The RAs conclude that adverse environmental effects from a PKC dam failure are not likely to be significant provided that the Proponent undertakes all reasonable measures, as described above, to limit, to the extent practical, the likelihood of a dam failure. Further, RAs will require the Proponent to develop contingency plans that outline how to deal with any PKC dam failure that do occur, to train personnel to apply these plans, and to review and exercise these plans to strengthen their effectiveness and ensure continuous improvement.

6.11.10 Stockpile Slope Failure

Rock and coarse PK stockpile slopes will be constructed with overall slope angles in the order of 7H:1V, with individual bench slopes of from 1.3H:1V. Bench heights will be 4 m, to a total stockpile height of approximately 12 m. The overburden stockpile will be constructed as two 4 m high benches, with individual bench slopes of 3-10H:1V, and an overall stockpile slope in the order of 25H:1V.

The potential for large scale stockpile failure during operations is low; but for planning purposes, it was assumed that there will be minor perimeter slope failures of all stockpiles, as per industry norms for low profile stockpiles. All stockpiles will be contoured to stable slope configurations at closure.

6.11.10.1 RA Conclusions

The RAs conclude that adverse environmental effects from a stockpile slope failure are not likely to be significant provided that the Proponent undertakes all reasonable measures, as described above, to limit, to the extent practical, the likelihood of a slope failure. Further, RAs will require the Proponent to develop contingency plans that outline how to deal with any stockpile slope failure that do occur, to train personnel to apply these plans, and to review and exercise these plans to strengthen their effectiveness and ensure continuous improvement.

6.11.11 Unexpected Water Quality Concerns

6.11.11.1 Potential Environmental Concerns

Based on monitoring, geochemical test work, and modelling, the Proponent has stated that there is no potential for the development of acid mine drainage conditions in seepage from the stockpiles, and that PKC facility effluent will be of high quality. Passive wetland filtration, in the case of seepage from stockpiles, is expected to improve the quality of seepage through processes such as adsorption and cation exchange of residual metals. Sulphate in low concentrations could be taken up as a nutrient by plants, or bacteria, depending on the availability of other nutrients.

Aspects related to higher than expected salinity concentrations in well field discharge water are discussed separately in Section 6.10.4.

6.11.11.2 Design and Operational Safeguards

Environmental monitoring will be conducted on all runoff, seepage and effluent discharges from the site. If an upward trend in metal concentrations is noted, to where metal/sulphate concentrations could be of potential concern to the environment, investigations will be conducted to determine the source of the metals and best means of mitigation.

6.11.11.3 Contingency and Emergency Response Procedures

There is no circumstance whereby metal concentrations could increase substantially and not be identified at an early stage during monitoring. Concentrations of metals and metal-like substances are generally low in the kimberlite and mine rock at the project. Nonetheless, heavy metals in effluent can be readily treated with conventional wastewater treatment systems, such as lime neutralization, if required. If the sulphate concentration should increase in the PKC effluent to where it becomes a concern to aquatic life in Granny Creek, effluent would be collected and pumped to the Attawapiskat River, along with well field discharge water, except during high flow conditions. During low flow conditions most or all PKC effluent from the polishing pond is expected to report subsurface to the wellheads.

6.11.11.4 RA Conclusion

The RAs conclude that adverse environmental effects from unexpected water quality measures are not likely to be significant. RAs will require the Proponent to develop contingency plans that outline how to deal with any unexpected water quality concerns that do occur, to train personnel to apply these plans, and to review and exercise these plans to strengthen their effectiveness and ensure continuous improvement.

6.11.12 Settling Pond Inefficiencies

6.11.12.1 Potential Environmental Concerns

Settling ponds will be used for removing TSS from pit sump water, fine PK facility discharge, and site drainage catchments. Additional ponds may be required during the construction phase to ensure adequate suspended solids removal from water pumped at excavation sites prior to release to the environment. All ponds, except the above grade settling pond and the PKC facility polishing pond, will discharge to fen areas for additional natural filtering of residual solids from the effluent. Inefficient settling within the ponds will cause an increased release of TSS to either muskeg or watercourses.

6.11.12.2 Design and Operational Safeguards

All of the constructed ponds will be designed to ensure adequate retention times for settling, including provision for extreme precipitation and runoff events.

6.11.12.3 Contingency and Emergency Response Procedures

Discharges from all ponds will be monitored regularly to ensure adequate settling of suspended solids. Settling efficiencies can be readily increased by expanding the pond dimensions or building additional cells (thereby increasing the time available for settling) if appropriate, or by installing silt curtains, and/or adding flocculants to promote improved settling.

6.11.12.4 RA Conclusion

The RAs conclude that adverse environmental effects from settling pond inefficiencies are not likely to be significant provided that the Proponent undertakes all reasonable measures, as described above, to limit, to the extent practical, the likelihood of any settling pond inefficiencies. Further, RAs will require the Proponent to develop contingency plans that outline how to deal with any settling pond inefficiencies that do occur, to train personnel to apply these plans, and to reviews and exercise these plans to strengthen their effectiveness and ensure continuous improvement.

6.11.13 Project Related Fires

6.11.13.1 Potential Environmental Concerns

Fires present obvious hazards depending on location and severity. A major fire at site could pose a serious health and safety concern, and could cause property damage and operations interruptions. Environmental impacts would include localized terrestrial habitat loss and short-term air quality effects.

6.11.13.2 Design and Operational Safeguards

A fire detection and alarm system will be installed in the main control room, with backup in the security control room. The Victor site will be protected by a fire loop system that will supply fire protection water to the sprinkler, standpipe, and fire hydrant systems. A foam system will also be available for protection against oil and fuel fires, where water is not suitable as a fire suppressant. In addition, the control rooms will be protected with an inert gas fire suppression system, and the electrical substations will be protected with a carbon dioxide fire suppression system. The entire fire protection system for the project was designed on the basis of the applicable National Fire Protection Association (NFPA) codes.

Remote buildings such as the ammonium nitrate storage facility, mining area structures, the intake pumping module, the airstrip, and the explosives plant will be equipped with portable extinguishers, as required. A fire pumper truck will be present at the site and equipped with a foam generation system for use as required.

The diesel fuel tank farm has been designed to meet Class II fluids storage per NFPA Codes, and water supply will also be in accordance with codes. A low expansion foam system will be designed for the fuel tank farm as per NFPA 11 code.

Regular fire drills will occur to ensure that all workers are familiar with fire prevention procedures, as dictated within the EMS.

6.11.13.3 Contingency and Emergency Response Procedures

In the case of a fire, evacuation of personnel from the affected area will be the first priority as per the emergency preparedness plan. Priorities for fire response will be to protect human health, to protect project facilities, and to ensure that the fire does not spread.

6.11.13.4 RA Conclusion

The RAs conclude that adverse environmental effects from fires are not likely to be significant provided that the Proponent undertakes all reasonable measures, as described above, to limit, to the extent practical, the likelihood of a fire. Further, RAs will require the Proponent to develop contingency plans that outline how to deal with any fires that do occur, to train personnel to apply these plans, and to review and exercise these plans to strengthen their effectiveness and ensure continuous improvement.

6.11.14 Emergency Response Strategy

Despite the best efforts to prevent events that have the potential to cause emergency situations, emergencies do occur from time to time at any industrial operation or community. Understanding the procedures to use and effective training are extremely important in affecting the outcome and minimizing impacts.

The Proponent's Emergency Response Strategy identifies the types of emergencies that may occur, and provides concepts and strategies to respond to such emergencies. Specific procedures will be developed from these concepts and detailed within the ERP that will guide site personnel. It will be subject to continual improvement and will be amended as required to accommodate changing circumstances over the life of the project.

The following emergency categories are considered in the strategy: necessities of life, personnel issues, natural environment-related issues, and operational incidents.

6.11.15 Environmental Management System

The VDP Environmental Management System (EMS) has been developed as a means of ensuring effective environmental management at a remote site. At the time of document preparation the EMS was developed to cover the current project Care and Maintenance phase. The EMS will continue to adapt and grow to address changing site activities and environmental risks throughout the construction, operations and decommissioning phases.

The Victor Diamond Project EMS is a comprehensive system that has been designed to satisfy the requirements of ISO 14001. It covers the seventeen elements of the ISO standard including:

- General requirements;
- Environmental policy;
- Environmental aspects;
- Legal and other requirements;
- Objectives and targets;
- Environmental management programs;
- Structure and responsibility;
- Training, awareness and competence;
- Communication;
- Environmental management system documentation;
- Document control;
- Operational control;
- Emergency preparedness and response;
- Monitoring and measurement;
- Non-conformance and corrective and preventative action;

- Records;
- Environmental Management System audit; and,
- Management Review.

A fundamental element of an EMS is the requirement for continual improvement. As the VDP progresses through various phases, the operating procedures and work instructions will be modified as required to reflect site operations. The EMS will be reviewed and updated at least annually, or more often if warranted. Specific procedures are modified more frequently if appropriate, according to site needs. Strict auditing procedures are also followed to maintain ISO 14001 compliance.

Current care and maintenance procedures include those dealing with:

- Petroleum products;
- Hazardous materials;
- Aircraft;
- Equipment operation;
- Soil protection;
- Wildlife;
- Plant communities;
- Maintenance wastes;
- Fires;
- Solid and liquid wastes;
- Water management;
- Drilling;
- Water and sewage;
- Inspection procedures;
- Contractor control;
- Environmental reviews; and,
- Emergency Response Plan.

The Operating Procedures are supplemented by a series of detailed Work Instructions. Work is also well advanced on developing a wider range of Operating Procedures and Work Instructions for the construction phase of the VDP. A team of dedicated environmental staff will implement the EMS.

6.12 Cumulative Effects

Cumulative effects, as defined by CEAA, are 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. (p16 (1)(a) CEAA 1992)

The various components of the project can also act in a cumulative manner to affect the environment. For example, habitat alteration, noise, accidents on winter roads, and improved access leading to increased hunting and predator pressures, can lead to a cumulative adverse effect on certain species of wildlife such as caribou and moose. Section 6.6.2.1 documents these various effects. However, it is not possible to attach any numerical value to such cumulative effects, other than to indicate general magnitude, and that such effects have the potential to act synergistically. In the case of caribou, the caribou monitoring program will attempt to sort out any adverse factors affecting caribou populations. Ultimately, the synergistic effects on a species such as caribou could include a potential reduction in population size (increased hunting pressure, accidents on winter roads), or more likely a change in behaviour or distribution patterns (habitat alteration, noise, increased hunting pressure, improved predator access).

The project, existing power production facilities along the Abitibi River south of Moosonee, and minor forestry operations in the Otter Rapids area, are the only industrial activities in the area outside of general prospecting for diamonds by De Beers and others in the general Victor site area. All other activities, including the Ontario Northland Railway (ONR) system and MTL barging operations, are associated with the maintenance of First Nation communities (Attawapiskat, Kashechewan, Fort Albany, and Moose Factory), and Moosonee, and the activities of their peoples. In the general vicinity of the Victor site, these activities are essentially confined to the traditional pursuits of fishing, hunting and trapping. In the coastal region, existing activities are associated with transport along the coastal winter road, barging, and traditional pursuits. Because of this condition, the potential for adverse cumulative effects associated with the project is limited.

Potential for Other Mining Operations

The lack of other projects in the area notwithstanding, there are several other kimberlite pipes in the area surrounding the Victor site. These other kimberlite sites include 16 kimberlite pipes on other De Beers' claims, many of which are known to host diamonds. There is consequently a potential for other diamond operations in the area. However, at this time, none of these other kimberlites are as yet classed as having either a medium or high potential for development, and there are no known plans for taking any such properties to the advanced exploration stage. As such, there are no other diamond "projects" to include in the cumulative effects analysis. The regional geology strongly suggests that there is also little, if any, potential for gold, base metal, or other mining projects in the project area.

There is currently some grassroots exploration being carried out in the Victor site area by others, limited to very small and transitory tent camps with some drilling and helicopter use. These activities are relatively short-term and it is not possible to forecast how long these activities will be sustained.

These aspects notwithstanding, several reviewers have raised the point that because other kimberlites are present in the area, there are potential cumulative effects associated with the mining of these other kimberlites. Potential cumulative effects could include additional stresses on groundwater and surface water systems, and additional stresses on terrestrial systems, as well as socio-economic effects. In public meetings, the Proponent has stated that while these other kimberlites have not been fully evaluated, there is a reasonable potential for at least a few of these other kimberlites to become mineable, and that the mining these kimberlites could extend the life of the project, perhaps by as much as 2 to 4 years, as a best guess. Further none of these other kimberlites, as currently understood, would be capable of supporting a mine on their own, because of their small size. But they could potentially be economic in connection with the project, as a certain level of infrastructure would already be available to support their development.

In the event that any of these other kimberlites were to be mined, they would be mined subsequent to, and not concurrently with the Victor kimberlites. The ore from these other kimberlites would be trucked to the Victor site for processing, as the construction of separate processing facilities for such small kimberlites would not be economic, and the processed kimberlite would likely be discharged to the flooded Victor open pit. Each of the new kimberlites being mined would have to be dewatered, as for the Victor kimberlites, but because of their smaller size, economics would typically preclude pits as deep as the Victor pit. Dewatering effects would therefore be more limited. For each kimberlite the value of the resource, once determined, would have to be weighed against the costs of development and operation. The data for such evaluations are not currently available.

Natural Environment Cumulative Effects

The potential for natural environment cumulative effects is summarized in Table 6-17. All natural environment VECs are considered in the analysis to ensure that no items are missed. In a number of instances there are no known, or reasonably anticipated, actions that could induce a cumulative effect. Where this is the case, a statement of “none known” is provided in the column headed by “Other Actions or Potential Actions of Interest”, and the associated analysis is regarded as non-applicable (NA). Instances where there are no anticipated cumulative effects are the following:

- Surface water systems – rivers and creeks at winter road crossings;
- Groundwater systems – all considerations;
- Inland terrestrial environments – fens systems;
- Inland terrestrial environments – upland sites;
- James Bay coastal zone – all aspects; and,
- Marine systems – all aspects.

Instances where there is a potential for cumulative effects are addressed below.

Atmospheric Systems

The only VEC defined for atmospheric systems is air quality. Two potential cumulative effects have been defined for air quality effects:

- Minor emissions of fossil fuel combustion products from vehicle use and stand-by generators; and,

- Noise associated with local road traffic along the James Bay winter road.

TABLE 6-17
CUMMULATIVE EFFECTS ASSESSMENT - NATURAL ENVIRONMENT

Local and Regional VECs	Spatial Boundaries	Temporal Boundaries	Other Actions or Potential Actions of Interest	Mitgation Required	Potential Cumulative Effect
Atmospheric Systems					
Air quality	PSA - Near coastal communities	Construction, operation and closure	Minor emissions of fossil fuel combustion products from vehical use and stand-by diesel generators	No	Potential for cumulative effects from Project winter truck traffic engine emissions (limited magnitude) **Effect Not Significant**
Surface Water Systems					
Attawapiskat River (and tributaries)	PSA - Attawaiskat River corridor	Construction, operation and closure	Water quality - community of Attawapiskat discharge of sewage lagoon effluent	No	Community sewage loadings are acceptable for discharge and are insignificant in relation to Attawapiskat River assimilative capacity, and in combination with parameter loadings from the VDP are not expected to adversely affter river water quality **Effect Not Significant**
		Construction, operation and closure	Fisheries resources - fish havesting by AttFN members	Possibly - Flow supplementation to be provided to North River, if indicated by early phase monitoring	Actions associated with the VDP are not expected to adversely affect fish or fish habitat - no potential for cumulative effect **Effect Not Significant**
Nayshkootayaow River (and tributaries)	PSA - Buffer zone of watersheds surrounding the Victor site	Construction, operation and closure	Fisheries resources - fish harvesting by AttFN members	Yes - Actions are required on the part of Proponent (I.e., flow supplementation) to limit adverse effects to fish habitat and productivity; no actions are suggested that would limit AttFN fish harvesting	VDP dewatering effects will be mitigated through flow supplementation, such that there will be no significant cummulative effect in combination with AttFN fish harvesting to reduce fish stocks **Effect is Significant**
Granny Creek	na	na	None known	na	na
Lawashi River system	PSA - Buffer zone of watersheds surrounding the Victor site	Operation	Fisheries resources - fish harvesting by AttFN members	No - Magnitude of VDP effects expected to be <15% of low flow condition; no actions are suggested that would limit AttFN fish harvesting	Victor Project dewatering impacts have minor potential to act cumulatively with AttFN fish harvesting to reduce fish stocks **Effect not Significant**
Rivers and creeks at winter road crossings	na	na	None known	na	na
Groundwater Systems					
Shallow overburden aquifer	na	na	None known	na	na
Bedrock aquifer	na	na	None known	na	na
Inland Terrestrial Environment					
Riverbank and creek margin forests	PSA - Watercourse crossings associated with new transmission line construction and south winter road, and Victor site	Construction	Commercial forestry activities in the Otter Rapids area, and minor tree cutting for First Nation domestic use	Yes - habitat restoration at closure, except for new transmission line south of Kashechewan that will become permanent; no restrictions are suggested regarding existing activities	Development of the VDP, and especially the new 115 kV transmission line, requires minor tree clearing at creek and river crossing areas **Effect not Significant**
Northern ribbed fens with broad flarks	na	na	None known	na	na
Upland sites	na	na	None known	na	na
Ungulates	PSA - Victor site area, Attawapiskat River corridor, south and west winter road corridors, buffer zone of watersheds surrounding Victor site area, and James Bay winter road route	Construction, operation and closure	Extensive hunting of moose and caribou practised by all local First Nations	Yes - Proponent to undertake site rehabilitation at closure; no actions are suggested to limit hunting by First Nation, other than for safety in high Project use areas	VDP will result in limited displacement of habitats potentially used by ungulates (mainly for caribou, habitats for this species not limiting; limited disturbance of moose habitat); noise and other forms of general disturbance could adversely affect caribou; habitat effects linked to VDP limted and restorable at closure **Effect not Significant**
Large predators and furbearers	PSA - Victor site area	Construction, operation and closure	Trapping by AttFN members still practised, but in decline due to poor fur prices and changing of traditional ways among younger generations	Yes - site rehabilitation at closure	Limited displacement of habitats utilized by large predators and furbearers, the majority of which show preferences for creek and river habitats and forests bordering these watercourses **Effect not Significant**

Local and Regional VECs	Spatial Boundaries	Temporal Boundaries	Other Actions or Potential Actions of Interest	Mitgation Required	Potential Cumulative Effect
Migratory birds	PSA - Victor site	Construction and operation	Waterfowl hunting is widely practised by AttFN members in the James Bay coastal zone, and to a lesser extent along the major rivers; grouse and ptarmigan hunting at inland sites (most species not migratory)	Yes - site rehabilitation at closure	Limited displacement of habitats (mainly fen and bog) at the Victor site, as a result of facility and infrastructure placement **Effect not Significant**
James Bay Coastal Zone - no activities proposed by Proponent that could significantly affect system VECs					
Marine Systems - no activities proposed by Proponent that could significantly affect VECs					
Natural Heritage Systems					
Attawapiskat River proposed candidate waterway park (ARPCWP)	PSA - Attawapiskat River corridor	Construction, operation and closure	Attawapiskat community and existing river crossings for coastal winter road and transmission line	Yes - site rehabilitation at closure	Minor displacement of riverbank forest habitat at south winter road crossings (two) and new 115 kV transmission line crossing; Proponent has suggested avoidance of south winter road crossings, but suggestion not supported by AttFN **Effect not Significant**
Areas of Natural and Scientific Interest	PSA - along coastal winter road	Long-term	Existing coastal winter road and 115 kV transmission line pass through the Southwest James Bay ANSI	No	Minor displacement of habitat will occur within the ANSI boundaries associated with twinning the existing 115 kV transmission line **Effect not Significant**
Conservation and Nature Reserves	PSA - along transmission line route, south of Moosonee	Long-term	Existing ONR line borbers, and the existing 115 kV transmission line passes through, the Coral Rapids Conservation Reserve	No - Proponent willing to avoid constructing new 115 kV line through Conservation Reserve if so directed by MNR	Potential for minor cummulative effect on Conservation Reserve if the existing 115 kV transmission line is twinned on the west side of the ONR line, within the Conservation Reserve boundary **Effect not Significant**
Malfunctions and Accidents					
Potential for fuel spills	PSA - James Bay coastal winter road	Construction, operation and closure	Fuel for the James Bay coastal communities is regularly shipped by winter road, although shipment volumes have declined since grid power was provided to the northern coastal communities	Yes - procedures are required to ensure that all reasonable actions are taken to prevent tanker truck fuel spills, and that materials and equipment are on hand to clean-up any spills, should they occur	An estimated 15 ML of diesel fuel is required annually for the VDP. Adverse effects associated with possible fuel shipment are not anticipated, but the potential for spills cannot be completely ruled out, even though the likelihood of a meaningful spill is extremely low. **Effect not Significant**

na - not applicable
PSA - Project study area
RSA - regional study area

The magnitude of cumulative environmental effects from fossil fuel combustion associated with First Nation activities in the region is considered to be minor, and therefore not significant. Impacts on air quality from fossil fuel combustion and other sources from current activities were considered in base line air quality. No mitigations are proposed.

Similarly, the magnitude associated with noise effects due to local traffic is not considered to be significant, and no mitigations are proposed.

Geological Systems

Cumulative effects involving geological systems and VECs are not reasonably anticipated.

Surface Water Systems

Potential cumulative effects involving surface water systems include:

- Water quality impacts to the Attawapiskat River involving domestic sewage management and disposal at Attawapiskat;
- Fish harvesting by AttFN members in the Attawapiskat River; and,
- Fish harvesting by AttFN members in the Nayshkootayaow River.

The discharge of treated domestic sewage water from the Attawapiskat community sewage lagoons to the Attawapiskat River is not anticipated to adversely affect river water quality in and of itself, or in combination with any industrial or domestic sewage discharges associated with the project.

With regard to fish harvesting in the Attawapiskat River, no cumulative effects to the fishery resource are anticipated, as project activities are not expected to adversely affect the Attawapiskat fishery resource.

AttFN members harvest fish from the Nayshkootayaow River. Project dewatering activities are expected to adversely affect Nayshkootayaow River flows during the winter months, and potentially during the late summer/early fall period during extremely dry years. Mitigation is required on the part of the Proponent to limit its potential for effect on Nayshkootayaow River fisheries resources. Therefore the proposed project will not have any residual effects on the Nayshkootayaow River fishery that could result in a cumulative effect from other fishing activity.

Groundwater Systems

Cumulative effects involving groundwater systems and VECs are not reasonably anticipated.

Terrestrial Environment

Potential cumulative effects involving terrestrial environment VECs include:

- Minor tree clearing on the part of First Nations for domestic use;
- Extensive hunting of moose and caribou by First Nation members;
- Trapping by First Nation members, focused mainly on beaver and marten; and,
- Waterfowl and upland bird (grouse and ptarmigan) hunting by First Nation members.

Tree harvesting by the First Nations, occurs adjacent to the communities.

The total area of forest clearing for the project includes 6.28 km^2 along the coastal transmission line route, 0.56 km^2 along the south winter road and transmission line route, and 0.23 km^2 in the Victor site area, for a total of 7.07 km^2. Tree cutting by First Nations tends to of a selective type, rather than clear-cutting, so area comparisons are not appropriate. Nevertheless, based on significance criteria determined for terrestrial habitat VECs, the cumulative effect is not significant

Where forest habitats are disturbed by project-related developments, harvested timber will be provided to the First Nations communities in areas north of the area of licensed forest operations. These habitats will be restored at closure, except along that part of the new 115 kV transmission line between Otter Rapids and Kashechewan, which will be a permanent structure.

Moose and caribou hunting is a major activity for local First Nation members. Woodland caribou are regarded as a species at risk (threatened category), where the principal threats are habitat alteration and over-hunting. Caribou are also known to be more sensitive than moose to general disturbances, such as aircraft and vehicle noise. Active hunting for both moose and caribou occurs in the general vicinity of the project site area, and along or near the winter roads.

The potential for project activities to directly adversely affect moose populations is considered to be limited, since the Proponent has taken reasonable steps to limit adverse impacts to moose habitat, and to control unnecessary noise and disturbance to the extent practicable.

For caribou, it is acknowledged that some level of disturbance is unavoidable, and that the provision of improved regional access through the development of the south winter road, in and of itself, increases harvesting opportunities, and therefore contributes to a possible cumulative effect. The potential for cumulative impacts to caribou can be managed through a number of actions, as per the following:

- Limit the project footprint to as small an area as practicable, as planned;

- Develop policies of restricted hunting in the vicinity of project developments, including winter roads, with such policies to be developed jointly with the First Nations, and to involve compensation for lost harvesting opportunities,

- Develop guidelines for vehicle and aircraft operation; and,

- Conduct monitoring studies to determine and respond to any adverse effects to caribou, should these occur.

All of these actions are proposed as a means of limiting adverse project effects on wildlife, and on caribou in particular, irrespective of any cumulative effects. However, it is anticipated the De Beers and the First Nations will work cooperatively to monitor the condition of area wildlife, and caribou in particular, and to take whatever actions are beneficial to the maintenance of local caribou populations. At mine closure disturbed habitats will be reclaimed, except for forest habitats associated with the new coastal transmission line.

Project-related impacts to furbearers are considered to be minor, as the most productive furbearer habitats (forested areas bordering creeks and rivers, and the creeks and rivers themselves) will not be meaningfully impacted by project development. No actions are proposed to limit AttFN trapping activities, except in the immediate Victor site development area, for reasons of personal safety. Sites that are disturbed by project activities will be reclaimed at mine closure, except in association with the 115 kV transmission line.

Regarding waterfowl and upland game (grouse and ptarmigan) hunting, only very limited hunting for such species occurs at inland sites, and the potential for project-related impacts to such species is considered to be limited and localized. Meaningful adverse cumulative impacts are not anticipated, and no special measures are proposed to mitigate such impacts beyond those inherent in the project design (mainly a small project footprint).

Natural Heritage Systems

The existing coastal winter road and transmission line cross the Attawapiskat River Proposed Candidate Waterway Park (ARPCWP), and the existing south winter road crosses the river approximately 20 km west of the community of Attawapiskat.

Relative to the various ANSIs in the project area, twinning the existing coastal transmission line will result in a widening of existing transmission line ROW through the Southwest James Bay candidate ANSI, and possibly through the Coral Rapids Wetland and Pinard Moraine Conservation Reserves, as described in Section 6.8.3. This action is regarded as being not significant.

Malfunctions or Accidents

The only concern associated with cumulative environmental effects and malfunctions and accidents is that involving the potential for spills, most notably fuel spills, along the coastal winter road. With increasing fuel transport to the region, all other factors being equal, the potential risk of fuel spills would be expected to increase. The cumulative increased potential for fuel spills derives simply from an increase in the combined shipping volumes of fuel to the area that would result from development of the Victor Diamond Project.

The current estimate for diesel fuel at the Victor Diamond Project during operation is 13 to 15 ML/a, and 25,000 L/a of gasoline. Historically, approximately 20 ML/a of fuel (mainly as diesel) has been shipped to the communities of Attawapiskat, Kashechewan, Fort Albany and Moose Factory, by way of Moosonee. This fuel was shipped by barge (typically 12 ML/a diesel and 2.5 ML/a gasoline) and by winter road (typically 6 ML/a). Most of this fuel was used to generate heat and power. With the construction of the new transmission line to Attawapiskat, Kashechewan and Fort Albany, the requirement for fuel by these communities is expected to decline to approximately 10 ML/a. Transmission line construction for the project also substantially reduces fuel demands.

Adverse impacts associated with fuel shipment for the Victor Diamond Project are not anticipated, and a number of procedures and equipment arrangements will be put in place to prevent and/or respond to incidents; however, even with such procedures and equipment arrangements, the risk of a spill can never be reduced to zero. This aspect is addressed in Section 6.11.2.

RA Conclusion

The RAs conclude that adverse environmental effects from cumulative effects are not likely to be significant provided that the Proponent undertakes all reasonable measures, as described above, to limit, to the extent practical, the likelihood of an effect.

6.13 Non-fettering of Federal or Provincial Governments' abilities

The Proponent has been cautioned that although mitigation measures included in the Comprehensive Study Report (CSR) are expected to minimize risks of significant project effects and that responsible authorities have concluded that there are not likely to be significant adverse environmental effects, there is no guarantee of compliance with federal or provincial legislation. Federal and provincial agencies may pursue enforcement actions should any such violation occur as a result of this project. Information and advice provided by the federal and provincial authorities in the course of the development of the CSR should not be construed as a fettering of the federal or provincial governments' ability to make decisions and/or enforce any applicable regulations.

TABLE 6-11
SIGNIFICANCE DETERMINATIONS OF RESIDUAL IMPACTS AFTER MITIGATION - PREFERRED ALTERNATIVE - NATURAL ENVIRONMENT EFFECTS

System / VEC / Feature	Potential Effect	Proposed Mitigation[1]	Residual Significance After Mitigation						Overall Significance	Likelihood
			Context		Extent	Duration	Frequency	Reversibility		
			Ecological	Socio-economic	Magnitude / Geographic Extent					
ATMOSPHERIC SYSTEMS										
Air quality	Air emissions from Victor site activities and from trucks used to transport fuel and freight along the coastal winter road, and inland to the Victor site, could potentially affect human health, and plant and animal health.	Use of transmission line power reduces site fuel consumption requirements by two thirds; water sprays and other dust suppressant measures will be used; switching to B trains for fuel delivery would reduce the amount of truck traffic, if the winter access roads are of suitable quality to take heavier loads.	No meaningful adverse ecosystem effects	Adverse effects to human health and socio-economic interests are not expected	Emissions consistent with federal and provincial guidelines; effects considered to be minor, with no credible source strength in terms of risks to human or plant and animal health.	Life of project	Effect expected to occur regularly or continuously	Emissions will cease at mine closure	Effect is minor; applicable standards will be met	Effect will occur
			Level I	**Level I**	**Level I**	**Level II**	**Level III**	**Level I**	**Not Significant**	
	Heavy equipment and other activities will generate noise at the Victor site. Truck traffic along winter roads will generate noise near communities. Limited potential for aircraft noise.	Use of transmission line power, as opposed to diesel generators at site, reduces site noise levels. Sound-proofing of work dormitories on site. Route winter road truck traffic away from communities, where possible, or acceptable. Various other measures will be used at site, such as high quality mufflers and working berms to reduce noise disturbance to wildlife.	Noise is a sensitive consideration for some wildlife species, especially more sensitive species such as caribou.	Adverse effects to human health and socio-economic interests are not expected, but people remain sensitive to noise issues. Worker health and comfort are important elements.	Emissions consistent with federal and provincial guidelines; effects considered to be minor, with no credible source strength in terms of risks to human or plant and animal health. Some disturbance could occur to sensitive species such as caribou within buffer zones.	Life of project	Effect expected to occur regularly or continuously	Emissions will cease at mine closure	Effect is minor; applicable standards will be met	Effect will occur
			Level III	**Level III**	**Level I**	**Level II**	**Level III**	**Level I**	**Not Significant**	
	Green house gas emissions - CO_2 emissions from on and off site sources have a minor potential to contribute to global CO_2 emissions and the associated phenomenon of global warming.	Greenhouse gas emissions have been reduced through use of transmission line power, and by restricting power demands at site. Minor opportunities exist to reduce winter road truck traffic by switching to B trains for fuel delivery, if the winter access roads are of suitable quality to take the heavier loads.	Climate change has the potential to positively and negatively affect species and habitats on a global scale	Federal government commitments regarding Kyoto Accord; general public interest	Ability of project-related greenhouse gas emissions to meaningfully affect climate is negligible; selection of the transmission line alternative reduces greenhouse gas emissions for the entire Project to 72,400 t/a as CO_2 (i.e., 0.030% of Canada's emission rate reduction target of 240 Mt/a)	Life of project	Effect expected to occur regularly or continuously	Emissions will cease at mine closure	Magnitude of impact too small to be measured	Effect will occur
			Level III	**Level III**	**Level I**	**Level II**	**Level III**	**Level I**	**Not Significant**	
SURFACE WATER SYSTEMS										
Attawapiskat River and its Tributaries	Hydrology - Well field water in the amount of 100,000 m^3/d will be pumped to the Attawapiskat River; well field pumping has the potential to draw 14,200 m^3/d from the Attawapiskat River, and up to 3,800 m^3/d from the North River,	The anticipated flow change to the Attawapiskat River is too small to warrant mitigation. Flow supplementation will be provided to the North River if monitoring during early operation shows that such supplementation is required to maintain base flows.	Adverse effects to the North River potentially involve locally or regionally important species, communities, or resources	Adverse effects to the North River potentially involve meaningful disturbance to Traditional Use activities	Flow supplementation to the North River, if required, will replace any adverse effects to base flow, and will preserve fish habitat during low flow periods for the duration of mine operation - flows to be maintained within 15% of seasonal norms.	Life of project	Effect likely to occur for most or part of the life of the project (until pit filling at closure initiated)	Effect completely reversible at closure	Magnitude of effect will be negligible for Attawapiskat River, and kept in check through flow supplementation for North River	Effect could reasonably be expected to occur.
			Level III	**Level III**	**Level I**	**Level II**	**Level III**	**Level I**	**Not Significant**	
	Water Quality - Discharge of moderately saline well field water has the potential to increase salinity values in the Attawapiskat River, especially during extreme low flow conditions. No effects to North River.	Point source off-shore discharge of well field effluent is proposed (25 m off shore) to improve well field water mixing (dispersion) within the Attawapiskat River near shore environment.	No meaningful adverse ecosystem effects.	No meaningful adverse effects to socio-economic interests.	Water quality effects in receiving water consistent with applicable Federal and Provincial guidelines, and no anticipated adverse effects beyond mixing zone.	Life of project	Will occur continuously for life of project, until well field pumping ceases at end of operations phase.	Effect completely reversible at closure	Magnitude of effect expected to be limited	Effect will occur
			Level I	**Level I**	**Level I**	**Level II**	**Level III**	**Level I**	**Not Significant**	

System / VEC / Feature	Potential Effect	Proposed Mitigation[1]	Residual Significance After Mitigation						Overall Significance	Likelihood
			Context		Extent	Duration	Frequency	Reversibility		
			Ecological	Socio-economic	Magnitude / Geographic Extent					
	Water Quality - Construction of the Attawapiskat River water intake and discharge structures has the potential to cause river siltation.	A coffer dam and erosion / sediment control measures will be used to contain the construction area.	No meaningful adverse ecosystem effects.	No meaningful adverse effects to socio-economic interests.	Water quality effects in receiving water consistent with applicable Federal and Provincial guidelines, and no anticipated adverse effects beyond mixing zone.	Short-term effect not measurable beyond construction, and decommissioning periods.	Effect expected to occur intermittently	Effect completely reversible on completion of construction and decommissioning stages.	Magnitude of effect expected to be minor and very short-term	Effect could reasonably be expected to occur.
			Level I	Level I	Level I	Level I	Level II	Level I	Not Significant	
	Fisheries Resources - Discharge of saline well field water has limited potential to affect growth of some species of invertebrates that provide forage for smaller fish, within the mixing zone, during low	Point source off-shore discharge of well field effluent is proposed (25 m off shore) to improve well field water mixing (dispersion) within the Attawapiskat River near shore environment.	No meaningful adverse ecosystem effects.	No meaningful adverse effects to socio-economic interests.	Water quality effects in receiving water consistent with applicable Federal and Provincial guidelines, and no anticipated adverse effects beyond mixing zone.	Life of project	Will occur continuously for life of project, until well field pumping ceases at end of operations phase.	Effect completely reversible at closure	Magnitude of effect expected to be minor	Effect will occur
			Level I	Level I	Level I	Level II	Level III	Level I	Not Significant	
	Fisheries Resources - Habitat disturbance in and around the Attawapiskat River water intake and discharge structures has the potential to disturb 600 m^2 of fish habitat.	Habitat within the intake and outfall areas will be reconstructed and enhanced to provide habitat for juvenile fish species. Measures will be taken during construction to limit siltation effects. Structure will be removed at closure.	No meaningful adverse ecosystem effects.	No meaningful adverse effects to socio-economic interests.	No expected net loss of fish habitat productivity.	Life of project	Effect expected to occur continuously.	Effect completely reversible at closure	Magnitude / geographic extent of effect expected to be minor	Effect will occur
			Level I	Level I	Level I	Level II	Level III	Level I	Not Significant	
	Fisheries Resources - Dredging the Attawapiskat River adjacent to the proposed barge landing area in Attawapiskat (if constructed) has the potential to alter fish habitat, and release sediments into the water.	Use of silt curtains around dredging area to reduce siltation, and replacement of similar substrates at dredging site. Timing to avoid sensitive periods, such as whitefish fall spawning.	Adverse effects involve common species and communities, and resources of limited significance	No meaningful adverse effects to socio-economic interests.	No expected net loss of fish habitat productivity.	Effect short-term - construction phase only.	Effect expected to occur infrequently	Effect completely reversible at close of construction phase (dredged area will silt in)	Magnitude / geographic extent of effect expected to be minor, and confined to the construction phase.	Effect will occur
			Level II	Level I	Level I	Level I	Level I	Level I	Not Significant	
Nayshkootayaow River and its Tributaries	Hydrology - Well field pumping has the potential to draw 22,300 m^3/d from the Nayshkootayaow River and up to 1,600 m^3 from Tributaries 5 and 7 combined.	Flow supplementation will be provided to the Nayshkootayaow River and to Tributaries 5 and 7 to maintain base flows.	Adverse effects potentially involve locally or regionally important species, communities, or resources.	Adverse effects to the Nayshkootayaow River potentially involve meaningful disturbance to Traditional Use activities.	Flow supplementation will offset adverse effects to base flow, and will preserve fish habitat during low flow periods for the duration of mine operation - flows to be maintained within 15% of seasonal norms.	Life of project	Effect will occur for life of the project (until pit filling at closure initiated)	Effect completely reversible at closure	With flow supplementation as planned, the magnitude of effect will be negligible	Effect expected to occur.
			Level III	Level III	Level I	Level II	Level III	Level I	Not Significant	
	Water Quality - Flow supplementation will introduce lower salinity water to the Nayshkootayaow River during winter low flow periods; minor direct and indirect addition of ammonia and TSS.	In-pit sumps for residual hydrocarbon removal, settling ponds and fen systems for TSS and ammonia removal.	No meaningful adverse ecosystem effects.	No meaningful adverse effects to socio-economic interests.	Water quality effects in receiving water consistent with applicable Federal and Provincial guidelines.	Life of project	Effect expected to occur regularly, or seasonally.	Flow supplementation effects completely reversible on completion of well field pumping; minor drainage effects related to TSS and ammonia will cease following revegetation of stockpiles.	Magnitude of effect expected to be minor	Effect expected to occur.
			Level I	Level I	Level I	Level II	Level III	Level I	Not Significant	

System / VEC / Feature	Potential Effect	Proposed Mitigation[1]	Residual Significance After Mitigation						Overall Significance	Likelihood
			Context		Extent	Duration	Frequency	Reversibility		
			Ecological	Socio-economic	Magnitude / Geographic Extent					
	Fisheries Resources - Well field pumping has the potential to draw 22,300 m^3/d from the Nayshkootayaow River and up to 1,600 m^3 from Tributaries 5 and 7 combined.	Flow supplementation will be provided to the Nayshkootayaow River and to Tributaries 5 and 7 to maintain base flows.	Adverse effects potentially involve locally or regionally important species, communities, or resources.	Adverse effects to the Nayshkootayaow River potentially involve meaningful disturbance to Traditional Use activities.	Flow supplementation will offset adverse effects to base flow, and will preserve fish habitat during low flow periods for the duration of mine operation - flows to be maintained within 15% of seasonal norms.	Life of project	Effect will occur for life of the project (until pit filling at closure initiated)	Effect completely reversible at closure	Magnitude of effect will be kept in check through flow supplementation	Effect expected to occur.
			Level III	Level III	Level I	Level II	Level III	Level I	Not Significant	
Granny Creek System	Hydrology - Minor changes to Granny Creek flow as a result of site development and overburden aquifer depressurization, and as a result of the diversion of South Granny Creek.	PKC facility has been positioned on the watershed divide to limit watershed drainage changes; diversion of South Granny Creek will not alter flow volumes, and will maintain downstream flow continuity.	No meaningful adverse ecosystem effects.	No meaningful adverse effects to socio-economic interests.	Flow alterations will be minor, <15% of seasonal norms.	Effect will persist beyond life of project	Effect will occur continuously, at varying levels as the project develops	Some flow change effects such as the South Granny Creek diversion, and open pit drainage capture will be permanent.	Magnitude of effect is minor.	Effect will occur
			Level I	Level I	Level I	Level III	Level III	Level III	Not Significant	
	Hydrology - Overburden trench subsidence within zone of North Granny Creek.	The integrity and location of North Granny Creek within the subsidence zone will be maintained through stockpile / berm development on the south side of the creek, to contain the channel.	No meaningful adverse ecosystem effects.	No meaningful adverse effects to socio-economic interests.	Mitigation will preserve channel location and function, no change in flow volumes.	Effect will persist beyond life of project	Effect will occur continuously, at varying levels as the project develops	Subsidence will cease at mine closure, but the effect is not reversible.	Magnitude of effect is minor.	Effect expected to occur.
			Level I	Level I	Level I	Level III	Level III	Level III	Not Significant	
	Water Quality - PKC effluent and runoff from mineral stockpiles will enter the Granny Creek system	Project design measures provide for adequate retention times for TSS removal; low flow discharge from the PKC facility to North Granny Creek will be prevented through subsurface flow to the well heads; muskeg buffers and perimeter drainage collection ditches will remove TSS from stockpile drainages	No meaningful adverse ecosystem effects.	No meaningful adverse effects to socio-economic interests.	Water quality effects in receiving water consistent with applicable Federal and Provincial guidelines.	Life of project	Effect will occur continuously, at varying levels as the project develops	TSS loadings to Granny Creek will cease following revegetation of PKC facility and mineral stockpiles.	Magnitude of effect is minor	Effect will occur
			Level I	Level I	Level I	Level II	Level III	Level I	Not Significant	
	Fisheries Resources - Realigning South Granny Creek will temporarily displace fish from this section of the creek. Overburden subsidence along a portion of North Granny Creek could affect fish habitat in this area.	A new channel will be developed using the principles of natural channel design to replace habitats provided by that portion of South Granny Creek that will be diverted. North Granny Creek through the potential subsidence zone will be retained through buttressing and infilling of the subsidence zone.	Adverse effects involve common species and communities, and resources of limited significance	No meaningful adverse effects to socio-economic interests.	No expected net loss of fish habitat productivity.	Effect will persist beyond life of project	Effect will occur continuously, at varying levels as the project develops	There are no plans to reverse the effect, other than through compensation.	Magnitude of effect is minor and compensation will be provided.	Effect will occur
			Level II	Level I	Level I	Level III	Level III	Level III	Not Significant	
Lawashi River System	Hydrology - Well field pumping has the potential to draw 1,500 to 2,600 m^3/d from the Lawashi River system.	None proposed.	No meaningful adverse ecosystem effects.	No meaningful adverse effects to socio-economic interests.	Flow alterations will be minor, <15% of seasonal norms.	Maximum effect could potentially persist during later stages of mine life	Effect potentially could occur on a periodic basis during later mine life (until pit filling at closure initiated)	Effect completely reversible at closure	Magnitude of effect expected to be minor	Effect could reasonably be expected to occur.
			Level I	Level I	Level I	Level II	Level I	Level I	Not Significant	

System / VEC / Feature	Potential Effect	Proposed Mitigation[1]	Residual Significance After Mitigation						Overall Significance	Likelihood
			Context		Extent	Duration	Frequency	Reversibility		
			Ecological	Socio-economic	Magnitude / Geographic Extent					
Rivers and Creeks Intersected by Winter Roads	Hydrology - Limited water taking to form ice surface on winter roads; limited potential for ice bridges to obstruct flow at break-up causing flooding.	Water take will be restricted to <15% of seasonal flows. Ice bridges will be monitored.	No meaningful adverse ecosystem effects.	No meaningful adverse effects to socio-economic interests.	Flow alterations will be minor, <15% of seasonal norms.	Effect will occur seasonally during the life of project	Effect expected to occur regularly during winter periods	Effect completely reversible at closure	Magnitude of effect expected to be minor	Effect on flows will occur; effect on break-up conditions could occur.
			Level I	Level I	Level I	Level II	Level III	Level I	Not Significant	
Muskeg Ponds	Fisheries Resources - Stockpile and other infrastructure development will infill 19 ha of muskeg ponds that currently provide habitat for minnows.	Efforts have been made to reduce to site footprint. Fish habitat compensation will be provided, mainly in the form of rehabilitated quarry ponds.	Adverse effects involve common species and communities, and resources of limited significance.	No meaningful adverse effects to socio-economic interests.	No expected net loss of fish habitat productivity.	Effect will persist beyond life of project	Effect will occur continuously, at varying levels as the project develops	There are no plans to reverse the effect, other than through compensation.	Magnitude of effect is minor and compensation will be provided.	Effect will occur
			Level II	Level I	Level I	Level III	Level III	Level III	Not Significant	
GROUNDWATER SYSTEM										
Shallow Overburden Aquifer	Well field dewatering within the bedrock aquifer has the potential to partially depressurize the overburden aquifer. Stockpile placements and other major site facilities have the potential block, or disrupt, shallow subsurface flows through muskeg systems.	The open pit will be actively filled at closure to increase the rate of water table recovery within the bedrock.	No meaningful adverse ecosystem effects.	No meaningful adverse effects to socio-economic interests.	A 3.3% reduction in surplus runoff is expected in areas where there are no bioherms, and an 11.9 % reduction in surplus runoff is anticipated for bioherm zones, such that all muskeg zones would continue to remain saturated. Flow disruptions to muskeg systems caused by stockpiles and other features would be very minor and localized.	Life of project	Effect will occur continuously, at varying levels as the project develops	Effect is reversible at closure	Magnitude of effect expected to be minor	Effect could reasonably be expected to occur.
			Level I	Level I	Level I	Level II	Level III	Level I	Not Significant	
Bedrock Aquifer	Well field dewatering within the bedrock aquifer is expected to draw down the bedrock aquifer surrounding the open pit area to a radius of approximately 30 km, resulting in reductions to creek and river base flows, where creeks and rivers are connected to the bedrock aquifer.	The open pit will be actively filled at closure to increase the rate of water table recovery within the bedrock. Flow supplementation will occur to offset effects to creeks and rivers during operations.	Adverse effects potentially involve locally or regionally important species, communities, or resources.	Adverse effects to the Nayshkootayaow River potentially involve meaningful disturbance to Traditional Use activities.	Mitigation measures will preserve the integrity of linked surface water systems during operations, and at closure. System alteration expected to alter creek and river flows by <15%.	Life of project	Effect will occur continuously, at varying levels as the project develops	Effect is reversible at closure	Magnitude of effect expected to be minor.	Effect will occur.
			Level III	Level III	Level I	Level II	Level III	Level I	Not Significant	
TERRESTRIAL ENVIRONMENT										
Riverbank and creek margin forests	Riverbank and creek margin forest habitat that has been (or would be) disturbed by Victor site area construction, and construction of the south winter road and transmission line corridor, is calculated at 0.97 km^2	Where feasible, Project related developments have been set back a minimum of 200 m from the margins of creeks and rivers, to avoid interference with riverbank and creek margin forests. Where disturbance to riverbank and creek margin forests is not reasonably avoidable, these sites will be restored at closure, where possible, using native seed mixes and plantings of black spruce seedlings. The only exception would be at coastal transmission line watercourse crossings, where tree growth would interfere with line operation.	No meaningful adverse ecosystem effects	Adverse effects to socio-economic interests are not expected	Effects considered to be minor; the 0.97 km^2 of riverbank and creek margin forest that would be cleared represents 0.026% of the 3,692 km^2 of forest habitat contained within the project study area (PSA).	Life of project for most areas, except along the new transmission line route from Otter Rapids to Kashechewan, where effects would be essentially permanent	Will occur (continuous effect until rehabilitation initiated)	Disturbed forest habitat to be substantially restored at closure, except along the new coastal transmission line route	Effects to riverbank and creek margin forests expected to be minor	Effect will occur
			Level I	Level I	Level I	Level II	Level III	Level I	Not Significant	

System / VEC / Feature	Potential Effect	Proposed Mitigation[1]	Residual Significance After Mitigation						Overall Significance	Likelihood
			Context		Extent	Duration	Frequency	Reversibility		
			Ecological	Socio-economic	Magnitude / Geographic Extent					
Northern ribbed fens with broad flarks (pools)	Developments at the Victor site will directly displace approximately 3.2 km^2 of the northern ribbed fen with broad flark habitat type. Widening the south winter road to accommodate an improved winter road and a transmission line (combined corridor width 60 m), and constructing a new transmission line along the coastal winter road will result in the partial modification of an additional 1.4 km^2 of northern ribbed fen with broad flark habitat (identified as open fen habitat on provincial Landcover maps). Well field dewatering activities are not expected to alter muskeg hydrology, as muskeg systems are essentially perched within the marine clay/silt layer.	Facility layouts have been designed to minimize overall disturbance to muskeg environments by developing a compact site. Portions of stockpile areas that displace fen habitat will be developed as wetlands at closure, as permitted by topography. Portions of stockpiles not amenable to restoration as wetlands will be developed as forested areas. Transmission line construction would take place in winter, minimizing impacts to open fen habitat. Winter road construction would alter but not completely change open fen habitat.	Adverse effects involve common species or communities **Level II**	Adverse effects to socio-economic interests are not expected **Level I**	Effects considered to be minor; the maximum 4.6 km^2 of northern ribbed fen with broad flark habitat that would be altered represents 0.188% of the 2,447 km^2 of open fen habitat contained within the PSA. **Level I**	Life of project **Level II**	Will occur (continuous effect until rehabilitation initiated) **Level III**	Disturbed fen associated with direct displacements at the Victor site not restorable to fen habitat, but will be restored at closure to a combination of wetland and forested upland habitats. Disturbed fen habitat along winter road and transmission line routes will become fully restored following closure, by natural means, as drainage patterns will not be meaningfully altered. **Level III**	Effects to northern ribbed fen with broad flark habitat expected to be minor **Not Significant**	Effect will occur
Upland sites	Developments at the Victor site will displace 9 ha of bioherm sites, 6 ha of raised permafrost forest (peat plateau bogs and palsa bogs), and 5 ha of esker habitat. Winter road and transmission line routes do not traverse upland sites	Facility layouts have been designed to minimize overall disturbance to terrestrial habitats by developing a compact site. Disturbed limestone exposure habitats associated with bioherms will be replaced at closure with exposed areas of limestone habitat with stockpiles. Coniferous forest areas associated with raised permafrost areas will be replaced with a much larger expanse of forested stockpiles. Esker habitat will be rehabilitated following completion of the Project construction phase.	Adverse effects involve common species or communities **Level II**	No meaningful adverse effects to socio-economic interests **Level I**	Effects considered to be minor, with such effects including 0.42% of the available bioherm exposures contained within only a portion (11.7%) of the PSA; an estimated 0.004% of peat plateau bog and palsa bog exposures within the PSA; and only 5% of the single esker under consideration. **Level I**	Life of project for effects to bioherms and raised permafrost area forests. Construction period for effects to esker. **Level II**	Will occur (continuous effect until rehabilitation initiated) **Level III**	Broadly similar habitats can be developed at closure to replaced disturbed habitats. **Level I**	Effects to upland habitats considered to be minor **Not Significant**	Effect will occur
Other peatland types (not defined as a VEC, but included here for completeness)	Developments at the Victor site will directly displace approximately 5.17 km^2 of "other peatland types" (bogs, horizontal fens and northern ribbed fens with narrow flarks). Winter road and transmission line development will result in the partial modification of an additional 10.26 km^2 of other peatlands. Well field dewatering activities are not expected to alter muskeg hydrology, as muskeg systems are essentially perched within the marine clay/silt layer.	Facility layouts have been designed to minimize overall disturbance to muskeg environments by developing a compact site. Portions of stockpile areas that displace peatlands will be developed as wetlands at closure, as permitted by topography. Portions of stockpiles not amenable to restoration as wetlands will be developed as forested areas. Transmission line construction would take place in winter, minimizing impacts to peatland habitat. Winter road construction would alter but not completely change peatland habitat.	Adverse effects involve common species or communities **Level II**	Adverse effects to socio-economic interests are not expected **Level I**	Effects considered to be minor; the maximum 15.43 km^2 of other peatland habitats that would be altered represents 0.107% of the 14,560 km^2 of other peatland habitat contained within the PSA **Level I**	Life of project **Level II**	Will occur (continuous effect until rehabilitation initiated) **Level III**	Disturbed peatlands associated with direct displacements at the Victor site not restorable as peatland habitat, but will be restored at closure to a combination of wetland and forested upland habitats. Disturbed peatlands along winter road and transmission line routes will become fully restored following closure, by natural means, as drainage patterns will not be meaningfully **Level III**	Effects to other peatlands expected to be minor **Not Significant**	Effect will occur

System / VEC / Feature	Potential Effect	Proposed Mitigation[1]	Residual Significance After Mitigation						Overall Significance	Likelihood
			Context		Extent	Duration	Frequency	Reversibility		
			Ecological	Socio-economic	Magnitude / Geographic Extent					
Moose and Caribou	Physical disturbance to habitats associated with the Victor site area and additional winter road and transmission line construction	A 200 m buffer zone will be established along watercourses to protect riverbank and creek margin forest habitats, except at necessary water crossings. Elsewhere, a compact mine site footprint will limit disturbance. The south winter road is set back a minimum 500 m from the Attawapiskat River. so as not to disturb moose. Transmission line construction will leave groundcover in tact, and will allow shrub regrowth. Disturbed habitats will be restored to productive moose and caribou habitat at closure.	Moose and caribou are regionally important species and resources	Significant adverse impact to traditional use activities	Habitats that will be directly displaced or altered as a result of site, access, and new transmission line development encompass an area of 28.8 km^2, representing 0.13% of the 22,400 km^2 PSA. The 28.8 km^2 area includes 8.7 km^2 at the Victor site, 13.4 km^2 associated with the coastal transmission line route, and 6.7 km^2 associated with the south and west winter roads.	Life of project	Will occur (continuous effect until rehabilitation initiated)	Disturbed habitats at the Victor site will be actively rehabilitated to diverse and productive moose and caribou habitat at closure. Disturbed habitats along winter roads and transmission line routes will self-restore at closure; tree seedlings to be planted at south winter road creek and river crossings	Effect of habitat alteration expected to be minor	Effect will occur
			Level III	Level III	Level I	Level II	Level III	Level I	Not Significant	
	General disturbance related to noise and other parameters at the Victor site, and disturbance related to site access from traffic along winter roads	Control noise emissions at source and through the use of noise barriers at the Victor site. Control fugitive dust emissions and incinerator air emissions at source. Use winter roads rather than all-season roads for site access. Restrict traffic along main winter roads to travel in convoys, where practicable; restrict hunting along winter roads. Restrict aircraft travel height to elevations above 300 m except during landing and take-off, to the extent practicable and allowed by safety considerations.	Moose and caribou are regionally important species and resources	Significant adverse impact to traditional use activities	Buffer zones encompassing areas potentially affected by disturbances related to Project facilities / activities encompass 373.4 km^2, representing 1.67 % of the 22,400 km^2 PSA. Limited exposure of ungulates road related disturbances or hazards due to seasonal use of winter roads, and limited traffic. Disturbance effects along coastal winter road not considered as this road already exists and has been used regularly for several years.	Life of project	Will occur regularly at the Victor site and at least once per month during the winter transport season	Effect completely reversible at closure	Extent of effect expected to be minor	Effect will occur
			Level III	Level III	Level I	Level II	Level III	Level I	Not Significant	
Large predators and furbearers	Disturbance to habitats associated with developments at the Victor site; habitat disturbance associated with additional winter road and transmission line construction; and minor disturbance associated with noise.	Habitats most critical to large predators and furbearers are the riverbank and creek margin forests and their associated watercourses. These habitats will be protected from disturbance, and riverine water quality values will be preserved, thereby preserving the integrity of wildlife food sources for aquatic furbearers. The south winter road is already set back from the Attawapiskat River by a minimum 500 m, so as not to disturb prime large predator and furbearer habitat. Appropriate measures will be taken at the Victor site to control noise emissions and other disturbances.	Adverse effects involve common species or communities	Furbearers are an important resource to AttFN	Habitats that will be directly displaced or altered as a result of site, access, and new transmission line development total 28.8 km2, representing 0.13% of the 22,400 km^2 PSA. Buffer zones encompassing areas potentially affected by Project related disturbances encompass 373.4 km^2, or 1.67 % of the 22,400 km^2 PSA. Limited exposure of large predators and furbearers winter road effects, including possible increased trapping pressure associated with improved access. Disturbance effects along coastal winter road not considered as this road already exists.	Life of project	Will occur (continuous effect until rehabilitation initiated)	Disturbed habitats will be actively rehabilitated at closure, or will be allowed to self restore at closure in the case of winter roads and transmission lines. Other disturbances such as noise will cease at the end of operations.	Effect of habitat alteration and general disturbance expected to be minor	Effect will occur
			Level II	Level II	Level I	Level II	Level III	Level I	Not Significant	

System / VEC / Feature	Potential Effect	Proposed Mitigation[1]	Residual Significance After Mitigation						Overall Significance	Likelihood
			Context		Extent	Duration	Frequency	Reversibility		
			Ecological	Socio-economic	Magnitude / Geographic Extent					
Migratory birds	Disturbance to habitats associated with developments at the Victor site; habitat disturbance associated with additional winter road and transmission line construction; and minor disturbance associated with noise and possibly light pollution.	A 200 m buffer zone will be established along watercourses to protect riverbank and creek margin forest habitats. Elsewhere, a compact mine site footprint will limit disturbance. The south winter road is set back a minimum 500 m from the Attawapiskat River to protect the forested corridor, and ANSI values. Winter road and transmission line construction will occur in winter and will leave groundcover in tact. Disturbed habitats will be restored to productive and diverse wildlife habitat at closure. All tree clearing and construction for new roads and transmission lines would take place in the winter months, outside the bird nesting season. Stockpile advancement will be controlled during the bird nesting period to protect ground nesting birds.	Adverse effects involve common species or communities	Adverse effects to socio-economic interests are not expected	Habitats that will be directly displaced or altered as a result of site, access, and new transmission line development total 28.8 km^2, representing 0.13% of the 22,400 km^2 PSA. Buffer zones encompass 159.7 km^2, or 0.71 % of the 22,400 km^2 PSA (buffer zones exclude those associated with winter road traffic).	Life of project	Will occur (continuous effect until rehabilitation initiated)	Disturbed habitats will be actively rehabilitated, or will be allowed to self-restore, in the case of transmission lines and winter roads, at closure. Tree seedlings to be planted at south winter road creek and river crossings. Other disturbances such as noise will cease with the end of operations.	Effect of habitat alteration expected to be minor	Effect will occur
			Level II	**Level I**	**Level I**	**Level II**	**Level III**	**Level I**	**Not Significant**	
Species at Risk	Woodland caribou potentially sensitive to habitat, nosie and other disturbances; bald eagles unlikely to be disturbed; other species not likley to be affected.	See mitigation measures for moose and caribou; for eagles, avoid disturbance to forested river corridors to extent practical.	Adverse effects involve regionally important species	Caribou are a critical resource for Aboriginal peoples; Species at Risk are important to the general public	Refer to discussion on moose and caribou; eagle habitat and food supplies (fish) not expected to be meaningfully affected	Life of project	Will occur (continuous effect until rehabilitation initiated)	Effect essentially reversible once habitat restoration occurs.	Effect of habitat alteration and general disturbance expected to be minor	Effect will occur
			Level III	**Level III**	**Level I**	**Level II**	**Level III**	**Level I**	**Not Significant**	
NATURAL HERITAGE SYSTEMS										
Attawapiskat River Proposed Candidate Waterway Park (ARPCWP)	The existing south winter road crosses the ARPCWP. The suggested new routing would stay south of the river and the ARPCWP. The transmission line from Attawapiskat to the Victor site would cross the Attawapiskat River at the existing transmission line crossing point. The Attawapiskat River water intake and discharge structures near the Victor site will be positioned within the 33 km section of river that has been withdrawn from the ARPCWP.	The existing south winter road crossing of the Attawapiskat River will be repositioned away from the river. The new transmission line crossing will be placed beside the existing crossing. Water discharge and intake structures on the river will be naturalized to the extent feasible to improve aesthetics, even though these features will be outside of the ARPCWP.	Adverse effects involve Provincially significant resources	No meaningful adverse effects to socio-economic interests	No meaningful change in ecological function of the feature.	Life of project	Will occur (continuous effect until rehabilitation initiated)	Disturbed winter road crossing area will be actively restored at closure, unless otherwise indicated by the AttFN and MNR	Effect on function and visual expression of the ARPCWP is minor	Effect will occur
			Level III	**Level I**	**Level I**	**Level II**	**Level III**	**Level I**	**Not Significant**	

System / VEC / Feature	Potential Effect	Proposed Mitigation[1]	Residual Significance After Mitigation						Overall Significance	Likelihood
			Context		Extent	Duration	Frequency	Reversibility		
			Ecological	Socio-economic	Magnitude / Geographic Extent					
Attawapiskat Karst Candidate ANSI, and the Southwestern James Bay and Chickney Point Candidate ANSIs on James Bay coast	The VDP is located entirely within the ANSI boundary, and its development will involve disturbance to some ANSI features, most notably three small bioherms. The existing south winter road and proposed transmission line will terminate within the boundaries of the Attawapiskat Karst candidate ANSI, as the VDP is encompassed by the ANSI, posing a visual and minor biophysical intrusion on the ANSI. The Southwestern James Bay ANSI will be transected by the transmission line and existing coastal winter road, and the Chickney Point ANSI is transected by the existing coastal winter road.	Victor site facilities have been set back from the Attawapiskat and Nayshkootayaow River exposures of the ANSI, which are the most significant features of the ANSI. The core of the ANSI is located > 5km east of Victor site. The south winter road and transmission line route avoids direct infringement on principal Attawapiskat Karst ANSI features, and the transmission line will be removed at closure and areas disturbed by the winter road would recover naturally from limited disturbance effects. Coastal ANSIs are already transected by the existing winter road and transmission line. The new transmission line would not adversely affect the values of the Southwestern James Bay ANSI.	Adverse effects involve a nationally important resource (Attawapiskat Karst ANSI), a provincially important resource (Chickney Point ANSI), and a regionally important resource (Southwestern James Bay ANSI)	No meaningful adverse effects to socio-economic interests	No meaningful change in ecological function of the Attawapiskat Karst ANSI (south winter road already exists). Project related developments occur within an area that comprises approximately 4.6% of the 540 km^2 ANSI. Prominent ANSI feature components such as sinkhole meadows and bioherms will be avoided. Coastal marshes and thickets, and associated waterfowl values would not be meaningfully affected by widening the existing coastal transmission line ROW by an added 30 m.	Life of project for Attawapiskat Karst ANSI; beyond life of Project for Southwestern James Bay ANSI	Will occur (continuous effect until rehabilitation initiated), except for Chickney Point ANSI which will not be traversed by the transmission line	The Victor site area, contained within the Attawapiskat Karst ANSI, will be rehabilitated at closure. The new coastal transmission line passing through the Southwestern James Bay ANSI will remain in place, but will support a diverse groundcover and shrub layer.	Effect on function and visual expression of all ANSIs is minor	Effect will occur for Attawapiskat Karst ANSI and for SW James Bay ANSI. No effect to Chickney Point ANSI
			Level III	**Level I**	**Level I**	**Level III**	**Level III**	**Level II**	**Not Significant**	
Coral Rapids Wetland Conservation Reserve (recommended), Pinard Moraine Conservation Reserve (recommended) and the Sextant Rapids Nature Reserve	The proposed new 115 kV transmission line that will run parallel and immediately adjacent to the existing 115 kV and ONR right-of-ways could pass through the margins of the Coral Rapids Wetland Conservation Reserve and the Pinard Moraine Conservation Reserve (pending further guidance from MNR), but will not pass through the nearby Sextant Rapids Nature Reserve.	Suggested by the proponent that an area of 0.6 km^2 be added to the 61.82 km2 Coral Rapids Conservation Reserve rather than having transmission lines on both sides of the ONR.	Adverse effect involves regionally important species, communities and resources	No meaningful adverse effects to socio-economic interests	The ONR and the existing 115 kV line already border or pass through the two conservation reserves. Constructing a new transmission line through the wetland, adjacent to the existing line will not meaningfully affect iconological function.	Effect will be permanent.	Effect will occur continuously.	The new transmission line passing through the Coral Rapids Conservation Reserve (if constructed on the west side of the ONR) would remain in place, but would not substantively disturb wetland function.	Effect on function and visual expression of conservation reserves is minor.	Effect will occur
			Level III	**Level I**	**Level I**	**Level III**	**Level III**	**Level II**	**Not Significant**	
MALFUNCTIONS AND ACCIDENTS										
VECs related to surface water systems, and secondarily to terrestrial systems	Fuel release during truck transport, potentially entering a creek or river and adversely affecting aquatic life, depending on the magnitude of the spill and how much enters the waterbody	Use of licensed carriers, fuel transport in convoys, spill response strategies, and EMS programs.	Adverse effect involves regionally important species, communities and resources	Advesre effects potentially involve meaningful disturbance to Traditional Use activities	Effect not expected to occur, except through and accident or malfunction	Effect would be short-term if it occurs	Effect expected to occur infrequently, or not at all	Effects typically reversible within 1-2 years	Effect not likely to occur, or to be minor and short-lived if it does occur	Could reasonably be expected to occur, but very infrently
			Level III	**Level III**	**Level I**	**Level I**	**Level I**	**Level I**	**Not Significant**	
VECs related to terrestrial systems, and secondarily to surface water systems	Fuel release from storage facilities potentially spilling to the suurounding muskeg terrain, possibly, but very unlikley to enter a waterbody	Appropriate design including provision of secondary containment, strict fuel transfer and management protocols, spill response strategies, and EMS programs.	Adverse effects involve common species or communities	Adverse effects to socio-economic interests are not expected	Effect not expected to occur, except through and accident or malfunction	Effect would be short-term if it occurs	Effect expected to occur infrequently, or not at all	Effects typically reversible within <1 years	Magnitude of any effect expected to be minor	Could reasonably be expected to occur
			Level II	**Level I**	**Level I**	**Level I**	**Level I**	**Level I**	**Not Significant**	
VECs related to surface water systems, and secondarily to terrestrial systems	Material release during truck transport, potentially entering a creek or river and adversely affecting aquatic life, depending on the magnitude of the spill, the type of material, and how much enters the waterbody	Use of licensed carriers, fuel transport in convoys, spill response strategies, and EMS programs.	Adverse effect involves regionally important species, communities and resources	Advesre effects potentially involve meaningful disturbance to Traditional Use activities	Effect not expected to occur, except through and accident or malfunction	Effect would be short-term if it occurs	Effect expected to occur infrequently, or not at all	Effects typically reversible within 1-2 years	Effect not likely to occur, or to be minor and short-lived if it does occur	Could reasonably be expected to occur, but very infrently
			Level III	**Level III**	**Level I**	**Level I**	**Level I**	**Level I**	**Not Significant**	

System / VEC / Feature	Potential Effect	Proposed Mitigation[1]	Residual Significance After Mitigation						Overall Significance	Likelihood
			Context		Extent	Duration	Frequency	Reversibility		
			Ecological	Socio-economic	Magnitude / Geographic Extent					
No involved VECs	Possible minor subsidence of immediately adjacent muskeg terrain	Proper pit design taking into account geotechnical considerations and earthquake potentials; diversion of South Granny Creek away from pit area	No meaningful adverse ecosystem effects	Adverse effects to socio-economic interests are not expected	Effect not expected to occur, except through and accident or malfunction	Effect would be short-term if it occurs	Effect expected to occur infrequently, or not at all	Effect may not be reversible	Effect would be minor (excluding potential for personal injury) and not likely to occur at any meaningful scale	Unlikley to occur at a meaningful scale
			Level I	Level I	Level I	Level I	Level I	Level III	Not Significant	
Nayshkootayaow River system and its Tributaries	Possible malfunction of the flow supplementation system	Burying the water line below the frost line to protect against freezing; temperature and flow monitoring; use of check values to facilitate repair, if needed	Adverse effect involves regionally important species, communities and resources	Adverse effects potentially involve meaningful disturbance to Traditional Use activities	Effect not expected to occur, except through and accident or malfunction	Effect would be short-term if it occurs	Effect expected to occur infrequently, or not at all	Effects typically reversible within a few days	Effect not likely to occur, or to be minor and short-lived if it does occur	Unlikley to occur at a meaningful scale
			Level III	Level III	Level I	Level I	Level I	Level I	Not Significant	
VECs related to terrestrial systems	Possible explosives accident	Explosive components not individually explosive; adequate spacing of storage and manufacturing facilities as per regulations; EMS procedures and training	No meaningful adverse ecosystem effects	Adverse effects to socio-economic interests are not expected	Effect not expected to occur, except through and accident or malfunction	Effect would be short-term if it occurs	Effect expected to occur infrequently, or not at all	Any ecosystem effects would be reversible within a short period (<1 yr)	Effect would be minor (excluding potential for personal injury) and not likely to occur at any meaningful scale	Unlikley to occur at a meaningful scale
			Level I	Level I	Level I	Level I	Level I	Level I	Not Significant	
VECs related to terrestrial systems, and secondarily to surface water systems	Possible PK pipeline resulting in the release of process water and PK solids	Suitable engineering design; regualr inspections of facilities; provision of emergency spill containment; EMS response	No meaningful adverse ecosystem effects	Adverse effects to socio-economic interests are not expected	Effect not expected to occur, except through and accident or malfunction; materials released would be essentially inert	Effect would be short-term if it occurs	Effect expected to occur intermittently	Any ecosystem effects would be reversible within a short period (<1 yr)	Effect would be minor	Unlikley to occur at a meaningful scale
			Level I	Level I	Level I	Level I	Level I	Level I	Not Significant	
VECs related to terrestrial systems, and secondarily to surface water systems	Possible PKC dam failure resulting in the release of process water and PK solids	Suitable engineering design; regualr inspections of facilities; EMS response	Adverse effects involve common species or communities	Adverse effects to socio-economic interests are not expected	Effect not expected to occur, except through and accident or malfunction; materials released would be essentially inert	Effect would be short-term if it occurs	Effect not expected to occur	Disturbed habitats will be actively rehabilitated, or will be allowed to self restore	Effect would be minor	Unlikley to occur at a meaningful scale
			Level II	Level I	Level I	Level I	Level I	Level I	Not Significant	
VECs related to terrestrial systems	Stockpile slope failure leading to minor covering of immediately adjacent boundary terrain	Suitable engineering design, maximum one to three 4 m lifts, with provision for minor failures; regualr inspections of facilities	No meaningful adverse ecosystem effects	Adverse effects to socio-economic interests are not expected	Effect not expected to occur, except through and accident or malfunction; materials not expected to enter watercourses; essentially inert material	Effect would be short-term if it occurs	Effect expected to occur intermittently	Any ecosystem effects would be reversible through restoration at closure	Effect would be minor	Unlikley to occur at a meaningful scale
			Level I	Level I	Level I	Level I	Level I	Level I	Not Significant	
VECs related to surface water systems (Granny Creek, Nayshkootayaow River)	Unexpected development of acid mine drainage, and/or increase in parameter loadings from PKC facility, or runoff from stockpiles potentially affecting waterquality and fisheries rersources	Extensive geochemical test work and experience with tesy processing plant; extensive monitoring program	Adverse effect involves regionally important species, communities and resources	Advesre effects potentially involve meaningful disturbance to Traditional Use activities	Effect not expected to occur, except through unforseen geochemical conditions - considered highly unlikely given the nature of materials (kimberlite and limestone host rock)	Effect would long-term if it occurs	Effect not expected to occur	Effect would be reversed with difficulty should it occur	Effect not expected to occur, and if it did, effects would be localized and minor	Unlikley to occur at a meaningful scale
			Level III	Level III	Level I	Level III	Level I	Level II	Not Significant	
VECs related to surface water systems (Granny Creek, Nayshkootayaow River)	Less than projected efficiency in settling ponds potentially increasing sediment loadings to surface waters	Designs provide for maximum runoff / stormwater conditions; contingency provision (flocculants / silt curtains)	No meaningful adverse ecosystem effects	Adverse effects to socio-economic interests are not expected	Effect not expected to occur, except through and accident or malfunction; materials released would be essentially inert	Effect would be short-term if it occurs	Effect not expected to occur	Effect easily reversed should it occur	Effect not expected to occur, and if it did, effects would be localized and minor	Unlikley to occur at a meaningful scale
			Level I	Level I	Level I	Level I	Level I	Level I	Not Significant	
VECs related to terrestrial systems	Project-related fires could potentially cause property damage; damage to terrestrial environments; or air quality effects	Installed fire protection systems; fire drills and inspections as part of EMS	Adverse effects involve common species or communities	Adverse effects to socio-economic interests are not expected	Effect not expected to occur, except through and accident or malfunction; effects would be controlled to limit areal extent	Effect would be short-term if it occurs	Effect expected to occur intermittently	Damage to terrestrial systems would require community re-growth taking time	Effect not expected to occur, or if it did, effects expected to be localized and minor	Unlikley to occur at a meaningful scale
			Level II	Level I	Level I	Level I	Level I	Level I	Not Significant	

Notes 1 Mitigation includes aspects inherent in Project planning and design, as well as any other proposed measures, including compensation, and rehabilitation at closure

2 PSA = Project study area

Figure
6-1 Expected Well Field Draw Down Contours in Relation to Nayshkootayaow River System

Figure
6-2 Confirmed and Probable Bioherm Features in the Victor Mine Site

Figure
6-3 Natural Drainage Effects (Sinkhole, Bioherm and Failed Riverbank) on Muskeg Systems

7.0 ENVIRONMENTAL EFFECTS ANALYSIS – SOCIO-ECONOMIC ENVIRONMENT

7.1 Approach

7.1.1 Context

Under the *Canadian Environmental Assessment Act* (CEA Act), the comprehensive study can consider only effects on socio-economic conditions caused by a change in the environment due to the project. For the purposes of the federal environmental assessment process, socio-economic conditions include effects at the population or community level on:

- The quality of life or "way of life",
- The economic, commercial opportunities or employment;
- The availability of recreational opportunities or amenities;
- Home life or personal security;
- Future land uses; and,
- The future use or future productions of commercial species or resources.

In addition, the following effects must be considered:

- Cumulative environmental effects on socio-economic conditions;
- Significance of the effects on socio-economic conditions; and,
- Technically and economically feasible measures that would mitigate any significant adverse effects on socio-economic conditions.

Socio-economic information not directly related to environmental effects was collected, but it was not used in making decisions on significance under CEAA. This information has been placed in Appendix F. This Appendix contains certain socio-economic information relating to the Victor Diamond Project that was collected pursuant to paragraph 16(1)(e) of the Canadian Environmental Assessment Act ("the CEAA"). This information is restricted to socio-economic effects that are not the result of any change in the environment caused by the project, and as such, are not "environmental effects" as defined in the CEAA. The content of this Appendix is therefore not required for the consideration by the Minister of the Environment, under Section 23 of the CEAA, of the likelihood of the project causing significant adverse environmental effects.

In the event that the Minister of the Environment determines, under Section 23 of the CEAA, that the project is likely to cause significant adverse environmental effects, he will be required to determine whether or not such effects are justifiable in the circumstances. The information contained in this Appendix will be relevant to the question of justification, should such question arise.

7.1.2 Criteria

Socio-economic assessment criteria are similar to those used to assess natural environmental effects, with some differences. Socio-economic effects can be positive or negative, thus direction is included. Geographic extent is based on administrative units (Attawapiskat, the other Cree communities in the regional study area, and northeastern Ontario). Magnitude is qualitatively assessed, as quantification is problematical on two grounds. First, important effects on a single individual are considered of high magnitude even if this effect represents a very small change relative to the community as a whole. Secondly, many socio-economic effects cannot be easily quantified. Duration is related to project phases (short-term for the construction phase, medium-term for the period to closure, and long-term beyond the life of the project). In this regard it is noted that socio-economic effects, insofar as they may alter the life patterns of people, are often long-term, e.g., 20 years of employment experience has effects long after employment has ended, for example through enhanced employability. Frequency is typically continuous, but may occur seasonally, or periodically.

7.1.3 Assessment of Significance

The assessment of significance also generally follows the environmental assessment methodology described in Section 6.1.4. Unlike natural environmental effects, some socio-economic effects may not lend themselves to being assigned criteria except in terms of potential. This element of uncertainty arises because people respond not simply to a project and what that project is able to put in place in terms of mitigation, but to the totality of their day-to-day reality. The socio-economic assessment therefore explores the potential for, rather than the predictability of, effects.

7.1.4 Mitigation

Irrespective of constraints on the predictability of potential effects, De Beers has committed to develop appropriate mitigation measures for potential negative bio-physically related effects and to enhance potential positive benefits.

The environmental and socio-economic agreement being developed by the RAs, in cooperation with the FAs and provincial ministries, will be negotiated with De Beers and First Nations. It will provide additional follow-up, ensure that mitigation measures are appropriately implemented, and establish a mechanism where discussion of issues of interest and concern can take place. It is hoped that the agreement will make it possible to enhance benefits of the project while minimizing any negative impacts.

7.1.5 Comments/Concerns

Gartner Lee, on behalf of the AttFN, has observed that overall the environmental assessment presents more of a discussion of types of effects that can be expected rather than a community-based, technical assessment upon which significance can be determined and a monitoring program can be based. They propose an alternative socio-economic assessment and monitoring framework for data collection for the monitoring of project effects. Gartner Lee has further recommended that a legal agreement on data collection and monitoring be in place before project construction is permitted to proceed.

INAC, commented that evaluating the effects assessment in the CSEA is challenging because of limited baseline data reporting and because residual effects were assessed on the basis of expectations regarding the Impacts and Benefits Agreement (IBA), the contents of which were not elaborated in the CSEA. INAC also noted that the effects are not described in terms of reversibility, frequency or socio-cultural context.

The RAs had concerns that socio economic considerations that need to be in the CSEA be included in the CSR. RAs cannot rely on the Proponent's commitment to include or address issues in the IBA that is being negotiated between the Proponent and Attawapiskat First Nation.

Mushkegowuk Council submitted a report by its reviewers (IER) that essentially made two basic points: first, that consultations have not been adequate with the other James Bay coastal Cree communities, and secondly, that the level of effort in baseline data collection (and by extension impact assessment, mitigation and monitoring) is not commensurate with expected effects.

7.1.6 Proponent's Response

The issue of the adequacy of the baseline data, that underlies some of the concern about the effect assessment approach, is addressed in Section 5.2 and will not be repeated here. With regard to the need for baseline data, the Proponent has responded that it is in agreement with Gartner Lee that baseline data are critical to the establishment of a monitoring program for many community level socio-economic effects (Section 5.2).

In further observations on the role of baseline data in socio-economic assessment the Proponent also noted the following:

- *The assessment of socio-economic effects, even where complete and accurate baseline data are available, is to some extent a speculative exercise because of aspects relating to societal complexity and matters of personal choice*.

- Where improved baseline data have become available subsequent to the submission of the CSEA, and have been analyzed for purposes of writing responses to comments, the additional data *have generally supported CSEA conclusions on the discussed project effects*.

- Overall, economic growth, employment and increased incomes are associated worldwide with improvement in the quality of life. To the extent that people have tried to model socio-economic effects (such as in the model available to Ontario's Ministry of Natural Resources for specific communities), they incorporate this positive relationship (again, at the aggregate level) between projects and improvements in socio-economic parameters such as rates of divorce and crime.

With regard to INAC's observation that the socio-economic assessment presented in the CSEA did not consider certain criteria, such as frequency and reversibility, the Proponent has included frequency in the CSR, recognizing that for most socio-economic effects frequency is mostly of a continuous nature. Reversibility was not generally included in assessments, as it is the Proponent's view that reversibility does not typically apply to socio-economic effects – individuals do not "unexperience" impacts on their lives.

7.2 Attawapiskat

This section provides an assessment of the following environmental effects and their significance for the Attawapiskat First Nation:

- Traditional pursuits, values and skills;
- Aboriginal community (physical disturbance);
- Health;
- Cultural heritage resources; and,
- Physical infrastructure.

7.2.1 Traditional Pursuits, Values and Skills

Canada's Supreme Court has established, in connection with projects, that the loss of use of traditional lands be minimized, and that any such losses be negotiated with the affected population, and fairly compensated. Financial compensation for land alone may not be sufficient, as spiritual, cultural and social values need also to be considered. De Beers' activities have had and will continue to have an impact on the Attawapiskat First Nation's traditional activities of hunting, trapping and fishing, and fair and reasonable compensation for the unavoidable loss of use of these activities is appropriate. In addition, the introduction of a formal wage economy into the community of Attawapiskat has the potential to affect the practice of traditional pursuits, as a result of cross-cultural contact, fulltime employment, and consequent social change.

7.2.1.1 Effects

Land Use

The potential area of affected land for the entire project includes:

- The 140 km^2 area of the Victor Diamond Project site, which would be disrupted on a year round basis and for the duration of the project;

- The 200 km^2 zone associated with the south winter road, which would be disrupted mainly for hunting on a seasonal basis (winter) for the duration of the project;

- The 30 km^2 zone associated with the proposed west winter road, to be used on a seasonal basis, mainly during the construction period;

- The 11 km^2 of habitat over the total 355 km of the new transmission line connecting Otter Rapids to the Victor mine site; and,

- The 3 km^2 of habitat that will be partially altered over the length of the new transmission line extending from Attawapiskat to the Victor site (mainly included within the 200 km^2 zone referenced above for the south winter road).

De Beers is negotiating compensation for the effects on these lands, but notes that with some limited exceptions, hunting, trapping and fishing by members of the AttFN is expected to continue through much of this area.

In addition, there will be hunting and trapping limitations (largely on safety grounds) as follows:

- No discharge of firearms within a 3 km radius of the Victor site (included within the 140 km^2 area), at any time once development starts, with the exception of nuisance animal control by designated site personnel after discussions with MNR and AttFN;

- No discharge of firearms within 1 km of the south winter road, or in the direction of the winter roads from a distance of 3 km, while the road is being constructed or in use, generally from December 1 to April 15 of each year; and,

- No trapping within the principal Victor site development zone, measuring approximately 35 km^2.

As such, for the Victor site area, the entire 140 km^2 area would be unavailable to hunters, but only 35 km^2 of this area would be closed to trapping. There would be no restriction on trapping along the winter roads, and only a partial restriction on the discharge of firearms, during the period of winter road use pursuant to the Hunter Safety Rules of Ontario. Where limitations affect individuals, De Beers has negotiated and paid compensation during the exploration phase of the project, and would continue to do so throughout the life of the project.

Project development will not impose limitation on fishing although this could decline close to the mine to the extent that fishing may at times be linked to hunting activity, which must be prohibited in the immediate mine site area.

Traditional Values and Skills

The socio-economic workshops made clear the high importance that particularly Elders, but also others in the community, give to the maintenance of traditional skills and values. There will be a shift towards more cross-cultural contact as the project moves forward. Employees and businesses will be operating within the context of De Beers' corporate culture, policies, language and operational requirements. To the extent that these trends result in less traditional practice, there is a potential for reduced inter-generational learning and over the longer-term a potential for some loss of traditional skills.

The extent to which traditional values and skills have and can be maintained over time is a result of a very large number of variables, only some of which can be attributable to the project specifically. Observed erosion of tradition in the past has been, in large measure, a response to the centralization of government services, increased communications, reduced income from trapping and economic transition into the wage based economy, and the cultural and social transition that has resulted.

The project will not significantly restrict access to, or the productivity of, most of the land used for traditional activities. The mine site itself is located far from Attawapiskat and will be a fly-in, fly-out operation. Cross-cultural contact will therefore be limited in the community, although there will be some associated with the construction camp for the power line (less than 30 people for one season, if required). Workers in this camp (if it is constructed) will be subject to a code of conduct governing their behaviour. Aboriginal workers will experience cross-cultural contact on a daily basis, however, this will be in a context of respect for Aboriginal culture, zero tolerance for inappropriate behaviours, and workplace practices that accommodate cultural needs. Fly-in, fly-out arrangements also provide the opportunity to AttFN members to engage in traditional activity on their weeks off, and employment provides the financial resources necessary to purchase equipment and encourage more traditional activity.

Despite the above, there remains the potential for some level of erosion of traditional values and skills with a ramping up of participation in the formal wage economy, and of contact with non-Aboriginals and their culture.

7.2.1.2 Mitigation

Land Use

In the course of the advanced exploration stage, De Beers has negotiated with the AttFN to provide compensation for observed disturbances to wildlife and the consequent reduction in harvests, or obligation to move harvesting activities to locations away from De Beers' activity. The AttFN has been responsible for identifying individually affected people and for distributing the compensation payments appropriately. Compensation has been based on estimates of the foregone harvest and the value of that harvest, and takes into consideration cultural loss. This approach will be maintained for compensation for individual loss as a result of land use limitations related to the project.

A closure plan has been developed and is available to the public. It will be continually updated during the operation phase of the mine. Upon closure, the site will be rehabilitated and the pit allowed to flood. At closure, habitats conducive for supporting wildlife will be actively restored and the lack of industrial activity will support hunting in the area.

Traditional Values and Skills

Workforce policies relevant to traditional pursuits are intended to minimize the contact between the residents of Attawapiskat and the out-of-area project workforces, to control inappropriate behaviours when contact does occur, to ensure that Aboriginal employees have opportunity to engage in traditional activity, and to provide workplace conditions that accommodate Aboriginal culture. The fly-in, fly-out operation will limit contact between the Attawapiskat general population and out of area workers, as workers will not remain in the area when they are not working but will be returned to their own communities. Fly-in, fly-out employment also provides resources[1] and rotational time for the pursuit of traditional activities. De Beers has also established and will enforce a code of conduct for out of area workers in their contacts with the people of Attawapiskat.

The accommodation of Aboriginal needs in the workplace not only supports the retention of traditional skills and values, but contributes to employment effects through improved retention rates.

7.2.1.3 Significance

The displacement of wildlife habitat, noise and other disturbances, and the restrictions on firearm discharge near project working areas represents a negative effect on AttFN members.

There is potential for both negative and positive effects on the retention of Aboriginal skills and values, which would be long-term and of high consequence. The creation for many individuals of options as to livelihood strategy, including increased traditional activity, is considered to be an important benefit although how this will net out at the community level is not predictable. An overall decrease in the total time spent on traditional economic pursuits may result. However, to the extent that community goals are to find a means to balance formal wage and traditional economic activity, the project provides an important opportunity to achieve those goals and any potential decline in time devoted to traditional economic pursuits (a negative effect) would be compensated for by an increase in choice to individuals and overall community well-being (positive effects). With regard to traditional skills and values, it is arguable that with enlightened workplace practices that respects, values and facilitates traditional culture (such as diet, environmental stewardship, ceremonial events and language) people in Attawapiskat will be able to integrate their traditional world with the non-Aboriginal world rather than be forced to choose between the two. Nevertheless there is potential for erosion of traditional skills and values, that would, if it occurred, represent a long-term negative effect of high consequence.

With regard to reversibility, the Proponent has committed to rehabilitating the Victor mine site to self-sustaining and productive lands at closure that will support viable wildlife populations and associated traditional activities that focus on wildlife.

Summary details relating to effects analyses are presented in Table 7-1.

7.2.1.4 Comments/Concerns

The people of Attawapiskat are concerned to see that economic participation in the project will not preclude traditional activity and that their Aboriginal culture will be accommodated in the workplace.

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[1] The survey data support an overall conclusion that harvesting costs are high relative to existing income levels, with over 30% of households spending more than half their income of harvesting.

INAC has observed that effects on local government (AttFN) finances should be further developed; that the CSEA did not include information on various elements of traditional life, including for example hunting cabins, travel routes, whitefish weirs, land use trends, plant harvesting, water collection, recreational activities, consumption of traditional foods, heritage or cultural sites other than burial sites, ceremonies, and language; and that there is no discussion of effects of non-Aboriginal activities on traditional land use.

7.2.1.5 Proponent's Response

With regard to local government finances, the Proponent has provided information from INAC, which indicates that federal transfers to the AttFN were in the order of $14 million in 2002 and $12 million in 2003. The Proponent also notes that while not privy to the details, there is much circumstantial evidence that the AttFN has over the recent past been struggling with debt.

With regard to the list of elements of traditional pursuits on which information was considered to be lacking in the CSEA, the Proponent acknowledges that some of these specific issues did receive somewhat abbreviated treatment. In addition, the Proponent notes that baseline information on many of these elements is contained in the TEK study appended to the CSEA. The Proponent has subsequently provided additional information as described in the following text.

Water collection when people are out on the land is from creeks and rivers that are convenient rather than from specific water sources (e.g., around the project site), according to Attawapiskat informants. That is, they will not collect water unless they are already in an area to hunt, trap or fish. Whitefish weirs are no longer used as people now use commercially available gill and purse nets to fish for whitefish.

The now available METS survey results on household participation in the traditional economy suggest that 54% of households harvest. Harvesting households either consume or share their harvest; there are only two reports of sales. About 70% of households report receiving harvesting from others, again almost certainly for consumption purposes. Finally, 80% of households report consuming harvested foods at least one day per week. If the levels of harvesting moose and caribou as reported by Wilkinson Associates (Table 7-48 in the CSEA) have been sustained since the 1990's (consultation results suggest some doubt), and if it is assumed that the bulk of harvesting on AttFN lands is by households in Attawapiskat itself, harvests of moose and caribou likely exceed 40 kg/person/year. Harvesting is therefore integral to livelihood strategies, and any reduction in this activity has the potential to harm particularly those households who may not harvest themselves, but depend on the harvest results of others.

Even taking into account the above information, the Proponent remains of the view that overall there will be no effects on most elements of traditional pursuits (including for example, interference with hunting cabins, travel routes, plant harvesting, water collection, recreational activities, consumption of traditional foods, or cultural sites). With limited environmental effect, there is no reason to believe that the various elements of the broad range of traditional activities, as described in the TEK study and above, would be differentially affected by the project. The project will provide continuing opportunities to engage in traditional pursuits on the one hand, and the income to purchase materials and equipment needed for traditional pursuits on the other. If traditional pursuits do decline as a direct result of the project, this will be because of personal choice rather than because of project-induced pressures, with the possible exception of the effects of increased contact among the project workforce with the non-Aboriginal world and consequent shifting cultural values. The exception to this is the prohibition on some traditional harvesting in the immediate area of the mine, which is addressed in Section 7.2.1.1.

7.2.1.6 RA Conclusions

The RAs conclude that there will not likely be any significant adverse environmental effects related to traditional pursuits.

7.2.2 Aboriginal Community – Physical Disturbance

This section only considers effects on the physical community of Attawapiskat.

7.2.2.1 Effects

Construction at the mine site will not cause disturbance in the community, however, construction of the power line, and the construction and use of winter roads and a barge handling facility (if required) will have effects on air quality and noise in Attawapiskat. Construction in particular is noisy and can be visually unappealing, but is temporary.

7.2.2.2 Mitigation

De Beers will apply the full range of industry standards and construction best practice to minimize noise and visual disturbances. To the extent practicable, and in consultation with the community, barge handling facilities (if constructed) and potentially winter roads will be constructed away from the community – the barge facilities on the east side of the sewage lagoon and the winter road on the south side of the Attawapiskat River. Traffic disturbances will be mitigated through good vehicle maintenance, driver training, driver codes of conduct that govern speeds particularly, but also considerate driving, and enforcement of those codes of conduct.

7.2.2.3 Significance

Potential disturbance effects are, considered to be negative, but will be only occasional and short-term and therefore of low consequence.

7.2.2.4 Comments/Concerns

Gartner Lee on behalf of the AttFN expressed concern for potential adverse noise effects on the community of Attawapiskat, particularly from winter road traffic near the community, and indicated that project related noise levels should be monitored.

7.2.2.5 Proponent's Response

The Proponent proposed to remove the winter road further from the community of Attawapiskat to reduce potential noise effects, as well as to reduce potential risks to children who are inclined to grab on to trucks passing through the community, and to reduce the number of major river crossings. The AttFN has supported a realignment of the existing south winter road, where it passes near the community, to remove the road from the immediate community environment. De Beers has indicated a desire to move the road even further away from the community, if agreement on this aspect can be reached with the community. De Beers has also agreed to monitor noise associated with winter road traffic.

7.2.2.6 RA Conclusions

The RAs conclude that there will not likely be any significant adverse environmental effects. Chapter 8 outlines follow-up programs to ensure conclusions are correct.

7.2.3 Health

7.2.3.1 Effects

Public Health and Security Related to Vehicular and Barge Traffic

Health concerns related to project air and water emissions are addressed separately in the next section.

Vehicle traffic represents a risk to public health insofar as accidents may occur. Of particular concern is that children often grab onto vehicles, especially during the winter, to slide along with the moving vehicles. All heavy winter traffic will be routed along a new dedicated winter road that will avoid passing through the community to promote safety.

During the construction stage, the major traffic risks will come with mobilization, as equipment is moved to site. Barges on the Attawapiskat River during the project construction phase, if used, also present some potential for accidents. Subsequently, infrequent transport of construction supplies, and then operations supplies, and of rotational project staff will add some traffic to the winter road. Traffic risks will be minimized with clear, enforced rules for vehicle operators in combination with public education on traffic risks. Nevertheless, there are presently accidents on the winter road and there are likely to continue to be traffic accidents over the mine life.

Health Related Project Emissions

Potential health effects related to project emissions include the accumulation of contaminants through the consumption of traditional foods and medicines, effects on potable water sources, direct air emissions, and noise.

According to TEK studies, almost all the harvesting of plants (plants, berries, and traditional medicines) for consumption by AttFN members occurs within an area that extends approximately 50 km upstream along the Attawapiskat River and on Akimiski Island. There is no reported meaningful harvesting of plants from areas near the Victor site. The only potential for project-related impacts to plants consumed by AttFN members is along the winter road, however, emission levels will be extremely low and will occur during the winter when plants are dormant.

With regard to meat, the concern is the potential for the magnification of metals, primarily heavy metals. An analysis of the area kimberlite ore and limestone shows that metal concentrations were all less than soil guideline values for residential and parkland settings, with the exception of two (out of 35) silver samples. Water samples tested for mercury and all other metals gave results that were better than drinking water standards, with the exception of sodium. Air emission modelling indicates that applicable environmental and health standards will be met for all parameters, with the possible exception of total particulate concentrations, which have the potential to occasionally exceed the provincial standard (marginal rare occurrences). For noise, the principal considerations will be workplace noise standards and comfort for sleeping. Workplace standards are mandated by the Ontario Occupational Health and Safety Act, and De Beers will comply with these standards.

7.2.3.2 Mitigation

Public Health and Security Related to Vehicular and Barge Traffic

The potential for traffic and workplace accidents will be reduced by selecting qualified contractors with appropriate health and safety policies; locating road(s) away from the community; regular health and safety training; use of convoys at restricted speeds along winter roads; winter road upgrading; regular inspection and maintenance of infrastructure and equipment; and adoption of clear work instructions.

Health Related Project Emissions

Emissions related to the project are covered by MOT regulations regarding traffic and MOL standards for employees. De Beers will be in full compliance with these regulations and standards.

7.2.3.3 Significance

Irrespective of the rigour with which De Beers implements health and safety and traffic control measures, there will remain the possibility that over the life of the mine a serious accident(s) could occur. Such an event would have to be considered at least potentially of long-term high consequence to any affected individual(s).

There is very low potential for health effects resulting from contamination of plant foods and medicines consumed by First Nations. There is some potential for the accumulation of heavy metals in game or fish. Effects on potable water are not expected. Noise at the mine site, of potential concern to project staff, will be within acceptable standards. Human health project effects are thus considered to be of low significance.

7.2.3.4 Comments/Concerns

Only Health Canada provided comments on health related issues. Some of these comments have been noted and addressed in the section on Aboriginal community. Additional information was also requested on air emissions from increased air traffic, effects of aircraft noise on human health and the potential contamination of country foods and water (including a screening level health risk assessment related to consumption of country foods and supporting documentation should the conclusion be that heavy metals are not considered to be a health threat).

7.2.3.5 Proponent's Response

The Proponent has responded, regarding air emissions of project-related aircraft, that the expected number of flights to the Victor site of a maximum of 5 to 7 flights per week during the construction phase is so small as to not warrant discussion within the context of potential health related effects. Nor were noise effects on human health considered significant, as Ontario Health and Safety Regulations will be adhered to so that there are no such effects.

With regard to contaminants of country foods, the Proponent has concluded that the only potential contaminant pathways would be directly through air and water, and indirectly through consumption of fish and wildlife. Air emission modelling has demonstrated that at the mine site contaminant concentrations will not exceed occupational health and safety standards, nor will they exceed the more rigorous federal and provincial standards for environment and health. For water, there is only potential for mine discharges to result in slightly elevated concentrations of sodium in the Attawapiskat River. With regard to accumulation of heavy metals in fish and wildlife, the Proponent has presented data to demonstrate that those metals that do have the potential to accumulate (cadmium, lead and mercury) will only be present in amounts well below levels that would be of potential concern in site drainage, even before water reaches rivers. Other metals are calculated to be below PWQO and CEQG PAL values in all receiving waters, as well. However, there is potential for minor contamination from on-site incineration and from the diversion of Granny Creek. Therefore, the Proponent has committed to monitoring of country foods harvested by First Nations, in order to ensure that these contaminants remain at predicted low levels. Supporting documentation has been provided as part of formal responses to Health Canada comments.

7.2.3.6 RA Conclusions

The RAs conclude that there is not likely to be any significant adverse environmental effects related to health emissions. Measurements of contaminants of potential concern in foods captured by First Nations will be taken as part of the follow up program.

7.2.4 Cultural Heritage Resources

7.2.4.1 Effects

Cultural heritage resources (burial sites, camp sites, sites of spiritual significance, and archaeological features) in the area of the project are typically located along the larger rivers. These rivers, such as the Attawapiskat and the Nayshkootayaow Rivers, have traditionally provided transportation routes, water sources, temporary camp sites, and fishing and hunting locations that sustained livelihoods from the land.

The project has been designed such that major infrastructure will not be built along these major rivers. Where necessary, winter water crossings are at perpendicular angles to the river flow to minimize the length of a crossing. While the winter road from Attawapiskat to site follows the Attawapiskat River it is located well back from the river where heritage sites are likely to occur, and no cultural heritage sites have been identified along the route. Only the necessary water crossings for roads, transmission lines, and for water intake and discharge structures, might have the potential to affect heritage sites. Should a heritage site be identified during construction, all activities within the vicinity will be stopped until the condition has been suitably addressed.

7.2.4.2 Mitigation

In the event that cultural heritage resources are encountered, or additional information regarding cultural heritage resources becomes available, site-specific mitigation measures will be developed. The TEK studies have identified a number of such sites, and the project design has been adjusted to ensure that such sites are as well away from planned infrastructure as practical. The Ontario Ministry of Culture will be notified if archaeological features are discovered during site construction. If human remains are encountered during construction (or other activities), the AttFN, the Ontario Ministry of Culture, Nishnawbe Aski Police Services (NAPS), and the Cemeteries Registrar of the Ministry of Consumer and Commercial Relations will be immediately contacted.

7.2.4.3 Significance

There are no expected project effects on cultural heritage resources.

7.2.4.4 Comments/Concerns

INAC requested additional information on locations and/or use of hunting cabins, traditional routes and cultural heritage sites other than burials sites.

7.2.4.5 Proponent's Response

Information had been collected, however there was initial reluctance by AttFN to permit its release. Maps were subsequently circulated to INAC illustrating the full range of cultural heritage features.

7.2.4.6 RA Conclusions

The RAs conclude that there will not likely be any significant adverse environmental effects on heritage resources.

7.2.5 Physical Infrastructure

7.2.5.1 Effects

Physical infrastructure in Attawapiskat that could be potentially affected by the project includes the sewage lagoon system, potable water system, landfill operations, and community roads. The sewage lagoon and potable water systems are sized to accommodate a much larger population than Attawapiskat presently has, thus there is considerable capacity to accommodate a temporary construction camp workforce of less than 30 people (if required for transmission line construction) within the existing system. The Attawapiskat landfill is in poor condition, thus if De Beers needs to use this facility then there will need to be discussion with both the AttFN and the MOE.

Power transmission to the community of Attawapiskat was activated in December 2003. The grid connection runs south to Moosonee and Otter Rapids. The reinforcement of this power supply, by constructing a new line parallel to the existing 115 kV line from Otter Rapids to Kashechewan, will add redundancy, and hence improved reliability of electrical power service to Attawapiskat.

The condition of the existing coastal winter road varies from year to year, depending on a variety of factors. With reliance of the project on the coastal winter road, the road will have to be substantially upgraded, as described in Section 2.5. Upgrading will improve the road's duration of use, reliability, and safety. The winter road between Attawapiskat and the project site will also facilitate access of AttFN members to their traditional lands.

7.2.5.2 Mitigation

As there are no capacity constraints, there are not expected to be any negative effects on physical community infrastructure.

7.2.5.3 Significance

Reliability of power supply and improved transportation infrastructure are considered to be effects that the community of Attawapiskat will benefit from beyond the life of the project. Payment for any use of existing physical infrastructure for project needs are benefits of moderate consequence but will endure for the life of the project. Project payments to Aboriginal businesses, for power transmission to Five Nations Energy and for road maintenance to the Services Company, will also be benefits.

7.2.5.4 Comments/Concerns

No CSEA reviewers provided comments on potential effects on physical infrastructure in Attawapiskat.

7.2.5.5 RA Conclusions

The RAs conclude that there will not likely be any significant adverse environmental effects on the physical infrastructure in Attawapiskat.

7.3 Other Affected Cree Communities

This section provides an assessment of the following environmental effects and their significance for the other affected Cree communities:

- Traditional pursuits, values and skills; and,
- Health.

7.3.1 Traditional Pursuits

7.3.1.1 Effects

The existing 268 km James Bay winter road from Moosonee to Attawapiskat passes through traditional lands of the Moose Cree, Kashechewan, Fort Albany, and Attawapiskat First Nations. Although the road will be upgraded in the interests of facilitating the movement of project goods, and in the interests of public health and safety, these upgrades are not expected to infringe on traditional lands any more than the existing road does. However, upgrades planned to the coastal winter road may facilitate access by outsiders to land used for traditional activities by the coastal Cree communities. As indicated by a recent case study in a Cree community on the eastern coast of James Bay, this could lead to increased pressures on available resources, particularly in areas adjacent to the coastal road. It could also lead to increased requirements for surveillance of areas close to the coastal road by concerned native hunters and trappers.

Widening the traveled coastal winter road width from the previous 6 to 8 m, to an improved width of 10 m, and widening the road right-of-way (ROW) from approximately 15 m to an improved 25 m to accommodate a widened traveled surface and to provide improved sighting and snow clearing, is expected to enhance overall road use and safety for all parties.

Power line construction will consist of the reinforcement of the existing line from Abitibi Canyon (near Pinard) to Moosonee and through to Kashechewan. Line upgrading will involve the construction of a second line along a parallel 30 m right of way (ROW), passing through the traditional lands of the Taykwa Tagamou Nation, the Moose Cree First Nation, the Kashechewan First Nation and the Fort Albany First Nation. Widening of the ROW to accommodate this new line would alter less than 11 km^2 of habitat over the total 350 km of new line. All habitats through which the new parallel ROW would pass are common in the area, and specific habitats associated with any particular trapline along the alignment would not be greatly altered. As the area through which the new ROW would pass is already disturbed as a result of adjacent ROWs and as ground cover would be left substantially intact and continue to support wildlife, this would not be expected to meaningfully alter harvesting activity in the area, although this is to be confirmed with the affected First Nations through monitoring.

Some additional traffic, particularly during the three-year construction phase, is expected on the existing rail line from Cochrane through First Nations traditional lands to Moosonee. This additional traffic will use existing train schedules for hauling with extended train length. Incremental increases in train car numbers are not anticipated to have any meaningful effects on traditional pursuits.

There is some potential, as for Attawapiskat, that increased cross-cultural contact and participation in the wage economy may induce personal decisions to reduce the amount of time engaged in traditional pursuits.

7.3.1.2 Mitigation

De Beers intends to pursue discussions with affected First Nations regarding any effects on traditional activities related to the construction of the new power line. Mitigation of potential effects on the practice of traditional pursuits by individuals who find employment with the project is as described in the sections on Attawapiskat.

Some of the mitigation measures mitigation measures proposed include: undertaking clearing and construction in winter to minimize disturbance to vegetation and wildlife; restricting vehicles to existing or proposed ROWs and to established watercourse crossings to the extent practicable; removal of stash and making any harvested timber available to local First Nations for their use; and managing the potential for fuel spills associated with construction equipment operation.

Reconnaissance along the transmission line corridor showed that there are two campsites located between the existing transmission line and the ONR that could potentially be affected by construction of the new transmission line, depending on details of final routing. General discussions conducted with persons who are knowledgeable of the area, including through TEK studies also suggest that there might be low numbers of tent frames and marten boxes near the proposed transmission line routing. Mitigation may include moving cabins or other hunting related materials such as marten boxes. Any identified loss, not covered by the community benefit of owning the line through FNEI, would be considered by De Beers.

7.3.1.3 Significance

There will be minimal loss of cover habitat; very little effect on vegetation or fauna, therefore any effects on traditional harvesting are considered to be of low significance. Effects on traditional skills and values as a result of cross-cultural contacts are also considered to be low consequence.

7.3.1.4 Comments/Concerns and Proponent's Response

During consultation on the new transmission line ROW and construction, and through associated TEK studies, most community members expressed the sentiment that the existing transmission line has had little effect on wildlife and traditional harvesting, and that outside of the construction period for the new line, similar effects would be expected. During construction, it was felt that some disturbance to wildlife will occur, but that the effects would be temporary. Several suggestions for mitigation were made, such as are described above. Some First Nation members suggested that compensation for adverse effects to traditional pursuits should be provided.

The Proponent has committed to implementing mitigation measures, suggested through consultation, on the new transmission line, and by TEK respondents. The Proponent has also agreed that compensation for the new transmission line where it passes through First Nation reserve lands is appropriate and will be developed through consultation with the Kashechewan and Fort Albany First Nations. As well, where the new transmission line is shown to adversely affect any cabins, tent frames, marten boxes, or similar physical assets, fair and reasonable compensation will be paid to replace or move these facilities.

7.3.1.5 RA Conclusions

The RAs conclude that there will not likely be any significant adverse environmental effects related to the traditional pursuits of other First Nations.

7.3.2 Health

Health related project emissions are, as for the rest of the project, considered of low significance. Worker health and safety is a concern, as for Attawapiskat, but other James Bay affected Cree community workers would of course come under the same protections in this regard as all other project workers.

The one exception to the above is that with increased project-related traffic, more accidents have the potential to occur along the winter road, which would be, in the event of occurrence, of high consequence to the individuals involved. However, occurrences are expected to be minimized as this road goes around (at a distance of at least 2 km) rather than through communities, drivers will be trained to drive safely, traffic will be convoyed and speed controlled and the quality of the road improved. Traffic on this road has been somewhat reduced recently as a result of the connection of Attawapiskat to the grid and the consequent decrease in fuel trucking.

The Proponent has not received any specific comments on project health effects on the other James Bay affected Cree communities.

7.3.2.1 RAs Conclusion

The RAs conclude that there will likely be no significant effects on the health of other First Nations.

7.4 Navigation

Project development will involve the following activities related to surface water navigation:

- Potential development of a barge landing facility at Attawapiskat and associated dredging;
- Construction of water intake and discharge structures on the Attawapiskat River, immediately north of the Victor site;
- Use of temporary bridges and rigmats to improve winter road crossings over creeks and rivers;
- Culvert crossings of North and South Granny Creek;
- Water pipeline crossing of the Nayshkootayaow River, and,
- Transmission line crossings over navigable waterways.

7.4.1 Effects

Development of a new barge landing facility and associated dredging at Attawapiskat will improve navigation near the community. Water intake and discharge structures in the Attawapiskat River near the Victor site will be constructed close inshore (within about 25 m of the riverbank) and will not obstruct canoe and freighter canoe traffic through this reach of the river, which is approximately 600 m wide, allowing ample room for this type of navigation. Temporary bridges and rigmats will be used in association with winter road access. Use of these structures will be seasonal, with the structures to be removed at the end of each winter road season, such that open water navigation would not be affected. North and South Granny creeks are considered to be too small to be navigable, and both creeks are disrupted by numerous beaver dams. Finally, the water pipeline crossing of the Nayshkootayaow River (required for flow supplementations of Tributaries 5 and 7) will be sufficiently raised above the river so as not to impede canoe or freighter canoe use of the river, or it will be buried below the river pending suitable subsurface conditions.

7.4.2 Mitigation

For the transmission line:

- Minimum vertical clearances must comply with CSA Overhead System Standard CAN/CSA-C22.3 No. 1-01.

For the pipeline crossing the Nayshkootayaow:

- The water pipeline crossing of the Nayshkootayaow River will be sufficiently raised above the river so as not to interfere with canoe traffic, or it will be buried.

For the intake, discharge structures and barge landing facility:

- Silt curtains or dewatering berms, installed during the navigation season, are to be marked with yellow buoys and/or yellow lights.

- Water intake and discharge structures on the Attawapiskat River will be marked as navigation hazards to prevent their being run into by canoe traffic.

- No person shall permit any tools, equipment, vehicles, temporary structures or parts thereof used or maintained for the purpose of building or placing a work in navigable water to remain in such water after the completion of the project.

- Where a work or a portion of a work that is being constructed or maintained in a navigable water causes debris or other material to accumulate on the bed or on the surface of such water, the owner of that work or portion of that work shall cause the debris or other material to be removed to the satisfaction of the Minister.

For the ice bridges:

- No person shall permit any tools, equipment, vehicles, temporary structures or parts thereof used or maintained for the purpose of building or placing a work in navigable water to remain in such water after the completion of the project.

- Temporary bridges and rigmats associated with annual winter road construction will be removed at the end of each winter road season.

- Where a work or a portion of a work that is being constructed or maintained in a navigable water causes debris or other material to accumulate on the bed or on the surface of such water, the owner of that work or portion of that work shall cause the debris or other material to be removed to the satisfaction of the Minister.

In addition to the generic mitigation measures identified above, Transport Canada will be providing site-specific mitigation for each proposal, during the detailed design stage of the project.

7.4.3 Significance

All of the potential effects to navigable waters are considered to be of low magnitude, and therefore not significant.

7.4.4 Comments/Concerns

Transport Canada requested that potential effects on navigable waters be addressed in one section for ease of review.

7.4.5 Proponent's Response

The Proponent was agreeable to Transport Canada's request, as per the material presented in this section.

7.4.6 RA Conclusions

De Beers will be required to implement the mitigation measures specified above, as well as any additional mitigation identified in the Navigable Waters Protection Act approvals to be issued by Transport Canada. Assuming these measures are implemented, as required by law, no significant adverse effects on navigation are anticipated.

7.5 Recreation and Aesthetics

The Proponent has concluded that there are no anticipated effects on the watershed of the Otoskwin-Attawapiskat River Provincial Waterway Park, which is the closest wilderness area, but lies well outside and upstream of the project site. Nor will the limited occurrence of commercial moose hunting along the forested borders of the Attawapiskat and Nayshkootayaow Rivers be affected. Therefore no mitigation is required. Recreation and aesthetics effects have not been raised by project stakeholders as being of concern, nor have reviewers provided comments on the CSEA conclusion of no significant effects. For further details on Natural Heritage Values, see Section 6.8.

Hunting and trapping effects adjacent to the mine site are discussed in Section 7.2.1 Attawapiskat, Traditional Pursuits, Values and Skills.

7.5.1 RA Conclusions

The RAs conclude that there will not likely be any significant adverse environmental effects related to recreation and aesthetics.

7.6 Effects on Sustainable Use of Renewable Resources

7.6.1 Fisheries and Aquatic Resources, Hunting and Trapping

Attawapiskat drainage basin fisheries resources are harvested for subsistence and traditional uses by members of the AttFN. At present there are no commercial fishing operations within the drainage basin, and only very limited fishing tourism and outfitting. The potential for disruption to fisheries resources and activities is discussed in Section 6.4.

Local community use of the land for recreational hunting and trapping is addressed earlier in this chapter in both the Traditional pursuits, values and skills of the resources (Sections 7.2.1 and 7.3.1). As outlined in Section 6.4, there will be no noticeable fisheries effects. Project development will reduce the area available for hunting in the immediate mine site area, for the life of the project, and seasonally along the south and west winter roads for the life of the project. There will also be restrictions on trapping activities in the immediate mine site area, but not along the winter roads.

7.6.1.1 Effects

Well field dewatering has the potential to adversely affect fisheries resources in the Nayshkootayaow River and some of its tributaries, as well as possibly the fisheries resources of the North River, and much less likely those of the Lawashi River (North Tributary). Hunting and trapping will be restricted in the immediate mine site area, and along the south and west winter roads (hunting only), for reasons of safety, during the life of the project.

7.6.1.2 Mitigation

River base flows that are disrupted by well field operation will be supplemented with water piped from the Attawapiskat River to maintain critical fish habitat during operations. Following mine closure, the open pit will be actively flooded to restore predevelopment base flow conditions and fish habitat. Disturbed habitats in the mine site area will be contoured and vegetated at closure to produce productive wildlife habitat.

7.6.1.3 Significance

Any effects on the sustainable use of renewable resources are considered to be of low magnitude, and hence not of significance. Natural habitats for fish and wildlife will also be restored at closure, though not necessarily in their original form in the case of terrestrial habitats, to facilitate a return to the sustainable productive use of local disturbed habitats.

7.6.1.4 Comments/Concerns

Members of the AttFN and their consultants, as well as members of the other area First Nations, have indicated the importance of restoring the land at closure to productive uses for fish and wildlife harvesting, such that there are no long-lasting adverse effects on traditional land uses. The AttFN has also expressed concerns on several occasions regarding the need to protect the water quality of area creeks and rivers, and associated fish and wildlife, during mine operations.

7.6.1.5 Proponent's Response

The Proponent has provided data to show that the water quality of area creeks and rivers will not be impaired during operations, or after site closure. The Proponent has also demonstrated its willingness to prevent adverse base flow effects to local watercourses and their fisheries and wildlife resources by providing flow supplementation during operations. Commitments have also been made to rehabilitate the Victor site area at closure, such that the site will provide long-term sustainable habitat for fish and wildlife.

7.6.2 Mining

7.6.2.1 Effects

Development of the kimberlite associated with the project will remove that specific resource from future mineral inventories, and thereby diminish future mining resource capital. Development of the project would, however, provide valuable infrastructure that would render the potential development of other kimberlites in the area potentially more feasible. This could improve future mineral resource inventories, which would be enhanced by training and skills development within the resident Aboriginal population. Also, development of the Victor kimberlite itself has and will provide exploration stimulus for the region, which will undoubtedly result in the identification of otherwise unknown diamond resources.

7.6.2.2 Mitigation

No mitigation is required. Development of the VDP will encourage further mineral exploration in the region, likely leading to the discovery of other mineral inventories, which might otherwise might not have been discovered.

7.6.2.3 Significance

Diamond mining, like all mining activities, involves the extraction of a non-renewable resource.

7.6.2.4 Comments/Concerns

AttFN members have expressed that the Victor kimberlite is a resource that has been in the ground for millions of years, and that if it is mined, then the AttFN should see benefits from the mining of this resource, because once it is gone, it will no longer be able to provide possible future benefits.

7.6.2.5 Proponent’s Response

The Proponent has responded that the AttFN and other local First Nations will derive financial benefits from the mining of the Victor kimberlites through such avenues as employment, training and business opportunities, life-skill enhancements, and in the case of the AttFN through direct compensation. Successful mining of the Victor kimberlite will also encourage further resource exploration in the region, likely leading to the identification of other mineable resources, which will provide further long-term opportunities to local Aboriginal peoples.

7.6.3 Forestry

Commercial forestry operations in the region occur within the Cochrane-Moose River Management Unit (CMRMU). Areas north of the Cochrane-Moose River Management Unit currently do not support commercial forestry operations, but local use of timber and fuel wood is practiced by members of the local First Nations. Developments associated with the VDP will avoid disturbance to areas of better forest growth, except in cases where such disturbance is unavoidable, such as transmission line and winter road crossings of creek and river valleys. At the end of mining operations, disturbed forest areas will be replanted, except along the transmission line from Otter Rapids (or Abitibi Canyon Junction, near Pinard) to Kashechewan, where the line would be left in place. In all such areas where salvageable timber is cut, the timber will be either used on site and/or made available for use to the local communities, to prevent waste.

7.6.3.1 Effects

The project is not anticipated to have any effect on the sustainable resource within the Cochrane-Moose River Management Unit.

7.6.3.2 Mitigation

Mitigation measures are not required.

7.6.3.3 Significance

Areas of permanent deforestation from the transmission line ROW is deemed to be of low significance.

7.6.3.4 Comments/Concerns

No concerns have been expressed regarding the sustainability of forestry operations.

7.6.3.5 Proponent's Response

No response is required.

7.6.4 RA Conclusions

The RAs conclude that there will not likely be any significant adverse environmental effects on the sustainable use of renewable resources.

7.7 Cumulative Effects

7.7.1 Attawapiskat

Potential cumulative effects involving socio-economic effects to Attawapiskat VECs are categorized as follows:

- Effect on traditional pursuits including continued and possibly accentuated cultural change; and,
- Change in community physical and social infrastructure.

7.7.1.1 Effects

Meaningful cumulative effects to traditional pursuits and to cultural and heritage resources due to other mineral projects are not anticipated, as there are no other projects in the area that are known to be economically viable.

With regard to the potential for more generalized cumulative effects involving cultural change and evolution, such changes are part of an ongoing process that is influenced by a number of factors including media, travel, and education. There is a general desire in the community to take advantage of the positive effects of the project such as training and employment. Training and employment will require proficiency in English potentially contributing to a decrease in Cree use.

The physical and social infrastructure will see no negative cumulative effect unless there is a dramatic net in-migration of AttFN members to the community. In-migration would place a cumulative effect on already stressed housing and social infrastructure. Based on experience with other mines such as Musselwhite, this consequence is deemed to be unlikely. With regard to the social infrastructure, the project will assist in increasing educational attainment and potentially create a reduced use of health and welfare services because of employment and the provision of health services at the Victor site.

Further details on cumulative effects are provided in Table 7-2.

7.7.1.2 Mitigation

The Proponent will offer cross-cultural training of all employees and provide a workplace environment that accommodates traditional pursuits.

7.7.1.3 Significance

Since there are no anticipated additional mines or development in the area, the project will have no cumulative effects of significance on the AttFN.

TABLE 7-2
CUMULATIVE EFFECTS ASSESSMENT - SOCIO-ECONOMIC ENVIRONMENT

Regional VECs	Spatial Boundaries	Temporal Boundaries	Other Actions or Potential Actions of Interest	Mitgation Required	Potential Cumulative Impact
Attawapiskat					
Traditional pursuits	PSA - community of Attawapiskat and associated traditional lands	Construction, operation and closure	Other mineral exploration in the region (no other projects currently economic)	No	Project development will disturb wildlife and wildlife habitat; restrictions on firearm discharge for safety reasons **Effect not Significant** (no other defined projects)
Health	PSA - community of Attawapiskat and associated traditional lands	Construction, operation and closure	Country foods at background level for contaminants	No - adverse contaminant releases that could potentially affect country foods lack one or more of - source strength, pathway, or receptor	Adverse health effects linked to biophysical aspects not anticipated **Effect not Significant**
Cultural and heritage sites	PSA - community of Attawapiskat and associated traditional lands	Construction	Other mineral exploration in the region (no other projects currently economic)	No	Project development not expected to adversely affect cultural and heritage sites **Effect not Significant**
Physical infrastructure	PSA - minor Attawapiskat area facilities (training centres, Proponent office, possible barge landing area to support construction phase)	Construction, operation and closure	Community solid waste disposal at local lanfill	Yes - any waste materials associated with the barge landing facility (if constructed) to be removed off site	Proponent will remove wastes associated with its activities at barge landing facility for off-site disposal. **Effect not Significant**
Other James Bay Coastal Cree Communities					
Traditional pursuits	PSA - communities of Moosonee, Moose Factory, Fort Albany and Kashechewan and traditional lands bordering James Bay winter road	Construction, operation and closure	Existing ONR and 115 kV transmission line; existing coastal winter road; limited commercial forestry operations in Otter Rapids area	No - Project-related adverse effects from new transmission line expected to be of short duration (construction period) and not likely to meaningfully affect hunting and trapping in the area	Project development has limited potential to disturb wildlife beyond that already associated with existing railway and winter road use **Effect not Significant**
Health	PSA - communities of Moosonee, Moose Factory, Fort Albany and Kashechewan	Construction, operation and closure	Country foods at background level for contaminants	No - adverse contaminant releases that could potentially affect country foods lack one or more of - source strength, pathway, or receptor	Adverse health effects linked to biophysical aspects not anticipated **Effect not Significant**
Cultural and heritage sites	PSA - new transmission line route	Construction	Existing ONR and 115 kV transmission line; existing coastal winter road; limited commercial forestry operations in Otter Rapids area	No - line would be constructed in winter, negligible potential for ground disturbance	Project development not expected to adversely affect cultural and heritage sites **Effect not Significant**
Physical infrastructure	PSA - James Bay winter road and coastal barge operations	Construction, operation and closure	Regular use of west James Bay winter road; possibly some limited use of coastal barge during construction phase	Yes - improve quality and safety of winter road operations - as per current Project plans	Construction and operation of the VDP will place increased demands on the James Bay winter road, and possibly the coastal barge operations - increased demands to be offset by infrastructure improvements **Effect not Significant**

na - not applicable; PSA - Project Study Area; RSA - Regional Study Area

7.7.2 Other James Bay Affected Cree Communities

Potential cumulative effects involving socio-economic impacts to the other James Bay affected Cree communities include:

- Continued and possibly accentuated cultural change;
- Possible adverse effects to wildlife (mainly caribou and moose) associated with winter road use; and,
- Capacity considerations involving use of the west James Bay winter road and coastal barge services.

7.7.2.1 Effects

Aspects of cumulative environmental effects relating to cultural change are the same as those described above in connection with Attawapiskat, but the level of project-related effect to these communities would be smaller.

Increased use of the west James Bay winter road in connection with the VDP is not expected to result in any meaningful increase in wildlife disturbance beyond that which already occurs with existing road use. Victor traffic is expected to be limited mainly to 4 to 6 convoys of 5 to 6 trucks per day during the project construction phase, each way; and to about 2 convoys of 4 to 5 trucks per day during operations.

7.7.2.2 Mitigation

To minimize interference with other users, and to provide for safety, De Beers will contribute to upgrading the quality of the west James Bay winter road. Project-related truck traffic will also move mainly in convoys, as stated above, to limit interference with other users and also to reduce the risk of possible accidents. By taking these actions, the potential for adverse cumulative impacts to regional transportation capacity can be effectively eliminated.

7.7.2.3 Significance

While there may be other industrial developments such as forestry in the other James Bay Affected Cree Communities, there will not be a cumulative effect of significant consequence caused by the project.

7.7.3 RA Conclusions

The RAs conclude that there will not likely be any significant adverse cumulative environmental effects.

TABLE 7-1
SIGNIFICANCE DETERMINATIONS OF RESIDUAL EFFECTS AFTER MITIGATION - SOCIO-ECONOMIC EFFECTS

Feature	Potential Impact	Proposed Mitigation	Residual Effects After Mitigation					Overall Significance	Likelihood
			Direction	Geographic Extent	Magnitude	Duration	Frequency		
ATTAWAPISKAT - TRADITIONAL PURSUITS									
Land Use									
Mine and infrastructure development and operation	Direct displacement of wildlife habitat, noise and other disturbance, and general restriction on firearm discharge near working areas to protect worker safety, resulting in reduced access to wildlife and possibly fisheries resources in project development areas	Financial consideration and compensation for temporary (life-of-mine) interference with hunting and trapping activities in project development areas	Negative	Victor site buffer zone, and along south and west winter road corridors (<10% of PSA)	Compensation for effect to be provided by the Proponent	Life of project	Continuous	Compensation will be provided to the AttFN for the temporary loss of hunting and trapping opportunities in project development areas	Will occur
				Level I	**Level I**	**Level II**	**Level III**	**Not Significant**	
Traditional Values and Skills									
Project employment	Opportunity for personal choice with regard to combining traditional pursuits with participation in the wage economy	Rotational work schedules; workplace culture that accomodates traditional pursuits; increased income will provide additional resources to undertake traditional activities	Positive	Attawapiskat and at individual level	Low at community level moderate at the individual level, matter of personal choice	Life of project	Continuous	Increased freedom of choice through provision of good options is considered a positive benefit at the individual level. But see below	Will occur
					Level I	**Level II**	**Level III**	**Not Significant**	
	Cross-cultural experience of Aboriginals, potentially leading to reduced value placed on traditional skills and values	Cross-cultural training, workplace culture that accomodates traditional pursuits, pending actual trends and magnitude of any resultant problems, discussion with the AttFN on possible mitigation measures.	Negative	Attawapiskat and at individual level	Low insofar as the project may contribute to a pre-existing trend; matter of individual choice	Life of project	Continuous	There is some possibility that an overall shift towards the formal economy could undermine traditional activity, especially at the indiviual level through matters of personal choice	May occur
					Level I	**Level II**	**Level III**	**Not Significant**	
ATTAWAPISKAT - ABORIGINAL COMMUNITY (PHYSICAL DISTURBANCE)									
Disturbance									
Various Project activities, including construction and transportation of goods and people	Disturbance mainly as a result of winter noise and truck exhaust emissions	Implementation of best practice and/or industry standard construction and operations procedures	Negative	Truck traffic along winter road, and possibly water activity at barge landing area during construction project phase	Winter road truck traffic to pass about 2 km from community, MOE noise standards expected to be met (options for routing traffic further away)	Life of project	Seasonal or infrequent	Noise modeling shows that MOE noise criteria are predicted to be met at the nearest residences	Will occur
				Level I	**Level I**	**Level II**	**Level II**	**Not Significant**	
ATTAWAPISKAT - HEALTH									
Public Health and Security									
Traffic and workplace accidents	For the individuals involved, the effects range from inconvenience to death	Compliance with legislation, implementation of best practice, public education, roads outside communities, improved road quality	Negative	Truck traffic along winter road, and Victor site	Improved road construction standards and use of convoys for De Beers' traffic will off-set the potential for increased accidents; strict safety enforcement at Victor site	Life of project	Seasonal for winter roads; continuous at Victor site	Safety designs and operating procedures will be put in place to reduce the potential for winter road and workplace accidents	Likely to occur
				Level I	**Level I**	**Level II**	**Level III**	**Not Significant**	

Feature	Potential Impact	Proposed Mitigation	Residual Effects After Mitigation					Overall Significance	Likelihood
			Direction	Geographic Extent	Magnitude	Duration	Frequency		
Health Related Project Emissions									
Project activity	Potential contamination of food, water and air	Project design features and footprint to avoid contamination of resources that people use	Negative	Mainly Attawapiskat River corridor and near community	Low to negligible	Life of project	Continuous	There is very limited potential for contamination of resources	Unlikely to occur
				Level I	**Level I**	**Level II**	**Level III**	**Not Significant**	
ATTAWAPISKAT - CULTURAL HERITAGE RESOURCES									
Construction of Project related facilities and infrastructure	Limited potential for disturbance to heritage and archaeological sites	Avoidance of known archaeological sites, protocols for mitigation if new sites are encountered	Negative	Mainly Attawapiskat River corridor and near community	Low to negligible	Life of Project	Infrequent	No harm or loss of cultural heritage resources is expected with mitigation	May occur
				Level I	**Level I**	**Level II**	**Level I**	**Not Significant**	
ATTAWAPISKAT - PHYSICAL INFRASTRUCTURE									
Project requirements for physical infrastructure	Potential for project requirements to exceed capacity of existing infrastructure	Improvements to existing infrastructure (roads and power lines)	Positive	Mainly Attawapiskat River corridor and near community	Moderate	Life of project	Continuous	The potential for negative effect is transformed into a positive effect with payment for services and improvements to existing infrastructure	Will occur
				Level I	**Level II**	**Level II**	**Level III**	**No Significant Adverse Effects**	
OTHER JAMES BAY COASTAL CREE COMMUNITIES - TRADITIONAL PURSUITS									
Power line construction and operation	Direct displacement of wildlife habitat	Discussion with communities to minimize effects	Positive	Displacement <10% of PSA	Groundcover left largely intact	Beyond life of Project	Continuous	The activity will not substantively affect traditional pursuits, affected communities will see benefit through increased reliability of power supply and profitability of FNEI	Will occur
				Level I	**Level I**	**Level III**	**Level III**	**Not Significant**	
Project employment	Opportunity for personal choice with regard to combining traditional pursuits with participation in the wage economy	Rotational work schedules; workplace culture that accommodates traditional pursuits; increased income will provide additional resources to undertake traditional activities	Positive	Attawapiskat and at individual level	Low at community level moderate at the individual level, matter of personal choice	Life of project	Continuous	Increased freedom of choice through provision of good options is considered a positive benefit at the individual level. But see below	Will occur
					Level I	**Level II**	**Level III**	**Not Significant**	
	Cross-cultural experience of Aboriginals, potentially leading to reduced value placed on traditional skills and values	Cross-cultural training, workplace culture that accommodates traditional pursuits, pending actual trends and magnitude of any resultant problems, discussion with the AttFN on possible mitigation measures.	Negative	Attawapiskat and at individual level	Low insofar as the project may contribute to a pre-existing trend; matter of individual choice	Life of project	Continuous	There is some possibility that an overall shift towards the formal economy could undermine traditional activity, especially at the individual level through matters of personal choice	May occur
					Level I	**Level II**	**Level III**	**Not Significant**	

Feature	Potential Impact	Proposed Mitigation	Residual Effects After Mitigation					Overall Significance	Likelihood
			Direction	Geographic Extent	Magnitude	Duration	Frequency		
OTHER JAMES BAY COASTAL CREE COMMUNITIES - HEALTH									
Traffic and workplace accidents	For the individuals involved, the effects range from inconvenience to death	Compliance with legislation, implementation of best practice, public education, roads outside communities, improved road quality	Negative	Other James Bay Coastal Cree Communities and at individual level	It is not expected that there will be an increase in the number of accidents	Life of project	Seasonal for winter roads; continuous at Victor site	It is not expected that there will be an increase in the number of accidents	Likely to occur
					Level I	**Level II**	**Level III**	**Not Significant**	
NAVIGATION									
Barge landing facilities, water intake and discharge structures, temporary winter road bridges, all-season road crossings of Granny Creek, water pipeline crossing of Nayshkootayaow River	Very minor potential to interfere with boat traffic in affected zones	Proper siting of facilities, worksite management during construction, seasonal removal of temporary winter road bridges so as not to obstruct waters in the non-winter period	Positive (barge landing facilities); negative (potential obstructions)	Attawapiskat River, along winter roads, and Victor site area watercourses	All effects considered to be minor	Life of project	Seasonal for winter roads; continuous at Victor site	No meaningful potential to interfere with water navigation	Unlikely to occur
					Level I	**Level II**	**Level III**	**Not Significant**	
RECREATION AND AESTHETICS									
Otoskwin-Attawapiskat River Provincial Waterway Park; guided moose hunting	No concerns have been raised	Undeveloped buffer zone to be preserved along major waterways to preserve river aesthetics, except in minor instances where avoidance is not reasonably practical	Negative	Minor reaches of Attawapiskat and Nayshkootayaow Rivers	All effects considered to be minor	Life of project	Continuous	No meaningful potential to interfere with recreation or aesthetics	Unlikely to occur
				Level I	**Level I**	**Level II**	**Level III**	**Not Significant**	
SUSTAINABLE USE									
Fisheries, hunting and trapping resources	Potential effects to riverine flows and water quality; disturbance of wildlife and wildlife habitat	Riverine flow supplementation and water quality management to protect fisheries resources; limited site footprint and noise control measures to limit effects to wildlife; compensation for adverse effects on traditional pursuits; site restoration at closure	Negative	Mainly river corridors and associated forested margins, and open areas for caribou	All effects considered to be minor	Life of project	Continuous	Effects to be managed through mitigation and adaptive management strategies	Likely to occur
				Level II	**Level I**	**Level II**	**Level III**	**Not Significant**	
Mineral and forestry resources	Mining the Victor kimberlites will remove that specific resource; limited tree clearing associated with new transmission line mainly south of Moosonee	Development of the Victor Diamond Project will encourage the identification of other mineral resources in the area; mitigation for forestry effects not required	Positive (mineral exploration); negative (mineral resource depletion, minor tree clearing)	Limited to Victor site and transmission line corridor mainly south of Moosonee	All effects considered to be minor	Beyond life of project	Continuous	Effects are of low magnitude and geographic extent	Will occur
				Level I	**Level I**	**Level III**	**Level III**	**Not Significant**	

8.0 FOLLOW-UP PROGRAMS

The *Canadian Environmental Assessment Act* (CEAA) defines follow-up as:

> *"a program for verifying the accuracy of the environmental assessment of a project, and determining the effectiveness of any measures taken to mitigate the adverse environmental effects of the project."*

Follow-up programs under CEAA serve 1) to provide information on environmental effects and mitigation resulting from project implementation that can be used to improve or support future EAs including cumulative effects assessments; 2) to aid in the detection of unanticipated environmental effects; and, 3) to support or verify predictions made concerning the likelihood of "no significant environmental effects".

A follow-up program under CEAA is functionally different than a compliance monitoring program, which only verifies the proper implementation of mitigation measures. Compliance monitoring on its own does not satisfy the requirements of a follow-up program. A follow-up program is used to determine the accuracy of EA conclusions and the efficacy of the required mitigation measures.

The RAs have the overall responsibility to ensure that all appropriate mitigation measures are implemented and to arrange for the follow-up program to be carried out as identified in the CSR. To fulfill this obligation, RAs are delegating the implementation of mitigation measures and the conduct of required follow-up to the Proponent as follows:

- Where federal regulatory processes exist for a specific environmental component, the mitigation measures and follow-up requirements will be specified as the terms and conditions by the federal regulatory instruments (e.g., *Fisheries Act* authorization, *Navigable Waters Protection Act* permit, *Explosives Act* permit, etc.); and,

- An environmental agreement between RAs, the Proponent, and other relevant parties, covering both natural and socio-economic elements will complement federal regulatory instruments to ensure the implementation of mitigation measures and conduct of a follow-up program.

The regulatory processes within the Province of Ontario (e.g., the Closure Plan pursuant to the *Mining Act*, Certificates of Approval pursuant to the *Ontario Water Resources Act* and *Environmental Protection Act,* land leases) may also require specific mitigation measures or prescribe specific follow-up program components. The RAs anticipate that the Proponent will work with federal authorities and provincial ministries to co-ordinate mitigation measures and follow-up programs addressed in both the environmental agreement and provincial instruments.

De Beers' Environmental Management System (EMS) will serve as its own method to ensure that commitments to natural environment monitoring and mitigation measures made both within regulatory instruments and agreements will be followed through to completion. The environmental management system for the Victor Diamond Project is based upon, and subject to registration under, the ISO 14001 Standard, which is a voluntary standard requiring that an EMS is developed, maintained and reviewed to ensure continual improvement.

The description of the follow-up programs described here is at a general level of detail regarding each program's context, the roles and responsibilities of the parties involved; the program objectives, reporting mechanisms, methods of measuring effects and the potential need for adaptive management measures. Specific details on each program are included in separate documents, as referenced.

8.1 Air Quality

8.1.1 Context

The Proponent outlined proposed air quality monitoring in the Comprehensive Study Environmental Assessment (CSEA), and committed to additional monitoring through public consultation on the comprehensive study. This was in response to public concern, and air quality modelling results that shows that some air pollutants approach ambient air quality criteria.

Air quality monitoring requirements will likely be included in one or more provincial Certificates of Approval (Air) for emission sources. The terms and conditions of these approvals, including methods, reporting and remedial actions, will be determined by the Ontario Ministry of the Environment and the Ontario Ministry of Labour.

The RAs are including an air quality follow-up program in the Environmental Agreement. This program will initially encompass the entire program as described below. However, this agreement will be flexible and can be amended by the parties formally engaged in the follow-up program review; the agreement may be amended in the future to be consistent with provincial approvals.

8.1.2 Roles and Responsibilities of the Parties Involved

The Proponent is responsible for implementing the follow-up program, reporting the results to the RAs, and implementing adaptive management measures where required.

The RAs' responsibility is to arrange for the review of the results of the follow-up program prescribed in the environmental agreement, with the input of federal and provincial authorities and other outside parties as necessary. Based on this review, the RAs will decide:

- Is the follow-up program meeting its objectives?
- Are the effects as predicted in the CSR?
- Does the follow-up program require amendment to adapt to changes in the project, differences in the observed environmental effects, or new or elevated stakeholder concerns?

- Is the Proponent required to implement additional adaptive management measures to achieve acceptable effects?

The Ontario Ministry of the Environment's (MOE) responsibilities will be prescribed in any Certificates of Approval and their enabling legislation. Specific monitoring requirements from the MOE will be dependent on modelled results and the potential for impacts at the property boundary.

8.1.3 Objectives

- Monitor the ability of site processes and equipment to produce emissions that are consistent with predictions in the CSR, and in compliance with all applicable regulations and standards;

- Determine the changes to air quality and noise that result from the project, and provide data that that can be used, if required, to account for any unanticipated effects on vegetation, wildlife, or socio-economic conditions noted in their respective follow-up programs;

8.1.4 Reporting Mechanisms

Results reported under the environmental agreement will be provided to the parties to that agreement in summary form on an annual basis during the construction, operation and decommissioning phases of the project. Additional reporting mechanisms may be prescribed in any provincial Certificates of Approval.

8.1.5 Methods for Measuring Effects

For air emissions from significant point sources, such as the incinerator and crushers, the Proponent will directly monitor emissions from each source using approved methods.

Monitoring at the point of release from point sources will occur continuously during operation for criteria air contaminants (e.g., carbon monoxide, sulphur dioxide and oxides of nitrogen, etc). Other air toxics (e.g. dioxins and furans, metals, etc.) may be monitored less frequently, although all applicable parameters will be monitored at facility commissioning to establish and confirm emissions. Results will be compared to the values used in the CSR, to any guidelines, standards and codes of practices related to the equipment being tested, and to any regulatory criteria.

For fugitive dust from roads, stockpiles, and from the open pit, the Proponent will assess effectiveness of planned dust control measures both visually and using dustfall jars. Dustfall samples will be collected monthly during construction, operation and decommissioning. Results, reported as total dustfall mass per unit area, will be compared with predictions in the CSR, and to any regulatory criteria.

The Proponent will confirm the effects to air quality from all sources through high-volume samples of ambient air at locations within the project study area, but outside the claim boundary. Sampling will occur periodically during the project lifespan, but may include sampling one day out of every six using standard protocols, with sampling conducted at sites both upwind and downwind of the claim boundary. Results from this testing will be compared to the appropriate federal and provincial ambient air criteria and to the prediction in the CSR.

8.1.6 Adaptive Management Measures

Additional mitigation measures include preventing air pollution (e.g., directing materials from incinerators to landfill, increased watering to suppress dust) and additional source controls (e.g., bag houses, filters). The Proponent will be responsible for determining the methods appropriate to achieve environmental effects consistent with the predictions in the CSR.

8.2 Greenhouse Gas Emissions

8.2.1 Context

De Beers has made a commitment to monitor and report greenhouse gas emissions directly associated with the project.

8.2.2 Objective

Compare GHG emissions from project activities with predictions in the CSR, and with mining industry profile.

8.2.3 Reporting Mechanisms

Results reported under the environmental agreement will be provided to the parties to that agreement in summary form on an annual basis during the construction, operation and decommissioning phases of the project.

8.2.4 Methods for Measuring Effects

The Proponent will tally fuel consumption and calculate the corresponding GHG emissions. The Proponent has also committed to measure changes in carbon exchange within the peatland that may result from project-induced changes in wetland moisture.

8.2.5 Adaptive Management Measures

Adaptive management will be considered with respect to changes in peatland moisture, within the context of the wetland follow-up program (Section 8.4).

8.3 Groundwater, Surface Water, Fish and Fish Habitat

8.3.1 Context

A follow-up program has been recognized as necessary to confirm the effects of the project on a number of aquatic Valued Ecosystem Components. In particular, the CSR recognizes that changes to surface water quantity and the effects of changes in water quality on fish have the potential to be different than predicted in the CSR. The Proponent and the RAs have further recognized the need to verify that all mitigation measures to protect fish and fish habitat are effective, and for the Proponent to be able to take actions based on follow-up results to allow conclusions and commitments in the CSR to be respected throughout the life of the project.

Water quality and quantity monitoring will be included in *Fisheries Act* authorizations specific to the project. As part of these authorizations, the Proponent will be required to develop Adaptive Management Strategies (AMS) for fisheries and fish habitat. The details of these programs will be developed in consultation with federal and provincial governments and the Attawapiskat FN.

Effluent and water quality monitoring requirements will be included in one or more provincial Certificates of Approval under the *Ontario Water Resources Act (OWRA)*. The terms and conditions of these approvals, including methods, reporting and remedial actions, will be determined by the Ontario Ministry of the Environment with due consideration to other provincial and federal approvals/authorizations. Water takings and water quantity issues will be monitored as outlined in the Permits to Take Water under Section 34 of the OWRA. The terms and conditions of these approvals, including methods, reporting and remedial actions, will be determined by the Ontario Ministry of the Environment with due consideration to other provincial and federal approvals/authorizations.

The RAs will include the effluent, water quality and water quantity follow-up program in the environmental agreement. The scope of the program will initially encompass the entire program as described below. However, this agreement will be flexible and can be amended by the parties formally engaged in the follow-up program review; the agreement may be amended in the future to be consistent with federal and provincial instruments.

8.3.2 Roles and Responsibilities of the Parties Involved

The Proponent is responsible for implementing the follow-up program, reporting the results to the RAs, and implementing adaptive management measures where required.

The RAs' responsibility is to arrange for the review of the results of the follow-up program prescribed in the environmental agreement, with the input of federal and provincial authorities as required. Based on this review, the RAs will decide:

- Is the follow-up program meeting its objectives?
- Are the effects as predicted in the CSR?

- Does the follow-up program require amendment to adapt to changes in the project, differences in the observed environmental effects, or new or elevated stakeholder concerns?

- Is the Proponent required to implement additional adaptive management measures to achieve acceptable effects?

Responsibilities specific to DFO will be contained within its *Fisheries Act* authorizations. The Province of Ontario's responsibilities will be prescribed in any Certificates of Approval and their enabling legislation.

It is anticipated that the Attawapiskat FN may wish to participate in the follow-up program for effects on fish and fish habitat. The Attawapiskat FN community has traditional ecological knowledge that could assist in the refinement of the monitoring program, the collection of information and the interpretation of any observed changes in the environment. As this knowledge is owned by the Aboriginal peoples, the holders of this knowledge must give their informed consent before this information is requested and used. It is the responsibility of the Proponent for the follow-up program to engage the FN in a manner the FN finds appropriate to share in this knowledge, and to incorporate this knowledge in the follow-up program in a transparent manner.

8.3.3 Objectives

- Monitor the ability of the water treatment facilities/equipment to produce an effluent which meets the requirements of both federal and provincial environmental laws, and to monitor the quality of water available for use;

- Determine/confirm the effects of the discharge and runoff on the Attawapiskat River, the Nayshkootayaow River and the North and South Granny Creeks, and assess whether additional mitigation measures are necessary;

- Determine/confirm the effects of site discharge and runoff on downstream aquatic life, and assess whether additional mitigation measures are necessary (adaptive management);

- Generate data necessary to confirm and update the surface water hydrology model as required, as a means of periodically refining effects analysis, and to guide responsive mitigation strategies;

- Generate data necessary to confirm and update the groundwater model as required, as a means of periodically refining effects analysis for surface water flows, and to guide adaptive management strategies;

- Assess the success of fish habitat mitigation and compensation measures and determine if additional measures are necessary, including the success of the South

Granny Creek diversion and the effects of pit dewatering activities on the flow regime of the Nayshkootayaow River, and other watercourses as required; and,

- Provide additional data as required, to support the implementation of fish habitat compensation measures.

8.3.4 Reporting Mechanisms

Results reported under the environmental agreement will be provided to the parties to that agreement in summary form on an annual basis during the construction, operation and decommissioning phases of the project.

Additional reporting mechanisms will be prescribed in any Certificates of Approval and *Fisheries Act* authorizations.

8.3.5 Methods for Measuring Effects

The Proponent will be required to carry out monitoring as per the following:

i) Collect and analyze samples, and measure rates of flow, from all site discharges, including:

   a. dewatering wells and pit sumps discharged to the Nayshkootayaow River;
   b. dewatering wells and pit sumps discharged to the Attawapiskat River;
   c. PKC facility cells and from the polishing pond prior to release to North Granny Creek;
   d. north quarry water discharged to North Granny Creek;
   e. south seepage collection point of the PKC facility to South Granny Creek;
   f. central quarry to South Granny Creek;
   g. sewage effluent discharged to either the surrounding muskeg (construction phase) or to the PKC facility (operation phase); and,
   h. stockpile perimeter and general site drainage ditches, in accordance with a stormwater management program.

ii) For each of the above, monitor the quality of waters upstream and downstream of discharges at established monitoring locations in receiving watercourses (i.e., the Attawapiskat River, the Nayshkootayaow River, and the North and South Granny Creek).

iii) Monitor the quantity and quality of surface water extracted from the Attawapiskat River for discharge as flow supplementation to the Nayshkootayaow and other rivers.

iv) Monitor water levels in all monitoring wells, including the 19 new monitoring wells during the winter of 2005 in the near field and far field sites around the Victor site, and report on short-term airlift test from varying stratigraphic levels from 13 of the above monitoring wells during the winter of 2005.

v) Continuously monitor flows in the four sites in the Nayshkootayaow River and one site for each of Tributaries 5 and 7, North Granny Creek, South Granny Creek, the North Tributary of the Attawapiskat River and the Lawashi River North Channel to determine the impacts due to dewatering and the need for flow supplementation.

vi) Development of broader regional estimates of low flow and flood flows for the watercourses in the project area to substantiate the validity of the baseline estimates of extreme flow conditions.

vii) Carry out an environmental effects monitoring (EEM) program in accordance with Environment Canada's *Metal Mining Guidance Document for Aquatic Environmental Effects Monitoring* to assess the character and quality of aquatic resources at the following locations:

   a) Attawapiskat River upstream and downstream of the primary discharge outfall;
   b) North Granny Creek upstream and downstream of the PKC polishing pond release;
   c) Nayshkootayaow River upstream of the flow supplementation discharge and downstream of the phase 1 mining water discharge; and,
   d) South Granny Creek upstream and downstream of the general site area.

viii) Carry out fish habitat assessments, including spawning surveys and benthos investigations for:

   a) North River;
   b) North Granny Creek;
   c) South Granny Creek;
   d) Nayshkootayaow River;
   e) Tributaries 5 and 7; and,
   f) Lawashi River.

ix) Assess changes to fish populations in the Nayshkootayaow River.

x) Monitor contaminants of potential concern in fish tissues harvested by the AttFN. A contaminant of potential concern (COPC) is a contaminant which could be released due to project activities and which has a feasible pathway into country food consumed by the local human population. COPCs are a concern from the viewpoint of human health. For fish tissues, monitoring of methyl mercury will be required, especially for those species of fish harvested where the Granny Creek system flows into the Nayshkootayaow River. In addition, for future monitoring studies, it must be determined if lead, cadmium, mercury, and dioxins/furans from the on-site incinerator are COPCs in regard to fish, based on the feasibility of pathways into fish tissues.

xi) As a component of the site's stormwater management plan, periodic analysis of the snow pack for pH and metals during winter periods will determine the effects of dustfall in the snow pack during spring melt.

8.3.6 Adaptive Management Measures

The Proponent has committed to implement mitigation measures to ensure compliance with the pollution prevention provisions of the federal *Fisheries Act*. If the monitoring program indicates that any substance deposited may be a deleterious substance within the meaning of the federal *Fisheries Act*, the Proponent will assess the cause(s) of the deposit and will propose and implement all reasonable measures to prevent the deposit or to counteract, mitigate or remedy the adverse effects of any such deposit (e.g., by reducing effluent concentrations at the point of discharge). Monitoring results will normally be reported as described in the Reporting Mechanisms above (i.e., annual reporting to the RAs and other parties to the environmental agreement, and any other reporting required under federal or provincial regulatory approvals). However, if urgent conditions exist (i.e., conditions that may require immediate action), such as were there is evidence of negative impact on fish, fish habitat or human use of fish (e.g., fish kills, adverse effects on fishing), the Proponent will report such urgent conditions directly and immediately to Environment Canada, and to other appropriate regulatory authorities.

Adaptive management measures related to fish habitat are included in the appropriate AMS documents (Granny Creek Adaptive Management Strategy, Nayshkootayaow River Adaptive Management Strategy, North River Adaptive Management Strategy, Lawashi River Adaptive Management Strategy) to maintain compliance with the *Fisheries Act*. These adaptive management systems include criteria to define when the Proponent will mitigate any significant changes to water quantity in surface waters. If planned mitigation measures prove ineffective, the Proponent will consider either changes to site operations or additional improved mitigation measures.

8.4 Wetlands and Wildlife

8.4.1 Context

The follow-up program for wetland and terrestrial resources includes monitoring and adaptive management programs for direct changes in the environment and the effects of these changes, as well as other mine site effects, on specific VECs, including wetland vegetation (Section 8.4.7) and wildlife (Sections 8.4.8 through 8.4.10).

The RAs will include monitoring of these elements as part of the follow-up defined in an environmental agreement. This program will initially encompass the entire program as outlined below, and as described in the Proponent's Wetland Monitoring Program (Draft, January 2005) and VDP Caribou Survey Methodology (March 30, 2005). Both documents are subject to changes by the federal and provincial authorities, and through involvement of the First Nations. The environmental agreement will be flexible and can be amended by the parties formally engaged in the follow-up program based on future results from the program.

8.4.2 Objectives

The objectives of the wetland and terrestrial resources monitoring programs are to confirm the effects on these resources from the project and to ensure that the development is consistent with the predictions presented in the CSR and supports the proposed closure strategy. This includes the effects of:

- Changes associated with altering wetland water levels and drainage patterns associated with mine dewatering;
- Noise and visual disturbances from the mine site and from low-flying helicopters and fixed wing aircraft;
- Winter road interference with wildlife movement;
- Loss of habitat resulting from the footprint of the mine, associated structures, and disturbances associated with obtaining building materials (e.g., eskers); and,
- Increased access for hunters to areas that they might otherwise not have reached, or known about.

This requires continuation of baseline studies to record any changes in wildlife distributions and use of the general project area to determine whether the project's activities are having an effect on local wildlife, especially caribou, moose and furbearers.

8.4.3 Roles and Responsibilities of the Parties Involved

The Proponent is responsible for implementing the follow-up program, reporting the results to the parties to the environmental agreement, and implementing adaptive management measures where required.

The RAs' responsibility is to arrange for the review of the results of the follow-up program prescribed in the environmental agreement, with the input of federal and provincial authorities as required. Based on this review, the RAs will decide:

- Is the follow-up program meeting its objectives?
- Are the effects as predicted in the CSR?
- Does the follow-up program require amendment to adapt to changes in the project, differences in the observed environmental effects, or new or elevated stakeholder concerns?
- Is the Proponent required to implement additional adaptive management measures to achieve acceptable effects?

It is anticipated that the Attawapiskat First Nation may wish to participate in the follow-up program for effects to wildlife. The Attawapiskat First Nation community has traditional ecological knowledge that could likely assist in the refinement of the monitoring program, the collection of information, and the interpretation of any observed changes in the environment. As this knowledge is owned by the Aboriginal peoples, it will only be used with their informed consent. It is the responsibility of the Proponent to engage the First Nation in a manner the First Nation finds appropriate to share in this knowledge, and to incorporate this knowledge in the follow-up program.

8.4.4 Reporting Mechanisms

Results reported under the environmental agreement will be provided to the parties to that agreement in summary form on an annual basis during the construction, operation and decommissioning phases of the project.

8.4.5 Wetland Water Levels

8.4.5.1 Methods for Measuring Effects

The monitoring currently proposed includes the following:

i. The quantity of groundwater extracted will be monitored from quarry operations, dewatering wells and from the pit sumps.

ii. Bedrock and overburden groundwater elevations (including within the muskeg) will be monitored at and around the Victor site to document the effects of quarry operations, dewatering wells and from the pit sumps.

iii. Results reported on a short-term air-lift test from varying stratigraphic levels from monitoring wells during the winter of 2005; and,

iv. A prototype well pump test will be conducted in the summer of 2006 and the response of groundwater monitoring wells to the prototype well pump test will be monitored.

8.4.5.2 Adaptive Management

If the groundwater withdrawal has effects on wetland hydrology that are significantly different than predicted in the CSR, then the groundwater model will be updated to refine the effects analysis. The necessity for, and type of, adaptive response strategy will be determined in consideration of this refined analysis and the results of follow-up programs related to wetland functions.

8.4.6 Noise

8.4.6.1 Methods for Measuring Effects

Manned noise surveys will be conducted by the Proponent on two occasions in a given year, reflecting winter and summer vegetative conditions, at several locations in the vicinity of the mine, to assess noise-related effects during the construction phase, at the start of operations, and at any point during operations and decommissioning where noise levels are expected to change significantly from start-up conditions. Noise will be compared to the predictions in the CSR.

The Proponent will also monitor noise from winter road traffic. During the construction phase, noise monitoring will be carried out on one occasion at both treed and open terrain locations next to the winter road that are free of other noise sources. A log will be maintained for project-related traffic (aircraft and winter road) arriving/departing the Victor site to estimate noise from continuing operations.

8.4.6.2 Adaptive Management

If the levels or extent of noise are greater than predicted in the CSR, the noise source and attenuation models used in the CSR will be updated. The necessity for, and type of, adaptive response strategy to address noise will be determined in consideration of the results of this updated modelling, and from the follow-up programs related to wetland functions.

8.4.7 Vegetation

8.4.7.1 Methods for Measuring Effects

Detailed methods are described in the Wetland Monitoring Program (reference). In summary, this program includes the following:

i. Continuation of the ongoing site monitoring, which commenced with the pre-development phase of the project, will ensure that site development occurs in accordance with the project design and is consistent with the EA concepts and closure strategy.

ii. Disturbed areas will be mapped and tabulated on an annual basis.

iii. Monitoring stations will be located in each of the principal wetland types, with stations radiating outward from the project site. These stations will include both sites potentially impacted by lower groundwater and control stations. In addition, monitoring stations will be established for bioherm zones, some of which may be combined with the monitoring stations noted above.

8.4.7.2 Adaptive Management

Revegetation is a critical aspect of mine closure and the Proponent has been working with Laurentian University since 2003 on revegetation strategies for the site, and the potential to utilize native plant species. This research work will continue through the mine life, with full-scale revegetation efforts implemented as part of progressive reclamation activities as described in the Mine Closure Plan.

8.4.8 Caribou and Moose

8.4.8.1 Methods for Measuring Effects

Detailed methods are described in the VDP Caribou Survey Methodology (March 30, 2005). In summary, this program includes the following:

At the landscape and regional scales:

- Aerial surveys in early and late winter to count caribou, moose and wolf, and to assess levels of human activity;

- Focused aerial survey with VHF radio beacons and helicopter will be used to locate each radio-collared animals and determine the group size of its herd;

- Hunter survey information will be solicited from the First Nations that use the area; and, if feasible; and,

- DNA analysis of tissue and faeces will be used to examine the characteristics of individuals as part of the Ontario population (potential collaborative activity between AMEC Earth & Environmental, Dr. Paul Wilson, DNA lab, Trent University, and the Ministry of Natural Resources).

At the site and landscape scales:

- Females will be monitored using radio-telemetry throughout the year to determine their annual and seasonal home ranges, habitat preferences, movement rates and calving areas;

- Habitat analysis using Geographical Information Systems will be used to identify preferred habitats based on interpreted Landsat imagery and location data;

- Climatic data will be collected throughout the year to provide an indication of potential co-factors that may affect the movement of caribou; and,

- Noise studies will be reviewed to determine if there is a correlation between noise and caribou movements.

Contaminants of potential concern in tissues of ungulates harvested by AttFN will be monitored.

8.4.8.2 Adaptive Management

Mitigation methods will be developed in consultation with agency staff and First Nation representatives as necessary. Mitigation will take the form of adaptive management, whereby data analysis of potential stressors and observed caribou behaviour will be used to determine whether or not corrective actions are required to lessen impacts.

8.4.9 Birds

8.4.9.1 Methods for Measuring Effects

Detailed methods are described in the Wetland Monitoring Program (Draft, January 2005). In summary, this program includes the following:

- The pre-development breeding bird survey carried out by the Proponent in 2004 will be followed by surveys at least every five years, commencing in 2007, and continuing until at least 10 years after production ceases at the far-field plots and at the Victor site. Surveys will be conducted of plots of representative habitat at a far-field (control) site, as well as at the Victor site (including the proposed sand and gravel pit at the esker). Birds will be identified visually and by sound using standard point count, or similar methods, agreed to by federal and provincial authorities. It is anticipated that breeding bird surveys will be conducted using 10-minute point counts, broken down into 5-minute segments to provide a more complete inventory of the birds that are present and allow for comparison with data that was collected pre-development. Surveys will be conducted by either skilled birder or by using tape recorders for future analysis.

- To assess how far any effects radiate from the site, stations will be established at near-field, mid-field, and far-field distances to assess these thresholds, with greater emphasis placed on sites farther from the site. Post-development bird survey stations will be located in the same place as the pre-development survey stations to allow for fair assessment of development effects.

- Contaminants of potential concern in tissues in waterfowl harvested by AttFN will be monitored.

8.4.9.2 Adaptive Management

Mitigation methods will be developed in consultation with agency staff and First Nation representatives as necessary. Mitigation will take the form of adaptive management, whereby data analysis of potential stressors and bird surveys will be used to determine whether or not corrective actions are required to lessen impacts.

8.4.10 Other Wildlife

8.4.10.1 Methods for Measuring Effects

This program includes the following:

- Furbearer and smaller mammal tracking studies will be initiated in 2005 (pre-construction), the first year of operation, and every three years thereafter until mine production ceases. Surveys will also be conducted the first winter after active reclamation ceases, and after production ceases. Tracking studies will encompass Victor site near-field habitats (within 3 km of the Victor site), and far-field control sites in comparable habitats located remote from the Victor site. The data will be used to assess the effects of project-related disturbances on furbearer and other smaller mammals' activity patterns.

- Monitoring of other wetland wildlife populations and community structures will be collected to meet wetland monitoring program objectives.

- Contaminants of potential concern in tissues of small mammals harvested by AttFN will be monitored.

8.4.10.2 Adaptive Management

Mitigation methods will be developed in consultation with agency staff and First Nation representatives as necessary. Mitigation will take the form of adaptive management, whereby data analysis of potential stressors and results from tracking studies will be used to determine whether or not corrective actions are required to mitigate impacts.

8.5 Accidents and Malfunctions

8.5.1 Context

Project-related accidents and malfunctions have been of significant public concern, particularly where spills from the handling of fuel could impact environmentally sensitive areas. While the Proponent has committed to a number of measures to reduce the risk of spills, there remains a possibility that spills may occur during the project lifespan.

The RAs will include measures to test the effectiveness of the spill response plan as a follow-up program in the environmental agreement. Further, as the project proceeds, new information may be available regarding the nature and likelihood of accidents and malfunctions, and may necessitate revision to the environmental emergency plans. This follow-up program will encompass the entire program as outlined below. This agreement will be flexible and can be amended by the parties formally engaged in the follow-up program review based on future results from the program.

8.5.2 Objectives

- To determine if the frequency and nature of possible accidents and malfunctions are consistent with those considered in the CSR.
- To determine if the responses to any accidents or malfunctions described by the Proponent were sufficient to avoid or otherwise minimize any significant residual effects.

8.5.3 Roles and Responsibilities of the Parties Involved

The Proponent is responsible for reporting all spills to the Ministry of the Environment forthwith, and for implementing the follow-up program, reporting the results to the RAs, and implementing adaptive management measures where required.

The RAs' responsibility is to arrange for the review of the results of the follow-up program prescribed in the environmental agreement, with the participation of federal and provincial authorities as required. Based on this review, the RAs will decide:

- Is the follow-up program meeting its objectives?
- Can the mitigation measures be as effective as predicted in the CSR?
- Does the follow-up program require amendment to adapt to changes in the project, differences in the observed environmental effects, or new or elevated stakeholder concerns?
- Is the Proponent required to refine its environmental emergency plan to achieve acceptable effects?

8.5.4 Reporting Mechanisms

Results reported under the environmental agreement will be provided to the parties to that agreement in summary form on an annual basis during the construction, operation and decommissioning phases of the project.

Additional reporting requirements for accidents and malfunctions are prescribed under various federal and provincial acts and regulations. Any reporting of accidents and malfunctions under this agreement does not change or substitute for any regulatory obligations.

8.5.5 Methods for Measuring Effects

De Beers has an environmental management system (EMS) in place. The EMS will audit compliance with regulatory requirements, and ensure that spills are reported and cleaned up. An environmental response plan will be developed before the start of construction that places priority first on prevention of spills. De Beers will demonstrate preparedness by itself and its contractors by identifying potential risks to sensitive resource environments, developing contingency plans that outline how to deal with emergencies and training personnel to apply these plans. A key component of this will be the Proponent's commitment to strengthen the effectiveness of the environmental emergency plans and ensuring continuous improvement through formal exercises of their effectiveness.

8.5.6 Adaptive Management

The EMS will stress a commitment to continuous improvement responding to any spills, such that the likelihood of any future spills is reduced, based on the lessons learned from any incidents and from exercises of the spill response plans.

8.6 Traditional Pursuits, Values and Skills

8.6.1 Context

A follow-up program has been prescribed to identify and monitor the biophysical effects of the project on traditional pursuits, values, and skills. The Proponent has committed to monitoring the impact of the project on the levels of traditional use of land, including those associated with the Victor site and its service facilities (winter roads and transmission line). The local First Nations have requested that this program include the consideration of TEK aspects.

8.6.2 Roles and Responsibilities of the Parties Involved

The Proponent is responsible for implementing the follow-up program, reporting the results to the RAs, and implementing adaptive management measures where required.

The RAs' responsibility is to arrange for the review of the results of the follow-up program prescribed in the environmental agreement, with the input of federal and provincial authorities as required. Based on this review, the RAs will decide:

- Is the follow-up program meeting its objectives?
- Are the effects as predicted in the CSR?
- Does the follow-up program require amendment to adapt to changes in the project, differences in the observed environmental effects, or new or elevated stakeholder concerns?
- Is the Proponent required to implement additional adaptive management measures to achieve acceptable effects?

It is anticipated that the First Nations will identify and administer any needed compensation agreements for their impacted membership as well as participating in the follow-up program as described below in the methods section, and in the review of the program results. It is the responsibility of the Proponent to engage the First Nations in an appropriate manner.

8.6.3 Objectives

The objective of the traditional pursuits follow-up program is to monitor the effects of the proposed project on the traditional pursuits of local First Nation community members within areas potentially affected by project development, as well as to document the effects of employment at the Victor mine site on employees' traditional activities, and to ensure that information is generated and opportunities identified to facilitate the retention of traditional pursuits, knowledge and skills. These objectives will be carried-out within the context of the environmental agreement.

8.6.4 Reporting Mechanisms

Results reported under the environmental agreement will be provided to the parties to that agreement in summary form on an annual basis during the construction, operation and decommissioning phases of the project, as appropriate, taking into consideration the frequency of monitoring elements described within Section 8.6.5.

8.6.5 Methods for Measuring Effects

The Proponent will be required to carryout monitoring as per the following:

i. Report on the delivery of financial compensation programs for life-of-mine interference with traditional land use in project-impacted areas, pursuant to the agreement of AttFN.

ii. Conduct a review of fishing, hunting, and trapping activities - activities by both traditional users and any others within the Nayshkootayaow River basin and along the Attawapiskat River corridor, provisionally at three-year intervals starting in 2006 (subject to details of the environmental agreement), including aspects of TEK.

iii. Conduct a review of hunting and trapping activities along the coastal winter road and transmission line route within the territories of the Attawapiskat, Kashechewan, Fort Albany, Moose Cree and Taykwa Tagamou First Nations, as well as MoCreebec, with reviews to involve a representative cross-section of traditional harvesters from each community, and with reviews provisionally conducted at three-year intervals starting in 2007 (subject to details of the environmental agreement), and including aspects of TEK.

iv. Conduct a review of the activities of VDP employees (representative cross-section) from local First Nation communities to determine the effects of employment on their traditional activities, including aspects of TEK.

v. Confirm any likely changes in the availability of fisheries and wildlife resources to local harvesters, based on data derived from biological monitoring programs.

vi. Report on all information that is generated and opportunities provided to facilitate the retention of traditional pursuits, knowledge and skills.

8.6.6 Adaptive Management Measures

Adaptive management measures will be developed by the Proponent in consultation with the RAs and in accordance with provisions in the environmental agreement, to respond to legitimate concerns arising out of the monitoring of traditional use patterns related to project development and activities.

8.7 Aboriginal Community - Physical Disturbance

The construction and use of winter roads and the barge handling facility (if required) have the potential to effect noise levels within the local First Nation communities. The Proponent has committed to monitoring noise levels associated with its use of the winter road, as described in Section 8.4.6. Data from this monitoring program will be used to determine the effects of truck traffic on local community noise profiles. Noise monitoring protocols associated with barge use are not proposed.

8.8 Health

8.8.1 Context

A follow-up program has been prescribed to identify and monitor the effects of the project on the health of local residents. This program includes consideration of vehicular accidents along the winter road, as well as the potential effects of project related emissions on country foods and water supplies. The Proponent has committed, in co-operation with the Services Company and the First Nations to monitoring traffic accidents along winter roads involving its vehicles. The Proponent has also committed, in co-operation with the AttFN, to monitor the levels of potential contaminants in fish and game harvested by the AttFN within areas potentially affected by project related emissions. This includes consideration of heavy metals including mercury and methyl mercury, as well as potential contaminants such as dioxins and furans.

8.8.2 Roles and Responsibilities of the Parties Involved

The Proponent is responsible for implementing the follow-up program, reporting the results to the RAs, and implementing adaptive management measures where required.

The RAs' responsibility is to arrange for the review of the results of the follow-up program prescribed in the environmental agreement, with the input of federal and provincial authorities as required. Based on this review, the RAs will decide:

- Is the follow-up program meeting its objectives?
- Are the effects as predicted in the CSR?

- Does the follow-up program require amendment to adapt to changes in the project, differences in the observed environmental effects, or new or elevated stakeholder concerns?

- Is the Proponent required to implement additional adaptive management measures to achieve acceptable effects?

It is anticipated that the Attawapiskat First Nation and INAC will actively participate in the emission contaminants investigations by providing representative examples of country foods such as fish, caribou, moose and goose flesh samples to the Proponent for analysis. It is the responsibility of the Proponent to engage the AttFN and INAC in an appropriate manner.

8.8.3 Objectives

The objective of the health follow-up program is to monitor the effects of the proposed project on the health of community members to ensure that project related activities are not contributing to an increased health risk to local residents through added vehicular accidents, or through the ingestion of additional contaminants from local country foods and drinking water.

8.8.4 Reporting Mechanisms

Results reported under the environmental agreement will be provided to the parties to that agreement in summary form on an annual basis during the construction, operation and decommissioning phases of the project.

The Proponent must advise the AttFN, the RA's, and INAC if they plan to utilize on-reserve community infrastructure (i.e. roads, landfill, water and sewage systems, housing, etc). This includes any change to project design which results in unforeseen use of community systems, such as the disposal of the contents of the Victor construction camp holding tank in the community sewage system lift station and unexpected results of the project such as in-migration leading to increased housing pressures.

8.8.5 Methods for Measuring Effects

The Proponent will be required to carryout monitoring as per the following:

i. Maintain a record of any accidents on winter roads involving its vehicles, contractors, or staff.

ii. Sample receiving waters for water quality parameters in accordance with the monitoring program defined in Section 8.3

iii. Collect samples of fish flesh for the analysis of COPC as described in Section 8.3.

iv. Obtain representative samples of the flesh from country foods (caribou, moose, geese, and potentially beaver) for the analysis of COPC.

8.8.6 Adaptive Management Mechanisms

Adaptive management measures will be developed by the Proponent in consultation with the RAs and in accordance with provisions in the environmental agreement, to respond to legitimate health related concerns as described herein.

8.9 Heritage Resources

8.9.1 Context

The Proponent has made a commitment to avoid, to the extent practicable, development within close proximity to the major rivers, where cultural heritage resources are most likely to occur. The Proponent has further committed that in the event that any cultural heritage resources are inadvertently encountered during construction, or that additional cultural heritage information becomes available on as yet unknown heritage sites, site-specific mitigation measures will be developed to protect these resources.

8.9.2 Roles and Responsibilities of the Parties Involved

The Proponent is responsible for implementing the follow-up program, reporting the results to the RAs, and implementing adaptive management measures where required.

The RAs' responsibility is to arrange for the review of the results of the follow-up program prescribed in the environmental agreement, with the input of federal and provincial authorities as required. Based on this review, the RAs will decide:

- Is the follow-up program meeting its objectives?
- Are the effects as predicted in the CSR?
- Does the follow-up program require amendment to adapt to changes in the project, differences in the observed environmental effects, or new or elevated stakeholder concerns?
- Is the Proponent required to implement additional adaptive management measures to achieve acceptable effects?

It is anticipated that the First Nations will actively participate in the sharing of information that will help to prevent unintended intrusion or damage to cultural heritage resources. It is the responsibility of the Proponent to engage the First Nations in an appropriate manner to acquire such information, recognizing that TEK studies have already been carried out in connection with the project, one purpose of which was to identify the locations and nature of cultural heritage resources.

8.9.3 Objectives

The objective of the cultural heritage resources follow-up program is to ensure that heritage resources are not inadvertently intruded upon or damaged during project construction or operation phases.

8.9.4 Reporting Mechanisms

Results reported under the environmental agreement will be provided to the parties to that agreement in summary form on an annual basis during the construction and operation phases of the project. This reporting requirement is in addition to any other time of discovery reporting requirements such as to the Ontario Ministry of Culture, the First Nations, and to the Nishnawbe Aski Police Services and the Cemeteries Registrar of the Ministry of Consumer and Commercial Relations in the case of human remains being discovered.

8.9.5 Methods for Measuring Effects

The Proponent will be required to carryout monitoring as per the following:

i. Maintain a record of all cultural heritage resources known to occur in the vicinity of planned developments such that intrusion or damage to such resources can be avoided during project construction, recognizing and respecting confidentiality limitations.

ii. Maintain an active dialogue with local First Nation representatives having knowledge of specific areas prior to and during major construction activities to provide guidance to supervisory staff on the likely or possible occurrence of as yet undocumented cultural heritage sites.

iii. Enlist the services of a trained archaeologist to be present, or on call, during the conduct of major construction works where there is a reasonable potential for encountering as yet undocumented cultural heritage sites.

iv. Enlist the services of Elders or other cultural advisors in the event that human remains are encountered.

v. Conduct a post-construction follow-up on the state of known cultural heritage sites within the vicinity of completed project works to confirm the integrity of such resources.

8.9.6 Adaptive Management Mechanisms

Adaptive management measures will be developed by the Proponent in consultation with the RAs and in accordance with provisions in the environmental agreement, to respond to any deficiencies in methods and procedures for protecting cultural heritage resources.

8.10 Physical Infrastructure

8.10.1 Context

A follow-up program has been determined as necessary to identify and monitor the effects of the project on community infrastructure. While the Proponent has stated that the project will only make use of use physical infrastructure that is operating under capacity, recently reported impacts to infrastructure stemming from changes to project design confirm the need for ongoing monitoring and the implementation of adaptive management measures as outlined below.

8.10.2 Roles and Responsibilities of the Parties Involved

The Proponent is responsible for implementing the follow-up program, reporting the results to the RAs, and implementing adaptive management measures where required.

The RAs' responsibility is to arrange for the review of the results of the follow-up program prescribed in the environmental agreement, with the input of federal and provincial authorities as required. Based on this review, the RAs will decide:

- Is the follow-up program meeting its objectives?
- Are the effects as predicted in the CSR?
- Does the follow-up program require amendment to adapt to changes in the project, differences in the observed environmental effects, or new or elevated stakeholder concerns?
- Is the Proponent required to implement additional adaptive management measures to achieve acceptable effects?

It is anticipated that the Attawapiskat First Nation may wish to participate in the follow-up program on effects on community infrastructure. It is the responsibility of the Proponent to engage the AttFN in a manner the First Nation finds appropriate.

8.10.3 Objectives

The objective of the infrastructure follow-up program is to monitor the effects of the proposed project on community infrastructure that is to be utilized. It is recognized that any project related change in community infrastructure would need to be agreed to by both the community and INAC taking into consideration any needed maintenance, upgrading, or re-capitalization. It must be ensured that all community development is logical and consistent with the planning objectives of the communities and INAC.

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8.10.4 Reporting Mechanisms

Results reported under the environmental agreement will be provided to the parties to that agreement in summary form on an annual basis during the construction, operation and decommissioning phases of the project.

The Proponent must advise the AttFN, the RA's, and INAC if they plan to utilize on-reserve community infrastructure (i.e. roads, landfill, water and sewage systems, housing, etc). This includes any change to project design which results in unforeseen use of community systems, such as the disposal of the contents of the Victor construction camp holding tank in the community sewage system lift station.

8.10.5 Methods for Measuring Effects

The Proponent will carryout monitoring as per the following:

i. Changes in average price and consumption rates for services including water supply, sewage, and solid waste facilities and services (if reasonably expected to have been influenced by project related activities).

ii. Changes in capacity in services provided by the First Nations including water supply, sewage, and solid waste facilities and services (if reasonably expected to have been influenced by project related activities);

iii. Implementation of mitigation measures developed to offset use of community infrastructure, if utilized, including the making of compensatory payment, or the construction of additional infrastructure, where appropriate).

iv. Report accidents or malfunctions of community infrastructure (if reasonably expected to have been influenced by project related activities).

8.10.6 Adaptive Management Mechanisms

The Proponent should develop an adaptive response strategy to address the use of community infrastructure with the First Nation and consultation with the RA's and INAC. If there is no alternative for use of community infrastructure and there is an additional or incremental capacity, operation or maintenance cost, the Proponent should consider supporting the affected community for use of its infrastructure.

8.11 Navigation

The use of temporary bridges and rigmats at winter road crossings has the potential to obstruct open water navigation of waterways, if structures are not removed at the end of each winter's season. The Proponent will keep an annual log on the installation and removal dates of any such structures, and provide a copy of this log to Transport Canada (TC) on an annual basis.

The Proponent will also keep a log of any complaints received in association with its activities that affect navigation, and report on an annual basis to TC, and the affected First Nation, the nature of all such complaints and any associated corrective actions.

8.12 Recreation and Aesthetics

The RAs have concluded that there is little potential for the VDP to adversely affect recreation and aesthetic interests, beyond those associated with traditional land uses, which are addressed above. No specific monitoring measures are therefore required for recreational and aesthetic aspects, other than that the Proponent should keep a log of any complaints received, and provide a copy of that log to the RAs on an annual basis.

8.13 Effects on Sustainable Use of Renewable Resources

The Proponent has completed a closure plan for the VDP which provides for rehabilitation of the Victor site area following the completion of mining activities, such that the land will be capable of supporting traditional uses (mainly fishing, hunting, trapping) at levels generally comparable to those of the predevelopment condition. Monitoring details are provided in the Proponent's closure plan.

During project construction, operation and active closure phases, some adverse effects to hunting and trapping activities are anticipated. Monitoring associated with these potential effects is described in Section 8.6 dealing with traditional pursuits, values and skills.

Significant adverse effects on mining and forestry interests are not anticipated, and as such no follow-up program is proposed in relation to these activities, other than that related to salvageable timber. An annual log will be kept regarding the disposal of salvageable timber (for Victor site or local First Nation use to avoid a waste of resources), and this log will be provided to the RAs in accordance with provisions of the environmental agreement.

Adverse effects are not anticipated on other forestry resources, such as teas and medicinal plants, and no follow-up program is proposed in relation to these resources.

8.14 Cumulative Effects

Cumulative effects involving biophysical socio-economic interests are limited to those involving the pursuit of traditional activities, and changes in physical infrastructure. Monitoring relating to these specific aspects is addressed in previous materials in this chapter. Additional monitoring measures may be developed through the environmental agreement.

9.0 SUMMARY AND CONCLUSIONS

This CSR for the proposed VDP was prepared in accordance with the requirements of the *Canadian Environmental Assessment Act* (CEAA). The responsible authorities (RAs), in consultation with federal authorities and other parties, developed guidelines for conduct of the comprehensive study and preparation of the draft comprehensive study report by the Proponent.

The RAs considered information contained in the Proponent's Comprehensive Study Environmental Assessment (CSEA) and supplemental information submissions; comments from federal and provincial governments, First Nations, Aboriginal organizations, non-government organizations and the public; recommendations from meetings, workshops and technical sessions, and correspondence received on the public registry. This information was adequate for the RAs to reach conclusions as to whether the project was likely to cause significant adverse environmental effects.

9.1 Overview

De Beers Canada Inc. (De Beers), owned by De Beers Canada Holdings Inc., proposes to mine a diamond-bearing kimberlite resource (the Victor kimberlite) within the James Bay Lowlands of Ontario. Mining facilities would be situated immediately adjacent to the deposit. The Proponent proposes to commence construction of the mine in the winter of 2006, with mine operations beginning in the last quarter of 2008. Total reserves of 28 Mt of kimberlite ore will be mined from an open pit at an average annual rate of approximately 2.5 Mt over nearly 13 years. Mine closure will be conducted over a period of 6 years with site monitoring up to 10 years after the end of mining.

The Proponent initiated consultation with the AttFN in 1999 in regards to its advanced exploration program, and consultation on the project moving forward as a mine was initiated in 2001. Pre-consultation was also carried out with the communities of Kashechewan, Fort Albany, Moosonee and Moose Factory starting in 2003. Pre-consultations were also conducted with the federal government agencies.

De Beers submitted its initial project proposal to the government in May 2002, and updated proposals in March and May of 2003. The federal government determined that Natural Resources Canada, Fisheries and Oceans Canada Transport Canada and Human Resources and Skills Development Canada were RAs. Health Canada, Environment Canada and Indian and Northern Affairs Canada were expert federal authorities.

NRCan announced in a September 19, 2003 letter to the Proponent that it had assumed the role of lead RA, and that the project would be assessed as a Comprehensive Study. The Proponent submitted its final project description in November 2003. A public registry was established by NRCan in Ottawa, and satellite public registries were established in Attawapiskat, Moose Factory and Timmins. The RAs undertook development of project-specific environmental assessment guidelines in consultation with expert departments, provincial agencies, Aboriginal groups, and the public. Draft guidelines were issued on December 12, 2003 and were made available for comment during a 9-week public review period ending on February 3, 2004. The final guidelines were issued on February 26, 2004.

The Proponent completed an environmental assessment and submitted it to the RAs in March 2004. The submission consisted of a Comprehensive Study Environmental Assessment (CSEA) document and 12 technical supporting documents. Technical reports included an environmental baseline study, air quality assessment, noise assessment, a river dispersion model, fuel spill models for the Attawapiskat River and James Bay, an economic impact study, geotechnical investigations, a processed kimberlite containment facility design report, a groundwater dewatering report, geochemistry study, and traditional ecological knowledge report. The CSEA summarized investigations undertaken since 2001 and, in some cases, since 1999, and documented pre-consultation with the Attawapiskat First Nation and government agencies. Baseline conditions were documented and analyses were conducted on the effects of the proposed project on the natural environment.

As a result of public consultation feedback and concerns over a fuel pipeline and tanker shipment of fuel in James Bay, as part of the project, the Proponent re-evaluated various project alternatives and, in August 2004, submitted supplementary information in the report entitled, *Re-evaluation of Site Access and Power Supply Alternatives*. This report detailed changes in project design, most notably the use of a transmission line to provide grid power in lieu of on-site diesel-fired power generation. The project change resulted in a significant reduction of planned fuel movement in James Bay.

As part of the public participation plan, information sessions, meetings and consultations with communities were conducted by De Beers and by the federal and provincial governments. The federal agencies undertook a technical review of the Proponent's CSEA. The review involved federal and provincial expertise, information provided by Aboriginal communities and their technical experts, and comments from the general public.

9.2 Environmental Effects

The Comprehensive Study included consideration of the potential effects of:

- The project on environmental components (air quality, geological systems, surface water systems, groundwater systems, the terrestrial environment, heritage resources, and bio-physical socio-economic conditions);
- Environmental changes on human health, physical and cultural heritage, current use of lands and resources for traditional purposes by Aboriginal persons and significant structures, sites or things;
- Cumulative environmental effects;
- Project alternatives;

- The project on the sustainable use of renewable resources;
- The environment on the project; and,
- Possible malfunctions or accidents.

Throughout the Proponent's pre-submission consultation and the environmental assessment process, the following potential effects of the project were consistently raised by various parties as areas of concern:

- Potential to dewater local creeks and smaller rivers due to bedrock groundwater dewatering;
- Potential to dewater a large area of muskeg around the site (and loss of habitat), due to bedrock groundwater dewatering;
- Degradation of the environment, including water quality in rivers, fish habitat, and wildlife habitat;
- Loss of potential land for traditional land use, and provision of compensation;
- Limitations to employment and training opportunities; and,
- Loss or reduction in social well-being.

The concerns raised during the Comprehensive Study were addressed by De Beers to the general satisfaction of the RAs. In some cases, such as hydrogeological issues, discussions between experts and additional information were required to satisfy the RAs. There was consensus of support from the federal authorities, provincial agencies and Aboriginal organizations for the RAs' conclusions that, with the implementation of appropriate mitigation measures, the project is not likely to cause significant adverse environmental effects.

9.3 Mitigation

Mitigation includes measures taken into account by the Proponent in the design of the project as described in the CSEA and supplementary materials, and the implementation of a site-specific environmental management system (EMS) and related procedures, as well as those identified through the technical sessions. The RAs considered that the mitigation measures proposed by De Beers to address potential environmental effects are appropriate. Mechanisms are required to ensure the co-operative development and implementation of mitigation measures and management strategies. These mechanisms include environmental management and socio-economic monitoring agreements, regulatory instruments with terms and conditions, and De Beers' EMS.

9.4 Outstanding Issues

The Attawapiskat First Nation has indicated that the socio-economic and traditional knowledge data collection has been insufficient for their requirements and that additional data collection and monitoring should be provided.

Mushkegowuk Council (MC) has indicated that the socio-economic effects assessment completed for the coastal Cree communities excluding Attawapiskat is not adequate. MC has proposed a detailed socio-economic monitoring framework.

Additional data on TEK and traditional land uses were provided by the Proponent; however, much of the socio-economic information requests from Attawapiskat and the MC have no bio-physical links to the project, and therefore lie outside of the scope of the Comprehensive Study.

9.5 Follow-up

Follow-up programs are required to ensure monitoring compliance and to determine the effectiveness of measures taken to mitigate adverse environmental effects of the project. A follow-up program as outlined in chapter 8 of the CSR is required to address specific issues.

Where a regulatory instrument is required for the project to proceed, related follow-up requirements may be specified as terms and conditions by the regulatory agency. If approved, the project would require:

- *Fisheries Act* authorizations;
- A *Navigable Waters Protection Act* permit;
- An *Explosives Act* storage and factory license;
- Approval under the Class EA for Minor Transmission Facilities (Ontario *Environmental Assessment Act*);
- Leave to Construct under Section 92 of the Ontario *Energy Board Act*;
- Closure Plan approval under the Ontario *Mining Act;*
- Quarry permits under the Ontario *Aggregate Resources Act*;
- Provincial work permits, and tenure for Crown Land under the *Public Lands Act*;
- Location approval under the *Lakes and Rivers Improvement Act;*
- Permits to take water under the Ontario *Water Resources Act*;

- Certificates of Approval for air, water, and waste management under the Ontario *Environmental Protection Act*; and,

- Other such permits, licences, authorizations and approvals as might be required.

The design and implementation of follow-up measures specified in this CSR that are not attached to a regulatory instrument will be assured through agreements as discussed in Chapter 8.

The environmental and socio-economic agreement for the VDP will be a key tool for ensuring that commitments and mitigation measures that lie outside the scope of regulatory instruments are appropriately implemented. This agreement will be finalized pursuant to the completion of the CSR.

9.6 RA Conclusions

The RAs have determined that there are no likely significant adverse environmental effects resulting from the project after mitigation is applied. In addition, there are no significant adverse cumulative effects predicted. The Proponent will be required to conduct monitoring and follow-up as per the commitments in this CSR, under permitting and as part of the follow-up program.

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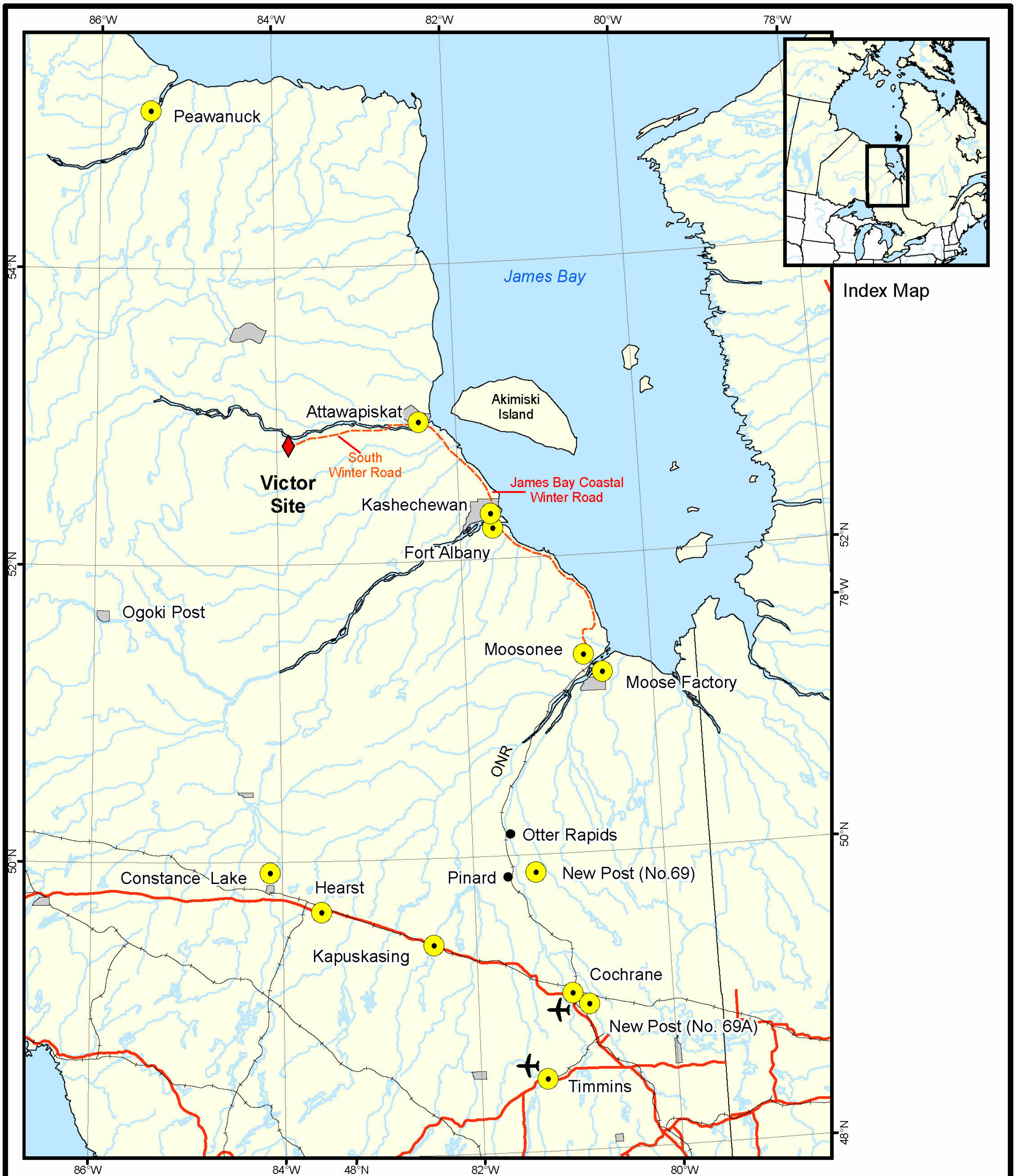

DE BEERS CANADA

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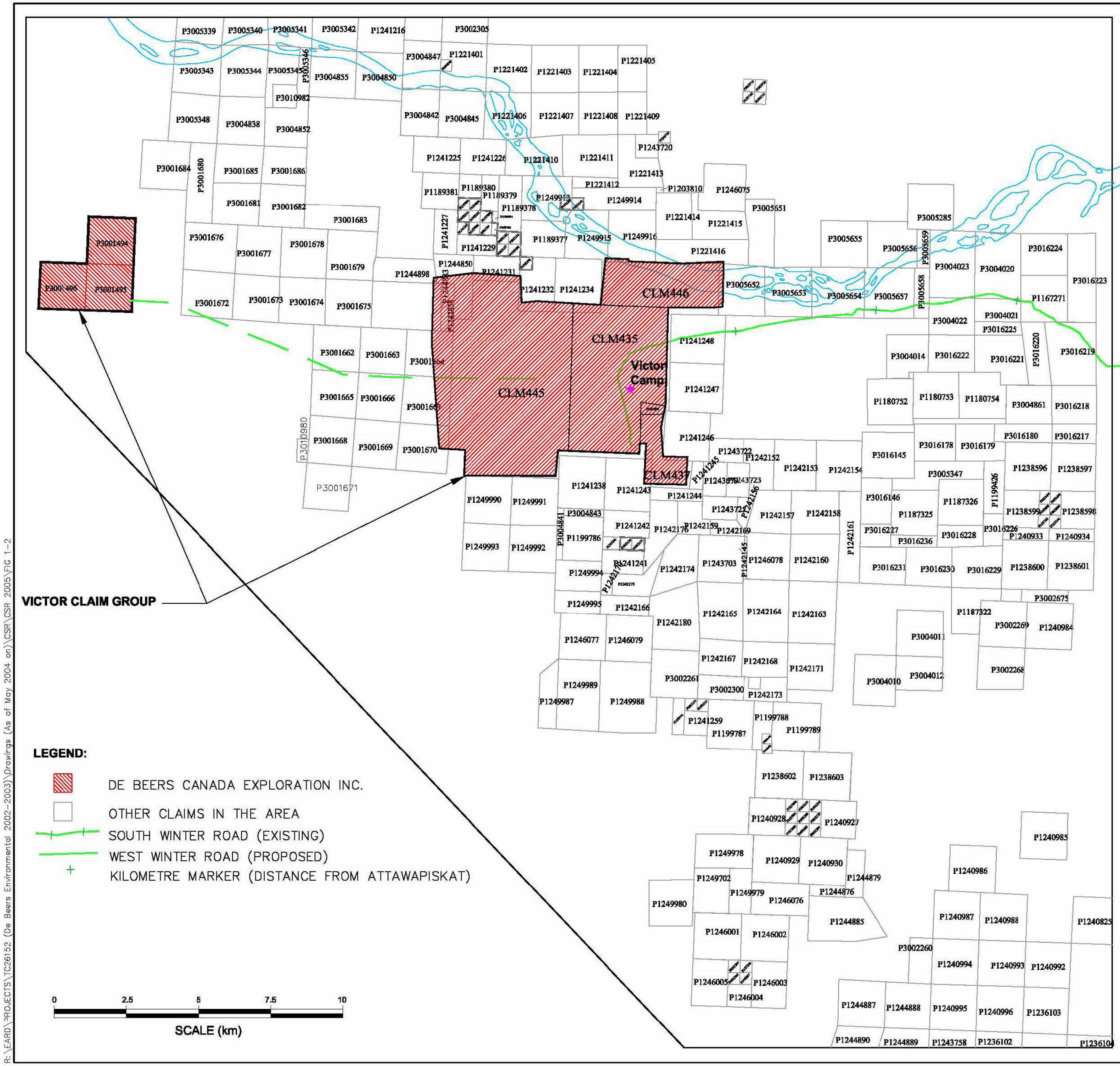
Victor Diamond Project
Environmental Assessment

Site Location

SCALE: AS SHOWN	DATE: APRIL 2005
PROJECT NUMBER:TC261521	**Figure 1 - 1**

R:EARD\PROJECTS\TC26152 (De Beers Environmental 2002-2003)\Drawings (As of May 2004 on)\CSR\CSR 2005\Figure 1 - 4 Study Area Letter Nov18.mxd



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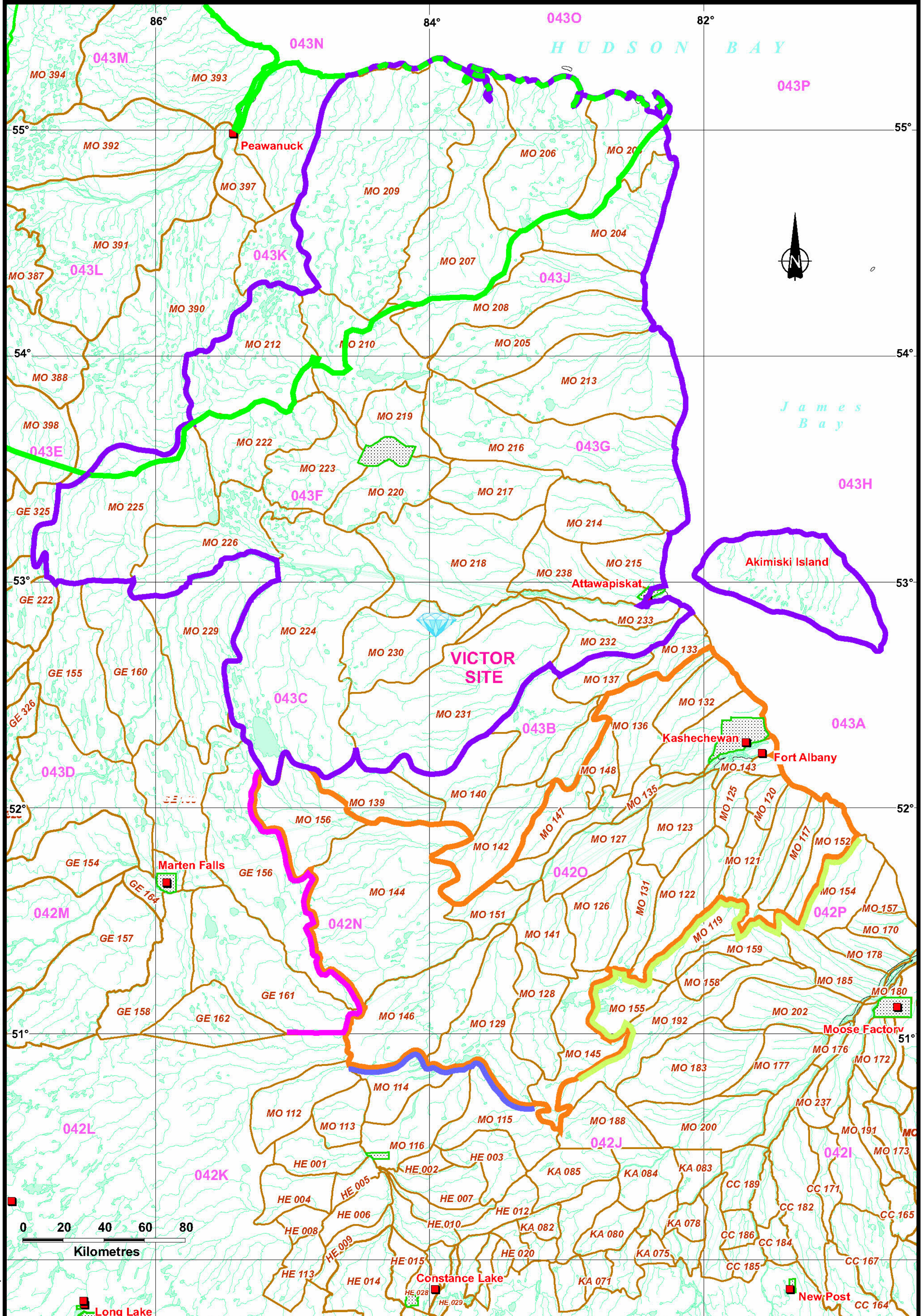
Victor Diamond Project
Environmental Assessment

Project Claim Map

SCALE: AS SHOWN	DATE: APRIL 2005
PROJECT NUMBER: TC26152	**Figure 1-2**



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LEGEND

Symbol	Description
SL 381	Traplines and Numbers
(green)	Weenusk Traditional Lands
(purple)	Attawapiskat Traditional Lands
(orange)	Fort Albany - Kashechewan First Nation Traditional Lands
(magenta)	Marten Falls First Nation Traditional Lands
(light green)	Moose Cree First Nation Traditional Lands
(blue)	Constance Lake First Nation Traditional Lands

Note: Overlap exists between traditional Lands (not shown).

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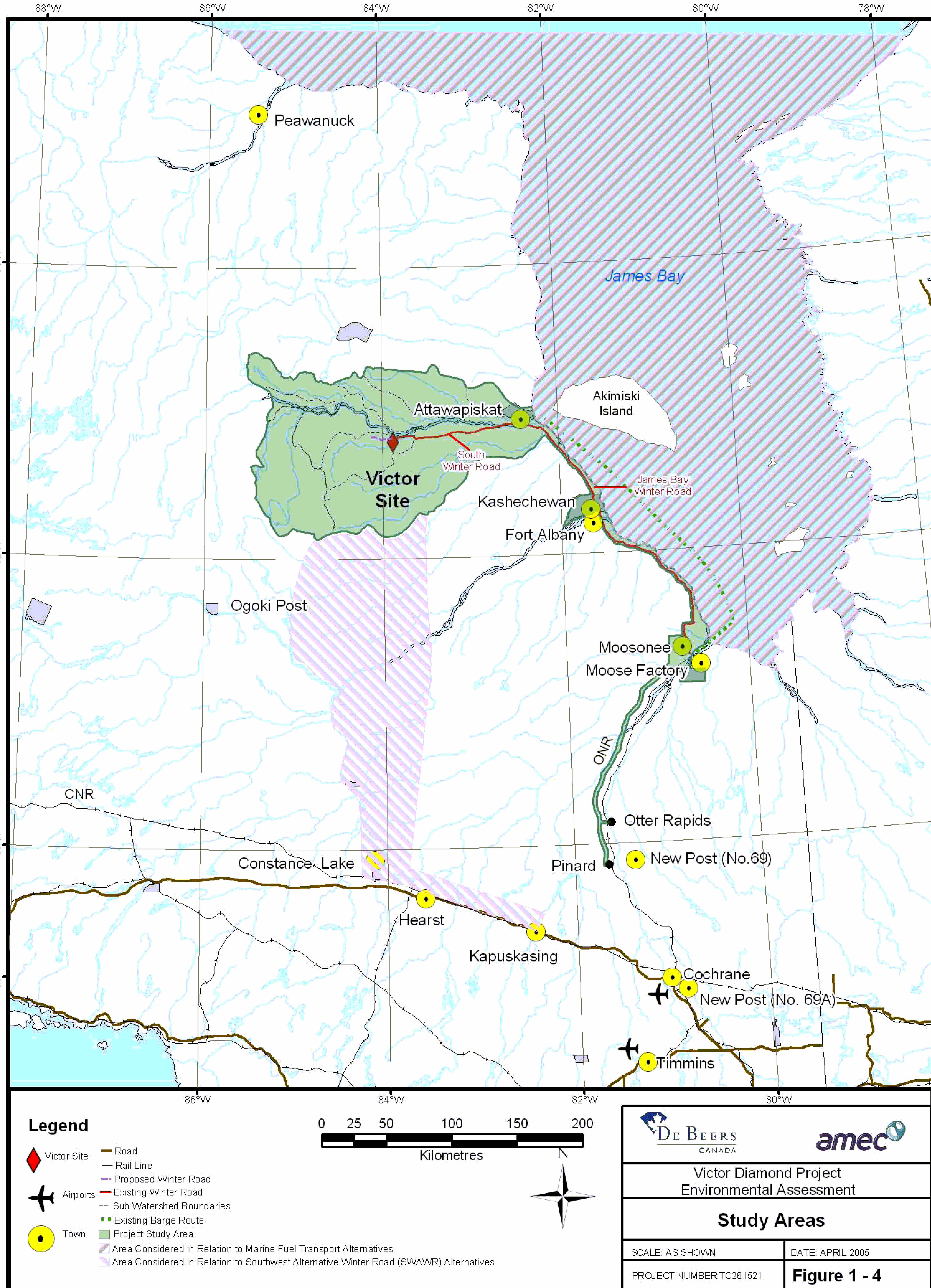
Victor Diamond Project
Environmental Assessment

Traditional First Nations' Lands

SCALE: AS SHOWN	DATE: APRIL 2005
PROJECT NUMBER: TC26152	Figure 1-3

C0803-465



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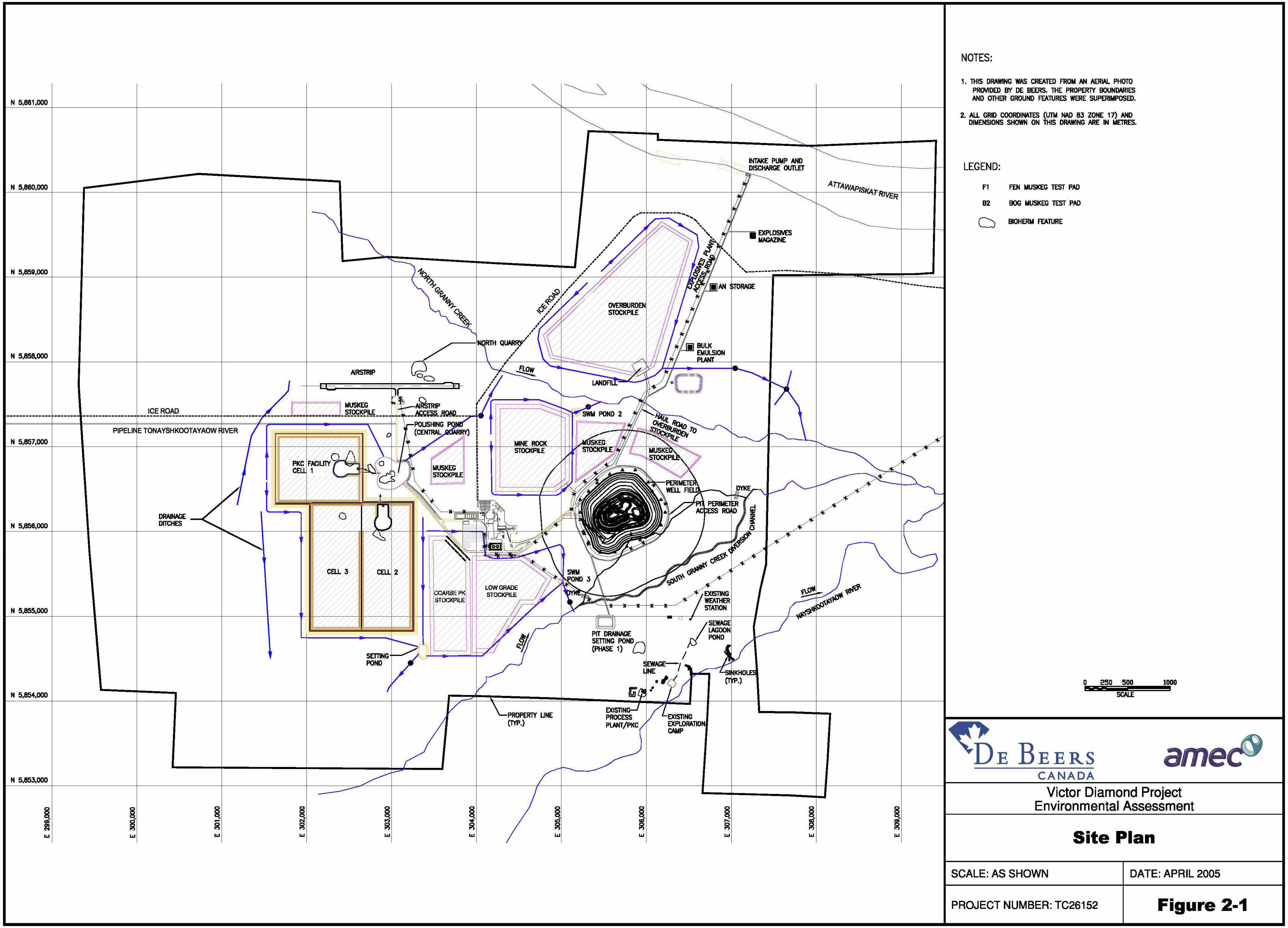

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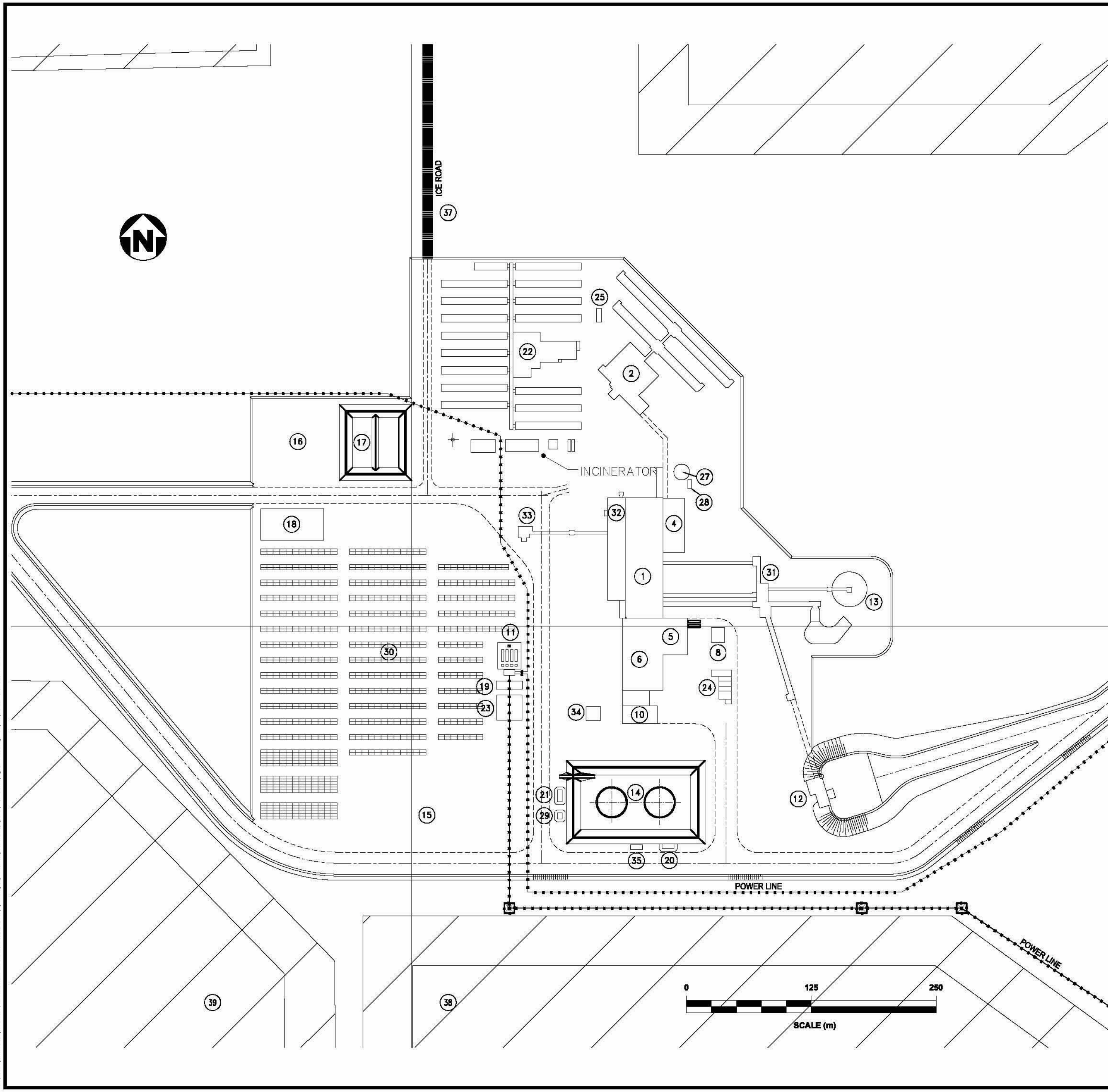
Victor Diamond Project
Environmental Assessment

Site Plan

SCALE: AS SHOWN	DATE: APRIL 2005
PROJECT NUMBER: TC26152	**Figure 2-1**

C0803-467

C0803-468



NOTES:

1. THIS DRAWING WAS CREATED FROM AN AERIAL PHOTO PROVIDED BY DE BEERS. THE PROPERTY BOUNDARIES AND OTHER GROUND FEATURES WERE SUPERIMPOSED.

2. ALL GRID COORDINATES (UTM NAD 83 ZONE 17) AND DIMENSIONS SHOWN ON THIS DRAWING ARE IN MILLIMETRES.

MINE FACILITIES AND BUILDINGS

1 - PROCESS PLANT
2 - ACCOMMODATION COMPLEX
3 - NOT USED
4 - ADMINISTRATION COMPLEX
5 - WAREHOUSE
6 - WORKSHOP
7 - NOT USED
8 - PRE-FAB. COLD STORAGE
9 - NOT USED
10 - BOILER PLANT
11 - EMERGENCY GENERATORS
12 - CRUSHER
13 - RECLAIM STATION
14 - DIESEL FUEL TANK FARM
15 - SAND PILE & BATCH PLANT
16 - CONTAINERS STORAGE AREA
17 - BIO-REMEDIATION SITE
18 - RECYCLING AREA
19 - SUBSTATION #1
20 - FUEL DISPENSING STATION #1
21 - FUEL DISPENSING STATION #2
22 - CONSTRUCTION CAMP
23 - SWITCH YARD
24 - READY LINE
25 - SUBSTATION #2
26 - NOT USED
27 - FIRE WATER TANK
28 - FIRE WATER PUMPS
29 - DISPENSING STATION #3 (GASOLINE)
30 - 8.0 Ha. CONSTR. LAYDOWN AREA
31 - TRANSFER STATION
32 - BULK SAMPLE PLANT
33 - COARSE PK STORAGE BIN
34 - LUBE STORAGE & WASTE OIL
35 - FUEL PUMPING MODULE

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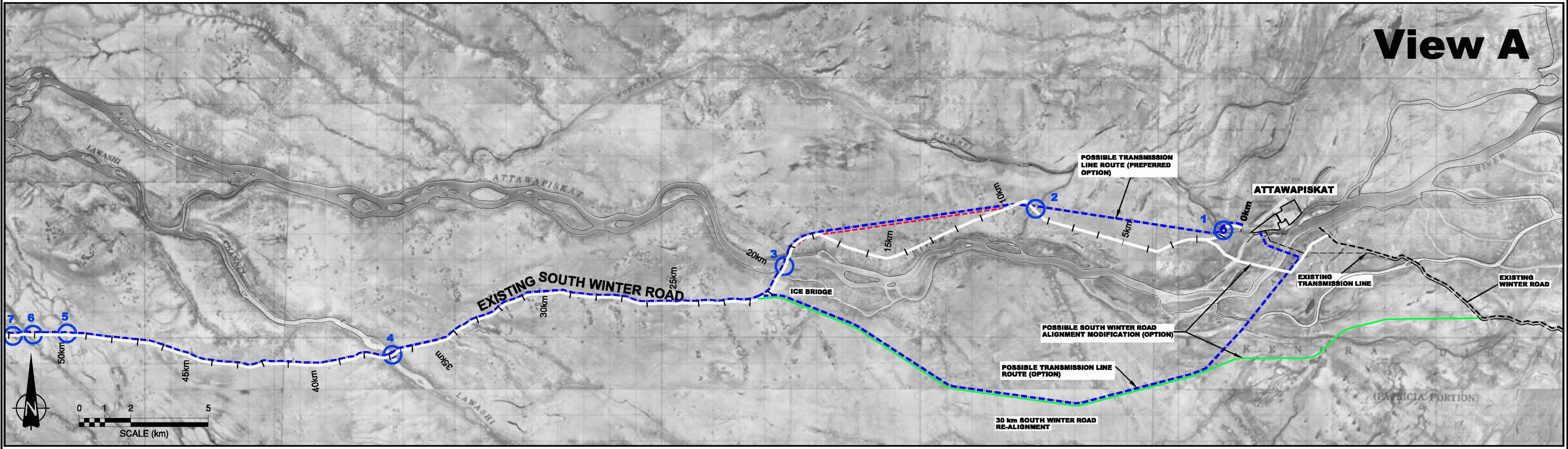
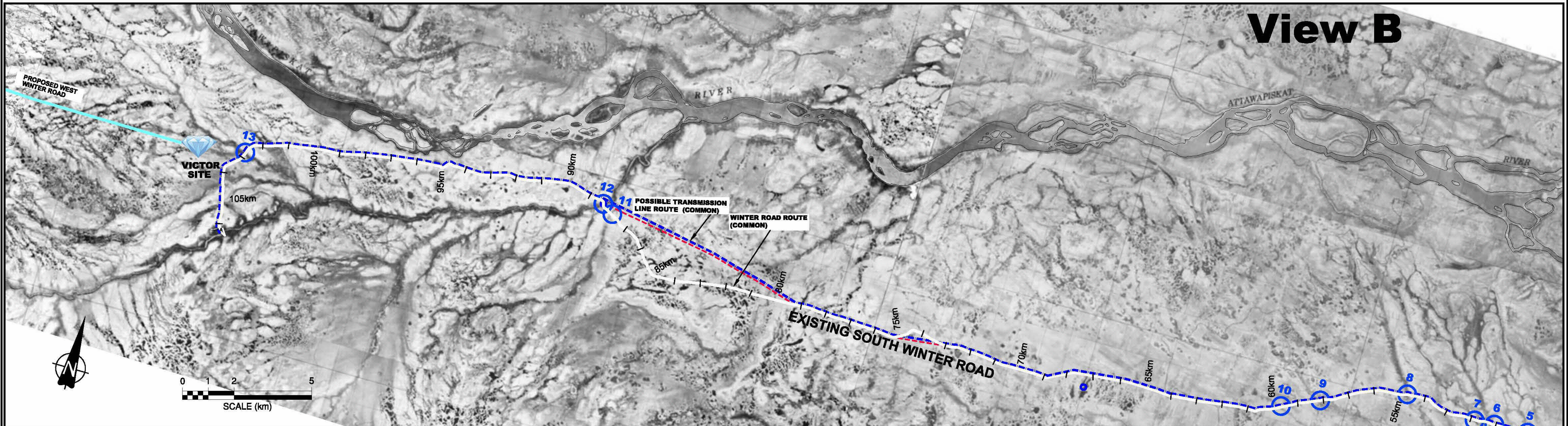
Victor Diamond Project
Environmental Assessment

Site Plan
Process Plant Area

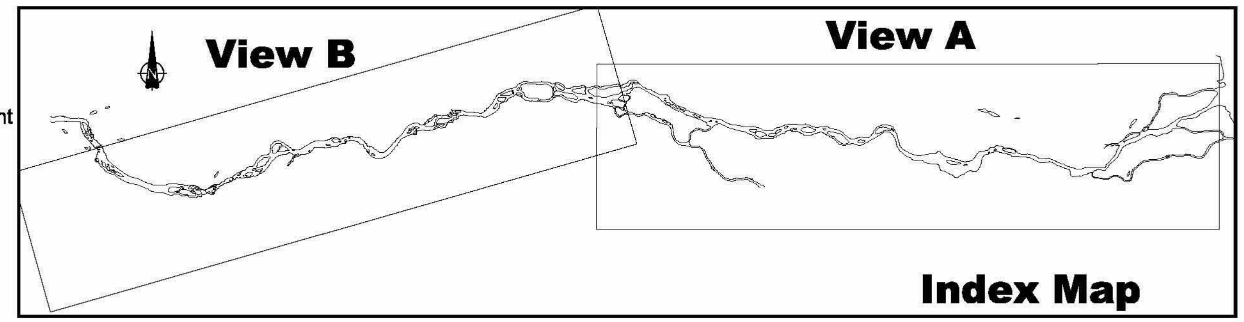
SCALE: AS SHOWN	DATE: APRIL 2005
PROJECT NUMBER: TC26152	**Figure 2-2**





LEGEND:

- Possible Alignment Modifications (2 options)
- Existing Coastal Winter Road
- Existing South Winter Road
- Proposed West Winter Road
- 55km Road Alignment Chainage Marker (from Attawapiskat)
- VICTOR SITE
- Proposed Water Taking Locations for Winter Road Freezing
- 12 Water Course Crossings
- Proposed Transmission Line Alignment (2 Options)
- Existing Transmission Line
- Recommended Improvements



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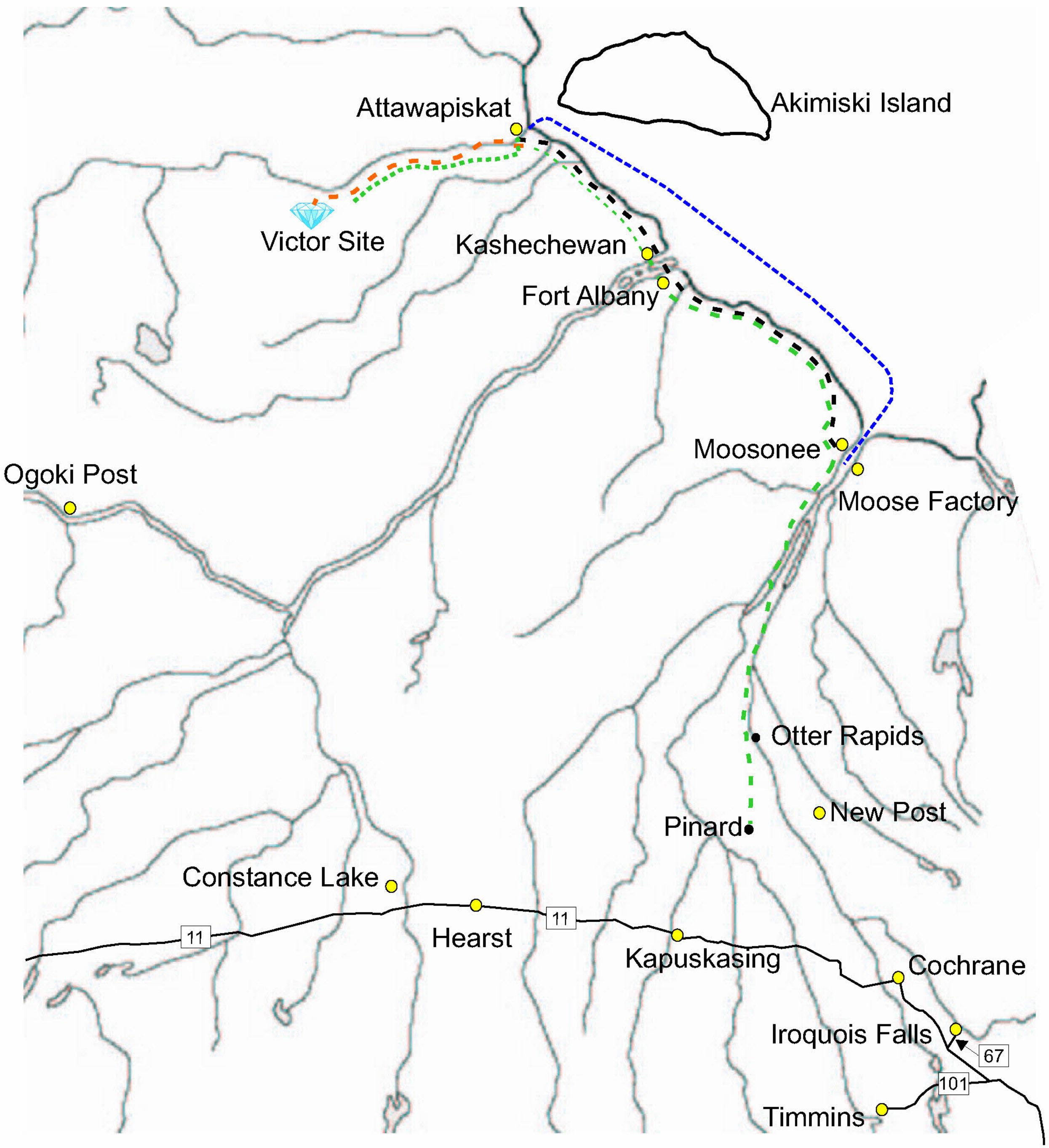
Victor Diamond Project Environmental Assessment	
South Winter Road and Transmission Line (with Options)	
SCALE: AS SHOWN	DATE: APRIL 2005
PROJECT NUMBER: TC26152	**Figure 2-3**



From Natural Resources Canada.

LEGEND

Preferred Option: Coastal winter road access with transmission line hook-up to Otter Rapids.

- Existing Coastal Winter Road
- Existing South Winter Road
- Existing Barge Route
- Existing and Reinforced 115 kV Transmission Line (Otter Rapids/Pinard to Kashechewan)
- Exisiting 115 kV Transmission Line Kashechewan to Attawapiskat)
- New 155Kv Transmission Line (Attawapiskat to Victor Site)

0 100 200

SCALE (km)

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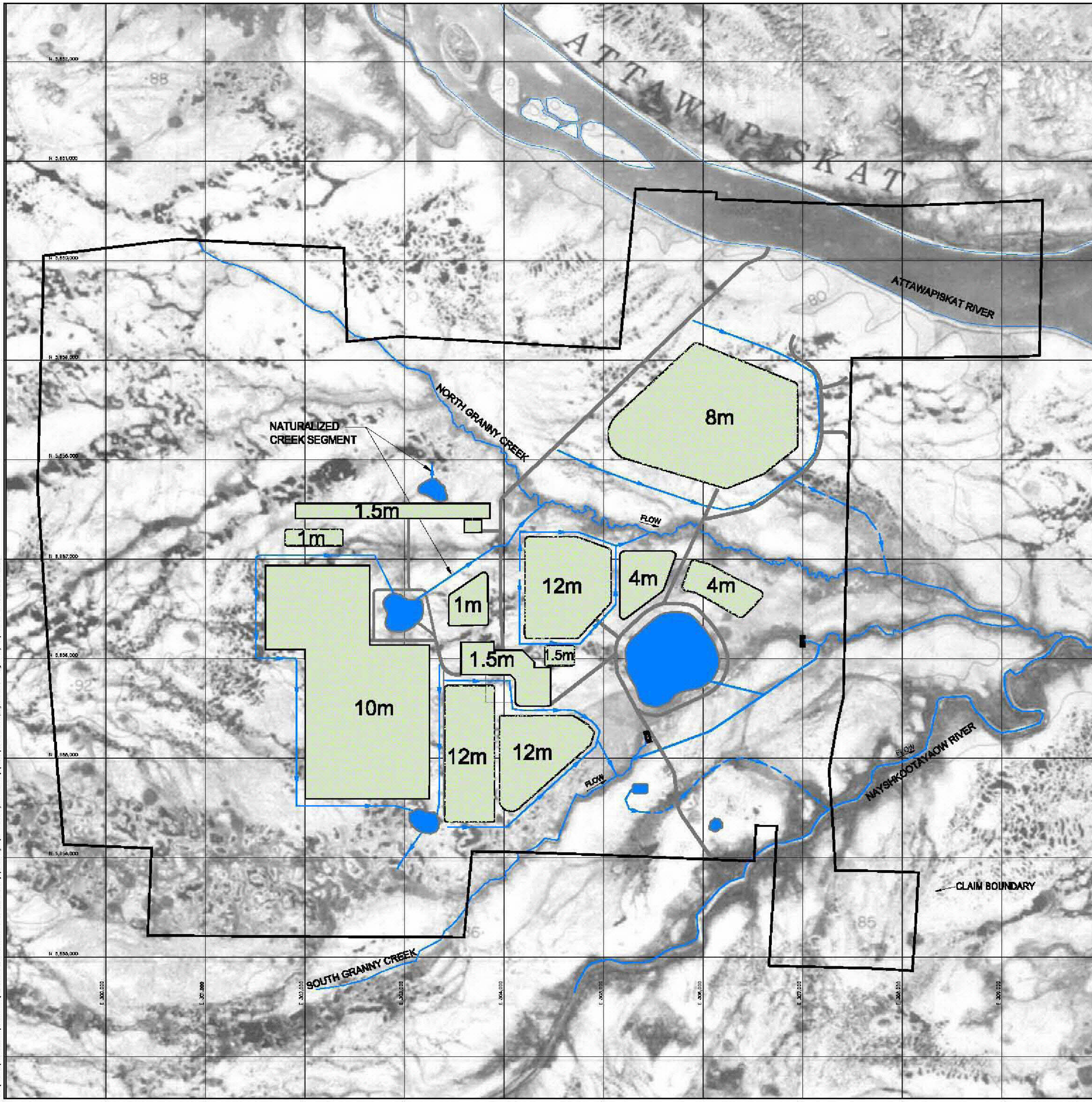
Victor Diamond Project
Environmental Assessment

Winter Road, Barge and Transmission Line Routes

SCALE: AS SHOWN	DATE: APRIL 2005
PROJECT NUMBER: TC26152	**Figure 2-4**

R:\EARD\PROJECTS\TC26152 (De Beers Environmental 2002-2003)\Drawings (As of May 2004 on)\CSR\CSR 2005\Figure 2-4.cdr



NOTES:

1. THIS DRAWING WAS CREATED FROM A TOPOGRAPHICAL MAP PROVIDED BY THE DEPARTMENT OF ENERGY, MINES AND RESOURCES, CANADA. THE PROPERTY BOUNDARIES AND OTHER GROUND FEATURES WERE SUPERIMPOSED.
2. ALL GRID COORDINATES AND DIMENSIONS SHOWN ON THIS DRAWING ARE IN METRES, UTM COORDINATE IS BASED ON NAD27, ZONE 17.

LEGEND:

- DRAINAGE DITCHES
- EMERGENCY FLOODWAY
- ON-SITE ROADS (RECLAIMED)
- 8m — RECLAIMED / REVEGETATED (MINERAL STOCKPILES AND SITE INFRASTRUCTURE AREAS); EXPECTED FINAL ELEVATION ABOVE THE SURROUNDING GROUND SURFACE
- POND AREAS (OPEN PIT, QUARRIES AND SETTLING PONDS)

SUMMARY OF RECLAIMED AREAS	
Pit Lake and quarry ponds	117 ha
Reclaimed/revegetated stockpiles	451 ha
Reclaimed/revegetated PKC facility	260 ha
Restored creek and river forest	13 ha
Reclaimed/revegetated roads, airstrip and plant site	70 ha

N

0 0.2 0.5 1.0

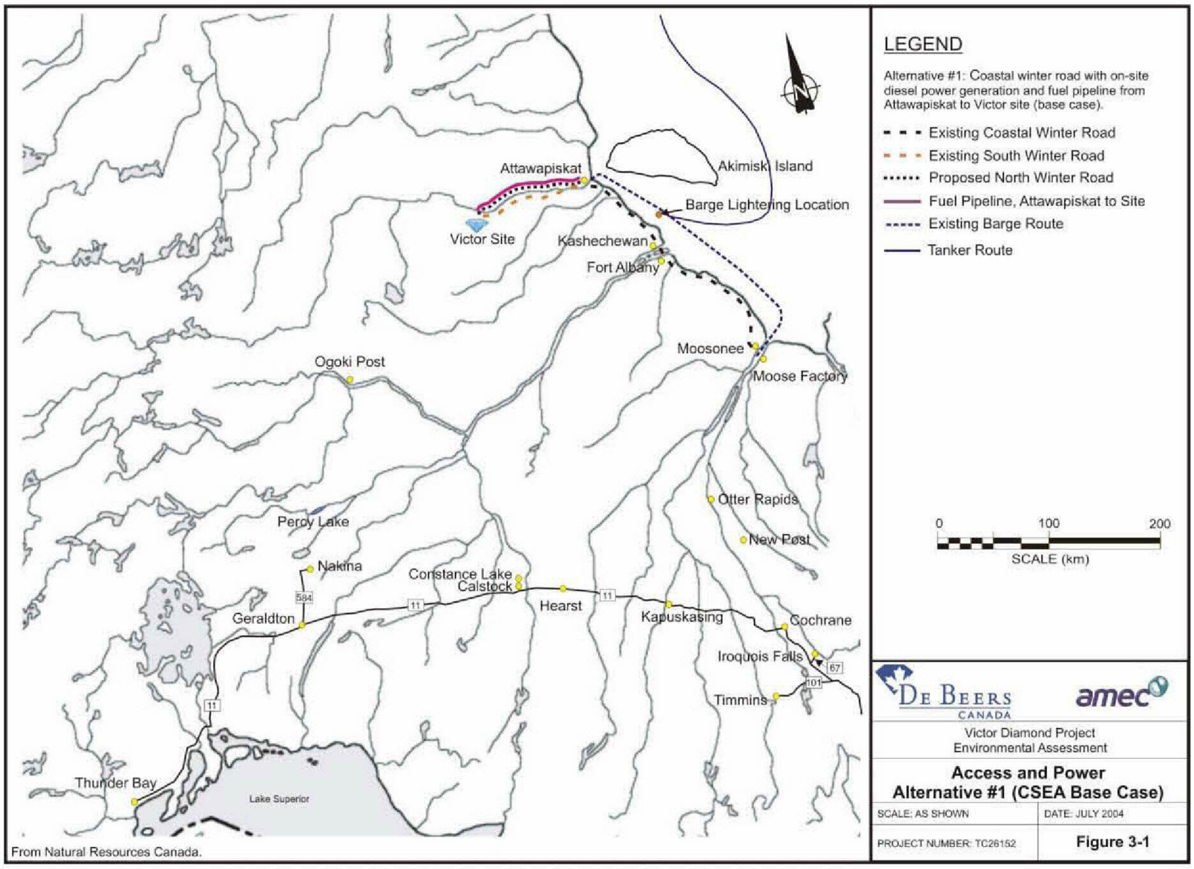
SCALE (km)

amec

Victor Diamond Project
Environmental Assessment

Post Closure Site Plan Schematic

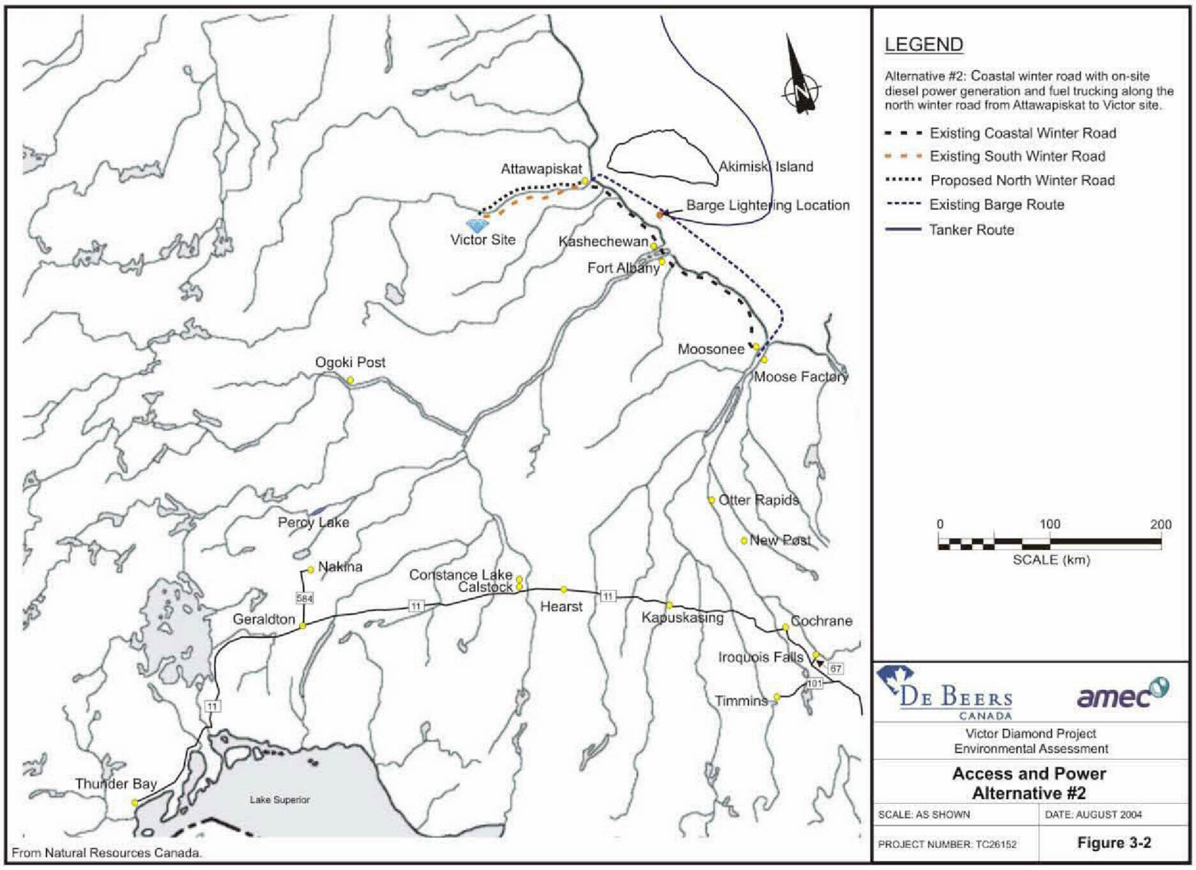
SCALE AS SHOWN	DATE APRIL 2005
PROJECT NO. TC26152	FIGURE NO. Figure 2–5



Victor Diamond Project
Environmental Assessment

Access and Power
Alternative #1 (CSEA Base Case)

SCALE: AS SHOWN	DATE: JULY 2004
PROJECT NUMBER: TC26152	Figure 3-1



Victor Diamond Project
Environmental Assessment

Access and Power
Alternative #2

SCALE: AS SHOWN	DATE: AUGUST 2004
PROJECT NUMBER: TC26152	Figure 3-2

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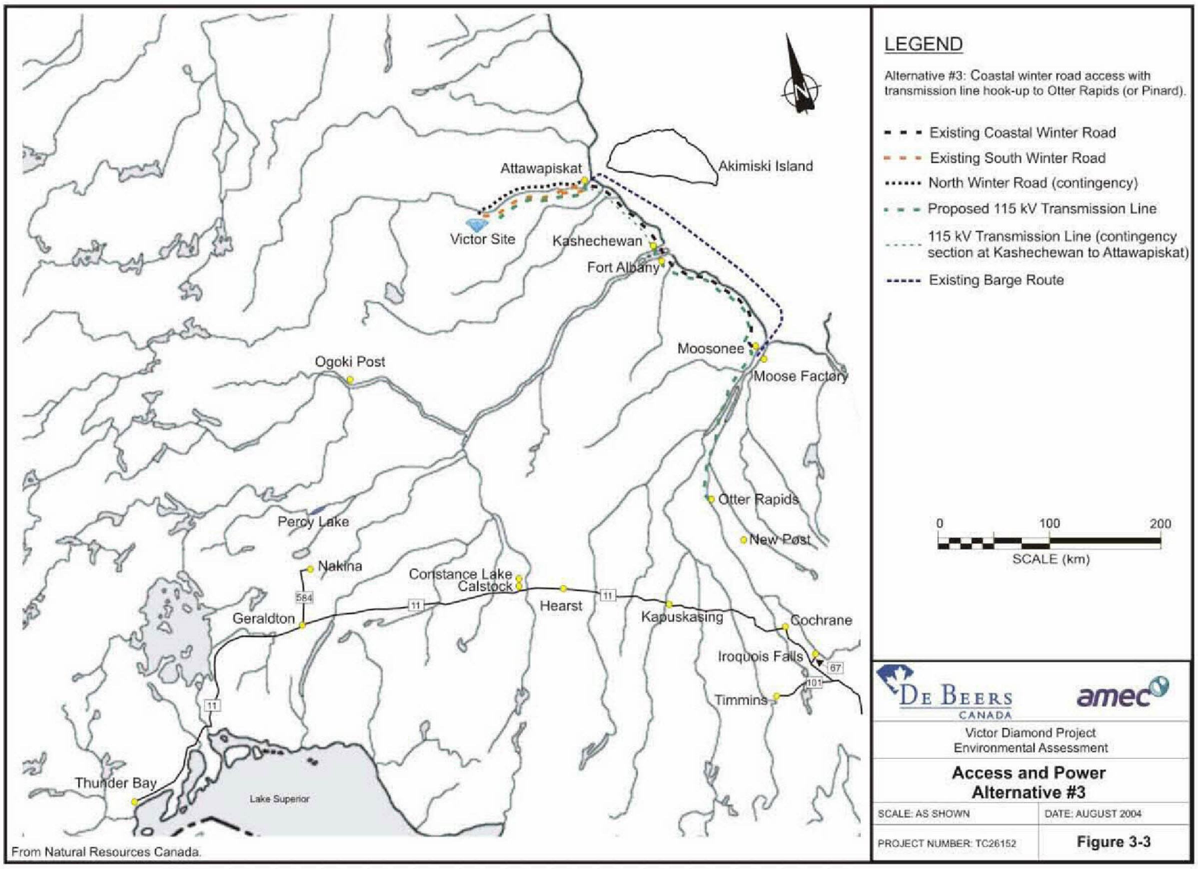

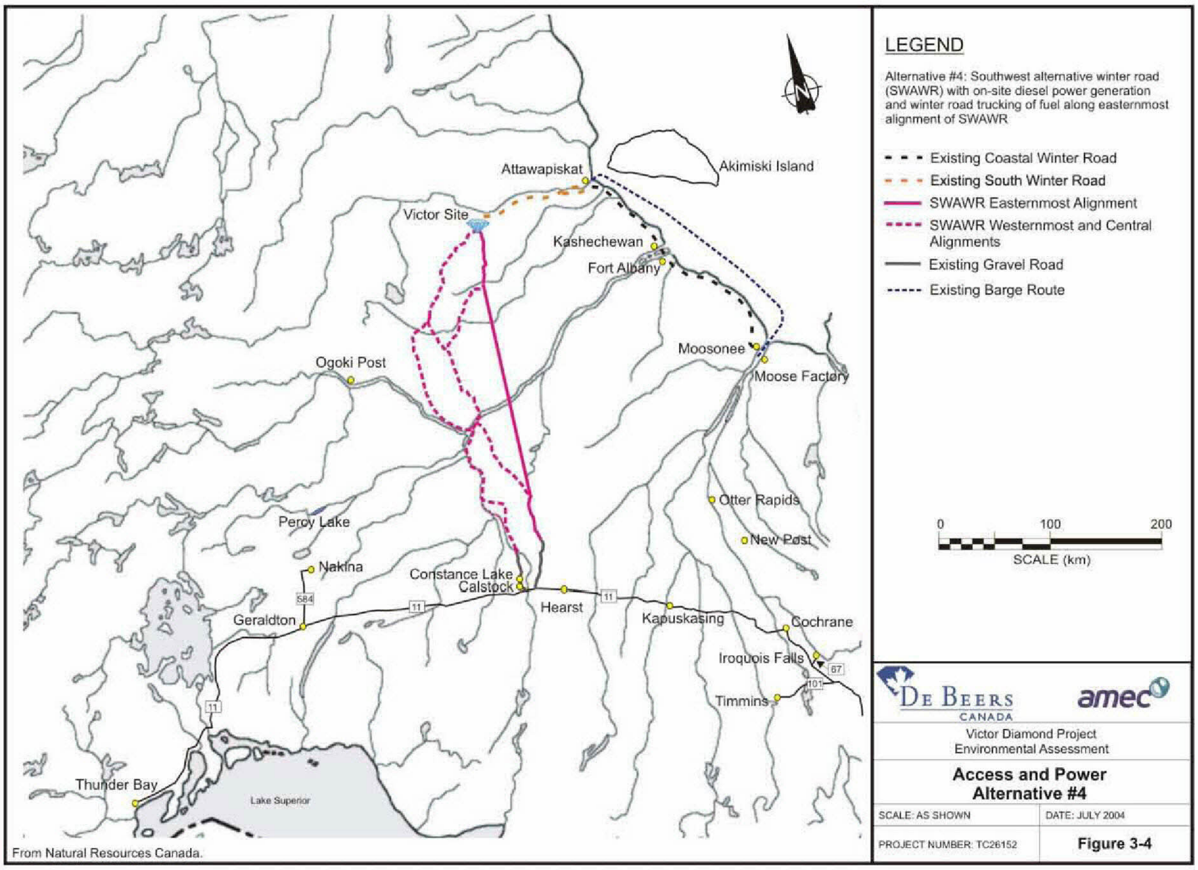

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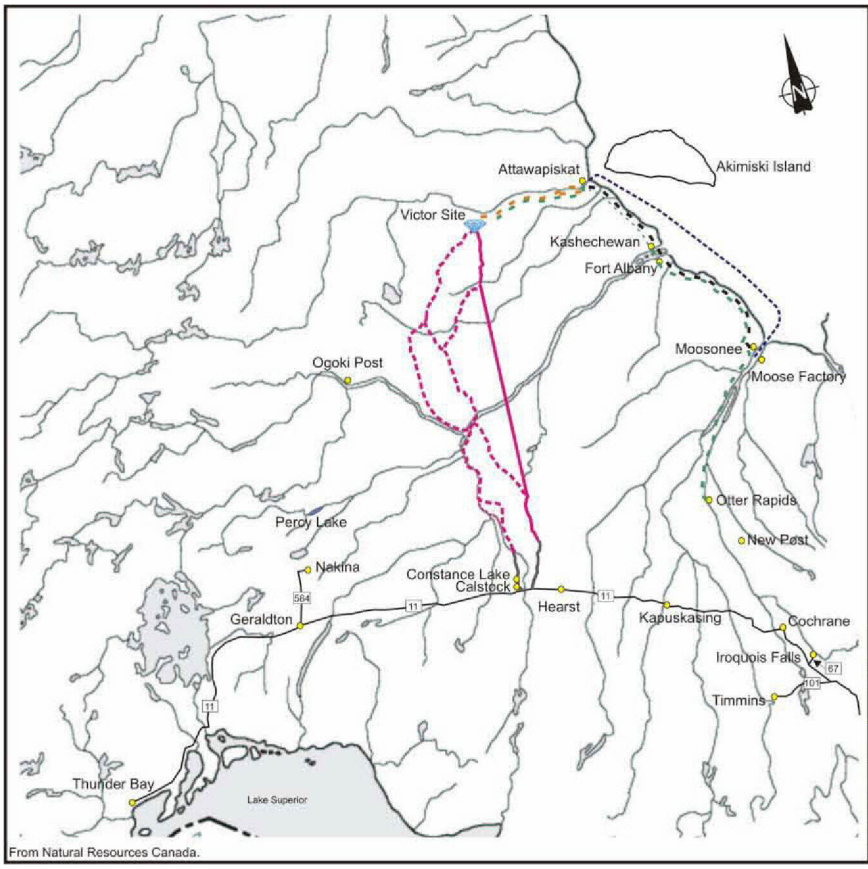

LEGEND

Alternative #5: Southwest alternative winter road (SWAWR) access (easternmost alignment) with transmission line hook-up along the coastal winter road route to Otter Rapids (or Pinard).

- Existing Coastal Winter Road
- Existing South Winter Road
- SWAWR Easternmost Alignment
- SWAWR Westernmost and Central Alignments
- Existing Gravel Road
- Proposed 115 kV Transmission Line
- 115 kV Transmission Line (contingency section at Kashechewan to Attawapiskat)
- Existing Barge Route

0 100 200
SCALE (km)

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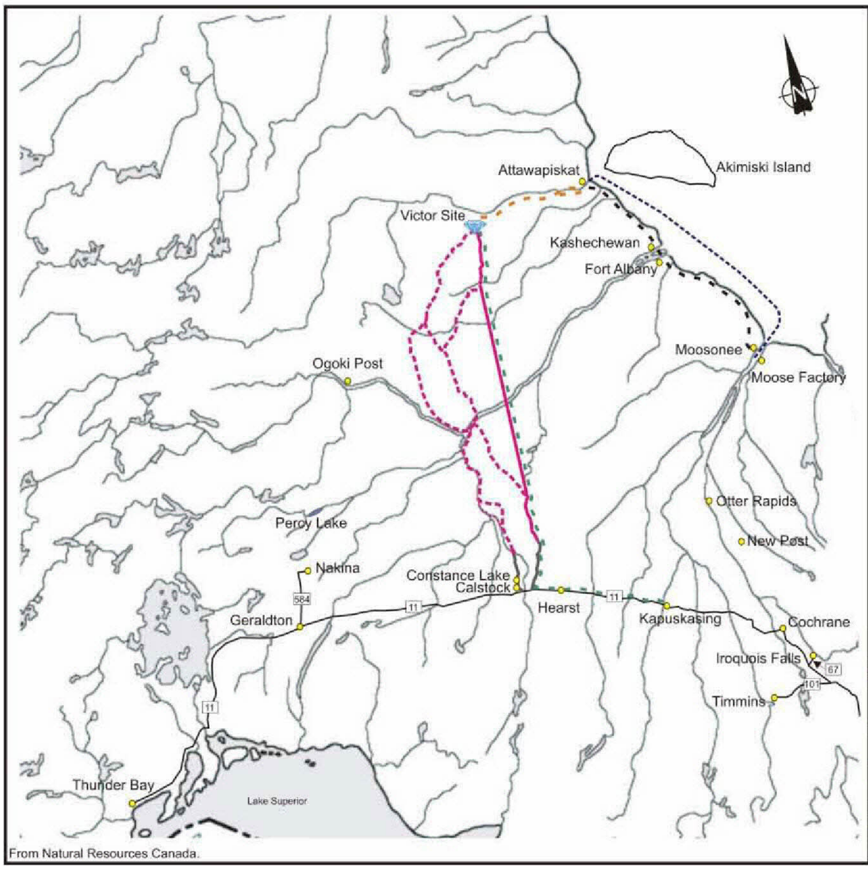
Victor Diamond Project
Environmental Assessment

Access and Power Alternative #5

SCALE: AS SHOWN	DATE: AUGUST 2004
PROJECT NUMBER: TC26152	**Figure 3-5**



LEGEND

Alternative #6: Southwest alternative winter road (SWAWR) access (easternmost alignment) with transmission line hook-up to Kapuskasing (or Calstock).

- Existing Coastal Winter Road
- Existing South Winter Road
- SWAWR Easternmost Alignment
- SWAWR Westernmost and Central Alignments
- Existing Gravel Road
- Proposed 115 kV Transmission Line
- Existing Barge Route

0 100 200
SCALE (km)

DE BEERS CANADA | amec

Victor Diamond Project
Environmental Assessment

Access and Power Alternative #6

SCALE: AS SHOWN	DATE: AUGUST 2004
PROJECT NUMBER: TC26152	**Figure 3-6**

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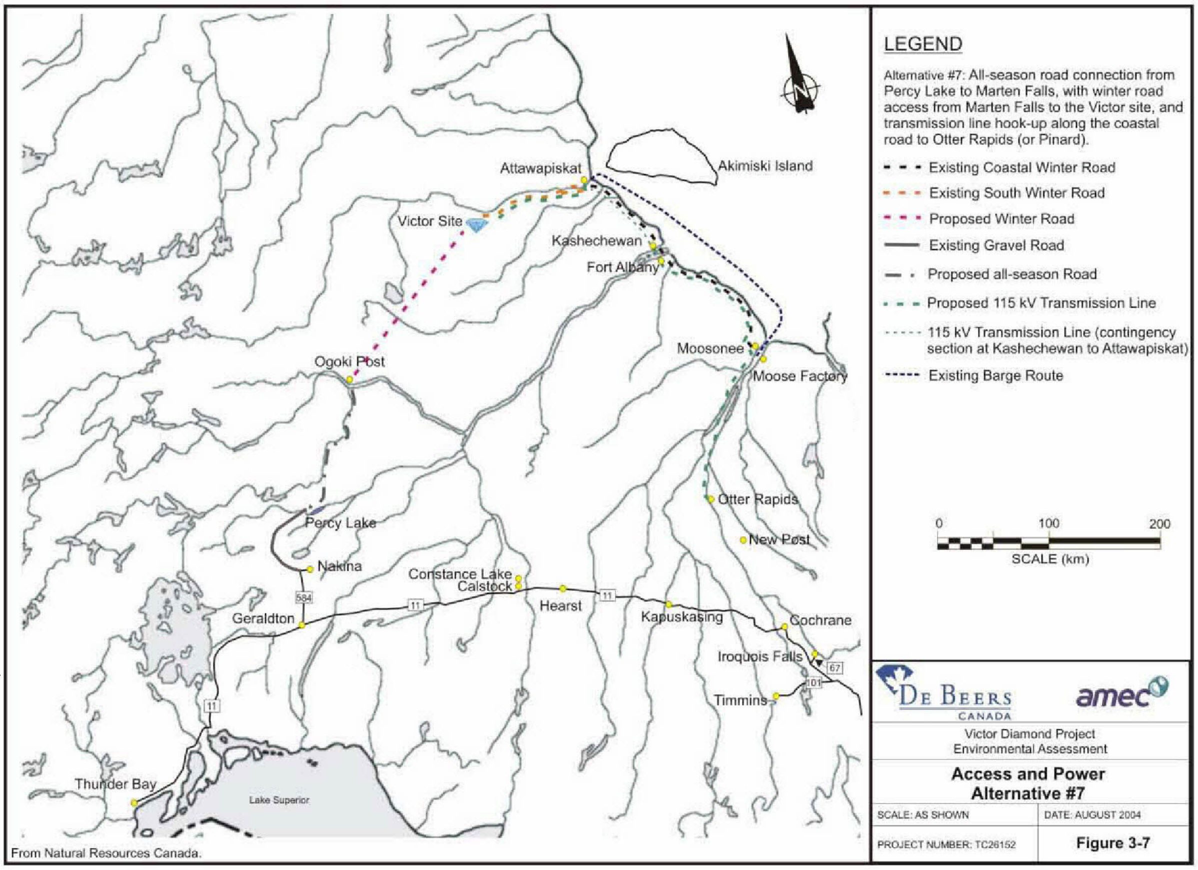

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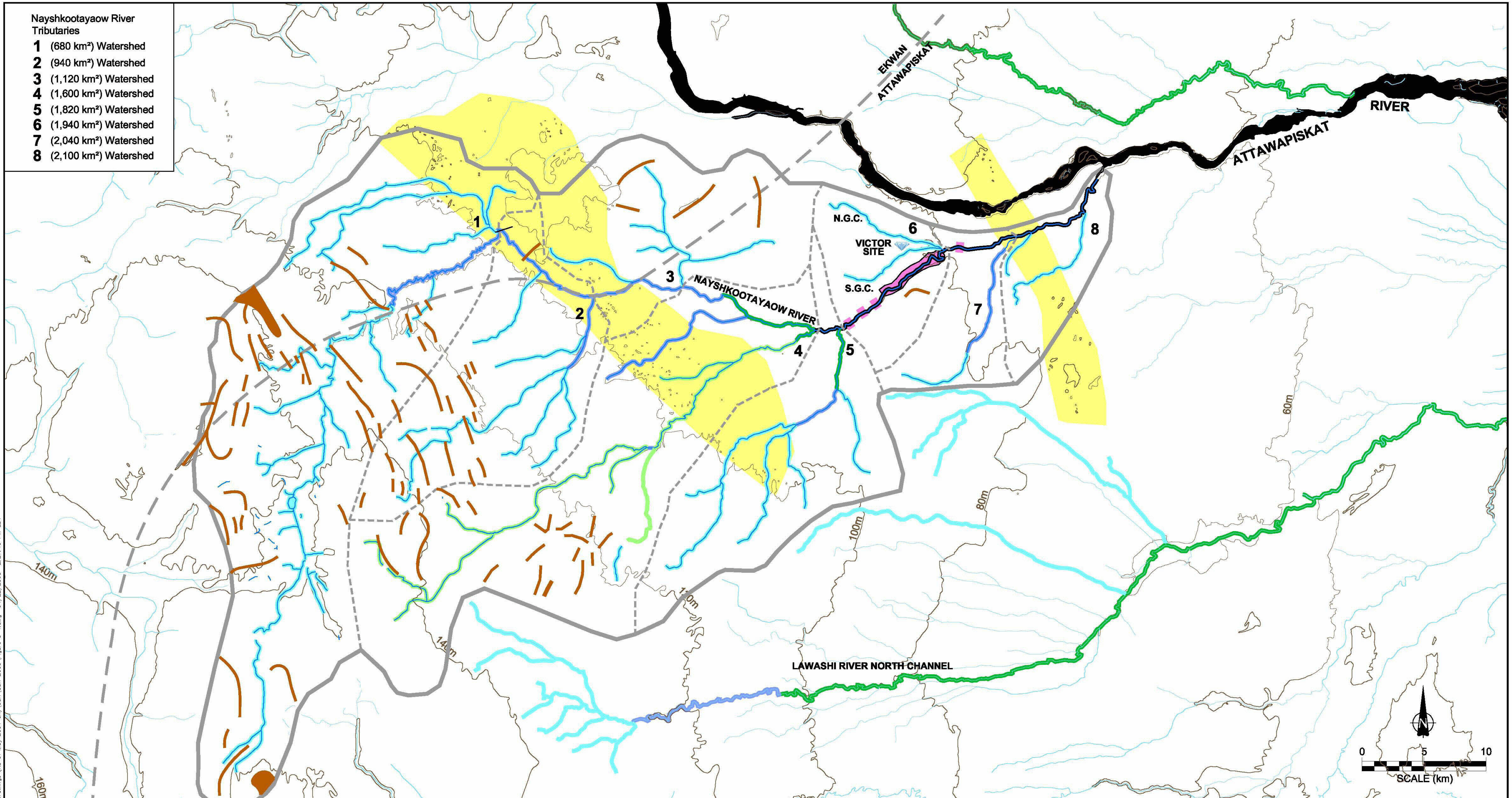

LEGEND:

- Bioherm Zones
- Approximate Frequent Limestone Outcrop Zone
- Approximate Infrequent Limestone Outcrop Zone
- Approximate Geological Boundary Between Attawapiskat and Ekwan Formations
- Nayshkootayaow River Watershed
- Sub Watersheds
- Burried Beach Ridges or Glaciolacustrine Deposits
- N.G.C. North Granny Creek
- S.G.C. South Granny Creek

KEY	FISH SPECIES (observed and inferred)	CHANNEL DESCRIPTION	SUBSTRATE TYPE	VEGETATION
	PIKE, BROOK TROUT, SUCKER, CYPRINIDS	UNCONFINED TO OCCASIONALLY CONFINED CHANNEL WITH HIGH SINUOSITY	ORGANIC MUCK WITH OCCASIONAL SILTS AND SANDS UNDERLAINED BY SILTY CLAY OR CLAYEY SILT. LOWER REACHES MAY HAVE PREDOMINANT SAND AND GRAVEL ERODED FROM SURICIAL BEACH DEPOSITS	DOMINANT BLACK SPRUCE AND TAMARACK AND ALDER WITH DEAD BLACK SPRUCE AND GRASSES IN NEAR SHORE AND LITTORAL ZONE
	PIKE, WALLEYE, BROOK TROUT, SUCKER, CYPRINIDS	FREQUENTLY CONFINED, RIFFLE-POOL, MODERATE SINUOSITY	MAINLY ERODED SURFICIAL SANDS AND GRAVELS WITH TRACES OF COBBLE. INTERMITTENT BEDROCK EXPOSURE IN MID TO LOWER REACHES OF THE MAINSTEM RIVERS	DOMINANT BLACK SPRUCE AND ALDER IN NEAR SHORE ENVIRONMENTS
	PIKE, SUCKER, CYPRINIDS	UNCONFINED UPPER REACHES TO CONFINED LOWER REACH.	ORGANICS IN UPPER REACH WITH INCREASING SANDS AND GRAVELS WITH TRACES OF COBBLE CLOSER TO MAIN RIVER.	DOMINANT BLACK SPRUCE AND ALDER IN NEAR SHORE ENVIRONMENTS
	PIKE, WALLEYE, SUCKER, CYPRINIDS, OCCASIONAL BROOK TROUT.	CONFINED, IRREGULAR MEANDERING, LARGE CHANNEL WITH RIFFLE-POOL MORPHOLOGY	PREDOMINANTLY SAND AND GRAVEL WITH A TRACE OF COBBLE AND INSTREAM BOULDER	PREDOMINANT BLACK SPRUCE WITH SOME POPLAR AND ALDER WITH NEAR SHORE GRASSES
	PIKE, WALLEYE, WHITEFISH, STURGEON, SUCKER, CYPRINIDS, OCCASIONAL BROOK TROUT	MODERATELY ENTRENCHED AND CONFINED, RAPIDS AND FLATS WITH POOLS.	PREDOMINANTLY COBBLE / BOULDERS AND LIMESTONE BEDROCK WITH SOME SANDY GRAVEL SECTIONS	BLACK SPRUCE AND POPLAR MIX WITH GRASSES IN NEAR SHORE AND LITTORAL ZONES

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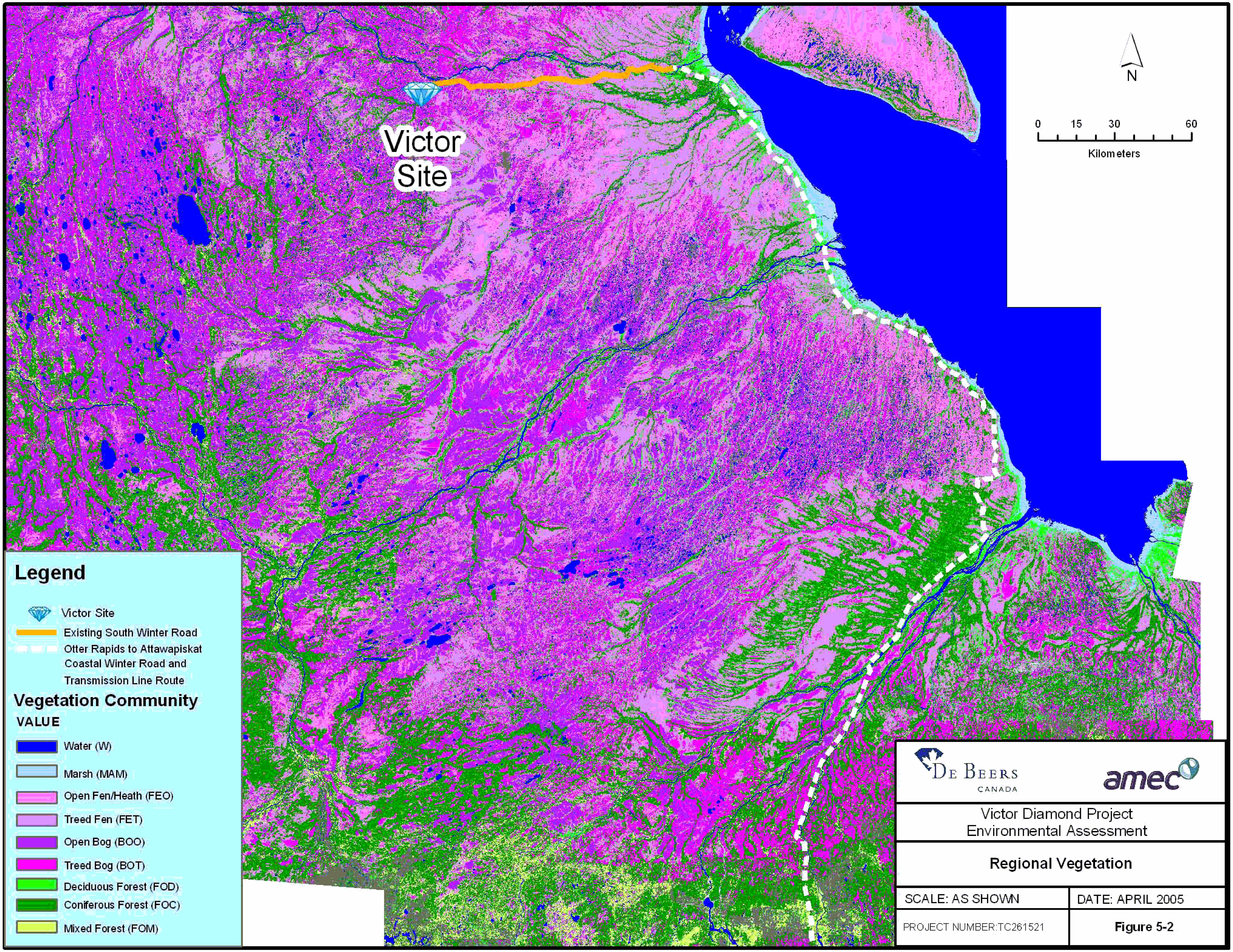
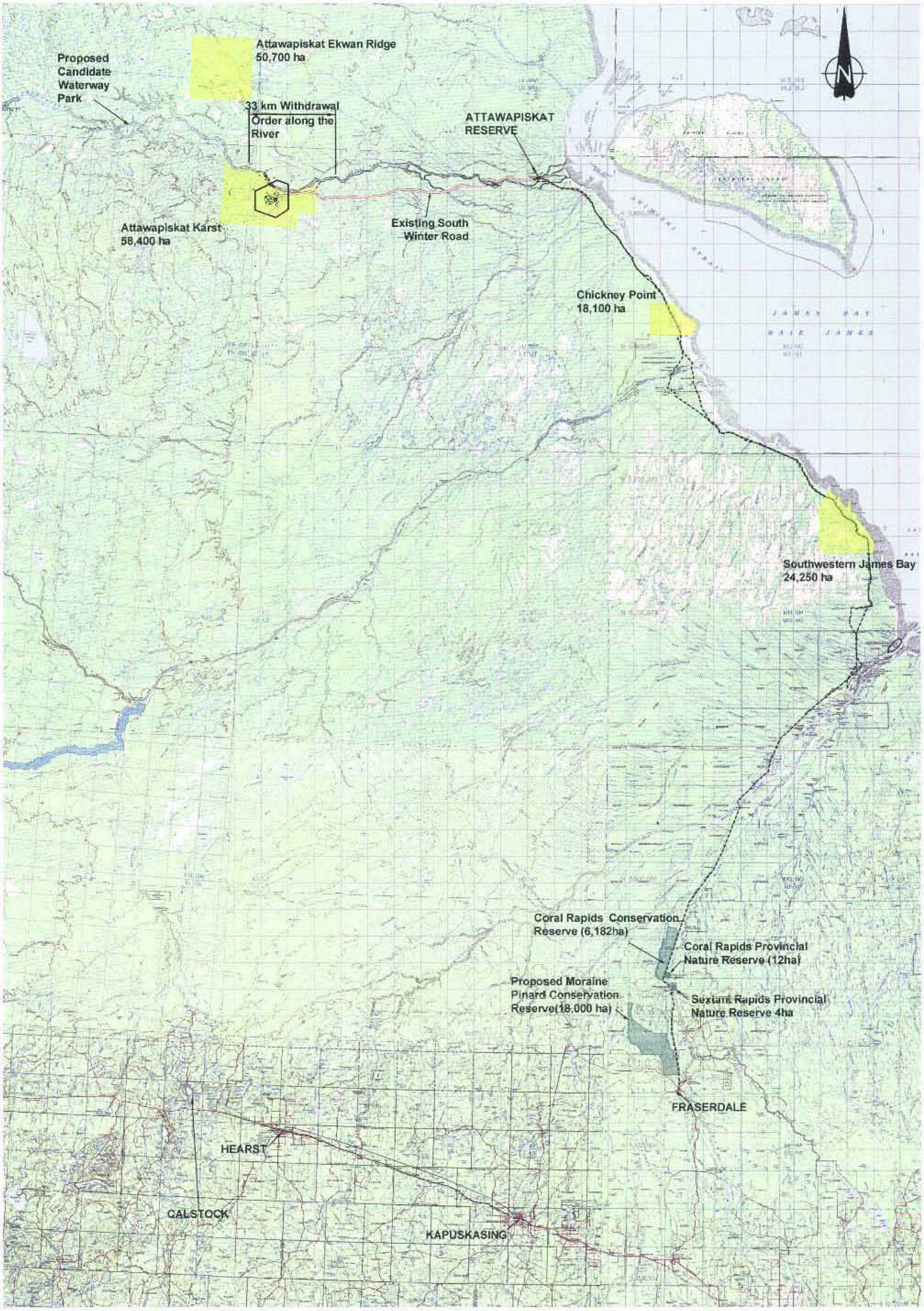
Victor Diamond Project
Environmental Assessment

General Fisheries Communities and Watershed Habitat Conditions

SCALE: AS SHOWN
DATE: APRIL 2005
PROJECT NUMBER: TC261521
Figure 5-1


Victor Site
N
0 15 30 60
Kilometers
Legend
Victor Site
Existing South Winter Road
Otter Rapids to Attawapiskat Coastal Winter Road and Transmission Line Route
Vegetation Community
VALUE
Water (W)
Marsh (MAM)
Open Fen/Heath (FEO)
Treed Fen (FET)
Open Bog (BOO)
Treed Bog (BOT)
Deciduous Forest (FOD)
Coniferous Forest (FOC)
Mixed Forest (FOM)
DE BEERS CANADA
amec
Victor Diamond Project
Environmental Assessment
Regional Vegetation
SCALE: AS SHOWN
DATE: APRIL 2005
PROJECT NUMBER:TC261521
Figure 5-2



CANDIDATE AREA OF NATURAL AND SCIENTIFIC INTEREST (CANDIDATE ANSI)

PROVINCIAL PARK

PROPOSED CANDIDATE WATERWAY PARK

COASTAL WINTER ROAD AND TRANSMISSION LINE

EXISTING SOUTH WINTER ROAD

DE BEERS CANADA

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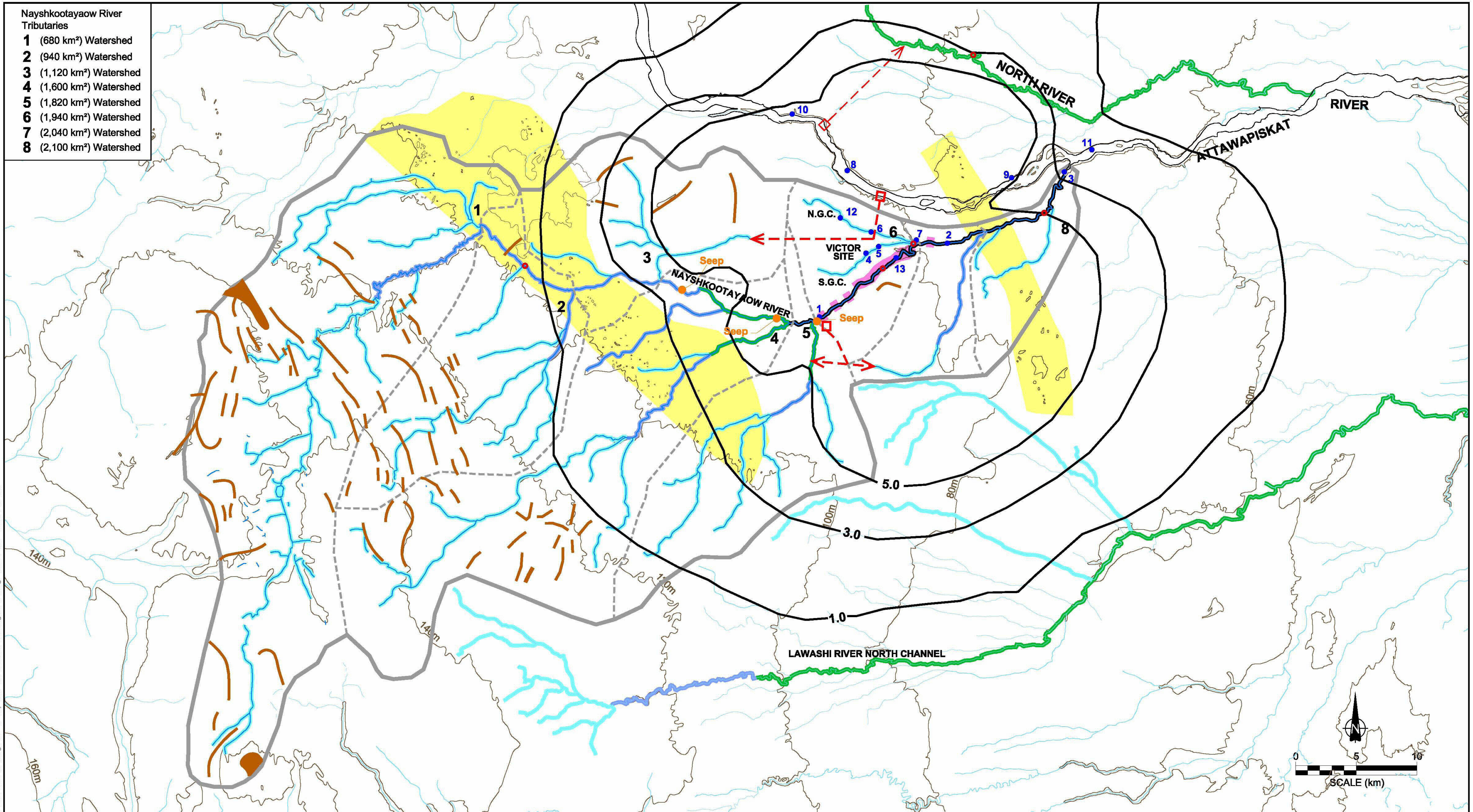
Victor Diamond Project
Environmental Assessment

Project Area Natural Heritage Values

SCALE: 1:1000	DATE: APRIL 2005
PROJECT NUMBER: TC281521	**Figure 5-3**



C0803-479

LEGEND:

- Bioherm Zones
- Approximate Frequent Limestone Outcrop Zone
- Approximate infrequent Limestone Outcrop Zone
- Nayshkootayaow River Watershed
- Sub Watersheds
- Burried Beach Ridges
- Flow Supplimentation Lines
- Supplimentation Pump Station

Sulphate Concentrations (as Regional Groundwater Indicator)

- SO_4 = 0 - 1 mg/L
- SO_4 = 1 - 5 mg/L
- SO_4 = 5 - 10 mg/L
- SO_4 = 10 - 15 mg/L
- Bedrock Aquifer Drawdown Contours (m)
- Groundwater Seep
- Flow Monitoring Stations (5)

N.G.C. North Granny Creek
S.G.C. South Granny Creek

Water Quality Monitoring Stations

1. Nayshkootayaow River Upstream of Site
2. Nayshkootayaow River Downstream of Site
3. Nayshkootayaow River Upstream of Confluence with Attawapiskat River
4. South Granny Creek Upstream of Site
5. South Granny Creek Downstream of Site
6. North Granny Creek
7. Granny Creek Confluence
8. Attawapiskat River Upstream of Site
9. Attawapiskat River Downstream of Site
10. Attawapiskat River Upstream #2
11. Attawapiskat River Downstream of Nayshkootayaow River
12. North Granny Creek Upstream #2
13. Nayshkootayaow River Downstream of Site but upstream of Granny Creek

DE BEERS CANADA amec

Victor Diamond Project
Environmental Assessment

Expected Well Field Drawdown Contours in Relation to Nayshkootayaow River System

SCALE: AS SHOWN	DATE: APRIL 2005
PROJECT NUMBER: TC26152	**Figure 6-1**

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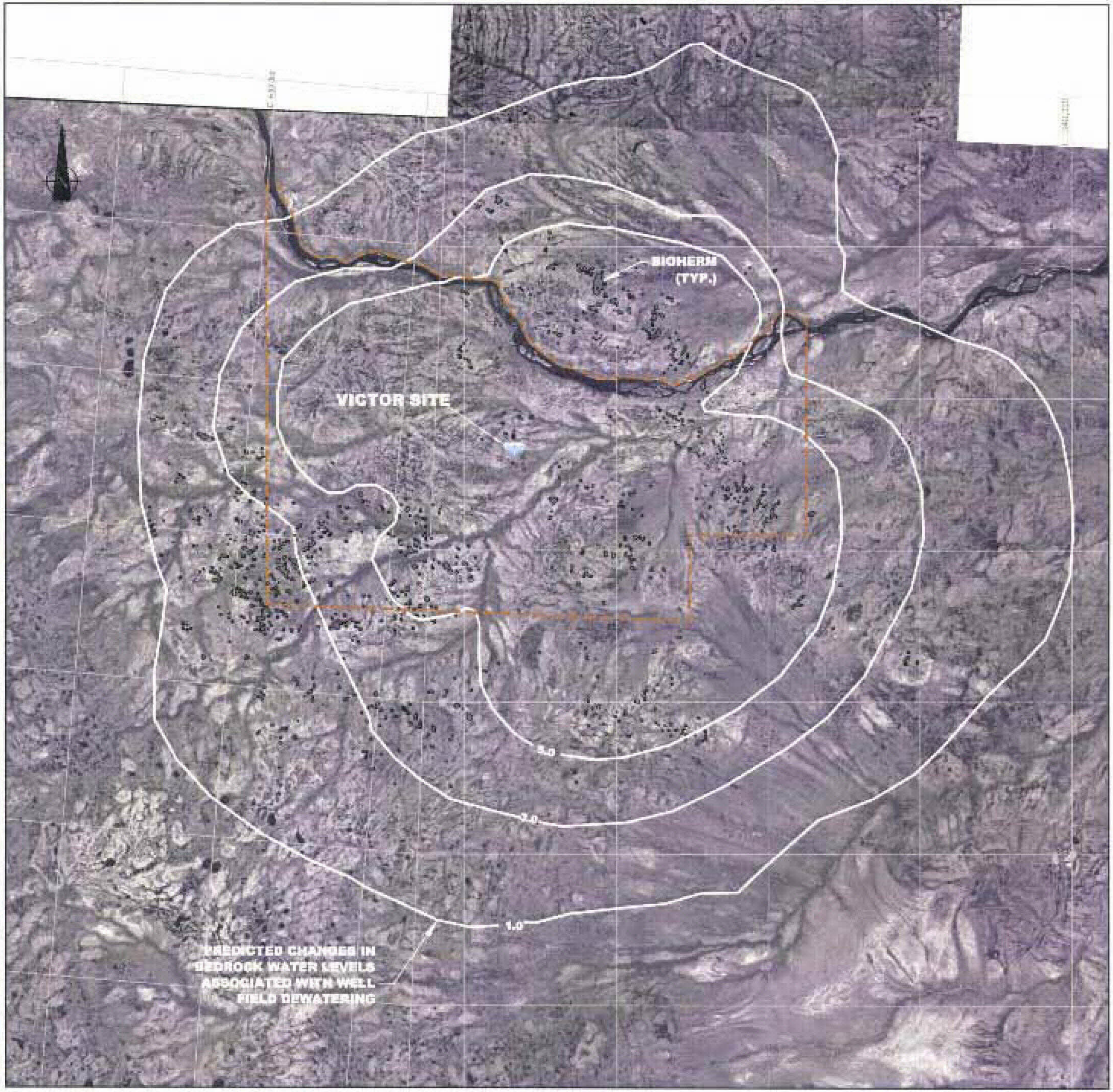

LEGEND:

Predicted Well Field Drawdown Contour

Bioherm

Approximate Boundary of the Candidate Attawapiskat Karst ANSI

0 5 10

SCALE (km)

DE BEERS CANADA

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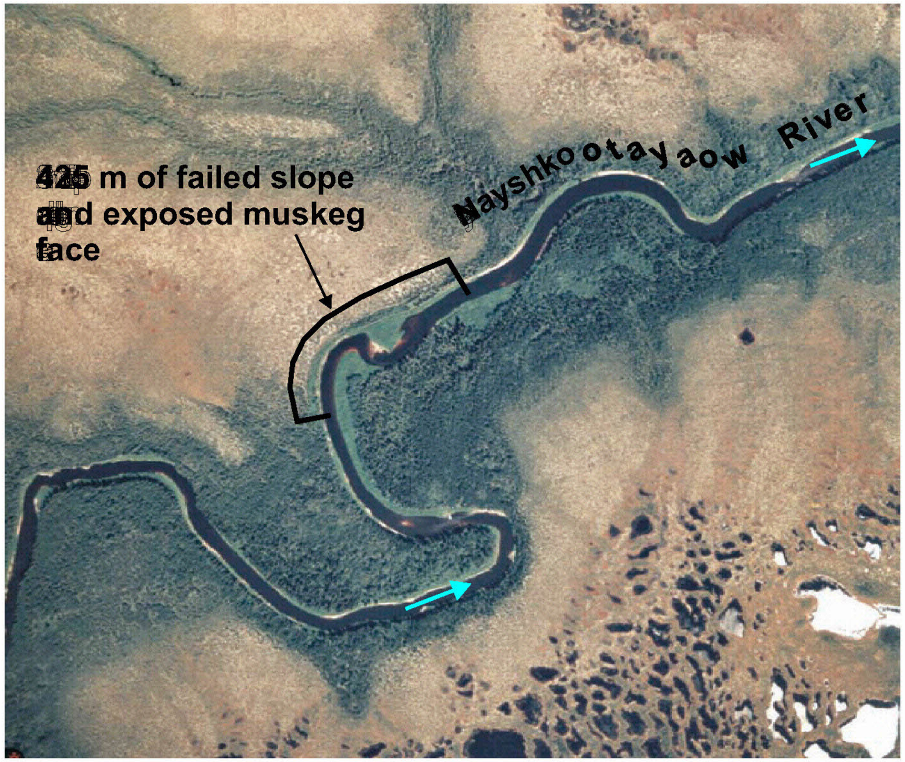
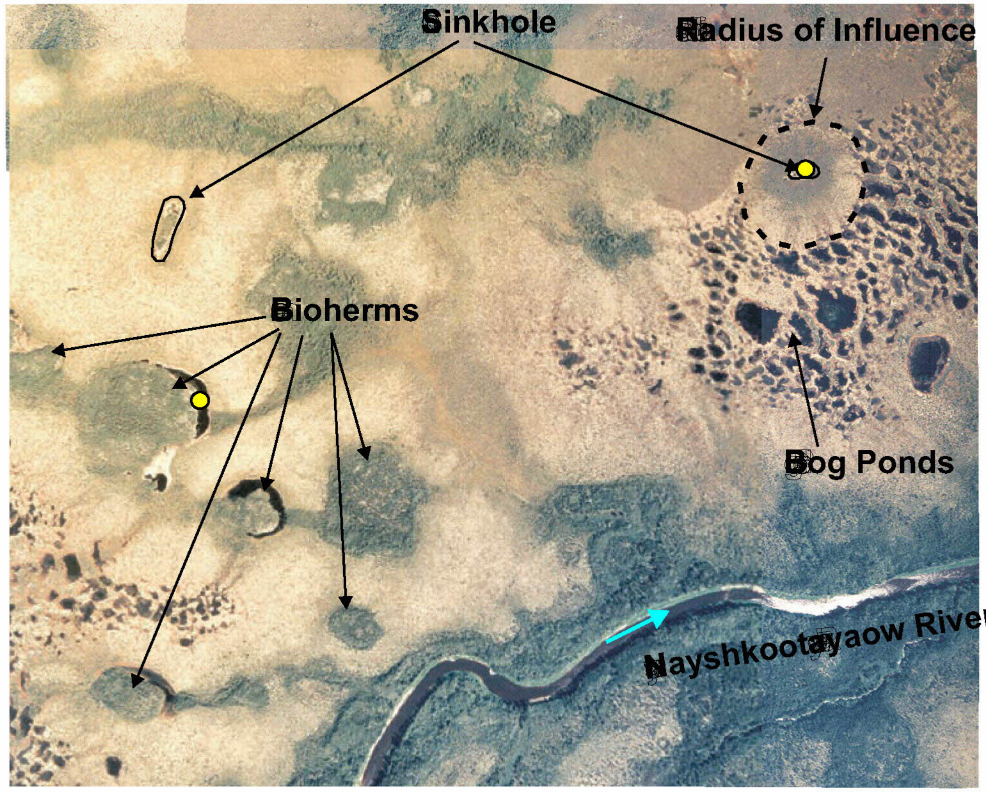
Victor Diamond Project
Environmental Assessment

Confirmed & Probable Bioherm Features in the Victor Mine Project

SCALE: AS SHOWN	DATE: APRIL 2005
PROJECT NUMBER: TC26152	**Figure 6-2**





N

Legend

- Water Quality Monitoring Location

0 100 300 500m
SCALE

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Victor Diamond Project
Environmental Assessment

Natural Drainage Effects (Sinkhole, Bioherm and Failed Riverbank) on Muskeg Systems

SCALE: 1:16,666	DATE: APRIL 2005
PROJECT NUMBER: TC26152	Figure 6-3

R:\EARD\PROJECTS\TC26152 (De Beers Environmental 2002-2003)\Drawings (As of May 2004 on)\CSR\CSR 2005\Figure 6-3.cdr

APPENDIX A

GUIDELINES FOR THE CONDUCT OF A COMPREHENSIVE STUDY AND THE PREPARATION OF THE DRAFT COMPREHENSIVE STUDY REPORT

Gouvernement du Canada
Government of Canada

VICTOR DIAMOND PROJECT
DE BEERS CANADA EXPLORATION INC.

Guidelines for the Conduct of a Comprehensive Study and the Preparation of a Draft Comprehensive Study Report

Issued by: Environment Canada • Natural Resources Canada
Fisheries and Oceans Canada • Indian and Northern Affairs
Canada • in collaboration with Health Canada

February 26, 2004

Canada

C0803-483

Table of Contents

1. Introduction

1.1 BACKGROUND

In May 2002, De Beers Canada Exploration Inc. (De Beers) submitted a prospectus to the Department of Fisheries and Oceans (DFO) regarding the Victor diamond project. The project consists of the construction, operation and decommissioning of an open-pit diamond mine and associated ancillary facilities, located 90 kilometres west of the Attawapiskat First Nation.

DFO announced that it would likely be a responsible authority (RA) under Section 5 of the *Canadian Environmental Assessment Act* (CEAA) pursuant to its responsibilities under the *Fisheries Act* and/or the *Navigable Waters Protection Act*. In June 2002, DFO circulated the project information to federal authorities (FAs) that may also have an interest in the project. As a result, Natural Resources Canada (NRCan) announced that it would be an RA as a result of its responsibilities under the *Explosives Act*. Indian and Northern Affairs Canada (INAC) indicated it would likely be an RA if land tenure supported by a Band Council resolution was requested by the proponent for any facilities located on reserve lands. Health Canada (HC) indicated that it would provide information or knowledge as an expert FA.

Information provided by the proponent on October 8, 2003, led Environment Canada (EC) to declare that it would also likely be an RA for the project through its responsibilities under the *Canadian Environmental Protection Act*.

The Department of Human Resources and Skills Development has indicated that it may have a funding trigger for training with respect to the Victor project and may become an RA if it is determined that training is required to enable the project to go forward.

The mandates of the RAs are as follows:

Fisheries and Oceans Canada

DFO is the lead federal government department responsible for developing and implementing policies and programs in support of Canada's economic, ecological and scientific interests in oceans and inland waters. This mandate includes responsibility for the conservation and sustainable use of Canada's fisheries resources while continuing to provide safe, effective and environmentally sound marine services that are responsive to the needs of Canadians in a global economy.

DFO protects and conserves marine and freshwater habitat, establishes fishery management plans, develops conservation and protection policies, and implements programs to provide for the sustainable use of Canada's marine resources. DFO also provides leadership on the development and implementation of an Oceans Management Strategy and a national system of marine protected areas, integrated coastal zone management, and marine environmental quality programs.

For the Victor project, DFO's primary responsibility is ensuring that the habitat protection provisions of the *Fisheries Act* are upheld. As proposed, the Victor project will require authorizations for the destruction of fish habitat. This is prohibited unless authorized by DFO pursuant to Section 35(2) of the *Fisheries Act*. In keeping with the Department's *Policy for the Management of Fish Habitat* (DFO 1986), no authorizations will be issued unless acceptable measures to compensate for the habitat loss are developed and implemented by the proponent. Furthermore, no authorizations will be issued in cases where the loss of a specific habitat type is considered unacceptable. Section 35(2) authorizations of the *Fisheries Act* is a Law List trigger under Section 5(1)(d) of the *Canadian Environmental Assessment Act* (CEAA).

The project components requiring authorizations include: dredging and sediment disposal within James Bay, dredging within Attawapiskat for a barge handling facility, in-stream works required at several unnamed stream crossings along winter roads, alterations to Attawapiskat River required for inlet and outlet structures, in-stream works required for North Granny Creek for road construction, destruction of fish habitat within muskeg ponds, realignment of South Granny Creek, and the dewatering of the Nayshkootayaow River.

Natural Resources Canada

NRCan is a federal government department specializing in the sustainable development and use of natural resources, including energy, minerals and metals, forests, and earth sciences. The Department deals with natural resource issues that are important to Canadians. NRCan looks at these issues from both a national and international perspective, using its expertise in science and technology, policy and programs. How our land and resources are managed today will determine the quality of life for Canadians, both now and in the future.

NRCan provides four main services to Canadians. It conducts leading-edge science and technology to provide Canadians with ideas, knowledge and technologies. This helps Canadians use their country's resources wisely, reduce costs, protect the environment, and create new products and services. NRCan builds and maintains a national knowledge infrastructure on Canada's land and resources so that all Canadians can easily access the latest economic, environmental and scientific information. NRCan ensures that federal policies and regulations on issues such as the environment, trade, the economy, Canadian land, and science and technology enhance the natural resource sector's contribution to the economy. At the same time, NRCan ensures that these policies and regulations protect the environment and the health and safety of Canadians. Together with international agencies and other nations, NRCan promotes Canada's international interests. This helps Canada meet its commitments related to natural resources and keeps access open to global markets for Canadian products, services and technology.

For the Victor project, NRCan has a regulatory trigger under Section 5(1)(d) of the CEAA. The Law List trigger is section 7(1)(a) of the *Explosives Act*, which requires that a licence be issued for an explosives factory or magazine.

Environment Canada

EC's mandate is determined by the numerous statutes, regulations, guidelines, policies and related programs that it administers. The Department has general responsibility for environmental management and protection, extending to all matters over which Parliament has jurisdiction and that have not, by law, been assigned to any other department, board or agency of the Government of Canada. This specifically relates to the preservation and enhancement of the quality of the natural environment (e.g., water, air, soil); renewable resources, including migratory birds and other non-domestic flora and fauna; water; meteorology; and the coordination of federal policies and programs with respect to the preservation and enhancement of the quality of the natural environment.

For the Victor project, EC has a regulatory trigger under Section 5(1)(d) of the CEAA. The Law List trigger is Section 127(1) of the *Canadian Environmental Protection Act, 1999,* which requires a permit for the disposal of dredged sediments in marine waters in James Bay.

Indian and Northern Affairs Canada

INAC's key objective is to create a better quality of life for First Nations, Inuit and Northerners. This is consistent with the Government of Canada's goal of improving the quality of life for all Canadians and with the commitments made in the Speech from the Throne. In general, INAC has primary, but not exclusive, responsibility for meeting the federal government's Constitutional, treaty, political and legal responsibilities to First Nations, Inuit and Northerners.

INAC is responsible for two separate yet equally important mandates: Indian and Inuit Affairs and Northern Affairs. These responsibilities encompass a broad range of services and INAC works collaboratively with First Nations, Inuit and Northerners, as well as with other federal departments and agencies, provinces and territories.

Indian and Inuit Affairs' primary role is to support First Nations and Inuit in developing healthy, sustainable communities and in achieving their economic and social goals.

Northern Affairs is the principal group responsible for meeting the federal government's Constitutional, political and legal responsibilities in the North. With legislative and policy authority over most of the North's natural resources, INAC is the custodian and resource manager for an area occupying 40 percent of Canada's land mass.

INAC's role in the Victor environmental assessment (EA) is as a likely responsible authority due to the potential issuance of *Indian Act* land tenure instruments for activities or facilities that may be proposed on the Attawapiskat #91A and potentially Kashechewan (Fort Albany #67) First Nation reserves.

Health Canada

Health Canada's mission is to improve the health of all of Canada's people while respecting individual choices and circumstances. To this end, Health Canada has developed programs, expertise, knowledge and resources to help maintain a safe environment for Canadians, addressing air quality, water quality, soil contamination, effects on food supply, toxic management, and the use of and exposure to chemicals and radiation-emitting devices, as well as a wide range of workplace health and safety issues.

The Environmental Assessment Services Office at Health Canada provides direction on all activities carried out under the CEAA. It is the primary responsibility of this office to ensure that human health is a component of environmental assessment.

Project History

On August 1, 2002, the Attawapiskat First Nation (AttFN) wrote to the Ministers of DFO, EC and INAC informing them that they had terminated the existing Memorandum of Understanding for the advanced exploration work with De Beers. The AttFN also requested that federal authorities not proceed with any ongoing permit or regulatory approvals related to the project and that the EA process for the project not commence until it resolved its issues with De Beers.

In October 2002, the AttFN reached an agreement with De Beers to allow the company to conduct its winter work program and continue its feasibility study. De Beers and the AttFN agreed to enter into negotiations on an Impact Benefits Agreement.

In March 2003, De Beers provided an updated project description to federal authorities. In April 2003, De Beers met with federal authorities to present the project and discuss the EA process issues. In May 2003, De Beers submitted a preliminary draft environmental assessment report to the provincial agencies and federal authorities.

In the summer of 2003, federal authorities initiated internal discussions on the project to be scoped and the EA process. On September 19, 2003, NRCan wrote a letter to De Beers explaining that it had assumed the position of the lead RA and that the EA of the project had commenced.

Based on information received to date, a comprehensive study is required for the project.[1] The *Canadian Environmental Assessment Act Comprehensive Study List Regulations* apply to three components of the proposed project:

- construction of a facility for the extraction of 200 000 m^3 per year of groundwater (s. 10);
- construction of an oil pipeline more than 75 km in length on a new right-of-way (s. 14); and
- construction of an all-season runway with a length of 1500 m or more (s. 29).

1.2 PURPOSE OF THE GUIDELINES

These guidelines provide instructions to De Beers for the conduct of a comprehensive study and for the preparation of a draft Comprehensive Study Report (CSR). They are designed to ensure that the appropriate information is provided to the Government of Canada to allow it to make a determination on the likelihood of the project to cause significant adverse environmental effects. The guidelines were prepared based on the project description provided by De Beers in November 2003 and any other relevant information.

The guidelines also provide the scope of the project and the scope of assessment determination of the RAs in consultation with the expert federal authority (FA). In addition, should an issue arise through the review that the RAs believe should be addressed, De Beers will be required to respond to these additional information requests.

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[1] As the environmental assessment of this project commenced prior to October 30, 2003, the RAs are proceeding under the *Canadian Environmental Assessment Act* (1992) as opposed to the *Canadian Environmental Assessment Act (2003)* due to the transition clause in Section 33 of the *Act to Amend the Canadian Environmental Assessment Act*. This clause allows EAs of projects that commenced prior to the coming into force of the amended CEAA to proceed under the 1992 CEAA.

1.3 COORDINATION OF FEDERAL AND PROVINCIAL ENVIRONMENTAL ASSESSMENTS

A number of components of the Victor project will require regulatory approvals from provincial agencies, including the Ministry of Natural Resources, the Ministry of the Environment, and the Ontario Energy Board. These agencies require that an EA be conducted under the Ontario *Environmental Assessment Act* before their respective approvals can be granted. To the extent possible, the comprehensive study will incorporate the provincial EA documentation needs so that De Beers is only required to conduct one EA to meet the requirements of both jurisdictions. However, De Beers should be advised that there will be additional requirements for the provincial environmental assessments. As well, federal authorities will work with the provincial agencies to determine the feasibility of coordinating, with respect to public participation, review of documentation, responsibility of mitigation, and communication of EA decisions.

2. Scope

2.1 SCOPE OF THE PROJECT

The RAs, in consultation with the expert FA, are responsible for defining the scope of the project according to Section 15 of the CEAA.

The most current project information available from De Beers indicates that the project components where RAs have a decision-making responsibility include:

- an explosives manufacture and storage facility;
- the harmful alteration, disruption or destruction of fish habitat in North and South Granny Creek, the Attawapiskat and Nayshkootayaow rivers, muskeg ponds, and James Bay, as well as other water bodies that may be affected by the project;
- project facilities constructed on First Nations reserve lands that require a land tenure instrument; and
- dredged material disposal in James Bay.

The RAs, in consultation with the expert FA and the Canadian Environmental Assessment Agency (Agency), and with the input of First Nations communities (Attawapiskat, Fort Albany, Kashechewan and Moose Factory), have made a determination that the scope of the project for the purpose of the EA will include the construction, operation, modification, decommissioning, closure or other undertaking in relation to the following physical works:

- access roads, including winter roads from Attawapiskat to the mine site, a winter road from Moosonee to Attawapiskat, the west winter road, and any new access roads to be constructed within the community of Attawapiskat;
- an accommodation complex;
- aggregate topsoil and muskeg storage facilities, and excavation areas such as pits and quarries;
- an airstrip and any proposed modification to the existing airport facilities, barge handling and staging areas, including any docks, wharves, piers or proposed modifications to existing infrastructure;
- a facility for the manufacture, storage and handling of explosives;
- a fuel pipeline and associated infrastructure;
- fuel storage and handling areas;
- kimberlite processing and management facilities;
- lay-down areas, including container storage areas;
- mine rock storage facilities;
- mine water management facilities;
- an open pit;
- chemical storage facilities;
- sewage facilities;
- utility area-power house (diesel generators), other power generation facilities and electricity transmission towers/line;
- water inlet, outlet, sump, pumps and diversion structures;
- all waste management facilities, including incinerators and off-site disposal;
- a work camp and visitor's centre;

- workshops, warehouses and administration complexes;
- an emergency response facility;
- fencing, lighting, and other required buildings and infrastructure; and
- berms, dams, erosion control structures.

The scope of the project also includes a number of physical activities associated with these physical works, including the following:

- water, waste, aggregate, chemical, explosives, resource, processed kimberlite and waste rock handling, storage and disposal, as appropriate;
- shipping and transportation;
- fuel storage, fuel handling and transfer (including James Bay and Attawapiskat);
- dredging and dredgeate disposal and handling;
- relocation of South Granny Creek;
- Nayshkootayaow River flow supplementation;
- reclamation;
- environmental data collection; and
- aircraft and helicopter movements.

2.2 SCOPE OF THE ASSESSMENT

The RAs, in consultation with the FA, are responsible for defining the factors to be considered in the EA, pursuant to Section 16 of the CEAA, and the scope of those factors.

The factors and the scope of the factors together constitute the scope of the EA.

Every comprehensive study of a project shall include consideration of the following factors:

- 16(1)(a): environmental effects of the project, including malfunctions or accidents and cumulative environmental effects;
- 16(1)(b): significance of effects referred to in Section 16(1)(a);
- 16(1)(c): comments from the public;
- 16(1)(d): mitigation measures that are technically and economically feasible
- 16(1)(e): any other matter the responsible authority or the Minister, after consulting with the responsible authority, may require;
- 16(2)(a): purpose of the project;
- 16(2)(b): alternative means of carrying out the project that are technically and economically feasible and the environmental effects of the alternative means;
- 16(2)(c): the need for and the requirements of a follow-up program; and
- 16(2)(d): the capacity of renewable resources to meet the needs of the present and future.

3. Comprehensive Study and Comprehensive Study Report

Pursuant to Section 17(1) of the CEAA, the RAs have delegated the conduct of the comprehensive study and the preparation of the draft Comprehensive Study Report (CSR) to De Beers under the direction of the RAs.

3.1 COMPREHENSIVE STUDY

The EA for the Victor diamond project will be a comprehensive study. The RAs require that the comprehensive study be undertaken using an ecosystem approach and that De Beers set out its understanding of such an approach to environmental assessment. The RAs also require that the comprehensive study be conducted in a manner consistent with the Government of Canada's sustainable development and precautionary approach principles.

The level of detail, types of reports and amount of information required as part of the comprehensive study are different than those required in the CSR. The comprehensive study will require submission of all supporting information, data and reports. De Beers may be required to translate English-language documents, summaries and/or correspondence into other languages throughout the comprehensive study for public and First Nations participation purposes.

3.2 COMPREHENSIVE STUDY REPORT

The CSR is the document that the RAs will submit to the Agency and to the Minister of the Environment at the end of the assessment. The RAs will determine if the project is likely to cause significant adverse environmental effects based on Section 16(1)(a) and the definition of environmental effects in the CEAA. Information and conclusions on the significance of adverse environmental effects for factors considered pursuant to Section 16(1)(e) of the CEAA will be used, as appropriate, for the purposes of considering justification and of promoting public understanding of the project as a whole.

A CSR is a stand-alone document that allows the reader to understand the essential details of the project components, the environmental components, and the nature of the potential interactions of the two. The reader should be able to understand and support or challenge the conclusions as presented. The Agency will make this document available to the public for comment and the Minister will then take a course of action based upon the CSR and public comments in respect of the project.

Pursuant to Section 23 of the CEAA, the Minister may determine that the project is not likely to cause significant adverse environmental effects with the implementation of any appropriate mitigation measures and refer the project back to the RAs so they can proceed with the regulatory phase of their decision-making. If it is uncertain or if it is likely that the project will cause significant adverse environmental effects that may be justified, the Minister will refer the project to a review panel or mediator for further assessment.

De Beers may begin to prepare the draft CSR as the essential details and results of the assessment are submitted to and accepted by the RAs. The CSR will include a plain-language executive summary suitable for community and general public use. De Beers shall be required to translate the final draft CSR into French and may be requested to translate a plain-language executive summary or other portion of the document into Cree and/or other Aboriginal languages for the purpose of public and First Nations participation.

3.3 PUBLIC REGISTRY

The reports, documents and other information generated, exchanged or received as part of this EA will be available on a public registry file maintained by NRCan. De Beers and all other participants in the process must ensure that they send a copy of all documentation related to the EA to the NRCan public registry to maintain the completeness of the registry. If NRCan is not the intended recipient or copied directly on record, the record should be sent to the registry at:

Penny Anderson
Mineral and Metal Policy Branch
Minerals and Metals Sector
Natural Resources Canada
580 Booth Street, 10B2
Ottawa, Ontario K1A 0E4

Telephone: 1-888-337-5094
E-mail: victor-project@nrcan.gc.ca

The primary public registry will be maintained at the above location; however, it has been determined that satellite public registry locations would be of value to facilitate the review of this project. As a result, satellite locations will be established in Attawapiskat and in Timmins. These locations will be announced once the comprehensive study is available for review. As well, the public registry document list will be made available on a web site. The web site address will be announced once it is determined where it will be located.

4. Participation Plan

The RAs intend to undertake a participation program as part of the EA process. To that end, a participation plan is being developed that outlines the nature of the public and First Nations participation process and will include, but not be limited to:

- goals and objectives of the public and First Nations participation;
- identification of parties involved in the public and First Nations participation;
- roles and responsibilities of the parties involved in the public and First Nations participation;
- methodology to be followed for the public and First Nations participation; and
- process for responding to information gathered through the public and First Nations participation.

The participation plan will form part of the federal government's broader regulatory-phase consultations with First Nations. The participation plan will be sent to First Nations for their input once a draft has been created. A consultation plan will be developed subsequent to the participation plan to address the broader regulatory requirements.

The following is a summary of the participation plan.

COMPREHENSIVE STUDY

As part of the federal authorities' participation plan, De Beers will develop a participation plan in consultation with federal authorities that will include establishing meetings with the five directly affected First Nations and their councils (Attawapiskat First Nation, Fort Albany First Nation, Kashechewan First Nation, Moose Cree First Nation, the Mocreebec Council of the Cree Nation, the Mushkegowuk Council and the Nishnawbe Aski Nation) and any other community that expresses an interest in having meetings. Federal representatives may also attend these meetings. The Province will determine if it should also attend these sessions. Any meeting held with Aboriginal communities will include a local translator to assist in the communication of information. When requested or when it becomes required, De Beers will schedule technical meetings to address specific issues or concerns. De Beers shall include in the comprehensive study (CS) a detailed description of the consultations it has undertaken to date and report on the concerns and issues raised in these sessions and how they have been addressed.

De Beers will place notices in the local papers and on radio (as determined by the participation plan) announcing that the CS is available and how to obtain copies. De Beers will send the required number of complete sets of documents (including all supporting documents) to the federal and provincial reviewers. In addition to the federal and provincial governments, De Beers will send as many copies of the CS as requested to the five directly affected First Nations (listed above), the six other regional First Nations (Flying Post, Constance Lake, Nibimamik, Weenusk, Webequie, and Marten Falls First Nations) and to three non-Aboriginal communities (Timmins, Cochrane and Moosonee). Copies of the CS will be placed on the public registry and will be provided by De Beers upon request. A draft summary/presentation shall be presented in Cree where appropriate. De Beers should ensure that documents are available upon request and that all documents are sent to participants as they are requested.

The public comment period on the CS will be for 60 days. During that time, written comments will be received by the CEA Agency in Toronto (address and contact to be placed in letters and newspapers as part of the communication plan) and any meetings that are requested by communities and First Nations will be held. Should any major deficiencies be identified, De Beers will be expected to address them as they arise and, if required, to submit additional information for review.

COMPREHENSIVE STUDY REPORT

Once the RAs, in consultation with federal authorities, are in agreement that the comprehensive study meets the guidelines, they will work with De Beers on the preparation of a draft Comprehensive Study Report (CSR). De Beers will submit the draft CSR to the RAs, who will finalize it to ensure that it reflects their determinations and recommendations and then submit it to the CEA Agency and the Minister of the Environment. Should there be unresolved issues that affect the First Nations, the RAs will discuss the CSR with the First Nations prior to the federal reviewers sending it to the Agency for final review.

The Agency will conduct a public comment period of appropriate length on the CSR before the Minister takes a decision on the next steps in the EA. The Agency will determine the public comment period plan for the review of the final CSR.

The Minister will make a final determination on the EA based on the CSR and on the comments received from the public during the Agency's public comment period.

5. Environmental Assessment Method

Explicit documentation on the assumptions, methods, models and information sources used, as well as information limitations and associated levels of uncertainty, should support all steps of the environmental assessment. The analysis should be quantitative where data are available or reasonably obtainable. Where data or models are lacking, best professional judgement or traditional/community knowledge may be used.

5.1 TRADITIONAL/COMMUNITY KNOWLEDGE

De Beers shall make all reasonable effort to collect and/or facilitate the collection of traditional/community knowledge relative to the proposed project. All traditional/community knowledge collection methods, data, and interpretations of that data must be collected and carried out in collaboration with and with the concurrence of Aboriginal communities and organizations. For reasons of confidentiality, De Beers shall only incorporate into the EA report those portions of traditional/ community knowledge that have met the express consent for release by the Aboriginal communities and organizations involved. Any use of traditional/community knowledge within the EA shall be carried out with the recognition that the intellectual property rights for that traditional/community knowledge remain with the Aboriginal parties involved.

Within the EA report, De Beers shall describe where and how traditional/community knowledge was used in describing the existing environment, the effect that it had on predicting effects, how it was used to determine the significance of effects, and how it was used to determine mitigation. Where traditional/community knowledge is not available, De Beers shall describe efforts taken to obtain it.

De Beers shall present both the scientific and traditional perspectives on predicted effects wherever both types of information are available.

De Beers shall present its understanding of the scientific and traditional/community knowledge concerning the environmental effects of the project wherever both perspectives are available. De Beers shall fully consider traditional/community knowledge, where appropriate, when predicting and assessing the effects of the project, and shall describe its understanding of the effect of traditional/community knowledge on understanding baseline conditions and on predicting the significance of environmental effects.

De Beers shall state how it intends to document traditional/community knowledge during the assessment in relation to traditional/community knowledge collection and use in project planning, design, management, mitigation, monitoring, and decommissioning.

The federal authorities undertaking this review recognize that traditional/community knowledge is the property of the First Nation or community and, as such, may contain data that are sensitive to that First Nation or community. The federal authorities will seek input from the First Nations and communities with respect to this information, and any conclusions or statements in the comprehensive study that are based on this knowledge will be discussed with the First Nations and communities to ascertain its validity.

5.2 SPATIAL AND TEMPORAL BOUNDARIES

The following two definitions shall be used when determining the spatial boundaries for the assessment:

- **Project Study Area**: The project study area will consist of the immediate geographical vicinity as determined by the RAs (land and water) that encompasses all physical works and activities proposed by the proponent for the Victor diamond project. This will include the mine site, the community of Attawapiskat (including Potato Island), all roads, the pipeline, facilities in or near Attawapiskat, the airstrip, the activities and roads near or along James Bay and the communities of Kashechewan, Fort Albany and Moose Factory, the shipping lane for diesel fuel in James Bay and Hudson Bay south of Belcher Islands' south tip around 55°40'N, and a fuel lightering site in James Bay.

- **Regional Study Area**: The regional study area will encompass the maximum geographical extent (zone of influence) in which impacts from the project may be incurred for each valued ecosystem component (VEC). The selection of VECs will be agreed upon between the proponent and the RAs. The geographical extent may vary depending upon the VEC or issue examined; however, each area will be defined and explained in the CS.

Temporally, De Beers shall assess the environmental effects of the proposed project for all phases of the project, including construction, operation, closure and post-closure. Sufficient detail to address the relevant effects on VECs over the entire temporal scope of the project shall be provided.

The following temporal boundary definitions shall be used in the assessment:

- **Immediate**: The duration of the proposed construction and operation of the mine site, and all physical works associated with the mine site.

- **Near Future**: The duration of the project from decommissioning of the mine site through all monitoring required for site closure; this period will be determined during the EA in consultation with federal and provincial agencies, the affected public and other stakeholders.

- **Far Future**: The duration over which long-term environmental and socio-economic effects may continue; predictions may be made at five-year intervals.

5.3 ALTERNATIVES MEANS OF CARRYING OUT THE PROJECT

Alternative means are the technically and economically feasible ways that the project can be implemented or carried out. These could include alternative locations, schedules, routes, methods of development, implementation and mitigation. De Beers must show how it has considered technically and economically feasible alternatives and their environmental implications in selecting its preferred option.

Examining alternative means of carrying out a project involves answering the following three questions:

- What are the feasible alternatives?
- What are the environmental effects associated with each feasible alternative?
- What is the rationale for selecting the preferred alternative?

An analysis of the alternatives may be most appropriately presented in tabular format, supplemented with text, to clearly show the relative advantages and disadvantages of each alternative based upon a set of pre-determined criteria. The comparison of alternatives should be quantifiable, where possible.

De Beers' analysis shall include consideration of the main project/production/technical alternatives, particularly those associated with:

- mining methods;
- project schedule;
- waste rock and processed kimberlite management;
- mine water management, treatment and disposal options;
- energy source, supply and routing (including power transmission);
- fuel shipping and routes (use of the Technical Review Process of Marine Terminal Systems and Transshipment Sites [TERMPOL] Review Process);
- decommissioning and reclamation;
- mine production rates;
- employee work scheduling;
- transportation and related infrastructure, including all-weather roads;
- dredging and dredged material disposal;
- waste management;
- fuel storage facility locations;
- barge handling and storage locations;
- mine production and processing rates;
- surface water intake and discharge locations;
- ground water management; and
- pipeline routing alternatives.

5.4 ENVIRONMENTAL EFFECTS OF THE PROJECT

The assessment must consider the environmental effects (both beneficial and adverse) of the project, including the environmental effects of malfunctions or accidents that may occur in connection with the project and any cumulative environmental effects from the project in combination with other projects or activities that have been or will be carried out. Environmental effects of the project are changes in the biophysical environment caused by the project, as well as effects that flow directly from those changes, including effects on human health, socio-economic conditions, physical and cultural heritage, including effects on things of archaeological, paleontological or architectural significance, and the current use of land and resources for traditional purposes by Aboriginal people. Environmental effects also include the effects of any changes to the project that may be caused by the environment.

The assessment should be focused on considering the potential effects of the project on valued ecosystem components. VECs are those identified as having a scientific, social, cultural, economic, human health or aesthetic value. The VECs proposed by De Beers will be reviewed by the RAs in the early phases of the EA in consultation with stakeholders.

5.5 MITIGATION MEASURES

The comprehensive study must identify technically and economically feasible measures that will mitigate the project's potential adverse environmental effects. For the purpose of the EA, each intervention, structure, preventive measure and corrective action or management measure must be presented in enough detail to give a clear understanding of the mitigation proposed. Additionally, each measure must be associated with a mechanism to ensure implementation. De Beers is to propose the regulatory, contractual or other instrument to be used to ensure mitigation. Traditional/community knowledge may be used to identify mitigation measures, as appropriate.

5.6 SIGNIFICANCE OF ENVIRONMENTAL EFFECTS

Clear conclusions by De Beers shall be presented on whether the adverse environmental effects, taking into account any mitigation measures, are significant, insignificant or uncertain. However, the federal authorities will make the final determination on significance. The methods used to determine significance must be clearly documented and the results of the determinations should be easily linked to these methods. All assumptions that entered into the determination of significance and the uncertainty or level of confidence that surrounds predictions made in the EA must also be documented. Dissenting opinions and information gaps should be reported.

A description of what would constitute a significant adverse environmental effect for each environmental component shall be presented.

The significance of residual effects determinations shall be described, as appropriate, in terms of the following criteria:

- magnitude;
- geographic extent;
- duration;
- frequency;
- reversibility;
- ecological context; and
- socio/cultural context.

Where a significant adverse environmental effect is predicted based on these criteria and in light of the description of what would constitute a significant adverse environmental effect, the likelihood of that effect occurring will be presented. The RAs will have the final decision on determining the significance of environmental effects.

6. Description of the Project

De Beers shall provide a project description that describes the construction, operation, maintenance, decommissioning and closure of the project as scoped by the RAs/FA under the heading, Scope of Project above (see section 2.1). In addition, De Beers will supply its record of compliance with government regulations, mine safety records (including accidents, spills and other emergencies), and relations with Aboriginal people, as well as its record of honouring commitments on socio-economic matters in the event of a planned or premature mine closure. De Beers should also demonstrate its understanding of the regulatory environment by identifying all relevant federal and provincial legislation and regulations.

De Beers shall provide relevant details on ownership of rights and interests in the project, other mining development sites, and previous mining experience relevant to the current project, as well as details on organizational structure, identifying organizational responsibilities for mine development and operations, including the linkage of these factors between the proponent and its parent companies in Canada and abroad. Concerning its commitments and policies, De Beers shall describe its commitment to protecting the environment and to preventing or minimizing the environmental effects of the project. De Beers shall discuss any requirements for contractors and sub-contractors to comply with these commitments, policies and arrangements.

7. Description of Existing Environment

De Beers shall provide a detailed and clear textual and graphic depiction of the existing environment and its use as it pertains to the potential effects of the proposed project. All existing reports and documents shall be appropriately referenced and information gaps shall be identified. Traditional/community knowledge should be used as much as possible in describing the existing environment. De Beers shall clearly and succinctly describe the following environmental components as they relate to the proposed project.

7.1 AIR

De Beers shall provide background information on existing ambient air quality conditions in the vicinity of the project study area with an emphasis on the substances that will be emitted by the project. Substances include (see section 8.1): particulate matter finer than 10 and 2.5 microns, nitrogen oxides, sulphur oxides, volatile organic compounds (VOC), carbon monoxide, dioxins, furans, cadmium, lead and mercury, as well as persistent organic pollutants (POPs), including dioxins and furans.

De Beers shall:

- characterize the ambient air quality using measurements from appropriate sites in northern Ontario, with an emphasis on those not affected by local pollution sources;
- discuss how applicable the data from these sites would be to the project study area;
- conduct a literature review to determine if other ambient air quality measurement campaigns have been undertaken for this part of northern Ontario; and
- consider any potential sources of air pollution, such as those from Attawapiskat, and estimate the impacts that these sources would have on the ambient air quality. If this analysis indicates that ambient concentrations of certain pollutants might be of concern, then a local monitoring campaign should be undertaken for those pollutants.

7.2 CLIMATE AND METEOROLOGY

DeBeers shall provide a description of the climatic conditions in the project area with an emphasis on the elements that will have an impact on, or interact with, the operation of the project. Where this description relies on traditional/community knowledge, De Beers is to refer to the conditions noted in section 5.1. Parameters of interest include monthly means and extremes of:

- air temperature and relative humidity (to derive evaporation);
- precipitation;
- wind speed and direction;
- snow depth; and
- solar radiation.

De Beers shall identify the sources of these data, discuss the degree to which off-site data are representative of conditions at the site, and describe the monitoring protocols, instrumentation and traditional/community knowledge used for any data collection programs. Representative meteorological data will also be required for dispersion modeling in accordance with the standard protocols of the models selected.

De Beers shall provide information related to the window of operation for winter roads (land and water) and any recent trends in climate parameters relevant to this season of operation.

De Beers shall outline regional analyses used to generate meteorological parameters for design purposes.

7.2.1 Ice Regime

De Beers is to provide relevant information on the ice regime in the Attawapiskat River and James Bay, including timing and expected monthly ranges of ice formation and break-up periods, ice thickness, and the progression of ice formation and decay, including common ice jam locations, durations, timing and frequencies. The existence of polynyas (ice-free zones) in James Bay should be described and mapped.

7.3 SURFACE AND GROUND WATER QUALITY AND QUANTITY AND SEDIMENT QUALITY

De Beers shall provide baseline information for surface and ground waters that have the potential to be changed by the project (construction, operation, decommissioning and closure) and affect project design. De Beers shall provide and interpret baseline data as appropriate on a daily, seasonal or annual basis for key parameters in all potentially affected waters, including the Attawapiskat River, Nayshkootayaow River, North Granny Creek, South Granny Creek and James Bay, as well as overburden and bedrock aquifers. This baseline data should include:

7.3.1 Water Quality

- Physical characteristics of the surface water column:
  - temperature,
  - depth,
  - possible existence of a thermocline/pycnocline (and its variations),
  - tidal characteristics,
  - direction and average velocity of surface, water column and bottom drift,
  - wind and swell characteristics, occurrence of storms, and
  - suspended solids;
- Chemical and biological characteristics of the surface water column:
  - pH,
  - salinity parameters,
  - dissolved oxygen content at the surface and in the water column,
  - chemical and biochemical oxygen demand,
  - nutrients,
  - metals, radioisotopes, and
  - primary productivity; and

- Chemical characteristics of ground water aquifers, and their variation with depth, including:
  - pH,
  - salinity parameters, and
  - total dissolved solids, metals, radioisotopes.

7.3.2 Surface and Ground Water Quantity

De Beers shall provide information from hydrogeological studies and models that describe and map both shallow and deep ground-water regimes in the study area, including information on aquifers, ground-water levels and flow (paths and velocities), hydraulic gradients, and properties of the surficial and bedrock geologic units. The criteria used to determine the study area adopted for the analysis of the ground-water systems should be described in detail, as well as information sources and assessment methods, and justification and calibration of the ground-water flow models and their input parameters and boundary conditions. The potential for hydraulic connection between geological zones affected by the project should also be discussed.

De Beers shall provide any pertinent hydrological information derived from an evaluation of historical flow and water level data, analyses of regional hydrologic data, and the collection of site-specific hydrologic data.

- At the proposed project mine site, these data would include but not be limited to continuous flow data and channel hydraulics data for watercourse reaches potentially affected by the mining works.

- For proposed winter access roads at stream-crossing locations requiring bridge structures, these data would include but not be limited to estimates of normal flows/water levels and flood flows/water levels in these watercourses.

The following information should also be provided for any watercourses in the study area potentially affected by pit dewatering, water taking, effluent discharges or diversions due to the proposed mining operations:

- the results of statistical analysis of existing site-specific and/or regional data used to derive estimates of normal (base flows and mean flows) and extreme (high and low) flows and water levels.

Any data limitations/inaccuracies and estimation errors identified for computed data, including any assumptions made when undertaking these analyses, should be clearly indicated.

The characteristics of surface water and ground-water interactions should also be described (e.g., physical features/mechanisms influencing recharge/discharge characteristics potentially affecting shallow and deep ground-water resources, and ground-water contributions to stream base flows in the study area).

7.3.3 Sediment Quality

For sediments proposed to be dredged in the project study area, De Beers shall sufficiently characterize sediment physical and chemical quality to permit assessment of potential disposal options. For example, sediments proposed for disposal in James Bay should have existing sediment quality described in a manner consistent with the *Canadian Environmental Protection Act*, *1999,* and its *Disposal at Sea*

Regulations. For other proposed dredged sediment disposal, characterization should consider the Ontario Ministry of the Environment's *Protection and Management of Aquatic Sediment Quality in Ontario* (Provincial Sediment Quality Guidelines). All sediment samples collected should be analyzed for physical characteristics (e.g., grain size).

Baseline sediment quality should be described in the project area or regional study area for areas where sediment quality may change as a result of the project, including as the result of changes in water quality resulting from the project. Parameters characterized in this baseline should include, at minimum, those that may change during the project and parameters potentially near Provincial Sediment Quality Guidelines or Canadian Sediment Quality Guidelines criteria.

7.4 TERRAIN, SURFICIAL GEOLOGY, BEDROCK GEOLOGY, GEOLOGICAL PROCESSES AND HAZARDS, SOILS, LAKE AND MARINE SEDIMENTS, AND MARINE LITTORAL PROCESSES

De Beers shall provide baseline information and a description of the terrain and geological conditions that have the potential to be changed by and/or affect the proposed project. Where appropriate, maps, cross sections and figures will be presented to document and illustrate these conditions, their spatial distribution and, where appropriate, their depth and lateral extent. This geoscience and traditional/community knowledge information will include but not be restricted to:

- surficial materials (both mineral soils [overburden] and organic soils [muskeg – or bogs and fen]) and their landscape features;
- bedrock geology and the structural geology (faults, fractures), karst conditions (including candidate Area of Natural and Scientific Interest [ANSI]);
- geochemical characterization of the bedrock geologic units (including ore and waste rock and their acid generation potential);
- the radioactivity within the kimberlite rock mass, especially total uranium and radium 226;
- physical, hydraulic, mechanical and geotechnical properties of surficial and bedrock units;
- seasonal and/or perennially frozen/permafrost ground conditions and processes;
- fluvial, coastal and marine geology and geomorphic processes, including physical, geochemical and chemical characteristics of sediments; and coastal process and tidal effects, including fluctuations of currents and water levels and any associated littoral drift;
- characterize currents and water levels in the lower James Bay by their normal and extreme magnitudes, durations and frequencies, and describe any seasonal changes, etc.;
- geological hazards, including ground and slope stability and seismicity;
- isostatic uplift; and
- bathymetry data for James Bay and southern Hudson Bay.

7.5 AQUATIC ORGANISMS AND HABITAT

De Beers shall provide detailed biological data for the Attawapiskat River, Nayshkootayaow River, North Granny Creek, South Granny Creek, Attawapiskat River estuary, James Bay, muskeg ponds, and all unnamed water crossings along the winter road. This information will be provided for all locations where the proposed Victor project has the potential to affect the aquatic environment. DeBeers shall use the spatial and temporal boundaries to determine the linear or spatial extent of these studies.

For each location noted above, De Beers shall produce detailed biophysical habitat maps. These maps will identify, where applicable, riparian vegetation, foreshore slope, bank stability, substrate, in-stream and overhead cover, aquatic vegetation, and flow characteristics.

For each location, De Beers shall collect benthic macroinvertebrate data. The evaluation shall be consistent with the weight-of-evidence approach required by EC's Environmental Effects Monitoring Program (EMM). This will include species identification and densities, total abundance, total number of taxa per sample, similarity index (e.g., Curtis-Bray), percent dominant taxon, abundance of sensitive taxa, and others as appropriate. At each sampling location a minimum of three samples will be collected, either before spring emergence or in the fall. The number of sampling locations should reflect the biophysical conditions. The benthic sampling locations should also be added to all water quality monitoring locations. Sediment sample collection referred to in section 7.3 should be completed at the same time as the benthic collection. Water depth and water velocity should also be recorded when collecting benthic water invertebrates.

For each water body, De Beers shall describe and identify the life history strategies of all fish and key habitat features. This shall include, at a minimum, the identification of nursery, foraging, rearing and spawning habitat, overwinter refugia, migration corridors, and staging areas.

Baseline concentrations of contaminants in aquatic organisms in the project and regional study areas should be provided. At a minimum, the range of parameters to be described are those where concentrations may change as a result of the project.

In addition, please note that, for the Nayshkootayaow River, data on diversity and abundance for key fish and benthic species will be required prior to mine-site construction. It should be gathered as soon as possible, but it is not essential for the conclusion of the EA process.

7.6 WILDLIFE AND WILDLIFE HABITAT

De Beers shall describe major wildlife species abundance and distribution within the project area, including mammalian fauna, amphibians and reptiles. De Beers shall also identify and describe critical/key and sensitive habitats and periods of habitat use in the project area, and shall also identify those species of concern on the basis of intrinsic value, economic importance, traditional use (e.g., predicted effects on harvest), recreational value, rarity, and sensitivity, including the woodland caribou, moose, eastern wolf, wolverine, and furbearers (e.g., river otter, pine marten, etc.).

For marine mammals, De Beers shall include information on habitat and occurrence (abundance, migration patterns and distribution) for polar bears (denning, feeding, etc.), seals, walruses and whales, including wintering sites in marine areas that remain ice free (i.e., polynyas).

7.7 BIRDS

De Beers shall provide information on waterfowl and other waterbirds' (i.e., shorebirds, gulls, terns, cranes, rails) occurrence and use of the project study area at all times of the year when waterfowl and other waterbirds are present. This must include spring and fall migration/staging (e.g., Brant) and summer moult staging (e.g., scoters) in coastal areas, as well as nesting and brood-rearing areas (including on Akimiski Island and other smaller islands along the coast), and wintering sites in marine areas that remain ice free (i.e., polynyas).

For landbirds (e.g., woodpeckers, thrushes, warblers, sparrows), shorebirds and raptors, De Beers shall ensure that breeding surveys are conducted at the mine site and along the pipeline and new winter road corridor using plots in each habitat that will be affected by the project. The resulting data should provide density estimates for migratory birds by habitat type to quantify the species and number of birds that could be lost/displaced by the mine and ancillary facilities, including an appropriate buffer zone. These data should be collected prior to mine-site capture and construction activities. In addition to quantifying direct losses, data from the buffer zone will be useful in determining what effect the mining operation will have on bird populations in adjacent habitats.

De Beers shall identify and describe any areas designated as important for birds in the project and regional study areas, including Migratory Bird Sanctuaries (e.g., Akimiski Island, Hannah Bay), Important Bird Areas, Western Hemisphere Shorebird Reserves, Ramsar wetlands, etc.

De Beers shall identify any additional or ongoing studies or monitoring programs (e.g., field work for the current *Ontario Breeding Bird Atlas*).

7.8 SPECIES AT RISK

De Beers shall identify COSEWIC (Committee on the Status of Endangered Wildlife in Canada) listed species at risk in the regional study area, including marine species. De Beers shall also identify provincially (i.e., by the Committee of the Status of Species at Risk in Ontario [COSSARO]) and territorially listed species. Species listed on Schedule 1 of the *Species at Risk Act* shall be identified and their habitat requirements shall be discussed in the context of any recovery strategies or action plans that have been developed by recovery teams.

7.9 VEGETATION

De Beers shall describe existing vegetation communities in the project study area using a modified Ecological Land Classification (ELC) System and provide information on forest cover and land capability, including stand types and characteristics.

De Beers shall describe wetland community types according to *Wetlands of Canada* (ELC Series No. 24, 1988). Ecological/physical functions that wetlands provide shall be described and any rare and/or endangered species (see Species at Risk section above) and any ecological reserves shall be identified (e.g., Areas of Natural and Scientific Interest, RAMSAR wetland sites, etc.), including candidate reserves.

De Beers shall provide information on the study methodology, results of vegetation cover and biogeoclimatic classification, and species lists. The description level should be of such quality that an assessment can be conducted on whether key habitat for important wildlife species is present in the project study area.

Pre-development plant communities existing on sites that may be disturbed as a result of development shall be documented to the species level and note shall be made of the site and community characteristics so that efficient and suitable selection of species for reclamation may be achieved.

7.10 HUMAN HEALTH

De Beers shall provide current information on the health status of the communities in the project study area. These data shall be quantitative wherever possible. The description of the health of communities needs to capture all aspects of health, according to the World Health Organization's definition of health: "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity."

Therefore, this description of health status should include indicators of many determinants of health, including physical, social, cultural and economic aspects. Specifically, it should include data on health services available, family structure, incidence of diseases, mortality (infant mortality, leading causes of mortality), personal health practices (e.g., smoking), sexual health, and injuries.

The scope and level of detail of the human health baseline information collected for each affected community should be commensurate with the potential likelihood and significance of changes to the community as a result of the project.

7.11 CURRENT USE OF LAND AND RESOURCES FOR TRADITIONAL PURPOSES BY ABORIGINAL PEOPLE

De Beers shall describe the current use of land and resources for traditional purposes in the regional study area, including but not limited to:

- camping;
- travel on traditional routes;
- hunting;
- fishing;
- trapping;
- trap line use (active and fallow);
- planting;
- harvesting;
- collecting; and
- any other traditional use of the land in and around the project area.

Where possible, and in keeping with the provisions of section 5.1, De Beers shall provide quantitative data on the amount of resources harvested and the amount used for country foods. (Where relevant, De Beers should make use of occupancy mapping).

7.12 ARCHAEOLOGICAL, PALAEONTOLOGICAL, HERITAGE AND CULTURAL RESOURCES

De Beers shall provide information on archaeological resources/sites within the project study area, which are defined as any geographical location that contains physical evidence of past human activity for which the application of either scientific methods of inquiry (i.e., site survey, excavation, data analysis) or traditional/community knowledge are the primary source of information, in keeping with the provisions of section 5.1. These sites may or may not have direct associations with living communities and include examples such as caves, lithic scatters, house pits, petroglyphs and pictographs.

De Beers shall describe any heritage resources/sites within the regional study area, which include an object, a site or the location of a traditional societal practice that is of historical, cultural, spiritual or archaeological significance to Ontario, a community or Aboriginal people.

De Beers shall describe existing cultural resources within the regional study area, which consist of a human work or a place that shows evidence of human activity or that has spiritual or cultural meaning and that has been determined to have historic of value. These can include, but are not limited to, cultural landscapes and landscape features, archaeological sites, structures, engineering works, artifacts, and associated records.

De Beers shall collect the above information in collaboration with and in concurrence with Aboriginal communities and organizations and in accordance with Ontario Ministry of Citizenship and Culture guidelines.

7.13 SOCIO-ECONOMIC ENVIRONMENT

De Beers shall describe the community and political structures in the regional study area.

The scope and level of detail of the socio-economic baseline information collected for each affected community should be commensurate with the potential likelihood and significance of changes to the community as a result of the project.

De Beers shall describe the existing economic situation in the project study area, consistent with the provisions of section 5.1. This includes but is not limited to:

- wage employment;
- skill level;
- local and regional businesses;
- training facilities;
- subsistence economy;
- local government finances;

- local and regional community planning;
- current and past levels of employment;
- current economic development goals and objectives;
- past experience with growth, industrial development and environmental problems; and
- population demographics.

De Beers shall describe the existing situation with respect to employment, education and training in the project study area and on reserve land that is located outside of the project study area. This includes but is not limited to the facilities and services related to:

- classroom-based education for all levels (pre-kindergarten to grade 12 or above);
- post-secondary education and training;
- informal and formal apprentice-based programs;
- outdoor education and training, including education related to hunting, fishing and other traditional activities;
- distance education and training; and
- upgrading and informal literacy/numeracy training.

De Beers shall describe the existing social environment in the project study area and on reserve land that is located outside of the project study area. This includes but is not limited to:

- crime, policing and security;
- housing (including information such as overcrowding and homelessness);
- language (including information on the percentage of population speaking and/or writing Cree);
- recreation (including information on recreational events and activities, both physical and cultural);
- drug and alcohol abuse;
- suicide rates; and
- family violence.

De Beers shall describe the existing infrastructure in the project study area and on reserve land that is located outside of the project study area, especially permanent installations as a basis for operations. These include but are not limited to:

- roads;
- air transportation facilities;
- sewer and water treatment and distribution systems;
- electricity generation and distribution systems;
- current uses of the ocean, including for marine traffic or fishing, within the project study areas of James Bay and Hudson Bay; and
- waste management and removal systems, and other municipal services, including:
  - recreational facilities,
  - medical facilities and staff, and
  - emergency response facilities.

7.14 VISUAL AND AESTHETIC RESOURCES

De Beers shall describe the existing view-scapes in the project study area, incorporating traditional/community knowledge as appropriate.

8. Environmental Effects

De Beers shall provide a detailed and clear textual and graphic analysis of the environmental effects of the proposed project, including the effects of the environment on the project and the effects of the project on the environment. The environmental effects to be considered will include those that are caused by the physical works and associated activities during construction, operation, modification, decommissioning and closure. Traditional/community knowledge should be used as much as possible in describing environmental effects. De Beers shall explicitly document all the assumptions, models, information sources and analysis used, as well as the information limitations and associated levels of uncertainty. The analysis should present information that is verifiable in nature and quantitative where available and applicable. All reports and supporting documents shall be appropriately referenced.

8.1 AIR

De Beers shall report the effects of the proposed project on air quality, including but not limited to emissions from the sources listed below. The identification of parameters to be assessed and the level of detail of that assessment should be based on each parameter's potential to: 1) pose an increased risk to human or wildlife receptors; 2) directly change concentrations in the surrounding environment (e.g., through deposition on vegetation, soil or water); or 3) bioconcentrate in ecological receptors and bioaccumulate in food chains. These emissions from sources should include, but not be limited to, those parameters listed in brackets with each source:

- diesel generators (mercury, particulate matter finer than 10 and 2.5 microns, nitrogen oxides, sulphur oxides, volatile organic compounds [VOCs] and carbon monoxide);
- solid waste incinerators (cadmium, lead, mercury, particulate matter finer than 10 and 2.5 microns, hydrogen chloride, nitrogen oxides, sulphur oxides, organic matter, carbon monoxide, and persistent organic contaminants, including dioxins and furans);
- emissions from vehicle, equipment, mining and processing-related activities, airport, storage, shipping and any other processes/actions (metals, particulate matter finer than 10 and 2.5 microns, nitrogen oxides, sulphur oxides, VOCs and carbon monoxide); and
- processes/activities that generate fugitive dust.

The analysis shall also include:

- the use of standard regulatory dispersion models and techniques to assess the air quality impacts of the primary emission sources;
- demonstration of compliance with applicable federal and provincial air quality standards, including the National Ambient Air Quality Objectives and Canada-Wide Standards;
- best technology economically achievable to minimize the release of air contaminant atmospheric dispersion of emissions on a local and regional scale;
- the effects of air emissions on biological receptors such as vegetation and wildlife, including any potential effects of acid deposition;
- the effects of air emissions on human receptors, including on-site workers; and

- an assessment of radioactivity in air (e.g., radon) and the associated health effects if the analysis of the kimberlite or waste rock has demonstrated the presence of high levels of radionuclides.

De Beers shall also assess the greenhouse gas emissions from the diesel generators, solid waste incinerators and any other relevant sources using the methodology outlined in the federal-provincial-territorial guidance document *Incorporating Climate Change Considerations in Environmental Assessment: General Guidance for Practitioners.*

8.2 SURFACE AND GROUND WATER AND SEDIMENT QUALITY

De Beers shall also provide an analysis of proposed project effects on surface and ground waters. Effect conclusions should be the based on predicted water quality of all waste streams and containment ponds throughout the project, including mine water, seepage, surface runoff and collection ponds, process plant discharges, the mine water settling pond, and the sewage treatment facility.

This analysis should include the effects on water quality specific to the following point and non-point sources, and to any other project activities that will result in a change in water quality:

- process effluent and discharges from the Processed Kimberlite Containment Area, waste rock, muskeg and other stockpiles, as well as other site runoff, including from runoff along roadways and drainage channels;
- effluent from domestic sewage treatment;
- water from pit de-watering well field and open pit;
- bio-remediation areas;
- supplemental water transferred from the Attawapiskat River to the Nayshkootayaow River:
  - provide a detailed comparison of the Attawapiskat and Nayshkootayaow River water quality and predict potential changes to fish species that have spawning runs within the Nayshkootayaow River and benthic macroinvertebrate population, and
  - effect of the flow supplementation on the temperature regime within the Nayshkootayaow River;
- dredging in the Attawapiskat River and James Bay, and from dregate disposal methods;
- shipping in the project study area; and
- discharge of water from on-site pits and quarries.

For each of the above, and any other activities that may result in identified effects, provide the following as appropriate:

- a description of any proposed treatment technologies (e.g., sewage treatment plant) or methods proposed (e.g., muskeg buffers), and their reliability and performance over the expected life of the project;
- a comparison, including costs, effectiveness and reliability, of proposed technology to best available treatment technology economically achievable;
- the discharge quality at points of discharge to land, wetlands and/or open surface waters with respect to:
  - metals, including radioisotopes, nutrients (e.g., phosphorous in all forms, blasting chemicals/ residues such as nitrogen, nitrate, nitrite and ammonia), salinity and major ions, Ph,

process/treatment chemicals, bacteria, and physical characteristics, including temperature and suspended solids,
  - the results of laboratory biological tests conducted on aquatic species, including fish, benthic invertebrates, plant and algae, for lethal and sublethal effects from acute and chronic exposure to effluent, and
  - prediction of the magnitude and extent of any resulting change in surface water quality from all point and non-point discharges to surface water, including defining the probable area and depth where there is predicted to be a measurable change in water quality (include secondary changes to water quality that result from effluent discharge, including changes to primary productivity);
- prediction of physical and chemical changes to sediment quality, including directly from the project or indirectly from changes to water quality;
- treatment sludge disposal;
- sludge characterization; and
- disposal techniques.

For dredging of the Attawapiskat River and for the dredging, transportation and disposal of dredged material in James Bay, also include:

- modification of the characteristics and quality of the river or ocean floor;
- resulting changes to the Attawapiskat River's current profile;
- effects of increased turbidity, including the duration of these effects and changes to bedload sediments; and
- portion of the river affected at one time by dredging operations.

The assessment of the potential effects of accidental spills on or near-surface waters should include evaluation by numerical and/or physical modeling to describe likely spill pathways for spills originating from the project study area, including along the proposed navigation route, and the destinations of vessels transporting supplies for the project. De Beers should include the source of information (either estimates or empirical) used in developing these models, and make reference to measurement standards or collection protocols used, assumptions built into the data used, and input data and model output reporting that includes ranges and confidence estimate for parameters and results.

8.3 WATER BALANCE AND WATER QUANTITY (SURFACE AND GROUND WATER)

A water balance should be prepared that incorporates all components of the proposed project under a range of climatic conditions. All parameter estimates (e.g., precipitation, evaporation, stream flows, ground-water flows, soil permeability, hydraulic roughness, water balance, etc.) reported by De Beers should include the source of information (either estimates or empirical) and make reference to measurement standards or collection protocols used, assumptions built into the data, and data reporting that includes ranges and confidence estimate for parameters:

- provide a detailed description of the hydrology of the affected watershed, including specific information on the hydrology of the sub-basin streams potentially affected by the project (e.g., Attawapiskat River, Nayshkootayaow River, and North Granny Creek and South Granny Creek);

- provide a description of the predicted mine inflows and outflows and hydrogeology, water handling procedures, water balance predictions, and contingencies for potential higher-than-expected flows, including:
  - water balances for waste water containment facilities, including contingencies and excess holding capacities,
  - effect on water supply/quantity resulting from changes in timing, volume, and deviation of peak and minimum flows resulting from the discharge of water from the open pit, site runoff, dewatering of workings, and the resulting effects on the water balance, water level, outflow rates, etc., including consideration of the effects of any supplemental water added to the Nayshkootayaow River and the effect of the project on the watershed,
  - describe and quantify the effects of discharges and surface and ground-water withdrawals on the hydrology and flow characteristics of the Attawapiskat and Nayshkootayaow rivers and North Granny Creek and South Granny Creek; and
  - describe and characterize the stormwater flows (i.e., peak flow, volume, duration, contaminant loading) discharged to treatment facilities (i.e., polishing ponds and stormwater management ponds) on site and measures to minimize downstream erosion and adverse water quality effects on receiving streams;
- provide a description of the effect of the open pit, waste rock piles and other project features such as roads on the project/regional ground-water flow regime, including recharge from and discharge to local water bodies and wetlands;
- provide a description of the effect of new structures in the Attawapiskat River on:
  - currents and sedimentology/geomorphology, and
  - ice regime and ice jamming potential in river reach;
- include any corresponding effects on water quality, such as through dilution and parameter loadings, in surface water and sediment quality; and
- provide a description of the effects of temperature, salinity and increased water discharge on the ice regime in the Attawapiskat River.

8.4 GEOLOGY, SOILS AND TERRAIN

Report the effects of the project on the environment when geology, bedrock, unconsolidated deposits, soils or sediments are disturbed or used for construction purposes, and the effects of the environment on the project. The analysis shall include:

- the proposed project's effect on the thermal milieu (permafrost), including:
  - effect on physical stability conditions (including physical strength characteristics) and thermal regime,
  - effect of modified ground ice or thermal conditions on roadway, waste rock piles, pipelines, diversion ditches, altered drainage, etc.,
  - effect of any ground ice occurrences beneath containment structures,
  - effect of frost heave, and
  - the effect of climate change (e.g., warming/cooling trends) on the above;
- effects of aggregate use, including limitations on volumes of resource material and minimization of terrain disturbance associated with its extraction;
- rock types, including the chemistry and stability of kimberlite by-products;
- seismicity;

- quantity of sulphuric concentration and results from tests of acid-generating potential from all excavated;
- effect of acid rock drainage and seepage and associated mitigation;
- effect of remedial actions at the mine site (waste dumps, tailings);
- effect of quarry development, including gravel, sediment, overburden and aggregate use;
- effect of use of esker and other ANSI components for quarry development;
- effect on the environment of the interaction of waste and processed kimberlite materials, including long-term management plans for ensuring the stability of the material;
- environmental effects of the quarry, including information on the timing and amounts of material required over the life of the diamond mine, the size of the extractable quantities, and a quarry management plan suitable for environmental assessment purposes;
- effect of dredging on the Attawapiskat River and James Bay on fluvial, coastal and marine geological processes and environment; and
- effect of supplementation on the Nayshkootayaow River of water from the Attawapiskat River on the fluvial geomorphology and processes in both rivers.

8.5 AQUATIC ORGANISMS AND HABITAT

De Beers shall assess the effects on aquatic invertebrates, vegetation, and fish and their habitat taking into account predicted water quality and quantity effects and their associated effects on fish, fish habitat, and local drainage patterns. The analysis of project effects should include:

- productive capacity of aquatic systems during construction, operations, closure and post-closure;
- effect on all water bodies that may experience changes to fisheries resources, including but not limited to the Attawapiskat and Nayshkootayaow rivers, North Granny Creek, South Granny Creek, muskeg ponds, James Bay, and other streams associated with these systems;
- effect on habitat loss or alteration, including aquatic vegetation and sensitive areas such as spawning grounds, nursery areas, winter refuges and migrations corridors;
- rare and/or sensitive fish species and habitat;
- mortality from increased fishing;
- potential lethal effects on fish from acute exposure to mine effluent, including process upsets;
- potential lethal and sublethal effects on fish due to chronic exposure to mine effluent, including within all proposed mixing zones;
- effect of blasting on fish and fish habitat on local aquatic systems;
- effect of sediment dredging, transportation and disposal in James Bay on marine resources and habitat, particularly the effects of increased turbidity;
- effect on all water bodies and associated food webs and water use potential that may be affected by changes in water chemistry (nutrients, bacteria, major ions, metals) due to runoff or discharges from the project;
- effect of the project on James Bay and the coastal habitat of Hudson Bay, particularly habitat loss or alteration; and
- effect of dewatering and flow supplementation to the Nayshkootayaow River on fish habitat, winter refugia and fish migration.

For changes or discharges to surface water, reference should be made to expected compliance with applicable federal and provincial legislation, including the federal *Fisheries Act's* habitat protection and pollution prevention provisions and the Ontario *Water Resources Act*.

De Beers shall include an overview of how DFO's 1986 principle of No Net Loss will be achieved during the construction, operation, care and maintenance, and closure stages of the proposed project.

De Beers, in assessing the water quality effect of discharges to surface water, shall reference the Canadian Water Quality Guidelines and the Ontario Provincial Water Quality Objectives. Where guidelines do not exist for a water or sediment quality parameter that will change as a result of this project, reference should be made where possible to guidance provided by other jurisdictions (i.e., U.S. Environmental Protection Agency, B.C. Ministry of Water, Land and Air Protection). Further, where appropriate, published data that describe the effects of similar changes in water quality, including the No Observable Effects Level (NOEL), both chronic and acute toxicity thresholds, contaminant uptake and bioavailability, and salinity tolerances of species present in the project and regional study areas, should be used to support the assessment of effects.

8.6 WILDLIFE AND WILDLIFE HABITAT

De Beers shall assess the proposed project's effects on wildlife and wildlife habitats, specifically on mammals, reptiles and amphibians, giving consideration to and demonstrating linkages between predicted physical and biological changes resulting from the proposed project.

De Beers shall provide its view of "ecologically representative areas" in the ecoregion, as it may be required for any adequate monitoring of effects, and report potential effects of the proposed project on those ecologically representative areas.

The analysis shall include:

- effect of loss of terrestrial habitat and the quality of lost habitat for relevant species;
- disturbance of feeding, nesting, denning (e.g., polar bear denning on the north shore and southeast shore of Akimiski Island) or breeding habitats;
- wetland habitat alteration or loss;
- physical barriers to wildlife;
- disruption, blockage, impediment and sensory disturbance (e.g., noise effects) of daily or seasonal wildlife movements (e.g., migration, home ranges, etc.);
- direct wildlife mortality;
- indirect wildlife mortality;
- reduction in wildlife productivity;
- effect of increased access and resulting increased hunting opportunities;
- implications of the proposed project acting as an attractant for particular species; and
- address the effects of wildlife on the project by providing a wildlife management plan, including a safety plan for nuisance wildlife.

8.7 BIRDS

De Beers shall provide an analysis of the proposed project's effects on birds (both migratory and permanent residents), giving consideration to and demonstrating linkages between predicted physical and biological changes resulting from the proposed project.

De Beers shall consider the potential effects on all life stages of birds, including breeding, migration, summer moult staging and wintering.

Particular attention needs to be paid to the potential effects of project facilities and activities (including shipping along likely routes) on James Bay coastal and marine breeding, staging and feeding areas (e.g., Atlantic Brant feeding in the subtidal eelgrass beds and intertidal salt marshes), including the unnamed adjacent islands and shoals. Specifically, the following areas should be considered:

- the coastline between Moose River and Cape Henrietta Maria;
- Akimiski Island;
- islands and islets in the Akimiski Strait;
- the Bear Islands and northern James Bay; and
- the Belcher Islands.

8.8 SPECIES AT RISK

De Beers shall identify whether there are species at risk that may be affected by the project, including species identified on Schedule 1 of the *Species at Risk Act* (SARA) and species designated by COSEWIC and COSSARO, and shall identify potential adverse effects on such species, mitigation measures and follow-up requirements. For any species listed on Schedule 1 of the *Species at Risk Act* that may be affected by the project, adverse effects on the species or its critical habitat shall be identified. De Beers shall identify measures to avoid or lessen any adverse effects, whether or not these effects are considered significant, and follow-up monitoring must be designed and implemented. Such measures shall be consistent with any applicable recovery strategy and recovery action plan.

Particular attention should be given to the yellow rail (Special Concern), short-eared owl (Special Concern), woodland caribou (Threatened), eastern wolf (Special Concern), and wolverine (Special Concern).

Specific effects assessment should be provided for any species at risk in the project study area that may be at risk from potential spills in the area based on the modeling and other assessment tools referred to in section 8.2.

8.9 VEGETATION

De Beers shall assess the effects of the proposed project on:

- plant communities within the project study area;
- rare or highly valued species (including species at risk);

- long-term direct and indirect habitat loss or alteration (e.g., along pipeline and winter road routes);
- forest and wetland vegetation productivity; and
- potential for adverse long-term effects on fens.

8.10 HUMAN HEALTH

De Beers shall assess the potential effects of the project upon the physical, mental, spiritual and cultural health of affected communities, employees and their families. The analysis should include at least the following:

- an analysis of the effects of the project on the health and safety of all workers, including the possible effects of any accidents or spills;
- a full assessment of the project's potential effects on human health through possible effects to country foods, including an assessment of potential human health outcomes of effects on country foods, including vegetation gathered for medicinal purposes (this assessment shall consider all possible sources of contaminants from the project and potential exposure pathways into air, potable water and/or country foods); with respect to country foods, information on the types and amounts of foods consumed, including parts of the organism consumed and methods of preparation, shall be provided where possible;
- any potential effects of the project on potable water for the mine site as well as for the Attawapiskat First Nation, taking into account all predicted water quality changes for all stages of the project (including post-closure) and any health effects of human exposure (this assessment must consider the Health Canada Guidelines for Canadian Drinking Water Quality, refer to www.hc-sc.gc.ca/hecs-sesc/water/dwgsup.htm);
- any potential effects of air emissions associated with the project on human receptors within the project study area, including an assessment of the health effects of particulate matter finer than 10 and 2.5 microns, nitrogen oxides, sulphur oxides, VOCs, carbon monoxide, dioxins/furans, metals, hydrogen chloride, and any other emissions from fossil fuel combustion, explosives use, and waste incineration;
- any potential effects of project-generated noise on human receptors within the project study area, including an assessment of the different effects of daytime and nighttime noise, and should examine continuous and intermittent noises (blasting, barging, and helicopter and air traffic); and
- a consideration of the health effects of social, cultural and economic changes brought about by the project, including the effects of mine closure. Social and cultural changes include impacts on subsistence lifestyles, traditional activities, family relationships, and language.

8.11 CURRENT USE OF LAND AND RESOURCES FOR TRADITIONAL PURPOSES BY ABORIGINAL PEOPLE

De Beers shall assess the potential effects on the current use of land and resources for traditional and cultural purposes as a result of the biophysical and socio-economic changes in the environment caused by the project. This will include but is not limited to:

- hunting;
- fishing;

- trapping;
- ceremonial activities;
- medicine gathering;
- camping; and
- social activities.

This will also include effects on the existing use of winter roads and winter travel on frozen rivers for carrying out these activities.

8.12 ARCHAEOLOGICAL, PALAEONTOLOGICAL, HERITAGE AND CULTURAL RESOURCES

De Beers shall assess the potential effects of the proposed project on archaeological, palaeontological, heritage and cultural resources as identified in section 7. Other resources to assess include but are not limited to:

- whitefish weirs;
- burial and cultural ceremonial sites; and
- travel routes.

8.13 SOCIO-ECONOMIC EFFECTS

The scope of the assessment for socio-economic variables shall include communities that could reasonably be expected to experience effects because of the project, including but not limited to increased transportation activities or employment and business opportunities.

De Beers shall assess the effects of the proposed project and its closure on the cultural well-being of the affected communities. This will include, for example, anticipated or possible changes on social cohesiveness or language use.

De Beers shall assess the effect of the proposed project and its closure on the economy, having regard to direct, indirect and induced effects on income and employment. Consideration shall be given to:

- wage and salary employment by skills category over the life of the proposed project, including estimates of northern participation;
- effects on household and family income levels;
- effects on short- and long-term populations and demographics;
- availability and use of skilled workers in northern Ontario to meet job requirements;
- opportunities for local and regional businesses to supply goods and services both directly to the proposed project and to meet the demand created by the expenditures of contractors and new employees;
- compatibility with current economic development goals and objectives;
- barriers to employment, advancement, and the retention of northern workers, including the training or retraining necessary for sections of the northern work force, and specifically for Aboriginal people to meet De Beers' employment standards;

- opportunities to diversify the northern economic base to produce and supply new goods and services;
- effects on the subsistence economy;
- federal and provincial revenues and costs;
- economic diversification and sustainable economic development;
- effects on the national and provincial Gross Domestic Product (GDP);
- probability of any effects on employee migration into or out of northern Ontario communities;
- local government finances;
- inflation and the cost-of-living effects;
- effects of increased pressure on existing social, institutional and community services, transportation facilities and services, and infrastructure;
- effects on community planning and reserve land use;
- decrease in amount of reserve land available for community housing or other needs, with consideration for population growth rates and ageing infrastructure;
- effects on specific groups, including the youth and elderly; and
- a gender-based analysis of the effects.

De Beers shall describe the effects on individuals who come to the community for education/training purposes and on those who leave the community for education/training.

8.14 VISUAL AND AESTHETIC EFFECTS

De Beers shall assess the visual and aesthetic effect of the proposed project, including:

- direct effects of the development on views of the landscape through intrusion or obstruction; and
- the reactions of viewers who may be affected.

De Beers shall report on design components that mitigate visual and aesthetic effects for all phases of the project.

8.15 EFFECTS OF THE ENVIRONMENT ON THE PROJECT

De Beers shall assess the effects of the environment on the proposed project and on activities forming part of the proposed project. De Beers shall consider the full range of climate conditions, including extreme weather events; wet, dry and normal precipitation; ice damage; and extreme temperature spells.

For the consideration of the effects of climate change (e.g., global warming/cooling scenarios), De Beers shall consider what components of the project are susceptible to changes in climate, what their life span is in relation to the predicted changes, and whether such changes will affect predictions on environmental effects in the future.

De Beers shall assess the effects of other types of environmental conditions that may affect the proposed project, including flooding, lightning strikes, forest fires, isostatic uplift, permafrost changes and erosion.

8.16 MALFUNCTIONS OR ACCIDENTS

De Beers shall describe the specific important malfunctions and accidents that have a reasonable probability of occurring during the project, including an explanation of how those events were identified for the purpose of this EA. De Beers shall explain the potential magnitude of an accident and/or malfunction occurring, including the quantity, mechanism, rate, form, and characteristics of the contaminants and other materials likely to be released into the environment during the malfunction and accident events. It shall also describe the contingency, clean-up or restoration work that would be required during and following the event. Link the outcome of the accident and malfunction probability analysis to consequential effects on the environment, including health and safety effects.

Some examples of accident/malfunction scenarios include but are not limited to:

- transfer and transportation, including by rail, truck or sea and at the Attawapiskat River, of fuel and other hazardous material;
- construction and operation of the fuel pipeline and fuel storage;
- handling and operation of explosives;
- mine operations;
- transportation of materials along the winter roads;
- air travel (aircraft accident or airstrip inoperability);
- fire-fighting and spill response;
- pit dewatering; and
- Nayshkootayaow River flow supplementation.

De Beers shall also prepare an emergency preparedness plan for all aspects of mine development, operation, decommissioning and closure.

8.17 CUMULATIVE ENVIRONMENTAL EFFECTS

De Beers shall ensure that, where it is predicted that the project will have a residual effect on a valued ecosystem component (VEC), the residual effect will be brought forward into the cumulative effect assessment. Where it is predicted that there is not likely to be a residual effect on a VEC with mitigation, that residual effect will not require further consideration in the cumulative effects assessment.

For the purposes of this project, the comprehensive study shall include an evaluation of cumulative effects that are likely to result from the proposed project in combination with other projects and activities, and projects within the regulatory process on the day these guidelines are issued. De Beers shall consider existing forecasting models of cumulative infrastructure development where such models are available and can be calibrated to the regional ecosystem encompassing the proposed project. Report the models considered.

De Beers shall explain the likelihood of expanding the proposed project and any areas of medium to high development potential within the claims block.

De Beers shall evaluate the effects of exploration, including claims blocks with medium to high development potential, whether or not those are owned by De Beers.

De Beers shall provide confirmation that all existing facilities, infrastructure, etc., that it plans to use can adequately handle the demands generated by the proposed project. Include cumulative effects in relation to:

- bio-physical environment;
- social environment;
- economic environment;
- cultural environment;
- heritage resources; and
- visual and aesthetic resources.

De Beers shall explicitly document the assumptions, models and information sources used, as well as information limitations, and associated levels of uncertainty should support all steps of the cumulative environmental assessment. The analysis should present data and analyses that are verifiable in nature and quantitative where data are available. In the absence of verifiable knowledge, best professional judgement or expert opinion (unverifiable) should be used whether from traditional or scientific sources.

De Beers shall explain the approach and methodologies used to identify and assess cumulative effects.

8.18 SUSTAINABLE USE OF RENEWABLE RESOURCES

De Beers shall assess the effects that the project may have on the sustainable use of renewable resources. The report should identify the potentially affected renewable resources and predict the change in capacity of those resources to meet present and future needs.

Capacity is based on a range of ecological considerations, such as:

- integrity of the ecosystem (e.g., complexity, diversity, stability, and resilience);
- productive capacity of the resource;
- carrying capacity of the ecosystem; and
- assimilative capacity of the ecosystem.

9. Follow-Up Programs

Follow-up is defined as a program for verifying the accuracy of the EA of a project and determining the effectiveness of any measures taken to mitigate the adverse environmental effects of the project. A follow-up program would typically be warranted when:

- the project site or its potential area of influence is environmentally sensitive;
- there is a need to address relevant project-related issues of public concern;
- the residual effects of the project may be different than predicted;
- there is a need to verify the effectiveness or success of mitigation measures or where the mitigation measures may not fully address the predicted effects;
- environmental effects were assessed using new or unproven analytical or modeling techniques;
- the project involves technology or mitigation measures that are new or unproven;
- cumulative effects assessment was an important or contentious component of the assessment;
- there is limited experience implementing the type of project being proposed in the specific type of environmental setting under consideration;
- the nature or scale of a project is such that specific types of environmental effects warrant careful monitoring (e.g., air emissions, wastewater discharges, erosion); and
- the knowledge used to predict the effects of the proposed project is limited.

De Beers shall propose follow-up programs to address any of the above circumstances. Each program plan should include a discussion of the proposed:

- regulatory context for the program;
- objective;
- general methodology and means;
- timing and anticipated length of the program;
- roles and responsibilities of parties to be involved in the program;
- reporting mechanism; and
- mechanism for feedback or remedial action.

De Beers will be required to develop monitoring programs on abundance and diversity on key fish species in the Nayshkootayaow River. De Beers will also be required to conduct site-specific bird studies. These components will be required for the regulatory approval of the project, and De Beers is encouraged to start these surveys prior to mine-site capture and construction activities. However, these components may not necessarily be required to be completed prior to completion of the EA review.

Glossary of Terms

Alternative means of carrying out the project are the various ways that the project could be implemented or carried out. This could include, for example, alternative locations in the project area, routes and methods of development, implementation, and mitigation. Consideration of alternative means that are technically and economically feasible, and the environmental effects of any such alternative means, are required in every comprehensive study.

Communication plan: A communication plan is the plan put together by federal departments to announce the various stages and releases with respect to the Victor project. It will be the method of communicating the various public-comment periods for the review and where material may be obtained or viewed.

Comprehensive study: In accordance with subsection 2(1) of the CEAA, "comprehensive study" means an environmental assessment that is conducted pursuant to Section 21 of the CEAA and that includes a consideration of the factors under subsections 16(1) and 16(2) of the CEAA.

Consultation plan: A consultation plan is part of the obligation of the federal government to involve First Nations in decisions that may have an impact on them. It goes beyond the EA process but can be undertaken, in part, during the EA process to ensure the EA incorporates First Nation concerns. Responsible Authorities will have to continue discussions with First Nations after the EA is complete and they are allowed to move on to the regulatory or funding decisions with respect to the project.

Cumulative environmental effect: The effect on the environment, over a certain period of time and distance, resulting from the effects of the project when combined with those of other past, existing and imminent projects and activities.

Ecoregion: A part of a province characterized by distinctive regional ecological factors, including climate, physiography, vegetation, soil, water, fauna, and land use. An Ecoregion (e.g., James Bay Lowlands, Ecoregion #217) is a component of an Ecozone (e.g., Hudson Plains Ecozone), which is defined as an area of the earth's surface representative of large and very generalized ecological units characterized by interactive and adjusting abiotic and biotic factors. Within each Ecoregion, there are one or more ecodistricts, which are each characterized by distinctive assemblages of relief, geology, landforms and soils, vegetation, water, fauna, and land use. For additional information, see "Narrative Descriptions of Terrestrial Ecozones and Ecoregions of Canada" at www.ec.gc.ca/soer-ree/English/Framework/Nardesc/TOC.cfm.

Ecosystem approach: While there is no single definition for an ecosystem approach, it embodies certain underlying principles. The following is a partial list describing the ecosystem approach cited in EC's 1995 *Guiding Principles for Ecosystem Initiatives* (www.ec.gc.ca/ecosyst/gdprecin/ acknowl.html). An ecosystem approach understands that humans are part of nature, not separate from it; recognizes the dynamic nature of the ecosystem; incorporates the concepts of carrying capacity, resilience and sustainability; uses a broad definition of the environment, including natural, physical, economic, social and cultural; is based on natural geographic units rather than on political boundaries; embraces all levels of activity (local, regional, national and international); emphasizes the importance of living species other than humans and of generations other than our own; and is based on an ethic in which progress is measured by the quality, well-being, integrity and dignity it accords natural, social and economic systems.

Environment: In accordance with subsection 2(1) of the CEAA, "environment" means the components of the Earth, and includes: a) land, water and air, including all layers of the atmosphere, b) all organic and inorganic matter and living organisms, and c) the interacting natural systems that include components referred to in a) and b) above.

Environmental assessment (subsection 2(10) of CEAA): In respect of a project, an assessment of the environmental effects of the project that is conducted in accordance with the CEAA and the regulations.

Environmental effect (subsection 2(10) of the CEAA): In respect of a project, a) any change that the project may cause in the environment, including any change it may cause to a listed wildlife species, its critical habitat or the residences of individuals of that species, as those terms are defined in subsection 2(1) of the *Species at Risk Act,* b) any effect of any change referred to in paragraph (a) on i) health and socio-economic conditions, ii) physical and cultural heritage, iii) the current use of lands and resources for traditional purposes by Aboriginal persons, or iv) any structure, site or thing that is of historical, archaeological significance, or c) any change to the project that may be caused by the environment.

Mitigation: In respect of a project, the elimination, reduction or control of adverse environmental effects of the project, including restitution for any damage to the environment caused by such effects through replacement, restoration, compensation or any other means.

Participation plan: Having made the determination that the RAs should seek the involvement of the public and First Nations that will be affected by this project, the participation plan is the process in which the input of these interested parties and First Nations will be sought. It will involve the placement of notices in papers and on radio to announce major releases and when input is sought, and it will involve direct contact with the First Nations and the non-Aboriginal communities listed in the plan.

Project study area: The project study area will consist of the immediate geographical vicinity as determined by RAs (land and water) that encompasses all physical works and activities proposed by the proponent for the Victor diamond project. This will include the mine site, the community of Attawapiskat, all roads, the pipeline, facilities in or near Attawapiskat, an airstrip, the activities and roads near or along James Bay and the communities of Kashechewan, Fort Albany, Moosonee and Moose Factory, and the shipping and transfer point for diesel fuel in James Bay and Hudson Bay south of Belcher Islands' south tip around 55°40'N.

Public registry: A framework that seeks to provide convenient access to complete information about the environmental assessment carried out under the CEAA. The framework consists of: the Federal Environmental Assessment Index, a list of publicly available documents related to the EA that the RA maintains, and the EA documents themselves.

Pycnocline: The portion of the water column where density changes rapidly because of salinity and temperature. In an estuary, the pycnocline is the zone separating deep, more saline waters from the less saline, well-mixed surface layer waters.

Regional study area: The regional study area will encompass the maximum geographical extent (zone of influence) that impacts from the project may be incurred for each VEC. This geographical extent may vary depending on the VEC or issue examined; however, each area will be defined and explained in the comprehensive study.

Scope of assessment: This includes all the factors that the RAs consider to be necessary to fully understand the impacts of the Victor project. It will include the factors laid out in Sections 16 (1) and (2) of the CEAA.

Scope of project: All the physical works and activities as outlined in section 2.0 of these guidelines.

Socio-economic conditions: The quality of life or way of life; the economy, commercial opportunities, or employment; the availability of recreational opportunities or amenities; home life or personal security; future land uses; and the future use or future production of commercial species or resources.

Valued ecosystem component: Those aspects of the environment that are particularly valued in the community or that have ecological importance. VECs may contribute to, or be otherwise relevant to, the health and well-being of people and/or play a key role in the function, stability or sustainability of ecosystems.

APPENDIX B

GLOSSARY

GLOSSARY

%	Percent
°C	degrees Celsius
µg	Micrograms
µS	microsiemens
1.3H:1V	ratio of horizontal to vertical in relation to slope
75^{th} percentile	75% of all data is less than the measure
7Q20	statistically calculated lowest flow that could be expected to occur in a creek or river, based on the minimum average low flow that would occur over 7 consecutive days within a time period of 20 years
a	annum (year)
ABA	acid base accounting
access roads	permanent roads at the Victor site for regular traffic
acid generation potential	ratio of the neutralization potential (NP) to acid producing potential (AP); rock that has an NP to AP ratio (NP:AP) of greater than 4:1 will not generate acid
acid mine drainage	naturally occurring process whereby rock/minerals containing sulphides and sulphur on exposure to water and oxygen generate acid
advanced exploration	later stage of exploration where a relatively large sample of ore is extracted for the purpose of defining the economic potential of the mineral deposit
AIRSS	Arctic Ice Regime Shipping System Standards
all-season roads	permanent roads accessible at all times of the year
AMEC	AMEC Americas Limited
AN	ammonium nitrate
ANFO	ammonium nitrate fuel oil explosive
ANSI	Area of Natural and Scientific Interest
AP	acid producing potential
API	American Petroleum Institute
Aqua Dam	water-filled cofferdam used to isolate in-water work areas
AQUASEA	two-dimensional, depth averaged flow and transport model
ARCAL	air to ground radio control of air field lights
ASL	above sea level
AttFN	Attawapiskat First Nation
ATV	all terrain vehicle
bedrock	more or less solid, undisturbed rock in place found either at surface or beneath overburden
BHP	boiler horsepower
bioherms	limestone and dolostone outcrops that rise above the surrounding topography
bioremediation	remediation of soil or other materials by natural biological processes
BOD_5	five-day test for biological oxygen demand
bog and fen	bogs and fens are marshes; fens are typically highly saturated often with a directional seepage; bogs tend to be slightly raised and therefore slightly drier than fen areas.
Bq/g	becquerel per gram; a measure of radioactivity
B-trains	two tankers hauled behind a single truck cab
CAEAL	Canadian Association of Environmental and Analytical Laboratories
CCME	Canadian Council of Ministers of the Environment
CCG	Canadian Coast Guard
CDWQG	Canadian Drinking Water Quality Guidelines
CEA Agency	Canadian Environmental Assessment Agency
CEAA	Canadian Environmental Assessment Act
CEMI	Canadian Environmental and Metallurgical Inc.
CEQG PAL	Canadian Environmental Quality Guidelines for the Protection of Aquatic Life
CESA	Cumulative Effects Study Area
CFA	Consolidated Frequency Analysis
CFU	colony forming units
CH_4	methane

CHS	Canadian Hydrographic Survey
CIRES	Cooperative Institute for Research in Environmental Sciences
cm	centimetre
CO_2	carbon dioxide
coarse PK	coarse processed kimberlite; crushed and scrubbed ore with a similar chemical composition
country rock	bedrock surrounding the kimberlite ore
COSEWIC	species at risk (endangered, threatened, special concern - as defined by the Committee on the Status of Endangered Wildlife in Canada
COSSARO	Committee on the Status of Species-at-Risk Ontario
cpht	carats per hundred tonnes
cpt	carats per tonne
crown pillar	thickness of competent rock left in place between the surface and the underground mine workings for safety reasons
CSA	Canadian Standards Association
CSEA	Comprehensive Study Environmental Assessment
CSR	Comprehensive Study Report
d	day
dBA	A-weighted decibels
De Beers	De Beers Canada Exploration Inc.
DFO	Department of Fisheries and Oceans
DMS	dense medium separation
DOE	Environment Canada
dredgeate	sediment extracted during dredging
DSA	detailed study area
E. Coli	*escherichia coli*
EA	Environmental Assessment
EBR	Environmental Bill of Rights
EBS	Environmental Baseline Study; documents the existing environmental conditions prior to development
ECRC	Eastern Canada Response Corporation
EEM	environmental effects monitoring
ELC	Ecological Land Classifications
EM	electromagnetic imaging
EMC	Environmental Management Committee
EMS	Environmental Management System
Enviro tank	double-walled tank
EPT species	*ephemeroptera* (mayflies) *plecoptera* (stoneflies) and *tricoptera* (caddisflies)
esker	a linear glacial landform composed primarily of sand and gravel
ESR	Environmental Study Report
FEC	forest ecosystem classification
fenceline	a figurative term relating to the property boundary
fens	see bogs and fens
FeSi	ferrosilicon iron-glass powder, typically 79% iron, 15% silicon, 5% titanium and 1% aluminum
fg	femtograms; 10e-15 grams or 1/1,000,000,000,000,000 of a gram (in relation to International toxicity equivalency factors)
fine PK	fine processed kimberlite, chemical composition similar to the raw ore feed but will also contain trace concentrations of flocculants and ferrosilicon
flarks	pools in a muskeg environment
flocculant	chemical that binds with solids and is added to a liquid to assist settling of the solids out of the liquid (such as mineral particles suspended in water)
fly-in, fly-out	remote operation where personnel do not live permanently at site
FNEI	Five Nations Energy Inc.
FPA	Feasibility Partnering Agreement
g	gram

g/cm^3	grams per cubic centimetre
g/t	grams per tonne
GAR	Geographic Area of Response
GDP	Gross Domestic Product
geogrid	synthetic (man-made) mesh used to better distribute weight
geotextile	synthetic material that water can pass through but sediments cannot
GHG	greenhouse gases (carbon dioxide, methane and nitrous oxide)
Golder	Golder Associates Ltd.
GPS	global positioning system
GVW	normal gross vehicle weight
ha	hectare
haul roads	permanent roads restricted to heavy equipment traffic
HazOp	study that identifies hazards and operability problems
HC	Health Canada
HCItasca, HCI	Hydrologic Consultants Inc.
HCl	hydrogen chloride
HDPE	high density polyethylene
heavy metals	certain metallic parameters such as lead, nickel and zinc (transition metals)
HEPA	high-efficiency particulate; relating to air filters
hiburnaculae	denning holes, typically for clusters of snakes and possibly for little brown bats
HPRC	high pressure rolls crusher
hr	hour
HRI	Human Resource Inventory
Hydro One	Hydro One Networks Inc.
IBA	Impact Benefit Agreement
IBP	International Biological Program
IMO	Independent Market Operator
INAC	Indian and Northern Affairs Canada
Indicated Resource	That part of a mineral resource with a sufficient level of confidence to support mine planning and evaluation of the economic viability of the deposit; based on detailed and reliable exploration and testing information.
Inferred Resource	That part of a mineral resource for which quantity and grade or quality can be estimated based on limited information and sampling
ISO	International Standards Organization
isostatic rebound	natural rising of the landscape once the weight of a glacier is removed
karst	cavity dominated landscape arising from the natural dissolving of limestone
kg	kilogram
kg/t	kilogram per tonne
Kilometre __	distance from Attawapiskat along the winter road or pipeline route to the Victor site
kimberlite	volcanic rock that originates at depth within the earth that hosts diamonds
km	kilometre
km^2	square kilometre
kPa	kilopascal
kV	kilovolt
kW	kilowatt
L	litre
L/d	litres per day
Lakefield	Lakefield Research Limited
LC50	measure of toxicity; concentration at which the test organism has 50% survival over a given period of time
lighter	marine transfer, such as from tanker to barge
LTI	lost time incident
m	metre
m/s	metres per second
m^2	square metre
m^3	cubic metre

m^3/a	cubic metre per day
m^3/d	cubic metre per day
m^3/h	cubic metres per hour
m^3/min	cubic metres per minute
m^3/s	cubic metres per second
mainstem	main branch of a river
meq	milliequivalents
METS	Mushkegowuk Education and Training Service
mg	milligrams
micro-karst	type of karst, characterized by very small fissures and cavities
min	minute
mine rock	non-diamond bearing rock that must be extracted to access rock of value (ore)
MINEDWC	model designed to simulate three-dimensional groundwater flow conditions
minerotrophic	influenced by the underlying mineral soil which contributes at least a modest level of nutrients to the system
ML	million litres
mm	millimetre
Mm^3	million cubic metres
MNDM	Ontario Ministry of Northern Development and Mines
MNR	Ontario Ministry of Natural Resources
MOE	Ontario Ministry of the Environment
MOL	Ontario Ministry of Labour
MOU	Memorandum of Understanding
MRCA	Mattagami Region Conservation Authority
MSDS	material safety data sheets
Mt	million tonnes
Mt/a	million tonnes per year
MTL	Moosonee Transportation Limited
MTO	Ontario Ministry of Transportation
muskeg	flat wet area containing a thick layer of slowly decaying vegetation and organics
MW	megawatt
MWh	megawatt hour
NAN	Nishnabee Aski Nation; represents most of the First Nations located within the area that drains to Hudson Bay and James Bay
NAPS	Nishnawbe Aski Police Service
NCAR	National Center for Atmospheric Research
NCEP	National Centers for Environmental Prediction
NEAS	Nunavut Eastern Arctic Shipping
Newtons	a measurement of force
NFPA	National Fire Protection Association
ng	nanograms (1/1,000,000th of a mg)
NGO	non-governmental organizations
NH_3	ammonia
NH_4^+	ammonium
NO_2	nitrite
NO_3	nitrate
NOAA	National Oceanic and Atmospheric Administration
NOSA	National Occupational Safety Association
NO_x	nitrogen oxides
NP	neutralization potential
NPV	net present value
NRCan	Natural Resources Canada
NTCL	Northern Transportation Company Limited
n/km^2	number per square kilometre
nurse crop	non-invasive, temporary species planted to modify the micro-environment and improve growth conditions for revegetation

NWT	Northwest Territories
ODWS	Ontario Drinking Water Standards
OEB	Ontario Energy Board
OHSAS	Occupational Health and Safety Assessment Series
ombrotrophic	environments that receive their nutrient input from rain and snow
ONR	Ontario Northland Railway
ore	rock of value for its mineral content
overburden	unconsolidated mineral material near surface (clay, silt and sand)
P&IDs	Piping and Instrumentation Drawings
PA	participation agreement
palsa bogs	slightly raised mound or ridge containing a core of permafrost
PCB	polychlorinated biphenyls
PDEA	Preliminary Draft Environmental Assessment
peat plateau	slightly raised, permanently frozen ground
percentile	comparison of values in a series; for example: 30% of all data in a group are less than the 30^{th} percentile (70% of all data are higher)
permafrost	permanently frozen ground; at the Victor site in the form of palsas and peat plateaus
pg	picograms are 10e-15 grams (in relation to International toxicity equivalency factors)
PK	processed kimberlite
PKC	processed kimberlite containment (facility)
PM10	particulate matter less than or equal to 10 microns in diameter
PM2.5	particulate matter less than or equal to 2.5 microns in diameter
polynya	any non-linear shaped opening enclosed in ice
ppb	parts per billion
ppm	parts per million
Project lands	lands that will be developed as part of the Project
PSA	project study area
PWQO	Ontario Provincial Water Quality Objectives for the protection of aquatic life
RA	Responsible Authority
RBC	rotating biological contractor
REDS	rare earth drum separator
RER	rare earth roll
revegetation	planting or seeding of disturbed areas to promote the growth of new vegetation
RO	Response Organization
ROW	right-of-way
RPI	residual passive inflow, groundwater inflow expected to bypass perimeter well field
RSA	Regional Study Area
s	second
SBR	sequencing batch reactor
SCADA	supervisory control and data acquisition
SCAPS	sizing, counting and processing system
settling pond	pond where water is slowed down or contained until suspended material can settle (precipitate) out of solution
SHE	Safety, Health and Environmental
sightholders	world leading buyers with specialized diamond and marketing expertise, that inspect and purchase diamonds on behalf of various organizations
sinkholes	hole produced by water dissolving limestone in a circular fashion
sin qua non	a thing or condition that is essential or indispensable
smart pig	computerized device that travels through and defines the pipeline condition
SMS	Safety Management System
SO_2	sulphur dioxide
SPS	single particle sorter used to sort diamonds from waste material
SRK	SRK Consulting
sump	a cavity excavated in the based of a pit to allow water to be pumped out
Super B-trains	two tankers hauled behind a single truck cab (larger than B-trains)
t	tonne

t/a	tonnes per year
t/d	tonnes per day
t/h	tonnes per hour
t/m^3	tonnes per cubic metre
T-C	Tibbitt-Contwoyto winter road in the Northwest Territories
TDS	total dissolved solids
TEK	Traditional Ecological Knowledge; a body of knowledge and beliefs transmitted through oral tradition and first hand observation about the environment
TEQ	toxicity equivalency factors
TERMPOL	Technical Review Process of Marine Terminal Systems and Transshipment Sites
TP	total phosphorus
traditional pursuits	activities, such as trapping, hunting, fishing or gathering, or other land uses traditionally practiced by Aboriginal persons for cultural or economical sustenance
TRP	TERMPOL Review Process
T_s	sea surface temperature in °C
TSS	total suspended solids
TSSA	Technical Standards and Safety Authority
USEPA	United States Environmental Protection Agency
Utilidor	insulated and heated passage way for personnel, piping and/or wiring
V	volt
VECs	Valued Ecosystem Components
VFP	Victor fuel pipeline
VHF	very high frequency
VOC	volatile organic carbon compounds.
W	watts
well field	connected groundwater pumping wells used to remove water from a work area
WHMIS	workplace hazardous materials information system
winter road	seasonal road constructed of snow and/or ice
WRER	wet rare earth rolls

MEASUREMENT CONVERSION TABLE

To convert from:	To:	Multiply by:
^oC (degrees Celsius)	Fahrenheit	1.8 (+ 32)
km (kilometres)	miles	0.6214
m (metres)	feet	3.2808
m^3 (cubic metres)	gallons (Imperial)	219.969
m^3/day (cubic metres per day)	gallons per day (Imperial)	219.969
m^3/s (cubic metres per second)	gallons per second (Imperial)	219.969
m^3 (cubic metres)	gallons (U.S.)	264.171
m^3/day (cubic metres per day)	gallons per day (U.S.)	264.171
m^3/s (cubic metres per second)	gallons per second (U.S.)	264.171
mm (millimetres)	inches	0.0394
tonnes	tons	1.1023
tonnes	pounds	2204.6226

Example:

To convert 20^{o}C to Fahrenheit, multiply 20 by 1.8 and add 32.
(20^{o}C = 68^{o}F)

To convert 90 km to miles, multiply 90 by 0.6214 to get 55.9 miles.
(90 km = 55.9 miles)

DESCRIPTION OF SPECIES AT RISK

Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assesses the national status of species that are considered at risk in Canada according to the definitions that follow. Species according to the Committee are “any indigenous species, subspecies, variety, or geographically or genetically distinct population of wild fauna or flora” (COSEWIC 2003).

Status	**Definition**
Extinct	A species that no longer exists
Extirpated	A species no longer existing in the wild in Canada, but occurring elsewhere
Endangered	A species facing imminent extirpation or extinction
Threatened	A species likely to become endangered if limiting factors are not reversed
Special Concern	A species of special concern because of characteristics that make it particularly sensitive to human activities or natural events (previously termed vulnerable 1990 to 1999; or rare prior to 1990)

The Ontario Ministry of Natural Resources also has a process to evaluate species at risk, the Committee on the Status of Species-at-Risk in Ontario (COSSARO), and evaluates species according to the definitions that follow (MNR, Natural Heritage Information Centre; www.mnr.gov.on.ca/MNR/nhic/nhic.cfm).

Status	**Definition**
Extinct	Any species formerly native to Ontario that no longer exists (anywhere)
Extirpated	Any native species no longer existing in the wild in Ontario, but existing elsewhere in the wild
Endangered	Any native species that, on the basis of the best available scientific evidence, is at risk of extinction or extirpation throughout all or a significant portion of its Ontario range if the limiting factors are not reversed
Threatened	Any native species that, on the basis of the best available scientific evidence, is at risk of becoming endangered throughout all or a significant portion of its Ontario range if the limiting factors are not reversed
Vulnerable	Any native species that, on the basis of the best available scientific evidence, is a species of special concern in Ontario, but is not a threatened or endangered species

APPENDIX C

COMMENTS ON THE VICTOR DIAMOND PROJECT ENVIRONMENTAL ASSESSMENT RECEIVED FROM FIRST NATIONS AND MEMBERS OF THE GENERAL PUBLIC

APPENDIX C

Issue	Comments	DG/CS	# Times	Community	Meeting/ Written
Socio- Economic and Cultural Issues					
1. Jobs, Skills and Education	Apprehension that AttFN will receive all jobs associated with project and that no management jobs will be available for First Nation citizens.	DG/CS	2	Fort Albany First Nation Mocreebec Council of the Cree Nation	M/W
	A description is needed of the current available programs such as distance education or adult education programs as well as any traditional education provided in the area.	CS	2	Mushkegowuk Council Mushkegowuk Council	W/W/W
	Statistics on the current availability of skilled workers is needed in each of the west James Bay area FN.	CS		Mushkegowuk Council Attawapiskat First Nation	W/W
	A Human Resources Inventory should be prepared and available to all James Bay Coastal Cree communities	CS		Mushkegowuk Council	W
	Existing funds from the HRDC for skills training are only available on a conditional basis as they can only be received when the project has been officially approved, therefore decreasing the employment chances of First Nations members.	CS/DG	2	Member of the First Nation Attawapiskat Attawapiskat First Nation	W/M
	Programs should focus on the acquisition of long term skills that are not solely associated with mining activities	CS		Member of the First Nation Attawapiskat	W
	Unable to obtain employment due to the lack of child care facilities	CS	2	Mushkegowuk Council Attawapiskat First Nation	M/M
	Skilled labour force will be lost within community	DG		Attawapiskat First Nation	M
2. Government Functions	Uncertainty over INAC's role in the EA process	DG	3	Moose Cree First Nation Mushkegowuk Council Mining Watch	M/M/W
	Questions regarding the differences between a federal and provincial EA process	DG		Mushkegowuk Council	M
	Concern over the role (or lack of role) of the province. Why have they not contacted First Nations groups yet?	DG	2	Moose Cree First Nation Fort Albany First Nation	M/W
	There is no clear indication how the federal and provincial regulators will coordinate their efforts	DG	3	Attawapiskat First Nation Mining Watch Canada Mushkegowuk Council	W/W/M
3. Housing and Community Infrastructure	A complete description of existing infrastructure is not depicted for the project study area communities that reside on reserve land	CS		Mushkegowuk Council	W
	There is a lack of adequate information on the effects the project will have on social services, education, housing and community	CS	2	Attawapiskat First Nation Attawapiskat First Nation	W/M

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Issue	Comments	DG/CS	# Times	Community	Meeting/ Written
3. Socio-economic impacts	infrastructure. No estimates have been supplied for the increased demand on these community features.				
	Not clear why out migration should continue at the same rate when more jobs are available locally, or why government transfers will remain the same with increased employment.	CS		Attawapiskat First Nation	W
	No measures have been identified to reduce speculative in-migration related to project	CS	2	Attawapiskat First Nation Attawapiskat First Nation	W/W
	Funds and resources for infrastructure and land use planning	DG		Attawapiskat First Nation	M
	Speculation that the citizens of Attawapiskat are being paid off for their compliance	DG		Moose Cree First Nation	M
	What level of liability insurance is required?	DG		Moose Cree First Nation	M
	Concern over the projects short term economic benefit will not outweigh any long term social effects or environmental damage	DG	2	Kashechewan First Nation Attawapiskat First Nation	M/M
	Reduction in economic opportunity could be felt within the community if the airport is developed at the mine, thus allowing company to skip over Attawapiskat	DG		Attawapiskat First Nation	W
	Reservations that DeBeers might process the diamonds outside of the mine area, therefore resulting in a decrease of economic opportunities	DG	2	Attawapiskat First Nation Attawapiskat First Nation	W/M
	DeBeers should describe how different community groups might experience that same social or economic effects differently	DG		Attawapiskat First Nation	W
	Environmental assessment does not adequately account for or address pre-existing limitations on economic development	CS		General Public	W
	More analysis is needed on the social impacts from development	DG		General Public	W
	Within the EA process there is a large imbalance between the assessments of environmental impacts versus socio-economic impacts.	CS		General Public	W
	Guideline requirements were not met on socio-economic issues since DeBeers did not consult with other affected James Bay communities	CS		Mushkegowuk Council	W
	DeBeers makes the assumption that all First nations communities are alike by applying the same general key issues to all the communities	CS	4	Mushkegowuk Council Mushkegowuk Council Mushkegowuk Council Mushkegowuk Council	W/W/ M/M
	Would like monitoring and comprehensive followup program to deal with socio-economic effects	CS	3	Mushkegowuk Council Mushkegowuk Council Mushkegowuk Council	W/W/W
	Net socio-economic benefits need to be determined in the CS, prior to government approval regardless whether or not the IBA has been ratified	CS		Mushkegowuk Council	W

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Issue	Comments	DG/CS	# Times	Community	Meeting/ Written
	There has been no assessment by DeBeers on the potential effect to current use of land and resources for traditional and cultural purposes as a result of biophysical and socio-economic changes	CS		Mushkegowuk Council	W
	No information to suggest that the socio-economic impacts for other Western James Bay Coastal communities will parallel those for Attawapiskat but in moderate form	CS		Mushkegowuk Council	W
	Potential social effects of rotational work schedule need to be examined	CS	2	Attawapiskat First Nation Attawapiskat First Nation	W/W
	Socio-economic baselines studies are weak and confined only to the community of Attawapiskat. Conditions for the FN communities are based solely on published overgeneralized information.	CS	4	Mining Watch Canada Mushkegowuk Council Mushkegowuk Council Mushkegowuk Council	W/W/W/W
	Fears that a boom and bust economy will take place in the region	CS	2	Mining Watch Canada Attawapiskat First Nation	W/M
	Impacts of mine already felt within the community from employment opportunities during the exploratory phase that impacted on leadership capacities and decision making process	CS		Member of the First Nations Attawapiskat	W
	Existing socio-economic environment is very general and does not provide the data upon which to conduct a complete socio-economic impact assessment.	CS	4	Attawapiskat First Nation Mushkegowuk Council Attawapiskat First Nation Attawapiskat First	W/W/W/W
	Studies lack adequate baseline data for social, economic, cultural and environmental impacts	CS		Member of the First Nations Attawapiskat	W
	Concern over NRCan's decision to scale back the scope of the environmental assessment to exclude socio-economic effects that are not biophysically linked	CS		Mushkegowuk Council	W
	Trend information on key socio-economic indicators would strengthen the baseline description	CS		Attawapiskat First Nation	W
	What impacts will the proposed project have on the groundwater and what is the potential for groundwater contamination on the people and environment	CS		Mocreebec Council of the Cree Nation	W
4. Impact on Youth	Impact of mine on Native Youth	DG		Kashechewan First Nation	M
	Movement of native youth out of the communities after mine closure in search of high paying jobs that they became accustomed to while working at the mine - therefore abandoning traditional culture	DG	3	Chief and Council of Kashechewan Kashechewan First Nation Kashechewan First Nation	M/M/M
	Concern that the mine will increase the already high incidence of youth violence and drug abuse	DG/CS	5	Attawapiskat First Nation Attawapiskat First Nation	M/W/W/M/M

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Issue	Comments	DG/CS	# Times	Community	Meeting/ Written
				General Public Attawapiskat First Nation Attawapiskat First Nation	
5. Study Area	Local study area is not well defined	DG		Mushkegowuk Council	W
	Regional study area and cumulative effects area need clarification	DG		Mushkegowuk Council	W
	Include the entire James Bay ecosystem	DG		Mushkegowuk Council	W
	It is often not clear what the local study area, regional study area and cumulative effects area refer to	DG		Mining Watch Canada	W
6. Human Health	"Project Area" and "Study Area" should not be used unless clearly identified	DG		AttFN	W
	De Beers did not include the use of land and resources for traditional purposes in the regional study area, nor in the project study area except for Attawapiskat	CS	2	Mushkegowuk Council Mushkegowuk Council	W/W
	Not all of the existing infrastructure is described in the project study area communities and on reserve land	CS		Mushkegowuk Council	W
	The assessment of human health will require the direct involvement of Aboriginal communities directly impacted by the project, particularly to develop community-based indicators that are not necessarily reflected in conventional indicators for which data is collected by government e.g. "community wellness"	DG		Nishnawbe Aski Nation	W
	Risk assessment for human consumption of fish did not provide for the generally higher levels of consumption by aboriginal users	CS	3	Mushkegowuk Council Mining Watch Canada Fort Albany First Nation	W/W/M
	Proposed description of human health is inadequate	DG	5	North Watch Mushkegowuk Council Mushkegowuk Council Attawapiskat First Nation Attawapiskat First Nation	W/W/W/W/ W
	A lack of consideration of linkage to peoples' health with the health of the land	CS		Attawapiskat First Nation	W
	Some form of environmental and human heath analysis is warranted particularly for post closure phase	CS	2	Attawapiskat First Nation Mushkegowuk Council	W/W
	No information from the communities of Fort Albany, Kashechwan and Moose Factory on the potential physical, mental, spiritual and cultural health effects on employees, their families and communities	CS		Mushkegowuk Council	W
	No information is given in the CS on family structure, incidence of diseases, mortality, personal health practices, sexual health and injuries	CS	2	Mushkegowuk Council Attawapiskat First Nation	W/W
7.Consultations and	Assurances that DeBeers will provide compensation to communities if	DG		Attawapiskat First Nation	M

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Issue	Comments	DG/CS	# Times	Community	Meeting/ Written
Compensation	they are not able to continue with traditional activities on the land				
	Concern that DeBeers is only dealing with the Attawapiskat First Nation through the development of the IBA	DG		Fort Albany First Nation	M
	AttFN is the sole focus of consultation. Although the primary study area includes five first Nation communities which should be consulted	CS	4	Mushkegowuk Council Mushkegowuk Council Mushkegowuk Council Fort Albany First Nation	W/W/W/W
	Information obtained during consultations with other west James Bay FN was not contained within CS. It should clearly indicate who said what and what the major concerns were.	CS		Mushkegowuk Council	W
	Lack of consistency in the treatment of other west coast area James Bay Nations. Consultations were held after the completion of socio-economic assessment in the CS.	CS	4	Mushkegowuk Council Mushkegowuk Council Mushkegowuk Council Fort Albany First Nation	W/W/W/M
	Any agreement that DeBeers reached with the AttFN does not satisfy the EA requirements.	CS		Mushkegowuk Council	W
	DeBeers choosing not consult with other FN communities due to future agreements is a serious deficiency in the validity of EA process.	CS		Mushkegowuk Council	W
	How can compensation be fair when it is based on an agreement that lacks the analysis of actual impacts, which are linked to the environmental assessment that is still in progress	CS	2	Member of First Nations Attawapiskat Member of First Nations Attawapiskat	W/W
	There is little technical assessment upon which the significance of effects can be determined, a monitoring program can be developed, or an Impact-Benefit Agreement (IBA) can be based	CS		Attawapiskat First Nation	W
	Can we have separate agreement, with the government as assurances on monitoring	DG		Attawapiskat First Nation	M
	Consultation was not used to identify VECs for the James Bay Coastal Cree communities. No community knowledge in the development of the traditional ecological knowledge as well there were no consultations to determine baseline data on the existing social and economic conditions.	CS		Mushkegowuk Council	W
	Concerns that DeBeers' lead investigator was not sitting in on consultations to hear concerns	DG		Attawapiskat First Nation	M
	Not enough information being shared between local communities and Attawapiskat	DG		Fort Albany First Nation	M
	Negotiation process has not been transparent due to the fact that they were done on confidential basis	CS		Member of First Nations Attawapiskat	W
	Should incorporate a strategy to involve the whole community in	CS	2	Member of First Nations Attawapiskat	W/M

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Issue	Comments	DG/CS	# Times	Community	Meeting/ Written
	community consultations			Attawapiskat First Nation	
	Attawapiskat is only looking out for itself and not other communities	CS		Fort Albany First Nation	M
8.Miscellaneous	DeBeers has not included an assessment of the potential impact on cultural well-being, social cohesiveness or language	CS		Mushkegowuk Council	W
	First Nations governance needs to be recognized as part of the existing environment	DG		Mushkegowuk Council	W
	Concern that diamonds from the Victor mine will be mixed in with "blood diamonds" of South Africa	DG		Attawapiskat First Nation	M
	Increased need for law enforcement to stop drug and alcohol abuse	CS		Attawapiskat First Nation	M
	The description of the environment should include the physical, social, cultural and economic environment	DG	2	Member of First Nations Attawapiskat Attawapiskat First Nations	W/W
	Concern that the Draft EA guidelines does not reflect the unique situation the project has on the AttFN	DG	2	Attawapiskat First Nation Attawapiskat First Nation	M/W
	First Nations Energy Inc importance as an important contributor to the local aboriginal community	DG		Mushkegowuk Council	W
	No quantitative data on the amount of resources harvested and the amount used for country foods	CS		Mushkegowuk Council	W
	DeBeers completed the socio-economic impact assessment without this data instead of waiting for the data collection to be completed	CS		Mushkegowuk Council	W
	DeBeers should not use the term "not significant" until it consults all local residents	CS	2	Mushkegowuk Council Mushkegowuk Council	W/W
	The CSEA also allows for the suspicion that the processes described in the document are not followed in the spirit that they are presented and only serve as justification of the agenda that is to be pushed through.	CS	2	Member of First Nations Attawapiskat Member of First Nations Attawapiskat	W/W
	Concern with DeBeers' legal interpretation about Aboriginal treaty	CS	3	Member of First Nations Attawapiskat Member of First Nations Attawapiskat Member of First Nations Attawapiskat	W/W/W
	The term development is indeed used in a very one-sided way, as economic development in interpretation of western, capitalist economy	CS		Member of First Nations Attawapiskat	W
	Concern over the fact that DeBeers Canada is a corporate entity that is separately incorporated from it's transnational parent	CS		Mining Watch Canada	W
	Other James Bay communities have already been impacted by the project from the rush in diamond prospecting. It has also resulted in the movement of caribou.	CS	2	Mining Watch Canada Moose Cree First Nation	W/M
	The Marten Falls Indian Reserve will not receive any benefit from the VDP because the coastal road will bypass their community	CS		Marten Falls Indian Reserve	W

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Issue	Comments	DG/CS	# Times	Community	Meeting/ Written
	What are the significant environmental effects and what does it have to do with them	DG		Attawapiskat First Nation	W
	Differences in the taste of food compared to the past	DG		Attawapiskat First Nation	M
	What good is our EA since DeBeers has already been mining	DG		Attawapiskat First Nation	M
	Construction phase is going to start soon yet there are ongoing negotiations at the same time and the EA is not yet complete	CS		Member of First Nations Attawapiskat	W
	Questions on how First Nations can get information on project	DG		Moose Cree First Nation	M
	Concerns over the extent of the monitoring project	DG		Mushkegowuk Council	M
	Small companies are causing a lot of problems by leaving waste behind	DG		Mushkegowuk Council	M
	How is the environmental assessment tied into the socio-economic effects	CS		Member of First Nations Attawapiskat	M
Water					
1.Ground water Quantity and Quality	Careful monitoring of the waters emerging downstream of the muskeg filters will be required. Possible contingency measures should be identified at licensing.	CS		Nishnawbe Aski Nation	W
	More laboratory and particularly field testing under system stress is required to confirm the vertical hydraulic conductivity of the overburden	CS		Attawapiskat First Nation	W
	Kinetic cell testing should be re-run without recycling solutions and circulation of moist air	CS		Attawapiskat First Nation	W
	Concern that there is limited hydrogeologic information from the west and east of proposed pit area where there are major fault lines as well as the deep overburden trench	CS		Attawapiskat First Nation	W
	Information collected on the vertical hydraulic conductivity of overburden is insufficient. No field tests were performed. All results were based on laboratory test that represent only a miniscule fraction of overburden materials, therefore the number and type of hydraulic conductivity data is considered to be inadequate	CS		Attawapiskat First Nation	W
	Concerns over the drawdown levels of the Nayshkootayaow River	CS	3	Nishnawbe Aski Nation Attawapiskat First Nation Mining Watch Canada	W/W/W
	Assessment done on dewatering was confined to the Nayshkootayaow River. There was no mention of potential effects on the entire surface water ecosystem.	CS	2	Nishnawbe Aski Nation Attawapiskat First Nation	W/W
	Ground flow model should be rerun due to deficiencies found within the model that could be "highly over or underestimate impacts"	CS	2	Nishnawbe Aski Nation Attawapiskat First Nation	W/W
	A detailed assessment of the connectivity between the Attawapiskat River and the bedrock aquifer is required.	CS	4	Attawapiskat First Nation Attawapiskat First Nation	W/W/W/W

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Issue	Comments	DG/CS	# Times	Community	Meeting/ Written
				Attawapiskat First Nation Attawapiskat First Nation	
	Amount of baseline information related to groundwater and hydrogeology is insufficient and does not adequately characterize the hydrogeology for purposes required	CS		Attawapiskat First Nation	W
	Subsurface investigations of geology and hydrology need to be undertaken over a larger portion of the predicted groundwater impact area	CS		Attawapiskat First Nation	W
	DeBeers should ensure that the groundwater model calibrates with respect to the volumetric groundwater flow contribution to the surface water features observed in the study area	CS		Attawapiskat First Nation	W
	Model limitations and uncertainty were not discussed in suitable detail given the magnitude of this project. There is a heavy level of reliance placed on the model prediction for dewatering design and environmental impacts	CS		Attawapiskat First Nation	W
	What impacts will the proposed project have on the groundwater and what is the potential for groundwater contamination on the people and environment	CS		Mocreebec Council of Cree Nation	W
2. Surface water quality	Quality of water during and after construction	DG	3	Moose Cree First Nation Attawapiskat First Nation Attawapiskat First Nation	W/M/W
	Concerns about whether mine water will undergo treatment prior to being pumped out and sent to the Attawapiskat River.	DG		Chief and Council of Kashechwan	M
	More baseline information is needed on the water quality both upstream and downstream of the Victor Project	DG		Attawapiskat First Nation	M
	Effects on fish from pumping salt water from the mine pit into the Attawapiskat River	DG		Attawapiskat First Nation	M
	Concerns over the pit being filled with water from the Attawapiskat River	CS		Nishnawbe Aski Nation	W
	Concern about the depletion of Nayshkootayaow River by dewatering the open pit	CS		Attawapiskat First Nation	W
	DeBeers needs to complete additional pumping test in proximity to the Attawapiskat	CS	2	Attawapiskat First Nation Attawapiskat First Nation	W
	A more traditional approach should be used when assessing surface water balance equation/model for each stream	CS		Attawapiskat First Nation	W
	The extent to which the drawdown might change water chemistry in the Nayshkootayaow River and the Lawashi River was not evaluated, nor has its effects on aquatic organisms	CS		Mining Watch Canada	W

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Issue	Comments	DG/CS	# Times	Community	Meeting/ Written
	DeBeers should optimize the design of the stockpiles to encourage recharge and surface water flows off the piles	CS		Attawapiskat First Nation	W
	The required volume of water to be pumped may be greater than predicted because the computer model used, may not have adequately considered the connection between the open pit and the Attawapiskat River. More groundwater may flow from the river to the dewatering wells.	CS		Attawapiskat First Nation	W
	There is a possibility than more groundwater may need to be pumped than predicted and the water may be more saline than predicted	CS		Attawapiskat First Nation	W
	DeBeers has not explained why they consider a 15% reduction in the flow of the Nayshkootayaow River to be the point which water should be added to the river from the Attawapiskat. It is not clear what might happen when flow is reduced by less than 15%	CS	2	Attawapiskat First Nation Mushkegowuk Council	W/W
	DeBeers was dumping water into the rivers without treatment. Do they have the right to do this	DG		Attawapiskat First Nation	M
	Concern with the location of garbage to the drinking water	CS		Attawapiskat First Nation	M
	Within the open pit lake how will the water be kept clean if it is not moving	CS		Attawapiskat First Nation	M
3.Ice Quality	The impact on the quality of ice on the Attawapiskat River	DG	2	General Public Mushkegowuk Council	W/M
	More information is required on ice conditions in small streams to make an assessment of the relative merits of culverts versus ice bridges	CS		Attawapiskat First Nation	W
	No information has been submitted on the winter operation of ditches whether they will be receiving seepage water	CS		Attawapiskat First Nation	W
	Snow chemistry needs to be looked at	CS		Attawapiskat First Nation	W
4. Sediment Quality	More baseline work is required on benthic community due to the fact that all samples were taken from only one site and at one time	CS		Attawapiskat First Nation	W
	Prior to any discharge of water into the river, studies should be completed on existing benthic communities in the Attawapiskat River at the proposed discharge site and at downstream locations within the predicted mixing zone for the discharge	CS		Attawapiskat First Nation	W
	How will sediments at the bottom of the ponds/rivers be sampled	DG		Mushkegowuk Council	M
5. Acid Rock Drainage	Concern with acid rock drainage	DG	2	Attawapiskat First Nation Attawapiskat First Nation	M/M
	EC presentation indicated that there is little potential for acid generation with diamond mines. However, it has been pointed out that this was predicted for both mines in Canada but Ekati has acid generation	DG/CS		Mining Watch Canada Mining Watch Canada	M/W

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Issue	Comments	DG/CS	# Times	Community	Meeting/ Written
6. Metal and Particulate Contamination	Monitoring of metals in receiving waters	CS	3	Nishnawbe Aski Nation Mining Watch Canada Attawapiskat First Nation	W/W/W
	The need for a contingency plan for dealing with ammonia	CS		Nishnawbe Aski Nation	W
	Concerns over residual ammonia; there is also no information on the fate and affect of residual ammonia	CS	4	Attawapiskat First Nation Mining Watch Canada Attawapiskat First Nation Nishnawbe Aski Nation	W/W/W/W
	In order to receive CoA for the discharge of water the project should incorporate monitoring of dissolved and total metals at reference and impact sites to assist with the future interpretation of project related effects	CS		Attawapiskat First Nation	W
	No mention is made in assessment of the possible impact of nitrogen related compounds derived from the ammonium nitrate based explosives, on the aquatic environment	CS		Attawapiskat First Nation	W
	The EA needs to address the possibility that mining activities may elevate the presence of minerals (i.e. manganese and iron) to levels that are harmful to humans and animals	CS		Mining Watch Canada	W
	Changes in natural mercury levels in water and food chain could occur due to pumping. Additional mercury monitoring is required	CS	2	Attawapiskat First Nation Attawapiskat First Nation	W/W
	Due to the fact that muskeg hydrology changes as a result of dewatering and/or mining processes have the potential to alter CO2, methane and methyl mercury releases to the atmosphere. Therefore DeBeers should address these issues	CS		Attawapiskat First Nation	W
7. Water management	An analysis of accidental or unplanned discharge into water, especially diesel fuel is needed	DG		Mushkegowuk Council	W
	Assurances that the river will continually be monitored, so problems will not go unnoticed	DG	3	Member of the First Nation Attawapiskat Attawapiskat First Nation Attawapiskat First Nation	W
	A need for an independent review of water treatment processes as well as viable alternatives	DG		Nishnawbe Aski Nation Mushkegowuk Council	W
	DeBeers monitoring river quality does not ensure that the river will not be harmed	DG		Attawapiskat First Nation	M
	More baseline information on water quality should be provided	DG		Attawapiskat First Nation	W
	More detailed analysis and review of water supply issue is required together with discussion of the relative importance of habitats affected and long-term interaction of pit lake with surrounding watercourses.	CS		Attawapiskat First Nation	W
	Addition of a cost/benefit of grouting should be included	CS	2	Attawapiskat First Nation	W

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Issue	Comments	DG/CS	# Times	Community	Meeting/ Written
				Attawapiskat First Nation	
	Additional monitoring wells should be installed to the ENE and the WSW of the proposed pit, Green Blue Claystone and the shales of Red Head Rapids	CS	3	Attawapiskat First Nation Attawapiskat First Nation Attawapiskat First Nation	W/W/W
	Proposed location of the project's hydrometric gauges should be clearly identified along with a rationale for its selection	CS		Attawapiskat First Nation	W
	Water balance analysis is poorly done, key channels were poorly defined in terms of their size and the amount of water they can handle	CS		Attawapiskat First Nation	W
	Discharge of water containing salts to Attawapiskat River may meet Ontario Drinking water standards but they will have an effect on aquatic life	CS	2	Attawapiskat First Nation Attawapiskat First Nation	W/W
	Monitoring programs should consider seasonal variability (event flows or low flow conditions)	CS	3	Attawapiskat First Nation Attawapiskat First Nation Attawapiskat First Nation	W/W/W
	Water management follow-up programs need to be addressed	CS		Attawapiskat First Nation	W
	DeBeers was dumping water into the rivers without treatment. Do they have the right to do this	DG		Attawapiskat First Nation	M
	Open pit lake: how do you keep the water clean when it isn't moving	CS		Attawapiskat First Nation	M
8. Movement of South Granny Creek	Further elaboration is needed on various diversion options for South Granny Creek	CS	2	Attawapiskat First Nation Attawapiskat First Nation	W/W
	Moving North Granny Creek could be problematic since muskeg located at new site may not drain into this relocated creek	CS		Attawapiskat First Nation	W
	Concern over the drainage and diversion options; more detailed comparison is needed	CS	3	Attawapiskat First Nation Attawapiskat First Nation	W
Fuel					
1. Fuel Management issues	Impact of power generation by diesel fuel on the ability of Canada to achieve it's Kyoto Protocol on climate change commitments	DG	2	Mushkegowuk Council Nishnawbe Aski Nation Mining Coordinator	W/W
	The scope of fuel related activities may be misinterpreted as to exclude the Attawapiskat River	DG		Attawapiskat First Nation	W
	Concerns about the volume of oil being used	CS		Attawapiskat First Nation	W
	Whether or not the proponents will look at alternatives to diesel fuel as ways of getting power to the mine	DG	3	Chief and Council of Kashechwan Mushkegowuk Council Attawapiskat First Nation	M/W/W
2. Fuel Mishaps and Clean up	Accidents during fuel transportation	DG/CS	8	Moose Cree First Nation General Public Mining Watch Canada	W/W/W/W/ W/W/W/M

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Issue	Comments	DG/CS	# Times	Community	Meeting/ Written
				First Nations Energy Inc General Public Mushkegowuk Council Attawapiskat First Nations Kashechewan First Nations Community	
	Identification of fuel spill mitigation procedures be examined	DG	3	First Nations Energy Inc Nishnawbe Aski Nation Mining Coordinator General Public	W/W/W
	Assurances that the DeBeers will pay any cost associated with potential clean up	DG	5	First Nations Energy Inc Nishnawbe Aski Nation Mining Coordinator Kashechewan First Nation Community Attawapiskat First Nation Community General Public	W/W/M/M/ W/
	Concern over fuel spilling in spring having an impact on harvest	DG		Moose Cree First Nations	M
	An assessment of the ability of proposed skimming systems to remove oil from the water	DG		Nishnawbe Aski Nation Mining Coordinator	W
	An assessment of the place to put the oil-water mix in the event of spill	DG		Nishnawbe Aski Nation Mining Coordinator	W
	A mitigation plan for potential oil and chemical spills has not been provided for any scale of investigation.	CS		Attawapiskat First Nation	W
	DeBeers should design the spill collection areas to minimize the risk of a worst case spill on the environment	CS		Attawapiskat First Nation	W
	No information provided on any estimates of how far fuel might reasonably be expected to move downstream before it could be contained	CS		Attawapiskat First Nation	W
	DeBeers has placed too much reliance on natural peatlands to address fuel spills	CS		Attawapiskat First Nation	W
	If an oil spill occurs can we expect it to be cleaned up quickly and not take 30 years	CS		Attawapiskat First Nation	W
	Fuel contamination to the land	DG	2	Moose Cree First Nations	M/M
	Concern about whether or not there would be compensation in the event of a spill that impacted community members' ability to hunt or fish	DG		Kashechewan First Nation	M
	Neither the potential for spills of chemicals being transported to the site nor the potential for oil spills related to the pipeline and the effect on the local breeding bird habitat have been taken into consideration	CS		Attawapiskat First Nation	W

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Issue	Comments	DG/CS	# Times	Community	Meeting/ Written
3. Fuel Transportation system	Barges may not have double mould protection for the oil	DG		Kashechewan First Nation	M
	Accidents occur on a more frequent basis in October	DG		Attawapiskat First Nation	W
	Will or can we look at the shipping from Montreal to Victor	DG		Attawapiskat First Nation	W
	Fuel transportation system	DG	5	General Public Moose Cree First Nation Mining Watch Canada Mushkegowuk Council Kashechwan First Nation	W/W/W/W/ W/M
	Need for an in depth study on fuel transportation and storage	DG	2	First Nations Energy Inc Nishnawbe Aski Nation Mining Coordinator	W/W
	The process of monitoring fully laden tankers as they pass through James Bay	DG		Nishnawbe Aski Nation Mining Coordinator	W
	The number of escort vessels to accompany each tanker while passing through the entire Bay	DG		Nishnawbe Aski Nation Mining Coordinator	W
	Weather criteria for safe navigation	DG		Nishnawbe Aski Nation Mining Coordinator	W
	The requirements for specially trained marine pilots while transiting the Bay	DG		Nishnawbe Aski Nation Mining Coordinator	W
	Shipping and Handling of Diesel Fuel in James Bay-including dredging	DG		Mushkegowuk Council	W
	Concern over having ocean-going vessels lightering to barges in James Bay thus increasing the potential risk of oil spills	DG		Mushkegowuk Council	W
	What would the risk be of increased shipping activity based on the annual volume, seasonal schedule and number of tankers that will be shipping diesel fuel and other supplies in Hudson Bay shipping lane north of 55 40N	DG		Mushkegowuk Council	W
	Impact of fuel shipping	DG		Mushkegowuk Council	M
Airstrip	Airstrip construction vs. use of current airstrip, impacts on the environment	DG	3	Mushkegowuk Council Attawapiskat First Nation Attawapiskat First Nation	W/M/M
	More detail is needed on the airport facilities	DG		Mushkegowuk Council	W
	The effect of increased noise patterns on wildlife	DG	2	Mushkegowuk Council Mushkegowuk Council	W/M
	First Nations have the opportunity to get jobs in the construction work of the new airstrip	DG		Chief and Council of Kashechwan	M
	DeBeers increased the size of the airstrip	DG	2	Attawapiskat First Nation	M/M

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Issue	Comments	DG/CS	# Times	Community	Meeting/ Written
	More information is needed on the effects or the airstrip on the AttFN and the compatibility of an on-site airstrip with it's economic objectives	CS	2	Attawapiskat First Nation Attawapiskat First Nation	W/W
	Concern about airport at Victor-size of planes - will be able to bypass FN organization by flying over them - should look at having airport in community	DG	3	Moose Cree First Nation Attawapiskat First Nation Kashechwan First Nation	M/M/M
Wildlife					
1.Wildlife and Wildlife Habitat	Fish and other wild life habitat i.e. water crossing movement	DG	3	Moose Cree First Nation General Public Attawapiskat First Nation	W/W/M
	Impact on animals, birds and fish	DG	2	North Watch Attawapiskat First Nation	W/M
	Concerns over the destruction of wildlife habitat	DG		Attawapiskat First Nation	M
	Concern over the effect that bulk fuel shipping and will have on the wildlife	DG/CS	3	Chief and Council of Kashechwan Kashechewan First Nation Mushkegowuk Council	M/M//W/
	Case studies or published literature are needed to justify the predicted improvement in wildlife support capability of reforested stockpiles	CS		Attawapiskat First Nation	W
	Wildlife baseline data is subjected to error associated with animal movement patterns and natural sampling limitation because surveys were conducted over short periods and under low repetition	CS		Attawapiskat First Nation	W
	Rationale should be provided for the selection of 1km buffer zone along the road corridors for the consideration of effects on the terrestrial environment giving particular attention to issues of noise and disturbance to caribou	CS		Attawapiskat First Nation	W
	The lists of status species only consider national and global significance with no provincial designations	CS		Attawapiskat First Nation	W
	No differentiation between the effects on wildlife on the coast vs. those on the interior	CS		Attawapiskat First Nation	W
	The choice of VEC classes is not supported by data ex. Fens considered to be "poor environment for wildlife" but no evidence is provided for that	CS		Attawapiskat First Nation	W
	Effects of predator prey strategies	CS	2	Attawapiskat First Nation Attawapiskat First Nation	W/W
	Effects on habitat as a result of changes in hydrology within peatland	CS		Attawapiskat First Nation	W
	Effects of contaminants on wildlife and wildlife habitat	CS		Attawapiskat First Nation	W
	With respect to wildlife there is general lack of baseline data and insufficient analysis, particularly the effect of muskeg subsidence on	CS		Attawapiskat First Nation	W

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Issue	Comments	DG/CS	# Times	Community	Meeting/ Written
	wildlife habitat				
	More attention is required to species of special concern (polar bears), predators and the effect of noise on caribou	CS		Attawapiskat First Nation	W
	The claim of a net improvement in wildlife support capability requires further justification based on case studies or published literature	CS		Attawapiskat First Nation	W
	Effect that SWAWR will have on caribou and the need for discussion of mitigation measures must be rectified in the CS	CS		Mushkegowuk Council	W
2.Birds	How oil shipment through James Bay will affect the local bird sanctuaries?	DG		Fort Albany First Nation	M
	Concerns about the regional impacts on migratory birds and their habitat	DG		Mushkegowuk Council	W
	All observation of birds from the Victor site were made outside bird breeding season, therefore the importance and productivity of the habitat is not documented	CS		Mushkegowuk Council	W
	Migratory waterfowl in James Bay was not mapped therefore no way to determine whether conflicts with shipping lanes will occur	CS		Attawapiskat First Nation	W
	Discussion of status species is limited and the data on migratory birds is 20 years old	CS		Attawapiskat First Nation	W
	Sections reporting on birds were inadequate, including literature review that omitted documents that would have aided the characterization of study area	CS		Attawapiskat First Nation	W
	Regarding birds there is a lack of appropriate baseline data for example - detailed breeding bird surveys should have been conducted for all areas directly disturbed by the project and information on existing bird habitat conditions	CS	2	Attawapiskat First Nation Attawapiskat First Nation	W
3. Aquatic Organisms and Habitat	How will DeBeers replace fish habitat after they are done	CS		Moose Cree First Nation	M
	Monitoring programs of fish have been identified but need to be developed in more detail as part of *Fisheries Act* Authorization	CS		Attawapiskat First Nation	W
	Constructing a whitefish culture facility and using abandoned quarries to recreate fish habitat are undemonstrated and have significant uncertainty attached to their success	DG		Mushkegowuk Council	W
	Investigation of spawning habitat for whitefish, trout and other species should be undertaken in the Nayshkootayaow River	CS		Attawapiskat First Nation	W
	Background data for characterizing fish species in James Bay Area is not referenced	CS		Attawapiskat First Nation	W
	A discussion of aquatic habitat, chemical and conductivity data as they relate to fisheries resources should be presented.	CS		Attawapiskat First Nation	W
	Little Information is provided on the methodology that was used to	CS		Attawapiskat First Nations	W

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Issue	Comments	DG/CS	# Times	Community	Meeting/ Written
	collect data on aquatic environment parameters				
	DeBeers should provide information regarding the rationale for the selection of the aquatic environment parameter sampling sited and describe in more detail the sampling methods or protocols that were used. DeBeers should identify whether or not these methods and protocols will be used or adapted to suit the purposes of an aquatic monitoring program in the future	CS		Attawapiskat First Nation	W
Air					
1. Air Quality Issues	Air quality issues	DG	3	Moose Cree First Nation North Watch Attawapiskat First Nation	W/W
	Need a list of aerial distribution patterns and directions for any of the emissions	DG		Mushkegowuk Council	W
	Concerns over the effect that fugitive dust will have on the plant communities	DG		General Public	W
	DeBeers should ensure that short term concentrations of air contaminants are calculated and compared to half hour Point of Impingement Standards as well as the Ambient Air Quality Criteria	CS		Attawapiskat First Nation	W
	Emissions from a number of sources have not been considered; these include off-site roads, airplanes and helicopters, burning of construction waste at the landfill and fugitive emissions from chemical storage and handling	CS	3	Attawapiskat First Nation Attawapiskat First Nation Attawapiskat First Nation	W/W/W
	The decision to exclude standby boiler emissions from the assessment needs to be justified	CS	2	Attawapiskat First Nation Attawapiskat First Nation	W/W
	VOC emissions were not modeled	CS		Attawapiskat First Nation Attawapiskat First Nation	W/W
	Contributions to GHG emissions at the provincial and national levels have not been stated by DeBeers to be insignificant but there is no standard to judge significance for these parameters	CS	2	Attawapiskat First Nation Attawapiskat First Nation	W/W
	Effects of monitoring must be broadened to ensure that larger aerial effects are considered	CS		Attawapiskat First Nation	W
2. Burning of Fossil Fuels	No information on effects of diesel engine emissions and noise emissions on the Attawapiskat community	CS		Attawapiskat First Nation	W
	Concern was raised about the effect of air pollution from the operation of diesel generators	DG		Attawapiskat First Nation	M
	Diesel generator emissions only address CO2-What about SO2 or NOX	CS		Attawapiskat First Nation	W
3. Effects of Incinerator	Air emissions created from the burn area are not included in emissions	CS		Attawapiskat First Nation	W

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Issue	Comments	DG/CS	# Times	Community	Meeting/ Written
	of the site				
	Concern over open burning; it will lead to burning of other wastes for expediency (plastics contained in paper fibers etc.,) A protocol is needed	CS		Attawapiskat First Nation	W
	Concern over the ash from incinerator leaching salts such as sodium chloride and boron	CS		Attawapiskat First Nation	W
4. Kyoto Agreement	The effect of the project on climate change and Canada's Kyoto targets	CS		Attawapiskat First Nation	W
	No consideration has been given to carbon exchanges from peat stockpiles which will result in high carbon emissions that need to be accounted for with respect to the Kyoto Agreement	CS		Attawapiskat First Nation	W
Noise	Baseline noise measurements should be undertaken within the community of Attawapiskat for use in subsequent noise assessment	CS	2	Attawapiskat First Nation Attawapiskat First Nation	W/W
	Noise report is incomplete does not supply sufficient detail	CS		Attawapiskat First Nation	W
	Noise effects of both construction and transportation need to be considered	CS		Attawapiskat First Nation	W
	Noise modeling should be conducted for both summer and winter conditions to ensure that worst-case noise effects are addressed	CS		Attawapiskat First Nation	W
	Very little information is provided on mitigation measures. Most are provided in the form of a performance specification. There is no discussion on the feasibility of achieving such performance levels	CS		Attawapiskat First Nation	W
	Noise levels at and within the dormitory should be assessed	CS		Attawapiskat First Nation	W
	The effects of noise on wildlife	CS		Attawapiskat First Nation	W
Energy					
1. Alternatives	Upgrade to hydro line as an alternative	DG	2	Moose Cree First Nation Moose Cree First Nation	W/W
	Alternatives to diesel energy need to be reviewed	DG	2	First Nations Energy Inc Mushkegowuk Council	W/M
	Communities dependence on fossil fuels will increase after it has only been reduced in recent years	DG		Kashechwan First Nation	M
	Energy Supply Issue: Comparison of alternative energy sources, supply and routing	CS		Mushkegowuk Council	W
	No evidence that using diesel pipeline would cause less total environmental disturbances than constructing a new 414km transmission line	CS		Attawapiskat First Nation	W
2. Cost/Economics	Questions on whether diesel power costs consider the total project cost including construction of pipeline, trucking of fuel etc.,	CS	3	Mushkegowuk Council Mushkegowuk Council	W

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				Attawapiskat First Nation	
	What is the cost per kw hour that DeBeers expects to pay for electricity delivered o the site	CS		Mocreebec Council of the Cree Nation	W
	What economic variables were utilized in arriving at the preferred option of twinning the hydro line?	CS		Mocreebec Council of the Cree Nation	W
	Who owns the hydro line?			Mocreebec Council of the Cree Nation	W
	What are the socio-economic effects of certain power supply options	CS		Mocreebec Council of the Cree Nation	W
Transportation					
1. Construction of All Winter Road	All weather road	DG	3	Moose Cree First Nation Mushkegowuk Council Attawapiskat First Nation	W/W/M
	All weather roads could alleviate the cost of living up north in remote areas	DG		Fort Albany First Nation	M
	Infrastructure regarding regional road and barge transportation	DG		General Public	W
	Monitoring program of the winter road must begin before DB can state that the potential socio-economic effect with increased road traffic is insignificant	CS		Mushkegowuk Council	W
	Reasons for winter road upgrades are unclear. Is it to facilitate transport associated with project or is it to provide continuing winter road transportation	CS		Mushkegowuk Council	W
2. Transportation System	More data needs to be collected from the community in order for socio-economic impacts of increase road usage to be assessed	CS	2	Mushkegowuk Council Mushkegowuk Council	W/W
	No consideration is given to identify community usage of road and potential conflicts between cars, trucks and other vehicles	CS		Mushkegowuk Council	W
	How will the movement of all additional goods impact the use of the railroad by local people	CS		Mocreebec Council of the Cree Nation	M
	Considering charging DeBeers a use fee for using the roads	CS		Mocreebec Council of the Cree Nation	M
	Need for highway traffic enforcement	CS		Attawapiskat First Nations	M
	No defined shipping lanes within Hudson Bay	DG		Nishnawbe Aski Nation Mushkegowuk Council	W
	Concern over the impact of ships in James Bay	DG		General Public	W
Hunting	Concern that wildlife will never recover after mine closure thus decreasing First Nation peoples ability to hunt and trap	DG		Kashechewan First Nations Community	M
	Concern on the effects on the food chain; because of the high cost of living they need to hunt and fish	DG		Attawapiskat First Nation	M

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	Hunters and fishermen are already noticing changes in belugas and seals	DG		Mocreebec Council of the Cree Nation	M
	Issues of loss of hunting lands because of power lines	CS		Attawapiskat First Nation	M
Physical Environment					
1. Muskeg, Soils and Terrains	The implications of mining in an area of isostatic uplift are not addressed in guidelines	DG		General Public	W
	DeBeers does not specify what specific serpentine minerals occur	CS		Attawapiskat First Nation	W
	DeBeers should define the nature and extent of mudstone interbeds with a discussion of how they have been incorporated into the sampling and analysis plan or how their exclusion affects the uncertainty of water quality predictions	CS		Attawapiskat First Nation	W
	Further investigations and assessments of the overburden trench and potential subsidence implications on site development and operation is required	CSEA		Attawapiskat First Nation	W
	Selection of suitable overburden and pit slopes is critical to prevent slope stability problems and potential failures	CSEA		Attawapiskat First Nation	W
	Changes to soil and muskeg composition due to deforestation	DG	2	Member of First Nation Attawapiskat Attawapiskat First Nation	W/M
	Questions on how DeBeers will clean muskeg due to the fact that the wet conditions of the muskeg would make it very difficult to accomplish clean up of a contaminated site	DG	2	Attawapiskat First Nation	M/M
	Concern over the rock fall penetrating the muskeg and creating a "break" in the continuity of the muskeg "mat". DeBeers should consider how breaks below PK facility will affect seepage through dams.	CSEA	2	Attawapiskat First Nation Attawapiskat First Nation	W/W
	No mention of permafrost and any necessary precautions that must be taken in construction of facilities and the laying of a pipeline under such conditions.	DG	1	General Public	W
	Concerns over placing kimberlite waste directly on the muskeg – not clear why they are not using a limestone pad	CS		Nishnawbe Aski Nation	W
	The muskeg, soil and rock stockpiles will require careful planning to ensure trafficability and minimal generation of sediment laden runoff	CS		Attawapiskat First Nation	W
	It should be indicated under what conditions the five-day period for the sedimentation ponds is likely to be achievable	CS		Attawapiskat First Nation	W
	Description of hydrological role of peatlands needs to be enhanced	CS	2	Attawapiskat First Nation	W/W

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Issue	Comments	DG/CS	# Times	Community	Meeting/ Written
2. Vegetation				Attawapiskat First Nation	
	Water table profiles of critical fens and bogs on site and at reference off-site locations to establish a preconstruction baseline and for use as an indicator of subsidence effects. Monitoring should implemented to establish water table dynamics during construction and operation	CS		Attawapiskat First Nation	W
	Concern over pumping the designated volume of water away from the site without significant change to the fens and bogs.	CS		Attawapiskat First Nation	W
	There should be some explanation for the rationale for devaluing the productivity of the fen and bog communities with respect to the upland forests	CS		Attawapiskat First Nation	W
	Effects to Northern Ribbed Fen from subsidence or as a result of the winter roads has not been factored into assessment	CS		Attawapiskat First Nation	W
	DeBeers should install some bedrock monitoring wells off-site to monitor the extent of the dewatering effects	CS		Attawapiskat First Nation	W
	Land will never be able to return to same pristine condition	DG	2	Moose Cree First Nation Attawapiskat First Nation	M/M
	The impact that an earthquake would have on the site	CS		Attawapiskat First Nation	M
	Biodiversity in this area is poorly documented thus it is essential to establish a baseline diversity inventory before any construction begins	DG		General Public	W
	DeBeers must develop a contingency plan in the event that monitoring detects contamination	CS		Attawapiskat First Nation	W
	Little assessment of "muskeg" hydrology- deficiency is important because this is the first major industrial project in Hudson Bay Lowlands	CS		Attawapiskat First Nation	W
	The increase incidence of invasive plant species	DG		Member of the First Nation Attawapiskat	W
	DeBeers should develop a conceptual model of peatlands as a layer in the hydrogeological model used to determine how mine dewatering would alter flows to surface	CS		Attawapiskat First Nation	W
	Methodology used to characterize vegetative communities is no clearly described but appears to depend on computer based interpretation of vegetation communities - Not all vegetation communities were visited	CS		Attawapiskat First Nation	W
	There should be a quality control check on the data presented on the CSEA and should be provided an updated discussion of vegetation to include all relevant sources	CS	2	Attawapiskat First Nation Attawapiskat First Nation	W/W
	The vegetation including rare species associated with the project site, areas along rivers and at the esker should be mapped and described. Areas of permafrost should be identified	CS	2	Attawapiskat First Nation Attawapiskat First Nation	W/W
	Field investigations should take place during appropriate times of year	CS		Attawapiskat First Nation	W

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	to identify communities where rare species are likely to occur mature				
	Limited literature search of vegetation has not allowed for occurrence of rare species to be appropriately evaluated	CS		Attawapiskat First Nation	W
	Lack of site specific investigations there is no VEC that deals with rare species	CS		Attawapiskat First Nation	W
	DeBeers should provide a map that overlays the winter roads and pipeline on the vegetation in order to provide a quantitative evaluation of losses	CS		Attawapiskat First Nation	W
	Regarding vegetation there was a lack of baseline data and the lack of an analysis of effects of dewatering and subsidence on peatlands	CS		Attawapiskat First Nation	W
	A mitigation plan for vegetation in the event of an oil or chemical spill is needed	CS		Attawapiskat First Nation	W
	DeBeers has indicated that it is undertaking vegetation trials to test the potential for native plant use in restoration but has not indicated how it intends to obtain the required seeds and other materials	CS		Attawapiskat First Nation	W
	The intensity and extent of nutrient additions to the fen from the sewage treatment facilities should be determined	CS		Attawapiskat First Nation	W
3. Climate and Meteorology	Information regarding the location, construction and audits of the meteorological tower at Victor should be provided	CS	2	Attawapiskat First Nation Attawapiskat First Nation	W/W
	Information regarding any sensitivity analyses that were conducted to reduce the potential uncertainties related to precipitation values should be provided	CS		Attawapiskat First Nation	W
	Estimates of daily/hourly extremes of rainfall at the Victor site should be provided	CS		Attawapiskat First Nation	W
	Further examination of the projected differences between the project site and regional station evaporation information should be undertaken. The implication of any significant differences on the project design and effects assessment should be identified	CS		Attawapiskat First Nation	W
	The inconsistencies identified in the wind information used for the Victor project should be reconciled	CS		Attawapiskat First Nation	W
	A discussion of climate change and meteorology should be added	DG		North Watch	W
	AttFN requires further evidence on the suitability of the landform approach to bioremediation of contaminated solid at mines in similar climates in Ontario and northern Canada prior to accepting this proposed method	CS		Attawapiskat First Nation	W
Exploration	Effects of exploration are unknown	DG	3	Nishnawbe Aski Nation Mining Coordinator Attawapiskat First Nation Mushkegowuk Council	W/M/W

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Issue	Comments	DG/CS	# Times	Community	Meeting/ Written
	DeBeers should identify other projects, including past mining ventures in the study areas, as these may have effects on the environment and social environment	DG	2	Nishnawbe Aski Nation Attawapiskat First Nation	W/W
	Inconsistent statements from DeBeers on whether or not exploration by other companies is taking place. What is going to happen after mine closure?	CS		Mushkegowuk Council	W
	In order to be responsive to community concerns, DeBeers should explicitly identify and consider the environmental effects of its own exploration activities in the cumulative effects assessment and follow that with a more detailed consideration of the cumulative effects of other exploration activities on other claim blocks	CS		Attawapiskat First Nation	W
Traditional Ecological Knowledge					
1. Uses of TEK		DG			W
	The reference to traditional knowledge is not well developed	DG	2	Mining Watch Canada Mining Watch Canada	W/W
	The development of both the TEK and social impact study will lead to greater community participation	DG		Member of the First Nation Attawapiskat	W
	Clarification on how TEK will be incorporated into the CSR	DG/CS	1	Nishnawbe Aski Nation Mining Coordinator NANMC	W
	Additional explanation concerning the value, role and significance of TEK	DG	1	Attawapiskat First Nation	W/W
	TEK could have been more properly used to design the fish surveys	CS		Mining Watch Canada	W
	TEK study did not specifically address matters relating to monitoring or mitigation	CS	2	Mushkegowuk Council	W/W
2. Quality of TEK	True meaning of Traditional Knowledge will be lost through misinterpretation of DeBeers employees	DG	2	Member of the First Nation /NW	W/W
	Federal regulators have a limited understanding of traditional ways and do not understand the importance of continuous dialogue to resolve issues	DG	2	Attawapiskat First Nation Nishnawbe Aski Nation	W/W
	TEK study does not provide the quantitative information on harvests and unit values that is necessary for the assessment and monitoring of project effects, nor does it serve as a basis for determining the need for or amount of compensation due to project effects	CS	2	Attawapiskat First Nation Attawapiskat First Nation	W/W
	Clarification on how the values for fish and wildlife species was determined	CS		Attawapiskat First Nation	W
	Other James Bay communities should have been involved in the	CS	2	Mushkegowuk Council	W/W

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Issue	Comments	DG/CS	# Times	Community	Meeting/ Written
	development of TEK however, this section focused only on information given by the Attawapiskat			Mushkegowuk Council	
	The inclusion of TEK in the way it is presented by DeBeers can not be the basis of either traditional land study and Heritage Resource Impact Assessment nor is it intended to be the basis of any decision making process	CS		Member of First Nation Attawapiskat	W
	TEK presented in the report shows disrespect for traditional knowledge and certainly does not emphasize the mutual respect that is incorporated	CS	2	Member of First Nation Attawapiskat Member of First Nation Attawapiskat	W/W
	TEK is defined as knowledge of lower value than scientific knowledge	CS		Member of First Nation Attawapiskat	W
	Feelings that FN groups were taken advantage of through the development of TEK	CS	2	Attawapiskat First Nation Attawapiskat First Nation	M/M
	Serious inadequacies in TEK studies presented in CSEA because they did not attempt to obtain TEK info from Fort Albany, Kashechewan and Moose Cree First Nations relating to potential impacts from malfunctions/accidents during fuel transportation in James Bay	CS		Mushkegowuk Council	W
3. Methodology	Need to use the Knowledge of elders i.e. TEK	DG	2	Moose Cree First Nation Attawapiskat First Nation	W/M
	TEK studies were not completed with the west James Bay area FN. Exclusion of these communities implies TEK is the same for all First Nations	CS	4	Mushkegowuk Council Mushkegowuk Council Nishnawbe Aski Nation Mushkegowuk Council	W/W/W/W
	Will traditional knowledge be a requirement for inclusion in this assessment and what weight will it be given	CS		Mocreebec Council of Cree Nation	W
	It cannot be the company that would be doing the TEK study because they direct the questions and may not be listening to all the information provided	DG		Attawapiskat First Nation	M
	Serious methodological problems with the way in which TEK was carried out	CS		Mushkegowuk Council	W
	Process of TEK has not been appropriate	DG			M
	DeBeers not only ignored pervious studies, TEK data from the TEK study they included in their report are presented in a way that undervalues, undermines and disrespects the knowledge of the local people interviewed	CS		Member of First Nations Attawapiskat	W
Mining Methods and Operation	Overburden pile will require careful planning to ensure trafficablity and minimal generation of sediment-laden runoff. This will also be a large area to manage and ensure dust generation is minimized	CS		Attawapiskat First Nation	W
	Consideration should be given to the co-disposal of waste rock with the	CS		Attawapiskat First Nation	W

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Issue	Comments	DG/CS	# Times	Community	Meeting/ Written
	overburden to reduce environmental effects and minimize operation problems at the mine site				
	DeBeers should consider the co-disposal of waste rock with the overburden to reduce environmental effects and minimize operation problems	CS		Attawapiskat First Nation	W
	More rationale is required to support the selection of the preferred mining methods. In particularly, the advantages and disadvantages of flooded pit need to be presented in the context of sustainable development	CS		Attawapiskat First Nation	W
	DeBeers should commit to further consultation with the AttFN and other stakeholders regarding the reclamation objectives for the stockpile that will be the legacy of the project	CS		Attawapiskat First Nation	W
	The proponent should establish a model for estimating NH3 from nitrogen-based blasting residues in its quarrying operations to enable a proper monitoring program for NH3 in the open pit designed	CS		Attawapiskat First Nation	W
	More rationale is required to support the selection of the preferred mining methods. Advantages and disadvantages of flooding the pit need to be presented	CS		Attawapiskat First Nation	W
	Final design of the open pit mine may require additional geotechnical investigation and analyses	CS		Attawapiskat First Nation	W
1. Mine water characteristics, management and disposal	The CSEA is not clear whether the five day retention period can be achieved at all times	CS		Attawapiskat First Nation	W
	More laboratory and particularly filed testing under a system wide stress is required to confirm whether the inefficiencies will occur in the dewatering wells, and if so, whether they can be mitigated	CS		Attawapiskat First Nation	W
	No kinetic test and effluent quality prediction exist for mine rock	CS		Attawapiskat First Nation	W
	Nitrogen compounds-monitoring program with respect to effects on surface waters	CS		Attawapiskat First Nation	W
	More evaluation of the potential for subsidence within the groundwater drawdown cone needs to be undertaken	CS		Attawapiskat First Nation	W
	DeBeers should provide a clear rationale outlining the benefits of leaving the settling pond liner in place versus removing the liner to the landfill	CS		Attawapiskat First Nation	W
2. PK management	Need for a 6m high internal ramp is not clearly explained. The ramp consumes storage volume and may be limited in height by weak foundation condition	CS		Attawapiskat First Nation	W
	Not clear that any allowance for permanent inclusion of ice within the pile has been considered	CS		Attawapiskat First Nation	W

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Issue	Comments	DG/CS	# Times	Community	Meeting/ Written
	A detailed PK management plan is required. The PK plan should be developed giving consideration to typical deposition of PK in both winter and Summer conditions.	CS		Attawapiskat First Nation	W
	DeBeers should optimize the layout of the cells within the fine PK containment facility to reduce the length of the perimeter dam	CSEA	2	Attawapiskat First Nation Attawapiskat First Nation	W/W
	DeBeers should submit a detailed PK management plan	CS		Attawapiskat First Nation	W
3. Domestic Waste	No detail is provided about the design of landfill other than it will comply with regulations of Ontario	CS		Attawapiskat First Nation	W
	Ash from incinerator may have potential to leach salts such as sodium, chloride and boron	CS		Attawapiskat First Nation	W
	It will be difficult to keep organic wastes from landfill-residual fuels in barrels	CS		Attawapiskat First Nation	W
	Inadequate information on design and operation of landfill. There is a need for further elaboration on the relationship between landfill and mine rock stockpile operation. Landfill design must take in account local ground water and surface water conditions.	CS	2	Attawapiskat First Nation Attawapiskat First Nation	W/W
	Concern over the use of onsite landfill would be a long term legacy of the project and a potential liability	CS	2	Attawapiskat First Nation Attawapiskat First Nation	W/W
	A more detailed analysis and review of domestic sewage alternatives is required, taking into account the presence of a high groundwater table and the ability of the various technologies to better handle typical fluctuations in loadings	CS		Attawapiskat First Nation	W
	What hazardous materials will be used at site	DG		Moose Cree First Nation	W
4. Dredging	DeBeers should assess groundwater quality in the vicinity of the dredge area and develop a dredge plan that identifies an appropriate monitoring program during the dredging as well as follow up monitoring	CS		Attawapiskat First Nation	W
	Concern over the proposal for dredging in the James Bay and the effect that stirring up sediment will cause	DG	2	Member of First Nation Attawapiskat Attawapiskat First Nation	M/M
	There is no information to where dredging will take place or to what extend. There is also few details on exactly where and at what depth it will be disposed of in open water	CS	2	Attawapiskat First Nation Attawapiskat First Nation	W/W
	Sediment quality data are required at the dredging location for the barge berth facility	CS		Attawapiskat First Nation	W
	Frequent re-dredging might result in an added environmental effect	CS		Attawapiskat First Nation	W
	How long will it take before the elements settle down? How far is dredging to occur from the mouth of the river?	CS		Attawapiskat First Nation	M
	There is not enough information in the CSEA regarding the location	CS		Attawapiskat First Nation	W

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Issue	Comments	DG/CS	# Times	Community	Meeting/ Written
	for in-land dredgeate disposal from the bare berth area				
	Since dumping the dredgeate from the Attawapiskat into James Bay is currently against the law, what legal and regulatory changes will need to be made to enable this?	DG		Mining Watch Canada	W
5. Roads	Concern over the use of berms in road construction, they have been found to catch snow and obstruct wildlife	CS	2	Mushkegowuk Council Attawapiskat First Nation	W
	The winter roads will be owned and operated by DeBeers. How will this affect the communities on the route?	CS		Mushkegowuk Council	W
	DeBeers needs to specify additional mitigation measures for construction, operation and closure of the winter roads	CS		Attawapiskat First Nation	W
	No comparison of the archaeological resources potentially affected by the coastal route compared with those potentially affected by the SWAWR routes	CS		Mushkegowuk Council	W
	No discussion of the road potentially opening up access to users than local First Nations is included	CS		Mushkegowuk Council	W
	No discussion on the effects that would be anticipated if a SWAWR were converted to an all season road -impacts of logging, increased tourism etc.,	CS		Mushkegowuk Council	W
	No discussion with FN affected by the SWAWR about reasonable accommodation relating to road development and meetings to date in these communities do not constitute adequate consultation	CS		Mushkegowuk Council	W
	No discussion of potential environmental effects on ANSI and provincial parks affected by SWAWR routes	CS		Mushkegowuk Council	W
	Concern over the effect that SWAWR will have on the wildlife and biotic environment - SWAWR should be abandoned as a contingency option during the last stages of the EA process	CS		Wildlands League	W
	How will roads be made safer	CS		Attawapiskat First Nation	M
	Safety concerns over large trucks using roads	CS		Moose Cree First Nation	M
	Concern over the damage caused to land by widening the road.	CS		Kashechewan First Nation	M
	The use of permanent and temporary bridges versus the use of snow bridges	CS		Fort Albany First Nation	M
	Questions about what was contained within the Alternatives report pertaining to the southwinter road	CS		Attawapiskat First Nation	M
	Upgrading the James Bay north-south winter road to an ice road will cause safety problems for other people using the road i.e. skidoos			General Public	W
	The development of the north road location will be a major intrusion on the landscape	CS		General Public	W

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Issue	Comments	DG/CS	# Times	Community	Meeting/ Written
	Concern over the fact that the road from Hearst to Attawapiskat has enormous implications on the Boreal Forest, as it will open up a previously pristine area to logging, hunting, more mines and tourism	CS		Mushkegowuk Council	W
	DeBeers/Regulators have not provided sufficient information on environmental effects of southwest winter road or its impacts for anyone to be able to evaluate it	CS		Mushkegowuk Council	W
	Winter road from Moosonee to Attawapiskat needs to be clear but it is hard as they are making decisions that will affect the children	DG		Attawapiskat First Nation	W
	There has been no analysis of the comparative environmental effects of the coastal road versus the SWAWR- conducted no aquatic sampling as a component of the coastal route assessment	CS		Mushkegowuk Council	W
	DeBeers has not referred to any studies that support its conclusion about the low impact potential of winter road construction on fisheries resources	CS		Mushkegowuk Council	W
	Winter road operation should also have been considered in connection with fisheries data collection and reporting techniques	CS		Mushkegowuk Council	W
6. Closure Phase	Decommissioning concerns	DG	3	Moose Cree First Nation Mining Watch Canada Mushkegowuk Council	W/W/W
	The consideration of what is an "acceptable" residual risk to the environment is a crucial part of the process fro selection of reclamation objectives that should be based on community values, technical feasibility and economics	CS		Attawapiskat First Nation	W
	A clear statement of the overall closure objectives for the Victor Project should be provided as they are the means of providing the context in which to assess the adequacy and appropriateness of the proposed reclamation measures	CS		Attawapiskat First Nation	W
	Closure Plan summary provided in the CSR is not adequate. Only a summary of the closure plan has been available for review by parties other than AttFN. All parties must have the right to review a detailed closure plan before the mine is permitted	CS		Mining Watch Canada	W
	DeBeers should consider post-closure stability of the overburden slopes subjected to flooding and wave erosion and should specify the types of erosion protection. This analysis should also consider the proximity of the overburden trench and a lake formed by subsidence of the trench	CS		Attawapiskat First Nation	W
	Concern over the closure of the mine - the size of lake will double and the water will have an increased salinity	CS		Kashechwan First Nation	M

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Issue	Comments	DG/CS	# Times	Community	Meeting/ Written
	Community does not have a good understanding of the closure plan	CS		Attawapiskat First Nation	M
	Concerns that there is not a more detailed closing plan in the CSR	CS		Nishnawbe Aski Nation	W
	10 years of monitoring is not enough	CS		Attawapiskat First Nation	M
	DeBeers should make an explicit commitment to reconsideration to flooded pit option if additional resources in the vicinity are identified and backfilling of the pit from other areas becomes possible	CS		Attawapiskat First Nation	W
	Estimates of the quantities of materials required for reclamation should be provided	CSEA	2	Attawapiskat First Nation Attawapiskat First Nation	W/W
	More information on the effects of malfunctions or accidents likelihood of occurrence, prevention and mitigation measures	DG	2	Mushkegowuk Council Attawapiskat First Nation	W/W
Process Related Issues					
1. Mitigation Measures/Accountability/Methodology	Mitigation measures in the CS have been developed by category, rather than related to the effects they are expected to address	CS		Mushkegowuk Council	W
	Questions about accountability -Are we representing the same government that has not cleaned up the oil spill under the school - If so how can the community trust us in making sure that DeBeers will not destroy the environment	CS		Attawapiskat First Nation	M
	NAN has concern over the fact that none of the Federal regulators sent them a draft of the Guidelines	DG		Nishnawbe Aski Nation	W
	A major deficiency with mitigation was the lack of consultation on the subject as a whole as well as the lack of consultation with the west James Bay area community leaders	CS		Mushkegowuk Council	W
	There should be development of the construction Code of Practice: indication of the hours of construction, that equipment will operate with proper exhaust mufflers	CS		Attawapiskat First Nation	W
	DeBeers needs to look at alternative mitigation measures to reduce effects of water flow reductions	CS		Attawapiskat First Nation	W
	DeBeers has not demonstrated that it can meet the Ontario 1/-hour Point of Impingement standards	CSEA		Attawapiskat First Nation	W
	Consultations should have already been completed and the FN should already have the expertise required to make decisions	DG		Moose Cree First Nation	M
	A baseline study should be prepared which describes the environment at large - including current environmental load	DG		North Watch	W
	When changes are made it is requested that explanation be included as to why they were changed and who authorized them	DG		Nishnawbe Aski Nation Mushkegowuk Council	W
	Clearer direction must be given to DeBeers to ensure that mitigation measures are assessed appropriately	DG		Attawapiskat First Nation	W

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Issue	Comments	DG/CS	# Times	Community	Meeting/ Written
	More justification is needed for proposed production rate	CS		Attawapiskat First Nation	W
	The identification of net effects was stated to be determined through Impact Benefit Agreements (IBAs) not the EA	CS		Mushkegowuk Council	W
	Socio-economic monitoring programs were not provided per VEC, as indicated in the text	CS	3	Mushkegowuk Council Mushkegowuk Council Mushkegowuk Council	W/W/W
	There is no rationale in CS to explain why risk is assessed by cost remediation and level of long term effects instead of by level of toxicity, surface area affected and duration of impact	CS		Mushkegowuk Council	W
	No summary of mitigation effects was found (missing from CS)	CS		Mushkegowuk Council	W
	Mitigation measures present were not developed specifically to each socio-economic effect	CS	2	Mushkegowuk Council Mushkegowuk Council	W/W
	DeBeers has not provided a comprehensive list of the commitments it has made in the CSEA in relation to various permits, licenses and authorizations it requires to allow the AttFN or others to determine whether or not the regulatory regime is sufficiently robust to address the full range of environmental issues of concern, or to identify who is responsible for their enforcement	CSEA		Attawapiskat First Nation	W
	Monitoring issues	DG	3	Moose Cree First Nation Northwatch Attawapiskat First Nation	W/W/M
	Individual First Nations IBA's	DG		Moose Cree First Nation	W
	Analysis of benefits from taxation and royalties to the province and the federal government should reflect the effective tax rates after CEE, CED, ACCA, exploration subsides, production allowance, participation allowance, participation supports, policing, promotion, trade supports, infrastructure supports	DG		Mushkegowuk Council	W
	The likelihood of effects of malfunctions or accidents should be included	DG		North Watch	W
	In the introduction there are inconsistencies between the information provided in this section and that posted on the FEAI	DG		North Watch	W
	Follow up programs are needed to ensure that the environmental assessment program is effective	DG	3	North Watch Mushkegowuk Council Mushkegowuk Council	W/W/W
	Mitigation measures should be identified, described and evaluated on the basis of their potential effectiveness	DG		North Watch	W
	Lack of independent expert review	DG	3	Nishnawbe Aski Nation Mining Coordinator	W/M/W

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Issue	Comments	DG/CS	# Times	Community	Meeting/ Written
				Attawapiskat First Nation General Public	
	"Best professional judgment" is subjected to biases thus it should be removed	DG		North Watch	W
	Would like a full panel review	CSEA		Nishnawbe Aski Nation	W
	Premature mine closure was not addressed	CS		Mushkegowuk Council	W
	Cumulative effects needs to be addressed in the comprehensive study	CS		Mushkegowuk Council	W
	The need for mechanisms to be established for complaints and concerns	CS		Member of First Nation Attawapiskat	W
	Concern that the federal government is receiving pressure from outside parties to complete the EA. Therefore, it is causing federal authorities to make decisions that are not in the interest of AttFN	CS		Attawapiskat First Nation	W
	Lack of coordinated land use planning for the region	CS		Wildlands League	W
	Assessment of risk to ecological values	CS		Wildlands League	W
	Proposed ecological monitoring program must undergo expert review by wildlife and ecosystem scientists as part of EA process	CS		Wildlands League	W
	Establish an independent agency with representation from all the stakeholders to oversee monitoring of the environmental impact of the VDP	CS		Wildlands League	W
	DeBeers should prepare the mitigation plan prior to closure	CS		Attawapiskat First Nation	W
	Concern over the fact that DeBeers has already commenced activities at the VP site without the process being finished	CS		Moose Cree First Nations	M
2. Public Registry/Access to Information	Concern over the fact that community members are required to sign a book in order to access the EA registry at the DBC office in Attawapiskat	CS		Nishnawbe Aski Nation	W
	CEAA website does not include any posting or news related to the project	CS		North Watch	W
	The Federal Environment Assessment Index # 40568 as of January 22nd did not include any notice that draft guidelines had been prepared or that a deadline for comment was imminent	DG		North Watch	W
	Minutes from meetings need to be made public in order to obtain clarification on what NRCan and other regulators are requiring DeBeers to do	CS		Mushkegowuk Council	W
	More public notices and greater access to documents needed	DG		North Watch	W
	Information is not being passed on to public quickly enough	DG		North Watch	W
	Poor communication with the CEAA, were not included in the distribution of the draft guidelines or given notice that NRCan had	DG	2	North Watch Nishnawbe Aski Nation Mining	W/W

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3. Participation Plan	been identified as the lead department even though notice of interest was given two years prior			Coordinator	
	DeBeers does not indicate which First Nations full documentation sets will be provided to	DG		North Watch	W
	All documents should be available in public institutions for public use i.e. libraries, municipal offices	DG		North Watch	W
	Clarity on how the public review results will be incorporated into the CSR	DG	2	North Watch Nishnawbe Aski Nation Mining Coordinator	W
	An email address and telephone number should be provided for registry users to request a hard copy	DG		North Watch	W
	Participation Plan must be developed with the direct involvement of First Nations, communities and other stakeholders	DG		Nishnawbe Aski Nation	W
	Need to make the distinction between "participation plan" and "consultation"	DG		Attawapiskat First Nation	W
	Participation plan must include the requirement to provide all local First Nations with full copies of all documents (including supporting documents)	DG		Mushkegowuk Council	W
	The First Nations and the 3 communities (Cochrane, Timmins, Moosonee) should be specifically referenced to ensure that the proponent and others know who must be consulted	DG		Nishnawbe Aski Nation	W/W
	The participation plan should include a work plan and related timeline, recognizing that this may be adjusted throughout the study and review process	DG		North Watch	W
	Development of a Consultation Plan should allow the AttFN an opportunity to comment on draft plan prior to its finalization	DG		Attawapiskat First Nation	W
	Numerous deficiencies were found through out the CS due to the fact that DeBeers focused most of its socio-economic impact assessment on AttFN alone while neglecting the other affected First Nation communities.	CS		Mushkegowuk Council	W
	DeBeers developed VECs for Cree communities in project area based on comments raised at two consultations. It is not even clear who raised these concerns or at what point in the process were they raised	CS		Mushkegowuk Council Mushkegowuk Council	W/W
	Participation plan must be developed with the direct involvement of First Nations, communities and other stakeholders	DG		Nishnawbe Aski Nation	W
	What definition of consultation with First Nations has been employed by DeBeers throughout this study and assessment?	CS		Mocreebec Council of Cree Nation	W
	What is the percentage of overall costs that have been employed by	CS		Mocreebec Council of Cree Nation	W

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Issue	Comments	DG/CS	# Times	Community	Meeting/ Written
	DeBeers throughout this study and assessment				
	Proper consultation will not occur until all understand issues. Attawpiskat will require funding for this	CS		Attawapiskat First Nation	M
	Minutes from community consultations are not included on the documentation	CS		Mushkegowuk Council	W
	Moose Cree will need resources to make sure that they are able to properly participate	DG		Moose Cree First Nation	M
	AttFN do not want other James Bay FN involved in the IBA with DeBeers as they feel that there would be unnecessary delays if the other FN try to negotiate IBAs	DG		Attawapiskat First Nation	M
	DeBeers should begin negotiating an Impacts and Benefit agreement with Mushkegowuk Council, Including provision of negotiations funding for that purpose	DG		Mushkegowuk Council	W
	Consultation process has not been carried out efficiently	CS		Mocreebec Council of Cree Nation	M
	Development of a consultation plan should allow the AttFN an opportunity to comment on draft Plan prior to its finalization	DG		Attawapiskat First Nation	W
	Very little communication with Attawapiskat. Not sharing information	CS		Fort Albany First Nation	M
5. Funding	AttFN do not have the resources to hire technical experts to review the guidelines and provide meaningful comments that represent their interest	DG		Attawapiskat First Nation	M
	A need for adequate funds to cover costs for retaining independent experts	CS		Member of the First Nation Attawapiskat	W
	Participant funding should be provided by DeBeers Canada and administered by CEAA under the participant funding program	DG		North Watch	W
	Participatant funding should support public involvement by reimbursing expenses incurred as a result of participating in a hearing, information session, or on a decision making table, including travel communication expenses, purchase information and independent expert advice	DG	7	North Watch Mushkegowuk Council Moose Cree First Nation Mocreebec Council of Cree Nation	W/W/W/M
	It is hard for the FN to make decisions on the process they need to have their own experts but there is no funding for this. What is the value of consultation without the true help from the FN	DG		Attawapiskat First Nation	W
6. Translations	DeBeers is not providing additional information in support of the revised project alternatives quickly enough in order for FN groups to have a adequate time to review information	DG		Attawapiskat First Nation	W
	Concern that there is not enough translation being done for the First Nations People	DG	3	Kashechewan First Nation Nishnawbe Aski Nation Fort Albany First Nation	M/W/M

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	Translation of the CSR into Cree	DG	2	Mushkegowuk Council North Watch	W/W
	The translation of documents into Cree was not done in the same dialect	DG		Attawapiskat First Nation	M
	Disappointment that there was no plain language summary of the Draft EA guidelines for the benefit of our members	DG		Attawapiskat First Nation	W
	Need all information translated into Cree	DG		Moose Cree First Nation	W
	Review of the CS becomes very hard because DeBeers has continued to update the CS as the comment period has progressed	CSEA		Mining Watch Canada	W
	Concern about deadlines - process is moving too quickly	DG	2	Attawapiskat First Nation Fort Albany First Nation	M/M
7. Time Constraints	Should have time to make the right decision	DG		Attawapiskat First Nation	M
	Consultation period on the CSR should be at least a 120 day minimum-60 days is to short	DG	4	North Watch Attawapiskat First Nation Nishnawbe Aski Nation	W/M/W/W
	30 day review period for "additional information" is to short	DG	2	North Watch Mushkegowuk Council	W/W
	Public review and comment period must be extended 180 days from the date on which the new or revised studies are made public	DG	3	Mushkegowuk Council Nishnawbe Aski Nation Mushkegowuk Council	W/W/W
	Comment period to be extended to 180 days from 60 given consideration to such issues as the timing of the spring hunt, time to conduct IBA agreements	DG	2	Nishnawbe Aski Nation Mushkegowuk Council	W/W
	More time is needed for review of project by First Nations in order for it to be fully understood	DG		Fort Albany First Nation Attawapiskat First Nation Attawapiskat First Nation Mushkegowuk Council	M/M/W/M
	Period for public comments should be extended to permit participants to review and comment on the new information once it has been provided	DG		Mushkegowuk Council	W
8. Scope	Scope should include all exploration and development activities that DeBeers has planned in the area not just limited to the Victor Mine Project	DG		North Watch	W
	Not addressing five identified VECs in the Project Study Area represents a serious omission in the socio-economic impact assessment and in the CS	CS	2	Mushkegowuk Council Mushkegowuk Council	W/W

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	DeBeers seems to be redefining the VECS	CS	2	Mushkegowuk Council Mushkegowuk Council	W/W
	Impact Predictions are not made on a VEC basis but rather are made in a general sense'	CSEA		Attawapiskat First Nation	W
9. Spatial and Temporal boundaries	The assessment criteria used was not sufficiently conservative to ensure that significant impacts have been identifies in the study area	CSEA		Attawapiskat First Nation	W
	Little information from the communities of Fort Albany, Kashechewan and Moose Factory, which are within the study area. For example there is no information from any of these communities in the TEK, VEC and aboriginal culture and traditions sections	CS		Mushkegowuk Council	W
	Clarification of the spatial and temporal boundaries	DG		Mushkegowuk Council	W
10. CSR	The communities and the First Nations referred to in the CS must be properly identified	DG	2	Attawapiskat First Nation Nishnawbe Aski Nation	W/W
	Concern that the consultation process will be hindered by allowing DeBeers to submit its completed CSR before the consultations are finished	DG		Attawapiskat First Nation	W
	More corporate information is needed about DeBeers in the CSR	DG		Attawapiskat First Nation	W
	Concern that the phrase "in and around the project area" is too vague. The AttFN would like that the current uses of land and resources for traditional purposes be described in detail	DG		Attawapiskat First Nation	W
	CS is inadequate and substantially incomplete information on central issues (power supply and road access)	CSEA		Mushkegowuk Council	W
	Draft guidelines referred to appendices that were not attached or included with the copies provided	DG	2	North Watch Nishnawbe Aski Nation	W/W

APPENDIX D

COMMENTS RECEIVED FROM THE FEDERAL AND PROVINCIAL GOVERNMENT AGENCIES ON THE VICTOR DIAMOND PROJECT ENVIRONMENTAL ASSESSMENT

APPENDIX D

Issue	Comment	DG/CS	#Times	Department	Written/ Meeting
SOCIO-ECONOMIC AND CULTURAL ISSUES					
1. Jobs, Skills and Education	No real assessment of barriers to employment and retention of Aboriginal workers is provided in Chapter eight on impacts	CS		INAC	W
	No discussion on availability of skilled manpower in other James Bay communities	CS		INAC	W
	More information on skill level is needed in study area	CS		INAC	W
	In what capacities will local and regional aboriginal business participate in the construction and operations of the project	CS		INAC	W
	More information is needed on the competence and skills of regional and local aboriginal manpower resources in specialized and non specialized work during, operations and closure of project	CS		INAC	W
	Not enough data is provided to evaluate proponents assessment of benefits of the project on regional and local aboriginal business and man power resources	CS		INAC	W
	Potential regional training and employment benefits for all the Cree communities concerned by the project have been neglected to a certain extent as the proponent has mostly focused on employment benefits for the community of AttFN	CS		INAC	W
	Work schedule - more discussion of socio-economic effects of different work schedules	CS		MNR	W
	No discussion on proponents, role in monitoring of training strategy and of social impacts provided	CS		INAC	W
	There needs to be a description of available programs such as distance education or adult education programs as well as any traditional education provided in the area	CS		INAC	W
2. Local Government Finances	More information needed to describe local government finances in study area	CS		INAC	W
	Section on the effects on local government needs to be further developed	CS		INAC	W
3. Socio-economic Impacts	No description provided of business conditions in the community	CS		INAC	W
	Effects on wage and salary employment are not assessed by skills category in Attawapiskat, only unskilled manpower participation is foreseen	CS		INAC	W
	Little consideration of monitoring the impacts, economic or general. A monitoring program, replete with a suite of indicators agreed upon by all parties would be closer	CS		EC	W

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Issue	Comment	DG/CS	#Times	Department	Written/ Meeting
	to ideal				
	The potential impacts on the local and regional environment present economic externalities that are not dealt with adequately	CS		MNR	W
	Virtually no consideration given to economics of socio-cultural impacts other than a brief mention about housing costs and Elders concerns regarding wealth sharing	CS		MNR	W
	Details need to be expanded upon, especially for James Bay coastal communities other than the AttFN	CS		HC	W
	Social effects should be further developed	CS		INAC	W
	Report does not say if business opportunities during operations will be smaller or greater than during construction where they are supposed to be limited	CS		INAC	W
	No Description of social environment is provided in the report in order to assess the effect the project will have on social conditions, relations and problems in Attawapiskat and on relations with other Cree Nations and non-aboriginal communities	CS		INAC	W
	Level of detail of socio-economic information is in some respects not considered to be in relation to the potential effects of the project	CS		INAC	W
	Description of past experience with industrial development growth and environmental problems in study area should be included in study	CS		INAC	W
	Further development of section on subsistence economy is needed with emphasis on the impacts that winter access road will have and the availability of community funds to help trappers and hunters	CS		INAC	W
	No mention of housing, recreational activities and events, suicide rates and family violence	CS		INAC	W
	The potential social tensions related to housing and employment benefits brought about by the in-migration of qualified AttFN community members living off-reserve and by the presence of other Cree community members and non-Aboriginal personnel living at the project site or in the community	CS		INAC	W
	Description of traditional activities is incomplete as no indication on the number of frequent or occasional users of the project and road area is provided	CS		INAC	W
	Records of compliance with socio-economic commitments and Aboriginal relations	CS		INAC	W

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Issue	Comment	DG/CS	#Times	Department	Written/ Meeting
	are not provided				
	Socio-economic effects are not described in terms of reversibility of frequency and socio-cultural context	CS		INAC	W
	Not enough baseline information to evaluate the effects on households and family income levels	CS		INAC	W
	The issues related to working language have not been addressed. Are all Crees able to work in English speaking environment	CS		INAC	W
	Concern over NRCan's clarification of what the assessment of socioeconomic impacts for the VDP. The CSEA requirements for the assessment of socioeconomic factors with or without a clear biophysical link were clearly set out in writing within the guidelines	CS		INAC	W
	Description of socio-economic environment is very vague and many generalizations regarding the First Nation communities are made. More detail should be included.	CS		MNR	W
	Concerns that it is not likely that DeBeers will provide a clear socio-economic monitoring system. Socio-economics will be discussed under many different monitoring programs and will therefore not provide a “big picture” view of what is really occurring. Further, this approach sets up a situation in which key socio-economic factors can easily be deliberately or accidentally missed	CS		MNR	W
	Effects of the project on economic diversification of Attawapiskat and other James Bay communities should be further addressed	CS		INAC	W
	It is important that construction workers understand and know the society rules within the area they will be living in order to reduce social tensions	CS	2	INAC/INAC	W/W
	Additional explanations on the history of division of Fort Albany and Kashechewan would help to better understand these communities and in which way they may be able to participate	CS		INAC	W
	A description of the social relations in the community should be provided in order to assess impact as required in the guidelines	CS			
	Should provide an evaluation of the present income distribution in order to assess impact on future income distribution and social conflicts	CS		INAC	W
	No discussion on effects of the project on identified socio-economic VECS				

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Issue	Comment	DG/CS	#Times	Department	Written/ Meeting
4.Consultations and Compensation	The environmental effects analysis needs to describe the electro magnetic fields associated with the transmission lines	CS		HC	W
	Measures to address disease transmission do not account for sexually transmitted diseases	CS		INAC	W
	No mention of the possible consequences on respiratory problems related to dust emissions particularly during construction stage	CS		INAC	W
	No discussion about the availability of alcohol and drugs at the temporary workers camp	CS		INAC	W
	Views expressed during community consultations regarding traditional land use and resources are not referred to in the report and there are several information gaps that are not addressed in the report	CS		INAC	W
	"Key Issues " (James Bay Coastal Cree Communities)- there are several issues identified but no record as to how information was collected or addressed	CS		EC	W
	DeBeers offers their proposed consultation program-post EA. There are a number of inconsistencies with respect to MNR protocols	CS		MNR	W
	Concern over the fact that DeBeers had once included other communities in negotiations concerning the Victor Project than later stated that only a single community was concerned	CS		MNR	W
	DeBeers should provide a rationale for the exclusion of the other communities such as Fort Albany and Kashechewan First Nations from the collection of TEK. If no rationale can be provided, the scope of the study should be broaden to determine the attachment that other Cree individuals or communities may have with land under study	CS		EC	W
	Views expressed during community consultations regarding traditional land use and resources are not referred to in the report and there are several information gaps that are not addressed in the report	CS		DFO	W
5.Miscellaneous	Few links between significance assumptions and sources of info referred to in Chapter 8	CS		INAC	W
	No mention of Aboriginal recreational activities and water collection	CS		INAC	W
	Insufficient data is provided in the report to be able to evaluate DeBeers assessment of effects of the project on traditional pursuits: 1- data needed on the number of	CS		INAC	W

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Issue	Comment	DG/CS	#Times	Department	Written/ Meeting
	affected users 2- information needed on recent trends related to use of potentially affected trap lines 3- info on trends affecting the subsistence economy in AttFN 4- A discussion of current transportation strategies to access AttFN and potentially affected trap lines and the effect that new winter roads on access of local as well as external Aboriginal and non - aboriginal land users				
	Local and community planning should be addressed in study area	CS		INAC	W
	Need clear definitions of the following concepts: historical, heritage and cultural	CS		INAC	W
	Effects the project will have on language use need to be addressed	CS		INAC	W
	How will elders benefit from the project? "Elders could also be affected by a reduction of support from community members who will be more engaged in wage economy"	CS		INAC	W
	Should provide an evaluation of housing shortage situation and expected trends in housing construction	CS		INAC	W
	What is the cumulative impact of all the negative environmental effects that have been deemed "not significant"	CS			
	IBA negotiations should not be included as part of consultation summary as this has no bearing on the legal obligation to complete consultation. This represents negotiations of a business-to-business relationship between the proponent and the First Nation.	CS		MNR	W
WATER					
1. Groundwater Quality	Proponent should provide a specific discussion on the effect of supplementation on the Nayshkootayaow River of water from the Attawapiskat River on fluvial geomorphology and processes in both rivers	CS		CEAA	W
	Proponent should provide the information requested in the Guidelines, or provide a rationale for why such information is not warranted to supplement the acute and chronic toxicity data provided	CS		CEAA	W
	Questions concerning the proponents value for vertical hydraulic conductivity in the bioherm. This is the most critical parameter value affecting the results of modeling study yet it is provided without any support rationale or field data	CS		NRCan	W
	The proponents' should provide a rationale for the choice of horizontal and particularly, vertical bioherm conductivities. The proponent should also provide a	CS		NRCan	W

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Issue	Comment	DG/CS	#Times	Department	Written/ Meeting
	sensitivity analysis showing how the results of the modeling study are affected by this choice of conductivities				
	The proponents' reasonable, but generic, choice of model boundary conditions may not reflect the specific surface hydrology of bioherm-fen complexes that are the focus of this study, thus estimates of recharge to the bedrock aquifer via the bioherm pathway may be significantly understated	CS		NRCan	W
	GSC concludes that areas of outcropping and shallow sub-cropping bioherms represent important flow paths between the surface water system and the deep groundwater system, and that such flow paths have not received adequate consideration in the proponent's conceptual and numerical flow models for both the bedrock and overburden aquifers.	CS		NRCan	W
	The proponent should incorporate the "bioherm" recharge (or discharge) path in its numerical groundwater flow models of the overburden and bedrock aquifers, using a level of representational detail appropriate for each model. Additional fieldwork should be performed in order to better understand the hydraulic function of bioherms in the coupled surface, shallow overburden and deep bedrock hydrological systems of the Attawapiskat karst candidate ANSI.	CS		NRCan	W
	Bad Cache Rapids Formation should not be modeled as a single layer: the high conductivity basal sandstone unit should be explicitly represented in the conceptual hydrogeological model and in numerical model used to predict the performance of the pit dewatering system and the pit lake infilling as well as the model to predict chloride concentration in mine discharge	CS	2	NRCan/NRCan	W/W
	The proponents' conceptual bioherms model neglects known geological features that would enhance the bioherms ability to conduct water between the overburden and the bedrock aquifers	CS		NRCan	W
	The environmental impacts associated with the grouting and wells should be looked at. Although grouting will not stop all ground water flow, it will decrease the flow. Therefore, the associated environmental impact on the ecosystem would be decreased.	CS		DFO	W
	NRCan concludes that the high-conductivity basal sandstone should be represented explicitly in the conceptual hydrogeological model and in numerical models, as was	CS		NRCan	W

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Issue	Comment	DG/CS	#Times	Department	Written/ Meeting
	the sandstone layer within the Red Head Rapids Mudstone.				
	Assumptions about decreasing kimberlite conductivity with depth need to be documented by obtaining filed data and by conducting numerical analysis with a revised numerical model also incorporating the above basal sandstone; this assumption has important implications for the predicted quantity and quality of mine discharge waters	CS		NRCan	W
	The proponents' assumption that the zone of enhanced hydraulic conductivity found in the limestone units surrounding the kimberlite does not extend downwards into the mudstones of the Red Head Rapids Formation because of their more plastic nature, has important implications for the predicted quantity and quality of mine discharge waters and needs to be documented more thoroughly. This could be done by obtaining field data if possible and by conducting numerical sensitivity analyses with revised numerical model	CS		NRCan	W
	The location, thickness and nature of the Quaternary sediments in this very significant overburden feature should be reported. This information is essential for assessments of many aspects of potential environmental impacts on open pit design, slope stability, pit reclamation and ground water flow	CS		NRCan	W
	It has been concluded that the high-conductivity zone of planar-bedded carbonates, shales and mudstones within the Upper Ekwan River Fm should be represented explicitly in the conceptual hydrogeological model and in numerical groundwater flow models.	CS		NRCan	W
	HCI's arbitrary assumption of anistrophy ratio between horizontal and vertical hydraulic conductiveness is rejected given that no geological rationale is provided	CS		NRCan	W
	Cold temperature rate equation in SRK Water Quality Estimates page 4 is incorrect	CS		CEAA	W
2. Surface Water Quality	Discharge to the James Bay through a submerged pipeline at the river bottom should also be evaluated	CS		CEAA	W
	Maybe it should be acknowledged that there is a real possibility that the project will completely destroy all habitats in North and South Granny Creeks and a contingency compensation package should be produced in case this occurs. As with many of the other issues, this problem could be avoided if the area that will be dewatered could be reduced using alternative technologies (e.g. freeze wall as primary method with	CS		MNR	W

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Issue	Comment	DG/CS	#Times	Department	Written/ Meeting
	pumps as back up).				
	Concerns over the proponents' new evapotranspiration value is likely overstated since it represents about 95% annual lake evaporation for the site	CS		NRCan	W
	The proponents' estimates of recharge and runoff in a single bioherm catchment are unconvincing - include monthly evapotranspiration fluxes in the numerical modeling of bioherm recharge along with monthly precipitation rates already included	CS		NRCan	W
	It is difficult to draw any meaningful conclusions from the sensitivity analysis because the total premining recharge rate applied to base case model	CS		NRCan	W
	Change in flow to North and South Granny Creek is likely to be very significant. The extent of the dewatering will completely envelop the watershed of these small systems. Base flow in these streams is provided by ground water. Modeling says the effects will be minor. Models are theoretical and do not always represent reality in nature	CS		MNR	W
	Proponent should also investigate the sensitivity of discharge water quality to residual passive inflow	CS		NRCan	W
3.Acid Rock Drainage					
	Will hydrofracturing or acidization of the bedrock (or just the loss of aquifer pressure) result in destabilization of the land (i.e. massive slumps) at some point in the future?	CS		MNR	W
4. Diversion of South Granny Creek	Realignment of South Granny Creek is only preferable from the standpoint of one criteria…cost. Restricting the extent of mining operations provides by far the best systems integrity and reliability, the least impacts to the natural environment and is most amenable to reclamation	CS		MNR	W
FUEL					
1. Fuel Management Issues	Concern that DeBeers proposes that it will take ownership of the fuel once it reaches the barge site and that control and management of fuel is responsibility of transport and or fuel company until it arrives	CS		EC	W
	Why would it not be practical to return empty contaminated containers to the vendors? The MNR preferred option is the removal of all barrels from site. No permanent storage of fuel barrels. Company needs to supply alternate options for the	CS		MNR	W

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Issue	Comment	DG/CS	#Times	Department	Written/ Meeting
	removal of waste and all infrastructures e.g. ongoing removal of waste throughout the project.				
	Have environmental risks been sufficiently evaluated / assessed with the proposed complete fuel system with various alternatives? From shipping/barging, potential lightering (Figure 3-18), off-loading, transport to Victor, etc.?	CS		MNR	W
	Are theses the current shipping routes for fuel by tanker or proposed routes a risk to Important Bird Areas	CS		MNR	W
	Concern over the increased risk of loading fuel from a ship to a barge in open water	CS		MNR	W
	Spill during lightering or off-loading – says volumes will be small because of constant communications. What if there is a communications break down? Most accidents are caused by human error. Is a contingency plan needed?	CS		MNR	W
	Security concerns regarding fuel handling	CS		INAC	W
2. Fuel Mishaps and Clean up	Full Descriptions of the Victor Fuel Pipeline (VFP) inspection and spill prevention and contingency measures	CS		CEAA	W
	Fuel contaminated materials/soil issues	CS		MNR	W
	Both sections require additional information re: post operating and closure and proposed rehabilitation of sites. All three sites, barge berth, laydown/storage areas and fuel farm will require soil testing and associated EA studies to determine soil contamination and requirements for clean up.	CS		MNR	W
	Consideration for additional alternatives to handling of contaminated soils beyond shipping to the mine site.	CS		MNR	W
	How long would it take to detect a leak of less than 1% at the VFP? Report says within 1 hour, but if it were a small leak underground, how long would it really take? Days? Weeks? Months? Or years? For the entire life of the project? This could be a bigger concern than a complete breach that could be detected immediately.	CS		MNR	W
	Marine fuel spills and shoreline sensitivity. Further shoreline sensitivity studies and clean up response strategies are required	CS		NRCan	W
	A contingency plan for fuel spills needs to be provided prior to the start of construction	CS		EC	W

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Issue	Comment	DG/CS	#Times	Department	Written/ Meeting
	Need information for accidents and malfunctions of fuel handling and spills in CSR	CS		MNR	W
	Concern over the consequences of a malfunction or accident that results in an oil spill in the environment	CS	2	EC/EC	W
WILDLIFE					
1. Wildlife and Wildlife Habitat	Special attention should be given to species at risk when preparing the summary in the comprehensive study report	CS		CEAA	W
	The definition of environment should be consistent with the Act. Should also be aware of changes to the definition of environmental effect, as a result of the *Species at Risk Act* when preparing the summary in the comprehensive study report (CSR)	CS		CEAA	W
	At risk species were identified but none were activitely searched for other than the bald eagle	CS		CEAA	W
	Did they inventory/survey amphibians?	CS		MNR	W
	Discount any significant negative potential impacts to caribou and other wildlife without any measurements or monitoring to assess their claims	CS		MNR	W
	What is the caribou monitoring protocol?	CS		MNR	W
	There is a need for detailed information on the levels and timing of use of the project study area by waterfowl and shorebirds to assess resources potentially at risk and to justify the most appropriate course of action	CS		CEAA	W
	DeBeers will include information on polar bear habitat in their description of the existing environment	DG		MNR	W
	Discrepancy in discussions on observed data. For example at one place it was stated that several garter snakes had been observed but at a later point the discussion referred to only one garter snake	CS		MNR	W
2. Birds	Studies on birds at Victor site were not conducted at a favorable time of year for desired information	CS	2	EC/CEAA	W/W
	In order for bird list to be adequate the Victor site must receive a series of visits spaced at least a week apart	CS	3	EC/CEAA/CEAA	W/W/W
	Avifauna section should be re-drafted and expanded based on field work during all seasons (More info on methodology required)	CS		CEAA	W
	More methodology is required on how the bird info was collected	CS		CEAA	W

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Issue	Comment	DG/CS	#Times	Department	Written/ Meeting
	Surveying of adjacent areas to determine the distance threshold of mining operations, which may affect the breeding community	CS		CEAA	W
	Snow Geese have not been described	CS		CEAA	W
	Additional information is required for seabirds and waterbirds including gull or tern colonies	CS		CEAA	W
	A breeding pair study should be conducted on waterfowl and shorebirds carried out by helicopter in early June	CS		CEAA	W
	A more detailed description of the life history strategies and specific identification of key habitat types within the area of impact is required	CS		CEAA	W
	DeBeers should consider the potential effects on all life stages of birds, including breeding, migration, summer moult, staging and wintering	CS		CEAA	W
	Particular attention needs to be paid to the potential effects of project facilities and activities on James Bay coastal and marine breeding, staging and feeding areas including the unnamed adjacent islands and shoals	CS		CEAA	W
	Efforts are needed to survey not just the site proper but adjacent areas to determine the distance thresholds of the mining operation, which may affect the breeding bird community	CS		CEAA	W
	DeBeers shall provide an analysis of proposed project's effects on birds, giving consideration to and demonstrating linkages between predicted physical and biological changes resulting from the proposed project	CS		CEAA	W
	Surveys must be conducted at the Victor site to determine whether the Short-eared, moose and eagles are present at site	CS		CEAA	W
	There is no evidence that in the James Bay Lowlands that roads would create habitat for owls unless one believes that cutting down trees creates open owl habitat	CS		EC	W
3. Aquatic Organisms and Habitat	The effects of whitefish weirs should be documented	CS		INAC	W
	Inadequate information on aquatic organisms and habitat	CS		CEAA	W
	Clarification is needed over the statement that there was not enough sand and gravel for significant brook trout spawning in the main channel of the Nayshkootayaow River	CS		MNR	W
	Should identify potential for HADDs with other stream/river crossings for the roads	DG		MNR	W

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Issue	Comment	DG/CS	#Times	Department	Written/ Meeting
	and pipelines as well				
	There likely is meaningful brook trout spawning	CS		MNR	W
	The temporal importance of estuary for several species of fish	CS		MNR	W
	Concerns over creating a "fish habitat" in a mine water-settling pond. Although the contaminant levels in the remaining processed ore are considered relatively low, is there the chance for bioaccumulation?	CS		MNR	W
	What is the effect on fish population/community as a result of reduced base/flow during dewatering	CS		MNR	
	Although no footprint at the barge landing, there is the potential to affect fish habitat: 1) loss of the natural shoreline structure, 2) sedimentation from construction, and 3) erosion that may occur up or downstream of the site due to changes in current patterns (as well as the dredging that is acknowledged in the report).	CS		MNR	W
	The proposed barge handling facility is located at or adjacent to areas currently utilized by Attawapiskat residents for fishing. What will the impact of the dredging and barging activity have on this subsistent fishery?	CS		DFO	W
	Based on the predicted impacts to the aquatic ecosystems the baseline study falls short in providing the information required for a proper impact assessment	CS		DFO	W
4.Hunting	1km no hunting buffer- how and who monitors?	CS		MNR	W
	Explain how the buffer zone works to protect caribou from noise	CS		MNR	W
	No discussion provided on the effect of a possible increased presence of Aboriginal and non-Aboriginal hunters on Attawapiskat lands because of winter access road	CS	2	INAC/MNR	W/W
	How will hunting be regulated to ensure no net negative impact on population?	CS		M	W
AIR					
1. Air Quality	GHG calculation for the year are in report, however the units of measure are missing	CS		CEAA	W
	The term "fugitive dust" needs to be clarified	DG		MNR	W
	There is no comment or mention of air quality under impact to the Natural Environmental Assessment	CS		MNR	W
	Why not include the CO2 emissions related to transporting fuel to the site? What about the CO2 emissions that will result from drying out an extensive area of muskeg. The rate of decomposition of dried peat will increase released CO2.	CS		MNR	W

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Issue	Comment	DG/CS	#Times	Department	Written/ Meeting
2. Transportation Related Emissions	No data is provided for transportation related emissions	CS		CEAA	W
	Please expand upon the section on disturbance from noise, air emissions and traffic, and explain potential health effects associated with these changes	CS		HC	W
ENERGY					
1. Alternatives and Cost	Why are the transmission line options rated as unacceptable due to high capital cost? Why is there a comparison of a "reasonable" capital cost and lowest cost overall with a capital cost? The comparison should include both capital and operational costs.	CS		MNR	W
	Why would the transmission have to be removed, and therefore rejected as an options by cost and while the fuel pipeline is not removed ?	CS		MNR	W
	The cost estimates don't include the costs of cleaning up a fuel spill should one occur, which would be very high. The possible effects of a diesel spill cannot be completely eliminated using mitigation measures.	CS		MNR	W
TRANSPORTATION					
1. Construction of all weather road	New Bullets should be added concerning: installation of water crossing for roads and potentially bailey bridges for the winter roads. The potential upgrading of the Ontario North land line from Cochrane to Moosenee to accommodate the freight shipments for the line	DG		MNR	W
	Effects on winter travel on frozen roads should be documented	CS		INAC	W
	Proposed North Winter Road crosses through an area north of the Attawapiskat River identified as having potential ANSI values (organo-karst); road may impact values; this requires inventory and/or slight re-alignment of road northward; candidate Attawapiskat Karst ANSI is south of the river.	CS		MNR	W
	Proposed West Winter Road and esker deposit – is the esker deposit lichen rich, are caribou known to use this area, and what potential impacts may result to caribou use of same?	CS		MNR	W
	Additional information required for the location of the winter road leading to the sand & gravel pit including any watercrossings.	CS		MNR	W
	Wouldn't there be less disruption to the natural environment if the south road was improved to the level needed for the project?	CS		MNR	W

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Issue	Comment	DG/CS	#Times	Department	Written/ Meeting
2. Transportation System	Insufficient information on barge facilities and barge berth	CS		CEAA	W
	What wildlife habitats are being displaced by proposed fuel tank farm and barge berth / laydown area?	CS		MNR	W
	Where will employees be flown in/out form? If plan to stop-over in Timmins, must address concerns that have risen in NWT with substance abuse etc.,	CS		MNR	W
	Effects on travel routes should be provided	CS		INAC	W
	Transport by ocean going vessel has a much higher risk to the environment. A spill would be more likely to occur in transfer from ship to barge and would occur in open water where the effects could dissipate over a large area. A spill in filling barges at Moosonee could be contained more easily. A spill on the winter road would be easier to clean up…scoop up the ice and snow. Suggest that as much as possible be sent by winter road, and any additional supply be barged from Moosonee (would also provide some economic benefits to the people of Ontario).	CS		MNR	W
	Little detail is given concerning road approaches to the crossing [i.e. right of way mitigation measures such as ditching and diverting ditch to bush or check dams etc. to mitigate any roadside sediment entering watercourse];	CS		MNR	W
PHYSICAL ENVIRONMENT					
1. Muskegs, soils and Terrains	The draft guidelines do not contain any reference to permafrost and the precautions that are necessary in the construction of facilities and the laying of a pipeline under such conditions	DG	2	MNR/GP	W
	The collection in muskeg of suspended solids from runoff will affect the function of these communities. Need to provide details of the anticipated effects of siltation on bog and fen composition and function. Elsewhere will need to describe efforts to collect baseline data and to monitor change.	CS		MNR	W
	It is stated that there would be difficulties in constructing a pipeline near James Bay due to damage by ice action, would this concern not also be applicable to the groin in the Attawapiskat River?	CS		MNR	W
	Physical environment should use local data and not baseline info from other areas	CS		MNR	W
	More detailed information should be provided on the occurrence of landslides along the Attawapiskat River and its tributaries, including type of failure, size, types of material, controls, whether active/non-active	CS		NRCan	W

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Issue	Comment	DG/CS	#Times	Department	Written/ Meeting
2.Vegetation	Stability of PKC perimeter dams	CS		NRCan	W
	There needs to be evidence provided from other projects and studies to substantiate claim that vegetation communities will revegetate on their own	CS		MNR	W
	Potential for metal leaching from muskeg stockpiles. Appropriate studies should be undertaken to evaluate the long-term leaching potential of the proposed Muskeg stockpile	CS		MNR	W
	The report does not seem to quantify the potential impacts to the surrounding wetlands, associated terrestrial landscapes and the candidate ANSI nor does it address what impacts might be to ecological functions	CS		MNR	W
	Physical environment should use local data and not baseline info from other areas	CS		MNR	W
	Question-Are there unique plant communities at risk on Bioherms? Elsewhere in the document, at least one species is identified.	CS		MNR	W
	Dismissing the majority of the James Bay lowland as poor wildlife habitat is inappropriate. An intelligent, quantified, scientific argument is required relative to specific species at specific life stages and in specific seasons. The exclusive focus on ribbed fens and riparian areas as the only valuable wildlife habitat precludes the consideration of most of the affected terrestrial areas.	CS	2	MNR/MNR	W/W
TRADITIONAL ECOLOGICAL KNOWLEDGE					
1. Quality of TEK i.e. baseline data	The report infrequently addresses the different roles of men and women but no analysis is provided in the report. Therefore the report should include an analysis of TEK by gender	CS		EC	W
	TEK and traditional activities need to be strengthened to better reflect cultural, spiritual and educational values	CS		EC	W
	No specific measures to monitor impacts on traditional land use are proposed	CS		INAC	W
	A rationale for the view of TEK provided in the report should be provided. This rational should note if it was developed by the community and if so what process was used to determine this view of TEK	CS		EC	W
	The description of the existing environment in the TEK study is not consistent in its content for many land uses. The information presented is either not clear or it is otherwise incomplete in some respects	CS		EC	W

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Issue	Comment	DG/CS	#Times	Department	Written/ Meeting
2. Methodology	The issue of recognition of intellectual property rights of TEK to the First Nations is not addressed explicitly in the TEK study	CS		INAC	W
	Details of sensitive areas are not identified at the request of AttFN and need to be known	CS		MNR	W
	Lack of reference/baseline material on TEK in James Bay Cree included in TEK analysis	CS		MNR	W
	Explain for the resource uses cited, both the past and present uses or describe why both uses are not included. For example, where present uses are not noted in the TEK study differentiate between instances where the practice is no longer practiced, or where participants choose not to discuss current practices and uses	CS		EC	W
	For "Burial Sites and Rituals" describe what "died outside of traditional area" means	CS		EC	W
	There should be an indication why certain methods (interviews, mapping etc.,) were chosen for consultations on TEK. A list of interview questions would assist in furthering reviewer's understanding of methods selected	CS		EC	W
	Report does not provide a profile of the participants in the study. Thus, DeBeers to the extend possible while respecting community wishes and keeping the identity of participants confidential provide a profile of the study participants	CS		EC	W
	There needs to be a description of the spiritual significance of place names	CS		EC	W
	Where possible TEK information should be used to predict effects, assess the significance of effects and determine mitigation measures. Describe each in terms of the future land uses Attawapiskat Cree wish to maintain	CS		EC	W
	It is not explained what information the Attawapiskat community has gained from the experience of past events	CS		EC	W
	The effect of the project on maintaining TEK should be described	CS		EC	W
	The proponent should describe what additional spiritual, social and cultural TEK information could be collected to be of use in predicting social-cultural-economic impacts	CS		EC	W
MINING METHODS AND					

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Issue	Comment	DG/CS	#Times	Department	Written/ Meeting
OPERATION					
	Stockpiles: …it is proposed that 0.6Mt of "low grade ore" or kimberlite is used for the construction of the PKC dams. Has the kimberlite been assessed for its suitability for use as dam construction material?	CS		MNDM	W
	Seepage through perimeter dams	CS		NRCan	W
	Effects of buckling and heaving of a deep pit should be addressed as an issue of worker safety. Buckling of pit floor under high horizontal stress	CS	2	NRCan/NR Can	W/W
	There needs to be a discussion on the possibility of there being more than one diamond project in the area and any potential cumulative effects	CS		NRCan	W
	No mention of open pit overburden slope stability under dynamic loading due to earthquake shaking	CS	2	NRCan/NR Can	W/W
1. Mine water characteristics, management and disposal	Detailed evaluations of the environmental impact of groundwater discharge to Attawapiskat River during pit dewatering and its impact on the established flora and fauna	CS		CEAA	W
	Dissolved radium and radon measurements are required in the pit area groundwater and their impacts, if any on the river sediments benthos	CS		CEAA	W
	Settling characteristics of process kimberlite fines and the required residence time in the PKC facility are to be evaluated for effective control of suspended solid through natural sedimentation in the designated basin. The impact of wind/wave induced re-suspension should also be investigated as it may have repercussions on dewatering facility design	CS		CEAA	W
	Says that ammonia levels will be elevated in PK water released from plant, but does not mention if levels are still elevated in discharge from PKC facility. There is no numerical value for "elevated" and there does not appear to be a standard to compare with the given value in 8-14. Are the expected levels possibly toxic to aquatic life?	CS		MNR	W
	Uncertain why the freeze wall option has been rejected. Has the technical applicability of perimeter freeze wall been tested?	CS		MNR	W
	Require clarification for any pipelines - outflow/inflow into area rivers and watercourses with respect to location being inside claim/leased area or outside. Pipeline outside of leased/claimed area will require survey, tenure.	CS		MNR	W
	Freeboard sensitivity analysis should be extended to solute transport modeling of	CS		NRCan	W

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Issue	Comment	DG/CS	#Times	Department	Written/ Meeting
	chloride concentrations in mine discharge				
	Short term leaching study of SRK, conducted for a period of eight weeks with drainage effluent re-circulation is considered inadequate and unrepresentative for evaluation of long term leaching potential. It is strongly recommended to undertake appropriate kinetic leaching studies to evaluate the long term acid generation and leaching from mining residues and waste rock produced	CS		CEAA	W
2.PK management	Proponent should provide a specific discussion on the effect of supplementation on the Nayshkootayaow River of water from the Attawapiskat River on the fluvial geomorphology and processes in both rivers	CS	2	CEAA/ CEAA	W
	Recycling of process water from the PKC facility requires further consideration as it would reduce the freshwater demand	CS		CEAA	W
	Potential discharge of 'brines' during dewatering i.e. water enhanced with CA, SO4, K, NA, Cl concentrations	CS	2	NRCan/NR Can	W/W
	What percentage of PK fines is expected to contain high sulphides? One result indicated pyrite-marcasite concentration of about 12%. Exposure of such materials should be of concern at the PKC facility	CS		CEAA	W
	Reductive dissolution and mobility of metals from surface deposited waste rock piles and PKC facility may be of concern in the long-term	CS		CEAA	W
3. Domestic Waste	Additional information/consideration given to recycling of sorted materials i.e. glass, tin etc as well as other recyclable material for removal from mine site. Consideration of infrastructure for the “temporary” storage of waste for removal of all waste products from the mine site. Consideration/information required re: the removal and depositing of damaged fuel drums at an off site approved location. What purpose does sorting material have if it is then proposed to be directed to an on site landfill?	CS		MNR	W
	Will Biomedical waste be transported off the site to an authorized biomedical waste faculty?	CS		MNR	W
	Why would it not be practical to return empty contaminated containers to the vendors? It is preferred that all barrels are removed from the site. No permanent storage of fuel barrels. Company needs to supply alternate options for the removal of waste and all infrastructures. E.g. ongoing removal of waste throughout the project.	CS		MNR	W

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Issue	Comment	DG/CS	#Times	Department	Written/ Meeting
	Additional information is requires on alternatives for the demolition wastes and disposal of proposed rehabilitation if contamination present	CS		MNR	W
	Assessment of significance of anticipated environmental effects for landfill sites, waste handling, incinerator	CS		MNR	W
	Require supporting documentation with respect to the total volume of wastes generated during construction and operation as the amount to be generated over the startup/operation and closure of the mine appears low. What is the estimated amount of demolition waste?	CS		MNR	W
	Could volume of operational waste not be handled and/or removed from the site more economically than by incineration at capital and operation costs of $1.6M ($10K/month)	CS		MNR	W
	Need to discuss alternative option of shipping waste off-site as alternative to landfill. At end of closure, the site reverts to the Crown and no option can be included which would indemnify the Crown at the end of this time	CS		MNR	W
	Why is removal of the material not carried as an operation?	CS		MNR	W
4. Dredging	Relocation and disposal options for the Attawapiskat River dredged sediments on land or at other James Bay locations requires a detailed impact analysis	CS		CEAA	W
	Where will dredgeate in James Bay ultimately end up? Due to currents, it may not stay where it is deposited	CS		MNR	W
	Long term weathering and kinetic leaching studies are required to evaluate the leaching potential of metals under neutral conditions from waste rock and process kimberlite wastes	CS		NRCan	W
	There is no detail of where dredging will take place or to what degree. There is also no detail to where or what depth the material will be disposed of in the open water	CS	3	CEAA/ MNR/MNR	W/W/W
	Consideration required for alternatives for disposal of dredging material i.e. removal to dry land.	CS		MNR	W
	A decision has not been made on how the dredging will be completed or where the dredgeate will be disposed. This needs to be determined to allow for a proper assessment of the impacts.	CS		DFO	W
	Marine dredging activity-stability				

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Issue	Comment	DG/CS	#Times	Department	Written/ Meeting
5. Roads	Permafrost-stability of winter road shorelines at water crossing				
6. Closure Phase	Guidelines should be specific in mentioning the abandonment and reclamation of project components/structures that will remain in perpetuity	DG		GSC	W
	There needs to be additional information on the post operating/closure of the mine site	CS		MNR	W
	Mine closure plan is relevant to the assessment and should be provided as information now	CS		MNR	W
	A Mine Closure Plan will have to be prepared	DG		MNR	W
	Reclamation of the PKC facility	CS		NRCan	
	Simply covering an above ground landfill with a little bit of overburden in a flat muskeg landscape is not going to result in reclamation that is sustainable in the long term. Frost heave will likely result in building material poking through several years after reclamation.	CS		MNR	W
	The principles of natural channel design will provide like for like fish habitat replacement. It is proposed that the new channel be designed to contain the 100-year return period. The existing channel would not contain this flow.	CS	2	DFO/DFO	W/W
PROCESS RELATED ISSUES					
1. Mitigation Measures/Accountability/Methodology	Ecosystem function is not considered in the discussion of environmental impacts	CS		MNR	W
	In order to understand why Moosonee is treated as a First Nation in this report, the percentage of the population who is aboriginal and their attempts to form a First Nation should be mentioned	CS		INAC	W
	Not clear that INAC records only Status Indian Population while Stats Can records resident population whatever its origin or status	CS		INAC	W
	It is recommended that the environmental effects, mitigation measures and determination of significance related to the environmental effects by consolidated for each ecosystem component (VEC). The current organization of the data does not allow the reader to readily discern how mitigation and the determination of significance relates to the environment effects on each VEC	CS		CEAA	W
	The study should reflect the Attawapiskat River Waterway candidate park	CS	2	CEAA/MNR	W/W

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Issue	Comment	DG/CS	#Times	Department	Written/ Meeting
	Is it possible to add a requirement that DeBeers follow appropriate procedures for secure bear-proof garbage management on the site as advocated by such organizations as The Safety in Bear Country Society	DG		MNR	W
	French Translation could be improved, mostly the translation of the maps	CS		INAC	W
	The fire sections do not contain a real description of the fire environment or of the predicted impacts which don't relate to the project in the EIS but rather to fires in general	CS		NRCan	W
	The fire section was not specific enough to add much to the assessment	CS		NRCan	W
	What is the cumulative impact of all of the negative environmental effects that have been deemed "not significant"?	CS		MNR	W
	Concern over what and how DeBeers classifies as "significant and not significant"	CS		MNR	W
	Federal Permits – the table should reflect the fact that an Authorization is required for the harmful alteration, disruption or destruction of fish habitat, as a result of project activities. DFO is not approving the works but authorizing the destruction of fish habitat.	CS		DFO	W
	Inadequate analysis of alternatives. This section does not clearly provide the rationale for chosen alternatives, nor does it effectively evaluate alternate means of carrying out the project.	CS		MNR	W
	For each alternative there should be an identification of the associated potential environmental effects	CS		MNR	W
	Risk of potential effects of chosen alternative(s) for project on VEC's inadequate and often contradictory (no effects on vegetation from dewatering yet there are clear connections between ground water and fens, river etc.).	CS		MNR	W
	Determination of "significance" is very subjective and the criteria may be insufficient. An environmentally harmful effect could be classified as "not significant" because the probability of the event is relatively small. Despite the probability, if it ever occurred the effects could be disastrous. An example like this should not be classed as "not significant" based on the low probability of occurrence, and a good contingency plan is needed for such cases. The entire problem could be avoided, if all negative environmental effects were considered significant.	CS	2	MNR/MNDM	W/W

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Issue	Comment	DG/CS	#Times	Department	Written/ Meeting
2.Participation Plan	"Significance" is site specific and subjective and is therefore open to professional judgment and interpretation	CS		MNDM	
	In several instances, it is not clear how the significance of the environmental effects was determined for each VEC.	CS		CEAA	W
	Specifics of monitoring program must be identified and they must be adaptable to respond to unforeseen events	CS	2	MNR/MNR	W/W
	Measuring environmentally induced socio-economic effects in terms of generations is too long. Duration should be changes to be similar to the non-environmentally induced effects	CS		HC	W
	Accidents and malfunctions not acknowledged. There could be failures and there is a need for contingency plans	CS		MNR	W
	Reporting and auditing function is not clear. There is a need for further discussion with First Nations, DeBeers, province and federal government, project team to discuss and mechanism for monitoring/compliance	CS		MNR	W
	The document should differentiate between the participation plan for consultation that FEDS are developing for their own consultation obligations and the consultation requirements for the proponent. Wording is unclear	DG	2	MNR/NAN	W/W
	The Environmental Baseline Studies relied primarily on a literature review which EC views to be largely inadequate (missing references and low number of references)	CS	2	EC/CEAA	W/W
	Data used in the Environmental Baseline Studies is outdated and does not represent # at the victor site	CS	2	EC/CEAA	W/W
	Not acceptable that an "agreement" will prevent FN from exercising treaty and aboriginal rights on crown land (i.e. no hunting on road). Is the safety issue going to be extended for the entire extent of all winter roads? Or are some roads more dangerous to workers than others?	CS		MNR	W
	The cumulative impacts of all the "non significant" impacts should be considered	CS		MNR	W
	Baseline study generally provides insufficient quantifiable information to act as a benchmark for any monitoring/mitigation that may be proposed	CS		MNR	W
	Need clarification of the term abandonment used in the description of the scope of the project	DG		MNR	W

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Issue	Comment	DG/CS	#Times	Department	Written/ Meeting
5.Spatial and Temporal Boundaries	Clarification of the spatial and temporal boundaries	DG		MC/MNR	W/W

APPENDIX E

SUMMARY OF CONSULTATIONS

E-1 Summary of De Beers Project Consultation with First Nations

E-2 Summary of Overall Project Consultation with Federal and Provincial Government Regulators

TABLE E-1
SUMMARY OF DE BEERS' PROJECT CONSULTATION WITH FIRST NATIONS

No.	Date	Location	Purpose	First Nation Representatives	Materials Presented or Discussed
Pre-Consultation (Prior to CSEA)					
1.	28-May-01	Attawapiskat	General discussion on Project planning and introduction of Desktop Study	C&C, SC, Elders	Review of Victor site conditions; De Beers' activities and studies carried out to date; introduction to the Desktop Study; including development concepts being considered; and associated permitting needs and implications
2.	28-Jun-01	Timmins	Present general discussion of Project planning to date, and to introduce the Desktop Study to Federal and provincial regulators	C&C, Elders	Review of Victor site conditions; De Beers' activities and studies carried out to date; introduction to the Desktop Study; including development concepts being considered; and associated permitting needs and implications
3.	11-Sep-01	Attawapiskat	History and status of Victor Diamond Project	C&C, SC	Topics included: environmental monitoring; TEK study; road from Attawapiskat to site; transmission line from Moosonee to Attawapiskat; Desktop Study; dewatering/site preparation; hiring practices; traditional pursuits - compensation; environmental impacts; work program and permitting for winter 2001-2002
4.	29-Oct-01	Attawapiskat	Ongoing discussion of Victor Diamond Project status	C&C, SC	Topics included: site preparation and CEAA; Desktop Study; future activities and other kimberlites; Victor 2002/2003 program; Attawapiskat employment; TEK ; identifying off-reserve members; closure plan and training needs of Steering Committee
5.	20-Nov-01	Attawapiskat	Present findings of Desktop Study to AttFN	C&C, SC	General concepts for development of the Victor Diamond Project, as determined through completion of the Desktop Study
6.	28-Nov-01	Timmins	Present finding of Desktop Study to AttFN representatives and to Federal and Provincial regulators	C&C, Elders, MCR, TA	General concepts for development of the Victor Diamond Project, as determined through completion of the Desktop Study, including discussions of Federal and Provincial permitting processes and timelines
7.	10-Jan-02	Attawapiskat	Steering Committee reviewed their information on the project including all correspondence, minutes and reports.	SC	Reports included: Application for a Certificate of Approval; March 2001 Aerial Surveys of Caribou and Moose in the Nayshkootayaow River - Watershed and Adjacent Areas; March 2002 Aerial Surveys of Caribou and Moose in the Nayshkootayaow Watershed and Adjacent Areas - draft of December 2001; Monthly Effluent Monitoring Report, October 2001
8.	27-Feb-02 and 28-Feb-02	Attawapiskat	Steering Committee	SC	Topics included: IBA, presentation by Marius Kataquapit, update on winter program 2001/2002, previous years' work, value of diamonds extracted from Victor versus costs incurred to date, potential jobs and prerequisites, traplines, 2001 and 2002 Aerial Survey of Moose and Caribou, TEK study, summary of prior monitoring reports, visit to diamond mine, liaison coordinator and community communications coordinator, compensation for temporary losses of traditional pursuits, economic benefits to AttFN from De Beers, winter road monitoring, donations - evaluation and prioritization
9.	22-Mar-02	Timmins	Brainstorming session	PAWG	"Participation Agreement - Work Plan and Budget - Draft of 15 March 2002"; "Agreement Respecting the Negotiation of a Participation Agreement - Draft of 15 March 2002"; Impact and Benefit Agreement - Draft Outline - Draft of 29 June 2001"
10.	08-Apr-02	Timmins	Brainstorming session to establish priorities for negotiation	PAWG	"Participation Agreement - Work Plan and Budget - Draft of 15 March 2002"; "Agreement Respecting the Negotiation of a Participation Agreement - Draft of 15 March 2002"; Impact and Benefit Agreement - Draft Outline - Draft of 29 June 2001"
11.	09-May-02	Correspondence from De Beers	Discussion of protocols for providing information	C&C	De Beers suggested protocol that all requests for information from Community members by channeled through C&C or the SC, to Jonathan Fowler or Michael Cunningham of De Beers
12.	10-May-02	Correspondence from De Beers	Letter to AttFN informing the FN of De Beers appointment of Golder Associates to coordinate socio-economic studies	C&C	Letter to AttFN informing the FN of De Beers' appointment of Golder Associates to coordinate socio-economic studies, and requesting C&C to meet with Golder at the May 28, 2002 meeting in Attawapiskat
13.	22-May-02	Correspondence from De Beers	Notice to C&C of scheduled June 10th presentation to Federal and Provincial regulators, and offering to assist the AttFN's participation	C&C	Letter providing details of planned presentation of Project update and Environmental Prospectus to Federal and Provincial government regulators in Timmins on June 10, 2002
14.	23-May-02	Correspondence from De Beers	Preparation and distribution of Environmental Prospectus, Victor Diamond Project	C&C, SC, Elders	Environmental Prospectus, Victor Diamond Project prepared and circulated to provide AttFN representatives (and Federal and Provincial government regulators) with a description of the Victor Diamond Project (as defined early in the Prefeasibility stage), and the environmental implications of bring the Project forward, including permitting requirements and processes and preliminary closure concepts.
15.	28-May-02	Attawapiskat	Present Environmental Prospectus and evolving Project concepts	C&C, Elders and Community	Prefeasibility level project description, project component options, and anticipated environmental impacts; meeting with C&C and SC in morning, and general Open House to Community in afternoon
16.	29-May-02	Attawapiskat	Follow-up discussions on information presented the previous day	C&C, Elders and Community	Further details on Project plans were presented in response to questions from C&C, the SC and the Community at large
17.	30-May-02	Correspondence from AttFN	Follow-up to May 28, 2002 presentation in Attawapiskat	C&C	Presentation of AttFN understanding of the proposed Victor Diamond Project, as defined in the Environmental Prospectus, with requests for additional information and clarification on a number of Project aspects, including EA process and timelines
18.	10-Jun-02	Timmins	Present Environmental Prospectus and evolving Project concepts to joint meeting of Federal and Provincial regulators and AttFN representatives	C&C, Elders, MC	Prefeasibility level project description, project component options, and anticipated environmental impacts
19.	13-Jun-02	Correspondence from AttFN	Expression of concerns regarding Project and consultation process	C&C, SC	Letter outlining AttFN concerns regarding Project consultation, schedule and development plans following from June 10, 2002 presentation
20.	26-Jun-02	Timmins	Information exchange regarding various government programs, services and activities that may support economic development, capacity building, training and employment associated with a potential mine development	Government, Development Agencies, De Beers and Thomas Tookate	FedNor; HRDC; Aboriginal Workforce Participation Initiative (AWPI), INAC; Northern Ontario Heritage Fund Corporation; Ministry of Training, Colleges and Universities Workplace Support Services Branch Apprenticeship & Client Services; Ministry of Training, Colleges and Universities, Adjustment Advisory Program; Ontario Native Affairs Secretariat; Aboriginal Economic Renewal Initiative; Wakenagun Community Futures Development Corp; Mushkegowuk Council
21.	25-Jul-02	Attawapiskat	Termination of Memorandum of Understanding (MOU)	C&C, SC	Termination of MOU
22.	20-Sep-02	Attawapiskat	Update of AttFN's internal review	C&C, SC, Elders, NAN, LC	Discussion of ongoing studies, i.e., TEK; winter program; discussion on long-term issues such as an IBA and EA.
23.	01-Oct-02	Timmins	Negotiation of Feasibility Partnering Agreement	C&C, LC	Negotiation of Feasibility Partnering Agreement

TABLE E-1
SUMMARY OF DE BEERS' PROJECT CONSULTATION WITH FIRST NATIONS

No.	Date	Location	Purpose	First Nation Representatives	Materials Presented or Discussed
24.	16-Oct-02	Timmins	Negotiation of Feasibility Partnering Agreement	C&C, LC	Negotiation of Feasibility Partnering Agreement
25.	22-Oct-02		Signing of Feasibility Partnering Agreement	C&C, LC	AttFN - De Beers Feasibility Partnering Agreement
26.	06-Dec-02	Toronto	EA process discussions	C&C, LC	C&C and LC met with DFO to discuss CEAA process
27.	10-Dec-02	Attawapiskat	Presentation of Project update and proposed 2003 winter program (afternoon and evening sessions)	Community, C&C	General information on proposed winter program; developing Project concepts coming out of Prefeasibility study, including access options; and Project animation video
28.	20-Jan-03	correspondence from AttFN	Consultation and negotiations process and funding for technical support	C&C	Letter from C&C regarding concerns over the consultation and negotiations process, particularly with regard to the need for support funding to hire technical advisors, and to ensure that Aboriginal and Treaty Rights are addressed and respected
29.	24-Jan-03	Correspondence from AttFN LC	EA process discussions	LC	Letter from LC requesting a meeting with De Beers' representatives to discuss EA process and options
30.	28-Jan-03	Mississauga	EA process discussions	LC	Reviewed EA and scoping options
31.	12-Feb-03	Sault Ste. Marie	Discussion of access to prefeasibility study, EA and permitting processes and timelines, funding for technical support	C&C	General discussions held on AttFN access to prefeasibility study and associated confidentiality requirements; EA and permitting processes and timelines, and funding for technical support
32.	20-Feb-03	Correspondence from De Beers	De Beers CEAA scoping request		Written submission to DFO requesting that DFO consider a broadly scoped EA pursuant to CEAA, copied to AttFN, CEAA Agency, Provincial government agencies, and AttFN LC; suggested EA draft table of contents attached
33.	22-Feb-03	Attawapiskat	AMEC presentation (Ian Pritchard and Brad Thompson)	C&C, SC	General information on Project and timelines
Consultation on the CSEA					
34.	11-Mar-03	Attawapiskat	Present EA process options and discuss EA process	Community, C&C, LC	Joint presentation of EA and permitting process options and associated timelines to Community and C&C (part) by AttFN LC and De Beers
35.	10-Apr-03	Oakville	Finalize Negotiation Agreement and Confidentiality Agreements	Jonathan Fowler Jeremy Wyeth Gerry Kerr Rick Hendriks	Complete overview of the project was presented; discussions to finalize Negotiation Agreement and Confidentiality Agreements; general discussions regarding the IBA negotiation process
36.	14-15 May-03	Attawapiskat	Preliminary IBA Negotiations	NT	IBA negotiation calendar, logistics, etc.; structure/format of IBA; community consultation; status of Environmental Assessment and next steps; due diligence; ongoing studies (TEK, SEIA, HRI); joint initiatives
37.	8-June-03	Attawapiskat	Public meeting - discussion of proposed Attawapiskat facilities and infrastructure	AttFN Members	PowerPoint presentation of Attawapiskat facilities and infrastructure focusing on barge landing facilities, construction camp, fuel farm and pipeline (and closure concepts of these facilities)
38.	9-June-03	Attawapiskat	Discussion of proposed Attawapiskat facilities and infrastructure	SC	PowerPoint presentation of Attawapiskat facilities and infrastructure focusing on barge landing facilities, construction camp, fuel farm and pipeline (and closure concepts of these facilities)
39.	9-June-03	Attawapiskat	Public meeting - discussion of Victor site access roads and airstrip	AttFN Members	PowerPoint presentation of Victor site access plans and options for roads and an airstrip
40.	10-June-03	Attawapiskat	Discussion of Victor site access roads and airstrip	SC	PowerPoint presentation of Victor site access plans and options for roads and an airstrip
41.	23-June-03	Attawapiskat	Public meeting - discussion of proposed Victor site development	AttFN Members	Victor animation and associated questions and discussions (closure concepts presented in animation)
42.	24-June-03	Attawapiskat	Discussion of proposed Victor site development	SC	Victor animation and associated questions and discussions (closure concepts presented in animation)
43.	24-June-03	Attawapiskat	Public meeting - discussion of proposed power options and Victor Fuel Pipeline	AttFN Members	PowerPoint presentation of Victor site power options and design and operational safe guards associated with the Victor Fuel Pipeline
44.	25-June-03	Attawapiskat	Discussion of proposed power options and Victor Fuel Pipeline	SC	PowerPoint presentation of Victor site power options and design and operational safe guards associated with the Victor Fuel Pipeline
45.	2-July-03	Attawapiskat	Public meeting - discussion of proposed Project construction activities	AttFN Members	PowerPoint presentation of proposed construction activities, manpower requirements and schedules
46.	3-July-03	Attawapiskat	Discussion of proposed Project construction activities	SC	PowerPoint presentation of proposed construction activities, manpower requirements and schedules
47.	3-July-03	Attawapiskat	Public meeting - discussion of Project logistics and transportation	AttFN Members	PowerPoint presentation of proposed Project logistics and transportation needs and options
48.	04-Jul-03	Attawapiskat	Discussion of Project logistics and transportation	SC	PowerPoint presentation of proposed Project logistics and transportation needs and options
49.	12-Aug-03	Attawapiskat	Public meeting - discussion of Project water management plans and impacts	AttFN Members	PowerPoint presentation of proposed water management plans and impacts
50.	13-Aug-03	Attawapiskat	Discussion of Project water management plans and impacts	SC	PowerPoint presentation of proposed water management plans and impacts
51.	13-Aug-03	Attawapiskat	Public meeting - second round of discussions on power and fuel needs	AttFN Members	PowerPoint presentation of power and fuel needs
52.	14-Aug-03	Attawapiskat	Second round of discussions on power and fuel needs	SC	PowerPoint presentation of power and fuel needs
53.	Aug-Sep-03	Attawapiskat TV	De Beers community television channel started	community	The community television channel presented information on the Project, including running of the Project animation, and announcing meetings and updates
54.	03-Sep-03	Fort Albany	Public meeting and meeting with Chief and Council	C & C, community	PowerPoint presentation on status of the Project, presentation of Project animation, presentation of environmental aspects of the Project, question and answer
55.	15-Sep-03	Moose Factory	Public meeting and meeting with Chief and Council of Moose Cree	C & C, community	PowerPoint presentation on status of the Project, presentation of Project animation, presentation of environmental aspects of the Project, question and answer
56.	16-Sep-03	Kashechewan	Public meeting and meeting with Chief and Council	C & C, community	PowerPoint presentation on status of the Project, presentation of Project animation, presentation of environmental aspects of the Project, question and answer
57.	25-Oct-03	Timmins	Off Reserve AttFN Consultation	C&C, NT	AttFN update on IBA Negotiations; De Beers Project update including Victor animation and EA (closure concepts included)
58.	22-Nov-03	North Bay	Off Reserve AttFN Consultation	NT	AttFN update on IBA Negotiations; De Beers Project update including Victor animation and EA (closure concepts included)
59.	17-Mar-04	Kashechewan	Meeting with Chief and Council, and public meeting	C & C, community	Presentation of CSEA document and Project animation
60.	18-Mar-04	Attawapiskat	Meeting with Chief and Council, and public meeting	C & C, community	Presentation of CSEA document
61.	19-Mar-04	Moosonee	Public meeting	community	Presentation of CSEA document and Project animation
62.	22-Mar-04	Fort Albany	Meeting with Chief and Council and public meeting combined	C & C, community	Presentation of CSEA document and Project animation

TABLE E-1
SUMMARY OF DE BEERS' PROJECT CONSULTATION WITH FIRST NATIONS

No.	Date	Location	Purpose	First Nation Representatives	Materials Presented or Discussed
63.	23-Mar-04	Moose Factory	Meeting with Muskkegowuk Council (Grand Chief and Deputy Grand Chief)	Mushkegowuk Council	Presentation of CSEA document
64.	25-Mar-04	Timmins	Diamond Workshop	FN members, Federal and Provincial regulators	Workshop of information for First Nations on diamond exploration / development. Invited presentation provided on Victor Diamond Project by AMEC
65.	01-Apr-04	N/A	Nishnawbe Aski Nation Information Request	Nishnawbe Aski Nation	At the request of NAN, digital copies of presentation material from the March 2004 round of public consultations was provided, including the CSEA presentation and CSEA posters and the Closure Plan posters
66.	19-May-04	Moosonee	Public meeting	community	Presentation of CSEA document and closure plan posters
67.	27-May-04	Constance Lake	Meeting with Chief and Council, and public meeting	C & C, community	Presentation of CSEA document, Project animation, and closure plan posters
68.	31-May-04	Kashechewan	Meeting with Chief and Council, and public meeting	C & C, community	Presentation of CSEA document and closure plan posters
69.	01-Jun-04	Fort Albany	Meeting with Chief and Council, and public meeting	C & C, community	Presentation of CSEA document and closure plan posters
70.	08-Jun-04	Mocreebec	Meeting with Chief and Council	C & C	Presentation of CSEA document and Project animation
71.	08-Jun-04	Moose Factory	Meeting with Chief and Council, community	C & C, community	Presentation of CSEA document, Project animation, and closure plan posters
72.	10-Jun-04	Marten Falls	Meeting with Chief and Council	C & C	Presentation of CSEA document, Project animation and closure plan posters
73.	21-Sep-04	Attawapiskat	Meeting with Chief and Council, and public meeting	C & C, community	Presentation of Re-evaluation report and posters, and closure plan posters (animation has been shown on community TV channel - see No. 53). This meeting was live broadcasted over the De Beers community television channel.
74.	28-Sep-04	Fort Albany	Meeting with Chief and Council, and public meeting	C & C, community	Presentation of Re-evaluation report
75.	12-Oct-04	Moosonee	Public meeting	community	Presentation of Re-evaluation report
76.	13-Oct-04	Moose Factory	Meeting with Muskkegowuk Council (Grand Chief and Deputy Grand Chief)	MCR	Presentation of Re-evaluation report
77.	18-Oct-04	Marten Falls	Meeting with Chief and Council, and public meeting	C & C, community	Presentation of Re-evaluation report
78.	18-Oct-04	Kashechewan	Meeting with Chief and Council, and public meeting	C & C, community	Presentation of Re-evaluation report
79.	28-Oct-04	Attawapiskat	Meeting with Chief and Council and community	C & C, community	Discussion of alternative winter road alignments around the community of Attawapiskat

NOTES:

C&C	Chief and Council (in whole or in part)	LC	AttFN Legal Council
SC	Steering Committee (Attawapiskat)	TA	AttFN Technical Advisors
MCR	Mushkegowuk Council Representative(s)	NT	AttFN Negotiating Team (in whole or in part)
NAN	Nishnawbe Aski Nation	PAWG	Participation Agreement Working Group

Moosonee, while not a First Nation community per se, is comprised predominantly of First Nations people; on this basis, consultation with Moosonee has been included as First Nations consultation

TABLE E-2
SUMMARY OF OVERALL PROJECT CONSULTATION WITH FEDERAL AND PROVINCIAL GOVERNMENT REGULATORS

No.	Date	Location	Purpose	Government Agencies	Materials Presented or Discussed
1.	28-Jun-01	Timmins	Present general discussion of Project planning to date, and to introduce the Desktop Study to Federal and Provincial government agencies (and to AttFN representatives)	DFO, CEAA, MNDM, MOE, MNR	Review of Victor site conditions, De Beers activities and studies carried out to date, and introduction to the Desktop Study, including development concepts being considered, and associated permitting needs and implications
2.	28-Nov-01	Timmins	Present findings of Desktop Study to Federal and Provincial regulators and to AttFN representatives	DFO, CEAA, INAC, MNDM, MOE, MNR, MOL	General concepts for development of the Victor Diamond Project, as determined through completion of the Desktop Study, including discussions of Federal and Provincial permitting processes and timelines
3	14-Dec-01	Ottawa	Brief overview and discussion of Project	CEAA	Presentation of Victor Diamond Project (environmental setting, work to date, Desktop Study results, planned pre-feasibility studies, Project timelines, and permitting requirements, including potential application of CEAA)
4	18-Jan-02	Ottawa	Brief overview and discussion of Project	DFO	Presentation of Victor Diamond Project (environmental setting, work to date, Desktop Study results, planned pre-feasibility studies, Project timelines, and permitting requirements, including potential application of CEAA)
5	25-Feb-02	Toronto	Brief overview and discussion of Project	INAC	Presentation of Victor Diamond Project (environmental setting, work to date, Desktop Study results, planned pre-feasibility studies, Project timelines, and permitting requirements, including potential application of CEAA)
6	23-May-02	Correspondence from De Beers	Preparation and distribution of Environmental Prospectus, Victor Diamond Project	DFO, CEAA, INAC, DOE, NRCan, MNDM, MOE, MNR, MOL	Environmental Prospectus, Victor Diamond Project prepared and circulated to provide Federal and Provincial government agencies (and AttFN representatives) with a description of the Victor Diamond Project (as defined early in the Pre-feasibility stage), and the environmental implications of bring the Project forward, including permitting requirements and processes
7	10-Jun-02	Timmins	Present Environmental Prospectus and evolving Project concepts to joint meeting of Federal and Provincial regulators and AttFN representatives	DFO, CEAA, INAC, MNDM, MOE, MNR, MOL	Prefeasibility level Project description, Project component options, anticipated environmental impacts and permitting requirements and processes
8	10-Jul-02	Correspondence from CCG	To advise De Beers of regulatory requirements pursuant to the Navigable Waters Protection Act (NWPA)	CCG	Letter to De Beers indicating permitting requirements pursuant to NWPA in follow-up to CCG review of Environmental Prospectus
9	29-Nov-02	Thunder Bay	Presentation and discussion of Project pre-feasibility design concepts and Environmental Prospectus with MOE	MOE Region and MOE District	General information on background environmental conditions, Project stages and scheduling, Project description (and options), water management strategies and impacts, and permitting requirements and processes
10	06-Dec-02	Toronto	EA process discussions	DFO	C&C and LC met with DFO to discuss CEAA process and potential application to the Victor Diamond Project
11	20-Feb-03	Correspondence from De Beers	De Beers CEAA scoping request	DFO (with copies to CEAA, MNDM, MOE, MNR and AttFN)	Written submission to DFO requesting that DFO consider a broadly scoped EA pursuant to CEAA, copied to AttFN, CEAA Agency, Provincial government agencies, and AttFN LC; suggested EA draft table of contents attached
12	26-Mar-03	Correspondence from De Beers	Present Environmental Scoping Document to Federal and Provincial regulators, to provide Federal regulators with the information required to trigger CEAA (copied to AttFN)	DFO, CEAA, INAC, NRCan, MNDM, MOE, MNR	Description of the Victor Diamond Project (as defined in the early Feasibility stage), together with a summary of expected Project related environmental impacts and mitigating measures related to federal CEAA triggers
13	14-Apr-03	Toronto	Presentation of Victor Diamond Project update and potential CEAA triggers to Federal government agency representatives in follow-up to February 20, 2003 scoping request	CEAA, DFO, DOE, INAC, NRCan, and observer for AttFN	Presented information on Project background environment, Project design concepts, potential environmental impacts, and Federal permitting requirements, focused on the application of CEAA and associated triggers
14	06-Jun-03	Correspondence from De Beers	Release of May 2003 Preliminary Draft Environmental Assessment (PDEA) to AttFN and other James Bay west coast First Nations, and to CEAA (followed by release to Provincial agencies in June, DOE in June, and other Federal agencies in August (note: CEAA requested that PDEA not be released to potential RAs, other than DOE, during June and July)	AttFN, other James Bay area west coast First Nations, CEAA, Provincial and other Federal agencies	The PDEA was structured in the form of a typical Comprehensive Study EA (CSEA), and was circulated for the expressed purpose of providing a complete information package as a basis for discussions and meetings with First Nations and government agencies. The PDEA was developed with a broad scope, and was intended to form the basis for a CSEA following development and release of a project scope by the Federal government. The PDEA presented preliminary closure concepts as part of the project description.
15	10-Jul-03	Toronto	Presentation and discussion of Project and feasibility design concepts to the Ontario Energy Board in regards to the proposed Victor fuel pipeline	OEB	Presentation and discussion of Project and feasibility design concepts in regards to the Victor fuel pipeline and approval requirements
16	17-Jul-03	Timmins	Presentation and discussion of Project and feasibility design concepts to Provincial government agency representatives - as an introduction to the provincial EA and permitting process	MNDM, MOE, MNR and AttFN representatives	Presentation and discussion of Project and feasibility design concepts, including Project animation and PowerPoint presentation, with an added focus on Provincial EA and permitting requirements
17	01-Aug-03	Toronto	Presentation and discussion of the Project and feasibility study design concepts to MOE representatives from the Waste Management and Air Approvals branches	MOE	Presentation and discussion of Project and feasibility design concepts in regards to waste management and permitting requirements
18	22-Aug-03	Hull	Presentation and discussion of Project and feasibility design concepts to Federal government agency representatives - NRCan defined as lead Responsible Authority (RA), and RA feedback to De Beers on likely CEAA requirements and possible timelines	CEAA, DFO, DOE, INAC, and NRCan	Presentation and discussion of Project and feasibility design concepts to Federal government agency representatives (Project animation and PowerPoint presentation), and RA presentation to De Beers of likely CEAA requirements and possible timelines (PowerPoint presentation)
19	26-Aug-03	Thunder Bay	Presentation and discussion of Project and feasibility design concepts to MOE Regional staff, who were unable to attend the July 17, 2003 presentation in Timmins	MOE, and observer from NAN	Same presentation as for Timmins on July 17, 2003
20	03-Sep-03	Cochrane	Discussion with MNR on EA and permitting requirements and timelines	MNR with MNDM as an observer	Informal discussion of MNR permitting and Class EA requirements

TABLE E-2
SUMMARY OF OVERALL PROJECT CONSULTATION WITH FEDERAL AND PROVINCIAL GOVERNMENT REGULATORS

No.	Date	Location	Purpose	Government Agencies	Materials Presented or Discussed
21	17-Sep-03	Victor Site	First hand site visit of Victor site, north winter road and pipeline route, Attawapiskat area facilities, and esker site	MNDM, MOE, MNR and AttFN representatives	Visitors were given a two-day tour of the site areas, with a stay over at the Victor camp; a helicopter was available to move people around; evening discussions were held to further discuss proposed Project developments
22	07-Oct-03	Victor Site	First hand site visit of Victor site, north winter road and pipeline route, Attawapiskat area facilities, and esker site	CEAA, DFO, DOE, HC, INAC, and NRCan	Visitors were given a two-day tour of the site areas, with a stay over at the Victor camp; a helicopter was available to move people around; evening discussions were held to further discuss proposed Project developments
23	27-Oct-03	Cochrane	Further discussion with MNR on EA and permitting requirements and timelines	MNR	Informal discussion of permitting and Class EA requirements, focusing on modifications to the PDEA that would be required to meet MNR Class EA requirements, with the understanding that a single major EA document would be produced that would meet both Federal Comprehensive Study EA (CSEA) requirements, and MNR Class EA requirements
24	29-Oct-03	Toronto	Meeting with MOE, EA Branch to discuss Provincial EA requirements for the power plant EA (construction and main power plants), and the relation of these EAs to the Federal CEAA process, and to MNR and OEB EA requirements	MOE (MNDM and MNR by teleconference link)	General discussions were held regarding the nature of the Project, and associated proposed works and EA and permitting requirements, with a focus on power plant EA requirements and timelines.
25	14-Nov-03	Ottawa	Discussion of CEAA requirements and potential timelines	CEAA, DFO, DOE, INAC, and NRCan (and GPC)	Informal discussion of Project EA requirements and timelines, including anticipated Scoping document from the Federal RAs
26	01-Dec-03	Toronto	Present an update on Project and feasibility design concepts to the Ontario Energy Board in regards to the proposed Victor fuel pipeline	OEB	Update of Project and feasibility design concepts in regards to the Victor fuel pipeline and approval requirements
27	12-Dec-03	Correspondence from RAs	Release of Draft Guidelines for the Conduct of a Comprehensive Study and the Preparation of a Draft Comprehensive Study Report (I.e., Draft Guidelines or Scoping Document)	Posted for all users	The Draft Guidelines define those parts of the Project to be assessed in the CSEA, and the assessment requirements, and were released for stakeholder comment, including comment from De Beers, the First Nations, the Province and others.
28	08-Jan-04	Toronto	Meeting with Federal RAs and CEA Agency to review and discuss aspects of the Draft Guidelines	CEAA, DFO, DOE, HC, INAC, and NRCan	Specific topics that were discussed included scheduling, spatial boundaries for the EA, consultation plans, and Valued Ecosystem Components (VECs).
29	14-Jan-04	Burlington	Technical meeting between AMEC and DOE	DOE	Discussions were held on the approach to plant community descriptions used in the EA document, and the level of detail, with specific reference to Ecological Land Classification (ELC) applications
30	20-Jan-04	Correspondence from De Beers / AMEC	Response from De Beers / AMEC to the Draft Guidelines	Posted for all users	Written response provided to the Draft Guidelines outlining concerns and suggested amendments to relevant sections.
31	09-Feb-04	Peterborough	Technical meeting between AMEC and DFO	DFO	Discussions were held on anticipated fish habitat impacts and potential fish habitat mitigation measures
32	10-Mar-04	Toronto	Meeting with Provincial agencies to discuss Provincial EA processes	MOE, MNR and MNDM	Discussions regarding the proposed Provincial Environmental Assessment approval processes.
33	15-Mar-04	Toronto	Conference call between AMEC and MNR / MOE	MOE and MNR	Follow-up teleconference regarding MNR comments to the Draft Guidelines for the CSEA.
34	15-Mar-04	Toronto	Technical meeting between AMEC and MOE	MOE	Meeting to discuss MOE Individual EA process for the Victor Power Plant.
35	29-Apr-04	Toronto	Technical meeting between AMEC and MOE	MOE	Meeting to discuss MOE Individual EA process for the Victor Power Plant.
36	28-May-04	Sarnia	Technical meeting between AMEC and Transport Canada	Transport Canada	Discussion of TERMPOL process, oil handling facilities, and navigable waters in relation to the VDP
37	02-Jun-04	Ottawa	Meeting with Senior Officials	CEAA, NRCan	Discuss progress on the EA
38	24-Jun-04	Toronto	Meeting with Federal and provincial RAs to provide information on the Project alternatives undergoing re-evaluation	CEAA, DFO, DOE, HC, INAC, NRCan, TC, MOE, MNR, MNDM	Discussions regarding the Federal EA process and the re-evaluation of Project alternatives
39	30-Jun-04	Teleconference	Technical discussion between AMEC and MNR	MNR	Discussion of MNR Class EA requirements
40	14-Jul-04	Thunder Bay	Technical meeting between AMEC and MOE	MOE	Discussions regarding waste management and the poposed landfill at the Victor site
41	21-Jul-04	Ottawa	Technical meeting regarding hydrogeology	NRCan, GSC, MNR	Hydrogeology meeting
42	22-Jul-04	Timmins	Socio-economics and health	CEAA, DFO, DOE, HC, INAC, NRCan, TC, MOE, MNR, MNDM	Discussions regarding socio-economic impact assessment and effects
43	23-Jul-04	Timmins	Technical meeting regarding the natural environment	DFO, DOE, MNR	Discussions of natural environment, including aquatic and terrestrial habitat
44	08-Sep-04	Ottawa	Meeting with Senior Officials	CEAA	Discuss general project
45	16-Sep-04	Cochrane	Meeting with the MNR to discuss Provincial Class EA process	MNR	Discussion of winter 2005 work program and the Class EA approval process

TABLE E-2
SUMMARY OF OVERALL PROJECT CONSULTATION WITH FEDERAL AND PROVINCIAL GOVERNMENT REGULATORS

No.	Date	Location	Purpose	Government Agencies	Materials Presented or Discussed
46	23 to 24-Sept-04	Victor site	Site visit / technical meeting on natural environment	CEAA, DFO, DOE, HC, INAC, NRCan, TC, MOE, MNR, MNDM	Discussions and site visit of natural environment, including aquatic and terrestrial habitat
47	30-Sep-04	Cochrane	Technical meeting regarding MNR Class EA requirements	MNR	Discussion of outstanding issues that need to be addressed for MNR Class EA process requirements
48	5-6 Oct 04	Victor site	Site visit / technical meeting on hydrogeology	NRCan, MOE, MNR	Site visit with HCI, AMEC and government hydrogeologists to review site conditions and discuss modeling
49	14-Oct-04	North Bay	Meeting with Federal and provincial RAs on socio-economics	CEAA, DFO, DOE, HC, INAC, NRCan, MOE, MNR, MNDM	Discussion of the scope of socio-economic impact assessment required by the Canadian Environmental Assessment Act

Federal Government Agencies:

CEAA	Canadian Environmental Assessment Agency
CCG	Canadian Coast Guard
DFO	Department of Fisheries and Oceans
DOE	Department of the Environment (Environment Canada)
INAC	Indian and Northern Affairs Canada
HC	Health Canada
NRCan	Natural Resources Canada
TC	Transport Canada

Provincial Government Agencies:

MNDM	Ministry of Northern Development and Mines
MOE	Ministry of the Environment
MNR	Ministry of Natural Resources
MOL	Ministry of Labour

APPENDIX F

ADDITIONAL SOCIO-ECONOMIC DATA AND CONSIDERATIONS RELATING TO THE VICTOR DIAMOND PROJECT

APPENDIX F

This Appendix contains certain socio-economic information relating to the Victor Diamond Mine that that was collected pursuant to paragraph 16(1)(e) of the *Canadian Environmental Assessment Act* ("the CEAA") in response to concerns raised by the local First Nation communities. This information is restricted to socio-economic effects that are not the result of any change in the environment caused by the project, and as such, are not "environmental effects" as defined in the CEAA. The content of this appendix is therefore not required for the consideration by the Minister of the Environment, under section 23 of the CEAA, of the likelihood of the project causing significant adverse environmental effects.

However, in the event that the Minister of the Environment determines, under section 23 of the CEAA, that the project is likely to cause significant adverse environmental effects, he will be required to determine whether or not such effects are justifiable in the circumstances. The information contained in this appendix may be relevant to the question of justification, should such question arise.

Additional Information on Life in Attawapiskat Local Economy

The Proponent is negotiating an agreement with the Attawapiskat First Nation (AttFN) to extend, on a priority basis, to the community of Attawapiskat, access to project economic benefits. Direct benefits to the local economy will result from employment and business opportunities created by the project and by education and training initiatives implemented by De Beers. Many family incomes will therefore increase, which will result in growth in the community economy.

The anticipated increase in economic activity for Attawapiskat could potentially lead to inflationary pressures within the community. Should such inflationary pressures occur, they are most likely to be felt by low income households that are dependent on fixed sources of income (old age pensions, social welfare programs, etc.). The impact of mine closure on the resumption of traditional pursuits, values and skills, and re-training for the transition to new careers at the end of the life of the project is also an important consideration.

To track potential changes to the economy that are project related, the proponent, in conjunction with INAC, will consider carrying out monitoring as per the following:

i. Report on tracking of standard inflation monitoring statistics, reliance on financial assistance programs, and number of families living below the poverty line, etc.;

ii. Report on skills training provided and opportunities provided to facilitate the transition to post-closure of the mine.

Adaptive management measures may be developed in accordance with provisions in the environmental agreement, to respond to legitimate concerns arising out of the monitoring of the local economy and the associated social impacts related to project development and closure activities.

Employment and Business

Estimates of employment and business effects were based on the Proponent's experience with local labour and business during the project exploration phase, expected project labour force, and procurement expenditures for construction and operations, labour force skill requirements, and employment and educational status of the Attawapiskat labour force.

Of total exploration expenditures to 2003, slightly over 12% of the total was paid out for Attawapiskat labour, goods and services. Total construction expenditures are expected to reach $873 million, mainly over the period 2006 to 2008. If De Beers continues to achieve a 12% percentage of total expenditures to Attawapiskat, this represents $98 million, or an average of about $32 million per year over three years. Total operational expenditures are expected to be in the order of $100 million per year over the period 2009 to 2020. Again, at 12% of these expenditures spent locally, over $12 million per year would be spent locally over a period of 13 years. Closure costs are forecast at about $42 million over the three-year period 2021 to 2023 representing a further $6.6 million revenue potential to Attawapiskat labour and businesses. The total inflow of expenditures on wages, goods and services could therefore be in the order of something over $235 million dollars between 2005 and 2023, if the experience of the past four years can be repeated.

The extrapolation of exploration phase patterns to other project phases, over a 20-year time frame, provides only an indication of the potential for economic benefit. Large capital expenditures during construction and educational and employability constraints in the Attawapiskat population may make it difficult to achieve an overall 12% in local expenditures in the early years of the project. With time, however, as labour becomes a more significant component with the move into the operations phase, and education and training initiatives produce results, the percentage of project expenditures spent locally is likely to increase.

With regard to employment, particularly in the early years of the project, there are real challenges to employment of the people of Attawapiskat in jobs requiring more than limited skills. Analysis of education and employment data suggests that the more educated are already working, and that barring individual reasons for choosing not to work, or being unable to work, the unemployed are largely people with low to very low educational achievement. Nor, generally, do people have the qualifications or skills to work in mining-related jobs without significant upgrading. No mining related experience has been reported beyond that gained by AttFN members through participation in the project advanced exploration phase.

Employment, at least initially, of Attawapiskat residents will be primarily for jobs requiring less specialized skills. During the construction stage, such jobs may number up to 120, and during the operations phase, up to about 75. It is expected that most of these can be filled by Attawapiskat people. Some more skilled positions will also be taken up by people in Attawapiskat, particularly those who have worked for some years on the exploration phase, but numbers will be small until such time as education, training, and on the job experience enhance presently existing skill levels. These numbers are comparatively large relative to the size of the Attawapiskat labour force of about 400, the employed labour force of about 300, and the full time employed labour force of less than 200.[1] Although the figures suggest that employment by the project has the potential to virtually eliminate unemployment in Attawapiskat, the labour force is likely to grow in response to new employment opportunities. Nevertheless, the unemployment rate is expected to fall rapidly.

There are a limited number of businesses in Attawapiskat, and these essentially cater to consumption needs of residents, and more recently of VDP associated visitors. Uptake of direct business opportunities will depend on the degree to which new businesses are started in response to project supply requirements and on the revitalization of the AttFN economic development corporation. There have been recent initiatives in Attawapiskat to form joint ventures with, for example, catering, road construction, and maintenance suppliers from outside the area.

Indirect and induced economic effects will occur, additional to the direct affects described above. With the direct economic benefit created by the project, individuals and businesses will be spending more on local goods and services, in turn creating more employment, and perhaps more small businesses, as people in the community organize to provide additional goods and services demanded by others with new disposable income.

Finally, there is some concern that attractive employment and induced economic effects will create inflationary pressures, first on wages and then more broadly in the local economy. While unemployment is high in Attawapiskat, the absolute number of the employable unemployed is not large relative to the project's requirements. Inflationary pressures are most likely to affect low income households that are dependant on fixed sources of income (old age pensions, social welfare programs, etc.).

Education and Training

Education and training initiatives are intended to enhance the potential positive employment benefits of the project by increasing the capacity of the Attawapiskat population to participate in employment opportunities, as well as to encourage the younger generation to prepare for employment, either with the mine or in the broader economy, over the longer-term. Education and training initiatives will be designed using data collected as part of a human resource inventory recently conducted by the Mushkegowuk Council (MC). The data indicate strong interest in accessing training in areas of high value to large mines, including administration and secretarial work, computers, heavy equipment operation, and trades. A training centre has already been constructed in Attawapiskat, completed in November 2003 and handed over to the AttFN. A larger second phase training centre is planned for Attawapiskat in later project stages.

[1] Population estimates for the community of Attawapiskat do not agree and reported participation rates do not take account of what are expected to be a large number of workers who are discouraged as a result of the poor economic opportunity in the community. Accurate labour force figures are therefore difficult to determine.

Cultural challenges constrain success when residents travel outside to attend school. Employment opportunities are few, outside the project, for those that obtain training and do not choose to leave the community.

Income

Income effects of the project were estimated on the basis of projected employment by the project and wage levels, relative to the base case as represented by data from Statistics Canada. It is noted that although methodologies and assumptions used in the CSEA itself, as opposed to those used in the economic modelling of economic impact (included as an appendix to the CSEA), are quite different, results of the two exercises are comparable.

Direct, indirect and induced employment and business creation by the project represents both increased income to individuals and their families, and by extension increased income and economic growth at the level of the community as a whole.

Based on projected employment rates of Attawapiskat residents (estimated at 100 to120 over the construction phase and about 75 initially during the operations phase), the project wage bill for residents of Attawapiskat could potentially reach between $3 and $4 million annually. This is based on an average wage of $40,000 for less skilled positions. An average annual wage of $40,000 compares very favourably to average individual earnings in the community of under $17,000, and to average full time earnings of under $29,000, as reported by Statistics Canada for the year 2001. With indirect and induced employment creation, the expectation is that the increase in total wages paid in the community will be greater than $4 million, representing an increase in average household income and in real gross domestic product of Attawapiskat in excess of 25% over the base case without the project. Over the life of the project, levels of employment and wage rates would be expected to increase, and both average household income and the economy as a whole will be in the order of 20 to 25% larger than without the Project.

Increased income can have negative effects at the individual and family level, and these can spill over into negative community effects.

Although increased incomes generally produce socio-economic benefit, there are also potential downsides, experienced at the individual, household and community levels. Essential to realizing the positive benefits of increased income is the capacity to manage that income in the interests of the household. There can be an association between increased disposable income and poor choices, such as increased gambling and use of drugs and alcohol. It is possible not only to spend income unwisely, such that potential benefits are not achieved, but also to spend it in ways that cause harm. Substance abuse harms individuals and their families, and in addition is the source of negative behaviour that harms the community as a whole.

Steady employment and the wages paid to a portion of the community will contribute to an income gap within the community, increasing inequity. Not all residents will be able to benefit from either the direct, indirect or induced Project-related employment. For the particularly disadvantaged, many of whom may be on relatively fixed incomes, the potential for inflation can exacerbate this effect. The widening of income distribution also has some potential to create social conflict.

Migration

In-migration of non-Aboriginals to Attawapiskat is not expected to occur, given that the project will be constructed and operate as fly-in, fly-out and there will be no incentive for workers to permanently relocate. The AttFN is also able to control in-migration of non-Aboriginals to Attawapiskat. Efforts will be made to ensure that project-related jobs in Attawapiskat will be taken up by community members where skills and experience are available. For the small number of workers (less than 30) that may be temporarily accommodated in Attawapiskat in connection with construction of the transmission line and the winter roads, rotational schedules and/or short assignments, with long work days and provision of all reasonable needs by De Beers, will limit contact with the resident population.

The project may, however, have some potential to draw home some of the almost 45% of the AttFN population that presently live off reserve. Many of these individuals are presently resident in Moosonee, Timmins, Cochrane and North Bay, and in other James Bay coastal Cree communities. These towns are experiencing their own economic stress and consequently comparatively high unemployment rates relative to the rest of Ontario. Migration into Attawapiskat by off-reserve AttFN members may generate both negative and positive impacts on the local economy and social organization, depending on the numbers, skill sets, behaviours, employment expectations and family status of migrants. The return of project employable family members can benefit family welfare, and the return of entrepreneurial-mined individuals can contribute to the local economy through business start-ups. However, current off reserve members may obtain jobs that would otherwise go to present Attawapiskat residents, compete for social services, put pressure on local supplies of goods and services (particularly housing) that could be inflationary, contribute to drug and alcohol problems, compromise public health and security, and undermine traditional values.

On the other hand, experience at Musselwhite suggests that employment and income created by the project, and the fly-in, fly-out nature of the operation, may motivate residents of Attawapiskat to move out of the community, into large communities in the region that are perceived to have more to offer in terms of quality of life. With comparatively large Cree populations in Timmins for example, it is possible to achieve better access to services while still remaining a part of an Aboriginal group, with access to elements of traditional life. While out-migration may benefit the individuals involved, Attawapiskat needs employment for residents, with the induced economic benefit that occurs when people spend their money locally.

Social Services and Infrastructure

Increased employment and business opportunities will result in increased income, a measure of economic security, capacity building that will contribute to employability over the long-term, and improved self image of employees and their families. Training initiatives should have similar effects. Improved well-being should reduce dependence on government transfers and relieve pressures on social service delivery, that is reduce demand for these services. Net out-migration would have a similar effect. Concurrently, payments to the AttFN may be used to improve social service delivery, in effect increasing supply.

Increased income may result in some increased demand for community services that have costs associated with them, for example recreation services[2]. Negative effects of increased incomes and net in-migration can increase demands on social services, already in short supply. Any increase in intergenerational, intra family or community conflict induced by social change can manifest itself in increased demand for social services. There may also be a need to consider the monitoring of outsiders attracted by the new income of employees.

Overall Social Change

Given the range of potential effects described in this section, there will be a number of forces at work on the social fabric of Attawapiskat that will result in very substantial overall social change. This in turn implies management and adaptation challenges if the positive potential of this change is to be maximized.

The extent to which individuals will be able to access employment, business, education and training opportunities will vary, potentially setting up inequity, and household and community conflict. Although well-managed prosperity is generally associated with all manner of improvements in quality of life, and although mechanisms can be created to share this prosperity, this does not always occur. Increased AttFN income can contribute somewhat to equalization of benefits across the whole community of the project, through improved services and safety nets for the more vulnerable. Any high levels of migration will change the character of the community. If there is net in-migration, this can contribute to economic and social vitality, but also has potential to contribute to social conflict, public health and security challenges and/or already significant social problems such as those due to the lack of housing. Net out-migration, particularly of those who are – or become – the more economically successful, is likely to have a negative impact on the people who remain. The retention of traditional skills and values is also a very large component to consider in the management of social change, as discussed above. There is potential for both weakening and for strengthening the traditional skills and values that are integral to individual and community well-being.

The project has the potential to result in increased inter and intra-community conflict and security issues, and substance(s) abuse, flowing from income disparity, inflationary pressures and potential in-migration of current non-resident community members.

A follow-up program could potentially be set up through the cooperative efforts of the First Nation, De Beers and the federal government to monitor the effects of the proposed project on the health of community members to determine whether project related activities and related social change are contributing to an increased health risk to local residents through increased inter and intra-community conflict, security issues, and substance abuse.

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[2] While most recreational facilities are provided free of charge, participating in recreation may imply equipment, clothing and other associated costs.

It is anticipated that the First Nation and government will actively participate in the sharing of information that will help to prevent or mitigate unintended social change.

Public Health and Security

Potential public health and security concerns are related to poor choices in the face of increased disposable incomes and consequent ripple effects, health effects of net in-migration and contact with out of area mine workers, behaviours of mine workers and others who will travel through Attawapiskat, and health and safety of mine workers resident in Attawapiskat. To the extent that social services are unable to meet any increased demand for services as a result of these potential project effects, public health and security could potentially be further compromised.

It is of concern to the people of Attawapiskat that out-of-area workers, some of whom may be migrants who chose to reside in Attawapiskat, are a potential source of disease. Workforce management best practice will be implemented to limit the potential for contact between workers and local populations. The out-of-area workforce stationed in Attawapiskat, and linked to the development of access and power supplies for the project, is expected to be not that different in scale from workforces that have been based out of the community on previous occasions. Such workforces appear not to have led to important health or security stresses in the community in the past.

Additional disturbances could be caused by outsiders attracted by new opportunities to profit from illicit activities within the community, or by worries related to the presence of unwanted visitors in the community. As indicated by a recent case study in a Cree community on the eastern coast of James Bay, increased security concerns related to the presence of outsiders in the community can lead people to start locking their doors.

Health and safety of workers is subject to both legislation and De Beers' commitment to best practice. De Beers has introduced a safety management system that is compatible with OHSAS 18001.

Irrespective of the rigour with which traffic, health and safety, workforce management, public education, and other relevant measures are implemented and enforced by De Beers, the risks to public health and security remain.

Closure

The active closure phase of the project is projected to last over a three-year period, as reclamation activities are completed. During this phase, expenditures for labour, goods and services will be reduced compared with the operations phase. Further, at the end of the three-year closure phase, all expenditures, with the possible exception of limited employment related to environmental aspects and monitoring, will end.

This has the potential to cause economic and associated social dislocation. Unemployment, businesses' struggle to succeed, the end of payments to the AttFN, potential accelerated out-migration of now more employable residents, and the consequent social problems at the family and community level, are real. Preparation for closure, however, begins at the earliest stages of project development, with the integration of sustainable development principles in all mitigation and enhancement measures presently under negotiation with the AttFN. The effects of a 20 year experience of working and training with the project, for both labour and business, will extend beyond the life of the mine. But closure will bring about a reversal of many of the financial flows into the community and households, unless there are replacement opportunities. Currently, there more than ten companies carrying out exploration for diamonds in the region. A trained Attawapiskat workforce and business community would be in a favourable position to take advantage of any opportunities created by new projects.

Other James Bay Coastal Cree Communities

Local Economy

With regard to business and employment, as discussed earlier, the IBA agreement between De Beers and the AttFN provides for priority being given to residents of Attawapiskat. There is an expectation that the largest percentage of these jobs will be taken up by residents of Attawapiskat. However, there are a number of factors that suggest that some employment and business opportunities will also be available to residents of the other communities. Business opportunities and indirect economic effects will create alternative employment for residents of Attawapiskat, some of whom may not choose to work on rotational jobs, with all that these imply for family life. There will also be a large number of more highly skilled jobs available that residents of the other James Bay coastal Cree communities, with a larger total population and more diverse skill levels, may be better able to access. There will be employment and business opportunities in Moosonee in relation to movement of goods, and in Kashechewan, Fort Albany, and Moose Factory in relation to construction of the power line, annual construction and maintenance of the winter road, and to movement of goods along that road.

It is not possible at this time to estimate the distribution, or value, of employment and business opportunities across the other James Bay coastal Cree communities, but these are not expected to be large in any particular community. Workforce and business capacity constraints are similar to those in Attawapiskat. Thus with few exceptions the residents of these communities will be competing for the same opportunities that AttFN members will be given priority to access. Construction jobs associated with the power line will be short-term. Seasonal road construction is also short-term employment. Nor will any indirect and induced economic benefits be substantial. It is, however, De Beers' intention to maximize Aboriginal participation in the project to the extent practical, including that of residents of the James Bay coastal Cree communities, both in relation to De Beers' employment and contracting, as well as that of their subcontractors.

Residents of other James Bay coastal Cree communities who do obtain employment with the project will benefit from on-the-job training that targets both skill upgrading towards improved job performance and promotion, as well as towards broadening skill bases that are transferable.

Closure effects, aside from on those individuals affected, will not be as pronounced as they are likely to be for Attawapiskat, again because the rate of economic participation in the Project will be proportionately less.

Aboriginal Community

For individuals who do benefit economically from the Project, through employment and/or business opportunities, the potential negative effects and benefits of increased income are the same as those discussed for Attawapiskat.

Substantial migration, into or out of the other James Bay coastal Cree communities, is considered unlikely, insofar as these communities are remote from the Project site and will not see, relative to their populations, significant levels of employment. There may be some potential for return to these communities of off reserve members, to take up employment and/or business opportunities. Provided housing can accommodate returning residents, this type of migration is potentially of benefit, particularly to migrants' families.

Health and Security

Threats to public health and security, as described for Attawapiskat, are not likely to occur in the other James Bay coastal Cree communities as income effects, migration, cross-cultural contact and other potential triggers for public health and security effects will not be present in the communities at the scale anticipated for Attawapiskat. Project activity will be restricted to short-term construction that is not quantitatively different from what occurs on an annual basis without the project.

Physical Infrastructure

The construction of the power line will add redundancy and thus improve reliability of electricity service. De Beers' participation in the annual construction of the winter road will be to upgrade the road, whose condition presently varies from year to year. Some concerns were expressed early in the winter season of 2004/2005 regarding continued use of the coastal winter road by local people, once upgrades were undertaken to better facilitate De Beers' use of the road. The concerns stemmed from misunderstandings regarding road use and priorities, which have since been clarified.

There will, however, be increased traffic on the James Bay winter road, representing potential increased risks to public health and safety and disturbance. Victor traffic is expected to be limited mainly to 4 to 6 convoys of 5 to 6 trucks per day during the project construction phase, each way; and to about 2 convoys of 4 to 5 trucks per day during project operations.

Upgrades to the road to mitigate these risks will also, of course, reduce hazards and disturbance from non-Project related traffic, which represents the majority of use. However, additional disturbances could be caused by outsiders attracted by new opportunities to profit from illicit activities within the community, or by worries related to the presence of unwanted visitors in the community. As indicated by a recent case study in a Cree community on the eastern coast of James Bay, increased security concerns related to the presence of outsiders in the community can lead people to start locking their doors[3].

Construction of the power line and the upgrading of the coastal winter road will have temporary effects on air quality (noise) in the concerned coastal communities. Construction in particular is noisy and visually unappealing.

Non-Aboriginal Communities and the Regional Economy

Regional Economy

The Proponent's analysis of the economic impact of the project in northeastern Ontario and Ontario as a whole is summarized in the Table F-1.

TABLE F-1
AVERAGE ANNUAL INCREASE IN SELECTED KEY INDICATORS OVER PROJECT LIFE

	Northeastern Ontario		Province of Ontario
		% increase	
Real GDP, 2003 $	245,400,000	1.6	397,700,000
Consumer expenditures	35,000,000	0.4	117,300,000
Business investment	95,000,000	3.7	125,700,000
Government investment	1,200,000	0.8	3,300,000
Government goods and services	20,800,000	0.8	44,400,000
Other net expenditures	93,400,000	n/a	107,700,000
Jobs	1,500	0.8	3,200
Population	2,876	0.8	6,407

Real GDP increases represent 1.6% and .06% increases for the region and province respectively. The Center for Spatial Economics (C4SE) Ontario regional economic modelling system (the model) predicts an increase in population, as well as a consequent increase in government expenditures on investment, goods and services. The model indicates that the regional GDP increase of 1.6% over the life of the Project represents on average an annual contribution of $245 million. Business investment is projected to increase substantially in the region.

The non-Aboriginal communities that are expected to be most affected by development of the project are Timmins, as the regional mining centre; and Cochrane, because of its rail link to Moosonee. The economic effects in both communities are primarily related to increased

[3] Vincent Roquet & Associates Inc. (2001) for Hydro-Québec and the Cree Nation of Wemindji. Post-project assessment of socio-economic impacts of a permanent access road to the James Bay Cree community of Wemindji. Participatory appraisal of social, economic and land use impacts from 1996 to 2000 (Final Report produced in English and in French).

employment, opportunities for the supply of goods and services, and consequent contributions to community economic health. The need to expand employment, as one means to address the out-migration of the community's youth, is central to Timmins' strategic thinking for economic development, and building on existing expertise in mining is one area of sector focus. It is expected that Timmins could see some in-migration as a result of the project, in addition to its share of the general population increase predicted by the model. As a fly-in, fly-out operation, long-term employment offers the possibility for living in this larger urban centre (with its better education, health and recreation opportunities). Given recent aging and shrinking of the Timmins population, such in-migration should be considered an additional potential benefit, although numbers would be small relative to a population of over 40,000.

Mining Industry as a Viable Economic Activity (Timmins)

Mining is important to the economy of particularly Timmins, directly and indirectly employing up to 3,000 people in a labour force of about 20,000. The project will provide employment and procurement opportunities to people who, experienced in the mining sector, may have been affected by recent reductions in mining activity in the area. Given the preponderance of mining sector suppliers in Timmins, the multiplier effect of the project (indirect and induced job creation) should be accentuated in this community, irrespective of the number of direct employment results from the project.

Human Capital

Development of the VDP has the potential to improve capacity within the James Bay coastal Cree communities, and especially within the community of Attawapiskat, through employment, development of Project-related businesses and education and training programs. During the advanced exploration program, the Proponent reported that the AttFN enjoyed significant employment at the Victor site, with community members making up to 40% to 50% of the site workforce. Participants in this effort have received valuable on-the-job training that has contributed to overall life-skills development and of course potential employment with the operations and construction phases of the project.

There is also the recognition that the skills applied to mining are diverse and that the acquisition of these skills by Aboriginal peoples contributes to their sustainable development. Mining sector skills include heavy equipment operation and maintenance; accounting, clerical work, and administration; heavy and light construction including electrical, plumbing, mechanical, framing, carpentry; cooking and catering; environmental studies; health and safety training; engineering, computers and information technology; and maintenance work. These skills are not unique to mining, but are transferable to a broad range of other employment. The project will also identify opportunities for business partnerships with the First Nations.

The potential for the Project to enhance the quality and sustainability of local human capital is therefore an important consideration, especially for the community of Attawapiskat.

Provincial and Federal Economies

Cumulative effects to the provincial and federal economies are viewed as being complimentary and positive. Over the life of the mine, Project-related revenues that are expected to accrue directly or indirectly to the provincial and federal governments are expected to be in the order of $255 million and $285 million, respectively.